South African Medical Research Council Annual Report 2010-2011

THE SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

Annual Report 2010/2011

BUILDING A HEALTHY NATION THROUGH RESEARCH

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

STRATEGIC OBJECTIVES

The nine MRC strategic objectives are grouped into three categories:

Promoting and conducting research

Promoting and conducting research is the core business and primary strategic objective of the MRC as a knowledge-producing organisation. Without research, the vision of the MRC of 'building a healthy nation through research' cannot be achieved.

1. Research strategy and business plan

Professional support for research

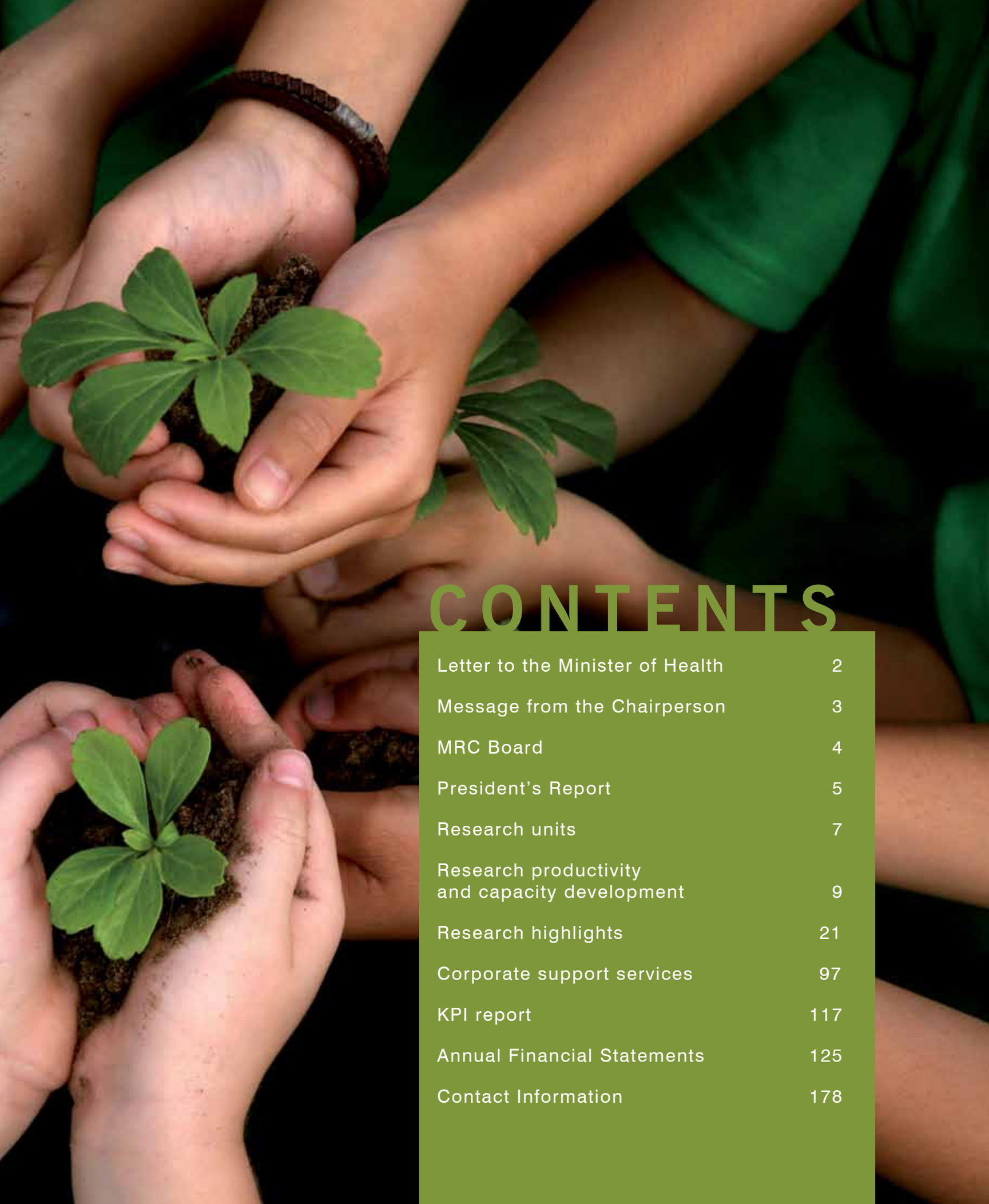
Research cannot take place, and staff cannot develop, unless supported by corporate professional services.

2. Financial model strategy and plan
3. Opportunity and risk management
4. Capacity development
5. Transformation and development

Research translation

Research makes no difference to health and quality of life unless it is translated into interventions such as policy, practice, products and health promotion, which can have an impact on the health and quality of the life of the nation.

6. Innovation management and technology transfer
7. Informatics and knowledge management
8. Research translation
9. Stakeholder management



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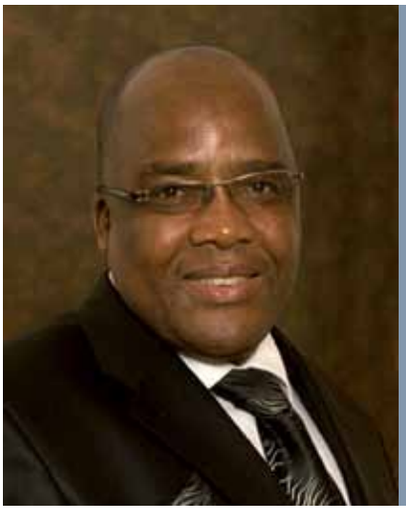


TO THE HONOURABLE MINISTER OF HEALTH

DR AARON MOTSOALEDI

The South African Medical Research Council respectfully submits the Annual Report on its activities from 1 April 2010 to 31 March 2011. The Council acknowledges, and is very grateful for the support received from the Honourable Minister, the Deputy Minister, Director General and officials of the National Department of Health. It thanks the Ministry for its contribution to the MRC's efforts to respond to the health research needs of the nation during the current period, as well as over the past decades. The MRC, via its research portfolio, is able and willing to assist the Honourable Minister in responding to the Negotiated Service Delivery Agreement outcome of A Long and Healthy Life for all South Africans. The Council thanks all of its colleagues in the scientific community for their continued contribution to health research in South Africa. Finally, the Council wishes to state its appreciation for the work of its own members of staff and all the other researchers it supports, and expresses its gratitude for all the advice and guidance received from members of the previous and current MRC Board, committees, evaluation and review panels, and task teams.

Prof. Mazwai
Chairperson of the Board
27 July 2011

Prof. Dhansay
MRC Acting President
27 July 2011

MESSAGE FROM THE CHAIRPERSON OF THE BOARD

This Annual Report represents activities of the South African Medical Research Council from 1 April 2010 to 31 March 2011. The Board took office on 1 November 2010 after appointment by the Honorable Minister of Health, Dr Aaron Motsoaledi. However, the Board is under the competency of the Deputy Minister, Dr Gwen Ramokgopa.

Among major outstanding issues from the previous Board Report was the appointment of a new President/CEO. This was emphasised by the Minister as the priority for the Board. Indeed the Board has preoccupied itself with this elaborate process since February 2011 and the process will be concluded soon.

On induction, the Board concentrated on Corporate Governance financial management issues, guidelines of the King III Report and Key Performance Indicators.

Other matters under consideration by the Board were the presentations of the Deputy Minister, Dr Gwen Ramokgopa, on the Millennium Development Goals (MDGs), the 10-Point Plan and the Negotiated Service Delivery Agreements (NSDAs), which are to be taken into alignment with the three-year Strategic Plan and Annual Performance Plan.

The MRC is planning to hold a stakeholder workshop for a 5–10 year-Strategic Plan in line with the health research needs of the Country's Quadruple Burden of Disease, Lancet Report and the recommendations of the Academy of Science for South Africa (ASSAf) Report. The workshop will also cover some aspects of the SETI Review Report, and a restructuring of the research units in line with a revitalised and transformed Health Research Agenda.

The Chairman would like to thank the Board members, the Executive Committee and staff of the MRC for their support and diligence in tackling some of the challenges at hand.

Finally, I would like to thank the Minister of Health, the Deputy Minister of Health and the Director-General of Health for the enthusiasm that they are injecting into the MRC; and also the support of the Directorate for Public Entities.

Prof. Mazwai
Chairperson MRC Board
27 July 2011

THE BOARD
OF THE MEDICAL RESEARCH COUNCIL

Prof. Lizo Mazwai
(Chairperson)
Specialist General Surgeon
St Mary's Private Hospital, Mthatha

Prof. Zodwa Dlamini
(Vice-Chairperson)
Deputy Executive Dean
UNISA

Dr Kebogile Mokwena
Head of Department: Social and Behavioural Health Sciences
Department of Public Health
University of Limpopo

Dr Nange Lidovho
Legal Adviser to the Vice-Chancellor and Principal
University of Venda

Dr Sibongile Gumbi
Chief Executive
Smart Innovation

Ms Gloria Spelman
Certified Government Auditing Professional
Parliament of the Republic of South Africa

Prof. Charles Feldman
Professor of Pulmonology and Chief Physician
Charlotte Maxeke Johannesburg Academic Hospital and University of the Witwatersrand

Dr Patricia Hanekom
Strategy Consultant

Prof. Edith Vries
Executive Head in the Office of the CEO
Independent Development Trust

Prof. Keymanthri Moodley
Associate Professor of the Bioethics Unit
University of Stellenbosch

Prof. Machaba Sathekge
Chief Specialist Scientist and Head of Nuclear Medicine
University of Pretoria and Steve Biko Academic Hopsital

Dr Lynn Morris
Chief Specialist Scientist
National Institute for Virology

Dr Umesh Lalloo
Dean of Medicine
Nelson R Mandela School of Medicine

THE PRESIDENT'S REPORT

Prof. MA Dhansay

The reporting period for this annual report (2010–2011) has been extremely eventful on personal, governance and research fronts. We experienced the tragic death of the Deputy Minister of Health, the late Dr Molefe Sefularo in April 2010, just as he was about to engage the health research community on plans for the country. The new Deputy Minister for Health, Dr Gwen Ramokgopa, was appointed in November 2010, while the new Director General for Health Ms Precious Matsoso started in her new position in June 2010. We were privileged to have the Deputy Minister of Health address the new MRC Board at its first meeting. She set the scene as to what is expected of the MRC in the context of the performance agreement signed by the Minister of Health with the President, viz. the negotiated service delivery agreements (NSDAs) linked to the outcome of *A Long and Healthy Life for All South Africans.* The MRC's strategy for the next five years has to speak to this.

From the small beginnings in 1969, the MRC has grown into the foremost health research institution in Africa. This is based on the excellence of the MRC's research and the reach that it has nationally and internationally. MRC researchers (10 in all) representing six of our units, played a major role in the seminal publication, *The Lancet Series on Health in South Africa* (Volume 374, Issue 9692, 5 September 2009). The contributing researchers highlighted the many challenges facing the health and health research communities in South Africa, as well as proposing solutions and priorities for a way forward. The MRC and its researchers are committed to playing a meaningful role in addressing these challenges. The series serves as a base for the National Department of Health's plans to address the burden of disease and ill-health facing the country.

While the challenge is to document the value for money of the health research done by the MRC, as a science council, publications remain an important output. A total of 798 peer-reviewed publications were produced during this reporting period, and 95% of the journal articles were in international journals. Thirty-three PhDs graduated from our units, and 117 African PhD students are enrolled among the 302 PhD students in our research units. Our aim is to continue support for high-quality science, but at the same time providing research capacity strengthening to HDIs.

The demography of the 974 employees reflects the face of the nation; 85% of the staff are black (50% of the 974 being African) and 69% of the employees are female. Of our 41 Unit Directors, 18 are black (three of them being Africans) and 14 (34%) are women. The MRC has accepted the challenge of increasing the number of African and women Unit Directors.

Growth in external income reached 53% of the total revenue of R553 million for 2010/2011. Eighty-eight per cent of this external income is in the form of competitive grants and contracts from the world's most prestigious health research organisations, such as the NIH, Centers for Disease Control, the Wellcome Trust, the UK MRC, the Bill & Melinda Gates Foundation, the European Union and the World Health Organisation. This attests to the high quality and

relevance of MRC research in addressing global and national health priorities. The global economic recession appeared not to have an effect on funding during this period; however, the MRC is aware of this risk and is planning for the eventuality.

Translation of MRC research results into policy, practice, products and health promotion has had major impacts on the health and quality of life of South Africans over the past 40 years, and 2010 was no different. The following are examples that illustrate this well: diarrhoeal disease and respiratory infections are major contributors to morbidity and mortality among young children. A rotavirus vaccine and a 7-valent pneumococcal vaccine were introduced as part of the Expanded Programme on Immunisation in South Africa. This was mainly due to the research conducted by the MRC's Diarrhoeal Pathogens Research Unit and the Meningeal and Respiratory Pathogens Research Unit, respectively. The MRC's Cochrane Centre directly informed the WHO antiretroviral therapy guidelines via reviews on Optimal Initiation of ART and Interventions for reducing MTCT of HIV, and which were incorporated in the WHO Rapid Advice in 2010.

Studies show that cardiovascular and metabolic diseases among South Africans are increasing at an alarming rate. This appears to be a world-wide trend and particularly pronounced in developing countries. Heart disease, diabetes and stroke together constitute the second most important cause of death in adult South Africans. As one response to addressing this challenge, the MRC launched its National Collaborative Research Programme (NCRP) in Cardiovascular and Metabolic Diseases, led by Dr Andre Pascal Kengne. As a result of a global 're-awakening' of concern on non-communicable diseases (NCDs), meetings of the UN General Assembly and the National Department of Health are planned for September 2011 – the MRC will be involved in both. The MRC is also part of the Global Alliance for Chronic Disease, which comprises the major funders of health research in the world. NCDs are not just a health issue but are a major concern for development as a whole and need to be combated vigorously.

Surveillance of risky behaviours is important in order to implement interventions early on. The MRC's Health Promotion Research and Development Unit conducted the follow-up to the 2002 Youth Risk Behaviour Survey (YRBS) for the Department of Health, with the results launched in 2010. The target group was youth at schools (more than 10 000 learners) across the country in Grades 8–11. While there were some positive changes in risky behavior compared to the 2002 survey, the areas of contraceptive use, hygiene (hand washing), violence (gang membership), traffic safety, suicidal intent, binge drinking and lack of physical exercise were of concern. Recommendations to address these issues were made, for example, tailoring of sexual education, promotion of sport and recreation programmes, and implementation of comprehensive prevention programmes for tobacco, alcohol and drug use.

With this Annual Report, the MRC heralds the end of the period covered by the MRC's Strategic Plan 2005–2010. The organisation enters the next period in its history with a fresh strategy (2010–2015), a new Board and a new President to be appointed – an exciting and a very challenging time. The SETI Review conducted in June 2010 and its ensuing report, together with the support of our line ministry the Department of Health, the Department of Science and Technology and our collaborators nationally, regionally and internationally, have provided insights into the future direction that the Medical Research Council takes. In striving to execute its mandate, the MRC will no doubt also assist the country in achieving the MDGs by 2015. Alignment of its research priorities with the health priorities and disease profile of the country is paramount. The emphasis is on tangible outcomes that impact on the lives of all South Africans.

Prof M A Dhansay
Acting President: MRC
27 July 2011

MRC RESEARCH UNITS
LISTED ACCORDING TO HEALTH PRIORITIES

RESEARCH PRIORITIES	RESEARCH UNITS
HIV and AIDS	HIV Prevention Research Unit South African AIDS Vaccine Initiative
TUBERCULOSIS	Tuberculosis Epidemiology and Intervention Research Unit Clinical and Biomedical Tuberculosis Research Unit Molecular Mycobacteriology Research Unit Centre for Molecular and Cellular Biology
CARDIOVASCULAR DISEASE AND DIABETES	Chronic Diseases of Lifestyle Research Unit Inter-university Cape Heart Research Unit Exercise and Sports Medicine Research Unit
INFECTIOUS DISEASES	Immunology of Infectious Diseases Research Unit Diarrhoeal Pathogens Research Unit Inflammation and Immunity Research Unit Respiratory and Meningeal Pathogens Research Unit Malaria Research Unit
CRIME, VIOLENCE AND INJURY	Safety and Peace Promotion Research Unit
CANCER	Cancer Epidemiology Research Unit Programme on Mycotoxins and Experimental Carcinogenesis (PROMEC) Oesophageal Cancer Research Unit Oncology Research Unit
PUBLIC HEALTH	Burden of Disease Research Unit Biostatistics Research Unit South African Cochrane Centre Health Policy Research Unit Health Systems Research Unit Rural Public Health and Health Transition Research Unit
HEALTH PROMOTION	Alcohol and Drug Abuse Research Unit Health Promotion Research and Development Unit
WOMEN, MATERNAL AND CHILD HEALTH	Gender and Health Research Unit Mineral Metabolism Research Unit Maternal and Infant Health Care Strategies Research Unit
NUTRITION	Nutritional Intervention Research Unit
BRAIN AND BEHAVIOUR	Anxiety and Stress Disorders Research Unit Medical Imaging Research Unit
GENOMICS AND PROTEOMICS	Bioinformatics Capacity Development Research Unit Bone Research Unit Human Genetics Research Unit Human Genomic Diversity Research Unit Receptor Biology Research Unit
ENVIRONMENT AND HEALTH	Environment and Health Research Unit
SOUTH AFRICAN TRADITIONAL MEDICINE	Drug Discovery and Development Research Unit Indigenous Knowledge Systems Research Unit

FACT: Breast milk contains all the nutrients that babies need during the first few months of life, and it also contains agents that protect against common childhood illnesses such as diarrhoea and respiratory infections.

Research productivity and capacity development 2010/2011

Research productivity and capacity development 2010/2011

*Doctoral students registered: The figure of 302 as per the 2010/2011 KPI Report on page 119 of the Annual Report denotes specific information from the universities that we were able to obtain.

**Doctoral students graduated: The figure of 33 as per the 2010/2011 KPI Report on page 117 of the Annual Report denotes specific information from the universities that we were able to obtain.

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
HIV Prevention Research Unit					
8	1 Unit Director 1 Division Manager 1 Senior Specialist Scientist 1 Chief Specialist Scientist 1 Specialist Scientist 12 Senior Scientists 9 Scientists 6 Senior Officers 5 Chief Officers 3 Officers 15 Pharmacists 20 Clinicians 1 Clinical Manager 1 Laboratory Manager 2 Office Managers 2 Research Project Leaders 61 Senior Research Technologists 16 Chief Research Technologists 30 Research Technologists 63 Senior Research Technicians 1 Receptionist 18 Drivers	6	1	1	1
South African AIDS Vaccine Initiative					
9	1 Director 5 Divisional Managers 8 Principal Investigators 5 Co-investigators 5 Chief Officers 3 Senior Research Officers 2 Quality Management Officers 5 Study Coordinators 4 Project Managers 1 Regulatory Manager 1 Research Associate 2 Research Nurses 1 Pharmacist 2 Social Scientists 13 Senior Research Technologists 1 Research Technologist 1 Equipment and Safety Officer 3 Laboratory Technicians 6 Facilitators/Counsellors 2 Data Capturers 14 Administrative/Finance Officers 1 Driver 1 Housekeeper 1 IT support	2		3	1

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Tuberculosis Epidemiology and Intervention Research Unit					
18	1 Interim Unit Director/Specialist Scientist 1 Specialist Scientist 2 Senior Scientists 2 Scientists 4 Senior Research Technologists 4 Chief Research Technologists 4 Research Technologists 5 Senior Research Technicians 1 Senior Laboratory Assistant 2 Support Staff	1	0	1	0
Clinical and Biomedical Tuberculosis Research Unit					
12	1 Unit Director 3 Chief Senior Specialist Scientists 2 Chief Scientists 5 Senior Scientists 14 Senior Researchers 4 Data Clerks 3 Field Workers 6 Drivers 3 Senior Support Staff 2 Counsellors/Drivers 1 Administration Assistant 2 Drivers	10		4	
Molecular Mycobacteriology Research Unit					
7	1 Unit Director 4,5 Senior Medical Scientists 3,5 Postdoctoral Fellows 1 Research Technician	5	1	3	0
Centre for Molecular and Cellular Biology					
12	1 Unit Director 3 Chief Specialist Scientists 2 Senior Specialist Scientists 2 Scientists 1 Senior Research technician 2 Research Interns 1 Research Assistant	20	5	24	2
Chronic Diseases of Lifestyle Research Unit					
6	1 Interim Manager/Senior Scientist 1 Senior Scientist 1 Scientist 1 Chief Research Technologist 2 Senior Chief Research Technologists 1 Senior Technician 1 Senior Administration Officer	5	2	4	1
Inter-university Cape Heart Research Unit					
Cardiovascular					
	1 Professor 1 Specialist Scientist 2 Senior Lecturers 1 Chief Research Officer 1 Scientific Officer 5 Technical Officers 2 Support Staff	2	2	11	0

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Lipidology					
	1 Medical Director 2 Part-time Officers 1 Postdoctoral Intern 1 Scientist 2 Laboratory Technologists 1 Nurse 2 Sonographers 1 Secretary 1 Laboratory Assistant	0	0	1	0
Hatter Heart Research Institute					
	1 Professor 1 Emeritus Professor 1 Associate Professor 1 Scientist 2 Research Assistants 3 Support Staff	3	1	6	1
Stellenbosch University Division					
	1 Professor 1 Senior Lecturer	6	2	3	1
Exercise Science and Sports Medicine Research Unit					
119	1 Unit Director/Professor 4 Professors 2 Associate Professors 1 Chief Specialist Scientist/Associate Professor 1 Specialist Scientist 1 Senior Lecturer 1 Lecturer 2 Researchers 5 Senior Research Officers 2 Senior Scientific Officers 7 Postdoctoral Research Fellows 1 Research Assistant 1 Technical Officer 1 Information Officer 1 Finance Officer 2 Senior Secretaries 1 Departmental Assistant 1 Personal Assistant 1 Administration Assistant 1 Secretary/Receptionist	47	5	21	1
Immunology of Infectious Diseases Research Unit					
13	1 Unit Director 4 Senior Researchers 6 Postdoctoral Fellows 3 Research Assistants 5 Technical Support Staff 2 Administration Support Staff	5	1	15	4

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Diarrhoeal Pathogens Research Unit					
16	2 Unit Co-directors 1 Deputy Director 1 Medical Scientist 1 Part-time Lecturer 1 Controller Medical Technologist 3 Research Assistants 4 Research Interns 1 Senior laboratory Assistant **Contract staff:** 1 Financial Manager 1 Vaccine Coordinator 1 Secretary 1 Laboratory Assistant 3 Health-care Workers 1 Nurse 2 Drivers	6	3	4	1
Inflammation and Immunity Research Unit					
6	1 Director 3 Senior Specialist Scientists/Advisors 5 Senior Researchers	5	1	8	0
Respiratory and Meningeal Pathogens Research Unit					
18	2 Unit Co-directors 1 Senior Pathologist 1 Senior Medical Officer 3 Senior Scientists 5 Medical Officers 1 Medical Officer/Epidemiologist 1 Postdoctoral Fellow 4 Medical Scientists 2 Medical Scientist Interns 2 Scientists 1 Statistician 2 Laboratory Managers 2 Senior Medical Technologists 4 Medical Technologists 5 Laboratory Technologists 1 Laboratory Technician 1 Junior Medical Technologist 2 Quality Control Managers 1 Study Coordinator 2 Professional Nurses 15 Nursing Assistants 4 Data Clerks 1 Personal Assistant 2 Unit Administrators 1 Research Assistant 1 Student In-service Training	12	2	10	0

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Malaria Research Unit					
7	1 Unit Director 2 Specialist Scientists 2 Senior Scientists 4 Scientists 2 Research Support Managers 2 Senior IT Advisors 3 Chief Research Technologists 2 Senior Research Technologists 1 Research Technologist 2 Senior Research Technicians 2 Research Technicians 2 Senior Encoders 1 Executive Secretary	4	0	3	0
Safety and Peace Promotion Research Unit					
11	2 Unit Co-directors 2 Senior Specialist Scientists 1 Specialist Scientist 2 Senior Scientists 2 Scientists 1 Senior Research Technician 2 Senior Officers 5 Research Interns 8 UNISA Research Staff	2	2; 6 completed internships	14	1
Cancer Epidemiology Research Unit					
7	1 Interim Manager/Senior Medical Scientist 1 Senior Medical Scientist 1 Medical Scientist 1 Project/Study Manager 2 Nurses/Interviewers 1 Data Coding and Capture Clerk 1 Laboratory Aide 1 Administration Assistant	0	0	0	0
Programme on Mycotoxins and Experimental Carcinogenesis					
52	1 Unit Director/Chief Specialist Scientist 2 Chief Specialist Scientists 2 Specialist Scientists 4 Senior Scientists 1 Chief Officer 2 Senior Research Technologists 1 Research Technologist 2 Senior Researchers	3	0	13	1
Oesophageal Cancer Research Unit					
7	1 Unit Director 1 Senior Lecturer 2 Research Associates 2 Postdoctoral Fellows 1 Research Technician 1 Research Nurse	4	1	8	2

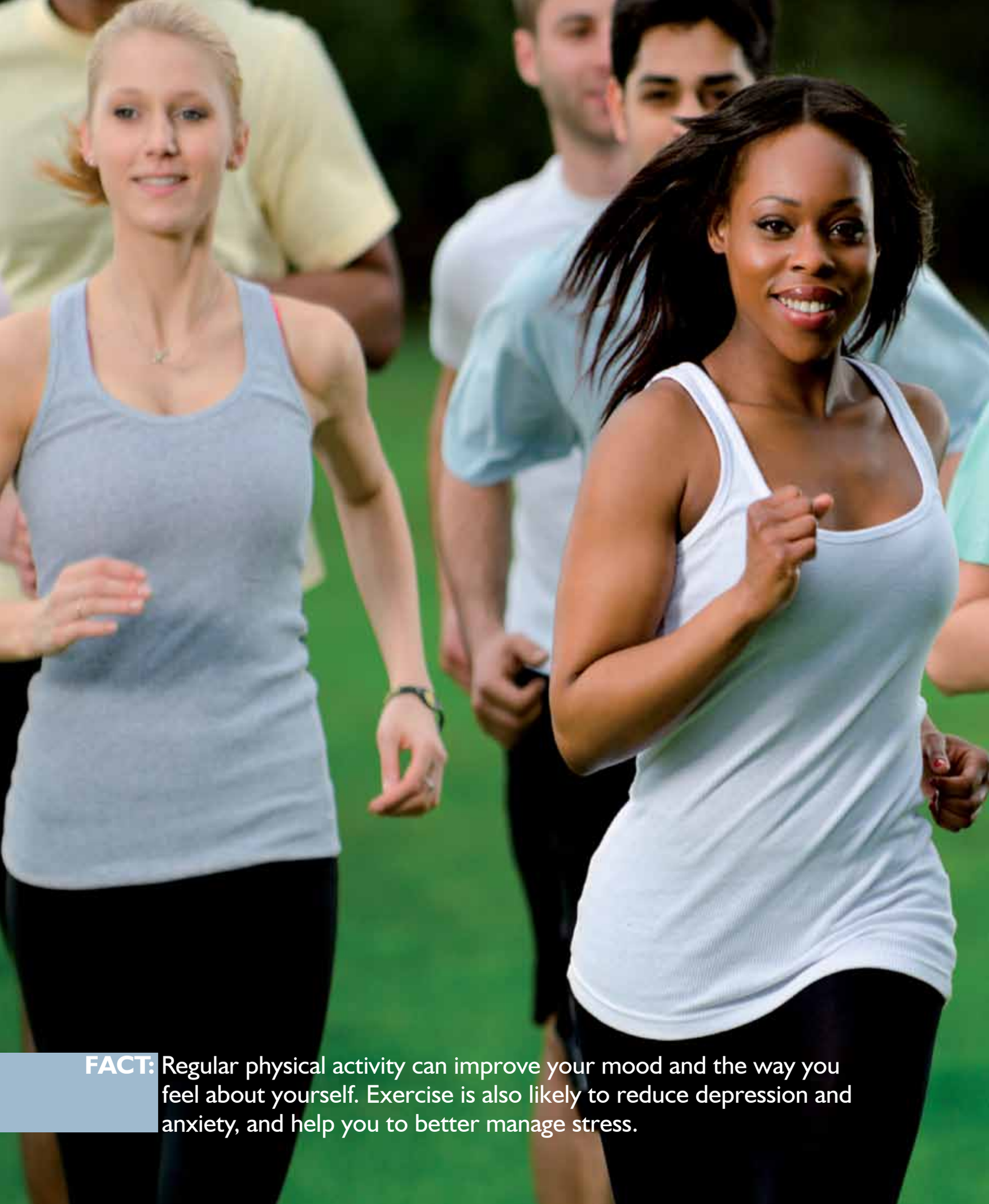
Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Oncology Research Unit					
8	1 Unit Director 1 Specialist Scientist 1 Scientist 3 Senior Research Technologists 1 Research Intern	4	2	3	0
Burden of Disease Research Unit					
8	1 Unit Director 3 Chief Specialist Scientists 1 Specialist Scientist 2 Scientists 1 Junior Scientist 2 Research Interns 1 Chief Officer	2	0	6	0
Biostatistics Research Unit					
89	1 Unit Director 2 Chief Specialist Statisticians 4 Specialist Statisticians 2 Senior Statisticians 4 Statisticians 1 Junior Statistician 1 Statistician Intern 1 Senior Officer 2 Senior Encoders 1 Data Encoder 1 Executive Secretary	1	1	0	1
South African Cochrane Centre					
8	2 Unit Co-directors 1 Senior Specialist Scientist 2 Senior Scientists 1 Biostatistician 1 Scientist 1 Chief Officer 1 Senior Officer 2 Consultants	8	1	3	0
Health Policy Research Unit					
13	1 Unit Director 3 Senior Researchers 8 Research Officers 1 Administrative Secretary 1 Administrative Assistant 1 Finance Officer 1 Senior Administrative Officer 1 Communications Officer	19	2	19	2

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Health Systems Research Unit					
15	1 Unit Director 1 Unit Director 1 Chief Specialist Scientist 1 Senior Specialist Scientist 4 Specialist Scientists 8 Senior Scientists 6 Scientists 1 DST Research Intern 3 Chief Research Technologists 11 Senior Research Technologists 5 Research Technologists 2 Senior Research Technicians 35 Research Technicians 3 Chief Officers 1 Senior Officer 2 Junior Officers	6	2	10	1
Rural Public Health and Health Transition Research Unit					
	1 Unit Director 1 Senior Specialist Scientist 3 Senior Researchers 3 Scientists 1 Senior Data Specialist 2 Data Specialists 5 Data Typists 3 Quality Controllers 6 Field Team Supervisors 32 Field Workers 5 Senior Support Staff 1 Administrator 1 Accountant 2 Secretaries 1 Personal Assistant 1 Maintenance Officer 1 Finance Clerk 1 HR Officer 1 Line Officer 1 Receptionist 5 Drivers 3 Cleaners	6	0	18	3

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Alcohol and Drug Abuse Research Unit					
24	1 Unit Director 1 Deputy Director 1 Specialist Scientist 6 Senior Scientists 4 Scientists 2 Junior Scientists 1 Chief Officer 2 Senior Officers 1 Project Coordinator 1 Part-time Research Coordinator 3 Chief Research Technologists 4 Senior Research Technologists 1 Research Technologist 4 Senior Research Technicians 1 Research Technician 1 Administrative Assistant 1 Data Collector 2 Consultants	1	1	5	2
Health Promotion Research and Development Unit					
	1 Unit Director/Chief Specialist Scientist 2 Specialist Scientists 4 Senior Scientists 1 Scientist 1 Chief Administrative Officer 1 Senior Administrative Officer 4 Junior Scientists 2 Senior Research Technologists 2 Research Technicians 1 PhD Intern 2 DST Interns 2 Health Educators 1 Junior Officer	1	1	7	4
Gender and Health Research Unit					
21	1 Unit Director 1 Senior Specialist Scientist 1 Research Support Manager 3 Senior Scientists 1 Scientist 1 Chief Research Technologist 1 Research Technologist 1 Research Intern 1 Secretary	4	1	10	1
Mineral Metabolism Research Unit					
3	1 Unit Director 1 Clinical Scientist 1 Scientist 1 Postdoctoral Fellow 2 Research Assistants			3	1

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Maternal and Infant Health Care Strategies Research Unit					
28	1 Unit Director 1 Lecturer 1 Senior Researcher 3 Researchers 1 Maternal Foetal Consultant 6 Specialist Scientists 13 Research Assistants 2 Medical Officers 1 Project Manager 2 Assistants 3 Data Collectors	9	5	2	1
Nutritional Intervention Research Unit					
15	1 Interim Unit Director/Chief Specialist Scientist 1 Chief Specialist Scientist 3 Senior Specialist Scientists 3 Senior Scientists 1 Chief Officer 6 Research Technologists 8 Research Technicians 1 Senior Secretary	2		1	
Anxiety and Stress Disorders Research Unit					
7	1 Unit Director 4 Project Leaders 2 Research Assistants 4 Psychologists 1 Administrator 1 Psychiatrist	2	0	13	2
Medical Imaging Research Unit					
15	1 Unit Director 1 Emeritus Professor 1 Associate Professor 1 Lecturer 2 Senior Researchers 2 Part-time Senior Researchers 2 Postdoctoral Fellows 1 Part-time Research Engineer 1 Part-time Research Radiographer	25	7	8	
Bioinformatics Capacity Development Research Unit					
16	1 Interim Director 1 Associate Professor 3 Senior Lecturers 1 Systems Administrator 2 Developers 1 Receptionist 1 Personal Assistant 1 Human Resources Administrator 1 Finance Administrator 1 Student Administrator	5	1	13	1

Number of projects	Staff	Masters students		Doctoral students	
		Registered	Graduated	Registered	Graduated
Bone Research Unit					
4	1 Unit Director 3 Specialist Scientists 1 Senior Scientist 2 Chief Research Technologists 1 Financial Officer	0	0	2	0
Human Genetics Research Unit					
5	1 Unit Director 1 Head: Molecular Genetics 1 Senior Specialist Scientist 1 Clinical Geneticist 1 Research Associate 1 Senior Medical Technical Officer 1 Scientific Research Officer 1 Project Leader 1 Contractual Genetic Counsellor 1 Postdoctoral Fellow 1 Senior Technical Officer	6	3	5	0
Human Genomic Diversity and Disease					
3	1 Unit Director 5 Researchers/Scientists	2			1
Receptor Biology Research Unit					
14	3 Unit Co-directors 4 Senior Researchers 2 Researchers/Scientists 3 Technical Officers	4		5	
Environment and Health Research Unit					
11	1 Unit Director 2 Senior Specialist Scientists 5 Senior Scientists 1 Senior Officer 1 Research Technician 1 Intern 1 Office Assistant	5	1	9	2
Drug Discovery and Development Research Unit					
3	1 Unit Director 7 Senior Specialist Scientists/Advisors 2 Senior Researchers 1 Technical Officer 1 LC Mass Spectrometer Technician 1 Technical Assistant 1 Financial Assistant 1 Quality Assurance Manager	1	1	18	3
Indigenous Knowledge Systems Research Unit					
13	1 Unit Director 1 Chief Specialist Scientist 1 Senior Scientist 2 Junior Scientists 2 Research Assistants 1 Personal Assistant 9 Research Interns 1 Assistant	6	3	5	1



FACT: Regular physical activity can improve your mood and the way you feel about yourself. Exercise is also likely to reduce depression and anxiety, and help you to better manage stress.

Research highlights

HIV AND AIDS

HIV PREVENTION RESEARCH UNIT

Director: Prof. Gita Ramjee

Mandate

The mandate of the HIV Prevention Research Unit (HPRU) is to address the HIV epidemic in South Africa through HIV prevention, treatment and care research in collaboration with key stakeholders. Research foci are:

- microbicide research
- HIV-prevention technologies, such as the vaginal diaphragm
- HIV vaccine research
- community mobilisation.

The Unit also coordinates the South African Microbicide Research Initiative (SAMRI), which focuses on the accelerated testing of safe and effective microbicides.

Research highlights

The HPRU continues to collaborate with many of the major players in HIV/AIDS prevention research, with its primary focus being microbicide research. The most recent studies completed are the Short Pulse Anti Retroviral Therapy at HIV Seroconversion (SPARTAC), Microbicides Development Programme (MDP) Top-Up and Microbicide Trials Network (MTN) 001 studies.

- The SPARTAC trial compared the effects of two different periods of antiretroviral (ARV) therapy, versus no treatment, in primary HIV infection (PHI).
- The MDP Top-Up study assessed the feasibility of daily dosing with an intravaginal gel and investigated mechanisms by which adherence could be measured.
- The MTN 001 investigation was a phase II safety, acceptability and pharmacokinetic study with a head-to-head comparison of the acceptability of orally versus vaginally applied tenofovir for pre-exposure prophylaxis.

The knowledge gained from these HPRU research studies will not only have a profound impact on clinical HIV-prevention research, but will also provide information on the status of the epidemic in the Ethekwini Metropolitan area (and some areas outside the Metro), which enables responsive local government planning. The participants who enrol

in the HPRU clinical trials are largely women who are not pregnant, which is a demographic that is excluded from the annual national antenatal HIV-prevalence surveys. Hence, the HPRU is able to provide information on the state of the epidemic amongst some of the most vulnerable people in South Africa.

Key community engagement activities undertaken by the HPRU include education, awareness and training, which will hopefully contribute towards safe-sex behaviour change. Women who participate in, or screen, for HPRU clinical trials, receive voluntary HIV testing and counselling, sexually transmitted infection (STI) testing and treatment, and HIV-prevention and safe-sex education. In this way, these trials also contribute towards curbing the HIV epidemic in KwaZulu-Natal through increased health knowledge, HIV testing, safe-sex counselling and condom promotion. This is in addition to the potential impact of any new prevention methods tested.

Capacity development

All staff employed in the Unit receive online good clinical practice (GCP) and human subjects protection training. Topics covered in these training sessions include:

- source documentation and essential documents training
- advanced human subject protection/good clinical practice: investigator responsibilities and federal-wide assurance training
- Division of Acquired Immunodeficiency Syndrome (DAIDS) Policy training: record retention policy
- advanced human subject protection/good clinical practice: Food and Drug Administration (FDA) inspection preparedness
- best practices for implementing the DAIDS clinical quality management plan policy with a focus on key indicators training
- advanced human subject protection/good clinical practice
- working with your Institutional Review Board (IRB): an investigator's guide to improving IRB/European Commission (EC) relations.

Both internal and external protocol-specific training is also provided to staff. Voluntary counselling and testing, and antiretroviral adherence training was provided by the Foundation for Professional Development in within this reporting period.

The MRC provides an induction programme for all new staff, and the HPRU provides research orientation training, during which staff are orientated to the various portfolios, namely pharmacy, clinical, laboratory, basic science, human resources, operations, finance and business management.

During this financial year, 25 staff members from the Unit attended the Microbicides International Conference, which was held in Pittsburgh, USA. Of these staff members, 22 presented posters.

The Microbicides Trials Network regional meeting was held between 4 and 7 October 2010 in Cape Town. The meeting was attended by 34 staff members from the Unit.

The Mucosal Immunity Workshop was conducted at the MRC HPRU in Durban on 1–11 August 2010. There were 25 attendees at various academic levels: one Honours student, six Masters students, eight PhD students, three Postdoctoral Researchers and seven Clinicians. Most of the basic science students (Masters and PhD students) had an immunology/microbiology and molecular biology background, and the Clinicians were infectious disease specialists and obstetricians/gynaecologists, with several of the Clinicians working on the microbicide clinical trials.

The Mucosal HIV/Human Papillomavirus (HPV) Immunity Workshop was recently conducted at the MRC Conference Centre in Cape Town on 17 and 18 February 2011. There were seven attendees at various academic levels: two Masters students, three PhD students,

one Postdoctoral Researcher and one Clinician. Most of the basic science students (Masters and PhD students) had an immunology/ microbiology and biochemistry background; the Clinician was a virology registrar.

Science communication and research translation

The Unit has successfully implemented large clinical trials that involve thousands of women from the community. HPRU clinics and novel research processes have been used as a model for other research sites in Africa that participate in multi-centre trials. Data from clinical trials conducted by the HPRU have been translated into policy briefs for the Department of Health (DoH), which highlight the urgent need for more aggressive HIV/AIDS prevention messages and interventions in communities in KwaZulu-Natal. Researchers at the HPRU published in national and international journals including *AIDS, American Journal of Public Health,* the *Lancet*, the *South African Journal of Science*, and also published scientific reports. HPRU researchers have also presented their study findings at local conferences, such as SA AIDS, and at international conferences including Microbicides. The very successful KZN AIDS Forum has returned to its original home at the HPRU. Established within the Unit about five years ago, this Forum has grown considerably, and is an effective and powerful platform for sharing research topics with various audiences. As part of its community focus, the Unit continues to hold bi-monthly meetings to share research findings with communities and their leaders. Such meetings take place within the communities in which research is conducted, and include presentations from Prof. Ramjee and community representatives.

SOUTH AFRICAN AIDS VACCINE INITIATIVE

Interim Director: Ms Elise Levendal

Mandate

The South African AIDS Vaccine Initiative (SAAVI) was established to coordinate the research, development and testing of AIDS vaccines in South Africa. The programme forms a highly integrated part of the worldwide drive to develop an HIV/AIDS vaccine, and closely collaborates with many other global players in the field, including organisations such as the US National Institutes of Health (NIH), the NIH-funded HIV Vaccine Trials Network, the International AIDS Vaccine Initiative (IAVI), the European Union (EU), the African AIDS Vaccine Programme, the European and Developing Countries Clinical Trials Platform (EDCTP), the Ethiopian AIDS Vaccine Initiative, the Nigerian AIDS Vaccine Programme, and the Botswana Harvard AIDS Institute, as well as international biotechnology companies. Although SAAVI closely collaborates with these and other organisations, it operates

independently, allowing it to pursue its own specific goals and maintain its focus on the needs of southern Africa.

Research highlights

SAAVI's main goal is to coordinate the research, development and testing of HIV vaccines in South Africa in order to produce affordable, effective and locally relevant HIV vaccines.

Based on the findings of two trials (the RV144 trial, which provided the first evidence that vaccine regimens can be designed to reduce HIV infection, and the HVTN 073/SAAVI 102 clinical trial), SAAVI and its collaborators developed a follow-up study protocol, namely the HVTN 086/SAAVI 103 clinical trial. This trial is a phase I placebo-controlled clinical trial, the aim of which is to evaluate the safety and immunogenicity of SAAVI DNA-C2, SAAVI MVA-C and Novartis subtype C gp140 with MF59 adjuvant in various vaccination schedules in HIV-uninfected healthy vaccinia-naïve adult participants in South Africa. The South African MCC recently (20 January 2011) approved an application to conduct this clinical trial. The trial consists of 184 adult participants and is a collaboration between MRC/SAAVI, the Division of AIDS (DAIDS) within the National Institute of Allergy and Infectious Diseases (NIAID) at the USA NIH, and Novartis. The trial has not yet started at the sites.

FACT: Because of AIDS, South Africa's population will be 44% smaller in 2050 than it would have been without the epidemic.

In addition, a phase I placebo-controlled extension to the HVTN 073/SAAVI 102 clinical trial is planned. This study will evaluate the safety and immunogenicity of the Novartis subtype C gp140 vaccine, with MF59 adjuvant, as a boost to the SAAVI DNA-C2 vaccine and SAAVI MVA-C vaccine, in HIV-uninfected healthy adult participants in South Africa and the USA. The protocol has been submitted to the US Food and Drug Administration (FDA) for approval, and if successful, it will be submitted to the MCC.

Three SAAVI-funded trial sites (the Aurum Health Research Institute; Desmond Tutu HIV Centre, University of Cape Town (UCT); and Perinatal HIV Research Unit (PHRU) of the University of the Witwatersrand (Wits)), were able to continue their work after receiving funding from the National Department of Health (NDoH). This included supporting the SAAVI DNA and Modified Vaccinia Ankara (MVA) virus clinical trials, building clinical research and management expertise, implementing training initiatives, and maintaining activities and research in community involvement in clinical research. Further, the HIV Vaccine Ethics Group (HAVEG), University of KwaZulu-Natal, was funded to critically evaluate ethical guidelines that regulate South African stakeholders' responsibilities with regard to informed consent, child participation and community participation in HIV vaccine clinical trials. The grant also supported the operational maintenance of the UCT Vaccine Research Group's (VRG) Good Laboratory Practice (GLP) Facility. This enabled potency testing of the SAAVI DNA-C2 vaccine, which is part of the DNA stability testing for lot release to meet the FDA regulatory requirements. In addition, the MRC Delft Non-human Primate Facility received partial funding, which contributes towards the cost of supporting the UCT VRG's research.

Over the past year, activities increased substantially to support the NDoH of South Africa in implementing a national programme of global response to HIV and AIDS, which is a cooperation between the Governments of Italy and South Africa, and which is funded by the

Italian Ministry of Foreign Affairs, Directorate General of Development Cooperation (MAE-DGCS). The programme is implemented by the National Institute of Health of Italy (*Istituto Superiore di Sanità* or ISS) in cooperation with the NDoH, and is supported by SAAVI. Highlights for the programme included approval and enrolment of 500 participants in the ISS T-004 observational study to assess the sero-prevalence of anti-tat antibodies in HIV-infected patients in areas of Gauteng, the Eastern Cape and Mpumalanga. Preparations are also well under way for implementing the ISS T-003, a phase II clinical trial developed by the ISS, to test a therapeutic vaccine based on the HIV-1 tat protein.

The ISS T-003 trial was approved in early 2011 by the MCC and the health research ethics committees of the participating institutions. The aim of this trial is to test the immunogenicity and safety of the vaccine in HIV-infected people already on ARV treatment. The NDoH has named MRC/SAAVI as the local programme partner to support the ISS in implementing the ISS T-003 activities. The trial will enrol 200 participants, and will be conducted at the University of Limpopo, the Medical University of Southern Africa (Medunsa) Clinical Research Unit (MeCRU) in Garankuwa, Gauteng Province. The Walter Sisulu University HIV Vaccine Research Unit (WSU HVRU) in Mthatha, Eastern Cape, is also envisaged as an additional site.

FACT: The HIV prevalence in South Africa is 18,8%.

Capacity development

During the past year, several SAAVI staff were enrolled in undergraduate and postgraduate studies. All staff at SAAVI-funded trial sites have had short-term training, for example, in good clinical practice and good laboratory practice. In addition, there has been a particular focus on staff orientation and training at sites involved in the programme to support the Ministry of Health of South Africa in implementing a national programme of global response to HIV and AIDS.

SAAVI and SAAVI-funded projects continued to raise awareness and carry out educational workshops with various community stakeholders, thereby building capacity within those groups. A highlight in 2010 was a series of four capacity development workshops with the new Community Advisory Board (CAB) members of the WSU HVRU. These workshops resulted in a series of outreach activities by the CAB to several communities in and around the trial site area, informing them about the HIV vaccine research to take place at the WSU HVRU.

In addition, several staff from SAAVI and SAAVI-funded projects attended and/or presented posters and talks at the following conferences and forums: the International AIDS Society Conference, the AIDS Vaccine Conference and the Conference on Retroviruses and Opportunistic Infections (CROI). Relevant SAAVI Principal Investigators (PIs); the Interim SAAVI Director; the SAAVI Ethics, Legal and Human Rights Advisor; a SAAVI Community Educator from KwaZulu-Natal; and CAB representatives, also attended the 2010/2011 HIV Vaccine Trials Network (HVTN) Full Group Meetings, thereby contributing to discussions regarding HVTN-sponsored trials in South Africa.

Science communication and research translation

Presentations were made by South African PIs and their staff at the AIDS Vaccine Conference, viz. Professors G Gray, L Morris and LG Bekker, and Mr R Thebus. These presentations provided an opportunity to share information with the international HIV vaccine research community. Furthermore, poster and oral presentations were made at the International AIDS Society (IAS) Conference, and at the CROI, thereby reaching local and international audiences involved in the HIV field.

In addition, SAAVI co-hosted a joint satellite session at the AIDS Vaccine Conference with the AIDS Vaccine Advocacy Coalition (AVAC), IAVI and the HVTN. The session showcased each organisation's advocacy, awareness raising and educational tools on HIV vaccines and other HIV-prevention technologies aimed at different sectors of society.

During this period, *Masikhulisane*, SAAVI's community involvement programme, reached almost 25 000 people through approximately 350 meetings, presentations and workshops to raise awareness or educate communities about HIV vaccine research and related topics. This included information dissemination via interviews on community radio stations, and participation at science festivals and other health-day activities, for example, World AIDS Day.

SAAVI has ongoing representation on the Global Vaccine Enterprise Communications Subgroup to share information about trials for various HIV-prevention technologies.

TUBERCULOSIS

TUBERCULOSIS EPIDEMIOLOGY AND INTERVENTION RESEARCH UNIT

Interim Director: Dr Martie van der Walt

Mandate

The mandate of the Tuberculosis Epidemiology and Intervention Research Unit is to conduct relevant research aimed at implementing evidence-based TB policies and practice. Therefore, the Unit's research portfolio is guided by national and international TB-control

programme priorities. Current research activities are driven by three major needs: rapid and effective expansion of the directly observed treatment short course (DOTS) management strategy, addressing the impact of HIV on the TB epidemic, and containing the spread of multidrug-resistant TB (MDR-TB) in South Africa.

Research highlights

The Airborne Infection Research (AIR) Facility at the Mpumalanga Provincial MDR-TB Referral Hospital in Emalahleni was set up by the Unit in 2005 in partnership with the Mpumalanga Department of Health and Social Services, and it is a joint collaborative effort with the CDC, Harvard University (USA) and the Council for Scientific and Industrial Research (CSIR). The main aim of the AIR Facility is to develop the evidence base for MDR-TB and extreme drug-resistant TB (XDR-TB) infection-control interventions, particularly in congregate settings (for example, hospitals and prisons) and in vulnerable populations, especially HIV-infected individuals. A study that the Unit conducted demonstrated the efficacy of patients using surgical masks as a way of containing airborne infections. Other research that the Unit is conducting at the AIR Facility is evaluating infection-control practices and knowledge of health-care workers working in TB hospitals.

Drug-resistant tuberculosis has poor treatment outcomes, especially due to the second-line tuberculosis drug used. The use of these TB drugs needs to be protected to prevent XDR-TB from developing and to prevent patients from developing additional resistance while on treatment. To assess this, 539 MDR-TB patients from four provinces were enrolled and monitored during their treatment course. Almost 50% of these patients were HIV positive and most of them had never been treated with second-line drugs. Most of the MDR-TB patients had not been cured by previous TB treatments and 6% were already XDR-TB at the onset of MDR-TB treatment. This translates into poor treatment outcomes. It is recommended that all patients that do not respond to treatment should be tested to determine whether they are resistant to second-line drugs. All patients with any level of drug resistance should then be put on appropriate treatment.

A best-practice approach to integrated TB/HIV care was initiated by the MRC with FY 2004 PEPFAR funding. A comprehensive integrated programme called that's*it* (tuberculosis, HIV and AIDS treatment support and integrated therapy) was developed together with the CDC. The programme is designed to ensure that patients suffering from TB and HIV receive a comprehensive range of services to effectively address both conditions. From September 2006, the project was expanded to rural resource-limited settings, and the lessons learnt were applied and implemented in these sites. Presently, the programme is supporting 183 clinics, mostly in rural settings in five provinces in South Africa. This exceeded the set target of 136 sites by 47. The number of sites supported includes nine TB hospitals in the Eastern Cape, and the anti-retroviral (ARV) sites in 11 district hospitals in different epidemiological and geographical settings in South Africa.

Activities in the comprehensive approach focused on screening all HIV-positive patients, offering counselling and testing to all TB patients (where possible, provider-initiated counselling and testing (PICT)), providing clinical care to all patients, supplementing key

personnel where indicated, and providing community outreach initiatives to increase awareness of TB and HIV, and to decrease the stigmatisation of the dual epidemic. Outreach initiatives involved outreaches to schools, church groups, businesses and farm workers, fun walks, and educational activities, such as poster and calendar art competitions. In this reporting period, the Unit has also employed a gospel singer community liaison officer to support provincial activities and outreaches in the Eastern Cape, Mthatha and Oliver Tambo district.

In all supported sites, activities include clinical management, antiretroviral therapy (ART) and adverse drug management, preventative and prophylactic treatment (including cotrimoxazole prophylaxis treatment (CPT)), nursing care (TB screening, patient education, treatment adherence and HIV prevention), and a focus on infection-control practices and awareness. Where necessary, infrastructure support was given to ensure compliance with infection-control requirements.

Negotiated partnerships and regular feedback meetings are held between project staff and provincial/district representatives to ensure truly integrated care services are established and maintained.

The improvement of operational systems and data collection remains one of the focus areas of the programme. To this end, a set of 12 data-collection and clinical forms were developed as a forerunner to implementing an integrated patient management system. This patient management system will now be expanded to include established electronic patient management systems such as SmartCare. This system is currently being piloted in 23 clinics in the Makana sub-district in the Eastern Cape. Various workshops have taken place in this reporting period to establish existing services, reports, patient flow and map policies, and procedures for implementing the electronic patient management system that went live in early 2010. The integration of patient files to ensure integrated care is a further initiative of the that's*it* programme. This has the objective of both quality patient care, and reliable and accurate patient statistics.

To improve case finding and case holding, that's*it* has employed a large number of patient tracers to minimise adherence problems and defaulter rates. As part of the visibility in, and services to communities, mobile patient clinics (Mercedes Sprinters) provide services to the heart of disadvantaged communities in five remote and rural areas: Cacadu district, Bitou district, Knysna, and Moses Kotane and Kagisano districts.

Capacity development

The Unit has developed a comprehensive course on infection control for health-care workers (HCWs), which is focused on the infrastructure in resource-limited settings where there is a high prevalence of HIV and TB. Participants are equipped with the necessary tools to assess infection control and to design an appropriate plan, which includes maintenance, to control infection. The course follows the framework of the Stop TB Strategy developed by the WHO, and strengthens cooperation among the different sectors in TB infection control. Local and international facilitators were used to teach the course.

Science communication and research translation

A series of four pamphlets has been developed that provide HCWs with the necessary information to allow them to carry out their duties safely and effectively. These pamphlets were published in two nursing

journals that are available on the MRC's SAHealth*info* website and are distributed among HCWs at various forums. The pamphlets are written so that they are easy to understand, and they are available in the most frequently used South African languages. The pamphlets provide information on the types of drug-resistant tuberculosis, the transmission risks for HCWs and how they can protect themselves from acquiring the disease.

CLINICAL AND BIOMEDICAL TUBERCULOSIS RESEARCH UNIT

Acting Director: Dr Alexander Pym

Mandate

The Clinical and Biomedical Tuberculosis Research Unit conducts research directed at effective TB control. The research portfolio spans the following five key research priorities:

- Expertise in conducting clinical trials in new drug development with the aim of simplifying TB treatment
- Interventions directed at TB and HIV dual epidemics aimed at reducing mortality from dual infection
- Development of new, rapid, effective, safe, field-friendly diagnostics
- Research translation directed at integrating clinical research into the provincial programme
- A provincial surveillance programme in response to a newly unfolding extreme drug-resistant TB outbreak

Research highlights

The Clinical and Biomedical TB Research Unit has made significant inroads in developing laboratory capacity, particularly in pursuing new, rapid diagnostics for TB and enhancing the molecular capabilities of the laboratory. The Unit is now in the final stages of having its own laboratory at the MRC's office in Durban.

The major highlight in tuberculosis research in more than 50 years, and indeed in the Unit's current portfolio of research, is new TB drug development. Ongoing clinical trials include investigating the safety and efficacy of fluoroquinolones, and the new diarylquinoline (R207910). These new drug regimens under investigation have broad therapeutic scope and may be the answer to simplifying the management of TB, MDR/XDR-TB and safe co-administration with anti-retroviral agents.

The laboratory collaborated in a multi-centre evaluation study of the Cepheid Xpert® MTB/RIF (Xpert) Assay, from May 2008 to February 2009, with the Foundation for Innovative New Diagnostics (FIND). Countries included in the evaluation were Peru, Azerbaijan, India and South Africa (the Clinical and Biomedical TB Research Unit and University of Cape Town's Institute of Infectious Diseases and Molecular Medicine). The objective of the evaluation study was to assess the performance of Xpert®, the first automated molecular test for TB, and rifampin resistance with fully integrated sample processing. The study found that this assay was easy and quick to use, and it had a high performance. This suggests that it could be used to remarkably simplify patient access to early and accurate diagnosis, and improve TB care and control, providing the first molecular TB assay at point-of-treatment.

In this reporting period, the Unit submitted a manuscript of the study to the *New England Journal of Medicine*.

Capacity development

Fourteen staff members enrolled for postgraduate degrees and other higher learning courses.

Science communication and research translation

The Unit completed a successful project for the DoH (Department for International Development (DFID) funded) to manage its Provincial TB Crisis Plan. The report on the evaluation outcomes was presented provincially and nationally, and used by the National Stakeholder Forum. The Unit continues to collaborate with WHO/Tropical Diseases Research (TDR), which has agreed to support the management plan by providing technical support and materials in accordance with South African TB policies. As part of this collaboration, and in response to the XDR-TB outbreak, TB drug-resistance surveillance in health-care facilities in KwaZulu-Natal, including patients in KwaZulu-Natal hospitals, is nearing completion.

FACT: About one-third of the 25 million Africans infected with HIV will die from tuberculosis. Worldwide, approximately 5 000 people die every day from TB, and most of these deaths occur in Africa.

MOLECULAR MYCOBACTERIOLOGY RESEARCH UNIT

Director: Prof. Valerie Mizrahi

Mandate

The mission of the Molecular Mycobacteriology Research Unit (MMRU) is to develop and apply genetic tools to identify, validate and characterise novel drug targets and vaccine candidates for tuberculosis. Specific areas of interest include:

- the construction and phenotypic characterisation of targeted knockout mutants of the causative agent of TB, *Mycobacterium tuberculosis*, which are defective in a number of cellular processes, including the biosynthesis of amino acids, deoxynucleoside triphosphates and molecules involved in stress responses
- the adoption of an integrated biochemical, genetic and physiological approach geared towards studying dormancy regulation in *M. tuberculosis* and the molecular mechanisms of DNA repair, replication and mutagenesis, in this, and related mycobateria.

Research highlights

Over the past year, research activities in the Unit have focused on seven, inter-related thematic areas. In January 2011, the academic home of the MMRU was transferred from the University of the Witwatersrand to the University of Cape Town. This was concomitant with Prof. Mizrahi taking up the position of Director of the Institute of Infectious Disease and Molecular Medicine (IIDMM) at UCT, and as a result, emphasis was placed on completing a number of projects in the MMRU. This meant that the last year was the Unit's best in its 11-year history in terms of the quality and quantity of publications produced. A research highlight for this reporting period was the publication of a paper in *Proceedings of the National Academy of Sciences of the USA* that described the identification and functional characterisation of two additional and essential components of a novel system for mutagenic DNA lesion bypass in mycobacteria. This bypass was originally identified several years ago in the MMRU and it has been implicated in the evolution of drug resistance in *Mycobacterium tuberculosis* through the introduction of resistance-conferring mutations. A related study on the role of two other genes implicated in DNA repair-related processes in *M. tuberculosis* was published in the *Journal of Bacteriology*. These two papers represent the culmination of six years of research in an area of TB research for which the MMRU is particularly renowned. Adding to the MMRU's publication outputs was an authoritative review article by Dr Digby Warner on the role of DNA repair in *M. tuberculosis* pathogenesis that was published in *Drug Discovery Today: Disease Mechanisms*, and an invited commentary article by Dr Warner and Prof. Mizrahi published in *Molecular Microbiology*. In another highlight, Dr Kana and Prof. Mizrahi published two review articles on the biology of resuscitation-promoting factors in mycobacteria: one in *FEMS Immunology and Medical Microbiology* and the other in *Drug Discovery Today: Disease Mechanisms*. The latter appeared in the same journal issue as Dr Warner's article. This special issue was edited by Dr Helena I Boshoff, a former graduate of the MMRU, who earned her PhD from Wits University in 2000 under the supervision of Prof. Mizrahi. The significant representation by past and current members of the MMRU in this issue of Drug Discovery Today: Disease Mechanisms emphasises the significant impact that the Unit has had in the international field of tuberculosis research.

Prof. Mizrahi was invited to deliver the mycobacteriology lecture at the 110th Meeting of the American Society for Microbiology in San Diego. This honour is given to individuals who have made significant international contributions to the field of mycobacteriology. Prof. Mizrahi was also appointed to the Board of Directors and Scientific Advisory Board of the KwaZulu-Natal Research Institute for TB and HIV (K-RITH). Dr Bavesh Kana was appointed as the new head of the Wits University node of the Department of Science and Technology/ National Research Foundation (DST/NRF) Centre of Excellence for Biomedical TB Research.

Capacity development

One new Postdoctoral Fellow was recruited. One MSc student graduated in 2010, and the theses of one PhD and one MSc student are under examination. The host departmental allocation from Prof. Mizrahi's International Research Scholar's grant was used to provide bursaries to four BSc (Honours) students at Wits University, and support the running costs of these and four other students.

Science communication and research translation

Through work carried out in the Integrated Methods for TB Drug Discovery (IMTB) Consortium, led by Dr David Sherman from Seattle Biomed and MMRU researcher, Dr Garth Abrahams, developed a promising new tool for TB drug discovery. This advance led to invitations for the MMRU to participate in one new, large, international TB drug discovery consortium project that will commence later in 2011.

CENTRE FOR MOLECULAR AND CELLULAR BIOLOGY

Director: Prof. Paul van Helden

Mandate

The Centre for Molecular and Cellular Biology (CMCB) is mandated to:

- study disease at a molecular and cellular level, which may include diseases that are (i) multifactorial, for example, cancer and psychiatric disorders, (ii) monogenetic inherited, for example, hypertrophic cardiomyopathy (HCM), progressive familial heart block (PFHB) and long QT syndrome (LQTS), and (iii) infectious, for example, tuberculosis
- serve as a reference facility for the development of expertise in molecular biology
- train researchers and link with other research projects
- support biotechnological demands of the research and industrial sectors, and transfer knowledge gained from research to the benefit of the research community.

Research highlights

Inherited disorders: The main focus is on inherited, apparently monogenic, cardiac diseases. The Centre's emphasis has initially been to identify the mutations and genes that cause these conditions, which has led to studies to discover the underlying pathophysiology. This has implications for preclinical diagnosis of the conditions and prognosis, and improved patient management. Consequently, the Centre offers DNA-based preclinical diagnosis and counselling for LQTS, HCM, as well as progressive familial heart block type I (PFHBI) and progressive familial heart block type II (PFHBII). It is now the reference centre for the genetic testing of these four conditions, in collaboration with the Department of Psychiatry and the MRC Anxiety and Stress Disorders Research Unit at Stellenbosch University. Together, the genetic factors involved in psychiatric disorders, such as obsessive compulsive disorder (OCD) and post traumatic stress disorder (PTSD), were investigated.

In South Africa, HCM affects males and females of all population groups. The second most frequent South African founder mutation, which causes the disease in 20% of the referred HCM population, and which so far has been found to affect primarily the mixed ancestry

population, is associated with a 50% mortality in males by the age of 35, thus removing a number of economically active individuals. Therefore, any research that improves risk identification helps to focus scarce resources on those who will benefit the most.

It was postulated that the factors that either increase or decrease the degree to which hypertrophy will develop in a person will be shared by both HCM and hypertension. From HCM families, it was observed that these unidentified genetic modifiers appear sufficient to completely prevent disease expression in some HCM mutation carriers. It is likely that identifying such modifiers, by working with HCM families, will point to new targets for intervention, which may eventually lead to strategies to prevent the development of pathological cardiac hypertrophy in HCM as well as other hypertrophic disorders. This is important, as a recent study indicated that at least 20% of our rural black population suffers from hypertension, and as urbanisation leads to increased hypertension, the number of individuals in which pathological cardiac hypertrophy develops is likely to increase.

LQTS is a model disease in which to identify factors that exacerbate the development of life-threatening arrhythmias, which are a feature of many common, but more complex disorders seen in the general population. From families affected by LQTS, it was observed that unidentified genetic modifiers that increase or decrease electrophysiological disturbances appear sufficient to completely prevent disease expression of some mutations. It is likely that identifying such modifiers by working with LQTS-affected families will point to new targets for intervention, which may eventually lead to strategies aimed at preventing the development of pathological cardiac heart rhythm disturbances in LQTS, as well as other arrhythmogenic disorders.

Identifying the gene responsible for PFHBI allows family members with normal ECGs, but who may still be at risk, to be identified by a DNA blood-based diagnosis. Patient management and counselling can then be directed accordingly. Knowledge and understanding of PFHBI at a molecular level may lead to new therapeutic options. In addition, findings from this rare disease can be applied to other forms of disease that are prevalent in the population.

Psychiatric disorders are among the most widespread and disabling of all illnesses in developed societies. However, since they are not listed among the major causes of death, they rarely receive the attention given to diseases such as cancer or AIDS, which have high mortality rates. The Centre is involved in a collaborative effort with the MRC Anxiety and Stress Disorders Research Unit to identify genetic susceptibility factors for OCD and PTSD. To reach these goals, various approaches have been used, which include case-control association studies of recognised OCD candidate genes as well as interactome studies to identify new candidates. Furthermore, through collaborations with Prof. Stein from the Department of Psychiatry at UCT and Prof. Russell from the Department of Human Biology at UCT, changes in gene expression in response to stress in animal models have been investigated.

Tuberculosis: Tuberculosis projects are often aimed at bridging

the gap between basic and clinical research. The Centre has conducted many different projects in this field, for example, genetics of human TB susceptibility; molecular epidemiology, which covers both the drug susceptible and resistant forms of the disease; evolution of drug resistance; diagnostics; bacterial genetics; immunology, including mycobacteria/helminth co-infections; surrogate markers for clinical trials; drug targets; and early bactericidal activity (EBA). The Centre operates two category-3 bio-safety level laboratories for this work. This aspect of the work also takes place within a DST/NRF Centre of Excellence for biomedical TB research.

In addition to human tuberculosis, *M. bovis* is currently a huge problem in South Africa's wildlife populations, and to a limited extent, in domestic stock. This poses a new threat to the tourism and wildlife industries in this country, as well as an emergent zoonotic (a disease caused by infectious agents that can be transmitted between animals and humans) threat. The Unit is also working on this problem, as well as investigating the influence of other mycobacteria in South Africa's populations of humans and animals.

Capacity development

The CMCB aims to develop new researchers mainly through supervising Honours, Masters and Doctoral students. It places an emphasis on developing established researchers by training, mentoring and supporting Postdoctoral Fellows, and promising research staff. As the Centre is not significantly involved in undergraduate teaching, it needs to attract postgraduate students from other departments. The Centre also runs training courses for professionals and believes in promoting the public awareness of science.

The Centre develops the careers of graduates by offering contract positions using grant funding and this is regarded as one of the most important activities in the CMCB. It is through activities such as these that South Africa can retain the capacity it has trained. In addition, the activities offer individuals the opportunity to utilise skills and gain experience.

Staff members attended six international conferences and 10 local meetings in this reporting period.

Science communication and research translation

Direct patient and community benefit: In terms of cardiovascular diseases, direct DNA-based testing is available for HCM, LQTS and PFHBI. We give information to Prevent Arrhythmic Cardiac Events (PACE) for patient and family-based advice and counselling. We also provide easy-to-understand information for their website.

Highly transmissible MDR- and XDR-TB strains have important implications for TB control, health-care workers, patients and communities. The findings of the Centre's research continue to be communicated to the TB control programme and to clinicians through presentations at meetings in the region. This includes city and provincial authorities, as well as the National Health Laboratory Service (NHLS).The CMCB supports the NHLS with genotyping and assistance in diagnosing problematic cases of TB and drug-resistant TB. The Centre also works closely with *Médecins Sans Frontières* (MSF) in Khayelitsha to see whether direct molecular diagnostics can make a difference to the drug-resistant problem there. To begin with, the aim is to try and quantify the extent of the drug resistance and define the mechanisms by which this epidemic arises.

Since 2000, a CMCB project, under the leadership of Prof. Tommie Victor, has involved Clinicians and the TB control programme to study the drug-resistant TB epidemic in 72 clinics in the Boland, Overberg, south Cape and Karoo (BOKS) regions. This work is ongoing and has obtained additional funding to enlarge the TB clinic at Lawaaikamp in George, where research is also conducted. The Centre provides molecular results of TB and drug-resistance tests, entered at the laboratory at Tygerberg in real time, to clinical staff at Lawaaikamp in a few days. It is therefore not only the patient that benefits directly but also the community as a whole and the TB control programme.

In the latter half of 2008, a molecular epidemiological study of drug-resistant TB was initiated in the Eastern Cape, in collaboration with Dr A Trollip, the Eastern Cape DoH and the NHLS. Initial results were presented to the Eastern Cape DoH. In this feedback meeting, the extent of XDR-TB in the province was emphasised, as well as the unusual population structure and the high prevalence of aminoglycoside resistance. The DoH has requested the CMCB's input in capacity development, quantification of the extent of transmission, molecular mechanisms underlying aminoglycoside resistance and cross resistance. The Centre has also suggested that research is required to develop methodologies to rapidly identify TB cases with a high risk of drug resistance.

A commentary has been written that discusses the draft guidelines on the management of MDR-TB. Revisions to these guidelines to limit the development of drug resistance have been suggested. The Centre is currently working on a study to demonstrate the relationship between certain resistance-causing mutations and the risk of developing drug resistance. This may have a profound effect on how molecular-based drug-susceptibility testing is interpreted.

A document for the National Department of Agriculture has been written (at their request) that explains the presence of unusual

mycobacteria in animal disease. This work has been continued and expanded, and in this reporting period it appeared as an explanatory document in peer-reviewed literature.

The Centre conducts specialised diagnostics for critical animal species for the National Zoological Gardens and SANParks, and advises them accordingly.

Technical advances: In all projects, technology is improved and advanced, and the latest technology available is used. Thus, for example, the ability to conduct DNA sequencing and handle data is vastly improved. Some other examples include the following:

- Two small robotic stations are used to assist with large-scale PCR assays and maximise labour efficiency.
- Whole genome amplification (WGA) has been introduced to make maximum use of minimal samples.
- High Resolution Melt (HRM) analysis for ab initio genetic mutation screening is used – a technique that is cheaper and faster than the current method and absolutely state-of-the-art. This methodology has now been applied in diagnosing the presence of *M. tuberculosis* in cerebral spinal fluid and fine-needle aspirate biopsies.
- The Centre's ability to conduct immunology work, for example, acquiring new instrumentation that can measure over 30 cytokines in a single sample, has been expanded.
- An automated western blotting station that can perform time-consuming western blots that were usually done by students or technicians, is now being used. This has greatly reduced the amount of man hours spent on performing western blots.
- A state-of-the-art orbitrap system for proteomics work has been acquired.
- Nanotechnology work has been initiated.

Prof. Corfield's outreach activities: Prof. Corfield has continued her involvement in outreach activities that engage the general public in a greater awareness and appreciation of biomedical science. During this reporting period, there were several requests to present popular, previously developed workshops and exhibits at national, regional and local forums, such as National Science Week, Scifest Africa, schools' Science Centres, a Netherlands NGO (SEEDS) outreach road show, meetings of lay groups (for example, PACE), and the SA Defence Force's HIV and Counselling and Testing (HCT) roll out. The activities featured at these events include:

- a workshop called 'HIV comes to the party', which explains immunology and the virus
- a TB exhibit and accompanying workshop ('The trouble with TB'), which emphasises drug resistance and antibiotics
- a workshop named 'Tik's tricks', which highlights the neurophysiology of the drug Tik (methamphetamine)
- a skin exhibit called 'The skin you're in', which looks at the skin in health and disease
- a workshop entitled 'DNA detective: what's in your genes?', which examines genomics and forensic applications in DNA fingerprinting
- a workshop called 'Enzyme antics', which introduces the role of enzymes in digestion and in biotechnology applications.

In response to public interest in the microbicide Tenofovir, Prof. Corfield developed an HIV exhibit that looks at anti-retrovirals and clinical trials.

In this reporting period, phase two of the Wellcome Trust International Engagement (WTIE) grant awarded to Prof. Corfield in partnership with the MTN Sciencentre, Cape Town, and the production of a biotechnology DVD for the Public Understanding of Biotechnology (PUB) initiative of the South African Agency for Science and Technology Advancement (SAASTA), was completed.

The WTIE project entitled 'Catalysing partnerships: the role of science centres as intermediaries between the public and scientists in engagement with biomedical sciences in South Africa', plans to bring science centres and scientists together to make biomedical science issues more accessible to the general public. Based on the first phase, which was completed in 2009, several new public engagement activities have been, and are being developed. The final phase of the project will involve the production of a 'how-to-engage' manual and a website.

The biotechnology DVD commissioned by PUB is to serve as a resource for high schools, to increase awareness and understanding of biotechnology, and to explore the ethical issues raised. The DVD features Prof. Corfield presenting four workshops that she developed, which look at the science of DNA genetics and forensics, genetically modified organisms, cloning, and bioinformatics. The DVD has been distributed to schools and interested persons across South Africa.

Prof. Corfield was involved in other activities that furthered public awareness of various aspects of science. One of these is the DNA Project, which is a non-profit organisation that seeks to raise awareness of the importance of DNA forensic evidence through many activities. The two facets in which Prof. Corfield has been involved are developing teaching modules for a BSc Honours course in DNA forensics, and a workshop called 'DNA CSI', which she has helped develop and has presented to ADT Security staff at their Cape Town training academy. She has also been involved in further projects with PUB, including assessing the basic biotechnology programme

rolled out by the Gateway Science Centre in Umhlanga. She has also updated several PUB fact sheets.

Several of the events in which Prof. Corfield has been involved have received media coverage and she has been featured on radio interviews about Scifest, the Gauteng WTIE workshop, as well as a 'State of the Nation' debate on Classic FM entitled 'Has the Human Genome Project delivered?' with David Gleeson and Prof. Michelle Ramsay. The *Star* carried a feature on the 'Murder mystery' event that she developed to look at the issues raised by DNA profiling.

CARDIOVASCULAR DISEASE AND DIABETES

CHRONIC DISEASES OF LIFESTYLE RESEARCH UNIT

Director: Vacant

Acting Manager: Ms Jean Fourie

Mandate

The mandate of the Chronic Diseases of Lifestyle Research Unit is to undertake public health research to promote healthy lifestyles, and early diagnosis and cost-effective management of diseases and their risk factors among the South African population. Our objectives are to:

- undertake priority research in the chronic diseases of lifestyle (CDL) area through effective partnerships with national and international collaborators
- communicate results with policy makers and other stakeholders with the purpose of improving health policy for managing CDL
- develop research capacity for CDL, particularly regarding postgraduate students from disadvantaged backgrounds.

Research highlights

The Chronic Diseases of Lifestyle Research Unit conducts and coordinates public health research to address chronic diseases in line with the mission of the MRC, which is to improve the nation's health and quality of life through promoting relevant and responsive health research.

The Unit developed and evaluated a smoking cessation intervention for pregnant women attending public sector antenatal clinics in Cape Town.

During this reporting period, the focus of the HealthKick research project in primary schools was to target schools' physical and policy environment regarding healthy lifestyles, family and community involvement, the curriculum, and diabetes awareness. An important aspect of this intervention was to introduce the identified behaviour objectives into the curriculum, not only in the Life Orientation curriculum but also in the general school environment.

Collaborations with several national and international institutions, such as McMaster University in Canada, include a prospective cohort study to track changing lifestyles, risk factors

and chronic disease. Collaboration with the US Centers for Disease Control and Prevention and Columbia University on the Global Burden of Disease project involved research contributions from the Unit's staff on ischaemic heart disease in sub-Saharan Africa. Collaborations with national institutions include the Chronic Diseases Initiative in Africa (CDIA); the Faculty of Health Sciences, University of Cape Town; and the School of Public Health, University of the Western Cape.

During this reporting period, there was an increase in awareness of the harmful effects of smoking during pregnancy and improved smoking cessation during pregnancy among disadvantaged women. To achieve this, a person-centred approach was used.

More than 1 000 participants in the study on cardiovascular risk in black South Africans received verbal and written information about healthy living and how to improve their awareness of preventing and managing their chronic diseases.

A health awareness day was held in Bishop Lavis, and members of the public had their blood pressure, weight and height measured. They then received information about healthy living and the risks of chronic diseases. A local newspaper (the *Tygerburger*) published this event.

Through the Unit's activities, educators, learners and their parents, at primary and secondary schools in the Western Cape, have been made aware of the benefits of healthy living through improved physical activity and healthier eating habits. A successful educators' workshop was held to introduce healthy nutrition and physical activity into the curriculum of all participating schools. This was followed by a workshop for school principals at the end of the year, in which feedback on the progress was given and expectations for the following year were shared.

Capacity development

Despite a reduction in staff members in this financial year, nine students and/or interns were supervised or co-supervised: two research interns graduated (one MPH and one PhD) while another PhD thesis has been

FACT: Foods rich in antioxidants, (such as vitamins A, C and E, and lycopene), fight and neutralise free radicals, which are molecules that damage cells, and cause heart disease, cancer and premature ageing.

submitted. One staff member enrolled for a PhD, while another senior staff member acted as an external examiner for a doctoral thesis.

Staff members attended various courses to enhance their skills. Dr N Peer was selected to participate in the NIH International Training Institute on 'Engaging communities to improve global health: Reducing disease burden through collaborative approaches'. This course enhanced her skills for planning research projects, and equipped her with additional skills to deal with community-related issues and pre-empt barriers to conducting successful community-based studies. Ms D Jonathan was trained as an evaluator on the job description panel for JExpert solutions. Other courses that Unit staff attended included the MS Word 2007 basic introduction course, biostatics and SSPS courses, an evaluation and monitoring workshop, the 'Project management dynamics' course, and a one-day leadership seminar.

Experienced CDL staff members are often requested to assist researchers with fieldwork, training, and translating questionnaires and other documents for countrywide surveys.

Science communication and research translation

The Unit developed smoking educational tools including a video in collaboration with the CDIA. This intervention package will be used by health-care providers to motivate and support behavioural changes among people at risk of developing chronic diseases. The target behaviours include smoking, physical inactivity and an unhealthy diet. These tools and activities will be used with patients that attend local public health clinics in the context of community-based outreach programmes in collaboration with the DoH.

The Community nutrition textbook that was developed at the CDL Unit is being used by students at many South African Universities. A similar textbook for developing countries is now being published online at the Athabasca University in Canada. The Unit contributed to a number of chapters in this version.

The Dietary Assessment and Education Kit (DAEK) was reprinted, and it is a very useful educational tool for students and professionals in South Africa, African countries and the USA.

Researchers at the Unit have published mainly in international journals, for example, *Acta Obstetricia et Gynecologica Scandinavica* and *Nutrition*. National publications included conference proceedings in various journals. Ms Fourie serves as an editorial board member for the AfroAIDSinfo Web Portal.

INTER-UNIVERSITY CAPE HEART RESEARCH UNIT

Director: Prof. Peter Zilla

Co-directors: Dr Neil Davies and Prof. Sandrine Lecour

Mandate

The MRC Inter-University Cape Heart Research Unit was established in 1997 to promote cooperation and integration of cardiac research between the universities in the Western Cape. The vision of the Cape Heart Research Unit is to be an internationally competitive African research group that advances the impact and stature of South African cardiovascular research and training. The mission statement of the Unit is to:

- be a highly productive cardiovascular research facility that contributes to the greater understanding of cardiovascular disease, with the ultimate purpose of generating new therapies
- advance the training of young South African scientists and academic clinicians
- promote a greater interest in science within the community.

Research highlights

During this reporting period, the Unit's productivity remained high with an increased number of publications. The majority of publications were in relevant pre-eminent international journals.

Cardiovascular Research Unit (CVRU): The CVRU continues to utilise a multi-disciplinary approach towards cardiovascular regenerative medicine. This has resulted in increased understanding of the biomechanics involved in vein grafts, the development of an improved synthetic graft material and a pro-angiogenic surface coating. Additionally, CVRU have been involved in a collaborative study with the University of Zurich to develop tissue-engineered heart valves, which may eventually hold the key for effectively treating heart-valve damage in rheumatic heart disease patients.

UCT is involved in a multi-centre clinical trial to determine the efficacy of an external stent in reducing intimal hyperplasia in coronary artery bypass vein grafts. This trial is a direct result of research carried out by the CVRU in a primate model on a novel external stent that was developed by the Unit. This is a vital and concrete step towards the improvement of patients' medical management.

Hatter Institute: In March 2010, Prof. Opie retired and Prof. Sliwa was appointed as the new Director of the Hatter Institute. As a consequence, the research interests of the Hatter Institute have been expanded to cardiovascular genetics, Heart of Africa, and cardiac disease and maternity (see www.hatter.uct.ac.za/). Using state-of-the-art genetically modified models to study the molecular, cellular and physiological bases of heart diseases, the Institute has been able to further characterise the intrinsic cardio-protective survival activating factor enhancement (SAFE) signalling pathway.

Lipidology: The project on the genetics of severe dyslipidaemia focused on the heterozygous familial hypercholesterolaemia phenotype. In a cohort of approximately 1 800 patients, and with an as yet incomplete systematic work-up, 60 different low-density lipoprotein (LDL) receptor mutations, four apoB mutations and one PCSK9 mutation were diagnosed. The new project on high-density lipoprotein (HDL), hyperalphalipoproteinaemia, is part of an international collaboration with the University of British Columbia in Canada, where efficient genetic work-up is available. Mutations, some of which are novel, have been found in endothelial lipase, cholesterol ester transfer protein, as well as more recently identified genes such as GALNT2. The clinical and lipoprotein results are due to be reported internationally.

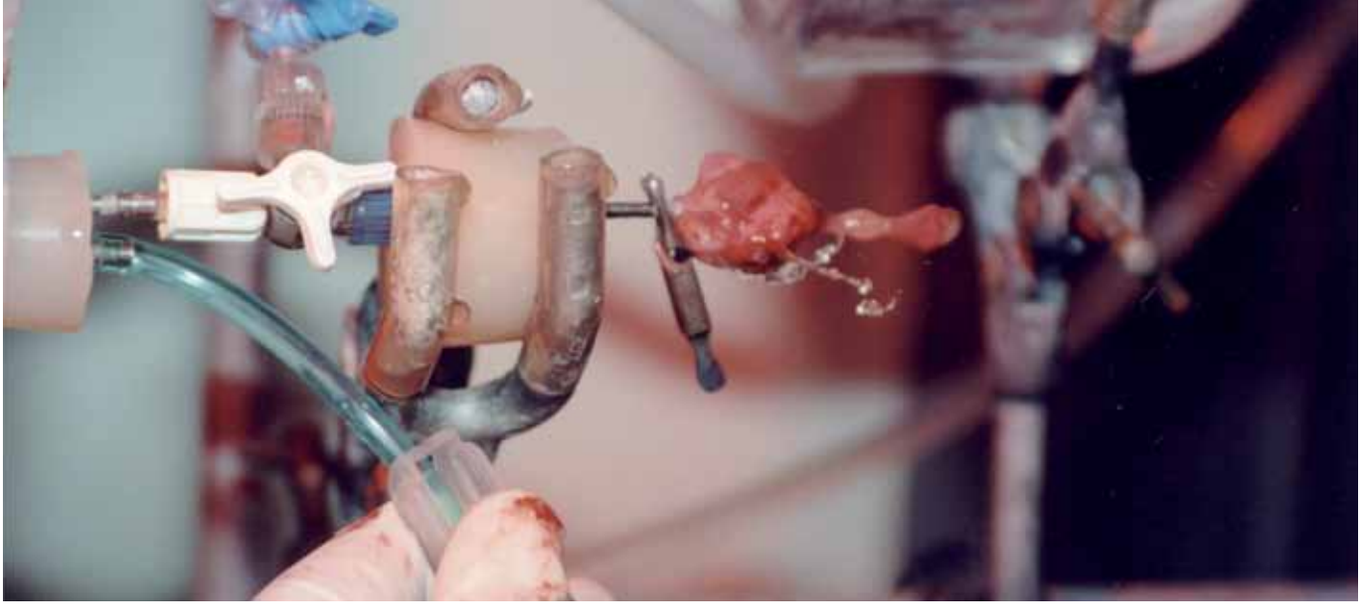
There is on-going evaluation of mipomersen, an inhibitory nucleotide to apoB, in the management of homozygous familial hypercholesterolaemia. Additionally, lomitapide is proving useful in this disorder. Lipidology took part in an international consultation on the modulation of LDL concentration by inhibiting PCSK9.

Stellenbosch University Division: Stem cell-like myoblast involvement in adult muscle tissue healing is influenced by many factors including growth factors, cytokines and oxidative stress.

The Division has demonstrated that control of neutrophil infiltration into injured muscle tissue greatly speeds up myoblast proliferation and tissue regeneration, and that surprisingly, this influence is not mediated by TNFa.

The Division has also shown that the behaviour of satellite cells differs when harvested from injured tissue. The mechanisms for these differences are being investigated. Knock-down of the muscle regulatory factor myogenin, in mouse muscle, results in pathological regeneration.

In human subjects, muscle micro-damage responses could be categorised into three severity groups. All groups have creatine kinase (CK) release that is substantially above the level that indicates a high risk of cardiac damage. Mid-level CK responses were similar to patients experiencing myositis, while the upper level experienced a form of rhabdomyolisis without involvement of myoglobinuria. The underlying factors that cause muscle damage forms the continued focus of this work.



Capacity development

Cardiovascular Research Unit: At present, 70% of the students at the CVRU are either black or female (30% black and 40% female).

The Pan African Training Centre for Cardiac Surgery affords specialist cardiovascular training for surgeons and allied health professionals from Namibia, Zambia and Nigeria.

S. Sharp was sent on a training course in Aachen, Germany, on micro-catheter-based evaluation of small animal pressure-volume loops. As a result, the CVRU is the only institution with this gold standard procedure established in Africa.

Doctors Davies, Franz and Bezuidenhout teach at undergraduate and BSc Honours levels.

Hatter Institute: Currently, black or female researchers constitute over 90% of our research group. Dr Lacerda, a research assistant within the Hatter Institute, successfully completed her PhD in December 2010.

Professors Opie, Sliwa and Lecour teach Medical, BSc and Honours students.

Lipidology: This small Unit is largely dependent on contract research for its existence but receives support from the MRC for some projects. This offers opportunities for postgraduate degrees, but a service-orientated unit that has to raise funds is generally an unattractive career option for students. Lipidology is expanding its capacity to diagnose new disorders at a biochemical and genetic level, and is collaborating with international centres to explore whether recently discovered genes in lipid and lipoprotein metabolism account for severe dyslipidaemias in South Africa.

Stellenbosch University Division: At present, the Division's postgraduate cohort consists of 30% black students. One of these is in a special development programme to be trained as a Research Assistant and Laboratory Technician.

Science communication and research translation

The Chris Barnard Health Promotion Day was hosted by the Cape Heart Group in December 2010. This day-long event was designed to increase awareness of both cardiovascular disease and the related research being carried out in the Western Cape. The day attracted almost 500 members of the general public.

Cardiovascular Research Unit: Research carried out by the CVRU into external vein grafts is presently being translated to the clinical arena via a multi-centre clinical trial that UCT is directly involved in.

Hatter Institute: The Institute has an annual Cardiology at the Limits Meeting, in conjunction with the University Hatter Institute of London, which is attended by leading academic cardiologists from the United Kingdom, Europe, South Africa and other parts of Africa. The proceedings are published in a book, *Cardiology at the limits*, and the talks are available on the website of the *Lancet*.

In this reporting period, a joint UK/SA workshop in London was organised in collaboration with University College London. The main purpose of this first joint UK/SA cardiovascular research workshop was to highlight the work of the Institute's young researchers, and to promote fruitful cardiovascular research collaborations between the UK and South Africa.

Lipidology: The clinical service is provided to public and state health care, and laboratory expertise is provided to the NHLS and private laboratories. Research findings were reported at local or international meetings, and included four abstracts at the Lipid and Atherosclerosis Society of South Africa in 2011. Dr Blom was the organiser of this meeting on apheresis for familial hypercholesterolaemia in the United Kingdom.

Stellenbosch University Division: Prof. Myburgh and her Postdoctoral Fellow were both invited speakers at a stem cell indaba, which included national experts, and clinical and industry participation.

EXERCISE SCIENCE AND SPORTS MEDICINE RESEARCH UNIT

Director: Prof. Tim Noakes

Mandate

The mission of the UCT/MRC Exercise Science and Sports Medicine (ESSM) Research Unit is to develop a novel neurobiological model of integrated human function during exercise, and to use this model to optimise human exercise performance, prevent and treat sports injuries, and prevent and treat certain chronic diseases.

Highlights

In Assoc. Prof. Collins' research group, preliminary data have shown that the 3'-untranslated region (UTR) of the COL5A1 gene alters mRNA stability in patients with Achilles tendinopathy. These are the first functional data resulting from the initial genetic study to identify the risk for developing Achilles tendinopathy.

Dr Albertus-Kajee's research has shown that patients with chronic disease have similar muscle activity to healthy controls. However, post-rehabilitation, their muscle activity decreases but their exercise performance improves. This can be explained as a development of muscle efficiency during exercise by possible changes in muscle contractile properties. As patients with chronic disease have similar muscle fibre conduction velocities compared to healthy controls, it is possible to conclude that no muscle myopathies are present in this patient population.

Related to the World Diabetes Foundation Project (for which the study protocol was published in *BMC Public Health*), Dr Draper submitted a funding application (second round) to the International Diabetes Federation for an ancillary study entitled 'A text-message-based social marketing intervention for the prevention of diabetes in parents of disadvantaged primary school children'.

Dr Goedecke's study results produced several 'firsts', for example, comparison of gene expression (inflammation, adipogenesis and glucocorticoid metabolism) between black and white women in different subcutaneous adipose tissue, and measurement of ethnic differences in skeletal muscle metabolism in relation to insulin sensitivity (measured by euglycaemic hyperinsulinaemic clamp with tracers). She has a collaborative project between a private radiological firm, the Biomedical Engineering Department at UCT and researchers at Umeå University in Sweden, to measure skeletal muscle and liver

fat content using magnetic resonance spectroscopy (MRS) in relation to insulin sensitivity. This project will provide insight into the risks of obesity and metabolic diseases. Dr Goedecke also received the Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMDSA) award for best published paper in the basic sciences for 2010.

Dr Kohn has established a world-class myology laboratory (complete with light microscope and digital imager) to conduct single muscle fibre research. This research is crucial for skeletal muscle contractility work.

Dr Kolbe-Alexander's 'personal pathways' product is currently under development and is to be launched both locally and internationally. It is designed, through a systematic process of health-risk appraisals, health awareness, and personal and incentivised goal settings, to encourage individuals to reduce and manage health-disease risk. The programme is based on the concept of 'risk-related' age, or chronological age, which is adjusted for age and gender, and modifiable risk factors for chronic, non-communicable diseases, such as heart disease, diabetes, lung disease and certain types of cancers. Risk-related age is then used to develop an algorithm to drive health-behaviour messaging and interventions.

Dr Rauch's research has produced two 'firsts'. One is the first study to show that deep, slow breathing improves reaction time and working memory during cognitive performance testing, and the second is the first study to conduct brain imaging during cycling using functional magnetic resonance imaging (fMRI).

Capacity development

The Unit has a strong undertaking to train postgraduate students within its four main research areas, and where possible, preference is given to applicants from previously disadvantaged backgrounds (PDB). In the Unit, a total of 81 students were registered. Of these, 22 were at the PhD level (six PDB, 10 females), 11 were MPhil (Sport and Exercise Medicine) students (six PDB, two females), 10 were MPhil (Sports Physiotherapy) students (four PDB, four females), 23 were MSc students (six PDB, 12 females) and 15 were BSc (Med)(Hons) students (four PDB, 11 females). During this reporting period, 22 students graduated from all categories (five PDB, 12 females).

The Unit has one staff member studying for an MPH degree.

FACT: A healthy immune system regulates our body's healing process, and protects it against infections and diseases.

Science communication and research translation

Collaboration between the University of Northampton in the UK, UCT and MRC, has led to a patent being lodged entitled 'Oligonucleotides and methods for determining susceptibility to soft tissue injuries'.

A commercial agreement for PeptoSport was reached between UCT (Assoc. Prof. Bosch from ESSM) and the company producing PeptoSport, to use the product in a study on recovery in Sevens rugby players.

In the Healthy Active Kids South Africa Report Card, led by Prof. Lambert of ESSM in collaboration with Discovery Vitality and the Sports Science Institute of South Africa, nine scientists from six tertiary institutions evaluated evidence available on the four major risk factors placing South Africa's children and youth at risk of chronic diseases (tobacco use, poor diet, lack of physical activity and obesity). The result was a Report Card, which provided an evidence-based picture of the health and activity levels of South African children. Prof. Lambert and other scientific panel members have shared the results of this important advocacy document, which evaluates the evidence, and provides recommendations to various stakeholders, to improve the health and well-being of South Africa's most important asset – its children. The work was presented in 2008 at the International Society for Behaviour Nutrition and Physical Activity in Banff, Canada. In 2010, the advisory panel reconvened to produce an updated Report Card. The panel plans to submit the process of the Report Card for peer review, and to broaden the consultative base going forward, focusing more on solutions. Funding was sought from the Wellcome Trust, unsuccessfully, for dissemination and international stakeholder engagement. A second Report Card was produced in 2011.

INFECTIOUS DISEASES

IMMUNOLOGY OF INFECTIOUS DISEASES RESEARCH UNIT

Director: Prof. Frank Brombacher

Mandate

The mandate of the Immunology of Infectious Diseases Research Unit is to be a relevant and comprehensive multidisciplinary team in a centre of excellence, embracing basic and applied research, and improving capacity, teaching and training in the immunology of infectious diseases, with focus on tuberculosis and other important human infectious diseases. The aims are to:

- strengthen research expertise in infectious diseases
- improve host protective mechanisms
- enhance research of infectious diseases nationally and in Africa
- generate and provide relevant animal models
- teach graduate and postgraduate students, as well as clinicians
- reduce morbidity and improve the quality of life of the community
- promote the knowledge of infectious diseases and their prevention in the population.

Research highlights

The Unit has generated a smooth muscle cell-specific IL-4Ra-deficient mouse model and showed for the first time that IL-4Ra-responsive smooth muscle cells can influence the adaptive immune system during helminthic infection, probably by neurological innovation. In 2010, it was demonstrated that these cells increase intestinal hypercontractility via the cytokines IL-4 and IL-13 in worm infection, and contribute to resistance during acute schistosomaisis. In allergic asthma, it is believed that IL-4Ra-responsive smooth muscle cell-induced contractions contribute to airway hyper-reactivity, which causes the typical breathing problems of asthmatics. However, in experimental allergic asthma, the Unit demonstrated that this is not the case, as smooth muscle cell-specific IL-4Ra-deficient mice still showed all the symptoms of allergic asthma. These exciting results were published in the high impact journal *Allergy.*

The investigation of the role of smooth muscle cells in immunology, physiology and neurology started a new, exciting and successful research interest in the laboratory. In 2010, the Unit recruited Dr Schmidt from Germany, who has expertise in neuroimmunology, sponsored by a prestigious Humboldt stipend. Together with Dr Tiro Brombacher (funded by a 2011 Wellcome Trust CIDRI stipend), Dr Schmidt will further investigate and dissect the cellular and molecular mechanisms of the role of IL-4Ra-responsive smooth muscle cells as well as other cells using neuroimmunological approaches.

In order to progress in research, it is important to further develop and modify tools. The Unit recently established several novel cell-specific gene-deficient mouse models and it is also characterising B and dendritic cell-specific IL-4Ra-deficient mice in several infectious

disease models. Currently, the Unit is establishing keratinocyte- and epithelial-specific Il-4Ra-deficient mouse models, as both cell types are believed to play important roles in leishmaniasis, allergy or colitis. Moreover, a third generation mouse model has been developed with temporal and spatial gene deficiency by utilising the tetracycline operator system in combination with the Cre/loxP recombination system.

The Unit, in collaboration with Professors Alexander and Robert at the University of Strathclyde in Glasgow, United Kingdom, has shown that IL-33, a recently described new interleukin, is important in preventing the development of murine encephalitis, which is caused by infection by *Toxoplasma gondii*, causing human toxoplasmosis. In a collaborative effort with Prof. J van Snick from the Ludwig Institute in Brussels, Belgium, a novel immunological cytokine network to activate CD4+ T-cells was uncovered, which may play an important role in autoimmune diseases. This is currently being further investigated.

Two workshops were organised: a bilateral Swedish/SA workshop on African trypanosomiasis and a Japanese/SA workshop on tuberculosis transcriptomics.

Capacity development

Two major grants (NRF on bioinformatics and a National Japanese grant) were secured in 2010 with a workshop held in Cape Town. Biological experiments will be performed in our laboratory, and whole genome analysis will take place in the omics centre of RIKEN, Japan, by Prof. Suzuki's group. Here, it is expected that candidate genes for host protection and pathogen invasion will be identified, which will be potential targets for rational development of drug therapies and vaccinations. The first results are expected in the second half of 2011. The Unit will also extend its collaborations with 10 new researchers, mainly from international research institutions.

Science communication and research translation

Nationally, staff members presented their research at the immunology conference organised by the South African Immunology Society (SAIS). There was good participation nationally and the conference included international keynote speakers. Moreover, postgraduate students presented their work orally and/or with posters at the MRC Research Day, and the AstraZeneca Health Sciences Research Day at the Faculty of Health Sciences at the University of Stellenbosch, Tygerberg Campus.

Internationally, staff members presented the Unit's research at several conferences and universities in Europe. A highly successful symposium within the Unit's student exchange program (International Research Training Group (IRTG)) with the University of Wuerzburg in Germany, allowed its postgraduate students to present their exciting results and network with their German counterparts.

DIARRHOEAL PATHOGENS RESEARCH UNIT

Unit Director: Prof. Duncan Steele

Acting Director: Prof. Jeffrey Mphahlele

Mandate

The Diarrhoeal Pathogens Research Unit (DPRU) was established at the Medical University of South Africa (Medunsa) in April 1996 and was the first such MRC unit to be founded at a previously disadvantaged institution. It is estimated that diarrhoeal disease is the primary cause of death in infants younger than five years of age, leading to about 160 200 deaths per day in South Africa. Consequently, the mission of the Unit is to:

- study viral and microbial agents associated with diarrhoea in infants and young children in southern Africa
- investigate the molecular epidemiology of rotavirus infection in southern Africa with a view to optimising the future implementation of a rotavirus vaccine strategy
- study the molecular pathogenesis of rotavirus infection using the vast array of clinical material available, as well as conducting a detailed molecular analysis of the associated viruses.

The Unit is also focusing on:

- the epidemiology and molecular characterisation of the small, round, structured viruses that have emerged as important aetiological agents in other developing countries
- characterising enterotoxin-producing strains of *E. coli* and *Shigella* spp.

Research highlights

The DPRU has been conducting a number of ongoing rotavirus infection studies between 2003 and 2010. This reporting period marks the culmination of a number of these projects, which are outlined below.

Rotavirus genetic diversity in South Africa: In Africa, South Africa was the first country to introduce rotavirus vaccine from 1 August 2009. To date, more than 1 million doses of Rotarix® have been distributed. There is great genetic diversity of rotavirus strains circulating throughout the world. The effectiveness of the rotavirus vaccines against these diverse rotavirus strains remains open. This emphasises the need for further research on the importance of strain diversity of rotaviruses and the emergence of new or previously

uncommon strains in the human population. Thus, this study aimed to describe the genetic diversity of rotavirus strains circulating in the community before the introduction of the rotavirus vaccine in the South African Expanded Programme on Immunisation (EPI-SA).

Diarrhoeal samples were collected from children <5 years of age at Dr George Mukhari Hospital from 2003 through 2010. A total of 5 021 diarrhoeal stool specimens were collected from children <5 years of age. The most prevalent rotavirus strains detected each year from 2003 2010 were G2P[4] (50%), G1P[8] (56%), G3P[8]/G3P[6] (69%), G1P[8] (39%), G2P[4] (48%), G2P[4] (50%), G1P[8] (52%) and G2P[4]/G8P[4] 44% respectively. The study highlights the wide diversity of strains and the potential emergence of novel rotaviruses in the Ga-Rankuwa and Madibeng area. It is thus important to continue with epidemiological studies to monitor the rotavirus strains associated with severe gastroenteritis in a hospital setting after 3–5 years following the introduction of a rotavirus vaccine.

Rotavirus infection in children: The aim of this ongoing study was to determine the diversity of the circulating rotavirus strains from a Private Pathology Laboratory in Pretoria. Diarrhoeal specimens, which were sent to the Lancet Pathology Laboratory in Pretoria during 2008 through 2010 from children below the age of 5 years, were collected. Two thousand and thirty-seven stool specimens were collected during the study period. Annual rotavirus infection positivity rates were as follows: 24,5% (297/1 220) for 2008, 23,6% (218/923) for 2009 and 17% (63/376) for this reporting period.

Epidemiology of rotavirus diarrhoea in children under five years of age attending public and private health-care facilities in Swaziland: The Swaziland Expanded Programme of Immunisation is considering introducing the rotavirus vaccines, and the pneumococcal and meningococcal conjugate vaccines to the national immunisation programmes in line with the United Nations Millennium Development Goal to 'reduce by two thirds between 1990 and 2015, the under five mortality rate'.

The estimates of the burden of rotavirus disease in Swaziland will create awareness of rotavirus disease in Swaziland's health-care system (at present non-existent), prior to the introduction of rotavirus vaccine. The results will guide the Swaziland government, WHO and Global Alliance for Vaccines and Immunisation (GAVI) to make a decision on funding rotavirus vaccines (PATH, 2008). Swaziland is a GAVI-eligible country, and in order to secure the funding from GAVI, data on rotavirus burden of disease and molecular epidemiology is required.

Between January and December 2010, a total of 469 diarrhoeal stool specimens were collected from children <5 years of age with diarrhoea that were hospitalised or attending outpatient departments in selected public and private health-care facilities (Mbabane Government Referral Hospital, RFM Hospital, Hlatikhulu Hospital and Good Sherpard Hospital, and a Lancet private laboratory). One hundred and twelve diarrhoeal stool specimens 112/469 (23,8%) were positive for group A rotavirus. Interestingly, the Swaziland data for severe rotavirus diarrhoea among children less than five years of age are similar to incidence estimates obtained in South Africa before the introduction of the rotavirus vaccine (Steele et al., 2003; Seheri et al., 2010). Rotavirus infection was found to be more common in children less than two years of age. The peak prevalence of rotavirus infection was found to occur in the month of July (38/92; 41,3%) and August (47/94; 50%).

Environmental and animal rotaviruses: Rotavirus morbidity and mortality rates in humans are well documented, but this information is lacking in animals, particularly in Africa. The aim of this programme is to detect and perform molecular characterisation of rotavirus strains in various domestic animals in South Africa and other African countries, in order to determine the extent of rotavirus infection in animals, the possibility of interspecies transmission, and the role of animals in contributing to genetic diversity of rotavirus strains in humans.

Between 2007 and 2009, a total of 1 353 stool samples were collected from domesticated animals in five African countries (Botswana, Tanzania, Ivory Coast, Tanzania, Tunisia and South Africa) and 130 South African human stools were screened for group A rotavirus antigen using commercial DAKO EIA kit. The new surveillance sites for this reporting period are Elisrus in the Northern Province and two surveillance sites in Cameroon.

The findings from this study suggested a widespread

FACT: When sanitation system fail, or are inadequate, the impact on the health of the community, on the health of others and the negative impact on the environment can be extremely serious, as evidenced by the 1,5 million cases annually of diarrhoea in children under the age of five.

prevalence of rotavirus infection in African domestic animals and the potential for widespread inter-species transmission between animals and humans, since African communities live in close proximity to animals. The latter possibility may account for the high diversity of human rotaviruses and emergence of novel rotavirus strains in Africa.

Capacity development

The two scientific meetings held in South Africa from 2–4 August 2010, provided an ideal opportunity for capacity development for DPRU postgraduate students. The students presented their research projects and were able to interact with the international rotavirus experts.

The first meeting was the 9th International Rotavirus Symposium, and was held in the Sandton Hotel in Johannesburg from 2–3 August 2010. The meeting was designed to provide updated information on relevant research that will inform public health agenda related to rotavirus gastroenteritis, especially issues relating to rotavirus vaccines and the clinical trials in developing countries in Africa. At the symposium, 27 oral and 94 poster presentations were delivered. Of the 94 posters, 15 were presented by DPRU staff and students.

The second meeting was the 6th African Rotavirus Symposium, which was held on 4 August 2010, at the National Institute for Communicable Diseases (NICD) in Sandringham, South Africa. The symposium was organised by the DPRU in partnership with the NICD and WHO. The aim of the meeting was to share the latest information on rotavirus research in Africa. More than 150 participants from over 20 African countries attended the symposium. Participants included African and international scientists, postgraduate students, clinicians, EPI managers, policy makers and the vaccine industry. A total of 21 oral and 34 poster presentations were delivered.

Finally, the DPRU, in capacity as the WHO Rotavirus Regional Reference Laboratory (RRL) for Africa, organised an annual African Rotavirus Surveillance Network (ARSN) training workshop from 2–20 August 2010. The participants were from 11 African countries: Cameroon, Cote d'Ivoire, DRC, Ethiopia, Kenya, Mauritius, Niger, Togo, Tanzania, Zambia and Zimbabwe. The DPRU staff and students successfully facilitated the training workshop together with other facilitators from the WHO, Noguchi Memorial Research Institute/RRL in West Africa, NICD, Kenya Medical Research Institute, and the CDC in the USA.

Science communication and research translation

The DPRU and NICD are key advocates of the DoH in monitoring the vaccine impact in South Africa, by allowing assessment of vaccine efficacy and the impact of vaccination on disease prevalence. This includes monitoring possible changes in rotavirus strains and detecting potential vaccine adverse events. The rotavirus surveillance studies are conducted in four sentinel sites: Dr George Mukhari hospital, Agincourt, Edenvale and Baragwanath hospital. Of these four sites, the Dr George Mukhari hospital has been conducting rotavirus surveillance in South Africa since the 1980s, and continues to provide data on the impact of rotavirus vaccination in African children.

These research findings from Dr George Mukhari hospital have been presented to the NDoH, together with the NICD, as part of vaccine advocacy. They have also been presented to policy makers and health officials, such as the EPI managers, doctors, nurses, vaccine manufacturers and scientists from other countries through scientific meetings. These meetings were the:

- South African Vaccine and Immunisation Centre (SAVIC) Meeting, Protea Manor Hotel, Pretoria, 28–30 July 2010
- 9th International Rotavirus Symposium, Sandton Hotel, Johannesburg, 2–3 August 2010
- 6th African Rotavirus Symposium, Sandringham, Johannesburg, 4 August 2010.

INFLAMMATION AND IMMUNITY RESEARCH UNIT

Director: Prof. Ronnie Anderson

Mandate

The mandate of the Inflammation and Immunity Research Unit is to provide novel insights into the immunopathogenesis of acute and inflammatory disorders of both infective and non-infective origin. The Unit is also mandated to identify targets on or in immune and inflammatory cells, as well as microbial pathogens, on which novel anti-inflammatory and anti-microbial chemotherapeutic strategies, respectively, can be based. The four main research focus areas of the Unit are to:

- identify the mechanisms (and possible preventative strategies) of lifestyle and occupational hazards, such as cigarette smoking, inadequate diet, and exposure to mineral dusts or chemicals that activate futile, chronic inflammatory responses, which result in

pulmonary dysfunction and carcinogenesis
- design and synthesise novel anti-cancer chemotherapeutic agents, particularly those that subvert intrinsic and acquired multi-drug resistance in cancer cells
- identify novel targets for anti-inflammatory chemotherapy, which is of particular relevance in treating acute and chronic inflammatory disorders of both infective and non-infective origin
- identify novel targets on Mycobacterium tuberculosis that can be exploited in developing new antimicrobial agents and vaccines.

Research highlights

The research activities of the Unit continue to focus on infectious diseases (HIV/AIDS, tuberculosis and severe pneumococcal disease), but specifically on:

- characterising risk factors, developing novel approaches to immunisation and optimising chemotherapy (pneumococcal diseases)
- establishing affordable, general ARV-resistance genotyping with the primary objectives of preventing mother-to-child transmission and initiating 'virtual treatment failure clinics' in the Tshwane/Metsweding regions
- characterising the major virulence factors of *Mycobacterium tuberculosis* that promote the persistence of this microbial pathogen, as well as developing novel pharmacological strategies that neutralise these mechanisms.

In addition to these research programmes, optimising the treatment of acute and chronic inflammatory disorders of non-infective origin, particularly bronchial asthma and rheumatoid arthritis, represent major priorities. In the latter case, researchers in the Unit have identified a combination of biomarkers that appears to identify patients at high risk of developing a severe disease and who would benefit from early, aggressive chemotherapy.

The potential impacts of these research programmes are as follows:

- Developing cost-effective prevention and therapy of pneumococcal disease, as well as reinforcing the dangers of cigarette smoking as a risk factor for severe pneumococcal pneumonia
- Standardising prescribing habits/rational decision making in respect of prescribing second- and third-line ARVs
- Validating the major potassium transporters of *Mycobacterium tuberculosis,* as well as biofilm formation, as novel targets for anti-tuberculosis drug and vaccine development
- More discerning and cost-effective use of anti-inflammatory chemotherapy in chronic inflammatory diseases, specifically bronchial asthma and rheumatoid arthritis

Capacity development

The Unit has a proven and ongoing commitment to capacity development, with 13 students currently registered for higher degrees (five Masters students and eight PhD students) on MRC-sponsored research programmes at the University of Pretoria and Tshwane University of Technology (TUT). One of the Masters students will graduate in 2011, and the theses of two of the PhD students are currently with the external examiners. In addition to these students, an additional nine students (six Masters and three PhDs) are currently registered at the Department of Immunology for higher degrees on non-MRC-sponsored research.

Senior researchers (13) and postgraduate students (eight) presented their research findings at national and international congresses. Finally, the facilities (equipment and expertise) available in the Unit are regularly utilised by researchers from other academic institutions.

Science communication and research translation

The Unit conducts mainly laboratory-based research, which has clear translational objectives. These are:

- optimising the antimicrobial/anti-inflammatory chemotherapy and immunoprophylaxis of severe pneumococcal disease
- contributing to establishing a South African antiretroviral drug-resistance database to enable the long-term success of treatment programmes throughout southern Africa, as well as developing future treatment guidelines
- identifying novel targets for pharmacotherapy/immunoprophylaxis of tuberculosis
- developing novel anti-inflammatory chemotherapeutic strategies (macrolides, imidazole anti-mycotics and montelukast)
- documenting the pro-infective effects of cigarette smoking.

RESPIRATORY AND MENINGEAL PATHOGENS RESEARCH UNIT

Co-directors: Professors Keith Klugman and Shabir Madhi

Mandate

The Respiratory and Meningeal Pathogens Research Unit (RMPRU) is mandated to study the causes of respiratory and meningeal infections. Both clinical and basic research is conducted with the aim of improving the diagnosis, management and prevention of these diseases.

Research highlights

Acute respiratory infections are the leading cause of death in children in developing countries and the leading infectious cause of death in all ages. The mandate of the Unit is to study the causes of these infections, and to reduce their global burden by improving their diagnosis, management and prevention.

A five-year vaccine trial, conducted in Soweto with 39 876 children, showed that the 9-valent pneumococcal conjugate vaccine (PCV) reduced the burden of invasive disease due to vaccine serotypes by 85% and was also efficacious in HIV-infected children. Using these data, the 7-valent PCV was licensed in South Africa in 2005 and was introduced into the National Expanded Programme of Immunisation in April 2009, and the 13-valent vaccine was introduced in April 2011. South Africa is the only African country that self-funds PCV.

The Unit is conducting two large studies based on the introduction of the 7- and 13-valent vaccines. The first study is a multi-centre case-control study in all major urban centres to estimate the vaccines' effectiveness against invasive pneumococcal disease in HIV-infected and HIV-uninfected children The second study is a case-control study in two urban settings and one rural setting to estimate their effectiveness in preventing clinical pneumonia.

The findings of the rotavirus vaccine efficacy trial served as the basis for the WHO recommendation that it be used globally. This led to the vaccine's introduction to the South African EPI and the trial was published in the *New England Journal of Medicine* (NEJM) in 2010. The study showed that rotavirus vaccine prevents severe diarrhoeal disease in diverse African socio-economic settings.

The first randomised controlled trial of trivalent influenza vaccine (TIV) in HIV-infected adults showed a 75% reduction in confirmed influenza. We now have Gates Foundation funding to conduct a trial to study the effect of influenza vaccination in both HIV-infected and HIV-uninfected pregnant women. This study commenced in February 2011, and the outcomes include protection from influenza in both mothers and their newborn babies until six months of age, as well as having an impact on newborn infants acquiring pneumococcal colonisation.

In a study of 8 000 pregnant women, intrapartum chlorhexidine failed to prevent vertical transmission of group-B streptococcus (GBS) or invasive GBS disease. These results guide future patient management and highlight the need for a vaccine. Based on this, the

FACT: According to the World Health Organisation, a child in Africa dies from malaria every 30 seconds.

Unit is working with Novartis to conduct immunogenicity and safety trials of a novel conjugate GBS vaccine. A phase III trial in Soweto and Malawi is being planned.

In collaboration with the Sanger Institute, whole genome sequencing was used to understand pneumococcal evolution in response to vaccination and antibiotics. The paper was published in *Science* in 2011. A follow-up study on pneumococcal serotype-1 whole genomes, in collaboration with Malawi and Gambia, has received Gates funding. A large-scale programme of sequencing, related to vaccine introduction in developing countries, is planned in collaboration with Emory University.

Since 2004, GERMS-SA has reported weekly data for *Streptococcus pneumoniae, Haemophilus influenzae* and *Neisseria meningitidis* to the National Outbreak Response Team and the NDoH. Group-B streptococcal surveillance will commence at some sites during 2011.

Ongoing surveillance and the Unit's analyses of vaccine interventions in South Africa inform the DoH, pharmaceutical companies, vaccine manufacturers, public health specialists, clinicians, and the public both nationally and internationally.

A number of Unit staff were recognised for the research that they have conducted:

- Prof. Klugman received NRF A-rating. He was awarded the 2011 John FW Herschel Medal, which is the top science award from The Royal Society of South Africa. He was appointed President-elect of the International Society of Infectious Diseases and was re-appointed Chair of the International Board of the American Society for Microbiology.
- Prof. Madhi received NRF A-rating and the NRF President's Transformation of the Science Cohort Award in August 2010, in recognition of his efforts in recruiting black scientists and encouraging them to move towards world-class research performance. He was also appointed President of the World Society of Paediatric Infectious Diseases, 2010–2014, and he received the Wits University 2010 Vice-Chancellor's Research Award.
- Dr Cutland won the Wits Faculty of Health Sciences research prize for best publication. She was also awarded best oral presentation in Infectious Diseases at Wits Faculty of Health Sciences Research Day, 2010.
- Dr du Plessis received NRF incentive funding in 2010 and 2011 for rated researchers.
- Dr von Gottberg was appointed as one of nine Steering Committee members for the Global Meningococcal Initiative (GMI) and nominated to the WHO Pneumococcal Serotype Replacement Technical Advisory Group.
- Dr Wolter received the Robert Austrian Research Award of US$25 000 for Africa in Pneumococcal Vaccinology at the 7th International Symposium on Pneumococci and Pneumococcal Diseases (ISPPD).

Capacity development

RMPRU conducts annual training for microbiology registrars and scientist interns from other NICD units to facilitate their registration with the Health Professions Council of South Africa (HPCSA).

MALARIA RESEARCH UNIT

Director: Dr Rajendra Maharaj

Mandate

The Malaria Research Unit (MRU) became a Lead Programme within the MRC in 1999, and the majority of research is carried out in collaboration with national, regional, pan-African and international collaborations. The Unit is mandated to:

- stimulate appropriate malaria research
- generate country-specific knowledge
- facilitate the flow of information between health workers, researchers and policy makers for the optimal use of resources and manpower
- develop a malaria research and control culture extending beyond South African borders
- directly transfer skills through capacity development.

Research highlights

The MRU's long-term involvement with the integrated malaria control effort of the Lubombo Spatial Development Initiative (LSDI) has allowed the Unit to monitor malaria prevalence in South Africa and Swaziland, as well as Maputo and Gaza Provinces of Mozambique for

over a decade. Epidemiological research conducted over this period showed that an integrated approach dramatically suppresses malaria prevalence, particularly in high-risk groups. Malaria prevalence in Mozambique declined from above 60% pre-intervention to below 15% by 2010. The Unit's research also revealed that despite declining malaria prevalence, both drug and insecticide resistance are emerging, resulting in anti-malarial and insecticide policy changes within the LSDI region.

As part of a novel drug-development platform, 381 plants from 79 taxa were evaluated as potential mosquito repellents. Following a stringent selection process, where 100% mortality had to be achieved within four days of application, only two plant formulations met the criteria. These formulations are currently undergoing further testing.

With many African malaria-endemic countries preparing for malaria elimination, the MRU is also researching novel ways of successfully eliminating malaria. The Unit, in collaboration with the National Institute of Infectious Diseases and the International Atomic Agency, are piloting a project to assess the effectiveness of the sterile insect technique in depleting a South African mosquito vector population.

The success of the LSDI has resulted in the model being copied by other African countries, including Bioko Island and mainland Equatorial Guinea. As a result of this, marked declines in malaria prevalence have been detected in both countries. Ms Naidoo oversaw the establishment of a sulfadoxine-pyrimethamine (SP) drug-resistance map website, which is a useful resource for researchers and policy makers interested SP resistance-marker dispersion. Mr Hlongwana, a social scientist within the MRU, conducted a 'knowledge, attitudes and practices' (KAP) survey in Swaziland, which was used to inform Swaziland's malaria elimination, communication and advocacy plan. He also conducted KAP surveys in South Africa, which have been used to develop educational material.

Capacity development

Mr Hlongwana was one of the elite few selected to participate in the Lean Six Sigma Black Belt course offered by the Breakthrough Management Group Institute. He has completed his course work and is now busy with his project. Mr Shezi, a GIS technologist, was awarded his BA in Environmental Management in 2010 and, with financial support from the MRC and MRU, has registered for an Honours degree in environmental management. Seven other Unit staff members are currently registered for higher degrees (four Masters and three PhDs), with another five registered for diplomas.

The Unit also encourages its staff to participate in ongoing skills development by attending either in-house or external training/ workshop sessions. Workshops attended include Microsoft development days, geographic source information (GIS) open source technologies for advanced users, introduction to monitoring and evaluation, introduction to Stata, and good laboratory practices.

During this reporting period, a number of staff members attended a variety of conferences. Dr Michael Gebreslasie delivered oral presentations at both the Pan African Malaria Vector Control conference and the Biology of Malaria conference, while poster presentations by other MRU staff members were given at three different international conferences. One of the research interns, Ms Chewparsad, presented a poster at the MRC Research Day.

Science communication and research translation

In May 2010, the Unit successfully held an inaugural week-long introduction to the malaria course for Environmental Health students from the Durban University of Technology. During the week, the students were exposed to every facet of research conducted within the Unit, with lectures and practical sessions presented by MRU staff members. The course content was deemed to be of such a high standard and so useful that the course is set to become an annual event. The Health GIS Centre of the MRU, in response to an appeal from the GIS Society of South Africa, adopted the Geography Department of Swelihle High School in Umlazi. Despite a lack of appropriate infrastructure and human resources, GIS is offered as a component of Geography at this high school. The GIS staff, led by Ms Morris, developed a GIS open-source training manual, which was shared with the school children at a contact training session.

The Unit has a group of highly trained insectary staff who have trained entomologists from Mozambique, Tanzania, Zambia and Swaziland, in mosquito rearing and insecticide-susceptibility testing techniques. The database section of the Unit has trained information officers from many African countries, including Swaziland, Mozambique, Guinea and Zanzibar, on the use of malaria information systems.

Dr Maharaj assisted with writing the malaria elimination strategy for South Africa, while Dr Raman contributed to the DoH's malaria diagnosis quality assurance guidelines. Researchers from the MRU have published in national and international journals including *Malaria Journal, Indian Journal of Medical Research, African Journal of Primary Health Care and Family Medicine, American Journal of Tropical Medicine and Hygiene,* the *Lancet* and *Trends in Parasitology,* and have presented their research findings at a variety of international

conferences including the American Society of Tropical Medicine and Hygiene, Biology of Malaria, Johns Hopkins Bloomberg School of Public Health, Epidemiology of Malaria, and the International Conference of Parasitology (ICOPA). A number of staff members have reviewed manuscripts for journals including *Acta Tropica, African Journal of Primary Health Care and Family Medicine, Indian Journal* of *Medical Research* and *Global Change in Biology.*

SAFETY AND PEACE PROMOTION

SAFETY AND PEACE PROMOTION RESEARCH UNIT

Co-directors: Professors Mohammed Seedat and Kopano Ratele

Mandate

The specific objectives of the Safety and Peace Promotion Unit are to:

- conduct and disseminate public health-oriented research into the causes and consequences of injuries due to crime, violence and unintentional incidents ('accidents') in South Africa
- conduct and encourage research that will serve to identify, support and develop best practice examples for primary prevention, injury control and safety promotion
- demonstrate and document how research may be applied to facilitate, influence, support and develop best practice examples for primary prevention, and injury control practices and policies
- build capacity among South African researchers, including historically marginalised groups, to conduct research into the causes, consequences and prevention of injuries arising from crime, violence and unintentional incidents ('accidents')
- increase the use of surveillance and best practice data at the levels of service provision, policy formulation and training.

FACT: When you are on the road at night, one out of every seven drivers sharing the road with you, is drunk.

Research highlights

The Crime, Violence and Injury (CVI) Lead Programme, which completed its second five-year cycle in December 2010, was strategically re-defined as the Safety and Peace Promotion Research Unit (SAPPRU), representing a deliberate paradigm shift and a commitment to producing research and scholarship in support of international democratic governments' and civil society's authentic quest for safety and peace. The name change was formally endorsed by the relevant institutional structures. At the end of the Unit's second cycle (2006–2010), an external international panel reviewed the CVI. The panel offered significant reflections and recommendations for the next cycle's (2011–2015) research, academic citizenship and community outreach activities as part of its endorsement and

support for CVI/SAPPRU. In addition to the successful re-definition of the CVI, this reporting period also reflected a diversification and increase in academic outputs, a strengthening of our Africa-centered international collaborations, a significant increase in staff postgraduate studies and a consolidation of research-in-action activities. SAPPRU research groups were organised around four research questions during this reporting period:

1. What are the risks for violence and injury? (Risks)
2. What works for safety and peace promotion? (Intervention)
3. What factors and issues inform policy development and community actions? (Research-in-action)
4. What technological innovations are required to enhance data and information systems? (Data systems)

Each of the key research questions are addressed by one or more lead projects. During this reporting period, these included the following:

1. Risk factors in male homicide victimisation: A city- and suburb-level analysis
2. Ukuphepha project: Demonstrating African safety
3. The DoH prevention of intentional and unintentional injury project
4. The national injury mortality surveillance system (NIMSS)/ automated national injury mortality surveillance system

The progress of these projects during 2010 involved methodological, technological and analytical formulations; refinements of safety interventions; and various contributions to the South African evidence base from which policy and practice may be informed to prevent homicides, traffic injury and child injury. The SAPPRU team produced 20 well-received academic publications, a number of which were published in leading international journals such as the *WHO Bulletin*; *Accident, Analysis and Prevention*; *Social Change*; and the *Journal of Psychology in Africa.*

Capacity development

SAPPRU hosted an international colloquium on safety, peace and health promotion research and practice from 4–8 October 2010. The keynote speaker was Prof. Bangdiwala of the Injury Prevention Research Center, University of North Carolina at Chapel Hill in the USA, who is an expert in biostatistics, research and methodology. Other delegates included scholars from Egypt, Uganda, Mozambique, Memphis and North Carolina in the USA, and Australia. The colloquium provided a unique opportunity for the formation of a successful coalition between international and national scholars, and it highlighted various statistical, methodological, and multidisciplinary issues in research and practice. SAPPRU hosted a number of further research methods workshops with South African, Egyptian, Ugandan and Mozambican stakeholders involved in the Ukuphepha Project. In 2010, SAPPRU staff supervised or registered a total of 14 PhD students, and an MA and MPH student, and hosted six successful internships. Staff members served on international conference committees, editorial boards and review committees, and contributed to global and regional reports concerned with unintentional injuries and violence. SAPPRU also formalised its long-standing collaboration with Eduardo Mondlane University (EMU) by signing a Memorandum of Understanding on 25 July 2010, at an event hosted by Prof. Filipe José Couto, Rector of Eduardo Mondlane University. This was followed by the launch of the Eduardo Mondlane University's Injury Prevention and Safety Promotion Research Unit, and the UNISA-MRC-EMU Safety and Peace Initiative (SAPI) on 26 July 2010.

Science communication and research translation

In July 2010, the SAPPRU was commissioned to work with the DoH in developing a national strategic framework for preventing unintentional and intentional injury. The aim of the framework is to align the many existing policies among the different ministries and departments, and address the challenges in implementing quality injury-prevention interventions and services. The project is coordinated by the DoH, guided by a national Steering Committee, and has technical assistance from the Health Policy Initiative (HPI) and SAPPRU. In this reporting period, the project involved the formation of a national Steering Committee, comprising SAPPRU, HPI and representatives from the following departments: Health, SA Police Service, Justice and Constitutional Development, Social Development, Transport, Basic Education, Trade and Industry, Sports and Recreation South Africa, Human Settlements, and Correctional Services. SAPPRU has completed a desktop review that identifies local and international good injury-prevention practices and policies. Currently, these departments forward SAPPRU information about existing programmes and relevant policies or strategies that relate to or impact injury prevention, to include in this review. The final review, which includes the policy analysis, will be tabled throughout 2011 at a number of national roundtables. This review, along with related documentation, will serve as the basis for developing sector-specific aspects of the National Strategic Framework.

The SAPPRU hosts the *African Safety Promotion: A Journal of Injury and Violence Prevention* (the *ASP journal*). The ASP journal is published twice yearly, and is the only scientific journal in South Africa aimed at fostering the exchange of ideas among researchers, practitioners, policy makers and theorists on the subjects of safety promotion, peace, violence and the prevention of unintentional injury. The main aim of the journal is to enhance ideas around these subjects in Africa, but not to the exclusion of other regions in the world. The journal is peer reviewed and accredited by the Department of Basic Education. An important goal since 2008 has been to ensure delivery and maintenance of a high-quality publication, including turn-around time for reviews. SAPPRU also continued its preparation of the *Crime, Violence and Injury Prevention in South Africa*, which is a biennial review publication, similar in format to other reviews in the social and health sector. The review seeks to provide a comprehensive, regular analysis of the crime, violence and injury sector that includes an analysis of the key developments and advancements, as well as the major emerging priorities. In the third edition, the Unit builds on the formative work of the last decade and draw inspiration from the WHO/UNICEF World Report on Child Injury Prevention (2008). The SAPPRU has embraced the theme of enabling child safety, with the aim of expanding existing knowledge to further develop strategies in childhood safety from both intentional and unintentional injury. The 18 chapters in review challenge preventionists to capitalise on the emerging responsive political climate and growing appreciation for research-driven efforts to develop good practices with limited financial and skilled human resources. The review is scheduled for publication in mid-2011. During this reporting period, reports of SAPPRU projects and activities were documented in over 50 national and local reports, newspaper editorials, and national television interviews. The SAPPRU also distributed a series of fact sheets to the media, general community and safety promotion agencies.

FACT: The cancers that affect all South African women, in order of prevalence, are breast, cervical, colo-rectal, lung and oesophageal. The cancers that affect all South African men, in order of prevalence, are prostate, lung, oesophageal, bladder and colo-rectal.

CANCER

CANCER EPIDEMIOLOGY RESEARCH UNIT

Director: Vacant

Acting manager: Ms Margaret Urban

Mandate

The aim of the Cancer Epidemiology Research Unit (CERU) is to identify causes of human cancer in South Africa that are potentially preventable, in order to inform policy on cancer prevention and control. The Unit focuses on:

- widespread exposures that may result in large increases in cancer risks (for example, tobacco and HIV infection)
- potential and escalating causes of cancer (for example, human herpes virus 8, human papillomaviruses and hormonal contraceptives)

- the epidemiology of the major cancers that affect South Africans (for example, breast, cervix, prostate, oesophagus and lung) and cancers that are increasing in incidence among South Africans (for example, Kaposi's sarcoma and non-Hodgkin's lymphoma)
- the genetic epidemiology of major cancers that affect the South African population.

Research highlights

The CERU has been part of the international collaborative study on risk factors for squamous cell carcinoma of the oesophagus (InterSCOPE), contributing 45% of the cases tested by serology for various human papillomavirus (HPV) types. The testing and analysis showed that, at least in the participating countries, the major currently described HPV types are at best involved in a very small subset of squamous cell carcinomas of the oesophagus.

The Unit analysed 12 years of data on hormonal contraceptive use and cancers of the breast, cervix, ovary and endometrium, diagnosed at tertiary public hospitals in Johannesburg. The results showed a transient increased risk for breast and cervical cancers and, with longer durations of use, a reduced risk of ovarian and endometrial cancers. This is the largest ever study to look at injectable contraceptive use in relation to these cancers. No significant difference was found in the effects of oral contraceptives compared to injectable contraceptives on breast, cervical and endometrial cancers.

The InterSCOPE results mean that future HPV vaccinations will not have a significant impact on rates of squamous cell cancer of the oesophagus, which is one of the top three cancers in black (African) South Africans.

The results from the study to find any links between hormonal contraceptives and female cancers still need to be interpreted in greater detail with respect to duration of use and type of contraceptive. However, it is reassuring that the overall effects on cancer incidence are similar for oral and injectable contraceptives, as South Africa has one of the highest worldwide uses of the latter and most research has been done on the former. The increased risk for commonly occurring cervical and breast cancers ceases a few years after a woman stops using the contraceptive. These transient increases need to be balanced against the benefits of fewer unplanned pregnancies and a reduction in the much less common cancers of the endometrium and the ovary.

CERU staff are very involved in interpreting the National Cancer Registry data for 2000–2002, which will soon be released in hard copy for use by various health-sector departments, companies and NGOs, for example, in planning future cancer-related programmes and awareness campaigns.

CERU nurses/interviewers counsel newly diagnosed patients whom they interview about their cancer, its treatment and outcome, and, if necessary, about their HIV infection.

Capacity development

CERU staff members regularly attend courses on offer by the NHLS, Wits Medical School and the Wits Health Consortium. Two staff members attended courses on basic Excel 2007, the new Project Manager attended a GCP course, the newest interviewer attended an eight-day counselling course, and our scientists attended tutorials and overviews on the molecular basis of cancer and haematological malignancies.

Staff gave lectures on cancer epidemiology as part of the Wits Graduate Entry Medical Programme (GEMP), as well as a tutorial on the epidemiology of cancers in South Africa for the Wits Department of Human Genetics Honours students.

The CERU participates in the Cancer Research Initiative of South Africa (CARISA) research strategy meetings.

The specialist nurses (interviewers) attended the Wits Multi-disciplinary Oncology Congress in order to keep up-to-date with the latest developments in cancer diagnostics and treatment. This assists greatly in counselling newly diagnosed patients whom they interview.

A new staff member at the Wits School of Public Health is analysing a sub-set of the Johannesburg Cancer Case Control Study (JCCCS) data as part of his epidemiology training.

Science communication and research translation

The JCCCS, with its proven simple and inexpensive design of using other cancers as controls for the cancers being studied, has been used as a model for large-scale cancer studies, for example, in India and Australia.

These two large analyses have been submitted for publication in top international cancer journals. A former MRC intern published work done at the CERU in *Infectious Agents and Cancer.*

A CERU scientist was a panellist at the public group discussion on HPV and neoplasia during the March visit of Nobel Laureate Prof. Harald zur Hausen.

The section on HIV and cancer for the National Cancer Registry (NCR) report to the Parliamentary Portfolio Committee, on Health was written by the CERU.

The CERU supports the NCR as a member of the Technical Advisory Committee, and is providing assistance with statistically interpreting and writing part of the next NCR report.

PROGRAMME ON MYCOTOXINS AND EXPERIMENTAL CARCINOGENESIS

Director: Prof. Wentzel Gelderblom

Mandate

The Programme on Mycotoxins and Experimental Carcinogenesis (PROMEC) is committed to excellence in science and conducting world-class research to solve health problems in South Africa with the objective of building a healthy nation through research. The main aim is to address health issues that are related to food safety, nutrition and cancer. The multidisciplinary PROMEC research team, with its internationally acknowledged expertise in microbiology, analytical chemistry, biochemistry and experimental carcinogenesis, focuses on the staple foods in the diet of millions of South Africans.

Research highlights

Subsistence farming is an important food security strategy. However, because of climatic conditions and poverty, the quality of home-grown food is generally poor, particularly where long-term storage is involved. The risk of natural contamination, especially by mycotoxigenic fungi, is an important safety concern. The fungal contaminants most frequently found in food and feed are the *Fusarium* and *Aspergillus* species. They are found both in the field and in storage. Apart from production losses that these fungi cause directly, they may also produce toxins, which pose a health hazard to both humans and animals, and impact the commercial trade of agricultural produce.

Using plant extracts could be a viable alternative in trying to develop new and safer fungicidal compounds against fungal contamination. Weedy dietary and medicinal plants were screened for activity against the growth of *Fusarium* and *Aspergillus strains*. The plant species selected were *Tagetes minuta* (wild marigold, *kakiebos, isangwana*), *Lippia javanica* (lemon bush, *lemoenbossie, musukudu) Vigna unguiculata* (cowpea, *boontjies, isihlumaya*) and *Amaranthus spinosus* (Spiny amaranth, *imbuya*). In general, the different extracts from *V. unguiculata* and *A. spinosus* exhibited the highest inhibitory and stability effects against all *Fusarium* strains. The plant extracts showed no growth inhibitory effects against isolates of the *Aspergillus* spp. The results obtained from this study indicate that dietary plant species, particularly *V. unguiculata* and *A. spinosus*, contain chemical compounds that can be developed as potential antifungal agents for agricultural use. This is the first study of its type on South African weedy dietary plants.

Fusarium verticillioides MRC 826 is a fungus that was first isolated from contaminated home-grown maize in the Eastern Cape, and was found to produce high levels of the carcinogenic fumonisin mycotoxins. Different subcultures of the fungus varied in their ability to produce fumonisin, despite the fact that they are genetically identical. This provides a unique opportunity to study variations in the potential to produce fumonisin at a genetic level and to learn how the 17 FUM genes responsible for toxin production are regulated. When comparing the gene expression patterns of the FUM-1 gene, using real-time PCR, with the actual fumonisin profiles of the subcultures, no correlation was found. This suggests that other essential factors involved in fumonisin-production should also be taken into account when trying to predict the fumonisin-producing potential of the fungus. Currently, the complete 17 FUM gene cluster, along with 10 regulatory genes, are being analysed using a custom microarray chip to give a more accurate prediction of the toxicogenic potential of the fungus. This genetic tool will also facilitate accurate assessment of different environmental conditions required for fumonisin production in food.

Capacity development

Dr Abel attended a meeting convened by Dr Wolmarans (Nutritional Intervention Research Unit (NIRU), MRC), inviting comments on the new government regulations concerning trans-fats in foodstuffs with reference to Act 54/1972 Foodstuffs, Cosmetics and Disinfectants, 4 August 2010. The purpose was to stipulate the correct methodology guidelines in analysing trans-fats in foods. A follow-up meeting was held on 18 September 2010.

Dr Abel participated as an adjudicator at the AstraZeneca Health Sciences Research Day, 25 February 2010, which was organised by the University of Stellenbosch (Tygerberg Campus).

Dr Abel and Ms Burger participated in organising a mini-symposium on food safety and food security as part of the Western Cape Nutrition Society event, held at Stellenbosch University (Tygerberg Campus). Ms Burger also attended the Continuing Nutrition Education (CNE) 2010 event, a CEU activity held by the Nutrition Information Centre, University of Stellenbosch (NICUS) on 13 and 14 May 2010, at the Cape Peninsula University of Technology (CPUT).

Ms Davids attended the Best Laboratory Management Practices Workshop that was held on 20 and 21 September 2010, at the University of Stellenbosch (Bellville Park campus). Ms Davids also attended SABiosciences PCR Arrays Seminar held on 12 October

2010, at the University of Stellenbosch (Tygerberg campus).

Prof. Gelderblom, and Doctors Shephard, Vismer and Rheeder participated in a one-day coordination meeting organised on behalf of the Maize Trust at the University of Stellenbosch. The purpose of this meeting was to discuss current mycotoxin research and possible future collaborations among all role players involved in research or analysis of mycotoxins in maize, with the object of forming a research consortium for funding from the Maize Trust (26 January 2011). Prof. Gelderblom was also invited to be a panel member of the NRF Blue Skies Research Programme in February 2011.

Dr Katerere spent 12 months in the Drug Metabolism and Pharmacokinetics (DMPK) Group at Scynexis in the USA. His main objective was to learn the science, techniques and strategies behind taking new drug candidates from early hit identification through optimisation of potency, pharmacokinetics and safety in preparation for candidate selection, and regulatory safety studies.

Miss Magcwebeba participated in the 4th annual MRC Research Day, held at the MRC's head office in Parow, Cape Town. The title of her poster was 'The in vitro modulation of IL-1 alpha in keratinocytes by *A. linearis* and different *Cyclopia* spp. as a biomarker for early chemoprevention'. Her presentation received the third prize in the PhD category. The Technology and Human Resources for Industry Programme (THRIP) application of Prof. Gelderblom was selected for exhibition at the DTI Technology Awards function, at Gallagher Estate in Midrand on 6 and 7 October 2010. An exhibition of the research was conducted for school children from Tembisa and the general public. The research was runner-up in the small, medium and micro enterprises (SMME) section for the project 'Biological properties – Rooibos and Honeybush tea'. He was accompanied by Ms TU Magcwebeba.

Dr Shephard was invited to participate as a session Chairperson at the 6th Conference of the World Mycotoxin Forum in Noordwijkerhout, the Netherlands, on 8–10 November 2010. During the conference, he, as member of the Advisory Board, attended an Editorial Board meeting of the World Mycotoxin Journal, for which he is section-editor for food, human health and analysis.

The workshop 'Harmonising genetic toxicology testing: Application of short-term cytogenetic assays' was held at the PROMEC Unit from 27–28 August 2010. The workshop was presented by Dr Firouz Darroudi from the Department of Toxigenetics, Leiden University Medical Centre

Science communication and research translation

On 7 May 2010, Hebron Christian School's Grades 6 and 7 visited the PROMEC Unit. The purpose of their visit was to see and experience science in action. Their visit included an introduction to DNA, general microbiology and DNA fingerprinting.

Some PROMEC staff visited two areas (Qolora and Gcina Village) within the Centane district, Eastern Cape (EC) Province on 10–19 August. The purpose of the trip was to visit the Dohne Agricultural Development Institute for collaboration in future projects; visit the EC Department of Health to create awareness of future projects and collaboration; collect *mageu*, *magou*, *mahewu* or *amahewu* recipes from the two areas; meet with the headmen, chiefs and elders in two areas in Centane; report back to volunteers who participated in the study 'Reducing toxic contamination of foods in developing countries by simple intervention programmes'; collect maize samples to test the newly developed multi-mycotoxin analysis method (MycoRed project); and take photographs for future educational material.

A PROMEC Unit exhibition table was displayed at the annual MRC Research Day on 14 and 15 October 2010. The display showcased the multidisciplinary research areas of the Unit. Various goody bags and prizes, sponsored by The Scientific Group, Rooibos Limited and Applied Biosystems, were awarded to attendees at the Research Day.

Dr Vismer was invited to talk at the Society of Medical Laboratory Technologist's (SMLTSA) 7th Annual Academic Day, Fairways Conference Centre, Welgemoed on 18 September 2010.

Prof. Gelderblom published lay articles 'Rooibos health and quality research update' and 'Aspalathin – the key to what make rooibos unique' in *News/Nuus*, the *South African Rooibos Council News* No. 1 and 2 during March and October 2010.

OESOPHAGEAL CANCER RESEARCH UNIT

Director: Prof. Iqbal Parker

Mandate

The MRC/Cancer Association of South Africa (CANSA) Oesophageal Cancer Research Unit is a multidisciplinary group of researchers based at the Universities of Cape Town and Stellenbosch, as well as at PROMEC (MRC). The mandate of this Unit is to investigate the epidemiological factors and molecular lesions in oesophageal cancer.

The Unit's focus areas span several MRC national programmes. Projects managed by the Unit can be grouped into molecular biology, population-based cancer registry and nutritional factors in oesophageal cancer.

Research highlights

The Unit has established a hospital-based oesophageal cancer registry at Groote Schuur Hospital in Cape Town and has started one at Tygerberg Hospital. These registries are essential in linking genetic susceptibility with environmental risk factors. However, in order to conduct risk-factor analysis studies, large sample sizes are required, and so the Unit had to go on an intensive drive to collect patient and normal control samples. To date, our registry contains demographic data and DNA from approximately 1 200 oesophageal cancer patients and 2 000 age-matched control samples with no previous history of cancer.

Previous studies have shown that HPV DNA is integrated into the DNA of more than 30% of oesophageal tumour DNAs. Further analysis on a limited sample size of 200 patients revealed an even more striking association of Epstein Barr Virus (EBV) DNA being present in the DNA of almost 60% of patients. What was even more interesting was the fact that less than 10% of the patients had both HPV and EBV DNA.

The Unit is now investigating the possible infection mechanisms of oesophageal epithelial cells with HPV and EBV via inflammation induced by their associated risk factors such as smoking and alcohol consumption.

Capacity development

Several of the Unit's PhD students were awarded fellowships to present their data at local and international conferences. Siti Kabanda was accepted into a training programme on poverty-related diseases (PRD), funded by an EU-FP-7 project. In December 2010, a two-week laboratory training course was run under the umbrella of the PRD College, in which 18 PhD students from Africa and eight from Europe received training in molecular and immunological techniques. During this time, five leading immunologists interacted with the Unit's students who acted as assistants in the training course. As a result of this training course, one of the Unit's students will spend six months working in the laboratory of Dr Boraschi in Italy. Dr Borashci is an expert on inflammation.

During the course of the year, two of the Unit's collaborators each spent one week at the Unit. Prof. Mathew from Kings College in London collaborates on single nucleotide polymorphism (SNP) analysis with a view to conducting genome-wide association studies on the South African oesophageal cancer cohort. Prof. Grafov from the University of Helsinki in Finland also visited the Unit with a view to developing bio-nanoparticles as drug delivery systems for ajoene-based derivatives. During their visits, they both delivered seminars and the students interacted very closely with them.

The Unit runs several highly focused training courses and meetings on specialised topics in order to bring the leading researchers in these fields to South Africa, so that the maximum number of students can benefit by having access to these people. One of these training courses is the very successful training course that runs every two years under the Advanced Summer School in Africa programme. This programme is modelled on the Advanced Summer School programme in Spetses (Greece) and deals with a number of different specialised topics. The first course in 2008 focused on the molecular and cellular aspects of infection, and the second course in 2010 was on the molecular mechanisms of viral infection and propagation. The course planned for 2012 will be on the biochemical and molecular insights of nutrition and disease. All these courses are particularly relevant to Africa, and have attracted the leading experts in the field who give lectures and interact with the 50 participants who are selected from between 300 and 400 applicants. Students and Postdoctoral Fellows from the Unit receive valuable feedback on their research projects from these interactions.

The Unit continues to rigorously train emerging researchers from previously disadvantaged backgrounds. The aim is to maintain the current level of two to three Postdoctoral Fellows, between six and eight MSc/PhD students and two BSc (Hons) students. The Unit has been very successful in obtaining external funding for its students and it continues to strive to generate the majority of its student bursaries from external sources.

Science communication and research translation

Members of the Unit have presented their data at local and international conferences such as the South African Society for Biochemistry and Molecular Biology, the Federation of African Societies for Biochemistry and Molecular Biology, and the International Union of Biochemistry and Molecular Biology. It has also participated in producing a policy document on health and human well-being in Africa for presentation to African health, science and education ministers.

ONCOLOGY RESEARCH UNIT

Director: Prof. Vikash Sewram

Mandate

The Oncology Research Unit focuses on research that combines the disciplines of cancer epidemiology, clinical biochemistry, analytical chemistry and toxicology, to try and understand the relationship between lifestyle and the environment, and cancer risk. Its research is also aimed at determining the causes of cancers, and in particular, the roles of complementary and alternative medicines in cancer prevention, cancer risk, cancer treatment and cancer management. These studies are early efforts to bridge the gaps in knowledge and familiarity that currently divide the domains of biomedical science research with public health research.

Research undertaken within the Unit cuts across the cancer continuum by:

- understanding the roles of lifestyle, the environment, and the use of plant-based natural products and dietary supplements in cancer prevention, cancer risk, cancer treatment and cancer management
- identifying and developing new therapeutics to stimulate the immune system to attack cancer cells or cancer-causing agents, in order to prevent primary and secondary cancers
- predicting tumour progression and metastatic capacity
- improving existing in vitro diagnostic technology to detect changes that indicate the remission, emergence or growth of tumours
- training scientists, clinicians and other health professionals in cancer research.

Research highlights

The research conducted in the Unit is aimed at describing the epidemiology of cancers, elucidating their risk factors, and studying the role of complementary and alternative medicines (CAM), including African traditional medicines (ATM), in cancer prevention, cancer risk, cancer treatment and cancer management.

Through its research projects, the Unit showed that tobacco smoking and alcohol consumption was strongly associated with oesophageal cancer (OC) in the Eastern Cape (EC) Province of South Africa. The attributable risks of smoking and alcohol consumption were found to be 58% and 48% respectively. This means that if smoking or alcohol consumption were completely eliminated, then 58% or 48% respectively of OCs would be prevented. It was found that dietary patterns also played a major role in OC risk. Consumption of sorghum, green leafy vegetables, legumes, fruits and meat were found to have a protective effect against OC (21–51% reduction in risk).

The Unit also conducted a study to assess the patterns of usage of *ndonya*-containing traditional medicines and determine the hexavalent chrome content in these samples. The aim of this study was to assess human exposure and to establish whether the use of such products contributes to high levels of Cr(VI) exposure in human populations, including populations likely to be monitored in occupational activities that involve exposure to chromium. Cr(VI) is classified as a human carcinogen.

Data generated from these studies have successfully quantified several risk factors for OC in the EC Province of South Africa and have provided unequivocal evidence in cases where previous studies were unable to, because of small sample sizes. Calculations demonstrated the effects that eliminating smoking and alcohol consumption would have on the burden of this disease. The *ndonya* study provided quantitative data on the use of Cr(VI) in traditional medicines that are used as enemas, and greater insight into the reasons for using Cr(VI) in traditional medicines. This hopefully paves the way for recommending a new and safer alternative. The Cr(VI) content of traditional medicines, and consequent likely human exposure, raises questions about other toxic constituents of traditional medicines, including heavy metals, and the need to ascertain which of these pose greater health risks in consumers.

Capacity development

Dr Shen obtained his PhD (medical virology) from UCT. The title of his thesis was 'An investigation into the use of lumpy skin disease virus as a vaccine vector for a potential HIV-1 vaccine'. A number of Master's and Doctoral students at various tertiary institutions are being supervised by the Unit Director.

The Unit staff attended laboratory safety and chemical grades training, hosted by Merck Chemicals, to reinforce their knowledge on laboratory- and chemical-handling safety, and to learn about the globally harmonised system of classifying and labelling chemicals.

Mr Dabula, Senior Research Technologist, attended the course 'An introduction to biostatistics: A short course' hosted by the MRC's Biostatistics Unit and the summer school biostatistics course at the University of Pretoria called 'Basic biostatistics for medical researchers and analysis of biomedical data using Stata'.

The Unit appointed a DST-NRF Intern, Mr Mulangaphuma, who has a BSc (Hons) in pharmacology. He has been trained by the Unit Director, as well as the laboratory staff, on cell culture, fluorescence microscopy, plant extraction, chromatography and in vitro assays to

measure cell proliferation, cell death and DNA damage.

Prof. Sewram delivered a series of lectures to postgraduate students at the Nelson R Mandela School of Medicine and the College of Health Sciences of the University of KwaZulu-Natal. Surgical registrars in the School of Surgical Disciplines registered for his research methodology course. Prof. Sewram also conducted lectures on 'Introduction to cancer epidemiology: Non-communicable epidemiology', at the School of Public Health and Family Medicine at the University of Cape Town. The Unit Director has also been invited to participate in the South Africa Netherlands research Programme on Alternatives in Development (SANPAD) as a facilitator for their doctoral programmes.

The Unit also has a highly active journal club where peer-reviewed articles within the oncology domain are discussed and appraised.

Science communications and research translation

The Statistician-General (SG) called together provincial civil society organisations, government departments and experts from science councils for urgent workshops to finalise the third Millennium Development Goals (MDGs) report for presentation at the United Nations summit in September 2010. Prof. Sewram was invited by the Statistician-General to participate in the workshop and facilitate a focus group in order to discuss and finalise the MDGs report.

The Unit further strives to put research into action through broadened stakeholder collaborations and knowledge exchange, and has entered into collaborations with researchers in India and China to build relations, and enhance scientific exchanges and research outcomes. In response to this study, a newspaper article entitled 'SA and India in joint traditional medicine research' was published in the *Sunday Tribune*, 22 August 2010, after the India delegation's visit to South Africa under the SA/India Inter-Governmental Bilateral Agreement on Cooperation in the Field of Science and Technology.

The Unit Director was invited to deliver several keynote addresses and lectures at the International Conference on Folk and Herbal Medicine, which was jointly organised by the Department of Botany, Mohanlal Sukhadia University, Udaipur and Rajasthan State Medicinal Plant Board in India, the 4th World Ayurveda Congress in Bengaluru India and the International Conference on Herbal Drugs in Belgaum in India. The Unit Director was also invited to deliver talks on cancer awareness at several national organisations and institutions. These collaborations have offered a unique educational opportunity for scientific exchange amongst scientists, oncologists, biotechnologists, pharmacologists and ayurvedic practitioners, to jointly explore the potential and pitfalls of traditional remedies in cancer care.

PUBLIC HEALTH

BURDEN OF DISEASE RESEARCH UNIT

Director: Prof. Debbie Bradshaw

Mandate

The mandate of the Burden of Disease Research Unit is to monitor health status and determinants, and project the future burden of disease, in order to provide planning information to improve the health of the nation. This fits in well with the strategic plan of the MRC, which includes the goal of reducing the burden of disease and the use of burden-of-disease information to make decisions about its research priorities. The research programme of the Unit is largely based on quantitative analysis of secondary data, drawing on the disciplines of epidemiology, demography and statistics, to estimate the burden of disease and the contribution of risk factors.

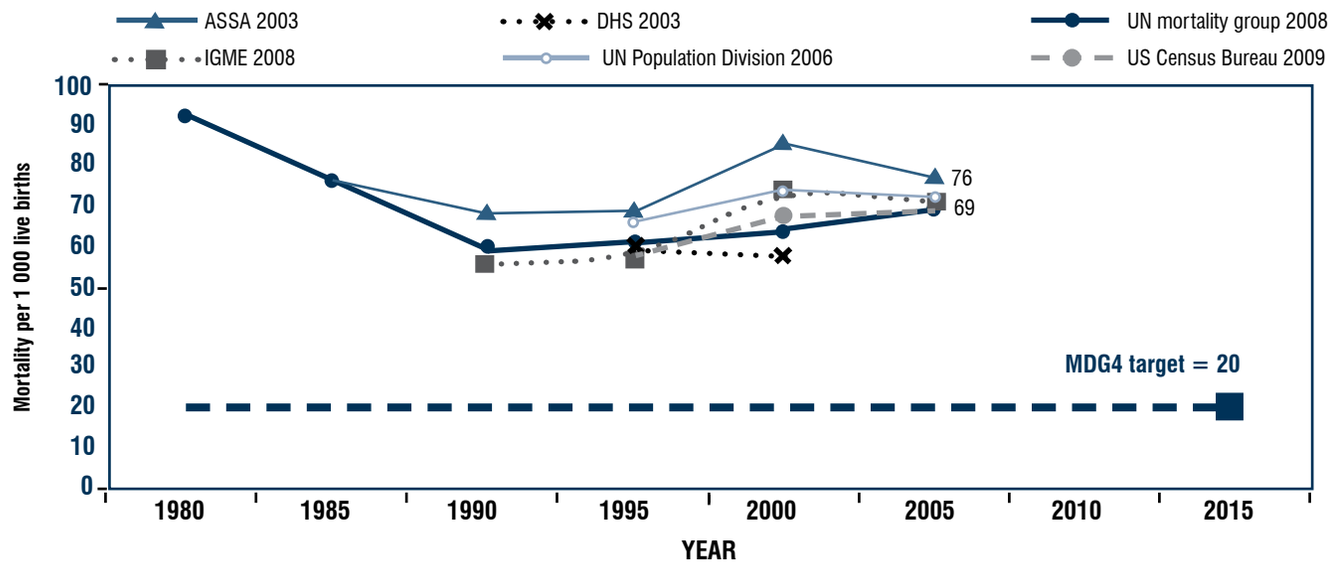
Research highlights

Measurement of maternal mortality: The MDGs have emphasised the importance of maternal mortality as well as the challenge of measuring this key indicator. South Africa has several data sources that the Unit can use to estimate the Maternal Mortality Ratio (MMR), but they provide a wide range of values, for example, a range of between 123 and 700 maternal deaths per 100 000 live births in 2007. A review was undertaken specifically to assess the relatively new method of measuring the MMR from deaths reported by households in censuses and surveys. The analysis by Dorrington and Bradshaw (2011) suggests that some of the variations between the estimates are due to differences in definitions (for example, pregnancy related versus maternal), whether incidental and external causes are included, and errors by researchers in processing data. However, they conclude that in general, pregnancy-related mortality (such as that collected in censuses and household surveys) cannot be treated as being synonymous with maternal mortality.

Three alternative approaches to explore plausible ranges of estimates indicate that there is considerable uncertainty about the estimates, but that the MMR in 2006 was probably of the order of 300 per 100 000 births. The lowest estimate was 181 and the highest was 478 per 100 000 births. These are all lower than the figure of 600 that was given in the South African MDGs report. The review of the estimates also highlights that it is difficult to establish the MMR accurately in a setting where the data are less than perfect.

Nonetheless, all the data indicate an upward trend in maternal mortality until 2006, which is highly correlated with the increase in prevalence of HIV among pregnant women.

Measurement of child mortality: The poor quality of child mortality statistics is a major concern in South Africa. The Unit is undertaking a child mortality review, drawing together information from vital statistics, household surveys, censuses and facility-based data to assess any trends in the empirical data, and how they compare with model estimates. In 1990, the estimated under-five mortality rate (U5MR) for South Africa was 60 deaths per 1 000 live births, so South Africa's MDG4 target is to reduce deaths of under-fives to 20 per 1 000 live births by 2015. However, South Africa is one of the few countries in which the U5MR is stagnant or increasing. By 2005, there was no improvement in the U5MR, as shown by several estimates from different data sources in the graph.



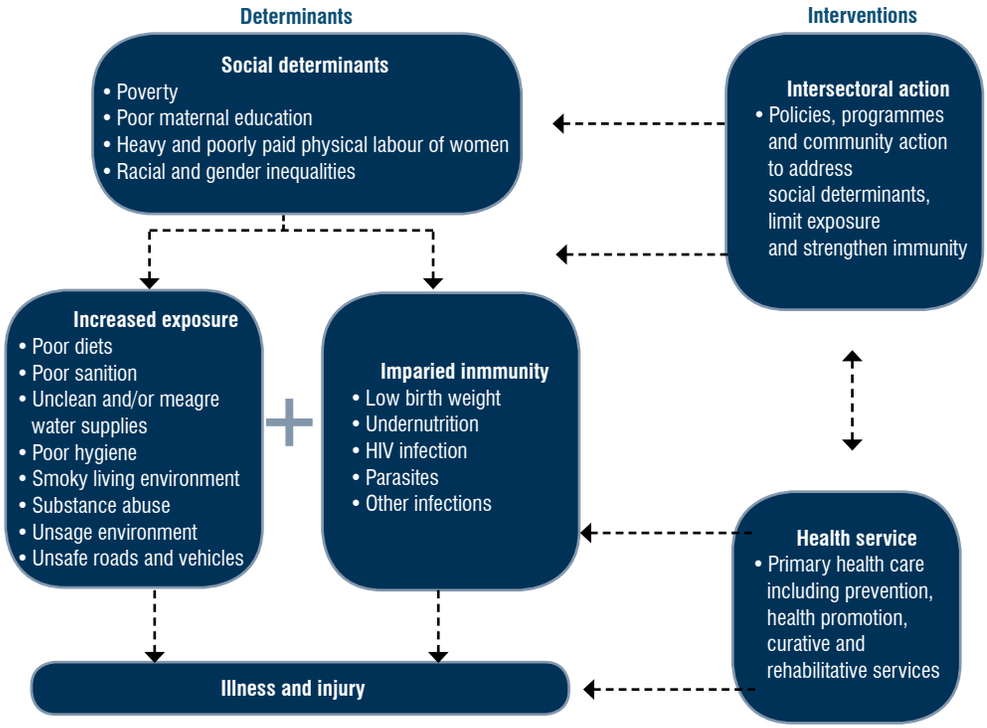
Rate of progress to MDG 4 in South Africa

Adapted from: South Africa Every Death Counts Writing Group (2008) Every death counts: Use of mortality audit data for decision making to save the lives of mothers, babies and children in South Africa. The Lancet, 371: 1294 1304.

Data sources:

- ASSA 2003: (Actuarial Society of South Africa): Dorrington R, Bradshaw D, Johnson L &Daniel L (2006) The demographic impact of HIV/AIDS in South Africa: National and provincial indicators 2006. Cape Town: Centre for Actuarial Research, Medical Research Council & Actuarial Society of South Africa.
- IGME 2008: Inter-agency Group for Child Mortality Estimation (2008) Child mortality database. Accessed 19 June 2010: www.childmortality.org/cmeMain.html.
- DHS 2003: (South African Demographic and Health Survey): Department of Health, Medical Research Council & Measure DHS (2002) South African Demographic and Health Survey 1998. Calverton, MD: Measure DHS.
- UN POPULATION DIVISION 2006: United Nations Department of Economic and Social Affairs, Population Division (2007) World population prospects: The 2006 revision, highlights. Working paper ESA/P/WP.202. New York: UN.
- UN MORTALITY GROUP 2008: (UN Inter-agency Group for Child Mortality Estimation): UNICEF (2008) State of the world's children 2008. New York: UNICEF.
- UN CENSUS BUREAU 2009: US Census Bureau (2009) International Database. Accessed 19 June 2010: www.census.gov/ipc/www/idb.

A rational, effective and sustainable approach to reducing the burden of childhood disease must address, not only the effects and the immediate causes, but also the underlying and basic determinants (or causes) of childhood illnesses. These include a range of factors that result in increased exposure and impaired immunity, as illustrated in the diagram on the next page. Such a comprehensive and integrated response is embodied in the primary health-care approach. While the health sector's role in health promotion, disease prevention, treatment and rehabilitation is vital, many of the determinants of children's health lie outside the direct control of the health system.



The quality of selected child-survival programme data was reviewed, and data inconsistencies between survey data and administrative data were identified and investigated. Routine administrative immunisation data values appear to be higher than survey-based estimates. However, the Unit has not been able to identify why and this could partly be influenced by the system of international incentives aimed at achieving high immunisation levels. In addition, there is currently insufficient data to give reliable provincial information about the nutritional status of children, and information relating to some key indicators, such as the provision of Cotrimoxazole, is not routinely available. The investigation has clearly highlighted the need to strengthen and improve the programmes directed at maternal and child health in South Africa. However, it is apparent that institutional capacities to collect, analyse and utilise routine health data at national, provincial and local levels, urgently needs to be strengthened.

National burden of disease study: A second national burden of disease study is underway. This three-year study aims to examine available epidemiological data and develop coherent estimates of the number of deaths, years of life lost and burden of disease in disability-adjusted life years in 1998, 2005 and 2008. Considerable preliminary work has been done. The multiple causes of death data obtained from Statistics South Africa for 2007 were reviewed, and a shortcoming, in that the current Death Notification Form does not ask for information regarding the manner of death (for example, homicide, suicide or accident), was identified. Discussions with forensic pathologists are needed to explore how this information can be captured in the future. Furthermore, there were multiple indications that doctors need training in cause-of-death certification, and that there is also a need to strengthen coding and application of the Automated Classification of Medical Entities (ACME) in the National Statistical Office. The review emphasises the need to correct the data inadequacies in the registration records, and to calculate coherent burden of disease estimates that can better inform policy makers. The classification of AIDS deaths as deaths due to common co-morbidities of HIV-infection presents a considerable challenge.

Local level mortality surveillance: The Unit has been assisting the Western Cape Provincial DoH in developing local-level mortality surveillance. The system used by the City of Cape Town has been modified and rolled out to the other health districts. A review was published in the *WHO Bulletin* highlighting the achievement of the project and its importance in monitoring geographic inequities in health status. A system for collecting the details about the external causes of death for fatal injuries has been developed to provide a provincial profile of the injury mortality. This system has been integrated into the mortuary management information system. This project also identified several inadequacies in cause of death certification and a programme to improve the quality of the information has been initiated. In particular, has been initiated a programme has been planned to train doctors in medical certification, which will be implemented and evaluated during 2011.

PROMEC cancer register: The MRC has been running a population-based cancer registry in the former Transkei area of the Eastern Cape. It collaborates with 19 health facilities: 11 district hospitals, seven referral hospitals and one regional laboratory, in order to collect information about all new cases of cancer that occur in the area. The analysis of data for the period 1998–2002 shows that the age-standardised rates for all cancers were 73,1 per 100 000 in males and 64,1 per 100 000 in females. The leading top five cancers for males were oesophagus (32,7 per 100 000), lung (5,8 per 100 000), prostate (4,4 per 100 000), liver (4,4 per 100 000) and larynx (2,5 per 100 000), whereas for females they were cervix (21,7 per 100 000), oesophagus (20,2 per 100 000), breast (7,5 per 100 000), ovary (0,9 per 100 000) and liver (0,9 per 100 000). Kaposi sarcoma cases, in spite of the HIV/AIDS epidemic, were relatively low during this period in both males (1,3 per 100 000) and females (0,3 per 100 000). Analysis of the 2003–2007 data is currently underway.

Capacity development

Six members of staff are enrolled for PhDs and one for an MPH. Support was obtained from the Research Capacity Development section of the MRC to enable staff to participate in workshops and conferences. The Unit Director participated in UN-sponsored training on estimating child mortality and WHO-sponsored training in health sector surveillance systems.

Science communication and research translation

Health-seeking behaviour plays a role in diagnosis and was one of the motivating factors for setting up Cancer Information Service (CIS) Units in selected hospitals in the former Transkei region of the Eastern Cape. Four units were established: one each in St Elizabeth, Mthatha, Tafalofefe and Butterworth hospitals, in collaboration with the Eastern Cape DoH, Cancer Association of South Africa and American Cancer Society. The aim of the project was to provide one-on-one interaction to counsel newly and previously diagnosed cancer patients, their families and friends at cancer treatment centres. Information material was developed that included brochures on eating well, stopping smoking, exercise and oesophageal cancer, as well as posters explaining cancer risk factors and the myths surrounding cancer. Oncology nurses were trained in counselling patients. According to participants, there was an improvement in the uptake of treatment. It is envisaged that better survival and an improvement in the quality of life of cancer patients will be achieved.

A presentation on maternal and child mortality was made to the Parliamentary Portfolio Committee on Women, Youth, Children and People with Disabilities.

BIOSTATISTICS UNIT

Prof. Carl Lombard

Mandate

The mandate of the Biostatistics Unit is to advance the health of the nation by applying, developing and promoting statistical methods to the clinical and health research conducted by the MRC. The aims of the Unit are to enhance biostatistical research, and to foster collaborations among researchers, clinicians and biostatisticians within the broad MRC network by providing:

- input into the design of protocols, questionnaires or aspects of data capture, and conducting statistical analyses, statistical reporting and statistical review of technical reports and manuscripts
- appropriate power calculations for estimating sample size that balance clinical and biological limitations, cost, and resource limitations, while maintaining statistical power and efficiency
- methodological developments to enhance the inference of collaborative projects, which is work that frequently forms the basis for postgraduate studies and first-authored publications
- data capture into various databases to ensure the highest level of data quality
- flexible data-transfer software, which can link databases to multiple statistical packages (and vice versa).

Research highlights

TB alliance: Phase IIb trials of the development of a new TB drug: In a phase II randomised-controlled trial (PA824-CI010) in 2007/2008, relatively high doses of a novel compound were tested in a collaborative effort between the Global TB Alliance and the MRC. The Biostatistics Unit was contracted to analyse the early bactericidal activity (EBA) data. Further to this trial, a second randomised-controlled trial (2009) was conducted at lower doses of the novel compound, and again the Unit was successful in bidding to provide the statistical support for this trial. Prof. Piet Becker of the Unit developed the statistical analysis plan for the efficacy parameters. This analysis plan was updated, and in the ensuing data analysis, EBA parameters were calculated using existing formulae that assumed linearity and non-linear regression methods, i.e. piecewise linear regression. The

data analysis of this phase II trial was mainly descriptive in nature. However, although it was not powered for comparative analysis, the latter was also conducted for exploratory purposes. Dose groups were compared using regression, and post-estimation employed Tukey's trend test and Hochberg's step-up approach. Both methods dealt with multiplicity. Contrary to the first high-dose study, in which all doses behaved similarly, in the low-dose study, activity was detected from 100 mg/gk/day. This study was analysed in 2010 and a report was submitted to the TB Alliance during November 2010. Subsequently, the Unit has also been contracted to provide the statistical analysis for a study in which the novel drug TMC207 was investigated in a phase II dose-finding study. Trials on combination therapy of the new compounds are about to start, and the Unit has also been contracted to work on the first of these.

The first South African national PMTCT six-week infant HIV-prevalence survey: This collaborative study with Principal Investigators (PIs) Ameena Goga (MRC), Debra Jackson (UWC) and technical advisor Thu-Ha Dinh (CDC), was the first national study to be undertaken in 2010. The project is funded by the CDC, NDoH and MRC. The aim of this study is to conduct a facility-based survey to monitor the effectiveness of the South African National Prevention of Mother-to-Child Transmission (PMTCT) Programme, with a primary objective to measure HIV-infection rates of early mother-to-child transmission (MTCT) at six weeks postpartum. The Unit developed the sample design. A preliminary report was produced for the Department in December 2010, but the report was finalised in March 2011. The antenatal prevalence observed in this study population will be compared with the national HIV-prevalence results for 2010 when they become available.

Geographical variations in HIV in South Africa from 2007 2009: Dr Manda led a study to look at the geographical variations in risk of contracting HIV in South Africa using multiple diseases joint spatial modelling. The data used were from the South African national antenatal sentinel HIV and syphilis prevalence surveys that were conducted between 2007 and 2009. Understanding this variation is essential for determining districts in which resources for prevention and treatment programmes should be focused. Prof. Carl Lombard collaborated with the DoH on this study and the results have been submitted for publication.

Survey of multidrug-resistant TB in KwaZulu-Natal: The Provincial DoH commissioned a survey of a sample of TB patients from all inpatient and outpatient facilities in KwaZulu-Natal to establish the prevalence of MDR- and XDR-TB at each institution. The Unit sought to determine the distribution of XDR-TB cases in the province in relation to population density.

In this cross-sectional study, the KZN tuberculosis laboratory database was analysed. Results of all patients with a sputum culture positive for *Mycobacterium tuberculosis* from January 2006 to June 2007 were included. Drug-susceptibility test results for isoniazid, rifampicin, ethambutol, streptomycin, kanamycin and ofloxacin were available for all patients, as well as the location of the hospital where their clinical diagnosis was made. The Unit managed the data in order to convert the routine laboratory data into a research database and performed the analysis.

In total, 20 858 patients attending one of 73 hospitals or their adjacent clinics had cultures positive for *M. tuberculosis*. It was found that XDR-TB is present in KZN. More than 65% of all diagnosed MDR-TB cases, including XDR-TB patients, were left untreated and likely remained in the community as a source of infection.

Capacity development

Statistical model formulation for linkage analysis in genetics: Ms Galal graduated with an MSc (with distinction). The title of her thesis was 'The statistical theory underlying human genetic linkage analysis based on quantitative data from extended families'. Her supervisors were Professors van der Merwe (MRC) and Blignaut (UWC). The aim of her research was to explain, in a unified and statistically comprehensive manner, the theory involved in analysing quantitative trait genetic data from extended families. The focus was on linkage analysis – what it is and what it aims to do.

Ten staff members from the Unit attended the annual South African Statistical Association (SASA) Conference at Northwest University, Potchefstroom, in October 2010. A total of nine oral presentations were made and seven workshops were attended. Ms Trishanta Padayachee, an MSc intern from the Cape Town office, was awarded the second prize at the 2009/2010 SASA student project competition, which is sponsored by SASA. She completed the first year of her Masters at the University of Stellenbosch and her internship contract was extended into 2011.

Dr Kabera was awarded his doctorate in 2010 from the University of KwaZulu-Natal (UKZN). He is continuing his work on the analytical construction of D-optimal designs for the two variable binary logistic models. This involves writing publishable papers, and exploring extensions and applications in medical fields of the theoretical results that emerged from his thesis. This research is being conducted in collaboration with Professors Principal Ndlovu of the University of

South Africa and Linda Haines of the University of Cape Town.

Dr Lombard was involved in a Technology, Research, Education and Technical Assistance for Tuberculosis (TREAT-TB) Operations research programme funded by the UNION (TB) through the Desmond Tutu TB Centre at Stellenbosch University. Research teams from each provincial DoH supported the development of a research protocol for ethical approval and funding. Dr Lombard also presented three workshops and acted as statistical facilitator at the annual Eding International Science Festival in Polokwane, Limpopo Province. The Unit was represented by Ms Gwebushe from the Cape Town office and Ms Masenyetse from the Pretoria office.

Science communication and research translation

Dr Lombard was the official statistician on a series of cluster-randomised trials being conducted in the primary-care clinics of the Free State. As the statistician, Dr Lombard was responsible for the study design, interim monitoring and analysis. Two publications in 2010 highlight the benefit of this intervention – the impact on the TB-treatment programme and its cost effectiveness. The STRETCH trial (nurse initiation of ARV in appropriate patients), which is funded by the UK-MRC, ended in June 2010.

The NDoH looked at the evidence of these studies using outreach training. From April 2010, this was accepted as the mode of training for staff in primary-care clinics throughout South Africa. A large contract was signed with the Knowledge Translation Unit from UCT who developed the training programme, to set up the national programme. The training focus will be the Practical Approach to Lung Health and HIV/AIDS in South Africa (PALSA PLUS) integrated care guidelines.

The basis for these trials is the data warehouse that was designed and guided by Dr Seebregts and his division from 2000–2005, because the trials use the clinical administrative databases of the Free State DoH.

The STRETCH intervention was implemented in the Free State in July 2010 with roll out pending in the rest of the country.

Dr van der Merwe was involved in updating the Cochrane systematic review titled 'Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection'. The WHO needed the information to determine a new policy. You can view changes on policy that the Unit has contributed to, at http://www.who.int/hiv/pub/mtct/antiretroviral2010/en/index.html.

SOUTH AFRICAN COCHRANE CENTRE

Co-directors: Prof. Jimmy Volmink and Dr Nandi Siegfried

Mandate

The mission of the South African Cochrane Centre (SACC) is to prepare and maintain systematic reviews of the effects of health-care interventions, and to promote access to and the use of evidence from systematic reviews in health-care decision making throughout sub-Saharan Africa. The objectives of the SACC are to:

- increase the number of high quality, up-to-date Cochrane Reviews relevant to the African region
- promote access to Cochrane Reviews and derivative products in countries for which the SACC is the reference Cochrane centre
- promote evidence-based practice and policy in the African region
- promote the science of research synthesis
- promote the optimal functioning and sustainable growth of The Cochrane Collaboration.

In addition to the above objectives, the SACC also serves as a distributing agent of *The Cochrane Library*.

Research highlights

Cochrane reviews: Nine Cochrane Reviews, which were either led or co-authored by SACC staff, were published in *The Cochrane Library* in 2010. Dr Taryn Young was invited by the publishers of *The Cochrane Library* (Wiley & Sons) to produce a podcast on the review she conducted on 'Home-based care for reducing morbidity and mortality in people infected with HIV/AIDS'. Certificates for the top-cited review for Review Groups in 2009 were awarded to Prof. Volmink and Dr Siegfried for their review on 'Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection' and Ms Elizabeth Pienaar for her review on 'Effectiveness of brief alcohol interventions in primary care populations'.

In addition, the Centre is involved in a number of initiatives to build capacity in the conduct of Cochrane Reviews that are relevant to our setting, such as the HIV/AIDS mentoring and the Reviews for Africa Programmes.

WHO antiretroviral therapy guidelines: The SACC was invited to provide the evidence base for the WHO guideline 'Recommendations for a public health approach'. This project required updating existing Cochrane Reviews. Dr Siegfried led reviews on 'Optimal initiation of ART' and 'Interventions for reducing the risk of mother-to-child

transmission of HIV'. These reviews were incorporated into the *WHO Rapid Advice*, released in November 2009 with the final revision being published in July 2010.

The Academy of Science of South Africa: Dr Siegfried and Prof. Volmink were members of The Academy of Science of South Africa's 13-member consensus panel that produced a peer-reviewed report entitled 'Revitalising clinical research in South Africa: A study on clinical research and related training in South Africa'. The report was presented to the Minister of Science and Technology in July 2010, and a workshop was held in October to discuss the way forward.

Pan-African Clinical Trials Registry (PACTR): The PACTR, hosted at the SACC, is a prospective registry of clinical trials conducted in Africa and the only WHO-endorsed Primary Registry on the continent. To date, 88 applications have been received. We were invited by the WHO to develop a strategy aimed at increasing clinical trial activity amongst child participants in Africa.

Capacity development

A core function of the SACC is to conduct training and provide support to Cochrane authors in 25 African countries. To ensure our staff are kept abreast of new Cochrane methodologies, a training course was held on Cochrane diagnostic test accuracy reviews. In addition, all staff attended in-house training on facilitation skills.

Other initiatives include a monthly journal club where staff present a critical appraisal of a published paper or clinical trial, and a monthly systematic review problem-busting session, where staff and Cochrane authors support each other in the conduct of Cochrane Reviews and in understanding the evolving methodologies behind systematic reviews.

The SACC encourages its staff to develop new skills, and in this reporting period, seven staff members attended various training courses such as enhanced library sciences skills and analysing health policy.

Staff presented seven posters and 10 oral presentations at a number of local and international conferences. Ms Amber Abrams was awarded first prize in the PhD oral presentation category at the MRC Research Day, where she described the current status of the PACTR's maternal- and child-related trials.

Science communication and research translation

The SACC works with clinicians and policy makers to promote evidence-informed policy and practice in the African region. In 2010, the Centre was invited by the Programme to Support Pro-Poor Policy Development in the Presidency, South Africa, which aims to improve the ability of policy makers to formulate policies, to contribute to a workshop to sensitise high-level policy makers in using best evidence in policy making. Following this, staff co-facilitated a workshop on the conduct of rapid-evidence assessments to respond to the needs of policy makers in a timely manner.

The Centre collaborated with the Southern African Regional Programme for Access to Medicines and Diagnostics, by providing technical support for a report on a baseline analysis of available clinical practice guidelines within the southern African developing community. We evaluated the availability, quality and content of guidelines relating to five priority diseases, namely HIV management in adults, malaria treatment in adults and children, pre-eclampsia, diarrhoea in children, and hypertension management in primary care. This study formed part of a larger study that was funded by the UK Department for International Development. The larger study addressed equitable access to medicines and diagnostics through regional harmonisation of guidelines and essential medicine lists to ensure best regional procurement practices.

Prof. Volmink chaired the Western Cape Health Research Committee (he has since resigned from this position), whose goals are to:

- inform and facilitate the process of priority setting, and to develop and continuously review health research priorities
- facilitate the conduct of relevant research
- aid the mobilisation of resources for research undertaken
- advise on translating health research findings into policy documents and service provision at all levels of the health-care system
- develop and implement a capacity-building strategy to strengthen research capacity in the province, in collaboration with research stakeholders.

HEALTH POLICY RESEARCH UNIT

Director: Prof. Laetitia Rispel

Mandate

As a multi-disciplinary research organisation, the Health Policy Research Unit (HPRU) seeks to contribute to excellence in health policy and health economics research, and to be a critical participant in health policy processes. The Unit's primary objectives are to:

- conduct research that advocates and promotes policies in support

of equity and social justice in health
- support and engage with a variety of stakeholders to promote appropriate health policy analyses
- provide learning opportunities, which build and strengthen capacity in health policy/health economics research and analysis
- advance the field of health policy by developing meaningful national and international partners.

Research highlights

HPRU staff members published 12 articles in peer-reviewed journals, in addition to nine technical reports and two book chapters.

The Unit's work featured prominently at local and international conferences. During the past financial year, significant conferences included the First Global Symposium on Health Systems Research: Science to Accelerate Universal Health Coverage, which was held from 16–19 November 2010 in Montreux, Switzerland, and the Public Health Association of South Africa (PHASA) conference in East London in December 2010.

Prudence Ditlopo, Nonhlanhla Nxumalo and Bronwyn Harris obtained part funding from the Carnegie Foundation, which enabled them to focus on their PhD studies.

The Unit reached an agreement with the *Journal of Public Health Policy* (JPHP), which is the official journal of the World Federation of Public Health Associations (WFPHA) on producing a special journal edition that will celebrate more than two decades of the existence of the HPRU. This special edition will comprise five commentaries and 10 papers, the majority of which will be authored by our staff. The edition will present a rare opportunity to provide an academic overview of health-sector transformation and the role of the HPRU. We anticipate that the publication will be launched during 2011.

In December 2010, HPRU was awarded a grant by the Rockefeller Foundation Bellagio Committee to organise a workshop on social inclusion and the right to health in Bellagio, Italy. This is a very prestigious award, which is granted only after a very competitive process.

Capacity development

The capacity development activities of the Unit are both internal, in relation to staff employed within the HPRU, and external, in relation to formal and informal teaching activities that reach a wider group of people in South Africa.

Through our external teaching activities at undergraduate and postgraduate levels, the HPRU supports knowledge and skills development in the field of health policy and systems research more broadly. The HPRU has academic responsibility for the Wits Masters in Public Health (MPH) in the health policy and health systems field of study. We also supervise or co-supervise more than 30 postgraduate students in the school.

We were a hosting institution for two NRF Interns: Keneilwe Motsotsi and Tshipfularo Ndou, from 1 April 2010 until 31 March 2011. Another two Interns were placed with us on 1 April 2011.

Science communication and research translation

New research techniques: The Centre for Health Policy (CHP) is at the forefront of conceptual and methodological development in health systems and policy research, often using a combination of qualitative and quantitative methods. In addition to macro- and micro-policy analyses, the range of methods include qualitative methods (for example, ethnographic research, discourse analysis, life histories/narratives, in-depth interviews and focus group discussions) and quantitative methods (for example, discrete choice experiments, experimental economics, the use of respondent-driven sampling for hard-to-reach populations, benefit incidence analysis and equity analysis).

Participation in health policy development processes: Prof. Rispel was a member of the Political Leadership in Health Programme, funded by the Kaiser Family Foundation and Atlantic Philanthropies. The Programme aims to support planned health-sector reforms through capacity enhancements of the current health political leadership. This Programme acted as a catalyst for a renewed impetus of the Ministry of Health to revitalise primary health care in South Africa. The HPRU researchers were requested to consult on the revised package of primary health-care services in South Africa. A technical report was prepared and it has fed into the revised model on primary health-care service delivery in South Africa

In May 2010, Jane Goudge and Laetitia Rispel participated in a round-table on public/private partnerships in health, which was coordinated by the Centre for Development Enterprise and the Aurum Health Institute. In July 2010, Laetitia Rispel was invited to present at a monitoring and evaluation workshop of the Atlantic Philanthropies on proposed research priorities. The work will be fed into the funding priorities of Atlantic Philanthropies over the next five years.

Four staff members (Duane Blaauw, Prudence Ditlopo, Pascalia Munyewende and Laetitia Rispel) participated in the September 2010 workshop, at which the WHO's recommendations on increasing access to health workers in remote and rural areas were launched.

HEALTH SYSTEMS RESEARCH UNIT

Director: Prof. Charles Hongoro

Mandate

The mandate of the Health Systems Research Unit is to provide leadership in the field of effective health-care services and systems in South Africa, by undertaking interdisciplinary scientific research to identify effective interventions and policies, by developing research methods, and by promoting the adoption of effective interventions. The objectives of the Unit are to:

- develop and evaluate interventions that promote evidence-based health-care provision
- further develop the research methodologies
- promote the development of research capacity.

Research highlights

South African prevention of mother-to-child transmission evaluation (SA PMTCTE) study: During this reporting period, the Unit conducted a facility-based national evaluation of the SA PMTCT programme, which was funded by the CDC. This work was carried out in 580 facilities and involved 10 802 mother-infant pairs. The aim of the study was to determine the HIV prevalence and mother-to-child transmission of HIV at six weeks of age, thus assessing the effectiveness of the antenatal and intra-partum aspects of the SA PMTCT programme. In 2011, the six-week SA PMTCTE was repeated, and HIV-negative exposed infants will be followed up to determine their outcomes at 6, 9, 12 and 18 months of age. Outcomes measured include HIV prevalence, HIV transmission, measuring associations with transmission in an operational context and measuring uptake of PMTCT services. South Africa may be the first country to conduct such a survey at a national level, and its contribution will include the methodology employed to measure PMTCT impact on a broad level and operational effectiveness of PMTCT in an African context.

An evaluation of a provider-initiated HIV testing and counselling (PITC) intervention for patients with sexually transmitted infections in Cape Town, South Africa: This study examined the impact of a PITC intervention on HIV-test uptake rates, access to HIV care, the extent to which ethical principles were upheld in HIV-care implementation and the factors that underlie the implementation of the intervention. Four sub-studies were conducted as part of an impact and process evaluation using a mixed-method approach that included a controlled trial and qualitative investigations. The main findings on the impact of the PITC were that it had three successes: it significantly increased the offer of HIV testing, the uptake of testing and the consistency of clinic performance with respect to testing uptake as compared to sites with voluntary counselling and testing (VCT). The study found no differences between PITC and VCT sites in the proportions of HIV-positive patients with sexually transmitted infections (STIs) who accessed follow-up care for HIV. Providers met the ethical requirements for obtaining informed consent, although there were challenges in effectively integrating informed consent into standard practice. Patients understood that the testing was voluntary. Routine implementation of PITC intervention was facilitated by appropriately adapting the PITC design and effectively re-allocating tasks that resulted from strong leadership, participative planning, operational support and continuous monitoring. The study concluded that PITC appears to be an effective, feasible and acceptable intervention for increasing HIV-test uptake in a busy primary health-care setting in Cape Town. The research makes practical recommendations for strengthening efforts to expand HIV testing and access to HIV care in high HIV-prevalence and resource-constrained settings.

'Options for health' is an evidence-based intervention that has

been shown to be successful in reducing sexually risky behaviour among people on ARV treatment in the United States and KwaZulu-Natal, South Africa. In collaboration with the Provincial and City of Cape Town Departments of Health, our aim was to strengthen the counselling service available to people receiving ARV treatment by training lay ARV-adherence counsellors to use the 'Options for health' intervention with their patients, to reduce sexually risky behaviour and optimise ARV adherence. Based on the principles of motivational interviewing (MI), the 'Options for health' intervention represents a significant shift in the counselling techniques for lay counsellors, and as such, an evaluation was conducted in order to determine the ability of lay counsellors to implement the intervention. As a part of this evaluation, we identified weaknesses in the current clinic-based counselling system and recommended that they be addressed in order to make the service of greater value to patients and the provincial ARV treatment programme. Our evaluation of lay counsellors' ability to implement the 'Options for health' will determine the feasibility of training lay counsellors to use techniques based on MI in their everyday practice.

Capacity development

The Unit has 16 staff members that are registered for postgraduate studies. Our scientists are involved in teaching and supervising these staff members, as well as external students from local partner universities.

Our transformation plan seeks to ensure that we have increasing numbers of senior staff from previously disadvantaged backgrounds, and so four PhD interns from these backgrounds were put on staff establishment in this reporting period (one on baseline and three on contracts). The strategy is to have a pipeline of junior staff that will occupy senior management positions in the future as part of the core staff of the Unit.

Our capacity-building activities extend beyond academic training, and include training for research and health systems strengthening. With regards to strengthening research, 82 nurse data collectors were trained in dried blood spot polymerase chain reaction (DBS PCR) (early infant HIV diagnosis), and routine health-care providers in the 580 facilities that were visited, were trained in infant diagnosis (heel pricks for DBS PCR) during the SA PMTCT study. Health workers at district, provincial and national levels were trained in integrated district and provincial planning, using tools such as expenditure reviews and human resource-planning models, quality assessment and improvement, and monitoring and evaluation at PHC level.

Science communication and research translation

As part of the Unit's drive to ensure that research results are applied in health systems improvement interventions, two staff members were seconded to the NDoH to assist with developing and applying quality assessment and improvement tools, establishing the Office of Health Standards Compliance (OHSC), and developing health financing reforms that seek universal coverage and financial risk protection in the health system. It is worth noting that not only were these tools developed using empirical evidence, but they were applied in the field by health workers at various levels that were trained to use these tools. The Unit was involved in re-engineering the PHC process and contributed by developing user-friendly human resources for health (HRH) planning tools, and costing and setting norms and standards at that level. Our scientists were involved in various technical committees locally (at national and provincial levels) and internationally in the fields of HIV/AIDS, TB, maternal and child health, human resources for health, health financing, and health systems development, amongst others.

Systematic reviews of health systems interventions remain a key part of our work, which saw a paper entitled 'Translating research into policy: Lessons learned from eclampsia treatment and malaria control in three southern African countries' win a BioMed Central (BMC) research award in this reporting period. Our close collaboration with the Practihc Policy Group has allowed our scientists to participate in producing policy briefs and systematic reviews in areas of local and international public health importance. Furthermore, the Unit published several papers in peer-reviewed journals, book chapters and technical reports for local and international clients. Staff members attended international and local conferences to present papers and sometimes as keynote speakers.

MRC/WITS RURAL PUBLIC HEALTH AND HEALTH TRANSITION UNIT

Director: Prof. Stephen Tollman

Mandate

The MRC/Wits Public Health and Health Transition Unit strives to better understand the dynamics of health, population and social transitions in rural South (and southern) Africa, in order to mount a more effective public health, public sector and public response. The research framework of the Unit covers three closely linked spheres of work: measuring and monitoring, investigating and responding to health, and population and social transitions in South (and southern) Africa.

Research highlights

Central to all research in the Unit is the Agincourt health and socio-demographic surveillance system, which serves as the scientific foundation for a programme of advanced research and intervention studies. The annual 2010 census update was the 18th successfully completed round. This census covers the life course of some 85 000 people in 25 rural villages. Monitoring tools assess the progress and quality of field work, a barcode scanning system tracks survey forms, and 'real-time migration reconciliation' tracks people's movement within the study area.

The process of linking population data with patients' clinical records began in 2008 and 2009, with several hundred patient records linked to population records through fingerprints. This led to an algorithm based on names, birth dates and villages, which has now been verified on a larger sample of patients. There will be future roll out to clinics within the sub-district.

A conditional cash transfer project, called *Swa Koteka* ('It's possible'), has led to a significant increase in the complement of staff within the Unit. The MRC/Wits Agincourt study site was approved as an National Institutes of Health (NIH) Division of AIDS (DAIDS)/ HPTN clinical trial site (number 31686), and full preparation, including piloting, was accomplished in this reporting period. This study seeks to determine the effects of a multi-level HIV prevention intervention to

jointly address structural and social factors that contribute to young women's increased vulnerability to HIV, by transferring cash to the families of young women on condition that they attend school.

In this reporting period, funds were obtained from the UK MRC to conduct the baseline survey for project *Ntshembo* (July–December 2011, with follow-up assessments over five years). In collaboration with Birth-to-Twenty (SA); Oxford and Cambridge Universities (UK); Umeå University (Sweden); the University of North Carolina, Chapel Hill (USA); and the International Network for the Demographic Evaluation of Populations and Their Health (INDEPTH), this project aims to promote adolescent health as a critical pathway to improve intra-uterine and infant growth, and thereby interrupt the inter-generational transfer of metabolic diseases and HIV/AIDS.

The end-of-intervention survey for the Kulani Child Health and Resilience Project took place in October 2010. This school-based intervention by the NGO, Soul City, sought to provide emotional and social support to pupils aged between 10 and 12 years, to enhance their ability to cope and learn in an environment of chronic adversity. We have started analysing baseline data and have completed analysing the qualitative data on school management systems.

Surveillance of severe acute respiratory infection (SARI) and rotavirus diarrhoea at four sentinel surveillance sites commenced in 2009, and data collection continued throughout this reporting period. This project will reflect the efficacy of the recent introduction of rotavirus and pneumococcal vaccines into the national expanded programme on immunisation.

Under Agincourt Unit leadership, and in collaboration with the INDEPTH, eight sites (Ifakara (Tanzania), Nairobi (Kenya), Navrongo (Ghana), Matlab (Bangladesh), Purworejo (Indonesia), Filabavi (Vietnam), Vadu (India) and Agincourt) applied a short version of the WHO study on global ageing and adult health (SAGE) instrument, adapted to routine surveillance, in adults 50 years and older, in order to assess baseline measures of physical and cognitive function, and establish cohorts of older adults in African and Asian settings. During the 2010 census update, a second round of data on adult health and ageing was collected. The data included a module on health-care utilisation. Data entry has been completed, and we will analyse it during 2011 and compare it with data from the SAGE survey in 2006.

In September 2010, a special journal issue, *Global Health Action* (Supplement 2) was published, with Professors Tollman and Kahn as guest editors, and launched at the October INDEPTH Scientific and Annual General Meeting in Accra, Ghana.

In this reporting period, and in collaboration with the Wits School of Public Health, and Colorado and Washington Universities, USA, fieldwork commenced on an HIV/non-communicable diseases (NCDs) prevalence study to measure HIV prevalence, biomarkers for NCDs, physical measurements including blood pressure and anthropometry, and lifestyle and sexual risk behaviours.

Capacity development

In July 2010, a capacity-building workshop on the burden of disease and health economics methods was arranged by the Priority Cost Effective Lessons for Systems Strengthening (PRICELESS) Initiative in collaboration with the University of Queensland. The Unit runs an annual on-site Masters course on Applied Field Epidemiology, which is taken by MSc Epidemiology and MA Demography students at Wits University. Several Masters and Doctoral students conduct their research within the Unit.

To enhance our research collaborations, and to make data more widely available, the Unit has developed the ability to share research documents online, using secure software. Sharepoint was developed in this reporting period and will be implemented later in 2011.

A priority of the Unit has been to increase our capacity to respond to requests for data from the Health and Socio-Demographic Surveillance System (HDSS). The data section thus has its own dedicated website: http://www.agincourt.co.za/DataSection.

A new server has been installed (funded by Wits University), which enhances analytical capacity and supports data archiving and Sharepoint. The data section hosted two Masters students in this reporting period, as well as providing datasets for student supervisors who then nest Masters students into the work.

Science communication and research translation

Sharing data internationally is a recent development in science. This Unit is one of 10 sites from Africa and Asia that participate in the INDEPTH ishare initiative. The ishare repository has been established and can be found at http://www.indepth-ishare.org/.

In this reporting period, researchers from the Unit contributed 20 articles and two commentaries in peer-reviewed journals, two book chapters, 15 keynote or plenary addresses, and 15 oral presentations or posters at conferences.

A partnership with the NDoH Directorate Chronic Diseases, Disabilities and Geriatrics has been established to develop, implement and test an integrated chronic disease package at primary care level. Prof. Tollman and Dr Gómez-Olivé serve on the Provincial Research Ethics Committee, and in this reporting period, the Unit was invited to join the Research Forum for the Office of the Premier, Mpumalanga. This provides a beneficial link to the Provincial StatsSA Office and Research Office of the Department of Social Development.

HEALTH PROMOTION

ALCOHOL AND DRUG ABUSE RESEARCH UNIT

Director: Prof. Charles Parry

Mandate

The mandate of the Alcohol and Drug Abuse Research Unit is to generate knowledge, and propose policy and other interventions that will reduce alcohol and other drug (AOD) abuse, and the burden of AOD abuse experienced by individuals and society at large. Key objectives include:

- measuring the prevalence of AOD use and associated consequences, and trends in AOD use and consequences over time
- identifying current and future risks, and protective factors for substance abuse (especially in high-risk groups)
- designing and evaluating appropriate preventative and other interventions
- facilitating the implementation of research findings by supporting advocacy efforts, and providing information that will allow policy makers, service providers and community representatives to make informed decisions
- undertaking research that will improve the methods for assessing the prevalence of AOD use and associated consequences, and evaluating the effectiveness of interventions.

Research highlights

A prospective study investigated the association between lifetime methamphetamine and other drug use, and school non-attendance in a sample of 1 535 high-school students in Cape Town. Of the students surveyed at baseline, 43% did not complete the follow-up questionnaire after 12 months. Lifetime methamphetamine use, in addition to other substances, was significantly associated with school non-attendance. We concluded that early identification of students with methamphetamine and other substance-use problems, and a supportive rather than punitive school policy, may be valuable in improving high-school completion and student retention rates.

Less than half of the facilities surveyed provided HIV counselling and testing (HCT) services to clients or test clients for co-occurring infectious diseases. Less than one-third conduct harm-reduction interventions among injection drug users, and opioid substitution treatment (OST) is largely unavailable. Few substance abuse services routinely monitor client outcomes. In order to address gaps in the availability of HIV risk-reduction services, our recommendations include providing HCT to all patients attending drug treatment services, rolling out the provision of OST to selected heroin users and piloting harm-reduction services for injection drug users. Furthermore, we recommended that a national minimum dataset of indicators for measuring intervention outcomes is developed and pilot tested.

FACT: Alcohol is the most commonly abused drug in South Africa, followed by dagga and the dagga/mandrax combination.

The aim of another project conducted by the Unit is to design and implement an intervention to enhance health-care providers' capacity to reduce alcohol-related non-adherence to ART. Almost all of the 313 ART recipients interviewed at two sites in the Tshwane municipality felt that there was a need for additional interventions that focused on alcohol use and ART adherence. They stressed that interventions should also include an emphasis on cigarettes and dagga, should consist of two group sessions of one hour each, and take place at HIV clinics.

The Unit initiated a further project in the Tshwane municipality to determine whether implementing an HIV-prevention intervention in bars is feasible and acceptable to bar clients, and if so, the extent to which the HIV-prevention services are utilised. A programme was designed that had on-site trained servers to encourage responsible drinking and reduce sexually risky behaviour among bar patrons. The programme also had trained bar patrons to serve as peer educators and leaders, and on-site professional counsellors to provide education, counselling, and referrals to outside counselling and treatment services. Magazines, booklets with prevention messages and information, and condoms were also provided. From the study, we found that the counsellor sub-component of the intervention was acceptable and feasible, and levels of uptake over the six months were higher than expected. Owners and managers were also supportive of the intervention, but the server intervention sub-component was not taken up fully by the bar staff due to their lack of time and interest. The peer sub-component of the programme was also successfully implemented. Several of these projects were funded by the CDC.

Capacity development

Staff in the Unit received training in biostatistics, qualitative data analysis, research methods, manuscript writing, good clinical practice, project management, motivational interviewing, monitoring and evaluation, and conducting Cochrane Reviews. Two external PhD students are being supervised, one of whom recently handed in her dissertation. Staff provide training to NGOs, field and outreach workers, and students. Other research capacity development activities include reviewing journal articles, theses/dissertations, a research proposal submitted to the MRC, and an NRF-rating application.

Science communication and research translation

Unit staff gave direct input into several important policy processes including:

- giving a presentation on epidemiology networks at an African Union expert meeting, which fed into a briefing document that formed the basis of the regional drug strategy that was agreed during the 4th session of the AU Conference of Ministers for Drug Control and Crime Prevention in Addis Ababa in September 2010
- preparing a briefing on alcohol policy to the Mental Health and Substance Abuse Directorate at the NDoH that was used to brief the Minister of Health prior to the World Health Assembly (WHA) in Geneva in May 2010
- giving a presentation at an NDoH inter-provincial meeting on the HIV and AIDS life-skills education programme that informed recommendations about best practices and approaches for conducting school-based interventions for substance abuse
- giving a presentation at a national consultation meeting arranged by the National Treasury on raising the benchmarks for alcohol excise taxes, which is being used to guide policy changes in this area
- giving a presentation to directorate heads at the NDoH on the departmental mini-drug master plan and inter-sectoral alcohol strategy that we were contracted to develop
- giving input into a speech on alcohol advertising being prepared for the Western Cape MEC for Social Development
- providing input into the 2010 Gauteng Liquor Act
- providing written input to the Department of Trade and Industry (DTI) on measures to reduce alcohol-related problems in and around football stadiums, which contributed to policies that were adopted such as the need to use plastic containers
- commenting on the City of Cape Town's draft alcohol/drug strategy for 2011–2014
- writing an opinion editorial piece for the *Argus*, which guided the City of Cape Town's policy on limiting the hours for liquor sales.

Staff also participated in and consulted on the Soul City Phuza Wize campaign by providing input on evidence-based strategies for alcohol and violence prevention, and also co-authored a briefing document on alcohol and non-communicable diseases, which is being fed into the UN General Assembly high-level meeting on non-communicable diseases in September 2011 in New York, via the WHO African Regional Ministerial Consultation meeting in Brazzaville in April 2010, and other avenues.

HEALTH PROMOTION RESEARCH AND DEVELOPMENT UNIT

Director: Prof. Priscilla Reddy

Mandate

The mandate of the Health Promotion Research and Development Unit is to conduct innovative research to develop, evaluate and disseminate effective behavioural, social, environmental and economic interventions to prevent disease and illness by reducing behaviours that place people at risk, by increasing protective behaviours. Interventions should address the social and cultural contexts within which risks occur, for example, social class, gender, race, culture, age, education, ethnicity, disadvantage and exposure to prejudice. The research conducted by the Unit is informed by founding documents on health promotion, the Alma Ata declaration, the Ottawa Charter, WHO documents on Essential National Health Research (ENHR), the National Health Plan and the Millennium Development Plan (UN).

Research highlights

In this reporting period, we launched the results of the second South African youth risk behaviour survey.

Dr Sifunda was invited to be part of the panel of scientists who were involved in the Academy of Science for South Africa (ASSAf) National Science Week activities and delivered a presentation at the Durban University of Technology

The Unit conducted the out-of-school youth risk behaviour survey, which is a study that has never been conducted anywhere else in the world.

A successful grant application was made to conduct research on responsible womanhood in the Eastern Cape.

The initiation and circumcision study: As a result of five years of research conducted by the Unit, men's health and behaviour research has emerged as an important area of work, especially in preventing STIs, including HIV and AIDS. To this end, the Unit spearheaded the signing of a Memorandum of Understanding with the Eastern Cape House of Traditional Leaders (ECHOTL) after hosting a workshop to gain an understanding of the determinants of men's health and behaviour. The MRC and the ECHOTL held additional talks to establish research priorities for the Eastern Cape. A joint decision was made to conduct research in male initiation, including circumcision and the cultural norms and behaviours that are associated with this age-old practice. The first study involved pilot and preliminary work to gain an in-depth understanding into the determinants of male initiation, and male circumcision and practices. As this is pioneer work, the initial phase involved developing valid measurement instruments. The initial target group included *abakwetha* (male initiates), *iingcibi* (traditional surgeons), *amakhankatha* (traditional guardians) and parents of *abakwetha*.

This pilot study involved distributing a questionnaire in IsiXhosa among 114 male initiates from the rural areas of Butterworth, Mount Ayliff, Mount Frere and Ntabankulu, in December 2006. These pilot data should result in a valid research instrument that will then make up part of a series of planned studies.

Following the pilot work in 2007, the ECHOTL requested the MRC to conduct further research on initiation and circumcision. This work was conducted from October 2007 to January 2008.

Again in this reporting period, the Unit conducted a survey amongst 2 200 men who had undergone initiation in the previous 24 months in order to conduct a retrospective analysis of the social and behavioural outcomes for the period subsequent to men undergoing traditional initiation and male circumcision.

This project has been expanded through funding under the MRC/CDC cooperative agreement to cover all nine provinces in the country, exploring initiation for boys and girls as well as male circumcision practices.

Health risk behaviours, life skills and socio-economic status survey of 'out-of-school' youth in South Africa: An investigation into sexual and other behaviours that place the next generation at risk: The Unit was awarded a grant from the United Nations' Children's Fund (UNICEF) to conduct this survey as an extension of our work with the in-school youth risk behaviour survey. According to UNICEF, approximately 120 million school-aged children are out of school worldwide, and slightly more than half of these are girls. In 1998, the South African Demographic and Health Survey found that 92% of children between 6 and 15 years of age are in school. However, in 1998, it was estimated that over half a million children (approximately 5% of school-aged children) were not attending school. According to the *Umsobomvu* Youth Fund's 2005 Status of the Youth Report, an estimated 551 000 children, between Grades 1 and 11, drop out of school each year. Approximately 170 000 Grade 12 learners fail the Senior Certificate examination every year and only about 290 000 learners pass. Although there is an emergent body of research on the role of individual and household factors on children's schooling in Africa, particularly studies on school enrolment and attainment, there have been relatively few empirical studies that focus on youths that have dropped out of school, especially within the South African context.

Capacity development

Two PhD students graduated in May 2010 at the University of Maastricht in the Netherlands.

Science communication and research translation

A community-based life skills intervention is currently being implemented in areas of KwaZulu-Natal, namely Nkhandla and Clermont. We expect to test the effectiveness of this culturally tailored intervention for men in both an urban and a rural setting. In order to achieve this, we decided to add an additional site to the study: Clermont Township. This will enable us to explore any differences in gender norms and practices between urban and rural males. We also expect to develop a self-sustainable model of community interventions, in which the Unit teams up with local youth development forums, and as implementing partners, they can continue this programme beyond the life of the funded grant period.

'*Imbokodo* responsible womanhood' is a project that focuses on women in the rural areas of the Eastern Cape Province. The study is funded by the Ford Foundation from a grant awarded in May 2010. The aim of the project is to develop and implement a culturally tailored life-skills intervention for Nguni-speaking women aged between 15 and 35 years, in order to promote responsible womanhood, including behaviours that are related to sexual health.

WOMEN, MATERNAL AND CHILD HEALTH

GENDER AND HEALTH RESEARCH UNIT

Director: Prof. Rachel Jewkes

Mandate

The mandate of the Gender and Health Research Unit is to improve the health status and quality of life of women through high-quality scientific research on gender and health, which informs the development of policy, health services and health promotion. The Unit's objectives are to:

- provide scientific knowledge to inform the development of policies around gender and gender-based violence
- develop and demonstrate the effectiveness of interventions to prevent gender-based violence through collaboration with health services and demonstrate the effectiveness of health-sector interventions
- undertake research to improve the health of women by focusing on gender and health issues within sexual and reproductive health
- develop research capacity in gender and health research.

Research highlights

The overlap between child abuse and gender-based violence is often unrecognised, but research undertaken by the Unit suggests that these should be approached as two intimately related problems. Child abuse is highly prevalent in South Africa. Analysis of baseline data from the Stepping Stones trial participants, published in *Child Abuse and Neglect,* showed that both women and men before the age of 18 had experienced physical punishment (89,3% and 94,4%), physical hardship (65,8% and 46,8%), emotional abuse (54,7% and 56,4%), emotional neglect (41,6% and 39,6%), and sexual abuse (39,1% and 16,7%). In children, emotional abuse and neglect have been given much less attention than physical and sexual abuse, and are often poorly understood, yet they are also associated with adverse health consequences. Emotional neglect and abuse were associated with a greater likelihood of depression, drug and alcohol abuse in boys and girls, and increased incidences of HIV and herpes simplex virus 2 (HSV2) in girls after a follow up two years later.

The important connections between child abuse and gender-based violence are seen in the research-based observations that children who are exposed to the abuse of their mothers are much more likely to become victims or perpetrators of partner violence when they are older, and that boys exposed to abuse in childhood are significantly more likely to become perpetrators of rape. Qualitative research on men who have killed intimate partners shows that they often have experienced marked adversity in childhood, which has had an enduring impact on the development of their male identity and personality as adults. This has rendered them insecure, feeling disempowered, lacking empathy and craving respect, which they then try to attain by becoming involved with gangs and using violence. The Unit's qualitative research on adolescents' emotional distress has highlighted the importance of perceptions of powerlessness. One source of this, which needs to be better recognised given the highly disorganised nature of many South African families, is the practice of concealing the identity of a child's father because paternity has been denied, is disputed, or mothers do not wish to disclose this information. The potential for emotional neglect, abuse and exploitation of children within alternative care arrangements, especially informal adoption within families, also needs to be better recognised. The Unit's research findings suggest that child-abuse prevention, including ensuring full implementation of the Children's

Act, must be a key government priority in South Africa, and should be recognised as an essential part of national efforts to stop gender-based violence, and other forms of violent and criminal behaviour.

Capacity development

The Unit has a very active Doctoral and Master's degree supervision programme, and Unit staff also examined three Doctoral and four Masters theses during 2010 and 2011. In addition to annual and ad hoc lectures, staff have made notable contributions to organising and teaching several courses. The four-week long research methods course in sexual and reproductive health and HIV, is hosted by the Reproductive Health Research Unit of the University of the Witwatersrand, and co-organised by the Unit Director, who also teaches the Epidemiology and Qualitative Research Methods sections of the course. In this reporting period, the Unit was very involved in building research capacity in gender-based violence in Africa. Naeemah Abrahams and Shanaaz Mathews provided technical advice to gender-based violence research projects in five countries (Rwanda, Malawi, Uganda, South Africa and Tanzania). Dr Abrahams is the overall senior technical advisor for all of these projects. The Unit also presented a training course in Kampala on gender-based violence (GBV) research methods. Prof. Jewkes is the Senior Technical Adviser to the Gender and Masculinities Regional Study for Asia and the Pacific, which is co-ordinated by Partners for Prevention, based in the United Nations Development Programme (UNDP) in Thailand. This project conducts quantitative and qualitative research in Bangladesh, Cambodia, Vietnam, Nepal, China, Indonesia, Sri Lanka and Papua New Guinea.

Science communication and research translation

The major research translation effort of the Unit is through the Sexual Violence Research Initiative (SVRI), which is hosted by the Unit. This is a global initiative that works to end sexual violence by promoting research and using research findings to develop high-quality national and local responses, including prevention strategies and services for survivors. The SVRI has over 2 250 members from 110 countries. The Unit provides the members with bi-weekly updates on sexual violence research. It has a dynamic website, and in this reporting period, it commissioned reviews of the evidence of intervention effectiveness for sexual violence prevention. The Unit also held workshops of researcher (vicarious) trauma, interventions to prevent child abuse, research on sex work in South Africa and training on post-rape care. Throughout this reporting period, the Unit has led the process of revising the post-rape care policy and clinical management guidelines for the NDoH. It also led the process that culminated in the publication of guidelines for post-rape care by the International Federation of Obstetrics and Gynaecology (FIGO).

In this reporting period, Prof. Jewkes was appointed by the Director-General of the WHO as a member of the WHO Expert Advisory Panel on injury and violence prevention and control, and was appointed to the WHO's Strategic and Technical Advisory Committee for HIV/AIDS (STAC-HIV) for the period 2011–2012, as well as to the President's Emergency Plan for AIDS Relief's (PEPFAR) Scientific Advisory Board. She was also an invited participant in the high-level meeting on HIV prevention, convened by the UK Minister of the Department for International Development (DFID), Gareth Thomas, in March 2010. This was held in the House of Lords in London, and the aim of the meeting

FACT: Problems associated with foetal alcohol syndrome tend to intensify as children move into adulthood. These can include mental health problems, troubles with the law and the inability to live independently.

was to develop a policy statement to inform the UK government's contribution to AIDS policy among G8 countries. Similarly, she was an invited presenter and participant at the PEPFAR meeting held in May 2010 in Washington, on programming inactivated polio vaccine (IPV) and HIV. This meeting was held to guide the programming of US$30 million on GBV and HIV over three years in Tanzania, Mozambique and Kenya.

In this reporting period, Unit staff reviewed 36 articles for peer-reviewed journals, two applications for NRF rating, six proposals and a report for the WHO. Prof. Jewkes is an advisor or Editorial Board Member for four journals, including an international advisor for the *Lancet* and an academic editor for the *Public Library of Science* (PLoS) *Medicine.* Unit staff gave 27 media interviews.

MATERNAL AND INFANT HEALTH CARE STRATEGIES RESEARCH UNIT

Director: Prof. Robert Pattinson

Mandate

The mandate of the Maternal and Infant Health Care Strategies Research Unit is to develop health strategies at primary and secondary care levels for mothers and infants by seeking saleable solutions. By 'seeking', we mean performing research. By 'saleable', we mean solutions that are acceptable to all women, health-care workers and administrators, and by 'solutions', we mean health strategies that have been developed to solve the problems defined.

Research highlights

The most important piece of research that the Unit has been involved in is a collaboration with an international group working on preventing stillbirths. The conditions that cause stillbirths are the same as those that cause the deaths of neonates and women during pregnancy. The Unit developed the background to implementing changes and defined the seven key interfaces that are involved in implementing new programmes or improving the quality of those already in place. The Unit identified the key programmes that have been shown to reduce mortality and described strategies on how they could be implemented. The number of potential lives saved was calculated and a costing exercise to estimate the cost of implementing these programmes if there was full coverage was also performed. The most effective means of preventing maternal and neonatal deaths and stillbirths is to have comprehensive emergency obstetric care.

This entails having skilled care at birth, with the ability to perform the nine signal functions, which include: administer anti-convulsants, oxytocics, antibiotics, manual vacuum aspiration, manual removal of the placenta, assisted vaginal delivery, caesarean sections and give blood transfusions. The cost of having these interventions at scale per capita is similar to other international programmes. This was published in the *Lancet* on 14 April 2011.

Capacity development

The Unit is extensively involved in capacity development. In particular, it is involved in training health-care providers and managers in collecting data, entering data, and analysing and interpreting the findings.

Science communication and research translation

The Unit has produced two documents directly aimed at facilitating change in maternal and infant health care. The first document

describes a detailed survey of the perinatal care in the Tshwane/Metsweding district. In this case, the findings of the survey were made available to all the health-care providers. A series of meetings was held to develop recommendations (for both the health system and diseases) that the health-care providers felt would directly impact on the causes of perinatal deaths. This was then taken to the district managers, and now a special maternal and child task team has been set up to implement these recommendations.

The second document was on developing a fact file for the district, regional and tertiary hospitals in Mpumalanga. The fact file covered the number and causes of maternal, perinatal and child deaths for each institution for the three-year period 2007–2009. With this data, interpretation workshops were held in each district in Mpumalanga and the data were used to develop local intervention plans. The Mpumalanga fact sheets (*Mpumalanga Maternal and Child Health Care Summary*) have been updated and now include data on all hospitals, districts and provinces from 2007–2010. Each hospital has a fact sheet of its own performance over that time and reports are being distributed to each site by the Multicultural Centre for Women's Health Unit in Mpumalanga.

Finally, the Unit developed the family health file (FHF), which was a new way of transmitting information to pregnant women and their families. The FHF contains the basic information that a pregnant woman needs during the postnatal period. It includes infant feeding information, and instructions on what to do in common pregnancy and postnatal period emergencies, and information on HIV. The file is simply written and has been translated into isiZulu. This tool is used during the pregnancy and postnatal periods to improve compliance with treatment and also to empower women to make their own health decisions.

NUTRITION

NUTRITION INTERVENTION RESEARCH UNIT

Interim director: Prof. Pieter Jooste

Mandate

The Nutrition Intervention Research Unit's (NIRU) mandate is to improve nutritional imbalances in vulnerable groups in the South African population by relevant nutrition research. The Unit operates within the framework of the MRC Corporate Strategic Plan and contributes to:

- nutrition knowledge and innovation through peer-reviewed publications
- formulating and implementing policy by participating in advisory panels
- capacity development through courses, presentations and involvement in postgraduate studies
- technology transfer by developing nutrition software
- generating income using a variety of approaches.

The NIRU focuses on national nutrition research priorities in which it has a competitive advantage.

FACT: It is estimated that in 50% of stillbirth cases, the exact cause of death cannot be determined.

Research highlights

The vitamin A status of mothers and pre-school children in an area in the Northern Cape with a high intake of pre-formed vitamin A: Implications for blanket vitamin A supplementation: Periodic high-dose vitamin A supplementation is known to reduce morbidity in vitamin A-deficient children, and vitamin A supplementation programmes targeting pre-school children are being implemented worldwide in vulnerable countries, including South Africa. There are, however, indications that vitamin A supplementation may actually increase morbidity in children that are not vitamin A deficient. A study on the vitamin A status of pre-school children in a Northern Cape community, before the high-dose vitamin A supplement was administered to children at clinics, showed that despite poor anthropometric status and high levels of poverty, only 5,8% of children were vitamin A deficient. This was in contrast to the national figure of 64%, and is presumably due to the frequent consumption of

liver, which is an exceptionally high source of vitamin A and a favourite food in this community. These results challenge the existing blanket approach of the national vitamin A supplementation programme in South Africa. The study is currently being extended to other areas of the Northern Cape.

A baseline assessment for the Sustainable Food Production and Nutrition Education in Schools programme implemented by the Department of Education: NIRU, in collaboration with the Agricultural Research Council, and the Department of Education and Food and the Agriculture Organisation of the United Nations (FAO), conducted a baseline survey in 10 schools in each of the nine provinces. During a five-day training workshop in February 2010, 26 officials from the Department of Education were trained in data collection. The study will provide critical support and facilitate the overall process of implementing sustainable food production and nutrition education in schools, which forms part of the national school nutrition programme.

International iodine studies: In the past year, NIRU has collaborated in various international iodine studies in Ghana, Haiti, Kuwait, Saudi Arabia and Somalia. Further collaborative work included iodine status studies of Nepalese women, as well as the iodine status of breast-feeding mothers and the iodine content of drinking water in refugee camps in the Sahara desert in Algeria. Furthermore, NIRU collaborates frequently, on an international level, in standardising laboratory methods, sampling techniques and training of laboratory analysts to determine urinary iodine as well as the iodine content of salt. These collaborations and knowledge sharing significantly contribute to efficiently monitoring the iodine status of the global public health environment.

Capacity development

During this reporting period, NIRU staff supervised or co-supervised 12 postgraduate students (four PhD and eight MSc students) from different universities, of which four graduated. In addition, three staff members were enrolled for postgraduate degrees and six staff members attended short courses. Moreover, NIRU staff spent a considerable amount of time and energy in training health staff, laboratory analysts and fieldworkers. This included training:

- two international scientists in iodine laboratory methods
- 26 officials from the Department of Education in data collection for a baseline assessment for the programme on sustainable food production and nutrition education in schools
- participants from South Africa, Lesotho, Botswana and Mozambique who attended a crop-based training workshop in Maseru, Lesotho
- nursing staff at Calvinia hospital in research methods, quality control, and data and blood collection procedures for the vitamin A hospital study.

Science communication and research translation

In this reporting period, the Unit's researchers produced another landmark reference publication in the nutrition field in the form of the condensed food composition tables, which combine the nutritional information for 1 472 food items from three earlier books. This is by far the most comprehensive food composition table on the African continent and is the most often-cited nutrition publication in South Africa. It is indispensable in nutritionally assessing individuals and groups of people, developing products, for labelling in certain circumstances, for training students. It is frequently used by the DoH, academic institutions, scientists, dieticians, the food industry and students.

To provide hands-on information on food composition to various users, a brand new website was launched, called the SAFoods website. On this website, users can read about the development of food composition tables at the MRC, find the energy, carbohydrate, fat, protein and fibre content of food items in the database, access the nutritional information of food, obtain information on labelling requirements, read more about the products produced from the SAFoods database and access a number of useful links to related websites (website address: http://safoods.mrc.ac.za).

In addition to the 10 publications in peer-reviewed science journals, the NIRU's scientists also produced an online article, a book called *Condensed food composition tables*, three reports, seven new proposals and they reviewed 31 manuscripts, mostly for international journals, including the *Lancet*. The Unit's scientists continued their exceptionally productive contributions at national and international conferences by making 37 presentations, 12 of which were at international conferences, of which, 33% were invited presentations. Of the 25 that presented at national conferences, 28% were invited presentations, which emphasises the recognition of the NIRU's scientists.

Also, the Unit's scientists served on 22 expert committees, examined nine postgraduate theses, gave 12 invited lectures, and participated in several health or science policy events and processes on issues such as growth monitoring at the national level, improving food security, revising draft regulations for trans-fatty acids in food and facilitating the revision of iodised salt standards of at least eight West African countries.

BRAIN AND BEHAVIOUR

ANXIETY AND STRESS DISORDERS RESEARCH UNIT

Director: Prof. Dan Stein

Mandate

The MRC Anxiety and Stress Disorders Research Unit was founded in 1997 with the mandate of:

- establishing a unit that focuses on anxiety disorders, including post-traumatic stress disorder
- fostering a multi-disciplinary bio-psychosocial approach to anxiety disorders
- promoting increased awareness of anxiety disorders in the community
- ensuring capacity building of clinical and research skills in students and staff.

Research highlights

Members of the Unit played a key role in the review papers produced by the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) workgroup on anxiety, obsessive-compulsive, post-traumatic and dissociative disorders, which is tasked with revising the current diagnostic criteria of the DSM. These review papers summarise the implications of recent scientific knowledge in updating our diagnostic criteria for these conditions, and will play an important role in informing the DSM-5 revision process. Unit members have also contributed to analysing large epidemiological datasets, which are also being used to inform the DSM-5 revision process.

Members of the Unit played a key role in the first papers that emerged from the Cross-University Imaging Centre (CUBIC), for example, a paper focusing on diffusion tensor imaging findings in patients suffering from neuro-HIV/AIDS.

Prof. Stein's work has led to him receiving a number of awards, including the Max Hamilton Memorial Award by the *Collegium Internationale Neuro-Psychopharmacologium* (CINP) (one of the most prestigious awards in neuropsychopharmacology internationally), and a Silver Medal from the South African Association for the Advancement of Science. He has consulted in the DSM-4 revision process, providing an African voice in a key international effort in psychiatric classification.

Prof. Seedat's work has led to a number of important awards for her, including the Lilly Fellowship from the World Federation of Societies of Biological Psychiatry in recognition of outstanding work in biological psychiatry, a prestigious Young Investigator Award from the Anxiety Disorders Association of America, the Maurice Weinberg prize from the South African College of Medicine in radiology, membership to the South African Academy of Sciences, and an NRF Research Chair.

Prof. Lochner was a member of the International OCD genetics consortium, and has received research awards from the CINP and from the American Anxiety Disorders Association.

Prof. Daniels was chairperson of the Society of Neuroscience of South Africa.

Several of our students and Postdoctoral Fellows have received grants to support their work. One of these, Jonathan Ipser, was also awarded the Kenneth Warren prize by the Cochrane Collaboration.

The work of the Mental Health Information Centre (MHIC) was recognised by a prestigious international award from the World Psychiatric Association. The MHIC has been included as a case study in a WHO publication on mental health in low-income countries.

Other Unit highlights include the following:

- Treatment algorithms developed by the Unit were used as the basis for the NDoH's standard treatment guidelines for mental disorders, the first such document in South Africa.
- Data from different sources, including studies from the Unit, were used as the basis for a Provincial Government of the Western Cape (PGWC) special policy option on neuropsychiatry.
- The Unit formulated specific policies regarding the South African Truth and Reconciliation Commission's approach to survivors of post-traumatic stress disorder (PTSD), published as an MRC policy guide.
- Epidemiology survey data from the Unit, representing the first nationally representative data of psychiatric disorders in any African country, were presented in a conference jointly sponsored by the MRC and the provincial government, to explore the implications of such data for ongoing planning of mental health services in South Africa, and published as an MRC policy guide.
- Reviews and data from the Unit have been used to revise the most widely used classification system in psychiatric research: the *Diagnostic and Statistical Manual of Mental Disorders*.

Capacity development

A significant portion of the Unit's resources goes towards supporting junior staff. We are building capacity in a number of key basic and clinical neuroscience areas. In this reporting period, members of the

Unit continued to collaborate closely with the Cross-University Brain Imaging Centre to build capacity in magnetic resonance imaging in particular.

Science communication and research translation

The Mental Health Information Centre is a fundamental structure within the Unit, and continues to play a significant role in mental health consumer advocacy in South Africa. Data from the Unit are gradually influencing mental health policies in the Western Cape and elsewhere.

MEDICAL IMAGING RESEARCH UNIT

Director: Prof. Tania Douglas

Mandate

The mandate of the Medical Imaging Research Unit is to conduct world-class research in medical imaging that specifically addresses the health-care needs of Africa. The Unit has a multidisciplinary focus. The Unit's research focuses on the role of medical imaging in health-care problems such as trauma, cancer, TB, AIDS, neuromuscular disorders and alcohol abuse, all of which are highly relevant to Africa. Projects utilising medical imaging include:

- low-dose digital X-rays for trauma and TB screening
- a navigator for neurosurgery
- teleradiology
- functional brain imaging
- measurement of cancer-cell topography
- characterising neuromuscular function
- positioning patients for proton therapy
- screening children for foetal alcohol syndrome.

Research highlights

The methods that we describe below support studies aimed at understanding the effects of HIV on the brain, monitoring and understanding cardiac disease, and assisting in rehabilitation after stroke. In addition, we assisted the Foundation for Alcohol-related Research in establishing an electronic database to record data related to their public health interventions to prevent foetal alcohol spectrum disorders.

Imaging muscle displacement and strain: We have used 2-D-ciné DENSE magnetic resonance imaging (MRI) to study displacement and strain in the medial gastrocnemius muscle during ankle-joint motion. This work provides insight into the behaviour of a muscle that moves within a complex muscle group, and has the potential to monitor healthy muscles adjacent to a site of injury in sports rehabilitation programmes.

Measuring cerebrospinal fluid flow: A new spin-echo phase-contrast velocity-encoded MRI sequence has been developed to measure flow, using a combination of flow-encoding and spin-echo imaging. To our knowledge, it is the first time that this combination of techniques has been presented.

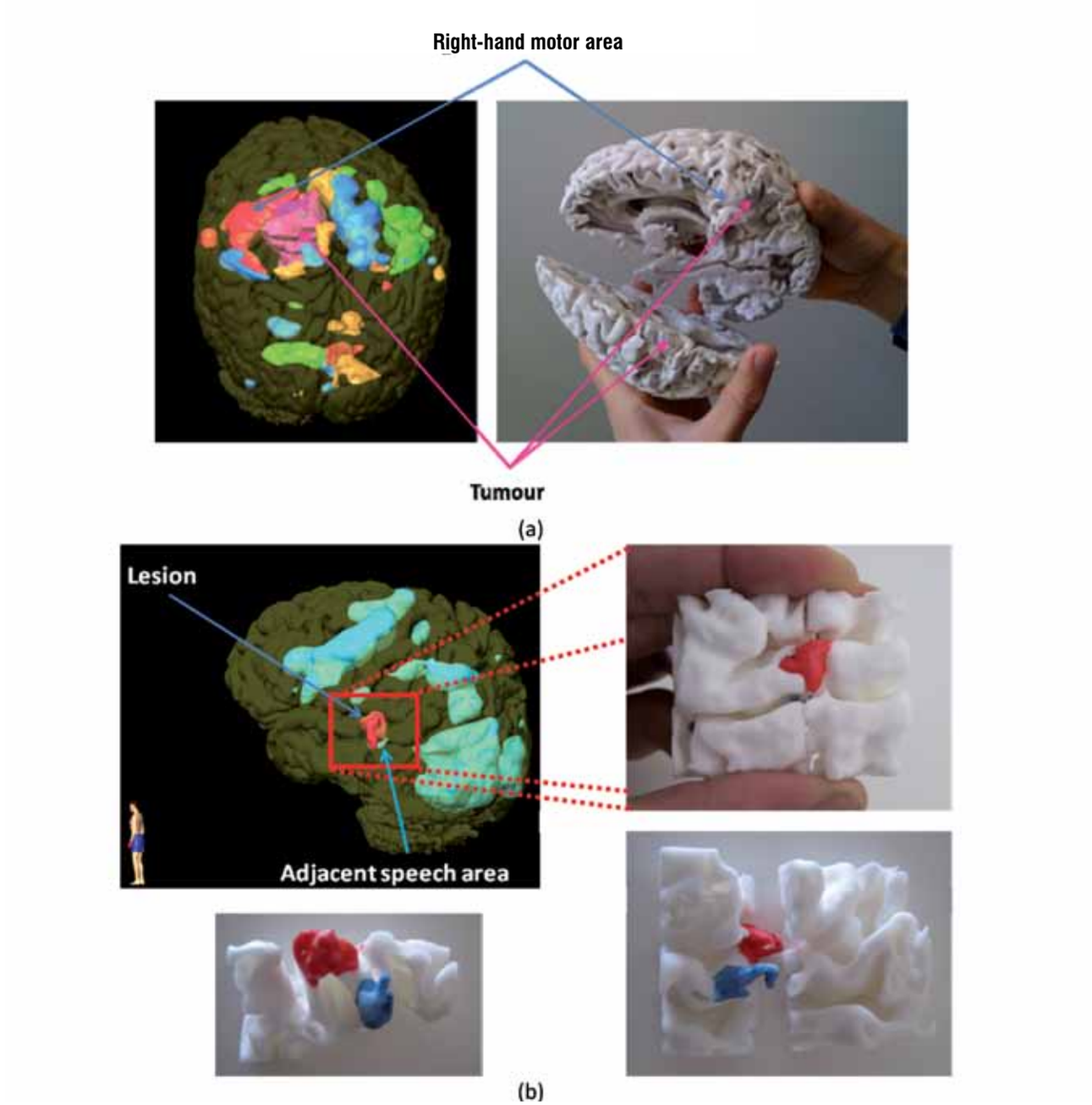
Studying HIV associated apathy: Diffusion tensor imaging (DTI) is an MRI technique that assesses central nervous system white matter integrity. A DTI study was conducted in patients with and without apathy to examine the co-morbid effects of apathy and HIV on white matter structures in the brain. White matter differences were shown in regions associated with frontal-striatal circuits – specifically circuits that are involved in motivational behaviour.

Rapid prototyping for neurosurgery: Rapid prototyping (RP) uses an additive manufacturing to generate a three-dimensional physical model of an object from a finite element mesh that defines the surface of the object. We have adapted MRI data to create RP scale models of a subject's brain to show the important structural and functional regions relative to a tumour. The models in the diagrams are derived from fused structural and functional MRI data. These provide a cost-effective hands-on physical model, which may assist neurosurgical planning by giving an intuitive indication of the depth and extent of the tumour, and by providing clear reference gyral and sulcal landmarks on the surface of the brain.

Cardiac MRI: Irregular myocardial motion occurs in almost all heart diseases. The right ventricle (RV) plays an important role in the haemodynamics of the body, while sharing the inter-ventricular septum with the left ventricle (LV). However, the RV is difficult to image because of its thin wall and unruly motion. We have introduced new techniques for quantifying RV displacement and strain at a previously unattainable spatial resolution using 3-D DENSE MRI.

Electronic stethoscope: A new modification of an electronic stethoscope has been prototyped and is currently in the early stages of pilot clinical studies at UCT and Groote Schuur Hospital. The device will ultimately be used to screen for cardiac valve disease in a remote telemedicine-based setting.

Stroke rehabilitation: An electro-mechanical device applied to spastic paralysis due to stroke has been prototyped, and is also in the early stages of pilot clinical studies at UCT and a Western Cape Provincial clinic.



Rapid prototype models showing both structural and functional MRI features relative to a tumour/lesion. (a) The tumour is shown in pink. Regions of activation identified using functional MRI are as follows: red – right hand; blue – left hand; green – left foot. (b) The lesion is shown in red and an adjacent speech association area is shown in blue.

Capacity development

Dr John registered for a certificate course in project management in 2011.

MSc student Andrew McNaught, spent four months at the University of Turin in Italy investigating voluntary control of motor unit action potentials using surface electromyography recordings. He also spent three months at the Swiss Federal Institute of Technology Zurich (ETHZ), co-developing a device to control a prosthetic using surface electromyography.

Under the Worldwide Universities Network Initiative, Dr Spottiswoode is collaborating with the Departments of Medical Physics and Radiology at the University of Wisconsin, on a project to develop an open source software platform to be used at clinical centres around the globe for analysing cerebrospinal fluid flow. Assoc. Prof. Douglas spent a week in the Department of Computer Science at the University of Washington under the same initiative, to discuss future collaborations on three-dimensional facial imaging for detecting gestational alcohol exposure.

PhD student Daniel Auger, spent four months at the University of Virginia, where he attended an advanced MRI course and gained hands-on experience working with their MRI instruments. He also obtained the necessary data to complete his PhD.

PhD student Ian Burger, spent one month with the MRI group

at Freiburg University in Germany. Under their guidance, and using facilities to which our Unit has no access, he made good progress in programming the MRI sequence for measuring cerebrospinal fluid flow.

Dr Spottiswoode was the principal organiser of a one-day workshop titled 'Functional MRI of physiological processes' held on 5 March 2011 in Durban. The workshop was run as a parallel session at the 2011 Annual Imaging Congress of the Radiological Society of South Africa (RSSA) and Society of Radiographers of South Africa (SORSA), held in Durban, South Africa, from 4–6 March 2011.

Science communication and research translation

Assoc. Prof. Douglas was invited to be the guest editor for an issue of *Continuing Medical Education* on biomedical engineering and medical imaging, which appeared in March 2011. This issue contains six articles authored or co-authored by members of the Unit.

GENOMICS AND PROTEOMICS

BIOINFORMATICS CAPACITY DEVELOPMENT RESEARCH UNIT

Director: Prof. Alan Christoffels

Mandate

The South African National Bioinformatics Institute (SANBI) at the University of the Western Cape provides a focus for biological research in South Africa by providing an excellent bioinformatics resource focused on Africa and African concerns. The Bioinformatics Capacity Development Research Unit aims to heighten the awareness of bioinformatics in South Africa and to assist the country in optimally using this technology. The MRC Unit at SANBI is focused on:

- services provided by the Unit to focus on specific health-related projects
- providing bioinformatics capacity development and training on the key health domains of HIV, malaria and disease vectors
- genome annotation to encompass capacity development of people and development, and/or utilisation of technologies to discover genes that contribute to or impact on human health, including disease-gene discovery in complex diseases, for example, diabetes and cancer.

Research highlights

Research at the Unit has continued to deliver well-recognised outputs in the field of computational biology. In 2010, the Unit delivered 14 health-related publications that contained significant discoveries. These included articles in journals such as *Nature Genetics, Cell* and *Medical Virology*. SANBI researchers have been invited to present three keynote speeches and 14 talks nationally, in Africa and internationally

Headed by Prof. Travers, the HIV research team has contributed to understanding the CXCR4-usage of HIV during disease progression. In Malawi, the Unit investigated the prevalence of drug resistance in a treatment-naïve population of HIV-infected individuals.

In cancer research, Prof. Hide has led, together with the Ludwig Institute for Cancer Research, a broad analysis of a group of potentially immunotherapeutic powerful genes called the Cancer Testis genes. The Unit has characterised a unique aspect of the expression of these genes: they appear to control P53, a gene that in turn is mutated in over 40% of all cancers.

Software development: SANBI has contributed a unique public resource to the biomedical community, namely the biomedical text-mining database of Hepatitis C virus (HCV) (http://apps.sanbi.ac.za/DESHCV). This resource contains biomedical concepts that relate to HCV proteins, their name variants and symbols. This makes it a valuable resource for specifically researching information and knowledge about HCV. Such an approach could also augment efforts in the search for diagnostic or even therapeutic targets.

Under the leadership of Dr Gamieldien, SANBI has developed a prototype next-generation system to integrate complex biological data, which has attracted the attention of an immunology-based research centre in France as a protocol to be adopted for managing their data.

Capacity development

Due to the funding it received, the Unit was able to provide extensive training to both local and regional African students and scientists. Over the past year, all of the 23 Postgraduate and Postdoctoral students the Unit trained, qualified. Of these, 35% (8/23) were female. During the past year, 10 students have presented their work at the Committee on Data for Science and Technology (CODATA) International Conference held in Stellenbosch. One of our PhD students, Ruben Cloete, won an international travel fellowship from the University of Hyderabad to attend a week-long workshop on molecular and drug design in India. Another PhD student, Kavisha Ramdyal won an international

travel fellowship to participate in the quantitative and evolutionary comparative genomics workshop in Japan. A PhD student, Edwin Murungi, presented his work on computational identification of trypanosome diversity at the African Network for Drugs and Diagnostics Innovation (ANDI) in Nairobi, Kenya. Edwin has more recently been funded to validate some of his computational results at the University of Cambridge, for a period of two months.

The Unit also houses the WHO regional bioinformatics training centre for Africa. A total of three African scientists from Kenya, Tanzania and Sudan were placed in a mentoring laboratory in Belgium, Liverpool and Kenya to build capacity in using bioinformatics functional genomics to control tsetse infestation through the WHO programme. Their follow-up mentoring is the responsibility of the functional genomics coordinator, Prof. Christoffels.

The Unit's first graduate internship programme was launched in December 2010 for a period of one month. A total of 14 final-year Computer Science, Mathematics and Statistics students participated in bioinformatics projects during December as part of our new internship programme, which is funded by the DST/NRF Research Chair.

Thaphelo Mohotsi, one of the third-year students who participated in the December programme, has been recruited for a one-year internship while he completes a semester course as part of his graduation requirements. During this reporting period, he will work on a collaborative project with the forensics group at UWC.

Ibrahim Ahmed, an MSc graduate in Mathematics, has registered for a PhD at SANBI to work on developing an algorithm for host-pathogen interactions relating to TB infection.

Emil Tanov, a BSc (Hons) graduate, has registered for an MSc degree at SANBI, working on virus secondary structures as an extension to his summer project.

Science communication and research translation

In June 2010, the US National Institutes of Health and the Wellcome Trust established the H3Africa programme. Two members of staff, Professors Christoffels and Hide, were elected to serve on a working group to provide a white paper describing models of funding to be considered on the African continent. Prof. Christoffels presented a summary of bioinformatics networks on the African continent as a template for coordinating computational research in Africa.

The Institutes' members have served on the South African Human Genome Programme Executive Committee, which is tasked with developing a proposal for establishing a national genomics programme to build human genetics resources that would serve a national and regional scientific committee.

The research conducted in the Unit has been communicated to the scientific community through at least 14 oral presentations at national and international conferences, and three keynote presentations.

The Unit's community involvement continues to mature as its schools' project migrates into its fourth year. With a task of developing an electronic resource for school learners as a vehicle to communicate information about TB, the Unit has now started the second phase of its DVD development and has finalised the material for printing a complementary resource for schools with limited computing resources. This project will be piloted in five schools during the next reporting period in the Western Cape.

BONE RESEARCH UNIT

Director: Prof. Ugo Ripamonti

Mandate

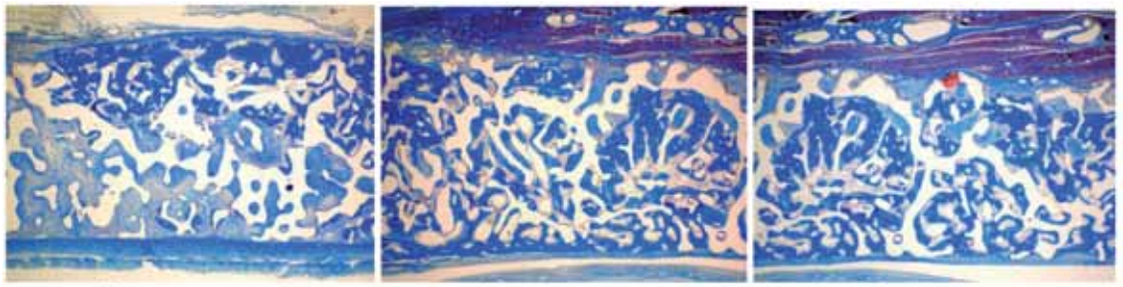
The Bone Research Unit is a joint undertaking between the MRC and the University of the Witwatersrand. It is committed to gaining insights into the mechanisms of bone, cartilage and connective tissue morphogenesis, development and regeneration, and to promoting and accelerating bone healing in humans. The Unit strives to provide new information in order to:

- plan therapeutic strategies to initiate and manipulate tissue morphogenesis and bone regeneration
- facilitate bone growth into prosthetic implants
- restore local and systemic bone mass, and develop synthetic bone substitutes for the 21st century.

Research highlights

As a world first, the Unit has shown that the recombinant human transforming growth factor-β3 (TGF-β3) protein, contrary to existing research results obtained in rodent, lagomorph and canine models, is a prominent osteo-inductive molecular signal that induces large quantities of newly formed bone in non-human primates of the species *Papio ursinus*. The Unit's research has shown that the TGF-β3 protein is the 'new bone inducer in human patients', and it has implemented translational research in patients affected by severe bone loss in the operated and avulsed large segments of mandibular bone.

Prof. Ripamonti has been invited to deliver several keynote



A: *Lack of bone formation in a specimen treated with 125 µg of hTGF-β3 preloaded within a macroporous coral-derived construct implanted in calvarial defects of Papio ursinus. Note limited bone formation pericranially only.*
B, C: *Calvarial defects identically treated with the addition of an impermeable membrane surgically inserted just above the dura: restoration of the bone induction cascade across the macroporous spaces. These morphological results clearly imply the presence of a sub-dural inhibitor percolating throughout the macroporous spaces blocking the bone induction cascade. The insertion of a mechanical barrier in the form of an impermeable membrane sets morphological boundaries restoring the induction of bone formation.*

lectures around the world as well as organise workshops and symposia on the inductivity of the TGF-β proteins, but particularly on the topic that he has identified on the spontaneous and intrinsic osteo-inductivity of macroporous calcium phosphate-based biomaterial matrices. Of note, is the invitation to deliver a keynote presentation and organise a symposium entitled 'Tissue-inducing biomaterials' to be held at the 9th World Biomaterials Congress in Chengdu, China, in 2012. Prof. Ripamonti has also been awarded the B1 NRF rating as Internationally Acclaimed Researcher, which is a researcher that enjoys considerable recognition by their peers for the high quality and impact of their recent research output.

Capacity development

In terms of capacity development, the Unit's staff members have attended a number of courses and workshops, including writing, STATA software, grant writing and proposal writing.

In addition, the Unit's scientists continually mentor and teach students, and correct manuscript drafts to be submitted for publication and scientific discussions.

Science communication and research translation

The Unit is particularly proud to have translated the world's first discovery of the endochondral osteo-inductivity of the recombinant hTGF-β3 in non-human primate species to a paediatric patient affected by a malignant odontogenic tumour, requiring the avulsion of the affected hemi-mandible. Five years after implantation, the patient is thriving with a new mandible.

The translation of pre-clinical results in human patients has proven to be surprisingly difficult with only small volumes of bone induced by mega-doses of recombinant human bone morphogenetic/osteogenic proteins (BMPs/OPs) that are several fold higher than those predicted in animal models including non-human primates.

The Unit has to start to identify systematically the molecular and cellular bases responsible for the significant differences in the healing pattern amongst mammals, that is, to analyse molecularly and genetically the mammalian wound-healing trait controlling the extent of tissue regeneration.

The Unit, in collaboration with the consultant maxillofacial surgeon Dr Ferretti, has recently introduced a now emerging concept of clinically significant osteo-induction: the quantity of regenerated bone adequate to be identified radiographically as normal bone, in radiolucency and trabecular architecture.

MRC/UCT HUMAN GENETICS RESEARCH UNIT

Director: Prof. Raj Ramesar

Mandate

The mandate of the MRC/UCT Human Genetics Research Unit is to develop human and technological research capacity in human health genomics, focusing on the genome research/clinic interface, building capacity as one of its major outcomes. To date, the Unit has played an important role in:

- the early diagnosis of inherited disorders, their management and treatment
- providing genetic counselling
- conducting research with the goal of offering predictive testing and the possibility of preventing the recurrence of diseases.

Research highlights

The wide range of studies currently underway in the Unit can be divided into the following groups:

- Genomic variation of indigenous African populations: characterisation and analysis
- Understanding biological consequences of genomic variation
- Translating genomic variations to clinical applicability

A study using high throughput technologies (Affymetrix SNP6; 1 million single nucleotide polymorphism (SNP) chip, to understand the population genome structures of our indigenous populations) has been accepted for publication in *PLoS Genetics*. In this regard, we have been invited to be part of large-scale genomic studies of longitudinal cohorts being developed with Harvard University School of Public Health (USA). We have also highlighted the value of using African populations for genetic research.

Our most recent enterprise involves using state-of-the-art technologies (full exome sequencing and next generation full genome sequencing) to identify the genetic basis of several disorders specific to this part of the world. This should result in an increased number of original research articles this year. The project is also exposing trainees (students and staff) to these technologies and modes of data analysis.

In addition, we have been recognised by the Pharmacogenomics for Every Nation Initiative as a regional centre of excellence (http://pgeni.unc.edu/site/index.php/where-we-work/regional-centers/south-africa.html) for being able to procure pharmacogenomic data for indigenous African populations. We have proven that we have the capability to gather good population and patient/clinical data, as well as being able to technically generate and interpret data from the high throughput Affymetrix microarray platform. A PhD student, Kusha Kalideen, attended and excelled at a workshop run at the University of North Carolina in the USA.

While we are mapping novel diseases by association of linkage, a very valuable follow-through of our research is understanding the functional biology of genetic variants, which we show to be causative of inherited disease. Maureen Akini's MSc dissertation (which she has successfully completed) has shown the unusual biological impact of a commonly occurring 5'-untranslated variant of the rhodopsin gene, which is implicated in retinal degenerative disease. Aisha Pandor's PhD research has convincingly characterised the compromised misfolding of the carbonic anhydrase IV gene, which results in retinal degenerative disease in South African families.

All students in the Unit are encouraged to participate in efforts to improve the public's understanding of genetics relating to education and training, and also to health. The Unit's major research projects on colorectal cancers and retinal degenerative diseases involve communicating research findings back to the subjects, and offering genetic testing and genetic counselling. These services are usually offered free of charge to thank the subjects and their families for their involvement in the Unit's research programme. Relationships are developed, so that following generations are also educated and have access to the services emerging from the research. The Unit's research has convincingly shown that the genetic and clinical intervention programme for colorectal cancers significantly reduced morbidity and mortality in our communities.

The Unit has made every effort to highlight the value of carrying out genetic research in an African setting, and hence the Unit represents Africa on the Human Variome Project (http://www.humanvariomeproject.org). It has also provided a professional analysis, from a genetic point of view, on the unfortunate saga of local athlete, Caster Semenya.

Capacity development

The Unit's direct involvement in postgraduate training means that seven students enrolled and graduated with an Honours degree in Human Genetics, and nine more students have enrolled this year. When the graduates emerge from the Unit, they are sought after both locally and internationally for advanced postgraduate training. The Unit also has nine MSc students and 12 PhD students (some of whom are affiliated with other supervisors but access the core resources, expertise and technology of the Unit). Prof. Ramesar has been invited to be course tutor in Molecular Medicine at the University of Khartoum, and he also served as an external examiner for the University of Mauritius's postgraduate programme in Science and Medicine.

Dr Owens from Vanderbilt University in the USA, joined the Unit for the second part of her year as a Fogarty Fellow, and completed her work on genetic modifiers of colorectal cancers in March 2011. Dr Hitchins, a visiting Fellow for a couple of weeks in October 2010, provided training in laboratory methods related to epigenetics. She worked in the laboratory as a collaborator, and this work led to a publication identifying trans-generational methylation of the hMLH1 gene mimicking familial colorectal cancer in our large South African cohort.

Prof. Ramesar was Chairperson of the organising committee for the International Conference of the African and Southern African Societies of Human Genetics in Cape Town on 6–9 March 2011 (www.

humangenetics2011.org). This provided a phenomenal opportunity for both junior and senior postgraduate students to attend and present at the conference, which recorded an unprecedented 452 attendees. More importantly, a Young Researchers Forum (YRF) was created specifically to encourage interaction and networking between African postgraduates. The YRF was put in the charge of three PhD students attached to the Unit (Aisha Pandor, Kusha Kalideen and Lauren Watson), who hosted a pre-conference day of academic and social activities. The YRF, which registered 200 attendees from more than 25 countries in Africa, had three invited plenary speakers, including Dr Axton, editor of the prestigious journal, *Nature Genetics*; Dr Glass, Director of the NIH's Fogarty Center; and Dr Rotimi, Director of the Centre for Research on Genomics and Global Health at the National Human Genome Research Institute. There were 14 oral presentations, and 94 posters were accepted for display. A range of specialist workshops also gave students and staff the opportunity to learn about international state-of-the-art developments. A genetic counselling workshop attracted 45 attendees, a neurogenetics workshop had 150 attendees, and a day-long advanced workshop on microarray technologies, run by Affymetrix at UCT, had 110 attendees.

Students in the Unit were also exposed to high-calibre international researchers by attending conferences, courses or special lectures. These researchers included Nobel Laureate Sydney Brenner, Sir Walter Bodmer (Cancer Research UK, Oxford University), Sir Mark Walport (Director of the Wellcome Trust, UK), Sir John Burn (University of Newcastle), Dr Collins (Director of the National Institutes of Health, USA), Prof. Liu (President of the Human Genome Organisation), Prof. Kwiatkowski (Director of MalariaGen, Oxford University) and Prof McCarthy (Oxford University/Sanger Centre, UK).

Of particular note is the fact that the Unit has been recognised by the Fogarty International Center as a training site for its Postdoctoral Fellows, and provides a facility for Clinicians to develop a foothold in the genetic research of their particular field of interest.

Science communication and research translation

A large part of the Unit's efforts is directed towards public awareness and translating genetics research for relevant use in the public health environment. Prof. Ramesar also serves on the Board of Directors of the African Genome Education Institute (AGEI), which is a non-government/non-profit organisation that organises regular Darwin seminars for the public on topics related to genetics, health and the community, often dealing with the ethical, legal and social implications of genetics research. The Darwin seminars, which are hosted by the AGEI and the Division of Human Genetics, have achieved a distinct brand. The Unit, through the AGEI, is also directly involved with an exciting teaching biology project (http://www.teachingbiologyproject.org.za/). This project provides advanced training and teaching materials to high-school teachers from previously disadvantaged schools in the Western Cape Province in areas of Biology, which they take back to inspire their students.

The Unit also involves high profile international visitors in its community outreach projects. Sir (Prof.) John Burn is an active collaborator who, as PI, coordinated an international programme in which people at high risk of developing colorectal cancers participated in a double-blind clinical trial, testing aspirin and complex starch as potential chemo-preventative agents. Sir John was on the outreach surveillance trip to the Northern Cape Province in September 2010, and gave a series of community/professional lectures in Nababiep/Springbok. While in Cape Town, he gave a Darwin lecture to the public entitled 'Can genetic diseases be cured?'. For the full list of Darwin seminars that took place in 2010, visit http://www.africagenome.com/2010/darwin-seminars-2010.html.

HUMAN GENOMIC DIVERSITY RESEARCH UNIT

Director: Prof. Himla Soodyall

Mandate

The mandate of the Human Genomic Diversity Research Unit is to incorporate population history in mapping and modelling human genetic variation. Through the activities of the Unit, staff propose to:

- elucidate the demographic and evolutionary processes responsible for producing the complex patterns of variation in sub-Saharan African and Malagasy populations, and to use this data to:
    - reconstruct the pre-history of sub-Saharan African and Malagasy populations
    - shed light on modern human origins.
- use population gene diversity to study population susceptibility to disease
- examine how variation in mitochondrial DNA (mtDNA) is associated with disease.

Research highlights

The Unit continues to conduct human population genetic studies in sub-Saharan African populations. The activities include conducting field work among populations throughout the country. In September 2010, we were invited by the San and Khoe community from Uitenhage to assist them in understanding their history. Prof. Soodyall spoke at the Community Hall together with other invited speakers. Then, over the next two days, her team sampled 261 individuals. In March this year, the team made a return visit to Uitenhage to deliver the genetic ancestry test reports to participants. The common mtDNA haplogroup, haplogroup L0d, which is commonly found in Khoe and San people, was found at a frequency of 65,5% in this sample. Most individuals in this region self-identify as coloured. However, their maternal ancestry shows a considerable African ancestry (87%), most of which is Khoe and San derived. Similarly, the coloured population we sampled at Colesberg was found to have the L0d haplogroup at a frequency of 64,5 % (manuscript accepted). The maternal ancestry of the Karretjie people from Colesberg, on the other hand, was exclusively Khoe and San since they harboured the mtDNA haplogroup L0d at a frequency of 100%. Thus, genetic studies are very useful in reconstructing the pre-history of people from Africa. Also, these studies have a major role in elucidating population structure and the demographic events that have contributed to shaping demic population gene pools. Only when this is known can we more effectively address health issues using genomic methods.

Capacity development

Angela Hobbs attended the introductory phylogenetics workshop held at the University of Pretoria, hosted by Inqaba Biotech, from 6–8 December 2010.

Science communication and research translation

A major translation of the Unit's research is the service we provide to the public in the form of genetic ancestry testing. During 2010, we conducted 307 genetic ancestry tests, 247 of which were for paying clients, and this generated an income of R250 200. The testing contributes to public education and understanding of science. In addition, Prof. Soodyall gave several radio interviews and contributed to print media inputs on topical issues published last year (for example, the whole genome sequencing of three southern Africans, and the sequencing of the Neanderthal genome) and public lectures (for example, the SAASTA meeting in Cape Town to celebrate the discovery of the Sediba fossil from Sterkfontein, and a media meeting hosted by Wits University to focus on science translation).

RECEPTOR BIOLOGY RESEARCH UNIT

Co-directors: Professors Arieh Katz, Robert Millar and Dr Colleen Flanagan

Mandate

The mandate of the Receptor Biology Research Unit is to study the structure and function of G-protein-coupled receptors and to apply the research to understanding and treating diseases that have major effects on the social and economic welfare of South Africa. The Unit's research focuses on:

- the gonadotropin-releasing hormone (GnRH) receptors and their role in reproduction and cancers of the reproductive tract
- the role of prostaglandins, receptors and cyclooxygenase in cervical cancers of the reproductive tract
- the role of CCR5 chemokine receptor in HIV infection.

Research highlights

Structure-function studies of the GnRH receptor: The Unit has been studying the role of specific residues in human GnRH receptor on binding and activation. The roles of Trp6,48(280), Glu2,53(90), His7,36(305) and Trp280(6,48) were studied and the findings are being written up for publication.

The 'rescue' of human GnRH receptor mutants using a cell-permeable GnRH small molecule: The Unit identified cell-permeable small-molecule GnRH antagonists for their ability to bind mutant GnRH receptors and ferry them to the cell surface, thereby 'rescuing' mutant receptor expression.

Anti-proliferative effects of GnRH receptors: By employing a Gq/i chimeric protein in transfected cells, the Unit found that Gi plays a role, possibly together with Gq, in mediating the anti-proliferative effect of the type I GnRH receptor. This work has been completed and is being written up for publication.

Development of kisspeptin (KP) antagonists: By employing an extensive systematic substitution of all the amino acids in the 10 amino acids of KP, the Unit has developed the first KP antagonist. This has led to the coordination of collaborative studies to reveal the

role of endogenous KP in regulating GnRH secretion in a wide range of physiological settings in rodent, sheep and non-human primate models, for both in vivo and in vitro studies.

Role of KP and GPR54 in placenta development: In order to understand the role of KP and its receptor in placenta development, the Unit examined their expression in the placenta and placental bed of normal pregnancies and pregnancies with pre-eclampsia. The analyses showed that KP levels are higher in the placental bed of pre-eclampsia relative to controls, while there is no difference in the expression of the receptor. Furthermore, it was found that KP inhibits vascular endothelial growth factor (VEGF), and that in pre-eclampsia patients, the expression of VEGF in the placental bed is lower. These results suggest that high KP levels may induce pre-eclampsia by inhibiting VEGF and the consequent angiogenesis.

Structure-function studies and identification of the ligand binding site of GPR54: This study involved testing ligand binding and signalling of GPR54 and galanin receptor chimeras. The analyses showed that the extracellular loops of GPR54 are important, while the Nt-terminus of GPR54 is not. In addition, when studying specific residues of the receptor, it was found that D139 is important for receptor expression and function. This approach should reveal residues in the receptor and ligand that are important for binding and will set the foundation for identifying receptor-ligand contact sites.

The CCR5 chemokine receptor and HIV: The Unit studied the CCR5 conformation that mediates HIV infection, generated constitutively active CCR5 receptor mutants and tested them in a fusion assay that mimics HIV infection. The analyses demonstrated that a few mutants showed high fusion activity. These results may improve the understanding and design of small-molecule HIV fusion inhibitors. This work is being prepared for publication.

Polymorphisms in the Kaposi's sarcoma-associated herpes virus G-protein-coupled receptor (GPCR) gene in South Africans: The Unit has analysed 50 tissue samples from Kaposi's sarcoma patients for polymorphism in the protein-coding region of the gene. The analyses revealed nucleotide changes in many of the isolates and several of them affected the amino acid sequences.

Capacity development

A major goal of this Unit is to train PhD, MSc and BSc (Hons) students, as well as Postdoctoral Fellows in the field of GPCR technology and molecular pharmacology. GPCRs are a major drug target for treating a wide spectrum of diseases ranging from psychiatric and neurological disorders through metabolic, cardiac and endocrine disorders to infectious diseases and cancer. Consequently, training students in GPCR technology and molecular pharmacology provides an important foundation for developing the intellectual capacity for a drug-design and development industry in South Africa.

The Unit provides in-house training to its students and staff in theoretical and practical aspects of GPCR technology. In addition, the Unit has a continuing programme of developing new technologies for its research, and both staff and students participate in this programme. Furthermore, Unit members are encouraged to use innovative research approaches involving the latest post-genomic technologies.

The Unit has a PhD student-exchange programme with the UK/MRC Human Reproductive Sciences Unit. The programme is a great opportunity for South African students to gain access to resources that are not otherwise available to them and also gain experience of a large international research centre, while maintaining strong South African connections. So far, six PhD students have graduated from the programme, and currently two PhD students are registered in the programme.

The Unit strives to provide its staff with development and training opportunities, and Dr Matjila, a Clinician enrolled as a PhD in the Unit, attended the Annual Human Placenta Workshop at Queen's University in Kingston, Ontario, on 11–17 July 2010.

Science communication and research translation

Researchers in the Unit publish in international journals including the *Journal of Clinical Investigation, Molecular Endocrinology, Endocrinology* and *PLoS One.* In addition, members of the Unit presented at several international conferences.

The Unit has developed cell-permeable small-molecule GnRH antagonists for their ability to bind mutant GnRH receptors and ferry them to the cell surface, thereby 'rescuing' mutant receptor expression. This approach can be very useful clinically, since the majority of mutations in the human GnRH receptor that lead to infertility are characterised by reduced trafficking to the cell membrane. In addition, the Unit has developed KP antagonists that have the potential for clinical use to treat numerous reproductive disorders.

ENVIRONMENT AND HEALTH

ENVIRONMENT AND HEALTH RESEARCH UNIT

Director: Prof. Angela Mathee

Mandate

The mandate of the Environment and Health Research Unit (EHRU) is to conduct population-based research on environmental risks to health, with special emphasis on those living in poverty. The EHRU is a multidisciplinary research team with expertise in children's environmental health, environmental epidemiology, psychology, quality of life, nutrition, women's health, environmental medicine, chemistry, social capital and local-level responses to HIV/AIDS. The EHRU is the proud host of the World Health Organisation Collaborating Centre for Urban Health (WHOCCUH), which brings together expertise from four leading academic, service provision and research institutions to address specific urban health policy, programmes and project needs.

Research highlights

Health risks of pica in pregnancy: The occurrence of pica (the ingestion of non-food items such as soil and paint) has been widely reported in certain groups in South Africa, including pregnant women. Because the practice of pica is potentially associated with elevated exposure to metals, such as lead, and also because some metals are readily passed through the placenta from mother to foetus, a study of the non-food ingestion practices in a group of 341 pregnant women attending antenatal clinics at the Raheema Moosa Hospital in Johannesburg was conducted. The results showed that 23% of women were ingesting non-food substances, including soil, *isihlambezo* (a traditional herbal preparation for pregnancy-related problems), *umcamo we mfene* (tree bark), laxatives (such as castor oil, stameta and liquid paraffin) and *ditaela* (Zion Christian Church water). Smaller numbers of women also ingested toilet paper, sea water, chalk, the dark green part of sponge scourers, glycerine, match sticks, stones and *imbiza* (a herbal preparation). The motives for ingesting the substances included satisfying cravings, alleviating nausea and vomiting, preventing miscarriage, easing labour, preventing constipation, and protecting the baby. Blood samples were taken to determine the blood content of lead, mercury, manganese, cadmium and arsenic. The laboratory results are being awaited.

Lead exposure and delay in the onset of puberty: Analysis of data from the 'birth to twenty' cohort study has shown that elevated lead exposure is associated with a delay in the onset of puberty in girls, and with aggressive behaviour in boys during early adolescence. Mothers were recruited from antenatal clinics in the Johannesburg-

Soweto metropolitan area in 1990. Lead levels were analysed in samples of cord blood collected at the time of birth and whole venous blood was collected from the cohort at the age of 13 years. Data on selected child, maternal and household factors were collected using a structured questionnaire in the third trimester of pregnancy and at 13 years of age. Additional data on puberty (attainment of menarche and self-reported Tanner staging for breast and pubic development) and behaviour using the Youth Self Report were obtained at 13 years of age. The results showed that the mean blood lead level at birth was 5,9 µg/dl, and was 5,7 µg/dl at 13 years of age.

Living in a warmer world: Over the past year, the first steps were taken toward a programme of research on the public-health aspects of life in a warmer world. These aspects include how a warmer climate would affect the comfort and productivity of workers who have to work in sun-exposed environments, such as road construction and parks workers. Another example is whether we would need more shade and water points in schools and living environments for children. A Doctoral student will be working on research projects related to the health risks of working in sun-exposed environments. Focus group discussions conducted as part of a pilot study in Upington in the Northern Cape, highlight a range of health-related effects currently experienced by those who work in the harsh sun, and points to opportunities for implementing immediate relief measures.

A second Doctoral student is planning to assess heat exposure in low-cost housing and the associated health risks.

Urbanisation and urban health: Following an initial five-year period, the Unit has extended its health, environment and development (HEAD) study for a further five years. The HEAD study aims to track changes in socio-economic status, living conditions and health status in five relatively impoverished urban settlements in Johannesburg. On one hand, the data appear to point to a slow improvement in living conditions and quality of life. However, on the other hand, the study has revealed a wide range of household health concerns for which there are often minimal or no public health services locally available. These health concerns include high levels of smoking; growing food insecurity and hunger; high levels of violence (such as rape, stabbing and gunshot wounds); low levels of physical activity; and high, unmet optometric service needs. Through partnerships with local academic institutions, non-governmental organisations, the business sector and communities, a range of interventions have been developed to address these main concerns.

Elevated metal concentrations in food garden soil: A small-scale investigation into the metal content of soil samples from a school food garden located next to a mine dump has revealed elevated concentrations of some metals, for example, arsenic. Vegetable samples collected from this garden also had elevated metal concentrations, albeit on a very small scale. The preliminary findings point to the need for additional research and assessment of the safety of food cultivated in close proximity to mining land and other sites of

potential pollution.

The need for optometric services in settings of poverty: There are very high levels of diabetes in one of the HEAD study communities, and so, in partnership with the Faculty of Health Sciences at the University of Johannesburg, the Unit has established podiatry and optometry clinics in Riverlea, in order to avert the secondary complications of diabetes. While the clinics were targeted for older age groups, a number of children were identified with severe vision problems. Most children, even by the age of 13, had never had the benefit of a vision test, and so had not received any corrective interventions. Local school principals reported that vision screening had not been conducted at their schools in more than a decade.

Capacity development

The Unit has continued the momentum gained in previous years in supporting the development of Doctoral students. Though a small Unit, EHRU staff members supervise the research of nine PhD students. Training in various aspects of environmental health is offered at local universities, and a long-term vehicle for experiential learning in the field of urban health research has been created in five communities in Johannesburg for undergraduate, Masters and Doctoral students.

Science communication and research translation

Previous research conducted by the Unit has shown that there is a high concentration of lead in the paint applied to children's playground equipment in public parks in Johannesburg, Ekurhuleni and Tshwane. The use of lead-based paint, especially in situations where the paint is flaking or peeling, has the potential to contaminate the playground, leading to lead poisoning in children. As a result of this research, staff from the Unit have been invited to participate in a committee of the South African Bureau of Standards that is dedicated to improving safety in children's playgrounds.

During this reporting period, the Unit produced 12 scientific publications, a report on urbanisation and health in Africa, and case studies on urban health in 10 African cities (including Johannesburg, Lagos, Nairobi, Dakar, Kinshasa, Brazzaville, Lusaka, Addis Ababa and Luanda) for the WHO Regional Office for Africa (AFRO). A related poster on urbanisation and health, produced by the Unit, was showcased at the Global Forum on Urbanisation and Health held in Kobe, Japan, in November 2010. To increase awareness of the hazards and prevent rodent infestations, a fact sheet was produced in partnership with the NDoH and other stakeholders.

SOUTH AFRICAN TRADITIONAL MEDICINES

DRUG DISCOVERY AND DEVELOPMENT RESEARCH UNIT

Director: Prof. Kelly Chibale

Mandate

The Drug Discovery and Development Research Unit, amongst other things, focuses on:

- establishing a scientific infrastructure as well as capacity for drug discovery and development of natural products in the broad sense, using general biodiversity, including traditional medicines
- developing infrastructural and operational systems for new discovery and development, with special reference to natural product-guided medicinal chemistry as well as biological screening platforms against infections and other diseases
- attracting young South African scientists, and scientists from elsewhere on the African continent, to make a concerted effort at transformation and capacity building
- providing career development opportunities for independent academic and/or research careers.

Research highlights

In collaboration with Medicines for Malaria Venture (Switzerland), the Unit conducted a medicinal chemistry programme on selected hit compounds from the screening of libraries. The aim of the programme was to identify quality leads suitable for optimisation and, ultimately, candidate selection as potential agents for the treatment of uncomplicated *Plasmodium falciparum* and blood-stage *P. vivax* malaria, ideally with additional activity against liver-stage parasites (including hypnozoites) and gametocytes.

The Unit also successfully, and for the first time, set up a recombinant microbe high-throughput screening (HTS) platform to discover anthelmintic drugs with a low propensity to generate drug resistance. In addition, bio-process development for metabolite generation in the medium to large scale (in bioreactors) was undertaken successfully.

In contributing to the safety of African traditional medicines, the Unit initiated a programme to study the effect of herbal medicines on drug metabolising enzymes, including interactions with conventional medicines. For the safe and efficacious use of conventional drugs and herbal medicines, there is a need to evaluate the potential risk

for drug-herb interactions using crude herbal extracts and/or isolated active chemical constituents. In this regard, the Unit studied frutinone A, the active ingredient of a herbal extract isolated from the shrub belonging to the polygala species. The crude extract from polygala has been widely used to treat a variety of diseases. In South Africa, herbal extracts from *P. fruticosa* have been widely used to treat dropsy, scrofula and as part of the decoction for TB treatment. Against increasing reports of drug-herb interactions at a metabolic level, the aim of this study was to characterise the metabolism of frutinone A. From the inhibition screens, frutinone A was identified as a potent inhibitor of CYP1A2 and showed moderate effects on CYP2C19, 2C9, 2D6 and 3A4. Overall, the potent CYP1A2 inhibition by frutinone A could be used to predict potential drug-herb interaction risks if the compound is co-administered with low therapeutic index drugs such as theophylline.

Capacity development

The Unit's main focus is a strong Doctoral training component; however, we also maintain a Masters pipe-line and provide Postdoctoral opportunities. Doctoral research, nested within major projects, involves a well-structured, interdisciplinary programme of research, and academic and professional development.

Funding for competitively awarded Masters, and Doctoral and Postdoctoral Fellowships has been received from the South African Department of Science and Technology under the South African Research Chairs Initiative, Medicines for Malaria Venture, WHO, EU and the Cape Biotech Trust/Technology Innovation Agency.

Training courses and workshops attended by Unit members include absorption, distribution, metabolism, excretion (ADME) profiling, basic LC/MS/MS, ADME assay, advanced LC-MS training, preparative HPLC training, and ADME laboratory setup and commissioning.

Science communication and research translation

As mentioned, the potent CYP1A2 inhibition by frutinone A could be used to predict potential drug-herb interaction risks if the compound is co-administered with low therapeutic index drugs such as theophylline. This study could be used to re-label herbal products containing fruitinone A to warn the public about the risks of taking such herbal products with known inhibitors of CYP1A2.

INDIGENOUS KNOWLEDGE SYSTEMS RESEARCH UNIT

Director: Dr Motlalepula Gilbert Matsabisa

Mandate

The mandate of the Indigenous Knowledge Systems Research Unit is to promote and advance indigenous knowledge systems of health through partnerships, research and development. The Unit aims to do this by making it a valued health model in the global environment and addressing health traditions, which, until now, have been neglected health research priorities and issues.

Research highlights

The Unit has developed preclinical toxicology platforms using the vervet monkey model, and this has set up a platform for testing the toxicology of traditional medicines.

The clinical trial platform for HIV and AIDS that uses both phase I and phase IIb placebo-controlled double-blind parallel group protocols, now accepted by the ethics committee of the MRC and Medicines Control Council (MCC).

The Unit completed six toxicological studies and three phase I placebo-controlled clinical studies, and the technical reports have been produced. Two phase II clinical trials on traditional medicines used in HIV have been approved by both the MRC ethics committee and the KwaZulu-Natal (KZN) Provincial DoH. These protocols are being reviewed by the MCC. The phase II clinical trials will be conducted in

hospitals and clinics in KZN, which have all approved these studies to be conducted at their facilities. A clinical platform for evaluating traditional medicines and plant-based medicines has been developed and validated.

Mutagenicity and anti-mutagenicity studies of selected traditional medicines have been completed. The Unit has developed assays and completed both in vitro and in vivo drug metabolising studies on a number of African traditional medicine products using major cytochrome P450 metabolising enzymes. These studies are very important in giving an indication of possible drug-herb interactions and predicting any possibility of toxicity even before the drugs can be given to patients. These assays have been validated.

The Unit has a number of collaborative research projects locally, regionally and internationally. All the research collaborations funded are led by the Unit.

The Unit has a special project for manufacturing traditional medicines. The manufacturing facility is state-of-the-art and is equipped with modern manufacturing equipment. This is the first such facility in the country that exclusively manufactures quality traditional medicines and products derived or based on traditional medicines. Adjacent to the manufacturing plant is the quality assurance and quality control laboratories. These laboratories are developing methodologies for validating traditional medicinal products. These facilities are also used for training students, traditional health practitioners, indigenous knowledge holders, scientists and pharmacists. In addition, the Unit trains traditional healers in quality and hygiene when producing medicines.

Capacity development

The Unit has training programmes for its staff, Postdoctoral Fellows, and PhD, MSc, and BSc (Hons) students.

Four staff members (three junior scientists and one support staff member) are enrolled for Masters and Psychology degrees at the University of the Western Cape, as well as three Postdoctoral Fellows and seven Interns.

The Unit gave entrepreneurial training to a group of project beneficiaries in Western Cape communities in the Breede Valley Municipality for the Worcester, De Doorns and Touwsrivier projects.

The Unit is investing in traditional medicines clinical-trial training of general practitioners (GPs) as PIs. These GPs are given research training skills in conducting clinical trials. Two clinical trials have been conducted in the Free State and Gauteng. One GP is currently being capacitated in clinical research in KwaZulu-Natal. Two junior medical doctors have been supported by the Unit to conduct good clinical practice training offered by Pfizer.

So far, 55 traditional health practitioners have been trained in TB, HIV/AIDS and diabetes, and in documentation. A pilot project in KwaZulu-Natal saw 10 traditional health practitioners trained in research methodologies and data collection.

Science communication and research translation

Together with the communities of De Doorns (Western Cape), Chulumna (Eastern Cape) and Mokgola (North West Province), the Unit is conducting projects on poverty alleviation, job creation and entrepreneurship, based on scientifically validated medicinal plants.

The Unit has conducted many radio and TV interviews on its research and programme activities. It is also involved in developing policies on traditional medicines with the MCC for registering and regulating traditional medicines. The Unit contributed to three of the country's Acts, namely the Traditional Health Practitioners Act, Indigenous Knowledge Systems (IKS) Policy and the Biodiversity Act. Currently, the Unit is running a number of workshops with community stakeholders to offer advice on developing a unique indigenous knowledge protection mechanism.

The Unit conducted training workshops for traditional healers, such as in record keeping, and infectious diseases including STIs, HIV/AIDS and TB. There have also been intensive training workshops on diabetes. The Unit gave training workshops for traditional healers on the contents and objectives of the comprehensive care, management and treatment plan for HIV/AIDS; indigenous knowledge systems policy intent; and application of the Traditional Health Practitioners Act, including the Biodiversity Management Act.

The Unit has a school outreach programme, which is an educational and awareness programme about the activities of the Unit, raising awareness on traditional medicines research. The Unit participates in the South African Agency for Science and Technology Advancement (SAASTA) supported National Science Week (NSW), which is hosted at the Unit's Delft laboratories and elsewhere in the country. A total of 1 159 students attended the event.

The Unit conducts workshops for communities, traditional healers and GPs on clinical trials. This is a public awareness campaign, but at the same time it targets research capacitation to rural GPs. The Unit has successfully completed a pilot GPS database of traditional health practitioners in three districts in KwaZulu-Natal.

FACT: Foods rich in omega-3 fatty acids have anti-inflammatory, cardiovascular-enhancing and immune-regulating properties. It helps to prevent and control high blood cholesterol, hypertension, heart disease, stroke, cancer, diabetes, depression, inflammatory and anti-immune disorders.

Corporate support services

OFFICE OF THE PRESIDENT

LEGAL SERVICES DIVISION

National Manager: Ms Marissa Damons

The MRC's Legal Services Division has a unique support service structure within the MRC, in that it operates nationally and plays a very strategic role in protecting the interests of the MRC and assists with risk management within the MRC.

The interests of the MRC are two-fold, and encompass not only legal risk or exposure, but also protecting the MRC's outputs.

The MRC's Legal Services Division is located within the office of the President of the MRC and is not aligned to any specific department, unit or group within the MRC. This has a positive impact on the role of Legal Services within the organisation, in terms of credibility and visibility. Legal Services is aligned to the mandate of the MRC and supports both the Board and the Executive Management Committee in fulfilling the mandate. Therefore, our mission is to support the strategic objectives and initiatives of the MRC, and in doing so, we strive to deliver an efficient and excellent legal service to the MRC by means of a dedicated team that is committed to the highest ethical and professional standards that are not compromised.

Highlights

Over the past year, the Division has met the goals set by the Business Plan, and it has also successfully advised both the Acting President and the Executive Management Committee.

In terms of the current year, the Division's work included the following:

- Through the Legal Services Division, the MRC successfully managed to conclude internal litigious matters in the interests of the parties involved, thereby mitigating the risk for the MRC.
- Improving the Division's productivity and continuing to deliver excellent service to the MRC will remain high on the agenda. To this end, various mechanisms to improve delivery, such as a legal helpdesk system, have begun to be implemented.

- The Division relays information about legal risk areas as well as contractual risks faced by the MRC to the MRC Board, through quarterly contract reports.
- The Legal Division successfully assisted with the Public Finance Management Act, procurement presentations and information dissemination to the various regions.

Transformation and capacity development

The development of skills and capacity within the legal arena is a priority within the Division and every staff member is given the opportunity to develop their skills.

All the staff members within the legal office attend regular training in the relevant areas of their work. The Division strives to keep abreast of new changes in the law and attends regular seminars in order to relay this information back to the MRC and accurately advise the Executive Management Committee. Staff are members of the relevant legal institutes, which also helps them to keep up-to-date with new developments within the legal fraternity.

CORPORATE AND PUBLIC AFFAIRS DIRECTORATE

Executive Manager: Ms Sarah Bok

This Directorate resides within the office of the President and, among other duties, is responsible for the public image of the MRC. Its mandate is to manage all communication with the MRC's target audiences, chief of which are government, other research institutions and the general public, through its community work and science communications office.

The Directorate has undergone several changes in an effort to meet the challenges of the MRC. Since April 2010 to date, the directorate has added a scientific writer, Dr Alpa Somaiya, to its ranks. Each year, the Directorate also employs an Intern from the Cape Peninsula University of Technology's Journalism Department.

The Directorate is also responsible for producing various reports including the Key Performance Indicators (KPI) Report, quarterly organisational performance reports to the NDoH, the MRC's Annual Report and the Research Outputs Report, in partnership with the Management Information and Knowledge Systems Division.

The directorate is divided into the following categories:

- Media, Science Communication and Web Content Office
- Research Translation Office
- MRC Multi-media Studio

Outputs produced during the reporting period include newsletters, the *MRC News*, *Cochrane News*, *MRC Grapevine,* Annual Reports, *Sacendu Newsletter* (alcohol and drugs update), pamphlets and conference materials.

MRC Media Office

Over the past 12 months, the MRC has featured nationally and internationally in online and printed media. Researchers over the year have appeared on e-TV, e-news channel, SABC, and on live radio shows on KFM, Radio 702, Jacaranda FM, East Coast Radio, Radio Lotus, AM Live, PM Live and Heart 104,9 FM.

The total value for articles for the past 12 months has been just over R0,5 million. (Please note that the MRC did not pay for this coverage.) The sum total of such coverage amounts to over R29 million.

In terms of our science communication component, we have:

- provided rapporteurs for EMC meetings, R&D meetings, strategic planning and budget discussions, as well as Portfolio Committee meetings
- visited different units during unit reviews
- edited copy for *MRC News*, scientific journals, press releases and other literature
- attended conferences and written articles on relevant and exciting research studies
- compiled and edited the Annual Report
- advised and helped to develop research translation tools
- developed a consistent scientific writing style for the MRC.

Research Translation Office

Eding science festival in Limpopo: In January 2010, the Research Translation Office was mandated to market Prof. Sewram's Oncology Research Unit, and Eding International Science Festival was the perfect platform to fulfil that objective. The MRC participated in three of the five focus areas of the festival: interactive exhibitions, presentations and career guidance in health sciences. The level of exhibitions and presentations by Prof. Sewram and his team outshone all the other organisations that were present at the festival. His level of work raised the bar, elevating the standards that can now be expected in terms of public engagement. The MRC became the centre of attraction to all those that were present, including primary school learners. Prof. Sewram was the guest speaker at the gala dinner, and the audience included members of

The MRC team at the 2010 Eding International Science Festival in Limpopo

Prof. Sewram addressing learners about careers in health science

government from the Limpopo province, learners, educators, SETI exhibitors, presenters and citizens of Limpopo.

The feedback from the coordinators was that the learners would like the MRC to be present in Limpopo for the next event. The MRC photographer, Mr Jefthas, captured most of the research-related activities at the Polokwane show grounds. The photographs are an indication of some of the activities during the event.

Expo for young scientists: The Cape Town Expo for Young Scientists is an annual event in which learners from Grades 6–12 showcase their investigative projects. The Expo stimulates an interest in Science and Technology in learners. Learners develop problem-solving and critical-thinking approaches when they think and do things scientifically.

The Research Translation Office is involved in the Cape Town Expo for Young Scientists and serves on the Expo Committee. At a suggestion from the MRC, the Expo ran mini workshops for educators and learners, the aim of which was to reach schools not previously involved in the Expo, for example, the Cape Flats and township schools. These workshops expose educators and learners to the requirements of the Expo, and the learners can discuss ideas for projects. Mini Expos will take place during the second quarter to give learners a feel of an Expo and also as a way to help them improve their projects.

De-worming project: The MRC was approached by Free Range Films to record and feature the De-worming Programme on television. Masupatsela Series II is a documentary series produced by Free Range Films for SABC Education. Masupatsela Series II showcases trail-blazing individuals, communities, organisations and businesses that are taking the initiative, and making a difference to South African lives.

Role players involved in the programme included the MRC coordinator of the programme who was interviewed and filmed in March 2009. The storyline was then featured on SABC2 on 23 August 2010, during the children's programme Masupatsela. You can view the story at www.freerangefilms.co.za/masupatsela2/.

The MRC Photography and Video Studio forms an integral part of the Research Translation Office as it visually showcases photographic and video images of all 41 MRC research units, as well as research-support staff projects. On request, the Photography and Video Studio also provides its services to the MRC website and to MRC publications (*Grapevine, MRC News* and the Annual Report). Portrait shots taken by the Studio included those of the PROMEC Unit, Health Systems Research Unit and the new MRC Board.

Over the past financial year, new images and footage were collected at SciFest Africa, Eding International Science Festival, MRC Research Day and the 5th PHASA Conference. Workshops were covered for various MRC research units, as well as support directorates, including the TB Epidemiology Research Unit, SA Cochrane Centre, Indigenous Knowledge Systems, Web and Media Technology Platform, MRC induction and presidential speeches, amongst others.

EXECUTIVE RESEARCH DIRECTORATE

Vice-President: Research: Prof. Ali Dhansay

The Research Directorate is tasked with executing the core business of the MRC, viz. the conduct of research and promoting research (agency function).

The following fall under the Research Directorate:

- Research Capacity Development

- Research Administration and Management
- Strategic Research Initiatives
- Management information and knowledge systems

Research Capacity Development

Dr Thabi Maitin

Grants: The Research Capacity Development (RCD) Unit continues to manage and review the grant values of the 14 funding categories that are being administered by the Sub-directorate. The latest review was of the Premier Career Development Award, which was altered from R230 000 p.a to R250 000 p.a. Efforts to review grant values will continue to be strengthened in order to retain excellent research skills within the MRC research community, and to avoid losing skills to competing funders or institutions, especially at PhD and Postdoctoral levels.

PhD support: Twenty-four PhD candidates are currently in training through the MRC internship programme. At least six young scientists completed their degrees (four MSc and two PhD students) within this reporting period. A highlight is that one PhD graduate has secured a Postdoctoral position at the NIH in the USA, and so will gain international exposure in her field of expertise.

Budget: Barring discrepancies resulting from financial year and academic year overlaps, the budget allocated to the Sub-directorate was almost completely spent. This is an indication that the Sub-directorate budget allocation needs to be increased.

Outreach: At least six historically disadvantaged institutions (HDIs) were visited by RCD staff and yielded successful applicants for grants. We have also supported scientists within MRC units in terms of technical grants, conference attendance, and so on.

Research capacity development events: The most important of the RCD events is the MRC Research Day. This important event continues to grow in stature, attracting more than 120 abstracts from young scientists in October 2010. The level of excellence of the research presented is one that the MRC can be proud of. The 2011 conference, the plans for which are already underway, will take place on 19 and 20 October 2010.

Research Administration and Management

Senior Research Manager: Dr Sandile Williams

The Research Administration and Management Division (RAMD) is a Sub-directorate of the Executive Research Directorate, and plays a key role in the achievement of the MRC's strategic objectives. The Sub-directorate consists of two divisions, namely Research Administration and Research Management.

The Research Administration Division (RAD) is responsible for providing professional support to MRC researchers, as well as to the external health research community. We do this by providing administrative processes and systems that enable researchers to access resources for their research.

The Research Management Division (RMD) is responsible for the quality assurance and peer review processes on which the research grants management system is based, to enable the MRC to support and promote high-quality research.

Self-initiated research (SIR) grants: Through the SIR grants, the MRC provides open competitive support for health research. These grants are predominantly accessed by researchers at HDIs, and to some extent, by other research institutions such as the National Health Laboratory Services (NHLS), National Institute for Communicable Diseases (NICD) and National Institute for Occupational Health (NIOH).

For the 2010/2011 financial year, 139 researchers were supported in this category. This represents a slight increase from the numbers in the 2009/2010 financial year. This year, R16,9 million was allocated for these grants, compared to R14,6 million in 2009/2010.

Support for MRC research entities: The MRC research units are reviewed every five years to determine whether funding support should be continued. During this reporting period, eight of these units were reviewed by expert panels consisting of eminent international and national reviewers. In addition, support for the units is provided on the basis of an annual submission that details its research, operational progress and budget requests.

Currently, the MRC supports 23 extramural (R19 854 292) and 19 intramural (R12 645 262) research units. The average allocation per extramural unit was R863 230, compared to R665 540 per intramural unit, which reflects the MRC's strategic intention to balance resource allocation in favour of external research units.

Research support for pathology research: The National Health Laboratory Service Research Trust (NHLSRT) makes research grants available to staff members and postgraduate students at academic pathology departments across the higher education and health research sphere. In terms of a formal service level agreement between the NHLSRT and MRC, the RAMD acts as administrators for applications to the Trust.

In this reporting period, the two Divisions processed and managed

the peer review of 73 applications for pathology development grants and 12 applications for pathology research awards. An amount of R5 131 645 was allocated to 62 applicants in the pathology development grant category, and an amount of R2 433 500 was awarded to seven applicants for pathology research awards. The process for the next reporting period has already started with a call for proposals and the receipt of 124 applications.

The RAMD has had a very busy and productive 2010, with the pre- and post-award administration, and peer-review of applications in various grant categories, including research capacity development grants and bursary applications. Additionally, the Divisions assisted the MRC in complying with various Acts of Parliament and regulations set out by the Treasury and the Auditor-General.

Strategic Research Initiatives

Executive Manager: Dr Niresh Bhagwandin

The focus of the Strategic Research Initiatives (SRI) Division is on initiating and developing collaboration-based research programmes, sourcing funding, developing international collaborations, and foresight and scenario planning. The highlights of the reporting period include the following:

- The Centers for Disease Control and Prevention (CDC) awarded the MRC US$10 842 801 and an additional US$4 861 614 (subject to availability of funds) for the period 1 August 2010 to 31 July 2011 under the cooperative agreement between the MRC and CDC: 'Cooperative agreement to the Medical Research Council (MRC) of South Africa for TB control and HIV prevention, care, and treatment activities under PEPFAR'. The proposed projects are being undertaken by various MRC units, including the TB Epidemiology and Intervention Research Unit, Health Systems Research Unit, Alcohol and Drug Abuse Research Unit, and Gender and Health Research Unit.
- SRI successfully tendered for a UNICEF call: Bid number 7/2010 HR (Landscape Analysis) 'System Strengthening: Landscape Analysis (LA) on Egypt's readiness to accelerate action in nutrition'. This project is a partnership between the National Research Centre (NRC), Egypt and the MRC's Nutrition Intervention and Health Systems Research Units. The project commenced in December 2010.
- Dr Bhagwandin was invited to serve on the Steering Committee of the DST Synthetic Biology, Systems Biology, Structural Biology and Functional Genomics Initiative.
- Dr Bhagwandin was nominated by the MRC to serve on the Nuclear Technologies in Medicine and Biology Initiative (NTeMBI) hosted by the South African Nuclear Energy Corporation (Necsa). He was elected as first Chair of the NTeMBI Steering Committee.
- Dr Bhagwandin arranged and chaired a meeting of key MRC and other researchers in chronic diseases in response to a request by DST and the Technology Innovation Agency (TIA), to establish a chronic diseases research initiative in South Africa.
- SRI sponsored and arranged a capacity-building conference of investigators of the management of pericarditis (IMPI) in Africa. The IMPI trial is in its third year and is coordinated by the Department of Medicine at UCT. It involves 20 centres in sub-Saharan Africa, 12 of which are outside South Africa and are in Mozambique, Malawi, Kenya, Uganda, Sierra Leone, Nigeria and Zimbabwe. The conference was attended by 58 delegates, 22 of whom were from sub-Saharan countries, 15 from other locations in South Africa and 21 from Cape Town.

Management Information and Knowledge Systems Division

Division Manager: Mr Zizi Mlonyeni

The Management Information and Knowledge Systems (MIKS) Division facilitates the development of various in-house information systems to support the MRC's administrative processes in order to reduce its dependence on external consultants. The Division plays a key role in sourcing systems for the MRC units/directorates and support departments. The MIKS Division actively participates, on behalf of the MRC at a national level, in successfully implementing the Department of Science and Technology (DST) Research Information Management System (RIMS). The Division is now actively edging closer to fully implementing a researcher-centred Management Information System (MIS) through the RIMS implementation, which has now expanded with two more modules being piloted within the MRC. The roll out of this system within the MRC is well on course, as the second module, Research Output, is being finalised.

The MIKS Division continues to provide critical strategic information support for the EMC's decision making through its quarterly and annual research output reports. These reports present the performance of the MRC in relation to its core business (medical

and health research). The Division also received additional requests for Scientometric Analyses Reports for the evaluation of MRC research units and ad hoc requests from other academics within the medical and health research field.

The MIKS Division has finalised the MRC's first Records Management Policy and the guidelines will be made available for comment to the MRC community at large. The MIKS Division is in the process of putting together a records management implementation strategy for the MRC.

While the Division's external client base for electronic document conversion services has increased significantly, it continues to facilitate the full-text retrieval of various peer-reviewed journal articles, both nationally and internationally.

DIABETES RESEARCH GROUP

Manager: Dr Abram Madiehe

Mandate

The UWC/MRC Diabetes Research Group (DRG) is hosted within the Department of Biotechnology at the University of the Western Cape.

There is no single cause of human obesity. It is caused by a complex interplay between factors such as physiological, environmental, genetic, socio-cultural, socio-economic and behavioural. This therefore makes obesity a difficult disease to investigate and manage. However, a better understanding of how environmental factors and genetic susceptibility interact to cause obesity may lead to targeted strategies for disease prevention and treatment. Therefore, the Group focuses on investigating obesity and its related metabolic disorders at the molecular level, in order to generate new knowledge that will be critical for the roll out of these prevention and treatment strategies.

The Group's research mandate is to:

- perform basic molecular biology research to generate new knowledge to help understand the interaction of environmental factors and genetics in the development of obesity
- develop research-based prevention and treatment solutions for obesity.

The Group carries out this mandate by:

- pursuing research into obesity and its associated chronic diseases at the molecular and cellular levels, in order to find the triggers of chronic disease development using proteomics
- developing research capacity by training postgraduate students
- developing reagents for diagnosing and treating obesity that have intellectual property potential
- educating the public about obesity and its associated morbidities.

In this reporting period, the DRG is involved in a number of projects, all aimed at diagnosing, preventing and treating obesity and its associated chronic diseases, especially diabetes. These projects include the following:

- The effects of pro-apoptotic recombinant proteins on adipose tissue development
- Identifying biomarkers associated with obesity using a proteomics approach
- Using nanotechnology in the early detection of type II diabetes
- Developing a drug-delivery system for imaging and treating obesity

Research highlights

The Group presented three posters at the MRC and the University of the Western Cape (UWC) Research Open Days.

The Group is currently working with Mintek to develop a diagnostic kit for diabetes.

The Group hosts the annual World Diabetes Day, where MRC and UWC employees, and the general public are made aware of the debilitating effects of diabetes. The Group also participated in the Diabetes Global Run/Walk. Dr Madiehe presented a breakfast seminar titled 'Why former athletes develop diabetes after retirement from sports' at the Tygerberg Sports Trust. This was well received, and follow-up talks with smaller groups were organised.

The Group, in collaboration with the MRC IKS Research Unit, PROMEC Unit and an international partner in Indonesia, are working on an Aloe project. The DRG is responsible for sample analysis during and after the clinical trial.

Capacity development

During this reporting period, the DRG had three BSc (Hons) students, all of whom have successfully completed their studies and graduated in March 2011; three Masters students, one of whom graduated in September 2010; and three PhD students.

Students in the Group attended several workshops:

- Laboratory and chemical safety to learn the necessary precautions required in a laboratory when working with laboratory equipment and chemicals
- Mentoring and evaluation, hosted by the MRC RCD for personal skills development
- ICP-MS seminar and Bio-Rad proteomics for laboratory and analytical skills training

Members of the Group also participated in a number of conferences,

including the UWC Research Open Day, the MRC Research Day and the Nanotechnology National Conference, to present their work and network with various researchers from different institutions to hopefully start collaborations.

Science communication and research translation

Dr Madiehe participated in two workshops in 2010 to develop a Masters level Nanotechnology curriculum coordinated by the Nanoscience Centre at the University of the Western Cape (UWC).

The Group is currently working in collaboration with Mintek to develop a diagnostic kit for diabetes, intended for commercialisation.

Dr Madiehe offered a special topics module in Obesity and Diabetes for BSc (Hons) students in the Department of Biotechnology at UWC. This course highlights the prevalence of these diseases, and educates the students on their epidemiology, causative factors and management. Dr Madiehe also teaches and coordinates the Ethics in Biotechnology module in the Department of Biotechnology at UWC.

OFFICE OF INTERNATIONAL AFFAIRS

Division Manager: Ms Carole Roberts

The Office of International Affairs (OIA) arranged visiting programmes for the following groups and individuals:

- **The Ministry of Health of Zambia, on behalf of the National Department of Health:** The delegation (the Director of Human Resources and Administration (delegation leader), the Director of Health Service Management, the Chief Planner of Development Cooperation (Economist), the Deputy Director, and the Principal Planner (Economist for Development and Cooperation)) was in South Africa to learn about our health system, to share best practices on equitable and affordable health care, and to develop an implementation plan for the Memorandum of Understanding between the two countries on cooperation in health.
- **A delegation from Tunisia, on behalf of the Department of Science and Technology:** The delegation (Directors-General of Higher Education and International Cooperation, the Director-General of Pasteur Institute of Tunis, and the Ambassador the Republic of Tunisia) was in South Africa to sign a new bilateral cooperation agreement in science and technology. The purpose of their MRC visit was to find out more about the MRC's work on vaccines, health innovation, biotechnology and indigenous knowledge systems.
- **United States Consul General (Cape Town):** The Consul-General visited the MRC for a briefing on MRC research and collaborations with the United States.
- **The Swiss Embassy:** The Science and Technology Counsellor and Attaché visited the MRC to explore the potential for research collaboration and agreements between the MRC and Swiss institutions.
- **The Initiative to Strengthen Health Research Capacity in Africa (ISHReCA) Steering Committee site visit:** Two members of the ISHReCA steering committee visited the MRC to evaluate it as a host for the ISHReCA Secretariat.

TECHNOLOGY AND INNOVATION DIRECTORATE

Acting Executive Director: Mr Bulelani Mahlangu

The mission of the Technology and Innovation Directorate is to translate MRC research into products that will make a difference to the health of the people of South Africa and beyond. The Directorate also recognises the urgent need to develop innovative but relevant interventions to address the growing health problems in the country.

With the passing of the Intellectual Property Rights (IPR) for Public Funded Research and Development Act, new MRC procedures have been developed to ensure that the Innovation Centre (IC) can review all new contracts in terms of the intellectual property (IP) clauses. The MRC's IP policy is also in the process of significant revision and internal consultation to ensure compliance with the Act, and it is due to be submitted to the National IP Management Office (NIPMO) on 1 August 2011.

Collaborations on research with parties within and outside the country are ongoing, and as a result of these, there have been student exchange programmes.

Members of the Directorate continue to represent the MRC in various critical organisations in South Africa.

INNOVATION CENTRE

Director: Prof. Tony Bunn

The passing of the IPR Act in August 2010 has required the Innovation Centre (IC) to rethink its policies, procedures and strategies to ensure compliance. In terms of the IPR Act, all publicly funded institutions in South Africa now have a legal obligation to effectively manage and exploit IP developed using public funds for the good of all South

Africans. However, the Act distinguishes between institutions that distribute public funds (funding agencies) and those that utilise public funds for research (recipients). Thus, contrary to previous practices (and the MRC Act), the MRC may now only claim ownership of IP developed by its internal units and by MRC-salaried employees in external units. This is expected to impact significantly on the number of new invention disclosures received by the IC and the size of the IC's future technology portfolio. However, the Act does not exclude the MRC from participating in benefit sharing or commercialising IP from external units.

Other requirements of the IPR Act are that the IC takes responsibility for ensuring that all contracts comply with the Act, and that IP is identified and protected as early as possible. Thus, new procedures have been developed, together with the Contracts and Budget Management Office, Legal Services Division, and the Research Administration Division, to ensure that the IC can review all new contracts, all newly funded project proposals and progress reports, and all annual unit reports in terms of the IP clauses. All MRC staff members have been informed of the IPR Act and its implications for them. The MRC's IP policy is also in the process of significant revision and internal consultation to ensure that it complies with the Act.

The primary impact of the IPR Act on the MRC will be a refocusing of the IP management and commercialisation efforts of the IC towards internal MRC units and other strategic initiatives, such as the Medical Device Innovation Platform. The IC will also continue to participate in and contribute to the broader national innovation imperatives, including capacity building in IP management, technology transfer and entrepreneurship.

Highlights

The IC continues to make progress in identifying, evaluating, protecting and commercialising IP developed using MRC funds. During 2010/2011, a number of projects were progressed to the start of negotiating commercialisation agreements.

The MRC/UCT Exercise and Sports Medicine Research Unit has made significant progress in integrating a novel genetic test for identifying the risk of tendon injury with associated biochemical and lifestyle information into the Gknowmix online platform. This will provide a holistic and integrated risk-management profile for athletes, managers, coaches and health professionals. The patent on the genetic test will enter the national phase in 2011, and significant progress has been made on negotiating the agreements for IP ownership and commercialisation rights between the relevant parties.

The IC continues to manage the IP portfolio of SAAVI, including prosecuting SAAVI patents and negotiating IP clauses in agreements with third parties. The SAAVI HIV gene sequence patents have now been granted in South Africa, Namibia, the African Regional Intellectual Property Organisation (ARIPO), India, Europe and the USA. Due to changes in the focus of SAAVI's vaccine research, the responsibility for managing three of the other SAAVI patents has been transferred to the University of Cape Town.

The IC is participating in a European Commission Framework Programme 7 project on access to pharmaceuticals (the ATP project). The project aims to identify the barriers to the access of medicines, especially in developing countries, and to make recommendations on policy and legislation in order to promote such access. The project is being carried out by a consortium comprising St George's University, London (UK); the International Vaccine Institute (South Korea); Fiocruz (Brazil); the University of Neuchatel (Switzerland); and the MRC.

IC staff members, together with two other collaborators, have prepared a paper entitled 'Socially responsible licensing of health technologies: Policy and practice in South Africa', which has been accepted for publication in *Les Nouvelles* (an international journal of the Licensing Executives Society International).

The IC has established a collaboration with the University of Sherbrooke in Canada, regarding involving the University's Masters students in the ATP project. As a result, the IC has hosted and will continue to host these Canadian students for 3–4 months every year to work on the ATP project.

Recently, the IC has successfully held a workshop on socially responsible licensing strategies and the relevant clauses in the IPR Act, which was attended by various IP, legal and technology transfer professionals in the Western Cape.

A business plan was drafted by the IC for a new innovation platform, namely the Medical Device Innovation Platform (MDIP), which was approved by the MRC Board in June 2010. MDIP now has eight universities and the CSIR (as a special member) as hubs in the platform. Two international universities (University of Oxford in the UK and Northwestern University in Chicago) are interested in becoming involved in the MDIP as collaborators on projects that relate to appropriate technologies in low-resource settings. A number of projects have been approved for funding, subject to the clinical-need market-opportunity university collaboration criteria. The MDIP has already secured a novel invention disclosure and has the opportunity to spin out a new venture in 2011.

In December 2010, the IC organised an IP policy workshop with colleagues from other technology transfer offices around the country, in order to seek consensus on some of the IP policy issues affected

by the new IPR Act. The results of the workshop have been used to make extensive revisions to the MRC's IP policy to conform to the IPR Act. The revised IP policy is now ready for consultation with other relevant internal departments at the MRC.

Capacity development

While the IC's primary responsibility is to MRC researchers, as the leading centre for health innovation in SA, the IC is extensively involved in building capacity and educating MRC researchers and other research organisations in IP management and technology transfer, through workshops and other forms of information sharing. In the past year, members of the IC have been involved in the following such activities:

- The IC co-organised (with the support of the Southern African Research and Innovation Management Association (SARIMA), and with funding from the UK IPO) and participated in an expert intervention for the commercialisation of South African technologies.
- The IC was invited to be on the teaching faculty of the international course for developing country candidates, namely 'Entrepreneurship for scientists and engineers'. This intensive, week-long course is organised by the Institute of Physics (UK) and events took place in Trieste and Buenos Aires in 2010.

As part of the IC's continued drive towards transformation and internal capacity development, the Centre has employed an Intern on a two-year contract. The Intern has gained significant hands-on experience in patent searching, market research and commercialisation of technologies, and was awarded a scholarship by the Association of University Technology Managers (AUTM) to attend their annual conference in Las Vegas in February 2011.

eHEALTH RESEARCH AND INFORMATION PLATFORM

Diabetes Discovery Platform

Director: Dr Johan Louw

Mandate

The mandate of the Diabetes Discovery Platform (DDP) is to:

- pursue research into diabetes with special attention to the South African perspective
- apply research results to developing methods of prevention, early detection and alternative treatments.

The primary outcome of the DDP's activities is focused on products defined in IP terms.

Research highlights

Drug discovery: The DDP and Danish collaborators have identified and characterised novel treatments for diabetes. Data demonstrate efficacy of the novel compound in lowering blood glucose concentrations in several animal models. The compound compares favourably with current diabetes agents, and promising data is still being generated. In addition to the novel compound, 38 analogues were synthesised from the compound and have been tested in vitro for bioactivity. The next phase of experiments is underway for clinical trials, which will pave the way for the launch of two complementary products into the global market.

Developmental programming: Programming refers to events during critical developmental phases that induce durable changes in offspring development and health. We have established a nutritional programming model and demonstrated programming effects in the brain with altered expression of factors involved in glucose transport and the feeding response. Hepatic physiology and plasma fatty acid profiles are being investigated.

Obesity: Obesity increases the risk of developing cancer, cardiovascular disease and diabetes. *Cyclopia maculata* induces lipolysis (fat breakdown) and inhibits lipogenesis (fat formation) in mouse 3T3-L1 adipocytes (fat cells). We are investigating the mechanism of action by quantifying the expression of proteins involved in lipolysis and lipogenesis in the liver and adipose tissue. Demonstrating that *Cyclopia maculata* has anti-obesity or health-promoting properties has major financial implications for the impoverished Genadendal community.

Capacity development

Unit staff have attended a number of training courses, including Opportunities for Organisational Training in the Virtual world, Second Life; and the EASD Scientists Training Course in Heidelberg, Germany, which took place from 3–9 October 2010.

Science communication and research translation

The Diabetes Discovery Platform researchers review grants and research proposals, and serve as external examiners (for theses), editors and reviewers (for journals). Members of the Unit have also

submitted abstracts for presentation at the Indigenous Plant Use Forum and International Organisation for Chemical Sciences in Development (IOCD) Symposium. They have also delivered presentations at the MRC Research Day.

Biomedical Informatics Research Division

Division Manager: Dr Chris Seebregts

Research highlights

The eHealth Research and Innovation Platform (eHRIP) was established to coordinate and facilitate activities within the MRC that are related to eHealth. In terms of the WHO definition, eHealth refers to the use of information and communication technologies (ICTs) for health. The activities of web and media technologies (WMT), health informatics R&D coordination (HIRD) and eHealth strategy and policy (ESP) are coordinated within the framework of eHRIP through the respective division managers: Ms Hendra van Zyl, Dr Lyn Hanmer and Dr Rosemary Foster.

Based on the 10-point plan of the NDoH and the national service delivery agreement (NSDA) of the Minister of Health, it is expected that the essential role of effective health information systems, including multiple eHealth systems and services, will be increasingly recognised. eHealth activities at the MRC mainly relate to health sector outputs – strengthening health system effectiveness – but also to other outputs by applying areas of eHRIP projects, including HIV and AIDS, and maternal and child health. This role was highlighted by the Minister of Health in his opening speech to the international Medinfo conference held in Cape Town in September 2010, in which he noted that:

'All the four outputs require a functional patient and health management information system that is capable of providing real time information at all levels of health systems. Strengthening information systems is thus one of the sub-outputs that will contribute towards Output Four: Strengthening Health System Effectiveness.'

Capacity development

See reports of WMT, HIRD and ESP.

Science communication and research translation

Doctors Foster and Hanmer represent the MRC on the NHIS/SA committee, which is responsible for planning and coordinating health information system activities in the public health-care sector. They also represent the MRC on the Private Health Information Standards Committee (PHISC), which develops and coordinates the implementation of health information standards, focusing on the private sector, but also taking national health system requirements into account.

WMT conducts an extensive range of research translation and health promotion activities, as indicated in the WMT report, and all the divisions (WMT, HIRD and ESP) work with an extensive range of internal and external stakeholders to support national eHealth and related activities.

Health Informatics Research and Development Coordination Division

Division Manager: Dr Lyn Hanmer

Research highlights

HIRD is an organisational unit in eHRIP that focuses on projects and activities related to health information systems evaluation, and developing and implementing health information content standards.

Medinfo, September 2010: Dr Hanmer chaired the Local Organising Committee for Medinfo 2010, the 13th World Congress on Medical and Health Informatics, which was held in Cape Town. This was the first time that this flagship activity of the International Medical Informatics Association (IMIA) had been held in Africa. It was hosted by the South African Health Informatics Association (SAHIA) on behalf of the IMIA. The conference was formally opened by the South African Minister of Health, and included nearly 1 000 participants from a wide range of international and national organisations, including the NDoH and all but one of the Provincial Departments of Health.

The WHO family of international classifications (WHO-FIC) collaborating centre: eHRIP will host the WHO-FIC collaborating centre at the MRC, which is currently under designation. The MRC will be hosting the 2011 Annual Meeting of the International Network of WHO-FIC Collaborating Centres in Cape Town from 29 October to 4 November 2011. Planning is currently under way with a local Steering Committee of MRC and other stakeholders, in coordination with the meeting planning group of the international WHO-FIC network. New projects to support the work of the collaborating centre are planned in HIRD.

Capacity development

Dr Hanmer continues to manage and mentor an NRF Intern at PhD level who is based in HIRD and is a co-supervisor for one Masters

thesis. She also provides ad hoc support to a Masters-level health informatics project planning at the Cape Peninsula University of Technology (CPUT) through the Information Development for Health in Africa (INDEHELA), which is a North-South-South research network that is funded through the Finnish Academy of Sciences.

Science communication and research translation

Dr Hanmer has been appointed as a member of the Ministerial Advisory Committee on Health Technology to the Minister of Health. She was invited to participate in an experts' meeting on ehealth and telemedicine harmonisation convened by the African Union (AU) Commission and is also participating in preparing a briefing document on this topic, which is to be presented at the next meeting of African Ministers of Health convened by the AU during 2011.

Through the WHO-FIC collaborating centre currently under designation, a network of South African, southern African and African stakeholders involved in health coding and classification is being developed, and will be maintained and coordinated through the collaborating centre at the MRC.

Dr Hanmer is currently the International Medical Informatics Association (IMIA) secretary and therefore a member of the IMIA Board. A primary role of the IMIA is to promote the effective development and use of health information and health information systems internationally. The HIRD division manager is also a council member of the South African Health Informatics Association (SAHIA), which is the national IMIA affiliate.

Telemedicine

Division Manager: Ms Jill Fortuin

In this reporting period, the Telemedicine Division has responded to the health-care needs of the nation by researching and providing innovative technologies that address these needs.

The MTN SA Foundation has a vision to connect communities for self reliance. Telemedicine is a pivotal part of this ongoing project. Health-care service delivery is inhibited by a lack of health professionals, availability of specialist health-care services and geographic positioning of specialised services to communities. The telemedicine workstation is an innovative and enabling tool, which has been identified by the MTN SA Foundation as the leveraging tool to aid their vision of connecting communities for self reliance. The telemedicine workstation, which is designed by Ms Fortuin and owned by the MRC, will be deployed to 100 public health facilities. This SA flagship project will be assessed independently to determine scalability, and if the results are positive, it will potentially form part of a larger initiative: National Health Insurance.

In September 2010, the MRC and the University of Stellenbosch collaborated to host the first SA Telemedicine Conference, which was attended by the Minister of Health and Deputy Minister of Science and Technology. The message from the Minister of Health, Dr Aaron Motsoaledi, highlighted that telemedicine will not answer all South Africa's health-care challenges, but it will enable and improve the delivery of health care in the public sector. This conference was well supported.

The first South African mHealth meeting was hosted by the MRC in September 2010. mHealth is a growing industry in emerging countries, due to the exponential growth of global mobile phone usage. mHealth is the use of mobile communications for health services and information. As a result of the conference, the MRC was asked to lead mHealth in South Africa.

The 'Introduction to Telemedicine course' is the first short course in telemedicine in South Africa and was initiated by Ms Fortuin. The course is facilitated by Ms Van Dyk at the University of Stellenbosch. The course ensures that synergy and awareness is created amongst key role players in the telemedicine and eHealth environment. The MTN SA Foundation and the DST have sponsored participants from all nine provincial departments of health to attend. By the end of February 2011, approximately 30 people had successfully completed the course.

Capacity building within the Telemedicine Division is important in order to ensure sustainability and growth. Within the Division there is one PhD student, who aims to graduate in 2012, and one student who is hoping to complete the postgraduate diploma in telemedicine in 2012. The Division also provides support, mentoring and supervision to external students at Stellenbosch University.

Web and Media Technologies Division

Division Manager: Ms Hendra van Zyl

Highlights

The Web and Media Technologies Division (WMT) resides within the eHealth Research and Innovation Platform, and its mission is to conduct appropriate public health research. This research is carried out by developing and using a convergence of technologies in eHealth

to enhance and translate research into innovative knowledge products, contributing to a strengthened health system in South Africa.

Based on knowledge-management principles for packaging content, WMT uses consumer health informatics (CHI) to analyse the information needs of consumer groups and model their preferences in information systems. This information is then used to develop methods of making health information accessible to these groups. The WMT is uniquely positioned to utilise eHealth for research translation, thereby positively impacting the public's understanding of MRC research.

The WMT developed a comprehensive eHealth promotion approach that addressed inequities in HIV prevention and education within three disadvantaged school communities in Mitchell's Plain.

A convergence of appropriate information and communication technologies (ICTs) were applied through different interventions, including an in-depth research study, to compare the difference between classroom learning and eLearning in the uptake of HIV knowledge among primary school learners. Various approaches addressed the needs of learners and built up their self-esteem in order to empower them to make healthy sexual behaviour choices. A capacity-building HIV peer educator course, focusing on educators, was developed and NQF-aligned. Presented during the complete project phase, 96 participants successfully completed the course. A research report was produced as evidence of successfully enabling horizontal HIV knowledge transfer between peers, and vertical HIV knowledge transfer in an adult-child relationship, thus contributing to public health efforts in HIV prevention.

Capacity development

Of the current eight staff members, one is enrolled for an MPH (University of Liverpool, UK) and one is enrolled in an MA in information science at UNISA. Also, one Intern is enrolled in an MTech course at CPUT. These courses are already adding much value to the WMT's work in public health and supporting the knowledge management and informatics approaches.

Monthly journal club meetings add value to our staff's capacity development, with successful abstract acceptance for conference participation. One oral presentation was given in May 2010 at the international IST-Africa Conference, two oral presentations were presented during September 2010 at the 13th MedInfo World Congress on Health and Medical Informatics, and one oral presentation was delivered in October 2010 at the International Conference on Intellectual Leadership Development for Africa's Advancement.

Ms van Zyl was elected as the Deputy President of the SA Knowledge Management Professional Association (SAKMPA) in May 2010 and serves on a conference scientific committee. Staff attended various courses to enhance their research skills.

From April 2010 to March 2011, the WMT hosted an NRF intern, who received in-depth training on science writing, focusing on research translation for different audiences. The Intern was successful in an abstract submitted to the MRC's Research Day in October 2010, where his presentation and poster addressed research translation. We acquired a second Intern in September 2010 who is currently undergoing capacity development in eHealth.

Science communication and research translation

The WMT manages and participates in an editorial board, consisting of experts, to review articles published on AfroAIDSinfo, an AIDS information portal. These articles and an eNewsletter are written for five different audiences, namely scientists, health professionals, policy makers, educators and the public, on a monthly basis. An online consumer health informatics study was conducted during this reporting period among these audiences to determine whether their information needs are addressed, and to identify changed needs and possible gaps. A special eNewsletter gave feedback to the members and following monthly articles addressed newly identified topics.

Towards the end of an innovative three-year eHealth promotion study, a community feedback meeting was held in November 2010, during which the community participated in the discussion of the final results.

Ongoing technology investigations take place to support and enhance eHealth, which have led to the introduction of various eForums that are appropriate to the needs of an eLearning group, social networking platforms that address the educational needs of adolescents in a community informatics project, and online management of audio and video material. These technologies are linked to methodologies such as Web2Public, Radio2Public, Peer2Peer, and Expert2Student knowledge transfer models, to effectively translate research outputs into knowledge products.

- **Web2Public:** This methodology investigates the information needs of health consumers to produce a web presence, designed and modeled according to their preferences. Examples of its application are the WMT audio production studio website (http://radio.mrc.ac.za), trials of excellence in southern Africa (www.tesafrica.org) and five conference websites, in addition to various updates and modifications to existing project websites. The methodology has also been presented at international

conferences, the MRC Research Day and IST-AFRICA 2010.

- **Radio2Public:** This model guided an investigation to determine the information needs of community radio presenters. While still under refinement, the model was implemented in two large studies of the WMT to support research translation. Twenty podcasts with accompanying articles were produced and embedded into websites during the past year. Additionally, 30 audio documentaries were edited based on research seminars and an oral presentation at the MedInfo World Congress on Health and Medical Informatics in September 2010.
- **Peer2Peer:** This is a mature methodology that has been implemented over the past five years in eHealth community outreach projects in Khayelitsha and Mitchell's Plain. This occurred after it was initially piloted in two rural universities. The main focus of the methodology is to leverage technologies to improved public health and address inequalities and inequities experienced by rural and disadvantaged communities. It was presented at the International Conference on Intellectual Leadership Development for Africa's Advancement in October 2010.
- **Expert2Student:** Using technologies such as audio podcasts, community radio broadcasts and social media, this methodology mobilises experts to encourage students to study natural sciences. Its unique approach has been presented at various conferences and has appeared in publications.

FINANCE AND CONTRACTS DIRECTORATE

Executive Director: Mr Bulelani Mahlangu

The MRC has adopted the 'procure to pay' model, and in this regard, the Board approved the upgrade of the JDE finance system. The system is due to go live in December 2011.

Several audits were conducted, over and above the statutory audit by the Auditor-General of South Africa and several financial reports were submitted to the funders.

A risk-maturity assessment was conducted in September 2010, and it indicated a significant improvement in risk-management processes compared to December 2009.

The CFO acted as the Chief Risk Officer of the MRC. A decision has been taken to formally establish a risk-management function, and a position for a Risk Manager has been advertised.

The Finance Directorate has managed to submit its annual financial statements (AFS) on time, which is a significant improvement from last year, given the number of transactions processed after year end.

The MRC has maximised its return on cash reserves by investing with CPD, and in limited cases, by investing in fixed-term call deposits with the big four banks.

OPERATIONS DIRECTORATE

Executive Director: Mr Zukile Vokwana

INFORMATION TECHNOLOGY

National Manager: Mr Patrick Charls

The IT infrastructure underwent a major hardware upgrade this year. The last significant hardware upgrade took place in the late 1990s, when Durban and Pretoria were linked to Cape Town for the first time.The ageing servers in these regions were replaced in order to support a virtualised server environment using VMware. This reduced physical from approximately 100 in 2006 to less than 20 in 2010. By moving to a virtualised environment, we are able to offer a much higher level of availability.

The new servers have also been attached to storage area networks. The storage requirement of the MRC increases by 30%–40% each year. We currently have approximately 45 terra bytes of storage spread throughout the country.

We are introducing the South African National Research Network, which is a high-speed network dedicated to research traffic, and conducting research into research networking and broadband infrastructures. The network is being rolled out in a phased manner and will connect to 204 sites across the country with research networks. This has enabled us to increase the internet bandwidth significantly, without increasing the running costs.

A full disaster-recovery data centre has been established in Cape Town, so that we can failover all critical servers to this site in the event of a disaster. This site is linked to the primary data centre via a high-speed fibre-optic link.

Upgrading the infrastructure has put us in a much better position to meet the needs of the MRC's researchers. More and more of the research projects involve collaboration with external organisations, which requires the exchange of data, video conferencing, and so on.

HUMAN CAPITAL MANAGEMENT AND DEVELOPMENT

Executive Director: Dr Nonhlanhla Madela-Mntla

Human Capital Management and Development (HCMD) is the centre-stage of support for any organisation.

1. Transformation and development:

This year, the MRC has exceeded the latest South African Employment Equity targets as compiled by the Department of Labour. This is due to the total commitment of the management to the transformation agenda of both the MRC and the South African government.

The Employment Equity profile of the organisation continues to improve due the effective use of the recruitment policy, which is being used as an affirmative action tool. This is reflected in both the race and gender of the new employees recruited during this review period. Percentages were 50% Africans, 19% coloureds, 16% Indians and 15% white. Of these, 68% were female and 32% were male.

Although satisfactory in relation to the South African employment equity statistics, improvement is required in both race and gender at senior management level

MRC EE profile as at 23 March 2011

		Black (%)				Female (%)				
		1997	2010	2009 SA EE statistics	2013 targets	1997	2010	Current SA EE statistics	2013 targets
Executive management	Level 1	25,0	100	22	80	12,5	0	21	20
Senior management	Level 1	13,0	36	27	52	22,0	48	27	38
Middle management	Level 2	15,0	71	37	55	53,8	71	36	57
Junior management	Level 3	42,4	89	58	66	74,3	74	36	76
Semi-skilled	Level 4	55,5	99	83	79	79,4	74	33	69
Unskilled	Level 5	95,2	98	90	99	47,6	39	29	54

Disabled employees as at 23 March 2011 for the period 1 April 2010 to 31 March 2011

Occupational Levels	Male				Female				Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	
Top Management	-	-	-	-	-	-	-	-	-
Senior Management	-	-	-	-	-	-	-	1	2
Professionally qualified and Specialists	-	-	-	-	-	-	-	1	1
Skilled Technical and Academically Qualified	1	-	-	-	-	-	-	-	1
Semi-skilled and Discretionary decision making	-	-	-	-	-	-	-	-	-
Unskilled and Defined Decision Making	-	-	-	-	-	-	-	-	1
Total	1	-	-	1	-	1	-	2	5

Recruitment: Due to the MRC's financial structure in which more than 50% of its funding comes from contract funding, the recruitment office is kept busy with appointments and renewals of contracts. During this review period, 122 job adverts were placed, 4 967 CVs were captured and 208 new appointments/contracts were made. Furthermore, 179 existing contracts were renewed.

Recruitment as at 23 March 2011 for the period 1 April 2010 to 31 March 2011

Occupational Levels	Male				Female				Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	
Top Management	-	-	-	-	-	-	-	-	-
Senior Management	1	-	-	-	-	-	-	1	2
Professionally qualified and Specialists	1	1	-	-	3	3	8	2	18
Skilled Technical and Academically Qualified	16	1	2	1	32	6	16	2	76
Semi-skilled and Discretionary decision making	16		4	-	69	1	9	-	99
Unskilled and Defined Decision Making	7	-	2	-	3	1	-	-	13
Total	41	2	8	1	107	11	33	5	208

*There were no disabled employees recruited

Terminations as at 23 March 2011 for the period 1 April 2010 to 31 March 2011

Occupational Levels	Male				Female				Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	
Top Management	-	-	-	-	-	-	-	1	1
Senior Management	-	-	1	-	1	-	1	2	5
Professionally qualified and Specialists	-	-	2	2	7	1	5	3	20
Skilled Technical and Academically Qualified	9	3	2	2	38	10	7	5	76
Semi-skilled and Discretionary decision making	19	2	1	-	23	8	5	1	59
Unskilled and Defined Decision Making	1	2	-	-	3	3	-	-	9
Total	29	7	6	4	72	22	18	12	170

*There were no disabled employees terminated

Promotions as at 23 March 2011 for the period 1 April 2010 to 31 March 2011

Occupational Levels	Male				Female				Total
	African	Coloured	Indian	White	African	Coloured	Indian	White	
Top Management	-	-	-	-	-	-	-	-	
Senior Management	-	-	-		-	-	-	1	1
Professionally qualified and Specialists	2	1	1	-	3	2	1	7	17
Skilled Technical and Academically Qualified	-	3	-	-	3	2	1	3	12
Semi-skilled and Discretionary decision making	1	1	-	-	2	1	1	-	6
Unskilled and Defined Decision Making	-	-	-	-	1	-	-	-	1
Total	3	5	1	1	9	5	3	11	37

Accelerated development programme (ADP): The ADP was originally established in line with the national need to grow and develop the skills base of previously disadvantaged individuals (PDIs). In the MRC, this programme has been used mainly to develop management skills of scientific employees who are identified as candidates for management skills development, either for career advancement or for the benefit of units and other entities.

Since 2008/2009, this programme has also been extended to include the development of non-scientific staff based in the Corporate Support Directorates. This was again the case this reporting period, with both researchers and support staff being given the opportunity for development. During this time, several employees attended various courses at the University of Stellenbosch Business School. Two people attended the senior management development course (SMDP), five registered for the management development course (MDP) and eight registered for the new management development course (NMDP). Furthermore, eight people were trained in change management by the Prosci and Change Management Learning Centre.

Study support and study leave for career advancement: The MRC has a study support and study leave policy. Permanent and contract staff receive 100% financial support up to a maximum of R10 000 per annum for the advancement of their careers.

For undergraduate studies, staff are allowed two days annually for every exam, up to a maximum of 16 days where operationally possible. Similarly, Masters students are allowed 15 days for writing their thesis, while PhD students are allowed 20 days.

During this review period, financial study support amounted to R349 353, excluding study leave. Support was given to 10 PhD, 10 Masters, six Honours, 14 Undergraduate, 11 Diploma and two Certificate students.

2. Employment relations and conditions

It has now been one year since the revised conditions of service were introduced on 1 January 2010, and no problems have been recorded. However, alignment with best practises remains an ongoing process. Mismanagement and unfair labour practices pose a potential risk to the MRC in the short and medium term. Through ongoing interaction, coaching and mentorship, we have managed to keep formal disputes at a low level. Referrals to the CCMA do happen, with no case losses thus far. Special attention is given to the management of financial misconduct and adherence to protocols. The MRC's disciplinary code has been revised in terms of best practises. On approval by the Executive Management Committee subsequent training will soon be offered to all managers and supervisors. There has been a decline in both formal disciplinary actions and operational requirement processes resulting in retrenchments. Grievances are addressed and facilitated at the lowest possible level.

The following table shows information on disciplinary actions taken during this reporting period.

Disciplinary actions as at 23 March 2011 for the period 01 April to 31 March 2011

Date	Gender	Race	Misconduct/charges	Penalty/outcome
June 2010	M	B	Incapacity – poor performance	Services terminated
July 2010	M	W	Misconduct	Final warning and EAP
August 2010	M	C	Incapacity poor performance	Final warning – demotion as per agreement plus EAP
September 2010	M	B	Incapacity ill health	Services terminated on basis of incapacity
November 2010	M	B	Misconduct	Services terminated
December 2010	M	B	Incapacity – poor performance	Services terminated
December 2010	F	B	Incapacity – poor performance	Services terminated
February 2011	M	B	Incapacity – poor performance	Services terminated
February 2011	M	B	Incapacity – poor performance	Services terminated

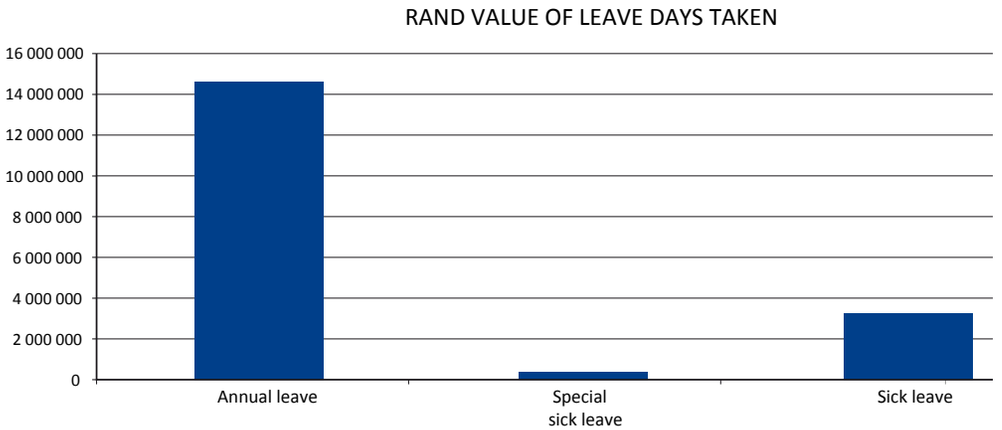
Due to nature of MRC business and funding structures, more than 50% of employees are appointed on fixed-term contracts. Special attention is now given to mechanisms on how to ensure a balance between the best possible employment contracts and practices, and not putting the MRC at risk in creating reasonable expectations and still retaining core and specially trained skills.

In view of the proposed amendments to labour legislation, HCMD is monitoring its progress, which could have an impact on some of the MRC's policies and practices, for example, contract employment. Finally, the MRC anticipates that employees may wish to join a union, ultimately negotiating a recognition agreement with management. A trained task team (including EMC members) is ready to deal with this challenge.

Job evaluation, benchmarking and remuneration: Most jobs in the MRC now have a formal job description, and the majority have been properly evaluated and benchmarked via the MRC's newly introduced job-evaluation system. Managers are now given feedback on the results, with an opportunity to revisit results if dissatisfied. Once all the results are validated, they will be used for salary benchmarking and career advancement. In addition, HCMD is in the final stage of standardising job criteria per job category and level, which will be used as a further guide for career development and growth. This process included the participation of all relevant stakeholders.

From a remuneration point of view, the MRC still experiences problems in remaining competitive with the external environment, and preventing employees being poached. Clinicians, clinical trial nurses and biostatisticians are some of the examples. The MRC's remuneration structure is currently under review, and a revised proposal will be submitted to the Board, based on market comparison information. The revised structure will allow for a flexible approach regarding remuneration in order to cater for scarcity and strategically important positions.

Leave management: HCMD is well prepared for the final roll out of the electronic employee leave self-service system to all staff. This will occur once the consultants have confirmed that the HR system is compatible with the new system software. It is anticipated that all staff will be using the new system by the end of 2011.



3. Performance management system

In 2010/2011, as well as coordinating and driving the performance management system of the MRC, the Performance Management Office has driven a number of projects aimed at changing how the MRC conducts its business. Some of these changes have been quite challenging for the staff. As expected, if change is not well managed, it could lead to unintended consequences. It is for this reason that the Performance Management Office took charge of the change management and worked closely with the various project teams that introduced these changes, in order to alleviate the challenges experienced during the transition process and ensure improved performance. The Executive team went through change management training, after which, a group of agents who were to drive change management within MRC was also sent on training.

Adding change management to the Performance Management Office will help strengthen performance within the MRC, as some of the interventions are not only intended to transform the way it conducts business but also enhance performance. Some of these interventions have been the introduction of supply chain management, JDE upgrade, measuring outcomes as well as outputs in performance management, and setting directorate performance targets versus only focusing on individual targets. These projects are just some of the highlights that were facilitated and coordinated by the Performance Management Office.

MRC CONFERENCE CENTRE AND EVENT MANAGEMENT OFFICE

Division Manager: Ms Mandy Salamo

The vision of the MRC Conference Centre and Event Management Office is to provide a one-stop health event management service to MRC researchers, health managers, community groups and the health industry in support of the MRC strategy through the following actions:

- Better management and utilisation of the MRC conference centre
- Planning and managing conferences, seminars, workshops and exhibitions
- Planning and managing corporate and staff events
- Managing catering for all events
- Managing a business centre for use by visitors and delegates

With only two permanent staff and seven contract staff, the Centre continues to successfully promote and maintain the MRC's branding while at the same time promoting the MRC to its stakeholders by hosting world-class events. Examples of events held during the reporting period include the:

- first SA Telemedicine Conference
- Annual MRC Research Day
- SA Dental Association Conference and AGM
- SA Radiography Association Seminar.

Although faced with several challenges, the Centre managed to raise sufficient funds to upgrade and maintain its facilities. It is envisaged that the Centre will soon boast a lapa, which will allow the facility to compete with big event brands within the country in terms of delegate numbers. Once completed, the facility will be able to host and manage events on site comprising in excess of 500 delegates per event. Events of this nature are currently outsourced to external facilities due to space constraints. This addition will contribute towards the Centre becoming a facility of choice due to its services, size and expertise.

The Centre is a registered member of the South African Accredited Conference Industry (SAACI) and is a member of Trade World. The venues are also advertised on www.sa.venue.com.

The Event Management Office is responsible for managing conferences, seminars, workshops, training and functions for external clients, MRC research units and MRC corporate divisions. The Centre manages national events for all the MRC regions, ranging from small workshops and functions consisting of less than ten people, to very large international conferences that comprise in excess of 1 000 delegates.

The Event Office has been awarded the contract of Secretariat for the Public Health Association of South Africa (PHASA), after facilitating five PHASA conferences to date. We have also facilitated four research days and will be continuing with the fifth for 2011. In addition, we successfully hosted the ISCB Africa ASBCB Conference on Bioinformatics and the 2011 Joint AfSHG and SASHG Conference. Going forward, the Conference and Event Office will become more proactive in event management business development. The following actions are proposed:

- Initiate a high-level interaction with the DoH and DST to offer the Centre as a preferred Western Cape conference and meeting venue for these two key stakeholders of the MRC
- Re-establish links with the universities
- Establish the MRC membership of the Western Cape Business Chamber
- Develop appropriate marketing material

SAFETY, HEALTH AND ENVIRONMENT

Ms Aragea Holland-Fredericks

The MRC strives to comply with all Safety, Health and Environment (SHE) related statutory and funder requirements. In this reporting period, SHE management was included as part of Enterprise Risk Management. Policies and procedures were implemented and continuous improvements were made to ensure that employees work in a safe and healthy environment for facilitation of optimal wellbeing and performance

FACT: Women who have had some schooling are more likely to get married later, survive childbirth , have fewer and healthier children, and make sure that their own children complete school. The UN estimates that for every year a woman spends in primary school, the risk of her child dying prematurely is reduced by 8%.

KPI Report: Financial Year 2010/2011

KPI REPORT : FINANCIAL YEAR 2010/2011				
Activity[1]	**KPI[2] indicator**	**Target performance**	**Actual performance**	**Variance**
1. RESEARCH STRATEGY AND BUSINESS PLAN				
Production of new knowledge	Number of peer-reviewed publications including journal articles, books, book chapters, technical reports, policy briefs and dissertations	800	798	
Quality of new knowledge	Percentage of journal articles in international peer-reviewed journals	87% (609 out of 700 journal articles)	95% (613 of 648 journal articles)	The MRC encourages its researchers to be more competitive and publish internationally to benchmark themselves against the world. To ensure that a quality journal is published, a rigorous review process is followed that accounts for the production of a good quality journal article. This is to ensure that the MRC consistently produces outputs that are included in international publications, and which lead to high impact within the science community. This accounts for the variance in the production of journal articles produced as originally envisaged. From the 648 journal articles produced, the MRC submitted more than originally envisaged for international peer review. This justifies the higher percentage in quality of new knowledge, even though fewer journal articles were produced.
Productivity of publication	Peer-reviewed publications per senior scientist (intramural units)	2,3	1,85	Overall, the number of peer-reviewed publications remained constant. However, the number of MRC internal publications has slightly decreased, largely because the MRC is beginning to see a trend of Scientists being directly involved in policy matters (e.g. participating in government task teams, rather than focusing on publications only).

[1]The activities relate to extramural and intramural units. Where activities relate to one or the other, it is explicitly mentioned in the table.

1. RESEARCH STRATEGY AND BUSINESS PLAN				
Continue with implementation of previous Strategic Plan and formulate new MRC Strategic Plan 2010–2015	Consolidate three NCRPs: • CARISA (cancer research) • African Traditional Medicines and Drug Discovery • Cardiovascular and Metabolic Disease	Three functional NCRPs	Two functional NCRPs consisting of: • CARISA • Cardiovascular and Metabolic Disease	Due to a lack of agreement on issues of governance and leadership among the partners in the African Traditional Medicines and Drug Discovery initiative, it was agreed internally to put this initiative on hold. The decision was based on the importance of the NCRP and the area of research which, if terms are not agreed upfront, could lead to future challenges.
MRC initiated collaborations between two or more institutions	Number of major new collaborations (funding greater than R200 000 per annum) between the MRC and other institutions	1	2	A conservative approach was taken in terms of formulating the target. The MRC initially budgeted for collaboration in the research area of rotavirus. During the year, it was evaluated that further funding was available for an additional collaboration, which was then channelled into the research area of Brain and Behaviour. The target was thus exceeded.
2. FINANCIAL MODEL STRATEGY AND PLAN				
Grow baseline income	Increase in line with MTEF	+6%	7%	
Grow external income	Percentage increase	+10%	0,01%	During years ended March 2007 to March 2010, the combined income from foreign contracts grew by an average of 18%. Management recognised that global conditions were likely to result in less funding channelled to developing countries, and projected growth at 10%. In reality, this growth did not materialise and external income remained constant.
Leveraging of baseline funding	Ratio of external income to baseline income	60:40	55:45	
Commercialisation income	Income generated for the 2010/2011 financial year	R200 000	R47 729	Commercialisation income relates to dividends and royalties received from patents and assigning Intellectual Property. There were deficient processes in terms of projecting (i.e. defining what commercialisation income is) and this did not form part of the focus for the year. As a result, less products and processes were licensed out.
Baseline salary expenditure	Gap between market and the MRC	Market -related salary benchmarking	Market survey has been done, but on senior positions. Benchmarking is not complete.	The process took longer than expected due to complexities that relate to assessing scientific positions. An external remuneration consultancy has been contracted to make recommendations on a revised remuneration structure based on national market information. The report is expected in mid-August, after which it will be submitted to the HR and Remuneration Committee, a committee of the MRC Board (HR and Remco), to advise on the way forward.

3. CAPACITY DEVELOPMENT				
PhD training	Number of PhDs graduated in reporting period	50	33	The target set was based on the prior year's figures for which evidence was lacking. A contributing factor that led to the significant variance was when the target was initially set, students set to graduate were not accurately counted within the various units. As a result, not all PhDs registered in prior periods graduated during the year.
	Number of PhDs registered in reporting period	200	302	There has been a big drive by the NRF, in collaboration with Science Councils, including the MRC, to have more people register for PhD programmes. In response to this drive, an increased number of visits were made by the MRC to the institutions, which resulted in greater awareness. The vigorous approach led to an increase in registrations.
African PhDs	Number of African PhDs registered in reporting period	45	117	The target of 45 was an under-estimation. More visits to previously disadvantaged institutions led to greater awareness being raised within this academic community. The PhD programme was marketed more vigorously during the current financial year, which led to an increase in African PhD enrolments.
Postdoctoral Scientists	Number of Postdoctoral Scientists registered for the reporting period	10	13	Previously, fewer Postdoctoral Scientists took up MRC scholarships/grants. However, when the MRC increased its Postdoctoral grant, there was an increase in the number of applicants. A special call was made, with revised values of the grant, to militate against attrition. This is advantageous for the organisation as Postdoctoral Scientists are in demand throughout the programme period.
Career Awards	Number of Career Awardees registered for the reporting period	10	10	
Internships	Number of registered Interns for the reporting period	10	24	Due to fewer numbers in other grant categories, more funds were available to accommodate more Internships in the programme.
MRC PhD supported fellows	Number of MRC PhD supported fellows for the reporting period	18	13	MRC supported fellows are funded from baseline funding. Five PhDs dropped out of the programme for various reasons beyond the MRC's control.
DST PhD supported Fellows	Number of PhD supported Fellows for the reporting period	15	7	DST originally funded 15 PhD Fellows. The NRF then took over the funding and only the candidates who were due to complete their PhD in 2010 were eligible for support as per the NRF's terms. There were seven such candidates that qualified as per the latter-mentioned criteria.

4. INNOVATION AND TECHNOLOGY				
Patents[2] and disclosures	Number of new disclosures Number of new patents	2 2	3 2	There were more discoveries/inventions during the current financial year. More partnerships were developed, which led to new research areas to explore.
Licence agreements[3]	Number of agreements between the MRC and other institutions/ organisations	1	0	The MRC was not able to finalise a licensing agreement because the Board required more clarity regarding the process followed in licensing out an assigned Intellectual Property. This delayed the approval of the licence. The policy has now been finalised.
5. INFORMATICS AND KNOWLEDGE MANAGEMENT				
MRC Information Systems	Implementing HR Self Service	Online payslips and Leave Self Service	• Online payslips live and implemented • Leave Self Service in testing phase	Leave Self Service has been rolled out to a few divisions in a phased approach. Full implementation was delayed because of inadequate support of the system by the supplier.
	Upgrade JD Edwards financial system	Upgrade JD Edwards to the latest version	Only the scoping phase of the project was done as at 31 March 2011.	Due to the change in Board, a new request of approval was required. Due to staff commitment in respect of year end, it was considered that it would be risky to start the project before the Annual Financial Statement process is finalised.
	Biometrics Co-enrolment system	Implement a web-based system for clinical trial participant enrolment	Launched new system Upgrade to version 2	The original web-based biometric co-enrolment system was installed in August 2010. During the reporting period, the system was upgraded to include additional enhancement required by the clinical trial studies. The enhancement included a field for passport numbers as some participants do not have SA ID books. ID number verification was also included as well as audit logs enhanced to improve the reporting options.
6. OPPORTUNITY AND RISK MANAGEMENT				
Fraud prevention and research misconduct	Education and awareness	Awareness programmes	• Policy on Research Integrity distributed to all staff via the intranet. • Awareness on supply chain (procurement) was conducted via imbizos, which are MRCs communication sessions with all staff. • Finance and Operations staff went on a one-week training on Supply Chain Management provided by the Public Administration Leadership and Management Academy.	
Risk management	Risk Working Group (RWG) and registers	Updates and assessments of risks	• Revised risk assessment • A revised risk register determined • KPMG trained RWG on all concepts of Risk Management	Risk Working Group meetings were held on 23 July 2010 and 29 July 2010. Risk training on all aspects of Risk Management was held on 10 September 2010
Compliance with audit processes, PFMA and King 3	Compliance with legislation	Assessment of governance in annual report	Assessment of governance in the 2010/2011 Annual Report cannot be assessed as at 31 March 2011.	

[1]A patent confers the right to exclude others from a precisely defined scope of invention in return for full disclosure of the details of the creation or invention to the public so that others can understand it and use it to further develop the technology.
[2]Agreement between parties for the use of Intellectual Property (IP)

6. OPPORTUNITY AND RISK MANAGEMENT				
			The Annual Report for 2010/2011 will include an assessment of the Audit, Risk and IT Committee's assessment of governance.	Comprehensive assessment is only possible in July.
	Annual Financial Statement (unqualified)	Unqualified Audit Report	Unqualified Report	
7. TRANSFORMATION AND DEVELOPMENT PLAN				
Expand Employee Wellness Programme	Upgraded Employee Wellness Programme	Establishment of Wellness Programme Forum	The Wellness Forum Programme was not established.	There was a delay in the approval process for the preferred supplier that would manage the Wellness Programme Forum. As a result, the MRC was not in a position to offer substantially more facilities than it usually does.
Transformation within the MRC	Staff proportion by race	African 52% Coloured 15% Indian 15% White 18%	African 50%; coloured 18%; Indian 17%; white 15%	
	Staff by gender	M:F; 32:68	M:F; 31:69	
Black Scientists within the intramural research units	Proportion of black Scientists	64% (62% in 2009)	65%	
	Proportion of African Scientists	35% (30% in 2009)	35%	
	Proportion of senior black scientists	56% (50% in 2009)	55%	
	Proportion of senior African scientists	27% (23% in 2009)	26%	
	Number (out of 41) African Unit Directors	3 (2 in 2009)	3	
	Number (%) out of 19 intramural Unit Directors that are African	3 (18%) (2 in 2009)	2 (13%)	The variance arose due to internal processes not conducive to employment of an additional African intramural Unit Director
Black Managers within the MRC support structure	Percentage of black Managers within the MRC support structure	75% (72% in 2009)	76%	
	Percentage of African Managers within the support structure	25% (25% in 2009)	20%	
	Percentage of African Division Managers within the support structure	30% (35% in 2009)	31%	The target was exceeded by 1% as a result of a reduction in support staff numbers but no additional Division Manager positions were filled during the reporting period.
Female Scientists	Percentage of female Scientists within intramural research units	68% (66% in 2009)	69%	

7. TRANSFORMATION AND DEVELOPMENT PLAN				
	Percentage of female Senior Scientists within intramural research units	60% (55% in 2009)	65%	
Disabled Researchers and Managers within intramural research units	Proportion of disabled Researchers and Managers	2% (1% in 2009)	1%	This performance remained constant from the previous years. There were no new appointees in the Research and Managerial positions that are disabled.
Skills development	Percentage of baseline salary spent on skills development	4% (4% in 2009)	5%	The organisation identified a need for additional training and a decision was made to increase the percentage spent on skills development
Accelerated development within intramural research units and support structures	Amount spent on development of future research and support leaders	R600 000 (R500 000 in 2009)	R205 550	The Accelerated Development Programme was initially aimed at Scientists. Given the fact that many had already been through the programme, access was extended to cater for support staff. Due to a lack of communication and awareness, support staff did not utilise the Accelerated Development Programme.
Organisational development	Staff with a PhD	10% (15% in 2009)	9%	
	Scientists with a PhD within intramural research units	30% (44% in 2009)	31%	The 31% represents 62 researchers with PhDs from a pool of 198 researchers within the MRC intramural units. The increase is due to additional PhDs obtained during the current period.
	MRC staff with an MBChB	5% (5% in 2009)	3%	The 3% performance represents 32 staff with MBChBs from a staff complement of 966. MBChBs constitutes research staff predominantly employed within the clinical trial setting. An increased number of projects were envisaged to be undertaken, especially in the HIV Prevention Research Unit and SAAVI, which unfortunately did not materialise due to a lack of funding for clinical trials.
	Intramural Scientists with an MBChB	15% (15% in 2009)	14%	
Peer-reviewed publications with black African Scientists as primary author within intramural research units	Number (%) of total publications with black African Scientists as primary author	14% (13% in 2009)	4,68%	The MRC has not found it easy (because of strong competition) to recruit black African scientists at a number substantial enough to create a decent pipeline. The MRC is yet to finalise a plan to systematically increase the number of publications by black African Scientists. The other contexts are that the number of publications remained constant in the MRC as a whole, and in a few instances, the MRC lost some of their black Scientists.

8. RESEARCH TRANSLATION				
Technical reports	Number of technical reports	50	30	Fifty technical reports were submitted by Scientists, but upon verification, it was established that out of the 50 submitted, 20 did not qualify as technical reports. This means that Scientists need to be educated on what constitutes a technical report.
Policy briefs	Number of policy briefs	4	4	
9. STAKEHOLDER MANAGEMENT				
Senior management strategic meetings between the MRC and NDOH	Number of strategic meetings	4	18	There was an underestimation in terms of meetings that were anticipated. Senior Management interacts with the National Department of Health from time to time. It is difficult to project the number of meetings, but a minimum of four were expected. During the reporting period, there was increased interaction as a result of Unit Directors collaborating more with the NDoH.
Presentations by the MRC to Portfolio Committees within Parliament	Number of presentations	2	2	
Senior management strategic meetings between the MRC and Provincial Government departments	Number of scientific meetings	10	13	There was an underestimation in terms of meetings that were anticipated. Senior Management interacts with the provinces from time to time. It is difficult to project the number of meetings but at least 10 were expected.
Senior management strategic meetings between the MRC and Science Councils	Number of scientific meetings to secure collaborations between the MRC and Science Councils	5	5	
Senior management strategic meetings between the MRC and the Department of Science and Technology	Number of strategic meetings held	5	5	

FACT: The Children's Charter of South Africa states that 'All children have the right to be protected from all types of violence, including physical, emotional, state, political, gang, domestic, school, township and community, street, racial, self-destructive, and all other forms of violence.'

THE SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

Annual financial statements

FOR THE YEAR ENDED 31 MARCH 2011

REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

REPORT ON THE FINANCIAL STATEMENTS

Introduction

1. I have audited the accompanying financial statements of the South African Medical Research Council (public entity), which comprise the statement of financial position as at 31 March 2011, and the statement of financial performance, statement of changes in net assets and cash flow statement for the year then ended, and a summary of significant accounting policies and other explanatory information, as set out on pages 132 to 175.

Accounting authority's responsibility for the financial statements

2. The accounting authority is responsible for the preparation and fair presentation of these financial statements in accordance with the South African Standards of Generally Recognised Accounting Practice (SA Standards of GRAP), the requirements of the Public Finance Management Act of South Africa, 1999 (Act No. 1 of 1999) (PFMA) and the South African Medical Research Council Act, 1991 (Act No. 58 of 1991), and for such internal control as management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor-General's responsibility

3. As required by section 188 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), section 4 of the Public Audit Act of South Africa, 2004 (Act No. 25 of 2004) (PAA), section 14(2) of the South African Medical Research Council Act, 1991 (Act No. 58 of 1991) and section 40(2) of the PFMA, my responsibility is to express an opinion on these financial statements based on my audit.

4. I conducted my audit in accordance with International Standards on Auditing and *General notice 1111 of 2010* issued in *Government Gazette 33872 of 15 December 2010*. Those standards require that I comply with ethical requirements, and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

5. An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

6. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Opinion

7. In my opinion, the financial statements present fairly, in all material respects, the financial position of the South African Medical Research Council as at 31 March 2011, and its financial performance and cash flows for the year then ended in accordance with SA Standards of GRAP and the requirements of the PFMA.

Additional matter

8. I draw attention to the matter below. My opinion is not modified in respect of this matter:

Unaudited supplementary schedules

9. The public entity provided supplementary information in the financial statements on whether resources were obtained and used according to the legally adopted budget, in accordance with GRAP 1, *Presentation of financial statements*. The supplementary budget information as set out on page 174 does not form part of the financial statements and is presented as additional information. Accordingly, I do not express an opinion thereon.

REPORT ON OTHER LEGAL AND REGULATORY REQUIREMENTS

10. In accordance with the PAA and in terms of *General notice 1111 of 2010*, issued in *Government Gazette 33872 of 15 December 2010,* I include below my findings on the annual performance report as set out on pages 117 to 123 and material non-compliance with laws and regulations applicable to the public entity.

Predetermined objectives

Usefulness of information

11. The following criteria were used to assess usefulness:
    - Measurability: Indicators are well-defined and verifiable, and targets are specific, measurable and time-bound.
    - Relevance: A clear and logical link exists between the objectives, outcomes, outputs, indicators and performance targets.
    - Consistency: Objectives, indicators and targets are consistent between planning and reporting documents.

12. The following audit findings relate to the above criteria:
    - For the selected objectives, 44% of the planned and reported targets are not specific in clearly identifying the nature and the required level of performance.
    - For the selected objectives, 86% of the planned and reported targets were not time-bound in clearly identifying the time period or deadline for delivery.
    - The indicator/measure and targets as per the annual performance plan did not relate directly in 100% of instances to the institution's strategic goals and objectives as per the three-year strategic plan.

Compliance with laws and regulations

Strategic planning and performance management

13. The following audit findings relate to non compliance with strategic planning and performance management:
    - The accounting authority did not submit the proposed strategic plan to the executive authority for approval at least six months before the start of the financial year of the designated department, as required by Treasury Regulation 30.1.1.
    - The accounting authority did not finalise and submit a strategic plan to the relevant executive authority on or before 1 April, as required by Treasury Regulations 30.1.1 and 30.1.2.
    - The executive authority of the public entity did not approve the strategic plan submitted late by the accounting authority, as required by Treasury Regulation 30.1.1.
    - The accounting authority prepared a strategic plan that did not include the key performance measures and indicators for assessing the public entity's performance in delivering the desired outcomes and objectives as required by Treasury Regulation 30.1.3(d).
    - The accounting authority did not report for two quarters of the year on the progress made in achieving measurable objectives and targets, as required by Treasury Regulation 30.2.1. Furthermore, the other quarterly reports were not submitted in time as required by regulation.
    - The accounting authority did not establish procedures for quarterly reporting to the executive authority in order to facilitate effective performance monitoring, evaluation and corrective action, as required by Treasury Regulation 30.2.1.

Annual financial statements, performance and annual report

14. The accounting authority submitted financial statements for auditing that were not prepared in all material aspects in accordance with generally recognised accounting practice as required by section 55(1)(b) of the PFMA. The material misstatements identified by the AGSA with regards to irregular expenditure and disclosure of related parties, post retirement benefits, prior period errors, trade and other receivables and reclassifications of comparative figures were subsequently corrected.

15. The annual report was not prepared with the strategic plan as its basis as per the requirements of Treasury Regulation 30.1.3(g).

Procurement and contract management

16. The following audit findings relate to non compliance with procurement and contract management:
    - Goods and services with a transaction value of over R500 000 were not procured by means of a competitive bidding process as per the requirements of Treasury Notes 16A6.1, Treasury Notes 16A6.4 and National Treasury Practice Notes 6 and 8 of 2007–08.
    - The preference point system was not applied in all procurement of goods and services above R30 000 as required by section 2(a) of the Preferential Procurement Policy Framework Act, 2000 (Act No.5 of 2000).
    - Awards were made to suppliers who failed to provide written proof from the South African Revenue Service that their tax matters are in order as per the requirements of Preferential Procurement Regulation 16 and Treasury Regulation 16A9.1(d).
    - A list of prospective suppliers was not in place for procuring goods and services through quotations as required of National Treasury Practice Note 8 of 2007-08.
    - The prospective suppliers list for procuring goods and services through quotations was not updated at least quarterly to include new suppliers that qualify for listing and prospective suppliers were not invited to apply for such listing at least once a year as per the requirements of National Treasury Practice Note 8 of 2007-08.

Expenditure management

17. The accounting authority did not take effective and appropriate steps to prevent irregular expenditure, as per the requirements of section 51(1)(b) of the PFMA.

18. The accounting authority did not take effective and appropriate steps to prevent fruitless and wasteful expenditure as per the requirements of section 51(1)(b) of the PFMA.

INTERNAL CONTROL

19. In accordance with the PAA and in terms of *General notice 1111 of 2010*, issued in *Government Gazette 33872 of 15 December 2010,* I considered internal control relevant to my audit, but not for the purpose of expressing an opinion on the effectiveness of internal control. The matters reported below are limited to the significant deficiencies that resulted in the findings on the annual performance report and the findings on compliance with laws and regulations included in this report.

Predetermined objectives

Leadership

20. The leadership did not exercise sufficient oversight responsibility regarding performance reporting and related internal controls. Performance objectives, indicators and targets were not approved by the relevant executive authority.

Performance management

21. Management did not implement proper record keeping ensuring that complete, relevant and accurate information is accessible and available to support reporting against predetermined objectives thus resulting in performance not being valid, accurate and complete. The entity also did not have adequate procedures for collecting and collating data.

22. Management did not regularly review interim, quarterly and/or monthly reporting, as required by the PFMA.

23. Furthermore, management did not implement processes to monitor compliance with the National Treasury Framework for Managing Programme Performance Information.

Non-compliance with laws and regulations

Leadership

24. The leadership did not exercise sufficient oversight responsibility regarding compliance with the relevant laws and regulations, as well as related internal controls over supply chain management regulations. Furthermore, leadership did not develop an action plan in a timely manner to address internal control deficiencies and did not adequately monitor the implementation thereof. The requirement for compliance with laws and regulations, in particular supply chain management regulations, was also not communicated to those responsible for implementation.

25. The accounting authority did not exercise sufficient oversight to ensure that findings raised in prior years with regards to supply chain management shortcomings were adequately addressed in the management action plan, as the ending of the term of the previous board in October 2010 caused instability in the leadership structure. The implementation of actions to address internal control deficiencies could, therefore, not be monitored and, as a result, many of the prior years' audit findings regarding supply chain management recurred.

Financial management

26. Management did not adequately review and monitor compliance with all supply chain management regulations and treasury regulations. The existing officials lacked training and guidance in the area of managing compliance with laws and regulations.

27. Management did not design or implement controls to ensure that the procurement policy is in compliance with all SCM regulations and practice notes, due mainly to delays in the establishment of a separate SCM unit within the entity to effectively address all the shortcomings in the SCM processes. Management further did not transfer the current SCM function from the operations division to the finance division as required by Treasury Regulation 16A4.1 as they viewed this requirement as a recommendation and not a National Treasury prescript.

OTHER REPORTS

Investigation

28. An investigation was conducted by a funder on request of the administrators of the funds. The investigation was initiated based on the allegation of possible misappropriation of funds by certain employees. The investigation resulted in criminal proceedings being instituted against the affected employees.

Cape Town

22 July 2011

AUDITOR-GENERAL
SOUTH AFRICA

Auditing to build public confidence

ACCOUNTING AUTHORITY'S RESPONSIBILITIES AND APPROVAL

The Accounting Authority is required by the Public Finance Management Act (Act No. 1 of 1999) to maintain adequate accounting records, and it is responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is the responsibility of the Accounting Authority to ensure that the annual financial statements fairly represent the state of affairs of the entity as at the end of the financial year, and the results of its operations and cash flows for the period then ended. The external auditors were engaged to express an independent opinion on the annual financial statements and were given unrestricted access to all financial records and related data.

The annual financial statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practice (GRAP), including any interpretations, guidelines and directives issued by the Accounting Standards Board. The annual financial statements are based upon appropriate accounting policies consistently applied, and supported by reasonable and prudent judgements and estimates.

New members of the Accounting Authority were appointed on 1 November 2011. The Accounting Authority has identified certain weaknesses, and is committed to ensuring good governance and compliance with all relevant legislation and regulations applicable to the South African Medical Research Council. The Accounting Authority acknowledges that it is ultimately responsible for the system of internal financial control established by the entity, and places considerable importance on maintaining a strong control environment. To enable the Accounting Authority to meet these responsibilities, the Accounting Authority sets standards for internal control aimed at reducing the risk of error or deficit in a cost-effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the entity and all employees are required to maintain the highest ethical standards in ensuring the entity's business is conducted in a manner that in all reasonable circumstances, is above reproach. The focus of risk management in the entity is on identifying, assessing, managing and monitoring all known forms of risk across the entity. While operating risk cannot be fully eliminated, the entity endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The Accounting Authority is of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute assurance against material misstatement or deficit. The Accounting Authority has reviewed the entity's cash flow forecast for the year to 31 March 2011 and, in the light of this review and the current financial position, is satisfied that the entity has access to adequate resources to continue in operational existence for the foreseeable future.

The external auditors are responsible for independently auditing and expressing an opinion on the entity's annual financial statements. The annual financial statements have been examined by the entity's external auditors and their report is presented on the following page.
The annual financial statements, which have been prepared on the going concern basis, were approved by the Accounting Authority on 22 July 2011 and were signed on its behalf by:

Prof. Mazwai
Chairperson of the Board
22 July 2011

Audit Committee report

We are pleased to present our report for the financial year ended 31 March 2011.

Audit Committee members and attendance: The Audit Committee consists of the members listed hereunder and it should meet four times per annum as per its approved terms of reference. A new audit committee was appointed in January 2011 by the newly appointed Board. The audit committee of the previous board had three meetings and the audit committee of the new board had one meeting.

Old Board (1 November 2007 to 31 October 2010)	Number of meeting attended
Dr Setai (Chairperson)	3
Prof. S Rataemane	3
Mr M Govindsamy	3
Mr B Nkosi	3
Ms S Hari	3
Adv. D Block	3

New Board(1 November 2010 to 31 October 2013)	Number of meeting attended
Dr P Hanekom (Chairperson)	1
Dr N Lidhovo	1
Prof. M Sathekge	1
Prof. K Moodley	1

The effectiveness of internal control: The audit committee appointed by the new Board met for the first time on 10 February 2011. The audit committee identified weaknesses, and is committed to ensuring good governance and full compliance with relevant legislation and regulations as well as improvement in internal controls and the quality of reporting. Notwithstanding this, the system of internal controls applied by the entity over financial and risk management is effective, efficient and transparent. In line with the PFMA and the King II Report on Corporate Governance requirements, internal audit provides the Audit Committee and management with assurance that the internal controls are appropriate and effective. This is achieved by means of the risk management process, as well as the identification of corrective actions and suggested enhancements to the controls and processes. From the various reports of the internal auditors, the Audit Report on the annual financial statements, and the management letter of the Auditor-General of South Africa, it was noted that no matters were reported that indicate any material deficiencies in the system of internal control or any deviations there from. Accordingly, we can report that the system of internal control over financial reporting for the period under review was efficient and effective except for the significant matter highlighted in the audit and management report.

The quality of year-end management and quarterly reports submitted in terms of the PFMA: We are satisfied with the content and quality of quarterly reports prepared and issued by the management of the entity of the entity during the year under review.

Evaluation of annual financial statements: We have:

- reviewed and discussed the audited annual financial statements to be included in the annual report with the Auditor-General of South Africa
- reviewed the Auditor-General of South Africa's management letter and management's response thereto
- reviewed changes in accounting policies and practices
- reviewed the entities compliance with legal and regulatory provisions
- reviewed significant adjustments resulting from the audit.

We concur with and accept the Auditor-General of South Africa's report of the annual financial statements, and are of the opinion that the audited annual financial statements should be accepted and read together with the report of the Auditor-General of South Africa.

Internal audit: We are satisfied that the internal audit function is operating effectively and that it has addressed the risks that are pertinent to the entity and its audits.

Auditor-General of South Africa: We have met with the Auditor-General of South Africa to ensure that there are no unresolved issues.

Chairperson of the Audit Committee
Dr Hanekom
17 August 2011

	Note(s)	2011 R	Restated 2010 R
ASSETS			
Current assets			
Inventories	8	124 557	307 700
Other financial assets	6	32 887 621	57 094 108
Trade and other receivables from exchange transactions	9	28 455 805	45 452 474
Cash and cash equivalents	10	410 336 417	370 371 851
		471 804 400	**473 226 133**
Non-current assets			
Biological assets	2	975 000	1 985 000
Property, plant and equipment	3	118 416 046	109 340 805
Intangible assets	4	4 330 777	1 100 685
Investments in controlled entities	5	2	2
Other financial assets	6	952 918	505 276
		124 674 743	**112 931 768**
TOTAL ASSETS		**596 479 143**	**586 157 901**
Liabilities			
Current liabilities			
Finance lease obligation	13	112 431	96 467
Trade and other payables from exchange transactions	16	53 518 694	40 655 098
VAT payable	17	1 121 745	520 595
Provisions	14	6 732 087	3 713 613
Deferred income	15	228 970 264	236 389 465
		290 455 221	**281 375 238**
Non-current liabilities			
Finance lease obligation	13	135 644	248 075
Retirement benefit obligation	7	1 080 000	1 345 000
Earmarked funds	10	999 344	1 004 875
		2 214 988	**2 597 950**
Total liabilities		**292 670 209**	**283 973 188**
Net assets		**303 808 934**	**302 184 713**
Net assets			
Reserves			
Fair value adjustment assets-available-for-sale reserve	11	1 858 370	1 550 309
Accumulated surplus	12	301 950 564	300 634 404
Total net assets		**303 808 934**	**302 184 713**

STATEMENT OF FINANCIAL PERFORMANCE

	Note(s)	2011 R	Restated 2010 R
Revenue		527 691 809	507 612 992
Other income		5 551 089	5 036 554
Operating expenses		(552 799 405)	(499 961 329)
Operating (deficit)/surplus	20	**(19 556 507)**	**12 688 217**
Investment revenue	23	20 973 749	28 285 770
Finance costs		(101 083)	(250 429)
Surplus for the year		**1 316 159**	**40 723 558**

STATEMENT OF CHANGES IN NET ASSETS

	Fair value adjustment assets-available-for-sale reserve R	Accumulated surplus R	Total net assets R
Balance at 01 April 2009	**755 363**	**259 910 846**	**260 666 209**
Changes in net assets			
Movement of fair value of investments	794 946	-	794 946
Net income recognised directly in net assets	794 946	-	794 946
Surplus for the year	-	40 723 558	40 723 558
Total recognised income and expenses for the year	794 946	40 723 558	41 518 504
Total changes	794 946	40 723 558	41 518 504
Opening balance as previously reported	1 550 309	300 986 390	302 536 699
Adjustments			
Prior year adjustments	-	(351 985)	(351 985)
Balance at 01 April 2010 as restated	**1 550 309**	**300 634 405**	**302 184 714**
Changes in net assets			
Movement of fair value of investments	308 061	-	308 061
Net income recognised directly in net assets	308 061	-	308 061
Surplus for the year	-	1 316 159	1 316 159
Total recognised income and expenses for the year	308 061	1 316 159	1 624 220
Total changes	308 061	1 316 159	1 624 220
Balance at 31 March 2011	**1 858 370**	**301 950 564**	**303 808 934**
Note(s)	11	12	

CASH FLOW STATEMENT

	Note(s)	2011 R	Restated 2010 R
Cash flows from operating activities			
Receipts			
Interest income		20 929 556	28 245 452
Dividends received		44 193	40 318
Other receipts		543 128 427	491 098 323
		564 102 176	519 384 093
Payments			
Suppliers		(522 500 008)	(494 237 413)
Finance costs		(101 083)	(250 429)
Post-retirement benefit obligation		(265 000)	(11 849 894)
		(522 866 091)	(506 337 736)
Net cash flows from operating activities	25	**41 236 085**	**13 046 357**
Cash flows from investing activities			
Purchase of property, plant and equipment	3	(21 877 763)	(21 304 800)
Proceeds from sale of property, plant and equipment	3	438 429	397 345
Purchase of other intangible assets	4	(3 571 070)	(86 375)
Movement in financial assets		23 758 845	(29 319 658)
Purchase of biological assets	2	(54 009)	(25 000)
Proceeds from sale of biological assets	2	136 047	42 024
Net cash flows from investing activities		**(1 169 521)**	**(50 296 464)**
Cash flows from financing activities			
Movement in earmarked funds		(5 531)	(103 659)
Finance lease payments		(96 467)	344 542
Net cash flows from financing activities		**(101 998)**	**240 883**
Net increase/(decrease) in cash and cash equivalents		**39 964 566**	**(37 009 224)**
Cash and cash equivalents at the beginning of the year		370 371 851	407 381 075
Cash and cash equivalents at the end of the year	10	**410 336 417**	**370 371 851**

ACCOUNTING POLICIES

1. PRESENTATION OF ANNUAL FINANCIAL STATEMENTS

The annual financial statements have been prepared in accordance with the effective Standards of Generally Recognised Accounting Practice (GRAP) including any interpretations, guidelines and directives issued by the Accounting Standards Board.

These annual financial statements have been prepared on an accrual basis of accounting and are in accordance with historical cost convention unless specified otherwise. They are presented in South African rand.

A summary of the significant accounting policies, which have been consistently applied, are disclosed below.

These accounting policies are consistent with the previous period.

Terminology changes have been made between the prior year financial statements and the current year financial statements. Listed below are the terminology changes.

2011 comparative	2010 financial statements
Other financial assets	Investments – current assets
Investments in controlled entity	Investments – non-current assets
Other financial assets	Loans and receivables
Finance lease obligation	Current portion of long term loans
Trade and other payables from exchange obligations	Trade and other payables
Finance lease obligation	Long-term loans
Retirement benefit obligation	Post-retirement benefits
Fair value adjustments assets-available-for-sale reserve	Market to market reserve

1.1 Property, plant and equipment

Property, plant and equipment are tangible, non-current assets (including infrastructure assets) that are held for use in the production or supply of goods or services, rental to others, or for administrative purposes, and are expected to be used during more than one period.

The cost of an item of property, plant and equipment is recognised as an asset when:

- it is probable that future economic benefits or service potential associated with the item will flow to the entity
- the cost of the item can be measured reliably.

Property, plant and equipment is initially measured at cost. Subsequent costs of replacing part of an item of property, plant and equipment is recognised in the carrying amount if it is probable that the future economic benefits embodied within the part will flow to the Council and its cost can be measured reliably. The costs of the day-to-day servicing of property, plant and equipment are recognised in the statement of financial performance.

Where an asset is acquired at no cost, or for a nominal cost, its cost is its fair value as at date of acquisition.

When significant components of an item of property, plant and equipment have different useful lives, they are accounted for as separate items (major components) of property, plant and equipment.

Property, plant and equipment is carried at cost less accumulated depreciation and any impairment losses.

Property, plant and equipment is depreciated on the straight-line basis over its expected useful life to its estimated residual value. The useful life of items of property, plant and equipment has been assessed as follows:

Item	Average useful life
Buildings	40–50 years
Vehicles and containers	5–10 years
Furniture and office equipment	3–15 years
Computer equipment	5–10 years
Air conditioners	10–15 years
Irrigation equipment	10–15 years
Signage	10–15 years
Usufruct buildings	Over life of usufruct
Prefabricated buildings	20–30 years
Laboratory equipment	10–30 years

The residual value, and the useful life and depreciation method of each asset are reviewed by management at the end of each reporting date. If the expectations differ from previous estimates, the change is accounted for as a change in accounting estimate. The useful lives of assets are based on management's estimation. The actual useful lives of the assets and residual values are assessed annually, and may vary depending on a number of factors. In re-assessing asset useful lives, factors, such as technology innovation product life cycles and maintenance programmes, are taken into account. The estimation of residual values of assets determines whether they will be sold or used to the end of their useful lives and what their condition will be like at that time. Residual value assessments consider issues such as future market conditions, the remaining life of the asset and projected disposal values. Each part of an item of property, plant and equipment, with a cost that is significant in relation to the total cost of the item, is depreciated separately.

The depreciation charge for each period is recognised in surplus or deficit unless it is included in the carrying amount of another asset.

Items of property, plant and equipment are derecognised when the asset is disposed of or when there are no further economic benefits or service potential expected from the use of the asset.

The gain or loss arising from the derecognition of an item of property, plant and equipment is included in surplus or deficit when the item is de-recognised. The gain or loss arising from the derecognition of an item of property, plant and equipment is determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item.

Assets that the entity holds for rentals to others and subsequently routinely sells as part of the ordinary course of activities, are transferred to inventories when the rentals end and the assets are available for sale. These assets are not accounted for as non-current assets held for sale. Proceeds from sales of these assets are recognised as revenue. All cash flows on these assets are included in cash flows from operating activities in the cash flow statement.

1.2 Biological assets

Biological assets or agricultural produce are recognised when, and only when:

- the entity controls the asset as a result of past events
- it is probable that future economic benefits or service potential associated with the asset will flow to the entity
- the fair value or cost of the asset can be measured reliably.

Biological assets are measured at their fair value, less point-of-sale costs. Agricultural produce harvested from an entity's biological assets shall be measured at its fair value, less estimated point-of-sale costs at the point of harvest.
A gain or loss arising on initial recognition of biological assets at fair value, less estimated point-of-sale costs and from a change in fair value, less estimated point-of-sale costs of a biological asset is included in surplus or deficit for the period in which it arises.
Where fair value cannot be measured reliably, biological assets are measured at cost accumulated impairment losses.

1.3 Intangible assets

An asset is identified as an intangible asset when it:

- is capable of being separated or divided from an entity, and sold, transferred, licensed, rented or exchanged, either individually or together, with a related contract, assets or liability
- arises from contractual rights or other legal rights, regardless of whether those rights are transferable or separate from the entity, or from other rights and obligations.

An intangible asset is recognised when:

- it is probable that the expected future economic benefits or service potential that are attributable to the asset will flow to the entity
- the cost or fair value of the asset can be measured reliably.

Intangible assets are initially recognised at cost.
Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised as an expense when it is incurred.
Intangible assets are carried at cost less any accumulated amortisation and any impairment losses.
An intangible asset is regarded as having an indefinite useful life when, based on all relevant factors, there is no foreseeable limit to the period over which the asset is expected to generate net cash inflows or service potential. Amortisation is not provided for these intangible assets, but they are tested for impairment annually and whenever there is an indication that the asset may be impaired. For all other intangible assets, amortisation is provided on a straight-line basis over their useful life.
The amortisation period and the amortisation method for intangible assets are reviewed at each reporting date. Any change will be accounted for as a change in estimate.

Amortisation is provided to write down the intangible assets, on a straight-line basis, to their residual values as follows:

Item	Useful life
Computer software	5–10 years

1.4 Investments in controlled entities

Investments in controlled entities are carried at cost less any accumulated impairment.

1.5 Financial instruments

Classification

The entity classifies financial assets and financial liabilities into the following categories:

- Financial assets at fair value through surplus or deficit – designated
- Held-to-maturity investment
- Loans and receivables
- Available-for-sale financial assets
- Financial liabilities measured at amortised cost

Initial recognition and measurement

Financial instruments are recognised initially when the entity becomes a party to the contractual provisions of the instruments.

The entity classifies financial instruments, or their component parts, on initial recognition as a financial asset, a financial liability or an equity instrument in accordance with the substance of the contractual arrangement.

Financial instruments are measured initially at fair value, except for equity investments for which a fair value is not determinable, and which are measured at cost and are classified as available-for-sale financial assets.

For financial instruments that are not at fair value through surplus or deficit, transaction costs are included in the initial measurement of the instrument.

Subsequent measurement

Financial instruments at fair value through surplus or deficit are subsequently measured at fair value, with gains and losses arising from changes in fair value being included in surplus or deficit for the period.

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. Such assets are subsequently measured at amortised cost, using the effective interest method, less accumulated impairment losses.

Held-to-maturity investments are subsequently measured at amortised cost, using the effective interest method, less accumulated impairment losses.

Available-for-sale financial assets are subsequently measured at fair value. This excludes equity investments for which a fair value is not determinable, and which are measured at cost, less accumulated impairment losses.

Gains and losses arising from changes in fair value are recognised in equity until the asset is disposed of or determined to be impaired. Interest on available-for-sale financial assets calculated using the effective interest method is recognised in surplus or deficit as part of other income.

Financial liabilities at amortised cost are subsequently measured at amortised cost, using the effective interest method.

Fair value determination

The fair values of quoted investments are based on current bid prices. If the market for a financial asset is not active (and for unlisted securities), the entity establishes fair value by using valuation techniques. These include the use of recent arm's length transactions, reference to other instruments that are substantially the same, discounted cash flow analysis, and option pricing models making maximum use of market inputs and relying as little as possible on entity-specific inputs.

Impairment of financial assets

At each end of the reporting period, the entity assesses all financial assets, other than those at fair value through surplus or deficit, to determine whether there is objective evidence that a financial asset or group of financial assets has been impaired.

Amounts due to the entity, significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy and default of payments, are all considered indicators of impairment.

In the case of equity securities classified as available-for-sale, a significant or prolonged decline in the fair value of the security below its cost is considered an indicator of impairment. If any such evidence exists for available-for-sale financial assets, the cumulative loss – measured as the difference between the acquisition cost and current fair value, less any impairment loss on that financial asset previously recognised in surplus or deficit – is removed from equity as a reclassification adjustment and recognised in surplus or deficit.

Impairment losses are recognised in surplus or deficit.

Impairment losses are reversed when an increase in the financial asset's recoverable amount can be related objectively to an event occurring after the impairment was recognised, subject to the restriction that the carrying amount of the financial asset, at the date that the impairment is reversed, shall not exceed what the carrying amount would have been had the impairment not been recognised. If in a subsequent period, the amount of the impairment loss for financial assets decreases and the decrease can be related objectively to an event occurring after the impairment was recognised, the previously recognised impairment loss is reversed.

Any subsequent reversal of an impairment loss is recognised in the statement of financial performance, to the extent that the carrying value does not exceed its amortised cost at the reversal date.

Financial instruments designated as available for sale

Investments in controlled entities accounted for as available-for-sale financial assets are stated at fair value. Changes in the fair value of investments are recognised directly in equity in the mark-to-market reserve. When the investments are disposed of, the related realised profit is released from equity to the income statement. Investments in associate companies are initially recognised at cost, and subsequent to that, at fair value.

Trade and other receivables

Trade receivables are measured at initial recognition at fair value, and are subsequently measured at amortised cost using the effective interest rate method, less a provision for employment. Where the effect of discounting is not material, trade and other receivables are measured at the original invoice amount. Appropriate allowances for estimated irrecoverable amounts are recognised in surplus or deficit when there is objective evidence that the asset is impaired. Significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy or financial reorganisation, and default or delinquency in payments (more than 30 days overdue), are considered indicators that the trade receivable is impaired. The allowance recognised is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the effective interest rate computed at initial recognition.

The carrying amount of the asset is reduced through the use of an allowance account, and the amount of the deficit is recognised in surplus or deficit within operating expenses. When a trade receivable is uncollectible, it is written off against the allowance account for trade receivables. Subsequent recoveries of amounts previously written off are credited against operating expenses in surplus or deficit.

Trade and other receivables are classified as loans and receivables.

Trade and other payables

Trade payables are initially measured at fair value, and are subsequently measured at amortised cost, using the effective interest rate method.

Cash and cash equivalents

Cash and cash equivalents comprise cash on hand and demand deposits and other short-term highly liquid investments that are readily convertible to a known amount of cash, and are subject to an insignificant risk of changes in value. These are initially and subsequently recorded at fair value.

Derivatives

Derivative financial instruments, which are not designated as hedging instruments, consisting of foreign exchange contracts and interest rate swaps, are initially measured at fair value on the contract date, and are re-measured to fair value at subsequent reporting dates.

Derivatives embedded in other financial instruments or other non-financial host contracts are treated as separate derivatives when their risks and characteristics are not closely related to those of the host contract, and the host contract is not carried at fair value with unrealised gains or losses reported in surplus or deficit.

Changes in the fair value of derivative financial instruments are recognised in surplus or deficit as they arise.

Derivatives are classified as financial assets at fair value through surplus or deficit – held for trading.

Held to maturity

These financial assets are initially measured at fair value, plus direct transaction costs.

At subsequent reporting dates, these are measured at amortised cost using the effective interest rate method, less any impairment loss recognised to reflect irrecoverable amounts. An impairment loss is recognised in surplus or deficit when there is objective evidence that the asset is impaired, and it is measured as the difference between the investment's carrying amount and the present value of estimated future cash flows, discounted at the effective interest rate computed at initial recognition. Impairment losses are reversed in subsequent periods when an increase in the investment's recoverable amount can be related objectively to an event occurring after the impairment was recognised, subject to the restriction that the carrying amount of the investment at the date the impairment is reversed shall not exceed what the amortised cost would have been had the impairment not been recognised.

Financial assets that the entity has the positive intention and ability to hold to maturity are classified as held to maturity.

1.6 Leases

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership. A lease is classified as an operating lease if it does not transfer substantially all the risks and rewards incidental to ownership.

Finance leases – lessee

Finance leases are recognised as assets and liabilities in the statement of financial position at amounts equal to the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding liability to the lessor is included in the statement of financial position as a finance lease obligation.

Minimum lease payments are apportioned between the finance charge and reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate on the remaining balance of the liability.

Operating leases – lessor

Operating lease revenue is recognised as revenue on a straight-line basis over the lease term.

Initial direct costs incurred in negotiating and arranging operating leases are added to the carrying amount of the leased asset and recognised on a straight-line basis over the lease term.

Income for leases is disclosed under revenue in the statement of financial performance.

Operating leases – lessee

Operating lease payments are recognised as an expense on a straight-line basis over the lease term.

1.7 Inventories

Inventory is stated at the lower of cost and net realisable value. Cost is calculated on the weighted average basis, and it includes expenditure incurred in acquiring the inventories and bringing them to their existing location and condition.

1.8 Employee benefits

Short-term employee benefits

The cost of short term employee benefits is recognised during the period in which the employee renders the related service. The provisions for employee entitlements to salary and annual leave represent the amount that the MRC has a present obligation to pay as a result of the employee's service provided to the reporting date.

Defined contribution plans

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

Payments made to industry-managed retirement benefit schemes are dealt with as defined contribution plans where the entity's obligation under the schemes is equivalent to those arising in a defined contribution retirement benefit plan.

Defined benefit plans

For defined benefit plans, the cost of providing the benefits is determined using the projected credit method.

Actuarial valuations are conducted on an annual basis by independent actuaries separately for each plan.

The amount recognised in the statement of financial position represents the movement in present value of the defined benefit obligation and the fair value of plan assets, after adjusting for contributions paid to the fund, as well as any unrecognised actuarial gains and losses and unrecognised past service costs.

Any asset is limited to unrecognised actuarial losses and past service costs, plus the present value of available refunds and reduction in future contributions to the plan.

Actuarial gains and losses are recognised in income in the period in which they arise.

Post-retirement medical aid obligations

The MRC provides post-retirement medical care benefits to some of its employees and their legitimate spouses. The entitlement to post-retirement benefits is based on the employee remaining in service up to retirement age. The expected costs of these benefits are accrued over the period of employment, using the project unit credit method. Actuarial gains and losses arising from experience adjustments, and changes in actuarial assumptions, are charged or credited to income in the period in which they occur.

Termination benefits

Termination benefits are payable whenever an employee's employment is terminated before the normal retirement date or whenever an employee accepts voluntary redundancy in exchange for these benefits. The MRC recognises termination benefits when it is demonstrably committed to either terminate the employment of current employees according to a detailed formal plan without the possibility of withdrawal, or to provide termination benefits as a result of an offer made to encourage voluntary redundancy. Benefits falling due more than 12 months after reporting date are discounted to present value.

Long-term employee benefits

Contributions to a pension plan, in respect of service in a particular period, are included in the total cost of employment and are charged to the statement of financial performance in the year in which they relate as part of the cost of employment. The amount recognised in the surplus or deficit for the period under defined benefit plans represents the movement in the present value of the defined benefit obligation and the fair value of plan assets, after adjusting for contributions paid to the fund, as well as any unrecognised past service costs. Actuarial gains or losses are recognised in income in the period in which they occur.

1.9 Provisions and contingencies

Provisions are recognised when:

- the entity has a present obligation as a result of a past event.
- it is probable that an outflow of resources embodying economic benefits or service potential will be required to settle the obligation
- a reliable estimate can be made of the obligation.

Provisions are measured at the present value of the expenditures expected to be made to settle the obligation using the effective interest rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in provision due to a passage of time is recognised as finance charges.

Where some or all of the expenditure required to settle a provision is expected to be reimbursed by another party, the reimbursement is recognised when, and only when, it is virtually certain that reimbursement will be received if the entity settles the obligation. The reimbursement

is treated as a separate asset. The amount recognised for the reimbursement does not exceed the amount of the provision.
Provisions are reviewed at each reporting date and adjusted to reflect the current best estimate. Provisions are reversed if it is no longer probable that an outflow of resources embodying economic benefits or service potential will be required to settle the obligation.
A provision is used only for expenditures for which the provision was originally recognised.
Provisions are not recognised for future operating deficits.
No obligation arises as a consequence of the sale or transfer of an operation until the entity is committed to the sale or transfer, that is, there is a binding agreement.
After their initial recognition, contingent liabilities recognised in business combinations that are recognised separately are subsequently measured at the higher of:

- the amount that would be recognised as a provision.
- the amount initially recognised, less cumulative amortisation.

Contingent assets and contingent liabilities are not recognised. Contingencies are disclosed in note 27.

1.10 Revenue recognition

Revenue represents the parliamentary grant from the government as well as the external income.

Parliamentary grant

Government grants are recognised when it is probable that the future economic benefit will flow to the public entity and these benefits can be measured reliably. The grant is recognised to the extent that there are no further obligations arising from the receipt of the grant. Government grants are assistance by government in the form of transfer of resources in return for compliance with conditions related to operating activities. Grants that compensate the MRC for expenses incurred are recognised in the statement of financial performance in the same periods in which the expenses are recognised.

Revenue other than grants, donations and project revenue

Revenue is recognised on the accrual basis. Revenue is recognised when the significant risks and rewards of the ownership have been transferred.

Research revenue

Research revenue is revenue recognised only to the extent of research costs incurred and it is probable that they will be recoverable. Advance income received in respect of which no work has been done, is treated as deferred until such time the expenditure is incurred or the conditions of the grant/contract are met.

Rental income

Rental income from tenants is recognised in the statement of financial performance on a straight-line basis over the term of the lease. Lease incentives granted are recognised as an integral part of the total rental income, over the term of the lease.

Investment income

Investment income is recognised as interest accrues in profit or loss, using the effective interest method.

Deferred revenue

Deferred income is recognised to the extent that expenses are incurred and that conditions of the grant are met.

1.11 Borrowing costs

It is inappropriate to capitalise borrowing costs when, and only when, there is clear evidence that it is difficult to link the borrowing requirements of an entity directly to the nature of the expenditure to be funded, i.e. capital or current.
Borrowing costs are recognised as an expense in the period in which they are incurred.

1.12 Translation of foreign currencies

Foreign currency transactions

Foreign currency transactions are translated into the measurement currency using the exchange rates prevailing at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such translations and from translation of monetary assets and liabilities denominated in foreign currencies are recognised in the statement of financial performance.

1.13 VAT

The MRC accounts for VAT on the invoice basis.

1.14 Comparative figures

Where necessary, comparative figures have been reclassified in order to conform to changes in presentation in the current year.

1.15 Fruitless and wasteful expenditure

Fruitless expenditure means expenditure that was made in vain and would have been avoided had reasonable care been exercised. All expenditure relating to fruitless and wasteful expenditure is recognised as an expense in the statement of financial performance in the year that the expenditure was incurred. The expenditure is classified in accordance with the nature of the expense, and where recovered, it is subsequently accounted for as revenue in the statement of financial performance.

1.16 Irregular expenditure

Irregular expenditure as defined in section 1 of the PFMA is expenditure other than unauthorised expenditure, incurred in contravention of, or that is not in accordance with a requirement of any applicable legislation, including:

- this Act
- the State Tender Board Act, 1968 (Act No. 86 of 1968), or any regulations made in terms of the Act
- any provincial legislation providing for procurement procedures in that provincial government.

National Treasury practice note No. 4 of 2008/2009, which was issued in terms of sections 76(1) to 76(4) of the PFMA requires the following (effective from 1 April 2008):

- Irregular expenditure that was incurred and identified during the current financial year and which was condoned before year-end and/or before finalisation of the financial statements will be disclosed in the notes to the financial statements.
- Irregular expenditure that was incurred and identified during the current financial year and which is waiting to be condoned at year-end will be disclosed in the notes to the financial statements.
- Where irregular expenditure was incurred in the previous financial year and is only condoned in the following financial year, the disclosure note to the financial statements will be updated with the amount condoned.
- Irregular expenditure that was incurred and identified during the current financial year and which was not condoned by the National Treasury or the relevant authority must be disclosed in the notes to the financial statements. If liability for the irregular expenditure can be attributed to a person, a debt account will be created if such a person is liable in law. Immediate steps will be taken to recover the amount from the person concerned. If recovery is not possible, the accounting authority may write off the amount as debt impairment and disclose such in the relevant note to the financial statements.

1.17 Earmarked funds

These funds represent monies that have been received for clearly defined purposes. The monies received have been allocated to a separate account. The monies are held separately from the cash balances of the entity.

1.18 Fair value adjustment assets-available-for-sale reserve

Investments are re-valued at year end, and unrealised gains/losses are allocated to the fair value adjustment assets-available-for-sale reserve and the investment. At the sale of the investment, the gain or loss is realised and is transferred to the statement of financial performance.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

2. BIOLOGICAL ASSETS

	2011			2010		
	Cost/ Valuation	Accumulated depreciation and accumulated impairment	Carrying value	Cost/ Valuation	Accumulated depreciation and accumulated impairment	Carrying value
Bearer mature biological assets	975 000	-	975 000	1 985 000	-	1 985 000

Reconciliation of biological assets – 2011

	Opening balance	Increase due to purchases	Decreases attributable due to sales	Gains or losses arising from changes in fair value	Total
Bearer mature biological assets	1 985 000	54 009	(136 047)	(927 962)	975 000

Reconciliation of biological assets – 2010

	Opening balance	Increases due to purchases	Decreases attributable to sales	Gains or losses arising from changes in fair value	Total
Bearer mature biological assets	456 140	25 000	(42 024)	1 545 884	1 985 000

Methods and assumptions used in determining fair value

The MRC holds certain monkeys, baboons and horses for research purposes. All research activities are monitored and controlled to ensure humane treatment of animals.

Fair value, less estimated point-of-sale costs of agricultural produce harvested during the period, determined at the point of harvest	975 000	1 985 000

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NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

3. PROPERTY, PLANT AND EQUIPMENT

	2011			2010		
	Cost/Valuation	Accumulated depreciation and accumulated impairment	Carrying value	Cost/Valuation	Accumulated depreciation and accumulated impairment	Carrying value
Buildings	69 540 194	(20 017 075)	49 523 119	67 373 382	(18 418 690)	48 954 692
Motor vehicles	21 667 502	(13 693 867)	7 973 635	21 488 331	(12 737 556)	8 750 775
Office equipment	24 899 684	(12 707 286)	12 192 398	22 826 886	(11 095 664)	11 731 222
IT equipment	45 508 558	(28 558 960)	16 949 598	38 781 118	(28 404 711)	10 376 407
Laboratory equipment	45 342 974	(13 565 678)	31 777 296	41 343 536	(11 815 827)	29 527 709
Total	**206 958 912**	**(88 542 866)**	**118 416 046**	**191 813 253**	**(82 472 448)**	**109 340 805**

Reconciliation of property, plant and equipment – 2011

	Opening balance	Additions	Disposals	Adjustment	Depreciation	Total
Buildings	48 954 692	2 166 813	-	-	(1 598 386)	49 523 119
Motor vehicles	8 750 775	1 564 736	(257 465)	-	(2 084 411)	7 973 635
Office equipment	11 731 222	2 574 501	(79 049)	-	(2 034 276)	12 192 398
IT equipment	10 376 407	11 116 479	(83 212)	-	(4 460 076)	16 949 598
Laboratory equipment	29 527 709	4 455 234	(160 389)	(6)	(2 045 252)	31 777 296
	109 340 805	**21 877 763**	**(580 115)**	**(6)**	**(12 222 401)**	**118 416 046**

Reconciliation of property, plant and equipment – 2010

	Opening balance	Additions	Disposals	Depreciation	Total
Buildings	45 858 125	1 554 276	(1 336)	1 543 627	48 954 692
Motor vehicles	10 371 693	4 267 619	(770 291)	(5 118 246)	8 750 775
Office equipment	6 862 665	5 872 560	(362 018)	(641 985)	11 731 222
IT equipment	10 500 748	3 929 403	(183 651)	(3 870 093)	10 376 407
Laboratory equipment	26 976 323	5 680 942	(566 426)	(2 563130)	29 527 709
	100 569 554	**21 304 800**	**(1 883 722)**	**(10 649 827)**	**109 340 805**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

4. INTANGIBLE ASSETS

	2011			2010		
	Cost/ Valuation	Accumulated amortisation and accumulated impairment	Carrying value	Cost/Valuation	Accumulated amortisation and accumulated impairment	Carrying value
Computer software	5 157 791	(827 014)	4 330 777	1 586 721	(486 036)	1 100 685

Reconciliation of intangible assets – 2011

	Opening balance	Additions	Amortisation	Total
Computer software	1 100 685	3 571 070	(340 978)	4 330 777

Reconciliation of intangible assets – 2010

	Opening balance	Additions	Amortisation	Total
Computer software	1 165 064	86 375	(150 754)	1 100 685

5. INVESTMENTS IN CONTROLLED ENTITIES

Name of company	Held by	% holding 2011	% holding 2010	Carrying amount 2011	Carrying amount 2010
Medres (Pty) Ltd		100,00	100,00	1	1
Jireshsa Medical (Pty) Ltd	Medres (Pty) Ltd	25,00	25,00	1	1
				2	2

The carrying amounts of controlled entities are shown net of impairment losses.

The financial statements of Medres (Pty) Ltd and Jiresha Medical (Pty) Ltd have not been consolidated with those of the MRC, because the companies are dormant and amounts are not material.

Controlled entities with less than 50% voting powers held

Although the entity holds less than 50% of the voting powers in Jirehsa (Pty) Limited, the investment is considered a controlled entity because MRC staff manage the entity.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
6. OTHER FINANCIAL ASSETS		
Available-for-sale		
Listed shares	413 958	408 451
Sanlam demutualised shares – No. of shares 12 715 (2010: 12 715) and Old Mutual demutualised shares – No. of shares 4 210 (2009: 4 210)		
Sanlam unit trusts	2 827 259	2 479 150
SIM General Equity Fund – 14 220,73 units (2010: 14 006,67 units) and SIM		
Balanced Fund – 22 930,97 units (2010: 22 429,27 units)		
	3 241 217	**2 887 601**
Held to maturity		
Nedbank 12-month fixed deposit	-	27 072 603
The fixed deposit matured on 9 April 2010		
Absa 36-month fixed deposit	29 646 404	27 133 904
The fixed deposit will mature on 25 May 2012		
	29 646 404	**54 206 507**
Loans and receivables		
Tertiary Education and Research Network of SA (TENET)	952 918	505 276
The loan is unsecured and interest free. The loan is repaid in monthly instalments by debiting the CIR Bid account amounts due by the MRC to TENET, in respect of the INT-SEA service.		
Non-current assets		
Loans and receivables	952 918	505 276
Current assets		
Available-for-sale	3 241 217	2 887 601
Held to maturity	29 646 404	54 206 507
	32 887 621	**57 094 108**
	33 840 539	**57 599 384**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

6. OTHER FINANCIAL ASSETS (CONTINUED)

Fair value information

Financial assets at fair value through surplus or deficit are recognised at fair value, which is therefore equal to their carrying amounts.
The following classes of financial assets at fair value through surplus or deficit are measured to fair value using quoted market prices:

- Class 1: Listed shares
- Class 2: Unit trusts

Fair value information

Available-for-sale financial assets are recognised at fair value, unless they are unlisted equity instruments and the fair value cannot be determined using other means, in which case they are measured at cost. Fair value information is not provided for these financial assets.

Fair value hierarchy of available-for-sale financial assets

For financial assets recognised at fair value, disclosure is required of a fair value hierarchy, which reflects the significance of the inputs used to make the measurements.
Level 1 represents those assets that are measured using unadjusted quoted prices for identical assets.

Level 1		
Class 1: Listed shares	413 958	408 451
Class 2: Unit trusts	2 827 259	2 479 150
	3 241 217	**2 887 601**
Fair value of held-to-maturity investments		
Fixed deposits	29 646 404	54 206 507

The entity has not reclassified any financial assets from cost or amortised cost to fair value, or from fair value to cost, or amortised cost during the current or prior year.
There were no gains or losses realised on the disposal of held-to-maturity financial assets in 2011 and 2010, as all the financial assets were disposed of at their redemption date.

Fair values of loans and receivables		
Loans and receivables	952 918	505 276

Loans and receivables are measured at cost.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

7. EMPLOYEE BENEFIT OBLIGATIONS

Post-retirement benefits

Post-retirement medical aid plan

Afew years, the MRC took a compulsory insurance policy in order to fund post-retirement medical obligations of its ex-employees. Given the nature of the policy, it is appropriate to treat this as a planned asset. Certain assets have been allocated specifically for the purpose of covering post-retirement medical aid defined benefit liability. The defined medical liability has been recognised and accounted for under the requirements of IAS 19 – Employee Benefits. The assets have been accounted for in terms of the requirements of the accounting standards to which they relate and not in terms of AC116, because the plan is not registered. The relevant assets are included in investments and cash balances.

Pension funds

MRC personnel are members of the following pension funds:

- Pension fund of associated institutions (Act No. 51 of 1963)
- Pension fund for temporary employees (Act no. 75 of 1979)
- MRC Pension fund (since January 1994)

(a) The first two funds were established by law and are regulated by the respective Acts.

(b) The last-named fund is regulated by the Pension Fund Act and is managed by an independent Board of Trustees. The fund was actuarially valued at 1 April 2008 and it was found that the fund had a surplus of R10 million. The next valuation for the fund is 1 April 2011.

(c) The first two funds offer defined benefits to staff. With regard to the MRC Pension Fund, however, some members are on a defined benefit scheme, while the remainder are on a defined contribution scheme.

Post-retirement medical aid plan

The amounts recognised in the statement of financial position are as follows:

Carrying value		
Present value of the defined benefit obligation – wholly unfunded	(1 080 000)	(1 345 000)
Present value of the defined benefit obligation – partially or wholly funded	(18 277 000)	(16 623 000)
Fair value of planned assets	17,450,000	17,693,000
Limitation of liability/(asset)	827,000	(1,070,000)
Net liability	**(1 080 000)**	**(1 345 000)**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
7. EMPLOYEE BENEFIT OBLIGATIONS (CONTINUED)		
The fair value of planned assets includes:		
Changes in the present value of the defined benefit obligation are as follows:		
Opening liability	17 968 000	20 824 894
Benefits paid	(1 913 120)	(3 613 932)
Actuarial gain (loss)	3 030 000	(176 000)
Net expense recognised in the statement of financial performance	272 120	933 038
Closing balance	**19 357 000**	**17 968 000**
Net expense recognised in the statement of financial performance		
Current service cost	57 000	162 000
Interest cost	126 000	269 000
Actuarial loss	89 120	502 038
Total included in employee related costs	**272 120**	**933 038**
Key assumptions used		
Assumptions used at the reporting date:		
Discount rates used	9,20%	9,00%
General increases to medical aid subsidy	7,30%	6,50%
Proportion continuing membership at retirement	100,00%	100,00%
Proportion of retiring members who are married	80,00%	80,00%
Retirement age for staff who joined prior to 1 May 1998	65	65
Retirement age for staff who joined after 1 May 1998	60	60

The basis used to determine the overall expected rate of return on assets, including the effect of the major categories of planned assets, is as follows.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

7. EMPLOYEE BENEFIT OBLIGATIONS (CONTINUED)

Other assumptions

Assumed health-care cost trend rates have a significant effect on the amounts recognised in surplus or deficit. A one percentage point change in assumed health-care cost trends rates would have the following effects:

	Impact on liability RM	% increase/ decrease
2011		
Assumptions as above	19 357	-
Discount rate – increases by 1% p.a.	17 703	(9)
Discount rate – decreases by 1% p.a.	21 306	10
Medical inflation – increases by 1% p.a.	21 208	10
Medical inflation – decreases by 1% p.a.	17 769	(8)
	20 428	6
2010		
Assumptions as above	21 235	
Discount rate – increases by 1% p.a.	19 343	(9)
Discount rate – decreases by 1% p.a.	23 468	11
Medical inflation – increases by 1% p.a.	23 371	10
Medical inflation – decreases by 1% p.a.	19 407	(9)
Retirement age – 60 for all ages	23 141	9

Pension funds:		
Defined benefit obligation – wholly funded		
Present value of obligation	(85 080 000)	(70 928 000)
Fair value of planned assets	99 324 000	85 981 000
Net asset	(14 244 000)	(15 053 000)
Net asset prior to limitation	(14 244 000)	(15 053 000)
Limitation of asset	14 244 000	15 053 000
	-	-
Reconciliation of defined benefit obligation		
Opening defined benefit obligation	70 928 000	61 065 000
Charges recognised in the income statement	17 371 000	13 635 000
Benefits paid	(3 219 000)	(3 772 000)
Closed defined benefit obligation	**85 080 000**	**70 928 000**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
7. EMPLOYEE BENEFIT OBLIGATIONS (CONTINUED)		
Reconciliation of planned assets		
Opening fair value of planned assets after limitation	85 981 000	50 688 000
Income recognised in the income statement	12 204 000	20 958 000
Contributions	4 358 000	18 107 000
Benefits paid	(3 219 000)	(3 772 000)
Closing fair value of planned assets	99 324 000	85 981 000
Staff costs include the following in respect of the defined benefit pension plan:		
Current service cost	5 015 000	4 486 000
Interest cost	6 606 000	5 466 000
Expected return on planned assets	(8 394 000)	(5 711 000)
Net actuarial loss/(gain) recognised in current year	1 940 000	(11 564 000)
Previous asset limitation	(5 167 000)	7 323 000
	-	-
The basis used to determine the overall expected rate of return on plan assets was the R186 Government Bond without adjustment for tax.		
The actual return on planned assets amounted to:	12 204 000	20 958 000
The principal actuarial assumptions used in determining the pension plan per annum were:		
General inflation rate	6,30%	5,70%
Discount rate	9,20%	9,20%
Expected investment return	10,30%	9,70 %
Salary inflation – percentage, plus merit increase	7,30%	6,70%
8. INVENTORIES		
Consumable stores	124 557	307 700
9. TRADE AND OTHER RECEIVABLES FROM EXCHANGE TRANSACTIONS		
Employee costs in advance	173 613	269 034
Prepaid expenses	1 421 917	1 253 495
Trade debtors	25 888 140	42 004 094
Travel and subsistence	972 135	1 925 851
	28 455 805	**45 452 474**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

9. TRADE AND OTHER RECEIVABLES FROM EXCHANGE TRANSACTIONS (CONTINUED)

The Executive Committee considers the carrying value of the trade and other receivables in order to approximate their fair values.

Trade and other receivables impaired

The amount of the provision was R2 809 000 as of 31 March 2011 (2010: R3 342 531).

10. CASH AND CASH EQUIVALENTS

Cash and cash equivalents consist of:		
Cash on hand	19 282	12 678
Bank balances	410 317 135	370 359 173
	410 336 417	**370 371 851**

Guarantees to the value of R784 984 is covered by funds held at ABSA Bank (R35 000) and First National Bank (R749 984).

Analysis of bank balances

ABSA and Standard Bank	1 319 713	2 220 857
ABSA funders accounts	119 486 536	110 798 343
First National Bank	3 541 929	7 359 281
Cash at the Reserve Bank	285 968 957	249 980 692
	410 317 135	370 359 173

The cash at the Reserve Bank includes funds for the Botha Trust, Bruhns Trust, Melville Douglas Trust, rationalisation fund and motor vehicle reserve fund.

Rationalisation fund

Balance at beginning of year	200 946	1 899 524
Transfer to rationalisation fund	-	500 000
Rationalisation payments	(102 085)	(2 198 578)
	98 861	200 946

The fund was instituted in terms of the regulations regarding the framework autonomy and provides for the expenditure associated with the institutional restructuring or rationalisation.

The motor vehicle reserve fund was established to provide self-insurance of motor vehicles with a low market value.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
10. CASH AND CASH EQUIVALENTS (CONTINUED)		
Motor vehicle reserve fund		
Balance at beginning of year	1 705 006	1 580 928
Allocation for the year	338 896	330 326
Expenditure	(401 778)	(206 248)
	1 642 124	1 705 006
Earmarked funds		
Botha trust	151 636	196 636
Bruhns trust	834 383	794 914
Melville Douglas trust	13 325	13 325
	999 344	**1 004 875**

The Executive Committee considers the carrying value of cash and cash equivalents in order to approximate their fair values.

11. FAIR VALUE ADJUSTMENT ASSETS-AVAILABLE-FOR-SALE RESERVE

The fair value adjustment assets-available-for-sale reserve comprises all fair value adjustments on available-for-sale financial instruments. When an asset or liability is derecognised, the fair value adjustments relating to that asset or liability are transferred to surplus or deficit.

Available-for-sale financial instruments – opening balance	1 550 309	755 363
Movement of fair value of investments for the year	308 061	794 946
	1 858 370	**1 550 309**

12. ACCUMULATED SURPLUS

Included in accumulated surplus is:

Deferred income contracts and grants, which refers to the portion of government grants and contract income that was applied to acquire property, plant and equipment, and which has not yet been released to the statement of financial performance.

Deferred income contracts and grants		
Balance at beginning of year	109 340 805	100 569 554
Increase on transfer to deferred income grants and contracts	9 075 241	8 771 251
	118 416 046	**109 340 805**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R

13. FINANCE LEASE OBLIGATION

Minimum lease payments due		
Within one year	143 640	143 640
In second to fifth year inclusive	148 210	291 950
	291 850	435 590
Less: future finance charges	(43 775)	(91 048)
Present value of minimum lease payments	**248 075**	**344 542**
Non-current liabilities	135 644	248 075
Current liabilities	112 431	96 467
	248 075	344 542

The loans are in respect of finance leases.
Fintech – unsecured, repayable in monthly instalments of R8 320 at 18% interest per annum
Scientific group – unsecured, repayable in fixed monthly instalments of R3 650 at 0% interest per annum
The Executive Management Committee considers the long-term loans to approximate their fair values.

14. PROVISIONS

Reconciliation of provisions – 2011

	Opening balance	Additions	Total
Provision for collaborative research	3 713 613	3 018 474	6 732 087

Reconciliation of provisions – 2010

	Opening balance	Additions	Utilised during the year	Total
Provision for collaborative research	3 391 766	2 792 479	(2 470 632)	3 713 613

The provision relates to collaborative research costs that will be settled in the next 12 months.

15. DEFERRED INCOME

Deferred income is monies received upfront in respect of research grants awarded and other income received in advance.

Deferred income	228 970 264	236 389 465

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
16. TRADE AND OTHER PAYABLES FROM EXCHANGE TRANSACTIONS		
Trade payables	16 987 950	14 098 804
Personnel provision fund	13 136 192	8 965 331
Outstanding cheques	808	5 456
Accruals	17 326 760	11 712 315
Interest due to funders	6 047 590	5 873 192
Credit cards	19 394	-
	53 518 694	40 655 098
Fair value of trade and other payables		
Trade payables	53 518 694	40 655 098
Personnel provision fund		

This fund was instituted to provide for the payments of personnel benefits, mainly leave gratuities, and death and disability benefits, on the retirement or death of personnel.

Personnel provision fund		
Balance at the beginning of the year	8 965 331	14 821 783
Leave payouts	(615 168)	(10 437 104)
Movement through statement of financial performance	4 786 029	4 580 652
	13 136 192	8 965 331
17. VAT PAYABLE		
Tax refunds payable	1 121 745	520 595
18. GOVERNMENT GRANTS		
Baseline grant	237 288 593	222 663 155
Total government grants		
Allocation for the year	270 508 996	251 139 000
Less: VAT	(33 220 403)	(30 841 632)
Additional funds received for 2008/2009 (excluding VAT)	-	2 365 787
	237 288 593	**222 663 155**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

19. GENERAL EXPENSES

	2011 R	Restated 2010 R
Advertising	457 029	212 482
Auditors remuneration	1 639 680	1 339 001
Bank charges	275 460	264 936
Collaborative research	112 881 350	106 806 434
Computer expenses	8 961 006	10 261 715
Consulting and professional fees	9 485 750	10 510 128
Debt collection	-	28 000
Insurance	2 495 620	2 402 226
Laboratory operating cost	35 501 920	34 398 264
Lease rentals on operating lease	5 460 902	4 153 058
Magazines, books and periodicals	1 207 001	831 413
Other expenses	4 577 067	4 062 475
Postage and courier	1 916 903	1 415 700
Printing and stationery	3 958 012	3 097 805
Retrenchment/early retirement costs	102 085	2 198 579
Security	3 477 915	2 792 384
Subscriptions and membership fees	324 394	275 214
Telephone and fax	3 985 433	4 057 873
Training	2 099 611	3 033 463
Travel, subsistence and conference attendance	38 740 228	34 956 075
Utilities	8 070 012	6 213 407
	245 617 378	**233 310 632**

Travel, subsistence and conference attendance

Local travel	8 079 818	6 712 306
Overseas travel	5 299 161	7 952 544
Accommodation – local and overseas	7 690 296	6 044 792
Subsistence and travel expenditure	12 900 640	8 175 899
Conference expenditure	4 770 313	6 070 534
	38 740 228	34 956 075

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
19. GENERAL EXPENSES (CONTINUED)		
Collaborative research		
Consulting costs and honorarium payments	57 166 419	50 547 518
Payments made to external institutions	55 714 931	56 258 916
	112 881 350	106 806 434
Other expenses		
Canteen costs	830 085	676 288
Personnel teas	525 773	507 355
Royalty distribution	31 952	43 240
Hire of premises and equipment	1 967 073	1 678 679
Licences	26 456	75 525
Staff recruitment costs	1 195 728	1 081 388
	4 577 067	4 062 475
20. OPERATING (DEFICIT) SURPLUS		
Operating (deficit)/surplus for the year is stated after accounting for the following:		
Operating lease charges		
Premises		
• Contractual amounts	5 460 902	4 153 058
Loss on sale of property, plant and equipment	(141 686)	(1 486 377)
Impairment on businesses (or controlled entities, joint ventures and associates)	-	99 999
Amortisation of intangible assets	340 978	150 754
Depreciation on property, plant and equipment	12 222 402	10 649 827
Employee costs	287 752 354	243 296 288

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
21. EMPLOYEE RELATED COSTS		
Basic	149 104 986	128 760 414
Bonus	16 513 011	12 588 000
Other non-pensionable allowances	65 492 302	53 795 288
Temporary staff	27 586 196	8 242 771
Leave payments	2 632 074	12 671 534
Medical aid – company contributions	6 919 280	6 021 411
Adjustments from the application of AC 116	272 120	3 933 038
Other salary related costs	1 059 977	1 160 068
Defined pension benefit plan expense – current service cost	3 213 410	3 016 395
Defined pension benefit plan expense – past service cost	-	623 322
Overtime payments	356 574	390 390
Defined pension contribution plan expense	11 928 444	9 840 483
SDL	1 316 120	1 120 093
UIF	1 357 860	1 133 081
	287 752 354	**243 296 288**
22. DEBT IMPAIRMENT		
Debt impairment	589 705	154 711
Contributions to debt impairment provision	(794 745)	2 431 491
	(205 040)	**2 586 202**

Contributions to debt impairment provision reflected above include the current year provision for bad debts of R2 809 000 (2010 provision for bad debts of R3 342 531).

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
23. INVESTMENT REVENUE		
Dividend revenue		
Listed financial assets – local	44 193	40 318
Interest revenue		
Unit trusts	14 765	74 475
Bank accounts	1 519 310	3 181 187
Interest charged on trade and other receivables	33 258	13 664
Corporation for public deposits	16 764 553	22 006 093
Interest received – investments held to maturity	2 597 670	2 970 033
	20 929 556	**28 245 452**
	20 973 749	28 285 770
24. IMPAIRMENT OF ASSETS		
Impairments		
Investments in controlled entities	-	99 999
The investment in Jirehsa Medical (Pty) Ltd has been impaired due to no income being generated.		
25. CASH GENERATED FROM OPERATIONS		
Surplus	1 316 159	40 723 558
Adjustments for:		
Depreciation and amortisation	12 563 380	10 800 581
Gain on sale of assets and liabilities	141 686	1 486 377
(Gain)/loss on foreign exchange	(528 204)	524 127
Impairment deficit	-	99 999
Debt impairment	(205,040)	2,586,202
Movements in retirement benefit assets and liabilities	(265 000)	(11 849 894)
Movements in provisions	3 018 474	321 847
Unrealised fair value adjustment on available for sale assets	308 061	794 946
Fair value adjustment on biological assets	927 961	(1 545 884)

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
25. CASH GENERATED FROM OPERATIONS (CONTINUED)		
Changes in working capital:		
Inventories	183 143	(5 143)
Trade and other receivables from exchange transactions	17 729 913	(10 955 837)
Trade and other payables from exchange transactions	12 863 603	(6 478 583)
VAT	601 150	520 595
Deferred income	(7 419 201)	(13 976 534)
	41 236 085	**13 046 357**
26. COMMITMENTS		
Authorised capital expenditure		
Already contracted for but not provided for:		
Property, plant and equipment	11 038 981	1 015 289
Goods and services	9 277 129	3 053 115
Research grants	382 470	160 000
	20 698 580	**4 228 404**
Operating leases – as lessee (expense)		
Minimum lease payments due		
Within one year	4 621 890	4 728 288
In second to fifth year inclusive	4 728 288	1 909 705
	9 350 178	**6 637 993**

The MRC leases certain property, plant and equipment as operating leases. The MRC does not have an option to acquire the assets at the termination of the lease. There are no restrictions imposed by leases.

27. CONTINGENCIES

Estimated fraud of R779 862 was committed at a site in Mozambique (Libombo Spatial Development related project). No formal communication has been received from the funder, but the contract conditions indicate that the MRC will be held responsible. A forensic audit is currently being conducted by the funder.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

28. RELATED PARTIES

Executive authority	Dept. of Health (DOH)
Controlled entities	Medres (Pty) Ltd Refer to note 5
Associates	Jiresha Medical (Pty) Ltd Refer to note 5
Members of key management	Prof. MA Dhansay (Acting President)
	Mr B Mahlangu (Chief Finance Officer)
	Mr Z Vokwana (Executive Director Operations)
	Prof. P Terblanche (resigned 15 August 2010 – Executive Director: Technology & Innovation)
	Ms S Bok (Executive Manager: Corporate and Public Affairs)
	Dr N Bhagwandin (Executive Manager: Strategic Research Initiatives)
	Dr E Madela-Mantla (resigned 31 December 2010 – Executive Manager: Human Capital Management and Development)
Ethics committee member – LBG Mphahlwa Mthatha	Health Resource Centre (MRC supplier)
Old Board Member – JM Pettifor	Wits Health Consortium (extramural Unit Director and MRC supplier)
Executive Director: Z Vokwana	Protea Coin Group (Pty) Ltd (MRC supplier)
Employee: S Goge	Ekswisit (MRC supplier)

Related party balances

	2011 R	Restated 2010 R
Loan accounts – owing by related parties		
Medres (Pty) Ltd (The loan is not considered to be recoverable.)	67 444	60 702

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2011 R	Restated 2010 R
28. RELATED PARTIES (CONTINUED)		
Amounts included in trade receivable/(trade payable) regarding related parties		
National Health Laboratory Services (NHLS)	-	(4 550 000)
Department of Health (DOH)	-	8 389 665
Department of Science and Technology (DST)	-	58 102
National Health Laboratory Services (NHLS)	166 214	242 086
Council for Scientific Industrial Research (CSIR)	274 708	11 400
Council for Scientific Industrial Research (CSIR)	(121 495)	-
National Research Foundation (NRF)	608 640	1 409 572
South African Agency for Science and Technology Advancement (SAASTA)	-	2 113
Human Sciences Research Council (HSRC)	217 457	15 390
Agricultural Research Council (ARC)	49 497	48 542
Department of Social Development (Western Cape)	1 552 193	1 270 104
Department of Social Development (Western Cape) – provision for doubtful debt	(1 552 193)	(1 270 104)
Deferred income		
Department of Health (DOH)	15 654 912	13 003 496
Department of Science and Technology (DST)	3 488 398	5 083 612
Department of Social Development (Western Cape)	1 964 296	784 940
Agricultural Research Council (ARC)	20 731	504 364
Council for Scientific Industrial Research (CSIR)	47 754	223 201
National Research Foundation (NRF)	3 452 268	3 880 533
Revenue		
Department of Health (DOH)	237 288 593	222 663 155
Department of Health (DOH) contracts	13 376 063	2 957 482
Department of Science and Technology (DST)	2 363 623	5 310 936
National Research Foundation (NRF)	4 136 282	7 636 488
Council for Scientific Industrial Research (CSIR)	327 341	84 376
Human Sciences Research Council (HSRC)	217 457	75 291
South African Agency for Science and Technology Advancement (SAASTA)	5 392	99 856
Agricultural Research Council (ARC)	1 063 522	129 035

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

28. RELATED PARTIES (CONTINUED)

Department of Social Development (Western Cape)	540 397	1 401 000
	259 318 670	**240 357 619**

Expenditure incurred with related party suppliers

National Health Laboratory Services (NHLS)	3 567 945	2 940 309
Mthatha Health Resource Centre	-	4 353
Wits Health Consortium	1 299 603	1 714 403
Protea Coin Group (Pty) Ltd	48 171	52 989
Ekswisit	47 775	-
	4 963 494	**4 712 054**

Executive authority information

Minister: Dr A Motsoaledi

No subsistence, travel and other related re-imbursement costs have been paid.

Director General: Ms Precious Matsoso (from June 2010)

No subsistence, travel and other related re-imbursement costs have been paid.

Executive Directors/Managers leave balances

Prof. P Terblanche (resigned 15 August 2010)	-	16 422
Dr MA Dhansay	196 249	150 498
Mr Z Vokwana	177 669	80 682
Mr B Mahlangu	122 218	41 913
Ms S Bok	41 134	22 217
Dr N Madela-Mntla	-	63 166
Dr N Bhagwandin	43 900	-
	581 170	**374 898**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

29. BOARD MEMBERS AND EXECUTIVE DIRECTORS/MANAGERS EMOLUMENTS

Board member's emoluments

Fees for the board and board sub-committee members

2011	Honorarium	Vehicle & parking & cell phone allowance	Reimbursements	Consulting fees & mileage post term	Total
	R	R	R	R	R
Advocate D Block	114 481	4 538	-	1 810	120 829
Prof. D Du Toit	78 983	1 562	-	41 120	121 665
Prof. DL Mkize	15 894	905	-	-	16 799
Dr K Mlisana	15 894	631	-	-	16 525
Prof. I Moodley	100 798	5 830	-	2 061	108 689
Prof. S Rataemane	61 810	3 524	22 189	-	87 523
Prof. K Voyi	40 726	140	-	2 945	43 811
*Prof. ZL Dlamini	24 724	-	-	-	24 724
*Prof. C Feldman	19 426	678	-	-	20 104
*Dr SC Gumbi	28 153	894	-	-	29 047
*Dr P Hanekom	35 217	944	-	-	36 161
*Pro. U Lalloo	19 426	575	-	-	20 001
*Dr NM Lidovho	30 022	17 040	-	-	47 062
*Prof. EL Mazwai	66 387	9 762	-	-	76 149
*Dr KE Mokwena	22 855	-	-	-	22 855
*Prof. K Moodley	24 724	-	-	-	24 724
*Prof. L Morris	19 426	-	-	-	19 426
*Prof. MM Sathekge	30 022	1 874	-	-	31 896
	748 968	**48 897**	**22 189**	**47 936**	**867 990**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

29. BOARD MEMBERS AND EXECUTIVE DIRECTORS/MANAGERS EMOLUMENTS (CONTINUED)

2010	Honorarium	Vehicle and parking	Reimbursements	Consulting fees & cell phone allowances	Total
	R	R	R	R	R
Adv. D Block	81 254	2 839	-	-	84 093
Prof. D Du Toit	107 435	2 920	-	-	110 355
Prof. DL Mkize	29 988	1 473	-	-	31 461
Dr K Mlisana	31 654	759	-	-	32 413
Prof. I Moodley	49 695	2 034	-	-	51 729
Prof. JM Pettifor	19 992	920	-	-	20 912
Col. DC Qolohle	34 986	2 456	-	-	37 442
Prof. Rataemane	73 689	5 280	377	-	79 346
Prof. K Voyi	40 096	-	-	7 068	47 164
Dr C Walsh	57 930	-	-	-	57 930
	526 719	**18 681**	**377**	**7 068**	**552 845**

*New board

Reimbursements column represents payment in lieu of travel costs.

Meeting attendance for the period 1 April 2010 to 31 March 2011

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

29. BOARD MEMBERS AND EXECUTIVE DIRECTORS/MANAGERS EMOLUMENTS (CONTINUED)

2011 New Board	6 December 2010	27 January 2011	19 February 2011	24 March 2011	Total
Prof. EL Mazwai	1	1	1	1	4
Prof. Z Dlamini	1	1	1	1	4
Prof. C Feldman	1	1	-	-	2
Dr S Gumbi	1	1	1	1	4
Dr P Hanekom	1	1	1	1	4
Prof. U Lalloo	1	1	1	-	3
Dr M Lidovho	1	1	1	1	4
Dr K Mokwena	1	1	-	1	3
Prof. K Moodley	1	1	1	1	4
Prof. L Morris	-	1	1	-	2
*Dr G Ramokgopa	1	-	-	-	1
Prof. M Sathekge	1	1	1	1	4
Ms G Spelman	1	-	-	1	2
Prof. E Vries	1	1	-	1	3
*Ms M Mushwana	-	1	-	-	1

2011 Old Board	18 June 2010	17 September 2010	Total
Adv. D Block	1	1	2
Prof. D Du Toit	1	1	2
Prof. DL Mkize	1	1	2
Dr K Mlisana	1	1	2
Prof. I Moodley	1	1	2
Prof. JM Pettifor	-	1	1
Col. DC Qolohle	1	1	2
Prof. S Rataemane	1	1	2
Prof. K Voyi	1	1	2
Dr C Walsh	-	1	1
*Ms P Netshidzivhani	1	-	1
**Dr B Setai	-	1	1

*(Department of Health representatives)

**Dr B Setai invited to two meetings in capacity as Chair of Audit & Finance Committee.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

29. BOARD MEMBERS AND EXECUTIVE DIRECTORS/MANAGERS EMOLUMENTS (CONTINUED)

EXECUTIVE DIRECTORS/MANAGERS EMOLUMENTS

2011	Package total	Bonus	S & T	Company contributions	Total
	R	R	R	R	R
*N Bhagwandin	882 393	91 384	-	81 844	1 055 621
*SH Bok	795 365	70 319	-	91 931	957 615
MA Dhansay	1 155 271	-	-	119 556	1 274 827
*E Madela-Mntla	733 711	91 429	2 228	57 428	884 796
BJ Mahlangu	1 045 555	64 286	-	93 164	1 203 005
AP Terblanche	427 512	-	747	635	428 894
Z Vokwana	1 058 651	64 286	-	80 065	1 203 002
	6 098 458	**191 704**	**2 975**	**524 623**	**7 007 760**

*Executive Manager
AP Terblanche Executive Director resigned July 2010
E Madela-Mntla Executive Manager; Contract ended 31 December 2010

2010	Package total	Bonus	S & T	Company contributions	Total
	R	R	R	R	R
*N Bhagwandin	726 432	131 901	-	74 898	933 231
*SH Bok	716 036	104 682	-	85 387	906 105
MA Dhansay	1 283 522	92 900	704	112 672	1 489 798
*E Madela-Mntla	800 728	125 681	5 265	71 627	1 003 301
BJ Mahlangu	1 164 971	67 915	-	93 672	1 326 558
AD Mbewu	1 206 945	-	-	84 730	1 291 675
AP Terblanche	752 068	200 484	7 218	42 380	1 002 150
Z Vokwana	978 526	67 915	-	76 368	1 122 809
	7 629 228	**791 478**	**13 187**	**641 734**	**9 075 627**

*Executive Manager
MA Dhansay – Acting President since January 2010
AP Terblanche – Executive Director; Contract ended 14 October 2009 and new contract commenced 1 February 2010

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

30. PRIOR PERIOD ERRORS

An error was identified with the valuation of the post-retirement medical plans.

Events subsequent to year end confirmed the fact that the market was active as at 31 March 2010 and therefore the biological assets should have been disclosed at a fair value of R1 985 000 instead of R593 116, giving rise to an adjustment of R1 391 884.

The correction of the error(s) results in adjustments as follows:

Statement of financial position		
Retirement benefit obligations	1 345 000	993 015
Accumulated surplus	299 242 520	299 594 505
Biological assets	1 985 000	593 116
Statement of financial performance		
Employee related costs	243 296 288	242 944 303
Laboratory operating costs	34 398 264	35 790 148
Cash flow statement		
Cash flow from operating activities		
Suppliers	493 399 428	493 868 404
Post-retirement benefit obligation	11 849 894	12 201 879

31. COMPARATIVE FIGURES

Certain comparative figures have been reclassified.
The effects of the reclassification are as follows:
In the cash flow statement for 2010, employment benefit obligation was previously reflected under cash flows from financing activities. It is now reflected under cash flows from operating activities. The amount for 2010 was previously disclosed as R12 201 879 and restated at R11 849 894.
In the notes to the annual financial statements, IT equipment and laboratory equipment was previously consolidated. It is now classified as two separate components. The cost for IT equipment is disclosed as R38 781 118 and cost of the laboratory equipment is disclosed as R41 343 536. The accumulated depreciation of the IT equipment is disclosed as (R28 404 711) and the accumulated depreciation of the laboratory equipment is disclosed as (R11 815 827).
The statement of financial performance and the detailed statement of financial performance have different groupings from the prior year.
In the statement of financial position, VAT payable was previously included as part of trade and other payables from exchange transactions for an amount of R520 595 in the 2010 financial period. In the current years' statement of financial position, the VAT payable is disclosed separately.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

31. COMPARATIVE FIGURES (CONTINUED)

In the previously disclosed cash flow statement, the purchase of biological assets and the proceeds from sale of biological assets was not disclosed separately. The increase in inventory and biological assets was disclosed. The restated amounts on the cash flow statement for purchase of biological assets is (R25 000) and proceeds from sale of biological assets is R42 024. The cash generated from operations (note 25) movement in inventory is reflected separately at (R5 143) and the fair value adjustment on biological assets is reflected at (R1 545 884). The increase in inventory and biological assets was previously disclosed at (R142 119).
The effect on the cash flow statement after reclassifying the post-retirement benefit obligation: the purchase of biological assets and proceeds from sale of biological is the restated supplier amount of R494 237 413 (supplier amount was previously stated at R493 868 404).
Irregular expenditure for the 2010 comparative, relating to finance lease was previously disclosed as R344 542, which related to the total liability including the future minimum lease payments. This figure has now been restated to R152 262 to reflect only the lease payments made during the 2010 financial period.

32. RISK MANAGEMENT

Financial risk management
The MRC's financial liabilities are trade and other payables, and financial assets are cash and cash equivalents, and trade and other receivables. The main risks arising from the MRC's financial instruments are currency, credit and interest risks.

Liquidity risk
The MRC's risk to liquidity is a result of the funds available to cover future commitments. 85% of the MRC's trade accounts receivables are current, i.e. less than 30 days. The MRC monitors its cash flow requirements and optimises its cash return on investments.

Interest rate risk
In respect of income-earning financial assets and interest-bearing financial liabilities, the table below indicates their average effective interest rates at the reporting date and the periods in which they mature.

Cash flow interest rate risk

`Financial instrument	Average effective interest rate	Due in less than one year	Due in one to two years	Due in two and more years	2011	2010
Trade and other receivables – normal credit terms	7,00%	28 455 805	-	-	28 455 805	45 452 474
Cash in current banking institutions	7,00%	410 336 417	-	-	410 336 417	370 371 851
36-month fixed deposits	10,05%	29 646 404	-	-	29 646 404	54 206 507
Trade and other payables – extended credit terms	7,00%	53 518 694	-	-	53 518 694	40 655 098

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

32. RISK MANAGEMENT (CONTINUED)

Interest rate sensitivity analysis

The sensitivity analysis has been determined based on financial instruments' exposure to interest rates at reporting date. For floating rate instruments, the analysis is prepared assuming the amount of the instrument outstanding at the reporting date was outstanding for the whole year.
The basis points increases or decreases, as detailed in the table below, were determined by management and represent the management's assessment of the reasonably possible change in the interest rates.
A positive number below indicates an increase in surplus. A negative number below indicates a decrease in surplus.
The sensitivity analysis shows the reasonable expected change in the interest rate: either an increase or decrease in the interest rate percentage. The equal but opposite per cent adjustment to the interest rate would result in an equal but opposite effect on surplus and therefore has not been separately disclosed below.
As the entity does not have any instruments that affect net assets directly, the disclosure only indicates the effect of the change in interest rates on surplus.
There were no changes in the methods and assumptions used in preparing the sensitivity analysis from one year to the next.

Increase in interest rates

The estimated increase in basis points – minimum	50	50
Effect on surplus	2 051 682	1 851 859
The estimated increase in basis points – maximum	200	200
Effect on surplus	8 206 728	7 407 437

Credit risk

This is the risk of one party to a financial instrument causing a financial loss for the other party by failing to discharge an obligation. Management has a debtor's policy in place, and this makes provision for credit evaluation for all customers requiring credit above R1 million. The CEO signs every contract and he can also do his own assessment of credit worthiness. Investments are allowed only in liquid securities, and only with the SARB and the four major banks with high credit standing.
Contract work constitutes the biggest portion of the MRC's income, and the major exposure is delays in finalising contracts, and disputes in terms of whether the outputs have been produced. A certain number of contracts are started and paid on a reimbursive basis, and this poses a risk if the funder is not happy with the outputs.

Foreign exchange risk

The MRC operates internationally and is exposed to foreign exchange risk arising from various currency exposures, primarily with respect to the US dollar and the euro. The MRC receives substantial funding from the USA and Europe, and as a result its statement of financial position can be affected by movements in the US dollar and euro. Foreign exchange risk arises from future commercial transactions, recognised assets and liabilities, and net investments in foreign operations.
Due to uncertainties in respect of when cash will be received from overseas, the MRC does not hedge foreign exchange fluctuations.
Approximately 20,92% of the MRC's debtors (R7 595 315) are exposed to currency, compared to 42% last year (R19 million).
The MRC's project office does a scenario calculation looking at how much would be lost if there was an unfavourable currency change. It is decided on the basis of this outcome whether to proceed with a particular project.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

32. RISK MANAGEMENT (CONTINUED)

FAIR VALUES

At March 2011 and March 2010, the carrying amounts of cash, accounts receivable, accounts payable approximated their values due to the short-term maturities of these assets and liabilities.

33. GOING CONCERN

The annual financial statements have been prepared on the basis of accounting policies applicable to a going concern. This basis presumes that funds will be available to finance future operations, and that the realisation of assets and settlement of liabilities, contingent obligations and commitments will occur in the ordinary course of business.

34. FRUITLESS AND WASTEFUL EXPENDITURE

Opening balance	90 060	-
Fruitless and wasteful expenditure current year	20 906	90 060
	110 966	**90 060**

Interest was incurred on supplier accounts and no disciplinary steps were taken to recover the funds.

35. IRREGULAR EXPENDITURE

Opening balance	247 670 430	212 558 639
Add: irregular expenditure – current year	38 273 291	35 111 791
	285 943 721	**247 670 430**
Analysis of expenditure awaiting to be condoned per age classification		
Current year	38 273 291	35 111 791
Prior years	247 670 430	212 558 639
	285 943 721	**247 670 430**

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

35. IRREGULAR EXPENDITURE (CONTINUED)

Details of irregular expenditure – current year

Non compliance with Supply Chain Management Practices	• National Treasury; TR 16A6.1, TR 16A6.1, TR 16A6.4 and paragraph 3.2 of SCM Practice Note 8 of 2007/08	973 735	2 017 688
	• National Treasury; TR 16A6.1, TR 16A6.4 and paragraph 3.3 of SCM Practice note 8 of 2007/08	2 305 907	2 785 879
	• National Treasury; TR 16A6.1, TR 16A6.4 and paragraph 3.4 of SCM Practice Note 8 of 2007/08	16 011 886	6 156 784
Expenditure incurred without complying to - Preferrential Procurement Regulations		18 831 514	23 999 178
Expenditure relating to finance leases that have not been approved by National Treasury		150 249	152 262
		38 273 291	35 111 791

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

36. RECONCILIATION BETWEEN BUDGET AND STATEMENT OF FINANCIAL PERFORMANCE

Reconciliation of budget surplus/deficit with the surplus/deficit in the statement of financial performance:

Net surplus per the statement of financial performance	1 316 159	40 723 558
Adjusted for:		
Impairments recognised/reversed	-	99 999
Deficit on sale of assets	141 686	1 026 654
Depreciation	12 222 401	7 449 827
Amortisation of intangible assets	340 979	150 754
Audit fees	639 680	439 001
Bad debts	(721 698)	2 565 252
Finance costs	101 083	250 338
Lease rentals	514 322	269 608
Laboratory expenses	1 571 460	(1 485 990)
Computer related expenditure	(548 053)	(1 173 046)
Infrastructural, communication and statutory costs	3 575 959	177 371
Other expenses	(853 592)	1 674 641
Repairs and maintenance	(704 073)	1 235 904
Staff costs	11 127 865	17 415 796
Travel, subsistence and conference costs	126 056	(385 323)
External research support, consulting and internal audit	2 006 086	1 795 351
Collaborative research	(12 303 736)	(24 179 093)
Printing and stationery	1 284 543	234 521
Investment income	1 366 399	(9 969 120)
Total government grants	-	(813 155)
Rent received	(146 036)	(306 013)
Sundry income	(344 948)	(173 356)
Dividend income	(44 193)	(40 318)
Overheads recovered	(3 145 880)	(1 085 782)
Contract funds surplus on contract funds	(12 101 756)	(22 377 478)
Income from contracts, grants and services rendered	(5 420 713)	(13 519 901)
Net surplus per approved budget	**-**	**-**

37. WORLD CUP EXPENDITURE

The Council incurred no expenditure relating to the World Cup. No tickets or World Cup clothes were purchased.

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

38. PUBLIC FINANCE MANAGEMENT ACT (PFMA)

Section 55 (2)

No material losses through criminal conduct were incurred during the year ended 31 March 2011. Irregular and fruitless and wasteful expenditure incurred has been disclosed in notes 34 and 35.

Section 53 (3)

The Council may not accumulate surpluses unless written approval of the National Treasury has been obtained. Approval for the retention of the accumulated surplus as at 31 March 2011, was obtained.

Section 54 (2)

In terms of the PFMA and Treasury Regulation 28.1.5, the Council has developed and agreed to a framework of acceptable levels of materiality and significance.

DETAILED STATEMENT OF FINANCIAL PERFORMANCE

		2011 R	Restated 2010 R
Revenue			
Income from contracts, grants and services rendered		290 403 216	284 949 837
Government grants	18	237 288 593	222 663 155
Rental income		2 763 796	2 626 888
Other income		2 259 089	2 409 666
Interest received – investment	23	18 331 886	25 275 419
Interest received – investments held to maturity	23	2 597 670	2 970 033
Dividends received	23	44 193	40 318
Total revenue		**553 688 443**	**540 935 316**
Expenditure			
Personnel	21	(287 752 354)	(243 296 288)
Depreciation and amortisation		(12 563 380)	(10 800 581)
Impairment loss/reversal of impairments	24	-	(99 999)
Finance costs		(101 083)	(250 429)
Debt impairment	22	205 040	(2 586 202)
Repairs and maintenance		(6 929 647)	(7 857 123)
General expenses	19	(245 617 378)	(233 310 632)
Total expenditure		**(552 758 802)**	**(498 201 254)**
Loss on disposal of assets and liabilities		(141 686)	(1 486 377)
Loss on foreign exchange		528 204	(524 127)
Surplus for the year		**1 316 159**	**40 723 558**

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BUILDING A HEALTHY NATION THROUGH RESEARCH