Medical Research Council of South Africa **ANNUAL REPORT 2005**

MRC Annual Report 2005

Research is the cornerstone of health care, and the Medical Research Council's task is to improve the health of the population of South Africa through excellent scientific research.

About the MRC

The South African Medical Research Council (MRC) is one of South Africa's premier science councils, founded by Act of Parliament in 1969.

The MRC's task is to promote and conduct health research. The results of this research can be translated into policy, health promotion, health practice and products that improve the health and quality of life of all South Africans.

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.

Organisational culture

The MRC is responsible for, and passionate about, Africa's development and welfare.

The MRC respects:

- Ethics and human rights
- Capacity development
- Indigenous knowledge and culture
- Information and knowledge management
- Intellectual property.

Values of the MRC

Transparency and open communication • Freedom to challenge • Accountability • Responsibility • Teamwork • Leadership • Participation • Respect • Dignity • Innovation • Honesty • Fairness and integrity • Reward and recognition • Excellence • Capacity development.

MRC SOUTH AFRICA

Building a healthy nation through research

CONTENTS

MRC RESEARCH UNITS, GROUPS, CENTRES AND LEAD PROGRAMMES

National Programme for Environment and Development	Alcohol and Drug Abuse Research Unit Exercise Science and Sports Medicine Research Unit Health and Development Research Group Health Promotion Research and Development Group Occupational and Environmental Health Research Group
National Programme for Health Systems and Policy	Biostatistics Unit Burden of Disease Research Unit Cochrane Centre Health Policy Research Group Health Systems Research Unit National Telemedicine Lead Programme Rural Public Health and Health Transitions Research Unit
National Programme for Non-Communicable Diseases	Anxiety and Stress Disorders Research Unit Cancer Epidemiology Research Group Chronic Diseases of Lifestyle Research Unit Crime, Violence and Injury Lead Programme Diabetes Research Group Interuniversity Cape Heart Research Group Medical Imaging Research Unit PROMEC Unit
National Programme for Infection and Immunity	Clinical and Biomedical Tuberculosis Research Unit Diarrhoeal Pathogens Research Unit Genital Ulcer Disease Research Unit HIV and AIDS Research Lead Programme HIV Prevention Research Unit South African AIDS Vaccine Initiative Immunology of Infectious Disease Research Unit Indigenous Knowledge Systems Lead Programme Inflammation and Immunity Research Unit Malaria Research Lead Programme Unit for Tuberculosis Operational and Policy Research Respiratory and Meningeal Pathogens Research Unit South African Traditional Medicines Research Group Tuberculosis Research Lead Programme
National Programme for Molecules to Disease	Bioinformatics Capacity Development Research Unit Bone Research Unit Centre for Molecular and Cellular Biology Human Genetics Research Unit Human Genomic Diversity and Disease Research Unit Liver Research Centre Molecular Hepatology Research Unit Molecular Mycobacteriology Research Unit Oesophageal Cancer Research Group Research Group for Receptor Biology
National Programme for Women and Child Health	Gender and Health Research Unit Maternal and Infant Health Care Strategies Research Unit Mineral Metabolism Research Unit Nutritional Intervention Research Unit

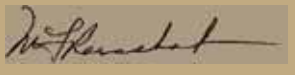
TO THE MINISTER OF HEALTH
DR M. E. TSHABALALA-MSIMANG

The Medical Research Council respectfully submits the following Annual Report on its activities from 1 April 2004 to 31 March 2005.

The Council wishes to acknowledge the support received from the Honourable Minister and the Department of Health, for which it is extremely grateful, and thanks the Ministry for its contribution to the MRC's efforts to respond to the health research needs of the nation.

The Council thanks all our colleagues in the scientific community for their continued contribution to health research in South Africa.

Finally, the Council wishes to state its appreciation for the work of its own members of staff and all the other researchers it supports, and expresses its gratitude for all the advice and guidance received from members of the Board, Committees, Evaluation Panels and Task Teams.



Professor M. F. Ramashala
Chairperson of the Board

Professor A. D. MBewu
MRC President

In the next 3-5 years the MRC expects more black and women scientists to be brought into the research process at doctoral and postdoctoral level.

Professor Mapule F. Ramashala

MESSAGE FROM THE CHAIRPERSON

The Medical Research Council of South Africa is entering a period of accelerated transformation and development of its research priorities, research portfolio, capacity development and employment equity profile. This was determined and planned at a recent workshop held by the MRC Board together with Executive Management Committee. Great gains have already been made, particularly in the 12 years since the MRC adopted essential national health research (ENHR) as the guiding philosophy of its research in 1993. The pace of progress increased after 1994 with prioritisation of the MRC research portfolio and development of performance management. The opportunity now exists to complete that transformation over the next few years resulting in an MRC that conducts research relevant and responsive to the health needs of the people of South Africa.

The Board is proud of the achievements of the MRC staff outlined in this document. It is confident that these achievements can be further developed. In the next 3-5 years the MRC expects more black and women scientists to be brought into the research process at doctoral and postdoctoral level. The outputs are documented in the key performance indicators (pp. 7-12), and the outcomes in terms of better health and socio-economic development are described in the research highlights and other sections of this report.

Furthermore, the organisation is on a sound financial footing with fully 50% of its total income generated from contracts and grants; the other 50% comes from the more reliably sustainable source of the government grant from the National Department of Health. Since 1 April 2005 the NDoH became the primary government department to which the MRC reports, and with which the MRC establishes priorities and undertakes performance management.

Nevertheless, the MRC will continue to operate within the National System of Innovation of South Africa, with access to the programmes and grants of the Department of Science and Technology (DST), such as the Innovation Fund. Indeed, the MRC is proud that two of its research units were recently granted Centre of Excellence status by the DST – the Centre for Cellular and Molecular Biology at the University of Stellenbosch, and the Molecular Mycobacteriology Unit at the University of the Witwatersrand.

Sometimes overlooked are the vitally important support divisions of the MRC whose work is regarded as among the highest quality of any support functions within any parastatal. Examples include the research grants management system of the MRC, which was recently chosen to administer the peer review and grant disbursement processes of the NDoH Reference Committee for Research within the Comprehensive Plan for the Management, Treatment, and Care of HIV and AIDS.

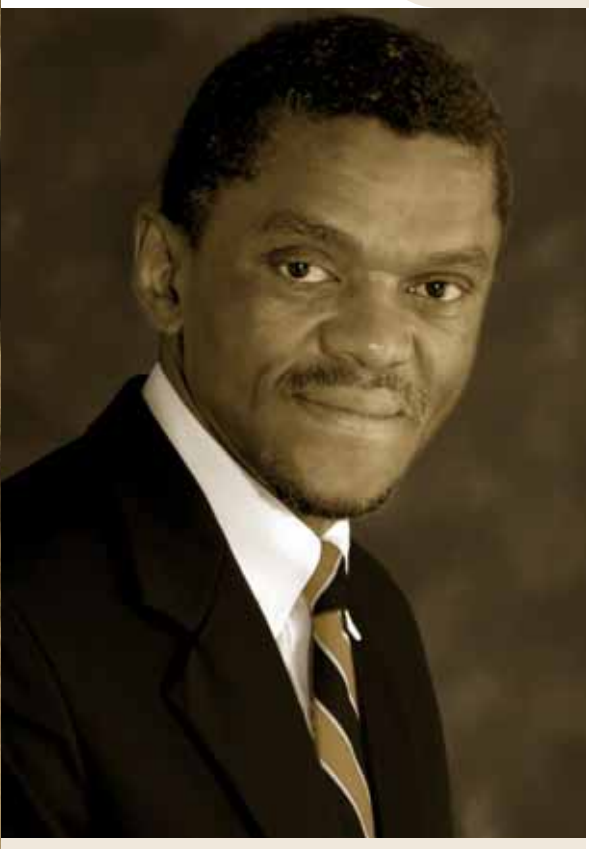
Making the MRC a more rewarding place to work has always been a priority of this Board and its Executive Management Committee. It was particularly gratifying therefore to witness the successful efforts this year to bridge the gap that had developed between the levels of MRC salaries and those of sister organisations. More work needs to be done since the gap is only half closed; and this will form part of efforts to continually improve the Conditions of Service of employees, and to build a harmonious organisation with shared values and a renewed sense of mission and purpose.

On behalf of the MRC Board I would like to thank the Minister of Health Dr Manto Tshabalala-Msimang for the faith and trust she has placed in us in steering this valuable national institution.

MRC BOARD

1. **Prof MF Ramashala (Chairperson)**
2. **Mr MP Canca (Vice-Chairperson)**
3. **Prof Ahmed A Azad**
   Faculty of Health Sciences, University of Cape Town
4. **Dr JF Hartzell**
   Co-ordinator
   Traditional, Complementary & Alternative Medicine,
   Nelson R. Mandela School of Medicine,
   University of KwaZulu-Natal, Durban
5. **Prof LJ King**
   Aga Khan University
   Regional Office, Nairobi, Kenya
6. **Ms JN Makhanya**
   Durban Institute of Technology
7. **Ms MK Matsau**
   Deputy Director-General,
   Department of Health
8. **Prof DL Mkize**
   Department of Psychiatry,
   University of KwaZulu-Natal, Durban
9. **Prof MS Mokgokong**
   University of Limpopo, MEDUNSA campus, Pretoria
10. **Prof JM Pettifor**
    Mineral Metabolism Research Unit,
    University of Witwatersrand and
    Chris Hani Baragwanath Hospital, Johannesburg
11. **Colonel DC Qolohle**
    Head of Department: Obstetrics & Gynaecology,
    1 Military Hospital, Pretoria
12. **Prof H Schneider**
    Health Policy Research Group, Johannesburg
13. **Prof Kuku Voyi**
    Faculty of Health Sciences, University of Pretoria
14. **Dr Corina Walsh**
    Department of Human Nutrition,
    University of Free State, Bloemfontein

Research makes no difference to health unless it is translated. Research translation is the theme of this year's annual report — and for the MRC's entire research strategy.



Professor Anthony MBewu

THE PRESIDENT'S REPORT

Getting Research results Into Policy, Practice, (health) Promotion and Product (GRIPPPP) – better known as Research Translation – is the theme of this year's Annual Report. Indeed it is a broad theme not just for this year's research activities but for the organisation's entire research strategy. This is because research makes no difference to health unless it is translated. Therefore, achieving the MRC vision of *'Building a healthy nation through research'* is only possible if the results of the MRC's research endeavours in its 800+ research projects are translated into policy.

The National Department of Health (NDoH) is important therefore not simply because it is the source of 50% of the MRC's R350 million budget (and the only part of the budget that is reliably sustainable year after year) – nor simply because it is the government department that has to sanction the MRC's research priorities and manage its performance. The NDoH is of vital importance to the MRC as the principal channel through which MRC research can improve the health of the nation – because NDoH develops and implements the policies and sets the norms and standards that guide preventive, health promotive, therapeutic and rehabilitative health services for the people of South Africa.

This Annual Report presents many examples of how MRC scientists have been able to take one step closer to achieving their vision through translating research into a form in which NDoH could formulate policy such as the 'National Strategy for Engaging in Healthy Lifestyles'.

Translation into health practice is key to achieving that vision, and important stakeholders for the MRC are the health care professionals whose practice is influenced by what they read of MRC research. Other professional groups are also influenced, such as social workers, for example in their implementation of the laws on domestic violence promoted by findings of the MRC Technical Report on 'intimate femicide', where a boyfriend or male spouse murders his partner.

However, perhaps the most powerful form of research translation for influencing the health of the people is health promotion. This is because health promotion does not refer only to the legislative and other instruments that create a healthy environment for South Africans – such as the smoke-free environments created by the ban on smoking in public places legislation influenced and supported by MRC research. Health promotion also refers to the healthy choices that people can make to protect themselves from, for example, the second greatest cause of death and disability in South Africa: chronic diseases such as heart attacks, strokes, high blood pressure, diabetes and cancer. Health promotion research helps to identify the determinants underlying such diseases – such as poverty, lack of education, or gender power imbalances. It furthermore explores how the risk factors that arise from these determinants can result in disease – such as the undernutrition arising from poverty causing immune deficiency or susceptibility to measles. Thirdly, it develops and tests interventions that can alter risky behaviours – such as unprotected sex resulting in HIV infection or sexually transmitted infections.

Again, these pages list myriad MRC research projects in health promotion that are already bearing fruit – for example, doubling the number of sexually active young people who report using condoms from 30% in 1997 (South African Demographic Health Survey) to 60% in 2002 (National Youth Risk Behaviour Survey).

Finally, MRC research is beginning to impact on the fourth leg of research translation – namely translation into products such as patents for new drugs and vaccines, and disclosures of new biomedical or public health processes. It is early days yet, but the MRC seeks to be a leader in the field of biotechnology – in both natural medicines, such as the evaluation of traditional medicines, and also 'high-tech' activities such as the development of drugs, vaccines and medical devices. Two novel antimalarial compounds have been isolated and characterised from South African plants and a total of 18 compounds for use in fields such as tuberculosis, diabetes and cancer have been identified from South African plants through the Novel Drug Development Platform funded by the Innovation Fund for R18 million. Such 'indigenous knowledge' is a part of our centuries-old heritage that the MRC jealously guards and develops for the benefit of current and future generations of South Africans.

Finally, research is only worth translating if it is excellent. The high calibre of many MRC scientists is attested to by the fact that 4 of our 48 research directors are A rated in the NRF system, and win for the MRC more competitive National Institutes of Health of USA grants than any other South African institution.

These are just some examples of how MRC researchers and their support staff are contributing to preserving and improving the health and wealth of the nation. We are proud of the work of all of our staff, and confident that in years to come they will ascend to even greater heights in the scope, quality and impact of their endeavours.

MRC KPIs FOR THE YEAR ENDED 31 MARCH 2005

The MRC is required by the NDoH and Treasury to outline its Key Performance Indicators and the outputs of these.

Perspective	Key Result Area	Key Performance Indicator	Measure	Outputs
Stakeholders and Customers	1. Scope of national and international collaborations	1. Projects done through collaborations between MRC and other national organisations	At least three projects per year done through collaborations	Six projects done through collaboration: 1. Khanyagula Science Expo; 2. Women's Day; 3. Taking Biotechnology to Rural Communities; 4. US Biotechnology Study Tour; 5. SciFest; 6. National Science Week participation in the Western Cape and Limpopo provinces.
			Comprehensive Prevention, Treatment and Care of HIV and AIDS Plan.	Six meetings between the MRC stakeholder relations office and NDoH.
			Department of Science and Technology – stakeholder relations	Six meetings between the MRC stakeholder relations office and DST.
			Number of Parliament visits	Visited 6 Portfolio Committees over 5 days; The following Portfolio Committees were briefed on MRC activities – Health; Arts and Culture; Science and Technology; Education; Labour; Safety and Security and Social development.
			With other Science Councils and collaborations	The MRC has a continuing working relationship with the various Science Councils through COHORT; COHAS and the Corporate Communications Forum
				Two-day media skills workshop together with SAASTA Launching the National Reference Centre for African Traditional Medicines - a collaboration with DoH; CSIR Traditional Medicines

Perspective	Key Result Area	Key Performance Indicator	Measure	Outputs
Stakeholders and Customers		2. Strengthening relationships with key provincial government departments	Number of meetings with provincial government	1. Western Cape - met with various stakeholders over a period of 2 days, discussed MRC research focus areas 2. Eastern Cape - a 2-day programme that facilitated the understanding of MRC research focus 3. Limpopo – discussed the extent of provincial health research and the likelihood of opening a provincial MRC office
		3. International strategic contracts and agreements	Number and overview of strategic contracts and agreements entered into	1. NEPAD e-health projects proposed and MRC specialist seconded to manage e-health portfolio for NEPAD (project value – R160 000) 2. EDCTP – a funding platform for essential drugs trials, MRC awarded 5 projects from this agreement 3. COHRED – MRC seconded a member of staff to this programme
	Contribution to the National System of Innovation (NSI)	1. Patents and disclosures	Number of patents	2 patents 3 disclosures
		2. New posts created with contract money	Number of posts	157
	Socio-economic impact of research	1. Smoking 25% reduction in prevalence	Lives p.a. saved Rands p.a. saved	Estimated 6000 Estimated R30 million
		2. Reduction in the incidence rate of new HIV infections in those aged 15 - 25 years	Lives p.a. saved Rands p.a. saved	Estimated 25 000 Estimated R50 million
		3. Alcohol and substance abuse	Road traffic accidents Crime and violence levels	Plateau of the rate of rise of RTAs Stabilised crime and violence rates
		4. Utilising Indigenous Knowledge Systems and natural products	Utilising health products for poverty alleviation	More than 5 poverty alleviation projects launched in rural South Africa utilising IKS and natural products for job creation through business creation A Public Private Community Partnership Model developed and implemented
	Policy interaction	Policy Briefs to Government	Number of Policy Briefs	Seven Policy Briefs: 1. Every Six hours a woman is killed by her intimate partner 2. Cause of death and premature mortality in SA 3. Demographic Impact of Aids in SA. National Indicators 4. The health facility-based nutrition programme does not address malnutrition effectively 5. Aggressive road behaviours in South Africa 6. Smoking during pregnancy 7. Prevention of mother-to-child transmission of HIV
		Portfolio Committee interaction	Number of meetings	Five Portfolio Committee meetings and briefings done

Perspective	Key Result Area	Key Performance Indicator	Measure	Outputs
Stakeholders and Customers	Policy interaction	Technical reports	Number of technical reports	5 Alcohol and Drug Abuse 1 Helminths 5 Burden of Disease 1 Health and Development
		Media, events and exhibitions platform	Value of media spend	Media coverage, advertising/column space/free airtime saving worth R12 million on a range of health research areas carried out by the MRC
			Amount of media exposure per each platform	18 media releases 50 TV interviews 250 radio interviews 645 newspaper articles 100 magazine articles Due to the adoption of the MRC Media Policy, media interaction has been selective and limited
			Number of events and exhibitions managed	15 events (8 national and 7 International) 19 exhibitions
			Number of videos and photographs used to facilitate research translation and the understanding of MRC outputs	9 video requests 81 photography requests
Finance & Investment	Growth in turnover	Commercialisation income	Rand value	R2.8m
		External grants and contracts	Rand value	R163m (50% of total revenue)
	Leverage baseline funding	High-impact diseases research income	1. HIV 140/20 million 2. Malaria 50/8 million	Ratio 7:1 Ratio 5:1
	Overhead structure	Lean administrative and support costs	Overhead ratio	27%
	Salary expenditure	Gap with the market	% off the industry standard	Reduced from 30% to 15%
		Ratio to baseline	Less that 70%	55%
	Good Corporate Governance	Compliance to audit process	Yearly reporting	Annual financial statements and KPI report by 31 May 2005
			A functioning internal audit unit	Several reports produced by internal audit, and these were presented to the Audit Committee
			A functioning Audit Committee	The Audit Committee met three times during the year
Internal/ Organisational	Research productivity	Published outputs	Published outputs in the SAMED database	568
		Non-peer-reviewed publications/ Non-technical communication	Number	3 issues of *MRC News* (a quarterly magazine), which was sent to a range of stakeholders and the media
			Number	7 brochures profiling and promoting MRC research units and groups as well as the corporate
			Number	3 posters

Perspective	Key Result Area	Key Performance Indicator	Measure	Outputs
Internal/ Organisational	Research productivity	New products transferred into the health care system	Innovative capabilities demonstrated by number and impact of new technologies developed and transferred into the market	DNA-based diagnostic kits transferred to a local start-up; Stereotactic Positioning Device for improved accuracy in brain biopsies licensed to a local start-up. 80 devices sold worldwide; HAPI technology for managing remote clinical research data is being diffused through open-source models
	Recognition of the MRC	MRC scientists serving on international panels	Number of scientists	39
Innovation/ Learning and Growth	Business Development	Success and number of tenders and contracts	Targeted competitive funds as well as global strategic funds	Innovation Fund success rate above 50% Strategic long-term relationships with global funding initiatives such as Global Alliance for TB Drug Development, EDCTP, DFID, FIND and others are being strengthened
	Research Management	Intra/extramural research mix	Number of intramural units	21
			Number of extramural units	27
		Research management processes and implementation of systems	% of extramural/total operating research spending Timeous and efficient	74%
	Knowledge transfer	New knowledge of product creation and knowledge transfer	Number of patents	2 patents
		Number of events in which MRC research is communicated to public so as to facilitate informed decision-making on health-related aspects	At least two events per year at different venues	3 events held: • National Science Week in Limpopo and Western Cape • Women's Day celebration
		Science promotion in schools	At least one project that aims at making learners realise the relevance of science in their lives and demystifying the negative connotations around science 3 websites	Khanyagula Science Expo. Informing public of MRC research and related health issues
	Staff skills gap	Investment in HR development	Skills development (training) as a % of payroll – 2003/2004	2.7%

Perspective	Key Result Area	Key Performance Indicator	Measure	Outputs
Transformation	Number of new scientists Equity	Equity plan achievement	Occupational levels by race and gender	See the table below
	Capacity development	Ph.D. graduates	Number enrolled Obtained	176 49
		M.Sc. graduates	Number enrolled Obtained	208 42
		Staff support request for study - empowerment of people	Value and the number of staff development grants issued by the MRC Training sessions and seminars for staff and users of MRC business processes	There was a range of in-house training sessions such as 1. Knowledge management awareness in the MRC 2. Training on document management and total cost ownership of IT 3. Media training for scientists 4. Corporate Governance from the MRC Board, EMC and the rest of the staff per province
	Relevance and quality of research	Prioritized research portfolio	Degree of fit with national health priorities	Very high
	Translation of research into policy, practice, process and promotion	Research translation systems and processes	Establishment of the Research Translation Office; operational plan and implementation processes Research translation policies	A comprehensive plan was tabled to motivate for the establishment of the Research Translation Office The office was established and the MRC pledged R750 000 for its initiation A presentation was done to DoH to facilitate further funding for this initiative

APPENDIX A

Occupational level by race and gender

Occupational level	Black April 2005	Female April 2005
Top management	86%	33%
Senior management	23%	44%
Middle management	50%	59%
Skilled	78%	75%
Semi-skilled	85%	66%
Unskilled	98%	42%
Total	**74%**	**66%**

RESEARCH OUTPUTS

ENVIRONMENT AND DEVELOPMENT

No. of Projects	No. of staff	Master's students; degrees obtained	Doctoral students; degrees obtained	Conferences		Refereed papers (in press)
				Local papers; posters	International papers; posters	
Alcohol and Drug Abuse Research Unit						
13	2 spec. sci. 3 sci.	2; 1	3; 0	2; 1	6; 5	20 (8)
Exercise Science and Sports Medicine Research Unit						
60	15	27; 7	15; 4	8; 4	25; 2	43 (8)
Health and Development Research Group						
27	11	3; 1	1; 0	18; 3	7; 1	21 (13)
Health Promotion Research and Development Group						
6	1 chief spec. sci., 1 spec. sci., 2 sen. sci., 1 secretary, 1 contract data technologist, 3 contract research interns, 1 contract admin. assistant, 2 support	2; 1	6; 1	1; 0	3; 0	5 accepted
Occupational and Environmental Health Research Group						
		Information requested; not provided				

HEALTH SYSTEMS AND POLICY

Biostatistics Unit						
232	22	2; 2	0; 0	31; 3	22; 8	58 (23)
Burden of Disease Research Unit						
12	4 full-time, 2 part-time, 2 research assistants, 2 support	1; 0	1; 0	17; 3	4; 1	8 (3)
Cochrane Centre						
7	1 chief spec. sci. (20%), 1 spec. sci., 1 scientist, 2 support, 1 sen. res. technologist, 1 research intern	2; 1	0; 0	10; 1	7; 2	8 (2)
Health Policy Research Group						
15	13 research, 4 admin.	0; 1	9; 2	2	10	7 (8)
Health Systems Research Unit						
10	1 chief spec. sci., 1 snr spec. sci., 2 spec. sci., 2 sci., 1 jun. sci., 1 res. assist., 1 snr officer	8; 0	3; 1	0; 0	9; 1	15 (4)

HEALTH SYSTEMS AND POLICY *continued*

No. of Projects	No. of staff	Master's students; degrees obtained	Doctoral students; degrees obtained	Conferences		Refereed papers (in press)
				Local papers; posters	International papers; posters	
National Telemedicine Lead Programme						
9	13	2	1	0; 2	4	2 abstracts submitted
Rural Public Health and Health Transitions Research Unit						
10	70 staff (10 scientific; 5 project m'gers; 10 management/ admin., 45 field staff	8; 0	4; 1	1; 0	12; 0	11 (0)

INFECTION AND IMMUNITY

Clinical and Biomedical Tuberculosis Research Unit						
7	12	1 current	3 ; 1	2 ; 1	1; 2	5
Diarrhoeal Pathogens Research Unit						
6	11	2	6	3; 4	5; 8	8 (9)
Genital Ulcer Disease Research Unit						
Information requested; not provided						
HIV Prevention Research Unit						
7	155	13; 0	1; 1	5; 6	3; 12	7 (1)
Immunology of Infectious Disease Research Unit						
6	7 (none paid by MRC)	6; 0	12; 1 (1 with MRC bursary)	6; 8	12; 10	18
Indigenous Knowledge Systems Lead Programme						
12	8	0; 1	2; 0	0; 0	1; 3	6 (1)
Inflammation and Immunity Research Unit						
5	6	1; 1	0; 2	0; 2	1; 3	12 (7)
Malaria Research Lead Programme						
20	40	4; 0	6; 1	7; 0	5; 1	9 (4)
Unit for Tuberculosis Operational and Policy Research						
19 (baseline 3, contract 16)	19 (baseline 11, contract 8); 5 scientists, 8 technologists, 4 technicians, 2 support	4; 1	1; 1	2; 0	5; 2	4 (6)
Respiratory and Meningeal Pathogens Research Unit						
25	68	2; 0	3; 0	5:4/3	22:20/13	30 (15)
South African AIDS Vaccine Initiative						
35	110	8; 1	8; 1	11; 4	32; 12	28
South African Traditional Medicines Research Group						
9	6	3; 1	15; 6	0; 2	0; 3	8 (2)

MOLECULES TO DISEASE

No. of Projects	No. of staff	Master's students; degrees obtained	Doctoral students; degrees obtained	Conferences		Refereed papers (in press)
				Local papers; posters	International papers; posters	
Bioinformatics Capacity Development Research Unit						
13	4	4; 0	5; 0	1; 0	9; 1	5 (1)
Bone Research Unit						
4	5	2; 0	1; 0	2	3 submitted 8 invited	6
Centre for Molecular and Cellular Biology						
2 main directions, many sub-projects	9 MRC, 4 PAWC, 2 US	4; 2	11; 6	5; 25	3; 29	33 (2)
Human Genetics Research Unit						
2	12 contract research	0; 0	7; 2	2	6	3
Human Genomic Diversity and Disease Research Unit						
3 themes	3	2	2	-	2; 0	2
Liver Research Centre						
24	26 (±21 full-time equivalents)	6	9	11	15	2
Molecular Hepatology Research Unit						
5	6	4; 2	3; 1	0; 2	5; 2	12 (10)
Molecular Mycobacteriology Research Unit						
6	5 Ph.D. level research staff, 6 postgrad. students, 1 MRC intern, 2 support staff	2; 0	4; 0	3; 1	2; 2	8 (1)
Oesophageal Cancer Research Group						
7	7 UCT, Unitra 1, MRC 6	5; 1	6; 1	6; 18	6; 10	13 (6)
Research Group for Receptor Biology						
9	5	4; 0	5; 1	1; 3	3; 3	11 (2)

NON-COMMUNICABLE DISEASES

Anxiety and Stress Disorders Research Unit						
7	9 MRC, 4 Univ. Stellenbosch	6; 2	8; 0	6	13	33
Cancer Epidemiology Research Group						
2 main (many subprojects)	1 Ph.D. level, 2 M.Sc. level research staff, $2^{3}/_{4}$ support	2; 1	1; 0	1	1	6
Chronic Diseases of Lifestyle Research Unit						
18	4 full-time scientists, 5 support staff	10; 4	13; 2	27; 2	1; 6	27 (23)
Crime, Violence and Injury Lead Programme						
19	14 researchers, 4 support	8; 2	4; 0	36	23	21 (12)

NON-COMMUNICABLE DISEASES *continued*

No. of Projects	No. of staff	Master's students; degrees obtained	Doctoral students; degrees obtained	Conferences		Refereed papers (in press)
				Local papers; posters	International papers; posters	
Diabetes Research Group						
5	11	1; 1	2; 0	0; 0	2; 2	4(2)
Interuniversity Cape Heart Research Group						
Hatter Institute for Cardiology Research						
7	16	3; 0	7; 2	5	4	15 (2)
Cardiovascular Research Unit (incorporating the Medtronic Institute)						
7	18	3; 1	5; 0	4; 0	2; 11	8 (2)
Lipidology Division of Internal Medicine						
6	1 academic, 3 technol., 4 contract	3; 1	3; 0	18; 0	0; 2	5 (2)
Department of Physiologic Sciences						
3	2	2; 1	1; 0	1; 2	0; 1	2 (1)
Medical Imaging Research Unit						
12	29	15; 5	8; 2	10; 5	7; 2	17 (13)
PROMEC Unit						
18 (excl. external)	10 scientists, 6 research technologists, 3 research technicians, 2 admin., 4 contract	1; 0	3; 1	11; 9	9; 10	12 (10)

WOMEN AND CHILD HEALTH

Gender and Health Research Unit						
3	23 (5 post-Master's)	9; 1	1; 0	11; 3	16; 4	7 (7)
Maternal and Infant Health Care Strategies Research Unit						
26	2 full-time, 1 part-time, 6 NIH funded (full-time)	7; 3	1; 0	31; 4	8; 0	7 (2)
Mineral Metabolism Research Unit						
7	2 MRC, 1 GPH, 1 Wits, 6 Wellcome	4; 0	4; 1	1; 0	2; 6 (2 invited talks)	16 (5)
Nutritional Intervention Research Unit						
27 + collaborative projects: 15	7 researchers; 15 research and fieldwork support; 4 support	1; 1	1; 0	27; 4	10; 7	11 (14)

NATIONAL PROGRAMME ENVIRONMENT AND DEVELOPMENT

Alcohol and Drug Abuse Research Unit

Major breakthroughs and successes

During 2004 SACENDU was expanded from five sites (Cape Town, Durban, Gauteng, Mpumalanga, and Port Elizabeth) to include East London, and the regional initiative (SENDU) was expanded to Luanda (Angola) and Kinshasa (DRC). Steps were taken to expand surveillance in Tanzania beyond the two sites in Dar es Salaam and Zanzibar. At the 6th regional report-back meeting of SENDU held in November 2004 data were reported on 12 countries.

Capacity development/research strengthening/collaboration

Since 2000 technical support has been provided to SADC countries to establish and expand alcohol and drug surveillance, including visits to 13 countries and provision of training.

Mavis Moshia attended lectures in the Depts of Applied Psychology and Biostatistics at New York University for 14 weeks, receiving training on tobacco and other substance use within the Dept of Psychiatry, funded through the Fogarty International Center (NIH) and CDC. In collaboration with Zohn Rosen, research director within the Dept of Psychiatry at NYU School of Medicine, Dr Neo Morojele undertook training visits to the Universities of Venda, the North and Witwatersand, lecturing staff and postgraduates on research methods and advanced statistical techniques. Bronwyn Myers received training in the Addiction Severity Index (ASI) and Matrix Model of Outpatient Treatment for Substance Use Disorders at the Neuropsychiatric Institute, University of California and the Matrix Institute, Los Angeles.

During 2004/5 the Unit had over 100 radio, TV and print media contacts. A module for fourth-year students in psychology at Stellenbosch University on 'Alcohol abuse in South Africa' was initiated, drawing on findings of MRC research.

Impact of research outputs

The pocket-sized *South African Drug Enforcement Handbook* was launched in March 2005 to assist law enforcement officials in identifying street drugs and the people that use or sell them. The Unit's research was fed into various policy initiatives, including revision of South Africa's national drug master plan, an initiative of the DoH to regulate warning labels on alcohol containers, and preparation of a Discussion Paper on cannabis by the Central Drug Authority. Findings from evaluation of substance abuse treatment facilities funded by the UN Office on Drugs and Crime may inform policies and practices regarding substance abuse treatment service delivery in SA.

Other

Staff serve on the boards of various organisations (e.g. the South African Central Drug Authority, the Cape Town Drug Counselling Centre, SANCA (Western Cape), and the Western Cape Drug Forum) and on the Editorial (Advisory) Boards of various journals (*African Journal of Drug and Alcohol Studies*, *Addiction*, and the *Journal of Substance Use*).

Dr Morojele was a finalist in Category J: Young Black Researcher in the Past 2-5 years for a National Science & Technology Forum Award and Prof. Charles Parry was presented with a Merit Award by the SA National Council on Alcoholism and Drug Dependence. Dr Morojele was an invited plenary speaker at the 31st Annual Conference of the Global Health Council in Washington, DC. Prof. Parry continued to serve on the Alcohol Policy Strategy Advisory Committee of the WHO, attending a WHO-sponsored technical meeting on regulatory approaches to alcohol marketing and young people in Washington, DC.

Exercise Science and Sports Medicine Research Unit

Major breakthroughs and successes

In November 2004 this group successfully hosted the international conference 'Clinical Sports Medicine: Caring for the athlete and the team'. Through close collaboration with Discovery Health a number of products have been developed and launched, including a 'Risk-related age' model for individuals based on lifestyle and health behaviour and the '10 000 steps' campaign.

The Unit showed that exercise and perception of effort are regulated by the central nervous system from the start of exercise, in a continuous and fluctuating manner, based on prior experience, knowledge of distance and time to be completed, and current metabolic rate (reported as five linked publications co-authored by Alan St Clair Gibson, Tim Noakes and Vicky Lambert, recently published in *British Journal of Sports Medicine*).

In collaboration with the MRC/UCT Medical Imaging Research Unit it was shown that brain activity does not change in a localised manner during a fatiguing muscle contraction, but rather that multiple brain areas are active throughout, operating using different electromagnetic frequencies at different times. This novel finding of multiple brain fatigue control regions has been defined as a brain cortical 'fatigue matrix', and was recently submitted for publication.

Capacity development/research strengthening/collaboration

Dr Julia Goedecke, recipient of an MRC Career Development Award, is working closely with Profs Jonathan Seckl and Brian Walker of the University of Edinburgh and Prof. Tommy Ollson of the University of Umea, Sweden, in obesity in SA women. Collaborators associated with development of a Youth Fitness Charter are very extensive. Vicki Lambert continued her collaboration with the MRC Chronic Diseases of Lifestyle Unit as well as developing strong collaborations with Dr Victor Matsudo from the Agita Mundo Network, Brazil, and Dr Adrian Bauman, School of Community Medicine and Public Health, University of New South Wales, Australia. Prof. Alan St Clair Gibson is working closely with the MRC/UCT Medical Imaging Research Unit. Joint planning and product development continue with industry partners Discovery Health, Bromor Foods, Sygade, Body iQ, Betucare and the Sports Science Institute of South Africa.

Impact of research outputs

Development of products such as the 'Risk-related age' model and '10 000 steps' campaign promote and evaluate improvements in physical activity. The Youth Fitness Charter provides an opportunity to impact on National Government policy and decision-making and the health of the entire nation. Novel findings of physiological changes associated with exercise in the heat will have far-reaching consequences in terms of hydration and fluid guidelines for endurance exercise. The obesity studies will highlight specific areas for intervention for treatment and management of co-morbid conditions associated with obesity in SA women.

Health and Development Research Group

Major breakthroughs and successes

The Group's major success this year was its presentation to the DoH of its findings that the paint on certain pencil crayons and wooden toys sold at toy stores, supermarkets, craft shops and flea markets in SA may contain lead concentrations up to 145 000 μg/g - considerably higher than the internationally accepted standard of 90 μg/g. High lead concentrations were even found in items marked as 'non-toxic'. This poses a direct threat of reductions in IQ and behavioural abnormalities to young children, especially those who tend to chew on toys and other painted items. The Minister of Health has now issued an instruction to draft legislation to ban the use of lead in paint that is intended for use by the general public (on homes, children's toys, furniture and play equipment). A nation-wide lead awareness campaign is also to be implemented. In this way, the Group's research will have a direct impact on the health and welfare of the nation's children.

Capacity development/research strengthening/collaboration

The Group will shortly be joined by 3 students who will undertake research towards doctoral degrees. Their projects will relate to environmental health economics, urban housing and health, and interventions to improve the situation of young children worst affected by lead exposure and poisoning.

Impact of research outputs

The finding by the Group that alarmingly high concentrations of lead are to be found in the paint coatings on children's toys in SA has led to a decision within the DoH to ban the use of lead in paint intended for infrastructure and items with which children may come into contact (homes, schools, toys, play equipment, children's furniture).

Research results showing that a proportion of children in Johannesburg and Cape Town have blood manganese concentrations in excess of international reference values is informing decisions within the Department of Minerals and Energy around future use of manganese-based petrol additives in South Africa.

Other

Ms Mathee and Dr Röllin serve on the Local Organising Committee for the 17th Annual Conference of the International Society for Environmental Epidemiology which is to be held in Johannesburg (Sandton) from 13 to 16 September 2005. This will be the first occasion on which this prestigious meeting will be held on the African continent. Dr Röllin holds the portfolio of Chairperson of the Scientific Programme Committee for ISEE-2005, while Ms Mathee is the Chairperson of the Fundraising Committee.

Ms Mathee continues to serve on the global steering committee of the WHO's Healthy Environments for Children Alliance, as well as on the national committee for the South African Healthy Environments for Children Initiative. Dr Röllin was appointed as an External Research Advisor to the National Institute for Occupational Health.

Health Promotion Research and Development Group

Major breakthroughs and successes

Much time and effort was spent disseminating data from the first National Youth Risk Behaviour Survey (YRBS) and second Global Youth Tobacco Survey to government and non-governmental sectors. Data from the YRBS were used to highlight risk factors and risk behaviours associated with future chronic and infectious diseases among 13- to 17-year-olds.

Capacity development/research strengthening/collaboration

Prof. Priscilla Reddy, the Unit Director received the Research for Research Capacity Development Award 2004 from the National Science and Technology Forum. The Unit has supported and developed doctoral candidates in behavioural sciences, health education and health promotion, and been integral to professional development of research interns at tertiary institutions and government departments (Education, Health, Correctional Services and Social Development) as well as individuals within the community. Where the Unit engages with the private sector for services, it partners with BEE suppliers.

Impact of research outputs

Prof. Reddy was Chairperson of the National Strategy for Engaging in Healthy Lifestyles of the National DoH. Internationally she was selected to serve on the Committee Examining the Probable Consequences of Alternative Patterns of Widespread Antiretroviral Drug Use in Resource-Constrained Settings, culminating in the publication *Scaling Up Treatment for the Global AIDS Pandemic: Challenges and Opportunities*. This report is used to guide President Bush's $15 billion President Emergency Plan for AIDS Relief (PEPFAR), which intends to provide antiretroviral treatment for 2 million people in Africa, avert 7 million HIV infections and put 10 million in care. Prof. Reddy is the only non-US citizen on the core evaluation committee of PEPFAR. She has also served on the Steering Committee of The Ethics of Research Related to Healthcare in Developing Countries (Nuffield Council on Bioethics) culminating in *The ethics of research related to healthcare in developing countries: a follow-up Discussion Paper*.

Other

Prof. Reddy was appointed Visiting Associate Professor at Georgetown University in Washington, DC, and is also a member of the NIH scientific review committee on Behavioural and Social Science Approaches to Preventing HIV/AIDS.

Occupational and Environmental Health Research Group

Information requested; not provided

NATIONAL PROGRAMME
HEALTH SYSTEMS AND POLICY

Biostatistics Unit

Major breakthroughs and successes

Dr Carl Lombard has been invited to serve as one of the statisticians on the NIAID International Data and Safety Monitoring Board for Africa of the Division of AIDS for 2005-2008. He has also been invited to serve on a Special Review Panel for a Phase II Trial: A Randomized Comparison of Three Antiretroviral Strategies Administered for 7 or 21 Days to Reduce the Emergence of Nevirapine Resistant HIV-1 Following a Single Intrapartum Dose of Nevirapine (The MOMS Study), NIH/ Division of AIDS International DSMB for Africa. Statisticians from the MRC and Biostatistics Unit play an important role in the conduct of randomised controlled trials, through which the MRC makes a high-level contribution to proper conduct of trials throughout Southern Africa.

Capacity development/research strengthening/collaboration

Collaborated as SA member of the EU-funded project PRACTIHC, developing tools for researchers in evaluation of health care systems in developing countries. By the very nature of their work, statisticians are involved in numerous collaborations, e.g. Dr J. Levin is supporting the RCT of the Stepping Stones Behavioural Intervention for HIV, submitted to the NIH, and Dr Lombard is collaborating on the grant funded by the Rockerfeller Foundation of Dr M. Cotton on strategies for prevention of opportunistic infections in HIV-infected SA children. Ms C. Connolly supported three HIV seroprevalence surveys funded by Metro-Rail, Post Office and Daimler-Chrysler, as well as the national HIV Prevalence Survey conducted by the HSRC with principal investigator Dr O. Shisana.

Impact of research outputs

The National HIV Prevalence Study household survey was the first of its kind. Estimates of prevalence of HIV can be influenced by non-response at various levels of the survey, and Ms Connolly made in-depth analysis of this aspect. Dr J. Levin was responsible for the survey design of a national study of TB drug resistance in SA. Provincial estimates have been made and reported on. He is supported by Dr Rustomjee of the MRC TB Programme in a more detailed study of multi-drug resistance in HIV-positive patients in Durban.

Other

Dr P. Becker received the Presidential Travel Award for best presentation at the 21st Annual Conference of the American Association of Clinical Anatomists meeting in San Francisco, 9-12 June 2004. He was also on the Camelot International (Pty) Ltd Academic Board, Honorary Professor in the Faculty of Health Sciences, University of the Witwatersrand, and Extraordinary Professor in the Faculty of Internal Medicine, University of Pretoria.

Papers/posters co-authored by Unit statisticians won the following prizes: 20th Biennial Congress of the Nutrition Society of South Africa, Goudini Spa, Worcester, Western Cape, 23-27 August 2004, First prize: Category – Established Scientist & William Fox Memorial Prize; and Second Prize: Category – Established Scientist; Public Health Association of South Africa, Durban, 6-7 June 2004, First Prize for poster. Statisticians in the Unit were co-authors on four MRC Policy Briefs, as well as many major technical reports.

Burden of Disease Research Unit

Major breakthroughs and successes

This Unit is quantifying the contribution of 17 selected risk factors to the burden of disease experienced at national level in 2000. The study will be completed in 2005 and will inform policy responses to reduce burden of disease in SA. Dr D. Bradshaw was appointed Honorary Associate Professor by the Dept of Public Health and Family Medicine at UCT. Since April 2001 the Unit has received US $9,267,300 from Bristol Myers Squibb (Secure the Future Foundation) for 'Estimation of HIV/AIDS in South Africa using empirical data and mathematical models'.

Capacity development/research strengthening/collaboration

Jané Joubert is SA representative for the International Network for the Prevention of Elder Abuse, and was nominated a core member of the Union for African Population Studies' Thematic Research Network on Ageing.

Impact of research outputs

The Unit's quantification of the contribution of 17 selected risk factors to the burden of disease experienced at national level will inform policy responses to reduce burden of disease in SA. A reliable and comparable analysis of risks to health is essential to guide health sector responses to prevent disease and injury. The demographic impact of AIDS on SA population ageing is being explored by the Unit. The number of people aged 60 or older is expected to increase by 72%, from 3.05 million in 2000 to 5.23 million in 2025. Strategies to promote healthy ageing will need to address the management of chronic conditions in age-friendly PHC facilities to reduce poor health outcomes, and promote healthy lifestyles in younger age groups in order to prevent these diseases.

The Unit continues web-based dissemination of research findings, with ongoing consultation on how to make their research public-friendly and consumable.

Other

The Unit produced 8 technical reports, 2 Policy Briefs and 2 lay publications, and carried out 30 interviews with the print and electronic media.

Cochrane Centre

Major breakthroughs and successes

The South African Cochrane Centre (SACC), in collaboration with the Liverpool School of Tropical Medicine and the HIV/AIDS Collaborative Review Group, obtained a grant from the Nuffield Commonwealth programme for a research synthesis training programme for people living in sub-Saharan Africa. This programme will start in 2005, and the outputs will be internationally recognised, peer-reviewed Cochrane systematic reviews. The project thus aims to build capacity in synthesising relevant research and to promote evidence-based health care policy and practice decisions in the African region.

Locally the SACC has joined forces with the Western Cape DoH and the University of Cape Town to launch STEPP (Supporting Translation of Evidence into Policy and Practice). STEPP aims to assess and bridge the gaps between research evidence, policy and practice by producing reports that compare specific policies formulated by the provincial DoH with the best available evidence on the benefits, harms, costs and feasibility of recommended interventions.

The SACC hosts and maintains both the African Trials Registry (ATR) and the HIV/AIDS Trial Registry. The ATR ensures that African research is available for inclusion in systematic reviews and helps facilitate use of locally relevant information. The HIV/AIDS Trial Registry includes details of all completed published/unpublished RCTs assessing HIV/AIDS interventions throughout the world.

The SACC's proposal to establish an international registry of RCTs focusing on AIDS, TB and malaria was selected for funding by the European Developing Country Trials Partnership (EDCTP). This registry will serve as an important global resource by providing reliable information on what works/does not work in prevention and treatment; identifying research gaps to be addressed; providing a 'laboratory' for studying the scope, quality and funding patterns of trials; and keeping track of trials undertaken in future.

Capacity development/research strengthening/collaboration

The SACC continues to assume a leading role in the sub-Saharan region in recruiting, training and mentoring authors of Cochrane systematic reviews. In January 2005 the SACC facilitated an interactive week-long HIV/AIDS review progress school with participants from SA and Cameroon. It also contributed to a successful 3-day Effective Care Research Unit workshop in East London attended by participants from Cameroon, Egypt, Nigeria, Pakistan, SA, Uganda, Zaire and Zimbabwe. Two 1-week training courses on research synthesis were conducted at the University of Malawi and in Mozambique.
Both undergraduate and postgraduate students benefitted from input at the Universities of Cape Town, Stellenbosch and the Western Cape. The SACC is also contributing to medical curricula development at the US and UCT.

Regular journal club meetings are held at the Centre and an Evidence-Based Practice journal club has also been started at Groote Schuur Hospital. The SACC hosts a monthly 'Systematic Review Problem-busting' training session for new authors of reviews or researchers interested in conducting a Cochrane systematic review. The SACC became a partner in PRACTIHC – a European Union-funded project which aims to improve partner countries' health systems by increasing their capacity to evaluate health care delivery systems, specific health policy, public health and clinical choices and identify those which are effective.

Impact of research outputs

As the only Cochrane Centre in Africa the SACC focuses on health care problems of high priority to SA and the region. Staff contributed to 5 technical reports, including the WHO's *Knowledge for Better Health* report, 2 book chapters and guidlines for the Cochrane Health Promotion and Public Health Field. Staff also participated in several conferences, including the Mexico Ministerial Summit, the Global Health Council's annual conference in Washington, DC, and the Bangkok International AIDS Conference. In addition, staff serve on a wide range of international, national and local advisory committees making decisions about health care policy, practice, education and research.

Health Policy Research Group

Major breakthroughs and successes

Early work identified that GPs commonly provide poor quality sexually transmitted infection (STI) care. This fed into development of a 3-year action research project funded by Wellcome Trust that sought to strengthen private providers' clinical practices with respect to STI care. Completed in 2003, over the course of 2004 this project provided the basis for activities that will support translation of some of the project's key findings into practice (outlined in main report). This will contribute to strengthening provision of STI services, particularly to lower income communities, demonstrating how the findings/activities of a programme of sustained research around an important health policy question can be translated into activities that benefit the broader population.

Capacity development/research strengthening/collaboration

In 2004 Tebogo Gumede successfully completed her M.A. at Rand Afrikaans University and Bulelwa Ngoma submitted her Master's dissertation for final assessment (UWC). Gugu Khumalo is currently studying at the London School of Hygiene and Tropical Medicine for an M.P.H. Her scholarship from Wellcome Trust includes funding to implement a research project on her return to SA to consolidate new skills learnt. Haroon Wadee won funding to support fieldwork for his Ph.D.

The Group teaches three courses on the Wits M.P.H. Each module is taken by 30-40 students, many working as managers within the SA public or private health sectors, and others from elsewhere in Africa. This provides one mechanism for translating research into practice. Capacity development and networking activities include management of a programme of capacity building in policy analysis for the Regional Network on Equity in Health (EQUINET). The Group is currently the only institution in Africa conducting this training.

Impact of research outputs

The Group's research outputs are available through their web site, resource centre and by post; available evidence suggests they are widely used in SA by national and local policy-makers. Impact is by informing people's understanding or approach to a policy issue, or by having a direct influence over policy frameworks; in other cases impact is by direct influence over clinical or managerial practice. The Group also acts as an institutional memory for the health sector, placing new problems or ideas in the context of past experiences, and pointing to the range of previous and available work. The Group's publications are also used internationally, and are cited in the UN Millennium Project's Task Force 4 2004 final report (www.unmillenniumproject.org).

Health Systems Research Unit

Major breakthroughs and successes

A major success has been development of the evidence base on the effectiveness of lay health workers (LHWs) - in collaboration with the London School of Hygiene and Tropical Medicine, Babcock University in Nigeria and the Liverpool School of Tropical Medicine, the Unit conducted the first global systematic review of RCTs of the effects of LHWs in primary and community health care (*Lewin et al*., 2005), demonstrating that LHW interventions have promising benefits (see main report).

The first RCT to examine the effects of LHWs in rural farm settings conducted in collaboration with the Karolinska Institute compared TB treatment outcomes, showing that the successful treatment completion rate in new smear-positive (NSP) adult TB patients was 18.7% higher on farms with LHWs compared to farms without. The treatment interruption rate was 4% on intervention farms compared to 26% on control farms. There is the potential to increase NSP TB case finding by 42% and increase the cure rate of NSP TB cases by 10% if the momentum of the intervention can be maintained. This intervention has been well received by the Boland Health District, and is being extended to other areas.

Capacity development/research strengthening/collaboration

Unit staff supervise Master's and doctoral students and contribute to teaching. They also teach on short courses and continue to develop research capacity through mentoring young researchers. Collaborative research with other institutions, both in SA and overseas, is another component. The Unit works closely on a number of projects with the Lung Institute and the School of Public Health, UCT; University of Toronto; Karolinska Institute, Sweden; and London School of Hygiene and Tropical Medicine, to name a few.

Impact of research outputs

Elements of training to improve quality of care in primary health settings have been taken up by health services for wider implementation. Unit staff have consulted on the design of nurse training programmes focusing on quality improvement in other settings, including internationally. The systematic review of LHW programmes has informed the focus of further RCTs in this field. Research on the effectiveness of LHW programmes on farms provides information to national and provincial health care planners on appropriate models of community participation to improve quality of care in underserved areas. Findings of the Cochrane systematic review of interventions to promote patient-centred care have informed hospital-based strategies on patient-centred care internationally. Research on feasibility of patient-centred interventions in TB care has illustrated the many factors to be considered when rolling out innovative practices.

Other

Book chapter: C Mathews. Reducing sexual risk behaviours: theory and research, successes and challenges. In: Abdool Karim S, Abdool Karim K, eds. *HIV/AIDS in South Africa*. Cambridge University Press (in press). Book review: C Mathews. Review: Catherine Campbell (2003). "Letting them Die". How HIV/AIDS prevention programmes often fail. *Journal of Community and Applied Social Psychology* 2004; 14 (6).

National Telemedicine Lead Programme

Major breakthrough and successes

A major breakthrough was confirming that it is practical and effective to set up telemedicine (TM) links to serve PHC needs of a nurse-directed remote rural clinic, providing improved service and pointing the way towards a TM workstation model that can be extended elsewhere in SA and Africa. A previous project found that use of TM in nurse-directed clinics was severely inhibited by lack of information and communications technology (ICT) experience. A TM software system has been devised without menus that use colour-coded buttons. To render TM consultations easier, a remote control with identical colour-coded buttons has been developed and field-tested.

Existing TM video cameras are expensive and fragile. A TM video camera has been developed and field-tested that is rugged and cheaper (by a factor of 2). An important part of this TM project is to emphasise tele-dermatology, which plays a most important role in the manifestation and staging of HIV infection. As a direct result of our 2004 evaluation of a Mindset Health Channel, the Centre is currently evaluating the Mindset Health HIV/AIDS content in hospital settings nationally. A TM approach is also being tested in Mpumalanga to ensure that multi-drug resistant TB patients do not default.

Capacity development/research strengthening/collaboration

Due to the demand for our TM expertise, the Lead Programme employed and trained 11 services-rendered contractors to help deliver on this demand. Besides offering temporary and permanent employment, the quality and calibre of people who have been produced under our programme has ensured them permanent absorption in other leading research institutions and government departments.

Impact of research output

Impacts include demonstration of the viability of TM links for a PHC clinic setting in a remote, impoverished rural region of SA, which refers to a district hospital. TM has reduced many unnecessary referrals and improved clinic nurses' patient management skills, thus improving health care. Further impacts are the introduction of ICT to nurses and others who had never previously encountered it. Since much existing TM equipment was unsuitable to the conditions in these clinics, improved TM devices have been developed and field-tested. Of particular value is a tele-dermatology aspect (dermatologists are rare in the public service), using very simple technology and emphasising HIV/AIDS. A skin condition (found in over 90% of HIV infections) is commonly HIV infection's first sign, and the dermatological condition can stage the infection.

All aspects of TM are leading to improved knowledge, whether of community service doctors, or clinic sisters, or students working in TM-equipped hospitals and clinics. It is anticipated that there will be application of all the clinical TM techniques successfully employed in this project and also the ruggedised 'African' equipment devised both in other rural regions of SA and elsewhere on the continent.

Rural Public Health and Health Transitions Research Unit

Major breakthroughs and successes

Findings from the Southern Africa Stroke Prevention Initiative (SASPI) demonstrate a pattern of cardiovascular risk factors in the general rural adult population consistent with an 'early adopter' population early on in the health transition. A high prevalence of hypertension, substantial obesity in women, and emerging hyperlipidaemia were found. A rapid increase in vascular disease is likely, and locally appropriate interventions are needed to avert this outcome.

Capacity development/research strengthening/collaboration

The Unit supports local staff in (a) studies towards degrees or diplomas, (b) 'on-the-job' skills development with respect to research methods (e.g. qualitative methods) and management skills, (c) IT and data management skills (including computer training for field staff), and (d) development of specialised expertise (e.g. geographic information systems). The Unit contributes to a new M.Sc. in Population-based Field Epidemiology, a partnership between the Wits School of Public Health and INDEPTH Network (International Network for the Demographic Evaluation of Populations and Their Health). The Unit has been awarded funds by the Wellcome Trust for 6-8 Master's research fellowships.

International contributions are to INDEPTH: Steve Tollman chairs its Board of Trustees, Mark Collinson leads the Migration and Urbanisation Initiative and Tollman and Kathleen Kahn lead the INDEPTH Adult Health and Aging Initiative which recently gained funding from the National Institute on Aging, NIH, for multi-site work with WHO and other African and Asian DSS sites. With respect to Adult Health and Aging the Unit is a leading contributor, having co-hosted the first workshop on 'Aging in Africa'.

Impact of research outputs

Findings from research into the take-up of Child Support Grants conducted in 2002 indicated that main reasons for non-access were lack of vital documentation and long distances from service points. In 2004 the Unit focused on improving access to services for orphans and vulnerable children (OVC). Presentation of study findings to provincial and local Departments of Home Affairs and Social Security, as well as local municipalities, resulted in:

- Two-day mobile Home Affairs and Social Security campaigns in 20 villages, during which 8000 people applied for identity documents and birth certificates.
- Two *imbizos* providing information on services for OVC.
- Introduction and specialised utilisation of six Child Support Grant extension officers employed by the Department of Social Security.
- A partnership between the MRC/Wits Unit, the Acornhoek Advice Centre, the Department of Home Affairs and the Mozambique Consulate in ongoing planning to assist former Mozamibican refugees who are stateless.
- A partnership between the Unit, local municipality and NGOs to form a multi-departmental district task team on OVC.

NATIONAL PROGRAMME INFECTION AND IMMUNITY

Clinical and Biomedical Tuberculosis Research Unit

Major breakthroughs and successes

The Unit in partnership with other groups secured 3 of 4 grants awarded by the EDCTP for TB research. The studies will affect policy and practice around TB management and care in Africa, incorporate training, capacity and infrastructure development aspects, and involve a multi-country partnership.

Capacity development/research strengthening/collaboration

Pivotal collaborations have been forged as part of the capacity strengthening component of the EDCTP grants. Infrastructure and capacity development are linked to the ongoing TB clinical studies at each site. Dr Rustomjee was invited to serve on the TDR, WHO Steering Committee on Proof-of-Principle Research as well as the product development team for Implementing Operational Research for HIV Treatment Scale-up in Resource-Poor Countries (TDR, WHO), and the Global Alliance for new TB Drug Development Stakeholders Meeting.

Impact of research outputs

A Memorandum of Understanding has been drawn up between the Unit and the KwaZulu-Natal DoH in order to improve communication and create an understanding of research conducted in KwaZulu-Natal. An outreach project was conducted in March 2004 in order to commemorate World TB Day and increase public awareness of TB in Durban. Together with King George V TB Hospital and a local athletics club, a fun day included education on TB, profiling the Unit, and a 10 km run. It was well attended by all ages and emphasis was placed on early detection.

Diarrhoeal Pathogens Research Unit

Major breakthroughs and successes

Dehydrating diarrhoea is a major cause of morbidity and mortality in young children - 4 to 5 million die annually. In SA alone, 50-60 children under the age of 5 years die daily as a result of diarrhoea. Rotavirus appears to be involved in almost 25% of cases. The Unit is continuing to move forward in its work on rotavirus surveillance and strain characterisation, with the ultimate aim of developing a rotavirus vaccine effective across Africa. The rotavirus vaccine trials continued during 2004. Phase I was completed in July 2003. Enrolment of subjects for Phase II trial was completed in February 2004. Two additional protocols involving HIV+ children enrolled in rotavirus vaccine trials have been prepared and approved by local ethics committees, and both are scheduled to begin in 2005.

Capacity development/research strengthening/collaboration

Dr Mathew Esona completed the second year of his postdoctoral term and has written a number of articles for submission. Mr Lindelani Masithi, a third-year medical student at Medunsa, received training

Diarrhoeal Pathogens Research Unit *continued*

as part of an MRC Work Study Programme. An M.Sc. student from Cote d'Ivoire registered in the Unit in 2003 and has submitted his dissertation.

The WHO favourably reviewed a number of grant applications, including grants to characterise rotavirus at molecular level and to provide support for rotavirus vaccine trials. The burden of disease study has been accepted for WHO funding, as has the follow-up cost analysis study. The Rotavirus Vaccine Program (RVP) based in Seattle, Washington, has provided funds for rotavirus research, co-ordinating the activities of the African Rotavirus Network and for hosting a Rotavirus Workshop in South Africa. The Norwegian Council for Higher Education provided extensive funding for the vaccine trials and allied research and for training of health care workers.

Impact of research outputs

Introduction of an effective rotavirus vaccine will have enormous impact on the morbidity and mortality from dehydrating diarrhoea in young children. Staff and researchers associated with the Unit hosted a practical Rotavirus Workshop attended by 10 delegates from 9 African countries. Over 10 000 stool specimens from across Africa were screened for rotavirus in 2004. The Unit has been upgraded to a regional rotavirus reference facility for Southern, East and North Africa.

Genital Ulcer Disease Research Unit

Major breakthroughs and successes

The Unit continues to perform regular point prevalence studies at the STD clinic at the Prince Cyril Zulu Centre for Disease Control (former Durban City Health STD Clinic), where the significant change in the relative aetiology of genital ulcer disease was confirmed. Decrease in prevalence of chancroid and primary syphilis has been accompanied by increase of genital herpes lymphogranuloma venereum (LGV). This confirms the importance of LGV in the region and draws attention to the fact that TB should feature in the differential diagnosis.

Capacity development/research strengthening/collaboration

The B.Sc. Hons programme in Pathogenesis of Infection has become the main source of M.Sc. students, and several students of African origin have been retained. In 2003 and 2004 there were a large number of applicants for this course, of whom 20 were selected.

Key collaborators include the University of KwaZulu-Natal, KwaZulu-Natal Provincial DoH, and London School of Hygiene and Tropical Medicine.

Impact of research outputs

This Unit studies genital ulcer disease in relation to HIV. Insight into the interaction of the organisms that cause the different diseases with host cells (including immune cells) as well as with each other can potentially lead to development of preventive strategies that help to control the HIV epidemic.

HIV Prevention Research Unit

Major breakthroughs and successes

December 2004 saw successful completion of the first DAIDS/NIAID-sponsored study at Chatsworth (Durban) and Hlabisa. The study, HPTN 055, was in preparation for the Phase II/IIb HPTN 035 microbicide trial. The primary objective was to estimate rates of HIV seroconversion among women from the community, and 240 HIV-negative women from each site were enrolled and followed up for 12 months. The study revealed an alarmingly high prevalence of HIV in the targeted communities - double the number of women had to be screened in order to find 240 HIV-negative women per site. (See main report for details.) This suggests that an urgent intervention targeted at women is needed.

This has led to activation of the Durban and Hlabisa sites for the HPTN 035 Phase II/IIb microbicide clinical trial - the first site world-wide to enrol women into the study. Unit Director Dr G. Ramjee was presented with a plaque by the NIH for the Unit's efforts at a recent meeting in Washington, DC.

A second epidemiological study at Tongaat and Verulam (north of Durban), funded by the Department for International Development (DfID) through the British MRC and Imperial College, London, also showed alarmingly high HIV prevalence rates, again highlighting the urgent need for HIV prevention interventions among women in the community.

Capacity development/research strengthening/collaboration

Apart from continued education and financial assistance, the Unit provides staff with on-going skills development, e.g. protocol training, study documentation training, study-specific training, sessions on HIV/AIDS, microbicides, home-based care, scientific report writing, etc. Staff also attend training hosted by external organisations and are encouraged to submit abstracts and attend local and international conferences.

Training programmes on HIV/AIDS counselling and home-based care have been developed for implementation in all the communities in which the Unit conducts research. This will assist participants and communities to gain knowledge around HIV/AIDS, and will empower them to form sustainable support groups and income-generating projects.

The Unit is engaged in collaborations with many major players in HIV prevention and microbicide research, including Division of AIDS (DAIDS), National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health, Gates Foundation and CONRAD. The Unit also has collaborative relations with other institutions such as Columbia University, University of KwaZulu-Natal, and the Global Campaign for Microbicides. Grants and funding to the Unit for the year under review totalled R72,765,510.

Impact of research outputs

Through numerous clinical trials and behavioural research studies, the Unit has had a significant impact on participants and their partners, as well as the broader community. The Unit also raised general awareness levels on research. The two epidemiological studies (HPTN 055

and MDP) completed in 2004 have generated very significant and pioneering data. They show, for the first time, HIV prevalence and incidence data from *non-pregnant* women in the community. These data have been presented to the Provincial DoH, and highlight the desperate and urgent need for more vigorous HIV prevention and education efforts in KwaZulu-Natal.

Other

Books and book chapters: *HIV/AIDS in South Africa*: Section 4: Important groups in the HIV/AIDS epidemic, Chapter 15 – Sex Workers. January 2005. Commentary: Book Section: *Respect for Communities*. Case 19: N-9 Phase III Trial, South Africa, 2005. UNAIDS: *AIDS in Africa: Scenarios for the Future*. What are the potential advantages and disadvantages of the female condom, diaphragm, and microbicides as tools in addressing gender disparities that feed into the spread of the epidemic? 2004.

Immunology of Infectious Disease Research Unit

Major breakthroughs and successes

The Unit created the first inducible and cell type-specific gene deficient mouse models 'Made in South Africa', published in the high-impact journal *Immunity* (Herbert *et al*., *Immunity* 2004; 20: 623) and *Journal of Immunology* (Seki *et al*., *J Immunol* 2004; 172: 6158-6166). The Unit also succeeded with a new technological approach to autovaccinate, to protect against autoimmune and infectious diseases. They were able to cure experimental autoimmune encephalitis (Uyttenhove *et al*., 2004), a model for multiple sclerosis, and protect against cutaneous leishmaniasis (Arendse *et al*., *J Immunol* 2005; 174: 2205). In TB the Unit demonstrated that adaptive immunity to mycobacterial infection is not necessarily dependent on innate immunity, induced by Toll-like receptor. This was published and commented on in the high-impact *Journal of Clinical Investigation* (Fremond *et al*., *J Clin Invest* 2004; 117: 1790).

Capacity development/research strengthening/collaboration

This Unit currently has more than 70 active collaborations. Highly reputed scientists from all over the world visit the Unit. An exciting achievement was the recently awarded Bilateral Programme grant from the Royal Society, UK and NRF for 'immunology in parasitic diseases' with a strong capacity development component and university exchange programme for students from a previously disadvantaged background. The Unit has attracted substantial financial support from the USA (NIH/SCOR), Belgium (Flemish/NRF co-operation), Germany (DFG/BMZ/NRF co-operation), France (PICS), UK (The Wellcome Trust) and the NRF (SA), in addition to MRC support.

Impact of research outputs

The Unit demonstrated high productivity with a total of 18 peer-reviewed international publications in the past year. Some of their mouse models are unique worldwide, the Unit receiving a high proportion of international funding from collaboration with researchers all over the world.

Other

Director Prof. F. Brombacher is Associate Editor of the *Journal of Immunology*, and is Visiting Professor at the University of Strathclyde, Glasgow, UK. Unit members were reviewers for 8 international journals and for 4 international organisations.

Indigenous Knowledge Systems Lead Programme

Major breakthroughs and successes

The IKS Lead Programme has been invited to be the WHO Collaborating Centre for Traditional Medicines. Together with CSIR the IKS is co-ordinating the National Reference Centre for African Traditional Medicines recently launched by the Minister of Health. IKS research on finding plants with potential antimalarial activity has discovered 6 novel compounds that show antiplasmodial activity. These molecules have been patented.

A database of all claims presented at the IKS Lead Programme has been created. This is unique in that it contains data on the current traditional medications and practices that are used, showing clinical trial validation and eventual commercialisation of the claims. Many claims are made in terms of the use of traditional medicines, including in life-threatening and chronic conditions. There are also numerous commercial products circulating in the market without safety and efficacy data. The safety and clinical evaluation of traditional herbal medicines by the IKS ascertains the health benefits and value of them for use by the wider public, to open up a niche commercial market for those proven products for both the local and international markets. One programme is dedicated to evaluation of claims of health benefits for persons living with HIV/AIDS. All remedies are put through scientific scrutiny of their safety and effectiveness.

A hundred monographs on SA medical plants have been completed so far and are selectively available via the Lead Programme's link on the MRC website. The IKS hopes to develop the first South African Pharmacopoea based on these. The IKS has also developed clinical trial platforms for immune modulators and evaluated safety in non-human primates and phase 1 randomised controlled studies of traditional medicines with reported health benefits for people living with AIDS. They have completed and piloted a GPS database of traditional healers in KwaZulu-Natal, positioning these with health facilities, schools, the population around them and their specialties.

Capacity development/research strengthening/collaboration

The IKS supervised 2 M.Sc. students who have now completed their studies; it supports and now supervises 2 doctoral students. They trained 60 traditional doctors in HIV and AIDS through workshops and training programmes, and have trained 4 GPs as clinical trial PIs for their national clinical trials studies. The IKS has school outreach programmes to make pupils aware of their activities, and so far 6 schools, including 1 international school, have visited their Delft Centre and medicinal garden facilities.

Collaborative research under contract or MOA has been signed with the following institutions: University of Botswana - for chemical and structural elucidation of IKS antimalarial compounds; University of Ibadjan - general collaboration on Traditional Medicine Research; THETA (Traditional Healers and Modern Doctors Together against HIV and AIDS and other Diseases), Uganda, for developing IEC materials; CSIR for a joint BioPad or IF Proposal for development and commercialisation of antimalarial drugs; University of the Free State - *in vitro* and *in vivo* metabolism of herbal medicines; University of Limpopo (Medunsa Campus) - mutagenicity and antimutagenicity

Indigenous Knowledge Systems Lead Programme *continued*

studies of herbal medicines; and The Nelson Mandela School of Medicine - *in vitro* anti-HIV activity of herbal medicines.

A number of training programmes are being undertaken at the Delft Community Partnership Centre, designed together with traditional healers and identified as a need by traditional healers themselves. The training projects include training traditional healers in TB /HIV and AIDS as treatment supporters; training traditional healers in record keeping; and training traditional healers' communities in basic principles of herbal drug manufacture. Traditional healers have been granted an opportunity to run self-initiated projects where they could raise funds and be actively involved in attracting tourists to the Centre.

The resource centre of the Lead Programme is committed to educating communities and bringing science back to the villages. It has a library and a computer facility accessible free of charge to traditional healers, communities and pupils. IKS is committed to educating communities and bringing science back to the villages. Their outreach programme aims at educating pupils about traditional knowledge and to value such knowledge and make it valuable for all.

The IKS has succesfully run entrepreneurial training workshops for 60 community members and 8 LED officials for their poverty alleviation projects, and is running a clinical trial awareness and preparedness programme for their clinical trials.

Impact of research outputs

The Lead Programme runs a national programme on the commercial cultivation of scientifically validated medicinal plants, with potential markets to eradicate poverty through the creation of sustainable jobs in rural communities. These projects are a partnership with the private manufacturing sector. The project is a joint project of DST and DoH and is a true private community public partnership (PCPP).

The IKS Lead Programme is committed to the equitable and fair sharing of benefits that may be derived from the utilisation of indigenous knowledge systems of health. This commitment to equitable sharing of the derived benefits is on mutually agreed on terms with those people who are the legitimate owners of such knowledge. The goal is to add value to traditional medicines and in so doing share any benefits that may be derived from the scientific research and development to eventual commercialisation of such research results with all concerned.

Other

Director Dr Motlalepula G Matsabisa received the Award for Best Project and Presentation, International Conference on Promotion, Development and Legal Aspects of Traditional Medicines, Kolkata, India. The IKS Lead Programme is a member of the Steering Committee of the African Initiative looking at developing traditional medicines. This is a regional iniative and Dr Matsabisa is a co-chair. He is also currently a special advisor to WHO Afro in Traditional Medicines, a member of the Medicines Control Council, and chairs the African Traditional Medicines expert committee of the MCC. The Lead Programme has made numerous presentations to the Portfolio Committees of Health, Science and Technology and that of Arts and Culture, and was part of Ministerial delegations for Health and Science and Technology.

The IKS Lead programme secured the following funding: Poverty Reduction Project: R6.9m from DST; Clinical Trials Platform: R4.5m from DoH; capital equipment: R3.3m from DST.

Inflammation and Immunity Research Unit

Major breakthroughs and successes

This Unit had a number of successes, including the following:

- Creation of a genetically modified strain of *Mycobacterium tuberculosis*, the cause of TB, which will be used in drug and vaccine design.
- Identification of pharmacological strategies to neutralise pneumolysin, a toxin produced by *Streptococcus pneumoniae*, the major cause of severe community-acquired pneumonia.
- Identification of novel targets on inflammatory cells which represent potential targets for anti-inflammatory chemotherapy.
- Identification of inflammatory mechanisms by which inhalation of heavy metals in the workplace and environment may cause respiratory disorders.

Capacity development/research strengthening/collaboration

One student working in the Unit was awarded an M.Sc. degree in 2004, while two others will be awarded Ph.D. degrees in April 2005. One student is currently registered for an M.Sc. and another for a Ph.D., while 3 are in the process of registering for a Ph.D. The Unit continues to have strong ties with University of Limpopo, providing assistance to one M.Sc. and one Ph.D. student, and strong collaborative associations at national and international level.

Impact of research outputs

During 2004/2005 19 publications (including 2 invited book chapters and 2 review articles) were either published or in press. The genetically modified strain of *Mycobacterium tuberculosis* (the cause of TB) created by the Unit will be used in drug and vaccine design. The Unit has also devised pharmacological strategies to neutralise pneumolysin, which will have a major impact on tackling severe community-acquired pneumonia.

Malaria Research Lead Programme

Major breakthroughs and successes

The Lubombo Spatial Development Initiative (LSDI) is the only regional project to receive funding from the Global Funds for AIDS, TB and Malaria. Malaria control was gradually phased-in in the LSDI area in southern Mozambique. Parasite prevalence was measured in children (2- <15 years) before the interventions were put into place and again on an annual basis, and it was seen that the parasite rates dropped dramatically in successive years (see main report).

Increasing resistance of malaria vectors to insecticides is cause for concern. The Lead Programme is involved in screening indigenous plants for biological activity against the vectors of malaria-transmitting mosquitoes. So far 357 crude plant extracts have been evaluated, and 21 have shown great promise against the aquatic, immature stage of the mosquito. Four have been investigated further, and two of these have shown great promise in dose-response studies.

Capacity development/research strengthening/collaboration

Within the LSDI appropriate expertise was lacking at all levels in Mozambique, and training was key before spraying and effective drug treatment could be introduced. To ensure smooth functioning

of the LSDI, to date 320 people have been trained as spray operators. Training of supervisors and spray persons takes place each year. Training was extended to include intervention, and has equipped field entomologists with research techniques, field staff to use global positioning system receiver hand-held units, office staff in the use of the Malaria Information System (MIS) and insectary staff in Maputo. To fully implement the MIS, information officers have been trained and put in place in all three malaria affected provinces in SA as well as in Mozambique and Swaziland. The malaria control programmes in SA have been strengthened by recruiting, training and seconding entomologists to the provincial malaria control programmes.

International funding was obtained from the Swiss Tropical Institute (STI), London School of Hygiene and Tropical Medicine (LSHTM), WHO, National Institutes of Health, Liverpool School of Tropical Medicine (LSTM) and the Gates Foundation for funding of doctoral students. Full funding has been received for 5 Ph.D. students to study at LSTM, STI and LSHTM.

Impact of research outputs

Extension of malaria control to southern Mozambique has been expanded, and the contiguous controlled area in the three countries now exceeds 100 000 km^2. Confirmation of pyrethroid resistance by *Anopheles funestus* in Mozambique required a policy change in the country. In southern Mozambique it has been seen that parasite prevalence in children (2- <15 years) dropped dramatically.

Reductions in malaria infection and declaration of St Lucia as a malaria-free area have enhanced attractiveness of the area to tourists and developers. So far 10 tourist development tenders in St Lucia Park valued at R450m have been released by the LSDI - providing employment and other economic benefits. The Lead Programme's drug efficacy studies have directly impacted on malaria treatment policy, and combination therapy has been implemented in KwaZulu-Natal, Mpumalanga and the districts of Namaacha and Matatuine in Mozambique. Limpopo and Swaziland changed policy in late 2004 and 2005 respectively.

Unit for Tuberculosis Operational and Policy Research

Major breakthroughs and successes

The Unit carried out a major study in five provinces to identify risk factors for multidrug-resistant TB (MDR-TB) patients defaulting from treatment. Results showed that negative attitudes by health care staff were the most significant reason why patients did not finish treatment, followed by the fear of stigma experienced in their communities, and side-effects from medication. These findings will be translated into appropriate policy interventions.

Public health practitioners in SA are confronted with a range of decisions around MDR-TB management with legal and ethical implications, such as enforced hospitalisation of patients and enforced MDR-TB treatment. The Unit was contracted by the DoH to develop new policy directives in line with the Constitution of SA and current public health legislation.

Capacity development/research strengthening/collaboration

TB operational research can provide evidence-based information for policy-makers and enable health officials to make informed decisions on patient management. There is, however, a critical lack of skills in operational research capacity both in SA and in the SADC. Training courses have been very well received and a course manual developed for future international use. In SA protocols for eight provincial TB operational research projects were developed, cleared for ethical approval, and are currently being conducted by health service staff, with supervision and mentoring by the MRC and CDC.

Impact of research outputs

The Unit is involved in policy formulation and operational research to improve TB service delivery in SA. Formal networks have been established in all nine provinces. This allows for ownership of research findings by health departments and rapid translation of research into policy and practice. This is particularly evident for policies on management of MDR-TB patients developed in the Unit and rapidly implemented within the health services in all provinces. The Unit is also involved in international TB policy formulation, particularly with regard to MDR-TB and laboratory issues, having an international reputation for its research and expertise, evident from participation of staff in key international policy-making bodies and invited presentations at international meetings.

Respiratory and Meningeal Pathogens Research Unit

Major breakthroughs and successes

The Unit has shown in both HIV-infected and uninfected children in Soweto that a significant fraction (30-40%) of hospitalisations with influenza-associated pneumonia were due to bacterial coinfection with the bacterial pathogen *Streptococcus pneumoniae*, and that these episodes were prevented by administration of pneumococcal conjugate vaccine. This was published in *Nature Medicine* in 2004, and suggests a major role for this vaccine in preventing influenza-associated morbidity, and that antibiotics may greatly reduce morbidity by treating bacterial coinfection.

Capacity development/research strengthening/collaboration

The Unit provides a platform for science graduates and junior doctors to become familiar with basic, applied and clinical research and offers nurses and other health professionals exposure to clinical research as well as support to undergo formal training in good clinical practice related to the conduct of clinical studies. The Unit pursues collaboration with international scientists in order to further local capacity. Lectures are given to general practitioners for continued professional development.

Impact of research outputs

The Unit's discovery of the role of bacteria in severe pneumonia associated with influenza and other viruses changes the way we understand how people develop severe pneumonia. This offers alternate strategies to prevent (with conjugate vaccine) and treat (with antibiotics) the very large burden of viral-associated pneumonia. The Unit's studies on the role of human metapneumovirus in African children and genotyping of these isolates provides important information that may be used to formulate a vaccine against this virus.

The Unit's national surveillance of important bacterial infections allows them to monitor the burden of these diseases and measure the impact of interventions such as the introduction of antiretroviral therapy to prevent opportunistic infections in HIV-infected people in SA.

Respiratory and Meningeal Pathogens Research Unit *continued*

Other

Unit Director Prof. Keith Klugman was co-recipient of the Emanuel Wolinsky Award, given by the Infectious Diseases Society of America to author of the best article in *Clinical Infectious Diseases* in 2003. He also received an Honor Award from the Dept of Health and Human Services, and Secretary's Award for Distinguished Service, the SARS and Monkeypox Public Health Response Teams, Centers for Disease Control and Prevention. Dr S. Madhi received the Research Prize from the Faculty of Health Sciences at Wits. A television interview was given on childhood infections, and a documentary on the work of the Unit, entitled 'Kill or Cure', was produced by BBC World and aired on television in February 2005.

Prof. Klugman is on numerous top-flight international committees and steering groups, as well as invited speaker and chairperson of international sessions. For example, he was invited member of the Review Committee, CDC International Emerging Infections Program (IEIP), Bangkok, Thailand, and Chairperson of the Malawi Conjugate Pneumococcal Vaccine Trial Steering Group Meeting, Wellcome Trust, London.

He was also invited to give numerous lectures to departments, societies and meetings across the globe.

South African AIDS Vaccine Initiative (SAAVI)

Major breakthroughs and successes

Three products developed by the SAAVI-funded group at UCT are being manufactured for trials and going through the regulatory processes preceding phase I human trials. SAAVI plans to test these in SA, Botswana and the USA, which would make SAAVI the first developing country HIV vaccine initiative to make and test its own products in developing and developed countries.

Major successes in assessing the laboratory immunological responses of novel HIV vaccines include successfully passing an ELISA Proficiency Panel with a US laboratory, completed testing of human samples from the 040 trial; establishing the pseudovirion assay including the cloning of functional HIB envelope genes; and extensive analysis showing that subtype C sera are effective at neutralising South African subtype B viruses – important for cross-clade neutralisation.

The SAAVI-funded HIV Vaccine Ethics Group (HAVEG) based at the University of KwaZulu-Natal collaborated with the Department of Health's interim National Health Research Ethics Committee (INHREC) and the MRC to develop the *MRC Guidelines on Ethics for Medical Research: HIV preventive vaccine research*, Book 5 of the MRC's series of ethical guidelines, launched in April 2005.

Capacity development/research strengthening/collaboration

All SAAVI partners place a strong emphasis on capacity development initiatives. Overall the initiative shows a healthy demographic mix and a predominance of women – both as researchers and principal investigators. SAAVI has established new relationships with important partners both within the country (such as the Nelson Mandela Foundation) and internationally, including the Bill and Melinda Gates' Foundation 'HIV Vaccine Enterprise' and the EDCTP.

The US NIH has awarded an additional R6 million for further SAAVI DNA vaccine manufacture and there has been increased investment by the HVTN in the SAAVI clinical sites – particularly the newer ones in Cape Town and North West Province. SAAVI trial sites have also received support from the International AIDS Vaccine Initiative (IAVI) to conduct another clinical trial in South Africa. The European Commission has given the SAAVI Community Involvement Programme an additional grant to build on and expand its activities.

Impact of research outputs

South Africa became the first developing country to run multiple phase I HIV vaccine trials and the first country in the world to test a subtype C HIV-1 vaccine – subtype C accounts for over 90% of all new HIV infections. SA is also the first developing country to submit candidate HIV vaccines to the US Food and Drug Administration for regulatory approval. If SA trials of the SAAVI-developed vaccines proceed SA will also be the first developing country to be testing its own vaccines in the developed world – i.e. the USA.

SAAVI is a leader internationally in investigation of new areas such as adolescent involvement in vaccine research. It is still early days in HIV vaccine development, but it is hoped to run multiple, multicentre trials of promising products and novel biotechnology approaches to reach at least a partially successful and safe vaccine in as short a time as possible.

South African Traditional Medicines Research Group

Major breakthroughs and successes

The past year saw publication in the *Journal of Ethnopharmacology* of a major research paper reporting on the antimalarial activity of some 500 plant extracts tested by the group. A plant-derived compound with significant antituberculosis activity has been isolated by postgraduate student, Eliya Madikane.

Capacity development/research strengthening/collaboration

The group continues to attract young black scientists as well as students from the African continent. Collaborative links with the University of Nairobi and Prof. Paul Waako at Makerere University in Uganda have been established. Faith Okalebo, a staff member of the Dept of Pharmacology at the University of Nairobi, is currently undertaking a Ph.D. with the group. Twelve of 15 postgraduate students associated with the group are black. Six students graduated with a Ph.D. during the past year, 5 of whom were black.

Isolation and characterisation of new compounds with biological activity has led to increased collaboration with Prof. Kelly Chibale at UCT's Dept of Chemistry, who uses these as templates for structural modification in order to enhance activity or decrease toxicity.

Impact of research outputs

The traditional medicines database continues to be expanded, and future plans focus on making this information more accessible

to communities who use traditional medicines and to traditional healers. A second edition of the *Traditional Healers Primary Healthcare Handbook* is under consideration, as well as translation of this text into a number of languages other than English. The group will play a major role in the Novel Drug Development Consortium awarded an R18m million grant from the NRF.

NATIONAL PROGRAMME MOLECULES TO DISEASE

Bioinformatics Capacity Development Research Unit

Major breakthroughs and successes

The Unit has leveraged an NIH grant and developed a core HIV analysis group that delivers greater understanding of genetic diversity in HIV isolates from infected South Africans. The Unit has, together with Prof. Serap Aksoy at Yale, developed the International Glossina Genomics Initiative, which will sequence the *Glossina morsitans* genome and also ESTs of several species of Glossina. The Unit has developed a system to display and mine matrices of genome resources available to promote understanding of the Plasmodium genome, and is developing this system to apply to trypanosomes. The Unit has developed and implemented an expression description system, eVOC, that connects genome to phenotype, including diseases.

Capacity development/research strengthening/collaboration

The Unit has developed an online server to provide research tools that effectively deploy the latest genome technology, skills and training to the research community. Hundreds of scientists at all levels of experience have been trained and are now working using technology provided by the Unit. The Unit also performs targeted online training and services development, with trained scientists receiving support at 18 South African institutions of research and higher learning. Capacity development and training to support growth of expertise and co-ordination of research has directly trained 274 people. The Unit has driven implementation of and graduated students from Africa's first Master's programme in Bioinformatics. Twenty-seven postgraduate students have been trained at SANBI, two-thirds of them black.

By leveraging the recognised need for bioinformatics infrastructure to underpin the development of biotechnology in South Africa, the Unit has driven and facilitated the establishment of the multimillion rand National Bioinformatics Network, dedicated and funded to develop bioinformatics capacity in South Africa. The Unit has secured a grant through NIH with Stanford University to facilitate biomedical informatics training, and this is being applied to HIV informatics development of students and junior faculty nationwide. Through the establishment of the Network, a national curriculum in Bioinformatics graduate education has been tabled by the education committee, and is to be adopted by the tertiary institutions involved by 2005.

The Unit encourages its staff (Director, trainers) to teach at sites such as Nigeria, Kenya, Malaysia, China, Brazil and Thailand, in concert with activities of the WHO. The Unit has developed material for delivery of training internationally, as well as software distributed via CD to trainees. Through this interaction alone over 200 international students have been trained by Unit staff.

Impact of research outputs

Working with the Wellcome Trust the Unit has developed and implemented an expression description system that connects genome to phenotype, including diseases. This system, eVOC, has recently been adopted by the ENSEMBL human genome annotation system to provide a means of providing insight for genome researchers worldwide to prioritise candidate disease genes in the human genome.

The Unit's most high-impact study has been as part of an international collaboration to discover the function (annotation) of over 20 000 human genes as they relate to disease. The resulting database and publication has become the most frequently read article in the new International Open-Access journal – The Public Library of Science, Biology. The Unit applied its expertise in normal and diseased gene expression description and also in expressed sequence clustering to a large international consortium of transcriptome researchers. The project represents the highest impact to date of its genome annotation efforts.

Bone Research Unit

Major breakthroughs and successes

The Unit has published and highlighted a world-first discovery on the molecular signals initiating bone formation in non-human primates, and so in human patients. Particularly important within the research activities on the phenomenon of apparent redundancy in bone formation, the Unit has shown induction of cartilage and bone formation by Ebaf/Lefty-A, a new member of the superfamily of proteins controlling pattern formation and skeletogenesis and initiating chondrogenesis in skull defect, as published as a cover story by the *South African Journal of Science*.

Capacity development/research strengthening/ collaboration

The Unit carries out student mentorship at Master's and doctoral levels, and encourages research strengthening through travel and skills development grants for staff. The Unit collaborates with CSIR (South Africa) on novel biomaterial matrices; Leader and Novaxa (Italy) biotechnology companies on modified titanium implants and hydroxyapatite biomaterials; and A. H. Reddi, University of California, Davis on bone morphogenetic proteins initiating new bone formation.

Impact of research outputs

This Unit has received much international coverage for its life-enhancing work. This Unit has made replacement of bone and growing of new bone possible. Its real impacts have been:

- Development of cost-effective and affordable biomaterial implants to treat skeletal defects with bone loss in human patients; and development of cost-effective periodontal implants for immediate post-extraction tooth replacement therapy.
- Development of autogenous and transplantable bone in non-bony sites using powerful recombinant bone-inducing proteins that after transplantation are a major source of bone for immediate reconstruction of various bone defects.

Centre for Molecular and Cellular Biology

Major breakthroughs and successes

Workers in the Centre have developed molecular diagnostic techniques which can reduce the time to diagnosis of multiple drug-resistant TB from 60-90 days to 4-7 days.

Using proteomics, workers in the Centre have shown that *Myco. tuberculosis* strains belonging to different genotypes exhibit variable protein and antigen expression patterns. This has important implications for vaccine development, and may possibly explain why previous *Myco. tuberculosis* infection does not render an individual resistant to infection with a genetically different strain. The findings also seriously undermine the use of serodiagnosis, a widely investigated technique for TB diagnosis.

A group within the Centre studying the genetic causes of hypertrophic heart disease has identified families that have inherited the disease from a common ancestor. These families offer a unique resource for investigating person-to-person variability in cardiac hypertrophy, which may be caused by a combination of genetic and lifestyle factors that may also play a role in the hypertrophy occurring in common diseases like hypertension.

Capacity development/research strengthening/collaboration

At the December graduation ceremony of the US Faculty of Health Sciences, 4 of the 7 Ph.D. degrees conferred were on students from the Centre, and 1 of the remaining 3 was partly supervised by the Centre. In February 2005 the Faculty established the Desmond Tutu Centre for TB Research, built chiefly on the achievements of the MRC Centre and its clinical partners. The Centre runs postgraduate and third-year B.Sc. courses. Joint TB projects are carried out with various local and international institutions, and collaborations with the USA, The Netherlands, UK, France, Canada, Zimbabwe, Sudan and Korea.

Impact of research outputs

The Centre's research on TB has highlighted the need for rapid diagnosis, particularly of drug-resistant TB, identified the mechanisms of drug resistance and allowed development of more rapid diagnostics. This has filtered through to the TB Control Programme and been communicated to control programme staff during update seminars, and the Centre has developed plans to use this information in real time at a pilot rural site. The Centre's work has changed the clinical approach to plural TB diagnosis, at least at their tertiary hospital (Tygerberg), while the Centre's published work on reinfection has stimulated clinical thinking regarding reactivation of disease.

Other

Prof. T. Victor was an advisor to the African regional project on detection of drug-resistant malaria and TB (IAEA/WHO). Profs P. van Helden, V. Corfield and R. Warren were reviewers for various grant bodies and various staff members were reviewers for international journals, e.g. *The Lancet, American J Human Genetics*. The Centre is listed in various international directories. Profs J. Smook, E. Hoal and R. Warren have Ad Hominem Associate Professorships; G. Durrheim received the award for Best Clinical presentation at the Cardiology conference; Prof. J. Smook received a Wellcome Trust Senior Fellowships award and P-rating; and Prof. R. Warren received the Beyers Trophy to for best poster presentation in 2004 from the US. A Fogarty Fellowship award went to Dr C. Pheiffer, and an EDCTP grant award to Prof. P. van Helden, who also received an MRC Silver Medal. Prof. G. Walzl was a collaborator on a successful Gates Grand Challenge award.

The proposal jointly submitted to the NRF by Prof. van Helden and Prof. Valerie Mizrahi (Director, Molecular Mycobacteriology Research Unit) resulted in establishment of the DST-NRF Centre of Excellence for Biomedical TB Research in September 2004.

Human Genetics Research Unit

Major breakthroughs and successes

Publication of the finding of carbonic anhydrase IV (CA4), the gene responsible for the RP17 form of autosomal-dominant retinitis pigmentosa (Rebello *et al. PNAS* 2004; 101: 6617-6622) heralded culmination of 10 years' research into autosomal-dominant retinitis pigmentosa of SA origin in this laboratory. This was followed by publication by our collaborators (Bonapace *et al. PNAS* 2004; 101: 12300-12305) showing that the mutation causing retinal degeneration in the SA RP17 families was likely to be amenable to therapy by carbonic anhydrase inhibitors such as acetazolamide, commonly used in the treatment of glaucoma. This led to the Unit preparing the first stages of a clinical trial of carbonic anhydrase inhibitors in the treatment of retinal degeneration in individuals carrying the R14W mutation in CA4.

This translation of research from identification of a 'new gene' to proposing a 'clinical trial' based on findings was remarkably short, vindicating the Unit's drive to provide a genetic profile of individuals with retinal degenerative disorders so that they can benefit from any new therapeutics or management regimens aimed at preventing loss of vision.

The Unit identified a range of modifier genes with a significant effect on age of onset of colorectal cancer in a cohort of patients all with an identical, primary disease-causing mutation. Identification of mutations in them has translated directly into presymptomatic testing and clinical screening. This cohort also led to an invitation to join an international clinical trial, the Colorectal Cancer Polyp Prevention programme run by the British MRC. This has brought us one step closer to having a possible treatment that may influence the rate at which mutation carriers for hereditary non-polypotic colorectal cancer develop malignant changes.

Capacity development/research strengthening/collaboration

There is commitment to developing capacity through training of students at Hons, M.Sc. and Ph.D. level. The excellent collaboration on retinal degenerative disorders with Dr Bill Sly has resulted in the realisation of translational research of the highest order. Work on genetic modifiers with Sir Walter Bodmer's Group at Oxford University has been very productive and expanded the Unit's research project considerably.

Impact of research outputs

A unifying theme over the last year has been translation. This means there are more returns for patients/subjects in terms of improved management/treatments/therapies. The Unit is now also focusing on

getting diagnostic DNA-based results to all the patients in its DNA Bank on whom tests have been performed in the last few years.

The Unit has developed a strong formal academic programme (M.Sc.) in genetic counselling which will also provide a platform for researching individuals and community issues in anticipation of greater advances in the field of human and specifically medical genetics.

Human Genomic Diversity and Disease Research Unit

Major breakthroughs and successes

The most rewarding project undertaken by the Unit was its contribution to the MNet documentary entitled 'So, where do we come from?'. This involved dealing with the public – high-profile people in politics, sport, media, etc., as well as ordinary members of the public.

Capacity development/research strengthening/collaboration

One MRC research internship fellow (Ms Khanya Vokwana) is still busy with research towards an M.Sc. Mr Thejane Motladiile, an MRC bursar, completed his M.Sc. after being mentored by Unit Director Prof. H. Soodyall and is now a medical scientist in the cytogenetics laboratory at the NHLS.

A student from Tanzania (Ms Venna Lyimo) came to the Unit for 2 months to acquire molecular laboratory techniques to assist Dr Kajuna in setting up a laboratory at The Hubert Kairuki Memorial University. Additional collaborative projects with Prof. Mike Hammer (Arizona State University) are under way. Prof. Soodyall's collaboration with Prof. Mark Shriver, Penn State, has come to fruition and Ms Akashnie Maharaj will spend 2 months in his lab acquiring techniques to implement upon her return.

Impact of research outputs

Several print media, radio and television interviews were carried out with respect to the documentary. The demand for genetic ancestry testing has resulted in the NHLS endorsing this as a service to the public. Income generated from these activities will be used to supplement research within the Unit. Prof. Soodyall has been approached by National Geographic Society to be the African PI on an international project entitled Genographic launched in April this year. This aims to sample a global population from 10 regions for mtDNA and Y chromosome variation.

Liver Research Centre

Major breakthroughs and successes

This Centre contributes to SAAVI through the work of Prof. Enid Shephard, senior immunologist for the Vaccine Development Programme at UCT, and actively participates in the SAAVI Product Development Team responsible for processes to bring candidate vaccines to phase I clinical trails and beyond. Two vaccines will enter phase I clinical trials in 2005, since they were shown by the immunology team led by Prof. Shephard to induce promising immune responses in both mice and non-human primates.

A study by the Centre to evaluate non-operative management in all patients with liver gunshot injuries who were haemodynamically stable with no evidence of peritonism showed that in centres with suitable facilities, non-surgical management of appropriately selected patients with liver gunshot injuries is feasible, safe and effective, regardless of the grade of liver trauma.

Capacity development/research strengthening/collaboration

The Centre graduated one previously disadvantaged student with a Ph.D. and another with a B.Sc. (Med.) Hons. Three students from disadvantaged backgrounds are currently working towards their Ph.D.

Impact of research outputs

The overall AIDS vaccine development programme highlights the ability of multidisciplinary teams in SA to develop vaccines and co-operate and work together with global partners for production and further clinical testing. Showing that non-surgical management of appropriately selected patients with liver gunshot injuries is feasible, safe and effective has major implications in terms of patient care and costs of that care.

Scientifically, the impact of the Centre's mouse ALA synthase work has been to challenge the current dogma that ALA synthase is naturally upregulated under 'baseline porphyric' conditions. It is of local interest that SA has a small 'founder gene effect' as far as erythropoietic protoporphyria goes, and this will impact positively on the molecular diagnosis of this condition.

Other

The Centre published 5 chapters in books, and has a further 3 in press.

Molecular Hepatology Research Unit

Major breakthroughs and successes

A major success was demonstrating that genotype A of the hepatitis B virus is far more likely that others to cause hepatocellular cancer in Southern African blacks, and that subgenotype A1 (described by the Unit) is responsible for the cancer-causing effect of the hepatitis A genotype of hepatitis B virus.

Capacity development/research strengthening/collaboration

The Unit's staffing structure – with all but the Director being females and 3 being black and 1 Chinese and with 2 postdoctoral fellows being black males - reflects capacity development. The Unit has little control over the composition of its student population, but all current students are female and 1 is black. The Unit continues to collaborate with research scientists in SA and several overseas countries (Japan, USA, Canada, Australia, Belgium, Sweden, India).

Impact of research outputs

The Unit continues to publish widely - 12 full-length articles and 2 book chapters in 2004 and early 2005. The articles have all been in prestigious international journals with high impact factors, and the research results of the Unit continue to be cited widely.

Molecular Mycobacteriology Research Unit *continued*

Major breakthroughs and successes

The full proposal for a DST-NRF Centre of Excellence jointly submitted to the NRF by Unit Director Prof. Valerie Mizrahi and Prof. Paul van Helden (Director, MRC/US Centre for Molecular and Cellular Biology) resulted in establishment of the DST-NRF Centre of Excellence for Biomedical TB Research (CBTBR) in September 2004. The CBTBR was selected as 1 of 6 Centres of Excellence out of 13 applicants in the final round, and the only one selected from the field of Health Sciences. The CBTBR is expected to complement the MMRU and enhance its activities. Funding from the Centre of Excellence grant is being used to refurbish and equip a new laboratory for the MMRU, to upgrade its IT infrastructure and for office refurbishment.

Mutant strains of *Myco. tuberculosis* lacking three members of a family of five Rpf-encoding genes were constructed. These were found to be defective for growth in a mouse model of TB and in their ability to resuscitate – i.e. to start growing again – after prolonged starvation in liquid culture. This provides conclusive evidence of a collective role for these proteins in promoting resuscitation of *Myco. tuberculosis* from a 'dormant' state, and makes them a potentially important new target for TB drug and/or vaccine development. This has been accepted for publication in the prestigious international journal *Infection and Immunity*.

Capacity development/research strengthening/collaboration

The University of the Witwatersrand created two new Ph.D.-level researcher posts in the MMRU, linked to the CBTBR, filled by Dr Bhavna Gordhan and Dr Bavesh Kana. Another notable achievement was the awarding of a Scarce Skills Doctoral Bursary from the NRF to Ms M. Betty Mowa, a new black female student in the MMRU.

The MMRU is involved in a vast international collaborative network involving researchers in the USA, UK, Australia, Russia and France. Particular emphasis was placed on strengthening collaborative linkages with Prof. G. Kaplan (Public Health Research Institute, New Jersey, USA), Dr E. Rubin (Harvard School of Public Health, Boston, USA), and Prof. A. Kaprelyants (Russian Academy of Science, Moscow, Russia). The formation of the CBTBR has enabled the MMRU to strengthen its network of local collaborations, particularly with the MRC Centre for Molecular and Cellular Biology.

Impact of research outputs

The major publications emanating from the MMRU in the field of TB have gathered over 220 citations in journals, including some of the best in the field – *Proceedings of the National Academy of Sciences, Molecular Microbiology, Journal of Bacteriology, Infection and Immunity* and *Nature Reviews Microbiology*. The Director of the MMRU was invited to present many lectures, including a Plenary Lecture at the ICGEB Tuberculosis Symposium in New Delhi, the Inaugural Distinguished Science Alumni Lecture at UCT, an invited lecture at the Wellcome Trust/EMBO Workshop on AIDS and TB in Cape Town, and at the Grand Opening Conference of the Institute of Infectious Disease and Molecular Medicine in Cape Town. Researchers in the MMRU co-authored the chapter on 'DNA metabolism' in the book *Tuberculosis and the Tubercle Bacillus*, recently published by the American Society for Microbiology and expected to become a leading text in the field. The high standing of the Unit was reflected in the invitation to write a review article on the role of mycobacterial genetics in target validation, published in *Drug Discovery Today: Technologies in 2004*.

Oesophageal Cancer Research Group

Major breakthroughs and successes

This Unit's studies have increased understanding of the molecular basis of the disease, and the Unit anticipates an exponential increase in knowledge during the next 2-3 years. They have recently discovered that about 50% of their patients contain integrated human papilloma virus DNA in their tumour DNA. If human papilloma virus plays a role in oesophageal cancer, this will be a major breakthrough in the understanding of the disease and radically change current thinking on the aetiology of oesophageal cancer.

Capacity development/research strengthening/collaboration

Prof. Karel Wirtz from Utrecht University in The Netherlands spent 3 months on sabbatical in the laboratory of Unit Director Prof. I. Parker. Dr Li from China will be spending 3 months in the laboratory to learn molecular biology techniques. During 2004 Drs Ezeronye (Nigeria) and Ayman Daba (Egypt) each spent 3 months in the laboratory to learn molecular biology techniques.

The Unit's cohort of 11 Ph.D. and M.Sc. students consists of 4 students from a previously disadvantaged background and 4 international students. The Unit graduated one M.Sc. student and one Ph.D. student (both black) in 2004. The Unit has a joint programme with researchers at the University of Transkei, but due to the fact that many researchers have left UNITRA, this collaboration has suffered a temporary setback. The Unit has a very strong collaboration with the University of Khartoum (Sudan), and co-supervises a Ph.D. student there. The Unit is attempting to set up a collaborative project with Jomo Kenyatta University in Kenya.

Impact of research outputs

The Unit's studies have contributed tremendously to understanding the molecular mechanisms of development of oesophageal cancer – which has an enormously high rate in some parts of South Africa. The Unit hopes to develop a non-invasive brush biopsy technique able to identify those individuals with increased risk of developing oesophageal cancer. Current studies aim to identify HPV-encoded genes that play a role in oesophageal cancer; the Unit will then use peptide nucleic acid technology to inactivate these genes in HPV-positive cells.

Research Group for Receptor Biology

Major breakthroughs and successes

The Unit has demonstrated that the type I GnRH receptor, when expressed in various cell lines, inhibits cell growth. Inhibition depends on the GnRH analogues used and suggests that specific GnRH analogues can be used for treatment of breast, ovarian and uterine cancers in women and prostate cancer in men.

In previous work the Unit showed that the PGE_2 receptors EP2 and EP4 are upregulated in cervical tumours in comparison with normal cervical tissue. It has also shown that seminal fluid can stimulate the COX-2/PGE_2 pathway in a cervical cell line, suggesting

that sexual activity can promote cervical tumorigenesis in women with pre-malignant lesions in their cervix. Research found that seminal fluid and PGE_2 through the EP4 receptor stimulated the growth rate of these cells and activated genes that enhance angiogenesis. This supports the notion that seminal fluid can promote cervical tumorigenesis, and it is postulated that EP4 antagonists can be used for treatment and prevention of cervical tumours.

Capacity development/research strengthening/collaboration

In the past year 1 Ph.D. and 3 B.Sc. (Med.) (Hons) students graduated. The group has numerous collaborations, including with the Dept of Anatomy and Cell Biology, Bergen University Medical School, Norway; MRC Human Reproductive Sciences Unit, Edinburgh; National Institute for Communicable Diseases, University of the Witwatersrand; and Institute for Infectious Diseases and Molecular Medicine, Faculty of Health Sciences, UCT. The Unit also consults for several international pharmaceutical companies, including Fering, Debiopharm, Neurocrine, and Zymogenetics.

Impact of research outputs

The group is engaged in basic research on a G protein-coupled receptor involved in a variety of diseases prevalent in South Africa. As such, the impact of the research is long-term. Nevertheless, recent research by the Unit into the role of COX, prostaglandins and their cognate receptors in cervical cancer suggests that treatment of women with aspirin and/or EP4 antagonists can be beneficial in reducing the risk of cervical cancer development and progression. However, further research is required before embarking on a clinical trial to test this.

NATIONAL PROGRAMME NON-COMMUNICABLE DISEASES

Anxiety and Stress Disorders Research Unit

Major breakthroughs and successes

The Unit was successful in capturing functional magnetic resonance imaging (fMRI) data - a first on the African continent. This amazing technology allows clinicians and researchers to probe the mind at work and is currently the pre-eminent form of functional neuro-imaging worldwide. Funding has been received from the National Institute on Drug Abuse in the USA for the Unit's first fMRI study, examining the effects of cannabis and Mandrax abuse on neuropsychological and brain function in recently abstinent abusers.

Capacity development/research strengthening/collaboration

Profs Stein and Seedat succeed in winning an NIH R01 grant to conduct analyses of a nationally representative survey of psychiatric disorders in South Africa, collaborating with a group in Michigan that specialises in understanding racial disparities in health care in the USA. The project will strengthen local capacity and expertise in psychiatric epidemiology. The Unit obtained funding to buy near infrared spectroscopy technology in collaboration with a group in New York, which will enhance their ability to conduct functional brain imaging research. The Unit collaborates with groups in Africa, the United States, Europe, and the East. The Unit's Mental Health Information Centre is devoted to outreach activities.

Impact of research outputs

Anxiety disorders are the most prevalent of the psychiatric disorders, accounting for one-third of the costs of mental illness. The Unit's work has contributed to increased awareness and destigmatisation of these disorders, as well as to understanding and treating them.
Specific findings include the following:

- Rats subjected to early maternal stress demonstrate anxious behaviour later in life, abnormalities in the stress response system, and alterations in brain neurotransmitters. This provides an animal model of how adverse early life experiences alter the brain and create vulnerability to adult psychiatric disorder.
- Members of the general public were interviewed about mental illness. The data suggested that stigma and misinformation about psychiatric conditions are prevalent, and that more needs to be done to educate about these disorders.
- Predictors of depression in patients newly diagnosed with HIV/AIDS were studied. Three significant predictors were female gender, greater impact of negative life events, and increased disability. It is important for clinicians to be aware of the high prevalence of depression in HIV/AIDS, and to institute appropriate treatment.

Other

Prof. Soraya Seedat has an ongoing MRC Mid-Career Award. Dr Jacqueline Muller and Christine Lochner were awarded the Rafaelson Fellowship from the Collegium Internationale Psychopharmacologicum for their contributions to psychopharmacology, the first time this award has been given to African applicants. Dr Paul Carey was the winner of a Poster Award at the Clinical Science Section of the above meeting. Prof. Dan Stein consulted in Thailand on the mental health consequences of the Tsunami disaster.

Prof. Brian Harvey won the South African Academy of Pharmaceutical Sciences 'Best Publication Award in Pharmacology, 2004' as well as the Janssen-Cilag 'Best Publication Award 2004' in the Faculty of Health Sciences, North-West University. Prof. Willie Daniels was Chairperson of the Society of Neuroscience of South Africa. Dr Muller and Christine Lochner were awarded research fellowships by the MRC.

The Unit published the *Mental Health Resouce Guide for South Africa, Psychiatric Medications in Primary Care: Algorithms and Guidelines*, and F*alse Alarm! How to Conquer the Anxiety Disorders*. Unit members edited 2 book volumes and 2 journal issues, and authored 8 book chapters.

Cancer Epidemiology Research Group

Major breakthroughs and successes

Data were analysed to examine the relationship between HIV and cancer among black South Africans. Approximately 10 000 patients were interviewed and had blood tested for HIV (10 years of patient data, from 1995 to the end of 2004). HIV infection was associated with significantly increased risks of Kaposi's sarcoma, B-cell non-Hodgkin's lymphoma, other non-Hodgkin's lymphoma, vulval cancer, squamous cell carcinoma of the skin, anogenital cancer, cervical cancer and

Cancer Epidemiology Research Group *continued*

Hodgkin's lymphoma. CERG's cancer case-control study allows for ongoing monitoring of cancer patterns among HIV-infected patients in SA. It will be interesting to compare these results with what is found after widespread use of antiretrovirals.

Cervical cancer data from a Johannesburg case-control study were analysed in an international collaborative study co-ordinated by the International Agency for Research on Cancer. Johannesburg data were combined with data from all other countries having conducted similar research. Results showed that the longer women use hormonal contraceptives (combined oral contraceptives or progestagen-only contraceptives), the greater their risk of developing carcinoma of the cervix. This persists for at least 15 years after contraceptive use has ceased, but can be counteracted by screening.

Data from the Johannesburg case-control study also showed that current smokers are at increased risk of squamous cell cervical carcinoma compared to never smokers, increasing with number of cigarettes smoked per day and younger age at starting smoking. However, the risk of cervical adenocarcinoma is not increased in current or past smokers. The same data were used to show that higher parity and younger age at first full-term pregnancy were associated with cervical cancer risk, independently of sexual habits and HPV status.

CERG researchers analysed a question introduced on the SA death notification form in mid-1998: 'Was the deceased a smoker five years ago?', comparing prevalence of smoking among adults (age 25+) who died of different causes. Signficantly increased relative risks were found for deaths from TB, chronic obstructive pulmonary disease (COPD), lung cancer, other upper aerodigestive cancer, and ischaemic heart disease. If smokers had the same death rate as non-smokers, 60% of lung cancer deaths, 35% of COPD deaths, 20% of TB deaths, and 8% of vascular disease deaths would have been avoided; or approximately 8% of all adult deaths in SA.

Capacity development/research strengthening/collaboration

Ms Margaret Urban attended the Study Co-ordinators Modular Course and two case-control study interviewers, Sr Gloria Mokwatle and Sr Patricia Rapoho and research assistant Ms Edith Ratshikhopha attended a course on 'Introduction to Good Clinical Practice'. Ms Ratshikhopha also attended a Research Methodology Training Course in the field of HIV/AIDS, tuberculosis and malaria. Ms Babatya Innocentia Malope (Ph.D. student) is currently visiting the Viral Epidemiology Unit, National Cancer Institute, Frederick, USA, where she is completing laboratory tests for her thesis. Thereafter she will spend time at the New South Wales Cancer Council in Sydney, Australia, where she will complete analysis of the data.

CERG is involved in research with a number of international collaborators. Prof. Freddy Sitas (Director, Cancer Registry and Research, New South Wales Cancer Council, Sydney, Australia) maintains an active collaborative role in many of the research activities of CERG. Dr Janet Wojcicki, (Centre for AIDS Prevention Studies, University of California, San Francisco) has made a number of working visits to CERG and analysed various data sets, continuing to be actively involved in new analyses. Dr Denise Whitby (Head of Viral Epidemiology, National Cancer Institute, Frederick, USA) is actively involved in CERG's research on the epidemiology of HHV-8.

CERG has been involved in a number of collaborative projects with the WHO's International Agency for Research on Cancer (Lyons, France). Current collaborative work comprises a meta-analysis of all studies conducted worldwide on risk factors for cervical cancer.

Impact of research outputs

About one in four South Africans will develop a cancer in their lifetime. This will rise to one in three as HIV and tobacco-related cancers increase. CERG analyses cancer patterns and causes among South Africans, thus informing cancer treatment and prevention strategies. The focus on oncoviruses such as human herpesvirus-8 and human papillomaviruses will inform their characterisation for vaccine and drug development. CERG's case-control study forms part of worldwide collaborative analyses, thus contributing to and impacting on international knowledge on causes of cancer.

Chronic Diseases of Lifestyle Research Unit

Major breakthroughs and successes

Two studies have dispelled an earlier-held notion that black African people are not going to develop high rates of heart attacks in future. The African data of the INTERHEART study and a study at Kalafong Hospital showed that heart attacks in black African people are caused by smoking tobacco, having hypertension, diabetes and high blood cholesterol. In addition, a strong family history of cardiovascular disease or their risk factors also predicts heart attacks in this group, where heart attacks occur more frequently in people of high socio-economic standing than in the poor.

The Dietary Assessment and Education Kit (DAEK) was launched, developed by researchers of the Unit and the University of Stellenbosch. Comprising a training manual, flash cards and a food photo manual of all food eaten in SA, it greatly facilitates collection of good nutrition data. To date more than 100 kits have been sold.

Capacity development/research strengthening/collaboration

Two Ph.D. and four Master's students supervised by the Unit graduated and there are 5 research interns. Three peer-reviewed papers with the interns as first author were published, and two presented papers at scientific meetings. Two full-time staff are registered for an M.P.H. at UCT, and one completed a Senior Management Programme at the Business School of the University of Stellenbosch.

The Unit collaborates with many universities across SA, with the School of Nursing of Johns Hopkins University in the USA, and with Umeå University in Sweden. This has also resulted in student and staff exchanges.

Impact of research outputs

The Director and other senior researchers act as informal consultants to a number of Directorates of the National DoH, and also advise a number of Provincial DoHs. They have been involved on committees of NDoH to support development of the Strategic Plan of the Directorate of Health Promotion, revision of the Hypertension Management Guidelines, formulation of Obesity Management Guidelines, and to develop tools to assess Total Cardiovascular Risk in the PHC setting. The Director and other staff wrote a proposal for the NDoH Directorate of Chronic Diseases, Disabilities and Geriatrics on

Surveillance for Chronic Diseases and Adult Health Indicators. The Director and researchers serve on the executive committees of many professional societies.

Data on smoking during pregnancy presented at a workshop in February 2004 and to the NDoH alerted health professionals of this risk to the unborn child. This resulted in workshops for midwives to be trained in better patient communication techniques, planning policies for smoking cessation during pregnancy and official support from NDoH for the Unit to develop and evaluate a smoking cessation programme for poor women with high smoking rates during pregnancy. The Unit evaluated tuckshops at schools, and developed a manual to help them to change the way they operate, to improve the quality of food sold to children.

Other

Besides refereed papers, the Unit published 7 book chapters and 11 non-refereed articles and editorials.

Crime, Violence and Injury Lead Programme

Major breakthroughs and successes

The Crime Violence and Injury Lead Programme (CVIP) successfully bid to host the 8th World Conference on Injury Prevention and Safety Promotion in Durban in 2006. It is expected that 2000 participants from 131 countries will attend this biennial international conference. Preparation for hosting this is integral to the CVIP's endeavour to prioritise injuries and their prevention in SA and the rest of the continent, and will dominate activities in 2005.

The electronic media have become an increasingly integral part of the information dissemination and profiling process within CVIP. At present there are two newly updated sites available on which to review the Lead Programme: http://www.unisa.ac.za/dept/ishs and http://www.mrc.ac.za/crime/crime.htm. Several Lead Programme publications have been available electronically on Sabinet since the beginning of 2003, and data requests can be made electronically.

Capacity development/research strengthening/collaboration

The Lead Programme's activities were supported through collaboration with several other groups working in the field of crime, violence and injury prevention, including NGOs, government departments, CBOs, secondary and tertiary institutions, and research departments and units. CVIP actively fostered constructive and critical research partnerships with groups such as the WHO, Karolinska Institutet, Child Accident Prevention Foundation of Southern Africa, as well as various SA academic departments.

Both the ISHS and the MRC have consistently promoted capacity development by offering training courses and other initiatives, including international collaborations with the Karolinska Institutet. The CVIP jointly hosted the annual Injury Control and Traffic Safety Course with the Indian Institute of Technology in New Delhi, and also a Safety Promotion Programme Evaluation Course with the Karolinska Institutet in Sweden. These are both certified courses, the Injury Control and traffic Safety Course having been developed into a fully accredited short learning course at UNISA. Furthermore, a number of these modules will contribute to a fully-fledged Master's course in Safety Promotion, expected to begin formally in 2006.

Impact of research outputs

As the 2010 Soccer World Cup approaches, the importance of city safety in South Africa will become more apparent. The CVIP aims to engage with cities using information from the National Injury Mortality Surveillance System (NIMSS), and to stimulate and inform violence and injury prevention initiatives. The NIMSS is currently the most detailed source of information on the "who, what, when and where" of fatal injuries in SA. The information will be used to evaluate and monitor progress of each city towards a phased set of safe city criteria that will be reviewed at 2-yearly intervals, beginning in 2006.

The CVIP was commissioned by the DoH, Sub-Directorate Maternal, Child and Women's Health, to conduct a feasibility study on introduction of brief interventions to reduce alcohol consumption among pregnant women attending selected PHC facilities in the Western Cape. A final report was handed to the DoH at the end of 2004 and report-back sessions as well as scientific articles in peer-reviewed journals are envisaged for early 2005.

The CVIP as per the PAUSET guidelines attempted to translate its research findings into applied sectoral action through public seminars, training courses, varied publications, policy briefs and press conferences, formal teaching and research supervision. Data produced by the CVIP were used in campaigns advocating for firearm control, child safety, pedestrian safety, and provision of medico-legal services for women.

Diabetes Research Group

Major breakthroughs and successes

The Group found that a high-fat diet fed to adult monkeys resulted in a reduction in insulin production and glucose clearance, early signs of type II diabetes, and an initial reduction in the normal two-phase insulin response to a glucose challenge. There was no insulin response to a glucose challenge after 4½ years on a high-fat diet, yet normal blood sugars are maintained in many of the monkeys.

The Group has established a number of animal models: obesity/insulin resistance rat model, typical symptoms of early stage type II diabetes; streptozotocin model, typical of type I diabetes; and a triglyceride model representing the 'metabolic syndrome' patient at risk of developing type II diabetes. These models have been used to test the efficacy and efficiency of numerous plant extracts for treatment of both diabetes and obesity. The results of these investigations are subject to non-disclosure documents, but there have been some very promising results.

Capacity development/research strengthening/collaboration

Currently two students, Xolani Nkomo (Ph.D.) and Kwazi Gabuza (M.Sc.), are participating in the Diabetes Postgraduate Research Programme. Other courses attended included MS Project Planning and Evaluation, Writing Skills Development, a Language Laboratory Course, and Leadership Skills Course. An Open Day promoting science to scholars around the Eastern Cape was held.

Impact of research outputs

A high-fat diet can be a strong predisposing factor in the development of type II diabetes. Knowledge of this can be used to promote a healthier lifestyle, to avoid developing it. The Group's research results in monkeys could lead to being able to avoid development of the secondary effects which are responsible for morbidity from the disease, while the results of studies on plant extracts could lead to new novel drugs for treatment of diabetics.

Interuniversity Cape Heart Research Group

Hatter Institute for Cardiology Research

Major breakthroughs and successes

Prof. L. H. Opie was appointed Associate Editor of *Circulation*, the leading cardiovascular journal of the American Heart Association, which will involve decisions on internationally submitted basic science papers and developing an African dimension to this journal. This is the first time a South African has become an Associate Editor of *Circulation*. Presentations were made at prestigious international meetings, most noticeably the World Congress of the International Society for Heart Research, American Heart Association Meeting, and European Society of Cardiology Meeting. The Institute's collaborative research work (Drs Sharma, Essop and Taegtmeyer) was awarded the Young Investigators Award at the 53rd Annual Meeting of the American College of Cardiology.

Capacity development/research strengthening/collaboration

During 2004 two black female students were awarded their Ph.D. degrees. Mr Siyanda Makaula (Ph.D. student) was invited to spend a 3-month period in the laboratory of Prof. Lindsay Brown at the University of Queensland (Brisbane, Australia), where he learnt how to perform echocardiography on rodents. Acquisition of this technique enhances the Institute's research capacity.

Dr F. Essop is currently in the process of submitting a Wellcome Collaborative Initiative Grant, together with Prof. Kieran Clarke of the Dept of Medical Physiology at Oxford University. He was recently awarded the prestigious Fulbright Researcher Scholarship to spend a 6-month sabbatical with Prof. Heinrich Taegtmeyer at the University of Texas-Houston Medical Center.

The Institute carries out extensive collaborative research with many partners, e.g. the Dept of Medical Physiology at the University of Tromsoe, Norway, Dept of Medical Physiology at the University of Stellenbosch, Dept of Medical Physiology, Oxford, and University of Osaka, Japan.

Impact of research outputs

During 2004 the Institute published two papers in *Circulation* (impact factor = 10.3, rank = 1/67), one paper in *The Lancet* (impact factor = 15.4), two papers in the *European Heart Journal* (impact factor = 6), two papers in *Cardiovascular Research* (impact factor = 4.7), two papers in the *Journal of Hypertension* (impact factor 3.5), as well as three papers in the second most prestigious physiology journal, *American Journal of Physiology* (impact factor = 3.4). Each represents a major scientific contribution and has helped placed SA on the world map of research cardiology.

Cardiovascular Research Unit (incorporating the Medtronic Institute)

Major breakthroughs and successes

The CRU has successfully utilised their heparin-modified polymeric surfaces to deliver two important angiogenic growth factors in a sequential fashion, long a desired outcome in the field of therapeutic angiogenesis. Analysis of *in vivo* results is ongoing but strongly suggests that delivery of these growth factors in this manner has generated more stable blood vessels.

Significant advances have been made in modulating the inflammatory response to bioprosthetic heart valves. Two subdermal animal models as well as a scoring system for inflammation have been established. A pilot study targeting antigens resistant to chemical masking has proven successful and a full study is currently under way.

Capacity development/research strengthening/collaboration

Participation at both the International Society of Applied Cardiovascular Biology and Microscopy and Microanalysis symposia by the CRU's histologist has dramatically increased the Unit's capability to perform phenotype labelling using confocal and fluorescence microscopy, and introduced application of quantum dot technology into this country.

The Unit continues to contribute to the teaching arena and has been involved in the University of Cape Town's Health Faculty's honours programme, enabling the CRU to expose students to the new field of tissue engineering and training of 4 B.Sc. Hons students, including 2 female and 1 male student from a disadvantaged background. A previously disadvantaged student graduated with an M.Sc.

The CRU has strong contractual links with Medtronic (Minneapolis, USA) and its satellite groups in California (Heart Valve Division), The Netherlands (Bakken Research Centre) and Switzerland (European Headquarters). They also have active scientific collaboration with scientists in many other countries, from Poland to Canada.

Locally the CRU continues collaborating with Prof. David Marais in examining the role of matrix metalloproteinases in atherosclerotic plaques, and has active collaboration on the design and mathematical modelling of vascular prostheses with Prof. Daya Reddy of Applied Mathematics through the auspices of The Centre for Research in Computational and Applied Mechanics. The CRU collaborates with Dr Jacob Tsotetsi from the Anatomy and Cell Biology Dept, and also with the Institute for Polymer Science and Dept of Chemical Engineering at the University of Stellenbosch, where Dr Bezuidenhout currently co-supervises 3 Ph.D. students.

Impact of research outputs

The escalating burden of cardiovascular disease in the First World has resulted in a substantial increase in attempts to develop innovative tissue engineering-based approaches to organ repair. As is now well established, cardiovascular disease incidence is predicted to increase even more dramatically in the Third World. Thus, the CRU research is ensuring that SA does not get left behind in a very necessary and new treatment paradigm.

Lipidology Division of Internal Medicine

Major breakthroughs and successes

A highlight over the past year was determination of autosomal-recessive hypercholesterolaemia in a black patient, with tests extended to include detection of this adapter protein because Prof. Linton Traub (Pittsburg, USA) kindly donated an antibody. Another important achievement was determination of a high prevalence of a gene producing autosomal-dominant dysbetalipoproteinaemia in a study during pregnancy in Zimbabwean women.

The first use of rituximab, an immune modulatory antibody, in severe hypertriglyceridaemia was found to be successful. In a collaborative study with Cambridge University genetic causes were found for two patients with lipodystrophy, both having novel mutations.

Capacity development/research strengthening/collaboration

Skills in clinical and laboratory work-up of dyslipidaemia have been transferred to students and some are currently awaiting appointments to work in SA where dyslipidaemias can now be researched in previously unexplored areas, including the Eastern Cape. A new method that can potentially determine plasma polyunsaturated fatty acid concentration and presents an opportunity for metabonomics has been developed during a visit to our laboratory by a Ph.D. student from Oklahoma State University. Collaborative work with overseas units working on low-density lipoprotein receptors is assisting in determining all genetic causes for the familial hypercholesterolaemia seen at the clinic, and can potentially give insight into newly discovered genetic defects or reveal new defects.

Impact of research outputs

The Division's research has delivered useful information on the nature of genetic dyslipidaemias and therapeutic strategies in the region. Major impact has been involvement in international collaborative studies on drug development for severe disorders, extended to being invited reviewers in this field. A method for studying lipoprotein particle size published by the Division was used, with their assistance, for research overseas.

Department of Physiologic Sciences

Major breakthroughs and successes

Dr Niesler was a member of the Expert Panel Member on Regenerative Medicine - University of Toronto Joint Centre for Bioethics, and Appointed Honorary Research Fellow of the Brain Function Research Unit, School of Physiology, University of Witwatersrand. He was also Scientific advisor for Lazaron Biotechnologies (SA) Ltd – a Cord Blood Stem Cell Biotechnology Start-up, and awarded both the Harry Crossley Scholarship for Research Abroad and DAAD Scholarship for Research Abroad.

Dr Niesler and Dr Smith both received their South African National Research Foundation Rating (Y2) in 2004.

Capacity development/research strengthening/collaboration

The research group has been strengthened via establishment of international collaborations: Analysis of cardiac stem cells in patients with dilated cardiomyopathy, University of Ulm, Germany (Dr Jan Torzewski), and provision of hemangioblast clones for stem cell transplantation (Rodent MI), University of Munich, Germany (Prof. Ralf Huss).

Impact of research outputs

Primary impact has been to increase basic science knowledge related to use of stem cells to improve cardiac muscle repair. It has increased the amount of local stem cell research, a vital part of basic science internationally but currently not prominent in SA. Answers to questions posed will join the literature used to decide what type of stem cell strategies can be used to improve on current therapeutic interventions available to improve muscle repair post-infarct. This could potentially decrease the cost of cardiac rehabilitation and prevent the high cost of transplants. The research may therefore have many commercial applications in the medical biotechnology industry in the long run.

Medical Imaging Research Unit

Major breakthroughs and successes

This Unit has made great strides with novel technologies, and recently received patent protection in the USA for limited angle computed tomography (LACT). With LACT the range of available projections is restricted and the challenge is to recover the underlying structures from incomplete information (see main report for details and images). Another recent patent by the Unit is in population screening, where they explored the potential of Lodox technology for breast cancer. Recognising that the thoracic cavity underlying the breast has a circular cross-section, the Unit simulated the concept of circular slot scanning for mammography, demonstrating that it is possible to reproduce the true structure of the original phantom. Breast compression, leading to patient pain and discomfort, will be eliminated with the Unit's design. The US National Institutes of Health is funding a grant, and the next step is to implement the Unit's ideas in a physical prototype to improve patient comfort and provide greater breast coverage.

The TB laboratory at the NHLS in Green Point, Cape Town examines 950 sputum specimens a day, requiring trained personnel to view up to 50 microscope fields in each slide. The Unit has developed a prototype smart microscope capable of automated analysis of sputum smear slides to reduce the manual load on technicians. A grant has just been submitted to NIH for further support to test this important technology.

Capacity development/research strengthening/collaboration

Dr Tania Douglas completed a 7-week associateship at the International Centre for Theoretical Physics in Trieste, Italy. Dr Ernesta Meintjes spent time at Vanderbilt and Wayne State Universities in the USA, studying functional magnetic resonance imaging. She and her collaborators there have just been awarded a grant by the NIH to study cognitive function in children with fetal alcohol syndrome. Prof. Alan St Clair Gibson participated in the INSITE exhibition in Gauteng, demonstrating applications of the Unit's research in electro-encaphalography. Dr Lester John contributed to a special exhibit on the brain at the MTN ScienCentre in Cape Town, and Unit Director Prof. Kit Vaughan led the effort to build a replica of Allan Cormack's original CAT scan device. This formed part of the South African Inventors Exhibit at the ScienCentre and was also on display at the Science Week in Grahamstown.

Impact of research outputs

The Unit is collaborating with Lodox Systems (Pty) Ltd in the

Medical Imaging Research Unit *continued*

development of their low-dose digital X-ray systems being marketed for trauma applications worldwide, as well as with Tornado Imaging to commercialise their image-guided surgery system based on smart digital cameras.

The work of the Unit has had a positive effect on the opportunities for university graduates to gain work in the fields of medical imaging and the manufacture of medical devices. The companies for which they work are exporting South African-made products all over the world.

Other

Dr Meintjes and Dr Douglas published an invited book chapter on techniques for measuring fetal alcohol syndrome.

PROMEC Unit

Major breakthroughs and successes

Medical mycology in Southern Africa and the rest of Africa has grown markedly over the last few years. HIV/AIDS patients frequently contract opportunistic fungal infections due to their compromised immune status. An international symposium, Medical Mycology: The African Perspective, was co-organised by Dr Hester Vismer of the PROMEC Unit and held in SA. During this meeting the Pan-African Medical Mycology Society (PAMMS) was founded, aiming to stimulate contacts between clinicians and researchers with a particular interest in medical mycology from the African continent and abroad. Dr Hester Vismer, Dr Ifeoma Enweani (Ekpoma, Nigeria) and Prof. El Sheikh Mahgoub (Khartoum, Sudan) were elected to the steering committee. A second meeting of PAMMS is scheduled for 2007 in SA. The mycological scene in Southern Africa was further enhanced by publication of the three-volume handbook *Infectious Diseases in Livestock*, which includes two chapters on mycoses and algal diseases by Dr Vismer.

Capacity development/research strengthening/ collaboration

J. L. Marnewick received a Ph.D. degree from the Dept of Biochemistry, University of Stellenbosch. The following students are registered for M.Sc. and Ph.D. degrees: Mr Stefan Abel: Ph.D. Physiology, UWC; Ms Lorraine Moses: Ph.D. Genetics, University of Pretoria; Dr Vikash Sewram: Ph.D. Epidemiology, UCT; Ms Petra Snijman: M.Sc. Chemistry, UWC; D. Van der Merwe: M.Sc. Food Science, University of Stellenbosch.

The MRC has evaluated and accepted Dr Vikash Sewram in their Accelerated Development Programme. The primary aim is to develop the scientific and leadership competencies of incumbents to prepare them to become future scientific leaders and/or Directors of MRC Units.

PROMEC receives numerous grants for its research, e.g. from the National Cancer Institute (NCI) in the USA, CANSA, THRIP, Rooibos Forum, Monsanto Global Protocol, Rockefeller Foundation, and Dutch Ministry of Agriculture.

Impact of research outputs

Members of PROMEC attended several international meetings, including the First International Symposium on Recent Advances in Food Analysis in Prague, Czech Republic, and the International Mycotoxin Workshop at the Donald Danforth Plant Science Center in St Louis, Missouri, USA.

Launch of the CANSA Awareness Campaign on Cancer of the Oesophagus was held on 5 May 2004 in Centane (Kentani) district, Eastern Cape Province. The audience included the community of Centane, MEC for Health in the Eastern Cape, Mnquma District Mayor, NGO representatives, and health professionals. Several workshops and forums were also held, including a visit from the INTSORMIL External Evaluation Panel comprising 12 members who visited PROMEC in March.

PROMEC is liaising with Ms Khalipha Ramahlape of People Supporting Science, Maths and Technology in connection with the supply of teaching materials, brochures, posters, etc. to science teachers and school children. Information sessions and interviews were held with the media, e.g. the UK's *The Guardian* newspaper and Melody Lee of e-TV, informing the public of PROMEC's research on the health benefits of rooibos tea.

NATIONAL PROGRAMME
WOMEN AND CHILD HEALTH

Gender and Health Research Unit

Major breakthroughs and successes

The Unit's work on association between HIV risk and different forms of gender-based violence was published in *The Lancet*. The Unit co-organised an international seminar held at John Hopkins University, Baltimore, USA on aetiological intersections between HIV and gender-based violence and interventions.

Research by the Unit has shown that a woman is killed by an intimate partner every 6 hours in SA. They have also shown that in SA, with a high prevalence of rape and HIV, prophylaxis against HIV infection after rape is affordable for health services, but unless delivered through high-quality sexual assault services that are supportive of drug course completion, only a modest number of HIV cases can be averted annually.

Capacity development/research strengthening/collaboration

Unit staff co-organised the 4-week Reproductive Health Research Methods Course with the Reproductive Health Research Unit of Wits for the eighth time and taught, among others, the qualitative research methods section. Staff have maintained their link to the Wits M.P.H. and M.Sc. programmes, teaching various modules. In addition, Unit staff taught qualitative research methods at the University of Pretoria (Monitoring and Evaluation course offered on the M.P.H. programme), served as an examiner for M.P.H. dissertations, successfully organised and taught on the Wits GEMP module on rape for a second year, established links with the M.P.H. programme at UNITRA, are teaching a module on qualitative research methods,

taught additional sessions on the GEMP covering domestic violence and theories and models of health behaviour, and have taught on the Gender and Health course at UWC and UCT.

Gender and health staff have completed course work and submitted a thesis for an M.P.H. at UCT, a Diploma in Public Health at UWC, and a Postgraduate Certificate in Health Promotion at UNITRA.

Impact of research outputs

The Unit's work on sexual assault services has been presented to the National DoH and been used to provide context to the new Sexual Assault Policy and Clinical Management Guidelines launched in March 2005. The Unit has continuously worked to try and improve the quality of sexual assault services, showing that high-quality services are important for effective public health policy as well as for respecting women's basic human rights.

Work from this Unit has had a major impact on advocacy around gender-based violence, showing that SA has the highest incidence of intimate femicide recorded in any country, and that the level of one such murder every 6 hours was 12 times higher than previously estimated. There has been very substantial media coverage of this and advocacy campaigns use this research extensively. The work has been presented to the South African Police Services and National Directorate of Public Prosecutions, both of which have considered the implications of the recommendations for management of female murder cases.

The Unit's work on intimate femicide has also shown that female partners of men who own legal guns are at substantially elevated risk of being killed by their partners. Two- thirds of these deaths would have been prevented if the men had not had guns. Amnesty International has drawn extensively on the Unit's work on the links between hand gun ownership and gender-based violence, particularly the risk of being killed, in a new campaign launched to draw attention to the risks of small arms.

Maternal and Infant Health Care Strategies Research Unit

Major breakthroughs and successes

This Unit provided the first direct evidence that use of audits of near-misses in maternity care result in a reduction of maternal deaths. They also published a model for objectively measuring progress in implementing a new health strategy. The Serithi Project in partnership with Yale University (project leader Prof. Bridget Jeffery) has followed up approximately 300 pregnant women infected with HIV over 2 years. The team has developed a programme to alter the women's behaviour to empower them to make more rational health choices. This programme will be launched and tested in Pretoria in 2005.

Capacity development/research strengthening/collaboration

The Unit is responsible for running and publication of the *Saving Babies* reports, keeping communication with over 120 sentinel sites and collating the data submitted. The original programme on which these perinatal care surveys of SA are based was developed by the Unit. The system is supported by the National DoH and funded by Saving Newborn Lives, an initiative of the Save the Children Foundation (US $36,000 for 3 years).

The Unit developed the first Quality of Child Health Care reporting system, and currently 10 hospitals are supplying information. This will be expanded to 18 (two per province) in 2005. The programme is supported by the Child Health Division of the National DoH, and its expansion is one of their priorities for 2005. The Unit is involved in the national system of confidential enquiries into maternal deaths in SA, and developed the MaMMAS programme on which the data are entered. The fourth interim report (collated and written by Unit Director Prof. R. Pattinson) has been submitted to the Minister of Health but not released for publication. Training in the use of MaMMAS has been undertaken by the Unit.

A basic antenatal care (BANC) training programme has been developed by the Unit and is being tested in the Pretoria region and Port Elizabeth Metropole. A series of focus groups with nursing staff in PHC clinics in the Pretoria area concerning problems in providing antenatal care was conducted after documentation of poor quality of such care in the area. Further expansion of the BANC is planned in collaboration with FIGO, the South African Midwives Association, SASOG and National DoH.

Impact of research outputs

Recommendations in the *Saving Babies* reports have been incorporated into the Maternal and Child Health Strategies document of the National DoH.

Other

Three technical reports: *Saving Babies 2003: Fourth Perinatal Care Survey of South Africa*. ISBN: 0-620-32650-6; *Saving Children: A pilot survey of child health care in South Africa* (Prof. Pattinson edited the report with Dr Krug and co-authored the process section); *Fourth Interim Report on Confidential Enquiries into Maternal Deaths* (Prof. Pattinson wrote the changing patterns of maternal deaths and compiled and edited the rest of the report). *A Basic Antenatal Care Handbook* was written and edited by Prof. Pattinson.

Mineral Metabolism Research Unit

Major breakthroughs and successes

The Bone Health Study (a cohort of children from the Birth to Twenty Study) continues to provide important information on bone mass accrual during adolescence. Two major modifiable factors are thought to be important in optimising peak bone mass during adolescence: calcium intake and exercise. Despite significantly lower physical activity levels and dietary calcium intakes in black than white children, black children have higher bone mass at the hip than white children. This suggests that higher bone mass at the hip in black children (also seen in black adults) is due to genetic differences, and may account for the lower hip fracture incidence in elderly black subjects in SA. Unlike findings in African-American children, who enter puberty earlier than white American children, South African black children enter puberty at a similar age to white children and have a similar bone age to their white peers.

The Unit previously showed the importance of low dietary calcium intakes in the pathogenesis of nutritional rickets in Nigerian children. Despite dramatic clinical, biochemical and radiological response to calcium supplements in affected children, they were unable to show significant differences in calcium intake between

Mineral Metabolism Research Unit *continued*

affected and non-affected children. Recent research tried to identify other factors which might contribute to pathogenesis. The Unit found that maternal breast milk calcium concentrations are lower in mothers who have children with rickets than those who do not. It also appears that children with dietary calcium deficiency may require higher levels of vitamin D to optimise calcium absorption than children with vitamin D deficiency.

Capacity development/research strengthening/collaboration

The Unit is collaborating with a number of researchers internationally, including: Dr Ann Prentice, director, MRC Human Nutrition Research, Cambridge, UK; Dr Philip Fischer, Dept of Paediatrics and Adolescent Health, Mayo Clinic, USA; Dr Tom Thacher, Dept of Family Practice, Jos University Teaching Hospital, Jos, Nigeria; and Dr Dorothy Nelson, Dept of Rheumatology, Wayne State University, Detroit, USA.

Impact of research outputs

The Bone Health Study is the first longitudinal study of bone development and growth in children living in a developing country. The children are now entering the most important time of their lives with regard to growth and bone development (mid-puberty); therefore the Unit's study of possibly modifiable factors which might have important influences on bone mass and growth is important in understanding how to optimise growth and bone mass in childhood to reduce trauma fractures in later life. Information so far points to an important role for adequate physical activity during childhood. Lack of formal physical activity periods in many schools in SA may have significant detrimental effects on long-term bone mass development.

The Unit's studies have highlighted the role of low dietary calcium intakes in rickets in children in Nigeria, and the importance of calcium supplements in its management. Recent studies on metabolism of vitamin D in affected children suggest that vitamin D requirements in children may vary depending on calcium intakes. This has important implications for setting nutritional recommendations for vitamin D.

Other

Unit Director Prof. J. Pettifor has been appointed to the Editorial Board of the *Annals of Nutrition and Metabolism*. He also sits on the Editorial Advisory Board of the *Encyclopedia of Human Nutrition*. Ms J. McVeigh received the Cyril Wyndham Prize for best presentation at the Physiology Congress. Four chapters in books were written, and several talks given on the radio.

Nutritional Intervention Research Unit

Major breakthroughs and successes

The MRC/Carotino spread, based on red palm oil fat, developed by NIRU and tested in a randomised controlled study among primary school children, has been patented and licensed to the industry. It has been incorporated in the Department of Education's list of items for the School Nutrition Programme, is an excellent natural source of vitamin A, is aflatoxin-free and can easily be fortified with vitamins and minerals. NIRU also showed that a savoury bread spread based on fish meal from fish waste improved learning, memory and school attendance of primary school children in a low socio-economic setting. The fish waste, previously discarded at sea causing severe pollution, can be used to effectively improve the quality of life of children.

Capacity development/research strengthening/collaboration

Staff attended a Workshop on Ethics in International Health Research, Harvard University, Boston, a training course on randomised controlled trials in Gauteng, a Project Management Course at the Centre for Continuous Education, Pentech and an International Graduate Course on Production and Use of Food Composition Data in Nutrition, ECSAFOODS Course, Pretoria. Staff were study supervisors (co-promotor) for 2 M.Sc. students at the University of Venda and promoter for a Ph.D. student at UWC, and gave presentations at micronutrient malnutrition courses at UWC and the Universities of Cape Town and Pretoria.

De Wet Marais, Research Support Manager at NIRU, was appointed co-ordinator for the Laboratory Network of Food Fortification Analysis technical group, East, Central and Southern Africa (ECSA) region. Training of laboratory analysts for monitoring levels of fortificants in fortified foods forms a critical part of the food fortification programme for the region. Marais visited several institutions (Kenya, Tanzania, Malawi, Zambia) to evaluate laboratory capacity and identify analysts to be invited to a laboratory training workshop on analysis of fortified foods held at the MRC during May 2005.

NIRU is currently engaging with the Program for Appropriate Technology in Health to assist with setting up reference laboratories in Africa linked to nutrition and health, and is involved in extensive collaborative research with partners both locally and globally.

Impact of research outputs

The MRC/Carotino spread based on red palm oil fat was developed by NIRU and tested in a randomised controlled study among primary school children. It has been patented and licensed to industry, now forming part of the Department of Education's list for the School Nutrition Programme, where it is sure to play a significant role in improving the health and educability of SA learners.

It is now required by law to fortify maize meal with minerals and vitamins. Supported by a grant from The Maize Trust, NIRU studied the nutrient composition of unfortified and fortified maize meal, providing the food industry with baseline information on the composition of maize meal, and a guideline for monitoring fortification.

Research results from NIRU iodine nutrition studies are fed back to the SA Iodine Deficiency Disorders Network, impacting on policy and legal implementation of the national salt iodisation programme. Dr P. L. Jooste wrote the 2005 operational plan for the Network, ensuring the practical implementation of NIRU results.

SELF-INITIATED GRANTS

Professor Lynda Chalkley
Senior Research Manager,
Research Management Division

Self-initiated grants are an important component of external funding to institutions nationwide. Some 180 applications are received annually for funding consideration.

A fully transparent peer-review process is conducted, whereby national and international evaluations are obtained. Based on comments and ratings provided by reviewers in conjunction with health priorities (depending on available budget), the MRC Research Grants Committee awards grants to approximately 25% of proposals received. Grants of 1-3 years' duration (maximum R130 000 per applicant per year) result in annual support being provided to 120-150 projects.

The research supported encompasses many important and relevant health issues, from developmental, health systems/and policy, health promotion/care and clinical applications across the full spectrum of MRC National Research Programmes. Output accountability is of exceptional value to national research efforts and to the development of students and young researchers. Periodically, as national health directives change or new priorities are identified, Request for Proposals are placed.

REPORT OF THE EXECUTIVE RESEARCH DIRECTORATE

Professor Anthony D. MBewu
Formerly Executive Director for Research

The year 2004/05 proved highly eventful in the life of MRC research. For the first time in a decade, capacity development was once again united with research into a single portfolio managed by one Executive Director for Research.

The MRC's Research Highlights follow, and it would be unfair to single out any one highlight among the 800 research projects, 568 peer-reviewed publications, 10 patents, numerous technical reports, Policy Briefs and media articles. Similarly, the 49 successful Ph.D. and 42 Master's graduates, and 18 'postdocs' from the 46 MRC research units must all be commended on their efforts. The scores of support staff who provide professional human resource services, service IT systems, prepare financial statements, tend gardens at the MRC campuses across the country, clean office floors or man the telephones have all worked hard, many of them going the extra mile to ensure the nation's health research council runs smoothly and efficiently, and is productive in 'Building a healthy nation through research'.

However, a few highlights must be mentioned, particularly those that reflect the theme of this book: research translation. For example, the sterling work done by the Health and Development Research Group in identifying that the source of high blood lead levels in at least some affected children was the high lead levels in children's toys. The manner in which the researchers, together with the National Department of Health, were able to analyse the problem and develop a strategy for information dissemination, policy formulation and eventually eradication of the health problem was exemplary.

Prominent also has been the rolling tide of action in the *Vuka South Africa*! campaign, which was at least in part instigated by research that the MRC has done over the years in chronic diseases of lifestyle, health promotion and sports science. This culminated in a march to Parliament by a motley crew of policy makers, scientists, health care professionals, exercise consultants, medical aid administrators and members of the public, accompanying the Minister of Health on her way to Parliament to deliver her budget speech.

Also of note has been the establishment of the Research Translation Office and the successful briefing that MRC scientists gave to various Parliamentary Portfolio Committees, including those on Health, and on Science and Technology. These briefings were well received, with Members expressing appreciation for the scope and depth of research done by the MRC on behalf of the nation.

Despite turbulent times surrounding the departure of senior personnel, the South African AIDS Vaccine Initiative continues to thrive, globally recognised as one of the most impressive HIV vaccine development programmes in the developing world. Having completed two Phase I clinical trials (including the first trial in the world of a subtype C candidate vaccine – subtype C being the most prevalent clade in Southern Africa), with another two Phase I trials in the pipeline, the Initiative is preparing sites for potential Phase III clinical trials within the next few years. We hope SAAVI's products over the next several years will be not only an effective, affordable, locally relevant HIV vaccine, but also a whole cadre of young scientists (including black scientists) plus the infrastructure of a sustainable vaccine biotechnology industry in South Africa.

Perhaps the most pertinent token of recognition of the excellence and relevance of MRC research was the nomination of 10 MRC scientists as finalists in the National Science and Technology Foundation (NSTF) awards – with three triumphing in their categories of young researcher, capacity developer and research done over the past 5-10 years.

Additionally, the MRC's contribution to the National System of Innovation and socio-economic development was recognised when in November 2004 it was voted the Large Enterprise Winner in the category Research and Development at the NSTF Top Technology 100 awards.

International recognition of the high quality of much of the MRC's research became evident when at least two MRC Units were part of international teams successful in winning funding in the Gates' Foundation 'Grand Challenges' in global health programme.

Congratulations therefore to all the scientists and support staff who, through their tireless efforts, continue to make the MRC the leading health research institution in South Africa, if not the entire African continent.

RESEARCH HIGHLIGHTS

NATIONAL PROGRAMME ENVIRONMENT AND DEVELOPMENT

Trends in 'tik' and other drug use

The Alcohol and Drug Abuse Research Unit highlighted the increasing use and burden of harm from methamphetamine ('tik') in Cape Town, releasing a Fact Sheet on the use of 'tik' and intervention strategies. Patients at specialist drug treatment centres in Cape Town with 'tik' as a primary or secondary drug of abuse increased from 121 to 668 between the second half of 2003 and the second half of 2004. Almost 6 out of 10 patients in treatment for 'tik'-related problems were younger than 20, and over 40% of these patients took 'tik' daily. To alert health professionals an editorial was published in the *South African Medical Journal* (December 2004), and a further article will appear in *SA Family Practice* during 2005.

South Africa singled out by the UN as the African country having the most systematic means of collecting data on drug abuse

The Unit monitors trends in use of alcohol and other drugs and associated health/social consequences in sentinel sites in South and Southern Africa (the SACENDU and SENDU projects respectively). SACENDU is funded by the National Department of Health (NDoH) and SENDU by the European Union. During 2004 the SACENDU project was expanded from five sites (Cape Town, Durban, Gauteng, Mpumalanga, and Port Elizabeth) to include East London, and the SENDU project was expanded to Luanda in Angola and Kinshasa in the DRC. Compared with 2003, the region saw an increase in demand for treatment for cocaine-, heroin- and methamphetamine-related problems, and an increase in police seizures of heroin.

In the 2004 UN *World Drug Report* released in 2005, South Africa was singled out as the African country having the most systematic means of collecting data on drug abuse, largely due to the work of the SACENDU project. The findings of both the SACENDU and SENDU projects were extensively referred to in the report.

In collaboration with the Institute for Security Studies and based on data from SACENDU, the 3 Metros Study on Drugs and Crime, an analysis of police dockets in Gauteng, and fieldwork on the links between drugs and sex work and drug markets, the pocket-sized *South African Drug Enforcement Handbook* was launched. This is designed to assist law enforcement officials in identifying street drugs and the people who use or sell them. It also makes the findings of earlier research useable and accessible to law enforcement practitioners.

Research by the Unit was fed into various policy initiatives, including revision of South Africa's national drug master plan, an initiative of the NDoH to regulate the placement of warning labels on alcohol containers, and preparation of a Discussion Paper on cannabis by the Central Drug Authority.

Lead poisoning in children and adolescents

The Health and Development Research Group has found that the paint on certain pencil crayons and wooden toys sold at toy stores, supermarkets, craft shops and flea markets in South Africa may contain lead concentrations up to 145 000 μg/g - considerably higher than the internationally accepted standard of 90 μg/g. High lead concentrations were even found in items marked as 'non-toxic'. These unacceptably high

Unacceptably high lead levels identified in children's toys

lead concentrations pose a direct threat of reductions in IQ and behavioural abnormalities to young children, especially those who tend to chew on toys and other painted items. Following presentation of the study findings to the Minister of Health, an instruction was issued to draft legislation to ban the use of lead in paint that is intended for use by the general public (on homes, children's toys, furniture and play equipment). A nation-wide lead awareness campaign is also to be implemented.

A study by the MRC and the Bone Mineral Density Unit of the University of the Witwatersrand pointed to a risk of lead exposure among adolescents exposed to lead solder used to repair radio and television sets, music centres and other electrical appliances. Blood lead concentrations up to 28 μg/dl (neurobehavioural effects have been demonstrated at concentrations as low as 3 μg/dl) were found among 1546 13 year olds. Investigation of those with the highest blood lead concentrations showed that they may be putting their health and social well-being at risk in their attempts to contribute to the household coffers.

The Health and Development Research Group's work on lead exposure in children and adolescents shows the need for an integrated programme of action to prevent childhood lead poisoning in South Africa. This needs to include, among others:

- aggressive, high-profile public awareness campaigns;
- banning use of lead in paint intended for use on residential, school and other public buildings;
- blood lead screening in high-risk areas; and
- a stepped-up research campaign to identify other high-risk groups and items.

Bloekombos community nutrition project

A community nutrition project in Bloekombos, a low-income community in Cape Town, allowed the Health and Development Research Group to evaluate the implementation of South Africa's nutrition policy, and assess impact on nutrition of an integrated package of interventions that included establishment of children's play parks, garden and sewing projects, skills training and distribution of food parcels. The evaluation showed a general improvement in the children's nutritional status. Among the lessons learned was the importance of involving stakeholders from local structures.

A detailed report on the Bloekombos Nutritional Project is available from Dr Lesley Bourne of the Health and Development Research Group on request (021 938 0313).

HIV/AIDS: First local level prevalence study

The first local government HIV prevalence study was undertaken in Buffalo City (East London, King William's Town and Bisho) during 2004. The Health and Development Research Group undertook a parallel study of projected human resources costs as a result of the HIV prevalence rate. This resulted in development of an internal and external HIV strategy for Buffalo City, and was linked to a voluntary counselling and testing programme which helped to promote knowledge of HIV status in the workplace.

A copy of the study report can be found at http://www.afroaidsinfo.org/public/Policy/localresponses/index.htm

Charter for Physical Activity and Sport for Children and Youth in South Africa

The Exercise Science and Sports Medicine Research Unit is helping compile the above Charter, in view of emerging evidence of decreasing participation in physical activity and concomitant increases in obesity levels in South African children.

Introduction of the Charter will further highlight the importance of physical activity, specifically at school level. The Charter will also assist policy makers to make future decisions around school curricula. Once all interested parties have agreed on the contents (being developed in collaboration with over 120 institutions), the research team will propose to the NDoH and Departments of Education and Sport and Recreation that the Charter be made policy. This will ensure that physical education is reintroduced as a compulsory subject in all South African schools, and will thus contribute to ensuring a lasting commitment to a healthy lifestyle.

Promoting behaviour change for health

The National Health Promotion Research and Development Unit is developing and testing interventions that promote behaviour change in a variety of settings, e.g. the determinants of smoking prevention and cessation, reduction of drug use and HIV risk among prison inmates, school-based HIV prevention, health education and counselling behaviour of primary health care nurses, and school-based tobacco prevention.

Over the last 12 months the Unit has spent much time and effort disseminating data from the first National Youth Risk Behaviour Survey (YRBS) and the second Global Youth Tobacco Survey to government and non-governmental sectors in each of the provinces. Data from the YRBS were used to highlight risk factors and risk behaviours associated with future chronic and infectious diseases among 13 to 17 year olds.

Research reports on both the National Youth Risk Behaviour Survey (YRBS) and the second Global Youth Tobacco Survey may be viewed at www.mrc.ac.za/healthpromotion/reports.htm

NATIONAL PROGRAMME HEALTH SYSTEMS AND POLICY

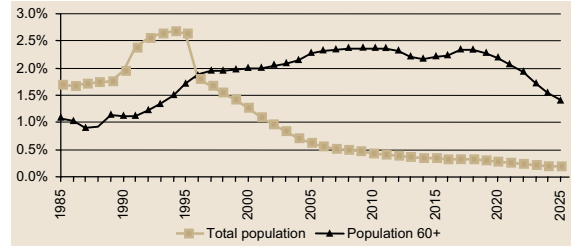
Risky sexual behaviour top risk

The Burden of Disease Research Unit is quantifying the contribution of 17 selected risk factors to the burden of disease experienced at national level in 2000. The study will be completed in 2005 and will inform policy responses to reduce burden of disease in South Africa. A reliable and comparable analysis of risks to health is essential to guide health sector response to prevent disease and injury. This has been recognised by the South African government as an important strategy to improve the health of the nation (Minister of Health's Budget Speech, May 2003).

Preliminary results show that loss of health in South Africa is dominated on the one hand by factors related to poverty and under-development (such as undernutrition, poor water, sanitation and hygiene, and indoor smoke from solid fuels), and on the other by risk factors associated with a Western lifestyle (such as alcohol, tobacco, high blood pressure and high cholesterol). Risky sexual behaviour resulting in sexually transmitted diseases is the leading risk in South Africa, accounting for approximately 35% of all healthy years of life lost in 2000. Exposure to violence is another important risk factor responsible for a substantial proportion of death and disability in the country.

Ageing of our population

Ageing has generally not been a high priority in developing nations, including South Africa. However, there is growing awareness and interest in demographic and individual ageing in Africa. The demographic impact of AIDS on population ageing is being explored by the Burden of Disease Research Unit. While declining fertility and increasing mortality has slowed overall population growth, the growth of the older population has not slowed (see diagram). Growth in older populations is currently 3.5 times higher than that of the total population. The number of people aged 60 or older is expected to increase by 72%, from 3.05 million in 2000 to 5.23 million in 2025, when about 1 in every 9 South Africans is projected to be aged 60 years or older.



Annual growth rates of the total population and the population 60 years or older, 1985-2005 (Source: Actuarial Society of South Africa, 2004).

It is acknowledged that many older persons are positive resources to their communities, but demographic ageing is associated with increased frailty, disability and disease in a population. Causes of death in older persons are dominated by chronic diseases, including cardiovascular conditions, respiratory disease, diabetes and cancer. Strategies to promote healthy ageing will need to address the management of chronic conditions in age-friendly primary health care facilities to

reduce poor health outcomes, and promote healthy lifestyles in younger age groups in order to prevent these diseases.

A systematic success!

The South African Cochrane Centre (SACC) contributes to informed decisions about health care at local and international level by synthesising existing research on the effects of interventions. As the only Cochrane Centre in Africa, it focuses on health care problems of high priority to the region, supporting Cochrane activities in 25 African countries. SACC staff conducted systematic reviews on various aspects of the management of TB and HIV/AIDS which were published in *The Cochrane Library*, *The Lancet* and *British Medical Journal* and presented at international and local conferences.

Supporting the Translation of Evidence into Policy and Practice (STEPP)

The SACC recently joined forces with the Western Cape DoH and University of Cape Town to launch STEPP - Supporting the Translation of Evidence into Policy and Practice. STEPP aims to bridge the gaps between research evidence, policy and real world practice by comparing specific policies formulated by the Western Cape DoH with the best available evidence on benefits, harms, costs and feasibility of recommended interventions.

Trials registries and potent partnerships

SACC hosts and maintains both the African Trials Registry (ATR) and the HIV/AIDS Trial Registry. The ATR ensures that African research is available for inclusion in systematic reviews and helps facilitate use of locally relevant information in decisions about health care on the African continent. The HIV/AIDS trial registry includes details of all completed published and unpublished randomised controlled trials (RCTs) assessing HIV/AIDS interventions throughout the world.

There are a large number of completed RCTs evaluating interventions for HIV/AIDS, TB and malaria. Given the current momentum of the search for new tools to control these major diseases and new funding to conduct trials, there is likely to be rapid growth in such RCTs over the next few decades. The challenge is to ensure that all are identified and made available in a useable form.

SACC's proposal to establish an international registry of RCTs focusing on AIDS, TB and malaria was selected for funding by the European Developing Country Trials Partnership (EDCTP). Registration of trials will be both retrospective (completed trials) and prospective (registration at trial inception). This registry will serve as an important global resource for researchers, clinicians, policy makers and consumers by: (i) providing a source of reliable information on what works and does not work in prevention and treatment; (ii) identifying research gaps that should be addressed in future trials; (iii) providing a 'laboratory' for studying the scope, quality and funding patterns of trials; and (iv) keeping track of trials that will be undertaken in the future.

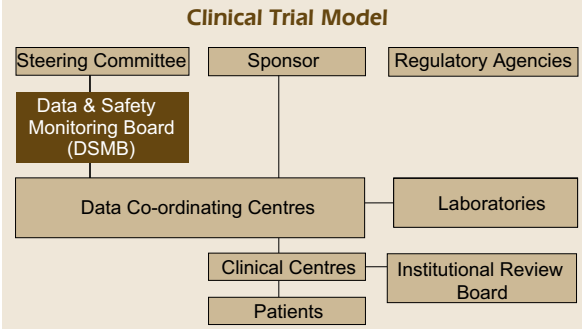
Data and safety monitoring boards

Development in the conduct of RCTs led to introduction of data and safety monitoring boards (DSMBs) in 1980. DSMBs are now a standard part of trials and cohort studies where risks to humans are involved. The DSMB comprises clinical, ethical and statistical experts that are independent from the trial sponsor or investigator. The MRC's Biostatistics Unit is ideally placed to provide independent statisticians to serve on DSMBs.

In 2004 statisticians from the Biostatistics Unit served on seven such committees, investigating issues ranging from male circumcision to antiretroviral treatment and TB. They provide and interpret the interim data analysis with respect to risk to patients and possible successful completion of the study or futility of it, forming part of the final recommendation to continue or stop the study. Through this the MRC makes a high-level contribution to the proper conduct of trials throughout Southern Africa, highlighting the important role of the statistician in clinical research.

The South African Cochrane Centre has a national subscription to *The Cochrane Library*. Access to this database is for South African citizens or permanent residents only. The database is available via the following URL: http://www.sahealthinfo.org/. First time users must register to obtain a user code and password.

For other developing countries The Health InterNetwork Access to Research Initiative (HINARI) http://www.healthinternetwork.org/ provides free access to *The Cochrane Library*, including major journals in biomedical and related social sciences to public institutions in low-income countries as defined by the World Bank. Access is also available to low-middle income countries, although HINARI may charge a reduced fee.



Role and reporting structure of a DSMB (adapted from Demets DL, Fleming TR. The DMC independent statistician. Statistics in Medicine *2004; 23: 1513-1517).*

Strengthening STI care

In 2004 the Health Policy Research Group was contracted by the NDoH to provide support for the development of policy analysis capacity, and by the Gauteng DoH to develop a surveillance system for monitoring the impacts of HIV/AIDS on the health system.

In the late 1990s the Group initiated work investigating STI care given by private providers, which is now coming to fruition. Since many people, even those of lower income, choose to use private providers for STI treatment, the quality and outcomes of their care is a significant public health issue, especially in the context of the national HIV/AIDS epidemic. Early work revealed that GPs commonly provide poor quality STI care. This fed into development of a 3-year action research project funded by the Wellcome Trust which provided the basis for four activities that will support translation of some of the project's key findings into practice:

- feedback to and continuing discussion with the NDoH about how to strengthen STI care nationwide;
- publication of a manual for district programme managers on how to work with private providers around the control of STIs (available on request from lucy.gilson@nhls.ac.za);
- incorporation of budgets for training private providers into all nine provincial health department budgets, as a direct response to sustained engagement with departments of health on this issue; and
- implementation of training activities for public sector workers around STI treatment across Southern Africa (with the Health Systems Trust).

This demonstrates how the findings/activities of a programme of sustained research around an important health policy question can be translated into activities that serve to ensure benefits for the broader population.

Powerful potential of lay health workers

Lay health workers (LHWs) are widely used to provide care in a broad range of health issues. However, little is known about the effectiveness of LHW interventions. In collaboration with the London School of Hygiene and Tropical Medicine, Babcock University in Nigeria and the Liverpool School of Tropical Medicine, the Health Systems Research Unit conducted the first global systematic review of RCTs on the effects of LHWs in primary and community health care (Lewin *et al*., 2005). This Cochrane review demonstrated that LHW interventions have promising benefits in comparison with usual care in promoting immunisation uptake in children and adults and in improving outcomes for acute respiratory infections and malaria. LHWs also appear promising for breast-feeding promotion and to have a small effect in promoting breast cancer screening uptake.

Lay health workers can save 59% of public health service direct staff costs for clinic-based DOT for TB patients who live on farms

A second project explored the effectiveness of farm-based LHWs in improving successful treatment completion by new smear-positive (NSP) adult TB patients. This RCT, the first to examine effects of LHWs in rural farm settings and conducted in collaboration with the Swedish Karolinska Institute, found the successful treatment completion rate in NSP adult TB patients to be 18.7% higher on farms in the intervention group than farms in the control group. Treatment interruption was 4% on intervention farms compared to 26% on control farms.

The study found that by implementing an LHW programme, the public health services could potentially save 59% of their direct staff costs for clinic-based directly observed treatment (DOT) of TB patients who live on farms. This saving is possibly underestimated since only direct staff costs were included. There is also the potential to increase NSP TB case finding by 42% and increase the cure rate of NSP TB cases by 10% if the momentum of the intervention can be maintained. It has been well received by the Boland Health District and is in the process of being extended to other areas.

NATIONAL PROGRAMME INFECTION AND IMMUNITY

Developing and testing novel HIV vaccines

Through the South African AIDS Vaccine Initiative (SAAVI), a lead programme of the MRC involving about 220 scientists, clinicians and other researchers at centres of excellence across the country, South Africa became the first developing country to run multiple phase I HIV vaccine trials and also the first

in the world to test a subtype C HIV-1 vaccine – subtype C accounts for over 90% of all new HIV infections. South Africa is also likely to become the first developing country to submit candidate HIV vaccines to the US Food and Drug Administration for regulatory approval. If trials of the SAAVI-developed vaccines proceed we will also be the first developing country to be testing its own vaccines in the developed world – i.e. in the USA.

Three South African-developed products – two DNA-based and one MVA-based (see table) developed by the SAAVI-funded group at the University of Cape Town are being manufactured for trials and going through the regulatory processes preceding phase I human trials. These will be tested both singly and in combination in a prime-boost approach and are planned to enter trials in 2006. SAAVI plans to test these products in South Africa, Botswana and the USA, in collaboration with the NIH and HVTN.

Progress in developing SAAVI candidate vaccines.

Product	Development group	Status
DNA–gag-rt-tat-nef // env	SAAVI/UCT	Pre-trial manufacture and preclinical toxicity testing in animals completed, regulatory review in 2005.
MVA–gag-rt-nef-tat-env	SAAVI/UCT	Pre-trial manufacture completed. Preclinical toxicity in animals, and regulatory review in 2005.
Plant-based VLPs	SAAVI/UCT	Preclinical laboratory development phase.
BCG	SAAVI/UCT	Preclinical laboratory development phase.
Salmonella	SAAVI/UCT	Preclinical postgraduate student project.

The SAAVI-funded HIV Vaccine Ethics Group based at the University of KwaZulu-Natal collaborated with the NDoH's interim National Health Research Ethics Committee and the MRC to develop the *MRC Guidelines on Ethics for Medical Research: HIV preventive vaccine research*, Book 5 of the MRC's series of ethical guidelines, launched in April 2005.

One of the first at the Perinatal Unit at Chris Hani Baragwanath Hospital to receive a trial vaccine

South Africa was the first developing country to run multiple phase I HIV vaccine trials and also first in the world to test a subtype C HIV-1 vaccine

Studies reveal alarmingly high HIV rates

December 2004 saw completion of a study by the HIV Prevention Research Unit to estimate rates of HIV seroconversion among women from the community of Chatsworth and Hlabisa, and to assess the incidence of sexually transmitted infections. Two hundred and forty HIV-negative women from each research site were enrolled and followed up for 12 months. Women were screened for HIV infection before being enrolled, and the study revealed an alarmingly high prevalence of HIV in the targeted communities. This resulted in double the number of women having to be screened in order to enrol 240 HIV-negative women per site. HIV prevalence and incidence at both sites were very high, suggesting the need for an urgent intervention targeted at women.

Study status and HIV prevalence and incidence rates, Chatsworth and Hlabisa

	Chatsworth (Durban)	Hlabisa
Date of first screening	21 May 2003	26 May 2003
Date of first enrolment	3 June 2003	6 June 2003
Date of last enrolment	27 November 2003	17 December 2003
Total screened	561	526
Total enrolled	240	239
HIV prevalence rates	39.5%	34.7%
HIV incidence rates	5.0% per 100 women years	5.5% per 100 women years
Overall retention rate	96%	94%

The study data were presented to both communities. The Durban and Hlabisa sites have now been activated for the HPTN 035 Phase II/IIb microbicide clinical trial - the first sites worldwide to enrol women into the study.

A second study in Tongaat and Verulam north of Durban enrolled over 600 HIV-negative women from the community as well as women attending postnatal and family planning clinics, and followed them up for 1 year. Data from this study also showed alarmingly high HIV prevalence rates, again highlighting the urgent need for HIV prevention interventions among women in the community.

HIV prevalence and incidence rates, Tongaat and Verulam

HIV prevalence at screening	47.0%
HIV incidence rate	7.4% per 100 women years
STI prevalence at screening	
Syphilis	3.5%
Gonorrhoea	1.6%
Chlamydia trachomatis	6.2%
Trichomonas vaginalis	6.9%
Bacterial vaginosis	47.8%

These two studies have generated very significant, pioneering data. They show, for the first time, HIV prevalence and incidence in *non-pregnant* women in the community.

The data have been presented to the Provincial DoH, and highlight the desperate and urgent need for more vigorous HIV prevention and education efforts in KwaZulu-Natal.

Model of care needed for those with both HIV and TB

TB is the most common opportunistic infection in HIV-positive individuals in South Africa, and the brunt of the HIV epidemic is currently seen in public health facilities providing TB care. A national survey to quantify the extent of HIV infection among TB patients confirmed the public health challenge of the joint epidemic in 2004, with co-infection rates ranging from 30% in the Western Cape to 72% in the Free State. It also showed that, on average, 1 in 2 TB patients is also infected with HIV.

The high co-infection rate may to a large extent be responsible for the increase in TB deaths currently being recorded in all nine provinces, since public health practitioners are much more inclined to report TB as the cause of death in co-infected patients. Antiretroviral treatment can drastically reduce HIV-associated mortality and ensure a better quality of life for dually infected patients. However, TB and HIV services currently primarily work in parallel, despite policies in place for dual care, making access to antiretroviral treatment difficult for TB patients. The Unit for TB Operational and Policy Research has therefore started antiretroviral treatment programmes for TB patients through a best-practice approach in four health care settings. This is aimed at developing a comprehensive model of care for dually infected patients, and is funded by the US Presidential Emergency Plan for AIDS Relief.

A key focus of the Clinical and Biomedical TB Research Unit's research activity also underscores the impact of HIV co-infection on the TB epidemic. A recently completed study informs the timing of treatment initiation by describing the spectrum of CD4 levels and concomitant AIDS-related illnesses in dually infected individuals, particularly in resource-poor settings - where it is recommended that antiretroviral treatment is commenced later in the course of HIV disease, as determined by CD4 T-cell counts. In the light of this, further research has been developed to optimise and improve

management of TB in high HIV prevalent settings.

In order to improve communication and create an understanding of research conducted in KwaZulu-Natal, a Memorandum of Understanding was concluded between the above Unit and the KwaZulu-Natal DoH. This outlines collaborative research activity and founded a provincial research committee to synchronise TB research in the province.

Managing multidrug-resistant TB (MDR-TB)

DOTS-Plus for MDR-TB in South Africa

Treatment of multidrug-resistant TB (MDR-TB) requires drugs which are much more toxic than first-line TB drugs and cost up to 100 times more. A standardised DOTS-Plus approach to management of MDR-TB in South Africa was developed by the Unit for TB Operational and Policy Research a few years ago, and the Unit was tasked with co-ordinating DOTS-Plus implementation in the country by the NDoH. Currently around 6000 MDR-TB patients are managed under DOTS-Plus in 12 specialist centres throughout the country, with the Unit providing training of health care workers and technical support, monitoring health service adherence to DOTS-Plus policy and evaluating treatment outcomes.

Findings from the first 946 patients treated under DOTS-Plus in South Africa showed that up to 90% of patients can be cured if they stay on treatment for the full 2 years. Results also showed that the treatment regimen is safe for HIV-positive MDR-TB patients. A major problem, however, is that 1 in 4 MDR-TB patients currently default from treatment after discharge from the MDR-TB specialist hospitals. Almost half of these patients die soon thereafter, often because of HIV-related conditions. This led to a major study (see below) to establish risk factors for default from MDR-TB treatment.

Risk factors for default from MDR-TB treatment

A major study was done in five provinces to identify risk factors for default. Results showed that negative attitudes by health care staff were the most significant reason why patients did not finish treatment, followed by fear of stigma, and side-effects from the medication. These findings will now be translated into appropriate policy interventions, including comprehensive reorientation training of health care workers, and supervision and support to avoid staff burn-out and work overload, which will impact on their relationships with patients. Policy recommendations will also include a comprehensive treatment package for patients, including family support sessions, public education campaigns to reduce stigma, and supportive counselling and medical management of drug side-effects.

Negative attitudes by health care staff were the most significant reason for MDR-TB patients not finishing treatment

Legal dilemmas in MDR-TB management

Public health practitioners are confronted with a range of decisions around MDR-TB management that have legal as well as ethical implications, such as enforced hospitalisation of patients, enforced MDR-TB treatment, termination of treatment, and disclosure of patient information in the interests of public health. The Unit for TB Operational and Policy Research was contracted by the NDoH to review existing legislation and develop new policy directives in line with the Constitution of South Africa and current public health legislation. This identified specific shortcomings in the new Health Act which may put public health activities in direct conflict with the Constitution. An MRC Policy Brief has subsequently been prepared for the NDoH to help health care workers and policy makers to make legally sound and ethically justifiable decisions. The Unit is also assisting provincial health authorities with managerial decisions, ensuring through legal counsel that these are justified and ethical.

Fight against malaria gains momentum

Inter-country collaboration on malaria control

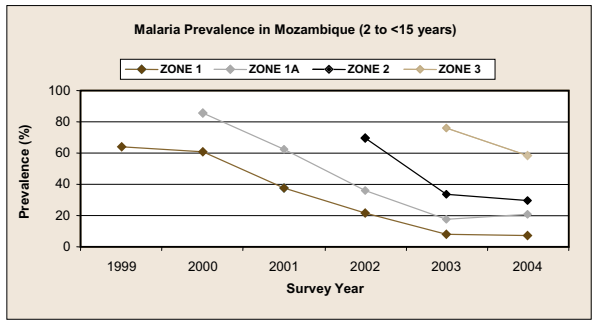
The Lubombo Spatial Development Initiative (LSDI), ratified by the heads of state of South Africa, Mozambique and Swaziland in July 1999, represents a continental first in inter-country collaboration on malaria control. The project is co-ordinated by the MRC through the Malaria Research Lead Programme, and was recently awarded a Global Fund allocation of US $22 million over 5 years.

Reductions in malaria infection and declaration of St Lucia as a malaria-free area have enhanced the attractiveness of the area to tourists and developers

Training of supervisors and spray persons takes place each year within the Lubombo Spatial Development Initiative

From a regional perspective, the extension of malaria control to southern Mozambique has been expanded and the contiguous controlled area in the three countries now exceeds 100 000 km^2. Confirmation of pyrethroid resistance by the malaria-transmitting mosquito *Anopheles funestus* in Mozambique has required a policy change in the country in respect of malaria vector control.

Malaria control was gradually phased-in in the LSDI area in southern Mozambique. Parasite prevalence was measured in children (2- <15 years) before this and again annually. It can be seen from the diagram that the parasite rates dropped dramatically in successive years.



Malaria prevalence in Mozambican children aged 2-≥15 years before and after house spraying

Reductions in malaria infection and declaration of St Lucia as a malaria-free area have enhanced the attractiveness of the area to tourists and developers. So far 10 tourist development tenders in St Lucia Park, valued at R450m, have been released by the LSDI - and are already providing employment and other economic benefits for local communities.

Surveys conducted at tourist facilities in the LSDI region show that malaria is perceived as less of a risk now than it was at the start of the initiative in 1999. These perceptions have largely been influenced by the extensive media coverage given to the dramatic reductions in the area.

Plant extracts join the arsenal

Increasing resistance of malaria vectors to insecticides is cause for concern. The Malaria Lead Programme is involved in screening indigenous plants for biological activity against the vectors of malaria-transmitting mosquitoes. Plant selection was based on use by traditional healers and mention in the ethnobotanical literature for treatment of fevers. So far 357 crude plant extracts have been evaluated, obtained from different parts of the plants and in some instances the whole plant. To date 21 extracts have shown great promise against the aquatic, immature stage of the mosquito. Four have been investigated further, and in dose-response studies two of these have shown great promise.

Evidence-based drug policy changes

Since effective malaria control requires both vector control and early effective treatment, the LSDI extended their objectives to ensure that the best malaria treatment was introduced. Widespread resistance to chloroquine and sulfadoxine-pyrimethamine has been reported from the region. The use of artemisinin-based combination therapy (ACT) not only improves cure rates, but also directly decreases malaria transmission and potentially slows drug resistance. To optimise the synergistic effects of indoor residual spraying and ACTs on reducing malaria transmission and thus disease burden, while minimising programme costs, the implementation of ACTs has been timed to follow establishment of effective vector control.

KwaZulu-Natal was the first Ministry of Health in Africa to implement an ACT malaria treatment policy when

it introduced Coartem in January 2001. The planned phased implementation of ACTs, resulting in their introduction in Mpumalanga in 2003 and two districts in southern Mozambique in 2004, is ahead of schedule and will ensure that ACTs will be in place throughout the LSDI region by 2006. The LSDI region is the first in Africa to use ACT.

Powers of traditional plants

The South African Traditional Medicines Research Unit continues to evaluate plants used by traditional healers to treat malaria and TB or as antiviral or immune-boosting agents. Pure compounds with antimalarial and anti-TB activity have been isolated and chemically characterised. The past year saw publication in the *Journal of Ethnopharmacology* of a major research paper reporting on the antimalarial activity of some 500 plant extracts tested by the Unit.

The traditional medicines database continues to be expanded and this information will be made more accessible to communities who use traditional medicines and to traditional healers. A second edition of the *Traditional Healers Primary Healthcare Handbook* is under consideration as well as its translation into a number of languages other than English.

Influencing influenza and pneumonia

The Respiratory and Meningeal Pathogens Research Unit has shown that a significant fraction (30-40%) of hospitalisations with influenza-associated pneumonia in both HIV-infected and uninfected children in Soweto were due to bacterial co-infection with *Streptococcus pneumoniae*. They also found that this was prevented by administration of pneumococcal conjugate vaccine. These findings were published in *Nature Medicine* in 2004, and suggest a major role for this vaccine in preventing influenza-associated morbidity. These data also suggest that antibiotics may greatly reduce influenza-associated morbidity by treating the bacterial co-infection.

The Unit's discovery of the role of bacteria in severe pneumonia associated with influenza and other viruses changes the way we understand how people develop severe pneumonia. This discovery offers alternate strategies to prevent (with conjugate vaccine) and treat (with antibiotics) the very large burden of viral-associated pneumonia. Furthermore, the Unit's studies on the role of human metapneumovirus in African children and genotyping of these isolates provides important information that may be used to formulate a vaccine against this virus.

These studies have clarified the burden of pneumonia prevented by the pneumococcal conjugate vaccine, providing decision-makers with the tools needed to evaluate impact of the vaccine on public health.

Work continues on vaccine for diarrhoea

Worldwide, it is reported that 4 to 5 million children annually die due to diarrhoea. In South Africa alone, 50-60 children under the age of 5 years die daily. Rotavirus appears to be involved in almost 25% of cases. Although two rotavirus vaccines are currently being tested and use of one has been approved by the Mexican health authorities, they are not yet generally available, and this condition is treated by administration of rehydration solution. Introduction of an effective rotavirus vaccine will have an enormous impact.

Worldwide, it is reported that 4 to 5 million children annually die due to diarrhoea. In South Africa alone, 50-60 children under the age of 5 years die daily. Rotavirus appears to be involved in almost 25% of cases

New strategic biomaterials and soluble molecular signals that can engineer bone tissue regeneration have been identified, and a world-first discovery of the molecular signals initiating bone formation made

Bone induction by a transforming growth factor-beta superfamily member in the rectus abdominis muscle of a non-human primate. Light brown = cartilage; dark brown = mineralized bone; dark grey/black = matrix.

The MRC/Medunsa Diarrhoeal Pathogens Research Unit is continuing its rotavirus vaccine trials with enrolment of subjects for phase II by February 2004, and two additional protocols involving HIV-positive children prepared and approved by local ethics committees.

Staff and researchers associated with the Unit hosted a practical Rotavirus Workshop during 2004. This lasted 6 weeks and was attended by 10 delegates from 9 African countries. Nearly 2000 specimens were screened for rotavirus and over 400 were found to contain it. Delegates received extensive training in techniques involved in molecular characterisation of rotaviruses. Routine surveillance for rotavirus continued, with over 10 000 stool specimens from across Africa screened in 2004. The Unit has been upgraded to a regional rotavirus reference facility for Southern, East and North Africa.

NATIONAL PROGRAMME MOLECULES TO DISEASE

Prioritising candidate disease genes

Working with the Wellcome Trust, the MRC/UWC/SANBI Bioinformatics Capacity Development Research Unit has developed and implemented an expression description system that connects genome to phenotype, including diseases. This system, eVOC (see http://www.sanbi.ac.za/evoc/) has recently been adopted by the ENSEMBL human genome annotation system to provide insight for genome researchers worldwide to prioritise candidate disease genes in the human genome.

The Unit's most high impact study has been as part of an international collaboration to discover the function of over 20 000 human genes as they relate to disease. The clone set developed and tested through this study (NIA 21K) is widely used throughout the world.

The Unit applied its expertise in normal and diseased gene expression description, and also in expressed sequence clustering, to a large international consortium of transcriptome researchers, representing the highest impact to date of their genome annotation efforts (see *Science*, April 2004, 'New global database lends a hand to gene hunters', and *Nature*, News in Brief, 22 April 2004).

World-first discovery on bone formation

The Bone Research Unit has identified new strategic biomaterials and soluble molecular signals that can engineer bone tissue regeneration after trauma with associated bone loss, diseases such as cancer, and age (e.g. osteoporosis). The Unit has provided possible mechanistic insights into this process of bone formation by induction, and embarked on a drive ultimately to provide novel treatments for human patients.

During late 2004 and the first quarter of 2005 the Unit published and highlighted a world-first discovery on the molecular signals initiating bone formation in non-human primates - and so in human patients. Particularly importantly, the Unit has shown the induction of cartilage and bone formation by Ebaf/Lefty-A, a new member of the super-family of proteins controlling pattern formation and skeletogenesis, and initiating the formation of cartilage in skull defect (as published as a cover article in the *South African Journal of Science*).

The Unit has also developed cost-effective and affordable biomaterial implants to treat skeletal defects with bone loss, and received much international coverage for their life-enhancing work.

New techniques and targets for diagnosing and treating TB

Workers at the MRC Centre for Molecular and Cellular Biology have developed techniques which can reduce time of diagnosis of MDR-TB from 60-90 days to 4-7 days. These results have filtered through to the National TB Control Programme, and been communicated to control programme staff during update seminars. The Centre's work has changed the clinical approach to plural TB diagnosis at Tygerberg Hospital. Their published work on reinfection has stimulated

clinical thinking regarding reactivation of TB. While it is too early to have changed the management of TB, it is clear that this will become a major research thrust in the future.

Using proteomics, a sophisticated, relatively new technique in TB research, workers in the same Centre have shown that *Myco. tuberculosis* strains belonging to different genotypes exhibit variable protein and antigen expression patterns. This has important implications for vaccine development, and may possibly explain why previous *Myco. tuberculosis* infection does not render an individual resistant to infection with a genetically different *Myco. tuberculosis* strain. The findings also seriously undermine the use of serodiagnosis, a widely investigated technique for TB diagnosis.

Mutant strains of *Myco. tuberculosis* lacking three members of a family of five Rpf-encoding genes were constructed in the MRC/NHLS/Wits Molecular Mycobacteriology Research Unit (MMRU). These strains were found to be defective for growth in a mouse model of TB and in their ability to resuscitate – i.e. to start growing again – after prolonged starvation in liquid culture. This provides conclusive evidence of a collective role for these proteins in promoting the resuscitation of *Myco. tuberculosis* from a 'dormant' state, and makes them a potentially important new target for TB drug and/or vaccine development. This work was carried out in close collaboration with research groups in Russia and the UK, and has been accepted for publication in the prestigious international journal *Infection and Immunity*.

From finding a new gene to clinical trial

Publication of the finding of carbonic anhydrase IV (CA4), the gene responsible for the RP17 form of autosomal-dominant retinitis pigmentosa (Rebello *et al. PNAS* 2004; 101: 6617-6622) by scientists from the Human Genetics Research Unit heralded the culmination of 10 years of research in this laboratory. This was followed by publication by their collaborators (Prof. W Sly, Saint Louis University School of Medicine, St Louis, MO) (Bonapace *et al. PNAS* 2004, 101: 12300-12305) showing that the mutation causing retinal degeneration in the South African RP17 families was likely to be amenable to therapy by carbonic anhydrase inhibitors such as acetazolamide, commonly used in the treatment of glaucoma. This led the Unit to prepare the first stages of a clinical trial of carbonic anhydrase inhibitors in the treatment of retinal degeneration in individuals carrying the R14W mutation in CA4.

The translation of research here, from the identification of a 'new gene' to proposing a 'clinical trial' based on the findings, is remarkably short and vindicates the Unit's drive to provide a genetic profile of individuals with retinal degenerative disorders so that they can benefit from new therapeutics or management regimens.

Where do we come from?

MRC/NHLS/Wits Human Genomic Diversity and Disease Research Unit Director Professor Himla Soodyall regards the most rewarding project undertaken by the Unit in the year under review to be their contribution to the M-Net documentary entitled '*So, where do we come from?*', which involved dealing with the public – high-profile people in politics, sport, the media, etc., as well as 'ordinary' members of the public. The documentary resulted in several print media, radio and television outputs for the Unit. The demand for genetic ancestry testing has resulted in the National Health Laboratory Service endorsing this as a service to the public. Income generated will be used to supplement research within the Unit. Professor Soodyall has been approached by The National Geographic Society to be the African Principal Investigator on an international project entitled '*Genographic*', to be launched in April 2005, which aims to sample a global population from 10 regions for mtDNA and Y chromosome variation.

Selective non-surgical management of liver gunshot injuries

Non-operative management of gunshot injuries to the liver is not widely accepted, in contrast to dealing with blunt liver trauma. A study was conducted by the Liver Research Centre to evaluate non-operative management in all patients presenting with liver gunshot injuries who were haemodynamically stable with no evidence of peritonism. Thirty-three patients (mean age 25, range 13-50) were enrolled over a 36-month period. Most (14/33) had grade III injuries,

while 11 and 8 patients sustained major (AAST IV/V) and minor (AAST I/II) injuries respectively. Non-operative management was successful in 31 of the 33 patients; 2 required delayed laparotomy for reasons unrelated to the hepatic trauma. One patient died from necrotising fasciitis, which appeared unrelated to the liver injury. This study showed that in centres with suitable facilities, non-surgical management of appropriately selected patients with liver gunshot injuries is feasible, safe and effective, regardless of the grade of liver trauma.

Does papillomavirus play a role in oesophageal cancer?

Studies by the Oesophageal Cancer Research Group showed that about 50% of their patients had integrated human papillomavirus DNA in their tumour DNA. If human papillomavirus plays a role in oesophageal cancer, this will be a major breakthrough in the understanding of the disease, and will radically change current thinking on the cause and course of the disease. Another of their focus areas is preparing a detox gene profile to determine how genetic polymorphisms in genes such as the cytochrome p450s and glutathione transferases contribute to oesophageal cancer risk. This will be useful in predicting how patients will respond to various anticancer drugs.

Role of semen in cervical cancer

The MRC/UCT Research Group for Receptor Biology has shown that seminal fluid can stimulate the COX-2/PGE_2 pathway in a cervical cell line, suggesting that sexual activity can promote cervical tumorigenesis in women with pre-malignant lesions in their cervix. In order to dissect the role of seminal fluid, PGE_2 and EP4 in cervical cancer, the Group created cell lines generated from a cervical tumour that over-express and under-express the EP4 receptor. Employing these cells they found that seminal fluid and PGE_2 through the EP4 receptor stimulate the growth rate of these cells, and activate genes that enhance development of blood vessels. This supports the notion that seminal fluid can promote cervical tumour development, and postulates that EP4 antagonists can be used for treatment and prevention of cervical tumours.

Recent research into the role of COX, prostaglandins and their cognate receptors in cervical cancer suggests that treatment of women with aspirin and/or EP4 antagonists can be beneficial in reducing the risk of cervical cancer development and progression. Further research is required before embarking on a clinical trial to test this proposal.

NATIONAL PROGRAMME NON-COMMUNICABLE DISEASES

A first in functional magnetic resonance imaging

The Anxiety and Stress Disorders Research Unit recently made history when researchers from the Unit became the first in sub-Saharan Africa to capture functional magnetic resonance imaging (fMRI) data at Tygerberg Hospital.

This amazing technology, first developed in the 1990s, allows clinicians and researchers to probe the mind at work and is currently the pre-eminent form of functional neuro-imaging worldwide. It comprises a special technique, utilising conventional magnetic resonance imaging principles to acquire images of the brain as it responds to any number of tasks while the patient is in the scanner. fMRI differs from other functional imaging in that it is remarkably safe, allows repeated scanning,

A patient lying in the functional magnetic resonance imaging scanner

The Unit's Mental Health Information Centre is devoted to outreach activities. In 2004 the Centre published several volumes, ran focused awareness campaigns (e.g. Brain Awareness Week, Anxiety Disorders Week, World Mental Health Day), did frequent media work and presented an annual media award, and operated a call centre for the public. Contact the Mental Health Information Centre at (021) 938 9229; mhic@sun.ac.za See also www.mentalhealthsa.co.za

and does not require the use of ionising radiation. It also enables the safe use of normal populations with which to compare findings in sufferers of anxiety disorders, for instance, where changes in brain function may be very subtle.

Funding has been received from the National Institute on Drug Abuse in the USA for the Unit's first fMRI study, examining the effects of cannabis and Mandrax abuse on neuropsychological and brain function in recently abstinent abusers. As in the case of the local Mandrax abuse epidemic, fMRI lends itself to studies in mental health with particular relevance to the disease and patient profiles in South Africa, including HIV/AIDS and substance abuse in disadvantaged and marginalised communities including women and children.

Link between cancer and HIV in black South Africans

The Cancer Epidemiology Research Group examined the relationship between HIV and cancer in black South Africans. Approximately 10 000 patients were interviewed and had blood tested for HIV (10 years of patient data, from 1995 to the end of 2004). HIV infection was found to be associated with significantly increased risks of Kaposi's sarcoma, B-cell non-Hodgkin's lymphoma, other non-Hodgkin's lymphoma, vulval cancer, squamous cell carcinoma of the skin, anogenital cancer, cervical cancer and Hodgkin's lymphoma. HIV infection was not associated with any of the other major cancer types examined, including Hodgkin's disease, multiple myeloma and lung cancer. This study allows for ongoing monitoring of cancer patterns among HIV-infected patients in South Africa. It will be interesting to compare these results with what is found after the widespread use of antiretroviral treatment.

Deaths attributable to tobacco use

Cancer Epidemiology Research Group researchers analysed a question introduced on the South African death notification form in mid-1998: 'Was the deceased a smoker five years ago?'. Comparison was made of the prevalence of smoking among adults aged 25+ who died of different causes. After adjustment for age, gender and education, significantly increased relative risks were found for deaths from TB, chronic obstructive pulmonary disease, lung cancer, other upper aerodigestive cancer, and ischaemic heart disease. If smokers had the same death rate as non-smokers, then 60% of lung cancer deaths, 35% of chronic obstructive pulmonary disease deaths, 20% of TB deaths, and 8% of vascular disease deaths would have been avoided - or approximately 8% of all adult deaths in South Africa. (Sitas F, Urban M, Bradshaw D, Kielkowski D, Bay R, Peto R. *Tobacco Control* 2004; 13: 396 - 399.)

If smokers had the same death rate as non-smokers, then 60% of lung cancer deaths, 35% of chronic obstructive pulmonary disease deaths, 20% of TB deaths, and 8% of vascular disease deaths would have been avoided

From tuck shops to your ticker

Studies dispel earlier held notions that black African people are not going to develop high rates of heart attacks in the future

Two studies by the Chronic Diseases of Lifestyle Research Unit dispelled an earlier held notion that black African people are not going to develop high rates of heart attacks in the future. The African data of the INTERHEART study and a study at Kalafong Hospital showed that heart attacks in black African people are caused by smoking tobacco, having hypertension, diabetes and high blood cholesterol. In addition, a strong family history of cardiovascular disease or their risk factors also predict heart attacks in this group of people. In this community heart attacks occur more frequently in people of high socio-economic standing than in the poor.

Data on smoking during pregnancy presented at a workshop in February 2004 and to the NDoH alerted health professionals of this health risk to the unborn child. This resulted in workshops being held for midwives to be trained in better patient communication techniques, planning policies for smoking cessation during pregnancy, and official support from NDoH for the Unit to develop and evaluate a smoking cessation programme for poor women with high smoking rates during pregnancy.

The Dietary Assessment and Education Kit (DAEK) developed by researchers from the Unit and the University of Stellenbosch was launched. The kit comprises a training manual, flash cards and a food photo manual of all food eaten in South Africa. Nutrition researchers report that the DAEK greatly facilitates the collection of good nutrition data, and to date more than 100 kits have been sold.

The Unit also recently evaluated tuckshops at schools, and the findings resulted in development of a manual aimed at helping tuckshops to change the way that they operate, to improve the quality of foods sold to children.

Key outcomes on crime, violence and injury

The Crime, Violence and Injury Lead Programme (CVIP) had a number of key outcomes for 2004, including strengthening and automation of a national fatal injury surveillance system to enhance data collection at local, provincial and national levels, and promotion of data uptake by key decision-makers. A utility study tracing the outcome of surveillance reports was produced at city level, and several successfully completed data collection drives were carried out on specific incidence and risk patterns related to road rage, childhood injuries and youth injuries, among others. Primary prevention and injury control measures were studied at local and national levels, with a specific focus on school, home and community safety, environmental and traffic safety. Data produced by the CVIP were used in campaigns advocating for firearm control, child safety, pedestrian safety, and the provision of medico-legal services for women.

The electronic media have become an increasingly integral part of the information dissemination and profiling process vital to the CVIP, with two newly updated sites available for end-user convenience, at http://www.unisa.ac.za/dept/ishs and http://www.mrc.ac.za/crime/crime.htm The CVIP made a successful bid to host the 8th World Conference on Injury Prevention and Safety Promotion in Durban in 2006.

All aspects of healing hearts

The MRC Cape Heart Group, comprising the Cardiovascular Research Unit, Hatter Institute and Lipidology Division of Internal Medicine at Groote Schuur Hospital and the University of Cape Town as well as the Department of Physiological Sciences at the University of Stellenbosch, has diverse fields of interest that have in common cardiovascular health and disease, from causation to treatment.

The Cardiovascular Research Unit successfully used their heparin-modified polymeric surfaces to deliver two important angiogenic growth factors in a sequential fashion - long a desired outcome in the field of therapeutic angiogenesis (blood vessel development). Analysis is ongoing but strongly suggests that delivery of these growth factors in this manner has generated more stable blood vessels.

Professor L. H. Opie of the Hatter Institute has been appointed Associate Editor of *Circulation*, the leading cardiovascular journal of the American Heart Association, a first for a South African, which will help develop an African dimension to this international journal. *Circulation* has one of the highest impact factors in cardiology.

The main interest in terms of lipidology is determination of causes of severe disorders of lipid metabolism, mainly those that cause atherosclerosis. Recently, arterial imaging has been developed to evaluate atherosclerosis in disorders of lipoprotein metabolism as well as vascular function, delivering useful information on the nature of genetic dyslipidaemias and therapeutic strategies. A major impact has been involvement in international collaborative studies on drug development for severe disorders, and being invited reviewers in this field.

The primary impact of research by the team in the Department of Physiological Sciences at the University of Stellenbosch has been to increase basic science knowledge related to the use of stem cells to improve cardiac muscle repair. This team has also increased the amount of local stem cell research, which has become a vital part of basic science internationally but is currently not prominent in South Africa. The ultimate aim is to decrease the cost of cardiac rehabilitation and prevent the cost of transplants.

Imaginative imaging garners patents

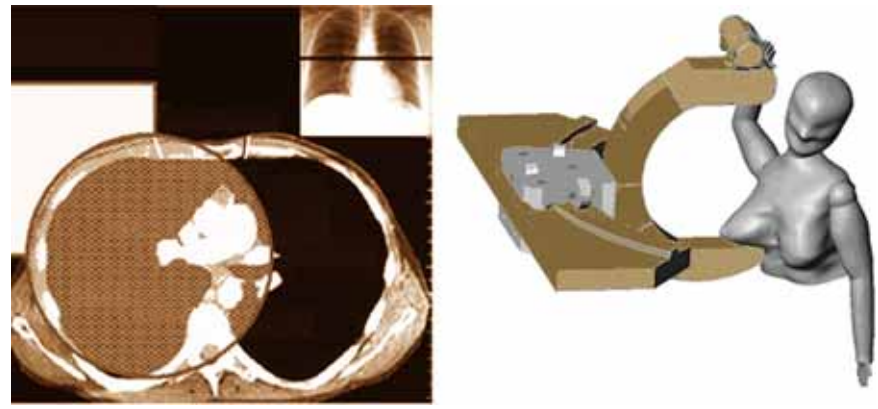
The MRC/UCT Medical Imaging Research Unit has made great strides with novel technologies. The Unit has recently received patent protection in the USA for limited angle computed tomography (LACT). Here the range of available

projections is restricted and the challenge is to recover the underlying structures with incomplete information, by: (1) obtaining an initial reconstruction of the image; (2) identifying regions that can be predicted with an acceptable degree of certainty; (3) applying *a priori* knowledge to regions of acceptable certainty; and (4) iteratively applying the projection data and prior knowledge until a final image is achieved. In the images below the input data set is based on 31 projections over a 90° angular range.

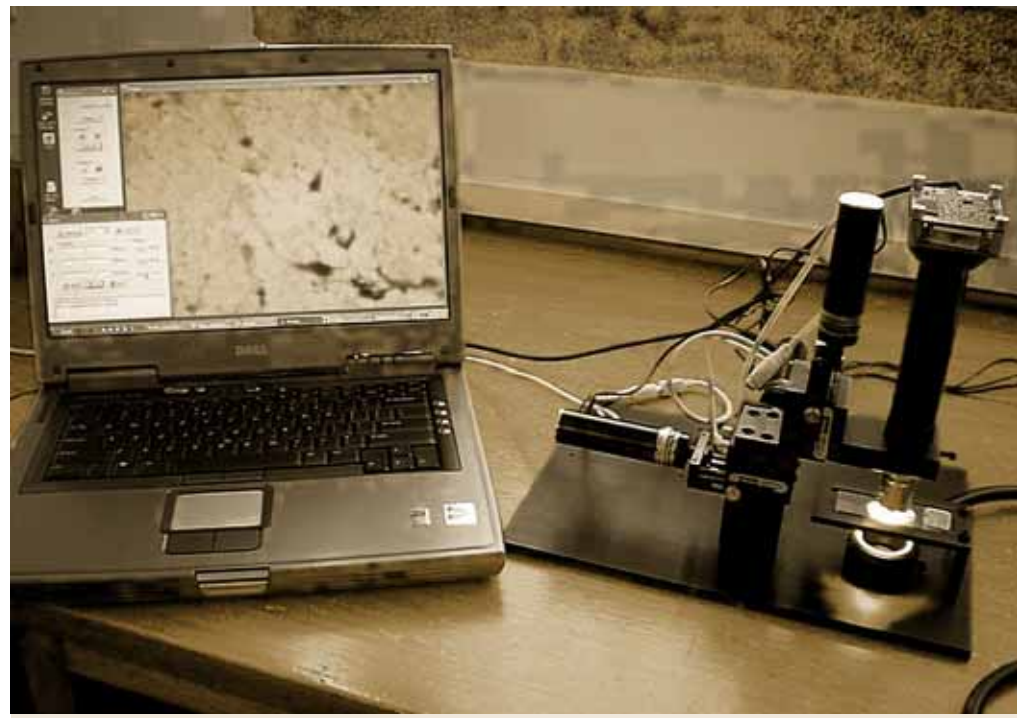
Despite incomplete projection data, LACT can recover the original structure

Another recent patent by the Unit is in the domain of population screening, where they explored the potential of Lodox technology for detecting breast cancer. By recognising that the thoracic cavity underlying the breast has a circular cross-section (opposite, left), the Unit has simulated the concept of circular slot scanning for mammography and demonstrated that it is possible to reproduce the true structure of the original phantom. Breast compression, which leads to patient pain and discomfort, will be eliminated with the Unit's design (opposite, right). The US National Institutes of Health is funding a grant, and the next step is to implement the Unit's ideas in a physical prototype to improve patient comfort and provide greater breast coverage.

The TB laboratory at the National Health Laboratory Service in Green Point, Cape Town, examines 950 sputum specimens a day, requiring trained personnel to view up to 50 microscope fields in each slide. The Medical Imaging Research Unit has developed a prototype smart microscope capable of automated analysis of sputum smear slides (concentrating on Ziehl-Neelsen-stained specimens), to reduce the manual load on technicians. A grant has just been submitted to the NIH to provide further support for testing this important technology.



Left: the thoracic cavity, which underlies the breast, has a circular cross-section. Right: The patient sits in the conventional mammography posture



Digital microscope under computer control

NATIONAL PROGRAMME WOMEN AND CHILD HEALTH

Gender and health research

Research on murder of and violence against women

The Gender and Health Research Unit has had a major impact on advocacy around gender-based violence, showing that South Africa has the highest incidence of intimate femicide recorded in any country. The level of one such murder every 6 hours is 12 times higher than previously estimated. There has been very substantial media coverage of this, and advocacy campaigns use this research extensively. This work has been presented to the South African Police Services and National Directorate of Public Prosecutions, both of which have considered the implications of recommendations made for the management of female murder cases. The Unit published its initial results in an MRC Policy Brief in 2004.

Their work showed that female partners of men who own legal guns are at substantially elevated risk of being killed by their partners. Two-thirds of such deaths would have been prevented if the men had not had guns. Amnesty International has drawn extensively on this work on the links between hand gun ownership and gender-based violence, particularly the risks of being killed, in a new campaign they have launched to draw attention to the risks of small arms. Work by the Unit on association between HIV risk and different forms of gender-based violence was published in *The Lancet*.

View the MRC Policy Brief 'Every 6 hours a woman is killed by her intimate partner' at www.mrc.ac.za/policybriefs/woman.pdf

What do women want most from sexual assault health services?

The Gender and Health Research Unit has shown that providing high-quality services is important for effective public health policy, as well as for respecting women's basic human rights. Women value being able to have an HIV test and receive post-exposure prophylaxis for HIV after rape. They also highly value counselling and are prepared to travel to receive better quality services. This work has been presented to the NDoH, and used to provide context to the new Sexual Assault Policy and Clinical Management Guidelines launched by the Department in March 2005. Staff of the Unit played a substantial role in drafting both of these documents.

The Unit has shown that in a country like South Africa, with a high prevalence of rape and HIV, post-exposure prophylaxis for HIV is affordable for health services. However, unless it is delivered through high-quality sexual assault services that are really supportive of drug course completion, only a modest number of HIV cases can be averted annually.

Why babies, children and mothers die

The MRC Unit for Maternal and Infant Health Care Strategies continued creating and field-testing useful audit systems. An under-5 child mortality audit system was successfully tested in 10 sites in the northern half of South Africa, finding that approximately 60% of all deaths of children between 1 month and 5 years of age were related to exposure to HIV.

The fourth perinatal care survey of South Africa showed that most babies die because of poor management of women in labour, and because of being born prematurely. Many of these deaths could be prevented with minimal expenditure. The Unit is responsible for the *Saving Babies* reports, keeping communication with the over 120 sentinel sites and collating the data. The system is supported by the NDoH, and recommendations have been incorporated into the Maternal and Child Health Strategies document of the Department.

A basic antenatal care training programme has been developed by the Unit and is currently being tested in Pretoria and Port Elizabeth. This was developed in response to a series of focus groups with nursing staff in primary health care clinics in the Pretoria area, held after documentation of poor quality of antenatal care provision in the area. Further expansion of the training programme is being planned in collaboration with the NDoH and other major stakeholders.

A study comparing changes in outcome in 1997-8 and 2002-3 showed that active use of auditing in maternal care results in improved practice. A theoretical exercise indicated that using the protocols developed from the original audit would have prevented 23 maternal deaths. This provided the first direct evidence that use of audits of near-misses in maternity care results in a reduction in maternal deaths.

Massive study of bone health in children

The Mineral Metabolism Research Unit's activities concentrated on bone and mineral metabolism in humans. The Bone Health Study is the first longitudinal study of bone development and growth in children living in a developing country, assessing over 600 children born in 1990. The children are entering their 15th year of life, a critical period in the acquisition of bone mass.

The Bone Health Study of bone development and growth in children points to an important role for adequate physical activity during childhood. Lack of formal physical activity periods in many schools in South Africa may have significant detrimental effects on long-term bone mass development

Two major modifiable factors are thought to be important in optimising peak bone mass during adolescence: calcium intake and exercise. Despite significantly lower physical activity levels and dietary calcium intakes in black than white children, black children have higher bone mass at the hip than white children. These findings suggest that the higher bone mass at the hip in black children (also seen in black adults) is due to genetic differences and may account for lower hip fracture incidence in elderly black subjects in South Africa.

This study is important in understanding how to optimise growth and bone mass in childhood, and reduce minimal trauma fractures in later life. Information obtained so far points to an important role for adequate physical activity during childhood. The lack of formal physical activity periods in many schools in South Africa may have significant detrimental effects on long-term bone mass development.

What really causes rickets?

Studies by the Mineral Metabolism Research Unit into dietary calcium deficiency rickets in Nigeria continue. Despite a dramatic clinical, biochemical and radiological response to calcium supplements in affected children, the Unit has been unable to show significant differences in calcium intake between affected and non-affected children. However, the Unit has found that maternal breast milk calcium concentrations are lower in mothers who have children with rickets than those who do not have affected children, suggesting that lower calcium intakes during infancy may predispose children to rickets during weaning.

The Unit has also found that children with calcium-deficiency rickets respond differently to vitamin D supplements than do vitamin D-deficient children. It appears that children with dietary calcium deficiency may require higher levels of vitamin D to optimise calcium absorption than children with vitamin D deficiency. This suggests that vitamin D requirements in children may vary, depending on calcium intake. This has important implications for setting nutritional recommendations for vitamin D requirements.

Nutritional nuggets

Fatty fish does make you brainy

The MRC was part of a consortium responsible for the development of a fish meal fit for human consumption using fish waste products (mainly hake heads). The Nutritional Intervention Research Unit (NIRU) in collaboration with the University of Stellenbosch was responsible for developing a savoury sandwich spread using the fish meal. Sandwiches made with this spread were used in a study involving school children (6-9 years) from a rural low socio-economic community. It was found that the sandwiches improved the children's learning and memory, as well as spelling ability. Compared to those receiving the spread without the fish meal, fewer children were absent. In this way fish waste previously discarded at sea, causing severe pollution, can be used to effectively improve the quality of life of children.

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Unconventional marketers should sell only iodised salt

Marketing of non-iodised salt through unconventional distribution channels is one of the factors weakening the national salt iodisation

programme in South Africa. A national survey found that 77.7% of households obtained their table salt from typical food shops. However, between 8% and 37% of households used unconventional sources which distribute mainly non-iodised salt, including distributors of agricultural salt, spaza shops in peri-urban and rural townships, street vendors, and salt sachets in the packaging of maize meal bags. Countrywide around 30% of low socio-economic households obtained their salt from unconventional sources compared to fewer than 5% of high socio-economic households. This emphasises the vulnerability of low socio-economic groups to the use of non-iodised salt. Role-players involved in unconventional marketing channels of household salt should be encouraged to provide only iodised salt to consumers, as required by law.

Research results from NIRU iodine nutrition studies are fed back to the SA Iodine Deficiency Disorders Network, impacting on policy and legal implementation of the national salt iodisation programme.

In another study knowledge of iodine nutrition was assessed in a survey of 2164 households representative of the South African population. Only 15.4% of respondents correctly identified iodised salt as the primary dietary source of iodine; 16.2% knew the thyroid gland needs iodine to function; while a mere 3.9% considered brain damage and 0.8% considered cretinism as the most important health consequence of iodine deficiency. Low socio-economic groups fared worse in the knowledge stakes. In the light of the legislated iodisation of salt, these results present a challenge to information, education and communication initiatives by the NDoH.

Carotino spread now on learners' menu

The MRC/Carotino spread, based on red palm oil fat, developed by NIRU and tested in an RCT among primary school children, has now been patented and licensed to the industry. It has been incorporated in the Department of Education's list of items for the School Nutrition Programme. This is an excellent natural source of vitamin A, is aflatoxin-free, and can easily be fortified with vitamins and minerals. It is sure to play a significant role in improving the health and educability of South African learners.

CORPORATE REPORTS

HUMAN RESOURCE MANAGEMENT

This short report briefly reflects on the integrated approach to employee development at the MRC. It outlines the Ph.D. fellowship initiative that targets the development of young black and female researchers, and supplies more detail about the Accelerated Development Plan. It also concentrates on the MRC's growth patterns as well as the administrative impact resulting from this. A number of other human resources milestones for the period are highlighted, including the launch of the HIV/AIDS Workplace Programme. The success of the MRC's Employment Equity Strategy is illustrated by a table showing the growth in representivity between 1997 and 2004.

Employee development

Ph.D. fellowships

The National Research and Development Strategy of 2002 identified the need for a well-balanced human resource development approach in the science, engineering and technology arena to address national imperatives relating to gender and race equity and South Africa's ability to compete in the global arena.

To give effect to this strategy, the Department of Science and Technology (DST) has launched the DST Professional Development Programme with a pool of funding to the value of R15 million for 2005. The programme is expected to increase the diversity in Science Councils, provide support to a core of promising young researchers, and supply highly qualified South Africans with leading-edge scientific and research skills. DST invited Science Councils to submit business proposals to compete for the development of promising scientists.

The Human Resources and Organisational Development Directorate of the MRC responded with a business proposal, and a total amount of R4.5m was allocated for 2005/6. This will be applied in the development of 15 scientists from the designated groups. Research fellows will be encouraged to engage in research projects that fall within the priorities for health research in the country. These research fellowships will create opportunities for young scientists and encourage them to remain in the country. A process of monitoring investments in individuals will be initiated to encourage them to take up positions in the academic, public or private sector. The Directorate will ensure that at least 80% of the successful candidates will be black and at least 60% will be women.

Accelerated Development Plan

As part of achieving its strategic objective of building a competent and sustainable employee base, the Human Resources and Organisational Development Directorate embarked on the Accelerated Development Plan of the MRC. This transformation initiative places a clear focus on developing research leadership in the MRC by growing potential Unit and Group Directors in strategic research areas. It also serves as a staff retention initiative and identifies successors for retiring Unit/Group Directors.

This contributes to the Employment Equity Strategy of the MRC by increasing black and female representation at Director level. It incentivises 'high-flyers' to develop research careers through the submission of development proposals. These 3- to 4-year development plans encourage international exchange/exposure and managerial development, and successful applicants are assured of ongoing support for the duration of the plan.

Employee growth

The continuous growth of employees in the MRC is placing considerable pressure on the administrative processes within the HR Directorate. New appointments, the requirement that contract staff should belong to employee benefits, and the constant renewal of contracts have impacted on the already stretched resources of all departments in this Directorate. There is a constant need to be vigilant of the effects that this might have on service levels that are offered.

Other Human Resources milestones

The Directorate launched the MRC HIV/AIDS Workplace Programme on World HIV/AIDS Day. This took place in all the major centres and included the telecasting of events to Hlabisa and Umtata. The Executive Management Committee (EMC) is showing ongoing commitment to the programme and at least 100 MRC employees have already been tested

voluntarily, including the former Interim President and members of the EMC.

An MRC health day held in each of the major centres contributed to employee wellness. The existing medical aid fund contributed greatly to the success of these events.

The Directorate collaborated with a consultancy to develop and implement a web-based job evaluation system specifically for research institutions. This is not only a national benchmark but it also, through contractual agreements, protects the MRC's intellectual property and as such ensures income generation.

The MRC's good record of successfully defending CCMA challenges further confirms the organisation's maintenance of fair employment practices.

On the national front, the MRC's HR Directorate obtained a mandate from COHORT to lead the investigation into the impact of HIV/AIDS on human resources in the science system, including strategic responses at policy and funding levels. A 10-year horizon is envisaged, i.e. the study plans projections until 2014. The study is managed jointly by the MRC/DST and SABS.

Employment equity

Our strategic business approach of empowerment through diversity has led to the MRC being a leading South African organisation in race and gender profiles.

The tables below illustrate the MRC's internal growth for 1997-2004, and also compare the MRC against the national average percentages from the Second Employment Equity Report of the Department of Labour. They show that the MRC is exceeding national averages, for both black and female profiles, in all occupational categories.

		BLACK %			
		1997	2004	Current SA EE Statistics	2007 Projection
Top Management	Level 1	25.0	75	19	67
Senior Management	Level 1	13 .0	24	22	32
Middle Management	Level 2	15.0	49	31	55
Junior Management	Level 3	42.4	77	57	75
Semi-Skilled	Level 4	55.5	85	83	85
Unskilled	Level 5	95.2	98	83	98

		FEMALE %			
		1997	2004	Current SA EE Statistics	2007 Projection
Top Management	Level 1	12.5	38	14	33
Senior Management	Level 1	22.0	42	31	50
Middle Management	Level 2	53.8	60	32	65
Junior Management	Level 3	74.3	75	44	75
Semi-Skilled	Level 4	79.4	66	36	75
Unskilled	Level 5	47.6	42	36	55

CORPORATE COMMUNICATIONS AND STAKEHOLDER RELATIONS MANAGEMENT

This Directorate's mandate is to facilitate the building of a healthy nation through appropriately packaging the MRC's health research outputs and communicating these using various platforms to reach the MRC's stakeholders. The five functional Divisions of this Directorate are as follows:

- Events and exhibition management;
- Studio/graphic design;
- PR/media (internal communication/media relations/ database management/photography);
- Stakeholder relations (international, national and regional community levels); and
- Science writing and editing.

Report-back is given on achievements in each of these areas, with particular focus on translation of MRC research into reality – real products, practices and promotions that impact on real people.

Events and exhibition management

This Division provides a one-stop health events management service to MRC researchers, health managers, national and international organisations, community groups and the health industry in support of the MRC's strategy.

In terms of research translation initiatives, this Division oversaw the running of 5 exhibitions in 2004/5, including the MRC exhibition at Insite and the first South African AIDS Conference in Durban.

MRC Studio

The MRC Studio aims to paint the MRC's corporate image for the world canvas, to be viewed by multiple audiences, woven into the fabric of our communication strategy, and displaying our corporate reputation, advocacy, employee communications, investor relations and government/stakeholder relations. The MRC Studio is the palette that renders the MRC's corporate identity. Through high-quality products it depicts the MRC's contribution to South African society and its role as a globally competitive centre of research excellence.

High-level publications, e.g. the MRC's Strategic Plan, Budget Submission, Annual Report, policy briefs, newsletters: *MRC News, AIDS Bulletin, Crime Violence and Injury Monitor, SACENDU Report*, etc., corporate electronic presentations, graphic elements and design for the MRC website, *ad hoc* advertising for various media and audiences, exhibition material and stands, corporate brochures, corporate stationery, scientific posters and technical reports, are all effective vehicles of research translation created by the Studio.

PR/media (internal communication/media relations/ database management/ photography)

This Division's main mission is to manage all external communications with the MRC's external target audiences, which includes the media, i.e. broadcast media (radio, TV, websites) and print media (newspapers, journals, and magazines), the general public (communities at large) and international target audiences.

This year's PR/media liaison value amounted to an estimated cost saving of R10m – in other words, the MRC would have paid R10m if we had paid for the exposure received through appearing for several minutes on TV and on radio and through column space in newspapers and magazines. This figure is low in comparison to previous years, as a result of the MRC adopting a Media Policy which guides everyone in terms of media liaison activities. Training in how to deal with the media and what/how to write to the media was conducted in conjunction with the Department of Science and Technology's community arm, SAASTA.

In terms of direct marketing value, the MRC advertised its services and commitment to finding health solutions in targeted magazines and newspapers to the value of R60,000 (*Mail & Guardian's* 'Investing in Life' supplement and the Healthy Living for Children campaign run by the Environmental Health Research Group in *Your Pregnancy*).

The MRC also carried out below-the-line marketing, with popular magazines called *YOU*/*Huisgenoot* using MRC articles and pictures.

The MRC photographer has embarked on developing his skills in videography. This entailed making videos of MRC-related research projects, i.e. following researchers in the field and filming them and editing the video, which is used as a training tool and reference for the unit's annual work. MRC photos have been used in various national magazines.

National, community and government stakeholder projects

This Division exhibits and conducts workshops at SciFest, in collaboration with the Public Understanding of Biotechnology and the MTN ScienCentre, also exhibiting and conducting workshops during the National Science Week in Western Cape and Limpopo. It also carries out teacher empowerment projects in collaboration with the Universities of Cape Town and the Western Cape. The Division plays a role in the Khanyagula Science Expo for township schools, and takes part in Women's Day events celebrating women in science, and in taking biotechnology to rural communities in the Eastern Cape.

The Division also looks after continued improvement of the relationship between government and other key stakeholders through active promotion and lobbying of the image, quality and capacity of the MRC. Research translation initiatives included assisting with the Insite and SA AIDS Conference, and carrying out PR and media liaison to the value of R5 million.

In terms of stakeholder relations with national government, projects included:

- making a presentation to Dr Makubalo of the Department of Health for the establishment of a Research Translation Office;
- presentations to the Portfolio Committees of Health and of Science and Technology;
- drawing up a Government Liaison Policy for the MRC;
- arranging field trips to MRC for university students;
- nominating MRC employees for NSTF Awards;
- co-ordination of visits to MRC for possible collaborations;
- visits to Portfolio Committees within Parliament and to government departments in Pretoria;
- facilitation of design and layout of the Department of Health's Epidemiological Comments document, and of their 'Monitoring and Evaluation of the ARV Rollout' brochure;
- project management of a workshop on 'Diabetes movement' and for the units'/groups' 2004 meeting; and
- active membership of the Communication Forum for Science Councils.

Science writing and editing

This functional Division helps disseminate the MRC's research and other activities to its various stakeholders: policy makers, researchers, health professionals and the general public. It produces *MRC News*, translating MRC research into articles that are both interesting and informative, and which appeal to as wide an audience as possible. The magazine is distributed directly to policy makers and other researchers, and is also sent to specific members of the media (newspapers, magazines, radio and television), who then adapt articles of their choice to suit their specific audiences.

This Division also compiles brochures, web pages and posters for the MRC itself and its units and groups. It produces the *Bits & Bytes* newsletter every 2 weeks and communicates with MRC operational staff and researchers and with collaborating scientists at other institutions. The Division also assists researchers with writing and editing research papers, reports and policy briefs.

The Division reported on the 2004 Department of Science and Technology Insite exhibition, producing a CD with slideshow presentation and additional photographs that were distributed to the units concerned for promotional use. Several

stories from *MRC News* were picked up by the media and re-used, for example in the *Sunday Times* newspaper (Hidden genes on a lonely island, *MRC News* October 2004). Ten research papers and six Cochrane Reviews were edited and translated for magazine and newsprint use.

INFORMATICS AND KNOWLEDGE MANAGEMENT

In 2004 the Informatics and Knowledge Management Directorate (IKMD) had a planning meeting to review its strategic direction. This strategic review led to a new approach in terms of the IKMD's direction, functions and roles. The new direction meant a new perspective in knowledge management at the MRC: "*From an ICT-centred approach to a people-centred approach*."

Goals of the Directorate

- Make MRC a leading knowledge-based organisation
- Create a seamless MRC
- Provide accurate information for policy- and decision-making
- Become the knowledge-based organisation of choice for information and knowledge for consumers

Selected Division highlights

The Informatics and Knowledge Management Directorate of the MRC has seven divisions: the Web and Media Technology Division, Management Information and Knowledge Systems Division, Information Services Division, Regional Informatics Services Division KZN, Health Informatics Research and Development Division, Biomedical Informatics Research Division and Information Technology Services Division.

The Web and Media Technology Division continued to focus on the effective use of the World Wide Web as one of the most powerful and appropriate services through which the MRC's health information resources can be communicated and distributed. This was done through the maintenance and ongoing development of resources such as the MRC's corporate web site (www.mrc.ac.za) and SA Health*Info*, an important health knowledge network for Southern Africa (www.sahealthinfo.org).

The Health Informatics Research and Development Division is working on a computerised decision support system for use by community members. The aim of this project is to develop a simple decision support system to be deployed via information terminals in communities, to enable community members to decide whether it is necessary to seek medical help for common symptoms. This is an attempt to encourage self-care among community members.

The Information Technology Services Division has installed a new core switch to replace the old one, which was unserviceable and obsolete. This installation will pave the way to upgrading all satellite switches, and users both internally and externally will start to reap the benefits of a faster and more fault-tolerant network. This is one of the activities which seeks to ensure that the MRC remains connected to national and international stakeholders.

The Biomedical Informatics Research Division's most significant current project is the development of an informatics platform accompanying the antiretroviral treatment programme in the Free State province in collaboration with the UCT Lung Institute, the University of Pretoria and the provincial Department of Health. The work is funded by a grant to this Division from the International Development Research Centre in Canada. The system was used to produce the first quarterly report on the status of the treatment programme which was presented to various government bodies and the national Minister of Health. In the next phase of the project, information feedback and resistance genotyping systems will be implemented. The overall aim is to develop a comprehensive information system for monitoring and evaluating the treatment programme and improving patient care.

Wide area network

During the past year the Regional Informatics Services Division KZN added two new sites to the network, Westville in June 2004 (which is a new office for the Health Promotion Research and Development Group), and Isipingo, a satellite site for the same Group, in November 2004. Three more sites are currently being planned.

TECHNOLOGY AND BUSINESS DEVELOPMENT DIRECTORATE

Review of activities, November 2004-March 2005

The Technology and Business Directorate has revisited its value proposition to the MRC, and agrees that it is a support and enabling function whose challenge is to realise value and impact from the value created through the MRC's core function, namely research and development. This Directorate has taken up this challenge by working in teams across the MRC to ensure that the organisation's innovation capabilities are demonstrated.

Specific activities and achievements for the period reported here are listed below:

- The Intellectual Property Policy for MRC was completed, and after organisation-wide sharing and consultation the Policy was approved by the EMC on 8 February 2005.
- A patent audit of all MRC patents has been completed. The MRC patent portfolio has now been consolidated to a total of 11 patents which are currently valid and in force. A detailed assessment is under way on each of these patents to identify and respond to potential commercial opportunities. An exploitation strategy unique to each patent or family of patents will be completed by the end of 2005.
- A license was secured for an online patent search database (with support from the Innovation Fund Commercialisation Office) which will be made available for use by other publicly funded institutions in the Western Cape region and adjoining provinces. The MRC has developed a desktop-based online booking system to facilitate access to the patent search database for all registered users.
- Due diligence on patents granted to MRC inventors that have been nominated for awards in terms of the Innovation Fund's Patent Incentive Scheme was completed. Through this process MRC inventors could receive incentives from the Innovation Fund.
- The Innovation Centre in consultation with other relevant groups in the MRC is in the process of developing a web-based knowledge asset management system (eKAM) as a revenue-generating product for own use and for use by all public and private R&D institutions. To date the full functional specifications have been developed and coded and beta testing started in mid-March.
- Funding for the final commercialisation phase of Umbiflow has been requested from the Innovation Fund and a resulting due diligence has been undertaken. Funding is expected forthwith.
- The Innovation Centre facilitated the renegotiation of the milestone terms of a license agreement between the MRC/Carotino partnership and Pioneer Foods for the commercialisation of a nutritional spread developed by the MRC's Nutritional Intervention Research Unit.
- The Innovation Centre facilitated the negotiation of license agreements and the establishment of joint ventures between the MRC and local and international partners, for the commercialisation of intellectual property generated by research conducted in the MRC's Diabetes Research Group.
- A strategically significant visit to Malaysia was undertaken by the Business Development Division. The purpose was to develop scientific collaboration with Malaysia, with special reference to University Sains Malaysia, the national drug regulatory authority, the private sector, the Novartis Institute for Tropical Diseases in Singapore, and to explore the potential for establishing a shared database for medicinal plants and novel drug development between the two countries. Recommendations from the visit are:
  - Consolidation of respective countries' national traditional medicines databases;
  - Scientific exchanges of students (Ph.D. and Master's) and of staff in both directions;
  - Marine flora studies - explore feasibility from South African side;
  - Explore formulation and biopharmaceuticals jointly with Malaysian partners;
  - Consider establishment of a shared clinical trials platform;
  - Strengthening of genomics studies within the TM1002 FP platform;
  - HIV: establish a traditional medicines proof of principal herbal medicines testing platform using both *in vitro* and *in vivo* testing systems.

- The following proposals are in development:
  - Diabetes Research Centre of Excellence to be submitted to NRF.
  - Human Genetics Centre of Excellence to be submitted to NRF.
  - Innovation Fund proposal: Development of a dental laser (MRC/US/NLC).
  - SA-India bilateral for Department of Science and Technology.
- The Collaborative Project Office is continuing to provide excellent multi-partner project management support. This office has managed projects to the value of more than R150 million since 2002. These included projects such as Glaxo, DST TB Lead Programme, THRIP and TB Innovation Fund. The office also manages the SAAVI project portfolio.
- The Legal Office is increasingly functioning as a Corporate Legal Office attending to all legal aspects of the MRC's activities. Involvement in corporate governance, labour and employment issues, intellectual property and contracts are increasingly well covered. The office has also extended its networks to super-specialist suppliers for speedy responses to specialist cases, e.g. licensing of multi-ownership intellectual property.
- The three technology platforms incubated in the Technology and Business Development Directorate, namely Essential Healthcare Technology Package, Telemedicine and Indigenous Knowledge Systems (IKS) are all in a performing phase.
- IKS has grown its funding base to over R8 million and has completed a strategic framework as a national resource. The Lead Programme covers IKS R&D, IKS Knowledge Management and IKS Utilisation. The latter involves community empowerment projects as a key component of the IKS value chain.
- Telemedicine has firmly printed its footsteps in strategic partnerships with the Departments of Health and of Science and Technology, SITA and DOC as well as WHO, NEPAD and private sector players. The Lead Programme has taken centre stage at the NEPAD e-Schools projects. The vision to create a Private Public Partnership (PPP) in e-Health is progressing well.
- The Essential Healthcare Technology Package (EHTP) WHO Collaborative Centre will complete its life cycle as a WHO Collaborative Centre on 8 March 2005. A process has started to prepare a submission to WHO for full Resource Centre status. This will be done in close collaboration with the South African Department of Health. EHTP is currently successful in its roll-out programme in South Africa, with Limpopo the leading province in implementing EHTP.

MRC Research and Technology Platforms – update

One of MRC's strategies to ensure ongoing renewal and progress in its scientific and technological basis is through the creation, incubation and growth of new platforms. The decision process on creating new science and technology platforms is informed by factors such as the strategic priorities of the South African government, global trends in medical and biosciences, WHO and Africa's burden of disease trends calling for R&D capacity as a requirement for effective interventions, as well as MRC's organisation strategy aimed at sustainability and competitive advantage.

The table opposite provides an update on MRC Science and Technology Platforms in the incubation phase as well as in preparation for launching. The table only covers those managed or enabled through efforts in this Directorate, and is by no means the full picture.

MRC Technology and Business Development Directorate Managed/Enabled Platforms Portfolio

Platform	Status	Key progress (Feb. 05)	Desired product/output
Drug development – natural products	Creation/performing phase	• 8 early drug candidates for malaria	• Malaria, TB, Immunomodulators and tonic novel therapeutics • Capacity building • Infrastructure creation
Diabetes research platform	Creation	• Strategy development in final stage	• Therapeutics and diagnostic agents • Capacity building
IKS	Performing	• Successful fund- raising • Pipeline of drug candidates • Traditional healer training Zprogrammes completed • Community empowerment projects launched in three provinces. Roll-out to others under way	• Novel therapeutics for key diseases • Reference Centre for Traditional Medicines • Successful community businesses
Telemedicine	Performing	• Successful fund-raising • Key strategic partnerships completed • PPP model evolving • NEPAD e-Schools project accepted	• MRC stakeholder value created • Successful platform building • Capacity building • PPP established • International recognition
Essential Healthcare Technology Package	Performing	• WHO International Roll-out, e.g. Mexico • SA Limpopo Province new contract	• Worldwide implementation • WHO affiliation to continue • Improved health care systems in South Africa
Immuno-Nutrition (convergence of technology, biotech, nutrition, chemistry immunology, etc.)	Proposal phase	• Buy-in from CSIR, MRC, and UCT • Working group established	• Novel therapeutics • Disease management practices • Capacity building • Strengthen research linkages • Publications • Patents
Systems biology (biotechnology, natural products, IKS convergence)	Concept development	• Early concept discussions	• Novel unique R&D platform • Patents • Publications • Capacity building • Strategic positioning in global arena

AUDITOR-GENERAL

FINANCIAL STATEMENTS

REPORT OF THE AUDITOR-GENERAL TO THE EXECUTIVE AUTHORITY ON THE FINANCIAL STATEMENTS OF THE SOUTH AFRICAN MEDICAL RESEARCH COUNCIL (MRC) FOR THE YEAR ENDED 31 MARCH 2005

1. AUDIT ASSIGNMENT

The financial statements as set out on pages 6 to 11 and 71 to 88, for the year ended 31 March 2005, have been audited in terms of section 188 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), read with sections 4 and 20 of the Public Audit Act, 2004 (Act No. 25 of 2004) and section 14(2) of the South African Medical Research Council Act, 1991 (Act No. 58 of 1991). These financial statements, the maintenance of effective control measures and compliance with relevant laws and regulations are the responsibility of the accounting authority. My responsibility is to express an opinion on these financial statements, based on the audit.

2. NATURE AND SCOPE

The audit was conducted in accordance with Statements of South African Auditing Standards. Those standards require that I plan and perform the audit to obtain reasonable assurance that the financial statements are free of material misstatement.

An audit includes:

- examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements,
- assessing the accounting principles used and significant estimates made by management, and
- evaluating the overall financial statement presentation.

Furthermore, an audit includes an examination, on a test basis, of evidence supporting compliance in all material respects with the relevant laws and regulations which came to my attention and are applicable to financial matters.

The audit was completed in accordance with Auditor-General Directive No. 1 of 2005.

I believe that the audit provides a reasonable basis for my opinion.

3. AUDIT OPINION

In my opinion, the financial statements fairly present, in all material respects, the financial position of the MRC at 31 March 2005 and the results of its operations and cash flows for the year then ended, in accordance with generally accepted accounting practice and in the manner required by Schedule 4 of the Companies Act, 1973 (Act No. 61 of 1973) and other reporting requirements as set out in the Public Finance Management Act, 1999 (Act No. 1 of 1999).

4. EMPHASIS OF MATTER

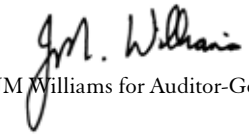
Without qualifying the audit opinion expressed above, attention is drawn to the following matter:

Non-Compliance with laws, rules and regulations

The MRC has failed to institute a Fraud Prevention Plan as required by Treasury Regulation 27.2.1.

5. APPRECIATION

The assistance rendered by the staff of the MRC during the audit is sincerely appreciated.



JM Williams for Auditor-General

Cape Town

31 July 2005

REPORT OF THE AUDIT COMMITTEE FOR THE YEAR ENDED 31 MARCH 2005

The Audit Committee has adopted appropriate formal terms of reference, which have been confirmed by the Board, and has satisfied its responsibilities as set out in the terms of reference.

In performing its responsibilities the Audit Committee has reviewed the following:

- The effectiveness of the internal control systems;
- The effectiveness of internal audit;
- The output of a risk assessment workshop to identify the major risks faced by the organisation;
- The risk areas of the entity's operations to be covered in the scope of internal and external audits;
- The adequacy, reliability and accuracy of financial information provided to management;
- The accounting or auditing concerns identified as a result of the internal or external audits;
- The adequacy of policies and procedures considered necessary to comply with the requirements of the Public Finance Management Act;
- The entity's compliance with legal and regulatory provisions;
- The activities of the internal audit function, including its annual work programme, co-ordination with the external auditors, the reports of significant investigations and the responses of management to specific recommendations;
- The adequacy of the terms of reference of the Audit Committee;
- The scope and results of the external audit, and its cost effectiveness.

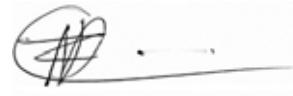
The Audit Committee has also been responsible for:

- Approving the internal audit charter and work plan;
- Ensuring adequate segregation between non-audit services and the internal audit function, where these services were provided by the same accounting firm;
- Recommending the appointment of a new firm to perform the internal audit function;
- Encouraging improved coordination and liaison between board committees in those areas where their responsibilities overlap.

The Audit Committee notes that during the past year there has been an improvement in the internal controls and financial management systems, and the Committee considers that the system of internal controls has ensured that the organisation's major risks have been reduced to an acceptable level.

The Audit Committee has evaluated the annual financial statements of the South African Medical Research Council for the year ended 31 March 2005 and concluded that they comply, in all material respects, to the requirements of the Companies Act (Act 61 of 1973, as amended), the Public Finance Management Act (Act 1 of 1999, as amended), together with the associated Treasury Regulations, and South African Statements of Generally Accepted Accounting Practice.

The Audit Committee concurs with the going concern premise in preparing the annual financial statements, and has recommended their adoption by the Board of Directors.



Chairman
July 2005

Committee members:
Mr AZ Dlamini (Chairperson)
Prof H Schneider
Prof MS Mokgokong
Mr MP Canca
Prof AD MBewu (President of MRC)

REPORT OF THE ACCOUNTING AUTHORITY (BOARD) OF THE MRC ON THE KEY PERFORMANCE AREAS AND ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2005

NATURE OF THE OPERATIONS

Medical Research Council is 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.

The total revenue of MRC increased by 12.5%, and the bulk of this was from the contracts and grants. As indicated in the notes, the assets and liabilities relating to the Post Retirement Benefit have been included in the balance sheet as at 31 March 2005. Previously, these accounts were accounted for off balance sheet.

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 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 key performance indicators (pp. 6 to 11) and annual financial statements (pp. 71 to 88) 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.

- **Internal controls**
  A comprehensive review and testing to ensure that group maintain adequate accounting records and effective systems of internal controls was carried out internally.

- **Going concern**
  The Board has reviewed the entity's budget and cash-flow forecast for the year ended 31 March 2005. On the basis of the review, and in the light of the current financial position, the Board is satisfied that the entity is a going concern, and has continued to adopt the going concern basis in preparing the financial statements.

- **Audit Committee**
  The Audit Committee met three times during the year. The new Audit Committee came to being during the year, and it is chaired by Mr A Dlamini (not an MRC Board Member). The other members of committee are Professors S Mokgokong and H Schneider, and Mr P Canca.

- **Internal Audit**
  Gobodo Risk Management did a risk assessment during the year, and a number of audits were performed.

- **Fees of Board members and remuneration of senior management**
  The fees paid to members of the Board, and the remuneration of the senior management have been detailed under notes 19 and 20, in the notes to annual financial statements.

SUBSIDIARY

MRC has a 100% shareholding at MEDRES Investments (Pty) Ltd. The subsidiary remains dormant, without any material assets or liabilities.

DISCLOSURE IN TERMS OF PFMA

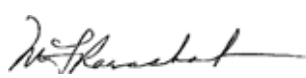
Section 47 of the PFMA requires us to disclose material losses as a result of criminal offences or irregular, fruitless or wasteful expenditures, and any criminal procedures instituted as a result of the offences. There were no material losses. There was fruitless and wasteful expenditure amounting to R64,956 (2004 – R4,157). The fruitless and wasteful expenditure came about because the accident reports were not presented on time. One accident happened in Maputo, the other in the Eastern Cape. Because of the delay, the insurance company paid R61,403 instead of R126,359 claimed.

The treasury regulations require for the purpose of significant and material events and transactions, as spelt out in sections 50 (1), 54 (2), 55 (2) and 66 (1) of PFMA, the accounting authority develops and agrees framework of acceptable levels of materiality and significance with the relevant executive authority, and in consultation with the auditors. Though this process has not been completed yet, the risks are low as MRC discloses all transactions, irrespective of the size of amounts involved.

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL
BALANCE SHEET AT 31 MARCH 2005

	Notes	2005 R	2004 R
ASSETS			
Non-current assets			
Property, plant and equipment	2	**62,332,189**	62,135,535
Investments	3	**46,721,797**	40,889,570
		109,053,986	103,025,105
Current assets			
Investments	3	**179,716,712**	173,786,298
Inventory	4	**698,108**	674,140
Trade and other receivables	5	**15,515,715**	16,150,879
Cash and cash equivalents	6	**48,025,022**	14,579,236
		243,955,557	205,190,553
Total assets		**353,009,543**	**308,215,658**
EQUITY AND LIABILITIES			
Capital and reserves			
General fund		**25,788,988**	21,832,045
Capital funds		**76,818,048**	75,553,662
		102,607,036	97,385,707
Non-current liabilities			
Trust funds	3	**1,369,476**	1,334,167
Long-term loans	7	**20,229**	27,219
Provisions	9	**64,022,863**	58,780,226
		65,412,568	60,141,612
Current liabilities			
Provision	9	**8,957,767**	6,400,300
Research funds received in advance	10	**148,348,717**	121,959,186
Trade and other payables	11	**27,676,465**	22,323,959
Current portion of long-term loans	7	**6,990**	4,894
		184,989,939	150,688,339
Total equity and liabilities		**353,009,543**	308,215,658

Signed on behalf of the SA Medical Research Council



Professor M. F. Ramashala
Chairperson of the Board

Date: 12 August 2005

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL
INCOME STATEMENT FOR THE YEAR ENDED 31 MARCH 2005

	Notes	2005 R	2004 R
Revenue		**335,178,615**	297,941,380
Government grants		**155,726,284**	152,081,591
Total Government grants		**154,388,000**	156,695,000
Add/(Less): Transfer from/to Capital funds		**1,338,284**	(4,613,409)
Income from contracts and grants		**161,889,591**	126,854,413
Gross income		**162,853,009**	128,560,836
Add: Transfer from/to Capital funds		**(963,418)**	(1,706,423)
Other income		**17,562,740**	19,005,376
Sundry income		**3,833,495**	4,136,941
Interest received	14	**13,729,245**	14,868,435
Expenditure		**328,127,011**	287,816,953
Collaborative research	15	**77,483,664**	61,721,942
Staff costs	16	**150,118,069**	132,387,287
Other operating costs		**100,525,278**	93,707,724
Operating surplus before transfers		**7,051,604**	10,124,427
Increase in rationalisation reserve (interest capitalised)		**594,104**	728,921
Payments from rationalisation reserve		**316,365**	418,671
Payments from motor vehicle self-insurance reserve		**12,685**	2,631
NET SURPLUS FOR THE YEAR	17	**6,128,450**	8,974,204

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL
STATEMENT OF CHANGES IN EQUITY
FOR THE YEAR ENDED 31 MARCH 2005

	Note	Capital Fund R	General Fund R	Total R
Balance at 1 April 2003		67,384,590	17,627,818	85,012,408
Transfer to research funds received in advance			(5,193,478)	
Surplus for the year		—	8,974,204	8,974,204
Interest capitalised	3	—	728,921	728,921
Allocation during the year	3	—	186,820	186,820
Capitalisation adjustments		1,849,240	(1,849,240)	—
Capitalisation of additions		6,319,832	—	6,319,832
Balance at 31 March 2004		75,553,662	20,475,045	101,222,185

	Note	Capital Fund R	General Fund R	Total R
Balance at 1 April 2004		**75,553,662**	**20,475,045**	**101,222,185**
Surplus for the year		**—**	**6,128,450**	**6,128,450**
Interest accruing to rationalisation fund	3	**—**	**594,104**	**594,104**
Allocation during the year	3	**—**	**230,641**	**230,641**
Capitalisation adjustments		**1,639,252**	**(1,639,252)**	**—**
Capitalisation of additions		**(374,866)**	**—**	**(374,866)**
Balance at 31 March 2005		**76,818,048**	**25,788,988**	**107,800,514**

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

CASH FLOW STATEMENT FOR THE YEAR ENDED 31 MARCH 2005

	Notes	2005 R	2004 R
CASH FLOWS FROM OPERATING ACTIVITIES			
Cash receipts from grants and contracts		**321,723,457**	282,752,258
Cash paid to suppliers and employees		**(279,825,307)**	(244,106,066)
Cash generated from operations	12.1	**41,898,150**	38,646,192
Net interest received		**13,710,503**	14,833,573
Net cash inflow from operating activities		**55,608,653**	53,479,765
CASH FLOWS FROM INVESTING ACTIVITIES			
Property, plant and equipment acquired		**(15,554,220)**	(17,049,388)
Proceeds on disposal of plant and equipment		**459,358**	62,021
Additions to investments		**(7,063,111)**	(26,378,728)
Net cash outflow from investing activities		**(22,157,973)**	(43,366,095)
CASH FLOWS FROM FINANCING ACTIVITIES			
Loans repaid		**(4,894)**	(2,796)
Net cash outflow from financing activities		**(4,894)**	(2,796)
Net increase in cash and cash equivalents		**33,445,786**	10,110,874
Cash and cash equivalents at beginning of year		**14,579,236**	4,468,362
Cash and cash equivalents at end of year	12.2	**48,025,022**	14,579,236

SOUTH AFRICAN MEDICAL RESEARCH COUNCIL

NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2005

1. Significant accounting policies and basis of preparation

The annual financial statements are prepared on the historical cost basis, except for certain financial instruments recognised at fair value as stated below.

The annual financial statements have been prepared in accordance with South African Statements of Generally Accepted Accounting Practice. The principal accounting policies adopted in the preparation of these financial statements are set out below and are consistent in all material respects with those applied in the previous year.

1.1 Revenue recognition

Turnover represents the parliamentary grant from the government, external grants and contracts, services rendered, and rentals. All the turnover is stated net of Vat.

1.2 Government grants received

Government grants received for the purposes of giving immediate financial support with no future related costs are recognised as income in the period in which they become receivable. Government grants relating to specific expenditure are deferred and recognised in the year in which the expenses are incurred.

1.3 Property, plant and equipment

Property, plant and equipment are stated at cost less accumulated depreciation, unless stated otherwise.

Property, plant and equipment are depreciated on a straight-line basis, over the useful lives of the assets, to their estimated residual values.

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	20%
Vehicles and containers	20%
Furniture and office equipment	20%
Computer equipment	33.3%

Gains and losses arising on the disposal of property, plant and equipment in the normal course of business are included in capital items to the extent that these are material.

1.4 Leases

Leases are classified as finance leases where substantially all the risks and rewards associated with ownership have been transferred to MRC. Capitalised leased assets are depreciated to their estimated residual values over their estimated useful lives. Lease rentals are appropriated between capital and interest elements, using the sum of the digits method.

Operating leases are leases where the lessor retains the risks and rewards of ownership of the underlying asset. Payments made under operating leases are charged against income on a straight line basis, over the period of the lease.

1.5 Inventory

Consumable stores are valued at the lower of weighted average cost or net realisable value.

1.6 Research and development costs

Research and development expenditure is written off as incurred.

1.7 Pension scheme arrangements

It is the policy of the Council to provide retirement benefits for employees. Contributions to retirement funds are charged against income in the year in which they become payable. Deficits in respect of the defined benefit component of the Council Pension Fund will be met by the Council through lump sum payments or through increased future contributions.

1.8 Financial instruments

Financial assets and financial liabilities are recognised in the balance sheet when MRC has become party to contractual provisions of the instrument. Subsequent to initial recognition of these instruments are measured as set out below.

Investments

After initial recognition, investments are measured at their fair values, adjusted for any transaction costs that may be incurred on sale or other disposal. Investments also include deposits on call.

Cash and cash equivalents

Cash and cash equivalents are measured at fair value.

Trade and other receivables

Trade and other receivables originated by the MRC are stated at their amortised cost less provision for doubtful debts. An estimate of doubtful debts is made based on a review of outstanding amounts at balance sheet date. Bad debts written off during the period in which they are identified.

Accounts payable

Non-derivative financial liabilities are recognised at amortised cost, comprising the original debt less principal payments and amortisations.

1.9 Foreign currencies

At the balance sheet date, monetary assets and liabilities denominated in foreign currencies are translated into South African Rands, at exchange rates ruling at the balance sheet date. Gains and losses arising from the settlement of such transactions are recognised in the Income Statement.

1.10 Capital items

Capital items are items of income and expense relating to the acquisition, disposal or impairment of property, plant and equipment, investments and intangible assets. To the extent that the gains and losses are immaterial, these are included in operating income.

1.11 Offset

Financial assets and financial liabilities are offset and the net amount reported in the balance sheet when the company has a legally enforceable right to set off the recognised amounts, and intends either to settle on a net basis, or to realise the asset and settle the liability simultaneously.

1.12 Provisions

Provisions are recognised when the Council has a present legal or constructive obligation as a result of past events, for which it is probable that an outflow of economic benefits will occur, and where a reliable estimate can be made of the amount of the obligation. Where the effect of discounting is material, provisions are discounted. The discount rate used reflects current market assessments of the time value of money and, where appropriate, the risks specific to the liability.

2. Property, plant and equipment

2005	Land and buildings R	Laboratory equipment R	Vehicles & containers R	Furniture & office equipment R	Total R
Carrying value at beginning of year	**38,545,883**	**13,615,776**	**6,783,193**	**3,190,683**	**62,135,535**
Cost	**49,777,734**	**51,513,848**	**9,880,803**	**11,589,683**	**122,762,068**
Accumulated depreciation	**(11,231,851)**	**(37,898,072)**	**(3,097,610)**	**(8,399,000)**	**(60,626,533)**
Additions	**2,602,669**	**6,578,177**	**3,611,314**	**2,762,060**	**15,554,220**
Disposals	**—**	**(77,558)**	**(659,564)**	**(53,588)**	**(790,710)**
Depreciation on disposals	**—**	**61,704**	**620,512**	**50,615**	**732,831**
Depreciation	**(1,067,731)**	**(8,800,743)**	**(2,473,166)**	**(2,958,047)**	**(15,299,687)**
Carrying value at end of the year	**40,080,821**	**11,377,356**	**7,882,289**	**2,991,723**	**62,332,189**
Cost	**52,380,403**	**58,014,467**	**12,832,553**	**14,298,155**	**137,525,578**
Accumulated depreciation	**(12,299,582)**	**(46,637,111)**	**(4,950,264)**	**(11,306,432)**	**(75,193,389)**
2004					
Carrying value at beginning of year	36,142,918	12,542,096	3,795,242	2,638,905	55,119,161
Cost	46,222,071	44,121,784	5,995,221	9,628,055	105,967,131
Accumulated depreciation	(10,079,153)	(31,579,688)	(2,199,979)	(6,989,150)	(50,847,970)
Additions	3,555,663	7,413,118	4,076,060	2,004,547	17,049,388
Disposals	—	(21,054)	(190,478)	(41,663)	(253,195)
Depreciation on disposals	—	21,044	190,475	33,475	244,994
Depreciation	(1,152,698)	(6,339,428)	(1,088,106)	(1,444,581)	(10,024,813)
Carrying value at end of the year	38,545,883	13,615,776	6,783,193	3,190,683	62,135,535
Cost	49,777,734	51,513,848	9,880,803	11,589,683	122,762,068
Accumulated depreciation	(11,231,851)	(37,898,072)	(3,097,610)	(8,399,000)	(60,626,533)

Furniture and office equipment having a book value of R32,045 is pledged as security against instalment sale agreements (note 7 refers).

3. Investments	2005 R	2004 R
3.1 Short-term investments		
Non-listed investments		
Investment in Corporation for Public Deposits at cost	**179,716,712**	173,786,298
Post retirement Medical Aid Benefit - under provisions	**28,000,000**	28,000,000
Research funds received in advance	**148,348,717**	121,959,186
Reserves and other accounts	**3,367,995**	23,827,112
3.2 Long-term investments		
Listed investments	**1,324,439**	1,002,020
Sanlam demutualisation shares	**171,514**	129,978
(No. of shares 14 128) (No. of shares: 14 128 - 2004)		
Sanlam Unit Trust	**1,086,660**	822,827
Old Mutual demutualisation shares	**66,265**	49,215
(No. of shares: 4210) (No. of shares: 4210 - 2004)		
Non-listed investment		
Investment in Medres (Pty), a dormant MRC company	**1**	1
Earmarked investments	**17,476,881**	16,363,382
Rationalisation reserve	**8,094,899**	7,817,160
Personnel provision reserve	**8,385,203**	7,767,399
Motor vehicle self-insurance reserve	**996,779**	778,823
Trust fund investments	**1,369,476**	1,334,167
Bruhns Trust at cost	**538,305**	502,996
WHO Steps Workshops - Agency Funds	**569,535**	569,535
Botha Trust	**261,636**	261,636
Investments in various instruments - to fund post retirement benefits	**26,551,000**	22,190,000
	46,721,797	**40,889,570**

	2005 R	2004 R
3.2.1 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	**7,817,160**	7,506,910
Interest capitalised	**594,104**	728,921
Rationalisation payments	**(316,365)**	(418,671)
Balance at end of the year	**8,094,899**	7,817,160
3.2.2 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	**778,823**	594,634
Allocation for the year	**230,641**	186,820
Expenditure	**(12,685)**	(2,631)
Balance at end of the year	**996,779**	778,823

4. Inventory	2005 R	2004 R
Consumable stores	**698,108**	674,140

5. Trade and other receivables	2005 R	2004 R
Trade receivables	**11,802,122**	12,921,242
Provisions	**(627,510)**	(798,324)
Value Added Taxes	**2,811,435**	2,742,200
Staff advances	**114,403**	224,621
Prepaid expenses	**933,262**	371,388
Travel & Subsistence	**422,515**	649,403
Other receivables	**59,488**	40,349
	15,515,715	16,150,879

6. Cash and cash equivalents	2005 R	2004 R
Bank balances		
Absa and Standard Bank	**3,914,477**	14,564,166
Absa - a funder account	**44,098,657**	—
Petty cash	**11,888**	15,070
	48,025,022	14,579,236

7. Long-term loans	2005 R	2004 R
Long-term loans	**27,219**	32,113
Current portion included in long-term loan	**(6,990)**	(4,894)
	20,229	27,219

8. Post employee benefits

8.1 Pension funds

MRC personnel are members of the following pension funds:
Pension Fund of Associated Institutions (Act No. 51 of 1963)
Pension Fund for Temporary Employees (Act No. 75 of 1979)
MRC Pension Fund (since January 1994)

(a) The first two funds were established by Law and are regulated by the respective Acts.

(b) The last-named fund is regulated by the Pension Fund Act and is managed by an independent Board of Trustees. The fund was actuarially valued as at 1 April 2005 and it was found that the fund is fully funded and financially sound.

(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.

8.2 Actuarial assumptions

	2005	2004
Discount rate	7.00%	9.00%
Consumer price inflation	5.10%	5.00%
Health care cost trend	10.50%	8.00%
Expected return on assets	7.60%	9.20%
Compensation increase rate*	6.00%	6.00%

* excludes merit increase

8.3 Changes in benefit obligation

The MRC Pension Fund is registered in terms of the Pension Funds Act. As a result of the Pension Funds Second Amendment Act, benefit obligations in these funds have been increased to equal the fair value of their assets resulting in zero surpluses.

	2005 *R*	*2004* *R*
	MRC Pension Fund R'000	
Benefit obligation at 1 April 2004	56,238,000	
Current year contributions	7,759,000	
Plus interest cost	2,977,000	
Plus service cost	4,536,000	
Actuarial (gain) / loss	932,000	
Benefits paid	-7,707,000	
Benefit obligation at 1 April 2005	64,735,000	
8.4 Fair value of plan assets	67,001,000	
8.5 Components of net periodic cost		
Service cost	4,536,000	
Interest cost	2,977,000	
Expected return on Plan Assets	-3,303,000	
Recognised actuarial (gain) / loss	846,000	
Net periodic cost	5,056,000	

9. Provisions

Long term

Personnel Provision Fund		
Balance at beginning of year	**8,590,226**	7,865,186
Interest capitalised		784,976
Leave payouts	**(823,244)**	(559,936)
Transfer from general fund	**1,704,881**	500,000
	9,471,863	8,590,226
Post retirement medical aid benefit		
Balance at beginning of year	**50,190,000**	41,173,000
Movement during the year	**4,361,000**	9,017,000
	54,551,000	50,190,000
	64,022,863	58,780,226

	2005 R	2004 R
Short term	**MRC Pension Fund R'000**	
Interest due to funders		
Balance at beginning of year	**7,757,300**	5,193,478
Movements	**1,200,467**	2,563,822
	8,957,767	7,757,300

10. Research funds received in advance

	2005 R	2004 R
Monies received in advance in respect of research grants awarded to the MRC for specific research projects.	**148,348,717**	121,959,186

11. Trade and other payables

	2005 R	2004 R
Accounts payable comprises:		
Trade creditors	**14,372,829**	11,620,771
Provision for audit fees	**280,000**	246,962
Accruals	**10,178,778**	8,564,261
Outstanding cheques	**2,844,858**	1,891,965
	27,676,465	22,323,959

12. Notes to the cash flow statement

12.1 Cash generated from operations	2005 R	2004 R
Operating loss before interest	**(7,582,053)**	(9,695,847)
Adjustments for cash items within specific funds not included in operating loss:		
Leave payout from Personnel Provision Fund	**(823,244)**	(559,936)
Allocation to motor vehicle self-insurance reserve	**230,641**	186,820

12.1 Cash generated from operations (contd.)	*2005 R*	*2004 R*
Adjustment for non-cash items:		
Depreciation of property, plant and equipment	**15,299,687**	10,024,813
Bad debts	**84,540**	27,935
Transfer (from)/to Other Property, Plant and Equipment capital fund	**(1,338,284)**	4,613,409
Transfer to funds	**1,704,881**	500,000
Profit on disposal of plant and equipment	**(401,479)**	(53,820)
Profit on revaluation of financial instruments	**(303,221)**	(275,642)
Cost to service post-retirement medical aid contributions	—	6,800,000
Adjustment to cost to service post-retirement medical aid contributions	—	(282,607)
Transfer to cost of land and buildings fund	**963,418**	1,706,423
Interest on rationalisation fund	**594,104**	728,921
Interest on Personnel Provision Fund	—	784,976
	8,428,990	14,505,445
Movements in working capital:		
Increase in inventory	**(23,968)**	(278,886)
Decrease / (increase) in accounts receivable	**550,624**	(7,989,562)
Increase in accounts payable and deferred income	**32,942,504**	32,409,195
	41,898,150	38,646,192
12.2 Cash and cash equivalents		
Bank balances	**48,025,022**	14,579,236

13. Commitments

13.1 Capital commitment

At year-end, a capital commitment of R100,000 exists in respect of the new building and building improvements. This will be funded from existing cash resources.

13.2 Operating lease commitments

MRC leases certain of its plant and equipment in terms of operating leases. The MRC does not have the option to acquire the assets at the termination on the lease. There are no restrictions imposed by leases.

Future minimum lease payments for (non-cancellable) operating leases are as follows:

	2005 *R*	*2004* *R*
Payable within one year		
Premises	**1,788,182**	370,152
Furniture and office equipment	**16,909**	16,253
Vehicles	**263,507**	196,542
	2,068,598	582,947
Payable thereafter		
Premises	**1,949,895**	440,376
Vehicles	**102,606**	137,285
	2,052,501	577,661

13.3 Finance lease commitments

An installment sale agreement is payable in monthly installments of R936 (2004: R820) increased by 15% (2004: 15%) per year. The agreement matures on 10 July 2007. The effective interest rate changes from prime to 0,5% above prime per annum. The installment sale liabilities are secured by office equipment (note 7 refers).

	2005 *R*	*2004* *R*
Future minimum lease payments for finance leases:		
Present value of lease payments	**27,219**	32,113
Finance charges	**7,046**	13,833
Total minimum lease payments	**34,265**	45,946
The present value of the lease payments is payable as follows:		
Payable not later than one year	**6,990**	4,894
Payable later than 1 year and not later than 5 years	**20,229**	27,219
	27,219	32,113

14. Interest received

Bank account	**505,352**	621,249
Unit Trusts	**42,071**	51,856
Call account investments	**16,414,619**	16,714,732
Interest (reversed)/charged on Debtors accounts	**(37,918)**	44,420
Interest payable to funders	**(3,194,879)**	(2,563,822)
	13,729,245	14,868,435

15. Collaborative Research

Consulting costs and honorarium payments	**24,667,432**	15,311,557
Payments made to external institutions	**52,816,232**	46,410,385
	77,483,664	61,721,942

16. Staff costs

	2005 *R*	*2004* *R*
Salaries and wages	**127,244,738**	106,528,262
Basic salaries	**70,665,973**	65,499,508
Performance awards	**8,043,308**	5,606,832
Periodic payments	**1,179,043**	316,258
Other non-pensionable allowances	**23,990,420**	17,947,631
Temporary staff	**21,979,477**	16,249,033
Leave payments	**1,028,927**	559,738
Overtime pay	**357,591**	349,261
Defined Pension contribution plan expense	**4,834,217**	**3,495,890**
Social contributions (Employer's contributions)	**9,068,247**	**7,529,407**
Medical	**4,572,376**	4,132,765
UIF	**668,591**	598,942
Other salary related costs	**3,827,280**	2,797,700
Defined Pension benefit plan expense	**3,448,229**	**2,721,601**
- current service cost	**2,629,079**	2,697,587
- past service cost	**819,150**	24,014
Other long-term employee benefits including long-service leave	**5,522,638**	**12,112,127**
	150,118,069	132,387,287

17. Net surplus for the year

	Notes	2005 R	2004 R
INCOME			
Profit on disposal of plant and equipment		**401,479**	53,820
Profit on revaluation of financial instruments		**303,221**	275,642
Rent received		**2,367,961**	2,419,376
EXPENDITURE			
Auditor's remuneration		**273,561**	305,818
- Audit fees		**238,218**	301,524
- Fees for other services and expenses		**2,305**	4,294
- Increase in provision		**33,038**	—
Depreciation of assets		**15,299,687**	10,024,813
Land and buildings		**1,067,731**	1,152,698
Laboratory equipment		**8,800,743**	6,339,428
Vehicles and containers		**2,473,166**	1,088,106
Furniture and fittings		**2,958,047**	1,444,581
Board Members' Emoluments	19	**340,821**	202,304
Executive Directors' and Managers' Remuneration	20	**6,299,935**	6,052,001
Finance cost		**40,458**	57,074
Operating lease payments		**405,909**	438,887

18. Restatement of balance

18.1 Liabilities previously treated as income

Interest due to funders was previously treated as part of MRC income, instead of it accruing to the projects.

	Before adjustment	**After adjustment 2005**	Before adjustment	After adjustment 2004
Interest received	16,924,124	13,729,245	17,432,257	14,868,435
Provisions - current liabilities	—	7,600,767	—	6,400,300
General funds - 1 April 2004			17,627,818	13,791,340

18.2 Post retirement medical aid benefit previously treated as an off balance sheet transaction

Provisions (current) and short term investments, each increased by R26,55m as at 31 March 2005, and by R22,19m as at 31 March 2004, as a result of the restatement of balances.

19. Board Members' Emoluments

Fees for the board and board sub-committee meetings for the period 1 April 2004 to 31 March 2005 were as follows:	**Honorariam**	**Vehicle and parking**	**Reimbursive**	**2005 Total**	**2004 Total**
Prof AA Azad	12,390	—	3,239	15,629	
Mr MP Canca	35,476	766	—	36,242	15,847
Prof D Du Toit	11,256	882	—	12,138	41,928
*** Prof RA Emsley	—	—	—	—	8,480
Prof T Gugushe	3,752	153	—	3,905	18,892
Dr JK Hartzell	14,658	153	3,086	17,897	
Prof LJ King	11,256	233	—	11,489	
Ms JN Makhanya	13,132	673	200	14,005	9,625
Ms ZP Manase	3,752	—	—	3,752	7,504
** Ms MK Matsau	—	—	—	—	
Prof DL Mkize	10,514	214	—	10,728	
Prof MS Mokgokong	24,822	1,204	—	26,026	12,981
Prof TR Mokoena	28,480	787	149	29,416	31,575
Prof DJ Ncayiyana	8,638	218	55	8,911	8,911
Prof G Padayachee	27,440	428	—	27,868	10,906
Prof JM Pettifor	10,164	275	—	10,439	
Col DC Qolohle	13,524	398	—	13,922	
Prof MF Ramashala	39,060	—	—	39,060	8,208
Prof H Schneider	16,142	61	—	16,203	11,674
Prof LR Uys	8,288	196	—	8,484	15,773
Prof K Voyi	17,668	505	—	18,173	
Dr C Walsh	16,534	—	—	16,534	
	326,946	**7,146**	**6,729**	**340,821**	**202,304**

Reimbursive column represents payments in lieu of travel costs.
** No honorarium due.*** No meetings attended.

20. Executive Directors'/Managers' Emoluments

	Salary	Travel Allowances	Leave Payouts	Package Total	Bonus	S&T	Company Contributions	2004/2005 Total	2003/2004 Total
TF Jackson	537,108	60,000	1,935	599,043	69,103	2,445	93,916	764,507	690,612
JA Louw	224,837	2,577	118,629	346,043	36,524	20,202	26,204	428,973	752,705
R Maharaj	190,736	16,400	64,584	271,720	—	1,415	27,239	300,374	566,208
BJ Mahlangu	578,439	29,161	—	607,600	59,016	7,156	86,703	760,475	698,804
ND Mbananga	306,009	—	11,021	317,030	22,818	28,984	22,408	391,240	
AD MBewu	640,620	115,344	—	755,964	73,047	5,897	69,965	904,873	727,476
K Mtunzi-Hairwadzi	409,465	66,935	—	476,400	40,896	9,542	34,800	561,638	414,042
W Pick	580,458	—	—	580,458	108,609	1,319	795	691,181	750,784
AP Terblanche	296,640	22,590	—	319,230	—	7,720	26,832	353,782	
NM Walters	201,953	3,180	114,538	319,671	40,156	1,655	29,154	390,636	764,335
BK Williams	577,956	38,928	—	616,884	55,544	2,410	77,418	752,256	687,035
	4,544,221	**355,115**	**310,707**	**5,210,043**	**505,713**	**88,745**	**495,434**	**6,299,935**	**6,052,001**

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

JA Louw	Contract ended 30 June 2004
NM Walters	Contract ended 30 June 2004
R Maharaj	Resigned on 31 August 2004
ND Mbananga	Appointed on 01 September 2004
AP Terblanche	Appointed on 15 October 2004
W Pick	Resigned on 31 December 2004

Bonus paid to W Pick was for years ended March 2004 and March 2005

TRIBUTE TO MRC RESEARCHERS

All MRC staff play an integral part in helping to build a healthy nation through research. Many of them receive local and international awards and honours for their achievements. We highlight just a few of them on this page.

1. **Professor P Becker**, Biostatistics Unit: Presidential Travel Award for the best presentation given at the 21st Annual Conference of the American Association of Clinical Anatomists (AACA) meeting in San Francisco, USA, 9-12 June 2004.
2. **Dr WM Faber**, Nutritional Intervention Research Unit: Unifoods award (1st prize) for nutrition research in the category Established Scientist for a paper presented at the Nutrition Congress 2004. Also awarded the William Fox Memorial Prize for best presentation by a dietician at the same congress.
3. **Dr Pam Groenewald**, Burden of Disease Research Unit: Award for Best Oral Presentation, 'Epi, Prevention and Public Health', at the 2nd SA AIDS conference, ICC, Durban, 7-10 June 2005.
4. **Dr Bavesh Kana**, Molecular Mycobacteriology Research Unit: Awarded a second postdoctoral training fellowship from the Columbia University-Southern African Fogarty AIDS Training and Research Program.
5. **Janet Kelso**, Bioinformatics Capacity Development Research Unit: UNESCO Young Women Scientist Award by L'Oreal, 6 August 2004.
6. **Professor Keith Klugman**, Respiratory and Meningeal Pathogens Research Unit: Co-recipient of the Emanuel Wolinsky Award given by the Infectious Diseases Society of America as an author of the Best Article Published in *Clinical Infectious Diseases* in 2003; Honor Award from the Department of Health and Human Services, Secretary's Award for Distinguished Service, the SARS and Monkeypox Public Health Response Teams, US Centers for Disease Control and Prevention.
7. **Dr MG Matsabisa**, Indigenous Knowledge Systems Lead Programme: Award for Best Project and Presentation, International Conference on Promotion, Development and Legal Aspects of Traditional Medicines, Kolkata, India.
8. **Prof. Valerie Mizrahi**, Molecular Mycobacteriology Research Unit: Co-awarded a DST-NRF Centre of Excellence with Prof. Paul van Helden from the MRC Centre for Molecular and Cellular Biology and University of Stellenbosch. Their joint DST-NRF Centre of Excellence for Biomedical TB Research was launched in September 2004; First Runner-Up in the Distinguished Woman Scientist category of the Department of Science and Technology's 2004 Women in Science Awards.
9. **Ms Neetha Morar**, Maternal and Infant Health Care Strategies Research Unit: Best poster presentation at the Microbicide 2004 Conference, 27-31 March 2004 on 'Acceptability of Microbicides among male partners of the COL 1492 trial participants'.
10. **Dr Neo Morojele**, Alcohol and Drug Abuse Research Unit: Finalist in Category J: Young Black Researcher in the Past 2-5 years, for an NSTF Science and Technology Forum Award, 2004.
11. **Ms. Mohube B. Mowa**, Molecular Mycobacteriology Research Unit: Awarded a Department of Labour Scarce Skills Doctoral Bursary from the NRF.
12. **Prof. Charles Parry**, Alcohol and Drug Abuse Research Unit: Meritorious award for outstanding service to SANCA (WC) and to the field of substance abuse prevention, 2005.
13. **Prof. J Smook**, Centre for Molecular and Cellular Biology: Wellcome Trust senior fellowship award; NRF P rating; Rector's Award for Excellence in Research (Stellenbosch University).
14. **Dr Bavanisha Vythilingum**, Anxiety and Stress Disorders Research Unit: US Faculty of Health Sciences Award, Best Postgraduate Student; Novartis medal for best results in FCPsych; Harry Eidelman Award for Best Registrar in Final Exams; Finalist – Women in Science Fellowship Award.

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