2012 to 2013

BIENNIAL RESEARCH REVIEW

FACULTY OF HEALTH SCIENCES

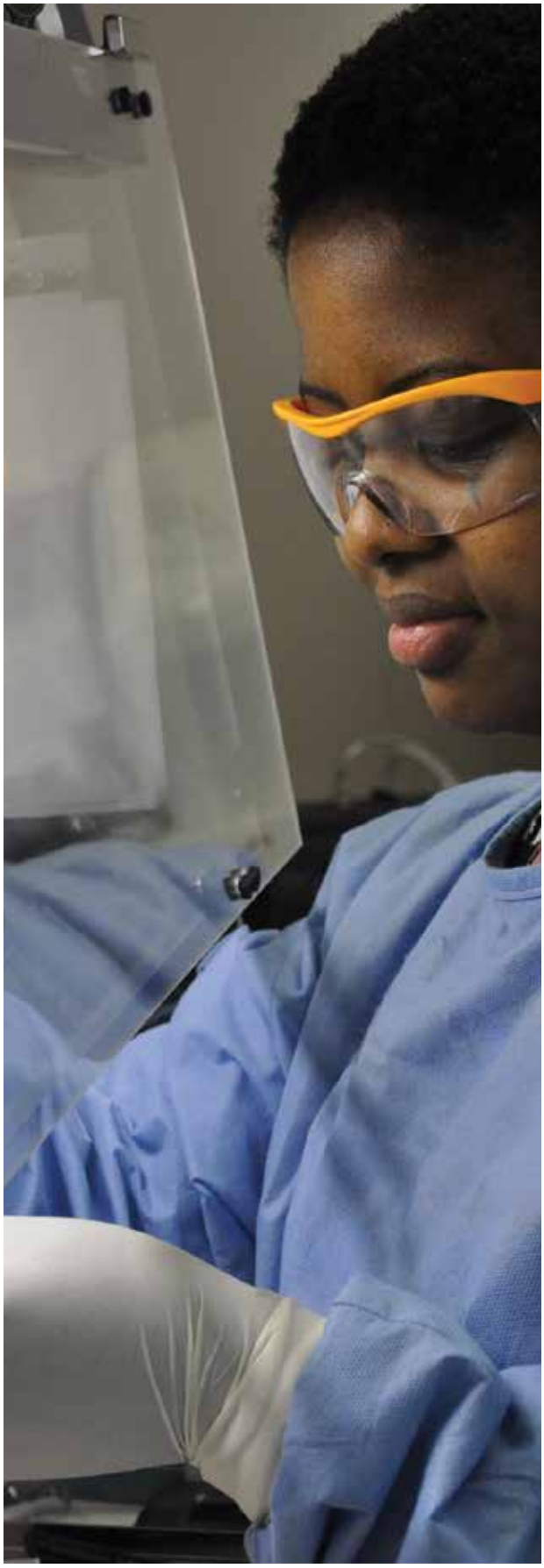






FACULTY OF HEALTH SCIENCES

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG



Contents

Message from the Dean

Faculty of Health Sciences

Professor **Martin Veller**

The research portfolio of the Faculty of Health Sciences, University of the Witwatersrand has shown substantial growth over the period reviewed in this biennial research report. This was indicated, not only by its continued output indicators, which were particularly successful in 2013, but also in the many activities surrounding research and postgraduate support. Despite the heavy service delivery encountered by the majority of clinical and joint staff in the Faculty under difficult circumstances, and the long teaching year with which our academics have to contend, research in the Faculty of Health Sciences is well and continues to flourish and improve both in quality and in quantity.

Research in the Faculty of Health Sciences is well and continues to flourish and improve both in quality and in quantity.

The Faculty has had an exceptional increase in publication outputs over the last two years with subsidy earning units rocketing from 283 in 2010 to a record high of 389 units in 2013. This is an outstanding growth spurt for the Faculty and the result of a sustained strategy to improve the research environment and nurture emergent researchers and postgraduates. The majority of the publications in the Faculty are being published in Institute of Scientific Information (ISI) journals with numerous articles appearing in high impact journals such as the *New England Journal of Medicine*, *Nature Medicine*, *The Lancet*, *Cell* and *Science*. This continues to indicate the international level of research in the Faculty as well as the local and global relevance of the research.

Over the period reviewed, the Faculty had 18 Research Entities of which two are Faculty Institutes. Of the 18 entities, four are in addition also supported as extramural Units of the South African Medical Research Council. The Entities are highly productive and produce a substantial quantity of the Faculty's outputs. The Faculty hosted five DST/NRF South African Research Initiative Chairs (SARChI) and was home to three Centre's of Excellence. Of the Faculty's National Research Foundation-rated scientists, six were A-rated.

The Wits Research Institute for Malaria (WRIM) was launched in 2013. Although ground-breaking research into Malaria has already been taking place at Wits, the Institute brings together researchers from a variety of fields in a multidisciplinary setting. The new Institute will fulfill not only the mission of Wits University, but also that of global players such as the World Health Organization and the Global Fund. WRIM will strengthen malaria research in the existing fields as well as in the fields of epidemiology and clinical medicine.

Collaborations with international Institutes have been strengthened during the past two years. In addition, through its Alumni Diaspora Programme, eminent international alumni have been 'brought home' to the Faculty for short periods of time to network with our researchers. This highly successful programme is now being funded by the Carnegie Corporation of New York for the next three years.

Research funding to the Faculty is derived from a variety of sources such as external funding to individuals and divisions through the Wits Health Consortium, a Wits Health Consortium Dividend, local funding organisations such as the NRF and South African MRC, as well as University Research Committee grants. The most important source of funding is via external grants which are managed by the Wits Health Consortium.

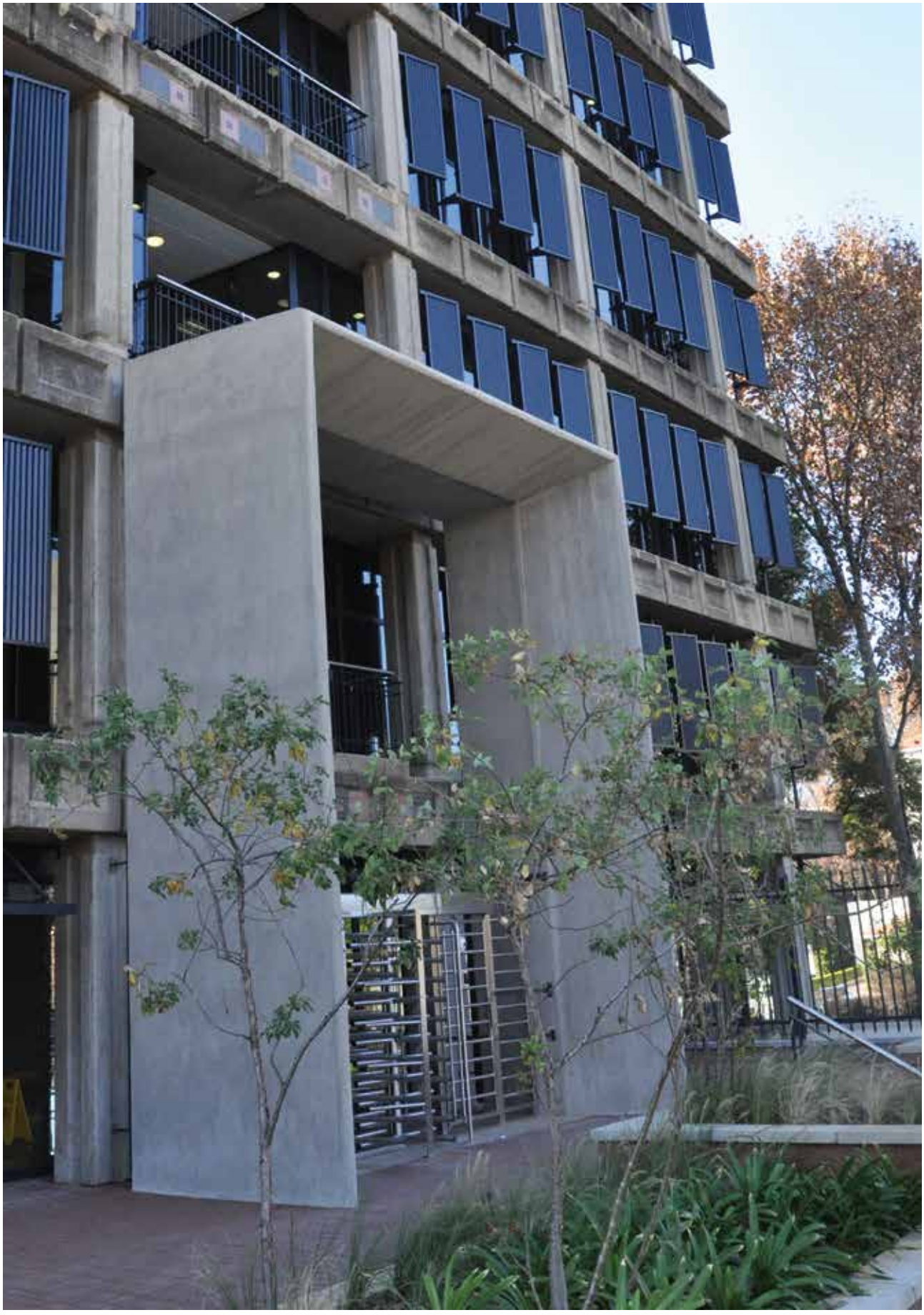
Postgraduate completions escalated to a pleasing 288 in 2013. Of great importance is the slow but sure increase in the number of Ph.D completions each year with a total of 37 recorded in 2013 (many of whom were academic staff), as well as the Master of Medicine graduations which reached a total of 57. Large numbers of students undertake a Masters by coursework in the Faculty which resulted in a record of 145 completions this year.

Three distinguished academics were awarded the senior doctorate, the Doctor of Science in 2013. The graduands are Professor Justus Hofmeyr, Professor Mario Altini and Professor Denis Daneman (Canada).

The Faculty celebrated the graduation of the first cohort of Carnegie Academic Medicine Clinician Scientists in July 2013. This unique programme by the Faculty of Health Sciences initiated in 2010, as a response to a consensus report from the Academy of Sciences of South Africa (ASSAf), allows for medical specialists to achieve their PhDs in two years.

The outstanding researchers in the Faculty who contribute immeasurably to both the Faculty and the University's mission of being a research-intensive Institution are herewith acknowledged. Acknowledgement too of our partners, the Gauteng Department of Health and the National Health Laboratory Service is warranted.

Finally, the Faculty's Research Office under Professor Beverley Kramer's direction must be thanked for the enabling environment they have created.



FACULTY IN NUMBERS (2012 - 2013)

The Faculty Hosts

58 NRF-Rated Researchers

6 A-Rated

5 DST/NRF SARChI Chairs

The Faculty was home to

18 Research Entities

3 Centres of Excellence

The Faculty graduated

67 PhDs

97 Masters of Science graduates (by dissertation)

Publications

680 Department of Higher Education and Training (DHET) publication units

1 161 publications in accredited journals

Students and Graduates

5 250 approximate number of registered students per year in the Faculty

2 900 undergraduate students **55%** of the student body

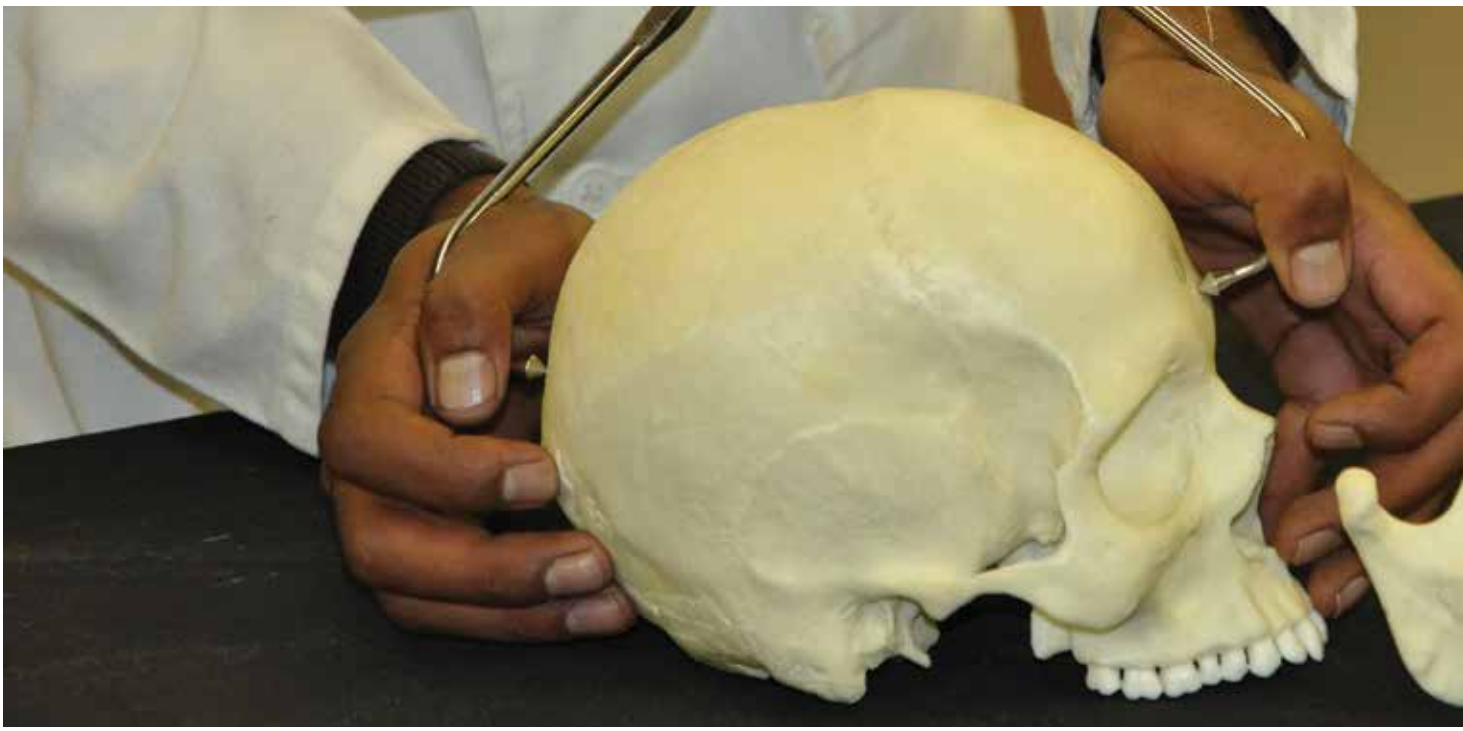
2 350 postgraduate students **45%** of the student body

Between 2012 and 2013, Postdoctoral Fellows in the Faculty increased from

26 → **43**

RESEARCH **FOCUS**

Research Focus



School of **Anatomical Sciences**

Head of School: **Adjunct Professor Joe Daly**

The School of Anatomical Sciences consists of the Divisions: Biological Anthropology, Histology and Morphological Anatomy. During the period under review, they were actively engaged in collaborations with both international and local universities and institutions with the specific goal of enriching and expanding their research initiatives and networks for their students. These activities contributed greatly to improving the School's research and widening its world class research portfolio.

Neuroscience Laboratory

The School has one of the best-equipped Neuroscience laboratories in the country. The laboratory houses a brain bank of mammalian brains from around the globe that serves as the basis for innovative research on evolutionary and comparative neuroanatomy. The School neuroscientists collaborate with international institutions and individuals with common interests in the areas of neuroregeneration of brain tissue, anatomy of the neurotransmitter systems, and the anatomy and physiology of sleep. The research programmes attract outstanding international postdocs. In 2012 the School hosted the International Brain Research Organization (IBRO/International Society of Neurochemistry (ISN) Advances Neuroscience School at the Wits Rural Facility in Bushbuckridge, Limpopo on the theme of '*Evolution of the Visual System'*. Participants attended from eight African countries and the facilitators represented six international countries.

Biological Anthropology

Within the School's Division of Biological Anthropology, researchers focus on paleoanthropology and taphonomy, skeletal biology and bioarchaeology, forensic anthropology, dental anthropology, and human growth and development.

New initiatives in human growth and development, experimental forensic anthropology and paleoanthropology involved collaborations across the University. The Raymond A. Dart Collection of Human Skeletons is an outstanding resource that attracts investigators from around the world. A comprehensive study of the School's cadaveric material was part of an international effort to compile data on the social demographics of body donation. During the period of review members of the Division of Biological Anthropology held positions in national and international organisations and institutions and also conducted research abroad.

Other Areas Of Research

Although the main thrust of research in the School focuses around neuroscience and biological anthropology (including forensic anthropology), there are many smaller 'pods' of research that are growing and expanding. During 2011-13 one of these involved research on wound healing; another investigated clinical anatomy questions that focused on refining our understanding of anatomical variation in South African populations and its clinical significance. Other research concentrations in the School cross the traditional divisional boundaries and serve to integrate the academic staff in the different divisions. An example of this is work employing geometric morphometric analyses. The School organised, in collaboration with the Freie University in Berlin, a workshop on 3D-Visualization Techniques for forensic scientists, craniofacial biologists and health care professionals.

Publications by researchers in all the Divisions of the School appeared in accredited international journals with high impact factors. During the period under review the School published 34 articles in ISI accredited journals, four book chapters and a number of other publications.

Apart from their research achievements, the School mentors numerous MSc and PhD students who achieved recognition for their research at conferences and workshops. In 2012 one of the School's MSc students received the Bob Symington Award for the best Young Oral Presenter at the Anatomical Society of Southern Africa annual meeting; another won the Antoinette Kotze Award for the best First Time Oral Presenter.

In 2012 the School had four staff members registered for their MSc's and nine staff members registered for PhD's. They had eight Honours, 23 Master of Science, and 21 Doctoral students registered.

The School plays a vital role in the Faculty of Health Sciences and is always working towards gaining insight into new research developments in all its fields and disciplines.

School of **Clinical Medicine**

Head of School: **Adjunct Professor Mkhululi Lukhele**

The School of Clinical Medicine (SOCM) is the largest School in the Faculty of Health Science. In 2013 the SOCM was restructured into three Clusters, nine Departments (Internal Medicine, Surgery, Paediatrics, Obstetrics and Gynaecology, Family Medicine, Neurosciences, Radiation Sciences, Anaesthesia and Psychiatry) and four Centres (Steve Biko Centre for Bioethics, Palliative Care, Centre for Health Science Education and Rural Health). The School houses nine of the 18 FRC and URC approved Research Entities in the Faculty (Carbohydrate & Lipid Metabolism Research Unit; Clinical HIV Research Unit; Developmental Pathways for Health Research Unit; Effective Care Research Unit; Hepatitis Virus Diversity Research Programme; Perinatal HIV Research Unit; Pulmonary Infection Research Unit; Soweto Cardiovascular Research Unit and the Wits Reproductive Health Institute). Members of the School also form the major proportion of researchers with syndicates in the Wits Health Consortium.

Only 50 of the more than 2000 members of the academic staff are full-time staff members. The majority are joint staff who are heavily inundated with clinical service work loads. Despite the challenges, the number of academic staff with a PhD degree in the School is increasing. The School remains the major contributor of DHET publication units in the Faculty (37%). The majority of the publications are from the Research Entities based in the School. In 2013, the SOCM increased its publication units by 23% from 2012 and hosted six of the top 10 most prolific authors in the Faculty. The School is beginning to enjoy the effort and strategies implemented by Heads of Divisions and Departments such as Diagnostic Radiology on increasing research output.

CARBOHYDRATE AND LIPID METABOLISM RESEARCH UNIT

The Unit has one of the largest cohorts of homozygous familial hyper-cholesterolaemia patients in the world.

Director: **Professor Frederick Raal**

The Carbohydrate and Lipid Metabolism Research Unit focuses on research related to the epidemiological, clinical and biochemical aspects of common diseases affecting lipid and glucose metabolism in the different ethnic groups of Southern Africa. The Unit is well recognised both nationally and internationally for their work on familial hypercholesterolaemia (FH), and has one of the largest cohorts of homozygous FH patients in the world. FH is a genetic disorder that is responsible for increased low-density lipoproteins (LDL) in the blood, a risk factor for premature coronary heart disease.

In 2013, Professor Frederick Raal acted on an expert panel to produce a paper which highlighted the extent to which familial hypercholesterolaemia is underdiagnosed and undertreated in the general population. They estimated that between 1 in 200 and 1 in 500 individuals are affected with heterozygous FH of which less than 1% are diagnosed in most countries. Based on these risks, between 14 and 34 million individuals worldwide have FH. The article discussed recommendations on how to better diagnose and treat individuals and families with FH to ultimately prevent coronary heart disease. This paper also highlighted the urgent worldwide need for diagnostic screening and timely and aggressive treatment of the condition in high risk individuals. Professor Raal also published an article on the current perspectives and diagnosis of homozygous FH in the journal, *Atherosclerosis.*

The prolonged survival associated with advances in lipid-lowering therapy, mainly statin therapy, in patients with homozygous FH was reported in the leading cardiovascular journal *Circulation*. This paper was one of the most read articles on the topic of epidemiology and prevention in *Circulation* in 2011-2012. The group continues to research novel therapies such as antisense apo B-100 and PCSK9-inhibitor therapy in this patient group. The results of such studies with Evolocumab, an inhibitor of PCSK9, given once or twice monthly by subcutaneous injection to subjects with either heterozygous or homozygous FH were published as lead articles in *Circulation*. Professor Raal also contributed two editorials to *The Lancet* on aspects and treatment of familial hypercholesterolaemia.

The Unit's research interests in FH are broad and they continue to investigate novel therapies for the treatment of both the homozygous and heterozygous form of this condition. They also investigate the genotypic versus phenotypic expression of both forms of FH in different population groups in South Africa, endothelial progenitor cells in FH subjects and high dose statin therapy in FH patients and its metabolic effects.

In addition to their highly regarded research on FH, the Unit also investigates lipid changes and changes in insulin resistance during the Ramadan fasting month, the relationship between glucose and cholesterol *in vivo*, dyslipidaemia in the South African Black population and the metabolic characteristics of menopause in Black South African women. A study on the mitochondrial toxicity, metabolic changes and lipodystrophy in patients receiving HAART for HIV infection has already resulted in three publications.

CLINICAL HIV RESEARCH UNIT

Director: **Associate Professor Ian Sanne**

The Clinical HIV Research Unit (CHRU), an internationally recognised research and technical assistance unit has a mission to deliver excellence and quality clinical, epidemiologic and health economic research, services in Johannesburg; to further ensure that this information is invested at operational level for the prevention, treatment and management of HIV and associated diseases.

The Unit is located at the Themba Lethu Clinic (TLC), Helen Joseph Hospital, one of the largest HIV and TB clinics in South Africa with more than 38,000 HIV positive patients. Over 2000 new cases of TB are diagnosed per annum, of which 3-4% are drug resistant and 87% are co-infected with HIV. CHRU in collaboration with Right to Care offers a unique third line clinic to diagnose and treat third line patients.

The CHRU's research focus is HIV treatment in adults, HIV prevention, Tuberculosis (TB), Cervical Cancer and has made significant contributions to these research disciplines, with over 220 publications since its inception in 1999.

CHRU has completed over 50 antiretroviral therapy (ART) studies in phase I-III research. It was the first International ACTG Site in 2002, and has since been the highest performing AIDS Clinical Trials Group (ACTG) international site.

Initially a neglected research area, treatment of M/XDR-TB requires the use of second-line medications that are less effective, have a narrower therapeutic index, and require longer durations of treatment compared to drug-susceptible TB. A TB research unit was established at the Sizwe Hospital, the inpatient referral unit for MDR TB in Gauteng. This was one of the sites for the registrational trial of the first drug registered for MDR TB, Bedaquiline. This medication is now registered by the FDA and in collaboration with the National Department of Health, they have pioneered a Bedaquiline Clinical Access programme. The site is also conducting the first randomised controlled trial for a MDR TB regimen, the STREAM Trial. This international multi-centre trial sponsored by USAID and led by the British MRC, is assessing a shorter nine month regimen as compared to standard 24 months.

In 2005 the Unit initiated a cervical cancer screening and treatment programme, with prospective cohort analysis defining the epidemiology of Human Papillomavirus (HPV), cervical dysplasia and cancer in South Africa. The programme has developed and executed 10 prospective studies in cervical cancer, exploring diagnostic screening methods, treatment options, vaccine immunology and responses in HIV. The unit has also investigated the co-infection of HPV and other sexually transmitted infections (STIs) in HIV positive men and women. This group has also begun to define the epidemiology of anal HPV infection and dysplasia in women.

In 2013 in a climate of challenging grant funding and sponsorship, the CHRU together with the Wits Reproductive Health and HIV Institute received a continuation of the WITS HIV Research Group funding from the US Government's National Institute of Health of over $4,600,000 per annum over a 7 year period.

During the review period the CHRU published 120 articles, 41 were in journals with impact factors greater than five and five articles were published in the high impact journals *The Lancet* (IF of 36), the *Journal of Infectious Diseases* (IF of 38) and the *New England Journal of Medicine* (IF of 52). The CHRU researchers presented 77 oral and poster presentations at National and International conferences including the Conference on Retroviruses and Opportunistic Infections (CROI) and the International AIDS Society (IAS) Conference on HIV Pathogenesis, Treatment and Prevention in 2013.

http://www.chru.co.za

Research Entities

DEVELOPMENTAL PATHWAYS FOR HEALTH RESEARCH UNIT

DPHRU
MRC/Wits Developmental Pathways for Health Research Unit

Director: **Associate Professor Shane Norris**

The Developmental Pathways for Health Research Unit (DPHRU) was established in 2011. The research carried out by this Unit aligns well with three national priorities; decreasing maternal and child mortality, increasing life expectancy, and strengthening health policy and systems. The Unit applies a life-course approach to study and understand how biological and environmental exposures, particularly in early life (fetal, infancy and childhood), subvert physiological and other developmental systems resulting in latent vulnerabilities. Their research studies draw upon genetics, cross-sectional and longitudinal population cohorts in rural and urban South Africa, and formative intervention work to test key hypotheses.

A number of the DPHRU's investigations utilize data from the Birth to Twenty Cohort (Bt20), a longitudinal study of the health and wellbeing of individuals who were born in the metropolitan area of Soweto in 1990. A study on pooled data from birth cohorts in Brazil, Guatemala, India, the Philippines and South Africa has shown that lower birth weight is a clear risk factor for glucose intolerance and that there is no risk associated with early life weight gain with regard to impaired glucose intolerance. However, there is a component of this weight gain that does carry insulin resistance risk. Another study measured the prevalence of obesity and related metabolic disorders in an urban population of African females, a group at high risk for such diseases, and determined the appropriate waist cut point for diagnosing the metabolic syndrome. Currently, the waist circumference cut point for diagnosing the metabolic syndrome in sub-Saharan African subjects is based on that obtained from studies in European populations. The present data demonstrates that the waist cut point (80.0 cm) currently recommended for the diagnosis of the metabolic syndrome in this African population should be increased to 91.5 cm. This demonstrates a clear ethnic difference in the relationship between abdominal adiposity and metabolic disease risk, also suggesting a common aetiological pathway.

The Bt20 cohort is now at a stage where it is possible to examine the impact of personal, social and family history on child, adolescent and adult health and wellbeing across four generations. A proposed research programme, referred to as Bt20 Plus, will involve enrolling the children of the Bt20 cohort into a systematic study investigating the effect of exposures over two generations on infant psychosocial and biological outcomes assessed in the third generation.

The DPHRU, in collaboration with the Sydney Brenner Institute for Molecular Bioscience at Wits, established a DNA biorepository of approximately 4000 samples (2000 mother-child pairs) from the Bt20 cohort participants. The biorepository enables research aimed at exploring genetic associations with phenotypic outcomes. A recent project involved genome wide association studies on obesity, a complex trait with both environmental and genetic contributors. The project identified several variants that are robustly associated with obesity and body mass index (BMI), many of which are found within genes involved in appetite regulation. The group assessed the association of candidate loci with BMI in black South Africans and highlighted single nucleotide polymorphisms (SNPs) in the *FTO* and *MC4R* genes as potential genetic markers of obesity risk in this population group.

DPHRU is currently involved in the NTSHEMBO (HOPE) project with the aim to improve the health and nutrition of adolescents and their infants to reduce the intergenerational risk of metabolic disease. In an H3Africa Collaborative Centre research study they investigate the genomic and environmental risk factors for cardiometabolic disease in Africans.

www.wits.ac.za/dphru

EFFECTIVE CARE RESEARCH UNIT

The team is responsible for updating more than 50 Cochrane reviews, making a substantial contribution to the Cochrane Library and the WHO Reproductive Health Library.

Director: **Professor Justus Hofmeyr**

The Effective Care Research Unit (ECRU) although located in the East London Hospital complex in the Eastern Cape is a Wits School of Clinical Medicine, Faculty of Health Sciences Research Unit. The focus of the Unit's work is to undertake primary research, research synthesis, implementation research, training and dissemination of research findings which address important issues in maternal, child and women's health in low income settings. The Unit is accredited as a WHO Collaborating Centre in Reproductive Health research synthesis and participates on several WHO guideline development panels.

A Cochrane systematic review conducted by the Unit showed that calcium supplementation in the second half of pregnancy reduces pre-eclampsia and severe morbidity. The Unit hypothesised that for calcium supplementation to have a more complete effect on the development of pre-eclampsia, it would need to be commenced before conception. In 2010 they developed the protocol for a randomised, placebo controlled trial to test this hypothesis in collaboration with colleagues at WHO and in Argentina. The trial of calcium supplementation in women with previous pre-eclampsia who are planning another pregnancy is being conducted in four centres in SA (East London, Chris Hani Baragwanath Hospital, Cape Town and Stellenbosch) and in Zimbabwe and Argentina, co-ordinated by ECRU. The Unit was awarded a sub-grant of USD 1 600 000 to conduct this trial from the University of British Columbia, a grantee of the Bill & Melinda Gates Foundation. If shown to be effective, the next step would be a food fortification study, with a view to developing a population-based approach to calcium supplementation to reduce pre-eclampsia. More than 800 women have been recruited.

In 2013 the Unit completed participation in the PROMISE PEP study to determine the effectiveness of two methods of HIV prophylaxis during breastfeeding, as well as follow-up of a randomised trial comparing injectable progestogen contraception and the copper intrauterine device.

Also in 2013, Ms Mandisa Singata, the Deputy Director completed a randomised trial of the effects of depot medroxyprogesterone acetate versus the copper untrauterine device on postpartum depression and sexual function, in fulfilment of requirements for her PhD degree.

In 2013 the Unit was awarded a grant by WHO to undertake the 'Gentle Assisted Pushing' Study, a randomised clinical trial assessing the effectiveness of upright posture and a modified method of gentle fundal pressure in the second stage of labour. The study will be completed over the next two years.

The Unit is a member of a multinational consortium planning a randomised trial to assess the effect of various contraceptive methods on HIV acquisition (the ECHO study).

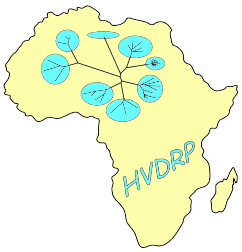
In the 2012/2013 period the unit produced 19 systematic reviews and clinical research papers for publication in the Cochrane Library and other DHET-recognised journals. The team is responsible for updating more than 50 Cochrane reviews, making a substantial contribution to the Cochrane Library and the WHO Reproductive Health Library.

Prof Hofmeyr was awarded the South African Medical Association 'Spirit of Medicine' Award, 2012, a DSc (Wits) in 2013, is an Editor of the Cochrane Pregnancy and Childbirth Group and the regional Editor for the WHO Reproductive Health Library.

www.wits.ac.za//academic/health/research/researchoffice/researchentities/17081/ecru.html

Research Entities

HEPATITIS VIRUS DIVERSITY RESEARCH UNIT



Director: **Professor Anna Kramvis**

The Hepatitis Virus Diversity Research Programme (HVDRP) was established in 2008. The Unit studies sequence variation of hepatitis viruses, in particular of hepadnaviruses, their functional characterization and their role in the clinical manifestation of liver disease.

In South Africa, Hepatitis B Virus (HBV) has a prevalence of 5% to 20%, with a correspondingly high incidence of hepatocellular carcinoma (HCC) i.e. liver cancer. The predominant strain of HBV that infects South Africans, subgenotype A1 is different to strains found in other hyperendemic regions of the world. Southern African Black carriers of the virus infected with this subgenotype have a 4.5 increased risk of developing HCC than individuals infected with other genotypes of the virus.

The Unit completed a number of studies on the genotyping and molecular characterization of HBV isolated from carriers of HBV with liver disease, from different populations. Studies carried out at the HVDRP showed that subgenotype A1 predominates in both Kenya and in Kerala, India. This prevalence is comparable to the South African prevalence. In contrast, Sudanese carriers of HBV, with liver disease were mainly infected with genotypes D or E. The latter is the first study to molecularly characterize hepatitis B virus from liver disease patients in Sudan and also the first study that allowed the comparison of individuals infected with either genotype D or genotype E. In Maranhão state, located in northeastern Brazil, where the population is heterogeneous, with a high proportion of African descendants, subgenotype A1 was found to be the most prevalent (67%), followed by genotype D (28%). The high frequency of subgenotype D4 (24%) together with previously reported data on the distribution of HBV/D4 in the world suggests that this subgenotype was more prevalent in the African continent in the past and may have been introduced in Maranhão by means of the slave trade during the late XVIII century, when the largest number of African slaves arrived to this region.

The HVDRP has initiated research into HBV-HIV co-infection in both urban and rural cohorts. The epidemiology and molecular characterization of HBV isolates from HIV infected Sudanese individuals found that the ratio of genotype A to non-A was higher than that in mono-infected patients. Also, the genotype E intragroup divergence in HBV/HIV co-infected individuals was significantly higher than that in HBV mono-infected patients.

The exact function of Hepatitis B e Antigen (HBeAg), an indicator of active viral replication, is still a mystery. However, the conservation of this secreted, non-particulate protein among hepadnaviruses is evidence of its importance. Histological examination found HBeAg in different cellular locations and a recent study by HVDRP followed the localization and trafficking of wild-type and mutant HBeAg and its precursors. HBeAg and its precursors localized in the nucleus in the early stages following transfection and progressively moved into the cytoplasm. Localization in the nucleus suggests an interaction between precore proteins and host chromatin. This possibility is being investigated as this interaction could be important in the establishment of viral persistence and clinical manifestation of disease.

A PhD study focused on the development of bioinformatics tools to explore ultra-deep pyrosequencing (UDPS) data of the basic core promoter/precore/core region of HBV, and to compare results with cloning based sequencing (CBS). This resulted in two online bioinformatics tools, the 'Deep Threshold Tool' and the 'Rosetta Tool' (http://hvdr.bioinf.wits.ac.za/tools/). The study showed that CBS detected fewer than 50% of the substitutions detected by UDPS.

www.wits.ac.za//health/hvdrp

PERINATAL HIV RESEARCH UNIT

PHRU
IMPROVING LIFE THROUGH RESEARCH
Perinatal Research Unit of the University of the Witwatersrand

Director: **Professor Glenda Gray**

The Perinatal HIV Research Unit (PHRU) is situated at the Chris Hani Baragwanath Hospital in Soweto. The Unit's current research scope spans HIV prevention, HIV/AIDS treatment and TB. They also conduct socio-behavioral research that focus on understanding and improving the lives and health of individuals across the lifespan through research related to the prevention and treatment of HIV/AIDS. During the 2012/2013 review period the PHRU published over 70 peer-reviewed articles of which two were published in the prestigious journal *The Lancet* and three in the top medical journal, the *New England Journal of Medicine* (*NEJM*) which has an impact factor of 53.

The PHRU has active clinical research sites affiliated with the HIV Vaccine Trials Network, HIV Prevention Trials Network, the International Maternal Pediatric Adolescent AIDS Clinical Trials and the AIDS Clinical Trials Group.

In 2013, PHRU was awarded a major grant from the National Institutes of Health which will fund the National Institute for Allergies and Infectious Diseases clinical research conducted by the Unit in Soweto for the period of 01 January 2014 to 31 December 2021.

The PHRU was involved in the Children with HIV Antiretroviral Therapy (CHER) randomised trial that concluded in 2008 and published the 5-year follow up results in *The Lancet* in 2013. The CHER trial focused on HIV-infected asymptomatic infants younger than 12 weeks with a percentage of CD4-positive T lymphocytes (CD4%) of 25% or higher. From these, 377 infants were randomly allocated to one of three groups: deferred ART, immediate ART for 40 weeks, or immediate ART for 96 weeks, with subsequent treatment interruption. The preliminary results showed that HIV-infected infants who received early ART for a limited time and was then interrupted, had a lower risk of death or disease progression when compared to those whose treatment was deferred. The follow-up results confirmed these findings which showed that infants treated with 40 weeks of ART early had a 47% reduced risk for disease progression and those treated for 96 weeks had a 58% reduction in risk when compared with infants in the deferred ART group. The researchers also found that longer treatment periods on primary ART permits longer subsequent interruption, with marginally better outcomes.

The Unit conducted a further randomised trial in six African countries and India, in HIV-infected children two to 36 months of age who had no prior exposure to nevirapine. Nevirapine-based antiretroviral therapy is the predominant and often the only treatment available for children in resource-limited settings. However, nevirapine resistance after exposure to the drug for prevention of maternal-to-child HIV transmission is common, a problem that has led to the recommendation of ritonavir-boosted lopinavir in such settings. The performance of the latter has never been rigorously established. In this trial the PHRU compared the initiation of HIV treatment with zidovudine, lamivudine, and either nevirapine or ritonavir-boosted lopinavir om these children. Virological failure or treatment discontinuation by week 24 occurred in significantly more children in the nevirapine group (40.8% vs 19.3%). The researchers also found that drug resistance, mortality and drug toxicity were higher in the nevirapine group. They concluded that the outcomes were superior with ritonavir-boosted lopinavir among young children with no prior exposure to nevirapine. The results of this trial was published in the *NEJM* and present policymakers with difficult choices as this regimen will be difficult to implement and costs twice that of the nevirapine-based regimen.

www.wits.ac.za/phru.co.za

Research Entities

Among the many new research initiatives including a number of projects in Socio-behavioural HIV Research, PHRU will aim to design and implement a series of studies to understand whether the RV144 vaccine regimen that was successful in Thailand will also be successful in SA and will focus on serotype vaccine research for HPV in young adults, the effectiveness of the two registered Flu vaccines, Agrippal and Fluvirm in geriatrics and testing the effectiveness of antiretroviral therapy in preventing the sexual transmission of HIV-1 In serodiscordant couples.

PULMONARY INFECTION RESEARCH UNIT

Director: **Professor Charles Feldman**

The Unit was established as the 'Human Ciliated Epithelium Research Unit' in 2001 and a name change to the 'Pulmonary Infectious Diseases Research Unit' was approved in 2006 when the Unit's research direction shifted away from pure studies on ciliated respiratory epithelium and investigations of the host regarding the pathogenesis of pulmonary infections, to focus more on the bacteria.

Work has progressed on studying the effects of the more recently introduced antibiotics, such as linezolid and tigecycline, on human neutrophils *in vitro* in order to determine whether these agents, similar to those of the macrolide class of antibiotics, reduce inflammation and/or influence the immune response.

Tigecycline, a recently approved, intravenously administered glycylcycline class of antibiotics was developed to counteract the increasing problem of antibiotic resistance in Gram-positive bacteria, especially *Staphylococcus aureus*, as well as some Gram-negative bacteria and anaerobes. Relatively little is known about the anti-inflammatory potential of tigecycline, specifically its interactions with human neutrophils. One aspect of the study investigated the effects of tigecycline at therapeutically relevant concentrations and greater, on alterations in cytosolic Ca^{2+} concentrations and generation of reactive oxygen species (ROS), among other things. Cytosolic Ca^{2+} concentrations were measured using spectrofluorimetry and radiometric procedures, and generation of ROS by oxygen consumption. The study found that by functioning as a calcium ionophore-like agent – independent of its antimicrobial activity and unlike that of the macrolides – tigecycline actually increased the pro-inflammatory functions of human neutrophils *in vitro*. The exact significance of this is uncertain, but could possibly account for some of the effects, including some side effects, seen with use of tygecycline in clinical practice.

The Unit is involved in a number of multicentre clinical collaborative studies, one of which is investigating pneumococcal bacteraemia.

A similar study investigating the same interactions was undertaken for the fluoroquinolone antibiotic, moxifloxacin, with human neutrophils. Moxifloxacin is used to treat respiratory infections including community-acquired pneumonia, and is also a promising antibiotic for treating tuberculosis which requires extended drug therapy. Relatively little is known about the effects of this agent on the antimicrobial and proliferative activities of human neutrophils and T-lymphocytes. This study found that extended use of this agent is unlikely to compromise the protective functions of neutrophils and T-lymphocytes and may even reinforce neutrophil-mediated antimicrobial activity by increasing the release of elastase.

The Unit is involved in a number of multicentre clinical collaborative studies, one of which has been underway for nearly five years investigating pneumococcal bacteraemia. Another study focuses on community-acquired all-cause pneumonia, as part of the Community-Acquired Pneumonia Organization (CAPO) Collaboration. A further collaborative study is exploring genetic factors which may predispose patients to community-acquired pneumonia and/or be associated with severity and outcome of this infection. The data collection for the South African component has been completed and the specimens have been shipped to the collaborating centre in the USA.

Cigarette smoking has been found to be one of the most important risk factors for pneumococcal infection. Smoking increases the risk of invasive pneumococcal disease and both the severity of this infection and the mortality are greater in smokers. A recent local research study has focused on the effects of tobacco condensate on the microbiological characteristics of appropriate clinical isolates of the pneumococcus *in vitro*.

SOWETO CARDIOVASCULAR RESEARCH GROUP

Director: **Professor Karen Sliwa**

The Soweto Cardiovascular Research Unit (SOCRU) was initiated in January 2006 and co-ordinates a range of research into cardiovascular disease in Soweto, and promotes research collaboration in this area.

In Africa, HIV/AIDS, postpartum haemorrhage and cardiovascular diseases are the most common causes of maternal death in pregnant women. This occurs in the setting of a very high overall maternal mortality. As embodied in Millennium Development Goal 5, the death of a mother not only affects the child's survival in the immediate maternal period, but also has effects throughout its life and may even impact on the next generation. Over the past 10 years, SOCRU's research focus has been in the area of cardiac disease and pregnancy generally, with a particular focus on peripartum cardiomyopathy. Professor Karen Sliwa has recently been invited to take part in a confidential enquiry into maternal death for South Africa 2011-2013.

SOCRU has performed a number of studies under the umbrella of the Heart of Soweto (HOS) Studies which included projects in the community, primary and tertiary care in Soweto. The project has now expanded under the term 'Heart of Africa studies' into nine other African countries. In 2012, a study on acute heart failure in more than 1000 cases has been published in the *Archives of Internal Medicine* journal. Those studies examine the epidemiologic transition in cardiovascular risk factors and clinical presentations of heart disease in this black African community. Focused intervention studies are underway.

A detailed dietary assessment on patients from the HOS Study with chronic heart failure highlighted the potential to improve the health status of these patients by recommending and supporting healthier food choices; particularly in respect to excess salt and soft drink consumption levels, as well as a limited intake of fruits and vegetables.

The HEDU-Africa project, a SOCRU initiative launched in 2012, aims to promote access to health information for pregnant women from previously disadvantaged socio-economic backgrounds. It is a web-based multimedia platform providing health educational material on Cardiovascular Disease in Maternity for these women and their families, the public, health care workers (nurses, midwives, counsellors) and physicians. The HeduAfrica web site (www.hedu-africa.org) provides an easy mechanism for information dissemination for the prevention and management of disease and has had extensive interest from the Department of Health.

Educational levels in young African women remain critically low. This provides a particular challenge when attempting to optimise the health of mothers and babies through educational strategies. It is estimated that up to one in two pregnant women in urban communities such as Soweto are either overweight or obese. In 2013, the HEDUAfrica PROTECT-AFRICA Study was initiated to provide readily accessible and understandable health education to this vulnerable population. This randomised study focuses on the use of an integrated, information technology-based educational intervention programme versus standard care, to minimise the risk of excessive weight gain in overweight (but not obese) pregnant African women.

In addition, as part of the Non-Communicable Diseases Research and Leadership Programme, funded by the National Institutes of Health (NIH), SOCRU has designed the REACH US SMS project. This ongoing study utilizes Short Message Services (SMSs) to understand the underlying issues that cause poor pregnancy outcomes by testing pregnant women's knowledge about risk factors that should be avoided.

Research Entities

WITS REPRODUCTIVE HEALTH AND HIV INSTITUTE

WITS REPRODUCTIVE HEALTH & HIV INSTITUTE

Director: **Professor Helen Rees**

Wits RHI's work spans the complementary fields of HIV and Sexual and Reproductive Health. The Institute's research and programmatic agenda is determined by national and regional health priorities, and includes technologies and interventions to reduce maternal and child morbidity and mortality, to reduce HIV, TB and STI infections in different target populations, and to identify strategies that can modify the structural drivers that contribute to ill-health. The RHI has a strong relationship with the National and Provincial Departments of Health and, as WHO and UNAIDS Collaborating Centre, has contributed extensively to national, regional and global health policy.

With more than eighty ongoing research and programmatic interventions, this report highlights a few that demonstrate the focus, breadth and diversity of their work.

The RHI is the coordinating partner of the Follow-on Africa Consortium for Tenofovir Studies (FACTS), a South African network of scientists, who are implementing a Phase III clinical trial to establish the safety and effectiveness of 1% Tenofovir gel used before and after sex in protecting women against HIV and genital herpes. Furthermore, RHI is participating in three studies of the NIH-funded Microbicide Trials Network including the ASPIRE study conducted across five African countries. This is a Phase III clinical trial assessing whether a slow release ARV containing vaginal ring is safe, and can protect women against HIV.

Given the Institute's major interest in womens' health, a series of HPV epidemiological and HPV vaccine studies are in progress. The HPV-in-Africa-Partnership Study seeks to evaluate the relative diagnostic performance of a novel HPV-rapid test versus other screening tests, to detect high-grade cervical intraepithelial neoplasia. The results of a study to assess the feasibility and acceptability of an HPV vaccine programme in South Africa helped to inform the national HPV-vaccine policy.

There is a pressing need to develop the most cost-effective and safe ARV regimens for use in resource-poor settings. One such treatment optimisation study is the Stavudine trial, a randomised, double-blind study to demonstrate non-inferiority of a cheaper Stavudine regimen when compared with Tenofovir.

A major focus of RHIs work is the retention in care and optimal treatment of children and adolescents who are infected with HIV and/or TB. With the new research facility in the Shadukani building of the Hillbrow Health Precinct, the RHI is implementing a series of Phase I/II studies evaluating new antiretroviral agents as part of the International Maternal Pediatric Adolescent AIDS Clinical Trials Group, as well as the complex PROMISE Study that aims to optimise the prevention of mother to child transmission. In addition, the RHI is implementing a Phase I study for a new TB vaccine for infants and the THINK study, which seeks to describe and diagnose TB-IRIS in children.

The RHI has assisted the Government with the development of the National Contraceptive Policy and associated Guidelines, and the National HPV Vaccine policy. The Executive Director co-chaired SANAC's Programme Implementation Committee. The RHI contributed to the development of guidelines for adult and paediatric HIV treatment, PMTCT and TB. RHI staff are members of many international committees (WHO, UNAIDS and NIH) and major contribution was the Executive Director's leadership of the WHO Strategic Advisory Group of Experts on Immunisation which advises the WHO's Director General on all matters related to vaccines and immunisations.

www.wrhi.ac.za/

Attendees at the School of Oral Health Sciences Postgraduate Students' get-together in 2012

School Of **Oral Health Sciences**

Head of School: **Adjunct Professor Phumzile-Hlongwa**

The School of Oral Health Sciences (SOHS) comprises of eight departments: Orthodontics and Paediatric Dentistry, Oral Rehabilitation, General Dental Practice, Oral Medicine and Periodontology, Oral Pathology, Maxillofacial and Oral Surgery, Community Dentistry and Oral Biological Sciences. In 2012 the SOHS celebrated Wits' 90th Birthday by publishing 24 articles in the South African Dental Journal Festschrift. The event raised the research output of the School from 0.66 units in 2011 to 27.43 in 2012.

The SOHS held a Research Day in 2013 for the first time in 20 years, as a platform to showcase its research activities. The event was attended by 240 participants, including staff members, undergraduate students and postgraduate students. The Research papers (oral and posters) presented represented a wide spectrum of research undertaken from all disciplines. The following Postgraduate students won prizes during the event: Dr M Michael received 'the Best Implantology Research Poster' prize worth approximately R60 000 to attend an education week overseas; Dr R Carim received the Best Poster presentation; Dr K Bennie received the Best Oral presentation.

The undergraduate Best Oral presentation 1st prize was awarded to Bachelor of Dental Science (BDS) V student, Mr N Dlamini.

Other awards received by students in 2012 are the following: Mr S van der Linde, a BDS V student won a SADA/Dentsply Student Clinician Programme award in a competition held for all Dental Universities in South Africa. The student then represented South Africa at an international conference held in San Francisco. Postgraduate student awards were received by Dr H Engelbrecht, who won the KLS Martin Registrar Award of the South African Society of Maxillofacial and Oral Surgeons; Dr N Green-Thompson, from OPD received the Registrar's best Research Award at the South African Society of Orthodontists conference. In 2013, Dr K Bennie received the Best Oral Presentation at the International Association of Dental Research (IADR) SA Division. Prof CP Owen and Dr K Bennie won Poster Awards at the 15th Biennial Conference of the International College of Prosthodontists (ICP) in Turin, Italy.

The SOHS hosted the IADR SA Division conference at Emperors Palace in Johannesburg in 2012. Prof V Yengopal, Head of Community Dentistry was appointed President of the IADR SA Division. Prof CP Owen received a Fellowship of the College of Dentistry by peer review in 2012 and was inaugurated as President of the ICP in 2013.

During the 2012/2013 review period, 98 Master of Science in Dentistry (MSc Dent) and 46 Master of Dentistry (MDent) students were registered in the School. Of these, 15 MSc Dent and 11 MDent students graduated. The School published 89 local and international publications during this period. Research and Academic collaborations were formed with the following local and international Universities: Limpopo, Pretoria, Obafemi Awolowo, Lagos, Nairobi, Botswana, Vermont, British Columbia, Nijmegen, Netherlands, Washington, Seattle, Oklahoma and Biomet (Walter Lorenz) USA.

Research Entities

SYSTEMATIC REVIEW INITIATIVE FOR EVIDENCE-BASED MINIMUM INTERVENTION IN DENTISTRY

Directors: **Dr Steffen Mickenautsch and Professor Jeff Yengopal**

The Systematic Review Initiative for Evidence-based Minimum Intervention in Dentistry (SYSTEM) obtained Research Entity status within the Faculty in May 2012. SYSTEM's aim is to establish an applicable evidence-based body of clinical knowledge in Minimum Intervention (MI) in Dentistry, which includes disease risk assessment, earliest disease detection and minimally-invasive treatment.

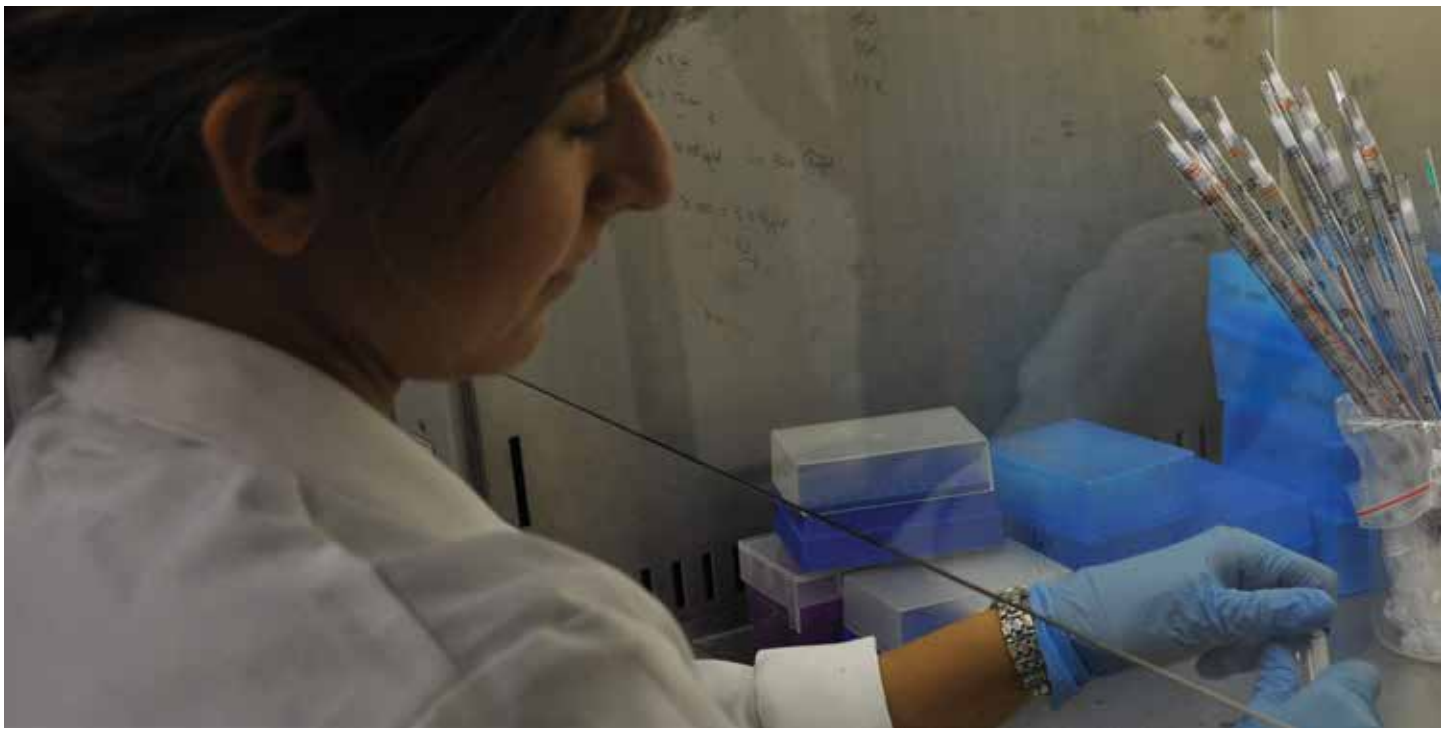
There is still a general lack of randomised control trials (RCT) in dentistry and therefore SYSTEM has departed from the common approach of strictly considering RCTs for review only. Instead they describe the current clinical knowledge about a specific topic as precise as possible and judge it on the basis of its internal validity. By using this approach they aim to derive any existing limitations that are to be addressed in future research and to ultimately advise the clinician regarding the current *status quo*.

Previous reviews by SYSTEM focused on the appraisal of the clinical merits for Chlorhexidine in the prevention of infection after tooth extraction and the use of the alcohol-sugar Xylitol in preventing tooth caries. They found that Chlorhexidine as an antibacterial agent may, when used under certain application regimes, prevent infection after tooth extraction. Xylitol products are increasingly presented as being equal to fluoride in their caries preventive effect. However, the group's systematic reviews show that such optimism may be premature.

Glass-ionomer based tooth restorations have, traditionally, been regarded as inferior to other types of fillings. Such inferiority has mostly been inferred from naïve-indirect comparisons of the results of unrelated, uncontrolled longitudinal studies. SYSTEM compared these results with that of randomised control trials which are considered the gold standard in clinical investigations. They found that results from naïve-indirect comparisons were inflated due to systematic error and thus are not suitable to guide clinical practice. Instead, the results from RCTs indicated no inferiority of glass-ionomer based tooth restorations. The Unit also investigated the clinical failure rate of using resin-modified glass-ionomer cements (RM-GIC) for orthodontic bracket bonding. This relates to the lower incidence of carious decay associated with orthodontic treatment when RM-GIC is used instead of resin-based adhesives. However, common belief considers the use of RM-GIC as less effective for bracket bonding. In contrast, the group's systematic review found no difference in efficacy up to 14 months.

For decades the complete and flawless retention of sealant materials on pits and fissures of posterior teeth has been accepted by the dental profession as the most important factor in preventing the development of tooth caries. Sealant retention has also become the principal quality criterion according to which different available sealant materials are either accepted or rejected. Consequently the dental material resin composite, shown to have the highest sealant retention rate in pits and fissures, is thus considered to be the current sealant material of choice. SYSTEM performed a meta-epidemiological study on 95 clinical trials which investigated the retention rate and related caries occurrence on resin-sealed teeth. The caries predictive power of losing resin material in pits and fissures, based on the combined data of these trials, was statistically compared to the predictive power of mere random guesses. Surprisingly they found no significant difference beyond the play of chance. Thus sealant retention loss appears not to be a valid predictor of clinical outcome.

www.system-initiative.info/



School of **Pathology**

Head of School: **Adjunct Professor Johnny Mahlangu**

The School of Pathology continued its sterling contribution to relevant and timeous biomedical research currently weighing heavily on the delivery of health care in South Africa. The ongoing epidemics of HIV, tuberculosis and malaria infections are the priority research areas in the School which are well funded in the various Divisions and Research Units. Infectious disease research efforts in the School are appropriately balanced by ongoing research on non-communicable diseases including research in diabetes, molecular genetics of cancer, haemostasis and thrombosis and a range of relatively rare genetic diseases.

The research highlights in the period under review include several publications in high impact factor journals as well as contributions of the School staff to formulation of National and International policies and guidelines. Noteworthy in this regard are the contributions made by the National Priority Group, under the leadership of Professor Wendy Stevens to the HIV and TB diagnostic response and in supporting the National Department of Health ARV delivery programme across the country.

The School of Pathology is the second largest contributor of research outputs in the Faculty after the School of Clinical Medicine. In 2012/2013 the School of Pathology increased its DHET publishing units by 34% from an average of 46.51 in 2010/2011 to 62.4 in 2012/2013. Sixty percent of this research output was contributed by the six diagnostic divisions of the

School while the four Research Units were responsible for the remaining 33% of the research output.

The School is the home to four of the Faculty's five highly contested South African Research Chairs Initiative (SARChI) Chairs funded by the Department of Science and Technology (DST)/National Research Foundation (NRF). Existing DST/NRF SARChI chair funding for Professor Shabir Madhi and Professor Maureen Coetzee were renewed in the period under review, while two new Chairs headed by Professor Caroline Tiemessen and Professor Michele Ramsay were established in the School.

Attraction and retention of postgraduate students and post-doctoral research Fellows in the School Research Units and Divisions has been successful in the period under review. There were 31 Masters and 13 PhD student graduations through the School in 2013 alone. The School currently hosts 11 postdoctoral fellows whose contribution to research output is invaluable. The number of MMed registered students in the School remains stable at an average of 62 registrars in the last two years. With the new requirement for MMed registered students to submit a research report before registration as a specialist, it is anticipated that the research out of this group will increase substantially in the next few years.

Nationally, the school continued to be the most productive School of Pathology in the training institutions associated with the National Health Laboratory Service in terms of research output, postgraduate registration and throughput. The number of applicants for MMed programmes has remained consistently more than places available in the School.

Sources of funding in the School are from diverse sources locally, Nationally and Internationally. In the past two years, the School received Local and National funding from the University Council, National Health Laboratory Service Trust, National Research Fund and Medical Research Council. International funding was from the NIH, Welcome trust and European Union to name a few.

ANTIVIRAL GENE THERAPY RESEARCH UNIT

AGTRU
antiviral gene therapy research unit

Director: **Professor Patrick Arbuthnot**

The Antiviral Gene Therapy Research Unit (AGTRU) focuses its research activities on the use of nucleic acids to inhibit viral replication, specifically of viruses with particular importance to sub-Saharan Africa. They have expertise in a range of techniques, including nucleic acid manipulation, gene transfer to mammalian cells and the use of lipoplex and recombinant viral vectors.

The Unit continued their research on the manipulation of the RNA interference pathway to inhibit hepatitis B virus (HBV), HCV, HIV-1 and Rift Valley Fever (RVF) virus. Previous approaches involved the optimization of expression cassettes that are capable of efficient silencing of viral replication as well as the use of synthetic RNAi activators aimed at silencing HBV.

Recently the emphasis of AGTRUs research has shifted to the development of safe and efficient vectors for the delivery of antiviral sequences as well as the engineering of 'designer' sequence specific DNA-binding proteins. The Unit aims to address the problem of delivery of silencing nucleic acids to target tissues through their ongoing investigations into the utility of recombinant adenoviruses, adeno-associated viruses and lentiviruses for delivery of gene silencers to target tissues such as the liver. This is a particularly challenging topic but good progress is being achieved and the technical expertise that has been established in the process will position the AGTRU team well for future investigations.

Significant results have emerged reporting on the use of Transcription Activator-Like Effector Nucleases (TALENs) for disabling HBV gene expression. The TALENs function by introducing a genetic mutation at specific target sites within the virus. These engineered DNA-digesting enzymes are very effective at recognising specific HBV sequences and introducing mutations at target sites thereby disabling specific HBV genes. This research is the first to demonstrate the use of TALENs for treating a virus infection and may have potential application in the treatment of a disease of significant global public health importance. Currently available treatment of HBV infection has modest efficacy and only rarely results in clearing of the virus from individuals carrying the virus.

In addition to the RNAi-activating gene silencers and TALENs, the AGTR Unit is developing repressor Transcription Activator-Like Effectors (TALEs) to disable HBV replication. Interest in using rTALEs as opposed to TALENs stems from the possible problematic mutagenesis that may arise following digestion of HBV sequences integrated within HBV-infected individuals. Sustained transcriptional suppression may be achieved with these gene expression inhibitors without introducing DNA cleavage. Preliminary work has demonstrated that rTALEs are effective against HBV in cultured cells and *in vivo*.

Promising results show that the use of adeno-associated and 'gutless' helper dependent adenoviral vectors which lack all the viral protein coding sequences, have achieved sustained inhibition of HBV replication in transgenic mice that replicate the virus. The AGTRU's aim now is to improve the duration of efficacy and to further minimise immunostimulation by these vectors. Also, recombinant lentiviral vectors that express anti-HBV and HIV-1 sequences have been developed and are capable of stably integrating into host cell genomes to effect sustained silencing of target viral genes.

In addition to the recombinant viral vectors, AGTRU is also developing lipoplexes and modified capsid particles for use as nucleic acid vectors. Capsid particles have the advantages of being capable of being modified to confer intended biological properties (e.g. specific tissue targeting) and they are also amenable to large scale preparation using recombinant techniques.

Research Entities

RESPIRATORY MENINGEAL PATHOGENS RESEARCH UNIT

VPD
Vaccine Preventable Diseases
RMPRU
Respiratory & Meningeal Pathogens Research Unit

Director: **Professor Shabir Madhi**

The MRC/URC Respiratory and Meningeal Pathogens Research Unit (RMPRU) and NRF/DST SARChI Vaccine Preventable Diseases Units are at the forefront of epidemiology, translational and laboratory research in the prevention of major infectious diseases causing death in young children; i.e. pneumonia, diarrheal disease and neonatal sepsis. Also, the Unit has expanded their activities to research on vaccines in HIV-infected adults and pregnant women, which are high-risk groups for many vaccine preventable diseases. The Unit has a staff complement of approximately 200, including laboratory scientists, epidemiologist, statisticians, medical doctors, nurses and research assistants.

Since the success of undertaking the first studies on the efficacy of pneumococcal conjugate vaccine and rotavirus vaccines in Africa, the findings from these studies have informed World Health Organization recommendations for the introduction of these vaccines into public health immunization programmes. Also, these studies were instrumental in South Africa being the first African country to introduce these vaccines into its public immunization programme since 2009. The field-evaluation on the effectiveness of these vaccines in reducing under-5 childhood morbidity and mortality has been investigated over the past three years by RMPRU. Findings include that rotavirus vaccination has resulted in a 40% reduction in all-cause diarrhea hospitalization, whilst pneumococcal conjugate vaccine has been effective in reducing all-cause bacterial pneumonia hospitalization by 39% and has also reduced vaccines-serotype invasive pneumococcal disease by >80% in children. An additional benefit of PCV vaccination of young infants, including in South Africa, has been reduction in pneumococcal exposure and invasive disease in unvaccinated individuals –including HIV-infected adults, due to vaccinated young children now being less likely to transmit pneumococcus in the community.

Over the past four years, following successfully competing for a USD10 million grant from the Bill and Melinda Gates Foundation (BMGF), the Unit has expanded its research to vaccination of pregnant women. This is aimed at not only protecting the women, but also directed at protection of their newborns and young infants by enhancing *in utero* acquisition of protective antibodies. The BMGF funded study provided the first evidence globally, by the Unit, from a randomised, placebo controlled trial that HIV-infected and HIV-uninfected pregnant women are protected (approximately 50% efficacy) against influenza confirmed disease by influenza vaccination during pregnancy. In addition, there is also 42% reduction in influenza confirmed illness in their infants up to 6 months of age. The findings from this study were published in the prestigious *New England Journal of Medicine.* Furthermore, the Unit has undertaken pivotal clinical and immunological studies that will help inform the future licensure of Group B streptococcus (GBS) conjugate vaccine, also targeted for pregnant women with the main purpose of protecting their young infants. This work is being further funded by a USD5 million grant to the Unit from Novartis, which aims at enrolling a cohort of 35 000 mother-newborn pairs to determine the correlates for protection against invasive GBS disease in neonates. Also, the Unit undertook the first study on a GBS conjugate vaccine in pregnant women in 2012/3. The Unit is also partnering with PATH and other industry partners on further studies in the field of maternal vaccination with Respiratory Syncytial Virus (RSV), including studies on establishing correlates for protection in the young infants.

The Unit produced 58 articles and a book chapter during the period under review, including two co-authored publications in *The Lancet*.

www.rmpru.com/

THE WITS RESEARCH INSTITUTE FOR MALARIA

Directors: **Professors Maureen Coetzee and Theresa Coetzer**

The Wits Research Institute for Malaria a joint undertaking by the Schools of Pathology and Therapeutic Sciences, under the Directorship of Professors Maureen Coetzee and Theresa Coetzer, was established in January 2013 and officially launched in November 2013. The launch was attended by many of the University's senior hierarchy as well as the Institute's patron, the UN Goodwill Ambassador for Malaria, Yvonne Chaka Chaka.

Research highlights during the period under review include:

Entomology: A seminal paper reviewing the insecticide resistance and molecular status of *Anopheles funestus* in Africa was published in the top entomology journal, *Annual Review of Entomology*. Research on the Sterile Insect Technique project continued in the Kruger National Park and northern Kwazulu/Natal, funded by the International Atomic Energy Agency and The South African Nuclear Energy Corporation (NECSA). The Akirin project continued in collaboration with the University of Pretoria and the Spanish Centre for Veterinary Health Science. The International Centre of Excellence in Malaria Research, lead by the Johns Hopkins Malaria Research Institute (USA), together with Zambian and Zimbabwean colleagues, has produced research results that will impact on both Zambia and Zimbabwe malaria vector control policy.

Parasitology: Research to screen and evaluate compounds active against *Plasmodium falciparum* gametocytes continued in collaboration with the University of Pretoria and Council for Scientific and Industrial Research (CSIR) funded by the Medical Research Council's Strategic Health Innovation Partnerships Programme. Parasite-host protein interactions were studied in collaboration with the Institut Laue-Langevin, Grenoble, France and Keele University, UK; parasite phage display projects with Tufts University, Boston, USA; and parasite protein trafficking pathways with Marburg University, Germany. Professor M. Markus in the School of Animal, Plant and Environmental Sciences published on malaria infection and immunity in *Nature Reviews Microbiology*.

Pharmacology: The evaluation of the antimalarial activity of several synthetic or naturally derived compounds was carried out in collaboration with the University of the Free State, Rhodes University, Tswane University of Technology, Medical University of Lublin and SANBI. Four groups of novel synthetic compounds were investigated in collaboration with the Indian Institute of Technology, Guwahati, and Jamia Millia Islamia, India. Molecular projects examining *Plasmodium falciparum* kinase (PfcGAK) as a potential target were initiated.

Publications

A total of 21 papers were published by staff and students affiliated with the Institute.

Postdoctoral Fellows and Postgraduate Students

Eight postdoctoral fellows were active in the Institute in 2013. Two Doctoral, five Master of Science (MSc) and six Honours students graduated and a further eight Doctoral and 17 MSc students were supervised.

Research Entities

From left: Professor Beverley Kramer, Professor Judy Bruce, Professor Robyn van Zyl, Yvonne Chaka Chaka, Professor Theresa Coetzer, Professor Maureen Coetzee, Professor Sharon Fonn, Professor Johnny Mahlangu and Professor Laetitia Rispel at the launch of WRIM in 2013

THE DST/NRF CENTRE OF EXCELLENCE FOR BIOMEDICAL TB RESEARCH

Director: **Associate Professor Bavesh Kana**

The DST/NRF Centre of Excellence for Biomedical TB Research (CBTBR) was established by the Department of Science and Technology (DST) and the National Research Foundation (NRF) to facilitate biomedical research on tuberculosis (TB). The CBTBR is made up of three distinct nodes: Wits, Stellenbosch University (SU) and the University of Cape Town (UCT).

The success of the CBTBR has been a result of the concerted efforts of the three nodes, which strive to excel in their respective areas of expertise and to serve as outstanding platforms for the training and development of postgraduate students and Postdoctoral Fellows.

A key feature of the Wits node is that it is co-hosted with the National Health Laboratory Service (NHLS); its laboratories are housed within the central complex of the NHLS in Braamfontein. The Wits node has two Biosafety Level II (BSLII) and three Biosafety Level III (BSLIII) laboratories, the latter for research on human pathogens under containment conditions. The largest of the three BSLIII laboratories, which conforms to international standards, serves as the primary platform for pathogen work at the Wits node.

The Wits node of the CBTBR has been engaged in research and development activities that aim to address the TB epidemic through basic, applied, operational and clinical research. The basic research involves a genetic approach to the identification and validation of new drug targets for TB disease. This research encompasses addressing the key knowledge gaps that have hampered the development of new effective drugs, these include mechanisms of bacterial persistence, emergence of drug resistance and energy metabolism. Some of these studies not only involve basic research but also involve clinical research, most of which are aimed at developing a more comprehensive understanding of bacterial physiology during TB infection in humans. Operational research involves a multi-pronged approach to ensure effective rollout of new molecular diagnostics and the development of faster culture-based diagnostic methods. These activities occur in the backdrop of concerted human capacity development which takes the form of careful and rigorous postgraduate student training and mentoring mid-career scientists.

The team (which includes three Masters, four Doctoral students and three Postdoctoral Fellows) has received international acclaim for its research, which has been published in leading international research journals. Projects include:

1. Identification and characterization of dormant bacterial populations in the sputum of patients with active TB disease

This project is aimed at identification of resuscitation promoting factor-dependent (RPFd) organisms in the sputum of patients with active TB disease. These bacteria are non-culturable and hence are not identified using routine culture. Moreover, they

are phenotypically resistant to chemotherapeutic intervention and their presence in sputum may have significant consequences for disease treatment and transmission. The Wits node of the CBTBR aims to identify these dormant bacteria through supplementation of sputum cultures with culture filtrate, from *M. tuberculosis*, containing resuscitation promoting factors (Rpfs) with the concomitant use of an Rpf deficient mutant as a negative control. These assays reveal that all TB infected individuals harbor variable proportions of bacteria that emerge when the culture media is supplemented with CF with or without Rpfs.

2. Counter-screening models for TB drug development

M. tuberculosis is unique amongst bacterial pathogens since it can grow and survive in multiples niches in the human body (lung, CSF, spine etc) which ultimately leads to complex clinical outcomes. Furthermore, the refractory nature of this organism to drug treatment nesseciates a protracted, six-month treatment period in an attempt to eradicate all persisting organisms. In light of this, there has been significant effort from drug development programs in establishing models for screening potential new compounds under laboratory conditions that induce bacterial persistence. The Wits node of the CBTBR has undertaken the development of specialist screening models with the ultimate aim of establishing and validating new screening modalities for South African TB drug development consortia.

3. Establishment of an external quality assurance assay for GeneXpert

The GeneXpert has revolutionized detection of TB infection and provides the exciting possibility of making an accurate diagnosis within a time frame of two hours. In recognition of the potential of this technological platform to revolutionize TB control, the South African Department of Health adopted the national rollout of GeneXpert in 2011. However, local and national reference laboratories had no mechanism for validation and external quality assurance (EQA). The Wits node of the CBTBR was able to fill the technological gap by creating a production pipeline for inactivated, titred organisms that could be used for instrument verification and EQA.

The CBTBR was able to provide sufficient organisms for the planned rollout and additional material for the verification of over 500 GeneXpert instruments in correctional facilities and mining operations. Moreover, the success of these endeavors garnered significant international attention and numerous African countries, India, China and recently Brazil have all requested material for verification of GeneXpert instruments. The material from the CBTBR will now also be shipped globally, under the GLI label, for all GLI, CDC and WHO sites. By the end of 2014, the CBTBR will provide material for the *global rollout* of GeneXpert.

School of **Physiology**

Head of School: **Professor David Gray**

The research activities of the School are broad covering both human and animal physiology. The School houses three URC/FRC research entities namely, the Brain Function Research Group (BFRG), the Cardiovascular Pathophysiology and Genomics Research Unit (CPGRU) and the Bone Research Laboratory (BRL) (see reports below). In addition, there are other active research areas covering exercise physiology, stress physiology, biomechanics, gastrointestinal physiology and receptor biology.

Exercise Physiology Research Laboratory

This Laboratory focuses on the role that exercise, physical activity and sedentariness play in relation to chronic disease and health. The lab is a strong proponent of the 'Exercise is Medicine' campaign - a global initiative which aims to make physical activity a standard part of global disease prevention. Some recent research highlights include: a novel exercise intervention completed at the Ma'Afrika Tikkun 'Wings of Life' community centre in Diepsloot, which involved working with the team leaders and management at this community centre implementing an exercise intervention for children who attend the centre. One of the long term goals of the research team is to set up and co-ordinate community group exercise sessions for adults and children. The lab has recently embarked on a new series of studies examining endothelial and vascular function in healthy and diseased populations. In addition, the lab has ongoing projects at the Rheumatology Clinic at Chris Hani Baragwanth Hospital examining the role of physical activity and inactivity (using accelerometers) in patients with rheumatoid arthritis (RA) as an indicator of functional ability.

Gastro-Intestinal Research Laboratory

The research thrust of this laboratory is to investigate the nutraceutical and medicinal properties of indigenous plants with a focus on uncovering non-conventional sources of macronutrients and preventing metabolic dysfunction. Intrinsic and extrinsic influences on the osmotic fragility of mammalian and avian erythrocytes are also explored.

Stress Research Laboratory

The research focus of this laboratory is the physiological response to stress and the pathophysiological consequences of stress. This research covers two separate but intrinsically linked areas: (1) human and laboratory-based investigations of stress and the associated psychoneuroimmune responses and (2) field-based investigations of the stress of capture, handling and confinement of wildlife, including translocated rhinoceroses.

Receptor Biology Laboratory

The Receptor Biology Group studies the mechanisms of action of G protein-coupled receptors that are important in reproductive health. The crucial role of this family of receptors in HIV infection is of particular interest. Understanding the interaction of the virus with human receptors is important for developing strategies to treat and prevent infection. The Group uses a range of molecular techniques to study the mechanisms by which HIV infects human cells.

Biomechanics Laboratory

The research conducted in the biomechanics laboratory is focused around three different themes all of which explore the interaction between physiology and biomechanics (specifically human movement). The first research theme of the lab is sports performance, where current studies investigate the role of biomechanics and physiology in cricket and golf performance. The second theme has to do with clinical research and involves exploring spinal hyperexcitability using biomechanical and physiological methods. The final research thrust is pure (non-applied) biomechanics. Under this latter theme current studies are investigating the measurement of the human centre-of-mass.

BONE RESEARCH LABORATORY UNIT

The Unit in 'world first' experiments, has translated dramatic discoveries from the bench and from non-human primates to the clinical bedside.

Director: **Professor Ugo Ripamonti**

The Bone Research Laboratory (BRL) primarily focuses their research on tissue biology and regenerative medicine. As life expectancy lengthens, the role of regenerative medicine to improve the quality of life is becoming increasingly important. The BRL in world first experiments, have translated dramatic discoveries from the bench and from non-human primates to the clinical bedside.

The Unit has shown that in non-human primates *Papio ursinus*, the mammalian transforming growth factor ß proteins (TGF-$ß_1$, - $ß_2$ and -$ß_3$ isoforms) induce rapid and substantial endochondral bone formation and that the mammalian hTGF-ß3 isoform is the most powerful inducer of bone formation so far tested in these primates. In translating this research to the bedside they have engineered novel three-dimensional osseous constructs deploying the hTGF $ß_3$ isoform for cranio-mandibulo-facial applications in paediatric patients affected by disfiguring neoplastic mandibular conditions.

In addition, the Unit has made several significant contributions to the field of bone induction. An important discovery has been the mechanistic understanding of the spontaneous induction of bone formation by macroporous constructs when implanted in extraskeletal heterotopic intramuscular sites. A study by the BRL describing the osteointegration and induction of bone formation by geometrically designed hydroxyapatite-coated titanium implants showed superior osteointegration compared to standard planar implants. It also demonstrated that a titanium implant with repetitive concavities on its external surface induces bone formation by providing a unique microenvironment for growth initiation. This is the first titanium device that has been shown to be inductive in pre-clinical studies in non-human primates and is now ready for translation in clinical contexts. This major result has been published in *Biomaterials*, the leading journal in biomaterial sciences.

The BRL continually builds on their groundbreaking research. They have previously shown that binary applications of recombinant human osteogenic protein (hOP-1) and hTGF-$ß_3$ induce the most significant and striking induction of bone formation in defects of the non-human primate *Papio ursinus.* Studies are currently underway to obtain long-term results after implantation. The combination of Noggin, a negative regulator and inhibitor of bone morphogenetic proteins, with osteogenic devices reconstituted with the TGF-$ß_3$ protein will show whether the endochondral osteoinductivity of the TGF-$ß_3$ protein in the primate is primarily due to the expression of bone morphogenetic proteins at the site of surgical implantation.

In seminal recently published research, the BRL has shown that the induction of bone formation as initiated by the TGF-$ß_3$ protein is *via* the bone morphogenetic proteins (BMPs) pathway. Recombinant hTGF-$ß_3$ elicits the induction of bone formation upregulating endogenous BMPs and its activity is blocked by recombinant hNoggin, a BMPs antagonist/inhibitor.

The discovery of the induction of bone formation by the three mammalian hTGF-ß isoforms has been a world-first discovery of the BRL, further potentiated by the mechanistic insights into the induction of bone formation by BMPs genes. Only a concerted genetic, molecular and morphological approach will break the boundaries of super-healing.

www.wits.ac.za/ academic/health/research/ boneresearchunit/10305/home.html

Research Entities

BRAIN FUNCTION RESEARCH GROUP

Director: **Associate Professor Andrea Fuller**

The Brain Function Research Group (BFRG) was granted formal Research Group status by the University 25 years ago. The Group, now with a circle of international collaborators and honorary fellows, continues to thrive, attaining high research outputs in recent years in the fields of pain, sleep, fever and wildlife conservation physiology.

The Pain Laboratory, one of the four research laboratories in the Group, has two main research thrusts: pain related to HIV infection and dysmenorrhoeic pain. The research on HIV-related pain covers the assessment, epidemiology, genetics and pathophysiology of HIV-related pain, with a particular focus on chronic pain resulting from peripheral nerve damage by the HI virus and neurotoxic antiretroviral drugs. Recently, the lab was the first to publish results on genetic risk factors for pain in an African population. The team's research on dysmenorrhoeic pain, a common painful condition in women that recurs every month across the reproductive years, aims to better understand the pathophysiology of dysmenorrhoeic pain, including its effects on sleep quality. Current research focuses on differences in pain sensitivity across the menstrual cycle between women with dysmenorrhoea and women without the condition, and the pharmacological treatment of dysmenorrhoeic pain.

The Wits Sleep Laboratory is the only dedicated sleep research unit in Southern Africa. Its research topics comprise: the interaction between immune function, sleep and circadian rhythms; restless legs syndrome (RLS); and sleep and exercise. In a cross-sectional and longitudinal study, the team is investigating the association between sleep disruption and immune reconstitution in HIV patients. Another study is examining how sleep disruption and circadian misalignment may contribute to the pathogenesis of autoimmune conditions. The team has extended its recently published work on RLS to investigate RLS in children and how magnetic stimulation affects RLS, and also is conducting research on how a nap may affect exercise performance, and the relationship between sleep, body composition and exercise in South African adolescents.

The Fever Laboratory has two main thrusts: pathophysiology of fever and sickness behaviour and immune activation, cognition and physical growth. The team has published research recently on the role of cytokines and prostanoids as endogenous mediators of fever and sickness behaviours, in particular anorexia and lethargy. The team's research on immune activation, cognition and physical growth covers investigating the degree to which physical growth and cognition, specifically learning and memory is compromised by acute and recurrent acute infections during distinct periods of development, namely infancy, adolescence and adulthood. Given that the sex of an individual can have profound influences on the functioning of the developing nervous and immune system, they also are focusing on determining if sex differences exist with regard to the consequences of immune activation on cognitive functioning.

The Wildlife Conservation Physiology team focuses on the ecophysiology and thermoregulation of African, Australian and Arabian mammals, as well as the physiological responses of wild mammals to global climate change and game capture procedures. Their work has yielded imported insights recently on how large mammals may buffer some consequences of climate change through behavioural and physiological modifications. In 2013, the team published a study using biologging techniques to remotely measure the body temperature and locomotor activity of free-living cheetah, hunting spontaneously. Their results, widely publicised in the science media, showed that cheetah did not abandon hunts because they overheated, thereby debunking a long-held myth.

www.wits.ac.za/bfrg

THE CARDIOVASCULAR PATHOPHYSIOLOGY AND GENOMICS RESEARCH UNIT

The Unit has provided substantial further knowledge on the causes and consequences of increases in aortic blood pressure.

Directors: **Professors Gavin Norton and Angela Woodiwiss**

The Cardiovascular Pathophysiology and Genomics Research Unit (CPGRU) aims to identify novel mechanisms responsible for cardiovascular damage and dysfunction; to enhance cardiovascular risk prediction; and to develop the most appropriate strategies to prevent cardiovascular events in poor communities in South Africa. In the past five years, the work of the Unit has resulted in 73 publications, 47 of which were in high impact journals, and in 14 PhD and 12 MSc student graduations. Some of the more meritorious findings of the Unit over this time period are outlined below.

In a series of papers published in the journals *Hypertension* and the *American Journal of Hypertension* the Unit has provided convincing evidence for a role of the renin-angiotensin-aldosterone system (RAAS) in salt-sensitive hypertension, thus in contrast to guidelines, providing the data to indicate that RAAS blockers should form part of antihypertensive therapy in groups of African ancestry.

The Unit has provided novel approaches to risk prediction for critical lower limb ischaemia (CLI)(which often results in loss of limbs) in HIV positive and negative patients alike. As CLI is often not preceded by symptoms, the Unit has provided a novel index of arterial function which predicts CLI with a high degree of accuracy. Moreover, in young HIV positive patients with CLI in who traditional risk factors for occlusive arterial disease are limited, the Unit has demonstrated that a measure of carotid structure (initima-media thickness) predicts CLI to the same degree as HIV negative patients with CLI. This work was published in the *Journal of AIDS and Clinical Research* and the *European Journal of Vascular and Endovascular Surgery.*

In a series of studies published in the journals *Hypertension, Journal of Hypertension* and the *American Journal of Hypertension*, the Unit has provided substantial further knowledge on the causes (genetic, salt intake and inflammatory effects) and consequences (end-organ damage and mortality) of increases in aortic blood pressure (BP) beyond that measured at the brachial artery. As aortic BP measurements are likely to improve risk prediction, but the cost of such devices prohibits their routine use, the Unit has subsequently developed a simple formula that estimates aortic BP from simple clinical measurements. This formula has subsequently been shown to predict total mortality beyond brachial BP.

Furthermore, the Unit has produced a series of papers published in the *Journal of Hypertension, American Journal of Hypertension* and *Blood Pressure Monitoring* to show that

www.wits.ac.za/physiology/cpgru/9001/cpgru.html

Research Entities

office BP measurements in groups of African ancestry are confounded by a high prevalence of an alerting response, which although associated with end-organ changes, these associations are not accounted for by BP effects, and which are inherited. Hence, the Unit is attempting to identify methods of BP measurement which limit these alerting responses.

Research published in the journals *Hypertension*, *Journal of Hypertension* and *Clinical Research in Cardiology* has also further contributed toward our understanding of obesity-associated left ventricular hypertrophy (LVH) as a cause of cardiac systolic and diastolic cardiac dysfunction, thus providing further insights into obesity as a possible cause of heart failure. In this series of papers the Unit has identified that electrocardiography is a poor measure of LVH in obesity, but further developed a simple formula that predicts LVH with a high degree of accuracy.

In a number of papers published in *Annals of the Rheumatic Diseases*, *PLOSOne*, *International Journal* of *Cardiology*, *Basic Research in Cardiology*, *Hypertension*, and other journals, the Unit has further contributed toward our understanding of the role of inflammatory markers in mediating cardiac and vascular damage and the mechanisms responsible for cardiac dilatation in end-stage heart failure.

Professor Gavin Norton

School of **Public Health**

Head of School: **Professor Laetitia Rispel**

In January 2013, the Wits School of Public Health (WSPH) celebrated the move to its new, state-of-the-art building by hosting an international public health symposium entitled *'Building Capacity 4 Health'.* The symposium programme dealt with critical issues that are relevant at both national and global levels. Drawing global attention to the work of the WSPH, a special issue of the international peer-reviewed journal, *Global Health Action*, was published as part of the celebrations. The journal features 23 articles by staff and students, of which 15 (63%) were authored by postgraduate students or junior academics. The full supplement can be found at: http://www.globalhealthaction.net/index.php/gha/article/view/20445

One of the hallmarks of the WSPH is their relentless quest to build capacity and new knowledge for health. The School encourages an environment where researchers continually raise new questions in order to improve population health and the performance of the health system. Their two research entities, the MRC/Wits Rural Public Health and Health Transitions Research Unit (the MRC/Wits-Agincourt Unit) and the Centre for Health Policy (CHP) were re-affirmed as MRC extramural, flagship research units during the review period.

The School's research in occupational diseases, specifically those related to mining exposures such as asbestos, silica and manganese, has advanced public health knowledge in South Africa. Silicosis rates in gold miners remain a national concern and a focus of government with rates having increased 10 fold in black gold miners in the last 30 years. The WSPH occupational health group continues to search for and identify environment exposures to the lethal asbestos fibres, long after the mines closed and the use of asbestos was banned in

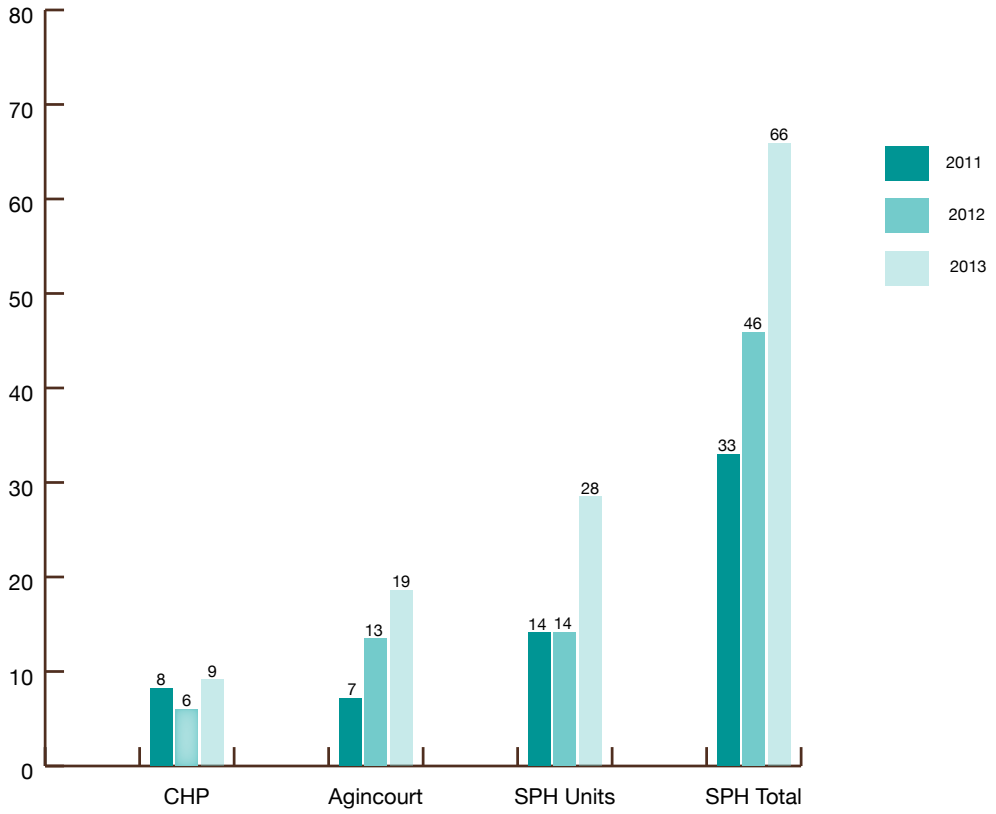


Figure: WSPH publication unit outputs 2011-2013

South Africa. Characterising the health effects of manganese exposure is a relatively new focus and collaborations have been forged. The autopsy database at the National Institute for Occupational Health (NIOH) continues to provide rich data for research into occupational diseases in all mining commodities, and several papers were published in 2012 and 2013.

The Department of Community Health specialists and registrars published several peer-reviewed articles in national and international journals. Of particular interest is the research published in the journal *Environmental Research* in 2013 on '*Lead poisoning among young school children in a South African subsistence fishing community*'. The researchers presented several oral papers and posters at the 2012 and 2013 Public Health Association of South Africa (PHASA) conferences.

The Division of Epidemiology and Biostatistics has made noticeable progress in strengthening research in infectious and non-communicable diseases and advancing biostatistics research methodology. The latter includes a proposal on development of spatio-temporal surveillance methods to support tuberculosis control in South Africa, health education and an awareness model for early tuberculosis diagnosis in resource-limited settings and sexual practices of women and their partners during and after pregnancy. For non-communicable diseases, research has included effectiveness of strengthened facility services and patient outreach groups for hypertension treatment. The Division's focus has also been on secondary data analyses using national datasets. The Division has excelled in collaborative research and notable examples include collaboration with the MRC/Wits-Agincourt Unit and CHP, and externally with the Wits Department of Paediatrics and Child Health, Warwick (UK) and Washington Universities, St. Louis, Missouri, (USA) and the Swiss Tropical Public Health Institute.

CENTRE FOR HEALTH POLICY

The Centre for Health Policy
Health Policy and Systems Research

Director: **Dr Jane Goudge**

The broad field of work of the Centre for Health Policy (CHP) is that of health policy and systems research. Strongly committed to the principles of social justice, equity, academic excellence, independence and transparency, CHP draws together theoretical insights and empirical evidence in understanding health system change and in proposing strategies for future health systems development. CHP conducts both independently-funded and commissioned research and also provides technical support to both national and provincial Departments of Health. CHP continues to engage in and influence policy both nationally and internationally.

In 2013, CHP received a grant of about R15 million from the British Medical Research Council to facilitate a new randomised controlled trial on treating hypertension in rural South Africa, exploring the role of clinic-based lay health workers to enhance integrated chronic care. This project, known as 'Nkateko' (meaning blessing), is a new partnership between the School of Public Health, Warwick University and provincial and national Department of Health.

The CHP is also involved in a number of other large, multi-partner projects. The UNITAS project aims to support the implementation of reforms intended to achieve universal health coverage in South Africa and Tanzania by monitoring and evaluating the policy processes. The Resilient and Responsive Health Systems (RESYST) programme focuses on health policy and systems research in Africa and Asia to promote health and health equity and also aims to reduce poverty. A four-year project on Health Systems and Maternal Health (WOTRO) aims to mainstream a health systems approach to delivery of maternal health services through trans-disciplinary research in Rwanda and South Africa. The multinational project, the Multilateral Association for studying Health Inequalities and Enhancing North-South and South-South Cooperation (MASCOT) which ended in March 2014 identified and implemented strategies for tackling health inequalities preferentially affecting children, adolescents and mothers.

In 2013, CHP closed the four-year Research on the State of Nursing (RESON) project funded by The Atlantic Philanthropies. Research from this project has enhanced nursing policy discourse, and led to improved design of human resource plans and support systems for nurses. In 2014, a special edition of the international peer-reviewed journal, *Global Health Action* will be published featuring the results of this important research project.

Universal coverage of health care is receiving substantial global and national attention, but the debate continues on the best mix of financing mechanisms, particularly to protect those outside the formal employment sector. In a paper published in *The Lancet*, CHP examined the equity in financing and use of health care in Ghana, South Africa and Tanzania, with implications for paths to universal coverage. Among the findings was that overall distribution of service benefits in all three countries favoured richer people, although the burden of illness was greater for lower-income groups. Access to needed, appropriate services was the biggest challenge to universal coverage in all three countries.

CHP also recently appointed Professor John Eyles, an eminent international research scientist, as the new SARChI Chair for Health Policy and Systems Research. Also in 2013, after a comprehensive five-year review the South African Medical Research Council (MRC) confirmed its funding support and MRC Unit status of the MRC-Wits Health Policy Research Unit located within CHP. Over the period under review, CHP produced 105 peer-reviewed publications, as well as 16 book chapters, five editorials and 33 technical reports.

Research Entities

MRC/WITS UNIT IN RURAL PUBLIC HEALTH AND HEALTH TRANSITIONS RESEARCH

AGINCOURT
Health & Population Unit
School of Public Health - University of the Witwatersrand
Medical Research Council Wits Rural Public Health and Health Transitions Research Unit

Director: **Associate Professor Stephen Tollman**

The Agincourt health and socio-demographic surveillance system (HDSS), located in rural northeast South Africa close to the Mozambique border, provides the foundation for the MRC/Wits Rural Public Health and Health Transitions Research Unit (the MRC/Wits-Agincourt Unit) which is situated in the School of Public Health, Wits. Within the Unit, the Priority Cost Effective Lessons for System Strengthening (PRICELESS) plays an integral role in producing policy relevant economic evaluation research outputs. MRC/Wits-Agincourt Unit also serves as a satellite secretariat of the INDEPTH Network and leads selected multi-centre studies.

The MRC/Wits-Agincourt Unit endeavours to better understand the dynamics of health, population and social transitions in rural South (and southern) Africa in order to mount a more effective public health, public sector and social response. The Unit undertakes research to elucidate causal pathways and test interventions across the life-course.

In 2013, by using longitudinal HDSS data, researchers showed the probability of young children dying before and after their mother's death, and that young children in lower resource households were more likely to die not only after their mother's death but also in the months before, when she is seriously ill. This calls for critical multi-sectorial interventions to support children of seriously ill mothers. Children are also at a high risk of dying when another child in their household is very ill or has recently died.

One of Agincourt's projects, Ha Nakekela ('we care') on HIV and non-communicable disease prevalence and their risk factors highlighted that the HIV prevalence of older adults peak at 45.3% among men and 46.1% among women at 35-39 years. The high prevalence among older adults presents a challenge to health systems in terms of prevention and treatment in the context of increased risk of non-communicable disease.

The MRC/Wits-Agincourt Unit currently runs a number of collaborative trials which target critical problems affecting the health and wellbeing of children and adolescents. The Ntshembo ('hope') project aims to improve the health and nutrition of adolescents and their infants to reduce the inter-generational risk of metabolic disease. The Swa Koteka ('we can') multi-level HIV-prevention trial aims to reduce HIV transmission in adolescent girls by encouraging them to remain in high school through a conditional cash transfer; and by influencing gender norms through community mobilisation focused on men.

The Nkateko ('blessing') trial, run together with the Wits Centre for Health Policy, aims to address weaknesses in chronic care systems and emphasise integrated management of chronic infectious and non-communicable diseases.

In addition, a portfolio of work examines household responses to shocks and stresses and the resulting pathways influencing child and adult health and wellbeing. This includes the care and support roles of older women, intra- and inter-household social connections, use of natural resources, and diverse migration and livelihood strategies.

In 2013 research by PRICELESS on the effect of reducing salt content on cardiovascular disease culminated in the regulation of salt in manufactured foods being passed at National level and will be implemented in 2016. During the review period, the group also published a number of journal articles on measles control in sub-Saharan Africa and a full economic evaluation of a child health delivery platform. A new project, entitled PEECHi (Programme on the Economic Evaluation of Child and Maternal Health Interventions), will evaluate the cost-effectiveness of interventions to reduce maternal and child mortality, specifically in the context of Primary Health Care, to improve health resource allocation across a range of investment options.

www.agincourt.co.za/

School of **Therapeutic Sciences**

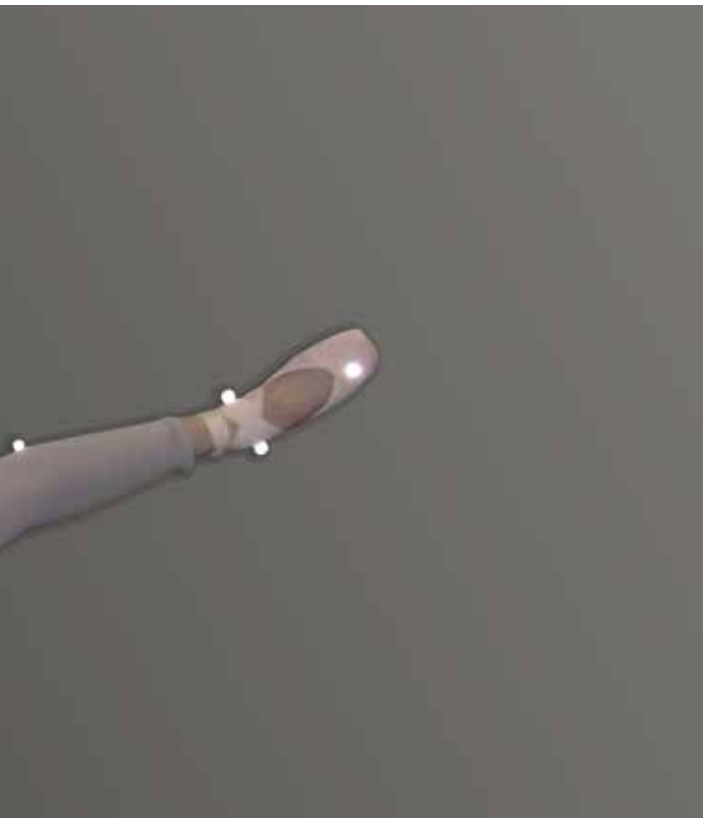
Head of School: **Professor Judith Bruce**

The School of Therapeutic Sciences comprises of five departments: Nursing Education, Occupational Therapy, Physiotherapy, Pharmacy and Pharmacology and the Centre for Exercise and Sport Medicine. In 2013 the School was number three out of seven Schools in terms of publications output which contributed 15% towards the Faculty's publications output (up from 7.5% in 2012). The jump in publications between 2012 and 2013 was a concerted effort from all departments with special mention of the Departments of Physiotherapy and Pharmacy and Pharmacology who almost doubled their publications for 2013. The School produced five PhDs in 2012 and 10 PhDs in 2013, with 26 MSc graduates in 2012 and 37 in 2013 which greatly contributed towards its growth in research.

The Department of Nursing Education produced nine MSc graduates in 2012 and eight in 2013. They had two PhDs in 2012 and four in 2013. They published four articles in 2012 and six in 2013.

The Department of Occupational Therapy is strengthening its research capacity. It graduated four MSc students in 2012 and eight in 2013. They had three publications in 2012 and eight in 2013. Their staff won three awards at different research related forums during the review period.

The Physiotherapy Department continues to grow in its research endeavors. It had seven MSc and two PhDs in 2012 and 13 MSc and three PhDs in 2013. Their publications were



13 in 2012 and 29 in 2013. There are various research projects being undertaken by the Department. The movement laboratory is busy with a number of research projects being undertaken.

The Wits Advanced Drug Delivery Platform (WADDP) in the Department of Pharmacy and Pharmacology has recently been awarded the status of a Research Unit. The URC-recognised Research Unit will continue to be involved in providing fundamental research in basic science, *in vitro* and *in vivo* preclinical studies and the development of novel pharmaceutical biomaterials and polymer-engineered drug delivery systems. This research will provide more efficacious treatment of communicable and non-communicable diseases faced by both the Developed and Developing Worlds, and is appropriately considered of scientific importance with significant benefits. They produced 15 publications in 2012 and 27 in 2013 and two MSc students in 2012 and four in 2013. They also produced a PhD in 2012 and another one in 2013. In 2012 they received 12 awards for various research related activities and had eight more awards in 2013. Some of the prizes included the Best Research Publication in Pharmaceuticals for Associate Professor Yahya E. Choonara and co-authors in 2012. The team also won the Best Research Publication in Pharmaceutics award in 2013.

The Pharmacology Division of the Department of Pharmacy and Pharmacology graduated one MSc student in 2012 and four in 2013 with two PhDs in 2013. They published five articles in 2012 and seven in 2013. The division won five prizes at various research forums in 2012 and 2013 with Mrs S. Moch awarded the first place for Conference Posters at the 5th Annual Congress of South African Association of Health Educationists (SAAHE) in 2012. Associate Professor Robyn Van Zyl co-established the Wits Malaria Research Institute (WRIM) in 2013. Their Clinical Pharmacology projects focused on how people utilized and adhered to various medicines, paediatric poisoning, prescribing habits and errors, as well as criteria used to determine resource allocations, access to healthcare interventions and their influence on health economics models.

The Centre for Exercise Science and Sports Medicine had four publications in 2012 and five in 2013. They graduated three MSc students during the period under review. The research environment is quite vibrant and there are signs that it is growing within the school of Therapeutic Sciences.

WITS ADVANCED DRUG DELIVERY PLATFORM

Innovation is a combination of identifying a challenge and finding a solution to solve it.

Director: **Professor Viness Pillay**

The team at the Wits Advanced Drug Delivery Platform (WADDP) continues to be engaged in the prototyping of 'advanced' drug delivery technologies. As world-leaders in research and development of advanced drug delivery technologies, the team was awarded Research Unit status in 2014 from the University of the Witwatersrand, Johannesburg (South Africa). The group has a demonstrable scientific track record of designing advanced, game-changing and reliable drug delivery platforms for effective treatment in various therapeutic categories.

Professor Pillay says, 'The WADDP Research Unit in conjunction with my SARChI Chair plays an important role in enabling me to train the next generation of scientists in this much specialised field. I have already engaged more than 40 masters and doctoral students, as well as seven postdoctoral fellows who I hope will continue to contribute to positioning South Africa as a credible and valuable member of the global pharmaceutical research community.'

His team's most recent research has focused on injecting brand-new features to combination-type customizable pK profiling matrices, programmable site-specific release platforms for peptides and proteins, wearable injectables, molecular targeted therapies with stigmergenic trajectories, neuro-platforms for CNS injury as well as nanotriangular, cuboid and rectangle technology for 'on-the-spot' drug delivery. The molecular target-based therapies utilise pseudo-peptides to stabilise large active biologic molecules to provide novel treatment options for diseases such as cancer, infection, genetic disorders and metabolic and neurodegenerative conditions.

Professor Pillay, as Director of the WADDP was awarded the African Academy of Sciences' Olusegun Obasanjo Prize 2013 for his innovative work on designing commercializable drug delivery technologies. This award recognised his pioneering work in the development of the RapiDiss Wafer Technology as an innovative way to provide effective anti-retroviral (ARV) drug therapy to paediatrics afflicted with HIV/AIDS. This is one of his seminal technologies that have two granted patents among a suite of over 38 other patents filed in the field of drug delivery technology. The RapiDiss Wafer Technology provides an ingenious solution to the daily challenge of administering ARVs to over 3 million children living with HIV/AIDS, with majority in sub-Saharan Africa. To date there is no patient-friendly, stable and simple to administer pharmaceutical product available for chronic ARV therapy specifically designed for paediatrics in mind. Most of the current products have been designed for adult use and have poor stability. The adult formulations are being manipulated for use in paediatrics through practices that results in drug degradation, inaccurate dosing and poor patient compliance. These complexities in dosing accuracy and formulation stability have also been recognised by the U.S. Food and Drug Administration. Their multitude of inadequacies is glaringly prevalent and this has spurred Professor Pillay to design the RapiDiss Wafer Technology for a vulnerable patient

population where even the large multinational pharmaceutical companies have up until now, overlooked. The RapiDiss Wafer Technology is a highly stable oral formulation that is placed on the inside of the child's cheek and releases the ARV medication directly into the systemic circulation. There is no need to swallow the wafer with water; neither does it require refrigeration to remain stable. More importantly it also significantly improves the taste and pharmacokinetics of current liquid ARV formulations. Innovation is a combination of identifying a challenge and finding a solution to solve it. Professor Pillay has shown his ingenuity as an African scientist who can significantly contribute to solving Africa's challenge in the fight against poor pharmaceutical product performance by designing formulation technologies that can dramatically improve the bioavailability of drugs at a rate and site of drug absorption within the human body. These game-changing innovations is the result of over 20 years of research undertaken by Professor Pillay and his team with immense multi-faceted contributions to the field of drug delivery in Africa and globally.

Through his research he has established a veritable 'factory' of novel drug delivery technologies with an impressive number of patents by an African pharmaceutical innovator. In addition, through his expert guidance, a diverse team of pharmaceutical scientists have been trained as the next generation of pharmaceutical scientists and emerging researchers under his leadership with skills that make them not only employable but also in leadership positions in high-tech pharmaceutical laboratories worldwide. His research has made an undeniable influence on the pharmaceutical research infrastructure and innovation in Africa. The commercial side of his work, stemming from research generated, operates on a business model/strategy of developing novel licensable drug delivery technologies that can be offered to the pharmaceutical industry to advance their existing or new drugs that are difficult or impossible to deliver. Prof. Pillay's work has been extensively published with over 150 publications in world renowned pharmaceutical journals and he has received many prestigious awards as an innovative pharmaceutical scientist.

Networking and collaboration activities

During the period under review, the WADDP established several new research collaborations, such as the partnership with CONRAD in the USA, which was facilitated through the Wits Enterprise. Advances in microbicide research made by the CONRAD team allowed for the production of a new microbicide molecule to be delivered intravaginally for the prophylaxis of STIs and HIV in vulnerable female populations. A Vagitab which combines novel patented technology developed by the WADDP will be the core work undertaken within this collaboration in order to produce a game-changing concept for the controlled release of microbicide molecules intravaginally. Collaboration also continues with many other global experts in the various areas on drug delivery research in countries such as India, Japan, Netherlands, Germany, USA, Mauritius and Argentina.

RESEARCH **HIGHLIGHTS**

Research Highlights

Broadly neutralizing antibodies against HIV-1

Neutralizing antibodies are likely to play a crucial part in a preventative HIV-1 vaccine. Although efforts to elicit broadly cross-neutralizing antibodies (bNAbs) by vaccination have been unsuccessful, rare individuals naturally develop these antibodies after many years of infection. How such antibodies arise, and the role of viral evolution in shaping these responses, has been the subject of much recent interest in the HIV vaccine field.

In a collaborative study published in the prestigious journal *Nature Medicine*, which has an impact factor of 24, **Professors Penny Moore and Lynn Morris** (from the School of Pathology and the National Institute for Communicable Diseases, or NICD, of the NHLS) and colleagues studied two HIV-1–infected individuals who developed bNAbs targeting a glycan at amino acid 332 on the viral envelope. By tracing the evolution of the virus, the team surprisingly found that this glycan was absent on the single virus that caused the infection. However, immune pressure from earlier strain-specific neutralizing antibodies that develop in all infected people, resulted in the HIV virus shielding itself by inserting a glycan at position 332. While this allowed the virus to escape strain-specific neutralizing antibodies, it created a new neutralizing antibody epitope that provided the antigenic stimulus to elicit bNAbs targeting the 332 glycan.

Using over 7,800 envelope sequences from more than 300 acute and chronic HIV infections, the team next showed that this pattern of viral evolution occurred commonly in subtype C viruses, the major subtype in sub-Saharan Africa and the world. This study provides a mechanism for the evolution of conserved epitopes, with neutralization escape driving viral convergence toward glycan motifs that are highly conserved. The data suggest that a vaccine regimen that mimics, but accelerates the pathway of natural viral evolution may be a viable strategy for stimulating bNAbs. However, vaccines that target this specific glycan, a major focus of the vaccine field, might be less effective against South African viruses, where viruses without this epitope appear to be preferentially transmitted.

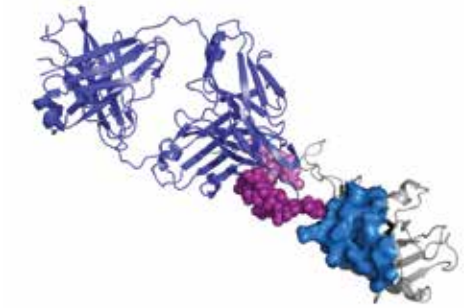
A second study on how viral evolution contributes to the maturation of HIV-1 bNAbs was published in *PLoS Pathogens* (impact factor of 9) by the same group. Postgraduate student **Kurt Wibmer** was first author of this study, and recipient of the Faculty Research Prize for this work. This study showed that the human immune system is capable of generating multiple bNAbs in response to a constantly evolving viral population that creates new epitope variants (or immunotypes) and exposes new targets as a consequence of escape from earlier neutralizing antibodies. The data further support the design of templates for sequential immunization strategies aimed at increasing neutralization breadth through the recognition of multiple epitopes and their immunotypes.

Professor Lynn Morris also contributed to the development of a new tool for identifying bNAbs against HIV. The new tool – known as neutralization fingerprinting - is a mathematical algorithm that uses existing data on bNAbs to accurately determine the epitope, or target, of bNAbs in blood samples. This new tool is much faster and less laborious than existing methods that yield information about bNAbs, and will be useful in the development of an effective HIV vaccine. The development of this tool was described in an article published in the prestigious journal *Science*, with an impact factor of 32, co-authored by Professor Morris.

Moore PL, Gray ES, Wibmer CK, **Bhiman JN**, Nonyane M, Sheward DJ, Hermanus T, Bajimaya S, Tumba NL, Abrahams M-R, Lambson BE, Ranchobe N, Ping L, Ngandu N, Abdool Karim Q, Abdool Karim SS, Swanstrom RI, Seaman MS, Williamson C & **Morris L**. (2012) Evolution of an HIV glycan–dependent broadly neutralizing antibody epitope through immune escape. *Nature Medicine* 18, 1688–1692

Wibmer CK, **Bhiman JN**, Gray ES, Tumba N, Karim SSA, Williamson C, **Morris L** and **Moore PL** (2013). Viral escape from HIV-1 neutralizing antibodies drives increased plasma neutralization breadth through sequential recognition of multiple epitopes and immunotypes. *PLoS Pathogens* 9(10): e1003738. doi:10.1371/journal.ppat.1003738

Georgiev IS, Doria-Rose NA, Zhou T, Kwon YD, Staupe RP, Moquin S, Chuang GY, Louder MK, Schmidt SD, Altae-Tran HR, Bailer RT, McKee K, Nason M,O'Dell S, Ofek G, Pancera M, Srivatsan S, Shapiro L, Connors M, Migueles SA, **Morris L**, Nishimura Y, Martin MA, Mascola JR, Kwong PD. (2013) Delineating antibody recognition in polyclonal sera from patterns of HIV-1 isolate neutralization. *Science*. May 10;340(6133):751-6. doi: 10.1126/science.1233989.



Crystal structure of the PGT128 fab in complex with an engineered HIV-1 envelope outer domain with mini-V3 protein

Pain in the HIV-positive patient

This undertreatment is likely to reflect a combination of patients not reporting their pain, and the poor equipping of the health care workers responsible for their treatment.

Pain is a common symptom of many diseases, and can cause significant psychological, social and economic impairment. However, pain is not often acknowledged or adequately addressed in HIV-positive patients. Various factors cause HIV positive patients to experience pain: the virus as well as the body's immune response to it can lead to inflammation and pain, secondary complications such as cancers and opportunistic infections, and many of the older drugs used to treat HIV are themselves neuro-toxic. As a result, pain is very common in people with HIV, across all stages of the disease.

A paper published by **Professor Peter Kamerman, Noko Mphahlele** and **Professor Duncan Mitchell,** from the Brain Function Research Group, School of Physiology, in the *European Journal of Pain* highlights the extent of pain experienced by HIV-positive patients. They assessed the pain experienced by more than 500 South African HIV-positive out-patients attending public sector clinics in rural Limpopo and in metropolitan Johannesburg. Approximately 70% of patients from the rural cohort and 60% from the metropolitan cohorts reported having pain at the time of their interview and the majority had moderate or severe pain. Yet, pain treatment was poor, with less than half of patients with pain receiving any treatment, and most of these were being provided with inadequate treatment. This undertreatment is likely to reflect a combination of patients not reporting their pain, and the poor equipping of the health care workers responsible for their treatment. For example, patients may feel uncomfortable describing their pain, or even unable to, due to culture or language barriers, while clinicians may lack the pain management skills to pin-point and adequately treat the multiple types of pain that may co-exist in a patient with HIV.

Broadening the Group's research on HIV related pain, **Liesl Hendry, Dr Zané Lombard, Dr Antonia Wadley** and **Professor Peter Kamerman**, investigated whether single nucleotide polymorphisms (SNPs) in *KCNS1* and *GCH1* were associated with pain intensity in a black southern African population with HIV-associated sensory neuropathy (HIV-SN). Both these genes have been associated with changes in pain sensitivity in other neuropathic pain states in non-African populations; *KCNS1* codes for a potassium channel that affects neuronal membrane potential, and *GCH1* codes for a key enzyme in the synthesis of catecholamines. It was found that there were no associations between polymorphisms in *GCH1* and pain intensity, even with the use of population-specific tagSNPs. Additionally, none of the risk alleles in *KCNS1* identified in other non-African population groups were associated with pain intensity, but several haplotypes constructed from population-specific tagSNPs correlated with pain intensity (after correcting for multiple comparisons and other risk factors for changes in pain sensitivity such as age, sex and CD4 T-cell count). This finding suggests that the haplotypes could incorporate the causative SNP(s).

The findings for *KCNS1* also provided additional evidence supporting a role for *KCNS1* in neuropathic pain across diverse population groups and neuropathic pain states. The study also illustrates the importance of conducting association analyses in independent ethnic groups, using population-based marker selection.

Mphahlele N, **Mitchell D**, **Kamerman P** (2012). Pain in ambulatory HIV-positive South Africans. *European Journal of Pain*, 16: 447-458.

Hendry LM, **Lombard Z, Wadley AL, Kamerman PR** (2013). *KCNS1*, but not *GCH1*, is associated with pain intensity in a black Southern African population with HIV-associated sensory neuropathy: a genetic association study. *Journal of Acquired Immune Deficiency Syndromes* 63: 27-30.

Sowetans appear genetically distinct from other Africans - clinical implications?

The citizens of Soweto reflect a melting pot of southern African people and cultures

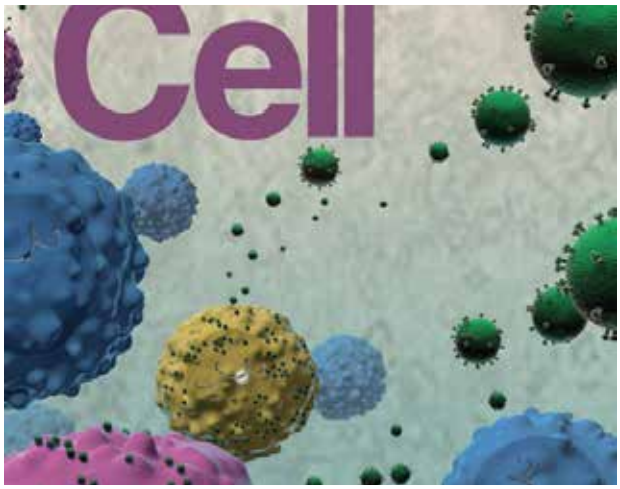
African populations have unparalleled genetic diversity that continues to attract an increasing level of research attention as scientists attempt to unravel important clues regarding human history and the genetic underpinnings of disease. The citizens of Soweto, who reflect a melting pot of southern African people and cultures, represent an ideal study population for appreciating the extent of African genetic diversity, and stand to gain from clinical insights garnered through research, given the growing disease burden in the area.

Through a prestigious collaboration with Novartis, Switzerland, **Mr Andrew May** from the Department of Human Genetics, School of Pathology, under the supervision of **Professor Michele Ramsay** generated data for the most detailed exploration of Sowetan genetic diversity to date by analysing the DNA code at ~4.3 million positions across the genomes of 94 black Sowetans. Results revealed that Sowetans have a genetic profile that is not only distinct from other African populations, but is also more heterogeneous, suggesting a significant amount of genetic mixing that aligns with historical knowledge of Sowetan citizens. Such heterogeneity implies that a more cautious approach needs to be adopted when doing health research on Sowetan participants.

Genetic composition has a crucial influence on data analysis, and its effects on the metabolism and transport of drugs (pharmacogenomics) in clinical practice among African patients needs further consideration. The valuable genetic data from the current study has been made publically available, and serves as the foundation for the Southern African Human Genome Programme, which aims to improve our genetic understanding of all of southern Africa's eclectic populations.

May A, Hazelhurst S, Li Y, **Norris SA**, **Govind N**, **Tikly M**, Hon C, Johnson KJ, Hartmann N, Staedtler F, **Ramsay M**. (2013) Genetic diversity in black South Africans from Soweto. *BMC Genomics* 14:644

Chromosomal contact permits transcription between co-regulated genes



How gene activity is regulated has been the subject of intense study for many years and scientists have suspected for some time that the physical contact between genes, or 'gene kissing' could play a role.

This question was finally answered when a team led by Dr Musa Mhlanga (CSIR), together with collaborator **Professor Marc Weinberg** (Department of Molecular Medicine and Haematology, School of Pathology) performed ground-breaking experiments to show that 'gene kissing' can switch genes on. The discovery sheds light on how genes change from inactive to active states, and how different genes can coordinate their activity simultaneously. These interactions could be crucial to how the information in the DNA is read and interpreted by the cell. This important research gives scientists across the globe new knowledge about how genes behave and how to direct them.

The landmark finding appeared in the journal *Cell*, one of the world's most prestigious research publications, with an impact factor of 33. The article is the fifth South African-affiliated article that has ever been published in *Cell*, and one of just two articles in three decades to feature an all-South African-based team.

Fanucchi S, Shibayama Y, Burd S, **Weinberg M.S**, Mhlanga M.M (2013). Chromosomal contact permits transcription between coregulated genes. *Cell*, 155 (3): 606-620.

Performance and safety of the second-generation female condom (FC2) versus the Woman's, the VA worn-of-women, and the Cupid female condoms

The three assessed female condom products are non-inferior to the FC2 regarding performance and safety.

New designs of female condoms have been developed to reduce costs and improve acceptability. However, donors such as United Nations agencies and international organisations purchasing female condoms as part of their international aid programmes normally require female condoms to be pre-qualified by the World Health Organization and the United Nations Population Fund (WHO/UNFPA). To secure regulatory approvals, clinical studies are needed to verify performance of these condoms.

In 2013, **Dr Mags Beksinska**, **Professor Jenni Smit** and **Mr Ross Greener** from the Division of the Maternal Adolescent and Child Health (MatCH), Department of Obstetrics and Gynaecology, School of Clinical Medicine, published the results of their clinical trial on female condoms in the *Lancet Global Health.* The clinical trial was a randomised controlled, crossover trial carried out in China and South Africa. It aimed to assess the functional performance (breakage, slippage, invagination and misdirection) and safety of three new condom types; the Woman's Condom, the VA worn-of-women (VA w.o.w.) Condom Feminine and the Cupid female condom against the widely available WHO/UNFPA prequalified FC2 female condom from the Female Health Company.

Non-inferiority was demonstrated for all condom failure modes for the three female condom products in the trial (within the margin of 3% difference in mean failure), meaning that the three assessed female condom products are non-inferior to the FC2 regarding performance and safety.

The trial provided important function data for these devices and has been used to compile evidence for prequalification by WHO/UNFPA. As a result of this trial, the Cupid condom has already been approved by WHO/UNFPA and is available for public sector procurement. Manufacturers of the other female condom products are using the clinical trial data in their ongoing applications to regulatory authorities.

Beksinska ME, Piaggio G, **Smit JA**, Wu J, Zhang Y, Pienaar J, **Greener R**, Zhou Y, Joanis C (2013). Performance and safety of the second-generation female condom (FC2) versus the Woman's, the VA worn-of-women, and the Cupid female condoms: a randomised controlled non-inferiority crossover trial. *The Lancet Global Health* 1(3), e146 - e152, September 2013

HIV therapy affects metabolic parameters

Major findings prove an early association between mitochondrial depletion and stavudine therapy, and showed that tenofovir had a minimal effect.

The success of controlling HIV-1 infection has led to significant complications. Toxicities related to the use of stavudine, which was part of first line therapy for HIV infection in South Africa and many other countries has been of major concern. Around 30% of patients switched to non-stavudine based regimens because of a peripheral neuropathy, symptomatic hyperlactataemia and lipoatrophy in a prospective analysis of 9040 HIV-1-infected adults initiated on HAART from 2004 to 2007 at the Themba Lethu Clinic at Helen Joseph Hospital.

In 2009, **Dr Colin Menezes**, a staff member and PhD student in the Department of Internal Medicine, School of Clinical Medicine, and his supervisors, **Professors Nigel Crowther**, **Derick Raal** and **Ian Sanne** and **Dr Rachel Duarte**, undertook a prospective randomised controlled trial comparing standard and low dose stavudine with tenofovir. Sixty patients were randomised 1:1:1 to either standard (30-40 mg) or low dose stavudine (20-30 mg), or tenofovir (300 mg) each combined with lamivudine and efavirenz.

Major findings prove an early association between mitochondrial depletion and stavudine therapy, and showed that tenofovir had a minimal effect. Only two of eight adipocyte genes were significantly affected by stavudine when compared with tenofovir, but this was seen with the standard dose only. Mitochondrial toxicities occurred in both stavudine arms. Both stavudine arms increased fasting insulin and C-peptide levels with the higher stavudine dose also causing increased fasting glucose and Homeostasis Model Assessment (HOMA)

levels. Whilst tenofovir had a more favourable effect on specific body measurements and adipokines, both drugs caused lipid changes. All three arms of the study had similar immunological and virological outcomes.

This highlights the occurrence of significant metabolic abnormalities with both drugs. Therefore, whilst supporting the new HAART guidelines which have evolved since 2004, with tenofovir currently being recommended as first line therapy, the possible increased cardiovascular risk with both drugs is a concern, although toxicity is lower in the low dose compared to the standard dose stavudine regimen with no attenuation of effectivity.

Menezes C, **Crowther N, Duarte R, Van Amsterdam D, Evans D, Dickens C, Dix-Peek T, Rassool M, Prinsloo A, Raal F, Sanne I.** (2013) A randomised clinical trial comparing metabolic parameters after 48 weeks of standard- and low-dose stavudine therapy and tenofovir disoproxil fumarate therapy in HIV-infected South African patients. *HIV Med*. 15(1), 3–12.

How linear growth and relative weight gain during infancy and childhood are related to health and human capital outcomes in young adults

Birth to Twenty, colloquially nicknamed Mandela's Children, is the largest and longest running study of child and adolescent health and development in Africa, and one of the few large-scale longitudinal studies in the world.

The COHORTS consortium, which includes the South African Birth to Twenty cohort, published an article in one of the world's leading medical journals *The Lancet,* which has an impact factor of 39. The article is authored by **Professor Linda Adair** (Honorary Wits Professor), **Professor Shane Norris** and **Dr Lisa Micklesfield** from the MRC/Wits Developmental Pathways for Health Research Unit (DPHRU), School of Clinical Medicine. Previous research, including some from the COHORTS group, has shown that fast weight gain and linear growth in children in low-income and middle-income countries have been associated with improved survival and enhanced cognitive development, but may also increase the risk of obesity and related adult cardiometabolic diseases.

In this longitudinal study of 8362 participants the COHORTS group investigated how linear growth and relative weight gain during infancy and childhood are related to health and human capital outcomes in young adults. Their findings concluded that interventions in countries of low and middle income which aimed to optimise birth weight and linear growth during the first two years of life are likely to result in significant gains in adult height and human capital (for example: more years of completed schooling) and give some protection from adult chronic disease risk factors, with few adverse trade-offs. These findings have noteworthy policy implications around the importance of the first 1000 days of life (pregnancy and the two years of infancy) as an important window of opportunity to optimise child growth and development to improve later adult outcomes.

Adair LS, Fall CH, Osmond C, **Stein AD**, Martorell R, Ramirez-Zea M, Sachdev SD, Dahly DL, Bas I, **Norris SA, Micklesfield LM**, Hallal P, Victora C. (2013). Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *The Lancet*, Aug 10; 382(9891):525-34

Crossing over: A novel α-spectrin mutation and gene rearrangement contributes to the clinical severity of red cell membrane disorders

The erythrocyte membrane skeleton is formed by structural proteins, including α and ß-spectrin (Sp), which assemble into heterodimers and self-associate into tetramers. Mutations of αSp within the self-association site represent the most common defects in the red cell membrane disorders, hereditary elliptocytosis (HE) and hereditary pyropoikilocytosis (HPP). The clinical presentation ranges from asymptomatic carriers to life-threatening haemolytic anaemia and is influenced by the location and type of mutation and the inheritance of modifying alleles such as the hypomorphic *SPTA*$^{\alpha LELY}$ polymorphism. In this study, **Dr Kubendran Naidoo** and **Professor Theresa L.**

Coetzer from the Wits Research Institute for Malaria (WRIM) in the Schools of Pathology and Therapeutic Sciences, in collaboration with the University of Utah, characterized the molecular defects in two Utah families of northern European ancestry, including two propositi with atypical non-microcytic HPP, seven HE members and one asymptomatic carrier.

Analysis showed a novel R34P mutation in the αSp gene, *SPTA*^{R34P}. This created a cavity which abolished the electrostatic interactions at the Sp self-association site and impaired tetramer formation. It was inherited *in trans* to the hypomorphic allele in the two propositi and 5/7 HE individuals which indicated that *SPTA*$^{\alpha LELY}$ was not the sole determinant for the variable clinical expression. αSp mRNA was mildly decreased in all HE subjects and severely decreased in both propositi. A unique *SPTA* intragenic crossover and uniparental disomy in one HE individual was identified and two additional crossover events, including a novel segregation of the two *SPTA*$^{\alpha LELY}$ mutations, demonstrated the susceptibility of the *SPTA* gene to rearrangement.

These findings indicate that the profound phenotypic heterogeneity in these families can be attributed to the *SPTA*^{R34P} mutation and its interaction with different modifying factors, which provides novel insights into a complex erythrocyte disorder.

*Swierczek S, *Agarwal A, ***Naidoo K**, Lorenzo FR, Whisenant J, Agarwal N, **Coetzer TL** and Prchal JT. (2013) Novel Exon 2 α Spectrin Mutation and Intragenic Crossover: Three Morphological Phenotypes Associated with Four Distinct α Spectrin Defects. *Haematologica*, 98(12), 1972-1979.

(*The authors contributed equally to the work)

Host genetic variability in South African populations: towards unravelling a role for higher expression of HLA-C and good control of HIV-1 infection in the absence of antiretroviral therapy

The role of host genetic variability on the outcome of HIV-1 disease progression is becoming increasingly apparent. Two of the genetic variants shown to be associated with long-term control of HIV-1 infection flank the human leukocyte antigen C (HLA-C) locus and have been associated with differential HLA-C expression in Caucasian cohorts: (i) a single nucleotide polymorphism (-35 SNP) upstream of HLA-C, and (ii) an insertion-deletion polymorphism (263 indel) within the 3' untranslated region of HLA-C. However, incongruent results observed when examining the distributions of these genetic variants in Caucasian and African-American individuals suggest the 263 indel may be the variant responsible for the observed differences in HLA-C expression and that the -35 SNP may simply be acting as a marker for the indel in some population groups.

PhD student **Nikki Gentle**, her supervisors **Professor Caroline Tiemessen** and **Dr Maria Paximadis**, and **Professor Adrian Puren** from the School of Pathology and the National Institute for Communicable Diseases, examined the relationship between these variants within a cohort of 265 Black and Caucasian uninfected South Africans and demonstrated that the -35 SNP is not an appropriate marker for the 263 indel in either of these population groups.

Within the 3' untranslated region of HLA-C additional genetic variants were identified, which they hypothesize may act independently of, or synergistically with, the 263 indel to regulate HLA-C expression. These findings will now be applied to and help inform the examination of patterns of genetic variability at the HLA-C locus in individuals who exhibit long-term control of HIV-1 infection in the absence of antiretroviral therapy.

Gentle NL, Paximadis M, Puren A, Tiemessen CT (2013) Genetic Variability in Markers of HLA-C Expression in Two Diverse South African Populations. PLoS ONE 8(7): e67780. doi:10.1371/journal.pone.0067780

Do cheetahs abandon hunts because they overheat?

A theory that has been in natural history books for forty years is a myth.

For superb athletes, cheetahs are surprisingly poor hunters with up to 60% of hunts ending in failure. Cheetah could easily outsprint any antelope, but they often give up the sprint

when they are within easy reach of their prey. Forty years ago, Harvard researchers suggested that cheetah abandon their hunts because they overheat. These researchers ran cheetah on a treadmill and found that they stopped running when their body temperature reached 40.5°C. Extending their findings to real hunts, the Harvard researchers concluded that cheetah could only sprint so far before getting too hot to move. The problem was that the speed that the treadmill could reach was nowhere near that of a real hunt.

Researchers from the Brain Function Research Group, School of Physiology, working with Professor Shane Maloney of the University of Western Australia, developed the required technology to measure the body temperature of hunting cheetahs. The Group in collaboration with the AfriCat Foundation based at the Okonjima Nature Reserve in Namibia equipped six cheetahs with body temperature and activity sensors and observed a number of hunts. Their data revealed that, contrary to initial expectations, the body temperature of the cheetahs did not increase during the sprint. Mysteriously, though, the temperature of the cheetah rose after the sprint was completed. This was more so if the hunt had been successful, in spite of the fact that the cheetah had sprinted just as hard when they got the prey as when they didn't. Eating could not have caused the mysterious late rise in body temperature, because the rise in temperature started before the first mouthful.

The researchers propose that the stress of guarding the prey from more dominant carnivores, such as leopards, may account for the increase in body temperature following successful hunts. Therefore cheetahs do abandon hunts, but it is not because they overheat. 'A theory that has been in natural history books for forty years is a myth', says **Dr Robyn Hetem**, lead-author on the paper.

Hetem RS, **Mitchell D, de Witt BA, Fick LG, Meyer LCR,** Maloney SK, **Fuller A.** 2013 Cheetah do not abandon hunts because they overheat. *Biol Lett* 9: 20130472.

Barbary macaques demonstrate the important effects of sociality

Barbary macaques are the only African species of macaque and due to habitat destruction and human disturbance, wild populations are quickly decreasing in size and have been increasingly pushed into the mountainous regions of Morocco and Algeria. Now living at altitudes in excess of 2000m above sea level these animals are subjected to freezing cold winters and dry hot summers, potentially living outside of their evolved thermal niche.

Dr Richard McFarland of the Brain Function Research Group, School of Physiology has been studying the endangered population of wild Barbary macaques living in the Middle Atlas Mountains of Morocco since 2008. Following the exceptionally cold and snowy 2008-09 winter, Richard observed the death of 30 wild Barbary macaques, nearly 65% of his study population.

He presented data on the socio-ecological factors that predicted which individuals were lucky enough to survive the winter. Most interestingly, the number of social partners an individual had in their group predicted whether they survived the winter or not. He argues that the benefits of feeding tolerance afforded by social relationships, and the ability to find a social partner to huddle up with at night, gave these individuals an increased advantage over those, left out in the cold. A number of studies on both humans and animals have shown that sociality has an effect on fitness, and that those with stronger social bonds have increased longevity and reproductive success. However, Dr McFarland showed for the first time, that the effect of sociality on fitness is so strong that it can predict an individual's survival across an unexpected, extreme environmental event. These findings support the theory that sociality has adaptive value and furthers understanding of the potential impact that environmental change may have on social species.

McFarland R, Majolo B. (2013) Coping with the cold: predictors of survival in wild Barbary macaques, Macaca sylvanus. *Biol Lett* 9: 20130428.

Advancing population health in South Africa

Mandatory regulations concerning the salt content of processed food were passed by the Minister of Health.

In addition to HIV and TB, diseases of lifestyle contribute to the mounting burden on social and economic development in South Africa. It is estimated that 40% of the population aged 35—44 years is hypertensive with higher levels in older age-groups. The consumption of salt is nearly double that recommended by the World Health Organization (WHO) with bread being the major source of non-discretionary dietary salt.

In March 2013 mandatory regulations concerning the salt content of processed food were passed by the Minister of Health. Beginning in 2016, it is expected that these regulations will be a key weapon in the fight against the rising burden of hypertension and stroke. This approach is a first for sub-Saharan Africa and could positively influence population health regionally.

Professors Karen Hofman and **Stephen Tollman,** both from PRICELESS and the MRC/Wits Rural Public Health and Health Transitions Unit (Agincourt), School of Public Health, describe the process by which South African regulations were passed in a commentary published in the *Lancet Global Health* entitled 'Population health in South Africa: a view from the salt mines'.

The original research published in the *South African Medical Journal* (2012) suggested that – mostly by reducing salt in bread - South Africa could avert 7400 cardiovascular deaths (2900 from stroke) and save 4300 lives from non-fatal stroke annually. The savings from reduced numbers of hospital admissions of patients with non-fatal strokes alone could save ZAR300 million per year.

This compelling economic evidence on lives saved was provided to senior policy makers and was important in the process towards regulation. Restricting salt in processed food is an example of why making sure that healthy choices are readily available is inherently more equitable – the policy provides an opportunity for an entire population to attain their full health potential. This is particularly relevant in South Africa where many people with hypertension, rural and urban, are either not diagnosed or treated and health services are overextended.

Hofman KJ and **Tollman SM**. (2013) Population health in South Africa: a view from the salt mines. *The Lancet Global Health*, Volume 1, Issue 2, Pages e66 - e67

Bertram MY, Steyn K, Wentzel-Viljoen E, Tollman S, Hofman KJ. (2012) Reducing the sodium content of high-salt foods: Effect on cardiovascular disease in South Africa. *South African Medical Journal* 102(9):743-745.

Potential gene therapy for the treatment of the global killer HBV

This approach could be developed as a treatment for people who are chronically infected with the HBV and prevent the risk of cancer and cirrhosis.

The hepatitis B virus (HBV) kills between 600 000 and 1 million people a year, predominantly in sub-Saharan Africa and Asia. Life-threatening complications from HBV include liver cancer and cirrhosis.

An article published jointly by Wits researchers in *Molecular Therapy* describes a significant advance in the use of gene therapy to treating the virus infection. The advance is based on the engineering of a new class of proteins called TALENs that can recognise and disable the DNA of the HBV. The publication is the result of 18 months of intensive collaborative research between the Antiviral Gene Therapy Research Unit (AGTRU) and the Laboratory of Cell and Gene Therapy at the University Medical Center in Freiburg, Germany. **Kristie Bloom** undertook this work as part of her PhD degree under the co-supervision of **Professor Patrick Arbuthnot** and **Dr Abdullah Ely**, both from the AGTRU, School of Pathology.

Describing the way TALENs work, Professor Arbuthnot says: 'One part of the protein specifically recognises the DNA of the HBV and another part acts as a cutting enzyme – it literally cuts the DNA of the HBV, and then introduces mutations at the exact site of cutting, resulting in the disabling of the viral DNA.'

AGTRU have demonstrated proof of principle that the TALENs are effective, and that this approach could be developed as a treatment for people who are chronically infected with the HBV and prevent the risk of cancer and cirrhosis.

To transport the TALENs to the HBV-infected cells, the team encodes the TALENs on engineered DNA or messenger RNA (mRNA) sequences. Their current research focuses on developing methods of safely and efficiently carrying the TALEN-encoding DNA or mRNA to liver cells.

Commentary on this article has been published in the same issue of the *Molecular Therapy* journal and highlights that the research published by this group *'may have great promise as a curative HBV therapy.'*

Bloom K, Ely A, Mussolino C, Cathomen T, **Arbuthnot P**. (2013) Inactivation of Hepatitis B Virus Replication in Cultured Cells and In Vivo with Engineered Transcription Activator-Like Effector Nucleases. *Molecular Therapy* 21(10), 1889–1897

Commentary:

Weber ND, Stone D, Jerome KR. (2013) TALENs Targeting HBV: Designer Endonuclease Therapies for Viral Infections. *Molecular Therapy* 21(10), 1819–1821

Cervical cancer screening methods in HIV positive women

Finding and treating the HPV infection early may prevent disease development.

Cervical cancer is the leading cancer in women in Sub-Saharan Africa. HIV positive women are at increased risk of developing cervical cancer dysplasia and cancer due to immunosuppression.

Cervical cancer is one of the few completely preventable cancers, if early screening and treatment is instituted. The Pap smear based screening programme has been proven to reduce mortality of cervical cancer but is not achievable in many limited resource areas in Sub-Saharan Africa. **Professor Cindy Firnhaber** from the Clinical HIV Research Unit, School of Clinical Medicine, and colleagues compared two other screening methods; Visual Inspection of the cervix (VIA) and human papillomavirus (HPV) DNA screening to the standard Pap smear method.

The VIA method involves applying acetic acid on to the cervix and the disease area turns white against the pink area of the cervix. This visualization allows for early treatment of the disease area with either oblation by freezing or cutting out the affected area at the same visit. Thus, the number of clinic visits women need for screening and treatment of their cervical disease is reduced. The VIA method is inexpensive, only requiring a light, speculum and 5% acetic acid (household vinegar) and is nurse driven. Finding and treating the HPV infection early may prevent disease development. At present HPV testing is expensive, but new cheaper tests are being developed for cervical cancer screening.

The results showed that HPV DNA screening was most sensitive for finding significant cervical disease at 92% while the sensitivity of the Pap smear was 75.8% and VIA was 65%. However, with further quality assurance review by specialist physicians in evaluating digital photographs of the cervix, the sensitivity of VIA was increased to 75%. While the sensitivity was highest with HPV DNA screening, the specificity was only 51.4%. The specificity of the Pap smear and VIA was 83% and 68% respectively.

This landmark study in HIV shows that the VIA alternative screening method can be as effective as the Pap smear in picking up early cervical disease if quality assurance is implemented.

Firnhaber C, Mayisela N, Mao L, Williams S, Swarts A, Faesen M, Levin S, Michelow P, Omar T, Hudgens M.G, Williamson A, Allan B, Lewis D.A, Smith J.S (2013). Validation of Cervical Cancer Screening Methods in HIV Positive Women from Johannesburg, South Africa. *PLoS ONE* 8(1): e53494. doi:10.1371/journal.pone.0053494.

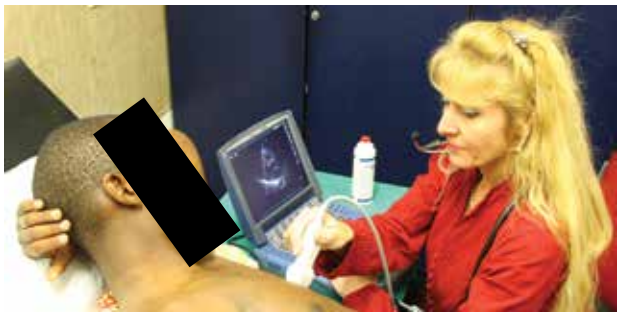
Contribution of circulating angiotensinogen concentrations to variations in aldosterone and blood pressure in a group of african ancestry depends on salt intake

The role of the renin-angiotensin-aldosterone system (RAAS) in blood pressure (BP) control is well recognised. However, high sodium (Na^+), low potassium (K^+) diets in salt-sensitive populations, such as those of African ancestry, suppress renin release. Consequently, RAAS blockers may not produce beneficial effects on BP in salt-sensitive populations. Therefore, despite the benefits that may accrue from RAAS blockers, they are not recommended as first line therapy in these groups.

Nevertheless, in populations of African ancestry, there is a dissociation between a low renin status and relatively higher aldosterone concentrations. Indeed, in low renin states in salt-sensitive individuals, reductions in plasma aldosterone concentrations may be less than that predicted from the extent of renin suppression. Moreover, aldosterone-induced increases in BP in groups of African ancestry may be more pronounced in the presence of high Na^+, low K^+ diets. However, the factors that maintain increases in downstream circulating RAAS concentrations despite suppression of plasma renin release in the presence of high Na^+, low K^+ diets in salt-sensitive populations, are still uncertain.

Dr Frederic Michel, Professor Gavin Norton, Professor Angela Woodiwiss and other members of the Cardiovascular Pathophysiology and Genomics Research Unit (CPGRU), School of Physiology, investigated whether circulating angiotensinogen concentrations ([AGT]) or its determinants contribute to maintaining serum aldosterone concentrations ([aldosterone]) and increases in BP on high Na^+, low K^+ diets in 579 participants from a community sample of African ancestry.

Plasma renin concentrations were inversely related to BP and an index of salt intake (24-hour urinary Na^+/K^+). An interaction between [AGT] and urinary Na^+/K^+ was associated with [aldosterone] and systolic BP (SBP) independent of confounders. Indeed, in participants with urinary $Na^+/K^+ \geq$median for the sample, [AGT] was positively associated with [aldosterone] and SBP; however no [AGT]-[aldosterone] or [AGT]-SBP relationships were noted in participants with urinary Na^+/K^+<median for the sample.



In conclusion, in participants of African ancestry, in the presence of high Na^+, low K^+ diets, which suppress renin release, RAAS activation and its impact on BP is maintained in-part by [AGT].

Michel FS, Norton GR, Majane OHI, Badenhorst M, Vengethasamy L, Paiker J, Maseko MJ, Sareli P, **Woodiwiss AJ** (2012). Contribution of circulating angiotensinogen concentrations to variations in aldosterone and blood pressure in a group of African ancestry depends on salt intake. *Hypertension*, Jan;59(1l):62-69. doi: 10/1161/hypertensionaha.111.181230

Young children's probability of dying before or after their mother's death

To date, studies indicating the increased risk of child mortality after their mother's death have served to highlight the importance of interventions for orphaned children; however little was known about the increased mortality risk of children with seriously ill mothers. A collaborative study by honorary staff of the School of Public Health Professor Samuel Clark (Washington University) and Professor Alan Stein (Oxford University), with **Professor Kathleen Kahn** (MRC / Wits Rural Public Health and Health Transitions Research Unit (Agincourt), School of Public Health), and was published in the high impact factor journal *PLoS Medicine.*

The research was carried out on data from the health and socio-demographic surveillance system run by the MRC/Wits-Agincourt, a founding member of the INDEPTH Network. The research indicated that in middle and low-income countries young children have a higher risk of mortality in the months before their mother's death, when she is seriously ill, and also

in the period after her death.

Furthermore, during the five month period around the time of their mother's death, children aged 0 – 6 months were about nine times more likely to die than children aged 24 – 59 months. The authors indicate that, 'when a mother becomes very ill and is unable to care for and feed her child, whether by breastfeeding or providing substitute or complementary feeding, the risks to the child rise substantially'. Another key finding showed that the odds of dying for a child were greater for all causes of the mother's death, the odds were greatest if the mother died of an AIDS/TB-related cause than if she died of other causes.

The authors indicate that several reasons may be attributed to the increased risk of child mortality, with compromised nutrition and caregiving the most likely major underlying causes of child mortality in the context of severe maternal illness and maternal death.

These findings are important as they highlight the urgent need for proactive and co-ordinated community-based interventions to support families, especially vulnerable children, when a mother becomes seriously ill, not just in the period following her death.

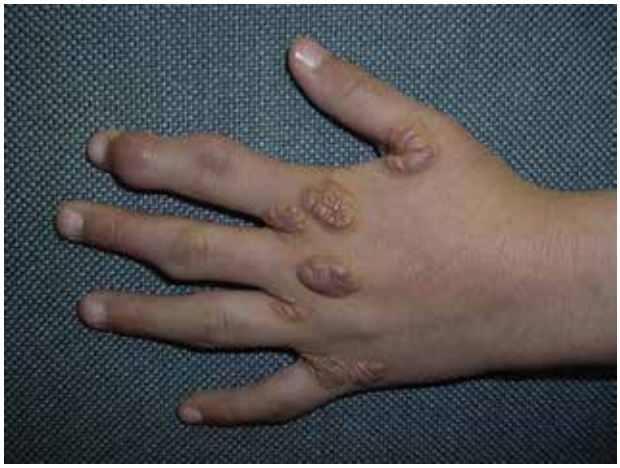
Clark SJ, Kahn K, Houle B, Arteche A, **Collinson MA, Tollman SM,** and **Stein A**. (2013) Young Children's Probability of Dying before and after Their Mother's Death: A Rural South African Population-Based Surveillance Study. *PLoS Medicine,* 10 (3):e1001400.

Study reveals great hope for familial hypercholesterolaemia patients

Familial hypercholesterolaemia (FH) or inherited high cholesterol is one of the most common inherited disorders, affecting at least 1 in every 500 persons – over 18 million persons - worldwide. In the Afrikaner, Jewish and Indian populations of South Africa the prevalence is even higher, with about 1 in every 100 persons affected. Patients with FH have markedly elevated LDL or 'bad' cholesterol levels which are associated with premature atherosclerosis, which in turn often results in heart attack at a young age.

Statins are very effective in reducing cholesterol levels and have been shown to markedly reduce the risk of heart attack and stroke in people with high cholesterol. Unfortunately statins are not able to reduce the cholesterol levels sufficiently in the majority of patients with FH. Proprotein convertase subtilisin/kexin type 9 or PCSK9 is a recently discovered serum protein which is involved in the regulation of serum cholesterol levels. Inhibiting PCSK9 has been shown to be effective in lowering LDL-cholesterol levels.

At the American Heart Association meeting held in 2012 in Los Angeles, California, attended by over 18 000 delegates, **Professor Frederick Raal** (Carbohydrate and Lipid Metabolism Research Unit, School of Clinical Medicine) presented the results of the RUTHERFORD study, a study on the use of AMG-145, an antibody to PCSK9 in subjects with FH. The addition of evolocumab (AMG-145), which is given as a monthly subcutaneous injection, resulted in a further 55% reduction in LDL-cholesterol levels with minimal adverse events and good tolerability. This therapy will therefore allow the majority of FH patients to reach goal LDL-cholesterol levels. The study was published in *Circulation*, which has an Impact Factor of 15 and was the highest ranked among journals in the Cardiac & Cardiovascular Systems category as well as the Peripheral Vascular Disease category in 2013.



Xanthomas (cholesterol deposits) on the hand of a young patient with homozygous familial hypercholesterolemia.

Raal F, Scott R, Somaratne R, Bridges I, Li G, Wasserman S.M, Stein E.A. (2012) Low-Density Lipoprotein Cholesterol–Lowering Effects of AMG 145, a Monoclonal Antibody to Proprotein Convertase Subtilisin/Kexin Type 9 Serine Protease in Patients With Heterozygous Familial Hypercholesterolemia: The Reduction of LDL-C With PCSK9 Inhibition in Heterozygous Familial Hypercholesterolemia Disorder (RUTHERFORD) Randomised Trial. *Circulation*.126: 2408-2417.

Khoe-San is unique, special – genomic study reveals

Genetically, culturally and ethically the Khoe-San have something special to add to this world. The largest genomic study ever conducted among Khoe and San groups reveals that these groups from southern Africa are descendants of the earliest diversification event in the history of all humans - some 100 000 years ago, well before the 'out-of-Africa' migration of modern humans. Approximately 220 individuals from different regions in southern Africa participated in the research which led to the analysis of around 2.3 million DNA variants.

The research was conducted by a group of international scientists, including **Professor Himla Soodyall** from the Department of Human Genetics, School of Pathology and Dr Carina Schlebusch, a Wits University PhD-graduate, from Uppsala University in Sweden.

The researchers estimate that the San populations from northern Namibia and Angola separated from the Khoe and San populations living in South Africa as early as 25,000 – 40,000 years ago. The Nama, a pastoralist Khoe group from Namibia showed great similarity to 'southern' San groups. However, the group found a small but very distinct genetic component which is shared with East Africans in this group and which may be the result of shared ancestry associated with pastoral communities from East Africa. With the genetic data the researchers determined that the Khoe pastoralists originate from a Southern San group which adopted pastoralism with genetic contributions from an East African group – a group that would have been the first to bring pastoralist practices to southern Africa.

The study also revealed evidence of local adaptation in different Khoe and San groups. The researchers found that there was evidence for selection in genes involved in muscle function, immune response, and UV-light protection in local Khoe and San groups. These could be traits linked with adaptations to the challenging environments in which the ancestors of present-day San and Khoe were exposed to, and which have been retained in the gene pool of local groups.

The researchers also looked for signals across the genome of ancient adaptations that happened before the historical separation of the Khoe-San lineage from other humans. They identified candidate genes involved in skeletal development which may have been crucial in determining the characteristics of anatomically modern humans. The study was published in the prestigious journal *Science*, with an impact factor of 32.

Schlebusch CM, Skoglund P, Sjödin P, Gattepaille LM, Hernandez D, Jay F, Li S, De Jongh M, Singleton A, Blum MGB, **Soodyall H,** Jakobsson M. (2012) Genomic Variation in Seven Khoe-San Groups Reveals Adaptation and Complex African History. *Science* 338, no. 6105 pp. 374-379.

Investing in african research training institutions creates sustainable capacity for africa: The case of the University of the Witwatersrand School of Public Health

Eleven percent of the world's population is accounted for by Sub-Saharan Africa, yet the continent bears 24% of the burden of global diseases. Therefore it is vital that research is well conducted to ensure the success of global health endeavours.

Behind every discovery of new treatment and improved services lie thousands of people who were involved in research, such as the experienced team at the University of the Witwatersrand which runs a Masters programme to train health and population researchers. A study to evaluate this programme was undertaken by researchers from the School of Public Health. They conducted a descriptive cross-sectional survey of the 70 students registered for the Masters programme in epidemiology and biostatistics at the University of the Witwatersrand from 2000-2005. Data was collected from self-administered questionnaire. Sixty percent (42/70) of students responded. At the time of the survey, 19% of respondents changed their country of residence following completion of the Masters course, 14% migrated within Africa and 5% migrated out of Africa.

The evaluation showed that investing in African training institutions provided a regional training resource, with graduates remaining in Africa. A good proportion of the graduates work in research positions, have contributed research output and have gone on to further higher degrees. The programme has not only been sustained but has also developed and over a

ten year period more than 200 students have been admitted. Government investment in higher education and the judicious application of those resources is central to sustainability.

Kellerman R, **Klipstein-Grobusch K**, **Weiner R**, Wayling S and **Fonn S** (2012). Investing in African research training institutions creates sustainable capacity for Africa: The case of the University of the Witwatersrand School of Public Health Masters programme in epidemiology and biostatistics. *Health Research Policy and System.* Apr 4; 10(1):11

The Wits School of Public Health

Quantification of the subpubic angle in South Africans

Forensic anthropologists are increasingly being asked to aid in the identification of skeletonized remains by estimating age-at-death, sex, ancestry and individualising factors such as height. For over a century, the pelvis has been known to be one of the most sexually dimorphic bones of the human body and the subpubic angle is one of the most accurate, albeit scarcely quantified features thereof.

Candice Small, Desiré Brits and **Jason Hemingway** from the School of Anatomical Sciences, documented the variation in subpubic angle between the sexes and populations, and developed specific standards to be used in the South African forensic context.

Using a novel method and custom-built stand, the team measured the subpubic angles of 145 pelves, consisting of 68 white and 77 black South Africans, from the Raymond A. Dart Collection of Human Skeletons housed in the School of Anatomical Sciences. A bootstrapped binary logistic regression was employed to derive sectioning points for each of the population groups and in a lumped sample.

As expected, the study found that significant differences exist between the sexes, but more notably between the two population groups. For black individuals it was found that males generally possessed a subpubic angle less than 74.9°, with larger values being indicative of the female sex. While for white

individuals the sectioning point lay higher, at a subpubic angle of 81.4°. Population-specific sexing afforded an accuracy of 86%, but when the incorrect population specific sectioning point was used to ascertain sex, the accuracy dropped significantly. A lumped-sample sectioning point of 78.2° was thus developed for these instances.

Hence, from the results of the binary logistic regression, population specific parameters ensure a high accuracy in sex estimation. However, should population affinity be unclear it is better to use binary logistic regression to derive sectioning points from lumped data of various populations than to use those derived from potentially the wrong population specific regressions.

An articulated pelvis housed in the articulation stand showing the subpubic angle.

Small C, **Brits DM** and **Hemingway J** (2012). Quantification of the subpubic angle in South Africans. *Forensic Science International*. Oct 10;222(1-3):395.e1-6

Female cancers and injectable contraceptives: risks similar to the Pill

In contrast to the majority of women worldwide, South African women - especially black South African women - use injectable hormonal contraceptives more frequently than oral hormonal contraception. Increasing exposure to oestrogen and/or progesterone, whether endogenous or exogenous, has been shown to increase risk for cancers of the breast and of the cervix. Globally, more than 210 million women currently use oral or injectable contraceptives with more than 60 million women, mainly in lower income countries, on injectable contraceptives (most often Depo-Provera – depot medroxyprogesterone acetate).

A study by **Margaret Urban** and colleagues from the NHLS/MRC Cancer Epidemiology Research Group for the first time conclusively confirmed previous cancer-related findings for the Pill in injectable contraceptive users as well. The group used data from the Johannesburg Cancer Case Control Study (JCCCS), a database of socio-demographic and risk factors on newly diagnosed black cancer patients in tertiary state hospitals in Johannesburg.

They showed that women who had recently used one or both of these contraception methods were more likely to develop breast and cervical cancer than women who had never used hormonal contraception. The increased risk returned to baseline by ten years after the last use. HIV status did not materially affect the risk estimates.

Additionally, the study found that use of hormonal contraceptives for at least five years significantly protected the user against the much rarer cancers of the ovary and of the endometrium.

If properly communicated, these findings should help women make informed decisions about their choice of contraceptive method, taking into consideration the transient increased cancer risk in the context of protection against unwanted pregnancy.

Urban M, Banks E, Egger S, Canfell K, O'Connell D, Beral V, and Sitas F (2012). Injectable and Oral Contraceptive Use and Cancers of the Breast, Cervix, Ovary, and Endometrium in Black South African Women: Case – Control Study. *PLoS Medicine* 9(3): e1001182.

Eliminating measles: why aren't we there yet?

Measles mortality has decreased substantially worldwide, thanks to intensified measles immunisation efforts. Recently, the World Health Organization AFRO region established a measles pre-elimination goal and experts have suggested engaging in a measles eradication campaign at the global level. However, recent large-scale outbreaks in many Sub-Saharan African countries present a challenge to measles control efforts.

In an attempt to understand the reason for such outbreaks, **Professors Karen Hofman** and **Steve Tollman** of PRICELESS and the MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), School of Public Health, and collaborators assessed measles immunisation coverage in South Africa for the period 2001–2010 at both the province and district levels.

To significantly reduce a child's risk of contracting measles in South Africa, immunisation efforts have focused on an initial vaccination administered at 9 months and a booster at 18 months. The national coverage for the first vaccination increased from 68% to 95% in the decade 2001 to 2010, and for the second vaccination from 57% to 83%.

However, the data showed substantial heterogeneity in coverage patterns at provincial and district level. Several districts had coverage as low as 59% while others enjoyed complete coverage. This is significant because the inconsistencies in coverage between districts leads to lowered 'herd immunity'. The consequences are country-wide outbreaks - such as the one seen in South Africa in 2009/2010 - which present a threat to the goal of measles elimination globally.

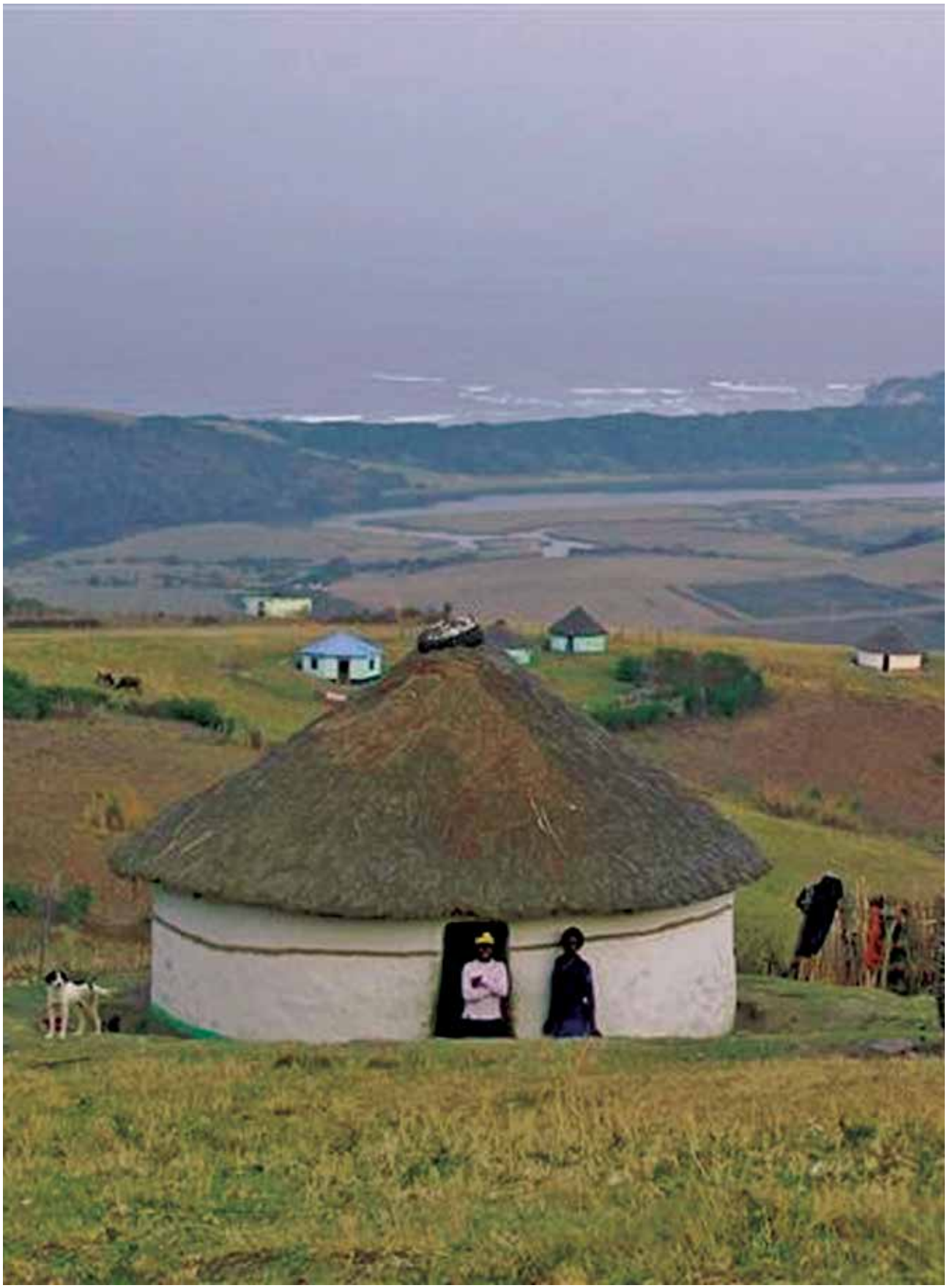
The team also investigated the impact and cost-effectiveness of supplemental immunization activities (SIAs) in South Africa. SIA campaigns provide children with an additional dose of measles vaccine, vitamin A supplements, deworming medication and oral polio vaccines. The team found that SIAs seemed to be associated with a decrease in routine immunisation coverage at the district level. The number of fully immunised children under the age of one decreased by 29% during periods of SIA implementation. Also, fewer women used contraceptives and visited antenatal clinics during these periods. The team found that the SIA child health delivery platform is cost-effective especially when vitamin A supplementation is included in the programme. However, the cost-effectiveness of SIAs differed greatly between the different provinces of South Africa.

The researchers concluded that mass immunisation campaigns often place additional pressure on health system infrastructure and may lead to a false sense of adequate coverage. They suggested that such campaigns may not be as effective as simply improving the population coverage of routine vaccinations.

Verguet S, Jassat W, Hedberg C, **Tollman S**, Jamison D, **Hofman K**. (2012) Measles control in Sub-Saharan Africa: South Africa as a case study. ***Vaccine***. 30: 1594–1600

Verguet S, Jassat W, Bertram M, **Tollman S**, Murray CJL, Jamison DT, **Hofman K**. (2013) Supplementary immunization activities: full economic evaluation of a child health delivery platform in South Africa. *Global Health Action*.1 (6) :1-9

Verguet S, Jassat W, Bertram MY, **Tollman SM**, Murray CJL, Jamison D, **Hofman KJ**. (2013) Impact of supplemental immunization activity campaigns (SIA) on health systems: findings from South Africa. *Journal of Epidemiology and Community Health,* 2013, 10.1136/jech-2012-202216



RESEARCH **RECOGNITION**

NATIONAL RESEARCH FOUNDATION (NRF) RATINGS

Researchers who receive NRF A-ratings are unequivocally recognised by their peers as leading international scholars in their field for the high quality and impact of their recent research outputs. The Faculty hosts six A-rated researchers.

The National Research Foundation (NRF) is an independent government agency which aims to promote and support research in all fields of scientific endeavour. The NRF provides services to the research community especially at Higher Education Institutions (HEIs) and Science Councils with a view to promoting high-level human capital development. The NRF uses a peer-evaluation and rating system as a mechanism to nurture scholarship and grow the country's research capacity. Ratings are awarded based on a researcher's recent research outputs and impact as perceived by international peer reviewers.

NRF A-RATED RESEARCHERS

Professor Charles Feldman

Professor Charles Feldman obtained his MBBCh degree at the University of the Witwatersrand and subsequently received his FCP (SA), PhD, and DSc. He was registered as a sub-specialist in Pulmonology in 1993 and was elected to the Fellowship of the Royal College of Physicians (FRCP) in 1997.

Professor Feldman is Chief Specialist, Head of the Division of Pulmonology, Director of the Pulmonary Infections Research Unit at Wits and also acts as Deputy Chair of the University's Human Research Ethics committee.

Professor Feldman is a member of several national and international societies, including the American Thoracic Society, British Thoracic Society, European Thoracic Society and is a Fellow of the American College of Chest Physicians. He is a member of the South African Thoracic Society, for whom he has served as President on two occasions, is a member of the Critical Care Society of Southern Africa, and is an executive committee member of the Infectious Disease Society of Southern Africa.

Professor Feldman is a member of the Board of the South African Medical Research Council. In 2011, he was made an Honorary Life Member of the Federation of Infectious Diseases Societies of Southern Africa (FIDSSA) for his outstanding contribution to Infectious diseases in South Africa, for his tireless work as Editor of the *Southern African Journal of Epidemiology and Infection*, and to FIDSSA itself. He also received an Honorary Fellowship of the South African Thoracic Society (SATS) for his contributions to pulmonology in South Africa. In 2009, he was awarded the Vice Chancellor's Research Award, the University of the Witwatersrand's top research prize.

His research in the field of community-acquired pneumonia includes both clinical and translational research. Some of the clinical research has been involved in understanding the optimal antibiotic management of the infection. The laboratory based research has focused on understanding the pathogenesis of pneumonia to derive alternative strategies as an adjunct to antibiotic therapy in order to improve the prognosis of patients with pneumonia. Much of this research has informed both local and international guidelines for the optimal management of pneumonia. Professor Feldman has over 300 publications.

Professor Duncan Mitchell

Professor Duncan Mitchell is Professor Emeritus of Physiology and an Honorary Professorial Research Fellow in the Brain Function Research Group. He first was awarded an NRF A-rating in 1984. Before joining Wits in 1975, he was on the scientific staff of the National Institute for Medical Research (London) and, before that, of the Research Organization of the Chamber of Mines of South Africa.

Professor Mitchell's research started in the field of applied physiology of deep level mining, and he has added research in somatosensory neurophysiology, fever physiology and thermal ecophysiology to a lifelong career in thermal physiology. His interest in somatosensory neurophysiology led to a parallel research programme in pain pathophysiology and pharmacology. He now is pursuing research in conservation physiology related to climate change, in the pathophysiology of pain resulting from HIV and its treatment, and in sickness behaviour.

Professor Mitchell was awarded the prestigious Harry Oppenheimer Fellowship in 2010. In 2012 Wits conferred the degree of Doctor of Science *honoris causa* on Professor Mitchell.

(Photograph courtesy of Bongiwe Gumede and Media24)

Professor Glenda Gray

Professor Glenda Gray, MBBCH, FCPaeds (SA), a pediatrician by training, is the President and CEO of the South African Medical Research Council, a member of the Vaccine and Infectious Disease Division of the Fred Hutchinson Cancer research Center, a non-executive director at the Perinatal HIV Research Unit and Professor in the Department of Paediatrics, at the University of the Witwatersrand.

She has carried out research in the Prevention of Mother-to-Child Transmission (PMTCT), pediatric HIV, and HIV prevention including HIV vaccines and microbicides. She is the Co-PI of the HIV Vaccine Trials Network (HVTN) and Director of HVTN International Programmes. In 2002, together with James McIntyre she was awarded the Nelson Mandela Health and Human Rights Award for pioneering work done in the field of MTCT of HIV-1. She is a member of the Academy of Science of South Africa, and chairs their standing committee on health. She is a member of the Institute of Medicine of the National Academies and serves on their Global Health Board.

Professor Gray has also been awarded the International Association of Physicians in AIDS Care 'Hero of Medicine' award for work in the field of HIV treatment in children and adults. In 2009, James McIntyre and Gray received the N'Galy-Mann lectureship in recognition of their HIV research contribution in South Africa. In June 2012 she received a DSc *honoris causa* from Simon Fraser University, Vancouver. She has also been admitted into the American Academy of Microbiology in 2012. In 2013 she received the country's highest honor, the Order of Mapungubwe, granted by the president of South Africa for achievements in the international area which have served South Africa's interest. She also received the 2013 European & Developing Countries Clinical Trials Partnership (EDCTP) Award for an Outstanding African Scientist.

Professor John Pettifor

Professor John Pettifor is an A-rated researcher of long standing who for 23 years was Head of the Department of Paediatrics at Chris Hani Baragwanath Hospital in Soweto, Johannesburg. Although recently retired, he remains active in research and postgraduate student supervision as an honorary Professorial Researcher in the newly established MRC/Wits Developmental Pathways for Health Research Unit and as Director of the Carnegie Clinician Scientist Fellowship programme of the Faculty of Health Sciences. Over the years, Professor Pettifor has had major research interests in metabolic bone diseases in children and in calcium and vitamin D physiology.

He continues to be active in both these fields, and his research in the vitamin D field was recently recognised internationally when he received a Career Award at the 15th Workshop on Vitamin D for his longstanding contributions to vitamin D research. His contributions to Children's Bone Health were also recognised some 12 years ago when he received the Dr Charles Slemenda Award from the International Conference on Children's Bone Health. He is on a number of editorial boards of international bone journals and has over 210 research publications and 30 chapters in books. He is joint editor of the major international book on paediatric bone and its diseases, which saw a second edition published a couple of years ago.

Professor Pettifor is currently leading research into establishing factors (both environmental and genetic) which influence bone mass and accretion in a longitudinal cohort of adolescent children who are part of the Birth to Twenty cohort. The data obtained from this cohort annually over more than 12 years, form a unique collection of information on the changes in bone mass that occur during pubertal growth and development. Studies in this area have already resulted in a number of international publications on the influences of genetics, ethnicity and gender on bone development. They have also highlighted the striking differences in fracture rates between the ethnic groups during childhood with black children fracturing less than half as frequently as white children. Now that the children have reached their final adult heights, data collection will occur less frequently but will continue to monitor changes in bone mass as an adult.

Professor Keith Klugman

Professor Ketih Klugman is currently the Past - President of the International Society of Infectious Diseases, Treasurer of the International Symposium of Pneumococci and Pneumococcal Diseases Board and a past Chair of the International Board of the American Society for Microbiology. He has chaired or served on numerous expert committees for the World Health Organization (WHO), the Wellcome Trust and the Centers for Disease Control and Prevention (CDC). He serves as an editor or member of the editorial board of 12 journals.

An outstanding scientist, Professor Klugman has made major contributions to the field of pneumococcal disease. His work, including the demonstration of pneumococcal conjugate vaccine efficacy in the developing world, has led to interventions that have saved millions of lives especially in Africa. He has published more than 500 scientific papers which have been cited more than 23,000 times to date. His current position allows him the opportunity to contribute to the mission of the Gates Foundation to reduce deaths from pneumonia in children, thus allowing them the chance to lead healthy and productive lives.

Professor Shabir Madhi

Professor Shabir Madhi is Executive Director of the National Institute for Communicable Diseases, Professor of Vaccinology and Director of the MRC Respiratory and Meningeal Pathogens Research Unit in the School of Pathology, University of the Witwatersrand. He also holds the position of DST/NRF SARChI Chair in Vaccine Preventable Diseases. Professor Madhi completed his undergraduate and postgraduate training at Wits, qualified as a paediatrician in 1996 and obtained his PhD in 2003.

He has been involved in research on vaccine-preventable diseases and on infections in HIV-infected children for 17 years. His research demonstrating a reduction in childhood morbidity with the use of pneumococcal conjugate vaccines (PCVs) and rotavirus vaccines prompted South Africa to be the first in Africa to introduce these vaccines in national immunisation programmes. These studies also contributed to the WHO recommending the introduction of these life-saving vaccines into public immunisation programmes globally.

Professor Madhi has contributed to nine book chapters and over 190 peer reviewed articles in international journals, including five in the highest ranked medical journal globally, the *New England Journal of Medicine*. He received a number of national awards for his research, including the NRF President's Award for Transformation of the Science Cohort (2009), the T W Kambule NRF-NSTF Award: Senior Black Researcher over the past five to 10 years (2010), Vice-Chancellor's Award for Research at Wits (2010) and the Medical Research Council: Life Time Achievement Award (Platinum Medal) (2013).

He was awarded an A-rating by the NRF in 2011 and was listed as being among the '100 World Class South Africans' by *City Press* in 2013. He is also the immediate past-president of the World Society of Infectious Diseases and has served as a consultant to the World Health Organization (in the fields of vaccinology and pneumonia) and to the Bill and Melinda Gates Foundation (on pneumonia and is member of its Scientific Advisory Committee).

NRF NEW/RE-RATED RESEARCHERS

First Ratings

Awarded in 2012	Awarded in 2013
Professor Glenda Gray (A-rating)	Associate Professor Lynne Schepartz (B-rating)
Professor Gavin Norton (B rating)	Associate Professor Cindy Firnhaber (C-rating)
Dr Ans Bayens (Y-rating)	Dr Alisha Wade (Y-rating)
Dr Frederic Michel (Y-rating)	Associate Professor Yahya Choonara (Y-rating)

Renewed Ratings

Awarded in 2012	Awarded in 2013
Professor Emeritus Duncan Mitchell (A-rating)	Professor Patrick Arbuthnot (B-rating)
Professor Janusz Paweska (B-rating)	Professor Maureen Coetzee (B-rating)
Professor Caroline Tiemessen (B-rating)	Professor Anna Kramvis (B-rating)
Professor Viness Pillay (B-rating)	Dr Peter Adrian (C-rating)
Professor Michele Ramsay (B-rating)	Professor Lizette Koekemoer (C-rating)
Associate Professor Shane Norris (C rating)	
Dr Mignon Du Plessis (C rating)	
Dr Colleen Flanagan (C-rating)	
Professor David Gray (C-rating)	
Dr James Phillips (C-rating)	

SOUTH AFRICAN RESEARCH CHAIRS INITIATIVE PROGRAMME

The South African Research Chairs Initiative (SARChI) programme is a national knowledge and human resource development intervention, led by the Department of Science and Technology and managed by the National Research Foundation (NRF). The programme was established in 2006 to address the crisis of brain drain in South African universities which impacts directly on the quality and quantity of postgraduate student training and research outputs. The main goal of the initiative is to strengthen and improve research and innovation capacity of public universities for producing high quality postgraduate students, research, and innovation outputs.

Chair in **HIV Vaccine Translational Research:**

Professor Caroline Tiemessen

Professor Caroline Tiemessen is an Associate Professor (Reader) within the Wits Faculty of Health Sciences and is based in the Centre for HIV and STIs, National Institute for Communicable Diseases (NICD), National Health Laboratory Services. She currently heads the Cell Biology Laboratory within the Centre for HIV and STIs at the NICD. Professor Tiemessen studied at the University of the Witwatersrand and completed her PhD in Virology in 1993. She has been employed at the NICD since 1986 where she has gained expertise in addressing molecular biological and immunological aspects of viral-host interactions. Her research interests include the immunology of HIV and TB, maternal-infant HIV-1 transmission as a model for study of protective immunity, natural resistance to HIV infection and disease progression in adults, chemokine-chemokine receptor interactions, HIV vaccines, and immunogenetics. In 2013, Professor Tiemessen was appointed as the Department of Science and Technology (DST)/National Research Foundation (NRF) South African Research Chairs Initiative (SARChI) Chair in 'HIV Vaccine Translational Research'.

Chair in **Health Policy and Systems Research:**

Professor John Eyles

Professor John Eyles is an eminent international research scientist and in January 2014 was appointed by the Centre for Health Policy (CHP), Wits as the new SARChI Chair for 'Health Policy and Systems Research'. The research portfolio associated with this Chair will focus on universal access to quality care for all South Africans.

Also based at McMaster University in Canada, Professor Eyles is a Professor in the School of Geography & Earth Sciences and had a Research Chair there for six years before becoming Director of the McMaster Institute of Environment and Health. He holds cross-appointments in the Centre for Health Economics and Policy Analysis and the Departments of Clinical Epidemiology and Biostatistics and Sociology at McMaster's. He has worked extensively internationally, developing research and practice partnerships across disciplines and sectors. He also serves on several expert panels and advisory committees and boards.

Professor Eyles has published widely in the fields of health and social sciences. He is author or co-author of approximately 200 books, peer-reviewed journal articles and technical reports and has supervised 30 PhD students. Some of his papers have become standards for citation, especially in qualitative methods, health care resource allocation and public involvement in health care decision-making. His particular areas of expertise include population health status and need; access and equity in health care; health care financing; human resources; governance and stakeholder participation; and the development of decision support tools to enable the transfer of research to practice.

Professor Eyles is world-renowned in the field of health systems and policy research, and will strengthen the field in South Africa as the Department of Health embarks on a major health systems reform programme to boost the country's health outcomes which fall below international targets in some areas.

Chair in **Pharmaceutical Biomaterials and Polymer-engineered Drug Delivery Technologies:**

Professor Viness Pillay

Professor Viness Pillay obtained his Master of Pharmacy *(cum laude)* from the University of Durban-Westville (South Africa) in 1996. His PhD was completed at Temple University (USA) as a Fulbright Scholar in 2000. He is currently the DST/NRF SARChI Chair in '**Pharmaceutical Biomaterials and Polymer-Engineered Drug Delivery Technologies**', a Personal Professor of Pharmaceutics and Executive Director of the Wits Advanced Drug Delivery Platform (WADDP). Professor Pillay holds an NRF B-rating and is a pioneer of drug delivery research on the African continent. He has been awarded a Center of Excellence by the African Network for Drugs and Diagnostics Innovation in 'Advanced Drug Delivery Technology'. He is a member of several prestigious academies that include the African Academy of Sciences, Academy of Science of South Africa, American Chemical Society, American Association of Pharmaceutical Scientists, New York Academy of Sciences, Academy of Pharmaceutical Sciences of South Africa and The Biomaterials Network. He also served as an Associate Professor of Pharmaceutics at Florida A&M University (USA). His research in the USA led to a granted US patent for the development of a monolithic controlled release tablet that was licensed to a US pharmaceutical company and currently provides benefit to patients globally. Professor Pillay is the author of more than 160 publications, over 15 book chapters and an inventor of more than 38 PCT patents with 16 granted and 26 under prosecution in USA, Europe and Japan. He is the brainchild behind the *RapiDiss Wafer* technology for treating infectious diseases in paediatrics which has won him the Olesugun Obasanjo Prize 2014 for Scientific Breakthrough and Innovation in Advanced Drug Delivery Technologies. In 2013, he was awarded the Vice Chancellor's Award, the University of the Witwatersrand's most prestigious award for research.

Chair in **Vaccine Preventable Diseases:**

Professor Shabir Madhi

Professor Shabir Madhi is Executive Director of the National Institute for Communicable Diseases, Professor of Vaccinology and Director of the MRC Respiratory and Meningeal Pathogens Research Unit in the School of Pathology, University of the Witwatersrand. He is also an NRF A-rated scientist. His abbreviated CV can be found in the NRF A-rated section on page 67.

Chair in **Medical Entomology and Vector Control:**

Professor Maureen Coetzee

Professor Maureen Coetzee is Co-Director of the new Wits Research Initiative for Malaria, and DST/NRF South African Research Chair in 'Medical Entomology and Vector Control' which has been renewed in 2012 for a further five years. Professor Coetzee holds a B-rating from the National Research Foundation and her research on the malaria vector mosquitoes in Africa has had major impact on control policies, both in South Africa and in other African countries. For some years she has been involved with the World Health Organization (WHO) in developing regional and global policy for vector control interventions. She serves on several committees for the WHO and is the WHO representative on the Stockholm Convention DDT expert committee. She is an elected Fellow of the Royal Society of South Africa, the Royal Entomological Society of London, the Royal Society of Tropical Medicine and Hygiene, and a member of the Academy of Sciences of South Africa.

UNIVERSITY AWARDS

Vice Chancellor's Award

This is the University's most prestigious award for research. The purpose of this Award is to stimulate research and research-related scholarly activities by acknowledging and rewarding an exceptional member of the University who has been engaged not only in research but also in more general scholarly activities. Over the past seven years academics in the Faculty of Health Sciences have garnered this award six times.

2012

Professor Helen Rees (Director of the Wits Reproductive Health and HIV Research Institute, School of Clinical Medicine.

2013

Professor Viness Pillay (Director of the Wits Advanced Drug Delivery Platform (WADDP), Department of Pharmacy and Pharmacology, School of Therapeutic Sciences)

Friedel Sellschop Award

This is a premier award which recognises outstanding young researchers across all disciplines at the University.

2012

Dr Lois Harden

2013

Dr Robyn Hetem

In 2012, the degree of **Doctor of Science,** honoris causa**,** was conferred upon **Professor Emeritus Duncan Mitchell** by the University of the Witwatersrand. This was in recognition of his enormous contribution and unfailing dedication to Wits. Professor Mitchell is an Honorary Professorial Research Fellow in the Brain Function Research Group (BFRG), School of Physiology. The following is an excerpt from the citation read at the ceremony 'He has selflessly and enthusiastically sought to further the careers of young students, postgraduates and scientists so that they too can become distinguished."

Professor Viness Pillay was awarded the **Wits Innovators Forum International Inventor Award** by the Wits Commercial Enterprise (Pty) Ltd. in May 2013 for having a patent granted in an international jurisdiction.

Professor Viness Pillay, Associate Professor Yahya Choonara and **Ms Lisa du Toit** were awarded the **Wits Innovators Forum Prolific Inventor Award** by the Wits Commercial Enterprise (Pty) Ltd. in May 2013 for having disclosed more than five inventions.

Professor Viness Pillay, Associate Professor Yahya Choonara and **Ms Lisa du Toit, Mr Pradeep Kumar** were awarded the **Wits Innovators Forum First-Time Inventor Award** by the Wits Commercial Enterprise (Pty) Ltd. in May 2013 for having disclosed a first patent.

FACULTY AWARDS

Faculty Research Prize

The Faculty Research Prize is the most prestigious prize offered by the Faculty of Health Sciences in recognition of excellence in research. The following individuals have been singled out as the top achievers and received the award in 2011, 2012 and 2013:

2011

Dr Kebashni Thandrayen

(MRC/Wits Developmental Pathways for Health Research Unit, Department of Paediatrics).

Dr Thandrayen was first author on the following publication in the *Journal of Bone and Mineral Research* in December 2011.

K Thandrayen, SA Norris, LK Micklesfield and JM Pettifor (2011) Heterogeneity of fracture pathogenesis in urban South African children: The Birth to Twenty Cohort. *Journal of Bone and Mineral Research.* Volume 26, Issue 12, pages 2834–2842.

Dr Thandrayen pictured with the Assistant Dean: Research and Postgraduate Support, Professor Beverley Kramer

2012

Associate Professor Penny Moore (Centre for HIV and STIs at the National Institute for Communicable Diseases, NICD and School of Pathology). Professor Moore is the first author on the following publication in *Nature Medicine:*

PL Moore, ES Gray, CK Wibmer, JN Bhiman, M Nonyane, DJ Sheward, T Hermanus, S Bajimaya, NL Tumba, M-R Abrahams, BE Lambson, N Ranchobe, L Ping, N Ngandu, Q Abdool Karim, SS Abdool Karim, RI Swanstrom, MS Seaman, C Williamson & L Morris. (2012) Evolution of an HIV glycan–dependent broadly neutralizing antibody epitope through immune escape. *Nature Medicine*.18,1688-1692.

Professor Moore receiving her Award from Professor Beverley Kramer: Assistant Dean: Research and Postgraduate Support

2013

Mr Kurt Wibmer from the School of Pathology. Mr Wibmber is the first author on the following publication in the *PLOS Pathogens journal:*

CK Wibmer, JN Bhiman, ES Gray, N. Tumba, SS Abdool Karim, C Williamson, L Morris, PL Moore. (2013) 'Viral Escape from HIV-1 Neurotralizing Antibodies Drives Increased Plasma Neutralization Breadth through Sequential Recognition of Multiple Epitopes and Immunotypes', *PLOS Pathogens.* 9, (10), e1003738, October.

Kurt Wibner pictured with Professor Angela Woodiwiss (acting Chair: Faculty Research Committee)

MOST PRESTIGIOUS POSTGRADUATE DEGREE AWARDS

The Most Prestigious Postgraduate Degree Awards were instituted by the Faculty in 2009 to recognise the efforts of outstanding emerging researchers. Any Faculty of Health Sciences postgraduate student who has graduated with a Masters or Doctoral degree may be nominated by his/her supervisor if they believe that the dissertation or thesis was of outstanding quality.

2011

The awards recognising outstanding research reports/dissertations/theses by postgraduate students for 2011 were awarded at the 38th prize-giving ceremony of the Faculty in March 2012. The prizes were awarded as follows:

Prestigious PhD Award:

Dr Kabamba Bankoledi Alexandre (School of Pathology, supervised by Professor Lynn Morris). '*Sensitivity of HIV-1 subtype C viruses to Griffin, Cyanovirin-N and Scytovirin: Potential HIV-1 microbides*'.

Prestigious Masters by Research Award:

Ms Priya Bawa (School of Therapeutic Sciences, supervised by Professor Viness Pillay and Associate Professor Yahya Choonara). '*Design and development of a stimuli-responsive oral tablet system for the treatment of ulcerative colitis*'.

Prestigious MMed/MDent Award:

Dr Warren Lowman (School of Pathology, supervised by Professor Adriano Duse). '*Antimicrobial susceptibility testing and profiling of Nocardia species and other aerobic actinomycetes from South Africa: a comparative evaluation of broth microdilution versus the Etest*'.

Prestigious Masters Award (course work and research report: 50% research)

Mrs Greer van Zyl (School of Public Health, supervised by Dr Nicola Christofides). '*A discourse and content analysis of how nursing is framed in the mainstream press in South Africa: January – June 2010*'.

Prestigious Masters Award (course work and research report: 30% research)

Dr Mazvita Sengayi (School of Public Health, supervised by Dr Harry Moultrie). '*Predictor of loss to follow-up in children receiving antiretroviral treatment in Johannesburg, South Africa*'.

2012

On 4 April 2013 the Faculty held its annual Prize Giving ceremony. The following awards were made:

Prestigious PhD Award:

Dr Gill Nelson (School of Public Health, supervised by Professors Jill Murray and Geoffrey Candy (Department of Surgery). *'Living in the shadow of a dust cloud: Occupational respiratory diseases in the South African mining industry, 1975 to 2009'.*

Prestigious Master of Science by Research Award:

Ms Roxanne Naidoo (Department of Clinical Microbiology and Infectious Diseases, School of Pathology supervised by Professor Mrudula Patel). *'Effect of Dodonaea viscosa var. angustifolia on the oral pathogens*'.

Prestigious MMed/MDent Award:

Dr Hanlie Engelbrecht (Division of Oral Pathology, School of Pathology, supervised by Professor Shabnum Meer). *'Perineural infiltration of the inferior alveolar nerve in mandibular ameloblastomas'.*

2013

The 2013 awards for the most prestigious postgraduate degrees were awarded as follows:

Prestigious PhD Award:

Dr Anne Von Gottberg (School of Clinical Medicine, supervised by Professors Charles Feldman and Keith Klugman). '*Studies on bacterial respiratory pathogens causing bacteraemia and meningitis in South Africa'.*

Prestigious Masters Award (50% Research)- MPH:

Ms Helen Savva (School of Public Health, supervised by Dr Nicola Christofides and Marlise Richter). *'Factors associated with the utilization of health services by female sex workers in South Africa'.*

Prestigious Masters by research Award- MSc (Med):

Ms Rivka R. Lilian (School of Pathology, supervised by Professors Gayle Langley and Elena Libhaber). *'Identifying interventions to improve outcomes of the South African prevention of mother-to-child transmission programme'.*

NATIONAL & INTERNATIONAL ACHIEVEMENTS

Professor Emeritus Phillip Vallentine Tobias

National

2012

In 2012, the degree of **Doctor Scientiae**, honoris causa, was conferred upon **Professor Emeritus Phillip Vallentine Tobias** by the **Nelson Mandela Metropolitan University** in recognition of 'his work in establishing South Africa as the 'Cradle of Humankind', his devotion to humanity and for raising the profile of southern Africa and its people in Science and Society'.

The South African Medical Association (SAMA) awards recognise the outstanding achievements of doctors and specialists in their respective fields from both the public and private sectors.

Professor Helen Rees was awarded the **SAMA Lifetime Achievement Award for 2012.**

Professor Rees receives her SAMA Lifetime Achievement award. On her right is Dr. Gwen Ramokgopa, Deputy Minister of Health, and to her left is Professor Mike Sathekge, Chairman of the SAMA EST Committee

Professor Justus Hofmeyr was awarded the **SAMA Spirit of Medicine Award for 2012**.

Professor Justus Hofmeyr pictured with Professor Mike Sathekge, Chairman of the SAMA EST Committee on his right and Dr Norman Mabasa, past Chairman of SAMA to his left

Associate Professor Yahya Choonara won the **TW Kambule Award** for an Emerging Researcher who has made an outstanding contribution to Science, Engineering, Technology and Innovation (SETI) through research and its outputs at the National Science and Technology Forum (NSTF) Awards, hosted in partnership with BHP Billiton in 2012. This is the flagship project of the largest and most prominent multi-stakeholder representative forum for SETI in South Africa. Professor Choonara was also selected as one of five **Young Affiliates by The World Academy of Sciences (TWAS)** for the period 2012-2016. This is part of TWAS' effort to recognise promising young researchers and increase the presence of younger scientists in the Academy.

Dr Daisy Selematsela, Prof Yahya Choonara and the Honourable Mrs Naledi Pandor Minister of Science and Technology at the NSTF-BHP Billiton Awards

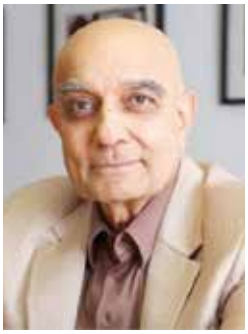
Professor Emeritus Duncan Mitchell was a finalist at the **NSTF/ BHP Billiton Awards** in the **Contributions made by an Individual to SETI over a Lifetime** category.

Professor Bavesh Kana was selected by the *Mail and Guardian* newspaper as one of the '**200 Young South Africans**'. The selection is based on outstanding contributions in their respective fields and to society in general.

Professor Kana with Minister Trevor Manual

Professor Barry Schoub received the prestigious **Order of Mapungubwe: Silver**, from the Honourable President Jacob Zuma for his 'excellent achievements in medical science and contribution to the field of virology.' This Order is awarded to South African citizens for excellence and exceptional achievement.

Professor Joe Veriava and **Professor John Milne** were presented with **Lifetime Achievement Awards** at the 17th biennial congress of the Southern African Hypertension Society. The Society wished to honour them for their 'outstanding contributions to the field of hypertension over the span of their careers, including their contributions to research'.



Professor Joe Veriava

Professor John Milne

2013

Professor Lynn Morris together with an exceptional research team were awarded an esteemed **MRC Flagship Project Award** for a study entitled 'Antiviral properties of HIV vaccine-elicited antibodies'. Professor Morris was also awarded second runner-up award in the **'Distinguished women in the Life Sciences' category at the South African Women in Science Awards** for her outstanding scientific contribution to advancing science and building the knowledge base in her discipline.

Professor Glenda Gray was honoured by the President of South Africa, the Honourable Jacob Zuma with the **Order of Mapungubwe: Silver**. The Order was awarded for her in depth and exemplary research into mother to child transmission of HIV which has not only impacted internationally, but has improved the lives of people in South Africa.

Professor Shabir Madhi was awarded a **Platinum Medal**, one of the MRC Lifetime Achievement Awards. As the MRC's highest scientific award it recognises outstanding scientists who have had a sustained scientific impact over many years and have helped build the foundations of health research in South Africa for future generations. He was also listed among the **'Top 100 World Class South Africans'**, which included among others former Presidents Nelson Mandela, Thabo Mbeki and many other luminaries in the inaugural edition of this listing by *City Press.*

Outgoing MRC President Prof. Salim Abdool Karim (centre) with Platinum Medal Winners, Prof. Shabir Madhi (left) and Prof. Eric Bateman from the University of Cape Town (Right). (Picture: South African Medical Research Council)

Emeritus Professor John Pettifor of the Wits Faculty of Health Sciences was announced as a finalist for the **2013 NSTF-BHP Billiton Awards** in the Category: **Contributions made by an Individual to SETI over a Lifetime**.

Professor Karen Sliwa-Hanhle, was also announced as a finalist at the **2013 NSTF-BHP Billiton Awards** in the categories: **Outstanding Contribution to SETI through Research Capacity Development** and **Individual for an outstanding Contribution to SETI through Research and its outputs**.

Professor Wendy Stevens has been awarded the National Health Laboratory Service (NHLS) **CEOs Award of Excellence**.

Dr Lisa Micklesfield and colleagues have been awarded the **Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMDSA) Endocrinology Award**. This was awarded in recognition of the best original research paper published in endocrinology. 'Micklesfield LK, Goedecke JH, Punyanitya M, Wilson KE, Kelly TL. Dual-energy x-ray performs as well as clinical computed tomography for the measurement of visceral fat. *Obesity (Silver Spring)* 2012 May; 20(5):1109-14 (Open access).

The **Department of Molecular Medicine and Haematology,** Charlotte Maxeke Academic Hospital was awarded the **Best Academic Pathology Laboratory** country-wide.

Lawrence Mashimbye was featured in the *Mail and Guardian's* **200 Young South Africans 2013.** The selection is based on outstanding contributions in their respective fields and to society in general.

International

2012

Professor John Pettifor received a **Career Award** at the 15th Vitamin D Workshop held in Houston, USA in June 2012 in recognition of his contribution to vitamin D research over many years.

Associate Professor Glenda Gray was awarded a **Doctor of Science**, honoris causa, from the **Simon Fraser University** (SFU), Canada. The university has been ranked as one of Canada's top three comprehensive universities for nearly 20 years. She was also **elected to the American Academy of Microbiology**.

Dr Mignon du Plessis was named the recipient of the 2012 **Robert Austrian Research Award in Vaccinology (Africa)** at the 8th International Symposium on Pneumococci and Pneumococcal Diseases (ISPPD-8). Five awards were presented to one researcher each from Europe, North America, South America, Africa and Australia.

At the 22nd meeting of the International Society on Morphological Sciences, **Professor Bev Kramer** was awarded the **Anatomist Excellence Award** for her significant contributions to the improvement of morphological sciences across the globe.

The American Mosquito Control Association (AMCA) selected **Professor Maureen Coetzee** as the recipient of the **AMCA John N. Belkin Memorial Award**, in recognition of her 'exceptional contributions to the taxonomy, systematics and biology of African mosquitoes'.

Dr Patrick Dessein became the only invited South African member of the **International Scientific Committee of Excellence in Rheumatology** (EiR). The number of delegates is currently capped at 900, hailing from 60 countries worldwide.

Professor Hoosen Coovadia was asked to **Chair the World Health Organization`s sub-regional consultation** on 'Male involvement in the elimination of mother-to-child-transmission (MTCT) of HIV and keeping their mothers alive'.

2013

Professor Laetitia Rispel has been inducted into the International Nurse Researcher Hall of Fame. This Hall of Fame recognises nurse researchers who are Sigma Theta Tau International (STTI) members and who have achieved long term, broad national and/or international recognition for their research which has impacted the profe ssion and the people they serve.

Professor Rispel pictured with Professor Hester Klopper (left), President of the Honor Society of Nursing, Sigma Theta Tau International (STTI) and Professor Suzanne Prevost (right), the immediate past President of the Society.

Professor Cindy Firnhaber received the **Constance B. Wofsy Women's Health Investigator Award**. The award recognises investigators who have made significant contributions to research in HIV-infected women and who embody qualities exemplified by Dr. Wofsy, the late Co-Director of the AIDS Program and Associate Chief of Infectious Diseases at San Francisco General Hospital.

Professor Glenda Gray was selected as winner of the **2013 European & Developing Countries Clinical Trials Partnership (EDCTP) Award for an Outstanding African Scientist**. This is awarded to senior researchers who have made outstanding achievements in their field and who are recognised research leaders in Africa working on HIV/AIDS, tuberculosis and malaria.

Professor Karen Sliwa-Hanhle received the prestigious Paul Morawitz award in Germany. This award is the highest annual award for exceptional cardiovascular research for German speaking countries (Austria, Switzerland and Germany) and can be given to scientists, cardiologists, cardiothoracic surgeons or paediatric cardiologists.

Professor Sliwa-Hanhle with her Award, pictured with (from left) Mr Georg Ertl, Mrs Vivien Weck and Dr Hugo A. Katus. (Photo: http://dgk.org)

Professor Keith Klugman received the **Albert E. Levy Scientific Research Award** for Senior Faculty at Emory University. Established to recognise the contributions of Emory faculty members to the advancement of scientific knowledge. He also received the **Alliance for the Prudent Use of Antibiotics (APUA) Leadership Award for 2013**. This award is presented to an outstanding individual or organisation demonstrating extraordinary leadership in promoting the prudent use of antibiotics in an effort to contain antibiotic resistance.

APPOINTMENTS & FELLOWSHIPS

2012

Associate Professor Bavesh Kana has been appointed as an **International Early Career Scientist** at the **Howard Hughes Medical Institute**, USA. He was one of 28 scientists selected (out of over 750) following a highly competitive review process.

Professor Karen Sliwa-Hanhle has been appointed **Vice president of the South African Heart Association**. She was also appointed as **Chair of the European Cardiac Society working group on Peripartum Cardiomyopathy** and is leading the international registry on this disease; *EuroObs Program.*

Professor Jeff Yengopal was appointed **President of International Association of Dental Research South African Division.**

Professors Helen Laburn, Shabir Madhi, Viness Pillay and Himla Soodyall were inaugurated as members of the **Academy of Science of South Africa (ASSAf)**.

Professors Hoosen Coovadia and **Maureen Coetzee** were elected as **Fellows of the Royal Society of South Africa,** the principal forum for peer appraisal in science.

Associate Professor Penny Moore was re-elected as a member of the **South African Young Academy of Science (SAYAS) Executive Committee.**

Professor Frederick Raal was selected as a member of the **European Atherosclerosis Society Consensus Panel** which is developing new guidelines on the management of familial hypercholesterolaemia for Europe.

Professor Frederick Raal

Professor Peter Kamerman was elected as the **president-elect of the Pain Society of South Africa (PainSA)**; the first non-clinician to be elected to this position.

Professor Andrea Fuller was appointed to the **Royal Society of South Africa Council.**

Drs Alison Bentley and **Karine Scheuermaier** were elected to the board of the **South African Society of Sleep Medicine.**

Professor Amadi Ihunwo was inducted as a **Fellow of the Anatomical Society of Nigeria (FASN).**

Ms Desire Brits was elected as council member of the **Anatomical Society of Southern Africa (ASSA).**

Dr Francesca Conradie was appointed as **President of the SA HIV Clinicians Society.**

Professor Stephen Tollman was appointed as **Chair of the Wellcome Trust 'Public Health and Tropical Medicine Interview Committee'** and will also be taking on the role of **Principal Scientist for the INDEPTH Network.**

Professor Glenda Gray was elected to the **American Academy of Microbiology**.

2013

Professor Paul Manger was elected as a **Fellow of the Royal Society of South Africa,** the principal forum for peer appraisal in science.

Professor Anna Kramvis was elected to the **Academy of Science of South Africa (ASSAf)**.

Professor Judy Bruce was inducted as a **Fellow of the Academy of Nursing in South Africa (ANSA)** in recognition of her National and International contribution to nursing education and scholarship.

Professor Efraim Kramer was recently appointed to the **FIFA Medical Assessment and Research Centre (F-MARC)** in Zurich.

Professor Viness Pillay was voted in as a **Fellow of the African Academy of Sciences**.

Professor Charles Feldman was re-appointed to the **Board of the Medical Research Council (SA)** for a second term.

Professor Savvas Andronikou was elected as **President of the African Society of Paediatric Imaging, Chairman of the South African Society of Paediatric Imaging** for the period 2012 – 2013 and as **board member of the World Federation of Paediatric Imaging.**

Professor Ames Dhai was elected as **President of the South African Medical Association** for the period 2013 – 2014.

Professor Helen Rees was appointed **Chairperson of the WHO's African Regional Advisory Committee on Immunisation.**

Professor Jeff Yengopal was appointed **President of the International Association for Dental Research (IADR) – SA Division.**

Professor Bavesh Kana and **Professor Janusz Paweska** were promoted to **Readers/Associate Professors in the School of Pathology**, Faculty of Health Sciences, Wits.

RESEARCH **EVENTS & INITIATIVES**

BIENNIAL RESEARCH DAY & POSTGRADUATE EXPO

Every two years, the Faculty hosts a Research Day and Postgraduate Expo. In 2012, close to 1000 delegates attended, and 90 oral and 187 poster presentations were delivered, covering topics within five themes: Clinical Research and Therapeutics for Health; Diseases of Lifestyle; Education, policy and systems; Infectious Diseases and Molecular and Comparative Biosciences. Research Day 2012, which fell under the auspices of the Wits90 celebrations, was held in the spirit of celebrating the Faculty's achievements in research, which was reflected in the record number of abstract submissions and overall increased attendance by researchers, exhibitors, government officials, senior visitors from other Faculties and senior University staff.

The day started with a heart-warming speech by the Deputy Minister of Health, Dr Gwen Ramokgopa. She reaffirmed the importance of medical research and its vital role in creating access to health care services for all. She also highlighted the key role that Wits is playing in creating the new generation of transformative health interventions for South Africa. Subsequently there were two plenary lectures, one given by Dr Jonathan Lewis 'The Future of Medicine: Faster, Better, Cheaper'. Dr. Lewis an alumnus of the Faculty is Chief Executive Officer and Director of ZIOPHARM Oncology and has played a leading role in developing several drugs for cancer. Dr Lewis placed substantial emphasis on how technology has influenced changes in health care and how it will bring about even bigger innovations over the next two to three decades. Professor Shabir Madhi, Executive Director of the National Institute for Communicable Diseases (NICD) and Director of the Faculty's Respiratory Meningeal Pathogens Research Unit gave the second plenary lecture titled 'Vaccinating toward a brighter future for children'. He highlighted the importance of vaccinations in children, especially in rural areas, and the battle for access to vaccines. Professor Madhi placed particular emphasis on basic infection control measures, such as hand washing, to curb further spread of disease agents.

After the plenary session, the five parallel breakaway sessions began, with presenters competing for substantial prizes in the form of travel grants. All presenters gave of their best, and the audience was treated to entertaining talks. Three round table discussions were convened in the afternoon, where top, highly qualified stimulating experts gathered to tackle different issues (A world without AIDS; Eliminating TB and Colliding Epidemics – Africa in Transition).

The Faculty Research Office together with the Postgraduate Office organised the Postgrad Expo, which ran concurrently with Research Day. This provided an additional opportunity for profiling the numerous prospects for undertaking postgraduate research and career development in the various departments in the Faculty and research units.

The day ended with a cocktail party at which the winners of the various Research Day prizes were announced.

Research Day
Prize Winners

Clinical Research and Therapeutics for Health

Best Oral: Dr Bridget Hodkinson

Best Poster: Mr Ronnie Immelman

Best Student Oral: Miss Derusha Frank

Best Student Poster: Dr Candice Feben

Diseases of Lifestyle

Best Oral: Dr Nitien Naran

Best Poster: Dr Marketa Toman

Student Oral: Mrs Rebecca Meiring

Best Student Poster: Miss Alessandra Prioreschi

Education, Policy and Systems

Best Oral: Dr Duane Blaauw

Best Poster: Dr Pelagia Ndambakuwa

Best Student Oral: Dr Pieter de Jager

Best Student Poster: Miss Shakira Choonara

Infectious Diseases

Best Oral: Mrs Kristie Bloom

Best Poster: Dr Arthi Ramkissoon

Best Student Oral: Mr Previn Naicker

Best Student Poster: Dr Simbarashe Takuva

Molecular and Comparative Biosciences

Best Oral: Dr Susan Williams

Best Poster: Miss Erin Hutchinson

Best Student Oral: Mr Dewaldt Engelbrencht

Best Student Poster: Mr Mukhlid Yousif

One of the poster exhibition areas, (middle row, clockwise from left): Dr Alex Welte, Professors Penny Moore, Francois Venter and Professor Lynn Morris

Professor Bavesh Kana and Dr Jonathan Lewis

Professor Yosuf Veriava, the Deputy Minister Dr Gwen Ramokgopa, Professor Ahmed Wadee and Professor Beverley Kramer

Dr Alisha Wade, Professors Brandon Wainwright, Michèle Ramsay and Stephen Tollman

WITS CROSS FACULTY GRADUATE SYMPOSIUM

The Wits Cross Faculty Graduate Symposium provides a forum for postgraduates to showcase their work and allow fellow students in other faculties to engage with research carried out in different disciplines.

The Fourth Cross-Faculty Graduate Symposium: October 2012

The Symposium was held in the Wits Professional Development Hub, East Campus. The following awards were presented to students from our Faculty:

Best Oral Presentation (across all five Faculties)

Fourth place: Dejana Ivacik

Best Oral Presentation (by Faculty)

First place: Mark Killick

Second place: Shune Oliver

Third Place: Gaurav Kwatra

Poster Display (by Faculty)

First place: Aletta Miller

Second place: Ayesha Ahmed

Third place: Arista van Staden

The Fifth Cross-Faculty Graduate Symposium: August 2013

The Symposium was once again held in the Wits Professional Development Hub, East Campus. The following awards were presented to students from our Faculty:

Best Oral: Presentation (across all five Faculties)

First place: Jaysen Knezovich

Best Oral Presentation (by Faculty)

First place: Jaysen Knezovich

Second prize: Dr Anna Haw

Third prize: Ms Jacqueline Frost

Best Poster Presentations (by Faculty)

First place: Josh Davimes

Second place: Ntombizodwa Ndlovu

Third place: Amashnee Saimen.

PRESTIGIOUS RESEARCH LECTURES

In 2012 and 2013, the Health Sciences Research Office continued the Prestigious Research Lecture Series. The Faculty is privileged to be home to many researchers who are respected internationally for their work. The purpose of the series is to showcase these scientists, and to provide an opportunity for them to share cutting-edge health research in their fields with members of both Faculty and the public. It is also a means to engage the wider healthcare community and public on issues pertaining to health. Open debate is encouraged after each lecture and usually is facilitated by an academic from outside of the Faculty or a member of government.

Professors Ahmed Wadee (Dean), Maureen Coetzee, Lucille Blumberg, Ms Yvonne Chaka Chaka, Professors Theresa Coetzer and Beverley Kramer

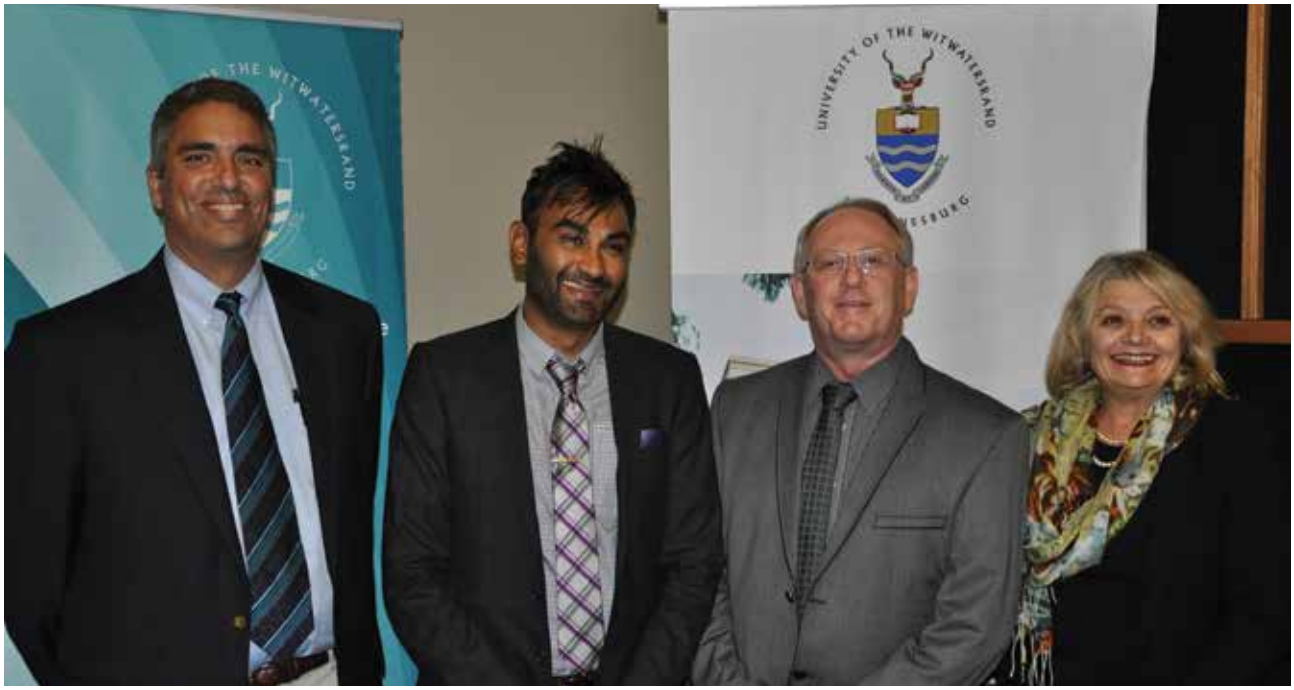
Lecture VII: 17 May 2012

Associate Professor Thérèsa Coetzer and Professor Maureen Coetzee presented the seventh lecture in the Prestigious Research Lecture Series, titled 'Towards malaria eradication: Myth or reality?'. The event was opened by Professor Ahmed Wadee, who had long served with both researchers.

Three parties are involved in the complex triangle skillfully maintained by a particularly devious organism belonging to the genus Plasmodium. The most common and deadly species in this genus, responsible for causing malaria in millions of humans in Africa, is falciparum. Professor Coetzer (Co-director of the Wits Research Institute for Malaria) explained how this parasite is constantly adapting, making sure that it draws the maximum from the two hosts it needs to complete its lifecycle: humans, and mosquito species belonging to the genus Anopheles. Our immune systems respond in various ways – one defense has been to destroy infected red blood cells when they reach the spleen. In answer, the crafty parasite found a way to make the infected cells adhere to vessel walls, leaving the parasite to multiply in relative peace. Constantly a step-ahead, *Plasmodium* is a difficult enemy to tackle, but advances in genomics over the last decade may finally enable us to locate chinks in its armour. Currently, we have effective treatments for malaria (as long as the infection is detected timeously) but with the first signs of resistance starting to appear, we need to find effective new weapons soon if we are to get ahead in this arms race.

The other angle of attack is that of targeting the other host, the vector mosquitoes. Professor Coetzee (Co-director of the Wits Research Institute for Malaria and South African Research Initiative Chair: Medical Entomology & Vector Control) explained how populations of vector species have been effectively controlled in the past, but how the mosquitoes too have developed resistance to many of the insecticides used since the early 1930s. DDT is still the most effective pesticide we have, but it has fallen out of favour due to concerns over its impact on the environment and on humans. Pyrethroids are the mosquito-killer of choice, sprayed onto houses and used in impregnated bed nets, but these will not keep the mosquito populations in check indefinitely. New pesticides must be developed or alternative strategies for managing vector populations found. New strategies are under investigation (such as fungus-based pesticides and genetically-modified mosquitoes), but it will be some time before these can be taken into the (battle) field.

Professor Lucille Blumberg, a Deputy Director of the National Institute for Communicable Diseases and an expert on the treatment of malaria was a gracious and astute critical commentator. Yvonne Chaka Chaka, WHO/UNICEF Goodwill Ambassador, Rollback Malaria Ambassador and President of the Princess of Africa Foundation, was our special guest, closing the event with her trademark sparkle. She commended the researchers on their efforts, saying how knowing of their tireless work motivates her in her work as a Malaria ambassador. She then broke out in song, urging the audience to ask, 'What have I done today to make me proud?'.



Professors Bill Bishai, Bavesh Kana, Gavin Churchyard and Beverley Kramer

Lecture VIII: 29 May 2013

The lecture: 'Eliminating TB!', was presented by basic scientist Professor Bavesh Kana and specialist physician Professor Gavin Churchyard of the Wits-Aurum Coalition – both of whom are world leaders in the field of TB. Professor Bill Bishai, an internationally-renowned TB researcher and Director of the KwaZulu-Natal Research Institute for Tuberculosis and HIV (K-RITH) was the expert commentator.

The presenters highlighted the complexity of the TB epidemic and the urgent steps required in South Africa if we hope to achieve the World Health Organization's 'Stop TB' goal of stabilising and ultimately eliminating this disease by 2050.

They further highlighted some of the problems faced with TB management in South Africa which includes adherence to the treatment regimen, the diagnosis of TB which takes too long, the increase of multi-drug resistant (MDR) and extensively drug resistant TB which are resistant to first and second line antibiotics. The country's TB epidemic is also fuelled by the large, mature and unabated HIV epidemic.

'In addition to this, the majority of drugs which we use to treat TB are targeted against bacteria that are actively growing and do not work well on dormant bacteria' said Professor Kana.

Professor Churchyard added that 'In South Africa, up to 80% of young adults are infected with TB and we need to find better, shorter treatment regimens to treat those at greatest risk of developing active TB disease in our country'.

Professors Kana and Churchyard eloquently conveyed the message that despite widespread vaccination and a WHO-approved drug treatment programme, there is much more which needs to be undertaken in order to eliminate TB. Decisive action is required in terms of policy and management to combat this increasingly complex disease that continues to cause long-term suffering and death in South Africa. Without this, the stabilisation and elimination of TB will remain a hope rather than an achievable reality.

Subsequent to the informative lecture, the presenters and commentator were individually interviewed by the Good Morning Africa television crew regarding the TB epidemic in Africa. Good Morning Africa is a highly interactive programme on Africa Magic Channel 154 DSTV and is designed to inform, educate, entertain and update viewers on the latest events happening across the world through the eyes of the African continent.

Professors Maria Papathanasopoulos, Beverley Kramer, Penny Moore and Dr Gwynn Stevens

Lecture IX: 26 November 2013

The ninth Prestigious Research Lecture was held ahead of World AIDS Day on the 1st of December 2013. The lecture entitled 'Antibody Based HIV Vaccines – are we any closer?' was presented by Professors Penny Moore and Maria Papathanasopoulos of the NHLS/NICD and the School of Pathology, Wits. Dr Gwynn Stevens, Senior Director at the International AIDS Vaccine Initiative (IAVI) was the expert commentator. Dr Frew Benson, Chief Director of Communicable Diseases, National Department of Health, South Africa concluded the evening by commenting on infectious diseases in South Africa.

The lecture focused on the hurdles faced and lessons learned from research conducted both locally and internationally on the immune responses of HIV infected people, the identification of viable vaccine targets and previous vaccine trials and how these observations are now being translated into designing and testing novel HIV vaccine candidates.

HIV/AIDS continues to be South Africa's major health challenge and many consider a vaccine to be the best hope for ending the pandemic. For over three decades scientists have focused on designing a vaccine to induce anti-HIV neutralizing antibodies and/or cell mediated immunity but sadly with little success.

However, results from a recent clinical trial in Thailand which offered protection from infection have offered hope that a vaccine against HIV is in fact possible. Scientists are now looking for a preventative vaccine with the ability to elicit antibodies called broadly neutralizing antibodies, which target the HIV envelope glycoprotein and are able to neutralise the wide range of global HIV strains. Neutralizing antibodies mediate protective immunity for most viral vaccines and studies have provided compelling evidence that the same will be true for HIV. Professors Moore and Papathanasopoulos illustrated that they are certainly at the forefront of this cutting edge research.

The lecture and interviews with Professors Moore and Papathanasopoulos were aired on TV and radio and were widely published in print media.

ALUMNI DIASPORA PROGRAMME

The Wits Health Sciences Alumni Diaspora Programme was initiated by the Faculty Research Office in 2010. Through the Programme, the Faculty seeks to bring research-active alumni 'home' for short periods of time, to network and explore areas of potential research collaboration.

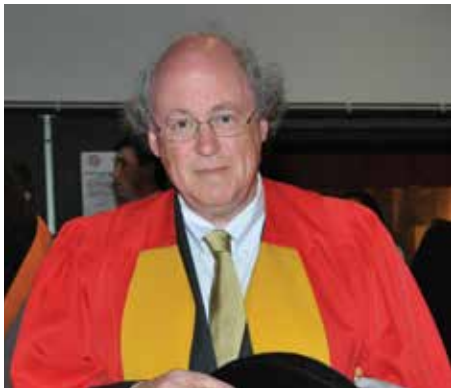
The Alumni Diaspora programme continues to be an important step in strengthening research ties with research institutions across the world, pursuing working relationships with Witsies who have excelled at Universities abroad. As a result of the success of the Diaspora programme, the Carnegie Corporation of New York requested that a concept document be submitted to them for the funding of this programme. The application was successful and the programme, now the Carnegie-Wits Alumni Diaspora Programme which will run from 2014, has received funding for a further three years.

During the 2012/2013 period, nine alumni participated in the programme. Each spent one to two weeks in the Faculty, presenting seminars and meeting with staff and postgraduate students. The Faculty hosted the following Alumni:

Professor Jonathan Hellmann (Wits MBBCh 1970) is a Professor of Pediatrics at the University of Toronto, where he has also served as Director of Continuing Education in the Department of Paediatrics. He spent a week in the Faculty at the beginning of February 2012. Professor Hellmann was hosted by the Department of Paediatrics and the Steve Biko Centre for Bioethics.

Professor Solly Levine, Professor Alan Rothberg and Professor Jonathan Hellmann, after his lecture to Faculty, 'Towards the responsible use of neonatal intensive care'

Professor Denis Daneman (Wits MBBCh 1973) is currently Paediatrician in Chief at the Hospital for Sick Kids in Toronto, and is Chair of the Department of Paediatrics at the University of Toronto. In 2012 Professor Daneman made his second visit to the Faculty as part of the Alumni Diaspora Programme and was hosted by the Department of Paediatrics. Professor Daneman also received his DSc from Wits in December 2012.



Dr Liza Weavind (Wits MBBCh 1990, FCCM) is an Associate Professor in the Department of Anaesthesiology and Critical Care, and also in the Department of Surgery at Vanderbilt University, USA. In 2007, she was appointed Director: Critical Care Fellowship at the same institution. Dr Weavind visited the Faculty in July 2012. She was hosted by the Departments of Anaesthesia, Surgery and Critical Care.

In November 2012, alumnus **Dr Dilip Parekh** (Wits MBBCh 1979) spent a week visiting the Faculty and was hosted by the Department of Surgery. He is a Professor of Clinical Surgery in the Division of Hepatobiliary Surgery at the Keck School of Medicine of University of Southern California (USC). Dr Parekh is the Section Chief for Hepatobiliary and Pancreatic Surgery in the Division of Hepatobiliary and Pancreatic Surgery and the Director of the USC Center for Pancreatic and Biliary Diseases.

Dr Jonathan Lewis (Wits MBBCh 1982, PhD 1990) is Chief Executive Officer and Director of ZIOPHARM Oncology. He served as Professor of Surgery and Medicine at Memorial Sloan-Kettering Cancer Center. In September 2012 he spent two days in the Faculty and gave a plenary lecture at the Faculty Research Day and Postgraduate Expo. Dr Lewis was hosted by Professor Bavesh Kana from the DST Centre of Excellence for Biomedical TB Research (Wits University node) in partnership with the Faculty Research Office.

Dr Jonathan Lewis with Professor Bavesh Kana

Professor Thomy de Ravel from the University Hospitals of Leuven, Belgium spent a week in the Faculty of Health Sciences and the Division of Human Genetics (NHLS) in August 2012. He is currently Clinical Geneticist/ Head of Clinic and Clinical Head of the Pre- and Post-Natal (Molecular) Cytogenetics Laboratory at the Centre. .

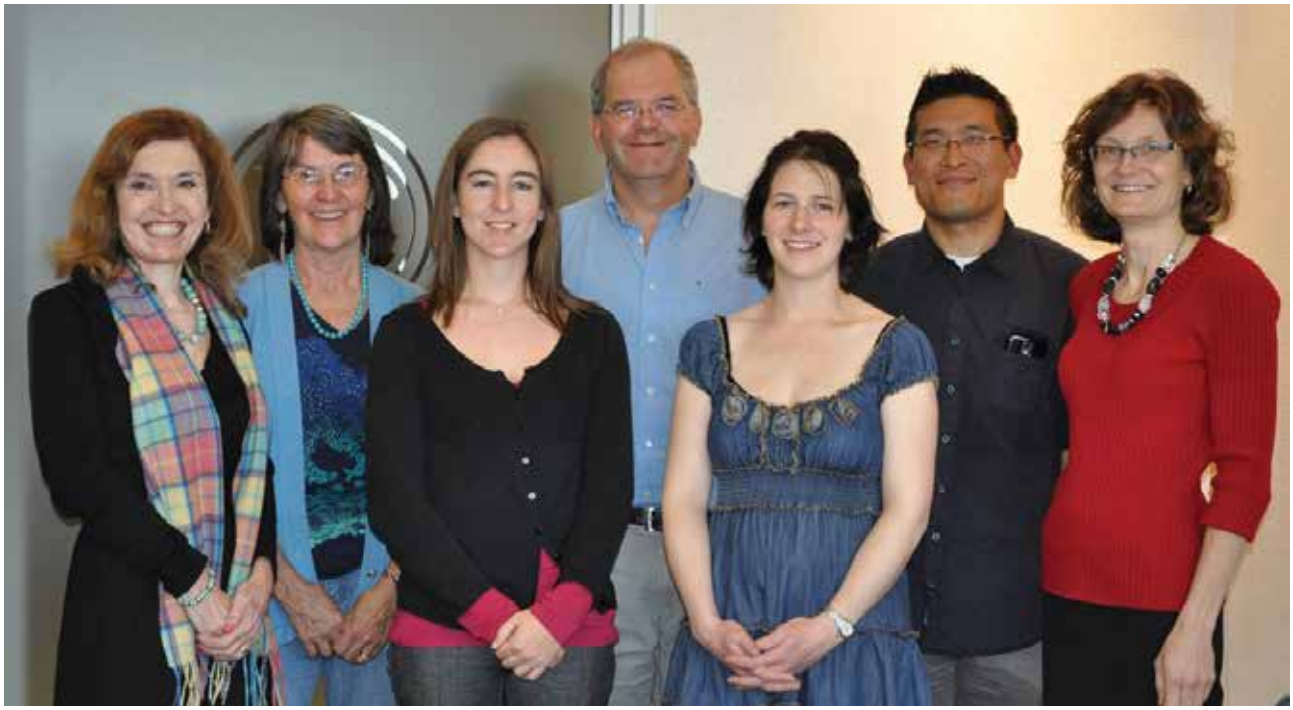
Alumnus **Professor Duncan Saunders** from the School of Public Health, University of Alberta, spent a week in the School of Public Health, in January 2013. He is a generalist epidemiologist with interest in global health. He serves on the Board of Directors for the Canadian Society for International Health and on the Editorial Board of the Canadian Journal of Public Health.

Professor Duncan Saunders pictured with Professors Sharon Fonn, Beverley Kramer and Laetitia Rispel

Professor Kelvin Hong (Wits MBBCh 1992) from Johns Hopkins University spent a week in the Department of Diagnostic Radiology, School of Clinical Medicine in January 2013. He is currently Clinical Director of the Division of Vascular and Interventional Radiology, Associate Professor of Radiology and Surgery, and Fellowship Program Director at Johns Hopkins University Medical School.

Professor Hong with Professor Victor Mngomezulu

In August 2013, **Dr Steven Soldin** (Wits PhD, 1968) visited the Faculty as part of the Alumni Diaspora Programme. He was hosted by the Department of Chemical Pathology. Dr Soldin is the Deputy Director of Chemistry and Senior Scientist in the Clinical Laboratories, National Institutes of Health, Bethesda, Maryland.



Professor Roy Zent (middle) and Professor Ambra Pozzi (far right) the Hillel Friedland Postdocs and their hosts. Pictured from left: Professors Anna Kramvis and Maureen Coetzee, Dr Aurelie Deroubaix, Dr Antonia Wadley and Dr Kwang Shik Choi

Professor Roy Zent is based at Vanderbilt University, USA, where he is the Vice Chair of Research in the Department of Medicine. Professor Zent was accompanied by his wife, Professor Ambra Pozzi, who is a Professor in the Department of Medicine, Division of Nephrology and Hypertension at Vanderbilt. The dynamic couple first visited the Faculty in 2010, and have made return visits every year since then. In July 2012 and September 2013, during their weeklong visits they presented a number of lectures and workshops in the Faculty on grant writing and scientific writing.

Professor Zent is the nephew of Mr Hilell Friedland, who created a Trust in support of Postdoctoral Fellows at Wits. During each visit, Professor Zent has met with Health Sciences Postdoctoral Fellows who were beneficiaries of the Hillel Friedland Trust in that particular year.

POSTDOCTORAL
FORUM & SYMPOSIUM

Some of the Faculty Postdocs who attended the Symposium

The number of Postdoctoral Fellows in the Faculty increased from 26 in 2012 to 43 in 2013. The Faculty Research Office continues to host a Postdoctoral Forum on a quarterly basis and a Postdoctoral Symposium every two years.

The Faculty Postdoctoral Forum, initiated in 2010 is open to all postdoctoral Fellows and their hosts. The Forum aims to provide Postdoctoral Fellows the opportunity to discuss items of mutual interest and explore avenues for improving the postdoctoral culture and activities of the Faculty.

The second Postdoctoral Symposium was held in September 2013 and was sponsored by Roche at their wonderful new facility in Randburg. The Symposium which featured diverse health sciences research was attended by the Fellows and their hosts as well as some of the Faculty's Carnegie Fellows. A number of oral presentations and posters highlighted key aspects from hepatitis B viral research to thermal physiology of wild animals. Posters were presented on electronic screens. The two guest speakers, Professor Debbie Glencross of the Department of Molecular Medicine and Haematology and Mr Clive Simpkins, an external consultant and coach delighted the audience with their presentations. The day's events closed with a cocktail party.

CARNEGIE ACADEMIC MEDICINE
FELLOWSHIP PROGRAMME

Director: **Professor John Pettifor**

n 2010, the Carnegie Foundation provided the University of the Witwatersrand with funding for three years to attract, train, develop and retain clinicians to pursue an academic and research based career in Medicine.

The aim of the Carnegie Academic Medicine Fellowship Programme is to attract, train, develop and retain clinicians to pursue an academic and research based career in Medicine. In order to build the next generation of African scientists, the programme provides academic clinicians the opportunity to spend two years in fulltime research obtaining their PhD, attending relevant courses in research methodology and ethics, in curriculum design and teaching, and in scientific writing, and to support them in their first postdoctoral year developing their research further.

The Programme has been generously supported by the Carnegie Corporation of New York since 2010, and the grant has been renewed for a further three years. The first cohort of Fellows, who joined the programme in March 2011, graduated with their PhDs in December 2013. The second cohort of four fellows, who joined in August 2012, are all making exceptional progress in their research and we are optimistic that they will achieve similar success. A third cohort has been appointed in January 2014.

The continued support of the Carnegie Corporation of New York in renewing the grant for a further three years will allow the Faculty to train a further eight academic clinicians, whom we hope will with the original cohort of eight form a nucleus of academic clinicians showing a renewed interest in clinical research at Wits and in South Africa and who will support, mentor and foster research among more junior members of the clinical staff.

Overall it is believed that the programme has been uniquely successful and is at the forefront of national efforts to address the long standing decline in clinical research that has been occurring over many years in South Africa.

Carnegie Fellows Symposium

The first cohort Carnegie Fellows at their graduation ceremony. Pictured from left: Professor John Pettifor, Professor Beverley Kramer, Dr Susan Williams, Dr Nimmisha Govind and Dr Martin Brand

The Faculty Research Office hosted the Carnegie Fellows Symposium to celebrate the completion of their PhD degrees by the first cohort of Carnegie Fellows. At the symposium in 2013 the four Fellows, who were awarded the Carnegie Fellowship in 2011, presented their research. They had two years in which to complete their PhD degrees.

The four clinicians from the first cohort were:

Dr Susan Williams (Supervisor: Professors T. Carmichael and M. Ramsay)

Dr Nimmisha Govind (Supervisors: Professors M. Tikly and M. Ramsay)

Dr Nirthi Maharaj (Supervisors: Professors E. Libhaber, M. Essop and F. Peters)

Dr Martin Brand (Supervisor: Professors M. Veller and G. Norton).

DIAMONDS AND PEARLS SYMPOSIUM

Pictured from left: Professor Carlos Libhaber, Professor Elena Libhaber, Dr Daniel Vorobiof, Dr Naomi Rapeport, Dr Eric Klug, Dr Emma Wypkema

The Faculty Research Office hosted the symposium 'Diamonds and Pearls: Insights into the management of Cardiovascular Disease in Women' in November 2012. The event was organised by Professor Elena Libhaber and Dr Naomi Rapeport . The symposium included highlights of the main cardiovascular topics, such as: Guidelines for the Prevention of Cardiovascular disease in Women, Hypertension in pregnancy, Valvular Heart disease in pregnancy, Peripartum Cardiomyopathy, The control of hyper-lipidaemia in South African women, Coronary Heart disease in women, and Depression in women with Cardiovascular disease. The speakers were distinguished Wits Faculty and alumni: Drs N. Rapeport, C. Shamroth and Professors E. Buchmann, M.R. Essop, K. Sliwa, P. Manga and M. Vorster. Many participants expressed their wish that the meeting should be repeated in 2013.

Thus, in November 2013, the Faculty Research Office hosted a second Diamonds and Pearls Symposium. The event was once again organised by Professor Elena Libhaber and Dr Naomi Rapeport. Additional topics enriched our scientific knowledge such as: Current Chemotherapy in breast cancer, Cardiac Complications of chemotherapy in breast cancer, Cardiac Nuclear imaging in women, Screening for Thrombophilia in women and Atrial Fibrillation in women. The speakers were distinguished Wits Faculty and alumni: Drs D. Vorobiof, E. Klug, E. Wypkema, N. Rapeport and Professor C. Libhaber.

YOUR RESEARCH AND THE MEDIA: LECTURE AND WORKSHOP

In 2013, Mr Clive Simpkins, Media and Communications Expert presented an interactive workshop to Emerging Researchers in the Faculty. The workshop was held in July with the purpose of giving concise but practical insight into how researchers should respond to print media, radio, TV or social media interviews, or when asked for comment. The workshop assisted with improving these researchers' competence and confidence when engaging with the media and provided them with an understanding of the media's usefulness in publicising their work. Mr Simpkins presented a two hour workshop and provided each participant with a copy of his book, Media Appearance Secrets.

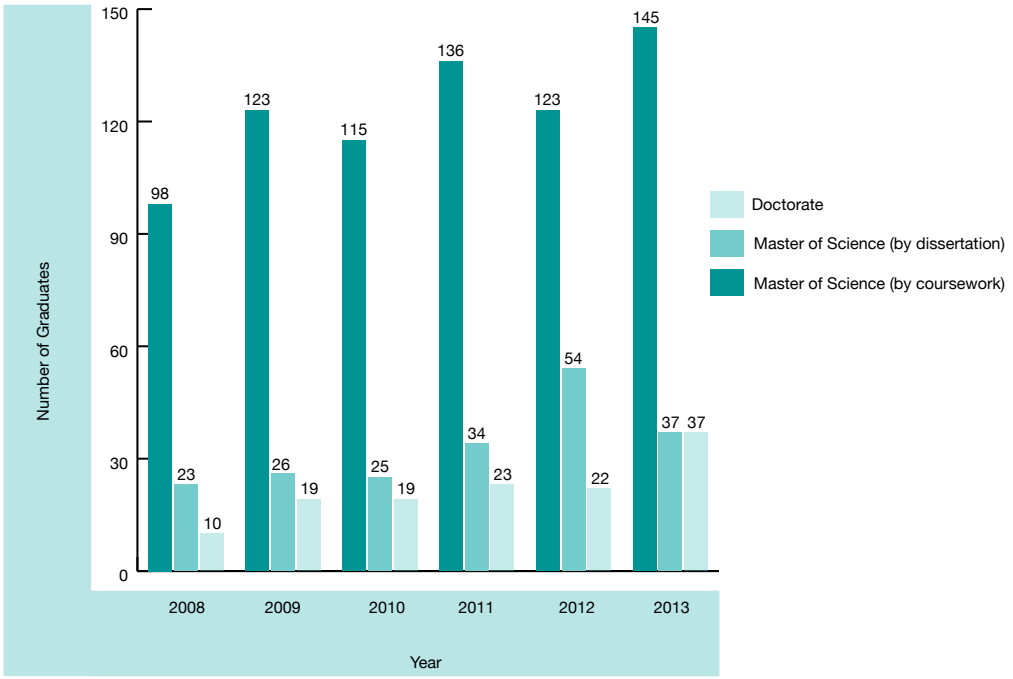
Interested individuals were then invited to participate in a more intensive media workshop in a small group setting. The workshop on media engagement and public speaking involved a combination of one-on-one interaction with Mr Simpkins, on various aspects of presenting information to the media and also the general public. Mr. Simpkins discussed the basic rules about the presentation of information during television and radio interviews. He also discussed nuanced approaches to unpacking complex information and the use of real-life comparisons to make the data more accessible. For public speaking and seminars, the appropriate use of presentation aids and slides were dealt with in detail. Mr. Simpkins then conducted live mock interviews with a video camera and played back the interviews to point out key details of the interview process. The workshop covered extensive background on how to prepare for interviews and how to enjoy the media experience. Overall, the workshop was creatively compiled and executed with enthusiasm and a great deal of energy. The participants reported that it was a very useful experience.

RESEARCH **OUTPUT INDICATORS & FUNDING**

Research **Outputs & Funding**

RESEARCH
POSTGRADUATES

The Faculty awards Master of Science (MSc) degrees by coursework, MSc degrees by dissertation and Doctoral (PhD) degrees in all health sciences disciplines. The following figure illustrates the number of MSc and PhD graduates in the Faculty of Health Sciences between 2008 and 2013.



In 2013, the University of the Witwatersrand awarded three **Doctor of Science (DSc) degrees** to Health Sciences researchers. The DSc is the highest research degree conferred in the University. This degree is a culmination of a lifetime's research work and generally records a research journey over many years for the candidate. The awardees were Professor Denis Daneman, Professor Justus Hofmeyr and Professor Mario Altini.

RESEARCH
PUBLICATIONS

The Faculty is proud of its publication history and continues to strive for an increase in the number of scholarly publications in reputable journals and books. **Figure A** shows **the number of publication units**, assigned by the Department of Higher Education and Training (DHET), awarded to the Faculty for accredited publications (research articles in journals, books, or chapters in books recognised by the Department) between 2008 and 2013. **Figure B** illustrates **the total number of research articles** published in accredited journals (journals recognised by the Institute for Scientific Information or included on the list of accredited South African journals compiled by the DHET) produced between 2008 and 2013.

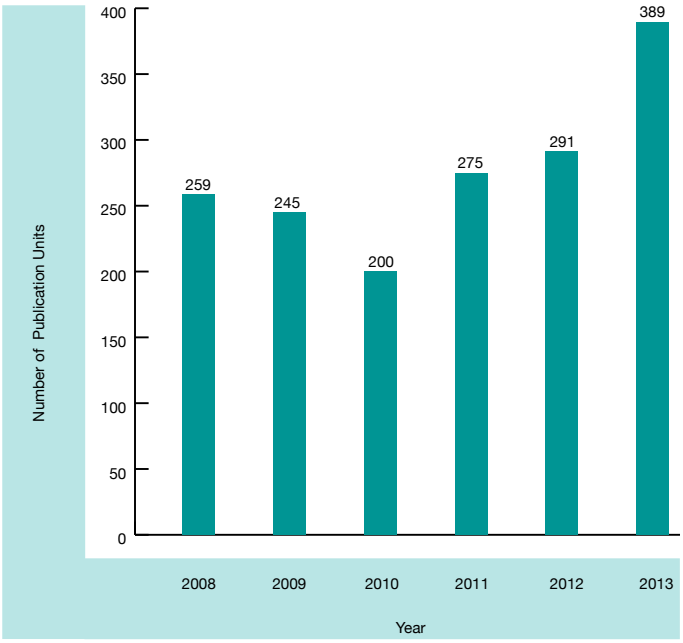


Figure A. The total number of publication units awarded by the DHET to the Faculty between 2008 and 2013. The 2013 value is an estimate yet to be confirmed by the DHET

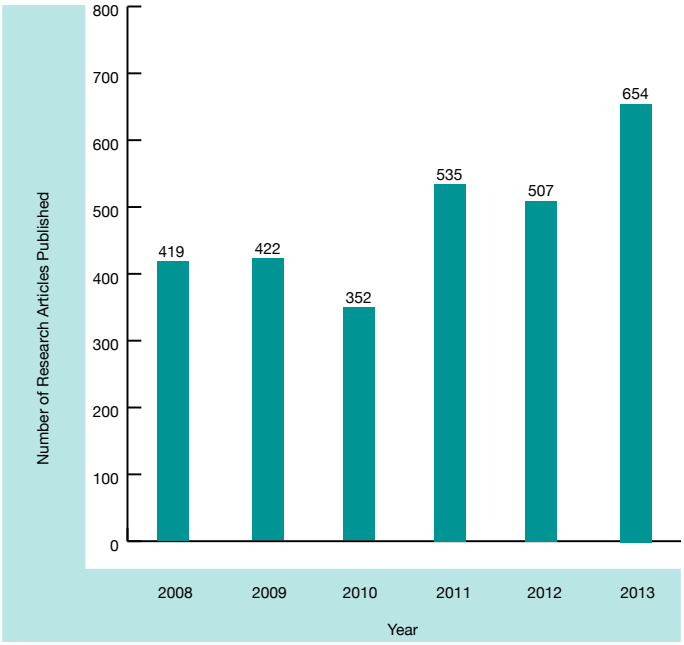


Figure B. The total number of research articles published in accredited journals or books by Faculty researchers between 2008 and 2013

RESEARCH **FUNDING**

The Faculty receives funding for research from a variety of sources such as the University Council, National Research Foundation, South African Medical Research Council, Wits Health Consortium, amongst others. The national research agencies (SA Medical Research Council and National Research Foundation) support research through grants to individual researchers and groups, while the Wits Health Consortium is responsible for managing grants from several other external funding agencies. A dividend declared by the Wits Health Consortium was used in 2012 and 2013 to support research activities in the Faculty. The table illustrates, in Rand, the funding available for research in the Faculty in 2012 and 2013.

Faculty of Health Sciences Research Funding	**(R '000)**	**(R '000)**
	2012	**2013**
Funds allocated by the University Research Council (URC)	9 526	10 893
External research funds administrated by the Wits Health Consortium	520 000	604 383
Wits Health Consortium Dividend	1 000	3 500
Funds awarded by local external funding bodies		
- South African Medical Research Council (MRC)	4 528	5 748
- National Research Foundation (NRF)	24 800	22 058
Total	**559 854**	**646 582**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Credits

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