

# SAMRC InfoSpace

## South African Medical Research Council Annual Report 2008-2009

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CELEBRATING 40 YEARS OF HEALTH RESEARCH

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL  
*Annual Report 2008/9*



## THE CONCEPT FOR THIS ANNUAL REPORT

*A healthy lifestyle is a fundamental tenet of a long and happy life. It must be a basic and lifelong pursuit of all humanity and therefore, in certain respects, might even be considered as eternal and timeless.*

*The imagery for the concept is centred around the strong, natural elements of rock and stone. They were chosen to create iconic visual statements and project a sense of timelessness and strength.*

*Rock and stone are also synonymous with Africa, not only in its beautiful landscape, but in the strength and tenacity of its people.*

THE MANDATE OF THE SOUTH AFRICAN  
MEDICAL RESEARCH COUNCIL (MRC)  
IS LEGISLATED IN TERMS OF ACT 58 OF 1991:

*'The objects of the MRC are, through research, development and technology transfer, to promote the improvement of the health and the quality of life of the population of the Republic, and to perform such other functions as may be assigned to the MRC by or under this Act.'*

VISION

*Building a healthy nation through research*

MISSION

*To improve the nation's health and quality of life through promoting and conducting relevant and responsive health research*

VALUES

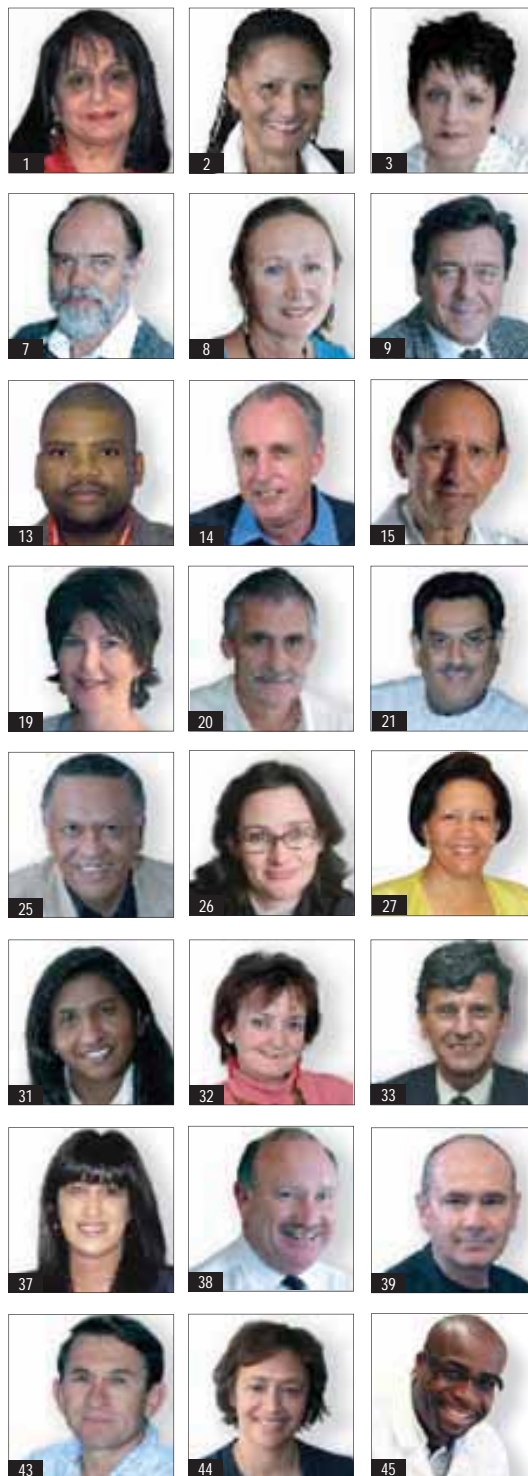
The five values of the MRC, and the keywords relating to each value, are:

- Communication: transparency, freedom to challenge.
- Accountability: responsibility, teamwork, leadership, participation.
  - Respect: dignity, honesty, fairness, integrity.
  - Excellence and innovation.
- Capacity development: reward and recognition.



# MRC RESEARCH UNITS LISTED ACCORDING TO THE HEALTH PRIORITIES OF SOUTH AFRICA

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 DISEASE	Immunology of Infectious Disease Research Unit Diarrhoeal Pathogens Research Unit Inflammation and Immunity Research Unit Respiratory and Meningeal Pathogens Research Unit Malaria Research Unit
CRIME, VIOLENCE AND INJURY CANCER	Crime, Violence and Injury Research Unit Cancer Epidemiology Research Unit PROMEC Oesophageal Cancer Research Unit Oncology Research Unit
PUBLIC HEALTH	Burden of Disease Research Unit Biostatistics Unit South African Cochrane Centre Health Policy Research Unit Health Systems Research Unit
HEALTH PROMOTION	Rural Public Health and Health Transition Research Unit Alcohol and Drug Abuse Research Unit Health Promotion Research and Development Research Unit
WOMEN, MATERNAL AND CHILD HEALTH	Gender and Health Research Unit Mineral Metabolism Research Unit Maternal and Infant Health Care Strategies Research Unit
NUTRITION	Nutrition 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 MEDICINES	Drug Discovery and Development Research Unit Indigenous Knowledge Systems





1. Prof Gita Ramjee  
HIV Prevention Research Unit
2. Ms Elise Levendal  
(interim director)  
South African AIDS Vaccine Initiative
3. Dr Karin Weyer
4. Dr Martie van der Walt – Interim Director  
Tuberculosis Epidemiology and Intervention  
Research Unit
5. Dr Roxana Rustomjee  
Clinical and Biomedical Tuberculosis Research  
Unit
6. Prof Valerie Mizrahi  
Molecular Mycobacteriology Research Unit
7. Prof Paul van Helden  
Centre for Molecular and Cellular Biology
8. Dr Nelia Steyn  
Chronic Diseases of Lifestyle Research Unit
9. Prof Peter Zilla  
Inter-university Cape Heart Research Unit
10. Prof Tim Noakes  
Exercise and Sports Medicine Research Unit
11. Prof Frank Brombacher  
Immunology of Infectious Disease Research Unit
12. Prof Duncan Steele
13. Prof Jeffrey Mphahlele (acting director)  
Diarrhoeal Pathogens Research Unit
14. Prof Ronnie Anderson  
Inflammation and Immunity Research Unit
15. Prof Keith Klugman
16. Prof Shabir Mahdi  
(co-directors)  
Respiratory and Meningeal Pathogens Research  
Unit
17. Dr Rajendra Maharaj  
Malaria Research Research Unit
18. Prof Mohammed Seedat  
Crime, Violence and Injury Research Unit
19. Dr Lara Stein  
(acting director)  
Cancer Epidemiology Research Unit
20. Prof Wentzel Gelderblom  
(acting director)  
PROMECC
21. Prof Iqbal Parker  
Oesophageal Cancer Research Unit
22. Prof Vikash Sewram  
Oncology Research Unit
23. Prof Debbie Bradshaw  
Burden of Disease Research Unit
24. Prof Carl Lombard  
Biostatistics Unit
25. Prof Jimmy Volmink
26. Dr Nandi Siegfried  
(co-directors)  
South African Cochrane Centre
27. Prof Laetitia Rispel  
Health Policy Research Unit
28. Prof Mickey Chopra  
Health Systems Research Unit
29. Prof Steve Tollman  
Rural Public Health and Health Transition  
Research Unit
30. Prof Charles Parry  
Alcohol and Drug Abuse Research Unit
31. Prof Priscilla Reddy  
Health Promotion Research and Development  
Unit
32. Prof Rachel Jewkes  
Gender and Health Research Unit
33. Prof John Pettifor  
Mineral Metabolism Research Unit
34. Prof Bob Pattinson  
Maternal and Infant Health Care Strategies  
Research Unit
35. Dr Peter Jooste  
(acting director)  
Nutrition Intervention Research Unit
36. Prof Dan Stein
37. Prof Soraya Seedat  
(co-directors)  
Anxiety and Stress Disorders Research Unit
38. Prof Christopher Vaughan  
Medical Imaging Research Unit
39. Prof Win Hide  
Bioinformatics Capacity Development Research  
Unit
40. Prof Ugo Ripamonti  
Bone Research Unit
41. Prof Raj Ramesar  
Human Genetics Research Unit
42. Prof Himla Soodyall  
Human Genomic Diversity Research Unit
43. Prof Arie Katz  
Receptor Biology Research Unit
44. Prof Angie Mathee  
Environment and Health Research Unit
45. Prof Kelly Chibale  
Drug Discovery and Development Research Unit
46. Dr Mottalepula Matsabisa  
Indigenous Knowledge Systems
47. Dr Johan Louw  
Diabetes Discovery Platform
48. Prof Anthony Bunn  
Innovation Centre
49. Dr Jürgen Seier  
Primate Unit and Delft Animal Centre

# 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 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 2008 to 31 March 2009. The Council acknowledges and is very grateful for the support received from the Honourable Minister and the National Department of Health, and thanks the Ministry for its contribution to the MRC's efforts to respond to the health research needs of the nation in this, the fortieth year since the establishment of the MRC. The Council thanks all of its colleagues in the scientific community for their continued contribution to health research in South Africa throughout four decades. 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 MRC Board, committees, evaluation panels and task teams.



Professor K Voyi  
*Chairperson of the Board*



Professor A D Mbewu  
*MRC President*



## MESSAGE FROM THE CHAIRPERSON

The 12 months from April 2008 to March 2009 marked another productive, successful period for the nation's statutory health research council in this, its 40th year.

Preparations began for the five-yearly MRC Institutional Review which will be conducted by the National Department of Health. Following the review, planning will begin for the MRC Strategic Plan 2010 to 2015, incorporating some of the recommendations that will flow from the MRC Review.

The MRC's portfolio of research addresses all the health priorities of South Africa. Many of the results of that research are translated into policy, practice, products and health promotion.

The profile of the organisation continues to grow with scientists being recognised for their contribution, for example, as nominations and finalists in the National Science and Technology Forum and a prize for the Top Technology 100 research award.

Transformation continues to be a serious challenge at

senior levels in the organisation. Currently, the unit directors' management level does not reflect the demographics of the country and this is a concern that the MRC is addressing. Furthermore, the inclusion of all research stakeholders in Higher Education, particularly previously disadvantaged institutions as well as universities of technology, is continuing gradually.

The MRC Board through the Risk, Audit and Finance Committees continued its oversight role and drove initiatives such as embedding a culture of risk management within the MRC, in line with the dictates of the Public Finance Management Act (PFMA) and other guides to corporate governance such as the King II and III reports.

The MRC Board is confident that the organisation will continue to deliver on its mandate of using research, technology development and transfer to address the health challenges of all the people of the Republic of South Africa.

A handwritten signature in black ink, appearing to read 'K Vuyi'.

*Prof K Vuyi*  
Chairperson  
MRC Board

## THE BOARD OF THE MEDICAL RESEARCH COUNCIL



1. Prof K Vuyi



2. Prof Solomon Rataemane



3. Adv. Derick Block



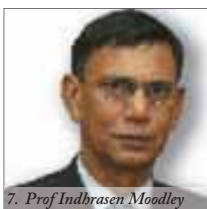
4. Prof Danie Du Toit



5. Prof Dan Mkize



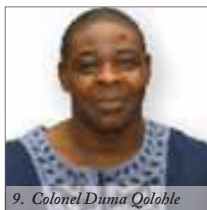
6. Dr Koleka Mlisana



7. Prof Indhrasen Moodley



8. Prof John Pettifor



9. Colonel Duma Qolohle



10. Prof Corinna Walsh

1. Prof Kuku Vuyi (Chairperson)  
Head of School of Public Health  
Faculty of Health Sciences  
University of Pretoria
2. Prof Solomon Rataemane (Vice-Chairperson)  
Head of Psychiatry,  
University of Limpopo
3. Adv Derick Block  
Acting Executive: Global Strategic Sourcing,  
Barloworld Logistics Africa
4. Prof Danie Du Toit  
Head of Department of Biomedical Sciences,  
Tshwane University of Technology
5. Prof Dan Mkize  
Head of Dept. of Psychiatry,  
University of KwaZulu-Natal
6. Dr Koleka Mlisana  
Head of HIV Vaccine Unit,  
CAPRISA, University of KwaZulu-Natal
7. Prof Indhrasen Moodley  
Director: Health Outcomes Research Unit,  
Department of Community Health,  
University of KwaZulu-Natal
8. Prof John Pettifor  
Head of Paediatrics,  
University of Witwatersrand
9. Colonel Duma Qolohle  
Head of Obstetrics & Gynaecology,  
1 Military Hospital, Thaba Tswane
10. Prof Corinna Walsh  
Dept. of Nutrition and Dietetics,  
University of the Free State
11. Dr James Hartzell, UKZN (emigrated)
12. Dr Lindiwe Makubalo (DOH, resigned)

## THE PRESIDENT'S REPORT

The MRC reaches middle age in 2009 – 40 years since it was first established in 1969. There have been many highlights in research and capacity development through those four decades. 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 in each of those 40 years, and 2008 remained true to form.

The nation's health research council continues to increase its outputs of peer-reviewed publications reaching 706 in 2008, 82% of them in international journals and books. Sixty-two PhDs graduated from our 41 Units, and we ourselves fund 59 black African PhD students amongst the 209 PhD students in our research Units. The steady stream of four new patents per annum again resulted in one spin-out company. Sixty-two PhDs graduating from a stable of 209 suggests an almost 100% completion rate if one assumes that

the average PhD takes four years to complete – a remarkable statistic. The demography of the 806 employees more closely reflects the face of the nation, 81% of the staff are black South Africans (49% of the 806 being black Africans) and 68% of them are female.

Of our 41 Unit Directors, 19 (nearly 48%) are black; three of them being black African and fifteen (38%) being women.

In research, development and technology transfer, the MRC (through the South African Vaccine Initiative – SAAVI) is one of the implementing agencies in the Italy/South Africa HIV and AIDS collaboration. This R240 million collaboration will include a Phase IIb therapeutic trial of an HIV vaccine; upgrading of health systems in and around the three clinical trial sites; and technology transfer to Biovac for HIV vaccine manufacture in South Africa.

A South African science milestone was reached



*Prof AD Mbewu*  
MRC President



when the first clinical trial of a human vaccine designed and developed in South Africa began in January 2009. This was the SAAVI DNA and MVA 'prime-boost strategy' HIV vaccine that has been in development by SAAVI principal investigators at the University of Cape Town over the past eight years. These include Prof Anna-Lise Williamson and Prof Carolyn Williamson. The vaccine was manufactured in the USA, kindly paid for by the National Institutes of Allergy and Infectious Disease (NIAID) of the National Institutes of Health (NIH) of the USA. The first nine participants were vaccinated in Boston, USA, with subsequent participants vaccinated in Cape Town and Johannesburg from July 2009 in this Phase I clinical trial involving healthy human volunteers. If the vaccine shows immunogenicity in human beings, there is interest in possibly progressing to Phase IIa clinical trials.

Another single milestone in MRC and global TB history was the publication in the prestigious *New England Journal of Medicine* of the first clinical trial in 35 years to demonstrate

efficacy of a new antituberculous drug in multidrug (MDR)- and extremely drug resistant (XDR)-TB. The drug is TMC207 and was developed by the TB Alliance and Tibotec (Johnson and Johnson) in a public-private partnership. This landmark clinical trial also pioneered new methodology in clinical trials in MDR- and XDR-TB, and five of the primary authors were MRC scientists from the MRC Clinical and Biomedical TB Research Unit in Durban, and the MRC and University of Stellenbosch Centre for Molecular and Cellular Biology.

This scientific milestone means that dramatically reducing the length of TB regimens from six months to four months or even a few weeks, now seems biologically feasible, and the possibility of eradicating TB from the world in the 21st century is no longer just a pipedream.

Finally, a decade of work by the MRC Malaria Research Unit and its partners in the Lubombo Spatial Development Initiative (LSDI) has resulted in malaria incidence declining in KwaZulu-Natal and Mpumalanga by 99% compared to



the baseline of 2000. Furthermore, the prevalence of the disease has decreased by 92%. This model has proven to be successful in malaria control to such an extent that the SADC Ministers of Health have endorsed implementing the LSDI model in the Trans-Zambezi Malaria Control Initiative involving Angola, Botswana, Namibia, Zambia and Zimbabwe, as well as in the Trans-Kunene Initiative involving Angola and Namibia. Indeed, the successes achieved by the MRC Malaria Research Unit have influenced changes in the WHO global malaria control policy, and encouraged the development of groups around the world dedicated to eradicating malaria from the planet by 2050.

The MRC, through its collaboration with scientists at the University of the Western Cape and Kwazulu-Natal, was part of the first Phase II trial of a South African medicinal plant, unwele (*Sutherlandia frutescens*), in patients living with HIV and AIDS who had not yet reached the stage in their disease where they required antiretrovirals. The collaboration was funded by the National Complementary and Alternative Medicine (NCAM) group of the National Institutes of Health of the USA and the results will be released later in 2009.

Over the past few years, I have been a member of an expert group convened by the Global Alliance for Vaccines and Immunisation (GAVI) to examine the use of Advanced Market Commitments (AMC) to fund drug and vaccine development and supply to low income countries. We helped develop a pilot AMC utilising pneumococcal conjugate vaccine in order to

avert 500 000 childhood deaths per annum in poor countries. The US\$1.5 billion pilot AMC is to be funded by four of the G8 countries, Norway and the Bill and Melinda Gates Foundation. The pilot AMC was launched in Rome in June 2009 and should be fully operational by 2012. If successful, it could be a model for AMCs for other diseases of mass burden, with the potential to save millions of lives.

The growth in external income continues, reaching 58% of the estimated total budget for 2009 of R536 million. Eighty two per cent of this external income comes in the form of competitive grants and contracts from the world's most prestigious health research organisations such as the NIH, the Wellcome Trust, the British 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 to addressing South Africa's health priorities.

Thus, in its 40th year, the MRC has been part of some groundbreaking discoveries in medical science that could impact dramatically on the global epidemics of HIV and AIDS, TB and malaria in decades to come. In 40 years' time, the MRC may celebrate together with the rest of the world the achievement of these goals that in the early 21st century seemed so distant.

Prof AD Mbewu  
MRC President



*“The purpose of life is not to be happy — but to matter, to be productive, to be useful, to have it make some difference that you have lived at all” .*

- Leo Rosten



## RESEARCH PRODUCTIVITY & CAPACITY DEVELOPMENT 2008/9

Overall, in 2008/9 the MRC produced:

- 706 peer-reviewed publications in: journals, books and chapters in books (676 in 2006, 680 in 2007) plus 41 from SAAVI
- 62 PhD graduates (191 enrolled in 2008; 239 enrolled in 2007; 44 graduated in 2007) plus two from SAAVI
- 59 Masters' graduates

This research productivity and capacity development came from:

- 19 intramural Units employing 114 senior scientists who produced 252 peer-reviewed publications
- 22 extramural Units, with 122 senior scientists who produced 454 peer-reviewed publications

In total, there were 236 senior scientists (338 in 2007) in these 41 research units engaged in 556 research projects.

Therefore per senior scientist, the productivity ratio was 3.00 (2.00 in 2007):

- 2.2 for the 19 intramural Units
- 3.7 for the 22 extramural Units

STAFF	MASTERS' STUDENTS		DOCTORAL STUDENTS		PEER-REVIEWED PUBLICATIONS
	Enrolled	Graduated	Enrolled	Graduated	Published
<b>HIV AND AIDS</b>					
<b>HIV PREVENTION</b>					
179 staff:	3	0	0	0	6
17 senior scientists	(0)	(0)	(0)	(0)	(11)
5 junior scientists					
133 technologists/ technicians					
24 support staff					
<b>SOUTH AFRICAN AIDS VACCINE INITIATIVE (SAVI)</b>					
Total of 127 staff	6	3	11	2	41
<b>TUBERCULOSIS</b>					
<b>TUBERCULOSIS EPIDEMIOLOGY AND INTERVENTION</b>					
21 staff:	2	0	2	0	3
2 senior scientists	(4)	(1)	(0)	(0)	(3)
2 junior scientists					
14 technologists					
3 support staff					
<b>CLINICAL AND BIOMEDICAL TUBERCULOSIS</b>					
61 staff:	1	0	1	0	5
9 senior scientists	(2)	(0)	(2)	(0)	(6)
1 junior scientist					
44 technologists/ technicians					
7 support staff					
<b>MOLECULAR MYCOBACTERIOLOGY</b>					
7 staff:	5	0	2	2	6
4 senior scientists	(4)	(1)	(2)	(2)	(6)
2 technical staff					
1 support staff					
<b>MOLECULAR AND CELLULAR BIOLOGY</b>					
16 staff:	12	11	11	7	59
9 senior scientists	(23)	(3)	(6)	(10)	(28)
4 junior scientists					
3 technologists					
<b>CARDIOVASCULAR DISEASE AND DIABETES</b>					
<b>CHRONIC DISEASES OF LIFESTYLE</b>					
16 staff:	1	0	2	0	20
6 senior scientists	(1)	(1)	(3)	(1)	(12)
4 junior scientists					
2 technologists					
4 support staff					
<b>INTER-UNIVERSITY CAPE HEART</b>					
<b>CARDIOVASCULAR</b>					
5 staff:	10	1	5	2	6
5 senior scientists	(2)	(0)	(4)	(0)	

<b>LIPIDOLOGY</b>					
9 staff:	1	1	2	2	9
3 senior scientists					(6)
4 technologists					
2 support staff					
<b>HATTER HEART RESEARCH INSTITUTE</b>					
8 staff:	3	1	1	0	27
3 senior scientists	(3)	(1)	(4)	(0)	(6)
2 technologists					
3 support staff					
Lochner:	5	0	2	0	6
7 staff:	(4)	(0)	(3)	(0)	(2)
4 senior scientists					
2 junior scientists					
1 support staff					
<b>EXERCISE SCIENCE AND SPORTS MEDICINE</b>					
25 staff:	12	6	18	2	52
16 senior scientists	(15)	(3)	(19)	(5)	(45)
3 junior scientists					
6 technical staff					
<b>INFECTIOUS DISEASES</b>					
<b>IMMUNOLOGY OF INFECTIOUS DISEASES</b>					
12 staff:	1	1	8	5	10
6 senior scientists	(12)	(5)	(10)	(5)	(30)
4 technologists					
2 support staff					
<b>DIARRHOEAL PATHOGENS</b>					
13 staff:	6	0	2	0	7
6 senior scientists	(5)	(0)	(2)	(0)	(10)
3 technologists/ technicians					
3 interns					
1 support staff					
<b>INFLAMMATION AND IMMUNITY</b>					
8 staff:	0	0	4	0	13
5 senior scientists	(2)	(2)	(2)	(1)	(10)
2 junior scientists					
1 support staff					
<b>RESPIRATORY AND MENINGEAL PATHOGENS</b>					
39 staff:	9	0	2	2	29
7 senior scientists	(2)	(2)	(2)	(2)	(27)
5 junior scientists					
16 technologists					
11 support staff					
<b>MALARIA</b>					
32 staff:	4	1	4	1	10
3 senior scientists	(5)	(0)	(5)	(0)	(13)
4 junior scientists					
20 technologists/ technicians					
5 support staff					

<b>CRIME, VIOLENCE AND INJURY</b>					
<b>CRIME, VIOLENCE AND INJURY</b>					
20 staff:	3	2	2	2	25
6 senior scientists	(4)	(4)	(9)	(1)	(11)
5 junior scientists					
6 technologists					
3 support staff					
<b>CANCER</b>					
<b>CANCER EPIDEMIOLOGY</b>					
4 staff:	3	1	1	0	5
2 senior scientists	(3)	(1)	(1)	(0)	(9)
2 technical staff					
<b>PROMECC</b>					
17 staff:	3	1	9	3	19
9 senior scientists	(2)	(1)	(8)	(0)	(19)
7 technologists					
1 support staff					
<b>OESOPHAGEAL CANCER</b>					
9 staff:	6	3	1	8	13
6 senior scientists	(7)	(2)	(9)	(1)	(7)
2 technical staff					
1 support staff					
<b>ONCOLOGY</b>					
4 staff:	6	3	2		
3 research interns					
1 postdoctoral fellow					
<b>PUBLIC HEALTH</b>					
<b>BURDEN OF DISEASE</b>					
10 staff:	3	1	4	0	25
6 senior scientists	(2)	(0)	(1)	(-)	(9)
2 junior scientist					
1 technologist					
1 support staff					
<b>BIOSTATISTICS UNIT</b>					
21 staff:	1	0	0	0	69
8 senior scientists	(3)	(0)	(2)	(0)	(63)
7 junior scientists					
4 technical staff					
2 support staff					
<b>COCHRANE CENTRE</b>					
12 staff:	0	0	2	0	19
7 senior scientists	(0)	(0)	(3)	(0)	(26)
3 junior scientists					
2 support staff					
<b>HEALTH POLICY</b>					
23 staff:	12	3	10	2	15
6 senior scientists	(15)	(3)	(14)	(2)	(11)
13 junior scientists					
4 support staff					
<b>HEALTH SYSTEMS</b>					
26 staff:	2	2	10	0	18
10 senior scientists	(2)	(0)	(10)	(0)	(28)
12 junior scientists					
4 support staff					

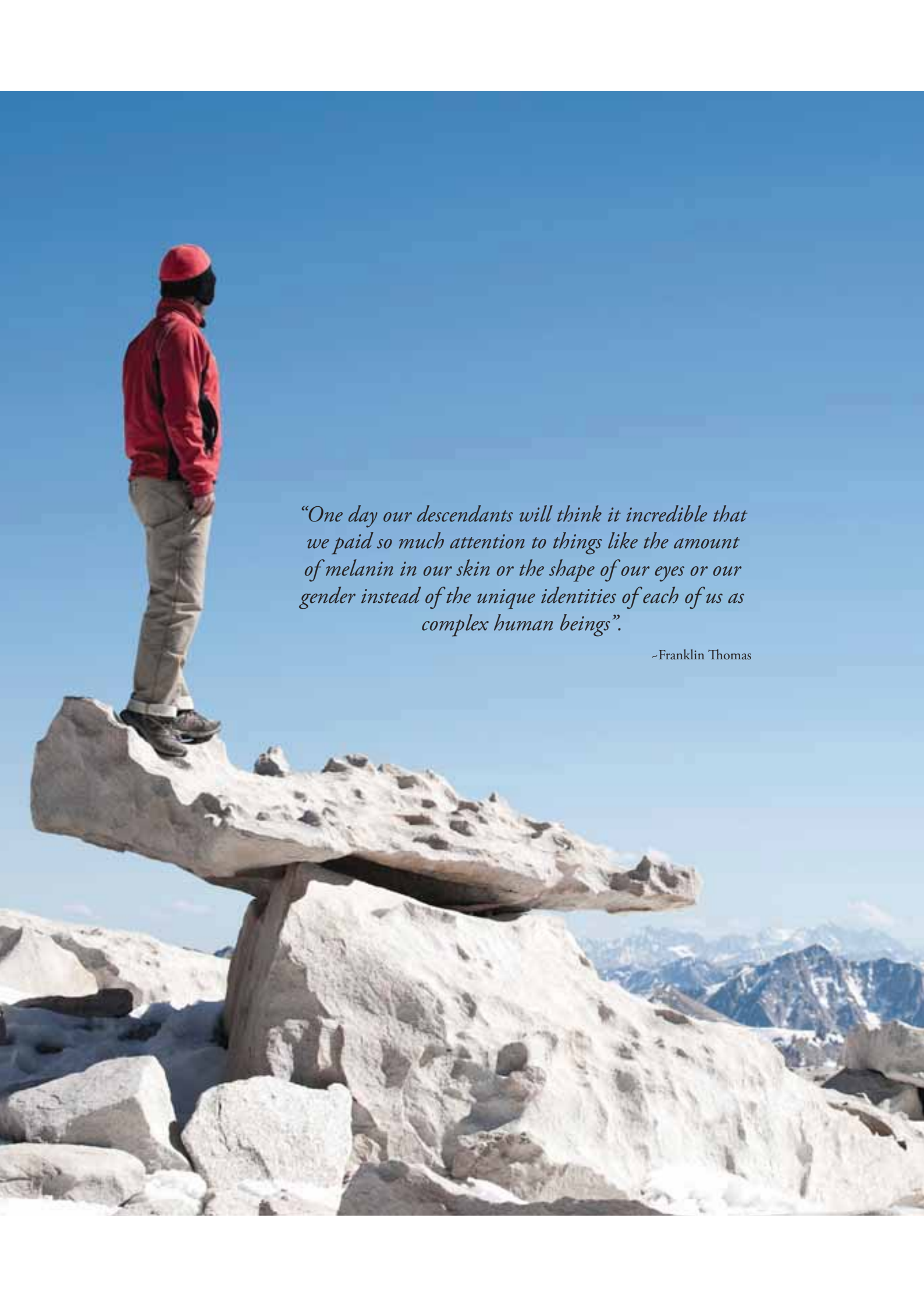
<b>RURAL PUBLIC HEALTH AND HEALTH TRANSITION</b>					
18 staff:	15	3	10	1	27
6 senior scientists	(7)	(1)	(5)	(0)	(10)
4 junior scientists					
6 technologists					
2 support staff					
<b>HEALTH PROMOTION</b>					
<b>ALCOHOL AND DRUG ABUSE</b>					
24 staff:	1	1	3	1	13
5 senior scientists	(0)	(0)	(4)	(0)	(5)
8 junior scientists					
6 technologists					
5 support staff					
<b>HEALTH PROMOTION RESEARCH AND DEVELOPMENT</b>					
12 staff:	4	1	8	1	11
7 senior scientists	(4)	(1)	(6)	(1)	(8)
1 junior scientists					
2 technicians/ technologists					
2 support staff					
<b>WOMEN, MATERNAL AND CHILD HEALTH</b>					
<b>GENDER AND HEALTH</b>					
18 staff:	3	0	6	0	14
7 senior scientists	(2)	(1)	(3)	(0)	(11)
3 junior scientists					
3 technologists					
5 support staff					
<b>MINERAL METABOLISM</b>					
9 staff:	3	0	0	0	23
2 senior scientists	(3)	(0)	(4)	(1)	(13)
6 technical staff					
1 support staff					
<b>MATERNAL AND INFANT HEALTH CARE STRATEGIES</b>					
10 staff:	4	5	3	0	15
2 senior scientists	(4)	(-)	(4)	(1)	(8)
8 technical staff					
<b>NUTRITION</b>					
<b>NUTRITION INTERVENTION</b>					
23 staff:	0	0	2	0	18
7 senior scientists	(0)	(0)	(2)	(0)	(17)
12 technologists					
4 support staff					
<b>BRAIN AND BEHAVIOUR</b>					
<b>ANXIETY AND STRESS DISORDERS</b>					
21 staff:	5	0	7	0	56
8 senior scientists	(4)	(1)	(6)	(3)	(49)
4 junior scientists					
4 support staff					
5 research assistants					
<b>MEDICAL IMAGING</b>					
9 staff:	25	3	14	1	31
8 senior scientists	(14)	(1)	(9)	(0)	(19)
1 junior scientist					

GENOMICS AND PROTEOMICS					
<b>BIOINFORMATICS CAPACITY DEVELOPMENT</b>					
8 staff:	7	1	14	3	21
2 senior scientists	(3)	(3)	(9)	(2)	(20)
2 junior scientists					
2 technologists					
2 support staff					
<b>BONE</b>					
6 staff:	0	3	1	2	8
2 senior scientist	(0)	(0)	(1)	(0)	(3)
1 junior scientist					
2 technologists					
1 support staff					
<b>HUMAN GENETICS</b>					
8 staff:	5	2	3	2	10
3 senior scientists	(7)	(3)	(8)	(0)	(6)
3 junior scientists					
2 support staff					
<b>HUMAN GENOMIC DIVERSITY</b>					
7 staff:	3	1	1	0	7
1 senior scientist	(5)	(0)	(1)	(0)	(4)
6 research assistants					
<b>RECEPTOR BIOLOGY</b>					
7 staff:	4	1	4	2	12
4 senior scientists	(3)	(1)	(5)	(1)	(13)
3 technologists					
<b>ENVIRONMENT AND HEALTH</b>					
<b>ENVIRONMENT AND HEALTH</b>					
14 staff:	4	1	2	1	12
5 senior scientists	(4)	(6)	(11)	(2)	(11)
3 junior scientists					
4 technologist					
2 support staff					
<b>AFRICAN TRADITIONAL MEDICINES</b>					
<b>DRUG DISCOVERY AND DEVELOPMENT</b>					
8 staff:	6	1	14	7	16
4 senior scientists	(10)	(2)	(8)	(3)	(20)
3 technologists					
1 support staff					
<b>INDIGENOUS KNOWLEDGE SYSTEMS</b>					
8 MRC staff + 10 research interns	2	1	6	1	
	(1)	(2)	(2)	(0)	
1 chief specialist scientist					
2 junior scientists					
1 research assistant					
7 research interns					
3 support staff					
2 postdoctoral fellows					

## EXTERNAL INCOME OF INTRAMURAL RESEARCH UNITS\*

MRC RESEARCH	CONTRACT INCOME
Alcohol and Drug Abuse	10,845,176.78
Biomedical Informatics	13,280,460.09
Burden of Disease	485,362.17
CARISA	37,617.08
Chronic Diseases of Lifestyle	1,562,585.94
Cochrane Centre	2,289,874.90
Crime, Violence and Injury	290,343.53
Diabetes Discovery Platform	3,494,385.71
Diabetes: Biochemistry	41 237.23
Gender and Health	7,157,433.65
Health and Development	683,155.80
Health Informatics	115,508.89
Health Promotion	6,431,763.58
Health Systems	23,307,283.46
HIV Prevention	57,511,908.80
Indigenous Knowledge Systems	8,727,347.81
Innovation Centre	1,537,361.00
L Thomas	129,542.32
Malaria	28,199,852.95
Nutrition Intervention	822,393.94
Oncology	281,361.87
Primate Unit	327,007.40
PROMECC	1,258,942.06
SAAVI	19,842,268.04
Clinical and Biomedical Tuberculosis	16,914,133.81
TB Epidemiology and Intervention	41,518,371.74
Telemedicine	3,299,135.81
Vice President: Research	4,765,744.69
Web and Media Technologies	612,779.02
TOTAL CONTRACT INCOME	255,770,340.07

\* Income recognised and reflected in the 2008/9 Annual Financial Statements



*“One day our descendants will think it incredible that we paid so much attention to things like the amount of melanin in our skin or the shape of our eyes or our gender instead of the unique identities of each of us as complex human beings”.*

-Franklin Thomas

# RESEARCH HIGHLIGHTS

## HIV and AIDS

### HIV PREVENTION RESEARCH UNIT

Director: Prof Gita Ramjee

#### Highlights

**Impact on scientific body of knowledge:** The MRC's HIV Prevention Research Unit has completed several Phase I and Phase II microbicide trials, as well as one Phase III trial and a trial to assess the effectiveness of short-course ARV therapy on primary HIV infection in seroconverted women (SPARTAC). The Unit has also conducted epidemiological studies among communities in the greater Durban area, including the North of Durban (Tongaat and Verulam), South of Durban (RK Khan, Isipingo and Umkomaas), Durban-Central (Overport), inland (Botha's Hill), as well as in the rural area of Hlabisa in northern KwaZulu-Natal. This epidemiological data has shown an alarmingly high prevalence of HIV among women in the communities (ranging from 38-47%), with HIV incidence ranging from 5-9%. This pioneering data is the first of its kind among non-pregnant women in the community in KwaZulu-Natal.

**Impact on public awareness and public health:** Data generated by the epidemiological studies has, for the first time, given a glimpse of the extent of the epidemic amongst non-pregnant women in the community in KwaZulu-Natal. This data highlights the urgent need for the development and implementation of effective HIV/AIDS prevention messages and interventions among communities in KwaZulu-Natal. Through participation in these trials, the women received voluntary HIV testing and counselling; testing for and treatment of sexually transmitted infections (STIs); HIV prevention and safe-sex education; as well as education on HIV prevention and home-based care. In this way, these trials are also contributing towards curbing the HIV epidemic in South Africa through HIV testing, safe-sex counselling, as well as condom use and promotion.

**Impact on SA's science and technology policy:** The Unit's current research is relevant to addressing the epidemic among women. A clinical trial involving more than 3000 women in southern Africa and the United States (the HPTN 035 study)

has demonstrated for the first time the promise of a vaginal microbicide gel for preventing HIV infection in women. The test product, PRO 2000 gel (0.5 % dose), was 30% effective at preventing HIV infection, even though the result was not statistically significant. The results of the MDP 301 trial, which tests the same product, will be released in November 2009 and will hopefully show a statistically significant result since more women were enrolled for the latter trial. It is hoped that technology transfer of manufacturing microbicide products in South Africa will build on the country's technological capacity and encourage local companies to develop and research their own microbicide products.

### Capacity Development

A complement of 41 HPRU staff members attended the biannual International Microbicides Conference in 2008 in India. A total of 33 submissions, including 23 posters and eight oral presentations, were made and 40 staff members were awarded scholarships. HPRU staff held key positions at the conference as abstract reviewers and session chairs or co-chairs. In February 2009, 28 staff members underwent training for the upcoming Microbicides Trial Network (MTN) 003 study. MTN 001 study and MTN 001 laboratory staff received training from the sponsor in March 2009. Apart from continued education and financial assistance, the Unit provides its staff with ongoing skills development, including in-house training and workshops, e.g. protocol training, study documentation training, study specific training, sessions on

HIV/AIDS, microbicides, home-based care and specific report writing. HPRU staff also attended training sessions hosted by external organisations on Good Clinical Practice, Good Laboratory Practice and Fogarty AIDS laboratory training, both nationally as well as internationally.

### External Funding

R57 511 908

### Science Communication and Research Translation

The Unit has successfully implemented large clinical trials involving thousands of women from the community. HPRU clinics and novel research processes have been used as a model for other African sites participating in multi-centre trials. Data from clinical trials conducted by HPRU has been transferred into policy briefs for the Department of Health which highlight the urgent need for more aggressive HIV/AIDS prevention messages and interventions among communities in KwaZulu-Natal. Researchers at HPRU published in national and international journals including AIDS, American Journal of Public Health, The Lancet, the South African Journal of Science and in scientific reports. HPRU researchers have also presented their study findings at local conferences, such as SA AIDS 2008 and international conferences, including Microbicides 2008. The very successful KZN AIDS Forum has returned to its original home in 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 finding 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 (SAAVI)

Interim Director: Ms Elise Levendal

### Highlights

SAAVI's overall 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. Unfortunately, 2008 saw a major funding crisis for the Initiative with funding from Eskom and the Department of Science and Technology (DST) coming to an end. The Department of Health (DOH) did, however, commit to further funding for the next three years. The way forward for Eskom



NAME OF PRINCIPAL INVESTIGATOR AND INSTITUTION	PROJECT TITLE	OBJECTIVES/KPIs
Prof Anna-Lise Williamson, University of Cape Town	Development of candidate HIV-1 subtype C vaccines for southern Africa	Four objectives were completed. Three objectives involving early pipeline projects were not started or completed due to the funding crisis. The remaining objectives have components that are in progress or are ongoing.
Prof Carolyn Williamson, University of Cape Town	HIV-1 diversity and vaccine immunogen design	Of a total of 29 Key Performance Indicators (KPIs), seven were completed, five were paused, five were not started, and the remaining KPIs were in progress. Those KPIs paused or not started were mainly due to a lack of adequate funding.
Prof Jeffrey Mphahlele, University of Limpopo	HIV-1 diversity of vaccine immunogen design	Two KPIs were completed, three were in progress and one was incomplete.
Prof Lynn Morris, National Institute for Communicable Diseases	Development of envelope HIV vaccine candidates: neutralizing antibody studies and development of monoclonal and polyclonal antibodies	Two projects/objectives were completed, while the remaining four were set to continue amid the funding difficulty.
Prof Clive Gray, National Institute for Communicable Diseases	Understanding correlates of protection through analysis of HIV-specific T-cell immune functions: development of novel immunogenicity markers	Two objectives were completed. One was ongoing, and the last objectives lagged behind. Money for the project was stretched to the end of the funding cycle.
Dr Jo-Ann Passmore, University of Cape Town	Characterisation of mucosal and peripheral blood T-cell responses in the control of HIV infection	Of a total of 30 KPIs, 11 were completed, 10 were in progress and nine had not started. Those Key Performance Indicator that were incomplete were due to factors other than funding.
Dr Caroline Tiemeissen, National Institute of Communicable Diseases	The role of chemokines CCL3/CCL3L1 in protective immunity and as adjuvants promoting immune responses to HIV-1	Work in three of the four objectives was in progress. Objective 2 was, however, not going to be pursued due to the funding crisis.

and DST-funded institutions continued to be negotiated on an individual Principal Investigation (PI)/institution basis, while DOH-funded institutions continued to be funded according to existing agreements. Throughout the crisis, MRC President Prof Mbewu expressed the commitment of the MRC, the National Department of Health and the South African government to HIV vaccine research and development.

The table above highlights the progress as well as the negative impact of the funding crisis on those SAAVI research projects affected by the DST and Eskom funding. Notwithstanding the above, SAAVI has experienced a number of achievements in this reporting period.

A momentous occasion this past year was the approval in November 2008 by the South African Medicines Control Council (MCC) for the HVTN 073/SAAVI 102 trial to proceed. This is a Phase I clinical trial testing two South African developed vaccines called SAAVI MVA-C and SAAVI DNA-C2. It involves 36 people at two sites in South Africa, one in Cape Town and one in Gauteng, and 12 people in the USA. The South African arm began in July 2009 once all 12 US participants had been enrolled. There has been substantial positive and

accurate media coverage both locally and internationally regarding the trial, resulting in greater public awareness about the importance of HIV vaccine research and development in South Africa.

SAAVI is providing ongoing funding to the UCT Vaccine Research Group (VRG) Good Laboratory Practice (GLP) Facility which was acknowledged in 2008 by the SAAVI Scientific Advisory Committee (SAC) as being a world class asset. SAAVI also continues funding the MRC Delft Non-human Primate Facility which maintains the breeding of macaques (monkeys) for biomedical research, in particular for the development and testing of the South African HIV vaccine candidates. The facility currently houses and cares for 147 animals, of which 23 are in experimental use by UCT.

Excellent progress has also been made with regard to the three-year (2008-2011) Tripartite Technical Plan between the Istituto Superiore di Sanita/the Italian National Institute for Health (ISS), the South African Department of Health (DOH) and the Italian Ministry of Foreign Affairs Directorate General Development Cooperation (DGCS) for the implementation of the project: "Program to support the Ministry of Health



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of South Africa in the implementation of a national program of global response to HIV & AIDS". The project includes extensive capacity development including development of three South African clinical trial sites and the development of the local vaccine manufacturing capacity at BIOVAC. Eventually, the project aims to test a tat-based HIV vaccine in South Africa. Since July 2008, several meetings have taken place between the above parties during which SAAVI played a crucial coordinating role. These include a governance meeting, a steering committee meeting, as well as further meetings between SAAVI and the ISS to review and facilitate revision of proposals and budgets.

SAAVI-funded clinical trial sites are based in Gauteng, Limpopo, KwaZulu-Natal, North West and the Western Cape provinces. All five sites continue to follow up trial participants from the Phambili/HVTN 503 study. Two of the sites, namely the Perinatal HIV Research Unit (PHRU) in Soweto, and the Desmond Tutu HIV Centre (DTHC) trial site in Crossroads, Cape Town, have been selected to run the South African arm of the HVTN 073/SAAVI 102 trial. Prof Glenda Gray of the PHRU is the national PI for this study.

DTHC is also now the European Developing Countries Clinical Trials Partnership (EDCTP) grant holder for capacity building of seven South African HIV vaccine trial sites for the inclusion of adolescents in future HIV vaccine trials. Other studies at certain SAAVI sites during 2008 included HVTN 204, HVTN 403, and the CHAVI (Center for HIV-AIDS Vaccine Immunology) study which is an observational study in support of vaccine development. During 2008, the MEDUNSA trial site received approval of the lease agreement and building plans by all relevant parties for establishing a permanent site. This site is also one of the participating trial sites in the ISS Tripartite Plan. Community outreach activities continue at each site, including the establishment of adolescent Community Advisory Boards (CABs) and training of both the adolescent and adult CABs.

SAAVI's Community Involvement Programme, Masikhulisane, continued with awareness raising and education, reaching 7598 people through 333 meetings, presentations and workshops with a particular focus on the following sectors: Traditional Healers, Youth, Faith-based Organizations, Women, Disability, and Community Health Workers, particularly in KwaZulu-Natal. Collaboration with the MRC TB Unit and the MRC HIV Prevention Unit continued as did collaboration with the Community Educators and CAB members at the SAAVI funded sites. As part of its role in the ISS Tripartite Plan, Masikhulisane also held initial meetings with relevant stakeholders in the District. Masikhulisane's role will be to assist local stakeholders to improve education and awareness raising activities regarding HIV and TB prevention in the Umzinyathi District.

The HIV/AIDS Vaccines Ethics Group (HAVEG) continued to explore stakeholder challenges of ethical concerns in HIV

vaccine trials, including informed consent; which aspects of the informed consent process are most impacted by culture; fair payment for trial participants and compensation for trial-related harm; the complexities related to standard of prevention in trials; and the notion of over-researched communities and fair benefits for participating communities.

In 2008, the MRC Health Promotion Research and Development Unit developed appropriate research instruments to measure the determinants and intention to participate in community vaccine trials. It also conducted and did preliminary data analysis of necessary interviews. A formal collaboration with Walter Sisulu University Faculty of Health Sciences and Department of Health Promotion in Mthatha was recently established to prepare for the quantitative phase of their study.

In October 2008, the SAAVI (SAC) held their annual meeting at which they stated that SAAVI had played a critical and successful role in the development of HIV vaccine activities in South Africa. The SAC highlighted the following SAAVI achievements: South Africa is the only country in the world currently on the verge of starting an HIV vaccine trial of a candidate vaccine that is both designed and developed by a developing country. It is also one of the few countries in the world involved in mucosal work, which is extremely challenging. SAAVI's GLP facility should be continued as should its unique animal facility of Chinese macaques and baboons.

### Capacity development

A substantial portion of SAAVI's funding goes towards the long-term studies and capacity development of students at postgraduate and undergraduate level. Short-term training also takes place in areas such as Good Clinical Practice (GCP), Good Laboratory Practice (GLP), peripheral blood mononuclear cells (PBMC) isolation training, quality assurance, data management, protocol specific training, risk reduction counselling training, as well as areas such as primary health care and other prevention approaches. Several SAAVI scientists received training at international research centres such as the Vaccine Research Center (VRC) of the National Institutes of Health (NIH) in, for example, mucosal sampling techniques. Capacity building partnerships between South African institutions has also allowed for skills transfer between institutions. An example of this is the programme on diversity and correlates of immune protection which is a partnership between the Universities of Limpopo, Venda and Cape Town.

SAAVI and partners such as HAVEG continue to train trial site staff and members of research ethics committees. Masikhulisane also trains civil society organizations and contributes to skills development of CABs and Community Educators at the SAAVI funded sites.

Several SAAVI staff attended the African AIDS Vaccine Programme (AAVP) meetings, the AIDS Vaccine Conference



from 13-16 October 2008, and the related AIDS VAX 08 Satellite Symposium, while others attended the XVII International AIDS Conference in Mexico. Several trial site staff attended the 2008/9 HIV Vaccine Trials Network (HVTN) Full Group meetings for training and or discussions regarding HVTN sponsored trials in South Africa.

### Funding

DOH – R10 million

DST – R8 066 987

Impala Platinum – R500 000

### Science Communication and Research Translation

In this period, the National Department of Health approached SAAVI to assist in developing Generic Community Advisory Board Guidelines, based on the SAAVI CAB Guidelines, which is now in final draft form.

Additional awareness raising materials were developed by Masikhulisane during 2008 and include fact sheets covering basic HIV and AIDS information, science and research, HIV vaccine research and development, ethics, legal and human rights, and community involvement.

Science communication regarding SAAVI related activities and research was also achieved through the acceptance of abstracts for posters and presentations at the following conferences: the 2008 Public Health Care Conference

held in Cape Town, the XVII International AIDS Conference held in Mexico, the Keystone Symposium' and the AIDS Vaccine Conference held in Cape Town, and the 16<sup>th</sup> Conference on Retroviruses and Opportunistic Infections held in Montreal. The SAAVI Interim Director also delivered a presentation on 'Translating Research Literacy to Multiple Audiences in Africa' at the AIDS VAX 08 satellite symposium of the AIDS Vaccine Conference, October 2008. These posters and presentations resulted in information dissemination regarding HIV vaccine development and related basic sciences, various aspects of HIV vaccine clinical trials including community involvement, ethical and socio-behavioural issues, as well as the issue of inclusion of adolescents in HIV vaccine clinical trials. Several papers covering similar aspects were published or were in press for the 2008/9 year. Several abstracts for posters and presentations from SAAVI staff were accepted for the 4<sup>th</sup> South African AIDS Conference to be held from 31 March – 3 April 2009.

SAAVI has already compiled a communications strategy, draft documents, a press release and facts sheets in anticipation of the first South African vaccinations for the HVTN 073/SAAVI 102 trial.

The SAAVI Communication Manager was also asked to co-ordinate the media component of the AIDS Vaccine Conference held in Cape Town during October 2008. This resulted in a number of relevant articles regarding HIV vaccine research and development in the local and international press.

## Tuberculosis

### TUBERCULOSIS EPIDEMIOLOGY AND INTERVENTION RESEARCH UNIT

Interim Director:  
Dr Martie van der Walt

#### Highlights

The Airborne Infectious Research (AIR) facility, a collaborative project between the MRC, Mpumalanga Province, CSIR, the Centers for Disease Control and Prevention (CDC, USA) and Harvard University (USA), was established to test the effectiveness of air disinfection interventions by quantifying the airborne concentration of infectious *Mycobacterium tuberculosis*. The facility is part of a regional MDR-TB referral hospital and consists of three two-bedded patient wards from which infectious air is extracted and conveyed to exposure chambers housing sentinel guinea-pigs. Guinea-pigs are the only models available to quantify infectious *M. tuberculosis* organisms in the air. Workers in public health facilities are especially vulnerable to the nosocomial transmission of tuberculosis (TB), yet most facilities lack appropriate infection control. Disinfection of upper room air with ultraviolet germicidal irradiation (UVGI) is a well established, safe and cost-effective technology, but evidence that it is efficacious against transmission of tuberculosis in high-burden, resource-limited settings like South Africa is lacking. Findings from the research conducted thus far at the AIR facility suggest that properly engineered upper room UVGI irradiation with good air mixing was highly effective in disinfecting the air from an ordinary hospital room occupied by multidrug-resistant (MDR) TB patients on treatment. However, evidence of efficacy is not the only requirement for these fixtures. It is equally important that fixture specifications are safe, are properly maintained and are installed according to published recommendations, including the installation of ceiling fans to assure optimal air mixing. Standardised management of MDR-TB in South Africa has thus far been effective, with rates of cases being successfully treated similar to other settings with high HIV co-infection rates. Researchers followed the first cohort of MDR-TB cases which had been treated successfully with the standardised regimen for two years after treatment completion: 51% were still healthy; for 35% no follow-up information was available; 11% had died; and 3% had relapsed with MDR-TB. This low recurrent MDR-TB rate provides additional evidence that this approach is a successful strategy to manage MDR-TB in SA. Factors associated with death or recurrent disease in the



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two-year post-treatment period was ethambutol resistance, having cycloserine replacing ethambutol in the regimen, and a completed versus cure treatment outcome.

#### External income

R41 518 371

#### Capacity development

The Supra-national Reference Laboratory (SRL) function of the Unit's TB laboratory is playing an important role in capacity development to African countries in their efforts to control TB. The emerging threat of drug-resistant TB in Africa has led to more requests from other African countries to the Unit's SRL for capacity building, training and other support for their national TB control programmes and national laboratories. SRL function and status was granted to the Unit's TB laboratory in 1994 by the World Health Organisation and it is the only



reference laboratory of TB in Sub-Saharan Africa. A group of technologists from the Nigerian National TB Laboratory visited the MRC for training in TB microscopy, culture-based drug-sensitivity testing and laboratory biosafety procedures. The laboratory has also provided input and assistance to the Malawi TB Control Programme in the development of protocols for their national drug-resistance survey. During the past year, a concerted effort has also been made to broaden the skills base of laboratory technicians. The Unit is well-known for conducting operational research which leads to constant requests by scientists from the USA to gain experience in public health research in a TB/HIV-high burden country. Over the past year, two epidemiologists from the CDC have visited the Unit for exposure to operational research in South Africa and the programmatic management of MDR-TB.

### Science communication and research translation

The Unit participated in health policy development in early 2009 focussing on upper room ultraviolet air disinfection shown to reduce the transmission of MDR TB in South African hospitals. In June 2008, an MRC press release (<http://www.mrc.ac.za/pressreleases/tb.htm>) increased public awareness around rapid tests for drug-resistant TB to be made available in developing countries. This was a collaborative attempt between the MRC, the Foundation for Innovative New Diagnostics in Switzerland, the National Health Laboratory Service (NHLS) and Department of Health.

## CLINICAL AND BIOMEDICAL TUBERCULOSIS RESEARCH UNIT

Director: Dr Roxana Rustomjee

### Highlights

The Unit participated in several cutting-edge, multinational TB clinical trials. It also competed successfully to become a centre of competence for TB clinical trials for the European-Developing Countries Clinical Trials Partnership (EDCTP).

### Capacity development

Lynne Gill and Jenny Allen attended a conference on laboratory safety, productivity and management. This improved the safety aspects in the laboratory and the implementation of a quality control policy for the laboratory. On an international scale, as part of a team of experts convened by WHO/TDR, the Unit facilitated a workshop entitled "Operational research for HIV treatment scale-up in resource-poor countries, priority setting and proposal development". Specific countries had



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RESEARCH HIGHLIGHTS

been granted assistance in developing an operational research proposal and obtaining funds for the research. Nationally, the Unit was involved in a workshop identifying clinical capabilities and gaps in setting national priorities for tuberculosis research in SA, organised by the Department of Science and Technology, and in various meetings and expert consultations targeted at addressing the extremely drug-resistant (XDR) TB outbreak. The Unit is a recognised training centre for registrars in Public Health Medicine. In addition, it supports provincial TB laboratory services, particularly peripheral microscopy centres in terms of improving turn-around times and ensuring ongoing staff training and updates. Five staff members attended the 39<sup>th</sup> Union Conference on Lung Health of the International Union against Tuberculosis and Lung Disease in October 2008, as well as the TB conference in Durban in July. A dissemination workshop on project achievements, innovative practice and lessons learnt from the three-day Managing Successful Programmes was held in October 2008 in Gauteng. Dr Rustomjee attended the Scientific Advisory Committee meeting held in Geneva in November 2008.

### External funding

R16 914 133

### Science Communication and Research Translation

The Unit completed a successful project for the Department of Health, funded by DFID, for the management of its provincial TB crisis-plan. The report on the outcomes of the evaluation were presented provincially and nationally and used by the national stakeholder forum. The Unit continues to collaborate with WHO's Special Programme for Research and Training in Tropical Diseases (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 facilities in KwaZulu-Natal, including patients in hospitals, is nearing completion.

## MOLECULAR MYCOBACTERIOLOGY RESEARCH UNIT

Director: Prof Valerie Mizrahi

### Highlights

As part of a study on the role of vitamin B<sub>12</sub> cofactor-dependent enzymes in the metabolism of *Mycobacterium tuberculosis*, a team of MMRU researchers led by doctoral student, Suzana Savvi, investigated the function of the methylmalonyl pathway, a key step of which is catalyzed by the vitamin B<sub>12</sub>-dependent methylmalonyl CoA mutase enzyme.

In a paper published in the June 2008 issue of the *Journal of Bacteriology*, it was reported that *M. tuberculosis* is able to grow on propionate as the sole carbon source in the absence of a functional methylcitrate cycle provided that vitamin B<sub>12</sub> is added to the culture medium. The subsequent research findings confirm the functionality of the methylmalonyl pathway as an alternate route for metabolism of the three-carbon metabolite propionate in *M. tuberculosis*. The results of this study have important implications for propionate metabolism during growth of *M. tuberculosis* on certain fatty acid carbon sources and therefore, on tuberculosis drug-discovery efforts that are based on targeting carbon metabolism pathways. This study formed the basis of a three-year Swiss/SA Joint Research Programme grant to Prof Mizrahi and Dr Digby Warner and their Swiss collaborator, Prof John McKinney (EPFL, Lausanne).

In another paper published in the February 2009 issue of the *Journal of Bacteriology*, doctoral student, Betty Mowa, and colleagues identified a potential vulnerability in the provision of the dNTP building blocks required for DNA replication and repair in mycobacteria. The results of this study provide a compelling rationale for pursuing the essential class Ib RNR enzyme as a target for anti-tubercular drug discovery.

Prof Mizrahi was elected to the fellowship of the American Academy of Microbiology. She also co-organised the Keystone Symposium on "Pathogenesis and Control of Emerging Infections and Drug-Resistant Organisms", held in Thailand in October 2008. Prof Mizrahi chaired the plenary session on "TB and Extremely Drug-Resistant (XDR)-TB" at this symposium in addition to delivering a lecture. Under the auspices of the Braamfontein Complex Renovation Project of the National Health Laboratory Services (NHLS), one of the biosafety level (BSL) 2 laboratories in the MMRU underwent a major refurbishment in 2008. The second component of the MMRU's laboratory infrastructure upgrade project involves the construction of a new BSL3 laboratory. Construction work on the new laboratory commenced in November 2008 and is

expected to be completed by May 2009. The new laboratory will triple the amount of BSL3 space available to the MMRU, thus increasing the Unit's capacity for research involving the use of *M. tuberculosis*.

### Capacity development

Emphasis was placed over the past year on the recruitment of a cohort of new students, which includes a postdoctoral fellow (Dr Cliff Magwira), a doctoral student (Duduzile Ndwandwe), and four Masters' students (Avani Bharuthram, Anastasia Koch, Lusanda Mapela and Krupa Naran). The host departmental allocation from Prof Mizrahi's grant from the Howard Hughes Medical Institute (HHMI) was used to provide bursaries to four Wits University Honours students and to support the running costs of two Masters' students. Dr Baves Kana was awarded a Career Development Award from the MRC and also received the Best Oral Presentation Prize in the Infectious Disease section of the Faculty of Health Sciences Research Day (Wits University). Dr Bhavna Gordhan was awarded a C2 rating from the National Research Foundation (NRF) and Dr Digby Warner received an Y1 rating. Doctoral student, Betty Mowa, and Prof Mizrahi were re-awarded a Mellon Postgraduate Mentoring Fellowship from Wits University, and MRC Master's degree bursar, Vivianne Goosens, received her degree with distinction. Master's student, Atica Moosa, was awarded a South African TB/AIDS Training (SATBAT) research grant and Duduzile Ndwandwe was awarded a Department of Labour Scarce Skills Doctoral Scholarship from the NRF. Ms Ndwandwe also won a poster prize at the 2008 Postgraduate Expo at Wits University.

### External funding

R5.6 million

### Science Communication and Research Translation

Drs Kana and Warner wrote an article entitled "Drug-Resistant TB in South Africa", which was published in *Quest: Science for South Africa*. Prof Mizrahi hosted a session on careers in the field of medical research as part of the University of Pretoria's Gordon Institute of Business Science (GIBS) Career Expo in Johannesburg. The GIBS Career Expo was attended by the top 1200 Grade 12 learners from approximately 500 schools in the Gauteng area. In April, she delivered a public lecture entitled "TB, the Scourge of Africa: Where to From Here" at SciFest Africa 2008. Her lecture was attended by learners in Grades 10-12 and by members of the public. Prof Mizrahi was interviewed by SAfm radio and by journalism students from Rhodes University for a television documentary on TB. She was also interviewed for a television documentary on TB while attending the Keystone Symposium on TB in the USA in January 2009.

## CENTRE FOR MOLECULAR AND CELLULAR BIOLOGY

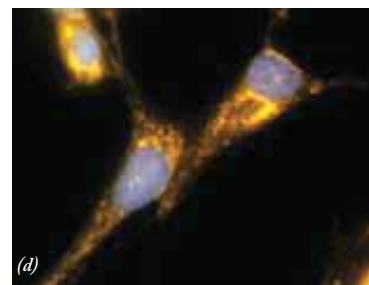
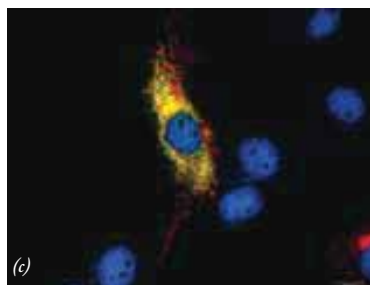
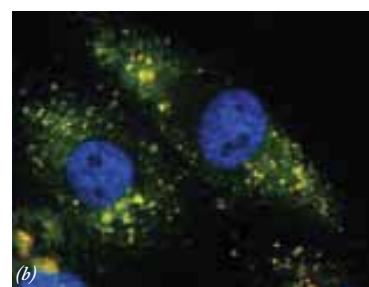
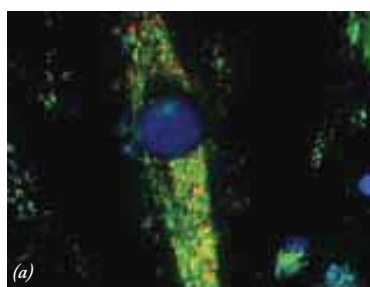
Director: Prof Paul van Helden

### Highlights

The Centre's main focus is on tuberculosis and inherited disorders.

(1) **Inherited Disorders:** The projects in this area focus on cardiac muscle disease, hypertrophic cardiomyopathy (HCM), an arrhythmic cardiac condition, long QT syndrome (LQTS) and two cardiac conduction disorders, progressive familial heart block types I and II (PFHBI, PFHBI). The presence of founder effects in South Africa for many single gene diseases is well documented and our earlier work which identified founder effects in HCM, LQTS and PFHBI and II afforded the opportunity to identify causal-genes and associated mutations through genetic mapping and positional cloning. From finding the genes, the emphasis has shifted to elucidating how primary defects cause disease and recognising factors that could explain the often pronounced phenotypic variability seen in persons carrying the same inherited defect. In some of these diseases, sudden unexpected death (SUD) has been a frequent occurrence in young, apparently healthy individuals who had not been aware that they have inherited an underlying risk. Consequently, within a family setting, the Centre offers DNA-based preclinical diagnosis and counselling for LQTS, HCM as well as PFHBI and II. It is the reference centre for genetic testing for the latter four conditions. In addition, in collaboration with other stakeholders the cardio-genetics group has helped to address the challenge that both medical professionals and the lay public are generally unaware of, namely the potential for unidentified risks of SUD in the young, and played an important role in establishing Prevent Arrhythmic Cardiac Events (PACE), an organisation that aims to increase awareness and support where necessary.

(2) **Tuberculosis (TB):** The projects under this theme are often aimed at bridging the gap between basic and clinical research, although basic and clinical research is also done. The Centre undertakes many different projects in this field, some of which are listed below: (a) genetics of human TB susceptibility (b) molecular epidemiology (c) diagnostics (d) bacterial genetics (e) drug-resistance (f) immunology, including Mycobacteria/Helminth co-infections (g) surrogate markers for clinical trials (h) drug targets (i) Early Bacterial Activity (EBA) and other drug trials. The Centre operates two category three biosafety level labs for this work. In 2008, the Centre demonstrated that the population structure of *M. tuberculosis* is highly complex and may be influenced by past migration as well as host pathogen compatibility. Certain strains may have evolved unique properties which afford them a higher level



of fitness and thereby may represent strains which are able to escape current vaccine strategies. This observation needs to be considered when novel vaccines are being designed. The researchers found evidence that the level of resistance to ethambutol and pyrazinamide is significantly higher than was previously predicted by national drug resistance surveys. This has extremely important implications for the use of standardized anti-TB drug regimens for the treatment of MDR-TB. The Centre also demonstrated how Light Emitting Diodes (LED) technology can greatly simplify the diagnosis of TB by fluorescence microscopy. This technology opens the way to take the diagnostic method to the patient and to greatly improve the time to diagnosis, thereby limiting the number of initial defaulters and the risk of transmission. In a collaboration between researchers in five African countries and Oxford University, a role for host susceptibility genes MC3R and CTSZ in human tuberculosis has been suggested.

### Capacity development

The Centre aims to develop new researchers through the supervision of Honours, Masters' and doctoral students primarily. Emphasis is also placed on the development of established researchers through the training, mentoring and support of postdoctoral fellows and promising research staff on their career paths, from postdoctoral to established researcher. Mechanisms for attracting prospective students from local geographical areas included teaching and tutoring at third-year level and Honours levels. The Centre offered a third-year course in Med.Biotech and offers a BSc (Honours) course. It also runs training courses for professionals and believes in promoting the public awareness of science.

### External funding

R13 million

*Tree-dimensional fluorescent live cell imaging showing the co-localisation of various proteins under investigation in the Centre for Molecular and Cellular Biology*

*a: Enolase 1 co-localising with COMMD4 in H9C2 rat cardiomyocytes*

*b: Cardiac Myosin Binding protein C co-localising with an endosomal marker in H9C2 rat cardiomyocytes*

*c: Muco1ipin1 co-localising with a mitochondrial marker in H9C2 rat cardiomyocytes*

*d: The neuronal protein Reelin co-localising with WD40 repeat protein 47 in GT1-7 rat hypothalamus cells.*

## Science Communication and Research Translation

Highly infectious MDR and XDR-TB strains have important implications for TB control, health care workers, patients and communities. The findings of our research continue to be communicated to the TB control programme and to clinicians through presentations at several meetings in the region. The Centre is working closely with Médecins Sans Frontières (MSF) in Khayelitsha to see whether direct diagnostics can make a difference to the drug-resistant problem. Greater vigilance is required to contain the drug-resistant TB epidemic in all settings. Since 2000, one of the Centre's projects under the leadership of Prof Tommie Victor has involved a consultation with clinicians and the TB control programme to study the drug-resistant TB epidemic in 72 clinics in the Boland-Overberg-South-Cape-Karoo (BOKS) regions. This work is ongoing and scientists have obtained additional funding to enlarge the TB clinic at Lawaaiikamp, where they work. Molecular results of TB and drug-resistance tests are provided and entered at the laboratory at Tygerberg Hospital in real-time to clinical staff at Lawaaiikamp within days. It is therefore not only the patient that benefits directly but also the community as a whole and the TB control programme.

A direct DNA-based test facility is available for HCM and LOTS. Information is also made available to PACE for patient- and family-based advice and counselling. Various members of the Centre have been part of numerous workshops with the National Department of Health (DOH), Western Cape DoH, Department of City Health and NHLS regarding XDR-TB. Towards the end of August 2008, Prof Victor together with six members of the Centre and international expert, Dr Kristin Kremer from the National Institute for Public Health and the Environment in the Netherlands, visited the study site in George to raise awareness about this disease and to inform the community about our activities at the clinic. Prof Rob Warren gave a few talks in 2008 on TB Epidemiology that included the TB Clinical Forum at Tygerberg and the TB update in Worcester. As part of the Stellenbosch University's 'Gesondheidsorg Ontwikkelingsprogram' (GESOG) programme, the Centre hosted Grade 11 job-shadowing learners in June-July 2008. TB outreach was conducted as part of the Local Integrated Network Kuils River (LINK)'s holiday programme in the Western Cape in July 2008. Numerous radio, television and newspaper interviews were done locally and abroad. Prof Valerie Corfield has worked closely with Dr Ethelwynn Stellenberg of the Dept of Interdisciplinary Health Sciences, University of Stellenbosch on the LINK project. Following the success of the HIV workshops of the LINK project, she was asked by the non-governmental organisation, BADISA, and the education department (EMDC) to develop a workshop explaining the physiological consequences of "tik" (crystal methamphetamine) abuse following the HIV model which

was designed for every child in every grade in every school in Kuils River. The community has collected R20 000 through a sponsored walk and the EMDC will contribute further funds for this. In 2008, a pilot "tik" workshop (TIK's TRICKS) was presented at the MTN Science Centre for learners with potential. In 2008, Dr Stellenberg and Prof Corfield conducted a follow-up survey to assess school learner knowledge retention. In that same year, peer educators conducted the HIV workshop as part of The President's Award for Youth Empowerment programme during a youth week in the Eastern Cape. The workshops have been presented to labourers on farms in the Kuils River area (though LINK), and presentations to various target audiences will continue. By invitation from the school, this workshop was given on International HIV/AIDS Day at Zimasa Primary School in Langa. The peer educators of Tertiary School in Business Administration Institute (TBISA) outreach programme have invited Prof Corfield to join them in 2009 in their training and presentation of HIV workshops. An interactive TB workshop entitled "The trouble with TB" was developed to explain how *M.tuberculosis* acquires antibiotic resistance and the importance of adhering to therapy. It has travelled to George with Prof Victor's research/outreach project and to the EDULINK conference in Gauteng. EDULINK is an ACP-European Union Cooperation Programme in Higher Education. It was also presented at 2 Military Hospital on TB Day to show medics and nurses innovative ways of translating the science of the epidemic to their patients. In 2008, it was duplicated by students of the Pharmacy Department of Rhodes University as part of the Centre's TB Centre of Excellence's (COE) "share-ware" approach to encouraging collaboration in translating science to a wider public audience. "Enzyme antics" is an interactive workshop which explores enzyme activity and uses in biotechnology. The skin you're in is an interactive exhibit that examines many facets of skin biology, skin in health and disease and skin colour and discrimination. In 2008, the workshops and exhibitions were given at Scifest and at National Science Week (NSW) Cape Town, as well as NSW Bergville in KwaZulu-Natal. At Scifest Africa 2008, Prof Corfield was assisted by two PhD students at the Centre, Gail Louw and Carmen Swanepoel to present three workshops: "HIV comes to the Party", the "DNA Detective" and "Enzyme Antics" and two exhibitions, "The Skin you're in" and "The trouble with TB". During the University of Stellenbosch's Science Focus Week, DNA and HIV/TB dialogue workshops were held for high school learners, with postgraduate students from CMCB and the University of Stellenbosch's Genetics department taking part. During 2008, Prof Corfield and Dr Craig Kinnear presented modules on DNA biotechnology at workshops on public understanding of biotechnology and agricultural biotechnology hosted by the Department of Science and Technology and Education held for school subject advisors in Gauteng. Workshops were attended by advisors from all provinces.



## Cardiovascular Disease and Diabetes

### CHRONIC DISEASES OF LIFESTYLE RESEARCH UNIT

Interim Director: Dr Nelia Steyn

#### Highlights

In a tobacco research study at typical antenatal clinics, a quasi-experimental design was used to evaluate the smoking cessation rates of 450 pregnant smokers exposed to an intervention programme in 2007. These rates were compared to those of a control group of 450 women, who received usual care at the very same clinics the year before. The comparison and intervention groups were equivalent on key demographic variables. The primary outcome measure was smoking cessation, validated by a cotinine urine test. The difference in quitting between the cohorts was 7.6% (95% CI: 4.6% - 10.7%  $p < .0001$ ). In addition, there was a significant difference in reduction of cotinine levels. In the intervention group, 28% of women reduced their cotinine by at least a half, compared to 16% in the control group. The difference between the two groups was 11.7% (95%CI: 5.0% - 18.4%; Fisher's exact test:  $p = 0.0003$ .)

Another study in the Western Cape Metropole aimed to conduct a formative assessment to explore health professionals' capacity regarding their knowledge, attitudes and practices and the conditions within primary health care facilities that facilitate or impede the provision of lifestyle modification education and counselling to patients with chronic diseases of lifestyle (CDL). The formative assessment combined quantitative and qualitative research methods, utilising questionnaires and interview schedules.

The Cardiovascular Risk in Black South Africans

(CRIBSA) study aims to ascertain the extent of the current cardiovascular disease (CVD) risk profile (diabetes, hypercholesterolaemia, hypertension, obesity, physical activity, dietary intake, smoking and alcohol use) as well as the trends and changes that have occurred over the last two decades in the urban black population of Cape Town. These trends will provide crucial information on the direction of the CVD epidemic in South Africa. This will enable government to make informed decisions with regard to health promotion and prevention as well as to direct resources appropriately and adequately for treatment of the CVD risk factors. The study, with a sample size of 1260 participants from townships in the Cape Peninsula, commenced in April 2008.

The School Health Intervention Programme (HealthKick Programme) comprises the development of an intervention programme for the prevention of diabetes and related CDL (obesity, hypertensive disease, ischaemic heart disease and ischaemic strokes) which are highly prevalent in adults in disadvantaged communities of South Africa. The intervention over three years (2008-2011) is aimed at children aged 9-10 years old until age 13. Specifically designed lessons will be implemented as part of the curriculum in collaboration with educators and the relevant education departments. Parents will also be involved in the programme that will focus on healthy eating, optimal physical activity and the prevention of smoking to prevent type 2 diabetes and related disorders.

#### Capacity development

On a full-time basis during 2008, four PhD students were supervised and one graduated at UCT, while two Interns worked on their Masters' proposals. On a part-time basis, two PhD candidates, four Masters' and two postdoctoral fellows were mentored by Unit staff.

#### External funding

R1 562 585

## Science Communication and Research Translation

Because health professionals currently have to use USA textbooks, the MRC and South African universities collaborated to compile the Community Nutrition Textbook for South Africa. This textbook includes a human rights approach. Phase 1 included a workshop held in Cape Town with the heads of the Nutrition Departments from the nine universities and staff from the Nutrition Directorate of the Department of Health where chapters were allocated according to specialties and expertise. In Phase 2, the textbook went through three drafts by the authors and the chapters were sent for peer review. This book was completed and launched in November 2008.

Also in 2008, a baseline survey of 880 Grade 4 learners at 16 randomly selected schools was undertaken after a formative assessment at 100 schools in the Western Cape. A newsletter was developed and sent to all these schools as well as to other role-players and collaborators. The baseline survey formed part of an intervention programme and included fitness testing, knowledge, attitude and behaviour testing, and anthropometry measurements. Implementing the programme involved a comprehensive participatory process with the 16 schools. This was done through action planning in combination with a "toolkit" approach. With an educational expert, a series of introductory and action planning workshops were held for the participating schools to incorporate the intervention into the life orientation curriculum. The Department of Health will be lobbied in 2009 to take responsibility to disseminate the intervention now that it has proved to be effective.

On 30 May 2008, World No Tobacco Day, preliminary research results were presented at two community events in Elsies River and Bishop Lavis where the research was conducted. About 500 adults and several school children attended the events. The programme also included presentations by local politicians about the significance of World No Tobacco Day. This was followed by a health fair, which involved performing health screening tests for blood pressure, blood sugar, lung capacity, body mass index (BMI) and HIV testing, along with pre- and post-test counselling.

## INTER-UNIVERSITY CAPE HEART RESEARCH UNIT

Director: Prof Peter Zilla

### Highlights

Cardiovascular Research Unit: A substantial reduction in intimal hyperplasia in a vein graft in the peripheral position had previously been achieved through the use of a novel external stent. It was then determined that this technology also

achieved a reduction in the coronary position. These findings have resulted in the initiation of a multi-centre clinical trial, with UCT being one of the participating centres. A detailed anatomical study of human saphenous veins has allowed for a long-awaited characterisation of this important vascular graft source. A growth factor delivery regime required for stable neo-vascularisation of polymeric scaffolds has been determined. These findings add clarity to this pressing problem in tissue regeneration. The simple injection of synthetic PEG hydrogels was shown to limit the progression of ventricular dilation after infarction in the rat model, an important marker of heart failure progression. The above gels have been modified to allow for slow-release of small therapeutic molecules.

Hatter Institute: The focus of the Hatter Institute is to study ways of protecting the heart against insults such as lack of blood flow (ischaemia), and the molecular regulatory mechanisms underlying the development of diabetic cardiomyopathy. The Institute's main research findings in 2008 focused on the delineation of novel protective signalling pathways against a heart attack. Scientists have been able to demonstrate the implication of this pathway following the activation of the immune system or with sphingosine 1 phosphate (a major component of the high density lipoproteins). In addition, it has been shown that regular and moderated consumption of red wine protects the heart against an ischaemic insult by activation of STAT-3.

Lipidology (UCT): Lipidology remains active in contributing to the diagnosis and management of dyslipidaemia regionally and nationally. The genetic causes of familial hypercholesterolaemia recorded now exceeds 50 mutations in the LDL receptor and a cohort of binding defective apoB100 (4 mutations) that has been submitted as a thesis, as well as a family with a mutation in PCSK9. More mutations in the latter gene are under investigation. Anti-sense RNA treatment is being investigated for the treatment of homozygous familial hypercholesterolaemia and so is a microsomal triacylglycerol transfer protein inhibitor, as part of multinational studies. The first case of Smith Lemmler Opitz Syndrome has been diagnosed.

Physiology (US): Theme 1: Cardiac Muscle-healing and Factors Impacting the Process: cellular and molecular influences. The Unit focused on mechanisms of muscular repair using tissue, cell culture and progenitor cell models. The inflammatory, myogenic and growth factor interactions have many similarities in cardiac and skeletal muscle. A review article currently in press places the recent controversy surrounding skeletal myoblasts as potential cell therapy within the context of other potential sources of stem cells for cardiac repair. The inflammatory processes are poorly understood, despite their influence on progenitor cells and fibrosis during healing. Inflammatory factors in low doses play a role in

preconditioning. The growth factor TGF-beta influences muscle progenitor cell differentiation irrespective of isoform. Theme 2: Chronic Metabolic Derangement Leading to Cardiovascular Disease: From basic science to human subjects.

The interplay between metabolism and cardiac morphology is complex, particularly in response to chronic conditions. Altered substrate preferences and pathway utilisation in animal models of chronic abnormal cardiovascular hypertrophy were demonstrated. Other data indicate that some metabolic pathways are required for development of normal heart size. Translational research included assessment of cardiovascular and metabolic syndrome risk profiles in young adults, and data indicate greater risk than expected for the age cohort. Data collected on abnormal body composition in HIV-positive women after chronic antiretroviral use indicated higher fat deposition in women with a more pronounced history of wasting (from HIV/AIDS and/or prior TB) compared with women without prior clinically defined wasting. In collaboration with the Groote Schuur Hospital (GSH) Lipid Unit, preliminary data indicate abnormal LDL particle size in many subjects in this cohort, which are currently being examined.

### Capacity development

Cardiovascular Research Unit: At present, 70% of the students at the Cardiovascular Research Unit are either black or female (30% black and 40% female). Dr Neil Davies teaches a Tissue Regeneration course at BSc Hons levels. Drs Paul Human, Thomas Franz, Neil Davies and Deon Bezuidenhout gave a number of four-week special study modules to second-year medical students. Dr Thomas Franz examined five undergraduate student theses for the Department of Mechanical Engineering at Stellenbosch University. Dr Bezuidenhout co-supervises an MSc student in Polymer Science from the University of Stellenbosch.

Hatter Institute: Currently, black and female researchers constitute 88% of the research grouping. Ms Tasneem Adam was awarded her Master's degree with distinction. The South Africa Senior Registrars in Cardiology Meeting (Hatter Meeting) was held in November 2008. Dr Sandrine Lecour was part of the Organizing Committee for the SA Heart meeting in 2008 and her mission was to encourage the participation of basic scientists to that meeting. Prof Lionel Opie teaches second-year medical students and Drs Lecour, McCarthy and Kelly teach Advanced Cardiovascular Physiology to BSc and Honours students. Five students won prizes for best oral presentations at national meetings including the MRC Research Day, an SA Heart meeting and an AstraZeneca meeting over the past year.

Lipidology (UCT): Lipidology, despite limited support, has increased its capacity to test for genetic dyslipidaemias with the technique of high resolution thermal denaturation of PCR products and has extended its experience to more sterol disorders.

Physiology (US): The Department has one Doctoral, two Masters', two Honours students and two final-year student assistants who are black.

### External funding

Cardiovascular Research Unit: R 4 million

Hatter Institute: R1.2 million

Lipidology (UCT): R 2 million (approximate; confidential contract research)

Physiology (US): R786 000

### Science Communication and Research Translation

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

Hatter Institute: We published 11 papers in peer-reviewed journals, two of which were published in *Circulation*, the most prestigious journal in cardiology. We hosted the annual Cardiology at the Limits Meeting (10<sup>th</sup> Meeting, 2008) in conjunction with the Hatter Institute of London, to which leading academic cardiologists from the United Kingdom, Europe, South Africa and other parts of Africa were invited. The proceedings were published in the book *Cardiology at the Limits*. We promote international education through the series entitled "Diabetes at the Limits" held annually in Kyoto, Japan in conjunction with the Hatter Institute of London. The proceedings of this meeting were published in the book *Diabetes at the Limits*. Furthermore, we promote the education of academic cardiologists.

Lipidology UCT: Lipidology has contributed to the understanding of genetic disorders and their treatment at international meetings and in publications.

Physiology (US): Prof Kathy Myburgh participated in two HIV/AIDS workshops (Western Cape Winelands HIV/AIDS Management Consortium and Stellenbosch University HIV/AIDS Research Focus Group). She received a grant via Stellenbosch University from the European Union-sponsored Higher Education AIDS (HEAIDS) project to increase HIV in the student curriculum. Lectures, a class quiz and tutorial case studies were developed in collaboration with Dr Myriam Moyon and delivered to BSc final-year students. Prof Myburgh was an invited speaker for a workshop in Stellenbosch which included public role-players and a seminar series in Copenhagen. She addressed the risk of chronic disease in South African women with HIV/AIDS on antiretroviral therapy (ART) with a paper entitled "Are there early signs of CV risk and insulin resistance risk?"



## EXERCISE SCIENCE AND SPORTS MEDICINE RESEARCH UNIT

Director: Prof Tim Noakes

### Highlights

For the Discovery Health research, Discovery Vitality, ESSM and the British Heart Foundation have developed instruments to measure the effectiveness of Vitality and Discovery workplace programmes. This will help to establish cutting-edge corporate wellness and employee assistance intervention programmes. Regarding the Worksite Wellness research, Dr Tracy Kolbe-Alexander has forged links with UCT's Occupational Health Division in the School of Community Health and Family Medicine with Dr Mohamed Jeebhay and colleagues. The intervention includes the development of a corporate physical activity "environmental audit". In research that examines adipose tissue distribution and metabolism to explain obesity-related comorbidities in South African women, Juliet Evans, who received a PhD scholarship from the Novo Nordisk Foundation, is looking at the expression of inflammatory genes in the adipose tissue samples of black and white women. ESSM is also part of the team of the Sub-Saharan Africa Centre for Chronic Diseases to assist with the development of intervention materials and training for the community health worker component, and the evaluation of the community health worker intervention. Research into the genetic link to injuries, and Achilles tendinopathy in particular, has been widely published in peer-reviewed international journals, including articles on "Variants within the COL5A1 gene are associated with Achilles tendinopathy in two populations"; "Variants within the MMP3 gene are associated with Achilles tendinopathy: Possible interaction with the COL5A1 gene";

"Genetic risk factors for anterior cruciate ligament ruptures: COL1A1 gene variant"; and "The COL1A1 gene and acute soft tissue ruptures". With regard to the evaluation of community-based physical activity and sport-related programmes, Dr Cathi Draper has been involved with the Leadership Project which, together with Educo Africa, is a wilderness-based leadership development programme aimed at youth at risk or in need. A poverty alleviation programme called Working on Fire examined the issues around the retention of female firefighters in relation to physical fitness. Project Ithuseng is an evaluation of the THETA/SSISA Soccer Life Skills Programme offered to professional soccer players, while the Laureus Sport for Good Foundation supports projects internationally and nationally that use sport as a vehicle for social change. Dr Draper was asked to present an overview of social issues in South Africa to enable funds to be distributed to Laureus-supported projects.

### Capacity development

Dr Kolbe-Alexander is the recipient of a MRC Career Development grant. Ms Madelaine Carstens, an MRC research intern, is investigating the relationship between dietary intake and substrate oxidation in vivo with reference to metabolic flexibility. Ms Zandile Mciza, who was an MRC intern, has been involved with research which has examined the socio-cultural and attitudinal factors associated with obesity in mothers and their daughters, and this was the subject of her PhD dissertation submitted to UCT at the end of 2008. Sixty-six percent of the new intake of MPhil Sports Medicine students for 2009 are from the designated groups.

### External Funding

International: R24 000  
National: R2 864 332

### Science Communication and Research Translation

In collaboration with the MRC Chronic Diseases of Lifestyle Unit, ESSM has contributed to a systematic review of Best Practice interventions for implementing the WHO Global Strategy on Diet, Physical Activity and Health since 2007, which was submitted for external review. A revised and final draft was completed in 2008, and the final document will appear on the WHO website. The "Healthy Active Kids South Africa Report Card" came about as a result of Prof Vicki Lambert's participation on the Expert Panel of the Physical Activity Task Force for the 2007 International Conference on Obesity and Physical Activity in Children, held in Canada. An advocacy document which evaluates the evidence and provides recommendations to various stakeholders to improve the health and well-being of South African children was presented at the International Society for Behaviour Nutrition and Physical Activity in Banff, Canada in 2008. A second report card is anticipated for 2009. Several staff members and students presented their research results at the Third Clinical

Sports Medicine Conference held from 8-10 October 2008 at the Vineyard Hotel, Cape Town. Prof Martin Schweltnus organised and coordinated the conference, which focused on "Novel concepts in Sports Medicine", covering the entire spectrum of clinical sports medicine practice. Specifically, the focus was on prevention, diagnosis, treatment and rehabilitation of injuries related to physical activity, medical conditions that athletes suffer from, and patients with established chronic disease or risk factors for chronic disease. The programme therefore included current trends and recent updates of the medical, nutritional and psychological care of athletes, as well as the latest on the scientific aspects of training.

## Infectious Disease

### IMMUNOLOGY OF INFECTIOUS DISEASE RESEARCH UNIT

Director: Prof Frank Brombacher

#### Highlights

**New Insights into African Trypanosomiasis:** African trypanosomiasis is caused by different species of extracellular flagellated protozoan trypanosome parasites. Trypanosomes have developed a mechanism of regular antigenic variation of their variant-specific surface glycoprotein (VSG) coat which allows chronic infection. Replacement of this coat occurs at rapid and regular time intervals, allowing the parasite to escape from an effective host antibody response. So far, primary T-cell independent antibody responses have been described to constitute the main host defence mechanism, relying largely on IgM antibody induction. Using genetically engineered B-lymphocyte- or IgM-deficient mouse strains, scientists showed that a lack of B-cells or IgM did not prevent infection-associated anaemia. More importantly, in the absence of IgM, parasitemia was controlled almost as well as in wild-type mice, with only slightly increased mortality. In addition, it was shown *in vivo* that antigenic variation was not affected by the lack of IgM. This outcome questions the role of Trypanosoma-specific IgM, which may have implications for the development of efficient vaccines against Human Trypanosomiasis.

**Memory Responses to Worm Infection:** Identification of host immune components required for generating memory responses to intestinal parasitic nematodes is essential for developing effective vaccines to these widespread and debilitating infections. In the study previewed, McCoy et al. show that non-specific polyclonal antibodies, produced following infection of native mice, intrinsically reduce parasite viability. Furthermore, the specific antibodies produced following re-infection induce a powerful host protective response, rapidly

expelling the model parasite *Heligmosomoides polygyrus*. These findings represent an important advance in the understanding of host-parasite biology and are of importance for strategic vaccine research against nematode parasites.

**An Emerging Drug Strategy:** The current paradigm for managing infectious diseases has targeted unique processes or enzymes within pathogens. A serious disadvantage of this strategy has been the development of microbial drug-resistance and consequent resurgence of once-contained infectious diseases. A new drug-discovery paradigm has therefore emerged focusing on identifying and targeting host factors essential for pathogen entry, survival and replication. Innovative strategies combining genome-wide computational biology, genomics, proteomics, as well as traditional forward and reverse genetics have identified host-pathogen interactions and host functions critical for the establishment of infection. Chemo-genomics and chemical genetics have allowed rapid identification of new and existing licensed drugs with antimicrobial activity. Although most host-directed drug targeting studies have focused on viral infections, they have provided a 'proof of concept' for similar approaches to bacterial and parasite infections. Future therapies may combine conventional targeting of microbial virulence factors together with host-directed drug therapy and augmentation of protective host factors to efficiently eliminate the invading pathogen.

**Novel Animal Models to Study Human Diseases:** As part of a genetic engineering approach, the Unit has established novel and animal models (murine) as applicable experimental model systems for human diseases. In 2008, three new model systems were established and characterized.

#### Capacity development

Prof Brombacher has been the programme coordinator and group leader for 'Immunology and Infectious Diseases' at the United Nations International Centre for Genetic Engineering and Biotechnology (ICGEB) since 2008. The Unit also holds two research lecturer positions in Immunology and is the South African Research Chair Host national institution (SARCHI).

#### External Funding

R9 140 832

#### Science Communication and Research Translation

Prof Brombacher is currently a reviewer for 14 international and national science journals. He serves as editor on three international journals and regularly conducts scientific consultations for two companies. Staff from the Unit attended the 2008 Royal Society/KISC UK/SA Workshop on New molecular and nano-technologies to visualise and analyse host/pathogen interactions and inflammatory processes, held from 10-13 December in Cape Town as well as the 2008 International Conference on Immunology of Health and Disease.

## DIARRHOEAL PATHOGENS RESEARCH UNIT

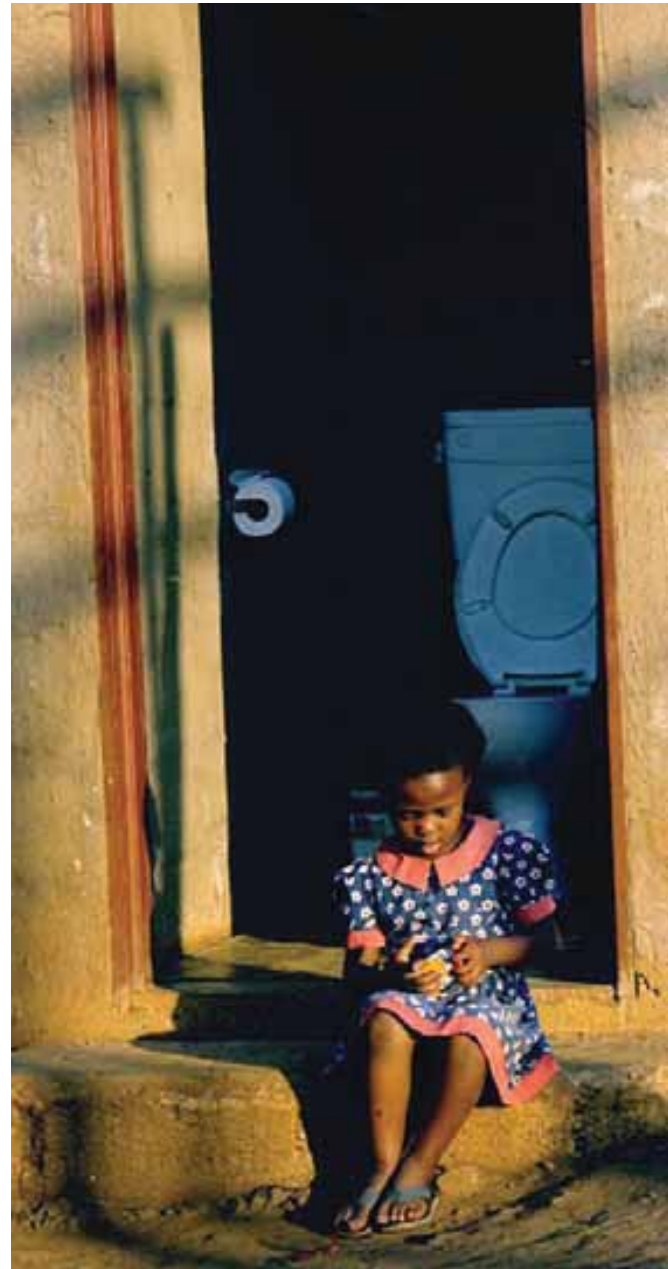
Director: Prof Duncan Steele  
Acting Director: Prof Jeffrey Mphahlele

### Highlights

The research undertaken at the Diarrhoeal Pathogens Research Unit (DPRU) has provided an excellent reference framework for the Department of Health to prioritise the introduction of RotaRix® as part of the South African Expanded Programme on Immunisation (EPI-SA). The phase III safety and efficacy trial of the Rotarix® vaccine was completed in 2008, after being initiated at the Madibeng site under the auspices of the DPRU. As a result of the vaccine trials and the initial epidemiological and burden of disease studies undertaken on rotavirus at the DPRU since 1982, a countrywide introduction of the Rotarix® vaccine will take place during 2009. The rotavirus vaccine was piloted in the Eastern Cape since September 2008. In addition, the quality of research outputs from the DPRU through the burden of rotavirus disease, strain surveillance and phase III rotavirus vaccine trials studies currently underway in Malawi, Ghana, Kenya, Mali and the Gambia have added to the impetus to introduce safe and effective rotavirus vaccines in Africa. The DPRU, as the Regional Rotavirus Reference Laboratory for Africa, has succeeded in hosting the 8<sup>th</sup> African Rotavirus Surveillance Network (ARSN) training workshop in association with the WHO/AFRO and PATH during May 2008. It was attended by 11 participants from Cameroon, Kenya, Uganda, Ethiopia, Senegal, Zambia, Zimbabwe and Cote d'Ivoire. It was intended to give theoretical and practical training in serological and molecular techniques to assist African countries to conduct rotavirus surveillance and burden of disease studies in their countries to support introduction of the rotavirus vaccine in Africa.

The current position of rotavirus burden of disease, rotavirus surveillance, rotavirus vaccine and economic aspects and cost of rotavirus disease in Africa (North, West, East and sub-Saharan) were reviewed during the 28<sup>th</sup> African Health Sciences Congress during the 4<sup>th</sup> Rotavirus Symposium held in Mauritius from 16-17 July 2008. The DPRU presented 18 papers, both oral and poster presentations. This information has provided excellent epidemiological and other data as to the significance of rotavirus-associated gastroenteritis in South Africa and other African countries. Research on rotavirus antigenaemia and viraemia in immuno-competent and immunodeficient children has confirmed extra-intestinal spread of rotavirus particles in infected hosts and association of viraemia and antigenaemia with rotavirus-induced gastroenteritis.

With respect to rotavirus genetic diversity using Dr George Mukhari Hospital as a sentinel site for the last five



years, the study indicates fluctuations of the "common" rotavirus strains over the five-year period, and the diversity of rotaviruses circulating, highlighting the presence of uncommon and untypeable strains and the emergence of novel rotaviruses within the community. Studies on other enteric viruses associated with gastroenteritis have indicated the significance of astroviruses and caliciviruses. For example, astroviruses have been detected in over 18% of children younger than five years during the winter months, with dual infections of astroviruses and rotaviruses occurring in at least 4% of children. Rotaviruses in the environment, including the investigation of rotavirus strains circulating within animal reservoirs, have highlighted potential zoonotic infections.



Studies to develop recombinant antigens and antibodies for the detection of group A, B and C rotaviruses as well as the new adult group of rotaviruses to form the basis of resilient detection methods are encouraging, with excellent, results to date.

### Capacity development

Three BSc Honours and four MSc students from the DPRU will graduate during 2009. Three MRC Interns (Mr Harry Ngoveni, Mr Phathu Ramudingana and Ms Leah Nemarude attended skills development workshops organised by the MRC. Sr Marlese Saueremann attended the Introduction of Management and Monitoring of Clinical Trials course at the University of Tshwane from October to November 2008, passing with

distinction. Although the DPRU participated in clinical vaccine trials in the past 10 years, all the instructions were informal and from in-service training. With the skills Sr Saueremann obtained through this course, the standard of such monitoring will be improved. Mr Khuzwayo Jere was awarded a scholarship to attend the 14<sup>th</sup> International Bioinformatics workshop in Cape Town at the University of the Western Cape from 1-5 September 2008. The MRC and the South African National Bioinformatics Institute organised the training workshop which assisted with the analysis of results for Mr Jere's dissertation. He has also helped the two BSc Med (Hons) students with their sequence analysis and alignment. Mr C Mothokoa and Mr Jere attended the laboratory safety-training workshop at the University of Pretoria in April 2008. The training covered comprehensive theoretical laboratory safety, reagent preparation, composition, handling and storage. In addition, hazard identification, first aid measures and fire-fighting measures were included. The workshop provided ideas for achieving safety in the laboratory and compliance goals within SA National Accreditation System standards.

### External Funding

R2 941 178

### Science Communication and Research Translation

Advocacy and consultation on the clinical importance and vaccine efficacy trials with Rotarix<sup>®</sup> played a significant role in the decision of the National Department of Health to introduce a rotavirus vaccine as part of the EPI-SA programme. The vaccine was introduced as part of the EPI schedule in South Africa due to prior vaccine phase II and III trials undertaken by the DPRU in the country.

An additional vaccine safety and efficacy study on children infected with HIV has just been completed, and the data will be invaluable to the National Department of Health as the neonatal burden of HIV in South Africa is still worrisome. The estimation of the cost analysis of the rotavirus disease burden was performed in collaboration with Prof Una McIntyre from the Department of Paediatrics at University of Limpopo (Medunsa Campus). This study aimed to estimate the direct medical cost and indirect costs associated with rotavirus infection in order to determine the potential economic impact of the disease in the health system and the community. A manuscript has been submitted to the Journal of Infectious Diseases entitled: "The Economic Burden of Diarrhoeal Diseases in a Tertiary-level Hospital, Gauteng, South Africa". Eleven articles were published over the past year and a significant number of papers have been presented at international congresses. Postgraduate students have presented papers and posters at the University of Limpopo (Medunsa) Academic Day and MRC Research Day held in Cape Town in October 2008.

## INFLAMMATION AND IMMUNITY RESEARCH UNIT

Director: Prof Ronnie Anderson

### Highlights

Infectious diseases research: Tuberculosis (TB), HIV/AIDS, and severe pneumococcal disease are the major research focus areas. TB research focuses on the potassium (K<sup>+</sup>) transporters of *Mycobacterium tuberculosis*, especially their role in bacterial virulence, and potential to serve as novel targets for drugs and vaccines. The primary objective of HIV/AIDS research is to establish the effects of HIV infection on regional T-lymphocyte colonisation and macrophage activation in the gastrointestinal tract, as well as the effects of antiretroviral therapy on reconstitution of various sub-populations of T-lymphocytes, macrophage activation status, and privileged viral reservoirs, especially in relation to anatomical site and drug-resistance. Novel insights into HIV immunopathogenesis of this type are essential for discerning approaches to drug and vaccine design. Pneumococcal disease research continues to focus on pneumolysin, the major protein virulence factor of this microbial pathogen, using strategies which target the production and/or cytotoxic and pro-inflammatory activities of the toxin.

Inflammatory diseases of non-infective origin: In the case of acute/chronic inflammatory diseases of non-infective origins, efforts were primarily targeted at identifying the mechanisms which initiate mobilisation of calcium during receptor-mediated

activation of inflammatory cells, particularly the neutrophil, as well as those which restore Ca<sup>2+</sup> homeostasis to the cells. This research has identified several novel Ca<sup>2+</sup>-handling-based targets for anti-inflammatory therapy. The second component in this research programme involves identification of the mechanisms by which heavy metals of environmental/industrial significance (cobalt, manganese, palladium and platinum) trigger and/or potentiate harmful inflammatory responses.

### Capacity development

One student graduated with an MSc degree from the University of Pretoria in 2008 and five are currently registered for PhDs.

### External Funding

R4 million

### Science Communication and Research Translation

Although the translational impact may be slow to emerge, some of the following primary translational objectives are being realised: optimising the antimicrobial/anti-inflammatory chemotherapy of severe pneumococcal disease; optimising HIV drug/vaccine design; identification of novel K<sup>+</sup>-based targets for pharmacotherapy/immunoprophylaxis of TB; developing novel, neutrophil-directed, anti-inflammatory chemotherapeutic strategies (macrolides, imidazole anti-mycotics, montelukast); and optimising pharmacotherapy through pharmacogenetic approaches.



## RESPIRATORY AND MENINGEAL PATHOGENS RESEARCH UNIT

Co-Director: Prof Keith Klugman

Co-Director: Prof Shabir Mahdi

### Highlights

Research underway at the clinical/vaccinology division of the Unit based at Chris Hani Baragwanath Hospital includes studies on:

- (1) Molecular and clinical epidemiology of newly-discovered respiratory viruses such as new echoviruses, coronaviruses, the human bocavirus and new rhinoviruses. Additionally, the role of pneumococcal co-infections in severe episodes of such viral infections is being probed;
- (2) The effect of HIV exposure and treatment with anti-retroviral drugs on the quantitative and qualitative antibody responses to conjugate bacterial vaccines aimed at preventing respiratory tract infections;
- (3) Affordable and implementable interventions to reduce neonatal sepsis, a large proportion of which is attributed to respiratory disease due to *Streptococcus agalactiae*;
- (4) Epidemiology of pneumococcal pneumonia in adults and the role of newer diagnostic modalities to improve pathogen-specific diagnosis in adults with suspected pneumococcal pneumonia;
- (5) Prevention of TB in HIV-exposed, infected and non-infected infants between 3-24 months old by way of primary prophylaxis with isoniazid;
- (6) Molecular and clinical epidemiology of *Staphylococcus aureus* infections;
- (7) Defining the correlates of protection against nasopharyngeal colonisation by pneumococci and the mechanism of protection induced by conjugate pneumococcal vaccines;
- (8) Determining the potential of a repertoire of 15-20 "common" pneumococcal protein antigens being developed as future vaccine candidates against pneumococcal disease;
- (9) Determining the impact of Pneumococcal conjugate vaccine introduction on the burden of pneumonia in children and in adults through the herd-effect.

Research underway at the surveillance division of the Unit based at the National Institute for Communicable Diseases includes studies on:

- (1) Phenotypic and genotypic characterisation of meningococcal, pneumococcal and *Haemophilus influenzae* strains causing invasive disease in South Africa. All three pathogens are vaccine-preventable,

and data on serotype-causing disease in SA is vital for vaccine introduction;

- (2) Evaluating of *Haemophilus influenzae* serotype b (Hib) routine infant vaccination on national level. Data on vaccination history of cases are being sought, and the role of HIV co-infection and lack of the booster dose in schedules are being investigated;
- (3) Changing epidemiology of meningococcal disease and the genotypic evaluation of meningococcal isolates against novel vaccine antigens currently being developed;
- (4) Risk factor analysis for antimicrobial resistant pneumococcal disease and the evaluation of risk factors for death related to invasive disease;
- (5) The effects of sub-MIC of macrolides on the synthesis of pneumolysin, as well as the impact on pneumococcal growth in an experimental in vitro model;
- (6) Investigating of doctors' perceptions of the utility of blood cultures in the diagnosis of respiratory tract infections and how that impacts on the documented burden of disease by province through the laboratory-based surveillance system.
- (7) The Impact of PCV introduction on invasive pneumococcal disease in both HIV-infected and uninfected adults and children in SA.

The outcome of a five-year vaccine trial conducted in Soweto with 39 876 children showed that the 9-valent pneumococcal conjugate vaccine reduced the burden of invasive disease due to vaccine serotypes by 85% and was also shown to be effective in HIV-infected children. National laboratory-based surveillance has shown that the introduction of the *Haemophilus influenzae* type b (Hib) vaccine has been successful in reducing the burden of disease in South Africa. Ongoing surveillance of Hib has shown that residual disease occurs in children with HIV-infection and these strains are more likely drug-resistant. The Unit has documented the first case of fluoroquinolone resistance in a pneumococcus in Africa, including the first global case of fluoroquinolone resistance in a pneumococcus from a child. A subsequent carriage study highlighted the association between children in TB hospitals and carriage of fluoroquinolone-resistant pneumococci. Scientists from this Unit have implemented several molecular diagnostic (PCR) assays to assist in the identification and serogrouping of organisms including culture-negative blood and cerebrospinal fluid specimens. Profs Klugman and Madhi contributed to the WHO guidelines for the treatment of pneumonia in HIV-infected children. The Unit has documented the replacement of heterogeneous serogroup A meningococcus with highly clonal serogroup W135 in Gauteng Province and an increase in the total number of cases from this province. Since 2004, annual GERM-SA meetings have been held to re-evaluate and improve the surveillance network. Participants include representatives from the US Centers for Disease Control (CDC), Department of Health, clinicians, pathologists and technologists from all

provinces. Widespread use of cotrimoxazole for prophylaxis of opportunistic infections in HIV-infected individuals has major implications for the development of resistance in other bacteria. Surveillance has been expanded to monitor the impact of this resistance in all provinces. Ongoing analyses show dramatic increases in cotrimoxazole resistance in the pneumococcus.

### Capacity development

Dr David Moore was awarded an MMed degree by Wits University. Ms Ruth Mpenbe was awarded the Baccalaureus Technologiae in Biomedical Technology from Tshwane University of Technology. Research staff members who have received higher level training include Ms Heidi Soeters, a first-year Master in Public Health student at Emory University's Rollins School of Public Health in Atlanta, USA who joined the Unit for an eight-week period in May 2008. During this time, as part of her Global Field Experience project, she explored the clinical relevance of trimethoprim-sulfamethoxazole (TMP-SMX) resistance in relation to the pneumococcus. Specialist training was afforded to scientists and practitioners from other institutions, SADC and other African countries after Dr Bekithemba R Mhlanga, Director of the Hib-PBM Surveillance Network and Intercountry Support Team Eastern & Southern Africa, AFRO/WHO, requested training for medical technologists from Lesotho and Swaziland. This included the principles and practices for handling blood culture and cerebrospinal fluid specimens; standard bacteriological procedures to identify and characterise common causes of bacterial meningitis; and testing these accurately for antimicrobial susceptibility. In addition, training included media preparation, bacterial isolate storage and shipment, and laboratory quality assurance and management. Mr Gilbert Masona and Ms Nomcebo Phungwayo from Swaziland, and Ms Mathabo Mareloa and Ms Lulu Buduaki from Lesotho joined the Unit from 6-17 October 2008.

### External Funding

R7 810 000

### Science Communication and Research Translation

The Unit reports weekly data for *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Neisseria meningitidis* to the National Outbreak Response Team (NORT) and the National Department of Health. Ongoing surveillance data informs pharmaceutical companies, vaccine manufacturers, public health specialists and clinicians nationally and internationally. The Unit also conducted community outreach to inform guardians of children vaccinated during the study against pneumonia and of the benefits of the vaccine. Parents were invited to bring their children for additional vaccination if the children were at risk for pneumonia. Prof Shabir Madhi has served as a consultant to the WHO on developing a global

action plan against pneumonia (2007-2008), and has been an advisor to PneumoADIP (2004, 2006, 2008) on the introduction of pneumococcal conjugate vaccine into developing countries, in addition to being a consultant to the Gates Foundation on improving diagnostics assays for defining the aetiology of pneumonia. Prof Keith Klugman was chair of the working group of the joint WHO – CDC International Conference on Health Laboratory Systems held in Lyon, France and was an invited consultant to WHO and Health Canada's consultation on new pneumococcal vaccines in Ottawa, Canada. He was the Chair of the working group on antibiotic resistance, 'New Approaches to an Old Problem' at the American Academy of Microbiology Colloquium held in Annecy, France. Dr Anne von Gottberg attended several national and Gauteng outbreak response team meetings convened by the Department of Health to discuss policies related to meningococcal disease control and prevention within South Africa.

Luminex instrument: RMPRU at Chris Hani Baragwanath was awarded an NRF equipment grant to purchase a Luminex system (BioPlex200). This system is capable of performing high throughput simultaneous analysis of multiple analytes. This system is intended to become an integral part of the core activities of the Unit, in particular its focus on vaccine preventable diseases. As part of these core activities, Dr Peter Adrian and Mr Matsekae Madimabe underwent two weeks' training at the Institute of Child Health at GOS Hospital in London. The Unit is currently developing assays for quantification of antibodies to multiple polysaccharide serotypes included in the current and future formulations of pneumococcal vaccines. In addition, these capabilities are being extended to include assays for measuring IgA antibody titers in saliva. Further, in anticipation of the potential for future multivalent recombinant protein based pneumococcal vaccines, the Unit is developing both serum IgG and salivary IgA assays to quantify antibody responses in multiple protein antigens. Researchers are also developing multiplex assays to measure the vaccine response to the expanded programme of immunization (EPI) vaccines, in particular for use in HIV-infected and HIV-exposed groups to determine reasons for vaccine failure, and to improve current strategies for vaccination in these high priority interest groups. Other applications for this equipment include its use in various novel serotyping assays, and for quantifying levels of cytokine and other biological markers in collaborative projects.

Real-time PCR system: At NICD, a multiplex real-time PCR assay to detect *S. pneumoniae*, *H. influenzae* and *N. meningitidis* from culture-negative clinical specimens, culture-negative transport media, and for urgent testing of specimens from suspected meningitis cases has been set up and validated. Due to increased specificity and sensitivity and vastly improved turnaround time, this assay

has replaced previously used conventional PCR assays. In addition, real-time PCR for serotyping of *H. influenzae* has been set up and is currently being validated in the laboratory. Preliminary results support the continued use of this assay. The Unit is collaborating with colleagues at CDC to validate their diagnostic real-time PCR assays (singleplex assays for detection of *S. pneumoniae*, *H. influenzae* and *N. meningitidis*) and PCR-based pneumococcal serotyping assays, using clinical specimens from South Africa, while also validating their PCR assays for serogrouping of *N. meningitidis*. Owing to the discovery of a new serotype (6C) within serogroup 6 pneumococci in 2007, all serotype 6A surveillance isolates are now routinely screened for serotype 6C using PCR. The Unit has previously assisted colleagues in Indonesia and Malawi in carrying out this PCR on subsets of their serotype 6A isolates. Conventional serotyping (Quellung) is currently unable to differentiate these serotypes.

The research activities within the Unit have assisted Prof Madhi in contributing to management guidelines for acute respiratory tract infections in South Africa as well as guidelines for the use of influenza vaccine in South Africa which were published in the South African Medical Journal in 2008.

## MALARIA RESEARCH UNIT

Director: Dr Rajendra Maharaj

### Highlights

**Lubombo Spatial Development Initiative (LSDI):** A decade of implementing research-based malaria control interventions in southern Mozambique has resulted in the decrease in the incidence of the disease in KwaZulu-Natal and Mpumalanga by 99% compared to the baseline of 2000. Furthermore, the prevalence of the disease has decreased by 92%. This model has proven to be successful in malaria control to such an extent that the SADC Ministers of Health have endorsed implementing the LSDI model in the Trans-Zambezi Malaria Control Initiative involving Angola, Botswana, Namibia, Zambia and Zimbabwe, as well as in the Trans-Kunene Initiative involving Angola and Namibia.

**Innovative Vector Control Consortium:** In line with requirements to develop integrated decision support tools for malaria control in the form of the Malaria Decision Support System, the Health Geographic Information System (GIS) Centre has developed a free and open source automated mapping tool for integration, with a web-based application developed with PHP/JavaScript/Ajax and connected to a PostgreSQL database. The product has been developed to integrate fully with the PostgreSQL database environment using PostGIS connector, and interfacing with the application side using MapServer to spatially display the results of preset queries. All spatial data have been adapted to reside within the database environment itself.



ALLEN JETHAS

MARA: Mapping antimalarial drug-resistance in Africa: The Malaria Research Unit is collaborating with the World Antimalarial Resistance Network which is an initiative set up by malaria researchers to gather antimalarial drug resistance data at a global scale. The Unit is responsible for the collation of in vivo and molecular antimalarial resistance data for temporal and spatial analyses within the MARA project. Low resolution maps of selected resistance markers for Sulphadoxine Pyrimethamine have been integrated with Google maps and made available at: <http://www.drugresistancemaps.org>. A poster presented by Inbarani Naidoo entitled "Prevalence of the DHPS 540E mutation in African *P. Falciparum*" won the best poster award in the PhD category at the MRC Research Day 2008.

Social Aspects of Malaria: One of the main factors affecting Indoor Residual Spraying (IRS) is community acceptance of the intervention. It is essential to understand the knowledge, attitudes and practices of the communities in designing health promotion material. Surveys were conducted in South Africa and Swaziland and the results were used to identify gaps in the knowledge of malaria at local community level. Surveys were conducted at Bushbuckridge and the report was submitted to the provincial Department of Health and Social Services in Mpumalanga. The results were used to design information and education material for malaria awareness in the province.

GIS-based Malaria Information System: The Health GIS Centre has embarked on a massive initiative to introduce integrated small-scale mapping and analysis across the LSDI region. This entails the mapping of all case data, IRS data and entomology data collected in the region over the past 10 years. During 2008, 93% of some 8000 localities, villages and farms in Limpopo Province, and 70% of almost 900 localities in Mpumalanga Province were mapped. The results have been integrated into the provincial malaria case and IRS databases in these provinces. This ensures that all queries can be run at a lower scale and can be integrated across all datasets. In addition, it will allow for all queried output from the provincial malaria information systems to be viewed at any desired spatial level, lending a new level of detail to decision support and the targeting of interventions. To add to this achievement, new and improved automated mapping solutions are being investigated to replace the existing WHO Health Mapper product currently in use.

Drug Resistance Surveillance: In collaboration with the London School of Hygiene and Tropical Medicine, the Lead Unit is investigating the spread of antimalarial drug-resistance in Africa using genotyping studies. Scientists have shown that African pyrimethamine resistant malaria parasites originated in Southeast Asia. This has important implications

for antimalarial drug policies in Africa, as 67% of parasites sampled in Thailand, Cambodia and Myanmar are resistant to the commonly available antimalarials.

### Capacity development

Mr Michael Gebreslasie completed his PhD through the University of KwaZulu-Natal. Inbarani Naidoo is registered for a PhD through the University of London. Natasha Morris is registered for a Master's degree through the University of Geographical Information Sciences (UNIGIS), while Khumbulani Hlongwana is registered for a Master's in Public Health at the University of the Western Cape. Amanda Jackson is registered for a MSc at UNISA, and Edison Mavundza is registered for an MSc through the University of Pretoria. Nicole Miller is registered for a Postgraduate Diploma in Health Economics at the University of Cape Town.

### External Funding

R28 199 852

### Science Communication and Research Translation

The programme presented an animated talk on "Artesunate plus sulfadoxine-pyrimethamine (SP) and SP quintuple mutations – associated or not?" at the Antimalarial Treatment Strategies: Getting the Most from Malaria Drugs Meeting held in Mpumalanga.

Training Workshops: Operational and theoretical training workshops were conducted in the use of Global Positioning System (GPS) and Personal Digital Assistant (PDA) units. Several sessions were conducted within the MRC in 2008, involving four staff members of the Unit, eight members of the TB Research Unit, and five members of the Health Systems Unit. GPS training workshops convened for external parties during the course of collaborative work involved approximately 14 Ministry of Health staff in Gaza Province (Mozambique), 10 Ministry of Health staff in Zambezia Province (Mozambique), an entomologist in Zambia (trained in GPS data capture and basic analytical methods) and 20 Ministry of Health Indoor Residual Spraying field personnel and the information manager at the Malaria Control Programme in Swaziland. Brief GIS software training was also provided to the information officer based at the Swaziland Malaria Control Programme.

National Science Week: The Health GIS Centre participated in the National Science Week held in Mtubatuba from 12-16 May 2008. Health GIS Centre staff represented both the Health GIS Centre and the Malaria Research Unit in general. Media and presentation material covered an introduction to malaria research and malaria control activities, the application of Geographic Information Systems for public health research, and some career guidance advice.



ALLEN JEFFHAS

RESEARCH HIGHLIGHTS

## Crime, Violence and Injury

### CRIME, VIOLENCE AND INJURY RESEARCH UNIT

Director: Prof Mohammed Seedat

#### Highlights

In 2008, the MRC/UNISA team continued to refine critical theoretical assumptions and values underpinning the generation, aetiology and prevention of crime, violence and injury. A range of projects were implemented or consolidated over the year, including the Male Interpersonal Violence Project, Female Homicidal Strangulation in Urban South Africa, International Child-Safety Intervention Study, the WHO Safe Communities Initiative, and the National Injury Mortality Surveillance System (NIMSS). Energies and resources were invested towards operational plans, staff recruitment, consolidation and expansion of partnerships, resource mobilisation and strategic alignment to the UNISA, MRC and WHO mandates. For example, in 2008 the NIMSS expanded its partnerships to secure full surveillance coverage of over 50% of fatal injuries in South Africa, including full coverage in two provinces (with a third pending) and seven cities.

The Crime, Violence and Injury (CVI) team produced several well-received academic publications and hosted a number of training and development courses. These have included two regular issues of the African Safety Promotion Journal, the second Crime, Violence and Injury Review, articles in leading international journals, some of which have received critical acclaim, and research methodology and statistical courses led by world experts in their fields. The CVI Unit consolidated long-standing collaborations with partners such as the Karolinska Institutet, Monash University and the Indian Institute for Technology through joint funding applications, participation in international and regional safe communities conferences, and its annual training courses. The Unit was also active as a WHO Collaborating Centre. 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. Of special note is that the CVI Unit, as part of its enduring partnership with the UNISA Institute for Social and Health Sciences, was re-designated for a further five years as a Collaborating Centre of the WHO.

#### Capacity development

The CVI Unit hosted the first of a series of workshops on Statistical Applications and Quantitative Design for Injury Prevention and Research. The workshop series is by internationally-renowned scholar, Shrikant Bangdiwala,

Research Professor in Biostatistics from the University of North Carolina. Prof Bangdiwala is also an advisory editor of the International Journal of Injury Control and Safety Promotion. The five-day workshop was conducted from the 18 - 21 August 2008. In the same year, CVI staff supervised 10 PhD students and five Masters' level students. Six CVI staff were involved in their own PhD studies or prepared for PhD registration in early 2009. The training and capacitating of partner organisations in the WHO Safe Communities initiative was also an important component of CVI's safety promotion work. The following workshops were organised in 2008: (1) community violence and trauma prevention (2) the impact of drug and alcohol abuse: community-level responses (3) the role of non-profit organisations: governance, organisational and management dynamics (4) violence prevention: sustaining community-based initiatives.

### External Funding

R290 343

### Science Communication and Research Translation

The CVI Unit edits African Safety Promotion: A Journal of Injury and Violence Prevention. Since 2002, the journal has maintained its publication target of two issues per annum and in 2005 was accredited by the South African National Department of Education. The year 2008 saw the launch of the automated online manuscript submission, management and review system which enables authors to track and monitor the status of their manuscripts in the review process. Apart from facilitating management efficiency, the online system also affords greater visibility and accessibility, and facilitates the promotion of collaborative efforts with scholars both on the continent as well as globally. In 2008, the second edition of Crime, Violence and Injury Prevention in South Africa was published. The edition sought to expand existing knowledge to assist the crime, violence and injury sector in the development of safety strategies in three major areas, namely childhood injury, crime and violence, and traffic injuries. The eight chapters contained in this review challenge preventionists to capitalise on the emergent responsive political climate and growing appreciation for the nascent research-driven efforts to develop good practices with limited financial and skilled human resources. It also highlights the need for strengthening existing national programmatic plans, intersectoral and multidisciplinary collaboration, technical co-operation and governmental/civil society partnerships, all of which remain vital for the long-term development of the injury and violence prevention sector in South Africa and the continent. Throughout 2008, reports of CVI projects and activities were documented in over 50 national and local reports, newspaper editorials and three television interviews. The National Injury Mortality Surveillance System received significant media attention.

## Cancer

### CANCER EPIDEMIOLOGY RESEARCH UNIT

Acting Director: Dr Lara Stein

#### Highlights

The CERU invested time during 2008 working on a proposal and the initial phase of a large multi-centric international study to clarify the role of human papillomavirus (HPV) in the aetiology of oesophageal cancer. Oncogenic HPVs are known to cause squamous cell carcinoma of the cervix, other anogenital organs, oral cavity, larynx and pharynx; however, the association between HPV and cancer of the oesophagus is unclear. This study aims to measure the association between a number of HPV serological markers and squamous cell oesophageal cancer from existing case-control studies conducted in different geographical locations with differing background oesophageal cancer risks. Contributors are from Australia, South Africa, Iran, China, Western and Central Europe and Latin America. This will form the largest study ever conducted measuring the association between HPV and oesophageal cancer. The results will potentially add another important cancer that may be prevented in part by vaccination.

CERU researchers continued to investigate associations between HIV and cancer. The CERU's Cancer Case Control Study and other studies have shown that several cancers increase in frequency in HIV-positive individuals. During 2008, the CERU collaborated with the South African National Cancer Registry to examine the impact of HIV on the incidence of cancers in South Africa. In the 10-year period from 1991 to 2001, the HIV-related cancer Kaposi's sarcoma (KS) rose from being the 34<sup>th</sup> most common cancer to 9<sup>th</sup> most common overall. By 2001, KS was the most common cancer recorded in black African males aged 20-44 and in black African females aged 20-29. The HIV epidemic in South Africa is clearly having a significant impact on the incidence of certain cancers, and the CERU's continued work in this area provides valuable data for public health needs.

A related highlight was the analysis of cancers recorded by the Namibian National Cancer Registry (NNCR) from 2000 to 2005. Again, the most striking outcome of this analysis was the increase in HIV-associated cancers compared to what the CERU found previously for the period 1995-1998. Kaposi's sarcoma rose from being the third most common to the most common cancer overall among males. The frequency of KS as a percentage of all male cancers increased from 5.8% in 1995



to 22.2% in 2005. Among females, KS rose from a rank of 7<sup>th</sup> in the previous report (2.6% of all female cancers) to being the third most common cancer in females in Namibia (8.7%). The incidence of non-Hodgkin lymphoma also increased, most likely because of HIV immunosuppression. The continued collaboration of the CERG and the NNCR is an essential resource and asset to the public health system of Namibia, as it provides the only data on the prevalence of cancer, in addition to reflecting the progress of the AIDS epidemic.

### Capacity development

The CERG's postgraduate students have continued to produce work of international standing. The third and final paper of Ms Babatyi Malope's PhD dissertation was written up during 2008. Her work on the epidemiology of Kaposi's sarcoma-associated herpes virus (KSHV) is a valuable contribution to the scientific literature, in light of the increasing incidence of KS associated with the AIDS epidemic. Dr Aus Ali completed his MSc (Med) project examining risk factors for endometrial cancer among Black South African women. Dr Mamaqhawa Hooхло commenced an MMed project analysing the association between lung cancer and occupation. During 2008, Ms Margaret Urban completed courses on Epi Info™ and Stata. Ms Daphne Madondo completed a course on Good Clinical Practice. Ms Urban lectured for various courses in the Wits School of Public Health and the National Institute for Occupational Health (NIOH).

### Science Communication and Research Translation

Ms Urban participated in a symposium on Strengthening Tobacco Control in South Africa, organised by the National

Council Against Smoking (NCAS) and MRC Health Promotion Unit. She presented on the Epidemiology of Cancers and HIV/AIDS to the Perinatal HIV Research Unit/Johns Hopkins University Research Promotion Programme. The CERG provided information for the Health in Gauteng Status Report 2006/2007, published in 2008 by the Gauteng Department of Health.

## PROMECC

Interim Director: Prof Wentzel Gelderblom

### Highlights

Altered lipid profile and oxidative status in human hepatocellular carcinoma: Altered fatty acid metabolism, especially regarding the n-6 and n-3 polyunsaturated fatty acids (PUFA), are linked to the modulation of membrane structure and cellular oxidative status. These alterations affect membrane function and cell signalling pathways disrupting the homeostatic balance regulating cell differentiation, proliferation and apoptosis. The current project investigated the disruption of lipid metabolism and different oxidative parameters in liver cancer patients. Altered membrane integrity in the cancer tissue included an increase in cholesterol and decrease of the phospholipid phosphatidylcholine (PC), resulting in decreased phosphatidylcholine/phosphatidylethanolamine (PC/PE) and increased cholesterol/phospholipid ratios, suggesting decreased membrane fluidity. Alterations in membrane integrity, fatty acid membrane distribution and the cellular redox status are likely to be important determinants underlying the selective growth advantage of liver cancer cells.



Guidelines on the application of good agricultural practices (GAP) and the Hazard Analysis and Critical Control Point (HACCP) system in mycotoxin prevention and control in South Africa: A project entitled "Assistance in the definition of a monitoring programme and assessment of mycotoxins in agricultural food commodities" was undertaken from 2006-2008 by the National Department of Health (Food Control Directorate), with technical/financial assistance from the Food and Agriculture Organization (FAO) of the United Nations. One of the outputs of the project was the compilation of a booklet by Dr John Rheeder of the PROMEC Unit, entitled Guidelines on the application of good agricultural practices (GAP) and the HACCP system in mycotoxin prevention and control in South Africa. The purpose of this booklet is to assist national stakeholders in government and industry, as well as farmers, in understanding and implementing a united monitoring programme for the prevention and control of mycotoxins in foods in South Africa. This programme can be applied from the most sophisticated food manufacturing industries, to the least sophisticated systems of subsistence farming and small-scale food processing.

### Capacity development

The Unit had many capacity development outputs during the year which included five conference presentations by Unit staff, attendance at five training workshops and three scientific workshops and a guest visit overseas by Ms Liana van der Westhuizen who spent eight weeks at the Leeds Institute for Genetics, Health and Therapeutics (LIGHT).

### Funding

R1 258 942

### Science Communication and Research Translation

This period was highlighted by local and international media interest in the health benefits of the South African herbal tea, Rooibos. In addition, members of the Unit presented lectures at a variety of conferences in addition to making important contributions to various local and international projects. A visit by twelve Grade 6 and 7 pupils from the Hebron Christian Primary School to the Microbiology Sub-programme Unit (PROMEC) emphasised the importance of science communication as a means of involving the youth of today.

## OESOPHAGEAL CANCER RESEARCH UNIT

Director: Prof Mohamed Iqbal Parker

### Highlights

The lack of understanding of the molecular pathways that underlie the pathogenesis of Oesophageal Squamous Cell Carcinoma (OSCC) has fuelled attempts to identify genetic polymorphisms that contribute to disease susceptibility. Historically, many of these studies have focused on possible aberrations in metabolic activation or detoxification of carcinogens. The phase I cytochrome P450 (CYP) enzymes, for example, catalyse oxidative metabolism during which electrophilic carcinogenic and mutagenic intermediates can be generated. These intermediates are converted into less active secreted forms by the phase II enzymes. The major CYP enzymes involved in the metabolic activation of chemical carcinogens are the CYP1, 2 and 3 families. CYP3A5 is the major cytochrome P450 enzyme in the oesophagus and metabolises many potentially carcinogenic compounds. Phase 2 enzymes such as the glutathione S-transferases and N-acetyltransferases (NAT) are involved in the detoxification of xenobiotics. Scientists from the Unit recently reported an association of single nucleotide polymorphisms in the ADH3 and ALDH2 genes with OSCC in the South African Black population, and a recent study of the major ADH locus in aerodigestive cancers in central European populations found that variants in ADH1B and ADH7 were protective against OSCC, particularly in association with high alcohol intake. Furthermore, this MRC Unit found that variants in the sulphotransferase gene SULT1A1 and in CYP3A5 are associated with an increased risk of OSCC in smokers and those who cook on open fires in poorly-ventilated rooms, as is often the case in rural areas.

### Capacity development

The Director and several members of this Unit have been actively pursuing its capacity development programme. Dr

Collet Dandara, one of the postdoctoral fellows in the Unit, was appointed lecturer at the University of Witwatersrand in October 2007 and will continue to collaborate with us. Dr Denver Hendricks trained a postdoctoral fellow from Nigeria for two years on drug-screening and drug-development.

### External Funding

R2 619 000

### Science Communication and Research Translation

Prof Parker addressed the SADC Ministers of Science and Technology at their meeting in Johannesburg in December 2008. He also successfully conducted a course on the "Molecular and Cellular Aspects of Infection" as part of the Advanced Summer School in Africa, which is modelled on the Advanced Summer School in Spetses and will be run every two years on different specialised topics.

## ONCOLOGY RESEARCH UNIT

Director: Prof Vikash Sewram

### Highlights

The Oncology Research Unit was established in March 2008 and focuses on research that combines the disciplines of cancer epidemiology, clinical oncology, chemistry and biochemistry to bring about an understanding in the relationship between lifestyle, the environment and traditional habits on cancer risk. Research within the Unit is aimed at elucidating causal factors in the development of cancers and in particular the role of complementary and alternative medicines (CAM) including African traditional medicines (ATM) in cancer prevention, cancer risk, cancer treatment and cancer management. The research projects are aimed at improving the quality of life, investigating cancer outcomes following CAM use and the impact of interventions on patient centred outcomes. Population-based epidemiological studies will focus on elucidating environmental factors associated with the development of specific cancers within specific local populations. Research in the area of phyto-oncology is important for two main reasons. First, to ensure continued safe use of the medicines as well as preservation of indigenous knowledge (ethnopharmacology), and second, to use as a base for the discovery of new chemicals which can be used in conventional medical practice (phytochemical bioprospecting). These two areas of research should not be mutually exclusive but should rather complement each other and be seamlessly interwoven. With regard to modern medicine, it should be noted that up to 60% of pharmaceuticals have an ethnopharmacological origin.

Progress made with respect to the projects include the findings that the intake of certain dietary and medicinal wild plants had been associated with an increased risk of developing oesophageal cancer in the Eastern Cape. These results were further substantiated by laboratory-based investigations. The Unit found the elimination of smoking and alcohol consumption from 'at risk' communities were shown to reduce the risk of developing oesophageal cancer by 50%, while diets high in fruit and vegetables were associated with a 50% reduction in oesophageal cancer risk. A comprehensive questionnaire has been developed to solicit information on patient demographics, cancer pathology, use of different modalities of CAM and ATM, prognostic outcome and quality of life indicators.

### Capacity development

Prof Sewram provided training courses on Chromatography and Mass Spectrometry to postgraduate students in the School of Pharmacy, the South African Herbal Sciences & Medicine Institute and the School of Biotechnology of the University of the Western Cape from 21-25 April 2008 at the University of the Western Cape. Ms Mopo Leshwedi attended a Systematic Review training workshop held by the SA Cochrane Centre in Cape Town from 3-9 May 2008. The Unit facilitated a Medline course from 3-4 July 2008 for staff of the ORU and scientists of other MRC Units based at the Ridge Road Campus. Prof Sewram provided lectures on Research Methodology over two semesters to the Surgical and Medical Registrars on the MMed Programme at the Nelson R Mandela School of Medicine at the University of KwaZulu-Natal. Areas of speciality include research study design, population and sampling, questionnaire design and consent forms, and the appraisal of literature pertaining to interventions and prognosis (including diagnosis and screening).

### External Funding

R281 361

### Science Communication and Research Translation

To establish community awareness and education, the ORU has organised a series of cancer lectures. Oncology experts from a range of backgrounds including paediatrics, public health and NGO consultants have participated in these talks which are open to staff members of the MRC as well as the general public. As indicated by the favourable response from the audience, this educational resource is a valuable addition to the MRC's quest for outreach education. High school learners were also given the opportunity to engage with the ORU scientists during a job shadowing exercise. Through a succession of questions and answers, the learners gained insight into the challenges and rewards of oncology and public health research.



## Public Health

### BURDEN OF DISEASE RESEARCH UNIT

Prof Debbie Bradshaw

#### Highlights

Making the findings of research undertaken in the Unit available in a more popular format has led to substantive interaction with policy makers and involvement in strategic plans. The quality and continuity of care for mothers and newborns has been brought to the attention of health planners as well as the need to address chronic diseases. This was facilitated by wide dissemination of the Every Death Counts summary report on maternal, newborn and child survival and the summary report of the South African Comparative Risk Assessment. The Unit has also collaborated with several agencies to make a contribution to the development of improved health information systems. This has involved the development of new systems, collaborations on improving cause of death statistics and the planning and analysis of population health surveys. The results of an intervention study conducted by the Unit to improve the quality of cause of death certification has been the stimulus of a provincial effort to enhance training of medical students as well as training practicing doctors. A brief guideline on completing death notifications was developed and given to interns at

one of the academic hospitals which resulted in a significant improvement in certification. A detailed guideline has also been developed and will be made available through the provincial Department of Health and academic institutions. It is anticipated that this will lead to the continued improvement of the quality of cause of death statistics. In addition, efforts to strengthen the MRC's cancer register based in the Eastern Cape are bearing fruit and the registry now covers an expanded area and the full spectrum of diagnosed cancers in line with international standards. This was done with a view to developing a model population-based register within a rural location to accommodate a wider public health and research agenda. A summary report of the cancer register results was distributed in the Eastern Cape where the cancer register is based so that the information can be used by the community and other agencies.

#### Capacity development

As part of skills development within the Unit, seven staff members completed the ProCite Course and two underwent training in time and stress management. Leigh Johnson, based at UCT's Centre for Actuarial Research, completed a PhD in 2008, while Nadine Nannan and Jané Joubert are both working towards PhDs. Beatrice Nojilana, Desirée Pieterse and Dr Jon Kigozi were awarded MPHs in 2008, while Nesbert Zinyakatira completed an MPhil in the same year.

#### External Funding

R2 312 800

## Science Communication and Research Translation

Three policy briefs were completed on the Comparative Risk Assessment – Summary Report; Every Death Counts – Summary Report; and the Cancer Register 1998-2002 – Summary Report. Prof Debbie Bradshaw was on the drafting team that compiled a review of health trends in South Africa with a particular focus on the Millennium Development Goals. Guidelines and technical fact sheets were developed and the final draft of the guidelines in certifying “cause of death” has been circulated for review.

Research recognition: Dr Jon Kigozi received the best poster award at the Public Health Association of SA (PHASA) Conference in June 2008.

Research collaboration and networking: The Unit has established links with the National Department of Health (NDOH), the Eastern Cape DOH, the Western Cape DOH and the City of Cape Town, among others. Good working relations have also been established with StatsSA and the Health Systems Trust as well as several academic institutions. Prof Bradshaw is co-chairing a review of the Health Information System (HIS) that is being conducted by Statistics South Africa and the NDOH.

## BIostatISTICS UNIT

Director: Prof Carl Lombard

### Highlights

Methods for the analysis of randomised controlled trials: In a trial, the main outcome of the study is measured prospectively after the delivery of the intervention, or at the end of the follow-up period. Other covariates are also measured during the post randomisation period. The statistical challenge is how to do an intention-to-treat adjusted analysis of the main outcome using post- randomisation covariates. A literature search revealed different approaches, each with some bias. A method of seemingly unrelated regression which treats these post-randomisation covariates also as trial outcomes was published by Rochan in the Journal of the American Statistical Association in 1995. This approach maintains the intention-to-treat principle and provides a joint model for the primary outcome and other covariates accounting for the within subject correlation. This method was used to adjust medication (change) in hypertensive patients who participated in a trial evaluating a sodium reduction intervention of the Chronic Diseases of Lifestyle Research Unit of the MRC.

Methods for the reporting of pragmatic trials: Pragmatic trials evaluate interventions in the usual care settings in contrast

to efficacy trials which evaluate interventions in specialised settings. As part of collaborative work over the past five years, three publications relating to this area were published in 2008 highlighting the reporting aspects of such trials. Since the Unit is involved in a number of pragmatic trials, this work will improve the quality of the design and presentation of these studies.

Methods for analysis of longitudinal data: Dr Samuel Manda evaluated statistical approaches for modelling “Regimen Switch in HIV/AIDS Patients Receiving Antiretroviral Therapy (ART) using Multi-State Models”. He analysed the HIV/AIDS data from the MEDUNSA National (ART) Pharmacovigilance Centre, in which patients move from one state to another as they fail therapy and some patients reach the death (absorbing) state from any of the transient states. In the analysis, Dr Manda included time-varying covariates and effects, and subject-specific random frailty. Fully Bayesian analysis using Markov chain Monte Carlo simulation techniques was used to estimate model parameters and transition rates between regimen changes.

The use of multi-state models provides a more effective approach of combining longitudinal regimen changes in a patient. This work was presented at the 2009 SA HIV Conference.

Bias in a binary risk behaviour model subject to inconsistent reports and dropout in a South African high school cohort study: Collaborators Perpetual Chikobvu, Carl Lombard, Alan Flisher, Gary King, Loraine Townsend, Martie Muller (UCT), DOH Free State, Penn State University and the MRC developed methodology for analysing self-reported risk behaviour transitional patterns in a binary outcome variable, subject to misclassification and a large loss to follow-up. The motivation stems from the analysis of self-reported transitional patterns in responses to the question “Have you ever smoked a whole cigarette?” in a cohort of South African school children. The partially complete records analysis (PCRA) introduced estimates the transitional probability as the ratio of the joint probability of the response at two time points based on the complete records for this time sequence over the marginal probabilities of the response based on the complete records at the first time point, and assumes a non-informative missing pattern. A comparison was made using un-weighted complete records and inverse probability weighted logistic regression. A simulation study indicated an association between bias and reporting error in all three methods. The final statistical simulations were done in 2008 and the manuscript has been e-published in Statistics in Medicine.

Methods for the analysis of genetic data: Ushma Gala under the supervision of Dr Lize van der Merwe is formulating the statistical theory underlying human genetic linkage and association analysis based on quantitative data from extended

families for her MSc thesis. She is formulating statistical mixed models which can incorporate all the features of the data, including the degree of the relationship between each pair of family members.

**Methods for developing scales (measurement instrument):** Dr Piet Becker was involved in developing a composite score for a measuring instrument utilizing re-scaled Likert values and item weights from matrices of pair-wise ratios. Along with researchers from Unisa, University of Pretoria and Tygerberg Hospital, a methodology was proposed to develop a measuring instrument (metric) for evaluating subjects from a population who cannot provide data to facilitate the development of such a metric, (e.g. preterm infants in the neonatal intensive care unit). Central to this methodology is an expert group which decides on the items to be included in the metric (content validity), the weights assigned to these items (estimated by fitting a generalised linear model to the expert opinions), and for each item an index associated to the Likert points. The experts supply pair-wise ratios of importance between items and the geometric mean method is applied to these to establish the item weights, a well-established procedure in multi-criteria decision analysis. The ratios are found by having a managed discussion before asking the members of the expert panel to mark a visual analogue scale for each item. The methodology, which is perceived as very appealing in the medical research environment with all its specialists, was applied successfully in a variety of problems and recently two papers have been published and one is in press. (The Collaborators were: Prof Kobus Wolvaardt (Unisa), Dr Angie Hennessy (Tygerberg Hospital) and Dr Carin Maree (UP).

**Cure Models in Parametric Survival Analysis:** Rebecca Shanmugan worked on this methodology for her MSc project and has continued her research on this topic which she presented at two conferences in 2008. In the statistical theory of survival analysis, standard parametric theory assumes that, if followed for a long enough period, all individuals/components will eventually die/fail. Cure models aim to relax this assumption when it is appropriate to do so. These models build on existing parametric theory in survival analysis, by assuming that some proportion of the individuals/components are 'cured' of the event of interest, that is, the event will not occur for them. 'Cure' is said to occur when the event of interest returns to the same level as that expected in the general population. The application of these models was described, and used to indicate how they applied to survival times of patients who have undergone a kidney transplant in a set of such patients from Addington Hospital in Durban between January 1990 and December 2004.

### Capacity development

A trial management workshop was hosted by the MRC and the

SUPPORT Collaboration for Southern African Researchers with Dr Carl Lombard as one of the four facilitators. Eight researchers from the MRC attended the workshop which was held in Pretoria. The important aspects of trial governance and good clinical practice were discussed through lectures and short workshops. The safety reporting of non-drug trials was new to most of the participants. Dr van der Merwe is developing a Master's course on Statistical Analysis of Human Genetic Data for 2009 at the Statistics Department of the University of the Western Cape. Nomonde Gwebushe and Rebecca Shanmugan participated in the National Science Week held in Bergville, KwaZulu-Natal. They presented Biostatistics as a career option during this week-long activity organised by the MRC. Banners and flyers were sponsored to provide some information to Grade 11 and 12 learners. Regarding postgraduate studies, the Unit has close links with many universities across South Africa and the biostatisticians provide advice on the protocol and analysis of the study and in some cases will handle the statistical analysis of these students. This is a substantial input into the capacity development of researchers in the country. A total of 114 postgraduate studies were supported by the Unit in 2008, 15 of which were PhDs.

### External Funding

R490 328

### Science Communication and Research Translation

**Dietary Intervention:** The results of the trial evaluating a food based dietary strategy to lower blood pressure (BP) were published in Public Health Nutrition this year. The Unit was involved from the design up to the publication. The positive findings of this pragmatic eight-week trial shows that modification of the cation content of a limited number of commonly consumed foods (salt replacement (SOLO), bread, margarine, stock cubes, soup mix and a flavour enhancer and 500 ml of maas (fermented milk)/d) lowers BP by a clinically significant magnitude (6.2 mmHg for systolic BP) in treated South African hypertensive patients of low socio-economic status. The magnitude of BP reduction provides motivation for a public health strategy that could be adopted through lobbying of the food industry by consumer and health agencies.

Dr Karen Charlton identified the following priorities for a successful salt reduction strategy in MRC News January 2008: Government should engage the food industry and encourage at least 25% reduction in salt content across product ranges. The best example of this approach is seen in the United Kingdom, where large amounts of salt were removed from the food supply, to a large extent, due to the catchy advertisement campaigns and widespread coverage of the Food Standards Agency (FSA) salt reduction education programme. The SA Heart and Stroke Foundation's Heart

Mark serves as a guideline and incentive for consumers to identify heart-smart product alternatives. Consumers must become more aware of the link between an excessive salt intake and increased blood pressure levels and there has to be government commitment to this topical area of research. The labelling of food products to indicate their salt content must also be clear and easy for the lay person to read, and inform them about healthy food options. A consumer awareness campaign would assist the public when reading food labels and deciphering other nutritional packaging information. Since most South Africans access nutrition information through the media, typically television and radio, it is an excellent way to distribute health messages on blood pressure control. The Department of Health must constantly engage with the food industry to ensure that messages are consistent. One of the Food-Based Dietary Guidelines initiated by the DOH advises consumers to “use salt sparingly”. Consumers need information in order to make informed food choices.

**TB Sputum register:** A study conducted by the Desmond Tutu Tuberculosis Centre in 13 primary health care facilities of the Western Cape showed the benefits of a simple management tool that could improve TB treatment success. This work was published last year and the Unit collaborated on the study. Sputum registers helped to identify and quantify deficiencies in the TB diagnosis process, especially the failure to ensure that those who have at least two positive smears do indeed start treatment. The register is an important tool to identify which primary health care facilities need extra assistance and gives insight into how the diagnostic process could be improved. It is important that in this local setting since 18% of TB suspects experienced deficiencies in the sputum diagnostic process and 17% of TB cases were initial defaulters, which is unacceptably high. Initial defaulters are not reported in nationwide treatment outcomes, resulting in an overestimation of the country's treatment success rate.

**Ceres Foetal Alcohol Syndrome (FAS) Study:** During September 2008, members of the Ceres FAS study team were invited to take part in a symposium to share results of local research into FAS prevention, co-hosted by the Western Cape FAS Task Team and the CDC-funded FAS Prevention Programme, on International FAS Day held in Cape Town. It was attended by various role-players from the MRC, UCT, UP, Foundation for Alcohol Related Research (FARR), DOH, DOE and others. The Ceres team delivered three presentations on the Ceres FAS study results. A policy brief and proceedings were produced following this event: “Confirmed and unconfirmed drinking in pregnant women: does this affect the intervention outcome in the Ceres FAS study?” “Preventing FAS: effects of screening and brief interventions on the drinking behaviour of pregnant women – a cluster RCT” and “Proposals to change drinking behaviour in pregnant women: findings from a Ceres

FAS study”. Proposed key strategies were: surveillance and monitoring; screening and brief interventions; awareness raising and education; liquor controls; and addressing research gaps. The Ceres study emphasised the importance of giving women relevant information as well as support during pregnancy. The ideal would be to apply the findings in a more sustainable way. After the September symposium, the Ceres team were contacted by the Western Cape DOH to help with a proposal to roll out screening, followed by brief interventions in the Overberg region. The plan is to train health care workers in clinics to do the interviews with women of child-bearing age. The team also successfully lobbied to have a social worker permanently appointed at the Ceres Hospital to inform and support pregnant women.

## SOUTH AFRICAN COCHRANE CENTRE

Co-Director: Prof Jimmy Volmink  
Co-Director: Dr Nandi Siegfried

### Highlights

The South African Cochrane Centre hosts the AIDS, TB and Malaria (ATM) Trials Registry which provides a platform for prospective trial registration as well as a comprehensive, searchable database of all HIV/AIDS, TB and malaria trials conducted in Africa. Funded by the European and Developing Countries Clinical Trials Partnership (EDCTP), the ATM Registry project has been successful in fostering collaborative partnerships with the South African National Department of Health's National Clinical Trials Registry, and the World Health Organisation (WHO) International Clinical Trials Platform, with representatives from both organisations serving on the Advisory Board of the project. Active promotion of both the ATM Registry Project and of clinical trial registration led to regional and international forums, and membership of the WHO Task Force to Integrate Ethical Review, Registration and Regulation of Clinical Trials in Africa. The Cochrane HIV/AIDS Review Group's satellite office, based at the Centre, was invited to attend the Southern African Development Community (SADC) Technical Team Meeting on HIV and AIDS Clinical Trials in Gaborone, Botswana. This meeting highlighted the importance of an up-to-date evidence base for decision-making, to summarise the available evidence on HIV/AIDS prevention and treatment trials internationally and within the region, and to address the principles of formulating a regional HIV/AIDS trial agenda. In collaboration with international partners from countries in Africa, South America and Europe, the Centre is part of the SUPPORT Collaboration (SUPPORTing Policy-relevant Reviews and Trials). SUPPORT aims to improve the

use of reliable research evidence in policy and management decisions on maternal and child health, and to help fill the gaps when reliable evidence is lacking. Since the inception of the three-year project in October 2006, staff have developed and used an exhaustive search strategy to identify systematic reviews on priority services and programmes to offer; service delivery, financial and governance arrangements; and how to bring about the desired changes in the health system in order to achieve maternal and child health goals. The Centre contributes structured summaries targeted at policy-makers, presenting the evidence as well as information of its applicability to low- and middle-income countries, equity, and scaling up (<http://www.support-collaboration.org/>).

### Capacity development

The Centre, in partnership with the UK-based Cochrane Infectious Diseases Group and the HIV/AIDS Cochrane Review Group in the US, supported by a grant from the Nuffield Foundation, co-ordinates the Reviews for Africa Programme (RAP). It involves a month-long interactive course during which trainees from African countries outside South Africa receive intensive instruction in the methods of research synthesis and complete a Cochrane Review protocol. This is followed by a round of tuition and mentorship and concludes with a three week intensive course approximately eight months later, to complete a Cochrane Review for publication in The Cochrane Library. In 2008, five trainees from two countries attended RAP and to date RAP has successfully trained 26 participants from Cameroon, Nigeria, Kenya, Malawi, Uganda and Zimbabwe. Three Cochrane Reviews and eight Protocols were published in The Cochrane Library in 2008. The HIV/AIDS Mentoring Programme is a collaborative project of the Centre and the Cochrane HIV/AIDS Review Group, University of California, San Francisco. The programme aims to increase capacity within sub-Saharan Africa, especially among researchers from previously disadvantaged backgrounds, to produce HIV/AIDS reviews on questions relevant to the African setting. Novice authors are linked with experienced Cochrane authors who provide guidance and methods expertise throughout the review process. A total of 45 authors have been registered on the mentoring programme with the help of 23 mentors from seven countries.

### External Funding

R2 289 874

### Science Communication and Research Translation

Between January and December 2008, a total of 14 full-length peer-reviewed papers (13 indexed, one non-indexed) were published, two of which were Cochrane Reviews. Other publications included three scientific letters, four commentaries, four conference proceedings and four peer-



reviewed Cochrane protocols. In addition, the Centre prepared five structured summaries of evidence for dissemination and conducted 11 evidence-based health care or research synthesis workshops targeted at policy makers, clinicians and health care consumers. At international conferences, staff presented one plenary session and also presented 11 papers, three posters and facilitated five workshops. At local conferences, staff presented one plenary session, six papers, one poster and facilitated one workshop. The Centre provided support to the Western Cape Clinical Guidelines Advisory Committee (GAC), a Health Care 2010 project aimed at ensuring that all clinical guidelines in use in the province are evidence-based. In 2008, the Centre compiled a list of international guidelines for the treatment of ischaemic heart disease and also conducted an appraisal of their methodological quality and relevance to SA. During 2008, three Cochrane Reviews (two formed part of RAP) and nine Protocols (four as part of RAP) were published in The Cochrane Library.



## HEALTH POLICY RESEARCH UNIT

Director: Prof Laetitia Rispel

### Highlights

The Health Policy Research Unit (HPRU) is embedded within the Centre for Health Policy (CHP), a multi-disciplinary research group based in the School of Public Health at the University of the Witwatersrand in Johannesburg. The CHP was established in 1987 to support the development of post-apartheid health policy. The MRC has supported the HPRU since 1997. The CHP is an official research entity of the University of the Witwatersrand but is primarily funded through research grants.

The major highlights for the period under review are:

- The award of a new R9million multi-year grant for research on nursing policy and practice from The Atlantic Philanthropies.

- The CHP received funding from the prestigious Economic and Social Research Committee (ESRC) in the United Kingdom for its study on "An experimental investigation of social preferences, their determinants and their role in the labour supply function".
- The Joint Economics, AIDS and Poverty Programme awarded the CHP a significant grant to conduct research on understanding why patients drop out of ART programmes.
- Nonhlanhla Nxumalo received funding from Teasdale-Corti for new research on comprehensive primary health care and community health workers.
- Laetitia Rispel organised a very successful workshop on nursing in South Africa which was attended by all the major nursing stakeholders in South Africa.
- Duane Blaauw and Laetitia Rispel participated in a process reviewing progress and priorities for health system development in South Africa in order to inform policymaking for the newly elected Government in 2009, and participated in the institutional support teams established by the Minister of Health in February 2009.
- All staff contributed to the successful completion of the MRC review in October 2008.
- The CHP participated in the 2009 Prince Mahidol Award Conference in Thailand on Mainstreaming Health into Public Policies.
- The CHP hosted and co-ordinated the Consortium for Research on Equitable Health Systems (CREHS) involvement in a Discrete Choice Experiment capacity development training course held in Cape Town and then hosted an analysis and writing workshop for CREHS members from the cohort study in February.

### External income

R 7 747 912.30

### Capacity development

HPRU's capacity development activities are both internal, in relation to staff employed within CHP, and external, in relation to formal and informal teaching activities reaching a wider group of people in South Africa. The Unit has an active programme to recruit and train young South Africans from historically disadvantaged backgrounds as health policy researchers and analysts. This training involves on-the-job mentoring in, and experience of, research, as well as support for formal qualifications. Staff members also attend a range of short courses intended to build specific skills (e.g. STATA, ethics and qualitative research). A number of researchers have moved to senior policy roles in government.

Through our external teaching activities at under-graduate and postgraduate (Master's and PhD) levels, the CHP supports knowledge and skills development in the field of health policy and systems research more broadly. It is one of a handful of

institutions in South Africa that supports training of this range in this field, and teaches three courses of the Wits Master's in Public Health (MPH): Health Economics, Decentralisation and Health Systems, Health Care Financing and Policy Analysis. Each of these MPH modules is attended by between 30 and 40 students annually, many of whom work as managers within the South African public health system. Dr Jane Goudge is actively involved in supporting the PhD programme in the Wits School of Public Health. In addition, the unit supervises postgraduate health policy research students, teaches on a variety of other courses at Wits and elsewhere, and serves as external examiners for other South African Universities.

Capacity development activities include the management of a programme of capacity building in the field of policy analysis for the Regional Network on Equity in Health (EQUINET), and the Unit is currently one of the few institutions in Africa conducting this form of training..

Research Interns

The CHP has been a PEPFAR Internship Placement Partner since 2007, and had one PEPFAR intern in 2008.

Postgraduate supervision

During the period under review, the HPRU supervised eight PhD students and 16 Masters' students. Three of the Masters' students graduated. This activity will be ongoing in the 2009/10 financial year.

### External Funding

R6 958 860

### Science communication and research translation

Conducting policy research requires researchers to think not only about how findings are disseminated but also how they are used. In addition to presentations at a number of conferences, research meetings and workshops, staff members were involved in outreach activities such as consultancies, workshops and public hearings in 2008/09.

## HEALTH SYSTEMS RESEARCH UNIT

Director: Prof Mickey Chopra

### Highlights

The Unit continues to grow and play an increasingly important role both nationally and internationally. At national level, members of staff have been asked to sit on a number of national committees focusing mainly on key health systems such as financing, human resource planning and quality improvements. The Unit is also playing an active role in the

research sector of the South African National AIDS Council (SANAC) and was heavily involved in the Every Death Counts Report released last year. Internationally, members of staff have served on a number of technical consultancies to the WHO including the Special High Level Consultation on Health Systems. The Unit has been contracted by several international organisations such as UNICEF, Save the Children US and the Gates Foundation to conduct multi-country programme and economic evaluations of key health interventions.

### Capacity development

The Unit now has almost 60 staff members including some of the leading researchers in the field. The Unit also has 12 members of staff conducting PhDs and many currently enrolled in Masters' level programmes. Attention to gender is often a missing dimension in policy reform here and internationally, with little understanding of the different ways in which the policy will impact on men and women. In recognition of the above, the PhD study of Ms Karen Daniels uses a gender lens to focus on policy and implementation of interventions utilizing community health workers in South Africa. Salla Atkins' "Evaluation of an enhanced tuberculosis treatment adherence programme" evaluates a new patient-centred tuberculosis treatment programme being implemented by City Health, Cape Town, and TB/HIV Care Association NGO, in five clinics in Cape Town. The intervention includes adherence counselling, and lay health worker supporters assisting patients in taking their treatment in the community. The evaluation focuses on the outcomes of this intervention compared with non-equivalent comparison clinics implementing directly observed therapy; on patient perceptions of the programme; on provider perceptions of the programme; and management and policy maker perceptions of the programme. This project adds to the knowledge base on the effectiveness and feasibility of patient-centred approaches in tuberculosis care. The intervention adds to public knowledge about tuberculosis and its treatment. Should the evaluation show that this approach is at least equivalent to standard care for tuberculosis, services may take this approach or parts of it as policy. Catherine Mathews is presently supervising or co-supervising five PhD students, all of whom are MRC staff members (Natalie Leon, Petal Peterson, Sarah Dewing, Loraine Townsend and Katherine Everett-Murphy). Ms Marian Loveday is doing collaborative work with the Tugela Ferry Care and Research Collaboration (TF CaRes), as well as with a group of national and international researchers on M/XDR-TB in health care workers. Mr Wesley Solomons' work includes introducing technology such as mobile telephones as a data collection tool for data collection and monitoring the progress using web-based systems which has improved the turn-around time for reporting results. A project by Emmanuelle Daviaud focused on an assessment of resources implications (finance and human resources) of the new mother and child policy for the NDoH.



This work is also part of an article for the Lancet: "Saving the lives of South Africa's mothers, babies and children – can the health system deliver?" She is also working on a costing tool for community-based interventions and resulting facilities' activities for saving newborn lives and provides support to several African countries for their economic evaluation of the programme, and providing support to provinces and districts in South Africa to conduct District Health Expenditure Reviews in partnership with the NDOH.

**External funding**  
R23 307 283

### Science Communication and Research Translation

Dr Chopra and Ms Atkins contributed Chapter Three of the book *Health Systems In Primary Health Care: Fresh Perspectives*, which was published in 2009. Lungiswa Nkonki and Karen Daniels delivered a poster presentation entitled "Selling a Service: peer supporters' experiences of promoting exclusive infant feeding" at the 4<sup>th</sup> Public Health Association of South Africa Conference held in Cape Town in June 2008. Several posters from this Unit were presented at the South African AIDS conference held in Durban from 1-3 April 2009. Work around the adherence to tuberculosis treatment was featured at the first SA TB conference held in Durban last July.

## RURAL PUBLIC HEALTH AND HEALTH TRANSITION RESEARCH UNIT

Director: Prof Steve Tollman

### Highlights

The Unit's goal is '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 social response'. Work over more than a decade has demonstrated the mortality impact of emerging non-communicable disease despite overwhelming chronic infectious disease (HIV and TB), and highlighted the implications of this for the provision of effective primary health care. A Lancet research article was published as part of a 30<sup>th</sup> anniversary commemorative issue on Primary Health Care with a linked commentary which was discussed in the editorial. The Lancet will produce a South Africa series in 2009 with Prof Tollman contributing to a paper on non-communicable disease (in preparation). The Unit is uniquely positioned to study coverage of, and equity in access to, treatment programmes including voluntary counselling and testing (VCT) and antiretroviral treatment (ART), as well as

other chronic care services. This will be achieved through linking health facility records with the Agincourt population-based database. Work evaluating the most effective methods for this linking is near completion.

The Unit's efforts to develop effective chronic care systems, responding to both infectious and non-communicable disease, are strengthened through partnership with the Mpumalanga Department of Health. This involves provision of population-based health and household data for provincial and district priority setting, and research and development on effective health programmes for children and adults. Medium-term sustainability of the Agincourt health and socio-demographic surveillance system over the period 2008-2013 is assured through award of a five-year Wellcome Trust programme grant (GB£2.9 million).

The Ndlela HIV Research and Clinical Trials Unit, directed by Eftyhia Vardas, established adult and adolescent Community Advisory Groups, and has a prevalence, incidence and molecular epidemiology study underway. Comparative rural-urban research on child and adolescent growth, development and risk for adult chronic disease is jointly led with Birth-to-Twenty (Soweto), and benefits from two major longitudinal studies. The Unit now serves as an International Network for the Demographic Evaluation of Populations and Their Health (INDEPTH) Satellite Secretariat. Work on adult health and ageing, led by Prof Tollman with Dr Kathleen Kahn, involves eight sites in Africa and Asia and will provide new, comparative information on physical and cognitive function among those 50 years and older. Following the creation of a multi-site dataset at a meeting in Umeå, Sweden, preparation of a special issue of *Global Health Action* is underway. A comparative migration and urbanisation initiative, led by Mark Collinson, involves 10 sites in eight African and Asian countries. These efforts provide exceptional opportunities to build the next generation of scientific leadership.

### Capacity development

The Unit's focus is doctoral training while maintaining a strong Master's pipe-line and providing postdoctoral opportunities. Doctoral research, nestled within major projects, involves a well-structured, interdisciplinary programme of research, academic programme and professional development. Funding for competitively awarded Masters' and doctoral fellowships has been contributed by the Wellcome Trust, UK; the William and Flora Hewlett Foundation and Fogarty International Centre, USA; a Swiss-South Africa bilateral partnership; and the National Research Foundation. A 1-in-10 sample dataset is freely available for training and exploratory research. The dataset comprises an anonymised 10% sample of the full Agincourt database, retaining its relational, temporal and data integrity. Developed in collaboration with Colorado University, this initiative has generated strong interest given its potential

to make data accessible to students while limiting demands on data staff.

### Funding

Income for 2008: R 5 868 009

### Science Communication and Research Translation

Findings are discussed with public sector stakeholders in health, social development, environmental affairs and education at local government, district, provincial and national levels. There is regular feedback of results with study communities. The Unit collaborates with Statistics South Africa and private stakeholders to promote public-private partnerships necessary for effective action. Policy-relevant work includes:

- Management of chronic non-communicable disease: Development and trialling of electronic patient records suitable for chronic disease management and patient follow-up in primary care settings (with SAP - German IT Corporation, Wits School of Public Health and Mpumalanga Department of Health)
- Maternal mortality: Inclusion of Agincourt data in the National Confidential Enquiry into Maternal Deaths Annual Report 2008 (panel titled "Maternal Deaths in South Africa: What Proportion Occurs at Home?")
- Increasing children's resilience: Collaboration with the NGO, Soul City, to evaluate interventions targeting primary school children ('Schools as Nodes of Care' and Soul Buddyz Clubs) introduced by the NGO and Mpumalanga Department of Education. Evaluation will inform national roll-out of intervention.
- Use of natural resources in offsetting livelihood impacts of early adult death: Two policy workshops were held in 2008 on "HIV/AIDS Mortality and the Role of Woodland Resources in the Maintenance of Household Food Security" with local government and the National Department of Agriculture.
- A policy document was produced on AIDS mortality and the role of natural resources in household food security in a rural district of South Africa. In terms of triangulating population data with national census data, Collinson is scientific adviser to Statistics South Africa and contributes to planning for 2010 censuses in SADC countries. He also contributes to the African Migration Alliance, a network convened by the HSRC to provide empirically-based evidence to policy makers regarding HIV/AIDS & Chronic Care. The Unit is evaluating the public and private rollout of highly active anti-retroviral therapy (HAART) which involves innovative linking of clinic records with population-based information, baseline HIV prevalence and incidence measures, and research on social factors and health service barriers associated with differential access to VCT services.

## Health Promotion

### ALCOHOL & DRUG ABUSE RESEARCH UNIT

Director: Prof Charles Parry

#### Highlights

In July 2008, the World Health Organisation (WHO) co-sponsored a technical meeting hosted by the Alcohol and Drug Abuse Research Unit (ADARU) in Cape Town to review evidence relating to the linkages between alcohol consumption and selected infectious diseases and examine potential causal impacts of alcohol use on both the incidence and course of HIV/AIDS and TB. A review of the evidence produced a consensus that there was conclusive proof of a causal linkage between heavy drinking patterns and/or alcohol use disorders and the incidence of active TB, and that these exposure categories were also causally linked to worsening of the disease course for both TB and HIV. Alcohol consumption was also shown to have a negative effect on adherence to HIV medication regimens. Participants, however, concluded that while alcohol use was consistently associated with the prevalence and incidence of HIV, further research was needed to substantiate causality. A summary of the main findings of the meeting was published in the March 2009 edition of the journal *Addiction*. ADARU (Pretoria) is conducting a project to investigate the role played by alcohol in non-adherence to antiretroviral therapy (ART). The formative phase of this project evaluated the perspectives of ART recipients and health care providers on this issue. Using purposive sampling, 13 single-gender focus group discussions were run with male and female ART recipients who drank alcohol and 17 in-depth interviews were conducted with health care providers across six ART sites in Gauteng. The viewpoint of most of the health care providers was that alcohol reduces ART's effectiveness and worsens some ART agents' side effects; hence ART recipients were advised to abstain from alcohol.

Furthermore, most health care providers believed that heavy alcohol use could lead to non-adherence to ART via the mechanism of "forgetting" to take the ART medication. Despite being told that "ART and alcohol do not mix", a substantial number of ART recipients indicated that in their view, alcohol and ART "agree with each other" because of the absence of nausea/vomiting upon concurrent ART and alcohol use and having been able to achieve optimal ART outcomes such as low viral loads and high CD4 counts despite concurrent alcohol consumption. The team also examined how ART programmes address hazardous alcohol use among treatment recipients. It was concluded that an apparent lack of knowledge that alcohol use is not contraindicated for any of the ART agents (except

for patients with HIV/Hepatitis B co-infection) may have placed health care providers at risk of imparting inaccurate advice. Improved training for health care providers regarding ART, adherence and alcohol use is urgently needed. In 2007, in collaboration with five NGOs, an initiative was started to roll out a number of harm reduction strategies aimed at vulnerable drug using populations, specifically women who engage in transactional sex, men who have sex with men, and injection and non-injection drug users in Cape Town, Durban and Pretoria. Activities include outreach; condom distribution and other preventive interventions; provision of voluntary counselling and testing (VCT); and referrals to drug, HIV and other services. Over the first eight months of the project, 3221 drug users were reached through initiatives that promote HIV and AIDS prevention and address drug risk behaviours and 474 received VCT and their results. The intervention to date has demonstrated the willingness among NGOs to expand the skills base of their staff and broaden their outreach and service delivery activities, and a strong uptake of VCT and other services by vulnerable drug using populations.

#### Capacity development

The Unit supervised two external graduate students and two interns during the past year. Five staff members worked on doctoral research (three of whom produced proposals that were accepted by university committees and secured funding). Staff provided training to a wide variety of persons during the year including field and outreach workers, peer counsellors in bars, students (MPH and medical students) and qualified professionals (social workers and psychologists). Other research capacity development activities provided by staff included reviewing journal articles (20) and theses (6).

#### External Funding

R10 845 176

#### Science Communication and Research Translation

Three policy briefs were produced, including Drugs, sex and gender-based violence: The intersection of the HIV/AIDS epidemic with vulnerable women in South Africa – Forging a multi-level collaborative response. Staff also provided substantial input into the Western Cape Department of Social Development's strategic framework on substance abuse, the substance abuse strategy for the City of Cape Town, the Western Cape Liquor Act, and the new national substance abuse bill. Staff had 83 media contacts between November 2007 and December 2008: 24 radio interviews, 51 newspaper/magazine articles, and eight television interviews. Staff also contributed articles to PS: Play Safe magazine for men in 2009. Two staff members were facilitators of the Sober South Africa Working Group at the Action for a Safe South Africa (AFSSA) Congress in Midrand and authored a chapter in the Action for a Safe



*Heroin*

South Africa book that was co-sponsored by the MRC. ADARU staff members were core members of a UN-led international working group on HIV and injection drug use; expert core group members in the Alcohol Use Expert Group of the Global Burden of Diseases, Injuries & Risk Factors Study; and participated in an international consultation workshop facilitated by the UN Office on Drugs and Crime (UNODC) and WHO on assessing population level needs for substance abuse services.

## HEALTH PROMOTION RESEARCH AND DEVELOPMENT UNIT

Director: Prof Priscilla Reddy

### Highlights

The Unit has continued the process of conducting the second National Youth Risk Behaviour Survey and the third Global Youth Tobacco Survey amongst over 10 000 learners in all nine provinces in both government and private schools, in addition to work on bio-behavioral prevention interventions. During this exciting year, all senior staff namely, Drs Sibusiso Sifunda, Shags James, Itumeleng Funani and Nasheen Naidoo and Ms Sharon Felix gained practical experience in writing large five-year grant proposals. This was done locally as well as by travelling internationally to the US to work with mentors, such as Dr Ken Resnicow at the Ann Arbor School of Public Health, University of Michigan. A pioneering development included the expansion of the Unit's men's health and behaviour research agenda to include studies on circumcision and initiation among young initiates, their families (abazali), indigenous surgeons (iNgcibi) and carers (amaKhankatha) and traditional leaders across the country. These studies will make unique

contributions both to theory and scientific methodology.

### Capacity development

The Unit has been actively involved in mentoring research interns. To date, six interns have gone through their internship programme and have been exposed to various processes in research in order to acquire skills and knowledge needed. Furthermore, the Unit has also trained national and international staff and scientists at Masters' and doctoral levels. The Unit partnered with Maastricht University to train doctoral level candidates. This has led to the unit developing a systematic model for the training and development of young scientists. Dr Roger Vaughn of Columbia University conducted a Statistical Course for PhD students within the Unit from 26 – 30 January 2009.

### External funding

R6 431 703

### Science Communication and Research Translation

The Unit also provided information to policy makers (NDOH) in the areas of community participation and vaccine trials, circumcision and HIV prevention and tobacco control. Professor Reddy continues to serve on the South African Academy of Sciences and the National Health Research Committee. Dr Sifunda was appointed on the expert team on male circumcision that represented South Africa at the WHO-Africa Region expert meeting in Brazzaville, Congo in April 2008.

Both Dr Sifunda and Dr Funani have also been appointed as members of the Scholars Network on African-American and African Masculinities Research Programme. The Unit concluded 2008 with a nomination by the National Science and Technology Forum in recognition of exceptional scientific research in South Africa.



## Women, Maternal and Child Health

### GENDER & HEALTH RESEARCH UNIT

Director: Prof Rachel Jewkes

#### Highlights

Strengthening responses to sexual assault in the African region: The impact of rape on survivors' physical and mental health and role in society is often substantial and long-lasting. Good quality holistic care for rape victims can play a critical role in recovery, and in supporting the transition from rape victim to survivor. Despite its pervasiveness, in most countries, services for rape victims have been neglected. The Sexual Violence Research Initiative (SVRI), with seed funding from the Ford Foundation, and in partnership with PEPFAR, the Population Council and the CDC, is supporting teams in seven African countries to develop and strengthen responses to rape survivors, both immediately after rape and in the longer term, and to promote an appropriate and effective interface between the health, police and justice sectors. The project was launched in March 2008. Four pillars form the foundations of this project: partnership; training; policy and research. To this end, the SVRI has worked with regional networks and partners to create multidisciplinary teams that are the drivers of change at country level. The researchers have adapted the South African curriculum on the care and support of rape survivors' for a regional, multi-disciplinary audience, conducted multi-country, multi-disciplinary training on strengthening responses to sexual violence with participants from Zimbabwe, Zambia, Kenya, Uganda, Rwanda, Nigeria and Malawi, and worked with country partners in identifying plans for strengthening sexual assault services at a country level. Over the next few years, in partnership with funders and regional networks, the SVRI will provide ongoing technical and financial assistance to country teams in their efforts to strengthen responses to rape.

Study of rape perpetration, partner violence and their intersections with HIV:

South Africa has one of the highest rates of rape reported to the police in the world, very high rates of intimate partner violence and the largest number of people living with HIV. There is considerable concern about the links between these problems. The aim of this research was to understand the prevalence of rape and physical partner violence perpetration and to describe intersections between rape, physical intimate partner violence and HIV in adult men. The study was conducted in randomly selected enumeration areas in three districts in the Eastern Cape and KwaZulu-Natal Provinces spanning



rural, urban and city geographical areas and results from the study will be released in a policy brief and will be submitted for publication in 2009. The finding from the study that men who are physically violent towards their intimate partners are more likely to have HIV confirms hypotheses in this regard which have been mooted from other studies. Again it seems likely that the explanation lies in an underlying construction of masculinity which legitimates the use of violent and sexually risky behaviours. It has been argued that this is a key driver of the HIV epidemic and our finding supports this. HIV prevention needs to embrace and incorporate promotion of more gender equitable models of masculinity, through the use of interventions like Stepping Stones, which the Unit's research has shown to effectively do this (Jewkes et al 2008).

#### Capacity development

In addition to its active PhD and Masters' supervision programme and ad hoc lectures on a range of degree courses, staff from the Unit examined five Masters' theses in 2008, reviewed 19 articles for a range of international journals, and organised and taught several courses. The Research Methods Course in Sexual and Reproductive Health and HIV is hosted by the Reproductive Health Research Unit of the University of Witwatersrand and co-organised with the MRC and the Population Council. It aims to build capacity in sexual and reproductive health and HIV research throughout Sub-Saharan Africa. The course lasts four weeks, has about 25 students each year, and was held for the twelfth time in 2008. Prof Jewkes has been involved each year in planning the curriculum, selecting applicants, and teaching qualitative research methods, epidemiology, critical review of journal articles and gender issues, and gender-based violence and critical appraisal. This amounts to about a third of the course contact hours. Other colleagues from the Unit also teach on the course: Nwabisa Jama on qualitative methods and She Christofides on gender-based violence, operations research and is a member of a panel reviewing student projects. Nicola was the course designer and coordinator for a module on the Graduate Entry Medical Programme (GEMP) at the University

of Witwatersrand's Faculty of Health Sciences that addresses sexual assault from 2004-2008. The week-long module entitled "Why did this happen to me?" is part of Block 2 "Life on the street". The module comprises six hours of face-to-face teaching as well as self study based on web-based sessions; two facilitated small group discussions (problem-based learning sessions) and a three-hour small group rotation focusing on applied learning (SCORPIO). Prof Jewkes and Ruxana Jina present a lecture on this course annually. Nicola Christofides has led the development of a six-day course on health, development and communication for Soul City in 2008. In 2008 a two-week training programme for researchers on gender-based violence research was held in Dar es Salaam and organised by the Unit in partnership with PATH, Muhimbili University (Tanzania), and Addis Ababa's Continental Institute of Public Health (Ethiopia). It was co-ordinated and co-taught by Naeema Abrahams and Shanaaz Mathews. This is the third occasion on which the course has been run.

### External Funding

R7 157 433

### Science Communication and Research Translation

The Unit developed and evaluated the national curriculum for training health professionals (doctors and nurses) in post-rape care. This is an important contribution towards strengthening the health sector response to sexual violence. The curriculum is a ten-day training course plus two days of practicum. It has been documented in a 250-page participants' manual and a 200-page trainers' manual, both of which were published in 2008/9.

These documents are evidence-based, cover a comprehensive approach to rape care and use adult education methods with a great deal of reflection and skills building. A range of supportive materials has also been produced including an assessment booklet for the practicum for the trainer and for the trainee; a course certificate; a 16-page brochure for distribution to survivors of rape in health facilities; a revised draft of the J88 form; and a 30-minute DVD with four clips demonstrating good practice talking to and supporting survivors and demonstrations of trauma-focused cognitive behavioural therapy, as well as indicators for monitoring rape services.

In 2008, the curriculum was piloted with the training of 144 health care providers from eight provinces in four two-week training courses and between January and March 2009, a further two courses were held. The curriculum has met with a tremendously positive response and sustainability of the training was the subject of a workshop held in October 2008 with provincial service managers. It is now being used as a basis for strengthening training throughout the African region.



## MINERAL METABOLISM RESEARCH UNIT

Director: Prof John Pettifor

### Highlights

**Factors influence bone mass acquisition during adolescence:** The Unit has shown in its longitudinal Birth-to-Twenty cohort that current socio-economic status (SES) appears to influence bone mass accretion during early adolescence. Those children with poorer SES have lower bone mass even after adjusting for differences in body size. These findings suggest that improved SES will help to improve bone mass acquisition during adolescence, and thus possibly influence peak bone mass and fracture risk in later life.

**Bone fractures during childhood:** Despite generally poorer nutrition (lower calcium intakes) and growth in black children,



they have approximately half the fracture risk during childhood and adolescence compared with white children. Although girls fracture less often than boys, the ethnic differences are apparent in that group too. Approximately 40% of white boys will fracture a bone (usually forearm) during their childhood and adolescent years, while the figure for girls is almost half that. The reasons for the ethnic and gender differences are still unclear and further work is being done to ascertain the pathogenesis.

Vitamin D status of children in early puberty in Johannesburg: Considerable international attention is being focused on the role of vitamin D deficiency in the pathogenesis of not only poor bone health but also on its role in the pathogenesis of a number of cancers, neurological disorders, diabetes and hypertension, and impaired immunity. The Unit has assessed the vitamin D status of a cohort of black and white nine-year-old children in Johannesburg. Only one child was considered to have vitamin D deficiency, the remainder generally had good vitamin D status.

This data suggests that in Johannesburg health workers should not be concerned about vitamin D deficiency in ambulatory children. It was shown, not surprisingly, that black children had lower levels than white children due to the increased skin pigmentation of the former group, while obese children had lower levels than non-obese children.

Dietary calcium deficiency and rickets in children: Renewed interest has been shown internationally in what is considered to be the normal or recommended range of circulating 25-hydroxyvitamin D. Researchers of adult disease suggest that 25(OH)D levels should be considerably higher than those currently found in most populations. No such data is available in children and especially in those living in developing countries on habitually low dietary calcium intakes. The Unit reported last year on studies investigating the effect of an oral bolus of vitamin D<sub>2</sub> on circulating 25(OH)D and 1,25-(OH)<sub>2</sub>D concentrations in untreated children with calcium deficiency rickets over a period of two weeks. The results suggest that children with dietary calcium deficiency develop higher concentrations of 1,25-(OH)<sub>2</sub>D than children with vitamin D deficiency rickets, requiring higher levels of 25-OHD to do so. These results have been interpreted to indicate that relative vitamin D insufficiency might be a factor in the pathogenesis of the disease. These results are supported by more recent data in which the responses to vitamin D<sub>2</sub> and D<sub>3</sub> are compared in rachitic and control children. The changes in 25(OH)D concentrations in the controls and affected children were similar after a bolus of either D<sub>2</sub> or D<sub>3</sub>, however there were marked differences in the response of the serum 1,25-(OH)<sub>2</sub>D concentrations. In the control children, the boluses of vitamin D had minimal effects on circulating concentrations of 1,25-(OH)<sub>2</sub>D but in the affected children, the concentrations of the active metabolite rose sharply by day three and then fell progressive over the next 10 days. The effect was similar with D<sub>2</sub> or D<sub>3</sub>. Once again the results indicate that the vitamin D status of children with dietary calcium deficiency rickets is probably inadequate to optimise concentrations of the active metabolite to ensure normalisation of the perturbations in calcium homeostasis.

### Capacity development

There are a number of postgraduate students involved in either Masters' or doctoral studies.

### Science Communication and Research Translation

The Director and his research scientists review research manuscripts for a large number of international research journals. Presentations of research findings are made at numerous national and international conferences and the director has been invited to give keynote addresses at a number of international meetings.



## MATERNAL AND INFANT HEALTH CARE STRATEGIES RESEARCH UNIT

Director: Prof Bob Pattinson

### Highlights

The Unit has continued its research into implementation and scaling up of effective interventions. The Basic Antenatal Care (BANC) quality improvement programme has been accepted as a national programme, but its provincial scale-ups have been less effective. The Unit conducted a randomised trial on the effectiveness of scaling up BANC using the Training of Trainers versus Face-to-Face (FtF) methodologies in two health districts in the Western Cape. The FtF methodology was shown to be eight times better than Training of Trainers. This has important implications as the cost of FtF training is considerably more than ToT and requires the establishment of mentor teams throughout the country if programmes are going to be effectively scaled-up. Furthermore, the Unit has started a research programme on integrating the various effective interventions into the district health system. A study on the Prevention of Mother to Child Transmission (PMTCT) of HIV in Mpumalanga demonstrated gaps at all levels of care and at each form of contact. To overcome this, the Unit is working with family practitioners and the Mpumalanga Department of

Health to develop a "participatory interactive care" system using a "book of health" and an integrated record system to improve PMTCT implementation. This system will also be used to integrate all the other programmes in the continuum of care from pregnancy, child birth, postnatal care to child and woman care. An integrated programme incorporating BANC, PMTCT and essential postnatal care (EPOC) has been developed for the Mpumalanga Province. The EPOC programme was tested in Tshwane and demonstrated a 75% attendance of women and their infants at their six-week postnatal visit (up from no recorded visits prior to the implementation of the programme). The Unit has taken the lead on developing and testing a training programme for improving emergency obstetric care. The programme Essential Steps in Managing Obstetric Emergencies (ESMOE), was associated with a 30% and 50% improvement of skills in managing obstetric emergencies of interns when compared with interns completing their obstetrics and gynaecological internship or with themselves prior to the beginning of the course. Scaling-up of the ESMOE training has been included in the recommendations of the National Committee for Confidential Enquiries into Material Deaths (NCCEMD) to reduce maternal mortality in the country. The National Department of Health has accepted this recommendation and has included in it their implementation plans for 2009-2012. The Unit will continue to research the most effective ways to scale this programme up and also monitor the effect of the ESMOE training programme by introducing a national maternal



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nearmiss audit system. Furthermore, the Unit has worked with the MRC's Health Systems Research Unit to develop staffing norms for maternal and child health and quantify in monetary terms the gap in financing maternal and child health so that the related Millennium Development Goals can be reached by 2015. Finally, the Unit has been very active in outreach into African countries in the past year. The results of the groundbreaking work the Unit performed in developing effective methods in implementing Kangaroo Mother Care (KMC) and monitoring and evaluating its progress is continuously being disseminated and implemented in other African countries. The Unit has evaluated KMC in Malawi; provided technical support for the development of educational materials in Tanzania and Mali; and facilitated the introduction of KMC in Ghana.

### Capacity development

The Unit is actively involved in capacity development at all levels. For a number of projects, health care providers are trained in specific skills, such as basic antenatal care, essential postnatal care, neonatal resuscitation and basic neonatal care, and emergency obstetric care during assessment of the contents of the training programme or evaluating the most effective method of training. The research here was to determine the most effective way to scale-up complex programmes. Further specific training in audit is performed using the Child Perinatal Problem Identification Programme (PIIP) and the Maternal Morbidity and Mortality Audit Systems (MaMMAS) programmes. Finally, international capacity

development is achieved by both training health care providers in KMC, training facilitators in providing KMC and training programme evaluators in assessing the success or otherwise of implanting KMC. The Unit's research aims to determine the key elements for scaling-up in different countries and how programmes need to be adapted for local circumstances.

**Child PIP:** Several PIP-training workshops were held in 2008. In De Aar (Pixley Ka Seme district), a workshop was held on 16 July 2008 with 20 participants; in the Northern Cape a workshop was held on 26 June 2008 with 14 participants; and another Northern Cape Workshop was held on 30 July with 28 participants. The Saving Babies Technical Task Team Meeting was held on 23 October 2008, with 22 participants attending.

**ESMOE (Essential Steps in Managing Obstetric Emergencies); KMC (Kangaroo Mother Care):** A two-day training workshop was done in May 2008 with 14 participants (paediatricians, neonatal nurses, government officials) from Indonesia. Seven participants from Ghana (neonatologists, neonatal nurses, one researcher) participated in a one-week KMC orientation programme at Kalafong Hospital in Limpopo Province. The KMC project in Ghana consisted of basic capacity building in four of the 10 regions in Ghana for 157 participants. With regard to advances in capacity building, in total 55 participants from district steering committees were trained. In Mali, capacity building was focused on the development of educational material at a workshop attended by 18 participants in January 2009. As part of the networking process in capacity building, education and training, Dr Anne-Marie Bergh was responsible for the working group on education and training at the International KMC workshop held in October 2008 in Sweden. About 32 delegates participated and the outcome of the process was a draft report available on request.

### External Funding

R 3 793 200

### Science Communication and Research Translation

In 1997 the Unit started a programme on developing a definition and criteria for "maternal near misses" and using maternal near misses as an audit tool to assess the quality of maternal health care. This programme has continued throughout the lifespan of the Unit. Prof Pattinson was asked to guest edit a "Best Practice and Research in Obstetrics and Gynaecology" on obstetric near miss audits article and this has been published on the Internet. Concurrently, WHO has been planning its next Global Survey and has decided to survey maternal and neonatal near misses. The definition and criteria used for this Global Survey of 28 countries are based on the definitions and criteria established originally by this Unit. Prof Pattinson is on the steering group for this WHO survey.

## Nutrition

### NUTRITION INTERVENTION RESEARCH UNIT

Interim Director: Prof Pieter Jooste



#### Highlights

Results from a study in a Northern Cape pre-school community have shown that despite a low socio-economic status and a high prevalence of stunting and underweight, vitamin A deficiency was virtually absent in this community. This is in contrast to the findings from the rest of the country and may be due to a high intake of liver, which is a concentrated source of preformed vitamin A, and available at very low cost in this community. These results may have implications for the national vitamin A supplementation programme in that the blanket approach in applying the programme may not be suitable for all areas in South Africa.

The evaluation of a Health System Trust facility and community-based nutrition project in three remote rural districts in the Eastern Cape and KwaZulu-Natal provinces identified strengths and weaknesses in the project which could assist the Department of Health in strengthening the national integrated nutrition programme. Vegetable gardens focusing on the planting of vitamin A-rich crops showed that the consumption of these vegetables had a favourable effect on dietary intake and child morbidity. Various sweet potato varieties were analysed for micro-nutrient content, sensory characteristics and consumer acceptability, to identify those

varieties with the biggest nutritional potential. New values were generated on the energy and nutrient composition of South African wheat flour and bread, fortified according to fortification legislation. These values will be included in the new Condensed Food Composition Tables containing information on the energy and nutrient composition of 1 472 food items, which will be available in 2009. The Unit contributed substantially to the body of scientific knowledge on nutrition, both nationally and internationally, influencing health policy, public awareness and directly and indirectly public health. The excellence of the research was further underlined when three of the senior staff (Drs Petro Wolmarans, Mieke Faber and Lize Van Stuijvenberg) received the most prestigious awards at the biennial Nutrition Society and Association for Dietetics Congress in Pretoria in September 2008. In addition, Prof Jooste was appointed as extraordinary professor at North West University. As an indication of international recognition for the Unit's research, Dr Wolmarans was invited to participate in and write a background paper for the FAO/WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition in Geneva, Switzerland. The Unit's analytical laboratories played a significant regional and international role by assisting the School of Public Health of the University of Rwanda and UNICEF Rwanda in a national vitamin A and iodine study. There was also collaboration with the University of Arkhus in Norway on iodine studies conducted in refugee camps in Algeria. At the end of 2008, the Unit was approached by the University of Stellenbosch to collaborate on the analysis of samples from a Nigerian micronutrient intervention study. The fatty acid laboratory is recognised as the leader in its field in the country and is therefore not only supporting studies within this Unit, but also collaborated with the food industry and researchers from universities and other organisations on the analysis of fatty acids.

#### Capacity development

Two NIRU staff members are registered for a PhD and one for a Master's degree. A six-month training course at the Stellenbosch University was attended by two staff members, another two have enrolled for diploma courses while two others attended short courses. Capacity development of community workers, students, researchers and laboratory staff at other institutions remains a high priority. At least 51 community members were trained in conducting interviews and collecting information on weight and height from the community in research studies in remote areas of the country. Invited lectures were given on nine occasions to pre- and postgraduate students and to other scientists from South Africa and Botswana. Staff acted either as a study leader, promoter or co-promoter for two MSc and four PhD students, including a PhD student from Switzerland.

#### External Funding

R822 393

### Science Communication and Research Translation

Scientists participated in several health promoting and science policy processes, such as an international workshop promoting orange-fleshed sweet potato to reduce malnutrition; reviewing nutritional issues for the benefit of national health planners; drafting learning material for a university course in food security; updating and marketing the country's most comprehensive food composition database and its products for the assessment of dietary intake; and supporting the salt industry towards optimal internal monitoring of the iodine content of iodised salt for human consumption. Furthermore, the Unit continues to collaborate with a host of partners such as universities, food companies, governmental departments, science councils, other MRC Units, non-governmental organisations, as well as regional and international groups.

## Brain and Behaviour

### ANXIETY AND STRESS DISORDERS RESEARCH UNIT

Director: Prof Dan Stein  
Co-Director: Prof Soraya Seedat

#### Highlights

In 2008, some of the initial papers were published from the first nationally representative survey of mental disorders in South Africa, conducted by members of the Unit. In particular, data was published on 12-month and lifetime prevalence of common mental disorders, demonstrating that although these conditions are prevalent and disabling, they are commonly left untreated. Data on the high prevalence of domestic violence in South Africa was also published. One of the most important papers from the Unit in 2008 was on the treatment of multisomatoform disorder. This condition is characterised by medical symptoms of unexplained origin and the optimal treatment remains unclear. In a randomised, double-blind controlled trial it was demonstrated that this disorder responds to treatment with a selective serotonin reuptake inhibitor. Another key paper was on an animal model of obsessive-compulsive disorder. It was demonstrated that deermice with stereotyped behaviour respond more robustly to a serotonergic antidepressant than to a noradrenergic antidepressant.

#### Capacity development

A significant portion of the Unit's resources goes towards the support of junior staff. It aims to build capacity in a number of key basic and clinical neuroscience areas including

behavioural pharmacology, brain imaging, neurogenetics and neuroproteomics.

#### External Funding

R2 million

### 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. Research projects from the Unit are gradually influencing mental health policies in the Western Cape and elsewhere.

## MEDICAL IMAGING RESEARCH UNIT

Director: Prof Kit Vaughan  
Deputy Director: Associate Prof Tania Douglas



#### Highlights

As part of ongoing studies of brain development in children with Fetal Alcohol Spectrum Disorder (FASD), scientists examined 12 right-handed children (8-12 years old) with FASD and nine non-exposed, age and gender-matched controls from Cape Town, on a rapid, event-related functional MRI (fMRI) Go/No-go task with 120 "Go" and 60 "No-go" trials. None of these children had been treated with psychostimulant medication.

Findings differ from those in the previous fetal alcohol fMRI study, in which the participants were somewhat older. The absence of group differences in right inferior frontal activations in that study may be related to the use of psychostimulant medication, to which the medication-naïve children had not been exposed. These results were presented at the Human Brain Mapping Conference in Melbourne in June 2008.

On the cardiac MRI front, the Unit continues to collaborate with Prof Bongani Mayosi (UCT Department of Medicine) and Dr Fred Epstein (University of Virginia) on the application of cine DENSE to Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC) patients. Initial results were recently presented at the annual meeting of the Society for Cardiac Magnetic Resonance in Orlando, Florida. In conclusion, preliminary results indicate that cine DENSE is useful in detecting abnormal myocardial strain in ARVC.

The Unit has developed algorithms for the automated detection of *Mycobacterium tuberculosis* in microscope images of Ziehl-Neelsen stained sputum smears. Sensitivity and specificity of greater than 90% and 95% have been achieved for one- and two-class classifiers respectively. These algorithms will be incorporated into an automated microscope to detect tuberculosis in the near future.

A new 3D gradient echo phase contrast velocity encoding MRI sequence has successfully been used to measure cerebrospinal fluid (CSF) flow in the brain. This MRI sequence non-invasively quantifies fluid velocity and this is the first time to our knowledge that a 3D sequence has been applied to measure CSF flow. Prior 2D MRI velocity measurements offered limited windows through which to view the complex anatomy of the CSF system. This technique has application in tuberculous meningitis, a late-stage manifestation of tuberculosis which often results in hydrocephalus. The ability to non-invasively locate and quantify flow abnormalities is useful for planning the surgery and management of hydrocephalus. The CSF flow is typically more than an order of magnitude slower than blood flow and is thus challenging to measure accurately. Novel post-processing and visualisation tools have been developed and we have successfully been able to demonstrate flow connectivity through a variety of CSF flow channels.

Dr Barak Morgan joined the Unit in 2005 as a post-doctoral fellow and was promoted to principal researcher in January 2008. He has initiated a new line of research, Affective Neuroscience, which investigates the human “emotional/social brain”. Dr Morgan’s initial studies involved 10 South African cases of a very rare genetic condition, Urbach-Wiethe Disease or UWD, for which only 15 cases have ever been reported worldwide.

Work conducted since 2007 yielded stunning MRI scans showing perfectly selective, bilateral amygdala lesions (the amygdala is the nerve centre of the emotional brain). Psychological and behavioural analysis, however,

reveals no emotional or intellectual impairment. Detailed image analysis and psychophysiological results (EEG) show profound structural and functional brain changes indicative of neuroplasticity underlying functional emotional/social compensation.

This finding contradicts all previous knowledge of the amygdala’s role in the emotional brain. The South African UWD population (45 cases in total) is therefore a major scientific asset and opportunity for investigating the fundamental properties of the emotional brain. Recognition of this fact has come in the form of valuable international grants for this project. It served as a flagship for the Cape Universities Brain & Behaviour Initiative (CUBBI) and was the first major study performed at the Cape Universities Brain Imaging Unit (CUBIC).

### Capacity Development

Associate Professor Tania Douglas’s PhD student, Tinashe Mutsvangwa, spent two months with Prof Peter Hammond, a specialist in 3D facial anthropometry for syndrome diagnosis, at University College London in 2008, where he learnt new techniques for facial shape analysis that will be used in the Unit’s fetal alcohol syndrome project. Her MSc student, Rethabile Khutlang, attended the four-week course on medical physics at the International Centre for Theoretical Physics in Trieste, Italy. Dr Bruce Spottiswoode attended a supervisory management skills course (FastTrack Training) in Cape Town from 19 – 20 November 2008.

### Science Communication and Research Translation

The inspiration for establishing the MRC/UCT Medical Imaging Research Unit in 2000 was Allan MacLeod Cormack. Cormack trained as a physicist at UCT from 1942–45 and then served as a lecturer from 1950–57. Towards the end of this latter period, he identified his ‘line integral’ problem – a mathematical algorithm which he was subsequently able to solve – which was the basis for one of the world’s first CAT scanners. For this work, Cormack went on to win the Nobel Prize in Medicine in 1979. In mid-2004 Prof Vaughan started to write a biography on him, and this monograph of 100,000 words was published in June 2008, *Imagining the Elephant, A Biography of Allan MacLeod Cormack*.

Successful book launches were held in Cape Town (9 June), Cambridge, England (31 July) and Boston (6 August). In December 2008, a review of the book was published in the *New England Journal of Medicine*, in which the reviewer, Dr Reginald Greene, a senior radiologist at Harvard University, said: “Those interested in the history of science are indebted to Vaughan for producing this wonderful biography of Allan Cormack and for creating an expert and vivid description of one of the two streams of discovery that led to the invention of computer tomography”.

## Genomics and Proteomics

### BIOINFORMATICS CAPACITY DEVELOPMENT RESEARCH UNIT

Director: Prof Win Hide

#### Highlights

The Unit developed and delivered key software tools for vaccine development for HIV and published 20 health-related publications containing significant discoveries in 2008. These include articles in high impact publications such as *Nature* and *Proceedings of the National Academy of Sciences (PNAS)*. These publications contribute to a total journal impact factor of over 141. Unit researchers have been invited to present five keynotes and 13 talks nationally, in Africa and internationally. Prof Hide has been invited to present at the Nobel Forum, Stockholm, and at Harvard where he has been on sabbatical (Oct 2007-2008). The prestigious MRC Unit at the South African National Bioinformatics Institute at the University of the Western Cape (UWC) has become synonymous with the leading African bioinformatics effort. The Unit is the lead bioinformatics organization internationally responsible for the sequencing and analysis of the *Glossina morsitans* genome, presenting an African group as a lead on a major eukaryotic genome project. The Unit has been a bioinformatics cornerstone of the national HIV research efforts with projects in the SAAVI, SATuRN and CAPRISA programmes. In cancer research, the Unit has led, together with the Ludwig Institute for Cancer Research, a broad analysis of the group of potentially immuno-therapeutic powerful genes called the Cancer Testis genes. A thorough survey of these targets has been conducted and Unit members, Prof Hide, his students and postdoctoral researcher, Oliver Hoffman, have published this survey of cancer vaccine targets in *PNAS*. Prof Hide was awarded the Oppenheimer Trust Sabbatical Fellowship, as well as a visiting Professorship by the Harvard School of Public Health in 2007 and again in 2008. Principal Scientist, Dr Tulio de Oliveira, has driven the development of a number of high profile meetings, which include the organisation of two international bioinformatics workshops in South Africa (the 14th International Bioinformatics Workshop on Virus Evolution and Molecular Epidemiology and the HIV Drug Resistance in Clinical Practice Workshop). Dr de Oliveira has also presented a number of keynote speeches in the South African Treatment Research Network meeting in Boston, USA and the 2<sup>nd</sup> Botswana AIDS Conference. At this conference, Dr de Oliveira participated in meetings with the Vice-President

of Botswana, the Health Minister and heads of the Botswana Harvard Partnership in order to establish an HIV bioinformatics programme to determine the level of ARV drug-resistance mutations in the health public sector in Botswana.

#### Capacity development

The Unit houses the WHO regional bioinformatics training centre for Africa. Over the past year, 62% of the 35 postgraduates and postdoctoral fellows training through the Unit qualify as historically disadvantaged and 31% were female. Output of students and scientists has had high impact, with high-profile publications and several staff furthering training overseas or taking up other positions locally. A total of 15 black African scientists from throughout the continent were trained in using bioinformatics to control Tsetse fly infestation over the past year. Staff have trained a total of 150 scientists in key applications of computational techniques to address infectious diseases. The WHO regional centre for bioinformatics training in 2008 was on Bioinformatics Tools for Comparative Genomics of Vectors: towards an understanding of *Glossina* biology. This was an initiative designed as part of the activities of WHO/TDR in collaboration with the South African National Bioinformatics Institute. The training course, held from 4-8 August 2008, continued the broader goal of building and promoting the capability of scientists from endemic countries to exploit genome resources that are rapidly being developed for *Glossina*, the vector of sleeping sickness. In undergraduate health informatics training, over 50 undergraduates had been taught the basics of biomedical informatics. In addition, the Unit implemented the Stanford-South Africa Biomedical Informatics Programme (SSABMI) which has attracted South African excellence in biomedical informatics.

It provides short courses; graduate support (a total of two PhD students, and one Master's student are supported at the Unit by SSABMI); regular live video seminars presented between Stanford and South African students; and access to Stanford online courses for SSABMI-supported students at UWC and UCT. The programme has graduated a Master's student, Cameron McPherson, in 2008, who is now receiving research training in New York. The programme was reviewed by a panel including scientists from Harvard, Stanford, UWC, UCT, and the University of California, San Diego (UCSD). It will be applying for renewal from the Fogarty Programme of the National Institutes of Health (NIH) in April 2009. It is likely to expand its activities to promote institutional recognition of training between the three Western Cape universities.

#### Funding

R10 million

#### Science Communication and Research Translation

The Unit published a set of key vaccine candidates for cancers

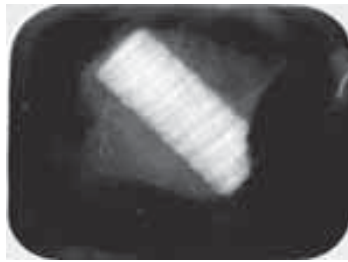


Fig. A

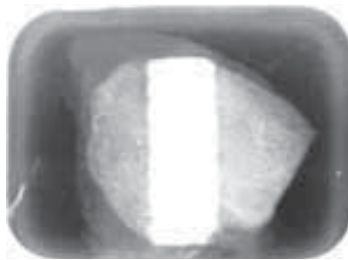


Fig. B

*Digital radiographic images (Fig. A-B) of hydroxyapatite/calcium carbonate constructs harvested from the rectus abdominis muscle showing the remarkable induction of large ossicles far exceeding the dimensions of the implanted constructs as a result of synergistic binary applications of hOP-1 and relatively low doses of hTGF- $\beta$ 3. The unique images in figures A and particularly B show the rapid and substantial induction of bone formation by binary applications of hOP-1 and hTGF- $\beta$ 3; translational research is now mandatory in clinical contexts; the first human patient has been already operated with a synergistic binary application delivered by 20/80 HA/ $\beta$ -TCP constructs to reconstruct a massive pediatric mandibular defect.*



Pre-Op



Post-Op

and delivered and trained more than a hundred scientists in key areas of bioinformatics of translation to health in HIV and sleeping sickness. Several thousand web visitors have also been given opportunities to learn from research staff via Internet sites and via e-mail lists such as 'Bioinformatics' and 'ABIONET'. From 21-23 April 2008 a meeting took place in Abuja, hosted by UNICEF/UNDP/World Bank/WHO-TDR on "Bioinformatics for Health Interventions in Africa through Translation of Genomic and Biological Information" to drive, through the MRC Unit, Pan-African development in order to deliver a realistic cohesive public health intervention capacity across Africa. Thus a network for bioinformatics translation for public health has now been successfully established. One key activity of this network is to translate the genome of the Tsetse fly that distributes sleeping sickness into better traps, drugs and control strategies. Efforts are now also focused on connecting the effort to providing training in epidemiology, biostatistics and computational biology training so that leaders and trainees can learn how to focus their efforts to better impact policy and public health.

## BONE RESEARCH UNIT

Director: Prof Ugo Ripamonti

### Highlights

The Unit is implementing in clinical contexts the synergistic induction of bone formation by loading synergistic binary applications of recombinant morphogens (the hOP-1 and hTGF- $\beta$ 3 osteogenic soluble signals) onto MRC/CSIR bioactive biomimetic matrices. The use of smart biomimetic matrices is a cost effective skeletal regenerative procedure whereby, when implanted in human patients, the responding mesenchymal cells differentiate into osteoblastic-like cells secreting and embedding osteogenic soluble molecular signals into the biomimetic matrices initiating bone formation by induction as a secondary response. The development of biomimetic matrices is a joint long-term research effort of the Unit and the CSIR Materials Science & Manufacturing Group. The recently operated 8-year-old child at Chris Hani Baragwanath Hospital via the synergistic induction of bone formation delivered by 20/80 HA/ $\beta$ -TCP biomimetic matrices also indicates a synergistic interaction between the BRU of MRC/WITS and the CSIR Materials Science & Manufacturing Group. The Director has organized a Symposium at the 8th World Biomaterials Congress in 2008 and another Workshop at the forthcoming 22nd European Symposium of Biomaterials 2009 Lausanne Switzerland, another Workshop at the forthcoming 17th Congress of the Association of Anatomists Cape Town 2009 and another during the International Conference on Bone Tissue Engineering Bone-Tec 2009 in Hannover, Germany. There is indeed a great opportunity by using biomimetic matrices that per se and without the addition of exogenously

applied osteogenic soluble molecular signals are capable of initiating the spontaneous induction of bone formation. The Director has published three major papers in Biomaterials (IF 6.2) and in J Cell Mol Med (IF 7) on biomimetic, biomimetic matrices and the induction of bone formation and particularly the unique data of the endochondral osteoinductivity of the TGF- $\beta$ 3 isoform; the Director has been awarded the NRF rating of Internationally Acclaimed Researcher. Finally, the Unit is constantly pursuing alternative granting sources particularly the National Research Foundation. The spontaneous induction of bone formation in bioceramic constructs implanted in different animal species is contributing to further understand the spontaneous induction of bone formation.

*Figure C shows the remarkable the spontaneous induction of bone formation (new bone in blue) within a 20/80 HA/ $\beta$ -TCP construct implanted in the rectus abdominis muscle of a Large White pig.*



### Capacity Development

Mrs Ruqayya Parak attended an international workshop in cutting and grinding techniques at the EXAKT Vertriebs in Norderstedt, Hamburg, Germany from the 2nd to the 4th of March 2009. The workshop focused on the theoretical and practical aspects of: Cutting with the Band-System EXAKT 300 CP and 310 CP; Production of plane parallel thin sections with Micro grinding System EXAKT 400 CS; Refreshing the knowledge about fixation, dehydration, infiltration with acrylic resin and polymerisation; Invaluable knowledge was gained on standardised operating procedures, safety measures and maintenance of the apparatus. Mrs Parak has improved her skills in the preparation of thin histological sections from research material containing metal or biomaterial implants. This workshop has assisted her in gaining a broader knowledge of the cutting and grinding technique for undecalcified histology sections, which has been invaluable for the Unit. PhD supervision correcting drafts of ms. and scientific discussions.

### Science Communication and Research Translation

Unique research from the laboratory bench and from the non-human primate *Papio ursinus* has once again been translated to a human patient; for the second time, the mandible of a juvenile patient, with a massive mandibular defect, has been reconstructed at Chris Hani Baragwanath Hospital. A binary synergistic application of hOP-1 and hTGF- $\beta$ 3 was loaded onto MRC/CSIR biomimetic matrices; four months after implantation,



the patient is thriving and has an aesthetically and functionally successful reconstruction; see below pre-op (left) and post op (right) images of operated patient.

## HUMAN GENETICS RESEARCH UNIT

Director: Prof Raj Ramesar

The major effort in the Unit pertains to the development of capacity in four different respects:

- training a cadre of molecular genetic scientists, who have a good grasp of molecular genetics, bioinformatics and genetic predisposition to disease in humans;
- training of clinical researchers from disciplines across the health sciences faculty;
- training of genetic counsellors, particularly with regards to translational research capacity, and qualitative research aimed at establishing the efficacy of our interventionist research in e.g. familial colorectal cancers, and preventative management; and
- developing strong links with African researchers, and utilising the resources available in the Unit and its host Institute for Infectious Diseases and Molecular Medicine (IIDMM) at UCT for the training of African researchers in genomic health technologies.

The established infrastructure includes mature relationships with lay/community support groups and the communities in which we work. All the research is informed

by our close working relationships with clinicians who manage patients and families; this is the environment where our research material is drawn from. Because of visible outputs of our work to date, which is being translated into clinical management programmes, this has attracted a strong cadre of clinical researchers who work very closely with the Unit. A biobank is supported by a strong informatics base, which in turn supports all of our research.

The demand on our research facility for education and training of postgraduates is unprecedented. Fortunately, this is achieved through the core clinically relevant projects that are the mainstay in the Unit. The projects aimed at identifying the genetic defects underlying familial colorectal cancers, retinal degenerative disorder and bipolar disorder, all have critical momentum, and serve to highlight the role of genetic predisposition to disease from seemingly simple Mendelian conditions, to those involving complex genetic factors and environmental interactions.

Apart from Unit researchers teaching in the medical (MBChB) undergraduate programme, formal courses/modules are provided within the following programmes: BSc (Med) Hons, Medical Genetics specialist training and MSc (Genetic Counselling).

### Capacity Development

The Unit has a mandate for capacity development; it is a hive of activity particularly for postgraduate students. Genetics and genomics research is expensive, yet absolutely necessary in terms of understanding the disease predisposition of our populations.

The Unit has to have a stable group of people who are primarily involved with the training and support of the postgraduate programme. This requires at least one senior specialist, two postdoctoral fellows, a research nurse and a research officer, supporting a band of postgraduates ranging from at least four PhD students, six Masters' and six to eight Honours students. This pyramidal structure, with adequate material support, will be a core machine for driving capacity development. Our current postgraduate enrolment in the Division of Human Genetics, supported by the MRC Unit, includes 10 PhD, nine MSc and five BSc.Med Honours students. A positive addition has been a Fogarty International Postdoctoral Fellow supported by the National Institutes of Health (NIH) who is spending a year in our Unit working on the Colorectal Cancer Project.

In summary, the genomic technologies available within the Division of Human Genetics at UCT and which are available to the Unit have resulted in a remarkable output. Unfortunately, this has been at great cost, and is currently non-sustainable because of a lack of critical mass of reliable long-term staff in the employ of the Unit or the University.

### Research Translation

The research of these projects has been highly productive in the past several years.

The work on Familial Colorectal Cancers has provided groundbreaking experience with regard to translating high tech research to families and communities that range from first world urban setting to remote rural settings. The translational work with genetic counselling and a mobile clinical surveillance team has provided evidence that this intervention prevents mortality and morbidity.

The Retinal Genetics Project has been very productive in terms of the identification of genes and genetic defects underlying this group of disorders in our populations in South Africa. Working with ophthalmologists nationally and the lay support groups, Retina South Africa and Retina International, every effort has been made to recruit affected individuals, to extend families genealogically, and map and identify genetic defects.

The project on the Genetics of Bipolar Disorder has been highly productive, and needed to be maintained in the MRC Unit stable because of its lessons for dealing with complex chronic disorders. The publications that continue to emerge from this work in highly rated journals bears testimony to the value of this research.

The African Genomic Variation Project: The variations evident in human populations at both the macroscopic and microscopic levels reflect human diversity. These variations are the result of minute heritable changes at the genetic level, often reflecting environmental selection pressures on migrating populations. This may most easily be observed in the continuum of anthropometric variations reflected in human populations reflecting their migration and settlement

through Africa, Asia, Europe and ultimately, to the modern world. These genetic changes, made up of mostly single nucleotide polymorphisms (SNPs) and copy number variants (CNVs), have been extensively characterised for many first world populations internationally, through large scale research endeavours such as the Human Genome Mapping Project, and most recently the HapMap project.

The Genetic Variations in Pharmacogenomically-relevant Genes Project aims to characterize genetic variants relevant to drugs on the Essential Drugs List (EDL) in South Africa. These variants would influence absorption, distribution, metabolism and excretion (ADME) of these EDL medicines. The resulting data will be highly useful in estimating the prevalence of these polymorphisms and how they vary among population groups.

## HUMAN GENOMIC DIVERSITY AND DISEASE RESEARCH UNIT

Director: Prof Himla Soodyall

### Highlights

The focus of the research is to sample as widely as possible, to conduct the necessary mitochondrial DNA (mtDNA) and Y chromosome DNA typing in the laboratory, generate individual reports, and then return into the field to deliver results to individual participants. During the course of the year, the Unit conducted field work in the Western Cape, Northern Cape and Eastern Cape and collected 400 samples from Khoi, San and Coloured groups. Researchers returned to sites in these regions to give back genetic ancestry test results to volunteers who had participated in research the previous year. The Unit conducted 353 genetic ancestry tests offered to the public at the NHLS and processed over 2000 samples for mitochondrial and Y chromosome DNA analysis for population genetic studies (MRC projects and Genographic Project [National Geographic Society]). This research is contributing to understanding the past associations and affinities of several sub-Saharan African populations. This research would eventually contribute to an understanding of the population sub-structure of African populations and allow modelling patterns of genetic diversity in health and disease. The Unit was audited by the National Geographic Society in July 2008 and its activities featured widely in the media. Publications in collaboration with the Genographic Project and as a group included an article "The dawn of human matrilineal diversity" in the American Journal of Human Genetics of March 2008 which received worldwide media coverage. Work is currently underway to publish the population genetic research activities.



### Capacity development

One medical scientist intern is trained by the director.

### Science Communication and Research Translation

A major activity of the Unit is public engagement of science. More specifically, the Unit's population genetics research has intersected with the public's curiosity to know the geographic origins of their ancestors. Consequently, the Unit has featured on several local TV programmes and a few international documentaries including a documentary called "Coast to Coast", another called "Trace Your Roots", which featured five individuals from different ethnic backgrounds, a National Geographic Society documentary in August 2009 and a documentary including genetic ancestry testing for the BBC which was filmed in Cape Town. The Unit contributed to the conception and outcome of a paper published jointly with the Genographic Team of the National Geographic Society entitled "The dawn of human matrilineal diversity" in the American Journal of Human Genetics (March 2008). There were many national and international articles published on the significance of this study, and this paper is also one of the most cited papers for 2008. Through the Unit's association with the Africa Genome Education Institute (AGEI), researchers delivered genetic ancestry test results to over 480 participants in Cape Town, Pietermaritzburg, Johannesburg, Ermelo and Pretoria. This project was done in conjunction with Ancestry24, part of Media24 which resulted in lots of publicity in local newspapers and on the Ancestry24 website about the

outcome of the study. Last year, some of the people tested featured on a BBC documentary, and the data has contributed to the Unit's databases for specific population studies. In addition to establishing better relationships between scientists and the public, this work has given the Unit opportunities of taking "big science" to the public throughout the country in the hope that this would inspire learners to appreciate how science intersects with societal issues.

## RECEPTOR BIOLOGY RESEARCH UNIT

Director: Prof Arie Katz

### Highlights

Impact on Scientific Body of Knowledge:

The Unit focuses on the G protein coupled receptors with particular emphasis on receptors that have a role in diseases that are prevalent in South Africa, particularly HIV/AIDS and cervical cancer.

The GnRH receptors:

Identification of ligand binding site: The GnRH receptor is essential for mammalian reproduction. The human GnRH receptor has two natural ligands, GnRH I and GnRH II. Better understanding of the ligand binding pocket of the GnRH receptor is the basis for the development of GnRH analogues and, in particular, non-peptide orally active GnRH analogues for

clinical use for treatment of infertility, reproductive disorders and cancers of the reproductive tract. Towards that end, the Unit has studied the roles of Trp280<sup>(6.48)</sup> and Tyr290<sup>(6.58)</sup> of the human (GnRH) receptor in the binding of GnRH I and GnRH II. Researchers found that Tyr290<sup>(6.58)</sup> interacts with both GnRH ligands and is important for high potency receptor activation. This work has been completed and has been written up as part of the PhD dissertation of the student Marla Coetsee, who graduated in 2008 and published in *Biochemistry* in 2008. In addition, the Unit has demonstrated that Trp280<sup>(6.48)</sup> has no role in ligand binding and the primary function of this residue is to ensure correct folding and expression of the receptor at the plasma membrane. This work has been completed and presented at an international conference, and is being written-up for publication.

Anti-proliferative effects of GnRH receptors: GnRH receptors have been implicated in inhibition of cell proliferation, suggesting that GnRH analogues can be used to treat certain tumours. Studying MCF-7 (breast carcinoma cells) and HEK293 (human embryo kidney cells) as model cell lines the Unit has shown that both type I and type II GnRH receptors inhibit cell proliferation by causing cell cycle arrest that in HEK293 cells is followed by cell death. Furthermore, this inhibition can be induced by GnRH agonists and antagonists. The Unit has also studied the molecular mechanism underlying this process and this work is being written up for publication. In the pituitary, the GnRH receptor signals via Gq/11 to regulate the release of the LH and FSH. However, it has been postulated that the anti-proliferative effects of GnRH are mediated by signaling via Gi. Employing mouse embryonic fibroblasts that do not express Gq and G11, researchers have shown unambiguously that the anti-proliferative effects of GnRH are mediated by Gq/11 and not by Gi. This work has been presented at conferences and was published in *Molecular Endocrinology* in 2008.

Cloning and characterization of novel type II GnRH receptors: The Unit was the first to clone the human and marmoset type II GnRH receptors. Recently, they embarked on analyzing the genes of the type II GnRH receptor and its cognate ligand in the various mammalian genome sequence assemblies that have been compiled. The scientists found that the functional statuses of the receptor and ligand varies in different species, several species have both genes functional, while others have only one of them functional or both not functional. This suggests that during evolution, the type II GnRH system became non-essential for the survival of certain species. Nevertheless, its role in species that express the ligand or the receptor remains an open question. This work is in press in *Neuroendocrinology*.

Signalling, desensitization and internalisation of the

GnRH receptor: Previously, researchers in the Unit showed that the C-terminal domain of the type II receptor can confer  $\beta$ -arrestin dependent internalization on the type I GnRH receptor, although it is not required for  $\beta$ -arrestin dependent internalization of the type II GnRH receptor. Furthermore, they identified three basic residues in intracellular loop 3 of the type II GnRH receptor which are not conserved in the type I GnRH receptor that, together with C-terminal tail, are important for  $\beta$ -arrestin dependent internalisation of the type II GnRH receptor. In addition, they showed that the type I GnRH receptor which lacks a C-terminal tail activates ERK independent of  $\beta$ -arrestin, while the type II GnRH receptor which has a C-terminal tail activates ERK in a  $\beta$ -arrestin dependent manner. This finding demonstrates that the signaling pathways activated by both receptors utilize different signaling modules. Currently, the researchers are examining whether the  $\beta$ -arrestin-dependent activation of ERK effects ERK localization and the kinetics of its activation, and they plan to complete this work and prepare a manuscript for publication during 2009.

Cyclooxygenases and Prostaglandins in Cervical Cancer and Uterine Pathology

Role of PGE2 and seminal plasma in neoplastic transformation of the cervix: Previously, the Unit showed that cervical cancer tumours over-express COX 1 and 2 enzymes leading to increased levels of PGE2 and upregulation of its cognate receptors, EP2 and EP4. This suggests that PGE2 via stimulation of the over expressed EP2 and EP4 receptors can lead to tumour progression. Furthermore, this suggests that seminal plasma, which is extremely rich with PGE2 may exacerbate cervical tumorigenesis by activating intracellular signaling via the elevated EP2 and EP4 receptors. Employing model cell lines, cervical biopsies and a mice animal model that they established, the researchers have begun identifying target genes that are regulated by PGE2 and seminal plasma, the signaling pathways mediating their activation and their effect on cell physiology. This research work is ongoing and they plan to publish in 2010.

Delineate the integrated signaling pathways of EP<sub>2</sub> and FP receptors in endometrial adenocarcinoma:

Scientists in the Unit are also studying the role of prostaglandins in endometrial cancer. In previous work, they found that in these cancer cells there are over-expressing EP<sub>2</sub> and FP receptors. In order to examine the integrated signalling stimulated by co-activation of these two prostaglandin receptors in a single cell, they established ishikawa, endometrial adenocarcinoma cells over-expressing EP<sub>2</sub> and FP receptors as a model system. The EP2 signals via cAMP which is catalyzed by adenylate cyclase, while the FP receptor signals via inositol phosphates and calcium. They found that activation of the FP receptor potentiates the signalling mediated by the EP2 receptor, and they identified the signalling molecule mediating

this cross-talk. They have also screened for genes that are synergistically upregulated by activation of both receptors, one of which is spermidine/spermine-N1-acetyltransferase (SSAT). Upregulation of this gene has been implicated in inhibition of cell proliferation and cell migration. This work has been completed and is being written up for publication and is also being written up as part of the Ph.D. dissertation of Aron Abera.

#### The CCR5 Chemokine Receptor and HIV

Functional consequences of novel CCR5 mutations identified in South Africa populations: The CCR5 chemokine receptor is the major co-receptor for HIV-1. Four mutations of the CCR5 receptor have been identified in South African populations, but the effects of these mutations on CCR5 function and HIV infection were unknown. The Unit studied the effect of the mutations, Asp2Val, Leu107Phe, Arg225Gln and Arg225stop, on CCR5 interactions with chemokine ligands and HIV. The Asp2Val mutation decreased CCR5 responses to chemokines and decreased interaction with the HIV Envelope in a cell-cell fusion assay. The Arg225stop mutant, which is truncated in the third intracellular loop, showed no measurable interaction with chemokine or HIV, because it was not expressed on the cell surface. This phenotype is similar to the CCR5 $\Delta$ 32 phenotype and it predicts that homozygous carriers are resistant to HIV infection. These results show that South African variants of the CCR5 chemokine receptor have a range of phenotypes in vitro that may reflect altered chemokine responses and susceptibility to HIV infection of individuals who carry these alleles. This work has been completed and has been written up as part of the PhD dissertation of Asongna Folefoc, who graduated in 2008, and which will be submitted for publication shortly.

Interaction of southern African isolates of HIV-1C with the CCR5 Co-Receptor: HIV-1 subtype C (HIV-1C) is the predominant HIV subtype in South Africa and it is the fastest spreading subtype worldwide. It predominantly uses the CCR5 co-receptor. Preference for CCR5 could arise from enhanced affinity of HIV-1C for CCR5 or from a decreased dependence on binding of CD4. To test this, the researchers expressed and purified recombinant gp120 proteins from HIV-1C isolates and assessed them in CD4 binding assays and a CCR5 chemokine competition binding assay. All gp120 proteins bound to CD4-expressing cells, except one which had Arg substituted for a conserved Cys. Reconstituting the Cys restored CD4 binding and confirms the importance of the disulphide bond. Gp120 from two southern African HIV-1C clones, Du151 and Mole1, bound CCR5 with high affinity, while gp120 from a non-functional clone had lower affinity. CCR5 affinity of all gp120 proteins was decreased in the absence of CD4, confirming that CD4 is required for HIV-1C interaction with CCR5. These results indicate that HIV-1C has high affinity for CCR5 with

variable dependence on CD4. This work has been presented at conferences and has been published in *AIDS Research and Human Retroviruses*.

Conformations of CCR5 and HIV-1C Envelope that mediate HIV Infection: This project addresses the detailed molecular mechanisms by which CCR5 mediates fusion of HIV with human cells, investigating conformations of both the HIV Envelope (Env) protein and the CCR5 receptor protein. Although gp120 interaction with CCR5 activates intracellular signaling, CCR5-mediated signaling is not required for HIV fusion with host cells. To study the CCR5 conformation that mediates HIV infection, the researchers generated constitutively active CCR5 receptor mutants that were fixed in the active conformation and tested them in a fusion assay that mimics HIV infection. They found that a few constitutive active CCR5 mutants do not mediate HIV infection, while others showed high fusion activity. These results suggest that the activated CCR5 mutants have distinct conformations, one that mediates Env-dependent fusion poorly and one that mediates fusion well. These results may improve understanding and design of small molecule HIV fusion inhibitors. Ms Alex Salo's MSc degree, which was based on this work, was awarded with distinction and this work is being prepared for publication.

Polymorphism and role of the Kaposi's Sarcoma-Associated Herpes Virus G-protein-coupled receptor in Kaposi's Sarcoma Tumours of South Africans

During 2008, the Group initiated a project on a receptor encoded by the Kaposi's sarcoma-associated herpes virus (KSHV). KSHV, also called human herpesvirus-8 (HHV8), is the etiologic agent of Kaposi's sarcoma (KS) which is the most common AIDS-related malignancy. It is also one of the most common cancers in several sub-Saharan African countries and is present also in elderly men, regardless of HIV infection. KSHV encodes a G-protein-coupled receptor (GPCR), termed vGPCR. The vGPCR is homologous to the human chemokine CXCR1 and CXCR2 receptors which are the cognate receptors for interleukin-8. The vGPCR signals in the absence of its cognate ligand due to a mutation that renders the viral receptor constitutively active. As such the viral receptor is a key molecule in the pathogenesis of Kaposi's sarcoma and is a target for development of drugs for treatment of Kaposi's sarcoma patients. Although this disease is more prevalent in Africa, only viral isolates from western hemisphere patients have been sequenced and studied. In view of the etiological role vGPCR has in this disease, the Unit intends to determine if there is sequence polymorphism in the KSHV vGPCR gene found in South African population and whether this sequence polymorphism is in the protein coding sequence and therefore, may have functional consequences on the role of vGPCR in KS initiation and progression in South African populations.

Kisspeptin Receptor, structure, signaling and role in placenta development

In the past year, the Unit embarked on studying Kisspeptin and its cognate receptor, GPR54. Kisspeptin and its receptor have recently been found to be expressed in the hypothalamus and to regulate GnRH release from GnRH neurons and as such play a key role in the control of reproduction and the onset of puberty in humans. Kisspeptin and its cognate receptors are also highly expressed in the placenta suggesting that Kisspeptin regulates placenta development. The Unit is focusing on the elucidation of the ligand binding pocket of GPR54 and on the role kisspeptin/GPR54 have in placenta development.

#### Capacity development:

The focus of the Unit on the structure and function of G protein-coupled receptors (GPCRs) is establishing it as a South African reference centre for GPCR technology and molecular pharmacology. The range of the disorders that can potentially be accessed through targeting GPCRs is vast, ranging from psychiatric and neurological disorders through metabolic, cardiac and endocrine disorders to infectious disease and cancer. Consequently, a detailed understanding of GPCR technology provides an important foundation for developing the intellectual capacity for a drug design and development industry in South Africa. The Unit's capacity development strategy consists of continuously developing the techniques that are used in the laboratory and updating and enhancing understanding of the theoretical and practical aspects of GPCR technology and training students (PhD, MSc and BSc(Hons)) and postdoctoral fellows who can ultimately provide a core of leadership and expertise in molecular pharmacology in Southern Africa. The Unit has a Journal Club for all the students and staff that takes the form of guided reading of papers and presentations of papers. Students also attend and present their research every year in the student seminar programme of the Division of Medical Biochemistry. In addition, students and staff attend the seminar series of the Institute of Infectious Disease and Molecular Medicine. Students are also encouraged to attend scientific conferences and present their research work. In addition, a few of the PhDs conduct part of their research at the Human Reproductive Sciences Unit at the British MRC. The students spend six months during each year of their PhD programme at the UK laboratory gaining access to resources not otherwise available to them and also the experience of a large international research centre, while maintaining strong South African connections. The dissertations of two PhD students and a Master's student were submitted and approved.

#### Funding

R 3 005 000



ALLEN JEFFTHAS

#### Science Communication and Research Translation:

Researchers published in international journals including Biochemistry, Cancer Research, Endocrinology, Molecular Endocrinology.

In addition, members of the Unit presented at the following Conferences:

- GnRH 9<sup>th</sup> International Symposium, Berlin, February 2008
- Endocrine Society USA, Annual Conference, ENDO2008, San Francisco, USA, June 2008
- 13<sup>th</sup> World Congress on Advances in Oncology and 11<sup>th</sup> International Symposium on Molecular Medicine, Crete, Greece, October 2008
- 13<sup>th</sup> Meeting of the European Neuroendocrine Association, Antalya, Turkey, October 2008
- 1<sup>st</sup> World Conference: Kisspeptin Signaling in the Brain, Cordoba, Spain, October 2008.



## Environment and Health

### ENVIRONMENT AND HEALTH RESEARCH UNIT

Director: Prof Angie Mathee

#### Highlights

In 2008, the Unit conducted a survey of the lead content of paint applied to playground equipment (e.g. swings, climbing frames, sliding boards and see-saws) in public parks in the municipalities of Johannesburg, Ekurhuleni and Tshwane. More than 2400 lead content measurements were undertaken in 49 parks identified for inclusion in the survey by parks department officials of the three municipalities. Around half of the measurements showed lead concentrations exceeding international reference levels. Of particular concern was the observation that on 83% of the playground items included

in the study, paint was chipping or peeling, increasing the risk of lead exposure in play parks. It is likely that hazardous lead-based paint has been used throughout the country in playgrounds, pre-school institutions and private homes to decorate playground equipment. It should be noted that lead-based paint from playground equipment is most likely not the predominant, or even a significant, contributor to high levels of lead poisoning in South African children. However, the possibility exists that in settings where lead-based paint is widely used, or where lead concentrations are highly elevated (and there is considerable peeling or flaking of paint), as in some of the playgrounds included in this study, local environmental lead levels may be elevated to some extent. In this regard, for some children, especially those with pica for paint or soil, elevated blood lead concentrations may result. Internationally, the precautionary principle is advised in respect of children's environmental health. In light of this, even though the risk of lead poisoning from the ingestion of chips of lead based in children's playgrounds is most likely small, action must be taken by parks and recreation departments to ensure that all children's playgrounds are lead-free zones. Where necessary,



lead-based paint should be removed under strict conditions to avoid exacerbation of environmental lead contamination, and ensure protection of workers. Equally important is the need for relevant stakeholders to conduct programmes to raise awareness of the potential for exposure to lead from paint used on playground equipment and implement measures to avoid lead poisoning in children from this source.

**Climate change and public health:** There is growing international consensus that the earth's climate is changing. While there is uncertainty regarding the precise outcomes of climate change, these are likely to include an increased frequency of heat waves (such as those experienced in Cape Town in March 2009, and which contributed to raging veld fires), and a range of other public health risks. Communities living in conditions of poverty and with poor quality service infrastructure are likely to be worst affected. In February 2009, the ageing and inadequate storm-water system in Soweto was unable to cope with a downpour of quite moderate intensity, resulting in severe local flooding, damage to road and other infrastructure, loss of property, injury and loss of life. The Unit is participating in the pilot phase of a multi-country study on the health implications of climate change. Specifically, the study is looking at the implications for health and work performance in individuals who work in exposed environments, for example gravediggers and road construction workers. The study is being conducted in Johannesburg and Upington. The climate change work programme of the Unit will be expanded in the coming years to include a focus on interventions to assist at-risk communities in coping with life in a warmer South Africa.

**Urban health:** Every August, the Unit, under the umbrella of the World Health Organisation Collaborating Centre for Urban Health, participates in a long-term environmental health indicators study. Data collected include socio-demographics, living conditions, lifestyles and health status (acute, chronic and mental ill health) in five relatively impoverished suburbs of the City of Johannesburg. Having commenced the study in 2006, three years of data have now been collected and are being analysed to examine urban health trends in Johannesburg. The study (and associated initiatives) is also proving instrumental in highlighting emerging health risks and the translation of research into community programmes. For example, evidence from the study of highly elevated levels of smoking in one of the study sites prompted a weekend visit in which the widespread use of hookah pipes (water pipes or "hubbly bubbly" pipes) was observed. Adults, as well as children as young as two years of age were seen to be using hookah pipes. Discussions with users revealed that many were using tobacco, combined with other harmful substances, for example, methamphetamine (Tik), marijuana and alcohol in

hookah pipes. Where affordability levels were low, children of around eight years were constructing their own hookah pipes from plastic bottles and straws. It was evident that users believed hookah pipes to be devoid of the risks associated with cigarette smoking; and in many instances hookah pipes were being purchased by parents for children, in the belief that it protected respiratory health. The World Health Organisation has stated that there is no evidence that hookah pipes are safer than cigarettes, and that their use may in fact hold additional risks to health. For example hookah pipe smoking usually occurs in groups, and sharing of the mouthpieces can increase the risk of transmission of diseases such as tuberculosis, hepatitis and oral herpes.

### Capacity development

The Unit has a multi-dimensional approach to capacity development, which includes the inculcation of a generalised culture of learning within the Unit. In line with this, all staff members are currently undertaking study towards a degree, diploma or certificate, or various short courses. The Unit creates opportunities for undergraduate students in environmental health from the University of Johannesburg to receive experiential research training, which is also provided to environmental health professionals in the City of Johannesburg and the City of Ekurhuleni. Specialists in public health at the School of Public Health of the University of the Witwatersrand are routinely seconded to the Unit to gain environmental health research experience, and an international programme of supervision for Masters' and doctoral students is ongoing.

### External Funding

R683 155

### Science Communication and Research Translation

On request from the World Health Organisation (African region), the Unit coordinated the design of a Children's Environmental Health (CEH) toolkit. The toolkit, which is targeted for use in African primary schools, will fill a void in the availability of educational materials to help raise awareness of major environmental hazards to children's health on the African continent. The Unit makes electronic copies of print-ready versions of the CEH toolkit available on request. Copies have already been provided to the National Department of Health (NDOH), the Gauteng Department of Education (DOE) and the City of Johannesburg for printing and further distribution and use. Following evidence from its Johannesburg Urban Health study, the Unit has joined forces with the NDOH, the National Council against Smoking (NCAS), the City of Johannesburg, the Gauteng DOE and others to raise awareness of the hazards of hookah pipe smoking.



## African Traditional Medicines

### DRUG DISCOVERY AND DEVELOPMENT RESEARCH UNIT

Director: Prof Kelly Chibale

#### Highlights

Following a review of the South African Traditional Medicines Research Group (SATMERC) during the period 10-11 September 2007, in which it was noted that the group had developed a significant focus in the area of drug discovery, the MRC made the decision that: "From 1 April 2009, the UCT component of SATMERC will continue to exist for a term of five years as the Drug Discovery and Development Research Unit under the Directorship of Prof Kelly Chibale". Within the context of the mandate of the new unit, the programme will focus on, among other things, 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 drug discovery and development, with special reference to natural product-guided medicinal chemistry as well as biological screening platforms against infectious and other diseases; attracting young South African scientists, and scientists from elsewhere on the African continent, and in doing so to make a concerted effort at transformation and capacity building; and providing career development opportunities for independent academic and/or research careers.

#### Capacity development

The group continues to have an impressive record in the training of students at the Honours, Masters' and PhD levels, significant numbers of whom are black. 20 Masters' and PhD students are currently attached to the group. Of these, 10 are male and 10 female, eight are black, five are coloured, five are white and two are Taiwanese.

#### External funding

R6 117 000

#### Science Communication and Research Translation

The South African Traditional Medicines Database – TRAMED III is available to the general public on the MRC website.



## INDIGENOUS KNOWLEDGE SYSTEMS

Director: Dr Motlalepula Matsabisa

### Highlights

Mutagenicity and antimutagenicity studies of selected traditional medicines were completed. The Unit has also completed *in vitro* and *in vivo* drug metabolising studies using major cytochrome P450 metabolising enzymes. Research partnership with the Agricultural Research Council (ARC) is near completion for looking at the genetic production of sesquiterpene from a medicinal plant with antimalarial activity. The project aims to manipulate and increase the production of the antiplasmodially active sesquiterpene dimmers. The research consortium consists of the University of Botswana, University of Limpopo, University of Kinshasa, ARC, University of the Free State and the University of Johannesburg, with IKS as the Project Leader. The Unit conducted training workshops for traditional healers on record keeping, infectious diseases including STIs, HIV and AIDS and TB. There have also been intensive training workshops on diabetes. The Unit will present training workshops for traditional healers on the contents and objectives of the comprehensive care, management and treatment plan for HIV and AIDS, IKS 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 Indigenous Knowledge System Unit and raises awareness on traditional



medicines research. IKS conducts workshops on clinical trials for communities, traditional healers and general practitioners (GPs). This is a public awareness campaign and research capacitation for rural GPs. The Programme has successfully completed a pilot GPS database of traditional health practitioners in three districts in KwaZulu-Natal. Dr Matsabisa serves on the Department of Science and Technology's bioprospecting task team.



### Capacity Development

Four staff members (three junior scientists and one support staff) are enrolled for degrees in MSc (2) and (1) Psychology respectively at the University of the Western Cape as well as four postdoctoral fellows and seven interns (four postdoctoral fellows and three Masters' students). Entrepreneurial training of communities is taking place at the Senqu and Tsolwana Municipalities in the Eastern Cape (Lady Grey and Hofmeyr community projects) and in the Mbombela Municipality of Mpumalanga (the Msogwaba community project). The Unit is investing in clinical trial training of GPs as Principal Investigators in traditional immune modulator clinical trials. These GPs are given research training skills in the conduct of clinical trials. Two clinical trials have been conducted in the Free State and Gauteng where two principal investigators (PI's) have been given clinical research capacity. One GP is currently being capacitated in clinical research in Kwazulu-Natal. Traditional Health Practitioner (THP) training programmes have trained 55 THPs in TB, HIV and AIDS, diabetes and documentation. A pilot project in Kwazulu-Natal saw 10 THPs trained in research methodologies and data collection (GPS Mapping of THP project). Ten, municipal officials have been trained in using IKS as a competitive advantage for business development in communities for job creation and poverty reduction (Makhuduthamaga, NamaKhoi, Tsolwana, Senqu and Mbombela Municipalities LEDs).

### External Funding

R8 727 347

### Collaboration

At a national level, the IKS Lead Programme at the MRC

has developed functional and effective partnerships with all THPs, Universities (University of the Western Cape, University of Cape Town, University of the Free State, University of Limpopo, University of Pretoria, University of Kwazulu-Natal, The Nelson Mandela Medical University) and science councils (including the ARC, CSIR, and the SA National Botanical Institute). The IKS Lead Programme has collaborative research agreements both at national and international level, which focus on research and development of products for diseases of burden in the region and partner countries, all based on traditional medicines. Pan African collaboration is underway with Botswana, Nigeria, Zimbabwe, Kenya, Uganda, DRC, Congo Republic, Algeria and Burkina Faso, and overseas collaboration with Brazil, India, Switzerland, UK, China, Hungary, Indonesia and Canada.

### Science Communication and Research Translation

Dr Matsabisa and others, wrote a book called Traditional Health Practitioner Training Project on TB, HIV and AIDS: THPs as Treatment Supporters for the Khayelitsha Township in Cape Town, which is currently in press. The Unit contributed chapters in books, including: "Guidelines for the pre-clinical evaluation of the safety of traditional herbal antimalarials". Chapter 17 contains information compiled by Dr Matsabisa and others. The programme has published six scientific publications, produced six scientific reports and five draft scientific reports. IKS also successfully registered a Patent Cooperation Treaty at national phase on antimalarial lead compounds.



*Respect your fellow human being, treat them fairly, disagree with them honestly, enjoy their friendship, explore your thoughts about one another candidly, work together for a common goal and help one another achieve it.*

-Bill Bradley



## PROFESSIONAL SUPPORT DIRECTORATES

### OFFICE OF THE PRESIDENT

The Office of the President coordinates the executive functions within the MRC through the Executive Management Committee (EMC), the Operations Committee and the Unit Directors Committee. Much of this work is done by the office manager, Ms Denise Nefdt, Executive Secretary Ms Bronwen George and Committee Secretary, Ms Adri Labuschagne.

The office also coordinates the risk working group of the MRC which has made much progress in inculcating a culture of risk management within the organisation.

Internal and external communication are also led by this office, as well as special projects such as the Cooperative Agreement with the Centres for Disease Control, an R80 million annual project that is coordinated by Dr Niresh Bhagwandin and Mrs Noluntu Funani.



### LEGAL SERVICES DIVISION

National Manager: Ms Marissa Damons

The Legal Services Division is based within the Office of the President of the MRC.

legal updates on newly passed laws affecting the MRC and its different spheres of operations as well as information such as the drafting of wills, the National Credit Act as well as the Protected Disclosures Act.

#### Transformation and Capacity Development

The development of skills as well as capacity within the legal arena is a priority within the Unit. Currently it has one legal advisor completing her LLB degree, the Division Secretary is in her second year of studying towards an LLB, and the manager has enrolled to do her Master's in Environmental Law under the auspices of the MRC Environmental Research Unit.

This Division subscribes to the transformation policies of the MRC and in terms of the criteria is regarded as being totally transformed. The knowledge and skills of staff are developed with continuous legal update seminars and training sessions in the areas of the law that are relevant and pertinent to the MRC and in the areas of speciality of each member of staff. A large part of the division's budget is consumed on this aspect. Furthermore, for the first time, each member of staff has developed a career path spanning the next three years.

#### Challenges

In carrying out its mandate, the Division is constantly faced with various challenges. One of these is ensuring that staff members operate within the legislative framework regulating the business of the MRC in an efficient and cost-effective manner. The second major challenge worth mentioning is ensuring that knowledge regarding the law is current and up to date, both within the legal fraternity and in terms of laws being promulgated, to ensure that MRC is always implementing best practice and operating within the legislative framework governing it. A further challenge is compliance with good governance principles as advocated in the leading literature in this regard in South Africa, namely the King II and soon to be released King III report on Corporate Governance.

#### Highlights

The Policy Review Report has been submitted to the EMC and thereafter to the Board of the MRC. The Division is currently in the second phase of the project, which constitutes the drafting of new policies that are lacking. The Legal Department still needs to engage with the relevant departments requiring amendments to their existing policies.

According to the productivity report rendered to the MRC President on matters filtering through to the Division, it has delivered on various high-level matters and also intervened meaningfully in terms of various labour matters and some contractual disputes.

The Division has made great strides in terms of its regional visibility and is continuously building trusting relationships with staff from the various regional offices. Ms Damons travels to the various regions periodically to attend to matters arising and staff members have an opportunity to consult with her on pressing legal matters in their various spheres of operation.

The new role of Company Secretary has been formalised but requires final approval before it can be implemented. Legal Services has appointed a new legal advisor, Mr Marlin Fransman, who is well-versed in legal practice as well as contract law and holds a Master's in IT law. He is already adding value to the department and organisation as a whole.

The Division's newsletter entitled From the Legal Chamber been very well received by staff who found it interactive and relevant. This newsletter provides staff with



Executive Management Committee



*Corporate and Public  
Affairs Directorate*

### *CORPORATE AND PUBLIC AFFAIRS DIRECTORATE*

Executive Manager: Mrs Sarah Bok

The sub-directorates implement four of the MRC's strategic objectives, namely: research translation; stakeholder management; and transformation and development.

These sub-directorates fulfil a cross-cutting service to the entire MRC, which includes intra- as well as extra-mural units/groups, international stakeholders, as well as providing support to the MRC President in strategic and operational matters.

### *MEDIA, PUBLIC RELATIONS AND SCIENCE WRITING*

The Science Writing Department edits strategic documents, technical reports and brochures; provides content for the MRC's website; edits web content, conference abstracts and brochures; and provides editorial assistance to most intramural MRC Units in relation to technical reports.

The Media and Public Relations Department has successfully advised and coordinated several media campaigns such as the microbicide gel clinical trial (HPTN 035) results in Durban, the successful launch of a telemedicine workstation

project in Botshabelo, the production and launch of the HIV/AIDS Handbook for local government at the South African AIDS Conference in Durban, the handling of sensitive information around exposure to mercury in communities living along the Inanda Dam, managing information on the 9<sup>th</sup> National Injury Mortality Surveillance System (NIMSS) Report, and has assisted reporters globally on MRC-related research. The department also held a successful in-house media training workshop with a research unit based at the MRC. In most cases, the media and public relations department has worked well with government departments and other research institutions' communication teams on collaborative research projects.

### *MRC STUDIO*

The MRC studio provides design services to its MRC clients for print, photography and video productions. Due to the nature of the demand of last minute productions, the MRC studio developed templates for the production of research posters, policy briefs and technical reports, which allowed it to produce far more projects in a shorter time. The studio also produces various MRC corporate and research publications, research posters, summary reports, policy briefs, presentations, research videos, internal communication videos, digital photography, exhibition stands and other visual materials.

## Some of our work includes

### Newsletters

MRC News; Cochrane News; MRC Grapevine; Masikhulisane.

### Reports

- a) Audit of prevention programmes targeting substance use among young people in the greater Cape Town metropole;
- b) PROMEC Cancer Registry;
- c) Cause of death and premature mortality in Cape Town, 2001 – 2006;
- d) Proceedings of the Orange-fleshed Sweet potato Symposium;
- e) Blood lead distribution in South Africa at end of leaded petrol era;
- f) Community nutrition textbook for South Africa: A rights-based approach.

### Policy briefs

- a) Sexual risk behaviour among men with multiple, concurrent female sexual partners in an informal settlement on the outskirts of Cape Town;
- b) Reducing child lead exposure: behavioural interventions in Johannesburg;
- c) Substance abuse and the young: Taking action.

### Brochures

Goodstart – Antenatal Booklet; World Diabetes Day; Indigenous Knowledge Systems; Orange-fleshed Sweet potato Brochure.

The studio also designs the MRC Annual Report and Research Output Report every year.

## RESEARCH TRANSLATION OFFICE (RTO)

This office targets communities, including learners, to enable them to see and experience the value of science in their lives. This was achieved through science promotion in schools in a number of provinces including the Eskom Expo for Young Scientists, and National Science Week (a Department of Science and Technology initiative driven by the South African Agency for Science and Technology Advancement - SAASTA) which is held annually in at least two provinces, and the Western Cape and Gauteng Departments of Health Career Expo held in Johannesburg. For the community, health exhibitions and presentations were conducted in community facilities such as clinics on health days and in conjunction with health promotion activities. These activities included: CANSA's Relay for Life; Bishop Lavis' Big Walk; Learners' Exhibition in Manenberg, and Parliamentary exhibitions. All this was done in collaboration with MRC scientists, DOH, DOE, CANSA, local municipalities and other interested groups. This office undertook to increase the visibility of the office and build relationships, and met with 35 of the 41 MRC Unit Directors.

The RTO has exhibited both nationally and internationally promoting the MRC during networking opportunities. A poster presentation on "Research Translation" was presented by Ms Sarah Bok and Ms Debra Railoun at a conference on Science and Community: Engage to Empower hosted by the Wellcome Trust during December at the Africa Centre for Health and Population Studies in KwaZulu-Natal. This conference brought together practitioners from all over the world, working in the fields of public engagement and communication of biomedical and health research. In February 2009, an oral and poster presentation was given at the African Science Communication Conference (ASCC) hosted by SAASTA in Gauteng. The RTO exhibited at the conference of the STOP TB Partnership hosted by the WHO in Rio de Janeiro, Brazil. The Stop TB Partnership's aim is to realize the goal of eliminating TB as a public health problem and, ultimately, to achieve a world free of TB.

## MRC WEBSITE

The publication section features peer-reviewed research articles and papers. The MRC's commitment to capacity development is highlighted by means of the various PhD students as well as MRC Research Day awardees. There is also emphasis on how the public would benefit from the results of MRC research. Health Awareness Days and dates have also been inserted on the site as a medium of providing information to the public or highlighting significance of Health Days.

## INTRANET

The MRC's Intranet has been re-engineered into upgraded portal technology and a study is underway to investigate enterprise-wide capturing of tacit knowledge through collaborative technologies. This is a collaborative project between Web and Media Technologies and Corporate and Public Affairs.

## CORPORATE AND PUBLIC AFFAIRS DIRECTORATE – PRETORIA



The office has taken part in events such as the recent World Tuberculosis Conference and assists the research translation office with Gauteng-based projects. As far as public relations is concerned, regular visits are made to Gauteng-based media houses to ensure that MRC-supported research is featured on local radio stations and in print publications.

## EXECUTIVE RESEARCH DIRECTORATE

Vice-President: Research:  
Dr Ali Dhansay

This Directorate consists of the following sub-directorates:

- Research Capacity Development
- Information Services Division
- Strategic Research Initiatives
- Research Administration and Management
- Diabetes Research Unit
- Management Information and Knowledge Systems Division

### INFORMATION SERVICES DIVISION

Division Manager: Ms Nomfundo Luke

#### Highlights

The Information Services Division (ISD) had a successful year in 2008, although it was not without challenges. Aside from the routine tasks related to technology in the Library, such as technical literacy training, maintenance of the online catalogue, and collaboration within and outside of the Library, the larger focus was on three primary goals: 1) better integration with Campus Computing and Networking Services, 2) a renewed emphasis on instructing personnel about the electronic resources, with an view toward greater productivity and security and 3) developing a digitisation programme.

#### Technology and Library Services

EZ Proxy is a service that provides authenticated off-campus access to selected web content for Medical Research Council staff. It is a reverse proxy system primarily intended to provide off-campus access to MRC Libraries' electronic journal subscriptions, databases, and other e-resources, which are generally restricted to access from computers on the Medical Research Council network.

#### Inter-Library Lending

Ariel provides the basis for librarians and information centres to excel in online document delivery right to the user's desktop. It assists librarians in locating free or shareware multipage viewers. The Division was chosen by the Executive Management Committee to be the holder of the corporate MRC credit card to facilitate an innovative and convenient acquisition of electronic information resources. The National Department of Science and Technology bought a subscription to the ISI Web of Science electronic database for all the academic/research libraries in the country. The MRC Library is a participant in this venture. ISD also purchased the access to the Henry Stewart Talks database which provides animated

audio visual presentations by world leading experts - advanced content in a user friendly format. The seminars are on the latest developments in biomedicine and other life sciences. Each topic has a series editor and list of participating speakers.

#### Preservation/Digitisation

A digitisation project was started. Internal procedures were created for documenting digitisation decisions and workflow for the online internal Institutional Repository.

#### Annual National Science Week

In response to the exponential growth of learners needing to be information literate, as well as an increased awareness of the growing digital divide, ISD's training team works alongside the IKS Lead Programme to deliver an Information Literacy and Skills Training Programme to South African schools. Library training was provided for African Cochrane Centre Delegates.

#### Nation Wide Information Services Training

Library staff members are on hand to answer questions and provide advice and help with information and research needs as well as academic learning skills. Electronic resources provided to staff and users on and off campus include databases, electronic journals and e-books.

## MANAGEMENT INFORMATION AND KNOWLEDGE SYSTEMS DIVISION

Division Manager: Zizi Mlonyeni

The Management Information and Knowledge Systems (MIKS) Division seeks to support and improve the quality and impact of MRC operations and outputs by providing cutting-edge competencies in information and knowledge-based systems and services.

The MIKS Division actively participates, on behalf of the MRC, at a national level in the successful implementation of the Department of Science and Technology (DST) Research Information Management System (RIMS). The open-source document management system continues to draw interest within the MRC and from external organisations. The division has finalized a records management policy and guideline which will be made available for comment to the MRC community.

The process of measuring and evaluating research units' outputs is critical for the MRC to achieve its objectives and forms an important part of the organisation's monitoring and evaluation process. The MIKS Division has for the year 2008 evaluated the following research units and their respective directors: Chronic Diseases of Lifestyle; Health Systems; Molecular Mycobacteriology; Tuberculosis Epidemiology and Intervention; Immunology of Infectious Disease; Nutrition Intervention; Health Policy; Malaria; Respiratory and Meningeal Pathogens; and PROMEC.



Vice-President: Research Office Staff



Information Services Division staff; Cape Town



Management Information and Knowledge Systems Division

*Strategic Research  
Initiative staff*



## STRATEGIC RESEARCH INITIATIVES

Executive Manager: Dr Niresh  
Bhagwandin

### Highlights

The CDC awarded the MRC an amount of US \$10 845 575 for the period 01 August 2008 to 31 July 2009 for the 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 projects under this agreement are being undertaken by, amongst others, the Tuberculosis Epidemiology and Intervention Research Unit; Health Systems Research Unit; Alcohol and Drug Abuse Research Unit; Gender and Health Research Unit and the Health Promotion Research and Development Unit.

Funded by the Department of Science and Technology (DST) and the South African Bureau of Standards, Dr Bhagwandin, as the South African Nanotechnology National Coordinator of Working Group 3: Health, Safety and Environment represented South Africa at the 6<sup>th</sup> International Organization for Standardization (ISO) Technical Committees (TC) 229 meeting in Bordeaux, France from 26-30 May 2008. He also represented the MRC at the launch of the PEPFAR funded project That's It at Bitou Clinic, Eden (Plettenberg Bay) on 06 June 2008. The Tuberculosis, HIV & AIDS Treatment Support and Integrated Therapy Programme aims to ensure that both diseases are effectively treated and managed. That's It is a collaborative programme between the MRC, the Foundation for Professional Development and the Department of Health.

At the 3<sup>rd</sup> Annual Meeting of the Pan-Asian Screening Network for Drugs for Neglected Diseases from Natural Products Workshop in Tokyo, Japan from 9-11 June 2008, Dr Bhagwandin presented two papers: "Overcoming barriers to establish and manage a network successfully" and Management of a successful network in South Africa". This trip was funded

by the Drugs for Neglected Diseases Initiative (DNDi).

The Cancer Research Initiative of South Africa (CARISA) organised a successful cervical cancer workshop in Somerset West, Cape Town on 10 September 2008. About 60 delegates from research institutions; non-governmental organisations; national and provincial government departments; and universities attended the CARISA workshop.

Dr Bhagwandin was part of a DST funded and led visit to Mauritius from 13-18 October 2008 to identify collaborative opportunities for research and development.

### Visitor highlights

Mr Jose Manuel Maria Silva Rodriguez, Director-General of Research from the European Commission, visited the MRC in Cape Town on 08 May 2008. The meeting entailed stakeholder discussions, as well as a presentation on the 7<sup>th</sup> Framework Programme (FP7) Health Call for applications. Later during the same month, Drs Hans Hagen and Lorna Casselton from the Royal Society (United Kingdom) visited the MRC to present new funding programmes. The Royal Society also proposed a working model for funding collaborations, focusing on postdoctoral collaborations; links with supervisors and mentors; and south-south mobility.

Instituto Superiore di Saniti, from Italy, technical counterparts to the MRC/SA AIDS Vaccine Initiative, was introduced to the MRC Research Capacity Development Staff to help harmonise capacity development initiatives. Prof Justine Burley from the National University of Singapore in Southeast Asia presented Singapore's fully-funded and non-bonded PhD training opportunities which have become available. South African students are eligible for such scholarships, which would be coordinated by the MRC.

Dr Regina Smith James, Medical Officer in the Division of Special Populations (US National Institutes of Health [NIH]) emphasised the NIH's support for institutional capacity development during a visit on 04 June 2008. The European Commission (EC)'s Dr Stéphane Hogan, together with (FP7) National Contact Point (NCP) Prof Iqbal Parker, delivered a presentation on the EC's FP7 3<sup>rd</sup> Health Call. Prof Sir Leszek Borysiewicz, Chief Executive Officer of the British Medical Research Council visited South Africa to meet with MRC Executives Members and Unit Directors.

A Singaporean delegation consisting of The Singapore Agency for Science, Technology and Research (A\*STAR); the National University of Singapore; and the Nanyang Technological University, visited the MRC from 6-17 October 2008. They came to explore collaborative research opportunities and inform SA student of available training opportunities in Singapore. Ms Katherine Robinson and Ms Valerie Brock from the Centers for Disease Control and Prevention (CDC) in Pretoria visited the MRC Cape Town on 10 November 2008. An MRC-CDC Workshop was held in Johannesburg on 14 November 2008 to present on progress made with CDC funding to the MRC.

## RESEARCH CAPACITY DEVELOPMENT (RCD)

Executive Manager: Dr Nonhlanhla Madela-Mntla

In 2008/9, the MRC registered 79% black, 75% females and 58% PhDs as research trainees. The Department of Science and Technology internship programme registered 68% black, 53% female and 79% PhDs. The 2008 MRC Research Day was a great success which saw a consolidation and a settling of the event on the MRC calendar. Strides have been made in 2008/09 to have historically disadvantaged institutions (HDIs) engage more with Research Capacity Development (RCD). For instance, exciting relationships have been initiated through MRC/RCD's financial support to nine researchers from the University of the North West and Walter Sisulu University. The MRC/RCD's flagship scholarship – the "Career Award" added three more recipients to the list, bringing the total of awardees in this premier award category to nine for the first time since its inception in 2003. RCD prides itself in supporting these researchers who are working on research areas that straddle both clinical and public health research.



*Research Capacity Development*

(via the Department of Health) to conduct and promote research in its own entities and to support research and develop research capacity in partnership with Higher Education Institutions (HEIs) and other research institutions are managed by the Research Administration and Research Management Divisions.

### Activities

The Research Administration Division is responsible for the provision of a professional support service to MRC researchers, as well as the health research community in the external environment in the form of administrative processes and systems to enable them to access resources for research.

The Research Management Division 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.

*Left: Research Admin and Management Staff*

## RESEARCH ADMINISTRATION AND MANAGEMENT

Senior Research Manager: Dr Sandile Williams

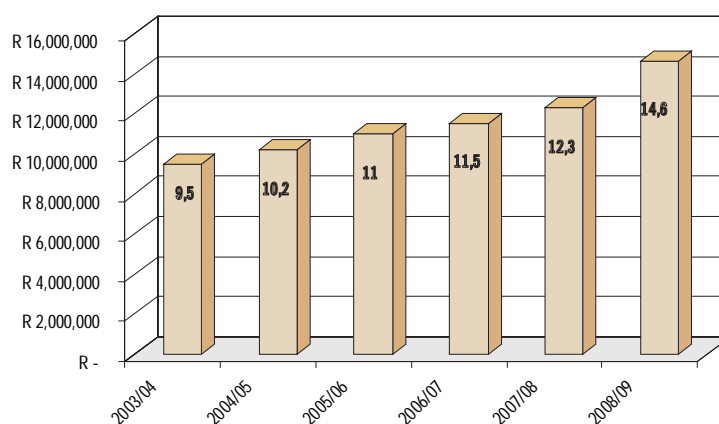


Research Administration and Management (RAM) is a sub-directorate of the Executive Research Directorate and plays a key role in the achievement of the MRC's strategic objectives. The sub-directorate consists of two divisions, namely, Research Administration and Research Management.

The baseline funds the MRC receives from government

### Self-Initiated Research Grants (SIRs)

Self Initiated Research Budget



The SIR grant is the main research category of support through which the MRC provides open competitive support for health research. These grants are predominantly accessed by researchers at the HEIs and to some extent from 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 2008/9 financial year, 145 researchers were supported in this category. This represents a slight decrease in numbers from 149 in the 2007/8 financial year. The average amount of the grants has, however, increased. An amount of R14.6 million was allocated compared to R12.3 million in 2007. (See graph on previous page.)

The demographic breakdown of the grant holders within the SIR category for the past two years is presented below:

2007/08	Gender		
Race	Female	Male	Total
African	2	5	7
Coloured	4	6	10
Indian	8	12	20
White	52	60	112
Total	66	83	149

2008/09	Gender		
Race	Female	Male	Total
African	2	8	10
Coloured	5	3	8
Indian	7	8	15
White	53	59	112
Total	67	78	145

### Support for Research Units

Research Units were supported by the MRC in 2008/9.

An amount of R16 685 290 was allocated towards the operating costs of the extramural entities which is an average of R695 220 per entity.

An amount of R10 233 131 was allocated to the intramural entities to support their general and research operating costs, which is an average of R568 507 per entity. A total amount of R27 351 181 was allocated for operating and capital equipment grants.

The table below reflects the MRC's strategic intention to balance resource allocation in favour of the external research entities.

External Entities			Internal Entities		
Amount	Number	Average Grant	Amount	Number	Average grant
R16 685 290	24	R695 220	R10 233 131	18	R568 507

The support for Units/Groups/Centres and Lead Programmes is provided on the basis of an annual submission detailing their research and operational progress and budget requests. The high quality of research and productivity of these entities is reflected in the ratings given by the Research Grants Committee: 33 entities out of 42 were rated 2+, 7 were rated 1+ and only two were rated at the same level as the previous year.

The Units/Groups/Centres and Lead Programmes are reviewed five-yearly with a view to determining whether support should be continued. During 2008/09, nine of these entities were reviewed by expert panels consisting of eminent international and national reviewers. The quality, significance and relevance of the research being undertaken is demonstrated by the fact that all of those reviewed were recommended for continuation for a further term. A further ten entities will be reviewed in 2009.

### 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 entered into by NHLSRT and the MRC, RAM acts as administrators for the applications to the Trust Fund.

The division processed and managed the peer review of 80 applications for Pathology Development Grants in 2008. An amount of R5 077 461 was allocated to 70 applicants. The NHLSRT also introduced the Pathology Research Award, with a value of R500 000 over a period of three years for established researchers and 22 applications were processed and peer-reviewed. For this category, an amount of R2 700 535 was awarded to six applicants.

The process for 2009 has also already started with a call for proposals and the receipt of 93 applications (16 Pathology Research Awards and 77 Pathology Research Development Grants).

### Conclusion

RAM has had a very busy and productive 2008 with the pre- and post-award administration and peer-review of applications in various grant categories, including Research Capacity Development grant and bursary applications. In spite of the loss of a number of experienced staff members, the remaining staff managed to deliver on their mandate.

## MRC/UWC DIABETES RESEARCH

### Highlights

#### Impact on Scientific Body of Knowledge:

Obesity is a disease and a risk factor for several chronic diseases such as type 2 diabetes, cardiovascular disease, hypertension, and some cancers. The prevalence of obesity has increased to epidemic proportions in South Africa and the world over. Given the complexity and multiplicity of factors driving the obesity epidemic, the Unit focuses on the molecular biology and biochemistry of the development of obesity and diabetes, and development of molecular therapeutics for the treatment of obesity. Our activities are centered around research into causative factors and potential interventions, as well as research capacity development.

#### Biomarker discovery:

Using proteomics technology in collaboration with the Proteomics Research Laboratory at the University of the Western Cape (UWC), we have identified several proteins that could be used as biomarkers. We are currently validating these proteins as targets that may be involved in the regulation of energy balance and body weight. We have also identified other proteins that could be used as biomarkers. This work has been completed and is being written up for publication, and has also been written up as part of the MSc thesis (NRS Sibuyi).

#### Maternal effects

We have studied the effects of modulating the maternal body weight on the postnatal outcomes of offspring in collaboration with the Cape Peninsula University of Technology. Our data suggest that the intervention we introduced exacerbated the effects of maternal body weight on outcomes of the offspring. This work was recently completed, and we plan to prepare a manuscript for publication during 2009.

#### Molecular imaging and drug delivery

The Unit is part of the Biolabels Unit of the Mintek/UWC Nanotechnology Innovation Centre. Our research is focusing on developing nanotechnology-based molecular imaging and drug delivery systems. This research work is ongoing and has attracted a number of postgraduate students to our group.

#### Capacity development:

The focus of the MRC Diabetes Research Unit in Obesity is to assist in building critical mass for the study of obesity and its associated chronic diseases at the basic molecular biology and biochemistry levels. We believe that establishment of this critical mass will assist to advance research in obesity. As a result, the detailed understanding of obesity development at the molecular level will provide an important foundation for developing the intellectual capacity for molecular drug design



*MRC/UWC Diabetes Research*

and development in South Africa. Our capacity development strategy involves training students (PhD, MSc and BSc (Hons)) who can provide a core of expertise in molecular biology and proteomics of obesity in South Africa. The Unit has a Journal Club where all the students and staff present current papers, with a strong emphasis on relevance to our work. Students attend and present their research during lab meetings. In addition, students and staff attend the seminar series of the Dept of Biotechnology at UWC. Students are also encouraged to attend scientific conferences and present their research work.

#### Funding

MRC	R218 000
ECDC	R 32 000
NIC	R 75 000

Members of the group presented at several conferences, notably the 2<sup>nd</sup> SA Proteomics and Genomics Conference held in Cape Town from 3 – 5 March 2008, at the 48<sup>th</sup> Annual Congress of the Federation of South African Societies of Pathology held on 19 - 21 July 2008, and at the Cape Biotechnology Forum held from 30 November – 2 December 2008. Two oral presentations on “Feeding high fat diet for obesity induction changes the serum protein profile in rats” and “Biomarker discovery for early detection of diabetes using urine” were given at the University of the Western Cape’s 2008 Open Research Day. Two staff members also made presentations at the first Nanotechnology Workshop held at Rhodes University, Grahamstown, in September 2008, while Mr Kwazi Gabuza gave a presentation on “What is science?” at the MRC’s Internship Workshop in April 2008.

The Unit supervised one MSc student at the University of Limpopo, and two Biotechnology Honours students at the University of the Western Cape.

## HUMAN CAPITAL MANAGEMENT AND DEVELOPMENT (HCMD)

Executive Manager: Dr Nonhlanhla Madela-Mntla

10 employees on this six months once-off contract. Positive feedback has been received regarding the shorter process. Contractors' Payroll: The year saw a welcome change in the payroll for services rendered personnel, which is a big chunk of the human resource budget running into R1million every month. This was renamed Contractors' Payroll and changed from fortnightly to monthly runs. It is used as a tool to better



*Human Capital Management and Development (HCMD)*

The partnerships and service level agreements (SLA) that have been forged through the Directorate's interaction with Research Units have laid the foundation for HCMD to play an effective internal consultancy role. HCMD, in line with the values of communication and transparency, has improved its strategy to share information on issues of interest by means of regular communiqués through the President's office as well as posting up-to-date information on the intranet. Transformation of skills and knowledge to employees include the Performance Management System, particularly the bonus allocation; promotions; reward and recognition; retention; capacity development and talent management within the research unit context; and transformation.

Challenges for the coming year include the development of the Reward and Recognition strategy, the scientific human capital development strategy and the succession planning strategy. The work of the five Divisions and the Performance Management office continues to effect positive changes in the organisation.

Recruitment Short-term contract guideline. The short-term contract guideline was developed and introduced at the end of the financial year (February) to extend options limited by changes to the Contractors' Payroll. There are currently about

control the reasons and categories of staff to be employed on short-term basis. Most of all, it has now become limited to a two-month contract that is not renewable under normal circumstances. Voluntary early retirement: The voluntary early retirement process, which was a once-off opportunity started in April 2008, saw 13 support directorate employees leave the organization, thereby bringing down numbers for this category of staff as advised by the Board. Even though the process ended officially in June 2008, some staff were allowed extensions to complete on-going projects while on the Contractors' Payroll for a couple of months towards the end of the year. Individual requests continue to be considered on merit, with the aim of moving towards reaching a desirable scientist/support ratio.

### Training and Organisational Development

The employment equity profile of the organization continues to mirror the demographics of the country on the surface, though specific areas lag behind others as far as transformation is concerned.

### Accelerated Development Programme (ADP):

The objective of the Programme is to develop targeted

employees to be competent in their current positions and to prepare them for future research leadership positions in line with the Succession Planning Strategy of the MRC. In line with the MRC Employment Equity Strategy of developing all black and female employees, the focus of development during the current year was extended to the professional support staff where a need for the development of management skills was identified. Twelve employees from this group were approved to attend the Management Development Programme (MDP) and 15 attended the New Management Development Programme (NMDP) at the University of Stellenbosch Business School.



### Employment relations

Conditions of service have undergone a major revision through a consultation process with all key stakeholders. Engagements with staff in the regions were particularly stimulating. It is envisaged that these will shape the final conditions once all inputs have been considered for integration. The revised conditions will be implemented as soon as all key structures of the organization have reached agreement. One of the exciting changes the revised conditions will bring is a once off opportunity for employees to cash in some of their leave days at a percentage higher than usual.

Contracts: With some contract projects coming to an end, a number of employee negotiations and redeployments were necessary. One of these was the closure of the Hlabisa unit, which brought along a number of staff dynamics, but these have been dealt with effectively.

Career advancement: Approval was received for the reintroduction of a job evaluation system which will determine the relative values of all jobs in the organization for purposes of implementing appropriate rewards. Through consultations with Unit Directors regionally, it was established that most of them are still in favour of returning the JExpert system, into which they had already invested energy for three years but the system was phased out before they could test its usefulness. Moving forward, customization workshops have been scheduled to build the current career development criteria into the JExpert system so customised systems can be used for evaluating all jobs. Concurrently, the job evaluation exercise that started in 2007 will continue until all the jobs in the MRC have a reliably established job grade which will be used as basis for considering fair remuneration, recruitment and promotion.

Employee Wellness Programme: The framework is due for revision in line with all other HR policies so that it is comprehensive enough to cover most work-life areas. This will build on the current Workplace HIV/AIDS Programme. An Employee Wellness Forum is in the process of being

established to act as an advocacy group on issues of employee wellness. Regional Bestmed Health Days are on the cards once again for this year.

### Performance Management System

In 2008, the MRC implemented the Revised Performance Management System. The implementation did not go very well which resulted in proposals at the Strategic Planning Session of 2009. These included the formation of a representative working group which was tasked with identifying problems encountered and ways of dealing with them or improving the system. The group met in February and concluded that the system as it stands did not have major problems, but implementation needed attention.



## MRC EE PROFILE AS AT 31 MARCH 2009

		FEMALE %			
		1997	2008/9	Current SA EE Statistics	2009 Targets
Executive Management	Level 1	12.5	20	21	20
Senior Management	Level 1	22.0	48	27	38
Middle Management	Level 2	53.8	68	36	57
Junior Management	Level 3	74.3	75	36	76
Semi-skilled	Level 4	79.4	70	33	69
Unskilled	Level 5	47.6	46	29	54

		BLACK %			
		1997	2008/9	Current SA EE Statistics	2009 Targets
Executive Management	Level 1	25.0	80	22	80
Senior Management	Level 1	13.0	42	27	52
Middle Management	Level 2	15.0	58	37	55
Junior Management	Level 3	42.4	87	58	66
Semi-skilled	Level 4	55.5	98	83	79
Unskilled	Level 5	95.2	99	90	99

DISCIPLINARY HEARINGS	
Number	Action
5	Dismissals
8	Written Warning

## TECHNOLOGY AND INNOVATION DIRECTORATE

Executive Director: Prof Petro Terblanche



*Technology and Innovation*

The MRC Technology & Innovative Directorate (T&I) operates in full alignment with the MRC Strategic Priorities. The T&I core function is the strategic management of innovation. The vision and drive of this directorate is to translate MRC research into products which will make a difference to the health of the people of South Africa and beyond.

To ensure delivery on the strategic management of innovation, T&I has been designed to include the following platforms:

- Innovation Centre, headed up by Prof Tony Bunn which forms one of the core functions to manage intellectual property (IP) and technology transfer within the MRC.
- Diabetes Discovery Platform whose core function is to develop a pipeline of therapeutics for diabetes and new markers for improved diagnosis of diabetes, headed by Dr Johan Louw.
- Primate Unit, with its Delft satellite headed up by Dr Jurgen Seier, boasts an internationally recognised animal research facility which supports local and international scientist and organisations with pre-clinical research programmes.
- eHRIP, currently managed by Prof Tony Bunn in an acting capacity to develop and apply ICT technologies for health solutions.

## MRC INNOVATION CENTRE

Director:  
Prof Tony Bunn

The MRC Innovation Centre (IC) provides an intellectual asset and innovation management service that goes beyond technology transfer and includes research and development (R&D), strategic IP management, commercialisation, fund raising, incubation and capacity development. Within the context of national innovation imperatives, the IC has been and continues to play a vital role.

While it has been recognised that the translation of MRC research into novel and sustainable health solutions is key to realising the mission of the MRC, until recently, the IP management and commercialisation functions of the IC have been “nice-to-haves” for the MRC. However, with the passing of the Intellectual Property Rights from Publicly Funded Research & Development (IPRPF RD) Act into legislation in late 2008, the MRC now has a legal obligation to address these functions adequately. Fortunately, the IC is well-established and already fulfils the necessary criteria to ensure the effective management and exploitation of IP developed using public funds.

### Highlights

The main highlight of the past year was the recognition of the MRC’s innovation excellence through its achievements in the Technology Top 100 (TT100) awards, also referred to as the “SA Technology Oscar awards”. The MRC and Sasol jointly won in the category for Excellence in the Management of Research. The MRC was also among the finalists recognised in three categories: Excellence in the Management of Innovation, Excellence in the Management of People and Excellence in the Management of Systems.

In November 2008 the IC held an internal workshop to redefine its strategy, procedures and activities in order to better serve its clients, namely MRC scientists. As a result, the IC has developed improved procedures for the effective protection, management and exploitation of IP and for decision making in this regard. In addition, the IC has developed strategies for increasing its project pipeline, forging closer relationships with MRC Units, improving cooperation with other MRC support Units, and increasing collaboration with external stakeholders.

As an incubatee of the IC, the spin-out company, Gknowmix (Pty) Ltd, had a very successful first year of operation in the delivery of an innovative, pathology-supported genetic testing service to health professionals. A strategic alliance has also been formed with the largest independent developer and supplier of electronic patient records in South Africa so as to provide the Gknowmix offering to a broad



*Innovation Centre Staff*

grouping of medical doctors. The MRC has licensed certain technology to Gknowmix and is assisting the company with business development.

The start-up company, Femipap (Pty) Ltd, has also been formed to commercialise a cervical self-sampling device. Funds have been secured from the Innovation Fund Patent Support Fund for SMEs to progress the company. The MRC is concluding a royalty agreement with Femipap in the event of successful commercialisation.

The IC was instrumental in being awarded third place for the IKS Unit's anti-malarial project in the Emory Business Plan Competition. As a result, project team members will undertake business internships in the USA during 2009.

In September 2008, the IC co-organised and participated in a workshop on commercialisation strategies for traditional and herbal medicines in Geneva, together with the University of Neuchatel and representatives from local and international organisations prominent in the field.

The IC played a major role in the establishment of a Medical Device Innovations Special Interest Group and in the organisation of a symposium on medical device innovations. These initiatives have resulted in the establishment of a Medical Devices Centre of Competence (MDCoC) to ensure closer collaboration between stakeholders involved in the development and commercialisation of medical devices in the country.

### Capacity development

While the IC's primary responsibility is to MRC researchers, as the leading centre for health innovation in South Africa, the IC is extensively involved in capacity building and education of MRC researchers and other research organisations in IP management

and technology transfer (TT), through workshops and other forms of information sharing. Members of the IC have been involved in a number of national capacity building activities, including a workshop for TT professionals (under the auspices of the Southern African Research and Innovation Management Association, SARIMA) aimed at sharing experiences and forging closer relationships between the technology transfer offices (TTOs) in South Africa. This workshop resulted in the development of a national TT Committee which will address common TT-related issues, facilitate collaboration between TTOs and promote capacity building within the sector. Staff also facilitated the development of information resources for innovators under the auspices of SARIMA; established a local chapter of the Life Sciences Committee of the Licensing Executives Society International; and organised seminars on life sciences licensing issues in SA.

### External Funding

R1,537,361

### Science Communication and Research Translation

Three members of the IC presented papers on the commercialisation of traditional medicines at a joint seminar with the University of Neuchatel in Geneva in 2008. The papers will be published in a book on traditional medicines co-edited by members of the IC.

In addition, members of the IC delivered presentations at the following events: UCT Biotechnology seminar series, and the Association of University Technology Managers (AUTM) Annual Meeting 2009, Orlando, USA.



## DIABETES DISCOVERY PLATFORM

Director: Dr Johan Louw

### Highlights

**Drug Discovery:** The Diabetes Discovery Platform is a dynamic discovery platform that specializes in the development and biological assessment of drugs and disease markers in diabetes. The Platform has completed the treatment, toxicity development and research plan of drug candidates for diabetes treatment. Scientists have established proof of concept for: potency to reduce plasma glucose at least as good as existing best therapy; oral mode of delivery; favourable side effect profile; and possibly novel mechanism of action. The Platform, in collaboration with an external partner, isolated and synthesized an active chemical compound from a drug candidate for diabetes treatment. Data from cell glucose uptake studies and diabetic animals have shown that the synthesised active chemical compounds are extremely effective at improving glucose uptake in cell lines, lowering blood glucose levels and inducing neogenesis of the beta cells in diabetic animal models. Scientists have completed two toxicity studies in rats to establish the safety of two other drug leads. Initial results from the active compounds showed that the compounds are performing as well as, and are comparable with other commercially available oral prescription drugs like metformin. Studies around the mechanism of actions of the active chemical compound are underway.

**Developmental programming:** High saturated fat exposure in early development programmes the physiology and metabolism

of progeny which is evident immediately and later in life. This environmental insult is implicated in the pathogenesis of diabetes, insulin resistance and cardiovascular disease. Furthermore, the programming concept is of great relevance to South Africa as there is rapid urbanisation which is concomitant with high dietary fat intake, and reduced physical activity has resulted in an increase in the incidence of type 2 diabetes. The Platform has mostly published on developmental programming and the pancreas (islet biology) and has recently extended this research to include other key organs, namely the liver, skeletal muscle, brain and heart. Other research highlights from the Platform include demonstrating the adverse effects of high fat programming on beta cell development and function in young offspring. Furthermore, scientists have found changes in key factors implicated in diabetes in the neonatal liver and brain. Further studies aim to elucidate the mechanisms that induce these changes.

### Capacity development

At the Diabetes Discovery Platform Workshop, Prof Luc Bouwens of the Free University of Brussels presented several papers and practicals on "Pancreatic islet and duct isolation". Ms Sithandiwe Mazibuko and Ms Samira Ghoor completed the Essential and Real-Time PCR short courses, hosted by DNA Biotech in Pretoria. Ms Charna Chapman attended a workshop on Laboratory Safety, Productivity and Quality Management. Dr Carmen Pfeiffer completed the Management Development Programme at University of Stellenbosch (US)'s Business School. Ms Nireskhi Chellan obtained her BSc Honours (Morphological Sciences) cum laude at US. Ms Mazibuko completed her BSc Honours (Biochemistry) at the University of Zululand. Ms Candice Roux obtained her BSc Honours (Morphological Sciences)

at US. Ms Ghoor obtained an MTech at the University of Johannesburg. Ms Clarissa Kruger obtained an MTech from Cape Peninsula University of Technology.

**External Funding**  
R3 494 385

**Science Communication and Research Translation**

Prof Luc Bouwens from the Free University of Brussels delivered a lecture entitled "Expanding, regenerating or replacing the beta cell mass" at the MRC. Dr Marlon Cerf presented a paper entitled "Type 2 diabetes: A complex, multifactorial metabolic disease" at a 2008 National Women's Day event held at Kenilworth Racecourse in Cape Town. In November, 2008 Dr Cerf presented a paper on Type 2 diabetes on "Current local and overseas research" at the World Diabetes Day event arranged by the Diabetes Society of South Africa in Cape Town. Dr Cerf and Dr Johan Louw contributed a book chapter on high fat-induced programming of beta-cell development and function in neonatal and weanling offspring, for the book entitled Developmental Programming of Diabetes and Metabolic Syndrome. The Platform contributed to the scientific community by producing nine peer-reviewed scientific articles, serving on editorial boards and reviewing manuscripts for journals.

**PRIMATE UNIT AND DELFT ANIMAL CENTRE**

Director: Dr Jurgen Seier



*Primate Unit and Delft Animal Centre, Cape Town*

**Capacity development**

Two staff members are PhD students (both females, one African black) and one extra-mural African black male Honours student. One unqualified staff member trained to a level where she is now enrolled in a course to obtain a full National Diploma in Lab Animal Technology.

**Funding**  
R327 007





*eHRIP staff in Cape Town*

## EHEALTH RESEARCH AND INNOVATION PLATFORM (EHRIP)

Interim Director: Prof Tony Bunn

The major eHRIP activities over the past year have been focused on the formalisation of the structure, and co-ordination between the activities of the following four entities which constitute eHRIP: Biomedical Informatics Research (BIRD); Health Informatics R&D Co-ordination (HIRD); Telemedicine (TLP); and Web and Media Technologies (WMT). eHRIP Objectives are to promote and conduct research and technology development; apply technological innovations to research practice; contribute to the future of e-Health in Africa and beyond; foster and develop collaborations and relationships internal and external to the MRC; attract funding to ensure sustainability; develop flagship projects; develop appropriate capacity and skills; and re-skill and repackage the team.

### HEALTH INFORMATICS R&D CO-ORDINATION DIVISION (HIRD)

Division Manager: Ms Lyn Hanmer

#### Highlights

Ongoing projects include evaluation of health information systems in hospitals and clinics, and participation in health information standardisation processes in public and private sectors. Lyn Hanmer participated in the first phase of a national review of health information systems being conducted under the auspices of Statistics South Africa and the National Department of Health.

#### Capacity development

Lyn Hanmer has submitted her PhD for examination at the University of Cape Town. Her thesis was entitled "Factors associated with the successful implementation of computerised hospital information systems in South Africa". Vincent Horner has registered for a PhD at the University of Pretoria. His PhD internship is funded through the DST Professional Research Development Programme. One Scientist post is vacant following the resignation of Lulama Dikweni in June 2008.

#### Science communication and research translation

One paper was presented at the 2008 Health Informatics for Southern Africa conference in Durban in June. One presentation was made at the Espresso Workshop of the University of Pretoria in September 2008, and a poster was presented at the MRC Research Day in October 2008.

### WEB AND MEDIA TECHNOLOGIES (WMT)

Division Manager: Ms Hendra van Zyl

#### Highlights

Projects of the WMT have successfully been aligned to eHealth approaches focusing on product development and research translation through a convergence of ICTs. AfroAIDSinfo, an AIDS information portal, remains the flagship project of the WMT with an online presence at [www.afroaidsinfo.org](http://www.afroaidsinfo.org) where monthly articles are published for each audience, going through an editorial process, and monthly eNewsletters are circulated to all the registered users. Currently there are 2414 registered users in AfroAIDSinfo. This project with its online presence and many spinoff sub-projects remains critical for transferring research knowledge to its various audiences. A unique eLearning project has been initiated between a township school in the Western Cape and a public school in Ireland, following a pilot project. This programme consists of eLessons and interactive assessments followed by a collaborative phase in which the learners develop HIV brochures. This is an innovative eHealth application utilising the sophisticated features of portal technology as learners are working in a secure area of which other visitors are unaware. As a spinoff from AfroAIDSinfo, a new product, the HIV Peer Education Training course, was compiled and received international accreditation. A study to evaluate its impact in an educational as well as community environment is underway.

The MRC's Intranet has been re-engineered into upgraded portal technology and a study is underway to investigate enterprise-wide capturing of tacit knowledge through collaborative technologies. Based on collaboration with the Gender and Health Research Unit's Sexual Violence Research Initiative (SVRI), a consumer health informatics



*eHRIP staff in Pretoria*

study to evaluate ICTs deployed in the project has been completed and results were published on the SVRI Web site at [www.svri.org](http://www.svri.org). The second phase of the ATM Registry (AIDS, TB, Malaria) for clinical trials in Africa has been completed for the Cochrane Centre. Further integration with the Technology and Innovation platforms has resulted in a web portal that was developed for the Diabetes Discovery Platform running in a secure environment, as well as a website for its projects.

### Capacity development

The innovative use of ICTs for eHealth solutions is a major focus area and as such it is an ongoing challenge to recruit appropriately skilled staff. Capacity development therefore forms an integral function within WMT. Where necessary, existing staff have been retrained, coached and successfully redeployed in research technologist positions. MRC-supported studies included that of Janus Snyders who completed a Bachelor of Education (ABET) Honours degree in 2008, and is now enrolled for a Master's in Education (Didactics). The title of this thesis is 'The development of a radio to public knowledge transfer model for the facilitation of health information to community radio station listeners'. Kedibone Aphone is pursuing a research Master's at the University of South Africa. The title of her theses is 'Assessing the appropriateness of an expert to student knowledge transfer model in a tertiary setting'.

### Research translation

Workshop and oral presentations were made at SAASTA's 2<sup>nd</sup> African Science Communication Conference held in February 2009; the 4<sup>th</sup> SA AIDS Conference held in Durban from 31 March – 4 April 2009; and the HISA 2008 conference held in June 2008. The following websites were newly developed as

a result of collaboration with various MRC Units and external organisations: TB Colloquium Website; SVRI Forum 2009 website; MRC Research Day Website; Professional Assistants Forum (PAF) Website; reengineering of the Intranet portal; legal services were added to the Intranet; Conference Centre Website; PHASA Website; PAEMS 2008 Website; Support Collaboration Website; and Reengineering of the Sexual Violence Research Initiative Website.

### External funding

R612 779,00

## *BIOMEDICAL INFORMATICS RESEARCH DIVISION (BIRD)*

Division Manager: Dr Chris Seebregts

BIRD participated in the conference organised by the Rockefeller Foundation entitled 'Making the eHealth Connection'. An outcome of this was an invitation to submit a grant for Developing an Open Enterprise Architecture for eHealth in Developing Countries. BIRD participated in the Steering Committee meeting of the American Medical Informatics Association (AMIA) International Training and eLearning Initiative and the formulation and submission of a grant proposal to improve capacity on African countries. The division also helped to organise the 14th International Bioinformatics Workshop on Virus Evolution & Molecular Epidemiology in Cape Town from 1 – 5 September 2008, as well as a successful workshop on HIV drug resistance. BIRD hosted the third OpenMRS Implementers Meeting in Durban during June of 2008 in collaboration with the Health Informatics in Southern Africa conference. OpenMRS is a highly-successful open source medical record system



*Biomedical Informatics Research  
Division in Cape Town*

that is widely used in Africa. BIRD is a member of the core management team of OpenMRS.

### Capacity Development

BIRD continued the development of a medical informatics unit at the University of KwaZulu-Natal and mentoring students for an M.MedSc and MPH (medical informatics) degrees. BIRD also appointed seven new staff members, four of whom are funded from research grants.

### External Income

R13 280 460

### Science Communication and research translation

BIRD published three peer-reviewed articles over this period and delivered 14 invited presentations.

## TELEMEDICINE PLATFORM

Division Manager:  
Ms Jill Fortuin-Abrahams

### Highlights

The MRC has been instrumental in the design, development and production of a telemedicine workstation together with the University of Stellenbosch. The workstation has been rolled out to the Free State Province following a major funding injection by the MTN SA Foundation. The MRC/MTN collaborative

project was launched on 12 March at Botshabelo Hospital in the Free State by the then Deputy Minister of Science and Technology, the Honourable Mr Derek Hanekom; the Premier of the Free State, the Honourable Ms Beatrice Marshoff; MRC President, Prof Anthony Mbewu, Chief Corporate Service Officer, Mr Mr Zolisa Masiza, and MRC Board Vice-Chairperson, Prof Solomon Rataemane. MTN SA Foundation's Senior Manager, Ms Angie Maloka, would like to see this initiative grow thereby enabling health care delivery. Over the past year, the KwaZulu-Natal Telemedicine Strategy Project has taken shape and a range of telemedicine equipment has been deployed to rural hospitals throughout KZN. As part of the SA/China Collaborative project, the Chinese government hosted a training workshop attended by 26 international delegates from countries such as Pakistan, Vietnam, Cambodia and Mongolia. Included in this group were 18 South African delegates representing the provinces of Mpumalanga, North West, Free State, Western Cape, Gauteng, KZN and Limpopo. The purpose of the training course was to disseminate theoretical and practical skills regarding telemedicine, as well as to obtain insight into the success of Telemedicine in China. SUNPA Image Tel Tech Co. Ltd and Telemedicine MRC were instrumental in the success of this course which will now become an annual event.

### Science communication and research translation

Dr Moretlo Molefi presented a poster titled "South African Telemedicine" at one of the largest telemedicine conferences in the world, Med-e-Tel. The telemedicine workstation and other relevant literature was exhibited at the SA AIDS Conference held at the International Convention Centre from 31 March - 3 April 2009. Jill Fortuin-Abrahams participated in a live television interview by Neo Motaung on 11 July 2008 as part of the Health Issues show on SABC International. The interview's focus was the benefit of telemedicine for Africa. In addition, another live interview featured on the news of SABC International on 16 March to highlight the Telemedicine launch that took place on 12 March 2009. Jill Fortuin-Abrahams was also interviewed on SABC radio about the MTN/MRC Telemedicine Launch.

### Capacity Development

Ms Jill Fortuin-Abrahams is studying towards a PhD and successfully completed the Managers Development Programme for which she was awarded the "top group award" for business plan drafted and presented. Mr Ashley Bess completed various telemedicine courses through the University of Virginia Health System, the University of Arkansas for Medical Sciences and a training workshop in China over the past year, as did Ms Muriel Koopman.

### External income

R 3 299 135

Telemedicine Platform staff in Cape Town





*Finance Staff*

## FINANCE AND CONTRACTS DIRECTORATE

Executive Director: Mr Bulelani Mahlangu

The MRC has achieved another unqualified audit report, which is particularly significant considering the complexities of some of the transactions. For some time now, the MRC has taken on Finance Interns from the Universities of Technology, and this has provided a number of students with very valuable practical experience.

The role of the Operations Division ought to be acknowledged, as processing starts from this end. A Request for Proposal process was run and KPMG has been appointed as the internal auditors, with effect from 1 April 2009.

After three years of very intensive discussions and audits, SARS has reversed an assessment of R11 million, previously provided for, in respect of VAT relating to government funding. The Finance Directorate also performs the secretariat function for the Risk and Audit, and Finance Committee meetings. At any point in a financial year, the MRC handles more than 200 research contracts. Apart from research deliverables, these contracts come with very onerous requirements in terms of reporting and audits. Apart from the audit by the Auditor-General, various audits are conducted during the year in respect of different contracts. This year the MRC managed – for the first time – to do the A133 (USA audit requirement) on

some of the big projects from the National Institutes of Health and other funders.

The MRC has invested in the money market in order to maximise its interest income. Our call account investments are spread between CPD (Corporation for Public Deposit) and some of the ‘big four’ banks. Daily call investments are through CPD, and six-month investments are through the banks.



*Contracts and Budgets*



Senior Managers from the Operations Directorate

## OPERATIONS

Executive Director: Mr Zukile Vokwana

The Division's mandate is to provide and maintain the professional infrastructure services for research and support programmes in order to attain MRC's mission. Some of the many significant system improvements achieved during the 2008/09 financial year are highlighted below:

### Travel Management

A Proposed new Travel Management System is expected to be implemented in second half of 2009. The system is expected to significantly contain travel costs.

### Emergency electricity supply

An upgrade of the electricity infrastructure and back-up system is currently underway for Medicina premises where two 400 kVA generators will be installed and are estimated to be fully operational by October 2009. Upgrades for other regions are expected to start early in 2010.



Operations officials



Switchboard

Below: Operations staff from Cape Town, Durban and Pretoria



### Risk Management

MRC risks are managed through several avenues, such as comprehensive insurance and preventative maintenance.

### Maintenance and refurbishments

- General and preventative maintenance is undertaken throughout the year.
- A down-blow air conditioning system for the server room at Medicina has been installed.
- An IT disaster recovery site has been established and is operational at the MRC RIND Building in Cape Town.

### Security

- Several incidences of security breaches were recorded at the Medicina buildings. Plans to improve security include the installation of CCTV cameras and improving the access control system.

### Proposed future projects include the following:

- An upgrade of the telephony system and/or migration towards Voice Over Internet Protocol;
- An online requisition system;
- Implementation of the Supply Chain Management Unit.

## SAFETY, HEALTH AND ENVIRONMENT (SHE)

The MRC adopted an integrated approach to SHE in 2008. Regular meetings with the President, Vice-President and Director of Operations were held to address pertinent SHE issues pertaining to operations and research. This integrated approach ensures the infusion of SHE Management into the organisational culture and progress through continuous improvements. In 2008, the regional MRC Emergency Response Committee consisting of a SHE Committee, first aid team, emergency evacuation team and fire team held evacuation drills in compliance with statutory requirements.

Risk assessment and management, strategies, training and the development and review of standards and procedures to eliminate and control risk continued to ensure continuous improvement. A process of SHE performance management was started in 2008 with the identification of key result areas to be included into the performance contracts of managers. This process will be ongoing.



*MRC Conference Centre and Event Management Office*

**MRC CONFERENCE CENTRE AND EVENT MANAGEMENT OFFICE**

Division Manager:  
Ms Mandy Salomo

The MRC Conference Centre and Event Management Office (MRC CC & EMO) reside in the Operations Division. This staff complement comprises two permanent and eight contract personnel, responsible for managing the Conference Centre and requested events for both internal (MRC) and external clients, and generating income for the MRC.

The Event Management Office (EMO) facilitates events such as conferences, seminars, symposiums, meetings, workshops, etc. These events do not necessarily take place at the MRC-CC, but also at other national (Botshabelo, Johannesburg, Durban, Mpumalanga) and international (Tanzania, Burkina Faso, Cameroon) locations.

The Conference Centre (CC) is a preferred venue for Imbizo's/presentations/workshops and events, and focusses on the untapped health and science sectors such as DOH, DST, and other health institutions/organisations. A number of high-profile international and organisations are already making use of the MRC CC & EMO on a regular basis, including EDCTP, WHO, PHASA, SVRI and others. Feedback received indicates that there is a strong prospect for future business from these clients and others.

Fifty three percent of the MRC-CC and EMO usage is for medical and scientific related events, organised by entities such as MRC, Dental Association of South Africa, AlphaPharm, University of Johannesburg and University of Stellenbosch.

Although faced with several challenges, this office managed to raise sufficient funds to upgrade and maintain its facilities to that of best standards in the industry. Currently, this office is ring-fenced, but its target is to become an income-generating business unit within the MRC.

**INFORMATION TECHNOLOGY SERVICES DIVISION**

National Division Manager:  
Mr Patrick Charls

In line with its commitment to facilitate administrative processes, the Division has implemented an electronic version of the MRC's Key Performance Indicator (KPI) Report. Various organizational benefits have been achieved with this process. Monitoring the progress or performance of various KPI activities can now be done regularly, and each KPI owner is able to update the performance of their KPI activities at regular intervals if required. The result is beneficial for management information regarding KPI activity performance. A facility to add supporting documentation against each performance is also available. Once the KPI report is due and all KPI owners have completed the performance of their KPI's for the period, the system will produce the completed KPI Report. A list of the 71 KPI's together with the timeframe, targets and responsible persons are available electronically as well.

The installation of a new storage area network (SAN) was installed on our Cape Town site in order to accommodate the rapid growth in email and disk storage requirements. We started a server consolidation process using VMware which has enabled us to reduce the number of physical servers by over 25% over the last year. It is anticipated that it will reduce by even more in the future, leading to significant savings in maintenance costs.



*Below:  
Information Technology staff, in Cape Town, Pretoria and KZN.*

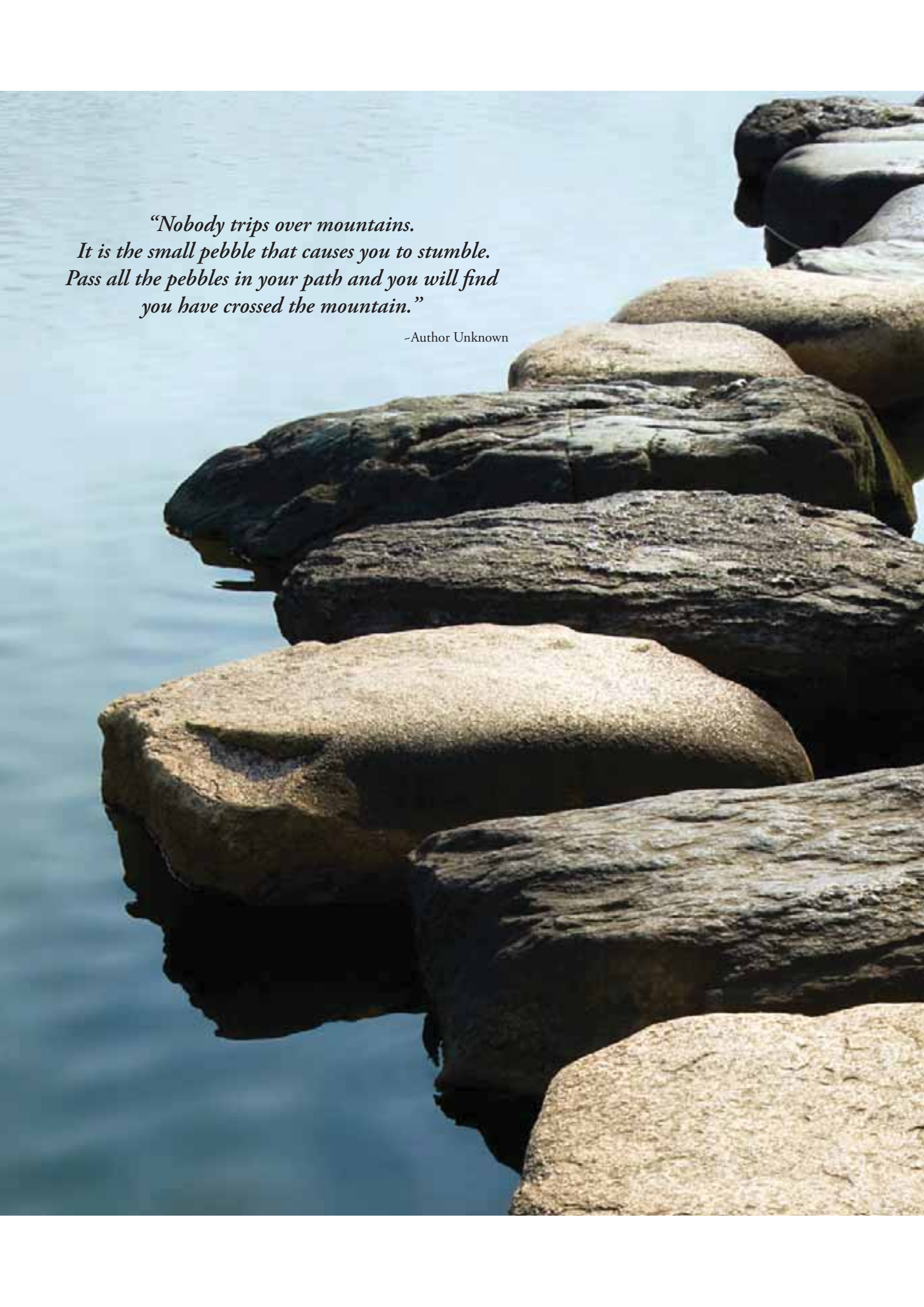


*Pretoria*



*KZN*



A row of large, smooth, light-colored rocks extends from the foreground into the ocean. The rocks are stacked and appear to be part of a natural formation or a breakwater. The water is a deep blue, and the sky is a clear, light blue. The lighting is bright, suggesting a sunny day.

*“Nobody trips over mountains.  
It is the small pebble that causes you to stumble.  
Pass all the pebbles in your path and you will find  
you have crossed the mountain.”*

-Author Unknown



# KEY PERFORMANCE INDICATOR REPORT

The Key Performance Indicator Report (KPI) of the MRC is organised according to the five perspectives of a modified balanced scorecard:

1. Internal processes - research strategy and Business Plan  
- Opportunity and Risk Management
2. Financial and Investment - Financial Strategy
3. Innovation, Learning and Growth - Capacity Development
4. Stakeholder and Customer Focus -Innovation and Technology - Informatics and Knowledge Management - Research Translation - Stakeholder Management
5. Transformation - Transformation and Development

## 1. RESEARCH STRATEGY AND BUSINESS PLAN

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Produce new knowledge through conducting research	Peer-reviewed publications	5% increase 2008 (2007 : 676)	+	5% increase : 706 (30 more than in 2007)
Productivity	Peer-reviewed publications in journals and books per senior scientist	5% increase 2008 (2007 : 2.00)	++	50% increase : 3.0 (236 senior scientists : – 114 intramural – 122 extramural)
Improve quality of publications	Impact factors and citations	Variable	-	Still to be measured
	Percentage in international journals	2% increase (2007 : 87%)	-	82%
Research Projects in Units	Number in 43 Units	5% increase 2008 : 441 (2007 : 420)	++	556 research projects (32% increase)
Contracts and Grants funded	Number of projects	5% increase 2008 : 196	++	57% increase : 293
Self-initiated research projects	Self-initiated Projects	10% increase 2008 : 165 (2007 : 150)	-	133
Restructuring of MRC research entities	Restructuring complete	3 NCRPs	+	3 NCRPs
Strategic review of 43 Units	Recommendations implemented	43 Units reduced to 40	+	40 Research Units
Establishment of new National Collaborative Research Programmes (NCRPs)	Two new NCRPs : Cardiovascular and Metabolic Disease African Traditional Medicines and Drug Development CARISA – Cancer Research In South Africa (established 2007).	2 new NCRPs	+	2 new NCRPs : CVD and ATM
National and international Collaborative Research Programmes	Number of new agreements	8 – 10 p.a.	++	97 in total
Five yearly MRC Unit Reviews	Unit review report (align this process also with PM system)	12 in 2008	+	12 reviews in 12 months
Research Integrity Office	RIO in place	Established	+	Functioning RIO
Improve quality of research	A-rated scientists	4	+	5 : Opie, Brombacher, Noakes, Pettifor, Vaughan
	B-rated scientists	4	+	4
	P-rated scientists	4	+	4
	Wellcome Trust Fellows	3	+	3
	NIH 'RO1' projects	3	+	3
International recognition of scientists and support staff	Technical Advisers Committees	Number	+	Academic Health Science Centres in the UK, WHO Research Strategy etc
Capital equipment expenditure	Expenditure on capital equipment	Increase	+	R16.9 million (R3 million in 2007)

## 2. FINANCIAL STRATEGY AND BUSINESS PLAN

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Grow global MRC budget	Increase (%)	Increase to R530 million (R104 023 000 (30%) increase in 2007 to R457 million)	+	R34 million (7%) increase to R531 million
Grow baseline budget	MTEF increases	R6.65 million (3.5%) increase (R22 938 000 (15%) increase in 2007)	++	R17 million (9%) increase
Grow external income : - total external income	Increase (%)	R320 million (20%) (R82 021 000 (42%) in 2007)	-	R282 million (+ R3 million) (1% increase)
- government contracts	Increase (%)	20% increase (R12 731 488 (55%) increase in 2007)	++	R35 815 585 in 2008 : increase of R12 667 425 (55%) (R23 148 160 in 2007)
- international grants and contracts	Increase (%)	R50 million (15%) (R6 059 318 (3%) increase in 2007)	+	R3.27 million (1%) increase
Leveraging of baseline funding	Ratio of external income to total income	55%	+	58% ratio external income to total income
Commercialisation income	Income	R3 million	+	R3.8 million
Salary expenditure	Gap with market	5%	-	10 - 15%
	Salary roll baseline staff (ratio to baseline budget)	R135 697 741 (69% or less)	+	53% of baseline budget is spent on salaries of baseline staff
	Salary roll total staff (ratio to global budget)	R158 584 266 (35% or less)	+	R158 000 279 (33%)
Implement full cost recovery model	Costing model working	Working cost recovery system	+	Partially working system
Improve contract database	Working electronic database	90% of contracts (by value) in the system	+	Electronic database working
Develop expanded contingency reserve : retrenchment fund	Contingency reserve	R3.5 million	++	R20 million reserves
Restructure MRC budget to spend more on research	Overhead ratio : • on baseline budget • on global budget	32% (29% 2007) 12% (14% 2007)	++ +	27% 13%
	Percentage changes in budget : • support directorates	- 2% (R62 390537) (- 8% to R63 772 762 in 2007)	-	+ 7% (R70 395 736)
	• research	+ 8% (R10 807 224) (+ 14% in 2007)	+	+ 11% (R163 346 826) (+ R17 722 000)
	• capacity development	+ 16% (R1 750 393)	-	+ 8% (1 000 000)

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Reduce professional support staff numbers	Restructure support directorates	Ratio to total staff 14% (120 professional support directorate staff ) (21% (180) in 2008, 24% (207) in 2007	-	20% (162 professional support directorate staff out of 817 staff)

Result : - means target not achieved

+ means target achieved

+ + means target exceeded

Overall 121 out of 148 key performance indicators were achieved or exceeded – i.e. 82%.

## 3. OPPORTUNITY AND RISK MANAGEMENT

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Managing Funders' interest Investigate the risk around the funding mix	A funding model	Working	+	Working funding model
Use MRC reserves to renew and refurbish the organisation	Rand value of reserves	R5 million	+	R20 million used for IT, painting, capital equipment etc
Corporate governance Performance management system linking strategy to individuals' KPIs	A Business plan that links to individual performance contracts	All staff using new system	+	New system introduced
Develop and implement a procurement policy addressing BEE; supply chain etc	Policy complete	35% BEE by April 2009	-	Work in progress
Implementation of the office of the Company Secretary to advise the MRC Board and act as custodian of ensuring and implementing good governance practices	Comprehensive Board Induction and Duties of Directors and Board Members.	Active	+	Training introduced
	Implementation of Board Evaluation	Evaluation begun	-	Still to be done
	Revision of Code of Conduct for Board Members and declaration of interests	Declarations made	+	Declaration complete
Board Committees	Effective Committees	Effective Committees	+	Effective Committees
Risk management Risk working group	RWG functional	RWG active	+	RWG active
	Fraud committee working and reporting to Audit Committee	Active Fraud Committee	+	Complete
	Fraud Strategy and/or policy	Successful Implementation	+	Implemented
	Comply with SA GAAP and IFRS	AFS on time	+	AFS 2008 on time and unqualified
Fraud prevention	Fraud, Sexual harassment, Racism	Policies active	+	Policies active : antiracism policy latest to be implemented
	Relevant policies in line with recent law	Training, implement new models	+	Training and implementation Underway
Financial Reporting Systems	Compliance with treasury requirements	Compliance	+	Fixed asset register updated Travel system in place
Safety issues, ethics, values, human rights	SHE issues attended to	SHE	+	SHE officer, policies
Revision of MRC Policies & Procedures	MRC policies revised	Completion	+	MRC policies complete

Continued...

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Establish Supply Chain Management unit; Update fixed assets registry, travel management remodelling; office and laboratory space management; property management, telecommunication management; fleet management; Procurement and continuous process improvement	Programmes underway	Programmes underway	+	Programmes underway Fixed asset register updated Travel system being implemented
Staff numbers	Number of staff : permanent v contract	5% growth . (2008 : 847)	-	817 (47% contract)
Turnover ratios	Staff turnover ratio	< 7%	+	< 7%

#### 4. HUMAN CAPITAL MANAGEMENT AND DEVELOPMENT

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Double PhD graduates	Number graduates p.a.	1 PhD p.a. per unit	+	62 graduates (44 in 2007) 1.6 per unit (205 enrolled)
Train black African PhDs	Number	30 PhDs : 6 p.a.	+	42 MRC-funded black African PhD students out of the total of 205 PhD students enrolled in the 40 MRC research units
Increase Career Awardees	Number	9	+	9
Develop post-docs	Number post docs	16 to 24 by 2010	+	14, therefore on track for 2010 target (plan to increase stipend instead of number in 2009)
Formal mentorship of research leadership	Number of leadership plans	1 per unit	+	5 of the 17 scientists chosen for leadership are now Directors of research units or Co-directors
Increase the proportion of African scientists over next five years	Minimum 20 additional African scientists p.a.	2007 : 85/151 (36%)	-	30% (63/210)
Develop and implement a leadership and management development strategy	Number : 19 identified Career paths	All 16 Units have plans	+	All units have plans. 4 of the research leaders identified have NRF Research Chairs (Dheda, Seedat, Mahdi); and one is a Head of Department (Mayosi)
Increase the number of black African intramural Unit Directors	Number : Increase from 2 in 2005 to 4 in 2009	2 by April 2009		1 intramural (Matsabisa), 2 extramural (Chibale, Mphahlele)
Job creation	Number of contract positions created	5% increase p.a. (91 or 12% in 2007)	+	47% of posts are contract positions (386/817) in March 2009

## 5. TRANSFORMATION AND DEVELOPMENT PLAN

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Social transformation: Organisational culture and values for the MRC	New culture and values implemented	Culture and values plan	+	Antiracism policy
Develop clear career criteria for every job level and category	Criteria developed	Criteria on website	+	Criteria on website
Develop a system of broadbanding	Broadbanding system	Broadband system in place	+	Broadband system in place
Revision of Conditions of Service and employment practises	New Conditions of Service (COS) and employee relations processes	COS in use and negotiated with staff. Managers trained	+	COS negotiations underway COS approved by Board
Develop a Code of Ethics for the MRC	Code of Ethics	Code in place by Sept 2008	-	Work in progress
Development of managers in terms of management and leadership skills	Number SMP courses Number other courses	Courses in progress	+	Courses in progress
Implement an HR and pay roll system	HR System implemented	HR system implemented	+	HR system implemented
Develop and implement an Integrated Employee Wellness strategy and programme	Strategy approved Building blocks implemented	Strategy implemented	+	Strategy implemented
Ethnic and Gender transformation	MRC demographics	April 2009 :  M : F 32 : 68 African 49% Coloured 18% SA Indian 13% White 19%	+	Demographic transformation well underway :  M : F 32 : 68 African 49% Coloured 18% SA Indian 13% White 19%
Black scientists	Proportion of black scientists	55% (108/208, 52% in 2007)	+	62% (131/210)
	Proportion of African scientists	45% (83/208, 40% in 2007)	-	30% (63/210)
Black senior scientists	Proportion senior black scientists	55% (67/126, 53% in 2007)	+	56% (93/166)
	Proportion senior African Black scientists	22% (24/126, 19% in 2007)	+	23% (39/166)
Black managers	Number (per cent) black managers	65% (67/108, 62% in 2007)	+	70% (64/92)
	Number (per cent) African black managers	22% (21/108, 19% in 2007)	-	16% (15/92)

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Female scientists	Number (per cent) female scientists	60% (116/208, 56% in 2007)	+	70% (146/210)
Female senior scientists	Number (per cent) female senior scientists	67% (85/126, 67% in 2007)	+	67% (112/166)
Female managers	Number (per cent) female managers	55% (57/108, 53% in 2007)	+	57% (52/92)
Female Unit Directors	Female Unit Directors :	50% (7/14)	+	50% (7/14)
	14 Intramural Directors	30% (12/40)	+	38% (15/40)
	40 Directors in total			
Disabled researchers and support staff	Proportion of disabled researchers and support staff	1% (0.3% in 2007)	-	0.5% (4/817)
Black African Division Managers	Number (per cent) of Black African Division Managers	35% (33% 8/24 in 2007)	-	24% (6/25)
Black African Unit Directors	Number (per cent) of 43 Unit Directors who are Black African	2 (4%) (1 in 2007)	+	8% (3/40)
	Number (per cent) of 16 intramural unit directors Black African	2 (15%) (1 in 2007)	-	7% (1/14)
	Number (per cent) of 43 Unit Directors who are black	(23%) 10/43	+	45% (18/40)
Managers and Researchers	Number (per cent) of total staff	42% (316/855 (38%) in 2007)	-	34% (280/817)
	Number (per cent) Black	57% (178/316 (55%) in 2007)	+	66% (184/280)
	Number (per cent) Black African	35% (104/316 (33%) in 2007)	+	28% (77/280)
	Number (per cent) female	57% (173/316 (55%) in 2007)	+	66% (184/280)
Business transformation Quality and cost of professional support divisions	Review of support Directorates	Complete by May 2008	+	Reviews complete
Skills development	Percentage of baseline salary spent on skills development	5% (3% in 2007)	-	Data only available in July
Accelerated development	Amount spent on development of future research and support leaders	R500 000 (R300 000 in 2007)	-	R400 000
	Professional support managers	Formal training courses	+	Formal training courses

*Continued . . .*

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Organisational Development	Staff with PhD	15% (28/208 (13%) in 2007	-	9% (70/817)
	Scientists with PhD	44% (81/855(10%) in 2007)	-	32% (67/210)
	Staff with MBChB	5%(28/208 (3.3%) in 2007	-	3% (26/817)
	Scientists with MBChB	15% (28/208(13%) in 2007)	-	12% (26/210)
Peer reviewed publications with Black African scientists as primary author	Number (per cent) of total	13% (71/676 (11%) in 2007	+	20% (140/706)

## 6. INNOVATION MANAGEMENT AND TECHNOLOGY TRANSFER

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Intellectual Capital (IC) Management Manage IC to world class status	Licence Agreements	One licence agreement	+	One licence agreement
Leverage IC of the MRC to create safe, effective, affordable accessible medicines for Africa	Product development	1 product into clinical trials	+	SAAVI HIV vaccine in Phase I clinical trials
	Diabetes Spin-out pipeline	Pipeline populated with back-up compounds	+	Well stocked pipeline
Explore Public-Public Partnerships (PPPs)	Develop a PPP Strategy for MRC in eHealth	Accepted Strategy Stakeholder buy-in	+	PPP strategy developed
Create new IP -generating platforms relevant to MRC mandate	Strengthen Animal Experimental Platform cGLP/GMP facility at Delft feasibility done	Macaque research facility. Vervet monkey research programme established	+	Well established primate colonies
Mentorship programmes	Building scarce and strategically important capacity and competence	Two candidates	+	Two candidates recruited
Implement the IP strategy	IP pipeline growing responsibly	Strategy aligned with national priorities	+	IP strategy implemented
New company creation	Start-up company	One company	+	One company : Gnowmix
Incubate new technology platforms	eHealth Research and Technology Platform	Business Plan completed Director appointed	+	EHRIP progressing well Acting Director appointed
General costs Innovation and Technology Directorate	Maintaining world class practices and systems for IC Management	Benchmark as part of SETI Review	+	IC management systems in place SETI review postponed

## 7. INFORMATICS AND KNOWLEDGE MANAGEMENT

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Electronic register of grants	Online register of MRC grants	May 2009	+	Electronic register of grants on MRC website
Integration of MRC Information Systems : MIS	Integrated MIS	Online MIS	+	Online MIS : Qlikview containing management information relating to Finance, HR and other systems
MRC Electronic Databases of Journal articles : Licenses	Electronic access	Working electronic databases	+	Grants database on website Electronic access for all MRC staff has been implemented Qlikview for senior managers KPI electronic dashboard

## 8. RESEARCH TRANSLATION

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Research Translation Office	Functioning office	Office	+	RTO staff : Debbie Railoun, Benita Mayosi and Sarah Bok
Scientific writing in indigenous languages	Scientific writing in 5 languages	Programmes	+	Begun
MRC Science Centre	Planning and funding	Proposal	+	Proposal submitted to Wellcome Trust and other potential funders
Annual Report	Print on deadline	On deadline in 2008	+	On deadline in Aug 2008
Publications and video	Outputs	Research-related videos, publications and DVDs	+	706 peer-reviewed publications; 9 videos and DVDs
Technical Reports Policy briefs	Number of technical reports Number of policy briefs	20 5	++ ++	79 15
Health and Socioeconomic Impact * :  HIV and AIDS	PMTCT  HIV incidence	Dual therapy  Reduction	+	Dual therapy (AZT + NVP) introduced 2008 : 30 000 lives p.a. saved Reduction in incidence in young people according to DOH Antenatal Clinic Survey and HSRC/MRC National Seroprevalence Survey

*Continued...*

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Tuberculosis	Comprehensive Plan for Care, Management and Treatment of HIV and AIDS	Reduced mortality, improved quality of life	+	730 000 initiated on ART : 100 000 lives p.a. saved
	Behaviour change	Increased condom use etc	+	Increased from 34 to 65% according to HSRC/MRC Survey : thousands of lives p.a. saved
	HIV vaccine	First SA HIV vaccine in Phase I clinical trial	+	SAAVI HIV vaccine trial begun in Jan 2009 in USA, June 2009 in South Africa
	Diagnostic for MDR	Adoption in health system (shorten diagnosis time from 2 months to 2 days) thus reducing MDR TB transmission	+	Adoption in health system (NHLS) after demonstration project of over 10,000 participants by MRC, NHLS and FIND Diagnostics
	New treatment regimens for TB	Treatment shortened to 4 months	+	Remox clinical trial in progress : ready for registration in 2012
	Treatment for MDR and XDR TB	Treatment for MDR and XDR TB	+	MRC Phase IIb clinical trial shows new chemical entity TMC207 is efficacious in MDR and XDR TB
Malaria	Malaria incidence	Reduction	+	Reduction in malaria prevalence by 99% in Lubombo Spatial Development Corridor
	Plan for eradication of malaria in Africa and in the world	Plan for Africa	+	MRC contracted by SADC for malaria control in Trans- Zambezi corridor
		Plan for the world	+	MRC member of MEG (Malaria Eradication Group) MRC contracted to eradicate malaria in Biolo Island, Gabon
Infectious Disease	Advanced Market Commitment (AMC) for pneumococcal vaccine	Launch with potential to save 500 000 children's lives p.a. by 2012	+	Launch of US\$ 1.6 billion AMC fund of 4 of the G8 countries, Norway and the Bill and Melinda Gates Foundation at G8 meeting in Rome, June 2009.
Child health	Pneumococcal and Rotavirus vaccines in South Africa's Expanded Programme for Immunisation (EPI)	Vaccines in EPI system	+	Pneumococcal and Rotavirus vaccines in South Africa 2009 after clinical trials and policy recommendations from Prof Mahdi et al Potential to save 25 000 children's lives p.a. in South Africa
Heart Disease and Stroke	NCRP for CVD	NCRP established	+	Advertising for NCRP Director

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Tobacco	Policy	Tobacco Act	+	Tobacco Act passed in 2008
	Smoking rates	Reduction in consumption of tobacco (from 2 billion to 1.3 billion cigarettes p.a. in 1990 – 2005)	+	55 705 lives saved p.a. due to 30% reduction in smoking since 1990
Health research policy	WHO policy on health research	Complete policy	+	WHO Research for Health Strategy completed
	GFHR WHO Ministerial in Mali	African Health Minister's policy on health research	+	Ministerial endorsement of strategy in Africa
African Traditional Medicines	National policy and legislation on ATM	Complete and promulgated	+	National Policy completed and tabled at Cabinet
	NCRP on ATM	NCRP established	+	NCRP established
	Research Colloquium on ATM	Successful Colloquium	+	Successful Colloquium
Men's health : circumcision and initiation and HIV transmission	National policy input	Research input to adopted policy	+	Research inputs into policy

\* Health policy, products, practice and health promotion, informed by MRC research that impacts on health and socio-economic state

\* Health impact

- Lives saved
- Reductions in morbidity (DALYs averted)

\* Socio-economic impact

- Rands saved or generated (each life saved is worth R3 million over 60 years lifespan if GDP per capita in South Africa is R48 000)  
(one year back at work is worth R48 000 if GDP per capita is R48 000 )

- Jobs created

## 9. STAKEHOLDER MANAGEMENT

ACTIVITY	KEY PERFORMANCE INDICATOR	TARGET 2008/9	RESULT	PERFORMANCE 2008/9
Develop a stakeholder plan and database	Stakeholder database and liaison	Database and plan complete	+	Database and plan complete
International Liaison	International Liaison	International strategy	+	Strategy complete
Involvement in NEPAD activities	Collaborations	Several collaborations	+	Several African collaborations
Build capacity in the MRC President's Office	Identify internal and external communication gaps	Stakeholder interactions list	+	List complete
National Department of Health	Quarterly Senior Management meetings	4	+	4
	Tasks commissioned by NDOH	4	+	4
Other Government Departments	Science and Technology Education Social Development	Number of Projects undertaken	+	Several projects
Parliamentary Portfolio Committees	Presentations	2	+	2
Provincial Government Municipalities Traditional Leaders	Meetings Projects	Number of meetings and projects	+	Several meetings
Science Councils	Meetings Collaborations	3 COHORT meetings	-	No COHORT meetings (only one held in the reporting period)
Universities	Interactions : research days, graduation ceremonies etc	Number	+	Several interactions
Conferences and events	Number	Number	+	8

## *EXPLANATION OF KPI VARIANCES*

The MRC achieved or exceeded the targets set in 121 (82%) out of its 148 key performance indicators (KPIs) for the year 2008/2009.

This document explains why the targets were missed in the remaining KPIs.

1. The KPI of impact factors and citations to evaluate the improvement in quality of publications is still being assembled in terms of knowledge management tools to correctly measure these indices.
2. The target of 89% of publications in international journals was missed as only 82% was achieved. With more sage reflection, the target was probably set too high as it not appropriate for nearly 90% of MRC publications to be in foreign journals – 80% is probably a more correct target.
3. The target of 165 self-initiated research projects was missed (only 133) as the MRC is struggling to marshal increased funds for self-initiated research projects. In the new financial year (2009/10) the funds for self-initiated research have been increased from R14.70 million to R15.93 million in an attempt to correct this fault.
4. The gap between MRC salaries and market benchmarks continues to lie between 10 – 15%, and the target of 5% gap was missed. The MRC Board has approved in the MRC Budget 2009/10 salary increases of 8 – 14%, partly in an attempt to bridge some of this gap. With MTEF baseline budget increases of 5% per annum tabled for the next three years, it will be a struggle to close the gap completely.
5. A target was set to reduce expenditure on support directorates by 2%, but the outcome was an increase of 7%. This is probably because the target set was too ambitious.
6. The target of 16% of baseline expenditure on capacity development was missed – with only 8% being achieved. This is due to budgetary constraints making it difficult to accelerate expenditure on this item.
7. The target of reducing professional support staff numbers to 120 was missed with number reached being 162 out of a total staff complement of 817 - i.e. 20%. With hindsight the target was too ambitious, and the MRC will continue to ensure that its overhead costs are gradually reduced. Currently the overhead on the total budget has been reduced to 13% - international best practice for health research councils being 10% overhead costs.
8. The target of developing and implementing a procurement policy addressing BEE supply chain issues was missed. The MRC will work energetically to ensure that the target is achieved in the coming financial year.
9. The target of implementing MRC Board evaluation was missed. The Board is working to ensure that this target is not missed again.
10. The target of 5% growth in staff numbers was missed with numbers shrinking from 847 to 817. The reason for this is that the nature of the MRC's business in which 75% of research work is funded by external income, results in marked fluctuations in numbers of contract employees recruited for each project. Currently 47% of employees are in contract posts. Such fluctuations are inevitable as 58% of the MRC budget comes from external sources – grants and contracts – rather than baseline parliamentary grant.
11. The target of increasing the number of black African scientists by more than 20 per annum was missed. The number shrank from 85 out of 151 scientists (36%) being black African in 2007 to 63 out of 210 (30%) in 2008. The MRC will need to work more energetically over the coming year to recruit and retain more black African scientists. One measure that has been taken to assist this is the formation of a Young Scientists Forum which should help MRC management to identify what are the constraints of recruiting and retaining black African scientists.
12. The MRC failed to meet the target of increasing the number of intramural black African Unit Directors from 1 to 2. An offer made to one prospective candidate was subsequently rejected; but the MRC will work vigorously to try ensure the number is increased to 2 in 2010, and more thereafter.

13. The MRC failed to put a Code of Ethics in place by September 2008. The Executive will work with the Board to ensure this is done as soon as possible.
14. The MRC failed to increase the proportion of black African scientists from the 2007 level of 40% (83/208) to the target of 45%. The proportion actually slipped backwards in 2008 to 30% (63 out of 210). The MRC will have to address this deficit through some of the mechanisms identified in bullet 11 above.
15. The MRC missed the target of 22% black African managers (19% in 2007 – or 21 out of 108). The proportion achieved was 16% (15 out of 92). Similar measures will need to be taken to correct this deficit, to those adopted to correct the dearth in black African scientists.
16. Recruiting disabled researchers and support staff continues to be difficult with the 2008 figure of 0.5% (4 out of 817) falling well short of the target of 1%.
17. The MRC missed the target of 35% black African division managers – achieving only 24% (6 out of 25). A Division Managers Forum has been established which hopefully assist in developing strategies to correct this fault.
18. Managers and researchers still only account for 34% (280 out of 817) of total staff – well short of the target set of 42%. This is partly because reduction of support staff numbers was not as successful as hoped. The MRC will continue to increase the proportion of researchers in particular employed.
19. The MRC will not know until late July whether it has reached its target of spending 5% of the baseline salary budget on skills development – the figure for 2007 was only 3%.
20. The amount of money spent on development of future research and support leaders in 2008 (R400 000) fell short of the target of R500 000. This will be corrected in the 2009/10 financial year.
21. The percentage of staff with PhDs in 2008 (9% - 70 out of 817 employees) falls well short of the target of 15%. The MRC has probably overestimated the speed at which it can correct this flaw.
22. A similar overestimate underlies the failure to reach the target of 44% of scientists holding PhDs – only 32% was attained (67 of the 210 scientists).
23. Similarly with the target of 5% of staff being medical doctors (MBChB) – only 3% (26 out of 817) are medical doctors. This is clearly inappropriate for an organization that calls itself the Medical Research Council!
24. Similarly again for the target of 15% of scientist staff being medical doctors – here the shortfall was less severe at 12% (26 out of the 210 scientists). The MRC is instituting measures to ensure that the targets in 23 and 24 are met – such as ensuring that our pay scales match those of the Occupational Specific Dispensation for doctors and nurses.
25. The MRC missed the target of three COHORT meetings (Committee of Heads of Research and Technology institutions) attended because only one COHORT meeting was held in the reporting period and the MRC President was overseas at the time of that meeting.
26. The one target that was exceeded was for the KPI 'African black PhD'. This was because the target set was for strictly MRC-funded African black PhD students; but the number reached included those funded by monies transferred to the MRC from DST and NRF.
- Prof A D Mbewu  
President : MRC

A close-up photograph of a person's hand carefully balancing a stack of smooth, rounded stones. The stones are stacked vertically, with the largest and most textured stone at the base and smaller, smoother stones on top. The hand is positioned on the left side of the frame, with the thumb and index finger holding a small, dark stone just above the top of the stack. The background is a clear, bright blue sky. The overall composition is simple and balanced, emphasizing the concept of equilibrium and stability.

*The greatest wealth is health.*

- Publius Vergilius Maro

# ANNUAL FINANCIAL STATEMENTS

## REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE FINANCIAL STATEMENTS AND PERFORMANCE INFORMATION OF THE SOUTH AFRICAN MEDICAL RESEARCH COUNCIL FOR THE YEAR ENDED 31 MARCH 2009

### REPORT ON THE FINANCIAL STATEMENTS

#### Introduction

1. I have audited the accompanying financial statements of the South African Medical Research Council which comprise the statement of financial position as at 31 March 2009 and the statement of financial performance, the statement of changes in net assets and the cash flow statement for the year then ended, and a summary of significant accounting policies and other explanatory notes, as set out on pages 123 -155.

#### The 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 basis of accounting determined by the National Treasury, as set out in note 1 to the financial statements and in the manner required by the Public Finance Management Act, 1999 (Act No. 1 of 1999) (PFMA) and for such internal control as the accounting authority determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### The Auditor-General's responsibility

3. As required by section 188 of the Constitution of the Republic of South Africa, 1996 read with section 4 of the Public Audit Act, 2004 (Act No. 25 of 2004) (PAA) and section 14(2) of the Medical Research Council Act, 1991 (Act No. 51 of 1991), my responsibility is to express an opinion on these financial statements based on my audit.
4. I conducted my audit in accordance with the International Standards on Auditing read with General Notice 616 of

2008, issued in Government Gazette No. 31057 of 15 May 2008. 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.

### Basis for qualified opinion

#### Property, plant and equipment

7. The entity has written off a significant number of assets without the approval of the executive authority that is required in terms of section 54(2)(d) of the PFMA. Approximately 6 600 assets with a cost price of R16 107 116 and accumulated depreciation of R15 112 325 were written off during the year under review as a result of assets that could not be located during the annual asset count.

### Qualified Opinion

8. In my opinion, except for the effects of the matter described in the Basis for qualified opinion paragraph, the financial statements present fairly, in all material respects, the financial position of the South African Medical Research Council as at 31 March 2009 and its financial performance and its cash flows for the year then ended, in accordance with the basis of accounting determined by the National Treasury, as set out in note 1 to the financial statements, and in the manner required by the PFMA.

### Emphasis of matters

9. I draw attention to the following matters on which I do not express a qualified opinion:

### Basis of accounting

10. The South African Medical Research Council's policy is to prepare financial statements on the basis of accounting determined by the National Treasury, as set out in note 1 to the financial statements.

### Restatement of corresponding figures

11. As disclosed in note 26 to the financial statements, the corresponding figures for 31 March 2008 have been restated as a result of errors discovered during 2009 in the financial statements of the South African Medical Research Council at, and for the year ended, 31 March 2008.

### Other matters

12. I draw attention to the following matters that relate to my responsibilities in the audit of the financial statements:

### Non-compliance with applicable legislation

#### Public Finance Management Act

13. The entity submitted its financial statements for auditing on 4 June 2009 and not on 31 May 2009, as required by Section 55(1)(c)(i) of the PFMA.

#### Treasury Regulations

14. Quarterly reports had not been submitted to the executive authority and the non-compliance has not been reported, together with the reasons therefore, as required by Treasury Regulation 26.1.2.

### Governance framework

15. The governance principles that impact the auditor's opinion on the financial statements are related to the responsibilities and practices exercised by the accounting authority and executive management and are reflected in the internal control deficiencies and key governance responsibilities addressed below:

### Internal control deficiencies

16. Section 51(1)(a)(i) of the PFMA states that the accounting authority must ensure that the public entity has and maintains effective, efficient and transparent systems of financial and risk management and internal control. The table below depicts the root causes that gave rise to the deficiencies in the system of internal control, which led to the qualified opinion. The root causes are categorised according to the five components of an effective system of internal control. (The number listed per component can be followed with the legend below the table.) In some instances deficiencies exist in more than one internal control component.

Par. no.	Basis for qualified opinion	CE	RA	CA	IC	M
7.	Property plant and equipment				1	

17. Pertinent information relating to property, plant and equipment was not identified and captured in time frame that supports the achievement of financial reporting objectives.

LEGEND	
<b>CE = CONTROL ENVIRONMENT</b>	
The organisational structure does not address areas of responsibility and lines of reporting to support effective control over financial reporting.	1
Management and staff are not assigned appropriate levels of authority and responsibility to facilitate control over financial reporting.	2
Human resource policies do not facilitate effective recruitment and training, disciplining and supervision of personnel.	3
Integrity and ethical values have not been developed and are not understood to set the standard for financial reporting.	4
The accounting officer/accounting authority does not exercise oversight responsibility over financial reporting and internal control.	5
Management's philosophy and operating style do not promote effective control over financial reporting.	6
The entity does not have individuals competent in financial reporting and related matters.	7
<b>RA = RISK ASSESSMENT</b>	
Management has not specified financial reporting objectives to enable the identification of risks to reliable financial reporting.	1
The entity does not identify risks to the achievement of financial reporting objectives.	2
The entity does not analyse the likelihood and impact of the risks identified.	3
The entity does not determine a risk strategy/action plan to manage identified risks.	4
The potential for material misstatement due to fraud is not considered.	5
<b>CA = CONTROL ACTIVITIES</b>	
There is inadequate segregation of duties to prevent fraudulent data and asset misappropriation.	1
General information technology controls have not been designed to maintain the integrity of the information system and the security of the data.	2
Manual or automated controls are not designed to ensure that the transactions have occurred, are authorised, and are completely and accurately processed.	3
Actions are not taken to address risks to the achievement of financial reporting objectives.	4
Control activities are not selected and developed to mitigate risks over financial reporting.	5
Policies and procedures related to financial reporting are not established and communicated.	6
Realistic targets are not set for financial performance measures, which are in turn not linked to an effective reward system.	7
<b>IC = INFORMATION AND COMMUNICATION</b>	
Pertinent information is not identified and captured in a form and time frame to support financial reporting.	1
Information required to implement internal control is not available to personnel to enable internal control responsibilities.	2
Communications do not enable and support the understanding and execution of internal control processes and responsibilities by personnel.	3
<b>M = MONITORING</b>	
Ongoing monitoring and supervision are not undertaken to enable an assessment of the effectiveness of internal control over financial reporting.	1
Neither reviews by internal audit or the audit committee nor self-assessments are evident.	2
Internal control deficiencies are not identified and communicated in a timely manner to allow for corrective action to be taken.	3

## Key governance responsibilities

18. The PFMA tasks the accounting authority with a number of responsibilities concerning financial and risk management and internal control. Fundamental to achieving this is the implementation of key governance responsibilities, which I have assessed as follows:

No.	MATTER	Y	N
<b>CLEAR TRAIL OF SUPPORTING DOCUMENTATION THAT IS EASILY AVAILABLE AND PROVIDED IN A TIMELY MANNER</b>			
1.	No significant difficulties were experienced during the audit concerning delays or the availability of requested information.	✓	
<b>QUALITY OF FINANCIAL STATEMENTS AND RELATED MANAGEMENT INFORMATION</b>			
2.	The financial statements were not subject to any material amendments resulting from the audit.		✓
3.	The annual report was submitted for consideration prior to the tabling of the auditor's report.	✓	
<b>TIMELINESS OF FINANCIAL STATEMENTS AND MANAGEMENT INFORMATION</b>			
4.	The annual financial statements were submitted for auditing as per the legislated deadlines [section 55 of the PFMA].		✓
<b>AVAILABILITY OF KEY OFFICIALS DURING AUDIT</b>			
5.	Key officials were available throughout the audit process.		✓
<b>DEVELOPMENT AND COMPLIANCE WITH RISK MANAGEMENT, EFFECTIVE INTERNAL CONTROL AND GOVERNANCE PRACTICES</b>			
6.	<b>Audit committee</b>		
	The public entity had an audit committee in operation throughout the financial year.	✓	
	The audit committee operates in accordance with approved, written terms of reference.	✓	
	The audit committee substantially fulfilled its responsibilities for the year, as set out in section 77 of the PFMA and Treasury Regulation 27.1.8.	✓	
7.	<b>Internal audit</b>		
	The public entity had an internal audit function in operation throughout the financial year.	✓	
	The internal audit function operates in terms of an approved internal audit plan.	✓	
	The internal audit function substantially fulfilled its responsibilities for the year, as set out in Treasury Regulation 27.2.	✓	
8.	There are no significant deficiencies in the design and implementation of internal control in respect of financial and risk management.		✓
9.	There are no significant deficiencies in the design and implementation of internal control in respect of compliance with applicable laws and regulations.		✓
10.	The information systems were appropriate to facilitate the preparation of the financial statements.	✓	
11.	A risk assessment was conducted on a regular basis and a risk management strategy, which includes a fraud prevention plan, is documented and used as set out in Treasury Regulation 27.2.	✓	
12.	Powers and duties have been assigned, as set out in 56 of the PFMA.	✓	
<b>FOLLOW-UP OF AUDIT FINDINGS</b>			
13.	The prior year audit findings have been substantially addressed.	✓	
<b>ISSUES RELATING TO THE REPORTING OF PERFORMANCE INFORMATION</b>			
14.	The information systems were appropriate to facilitate the preparation of a performance report that is accurate and complete.	✓	
15.	Adequate control processes and procedures are designed and implemented to ensure the accuracy and completeness of reported performance information.	✓	
16.	A strategic plan was prepared and approved for the financial year under review for purposes of monitoring the performance in relation to the budget and delivery by the [entity name] against its mandate, predetermined objectives, outputs, indicators and targets [Treasury Regulation 30.1].	✓	
17.	There is a functioning performance management system and performance bonuses are only paid after proper assessment and approval by those charged with governance.	✓	

19. The shortcomings in respect of certain key governance responsibilities highlighted in the table above require attention. The main issue driving these findings includes deficiencies in information and communication where:

- pertinent information was not identified and captured in time frame that supports the achievement of financial reporting objectives.
- communication in the entity does not enable and support the understanding and execution of internal control processes in order for employees to understand their control responsibilities.

20. Over and above the observations on the key governance responsibilities, the internal control deficiencies mentioned above also resulted in other important audit findings, as highlighted in the final management report of the entity that should receive the attention of those charged with governance, as well.

## REPORT ON OTHER LEGAL AND REGULATORY REQUIREMENTS

### Report on performance information

21. I have reviewed the performance information as set out on pages 99-113.

### The accounting authority's responsibility for the performance information

22. The accounting authority has additional responsibilities as required by section 55(2)(a) of the PFMA to ensure that the annual report and audited financial statements fairly present the performance against predetermined objectives of the public entity.

### The Auditor-General's responsibility

23. I conducted my engagement in accordance with section 13 of the PAA read with General Notice 616 of 2008, issued in Government Gazette No. 31057 of 15 May 2008.

24. In terms of the foregoing my engagement included performing procedures of a review nature to obtain sufficient appropriate evidence about the performance information and related systems, processes and procedures. The procedures selected depend on the auditor's judgement.

25. I believe that the evidence I have obtained is sufficient and appropriate to provide a basis for the review findings reported below.

### Findings on performance information

#### Usefulness of reported performance information

26. Variances between the planned and the actual performance of reported performance information were not supported by explanations for the variances in the annual report submitted during the audit. Variance explanations were included subsequently and were therefore not subject to audit.

### APPRECIATION

27. The assistance rendered by the staff of the South African Medical Research Council during the audit is sincerely appreciated.

*Auditor-General*

Cape Town

7 September 2009



AUDITOR-GENERAL

## REPORT OF THE AUDIT COMMITTEE

We are pleased to present our report for the financial year ended 31 March 2009.

### Audit Committee Members and Attendance:

The audit committee consists of the members listed hereunder and should meet four times per annum as per its approved terms of reference. During the current year, four meetings were held.

Name of Member	Number of Meetings Attended
Mr A Dlamini (Chairperson)	2 (resigned in September 2008)
Mr S Govindsamy	4
Ms S Hari	4
Adv D Block	4
Prof S Rataemane (Acting Chairperson)	4

### Audit Committee Responsibility

We report that we have adopted appropriate formal terms of reference in our charter in line with the requirements of Section 51(1) (a) of the PFMA and Treasury Regulation 27.1. We further report that we have conducted our affairs in compliance with this charter.

### The effectiveness of internal control

A significant amount of assets have been written off, many of which relate to previous years. Controls in respect of write offs have not been effective. The asset count has also identified areas of weakness in respect of procurement and disposal of assets, and custodianship over assets.

From the various reports of the Internal Auditors, the Audit Report on the Annual Financial Statements and the management report of the Auditor-General South Africa, it was noted that no matters were reported that indicate any material deficiencies in the system of internal control or any deviations therefrom, except in the area of assets. Accordingly, we can report that the system of internal control over financial reporting for the period under review was efficient and effective except in asset management.

The quality of in-year management and monthly/quarterly reports submitted in terms of the PFMA and the Division of Revenue Act.

We are satisfied with the content and quality of the quarterly reports prepared and issued by the Accounting Officer of the Public Entity during the year under review. We have indicated to the management that our analysis of the finances will be more constructive when management implements a system which allows for detailed reporting at line and research unit/division level.

### Evaluation of 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 and the Accounting Officer;
- Reviewed the Auditor-General of South Africa's management report and management's response thereto;
- Reviewed changes in accounting policies and practices;
- Reviewed the public entity's compliance with legal and regulatory provisions; and
- Reviewed significant adjustments resulting from the audit.

We concur with and accept the Auditor-General of South Africa's report on 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.

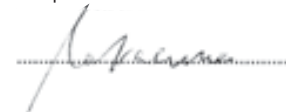
### Internal audit

We are satisfied that the internal audit function is operating effectively and that it has addressed the risks pertinent to the department in its audits.

### Auditor-General South Africa

We have met with the Auditor-General South Africa to ensure that there are no unresolved issues.

Chairperson of the Audit Committee



Date: 08/09/2009

# REPORT OF THE ACCOUNTING AUTHORITY (BOARD) OF THE MRC ON THE KEY PERFORMANCE AREAS AND ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2009

## NATURE OF THE OPERATIONS

The South African Medical Research Council is a Section 3A public entity in terms of the PFMA, an independent statutory body set up by government, to co-ordinate health and medical research activities throughout South Africa. Research takes place at Head Office (Cape Town) and at the two satellites, Durban and Pretoria.

## CORPORATE GOVERNANCE AND CONTROL FRAMEWORK

### Board's responsibility for financial statements

The Board is responsible for preparing the annual financial statements and other information presented in the annual report in a manner that fairly presents the financial position and the results of the operations of the entity. The Board is also responsible for preparing the KPI report.

The external auditors are responsible for carrying out an independent examination of the annual financial statements in accordance with Statements of South African Auditing Standards, and for reporting their findings thereon. The external auditors also audit the KPI, but they are currently not required by law to express an opinion thereon.

The annual financial statements set out on pages 123 to 155 have been prepared in accordance with South African Statements of Generally Accepted Accounting Practice and are based on appropriate accounting policies which have been consistently applied in all material respects, and are supported by reasonable and prudent estimates where appropriate. Adequate accounting records have been maintained throughout the period under review.

## FINANCIAL OPERATIONS

This year saw a 6% increase in baseline, and the contracts remained constant. The MRC has recorded a surplus of R38m during the year. Increase in interest is partly a reflection of increase in deferred income. Not all funders require that interest be invested in the projects. We are anticipating decreases in interest income, as the interest rate had started declining.

### Income from restricted projects

Some of the foreign funding is done with what are considered restricted funds. The MRC did not recognize the cost of the researchers' time because of the nature of these funds. The research has been done, and that time has now been recognized. From an accounting point of view, time worked should have been recognized as research was done, even though the funds were said to be restricted. The total adjustment came to R29 million, and it is spread over a number of past years.

### Fixed assets

For some time, the MRC was doing limited asset counts. This year it did a comprehensive count, which indicated that a number of assets needed to be written off. Clearly there were management lapses, as some assets should have been written off years back.

### Pension Fund liability

An actuarial valuation done as at 31 March 2009, indicated a loss of R10 million. MRC has fully provided for this loss, and it intends paying over an amount equivalent to this loss, even though it understands that this is merely a short term valuation. Salary increases as at 1 April 2009 are approximately 11.5%, and with a significant number of MRC employees being on a defined benefit pension fund scheme, it can be expected that the loss could widen.

The MRC Board has in principle given the management the go-ahead to investigate ways of reducing the leave liability. This exercise will be done in conjunction with looking at all other conditions of employment at the MRC.

### GOING CONCERN

Based on the MRC's reserves, on the fact that the cash inflows have been positive for a few years, and also on the fact that research work has been increasing over the past few years, the MRC is confident that in the foreseeable future, it will continue to function.

Substantial investment will soon be required in terms of re-capitalisation, and the reserves generated so far will be used for this purpose.

### KPIs

The key performance issue is the number of publications that were submitted. The MRC scientists published 706 papers, three papers less than what was targeted.

### INTERNAL AUDIT

The Internal audit is outsourced to Gobodo Risk Management, and they do their audit according to an audit plan approved by the Audit Committee. On a number of occasions, they have been asked to do special audits in order to manage some of the risks that keep on arising.

### Remuneration of Board Members and Senior management

The fees paid to members of the Board, and the remuneration of the senior management have been detailed under notes 22 and 23, in the notes to annual financial statements.

### SUBSIDIARY AND ASSOCIATE COMPANIES

The MRC has a 100% shareholding at MEDRES Investments (Pty) Ltd. The subsidiary remains dormant, without any material assets or liabilities. Medres Investments (Pty) Ltd has a 24.9% investment in Jirehsa (Pty) Ltd. Jirehsa has not started trading yet, and as at 31 March 2009, it had accumulated losses of R32 000.

### FINANCIAL STATEMENTS

MRC financial statements are prepared in accordance with GAAP and GRAP.

### POST BALANCE SHEET EVENTS

By the time of writing this report, no significant post balance sheet event had occurred.

SA MEDICAL RESEARCH COUNCIL  
**STATEMENT OF FINANCIAL POSITION**  
*at 31 March 2009*

	Notes	2009 R	2008 R
<b>ASSETS</b>			
Non-current assets			
Property, Plant and Equipment	3	100,569,554	94,989,230
Intangible assets	4	1,165,064	574,111
Biological assets	5	456,140	1,180,410
Investments	6	100,001	100,001
		<u>102,290,759</u>	<u>96,843,752</u>
Current Assets			
Investments	6	28,279,726	2,570,750
Inventory	7	302,557	362,011
Trade and other receivables	8	37,606,966	42,095,752
Cash and Cash Equivalents	9	407,381,075	333,668,437
		<u>473,570,324</u>	<u>378,696,950</u>
Total assets		<u>575,861,083</u>	<u>475,540,702</u>
<b>NET ASSETS AND LIABILITIES</b>			
Net Assets			
Accumulated Surplus		159,341,292	121,225,088
Mark to Market Reserves		755,363	1,416,911
		<u>160,096,655</u>	<u>122,641,999</u>
Non-current liabilities			
Deferred income contracts and grants	10	100,569,554	94,989,230
Earmarked Funds	9	1,108,534	1,035,377
Long Term Loans		-	-
Post Retirement Benefits	11	2,817,894	3,931,000
Pension Liability	11	10,377,000	-
		<u>114,872,982</u>	<u>99,955,607</u>
Current liabilities			
Deferred income	10	250,365,999	170,560,020
Provisions	12	3,391,766	4,283,926
Trade and other payables	13	47,133,681	78,099,150
Current portion of long term loans		-	-
		<u>300,891,446</u>	<u>252,943,096</u>
Net assets and liabilities		<u>575,861,083</u>	<u>475,540,702</u>

SA MEDICAL RESEARCH COUNCIL  
**STATEMENT OF FINANCIAL PERFORMANCE**  
*for the year ended 31 March 2009*

	2009	2008
	R	R
Revenue	495,975,562	470,636,887
Operating Expenditure	(250,155,541)	(228,037,355)
Operating Surplus for the year	245,820,021	242,599,532
Interest Received	35,829,865	23,410,639
Staff Costs	(232,862,613)	(213,509,702)
Depreciation	(11,175,904)	(8,815,482)
Change in estimate/Amortisation	590,953	(750,173)
Finance costs	(86,118)	(89,413)
Surplus for the year	38,116,204	42,845,401

SA MEDICAL RESEARCH COUNCIL  
**STATEMENT OF CHANGES IN NET ASSETS**  
*for the year ended 31 March 2009*

		Accumulated Surplus R	Mark to Market Reserves R	Total R
	Notes			
Balance at 1 April 2007 as previously stated		62,347,304	1,449,169	63,796,473
Decrease in depreciation	26	4,678,700	-	4,678,700
Increase in transfer to deferred income grants and contracts	26	(4,678,700)	-	(4,678,700)
Increase in income from contracts, grants and services rendered	26	16,032,383	-	16,032,383
Balance at 1 April 2007 as restated		78,379,687	1,449,169	79,828,856
Surplus for the year		42,845,401	(32,258)	42,813,143
Surplus for the year previously stated		28,517,878	-	28,517,878
Movement on fair value of investments		-	(32,258)	(32,258)
Decrease in depreciation	26	2,419,470	-	2,419,470
Increase in transfer to deferred income grants and contracts	26	(2,419,470)	-	(2,419,470)
Increase in income from contracts, grants and services rendered	26	14,327,523	-	14,327,523
Balance at 31 March 2008		121,225,088	1,416,911	122,641,999
Balance at 1 April 2008		121,225,088	1,416,911	122,641,999
Surplus for the year		38,116,204	-	38,116,204
Movement on fair value of investments		-	(661,548)	(661,548)
Balance at 31 March 2009		159,341,292	755,363	160,096,655

SA MEDICAL RESEARCH COUNCIL  
**CASH FLOW STATEMENT**  
*for the year ended 31 March 2009*

		2009 R	2008 R
	Notes		
Cash flows from operating activities			
Cash receipts from grants and contracts		498,288,679	360,693,515
Cash paid to suppliers and employees		<u>(426,011,891)</u>	<u>(322,492,615)</u>
Cash generated from operations	19	72,276,788	38,200,900
Interest received		35,829,865	23,410,639
Finance costs		(86,118)	(89,413)
Dividend received		99,880	49,757
Net cash inflow from operating activities		<u>108,120,415</u>	<u>61,571,883</u>
Cash flows from investing activities			
Property, plant and equipment acquired		(18,302,893)	(11,456,990)
Proceeds on disposal of plant and equipment		267,041	105,143
Investments acquired		<u>(25,708,976)</u>	<u>(29,847)</u>
Net cash outflow from investing activities		<u>(43,744,828)</u>	<u>(11,381,694)</u>
Cash flows from financing activities			
Increase/(Decrease) in Post Retirement Benefit Obligation		9,263,894	(18,415,580)
Increase / in Trust Funds		73,157	157,547
Loans repaid		-	(11,141)
Net cash inflow from financing activities		<u>9,337,051</u>	<u>(18,269,174)</u>
Net increase in cash and cash equivalents		73,712,638	31,921,015
Cash and cash equivalents at beginning of year		333,668,437	301,747,422
Cash and cash equivalents at end of year		<u>407,381,075</u>	<u>333,668,437</u>

SA MEDICAL RESEARCH COUNCIL  
**NOTES TO THE FINANCIAL STATEMENTS**  
*for the year ended 31 March 2009*

#### GENERAL INFORMATION

The South African Medical Research Council (MRC) was established in terms of the South African Medical Research Council Act of 1991. It is a Section 3A public entity in terms of the Public Finance Management Act (PFMA).

The Head Office is in Cape Town and it has offices in KwaZulu-Natal and Gauteng.

The objects of the MRC are, through research, development and technology transfer, to promote the improvement of the health and the quality of life of the population of South Africa and to perform such other functions as may be assigned to the MRC by or under the Act.

#### BASIS OF PREPARATION

The financial statements have been prepared under the historical cost convention. They have been prepared in accordance with the South African Statements of Generally Accepted Accounting Practices (GAAP) including any interpretations of such Statements issued by the Accounting Practices Board, with the effective Standards of Generally Recognised Accounting Practices (GRAP) issued by the Accounting Standards Board replacing the equivalent GAAP Statement as follows:

STANDARD OF GRAP	REPLACED STATEMENT OF GAAP
GRAP 1: Presentation of financial statements	AC101: Presentation of financial statements
GRAP 2: Cash flow statements	AC118: Cash flow statements
GRAP 3: Accounting policies, changes in accounting estimates and errors	AC103: Accounting policies, changes in accounting estimates and errors

Currently the recognition and measurement principles in the above GRAP and GAAP Statements do not differ or result in material differences in items presented and disclosed in the financial statements. The implementation of GRAP 1, 2 & 3 has resulted in the following changes in the presentation of the financial statements:

#### 1. TERMINOLOGY DIFFERENCES:

STANDARD OF GRAP	REPLACEMENT STATEMENT OF GAAP
Statement of financial performance	Income statement
Statement of financial position	Balance Sheet
Statement of changes in net assets	Statement of changes in equity
Net assets	Equity
Surplus/Deficit for the period	Profit/loss for the period
Accumulated surplus/deficit	Retained earnings
Contributions from owners	Share capital
Distributions to owners	Dividends

2. The cash flow statement can only be prepared in accordance with the direct method.
3. Specific information has been presented separately on the statement of financial position such as:

- a) Receivables from non-exchange transactions, including taxes and transfers;
- b) Taxes and transfers payable;
- c) Trade and other payables from non exchange transactions.

4. Amount and nature of any restrictions on cash balances are required.

The following GRAP statements are effective from 1 April 2009. Although MRC has not done a detailed assessment, our view is that these GRAP statements are closely related to the AC Statements.

STANDARD OF GRAP	REPLACEMENT STATEMENT OF GAAP
GRAP 4: The Effects of Changes in Foreign Exchange Rates	AC113: The Effects of Changes in Foreign Exchange Rates
GRAP 5: Borrowing Costs	AC114: Borrowing Costs
GRAP 6: Consolidated and Separate Financial Statements	AC132: Consolidated and Separate Financial Statements
GRAP 7: Investments in Associates	AC110: Investments in Associates
GRAP 8: Investments in Joint Ventures	AC119: Investment in Joint Ventures
GRAP 9: Revenue from Exchange Transactions	FS20: Revenue from Exchange Transactions
GRAP 10: Financial Reporting in Hyperinflationary Economies	AC114: Financial Reporting in Hyperinflationary Economies
GRAP 11: Construction Contracts	AC109: Construction Contracts
GRAP 12: Inventories	AC108: Inventories
GRAP 13: Leases	AC105: Leases
GRAP 14: Events After the Reporting Date	AC107: Events After the Reporting Date
GRAP 16: Investment Property	AC135: Investment Property
GRAP 17: Property, Plant and Equipment	AC123: Property, Plant and Equipment
GRAP 19: Provisions, Contingent Liabilities and Contingent Assets	AC130: Provisions, Contingent Liabilities and Contingent Assets
GRAP 100: Non-current Assets Held for Sale and Discontinued Operations	AC 142: Non-current Assets Held for Sale and Discontinued Operations
GRAP 101: Agriculture	AC137: Agriculture
GRAP 102: Intangible Assets	AC 142: Intangible Assets

The preparation of financial statements in conformity with GAAP requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the accounting policies. There were no areas requiring higher degree of judgement or complexity, or areas where assumptions and estimates are significant.

#### Standard effective at 25 July 2008

IFRS7 introduces disclosures relating to financial instruments and does not have any impact on the classification and valuation of the MRC's financial instruments.

#### Revenue Recognition

Revenue represents the parliamentary grant from the government as well as the external income.

##### 2.1.1 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. Grants used to obtain long term assets are recognised as deferred income and recognised as revenue over the estimated useful lives of the related assets.

##### 2.1.2 Research revenue

Revenue is recognised only to the extent of research costs incurred and 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.

##### 2.1.3 Interest and rental income

Interest income is accrued on a time proportion basis. Rental income is derived from fixed property and is recognised on an accrual basis in accordance with the substance of the relevant agreements.

### Investments in associates

An associate is an entity in which the Council has significant influence, through participation in the financial and operating policy decisions of the investee, but not having control over those policies. Investments in associates are carried in the balance sheet at cost as adjusted by post-acquisition changes in the group's share of the net assets of the associate, less any impairment in the value of the individual investments.

### 2.3 PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment are stated at historical costs less depreciation and adjustment for any impairments. Costs include costs incurred initially.

Property, plant and equipment is written off on the straight-line basis to residual value, over the useful life of the assets.

The depreciation rates applicable to each category of property, plant and equipment are as follows:

Buildings	2%
Usufruct Buildings	over life of usufruct
Prefabricated Buildings	5%
Laboratory Equipment	5%
Vehicles and containers	20% with a 15% salvage value
Furniture and office equipment	10%
Computer Equipment	20%
Airconditioners	10%

The depreciation charge is based on the componentisation approach where appropriate. Items of property, plant and equipment are not componentised when the replacement policy of the Medical Research Council is to replace the item as a whole rather than its component parts. The effect is that every component in the item of property, plant and equipment has the same assessment of useful life, and the effect of componentising of no effect.

The useful lives and residual values of items of property, plant and equipment are reviewed on an annual basis. If there are changes in expectations, the difference is accounted for as a change in accounting basis. If there are changes in expectations, the difference is accounted for as a change in accounting basis.

### 2.4 Impairment of non-financial assets

Assets, other than inventories and receivables which are separately assessed and provided against where necessary, are reviewed at each balance sheet date to determine whether there is any indication of impairment. If there is any indication of impairment, its recoverable amount is estimated. The recoverable amount is the higher of its net selling prices and its value in use. Impairment losses are recognised in the income statement.

### 2.5 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 balance sheet 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 balance sheet as a finance lease obligation.

#### Operating leases - lessor

Rental income from operating leases is recognised on a straight-line basis over the term of the relevant lease. Initial direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognised on a straight-line basis over the lease term.

#### Operating leases -lessee

Operating lease payments are recognised as an expense on a straight-line basis over the lease term

## 2.6 Intangible assets

Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised in the income statement as an expenditure when incurred.

Intangible assets acquired separately are reported at cost less accumulated amortisation and accumulated impairment losses. Amortisation is charged on a straight-line basis over their estimated useful lives. The estimated useful life and amortisation method are reviewed at the end of each annual reporting period, with the effect of any changes in estimate being accounted for on a prospective basis.

The amortisation rate is:

Computer software 10%

## 2.7 Provisions

Provisions are recognised when the Council has a present obligation (legal or constructive) as a result of a past event, it is probable that the Council will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation.

Provisions are measured at the present value of the expenditure expected to be required to settle the obligation using a rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to passage of time is recognised as interest expense.

## Onerous contracts

Present obligations arising under onerous contracts are recognised and measured as a provision. An onerous contract is considered to exist where the Council has a contract under which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it.

## 2.8 Biological assets

The Council recognises biological assets when:

- (a) the entity controls the asset as a result of past events;
- (b) it is probable that future economic benefits associated with the asset will flow to the entity; and
- (c) the fair value or cost of the asset can be measured reliably.

Biological assets are measured on initial recognition and at each balance sheet date at its fair value less estimated point-of-sale costs, except where the fair value cannot be measured reliably.

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.

## 2.9 Cash and cash equivalents

Cash and cash equivalents comprise of cash on hand and deposits held on call with banks. Cash equivalents comprise of highly liquid investments that are convertible to cash with insignificant risk of changes in value and with original maturities of less than three months.

## 2.10 Inventory

Inventory is stated at the lower of cost and net-realizable 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.

## 2.11 Employee benefits

### Short term employee benefits

The cost of all short-term employee benefits is recognised during the period in which the employee renders the related services. The provisions for employee entitlements to salaries and annual leave represent the amount which the MRC has a present obligation to pay as a result of employee's service provided to the reporting date.

### Long-term employee benefit

#### Leave

The liability for employee's entitlements to long service leave represents the present value of the estimated future cash outflows resulting from employee's services provided to the reporting date. In determining the liability for employee benefits, consideration has been given to future increases in wage and salary rates.

### Pension Plan

Contributions to a pension plan, in respect of service in a particular period, are included in the employee's total cost of employment and are charged to the income statement in the year in which they relate as part of the cost of employment.

The amount recognised in profit or loss 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 actuarial gains and losses and unrecognised past service costs.

Actuarial gains and losses are recognised in income in the period in which they arise.

### Post-retirement medical care benefits

The MRC provides post-retirement medical care benefits to its employees and their legitimate spouses. The entitlement to post-retirement medical benefits is based on the employee remaining in service up to retirement age. The expected cost 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 it occurs.

## 2.12 Financial Instruments

### Financial assets

Financial assets are recognised when the MRC has rights or other access to economic benefits. Such assets consist of cash and cash equivalents, trade and other receivables, and investments.

Financial assets carried on the balance sheet include cash and cash equivalents, trade and other receivables, and trade and other payables, and investments.

### Investments

Investments 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 and other receivables are initially recognised at fair value and are subsequently recognised at their amortised cost less provision for impairment. An estimate of doubtful debt is made on a review of all outstanding amounts at reporting dates.

### Cash and cash equivalents

Cash and cash equivalents comprise of cash 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.

### Financial liabilities

Financial liabilities are recognised when there is an obligation to transfer benefits and that obligation is a contractual liability to deliver cash or another financial asset. Financial liabilities carried on the balance sheet include trade and other payables.

## 2.13 Foreign currencies

Transactions in foreign currencies are accounted for at the rates of exchange on the date of the transactions.

Gains and losses arising from the settlement of such transactions are recognised in the income statement.

At year end foreign currency transactions not yet settled are restated at the closing rate.

## 2.14 Irregular or fruitless and wasteful expenditure

Irregular expenditure means expenditure incurred in contravention of, or not in accordance with, a requirement of the PFMA. Fruitless and wasteful expenditure means expenditure that was made in vain and would have been avoided had reasonable care been exercised. All irregular, fruitless and wasteful expenditure is charged against income in the period it was incurred.

## 2.15 Change in estimate

The MRC has decided not to discount accounts receivable and accounts payable with effect from the current financial year, because of complexities associated with estimating interest receivable and interest paid.

The comparative figures have not been changed. Based on our calculations, the effect of not discounting on the current years surplus, will not be material.

SA MEDICAL RESEARCH COUNCIL  
**NOTES TO THE FINANCIAL STATEMENTS**  
*for the year ended 31 March 2009*

3. PROPERTY, PLANT AND EQUIPMENT

2009	Land and Buildings R	Laboratory Equipment R	Vehicles & Containers R	Furniture & Office Equipment R	Total R
Carrying value at beginning of year	47,924,242	28,058,143	11,251,144	7,755,701	94,989,230
Cost	64,769,576	78,386,927	19,611,917	19,173,116	181,941,536
Accumulated Depreciation	(16,845,334)	(50,328,784)	(8,360,773)	(11,417,415)	(86,952,306)
Additions	2,094,651	13,373,311	1,678,141	1,156,790	18,302,893
Disposals	-	(14,340,690)	(1,039,599)	(3,025,166)	(18,405,455)
Depreciation on disposals	-	13,365,325	928,245	2,565,220	16,858,790
Depreciation	(4,160,768)	(2,979,018)	(2,446,238)	(1,589,880)	(11,175,904)
Carrying value at end of the year	45,858,125	37,477,071	10,371,693	6,862,665	100,569,554
Cost	66,864,227	77,419,548	20,250,459	17,304,740	181,838,974
Accumulated Depreciation	(21,006,102)	(39,942,477)	(9,878,766)	(10,442,075)	(81,269,420)

2008	Land and Buildings R	Laboratory Equipment R	Vehicles & Containers R	Furniture & Office Equipment R	Total R
Carrying value at beginning of year	48,398,498	26,236,035	11,324,771	6,601,627	92,560,931
Cost	63,281,728	72,207,740	18,470,467	18,191,093	172,151,028
Accumulated Depreciation	(14,883,230)	(45,971,705)	(7,145,696)	(11,589,466)	(79,590,097)
Additions	1,487,848	7,261,014	1,542,679	1,165,449	11,456,990
Disposals	-	(1,081,827)	(401,229)	(183,426)	(1,666,482)
Depreciation on disposals	-	1,033,071	261,455	158,747	1,453,273
Depreciation	(1,962,104)	(5,390,150)	(1,476,532)	13,304	(8,815,482)
Carrying value at end of the year	47,924,242	28,058,143	11,251,144	7,755,701	94,989,230
Cost	64,769,576	78,386,927	19,611,917	19,173,116	181,941,536
Accumulated Depreciation	(16,845,334)	(50,328,784)	(8,360,773)	(11,417,415)	(86,952,306)

An amount of R16 million was written off during the year after a comprehensive asset count was conducted. A large number of assets were purchased more than 20 years ago.

## 4. INTANGIBLE ASSETS

2009	Computer Software R	Total R
Carrying value at beginning of year	574,111	574,111
Cost	1,500,346	1,500,346
Accumulated Amortisation	(926,235)	(926,235)
Additions	-	-
Change in estimate of the useful life	(590,953)	(590,953)
Carrying value at end of the year	1,165,064	1,165,064
Cost	1,500,346	1,500,346
Accumulated Amortisation	(335,282)	(335,282)

2008	Computer Software R	Total R
Carrying value at beginning of year	1,324,285	1,324,285
Cost	1,500,346	1,500,346
Accumulated Amortisation	(176,061)	(176,061)
Additions	-	-
Amortisation	(750,173)	(750,173)
Carrying value at end of the year	574,111	574,111
Cost	1,500,346	1,500,346
Accumulated Amortisation	(926,235)	(926,235)

	2009 R	2008 R
<b>5. BIOLOGICAL ASSETS</b>		
Bearer mature biological assets at beginning of year	1,180,410	710,850
Gains and losses from changes in fair value less estimated point of sale costs	(664,270)	469,560
Increases due to purchases	3,000	-
Decreases attributable to sales	(63,000)	-
Bearer mature biological assets at end of year	456,140	1,180,410
<p>The MRC holds certain monkeys, baboons and horses for research purposes. All research activities are monitored and controlled to ensure humane treatment of animals.</p>		
<b>6. INVESTMENTS</b>		
<b>6.1 Short-term investments</b>		
Listed investments	28,279,726	2,570,750
Sanlam demutualisation shares (No. of shares 14128) (2006 - No. of shares: 14 128)	237,916	269,845
Sanlam Unit Trust	1,775,867	2,226,514
ABSA 12 month fixed deposit	26,236,473	-
Old Mutual demutualisation shares (No. of shares: 4210) (2006 - No. of shares: 4 210)	29,470	74,391
Non-listed investment		
Investment in subsidiary	1	1
<p>Investment in Medres (Pty) Ltd is stated at cost less amounts written off. Medres Investment (Pty) Ltd is a wholly owned subsidiary of the MRC. The financial statements of Medres are not consolidated with that of the MRC, because the company was dormant and has no assets and liabilities.</p>		
Investment in Jirehsa Medical	100,000	100,000
Investments in various portfolios- to fund post retirement benefits		
Advanced Balanced portfolio	-	-
Investments in various instruments - to fund post retirement benefits	-	-
	100,001	100,001

	2009 R	2008 R
<b>7. INVENTORY</b>		
Consumable stores	302,557	362,011
<b>8. TRADE AND OTHER RECEIVABLES</b>		
Trade Receivables	35,837,684	41,658,166
Provisions	(2,181,477)	(1,873,422)
Staff Advances	33,933	70,918
Prepaid Expenses	1,412,947	1,319,440
Travel & Subsistence	1,225,169	850,179
Vat Refundable	1,278,710	-
Other Receivables	-	70,471
	<u>37,606,966</u>	<u>42,095,752</u>
<b>9. CASH AND CASH EQUIVALENTS</b>		
Bank balances		
ABSA and Standard Bank	1,814,341	44,988,611
ABSA - funders accounts	99,783,578	93,006,878
Petty cash	17,559	13,644
First National Bank	2,136,328	5,453,765
Cash at the Reserve Bank	303,629,269	190,205,539
	<u>407,381,075</u>	<u>333,668,437</u>
Additional disclosure on cash and cash equivalents		
Rationalisation fund		
The fund was instituted in terms of the regulations regarding the framework autonomy and provides for the expenditure associated with institutional restructuring or rationalisation.		
Balance at beginning of year	6,592,760	7,637,218
Rationalisation payments	(4,693,236)	(1,044,458)
Balance at end of the year	<u>1,899,524</u>	<u>6,592,760</u>

	2009 R	2008 R
Motor vehicle self-insurance reserve		
This reserve was established to provide for the self-insurance of motor vehicles with a low market value.		
Balance at beginning of year	1,794,700	1,500,740
Allocation for the year	345,746	302,154
Expenditure	(559,518)	(8,194)
Balance at end of the year	<u>1,580,928</u>	<u>1,794,700</u>
Earmarked Funds		
Botha Trust	261,636	261,636
Bruhns Trust	746,898	673,741
Melville Douglas Trust	100,000	100,000
	<u>1,108,534</u>	<u>1,035,377</u>

## 10. DEFERRED INCOME

Deferred Income monies received upfront in respect of research grants awarded to the MRC for specific research projects.	<u>250,365,999</u>	<u>170,560,020</u>
Deferred Income contracts and grants	<u>100,569,554</u>	<u>94,989,230</u>

Deferred Income contracts and grants refers to the portion of government grants and contract income which was applied to acquire property, plant and equipment and which has not yet been released to the statement of financial performance.

Deferred Income for research grants is recognised as revenue as the related research expenditures are incurred.

Deferred Income contracts and grants is recognised as revenue as the related items of property, plant and equipment are depreciated.

	2009 R	2008 R
<b>11. POST RETIREMENT OBLIGATIONS</b>		
<b>11.1 Pension funds</b>		
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 as at 1 April 2008 and it was found that the fund had a surplus of R10 million.		
(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.		
Details of the funded defined benefit plans are as follows:		
Defined benefit obligation - Wholly funded		
Present value of obligation	61,065,000	58,338,000
Fair value of plan assets	50,688,000	63,528,000
	<u>10,377,000</u>	<u>(5,190,000)</u>
Unrecognised actuarial gains and losses	-	-
Unrecognised past service cost	-	-
Net asset prior to limitation	10,377,000	(5,190,000)
Unfunded liability provided	(10,377,000)	-
Limitation of asset	-	5,190,000
Net asset recognised on the Balance Sheet	<u>-</u>	<u>-</u>
Reconciliation of defined benefit obligation		
Opening defined benefit obligation	58,338,000	55,204,000
Charges recognised in the income statement	14,698,000	8,982,000
Benefits paid	<u>(11,971,000)</u>	<u>(5,848,000)</u>
Closed defined benefit obligation	61,065,000	58,338,000

	2009 R	2008 R
<b>Reconciliation of Plan assets</b>		
Opening fair value of plan assets after limitation	58,338,000	55,204,000
(Income)/Charges recognised in the income statement	(600,000)	(547,000)
Contributions	4,921,000	9,529,000
Benefits paid	(11,971,000)	(5,848,000)
Closing fair value of plan assets	50,688,000	58,338,000
Staff Costs includes the following in respect of the defined benefit pension plan:		
Current service cost	4,397,000	4,381,000
Interest cost	5,081,000	4,195,000
Expected return on plan assets	(6,490,000)	(5,200,000)
Net actuarial (gains)/losses recognised in current year	17,500,000	(1,738,000)
Asset limitation	(5,190,000)	7,891,000
	15,298,000	9,529,000
The basis used to determine the overall expected rate of return on plan assets was the R186 Government bond without adjustment for the effect of tax.		
The actual return on plan assets amounted to:	(5,790,000)	3,868,000
The principal actuarial assumptions used in determining the pension plan were:		
General inflation rate	5.9% p.a	6.8% p.a
Discount rate	8.9% p.a	9.3% p.a
Expected investment return	9.9% p.a	10.8% p.a
Salary inflation	6.9% p.a	7.8% p.a
	plus merit bonuses	plus merit bonuses

	2009 R	2008 R
<b>11.2 MEDICAL FUNDS</b>		
<p>During the year, 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 benefit 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.</p>		
Details of the defined benefit plans are as follows:		
Defined benefit wholly funded		
Present value of obligation	18,007,000	17,632,000
Fair value of plan assets	17,897,000	17,650,000
	<u>110,000</u>	<u>18,000</u>
Unrecognised actuarial gains and losses	-	-
Unrecognised past service cost	-	-
Net asset prior to limitation	-	(18,000)
Limitation of asset	-	18,000
	<u>-</u>	<u>-</u>
Reconciliation of defined benefit obligation		
Opening defined benefit obligation	17,632,000	16,195,000
Charges recognised in the income statement	1,519,000	2,498,000
Benefits paid	(1,144,000)	(1,061,000)
Closed defined benefit obligation	<u>18,007,000</u>	<u>17,632,000</u>
Reconciliation of Plan assets		
Opening fair value of plan assets after limitation	17,632,000	-
Charges recognised in the income statement	1,326,000	2,498,000
Contributions	-	16,195,000
Benefits paid	(1,061,000)	(1,061,000)
Closing fair value of plan assets	<u>17,897,000</u>	<u>17,632,000</u>

	2009 R	2008 R
Details of the unfunded defined benefit plans are as follows:		
Defined benefit obligation - Unfunded		
Present value of obligation	4,542,000	3,931,000
Fair value of plan assets	-	-
Net liability	4,542,000	3,931,000
Reconciliation of defined benefit obligation		
Opening defined benefit obligation	3,931,000	22,346,580
Charges recognised in the income statement	(251,053)	1,150,676
Benefits paid	(862,053)	(3,371,256)
Transferred to insurance policy	-	(16,195,000)
Closed defined benefit obligation	2,817,894	3,931,000
Staff Costs includes the following in respect of the defined benefit medical plan		
Current service cost	207,000	331,000
Interest cost	393,000	518,000
Net settlement and actuarial gains recognised in current year	(851,053)	301,676
	(251,053)	1,150,676
The main principal actuarial assumptions used in determining the medical plan were:	assumptions	assumptions
Discount rate	8.80%	10.00%
General increases to medical aid subsidy	7.90%	8.50%
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
Proportion continuing membership at retirement	100%	100%
Proportion of retiring members who are married	80%	80%
Sensitivity analysis	Impact on liability RM	% Increase/ Decrease
The effects of an increase or decrease of one percentage point on principal actuarial assumptions is as follows on the liability at 31 March 2009:		
Assumptions as above	22,549	
Discount rate - increases by 1% p.a	20,305	-10.00%
Discount rate - decreases by 1% p.a	25,240	12.00%
Medical inflation - increases by 1% p.a	25,105	12.00%
Medical inflation - decreases by 1% p.a	20,392	-10.00%
Retirement age - 60 for all ages	4,324	10.00%

	2009 R	2008 R
Sensitivity analysis	Impact on liability RM	% Increase/ Decrease
The effects of an increase or decrease of one percentage point on principal actuarial assumptions is as follows on the liability at 31 March 2008:		
Assumptions as above	21,563	
Discount rate - increases by 1% p.a	19,356	-11.00%
Discount rate - decreases by 1% p.a	24,239	13.00%
Medical inflation - increases by 1% p.a	24,102	13.00%
Medical inflation - decreases by 1% p.a	19,447	-10.00%
Retirement age - 60 for all ages	25,922	16.00%

## 12. PROVISIONS

### Short Term

#### Provision for collaborative research costs

Balance at beginning of year	4,283,926	-
Additions through income statement	3,391,766	4,283,926
Movement through income statement	-	-
Utilised	(4,283,926)	-
Balance at end of the year	<u>3,391,766</u>	<u>4,283,926</u>

## 13. TRADE AND OTHER PAYABLES

Accounts payable include outstanding cheques amounting to:

Trade creditors	17,701,916	12,940,485
Accruals	5,842,791	36,137,106
VAT	-	8,179,036
Outstanding Cheques	6,476	10,593
Interest due to funders	8,760,715	7,339,359
Personnel Provision Fund	14,821,783	13,492,571
	<u>47,133,681</u>	<u>78,099,150</u>

	2009 R	2008 R
Personnel Provision Fund		
This fund was instituted to provide for the payments of personnel benefits, mainly leave gratuities, death and disability benefits, on the retirement or death of personnel.		
Balance at beginning of year	13,492,571	12,180,529
Leave payouts	(1,700,932)	(697,614)
Movement through income statement	3,030,144	2,009,656
Balance at end of the year	<u>14,821,783</u>	<u>13,492,571</u>

## 14 COMMITMENTS

### 14.1 Capital commitment

At year-end, a capital commitment of R3 365 960 excluding vat, existed in respect of the generator upgrade and other property, plant and equipment orders. This will be funded from existing cash resources.

### 14.2 Outstanding orders

At year, a commitment of R1,490,816 existed in respect of goods and services that have been ordered but not delivered at 31 March 2009.

### 14.2 Operating lease commitments

MRC leases certain of its property, plant and equipment in terms of 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.

Future minimum lease payments for (non-cancellable) operating leases

Payable within one year		
Premises	1,452,104	2,610,358
Furniture and office equipment	99,840	-
Vehicles	232,670	284,492
	<u>1,784,614</u>	<u>2,894,850</u>
Payable 1 to 5 years		
Premises	1,147,974	3,057,618
Furniture and office equipment	407,680	-
Vehicles	116,350	87,993
	<u>1,672,004</u>	<u>3,145,611</u>

	2009 R	2008 R
<b>14.3 Finance lease commitments</b>		
There are no finance lease commitments.		
<b>15. NET SURPLUS FOR THE YEAR</b>		
The net (deficit)/ surplus for the year, includes, amongst others, the following:		
<b>INCOME</b>		
Rent Received	2,667,082	2,444,563
Interest Received	35,829,865	23,410,639
<b>EXPENDITURE</b>		
Auditor's remuneration	942,110	549,102
- Audit fees	942,110	549,102
- Underprovision in previous year	-	-
Depreciation of assets	11,175,904	8,815,482
- Buildings	4,160,768	1,962,104
- Laboratory equipment	2,979,018	5,390,150
- Vehicles and containers	2,446,238	1,476,532
- Furniture and fittings	1,589,880	(13,304)
Loss on disposal of plant and equipment	1,279,624	108,067
Amortisation	(590,953)	750,173
Board members emoluments	459,707	304,429
Executive directors' and managers' remuneration	10,326,185	11,031,578
Finance cost	86,118	89,413
Operating lease payments	3,385,150	3,191,339
Collaborative research	111,770,471	114,562,598
Staff costs	232,862,613	213,509,702

	2009 R	2008 R
<b>16. INTEREST RECEIVED</b>		
Bank accounts	6,459,925	3,048,258
Sanlam Unit Trusts and Bruhns Trust	123,373	61,231
Corporation for Public Deposits	29,209,467	20,251,224
Interest earned / (reversed) on Debtors accounts	37,100	49,926
Interest due to discounting receivables	-	-
	<u>35,829,865</u>	<u>23,410,639</u>
<b>17. COLLABORATIVE RESEARCH</b>		
Consulting costs and honorarium payments	41,169,726	57,146,530
Payments made to external institutions	70,600,745	57,416,068
Reduction due to discounting payables	-	-
	<u>111,770,471</u>	<u>114,562,598</u>
<b>18. STAFF COSTS</b>		
Wages and salaries	200,458,895	187,227,937
Basic salaries	176,413,562	161,030,556
Performance awards	11,633,040	12,443,312
Other non-pensionable allowance	1,143,123	366,347
Temporary staff	9,218,583	11,777,783
Leave payments	1,702,932	972,133
Overtime pay	347,655	637,806
Defined Pension contribution plan expense	9,014,922	8,499,688
Social contributions (Employer's contributions)	9,360,917	8,133,900
Medical	5,256,280	5,051,081
UIF	1,018,551	1,000,310
Other salary related costs	3,086,086	2,082,509
Defined Pension benefit plan expense	3,901,932	8,497,500
- current service cost	2,978,416	2,821,671
- past service cost	923,516	5,675,829
deferred compensation		
Adjustments from the application of AC 116	10,125,947	1,150,677
	<u>232,862,613</u>	<u>213,509,702</u>

	2009 R	2008 R
<b>19. NOTES TO THE CASH FLOW STATEMENT</b>		
Cash generated from operations		
Surplus for the period	38,116,204	42,845,401
Adjustment for non-cash items:	11,203,029	25,673,847
Depreciation of property, plant and equipment	11,175,904	8,815,482
Change in estimate/Amortisation of intangible assets	(590,953)	750,173
Unrealised market to market reserve adjustment	(661,546)	(32,258)
Loss on disposal of property, plant and equipment	1,279,624	108,067
Prior year adjustment	-	16,032,383
Adjustments for items disclosed separately:	(35,843,627)	(23,370,983)
Interest received	(35,829,865)	(23,410,639)
Dividend received	(99,880)	(49,757)
Finance costs	86,118	89,413
Adjustment for changes in working capital	53,220,858	(9,375,664)
(Increase) in inventory and agricultural assets	783,724	(441,710)
Decrease/(Increase) in receivables	4,488,786	7,435,128
(Decrease)/Increase in payables and current deferred income	48,840,508	(21,965,050)
Increase in provisions	(892,160)	5,595,968
Adjustment for increase in non current deferred income	5,580,324	2,428,299
Cash generated from operations	<u>72,276,788</u>	<u>38,200,900</u>
<b>20. TOTAL GOVERNMENT GRANTS</b>		
Allocation for the year	230,436,003	221,290,000
Transfer to deferred income	-	(4,014,036)
Less: Vat	(28,299,158)	(27,175,965)
	<u>202,136,845</u>	<u>190,099,999</u>
<b>21. CONTINGENT LIABILITY</b>		
Remuneration		
<p>There is a legal process in place regarding the special payment made by EMC to staff, in respect of the difference between the salary increases at MRC, and the increases in the public sector. The Board is disputing the payment on the basis that no approval was given.</p>		

## 22. BOARD MEMBERS' EMOLUMENTS

Fees for the board and board sub-committee meetings for the period 1 April 2008 to 31 March 2009 were as follows:

	Honorarium R	Vehicle and parking R	Consulting fees & cellphone Allowance R	Total R
Advocate Block	57,064	2,881	15,370	75,315
Professor D Du Toit	70,904	2,628	-	73,532
Doctor JK Hartzell	9,004	424	-	9,428
Professor DL Mkize	30,594	1,967	-	32,561
Doctor K Mlisana	28,998	800	-	29,798
Professor Moodley	28,998	1,482	-	30,480
Professor JM Pettifor	44,210	2,610	4,524	51,344
Colonel DC Qolohle	23,220	1,682	-	24,902
Professor S Rataemane	56,971	3,423	-	60,394
Professor K Voyi	32,594	-	1,767	34,361
Doctor C Walsh	33,068	-	4,524	37,592
	415,625	17,897	26,185	459,707

Reimbursive column represents payments in lieu of travel costs.

## 23. EXECUTIVE DIRECTORS'/MANAGERS'/TEAM MEMBERS EMOLUMENTS

	Salary R	Travel & Cellphone Allowances R	Leave/ Lump sum Payouts R	Package Total R	Bonus R	S&T R	Company Contributions R	2009 Total R	2008 Total R
*N Bhagwandin	651,564	6,798	58,573	716,935	14,427	15,315	69,781	816,458	766,666
**SH Bok	641,832	6,798	-	648,630	14,427	2,255	79,175	744,487	739,182
***PA Charls	540,900	6,798	-	547,698	61,322	4,294	84,761	698,075	632,413
***MA Damons	474,312	5,715	-	480,027	51,364	8,999	52,104	592,494	539,504
MA Dhansay	886,860	50,308	20,231	957,399	20,644	14,924	106,323	1,099,290	811,032
*E Madela-Mntla	672,804	53,370	-	726,174	15,733	15,262	67,243	824,412	807,416
BJ Mahlangu	887,616	6,798	-	894,414	19,404	967	82,589	997,374	981,179
** ND Mbananga	-	-	-	-	-	-	-	-	1,268,920
AD Mbewu	1,463,343	12,640	212,884	1,688,867	-	21,641	104,960	1,815,468	1,575,369
***MC Mdhuli	561,372	6,798	-	568,170	67,454	3,120	64,109	702,853	594,959
*C Nxomani	-	-	-	-	-	-	-	-	182,451
AP Terblance	815,868	92,517	-	908,385	19,559	23,417	82,110	1,033,471	1,151,372
Z Vokwana	904,680	6,798	-	911,478	19,404	55	70,866	1,001,803	981,115
	8,501,151	255,338	291,688	9,048,177	303,738	110,249	864,021	10,326,185	11,031,578

Executive Directors'/Managers'/Team members resignation; contract end dates and appointment dates

C Nxomani	Resignation	30/06/07
MA Dhansay	Appointed	01/09/07
ND Mabananga	Resignation	31/10/07
MA Damons	Effective	July 2007
MC Mdhuli	Effective	October 2007

\* Executive Manager

\*\* Executive Team members

## 24. FINANCIAL RISK MANAGEMENT AND FINANCIAL INSTRUMENTS

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.

### 24.1 Credit risk

This is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation.

Management has a debtors 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 big banks.

Contract works constitutes the biggest portion of MRC's income, and the major exposure is delays in finalising contracts, and disputes in terms of whether or not 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.

### 24.2 Liquidity risk

This is the risk that MRC will not be able to meet its financial obligations as they fall due. 86% of MRC's trade accounts receivable are current, i.e. less than 30 days.

The MRC monitors its cashflow requirements and optimising its cash return on investments.

### 24.3 Currency risk

This is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices.

The MRC receives substantial funding from the USA and Europe, as a result its balance sheet can be affected by movements in the US\$ and Euros.

Due to uncertainties in respect of when cash will be received from overseas, MRC avoids taking forward cover.

Approximately 84% of MRC's debtors (R32m) are exposed to currency changes, compared to 66% last year (R27 million).

The MRC's project office does a scenario calculation, looking at how much would be lost if there was an unfavourable currency change. On the basis of this outcome, it will be decided whether or not to proceed with particular project.

The following table demonstrates the sensitivity to a reasonably possible change in the US dollar exchange rate.

	Increase/decrease in US dollar rate	Effect on revenue R
<b>2009</b>		
Overseas debtors	10%	
Overseas debtors	-10%	
<b>2008</b>		
Overseas debtors	10%	2,945,771
Overseas debtors	-10%	(2,945,771)

Using the debtors balance as a starting point is not always giving a true reflection of the potential loss, as it could be some time from the period when the contract is concluded and when invoicing starts. There have been cases where the loss was more than 20%.

## 24.4 INTEREST RISK

In respect of income-earning financial assets and interest-bearing financial liabilities, the following tables indicates their average effective interest rates at the reporting date and the periods in which they mature.

2009	Average effective interest rate	Total	6 months or less	1-2 years	2-5 years
Variable rate instruments		R	R	R	R
Cash and cash equivalents	8.00%	407,381,075	407,381,075		
Trade and other receivables	8.00%	37,606,966	37,606,966		
Trade and other payables	8.00%	47,133,681	32,311,898	14,821,783	

2008	Average effective interest rate	Total	6 months or less	1-2 years	2-5 years
Variable rate instruments		R	R	R	R
Cash and cash equivalents	9%	333,668,437	333,668,437		
Trade and other receivables	9.77%	42,095,752	42,095,752		
Trade and other payables	9.77%	78,099,150	64,606,579	13,492,571	

## 24.5 FAIR VALUES

At March 2008 and March 2009, the carrying amounts of cash, accounts receivable, accounts payable approximated their fair values due to the short-term maturities of these assets and liabilities.

## 25. RELATED PARTIES

The MRC has the following Related Parties:

### Investments

The MRC has a wholly owned subsidiary, Medres (Pty) Ltd and Medres (Pty) Ltd has a 24,9% shareholding in Jiresha (Pty) Ltd. During the year, the MRC incurred audit fees of R5700 in respect of Medres. Medres (Pty) Ltd has a loan received from MRC for R55 702; this loan is not considered to be recoverable.

### Services bought or sold

Department of Health (DOH): DOH determines the health priorities, and on the basis of this, MRC presents its business plan. The budget is approved after the business plan has been reviewed by DOH. DOH also funds contract work. National Health Laboratory Services (NHLS) is a public entity of DOH.

Department of Science Technology (DST): DST co-ordinates and fund the Science system. National Research Foundation (NRF), SAASTA and the Council for Scientific Industrial Research (CSIR) are public entities reporting to DST.

Revenue in respect of work done for related parties in respect of services rendered:

	2009	2008
	R	R
DOH baseline (excluding vat)	202,136,845	194,114,035
DOH	20,034,757	25,029,239
DST	17,582,548	19,522,781
NRF	6,361,833	5,714,405
CSIR	95,998	183,933
NHLS	162,500	-
HSRC	102,218	13,398
SAASTA	157,837	433,266
ARC	249,430	-
Expenses paid or accrued in respect of services rendered to the MRC:		
NHLS	3,734,270	4,242,620
CSIR	2,054,687	1,683,988
HSRC	-	60,000
Repayment of grants		
NRF	-	471,146
Accounts receivable balances at year end:		
DOH	4,418,105	1,445,900
DST	46,771	604,949
NHLS	855,390	846,798
CSIR	-	139,789
NRF	66,008	870,873
SAASTA	-	93,110
HSRC	175,627	-
Accounts payable/Prepaid income balances at year end:		
NHLS	6,939,280	3,205,010
HSRC	-	22,800
CSIR	795,574	-

Key Management Personnel

The remuneration of the Key Management Personnel has been included under remuneration note 23.

	2009 R	2008 R
Remuneration	10,326,185	11,031,578
Their leave balances were as follows:		
Prof A Mbewu	7,838	287,518
Prof P Terblanche	4,889	(27,942)
Dr A Dhansay	275,603	223,568
Mr. Z Vokwana	66,944	81,372
Mr. B Mahlangu	178,518	143,072
Ms S Bok	92,332	66,483
Mr. P Charles	149,012	132,817
Ms M Jacobs	32,872	-
Dr N Madela-Mntla	104,621	73,950

## 26. PRIOR YEAR ADJUSTMENTS

Net effect of  
restatement  
R

### 26.1 DEFERRED INCOME

Deferred income was overstated

The impact of the adjustment on the 2008 financial statements is as follows:

Increase in accumulated surplus at 1 April 2007

Increase in surplus resulting from:

Increase in income from contracts, grants and services rendered 15,721,626

Decrease in deferred income (15,721,626)

MRC erroneously did not recognise time spent related to some foreign contracts, and the funds were regarded as restricted.

	2009 R	2008 R
<b>26.2 Property, plant and equipment</b>		
The property, plant and equipment have been restated to reflect net book values, given appropriate useful lives. The impact of the adjustment on the 2008 financial statements is as follows:		
Increase in accumulated surplus at 1 April 2007		
Increase in surplus resulting from:		
Decrease in depreciation	(4,678,700)	
Increase in property plant and equipment	4,678,700	
Increase in accumulated surplus at 31 March 2008		
Increase in surplus resulting from:		
Decrease in depreciation	(2,419,470)	
Increase in property plant and equipment	2,419,470	
	RESTATED 2008	PREVIOUSLY DISCLOSED 2008
	R	R
Amount of Property Plant and Equipment disclosed	94,989,230	87,891,060

	2009 R	2008 R
<b>26.3 Government grants and contracts related to assets</b>		
		Net effect of restatement R
<p>The deferred income is recognised as an increase to surplus over the estimated useful lives of the related property, plant and equipment. The adjustment to depreciation as at 1 April 2007 resulted in an excess on deferred income. The excess of the deferred income above property, plant and equipment were released to accumulated surplus immediately to match them to the assets already consumed. The impact of the adjustment on the 2008 financial statements is as follows:</p>		
Decrease in deferred income at 31 March 2008	(2,419,470)	
Increase in Surplus 2008, resulting from:	2,419,470	
Increase in grant revenue 2008	2,419,470	
	RESTATED 2008 R	PREVIOUSLY DISCLOSED 2008 R
Deferred income contracts and grants	92,560,931	87,882,231
Increase in trade and other receivables at 31 March 2008		(310,757)
Increase in accumulated surplus at 1 April 2008, resulting from:		310,757
Increase in income from contracts, grants and services rendered		310,757
	RESTATED 2008 R	PREVIOUSLY DISCLOSED 2008 R
Trade and other receivables	42,095,752	41,151,029
Deferred income	170,560,020	199,975,203

	2009 R	2008 R
<b>26.4 Summary of effect of adjustments on net assets</b>		
Increase in income from contracts, grants and services rendered	16,032,383	
Increase in accumulated surplus 1 April 2007	16,032,383	
Increase in surplus 2008	14,327,523	
Decrease in deferred income	(29,415,183)	
Increase in trade and other receivables	(944,723)	
	RESTATED 2008	PREVIOUSLY DISCLOSED 2008
	R	R
<b>26.6 Accumulated surplus</b>	121,225,088	90,865,182

## 27. RECLASSIFICATION OF PRIOR YEAR FIGURES

27. 1 Motor vehicle self-insurance reserve note reflected the incorrect expenditure amount in note 9.

27. 2 Trade and other payables include the personnel provision fund which was previously disclosed as a long term provision.

## 28. DETAILED STATEMENT OF FINANCIAL PERFORMANCE

	Notes	2009 R	2008 R
Revenue		531,805,427	494,047,526
Government Grants		208,487,468	187,671,700
Total Government grants	20	202,136,845	190,099,999
Vat Assessment		11,930,947	-
Add/(Less): Transfer to deferred income grants and contracts		(5,580,324)	(2,428,299)
Income from Contracts, grants and Services Rendered		281,875,151	278,605,692
Gross Income		281,875,151	278,605,692
Add/(Less): Transfer to deferred income grants and contracts		-	-
Other Income		41,442,808	27,770,134
Interest Received	16	35,829,865	23,410,639
Rent received	15	2,667,082	2,444,563
Bad debts recovered		15,550	46,669
Sundry income		2,830,431	1,818,506
Dividend income		99,880	49,757
Expenditure		493,689,223	451,202,125
Laboratory Operating Cost		42,240,866	27,920,766
External Research Support, consulting and internal audit		5,491,221	9,241,819
Collaborative Research	17	111,770,471	114,562,598
Audit Fees	15	942,110	549,102
Bad Reversed/ Bad Debts		(155,357)	287,142
Computer Related Expenditure		8,937,516	7,291,982
Depreciation of assets	15	11,175,904	8,815,482
(Change in estimate)/Amortisation of intangible assets	15	(590,953)	750,173
Lease Rentals	15	3,385,150	3,191,339
Loss on disposal of plant and equipment	15	1,279,624	108,067
Infra-structural, communication and statutory costs		20,525,933	18,618,144
Sundry Expenditure		4,412,561	3,871,493
Repairs and maintenance		6,358,353	4,921,837
Staff Cost	18	232,862,613	213,509,702
Retrenchment/ early retirement costs		4,693,236	1,044,458
Travel, Subsistence and Conference Attendance		36,649,327	33,093,495
Finance cost		86,118	89,413
Printing and Stationery		3,624,530	3,335,113
<b>SURPLUS for the year</b>		<b>38,116,204</b>	<b>42,845,401</b>

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