

FACULTY FOCUS

A MONDAY MONTHLY SUPPLEMENT

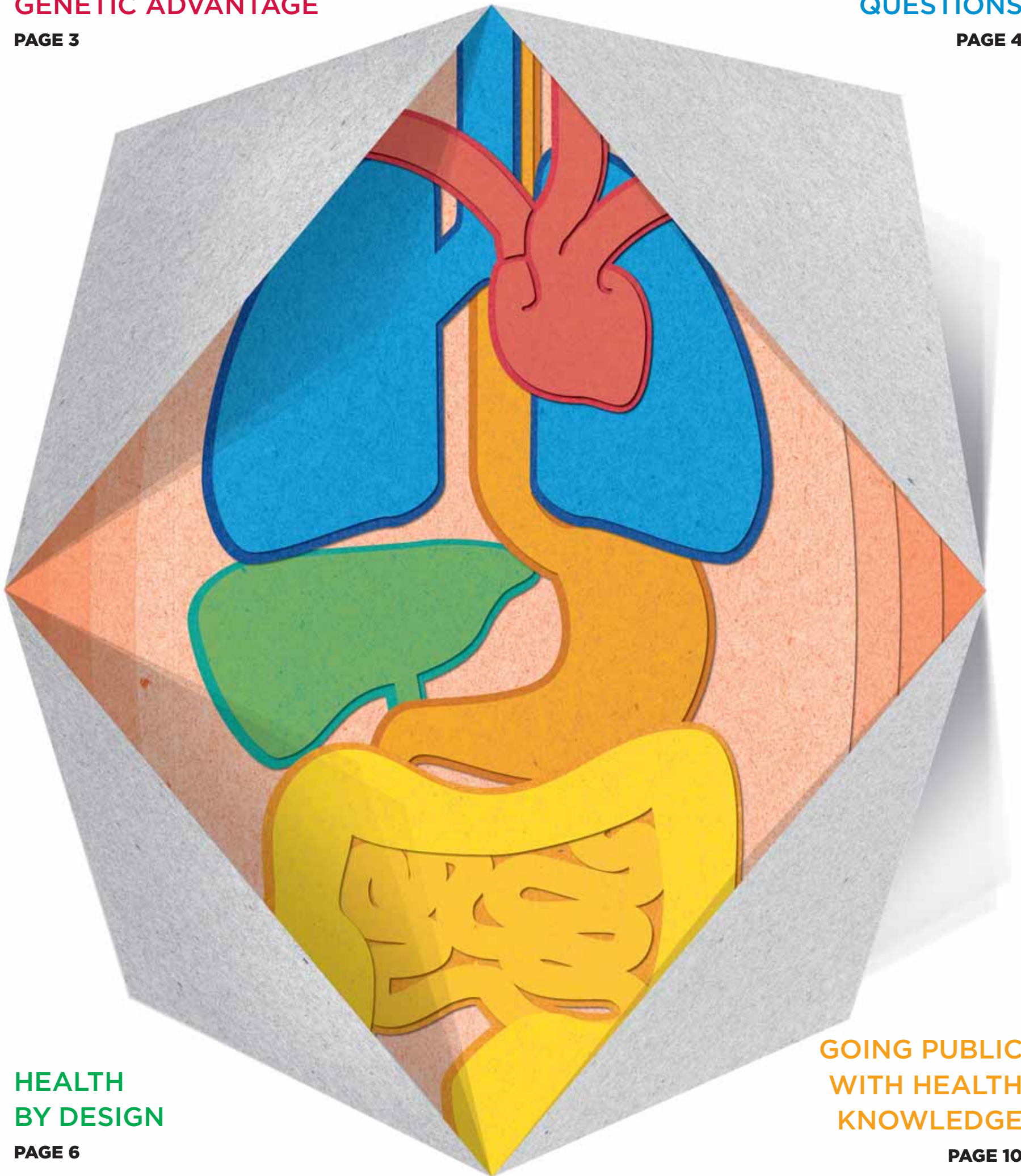
FACULTY OF HEALTH SCIENCES

**SOUTH AFRICA'S
GENETIC ADVANTAGE**

PAGE 3

**MAPPING RESEARCH
QUESTIONS**

PAGE 4



**HEALTH
BY DESIGN**

PAGE 6

**GOING PUBLIC
WITH HEALTH
KNOWLEDGE**

PAGE 10

A WORD FROM THE DEAN

Prof Wim de Villiers
Dean of the Faculty of Health Sciences

As dean of the Faculty of Health Sciences since 2013, I feel privileged to be associated with UCT, and leading the top-ranking health sciences faculty on the continent. The reputation of this faculty is rooted in its excellence over the past 102 years – attributable to the calibre and standing of staff, students and our alumni. I have personally experienced this, having lived and worked as a clinician overseas, in the United Kingdom and United States, for more than 20 years.

This year we ranked 48th in the Times Higher Education World University Rankings for clinical, pre-clinical and health. This position is up from the previous two years (53 in 2013, and 50 in 2012) – demonstrating consistency in our ratings, and placing us in the company of internationally acclaimed universities. The drivers of these ratings relate largely to our reputation in education and research (specifically, number of citations and publications).

Our research enterprise has grown tremendously over the past decade, to a projected research income exceeding R600 million in 2014. Last year we also attracted more direct grants from the National Institutes of Health than any other university outside the USA. Our publication output has increased similarly, by more than 50% from five years ago.

The faculty's 11 departments have numerous research groups spread across them, many promoting interdisciplinary work – a practice particularly emphasised in our Institute of Infectious Disease and Molecular Medicine (IDM). The IDM, a cross-faculty research grouping, recently celebrated 10 years of exceptional growth with a symposium

on driving research for human health in Africa. It has grown into UCT's largest research entity, attracting the most income for the faculty. The majority of this research income is sourced from foreign funders, with significant funding coming from non-profit organisations.

The faculty's commitment to developing human research capacity is illustrated by our more than 2 000 postgraduates (roughly a quarter of UCT's total), of whom 360 are PhD candidates. In addition, we had 119 postdoctoral fellows during 2013.

We are also increasing our undergraduate student numbers to address the need for more doctors in the country, by enrolling 20 more students in first-year MBChB (now at 220), with the aim of increasing this to 300 by 2016. This has already strained our infrastructure and resources, and we are strategising how to address this in a more sustainable way. Our approximately 2 000 undergraduates across the health sciences disciplines are indeed among the best in the country. We are spoilt for choice – this year, we had over 5 000 applications for 220 places in first-year MBChB alone. Our students learn practical skills in community-based settings

at 87 public health facilities across the province; and the calibre of graduates can be seen in the impact they make. A recent example is our Surgical Society – the driving force behind the establishment of an international undergraduate surgical society focused on improving the quality of undergraduate surgical training in Africa and beyond. Other examples include two recent graduates who were awarded prestigious Rhodes Scholarships to Oxford University last year, and another of our graduates who received a Mandela Rhodes Scholarship for next year.

I am very proud of our teaching staff, who are among the best and most dedicated – some have been honoured with UCT Distinguished Teacher Awards. The professional development of our staff as teachers is paramount, and next year will see the establishment of a new Department of Health Sciences Education to promote the development of medical education as a distinct and growing academic discipline.

This supplement represents merely a snapshot of our faculty's wide range of activities. Enjoy the read.



GENETIC ADVANTAGE

Why Southern Africa may be the best place on Earth for health science research

Story by Carolyn Newton

Research is competitive – despite also often being collaborative. In the global competition for health science research, UCT's Faculty of Health Sciences stacks up as one of the best in the world: the latest results of the Times Higher Education World University Rankings placed the faculty at 48th globally. This is in large part due to the calibre of researchers and teaching. It could also be argued, however, that researchers in the field have a perhaps unexpected advantage: the genetic diversity of the population on our doorstep.

All people trace their origins to Africa, where anatomically modern humans evolved around 200 000 years ago. This prehistory has made Africa the best place in the world for palaeontologists interested in the evolution and migration of *Homo sapiens sapiens*.

Since the birth of genomics, Africa has gradually started to become of equal interest to geneticists. Research (by, among others, the International HapMap Project) has established that the genomes of indigenous African people carry the greatest depth of genetic variation compared to other population groups on the planet.

"The genomic material of African indigenous populations is so rich and diverse, it's – by analogy – like a Persian carpet," says Professor Raj Ramesar, Chair of Human Genetics in the Faculty of Health Sciences. "The genomes of Caucasians and Asians, by contrast, are like institutional carpets: lacking the rich depth of variation." This is because the latter left the continent in small bands, taking with them subsets of the total available genetic variation. The further you move away from Africa along the migratory route of early humans, the less genetic diversity there is.

You would therefore expect that Africa would be the first place researchers would turn to as they began to look into the genetics of global health problems. Genetic variation between individuals affects their risk for developing different diseases, their resistance to developing diseases, and even their response to treatment. The greater the variation, the easier it may be to map disease genes.

Paradoxically, while Africa has the most interesting and potentially useful genetic material in the world, it is also the most unexplored. For example, almost all studies on the genetic basis for psychiatric disorders such as schizophrenia have been conducted in the Global North. However, researchers there are conducting research on suboptimal populations.

"When you're mapping disease genes in Caucasian populations," explains Ramesar, "a marker may show up consistently in affected individuals. However, that marker may not be as close to the causative factor as you would like it to be – it may just be a proxy."

This is because, in reproduction, genetic material is shuffled in a process called 'recombination'. Populations in Africa have had their DNA shuffled or recombined over a longer period of historical time, so the blocks of DNA will be smaller (as when shuffling a new deck of cards – each time the cards are shuffled, cards of one type are broken up). So, as you look far back into African populations, you can see that the blocks of DNA exchanged become finer over time, because of how ancient they are.

"The real advantage of doing work in indigenous African populations is that – because these genomic blocks are small – if you find an association, there's a good chance you're close to the causative genetic factor," says Ramesar.

Schizophrenia in Xhosa populations

There is therefore a big advantage to doing research in Africa, and UCT is well positioned to take the lead.

Professor Dan Stein, head of the Department of Psychiatry and Mental Health, is leading a project on the genetics of schizophrenia in the Xhosa population of South Africa. "It's the first project to use modern genomic sequencing approaches to study schizophrenia in a population of sub-Saharan African lineage," says Stein.

The project has important implications, both for the treatment of schizophrenia and more widely. While there is good evidence that genetic factors contribute to the disorder, the exact nature of its genetic basis is unclear. "If successful," says Stein, "our approach will identify genes that are important for the disorder in populations worldwide, and help develop more effective treatment and prevention strategies."

"While we're looking for genes that may predispose people to schizophrenia," says Ramesar, who is also involved in the project, "a great deal of other information about African genomic variation will emerge."

The schizophrenia project is part of an initiative that is spearheading the growth of genomics on the continent: the Human Heredity and Health in Africa (H3Africa) Initiative, a pan-African venture funded by the National Institutes of Health in the US and the Wellcome Trust in the UK. "H3Africa aims to transform the way science is conducted in Africa, by creating a sustainable research infrastructure and catalysing the use of advanced genomic technologies to improve our understanding of a variety of diseases," says NIH director Dr Francis Collins.

A frequent but neglected disease: sickle-cell anaemia

Building capacity in Africa to take advantage of advanced genomic technologies is crucial, because it gives Africans the ability to set their own health agenda. Importantly, this means that attention can be focused on diseases that mainly affect the populations of the continent.

Sickle-cell anaemia (SCA), for instance, is the most common monogenic disease in the world. Patients with SCA have a short lifespan – an average of 47 years in the US. We don't even know what the lifespan is in Africa, home to 70% of those with the disease, but researchers think around half may die before their first birthday. The only current treatment is a bone marrow transplant.

Yet it is a neglected disease, according to Associate Professor Ambrose Wonkam, senior specialist in the Division of Human Genetics. He is leading a collaborative project – also part of H3Africa – across four countries in Africa focused on SCA. Once again, genetic diversity

is crucial: "The programme aims to find out why some patients get sicker than others, despite having the same gene defect," says Wonkam. Identifying the genomic variation will help determine which patients have SCA from birth, enabling early intervention.

Fear and anxiety disorders in Namaqualand

Another disease more commonly found in Africa is the rare genetic developmental condition Urbach-Wiethe disorder. There are only around 100 reported cases worldwide, and 40 of these are found in a community in the Namaqualand region – coincidentally, one of the oldest populations in Africa.

Rather than wielding genomics as a tool, Professor Jack van Honk from the Department of Psychiatry and Mental Health has used neuroimaging to examine lesions of the basolateral amygdala – the part of the brain responsible for emotional arousal – that are characteristic of the disease.

While the disease itself is rare, the findings could be far-reaching. Van Honk's analysis revealed that the lesions made patients highly sensitive to other people's fearful expressions. This finding has important implications for the understanding of the basolateral amygdala's role in an array of social behaviours, and especially its role in fear and anxiety disorders.

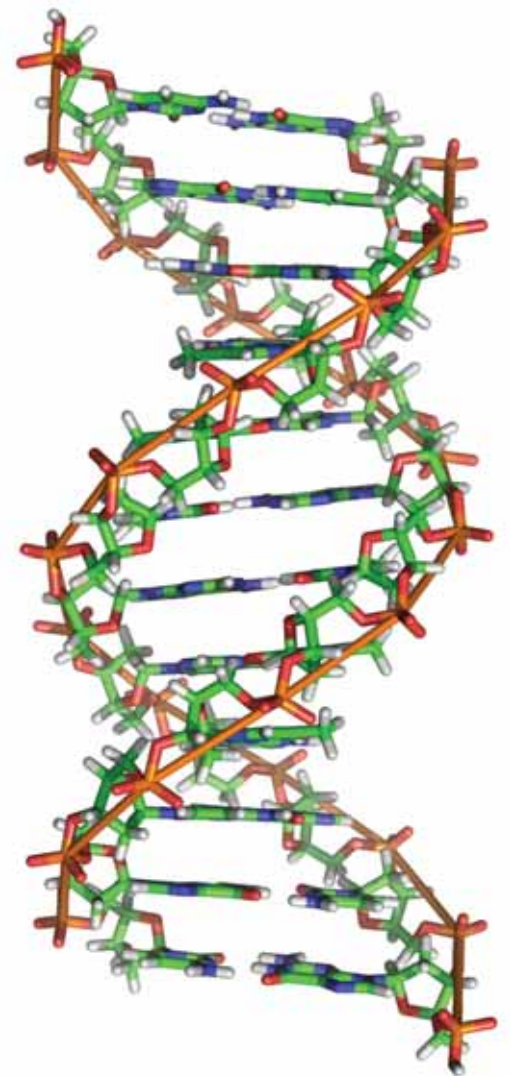
"Cultural neuroscience holds promise for South Africa," says Van Honk, "given the genuine cultural diversity of the population and the modern neuroimaging infrastructure in Cape Town."

The rich ancestry of the Cape

In fact the Cape is particularly interesting, in both its cultural and its genetic diversity. Not only does it still provide a home to some of the oldest populations in Africa, but it also has a rich mixture of groups that have migrated back, thousands of years after their ancestors left, such as the Dutch, Indians, Malay and English.

As populations migrate, their genomes adapt to their environments: some parts of the genome are selected for and others are selected against. Researchers can examine how those populations fit into their current environment and respond to disease, particularly in their susceptibility or resistance.

This is powerful research that will be important in understanding our response to environmental triggers for disease, such as diet, according to Ramesar. And the Cape might be one of the very best places in the world to do this: "We have a beautiful mix in the Western Cape," he says, "and therein lies some really fantastic potential for discoveries in the future."



"The genomic material of African indigenous populations is so rich and diverse, it's – by analogy – like a Persian carpet."

Raj Ramesar

HEALTH SCIENCES BY NUMBERS

11 departments

Anaesthesia, Paediatrics and Child Health, Clinical Laboratory Sciences, Health and Rehabilitation Sciences, Human Biology, Medicine, Obstetrics and Gynaecology, Psychiatry and Mental Health, Public Health and Family Medicine, Radiation Medicine, Surgery

#1 health sciences faculty in Africa



10 academics with national orders, the highest award South Africa can bestow on its citizens

12 A-rated scientists, the highest recognition for excellence in research by the National Research Foundation of South Africa

48th in the 2014 Times Higher Education World University Rankings for clinical, pre-clinical and health universities

4 000 students (1 954 undergraduates, 2 046 postgraduates)

Over 11 000 graduates 1 380 staff members

24 research groupings involved in multi-disciplinary, cutting-edge research

More than 4 peer-reviewed articles published per day (41% of UCT's total in 2013)

102 years old the oldest medical school in sub-Saharan Africa

Fingerprint detail by Frettie and DNA structure by Richard Wheeler, licensed under Creative Commons and accessed via Wikimedia Commons

IN SEARCH OF BETTER HEALTH

Compiled by Ambre Nicolson

How can we break the cycle of poverty and mental illness?

Growing international evidence shows that mental ill health and poverty interact in a negative cycle in low-income and middle-income countries. "Mental health is inextricably linked with social and economic development: conditions of poverty and deprivation increase risk for mental illness in countries around the world; and people living with mental illness are at increased risk of drifting into poverty as a result of disability, stigma and increased health expenditure," says Associate Professor Crick Lund of the Alan J Flisher Centre for Public Mental Health. Recent research conducted through the centre has shown that mental health interventions are associated with improved economic benefits to individuals and households in low- and middle-income countries. As Lund explains: "There are humanitarian and economic reasons for investing in mental healthcare that is integrated into general healthcare systems in low- and middle-income countries."

Can we make a better TB vaccine?

Mark Hatherill, Tom Scriba and colleagues from the South African Tuberculosis Vaccine Initiative (SATVI) recently started the first TB vaccine efficacy trial to test whether a new vaccine (the H4 candidate vaccine) can protect against TB infection in adolescents. Several Phase 1 and Phase 2 TB vaccine trials are ongoing at the SATVI research site near Worcester, including a large, multi-centre efficacy trial that will test whether adults who are latently infected with TB can be protected against developing active disease.

Can exercise and education help reduce pain in HIV patients?

Research conducted by physiotherapist Dr Romy Elizabeth Parker shows that over 50% of people living with HIV experience pain of moderate severity. A six-week peer-led exercise and education intervention using a workbook was found to significantly reduce pain severity and pain interference in the subjects studied.

How can we help people with asthma breathe more easily?

Two new (and very different) asthma treatments are the result of recent research in the Lung Infection and Immunity Unit and the Department of Paediatrics and Child Health at the Red Cross War Memorial Children's Hospital. Professor Keertan Dheda and his team have pioneered the use of bronchial thermoplasty in Africa. The procedure involves inserting a catheter into the lungs through a tube passed through the patient's nose and throat. The catheter then delivers heat energy that reduces excess smooth muscle tissue in the airways. While it's not a cure, it does reduce the number of attacks experienced by asthma sufferers by up to 80%.

Paediatric pulmonologist Professor Heather Zar and her team have pioneered the use of a low-cost asthma spacer made out of a plastic 500ml cooldrink bottle. When Zar started working at the Red Cross War Memorial Children's Hospital, children with asthma were often given oral doses of theophylline – a less effective drug, with more side effects – because asthma spacers (chambers that allow children to breathe in a drug over a number of breaths) were too expensive. Now, thanks to the team's low-budget solution, the use of theophylline is a thing of the past, and the use of cooldrink bottles as asthma spacers is now included in guidelines from the Global Initiative for Asthma and the World Health Organisation (WHO).

Can early screening for colon cancer save lives?

Geneticists, surgeons and gastroenterologists have shown how multidisciplinary collaboration can help prevent serious disease. Professor Raj Ramesar of the Human Genetics Research Unit and colleagues have been able to reduce morbidity and mortality in a remote region of the country – Namaqualand – by providing pre-symptomatic colonoscopies for those identified to be carriers of a colorectal cancer-causing mutation.

Research conducted by the Faculty of Health Sciences spans everything from basic health challenges to clinical, rehabilitation and public health. But whether researching vaccines for newborns, the relationship between poverty and mental health, or how exercise can alleviate pain in HIV patients, researchers are united by their desire to improve the health and increase the well-being of the people around them. Here are some of the pressing questions to which UCT researchers are currently seeking answers.

Are keratin hair-straightening treatments safe to use?

Chemical hair-straightening treatments, dubbed 'Brazilian' keratin treatments for the country in which they were invented, are used daily in many South African hair salons. According to research conducted by Associate Professor Nonhlanhla Khumalo, Dr Mbulelo Maneli and Associate Professor Peter Smith, most commonly sold keratin treatments contain unacceptably high levels of formaldehyde. The maximum safe concentration of formaldehyde set by the US Cosmetic Ingredient Review Expert Panel – and by most countries, including South Africa – is less than 0.2%. Six of the seven brands tested by researchers showed levels of between 0.96% and 1.4% – five times higher than the legal limit. Exposure to formaldehyde can cause eye and skin irritations, and according to Dr Khumalo, "Formaldehyde is classified as a carcinogen (or cancer-causing agent). Chronic exposure to high concentration is associated with respiratory and blood cancers such as leukaemia and lymphomas."

How can we prevent heart failure after childbirth?

Professor Karen Sliwa-Hahnle, director of the Hatter Institute for Cardiovascular Research, has found a way of treating heart failure of previously unknown origin occurring in African women around the time of childbirth (post-partum cardiomyopathy). By studying a laboratory rodent model, Sliwa and Professor Hilfiker-Kleinert, from Hannover, Germany, discovered the molecular mechanism of the disease and devised a successful treatment with the hormone bromocriptine.

How can we help reduce the incidence of cervical cancer?

Researchers affiliated with the Institute of Infectious Disease and Molecular Medicine have made great strides in the treatment and prevention of cervical cancer. In 2013 Prof Ed Rybicki and his team had a final patent grant pending for a chimeric human papillomavirus (HPV) vaccine. HPV vaccines promise to reduce the incidence of cervical cancer, which affects more women in developing countries than anywhere else. Screening for the same virus DNA, followed by cryotherapy (freezing affected tissue), has been shown by Prof Lynette Denny and colleagues to reduce cervical cancer precursors by 75%. These methods of combating cervical cancer have now been adopted in many other countries.

How can we strengthen the child protection system?

Recognising the fact that too many children in South Africa die of preventable causes such as child abuse, the UCT Children's Institute is researching ways in which risk factors for preventable deaths can be identified. Working with the UCT Division of Forensic Medicine and Toxicology, and the Departments of Health in the Western Cape and KwaZulu-Natal, the Children's Institute is piloting and testing child death review teams. These teams, modelled on successful examples from high-income countries, review child deaths so as to identify weaknesses in the health, welfare and legal systems. The project will run into 2015 and has already shown, in the words of institute director Shanaaz Mathews, that "the mechanism can alert us to health system failures, and has the potential to identify points of intervention to reduce preventable deaths".

Can a web-based pregnancy calculator help women seeking safe abortions?

The World Health Organisation estimates that one in five pregnancies globally ends in induced abortion, and 21.6 million of the 43.8 million abortions that occurred in 2008 were unsafe. In South Africa, many women still seek out unsafe abortions, despite access to a safe abortion being a constitutionally enshrined right for any South African woman. Now, an innovative web-based pregnancy calculator, developed by researchers in the Women's Health Research Unit under the leadership of Associate Professor Jane Harries, promises to help women evaluate their own stage of pregnancy more accurately. "If a woman can accurately determine her gestational age, she can also determine her eligibility for medical abortion; and also correctly determine the doses and regimens of drugs required for a safe abortion. Most pregnancy calculator apps or websites use due-date calculators, and provide other information that is not suitable for a woman seeking to terminate a pregnancy."

How can we support people with disabilities in low-income areas?

Soraya Maart, head of physiotherapy, recently conducted research into the prevalence of disability in low-income areas through surveys of over 7 000 people in 950 households in Oudtshoorn (a semi-rural small town) and Nyanga (a peri-urban township). She found that the disability prevalence in the areas studied was higher than the national census estimate of 2011. Moreover, the findings of the research suggest that census data is inappropriate for use in service planning, as it underestimates disability and provides a narrow understanding of the experience of disability in context. The study also found that the experience of disability is much worse for patients with disabilities living in an urban township area. According to Maart, "The inherent limitation of inaccurate estimates is that those who are not counted will remain invisible, and will not be able to achieve their full potential in society."

1912

The first medical teaching facilities are formally inaugurated at Hiddingh Campus on 6 June.



1922

The first two South African-trained doctors are capped.



1924

The first two medically trained women graduate.

1938

The original Groote Schuur Hospital is completed.

1943

Andrew Kinnear and Dr Golda Selzer establish the Students Health and Welfare Centres Organisation (SHAWCO).



1956

The Red Cross War Memorial Children's Hospital is established.



1957

UCT's first intake for the Diploma in Physiotherapy.



Allan Cormack develops a prototype of the world's first computer-assisted tomographic (CAT) scanner.

1962

The Department of Psychiatry and Mental Health is established.



1964 South Africa's first successful separation of conjoined twins is performed at Red Cross War Memorial Children's Hospital.

1967

Chris Barnard and his team perform the first human heart transplant at Groote Schuur Hospital.



1975

Prof Gaisford Harrison from the Department of Anaesthesia discovers dantrolene, the treatment for malignant hyperthermia.

1977

Prof Frances Ames leads a successful legal challenge against the South African Medical and Dental Council's failure to discipline the so-called Biko doctors, who were complicit in circumstances leading to anti-apartheid activist Steve Biko's death.



THE TEST OF TIME

A timeline of highlights from the oldest medical school in Southern Africa

HEALTH BY DESIGN



Compiled by Helen Swingler Photos by Michael Hammond

Innovation, whether reflected in technology, design or systems, is the lifeblood of the health sciences; and at UCT it's being harnessed to suit conditions in developing countries, where 'simple' and 'affordable' are watchwords. We take a look at several projects – many the result of cross-faculty collaborations.

Heart valves

Several initiatives tackle the high rates of heart disease in the country and in the rest of Africa. Strait Access Technologies (SAT), a UCT spin-off company, develops and manufactures cardiac-related medical devices that address the needs of 75 million rheumatic heart disease patients worldwide. The company's big coup is a delivery device that implants heart valves without complicated surgery or high-tech operating theatres with advanced imaging systems and surgical teams. SAT has also developed a plastic heart valve for younger patients, designed to last longer than current valves, which are made from animal tissue. Part of the SAT platform is also an 'easy to deploy' system for the repair of the inflow valve into the heart – the most affected heart valve in children and adolescents. Leading the team is Prof Peter Zilla, head of the Department of Cardiothoracic Surgery, with polymer scientist Prof Deon Bezuidenhout and Prof David Williams, a world expert in biomaterials and implantable medical devices.

Titanium bones

Mechanical engineer Dr George Vicatos has married engineering know-how and a life-long interest in the medical field to design titanium-alloy bone and joint implants and prostheses, changing the lives of over 500 patients at home and abroad. This technology can salvage a damaged or diseased limb, and avoid the need for amputation. Recently, Vicatos and his team of Dr Rushdi Hendricks and student James Boonzaier made another surgical breakthrough in a tricky area: the upper jaw (maxilla). The Maxillofacial Distractor is a semi-circular structure with a moveable carrier that allows patients who are missing large parts

of the upper jaw to regrow their own soft tissue and bone, from gums to palates. "Because locally designed and produced products cost far less than imported equivalents and are delivered faster to the surgeons, and hence to the patients, the lower cost is passed on directly to the patient. They're also more affordable to medical aids," says Vicatos.

Smart glove for leprosy patients

Indigenous technology developed partly at UCT is helping leprosy patients in India, where a new 'tactile' or 'smart' glove is being tested. The glove, built with a revolutionary fabric with embedded sensors that help patients avoid hand injuries caused by sensory loss due to nerve damage (for example, picking up a hot pot without realising how hot it is), was developed by Dr Sudesh Sivarasu, a biomedical engineer in the Department of Human Biology. The technology tracks pressure points on the palms and fingers and is being tested at the Leprosy Mission Hospital in New Delhi. The idea is to make technology more affordable, says Sivarasu. In South Africa, where 90 to 95% of medical equipment is imported with up to 300% mark-up, the high cost is passed on to patients. He and his team of postgraduate students have created several innovative, inexpensive solutions to common medical problems, such as locally designed drip lines to replace the imported models used in medical facilities.

“Because locally designed and produced products cost far less than imported equivalents and are delivered faster to the surgeons, and hence to the patients, the lower cost is passed on directly to the patient. They're also more affordable to medical aids.”

George Vicatos

Hand exoskeleton for stroke patients

Locally designed medical devices have the potential to revolutionise the lives of many, in the aftermath of illness and accident. For example, a 'hand exoskeleton' developed by biomedical engineer Yasheen Brijal and the Department of Human Biology's Dr Lester John and Dr Sudesh Sivarasu can help stroke patients write again. A low-cost stroke-rehabilitation device, reScribe fits over the patient's hand and guides their movement as they trace an image on a computer with a stylus. The technology is complementary to John's development of non-invasive deep-muscle electromyography. Using surface electrodes, electromyography 'reads' a muscle's responses to electrical stimuli via the nerves.

Techniques for pinpointing brain tumours

Last year a new colour-coded brain tumour operating technique was introduced at Groote Schuur Hospital, using 5-ALA, a drug administered before surgery. This drug is preferentially taken up by brain tumours, which literally light up under the operating microscope, helping neurosurgeons pinpoint a tumour's exact location. Pioneering neurosurgeon Dr Sally Rothermeyer of UCT's Division of Neurosurgery conducted the six-hour operation on a 52-year old patient, while

the division is headed by Professor Graham Fleggen, who in 2009 received a medical doctorate for his work on the innovation known as the Cape Town Stereotactic Pointer (CTSP). Importantly, the CTSP provides a cost-effective alternative for neurosurgeons working in under-resourced settings. Fleggen says developments in CT scanning and MRI have led to exponential growth in applications. The CTSP itself involves four steps: suturing a 'halo' to the patient's scalp, and then scanning the patient and calculating 3D co-ordinates that guide surgeons in setting the device. The system was patented by the Medical Research Council and has sold around the world.

App for cognitive disorders

The Department of Psychiatry and Mental Health's Prof John Joska's Cognitive Assessment Tool-Rapid Version (CAT-rapid) is a quick, easy-to-use smartphone application to assist the clinical assessment of cognitive disorders in busy clinical settings, and particularly those where there are limited resources. The app was written for Android, and can be used in multiple healthcare settings to screen for a range of neurocognitive impairment. The patient is taken through a number of tests using the interactive touch screen, and an assessment is automatically generated for the healthcare practitioner. A wide range of brain disorders, such as Alzheimer's disease, HIV-associated neurocognitive disorder, and traumatic brain injury can be diagnosed in this way. The app includes a link to a YouTube demonstration of the screener.



Rapid TB testing

Pioneering pulmonologist Professor Keertan Dheda developed a test for TB outside the lung (lining of the lung, heart and other organs, also called extra-pulmonary TB). Conventional TB tests (such as GeneXpert) work poorly for this type of TB, which is common in Africa. The same-day test is being commercialised by a UCT-co-owned spin-off company, Antrum Biotech, while a user-friendly bedside version of the test is also being developed. Dheda also led a team whose findings, published in *The Lancet*, showed that placing new rapid TB diagnostic technology (GeneXpert) in a clinic setting is feasible when the testing is performed by a nurse – making roll-out of this test feasible in TB hot-spots and resource-poor settings. This approach has led to rapid diagnosis of drug-resistant TB, with more patients being placed on treatment. As easily treatable TB strains are being superseded by highly drug-resistant strains, Dheda and his co-workers are also working to find a user-friendly test to identify the 'super-spreaders' of drug-resistant TB.

Early warning system

Dr Una Kyriacos' modified early warning score (MEWS) system for adult patients, incorporating a reporting algorithm, has had a significant impact on nurses' recognition and recording of deterioration in their patients. This early warning system is a useful adjunct to the clinical skill of observation, standardising early warning signs. Patients are scored on the chart according to basic physiological signs: respiratory and heart rates, oxygen saturation, systolic blood pressure, temperature and level of consciousness. Kyriacos' observation chart incorporates existing UK MEWS signs, and uniquely unscored clinical signs. MEWS has now been adopted by the Western Cape Department of Health for bedside monitoring

on general wards at public hospitals from 2015. Kyriacos' research has also inspired medical manufacturer Welch Allyn to incorporate a colour-coded early warning score protocol in their Respiratory Monitoring and Electronic Vital Signs Documentation System, and to add the UCT MEWS system to their Vital Signs Monitor for demonstration purposes.

E-health mobile technology

In 2004, when civil engineer Associate Professor Ulrike Rivett, together with colleagues Professor Jon Tapson (electrical engineering, UCT) and Dr Jevon Davies (electrical engineering, CPU), conceived Cell-Life – an e-health mobile technology development – it addressed one of the country's biggest medical challenges: monitoring patient adherence to antiretroviral treatment, and managing stocks of ARVs at clinics and pharmacies. Over the past decade, Cell-Life (now an NGO) has rolled out their in-house pharmacy management platform, 'Intelligent Dispensing of Antiretroviral Treatment', or iDART, to a number of sites in South Africa and the rest of the continent. Users in 112 countries have downloaded the platform, which operates as a stock- and patient-management system. Pharmacists and clinicians are able to monitor the drug supply chain and record when patients collect their medication, as well as noting any changes to their prescriptions.

Electronic health registers

Tier.Net is an electronic register that allows the rapid digitisation of paper registers and further prospective electronic capture for patients on HIV and TB treatment. Developed by the School of Public Health and Family Medicine's Centre for Infectious Disease Epidemiology and Research (CIDER), Tier.Net was built to

be able to export to and import from eKapa, an electronic health record for primary care, initially built for HIV/TB care and now being adapted for general primary care, including chronic diseases and all primary-care visits. (eKapa is a joint initiative between UCT CIDER, the Western Cape Government and Medicines Sans Frontières). A three-tier monitoring system (using paper, Tier.Net and eKapa) has been adopted for HIV and TB services by the national Department of Health, which requires a centralised national database for monitoring the progress and temporal trends of the two epidemics. Tier.Net is currently being used by over 3 000 health facilities across South Africa and in several projects in Zimbabwe, Mozambique, Guinea, Malawi, Democratic Republic of Congo, Sudan, Pakistan and Yemen.

Real-time poison information

Once described as UCT's most successful social responsiveness project, the Poison Information Centre (PIC) at Red Cross War Memorial Children's Hospital recently launched a new internet-enabled platform that makes the most comprehensive poison databank on the continent, AfriTox, available to a broad community of medical practitioners. With over 40 000 records and accessible via mobile device, AfriTox is used in over 40 centres in South Africa as well as in Botswana, Zimbabwe, Mozambique, Kenya and Nigeria. In a new development, patient information is now available immediately, thanks to a program designed to record telephonic information and generate reports in real time, as well as immediate statistics. The program's developer is alumnus Dr Selig Leyer, who also paid for a part of the program that needed a commercial licence and covered the costs of converting it from the Apple operating system to Windows.

The program has been branded AfriTox TeleLog. "It's a Rolls Royce program," said PIC director Dr Clare Roberts.

Digital mammography

Technology developed by Dr Kit Vaughan and his team in the Department of Human Biology five years ago has come to fruition in the form of the PantoScanner, an advanced mammography platform that combines ultrasound and low-dose X-rays to improve the detection of breast cancer. The innovative device has been developed by UCT spin-off company CapeRay, with Vaughan at the helm.

Home care for children with tracheostomies

Breatheasy was pioneered by Sister Jane Booth, Professor Louis Reynolds, Professor Max Klein and social worker Sheila Berger at the Red Cross War Memorial Children's Hospital, beginning in 1989. It is a unique and innovative home-care programme for children with tracheostomies and on ventilators (that is, they are technology-dependent). The programme trains mothers and caregivers to take care of their children despite many of them coming from conditions of poverty, where there is no readily available support system. Over more than 25 years, 700 technology-dependent children have been able to return home to their families and communities, rather than remain in hospital indefinitely. Although this has saved over 32 500 hospital days, the real saving has been in the social and psychological effects of long-term hospitalisation on the children and families, says Booth. The programme has been replicated at other institutions, and has also guided research and contributed to curricula content for clinicians and specialist nurses.

1979

Allan Cormack and Godfrey Hounsfield share the Nobel Prize in Medicine for the development of the CAT scanner.



1983

The brutality of the violence between the Crossroads community and the South African Defence Force convinces UCT graduate Dr Ivan Toms not to serve in the army. At the time he was the only doctor serving the Crossroads population of 60 000. He would eventually receive a 21-month jail sentence for refusing to accept the military call-up, and served nine months in Pollsmoor Prison.



1994

The Sport Science Institute of South Africa is founded



The Inherited Retinal Degeneration Disease (RDD) research team identifies the location of the first retinitis pigmentosa disease-causing gene in South Africa.

1995

Primary healthcare is adopted as a philosophy of social justice, and Jeffrey Dumo Baqwa is appointed the first professor of primary healthcare.

1996

The long-sought-after founder gene mutation for the prevalent form of porphyria in South Africa is discovered. This discovery significantly alters diagnostic strategies and the understanding of the natural history of the disease.

2000

The MRC/UCT Medical Imaging Research Unit (MIRU) is officially opened.



2002

The UCT Medical Centre, later renamed the UCT Private Academic Hospital, is opened.

2003

A disability studies programme – the first of its kind in Africa – is started.

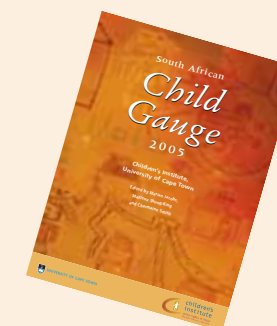
2004

The Institute of Infectious Disease and Molecular Medicine (IDM) is accredited as a cross-faculty institute.



2005

The first South African Child Gauge – an annual snapshot of the status of South Africa's children – is published by the Children's Institute and the School of Child and Adolescent Health.



2013

The first tuberculosis (TB) vaccine to be tested for efficacy in infants in more than 40 years is evaluated in a historic phase 2b trial conducted by a team from SATVI, a world-leading TB vaccine group based in the Institute of Infectious Disease and Molecular Medicine.

A new species of dimorphic fungus (*Emmonsia*) that is pathogenic to humans is discovered by Dr Chris Kenyon and his colleagues. The species appears to be an important cause of infections among patients with advanced human immunodeficiency virus (HIV) disease in Cape Town.



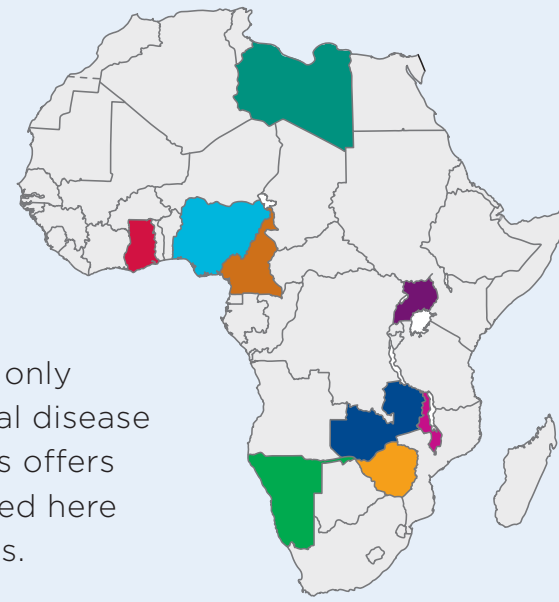
2014

MMV390048, a compound discovered by the UCT Drug Discovery and Development Centre (H3-D), with the potential to form part of a single-dose cure for malaria, goes into clinical trials.

TRAINING IN AFRICA, STAYING IN AFRICA

Compiled by Abigail Calata Photos by Michael Hammond

Africa is hardest hit by the worldwide shortage of healthcare workers, with only three percent of the world's healthcare workers tending to 24% of the global disease burden. In order to bridge the skills divide, UCT's Faculty of Health Sciences offers programmes aimed at African students who want to use the expertise gained here to make a difference in their home countries. These are some of their stories.



Theresia Shivera-Anton
MMed (Anaesthesiology)

Upon her return to Namibia, Theresia Shivera-Anton plans to initiate a training programme for anaesthetic nurses in every hospital offering anaesthetic services.

Shivera-Anton, who is in the process of completing a Master of Medicine in Anaesthesiology, describes herself as having been "patriotic from a young age".

"When I first came to study medicine [at UCT] my intention was to return home and serve the Namibian people. Now, as a postgraduate student, that has not changed," she says.

Namibia currently has only 10 registered anaesthetists, most of whom work in the private sector. There is hope, though, with the Namibian Ministry of Health and Social Services' strategic framework outlining plans to have 750 medical undergraduates, 100 postgraduates and 22 medical specialists trained by 2017.

Shivera-Anton has a passion for teaching, and sees herself passing on the knowledge and skills she's acquired at UCT to the next generation of Namibian medical professionals: "Namibia has its own medical school (almost five years old), filled with young, enthusiastic minds that need to be nurtured."



Chishala Chishala
Internal Medicine Fellow

A relative suggested that he do his postgraduate studies at UCT; and that, together with the prospect of using the skills acquired through his studies to find work in the developed world, persuaded him to apply for a training post at Grootte Schuur Hospital.

However, Chishala Chishala has every intention of returning to Zambia, his home country, to practise medicine "in the way I have learnt it here". Chishala completed a four-year fellowship in internal medicine at UCT, following a Bachelor of Medicine and a surgery degree from the University of Zambia.

The best aspect of training at UCT is the access to many specialists in various fields, Chishala says. "The lack of specialists at home means that doctors have to learn from textbooks." He also appreciates the "availability of quality laboratory, radiology and other support services", and says that "the very heavy burden of disease in Cape Town" provides a wealth of learning opportunities.

The situation in Zambia is very different. There are very few specialists – Chishala estimates that fewer than 10 Zambians are currently in South Africa pursuing sub-specialty training, and he is also not aware of any efforts by the Zambian government to encourage medical professionals to specialise.



George Chagaluka
MPhil (Paediatric Oncology)

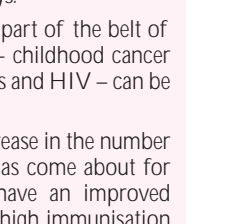
A holistic approach to childhood cancer is at the top of things this specialist in paediatric oncology plans to implement when he goes back to Malawi.

George Chagaluka, who completed his MPhil in Paediatric Oncology at UCT, believes the multi-disciplinary care he witnessed during his time at the Red Cross War Memorial Children's Hospital is something Malawian children could benefit from. "There is a dire need for good networking among professionals such as surgeons, pharmacists, radiotherapists and social workers," he says.

According to Chagaluka, Malawi forms part of the belt of African states where Burkitt lymphoma – childhood cancer associated with malaria, Epstein-Barr virus and HIV – can be considered endemic.

"Lately, there has been a remarkable increase in the number of cases [of this disease]. The increase has come about for two reasons: more medical graduates have an improved knowledge of childhood cancer; and the high immunisation coverage has reduced the burden of infectious diseases, and therefore, diagnostic efforts are channelled to non-infectious diseases such as cancer. This has led to a growing need for paediatric oncologists," he says.

Chagaluka is currently the only paediatric oncologist in Malawi, but he hopes to identify other paediatricians who can undergo oncology training, as well as set up a "training programme in Malawi" with others in his field.



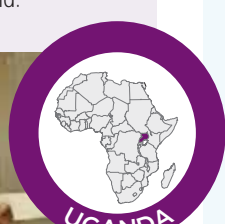
Fredrick Lutwama
Immunologist

Fredrick Lutwama is transferring laboratory techniques learnt at UCT to his home institution – Makerere University in Uganda.

"Specifically, the whole-blood intracellular cytokine staining techniques have helped postgraduate students in data analysis," Lutwama explains.

Lutwama completed his postgraduate studies in clinical sciences and immunology at the South African Tuberculosis Vaccine Initiative (SATVI). What impressed him most was the "advanced laboratory facilities and greater technical capacity" he encountered in South Africa. "I valued the support from high-quality postdoctoral fellows and faculty members, and appreciated the greater efficiency of systems right from the registration process through to ICT support and supervision," he adds.

He is optimistic about immunology in Uganda, saying that although there are very few immunologists in the country, a new department of immunology will soon be established to train more postgraduate students in this important field.



Muki Shey
Immunologist

His solution for the dearth of adequate research facilities and resources in Cameroon's health sector is a research action plan with "clearly defined evidence-informed research priorities that speak to the major health challenges of the country's population".

Muki Shey studied immunology and infectious disease at UCT before completing a postdoctoral fellowship centred on HIV/AIDS through the Centre for the AIDS Programme of Research in South Africa (CAPRISA) in KwaZulu-Natal.

According to Shey, whose brother is a professor at Stellenbosch University's Department of Interdisciplinary Health Sciences, South African and Cameroonian students experience similar learning conditions, but the research facilities in his home country are not at the desired levels.

The research action plan he envisions should contain "strategies for advancing the research agenda; and a sound monitoring and evaluation framework. All relevant stakeholders, including Cameroonian researchers based outside the country, should be involved at all stages of the plan, including securing funding for the plan through grants and other sources. This would help reduce the so-called 'brain drain', and encourage 'brain circulation' instead," he maintains.

Shey believes many of his compatriots have specialised in his field, but most of them work outside of Cameroon because of lack of adequate research facilities – an issue that is on the government's agenda, but which needs to be addressed in a more co-ordinated way.

Gina Oladokun

MPhil (Paediatric Infectious Disease)

What makes studying at UCT stand out for Gina Oladokun is exposure to the appropriate identification and diagnosis of conditions related to paediatric infectious disease – about which she would only have read in textbooks in Nigeria.

Oladokun, a fellow of the African Paediatric Fellowship Programme, is in the process of completing an MPhil in Paediatric Infectious Disease.

She has already identified activities of the Paediatric Infectious Disease (PID) unit and the Department of Paediatrics that she would like to implement when she returns home. "I could see the annual research day of the Department of Paediatrics being replicated in our Faculty of Clinical Sciences at the University of Ibadan. The antibiotic stewardship and infection-control activities in the PID unit can also easily be translated to our unit at home," she says.

Paediatric infectious disease is a relatively new sub-speciality in Nigeria; however, a Nigerian Society for Paediatric Infectious Disease has been established and is tasked with streamlining and standardising practice in the country. To Oladokun's knowledge, the West African College of Physicians also has plans "to commence sub-speciality training" in the region.



John Adabie Appiah
Paediatric Critical Care Specialist

He is the only paediatric critical care specialist in Ghana, having completed this training through UCT's successful African Paediatric Fellowship Programme (APFP).

John Adabie Appiah currently works at the Komfo Anokye Teaching Hospital in Kumasi, a city northwest of Accra, the capital. His dream is to establish a critical-care nursing programme in Ghana.

He found the learning conditions in Cape Town "practical and very patient-oriented – quite holistic", and praises UCT for its efforts to empower African students. "I feel more needs to be done to assist the continent. The support could be extended through establishing similar training centres in other regions in Africa," he suggests.

Haitem Elasir

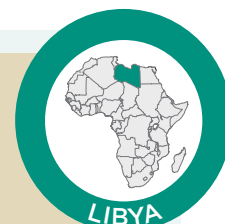
Internal Medicine Fellow

Haitem Elasir is excited by the thought of applying the principles of clinical medicine, which he learnt when he specialised in internal medicine at UCT, when he goes back to Libya.

"Unfortunately, Libyan doctors are currently geared towards the American school of medicine, which depends almost exclusively on technology for a diagnosis. Libyan students are not taught how to conduct a relevant (physical) examination, and to look for signs that together with the patient history can produce a diagnosis without the need for expensive tests," he says.

Elasir has his sights set on building a new generation of Libyan doctors: "They will use patient history, a proper physical examination, and simple bedside tests to make a diagnosis – thus building confidence with the patient, by spending more time with them and answering any queries they might have."

Elasir starts as a senior registrar in rheumatology in November. He only knows of three rheumatologists currently practising in Libya. "I want to establish an arthritis clinic, and ultimately hope to establish a Libyan Board of Rheumatological Diseases," he says.



Thabani Thatha

MMed (General Paediatrics)

Zimbabwe has only 30 general paediatricians for a population of over 13 million. Bulawayo has three paediatricians serving some one million people – with two of the three nearing retirement age.

This is what prompted Thabani Thatha to register for an MMed in General Paediatrics at UCT, where he's now a fellow of the African Paediatrics Fellowship Programme, and based at the Red Cross War Memorial Children's Hospital.

Professor Michael Ikeogu, a senior paediatrician at the hospital in Bulawayo where Thatha served as medical officer, alerted him to the existence of the programme and encouraged him to apply.

"Serious economic meltdown for more than a decade in Zimbabwe has resulted in a largely dysfunctional health system, with material (for specialised tests) and human resources (specialists and sub-specialists) in short supply. We need more hands on deck and an injection of fresh blood to address the many challenges we face," says Thatha.





GOING PUBLIC WITH HEALTH KNOWLEDGE

Compiled by Yusuf Omar Photos supplied

Greek physician Hippocrates is often quoted as saying, "The chief virtue that language can have is clearness, and nothing detracts from it so much as the use of unfamiliar words." From open access textbooks to concerted efforts to create equitable communication between health professionals and patients, take a look at some of the ways people inside UCT's Faculty of Health Sciences are sharing what they know – in a language people can understand.

Language immersion

The primary language used between medical students at UCT and their patients is English, but many patients in the Western Cape are first-language Xhosa- or Afrikaans-speakers. This creates a host of problems for the patient and for treatment – such as when cleaning staff, for example, are asked to step in as translators. This has serious implications for doctor-patient confidentiality, explains Associate Professor Derek Hellenberg of UCT's Division of Family Medicine.

While Xhosa and Afrikaans have been part of the curriculum for more than a decade, Hellenberg and colleagues stepped up the intensity in 2009 with the Language Immersion Project. Students could choose to live with a local Afrikaans- or Xhosa-speaking health worker for two and a half weeks while stationed at a community health facility, as part of the 'Becoming a Doctor' course.

During the day, the students did their clinical duties; and after hours, they integrated socially and culturally with their host family and the community, on condition that only Afrikaans or Xhosa was spoken. Hellenberg reports that immersing students into a language environment in this way saw them improve drastically.

But it wasn't just their language skills that improved.

"Their confidence in their clinical skills and clinical reasoning [also]

improved over the period," reports Dr Ian van Rooyen, who teaches on the 'Becoming a Doctor' course.

The programme grew from two students per language in the first year to eighteen students in 2014, and the demand is high.

"In the first year we could only take two students, but we received 36 applications," says Hellenberg.

The project has been so successful that many other South African universities have adopted similar models.

Mobile translator

Some students have put their thinking caps on to remove language barriers in the medical arena. In 2013, then-MBChB student Saadiq Moolla developed and launched the Mobile Xhosa and Mobile Zulu websites, which help health professionals translate key terms into patients' mother tongues, at no charge.

Doctors can now confirm translations of key phrases – grouped in categories such as 'heart' and 'respiratory' – on the spot.

"It helps so much to be able to explain to a patient that you will be taking blood, for example, so that they understand what you're doing and why. It reduces anxiety and improves the quality of care," Moolla told UCT's *Daily News* at the time.

Moolla's younger brother Ashraf, a UCT actuarial science student, later wrote the code for a mobile application along the same lines.

Mobile Translate MD introduced several new languages that weren't previously available on the website: Afrikaans, French and Spanish.

"French in particular is unexpectedly important in the South African setting, as we have many refugees and immigrants who speak this language, and there are no French translators in our hospitals; so hopefully, the app will help to overcome this barrier," explains the elder (and now-graduated) Moolla.

Plans are afoot to include all eleven of South Africa's official languages.

Besides dodging the need for a stable internet connection, the app also introduced new features, including a handy text-to-speech function that allows users to hear how phrases and words should be pronounced correctly.

"We ask that people contact us about phrases that they often use as the doctor, so that we can add them to the list," says Ashraf Moolla.

Anybody interested in helping to grow the app can send the developers an email at info@mobilexhosa.org.za.

Signs of improvement

The Language Immersion Project and Mobile Translate MD go a long way towards creating equity in medical treatment, and UCT's Health and Human Rights Programme (HHRP) takes it a step further.

Dr Marion Heap of the HHRP has long argued that deaf patients are at a tremendous disadvantage

during medical examinations, as so few health professionals are fluent in sign language. As she argued in a *Cape Times* article in 2008, the studies show that deaf people in Cape Town fall victim to problems such as delays in diagnosis, missed appointments, repeat visits, misdiagnosis, misunderstandings, and misuse of medication, as well as anxiety and distress.

"Until professional interpreting services are an integral part of healthcare services, we will not bridge the language gap; and a majority of South Africans will continue to be deprived of their constitutional right to health care," she wrote at the time.

This is why, since January 2010, the HHRP has been piloting accredited diploma-type medical interpreter training. It includes accredited South African sign language (SASL) classes, human rights, ethics, and interpreting, as well as practice in selected health facilities under the guidance of the professional SASL interpreters.

In 2012, and in conjunction with UCT's Disability Unit, Heap arranged for an introductory course in medical sign-language interpretation to be hosted at UCT's Medical School. The course was run by academics from the University of the Free State, a university with experience in training professional interpreters, with a view to kickstarting the Western Cape's ability to provide professional interpreting services.

Four people from or associated with UCT completed the course,

much to Heap's delight. Now, the HHRP is piloting the first ever free-to-patient sign-language interpreter service in Cape Town, and in the country, South Africa has no posts for interpreters in health care for signed and spoken languages – and indeed, has never had, says Heap.

"Our project provides trained medical sign-language interpreters on a daily basis for signing deaf adults and children," says Heap.

Big-screen teaching

June 2013 marked the first time that an upper endoscopy performed on a patient at Groote Schuur Hospital was streamed live to surgical registrars-in-training at Red Cross.

This was part of the hands-on training course developed jointly by Professor Sandie Thomson, head of the Division of Gastroenterology, and Professor Alp Numanoglu, head of the Division of Paediatric Surgery.

Endoscopy is a minimally invasive medical procedure that examines interior organs. Endoscopes are thin tubes, fitted with a light and video camera, that allow diagnostic tissue sampling and a wide array of therapeutic interventions that reduce the need for major operations.

The course combined two different video-conferencing technologies – digital video transport system (DVTS), and Polycom, which provides high-definition images – and uses minimal bandwidth, making it ideal for implementation in

Message in a bottle

Compiled by Helen Swingler Main photo by Michael Hammond

Many of the bottled tissue and organ specimens in the collection at UCT's Pathology Learning Centre – the biggest of its kind in Africa – are fast becoming rarities, as medical schools worldwide report declining autopsy rates. But now anyone can 'adopt a specimen' and conserve this treasure.

"Not many universities around the world have collections like this," says virologist and curator Dr Jane Yeats about UCT's collection of over 5 000 specimens – the earliest (showing a testicular lesion) dating to 1920. "Museums like these fell out of use dramatically after the introduction of good colour photography.

"With contemporary textbooks, you don't have to see something in a bottle. So although we're keeping our collection, our push is for digitisation to open the resource to the world, covered by Creative Commons licensing."

But the collection remains a valuable teaching and research resource, Yeats adds, even in this digital age. Some specimens reflect our medical history (the collection includes a baboon piggyback heart used by transplant pioneer Chris Barnard in his early experimentation), while others illustrate distinctly African diseases – in addition to common-or-garden varieties such as appendicitis.

Students do tutorials on the specimens, learning what a diseased organ looks like so that when it comes to surgery, they know what to expect; for

example, they can tell the difference between a benign and a malignant tumour.

"It's a precursor to surgery," says Dr Rob Bowen. "But today you'd never make a final diagnosis on what you see with the naked eye, even though you know something is malignant."

Some of the preserved organs show diseases that have declined markedly in the post-antibiotic era; such as syphilis.

"Syphilis is not a disease that's vanished." His colleagues are seeing a resurgence of syphilis in neonates, for example, linked to HIV.

"The extreme cases doctors saw before penicillin are or should be rare now, so it's nice to have specimens to show students what happens if you don't treat syphilis – or don't recognise it in a modern context."

That said, it's an expensive collection to maintain. To help them in their task, the Pathology Learning Centre has launched the 'Adopt a Specimen' campaign. For R250, you can adopt a specimen for five years; or for a lifetime for R1 000.



Dr Jane Yeats



rural areas where UCT is extending its clinical teaching platform, says Jerome Corns, who manages the faculty's Information and Communication Technology System.

When Corns and colleagues installed the first video-conferencing system linking campus lecture rooms with off-site teaching facilities, video conferencing "wasn't big at UCT", he says. "But the faculty later developed a teaching programme around it, with eight to 10 students sitting in on lectures relayed from the main campus."

Bandwidth had been a limiting factor, but that changed after the introduction of SANReN (a high-speed network, primarily for research institutions and organisations) at UCT.

"We also take teaching straight from the wards. Live demonstrations are relayed from theatre via a portable tele-education facility that allows us to plug into the network, so that we can feed live video conferencing from surgery."

"It adds a huge dimension to our teaching platform – and we can expand this into rural areas, where we don't have specialist services."

Thomson and Numanoglu ran their basic endoscopy course at the Surgical Skills Training Centre at Red Cross War Memorial Children's Hospital, the most advanced surgical skills training centre in sub-Saharan Africa. The venue means that technology can be used for more than 'just' the high-tech streaming

equipment, but also for distance teaching, such as the web-based education programmes broadcast at the centre.

"The theatres here [at Red Cross] are all linked up with lecture rooms. Today we can take surgery to and from many hospitals, such as Groote Schuur, for as few as six students or to a whole lecture room," Thomson told the *Monday Monthly* last year.

"We have had live surgery from Japan being shown to students in the anatomy building. There's nothing like it in the country."

Open access textbooks

When UCT's Professor Johan Fagan realised that colleagues from other African countries could not afford textbooks, his first thought was to make textbooks about the ear, nose and throat (ENT) open access.

An ear, nose and throat specialist, Fagan first approached two senior authors in the field to see if they would agree to making some of their old, out-of-print textbooks available free online. They agreed.

But their publishers didn't. Instead of giving up, Fagan began writing textbooks chapter by chapter that he released online as PDFs. One textbook focused on head and neck operative surgery, and the other focused on hearing tests and how to fit hearing aids.

"I have since had some of the top ear, sinus, and head and neck

surgeons around the world writing for free – to the extent that I'm now being approached by colleagues who ask if they can contribute," says Fagan.

And the chapters have proven extremely popular, as Fagan reports over 400 000 downloads so far, with a chapter being downloaded every 80 seconds.

"Downloads are from almost every country in the world. The biggest users at the moment appear to be South Africa, the United Kingdom and the US, followed by India," says Fagan.

"What's remarkable is how the internet crosses boundaries. At the height of the Syrian War we had downloads coming from Damascus, so there was obviously one surgeon or doctor in Damascus who required some information and was downloading information as to how to do the surgery."

The *Open Access Atlas of Otolaryngology: Head and Neck Operative Surgery and Open Access Guide to Audiology and Hearing Aids for Otolaryngologists* have become standard textbooks in many countries. Fagan sees such open education resources as part of an academic's role to both create and distribute knowledge.

“We have had live surgery from Japan being shown to students in the anatomy building. There's nothing like it in the country.”

Jerome Corns




View from within: This image of an endoscopy, streamed live to students, allows students to get a close look at the surgical procedure without actually being in the theatre.

WHAT IT TAKES TO MAKE IT

Compiled by **Thaheer Mullins** Photos by **Michael Hammond**

There's no doubt that research in the health sciences is incredibly important, but degrees in this field are known for being difficult – they're incredibly competitive, not to mention time-intensive. What keeps students motivated when the going gets tough?



“My goal is to reduce the disease burden in Africa through science, by contributing to unravelling the mysteries that surround poorly understood diseases and finding therapies using computational means. My first challenge was blending two fields that are traditionally considered divergent [computer science and biology]. Since my honours degree was entirely in computer science, I found it a little challenging grasping some biological concepts that I needed for my studies. I also spend a lot of time away from my family and friends back in Kenya, due to research demands and financial constraints. On the other hand, I have received a lot of support from the Faculty of Health Sciences not only in terms of funding for my studies but also the relationships that I have developed, specifically with my colleagues at the Division of Computational Biology – for which I am very grateful.”

Kenneth Babu
PhD in Bioinformatics

“My field of study is in human genetics – specifically the pharmacogenetics related to breast cancer. There is a predisposition of women in my family to developing breast cancer, and seeing these beautiful, vibrant women reduced to shadows of their former selves motivated me to do something about it. I believe with a personalised medicine approach, we have the best chance of long-term survival.”



Horacia Naidoo
PhD in Human Genetics



“My research area is maternal health, including health systems strengthening in primary healthcare and sexual rights. I chose this research area as I'm interested in the health needs of women and how socioeconomic factors such as education impact the quality and access of reproductive health services. I'm interested in determining the role the health system plays in ensuring that women receive quality reproductive services at the primary healthcare level.”

Zulfah Albertyn
PhD in the School of Public Health and Family Medicine




“Pursuing a PhD can be demanding. It can consume you if you allow it to. Of course this journey will cause some things to take a back seat; however, maintaining a balanced lifestyle is important. I absolutely love running and make a point of putting time aside to exercise. Giving back to the community is also a priority; I am involved in a mentoring programme at an organisation called Ikamva Youth – we aim to equip students from disadvantaged communities with skills and resources to access tertiary education and employment opportunities.”

Dylan Barth
PhD in Medicine



“I'd like to be able to make a contribution that is relevant in the clinical setting, such as earlier cancer diagnosis through the identification of suitable biomarkers, or the development of a drug that can prolong the life expectancy and quality of life of cancer patients. I am very grateful to have been given the opportunity to keep on studying and do what I love. This has only been made possible by the financial assistance I receive in the form of merit scholarships through the post-graduate funding office.”

Tamara Stelma
Master's in Medical Biochemistry



“I want to answer pressing medical questions that affect South Africa (and Africa), and contribute to the knowledge base by solving atomic structures by X-ray crystallography. I am currently trying to clone, express, purify, crystallise and solve the 3D atomic structure of proteins involved in the induced mutagenesis system of *Mycobacterium tuberculosis* [the bacterium that causes TB].”

Simon Broadley
PhD in Medical Biochemistry

“I am realising more and more now that medicine has granted me such privileged access to the lives and stories of people with whom I would never previously have engaged. I hope to leave my mark on the healthcare system and to honour the stories of the patients whose lives touch mine.”



Farah Jawitz
Bachelor of Medicine

“My supervisors have helped build me as an individual. I've overcome a lot of my self-doubt and self-limitation because of their leadership and guidance, positive feedback and criticism. I am a more confident and outspoken individual because of it. I was faced with having to deal with my mother's hospitalisation in September last year after a brutal mugging, while I was writing my honours thesis (crime sucks); and they were very understanding in my distress, and helped me cope and submit my thesis on time.”



Kamogelo Lebeko
Master's in Human Genetics