THE HUB CONNEXION
Department of Human Biology
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Celebrating HUB's Sports Medicine Maestro

HUB PROFILE

Meet **A/Prof Jeroen Swart**: Programme Director of Sports and Exercise Medicine

Image: UCT FHS HUB supplied.

What motivated you to specialise in sports medicine?

I first studied medicine before racing professionally in mountain biking. I was South African Champion in 2002, and represented South Africa at two World Championships.

The combination of medical knowledge and first-hand experience ignited research interests, and I pursued a PhD in exercise science, supervised by Prof Tim Noakes, at the Sports Science Institute of South Africa (SSISA) in 2003. I have been based at SSISA ever since, completing my Masters in Sports Medicine in 2008, and have been the programme director for Sports and Exercise Medicine postgraduate teaching, research and clinical services since 2015.

The cycling performance laboratory was launched in 2003 when I started my PhD. There was a need for a facility where athletes undergo specialised testing to assess and improve their cycling abilities. Since then the lab has grown yearly and now offers services to world-class cyclists from around the globe, and acts as a facility for world-leading research in biomechanics and applied sports physiology.

Tell us more about your achievements?

Despite limited research time due to my primary role as a clinician and clinical educator, I have achieved the following:

- Published over 60 manuscripts, mostly in Q1 and Q2 ranked international journals;
- 14 consensus statements co-authored with leading international researchers, covering topics ranging from concussion management to ethical considerations related to gender in sport;
- 20 of my publications have been cited more than 50 times, and 9 of my publications have received over 100 citations each underscoring their significance in the field; and
- Supervised 5 PhD and 18 Master's students of whom 18 have successfully completed their dissertations (including 4 PhD students, with 2 as primary supervisor).

I have achieved globally-recognised expertise in cycling biomechanics and applied physiology — my expertise has been sought by 3 Tour de France winners:

- **Jan Ullrich** (Tour de France Winner, 1997)
  Swart J, Tucker R, Lamberts R, Albertus Y, Lambert MI. *Potential causes of chronic anterior knee pain in a former winner of the Tour de France*. ISMJ 2009;4:162-171.
- **Chris Froome** (Tour de France Winner, 2013, 2015, 2016, 2017)
  Bell P, Furber M, van Someren K, Antón-Solanas A, Swart J. *The physiological profile of a multiple Tour de France-winning cyclist.* MSSE 2017;49(10):115-123.
- **Tadej Pogacar** (Tour de France Winner, 2020, 2021, 2024)

Following my recruitment by UAE Team Emirates in 2019 (now as Head of Performance), I have played a key role in helping elevate the team from 16th to world no. 1 ranking (2023 and 2024). In 2024, the team won 81 races, including the Tour de France, Giro d'Italia, and the UCI World Championships — a historic achievement, regarded as one of the greatest team performances in professional cycling history.

In 2025, I co-founded Cape Sports Medicine. The group has since gone on to become the largest Sports and Exercise Medicine group in Africa and one of the largest globally. The SSISA centre of Cape Sports Medicine hosts 10 full time Sports Physicians and services all of Western Province Rugby (including the DHL Stormers Super Rugby team), provides all of the medical services to UAE Team Emirates, co-ordinates the medical services for the Two Oceans Marathon and Cape Town Spurs Football Club, as well as servicing hundreds of private patients every month. The centre also provides clinical mentoring and a research database for post graduate students specialising in sports medicine.

Most recently I have been active in establishing the Intercare/UCT/SSISA academic rehabilitation hospital that will open at SSISA in July 2025, and the surgical hospital in 2026. These hospitals will provide world-class integrative care and an academic teaching platform for sports medicine, orthopaedic surgery and biokinetics.

What do you do when not working?

I love being a father, and enjoy cycling, hiking, and skiing.

Who are your role models?

There is no one person, I am inspired by many people I have met on my journey.

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FACULTY OF HEALTH SCIENCES

HUB HOD: PRESENT & PAST

Welcome to Prof Ernesta Meintjes

by **Ayesha Hendricks**

Images: UCT FHS HUB supplied.

Image: UCT FHS HUB supplied.

Welcome, Prof Ernesta Meintjes

We warmly welcome **Prof Ernesta Meintjes**, our new HUB Head of Department.

Ernesta started her journey at UCT in 1998 as a postdoc under the mentorship of Prof Kit Vaughan in the then Department of Biomedical Engineering. She was appointed as a soft-funded research officer in the Medical Imaging Research Unit in July 2000, and in 2007 was awarded the NRF/DST South African Research Chair in Brain Imaging, which she held until Dec 2021.

Ernesta is best known in the faculty for her role in initiating and establishing magnetic resonance imaging (MRI) research at UCT and in the country. Together with collaborators Prof Dan Stein, Prof Kit Vaughan, the late Prof Bongani Mayosi, and colleagues from Stellenbosch University, she negotiated with Siemens the donation of a brain-only research-dedicated MRI scanner in 2007 and led 4 years of fund-raising by a multi-disciplinary and inter-institutional team for a whole-body research-dedicated MRI scanner. These activities culminated in the opening in March 2015 of the Cape Universities Body Imaging Centre (CUBIC) at UCT. CUBIC, which is a fully self-sustaining faculty core research facility and national imaging platform, is the only research MRI facility on the continent.

Ernesta's teaching and research spans all things MRI. On the technology front, she has worked extensively with Prof Andre van der Kouwe at Massachusetts General Hospital on developing real-time motion correction technology. This work aims to reduce the burden on limited MRI resources by improving scan success rates and throughput. Their methods have been employed both locally and globally to perform neuroimaging in restless populations — such as the young and the elderly, or in cardiovascular MRI where both respiratory and cardiac motion need to be accounted for.

In her own work, she has applied these technologies to study how prenatal and early life insults (such as prenatal alcohol and HIV exposure or living with HIV) affect neurodevelopment in infants and children. One of the most exciting findings has been from a small randomised double-blind placebo-controlled clinical trial that revealed that high-dose prenatal maternal choline supplementation to heavy drinking mothers reduces the damaging effects of alcohol on the unborn fetus. Ernesta and her co-investigators, Profs Colin Carter, and Sandra and Joseph Jacobson, are currently conducting a phase 3 clinical trial to confirm these preliminary findings. Most recently, she and Mr Stephen Jermy established the South African Low-field MRI (SoLow) consortium that aims to develop a low-field point-of-care MRI scanner to increase MRI accessibility in under-resourced settings. During a two-week workshop in December 2024, the team built the first prototype, which they are currently developing further.

Outside of work, Ernesta is a member of the Health Sciences Orchestra and enjoys an active lifestyle. After everyone she used to play squash with got injured, she started trail running at the age of 39, started mountain biking with her husband, Riaan, at age 43, and started swimming and climbing with friends intermittently in between. Above all, she has discovered she loves a challenge.

For her 40th birthday, she set herself the goal to complete the 3-day African-X trail run. For her 50th, she wanted to do the Freedom Challenge 2,200 km mountain bike Race Across South Africa, but only managed to tick it off in 2023. This past February, she and Riaan rode the Atlas Mountain Race in Morocco — a non-stop unsupported 1,304 km mountain bike race with 23,000m elevation gain. Ernesta admits that they never expected to make the 8-day cut-off and likely only did because everything went perfectly — mostly she reckons it is because they are too stubborn to give up. No doubt she is already scheming for her next challenge...

BIOGRAPHY

Prof Ernesta Meintjes is a Professor in Biomedical Engineering at the University of Cape Town, and from 2007 to 2021 held the prestigious South African Research Chair in Brain Imaging. She completed her Bachelors, Honours and MSc degrees in Physics at the UKZN Pietermaritzburg campus, and a PhD in Physics at Oregon State University. Upon her return to South Africa in 1998, she joined the Biomedical Engineering Department of UCT as a postdoctoral fellow where she contributed to developing a stereophotogrammetric image-guided neurosurgical navigator. Following the commissioning of the first MRI scanner at Groote Schuur Hospital in November 2001, she embarked on establishing a research stream in Magnetic Resonance Imaging (MRI) and in 2004 implemented the first functional MRI studies in South Africa. These studies led to the establishment of the Cape Universities Brain Imaging Centre (CUBIC), with subsequent expansion to the Cape Universities Body Imaging Centre, of which she has been director since its inception in 2015. Her research focuses on developing technology to track and correct motion during MRI scanning, and applying advanced imaging methods to study conditions particularly relevant to South Africa. These include studies on the effects of prenatal insults and diseases, such as HIV, maternal alcohol or drug use during pregnancy, as well as antiretroviral drugs taken by HIV-infected pregnant women, on brain development. She has authored/co-authored more than 140 peer-reviewed journal papers and more than 250 international conference papers, supervised to completion 26 PhD and 31 MSc students, and mentored 22 postdoctoral fellows. She is a fellow of both the University of Cape Town and the American Institute for Medical and Biological Engineering (AIMBE).

HUB HOD: PRESENT & PAST

Farewell to A/Prof Delva Shamley

by **Dr Supratim Biswas**

Farewell, A/Prof Delva Shamley

A legacy of Excellence, Innovation, and Dedication

It is with deep gratitude and warmest regards that we bid farewell to **A/Prof Delva Shamley**, whose tenure as Head of the Department of Human Biology at the University of Cape Town has left a lasting legacy of excellence, innovation, and dedicated leadership.

A/Prof Shamley brought to the department a wealth of experience, a strong vision for interdisciplinary research, and a tireless commitment to academic rigor and transformation. Under her guidance, the department experienced significant growth — not only in research output and international collaborations, but also in commitment to diversity, equity, and inclusion. She was instrumental in strengthening the department's focus on translational research, aligning academic inquiry with the health priorities of South Africa and the broader global community.

A/Prof Shamley's leadership style was marked by both intellectual rigour and genuine care for her colleagues and students. She cultivated a culture of collaboration and mentorship, empowering emerging researchers and creating opportunities for academic development across all levels. Her ability to navigate complex challenges with grace, resilience, and strategic foresight inspired confidence and admiration from all who worked alongside her.

Image: UCT FHS HUB supplied.

Though she now moves on from this role, A/Prof Shamley's impact will continue to be felt in the structures she helped shape, the relationships she built, and the many individuals she mentored and inspired. We extend our heartfelt thanks for her unwavering service and dedication. We wish her every success in the next chapter of her career and trust that her contributions to science and leadership will continue to flourish.

UCT-BMERC ACHIEVEMENT

Division of Biomechanical Engineering: ISO 13485:2016 Certification

by **Dr Fleur Warton**

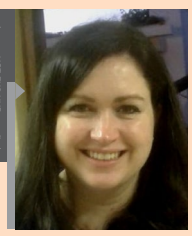


Image: UCT FHS HUB supplied.

UCT-BMERC Receives ISO 13485:2016 Certification

In order for a medical device establishment to manufacture, distribute and wholesale medical devices legally in South Africa, they must receive a medical device establishment license from the South African Health Products Regulatory Authority (SAHPRA).

One of the major requirements for receiving the license from SAHPRA is proof of ISO 13485:2016 certification. ISO 13485:2016 is an international standard that specifies the requirements for a quality management system (QMS) specific to medical devices. It was developed to ensure that consistent design, development, production, installation and delivery of medical devices is safe and effective. A QMS is a structured framework that allows organisations to ensure their products and services consistently meet regulatory and customer requirements.

Prof Sudesh Sivarasu, Director of UCT-BMERC, began this process in 2022. Beginning in February 2025, the system went through a two-stage auditing process for the development and implementation of a QMS specific to UCT-BMERC.

On 28 May 2025, UCT-BMERC received ISO 13485:2016 from JC Auditors CC, a SAHPRA recognised conformity assessment body. The certification was received following a 2-day on-site Stage 2 Audit, during which the auditors conducted a comprehensive evaluation of the implementation and effectiveness of the QMS.

Image: UCT FHS HUB supplied.

Once the Centre has received a medical device establishment license from SAHPRA, they will be able to legally commercialise medical devices in South Africa.

As Sudesh expressed it: *"Achieving ISO 13485:2016 certification marks a monumental milestone on UCT-BMERC's journey to becoming a continental leader in medical device innovation and manufacturing. It is not just a testament to our team's commitment to quality and compliance — it is a bold statement that South Africa, and indeed Africa, is ready to meet global medtech standards head-on."*

HUB SPOTLIGHT: THE CRYPTOLAB

Division of Physiological Sciences: Dr Rachael Dangarembizi

by **Ayesha Hendricks**

Image: UCT FHS HUB supplied

The African Lab at the Forefront of **Cryptococcal Meningitis** Research

Founded during the COVID-19 lockdown in 2020 by neuroscientist **Dr Rachael Dangarembizi**, the CryptoLab is the first lab in Africa devoted to understanding how *Cryptococcus* invades the brain and causes neurological damage.

Images: UCT FHS HUB supplied.

CryptoLab Members (Front row - L to R) Yanga Pato; Lilitha Cengani; Blessing Gumbu; Simran Patel. (Back row - L to R) Amalia Awala; Maahir Kauchali; Dr Rachael Dangarembizi; Masilo Matlakala; Will Newton and Anja de Lange). Members missing from the picture: Nawaal Samodien and Saba Gebreseilassie.

Amid the global crisis of fungal infections and rising antimicrobial resistance, a trailblazing laboratory in South Africa is making strides in one of the world's most neglected yet deadly diseases — **cryptococcal meningitis**, a brain infection caused by the fungus *Cryptococcus*.

Founded during the height of the COVID-19 lockdown in 2020 by neuroscientist **Dr Rachael Dangarembizi**, the CryptoLab is the first lab in Africa devoted to understanding how *Cryptococcus* invades the brain and causes neurological damage. Though research activities officially commenced in 2021, the lab's vision was clear from the beginning: to bridge the critical gap in neuroinfectious disease research on the African continent.

"Cryptococcal meningitis kills hundreds of thousands of people each year, especially in Sub-Saharan Africa where the burden of HIV is highest. Yet, it remains under-researched and under-funded," says Dr Dangarembizi. *"Our lab was born out of urgency — and the belief that local problems demand local solutions driven by excellent science."*

A Multidisciplinary Approach

The stakes are high. *Cryptococcus neoformans* is not only opportunistic, thriving in immunocompromised individuals such as those living with HIV, but it is also notoriously difficult to treat. In 2022, it was placed in the critical priority category of the World Health Organisation's Fungal Priority Pathogen List (WHO-FPPL) in recognition of its lethality and the need for focused global action.

This CryptoLab is one of only a few labs in the world focusing exclusively on the neuropathology of cryptococcal meningitis. The team is especially interested in how the fungus damages the brain, and why antifungal treatment fails in some patients despite clearance of the pathogen from blood or cerebrospinal fluid. *"We realised very early on that we needed to take a multidisciplinary approach, to bring in people from disciplines who can contribute with their diverse skills and expertise,"* says Dr Dangarembizi.

Currently, the CryptoLab comprises 12 core members and collaborates closely with clinicians, medical mycologists, immunologists, bioinformaticians, and infectious disease experts. Beyond its local team, the lab has also become a hub for international researchers, hosting scientists from around the world who are investigating both clinical and fundamental aspects of neurocryptococcosis.

The team leverages a wide range of models and cutting-edge techniques, including mouse and human brain slice cultures, advanced bioimaging and molecular profiling, to uncover how *Cryptococcus* evades immune detection, disrupts brain structure, and triggers lethal inflammation.

A Space to Match the Science

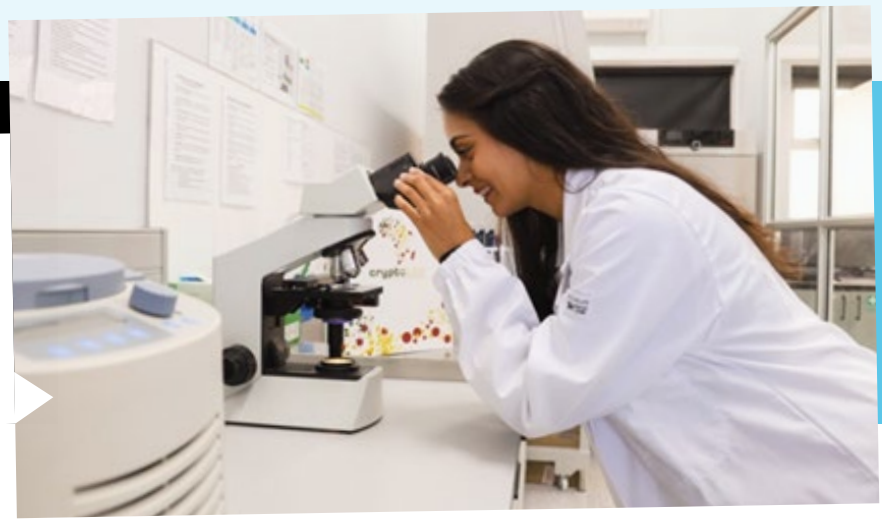
Four years since its founding, the CryptoLab has transitioned from borrowed bench space into a state-of-the-art research facility purpose-built for high-containment fungal and neuroinfectious work. The lab now houses biosafety-level infrastructure and dedicated workspaces for translational and preclinical research. This has enabled the team not only to conduct safe and high-quality experiments, but to remain globally competitive in a field that is often overlooked in major funding calls and scientific discussions.

At the official lab opening meeting held in April, Dr Dangarembizi expressed her profound gratitude to the UK Medical Research Council, Division of Physiological Sciences, Department of Human Biology, and the Neuroscience Institute for the financial support that enabled the CryptoLab to develop the lab facility.

A Vision Rooted in Africa, Impacting the World

As fungal pathogens continue to rise globally — driven by climate change, immunosuppressive therapies, and global health inequities — labs like this one are not just important, they are essential. Africa, bearing the greatest burden of cryptococcal disease, is leading in asking the tough scientific questions: Why do current treatments fail? What drives brain injury in survivors? How can we design more effective, brain-targeted therapies?

Dr Dangarembizi's lab is answering these questions one experiment at a time — and in doing so, is shaping the future of brain infection research on the continent: *"Our goal is not only to do excellent science, but to train the next generation of African scientists who will carry this work forward,"* she says. *"The world is finally waking up to the seriousness of fungal infections. We're already on the frontlines."*



Images: UCT FHS HUB supplied.

by **Alexa Rabeling**

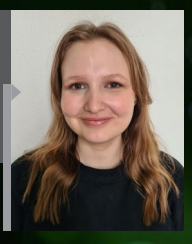


Image: UCT FHS HUB supplied

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Organoids
as a Multitool in Health Research

In health research, we are always looking for new models that we can use to study why disease happens, what its features are, and how we can treat them. These models are broken up into two main groups: pre-clinical models, which are used in the discovery process before testing in people, and clinical models, which include testing findings from pre-clinical research in people by performing clinical trials.

Traditionally, in pre-clinical research, researchers have made use of 2D cell cultures, in which cells of the relevant type are grown in the lab to act as an initial model, after which they move on to studying the disease in animals such as mice, rats and other mammals, which is then followed by human clinical trials if a drug or treatment of interest is identified to help treat the disease. Traditional pre-clinical models, while they have led to important discoveries, are not necessarily the best models to use to understand human disease.

Luckily, researchers have developed new models known as organoids, which are human disease relevant and promise to improve pre-clinical disease studies and reduce animal use in health research.

What are Organoids?

The term ‘organoids’ refers to 3D structures grown in the lab which mimic aspects of a specific organ or biological structure. For instance, you can get brain organoids which resemble the brain in terms of gene expression, protein expression, cell types and some morphological aspects. You can also get liver organoids, kidney organoids…pretty much anything you can think of, as long as you can figure out how to make it.

Organoids are made by taking cells with specific properties and exposing them to different signalling molecules that mimic signals in the developing embryo which form the cell type or organ of interest. Cells used for organoids are generally pluripotent, which means they are similar to some of the earliest cells in the embryo, specifically the inner cell mass of the blastocyst which forms at about 5-6 days after fertilisation in humans and can form any cell type in the body when given the appropriate signals.

Pluripotent cells can be obtained from embryos themselves, which can either be animal embryos or donated human embryos leftover from in vitro fertilisation (IVF) and are known as embryonic stem cells (ESCs). More commonly, human induced pluripotent stem cells (hiPSCs) are used. hiPSCs are generated by taking cells from a skin biopsy and using inactivated viruses to make them express embryonic genes. This causes them to revert to an ESC-like state, requiring no embryos in their generation and thus is used in many labs to generate organoids.

But organoids are not only made from pluripotent cells: in order to study different cancers, some labs make use of patient-derived tumour organoids, in which cells from a patient’s tumour are grown in the lab, then used to make 3D structures known as cancer organoids or cancer spheroids.

The resulting organoids can then be used to answer fundamental questions about a disease such as: what are the key features of this disease on a cellular level? How do things change when we use a certain drug? And, of course, what is the mechanism through which a drug exerts its effects?

Organoids in Drug Testing

Since organoids can be generated from pluripotent cells obtained from either animals or humans, we can determine whether species-specific drug responses are maintained in organoid cultures. This is essential in health research, as it is known the drug responses in animals such as mice are not always predictive of how humans will respond to the same drugs.

Perhaps one of the most famous stories of animal models not adequately predicting human responses is that of thalidomide.

Thalidomide was a drug marketed to pregnant women in the late 1950s to early 1960s to treat morning sickness. However, severe birth defects caused by the drug were noticed in the 1960s and it was taken off the market, but not before affecting at least 10 000 children. The reason that thalidomide was approved for use in some countries was because it was not found to cause adverse reactions in animals. Even after the discovery that thalidomide may be teratogenic, tests on pregnant mice and rats were inconclusive

by **Ayesha Hendricks**

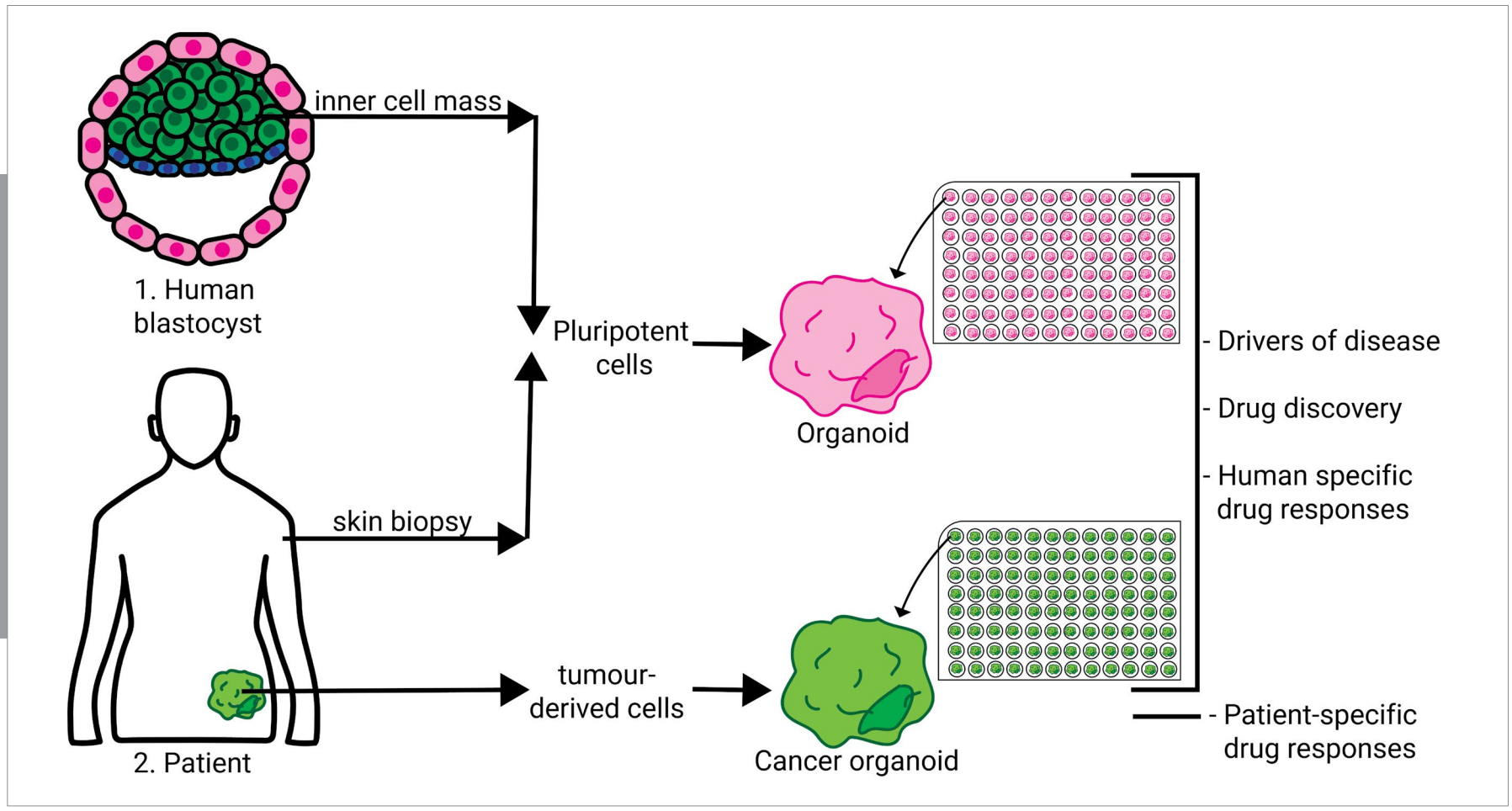


Illustration: UCT FHS HUB supplied.

as they did not always cause birth defects in offspring. This shows there are important species-specific differences in how rodents and humans respond to this drug.

Researchers in the lab of Naomi Moris (University of Cambridge) decided to test whether organoids would also show these species-specific differences. They tested the effects of thalidomide on gastruloids, organoids which mimic the early embryo, and found thalidomide caused growth defects and gene expression effects in human gastruloids at the lowest concentration tested, while mouse gastruloids only showed some effects on gene expression at the highest concentration. This is an essential study which highlights the use of organoids to identify species-specific differences in drug responses and shows how important it is to use human organoids in these studies.

Organoids as Tools for Personalised Medicine

Beyond their use in discovering species-specific differences in drug responses, organoids can be used to determine how individuals themselves would respond to the same drugs. This is an important consideration in the treatment of many diseases, as a person's genetic background and individual manifestation of a disease can affect how they metabolise a drug and how well it works to treat their symptoms or cure their disease. Researchers can thus use organoids made from a patient's own cells to test how they respond to a panel of drugs, and thus what drug or combination of drugs to use to treat the patient. This approach, known as personalised medicine, can help to increase the effectiveness of treatments while reducing negative side-effects to drugs.

Cancer organoids have in fact already shown promise in personalised medicine. Patient-derived cancer organoids can recapitulate their parent tumour's genetic and epigenetic alterations, making them a good predictive model of patient response. A review by Shiihara and Furukawa (Tokyo University Graduate School of Medicine) published in 2022 summarises studies in which cancer organoids have been used to test patient responses to chemotherapeutic drugs, radiation and combinations of both.

There were several studies mentioned in which organoid responses correctly predicted patient responses. One such study by Jiang *et al* (Tsinghua University) formed organoids from 21 patient tumours of various types and tested 29 first-line chemotherapeutic drugs, as well as 2 targeted therapies, on these organoids. They found that organoid responses predicted patient responses to these chemotherapeutic drugs with 81% accuracy and 78% sensitivity. Based on the promise of cancer organoids to predict patient responses from this and many other studies, there are currently clinical trials in place to further the use of organoids in clinical practice. One day, this may mean that drug and radiotherapy regimens will be fully personalised to individual patients based on organoid responses, which should increase the efficacy and success of cancer treatments.

Organoids as Ideal Health Research Tools in a South African Context

Organoids have a number of key benefits that make them suitable for disease studies.

Firstly, they are 3D and so recapitulate cell-cell interactions as they happen in the body. For this reason, they behave similarly to cells in the body in terms of how they interact with each other and respond to their environment. This is an improvement on 2D cellular models, in which cells are grown flat on a plastic surface and so have limited interactions with each other.

Secondly, you can make 100s or even 1000s of organoids for each experiment. This increases the statistical power of experiments and allows researchers to test the reproducibility of an experiment or observation. Additionally, it means that one can perform many different tests in each study done on organoids.

Another important advantage of organoids over animal models is that they are much quicker to grow and thus more conditions and/or drugs can be tested in a shorter time frame.

Because of these attributes, organoids can be much cheaper to produce and use for disease studies and drug testing than animal models. Beyond this, they also have increased predictive power for human drug responses as discussed above. These attributes make organoids an ideal research tool for under-resourced or resource constrained areas, like South Africa. Since our budgets for research tend to be smaller than those in the USA and the global north, the ability to use organoids to augment our research can revolutionise our ability to do preclinical research such as drug discovery and drug testing. This is also in line with the Food and Drug Administration's (FDA's) recent plan to phase out animal testing in preclinical research in favour of approaches like organoids. This gives us as South African researchers a unique opportunity to further our techniques in this area and to contribute even more to health research on a global scale.

HUB PROFILE

Meet **Dr Adhil Bhagwandin**: Senior Lecturer, Division of Clinical Anatomy & Biological Anthropology

by **Megan Petersen**

Image: UCT FHS HUB supplied.

How do brains get to be the way they are?

Academic Background and Research Motivation

Driven by a fascination with animals and their brain structures, Dr Adhil Bhagwandin, Senior Lecturer in the Division of Clinical Anatomy and Biological Anthropology (CABA) says his academic journey began with a BSc in Human Biology at the University of Witwatersrand, majoring in comparative Anatomy and Physiology. This foundation led him to pursue an honours degree in Human Biology, followed by a Master's in Neuroscience, where he studied sleep patterns in mole rats. The success of this project allowed him to upgrade his Master's to a PhD, effectively completing both in just four years.

During his PhD, he gained extensive experience in laboratory techniques, from immunohistochemical analyses to varying sleep experiments. During his PhD, Dr Bhagwandin also had the unique opportunity to travel internationally, spending three weeks at the University of California, Los Angeles (UCLA) for quantitative stereological experiments, and six weeks in Russia learning to work with Northern fur seals. These experiences were pivotal in shaping his subsequent postdoctoral research at UCLA, where he continued investigating sleep behaviour and the neurotranmitters released during the sleep-wake cycle in the Northern fur seal, under a long-standing research agreement between UCLA and Moscow State University.

His research has always been rooted in evolutionary sciences, questioning whether traditional laboratory model animals, such as rats and mice, are the best models for understanding human brain diseases. With millions of years of evolutionary divergence between humans and rodents, Dr Bhagwandin advocates for diversifying the understanding of brain structures by investigating the brains of various vertebrate species.

Current Research and Challenges

Today, his focus is on the glymphatic system, a recently identified waste-clearing mechanism in brains that operates maximally during sleep. This research integrates his past work on sleep patterns and comparative neuroanatomy, offering exciting possibilities for potentially understanding neurodegenerative diseases.

However, establishing a research group at the University of Cape Town has been challenging due to limited funding for comparative research. Despite these hurdles, he continues to collaborate internationally, with established connections at UCLA, Oxford University, Moscow State University and State University of Rio Grande do Norte. He recently received an invitation to be a visiting Professor in Brazil - a testament to the global recognition of his work.

Awards and Recognition

- NRF Research Career Award (2014-2018): A prestigious early-career grant providing salary and research funding.
- Competitive Support for Unrated Researchers Grant (2015-2017): R 1.4 million award supporting postdoctoral research.

Beyond the Lab

Image: UCT FHS HUB supplied.

Since science and academics can be quite demanding, he actively advocates for a healthy work-life balance. Dr Bhagwandin plays competitive tennis for Wynberg Lawn Tennis Club in Cape Town, and his favourite tennis player is Carlos Alcaraz. He also enjoys an occasional round of golf, a game of padel, remains active at the gym, and enjoys a good book, whether fiction or non-fiction.

Looking Ahead

Dr Bhagwandin's mission remains clear: "How did brains get to be the way they are?" While funding obstacles persist, his passion for discovery drives him forward, whether in Cape Town, Brazil, or beyond.

DIVISION OF PHYSIOLOGICAL SCIENCES: ACHIEVEMENTS & AWARDS

NRF Ratings, Grants, Scholarships, Publications, Conference Presentations, Inventions, Achievements & Awards

Please send any recent achievements, awards, NRF ratings or the like that you would like published in the next issue of the HUB CONNEXION newsletter to your Divisional Comms Reps. We love to celebrate the achievements of the HUB family!

ACHIEVEMENTS

Image: UCT FHS.

Dr Sharief Hendricks (left) was awarded the Stellenbosch Institute for Advanced Study (STIAS) Senior Fellowship (2025).

The STIAS invests in experts who work across disciplinary borders to tackle issues ranging from health equity to complexity theory, the effects of race to quantum information. In this age of tumultuous change, the development of a long-term view and a critical mass of expertise on a broad range of issues is crucial to the well-being of future generations. Sharief's project is *A two-prong approach – preventing head injury in rugby through law changes and effective tackle training*.

Sharief and his team were awarded the SASCOC Paris 2024 Performance Review Project again. This project analyses the performance of South African Olympic and Paralympic athletes at the 2024 Paris Games.

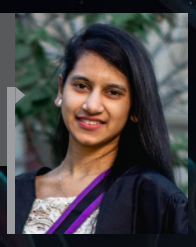
A study by Demi Davidow and our research group published in the European Journal of Sport Science *"Video-based technical feedback and instruction improves tackling technique of community rugby union players"* received the top cited award for 2023-2024.

Update from A/Prof Dale Rae: Pip Forshaw has been awarded her PhD in Physiology: *Towards an understanding of the relationship between sleep and cardiovascular disease risk in adults of African descent living in a low socioeconomic status community.*
(Supervisors: Dale Rae, Laura Roden, and Vicki Lambert).
Pip will graduate in September! Congratulations!

METABOLIC PATHWAYS IN CANCER CELLS

Division of Cell Biology: Balanced Equations & Living Cells

by **Nirvashi Autar**



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Bridging the Gap between Disciplines: A Tale of Pipettes, Panic and Perspective

I am a chemist — comfortable among flasks, reaction schemes, and the sweet certainty of stoichiometry. My idea of a successful day involved controlled reactions, clean spectra, and maybe a splash of caffeine. I believed in precision, repeatability, and the beauty of a balanced equation. Biology? That was the chaotic cousin. Messy. Squishy. Too alive. And yet, here I was surrounded by incubators, pipettes, and living cells that refused to behave.

It started with curiosity. My supervisor mentioned a project on metabolic pathways in cancer cells — something that involved tracking small molecules, looking how my synthesised drug worked. It sounded like chemistry. So. I signed up. But I quickly learned that knowing how to make a buffer doesn't mean you know what to do with it once you're staring at a plate of human cells. The first time I was in a tissue culture lab, the overwhelming smell of ethanol, the very sterile environment, definitely not something I was used to when synthesising those drugs. When I started handling my cells, I treated them like an organic compound — roughly shook the flask, aspirated too aggressively, and watched helplessly as the delicate monolayer I was supposed to preserve vanished like a bad reaction yield. I stared into the microscope, horrified. The cells were gone. Probably dead. Definitely angry. My mentor patted my back. "You'll get the hang of it," he said kindly. I was convinced I wouldn't.

What saved me wasn't just persistence — it was a shift in perspective. Slowly, I began to understand that cells are systems, not samples. They don't follow your logic — they follow biology's. There are no neat arrows or precise molar ratios. There is messiness. But there is also elegance. When I finally got my first set of results, I felt the same thrill I used to get from solving a complex synthesis. And more importantly, I began to see how my chemistry training gave me a unique lens. Understanding the molecular basis behind reactions helped me troubleshoot biological protocols, and there I was, falling for biology. I loved watching cells respond to treatments, realizing that behind every blurry nucleus was a story - of stress, adaptation, survival. I started asking questions that chemistry alone couldn't answer. What genes are turning on? What's happening inside the mitochondria? Why do some cells survive when others don't? I learned to accept variability. To respect it. To expect it. And more importantly, I learned to appreciate the messiness as a kind of truth - not a flaw, but a feature of life.

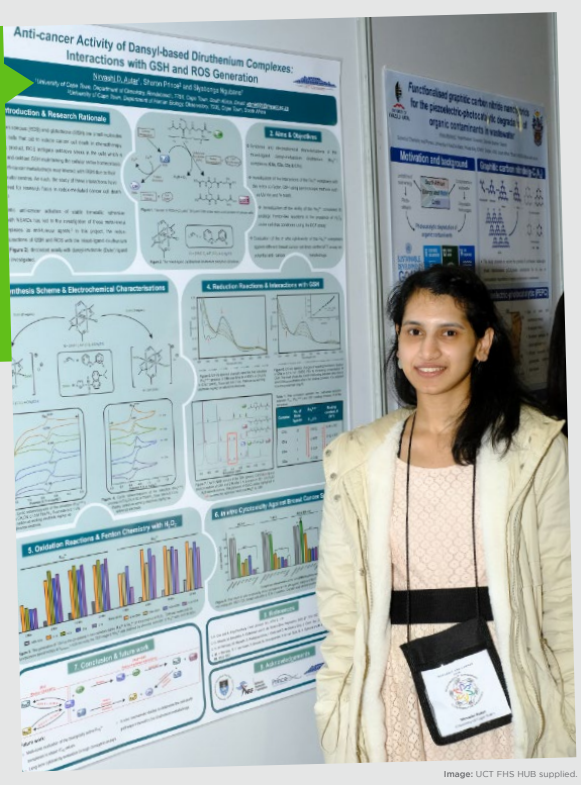


Image: UCT FHS HUB supplied.

My work that initially started as a drug design chemistry project, crafting and modifying metal-based drugs, transitioned into a new area of research. Now, the aim was not just to find molecules that "kill cells," but to design compounds that selectively target *oncogenic proteins* or *aberrant signalling pathways* unique to cancer. But it is not as easy as it sounds! Hence, the cell biology lab is where my chemical creations met their real test, this is where I could take it to one step further, from molecules to mechanisms. This exemplifies the evolving nature of modern science: interdisciplinary, collaborative, and deeply integrated. Chemistry isn't confined to a fume hood, and biology isn't limited to petri dishes. In the shared space of a cancer cell biology lab, the two fields intersect - and it's in that intersection that some of the most promising therapies are born.

Image: UCT FHS HUB supplied.

Now, I'm not just a chemist in a cell biology lab. I'm something in-between. A hybrid. And honestly, I wouldn't want it any other way. Sure, I still miss the clean lines of reaction mechanisms and the comforting hum of the rotary evaporator. But there's something exhilarating about working with living systems — about not knowing exactly what's going to happen and chasing the answer anyway.

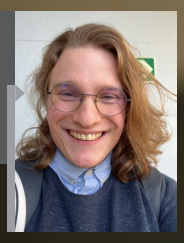
So here it is, my full confession: I walked into the cell biology lab thinking I was just visiting. I never expected to stay. But now that I'm here? I don't think I'm leaving anytime soon.

Moral of the story: It's okay to feel like an outsider when you're crossing disciplines. In fact, that outsider perspective might be the very thing that leads to discovery. So, whether you're a chemist in a biology lab — or a biologist in a physics lab — don't be afraid to confess your confusion. That's often where the learning starts. I represent just one of many examples of this growing trend in biomedical research: chemists stepping into traditionally biological spaces to drive innovation from a molecular level. The boundary between disciplines isn't a divide — it's a place of opportunity. It reflects a new era of drug discovery, one where molecules are designed not just with science, but with precision, purpose, and patients in mind.

FOLDSCOPES

Division of Cell Biology: Citizen Science

by **August Herbert** & **Sahar Jamal**



Images: UCT FHS HUB supplied

A Revolution in Citizen Science: Unleashing Microscopy for All Curious Minds

Image: UCT FHS HUB supplied

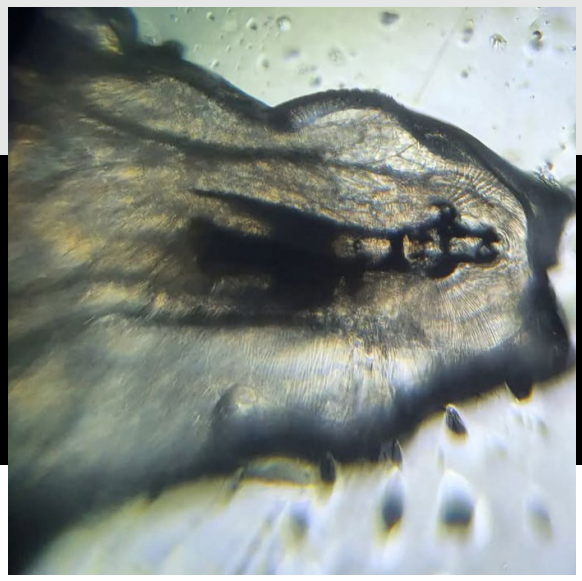
The earliest known references to the practice of microscopy can be traced back to ancient China nearly 4,000 years ago. In order to achieve varying degrees of magnification, scholars filled glass tubes or spheres with precise amounts of water. However, over time, as microscopes have become more refined and sophisticated, their use has been increasingly restricted for only a select few academics.

In 2010, researchers Manu Prakash and Jim Cybulski developed the first prototype of an affordable and accessible microscope, one which would be available for anyone to use, both within and outside of academic or research institutions. Motivated by their dissatisfaction in the quality of standard microscopes found at remote field stations, Cybulski came up with the idea of the Foldscope, a portable microscope constructed out of an inexpensive and durable synthetic paper.

In 2015, the two founded Foldscope Instruments with the goal of producing and deploying their novel invention. To-date, the company has distributed over two million Foldscopes to students across 135 countries and has received multiple awards and grants. In addition, they host an online forum known as Microcosmos, where users can share blog posts detailing the discoveries made with the Foldscope. Over the years, a bustling global community has emerged, fostering limitless opportunities for exploration and learning.

People from around the world have been provided the opportunity to uncover the microscopic. A love for biology is cultivated from a young age, where a strong curiosity is sculpted. At the end of the day, science should be democratised for the benefit of all, where regardless of where someone lives, who someone is, or what resources are available to them, they should be given the opportunity to investigate and discover. Inventions like the Foldscope work towards that ultimate goal: educators are given the greater means to teach, and students are gifted the ability to learn. The world (both micro and macroscopic) can be beautiful, and everyone should be able to experience that.

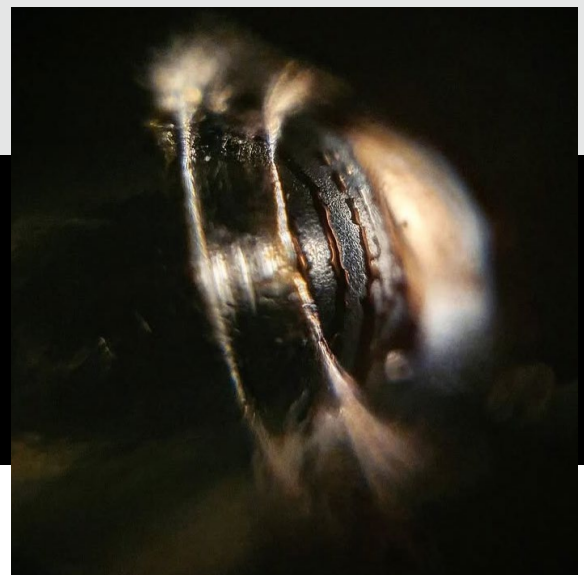
The fundament of the scientific practice is observation. Alexandra Horowitz, in her book On Looking, says "*There is a certain bias in everyone's perspective that has been named, by the French,*



Images: UCT FHS HUB supplied.

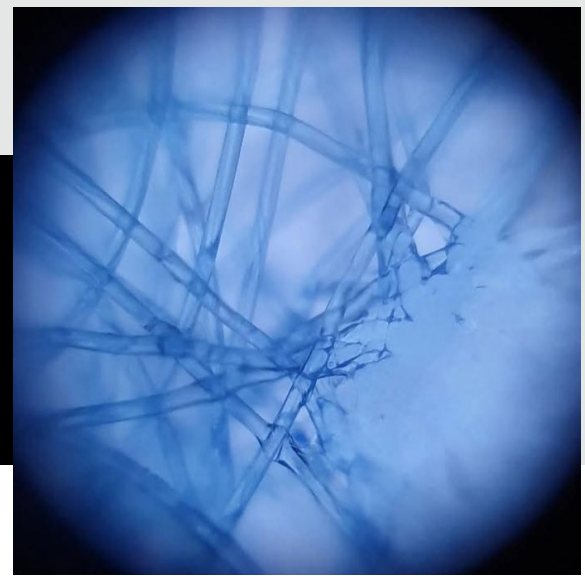
Above: Head of a maggot.

"Beginning to think is beginning to be undermined. Society has but little connection with such beginnings. The worm is in man's heart. That is where it must be sought. One must follow and understand this fatal game that leads from lucidity in the face of existence to flight from light."
Albert Camus



Above: Tip of a ballpoint pen.

"Any reaction to stimulus may be causally explained; but the creative act, which is the absolute antithesis of mere reaction, will forever elude the human understanding. It can only be described in its manifestations; it can be obscurely sensed but never wholly grasped."
Carl Jung



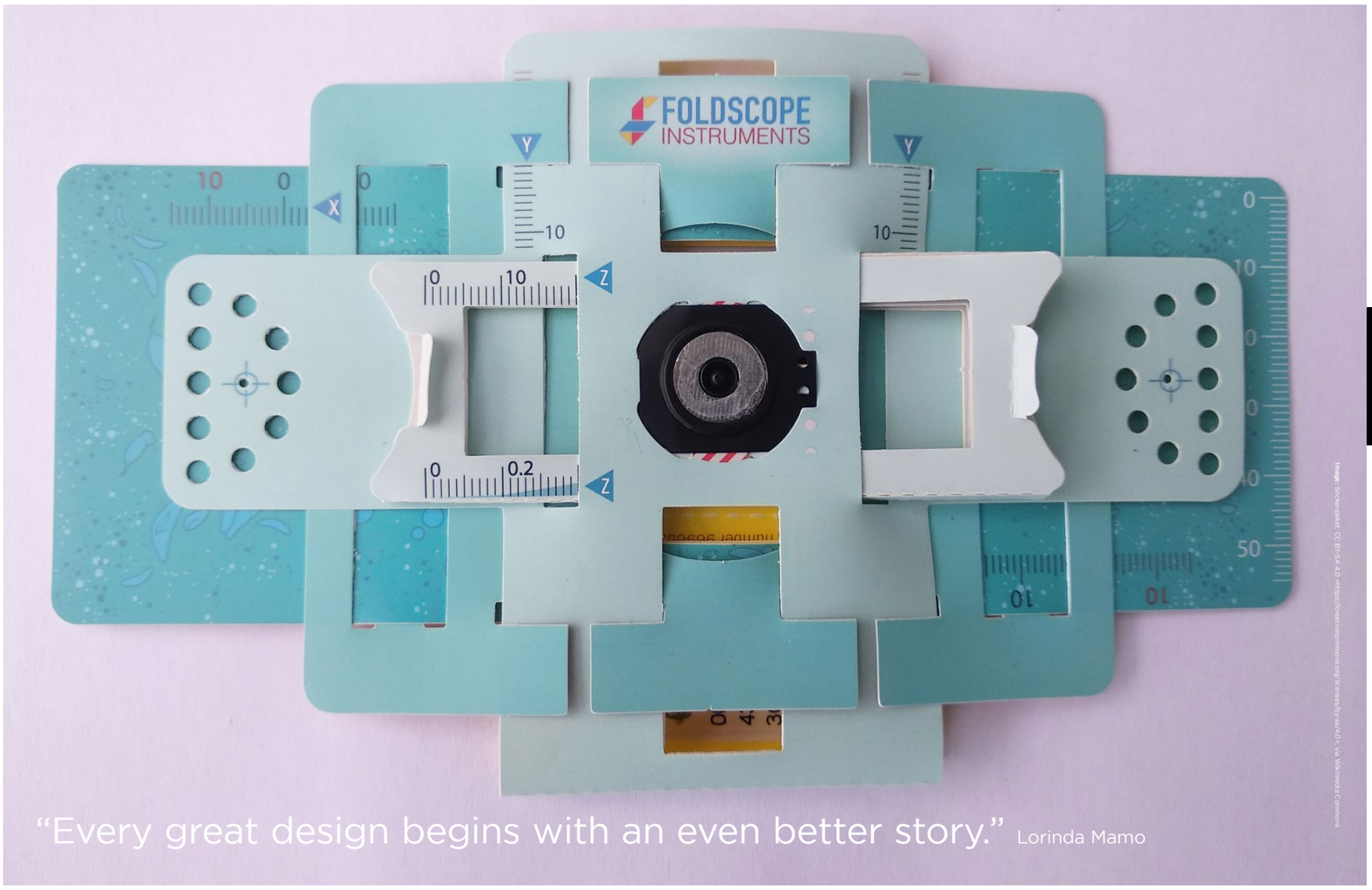
Above: Surgical facemask.

"He knows he is incommunicable: he finds it tasteless to be familiar...When not speaking to himself, he wears a mask. There is a solitude within him that is inaccessible to praise or blame."
Friedrich Nietzsche

FOLDSCOPES

Division of Cell Biology: Citizen Science

by **August Herbert** & **Sahar Jamal**



"Every great design begins with an even better story." Lorinda Mamo

***déformation professionnelle**: the tendency to look at every context from the point of view of one's profession."* Observation is a basic human experience and sharing observations is an integral aspect to human evolution.

The Foldscope tool may be used to observe hundreds of things. Sahar Jamal, a member of the Hockman lab, was the July Foldscoper of the Month in 2021 as a result of being the most active user within the Microcosmos community. In addition, they share their posts on Instagram, on the account @scopes_and_quotes. In their view, although each post is an image, each image may be considered an insight. Each post is paired with a carefully curated excerpt of literature; in this way, there is an attempt to share an experience. Hence, the Foldscope may be instrumental in fostering interdisciplinary communication, particularly between the sciences and the humanities.

The Foldscope can act as a gateway to the appreciation of the world around us, a way to look without and within. The act of observation may be considered an existential practice, and the Foldscope tool enables us to transcend boundaries of perception. The scientific process is an act of expanding on ideas. Each image captured with the Foldscope can act as a spark to be built upon and bridged into other worlds. In October 2021, Sahar hosted an exhibition of their artworks, facilitating the experience for the local community.

The Foldscope can shed light on aspects of physical health as well, for example the observation of mold on food and the consistency of blood. During the Covid pandemic, they observed facemasks and noted the "holes" within. To them, the most fascinating observation was water: all the creatures that could be found in a pond. In essence, the capacity for observation is endless and interpretation boundless. The act of sharing these observations is not only powerful, but transformative.

Monty Python questioned the meaning of life, with the lyrics:
"For millions this life is a sad vale of tears
Sitting round with rien - nothing to say
While scientists say we're just simply spiralling coils
Of self-replicating DNA."

Citizen science can foster the demystification of the scientific practice. In the Hitchhiker's Guide to the Galaxy, supercomputer Deep Thought's answer to the question ***"what is the meaning of life?"*** is "42". In the most basic computer software language ASCII, "42" is the designation for an asterisk, which means ***"anything you want it to be"***.

Above & Left: Sahar Jamal's foldscope exhibition, 2021.

Images: UCT FHS HUB supplied.

Image: UCT FHS HUB supplied.

Meet **Dr Fredirick Mashili**: A/Prof, Division of Physiological Sciences

I am originally from Dar es Salaam, Tanzania, and my academic journey began at Muhimbili University of Health and Allied Sciences (MUHAS), where I spent nearly two decades progressing from a tutorial assistant to a senior academic and researcher. During my time there, I led several initiatives, including the development of a master's programme in Applied Medical and Exercise Physiology and the establishment of a Human Body Composition and Exercise Physiology Laboratory. My background spans both clinical and public health contexts, with a focus on non-communicable disease prevention through physical activity, metabolic health, and early detection strategies.

My research interests are deeply rooted in exploring how we can make health-promoting behaviours like physical activity more feasible and accessible to communities — and how we can detect chronic diseases earlier, when lifestyle interventions really matter. I am particularly passionate about translating scientific knowledge into cost-effective, real-world solutions — especially in low-resource settings. At UCT's Health through Physical Activity, Lifestyle, and Sport (HPALS) Centre, I contribute to projects that bridge physiological science, public health implementation, and policy.

My path to UCT began more than six years ago, motivated by a desire to find an institution that could bring all my academic passions under one roof: physiology, physical activity/exercise science, teaching, research, and a vibrant network of like-minded colleagues. That journey led me to connect with Professor Vicki Lambert, whose mentorship and support helped nurture what has become an immensely fulfilling collaboration.

Today, I am proud to be part of Africa's leading university — working alongside brilliant scholars in a dynamic environment.

What has always stood out in my career is a deep appreciation for diversity — academic, professional, and socio-cultural. This value was seeded early: my father is from the Lake Victoria zone and my mother from the Kilimanjaro region, home to Africa's highest peak. Though I settled in Dar es Salaam along the coast, growing up in a household shaped by two distinct cultures taught me to value difference and connection.

Over the years, I've worked with multidisciplinary teams across countries and continents, and immersed myself in the research cultures of Africa, Scandinavia, America and beyond. My work has spanned the continuum of basic science, clinical application, and public health implementation — each informing the other and enriching my approach. I speak and understand Sukuma, Chagga, Swahili, English — and a little Swedish — each language representing a thread in my personal and professional signature. I've learned to value the growth that comes from breaking out of one's comfort zone and working across boundaries. UCT's rich diversity has made it an ideal place for that kind of growth.

Outside of academia, I'm deeply committed to practicing what I teach. I enjoy weightlifting and writing about muscle physiology and strength training in a way that blends science with lived experience. I also have a creative side — drawing popular science writing and graphic design — which I use to communicate complex physiological ideas in visual, relatable formats. I believe that applying scientific insights in our own lives not only keeps us grounded but also enhances the way we engage with communities. Sharing what works for me (always evidence-based!) has become part of how I connect with others.

And if you ever catch me outside the classroom or lab, I might be perfecting my espresso shot, sketching something for my next community health infographic — or simply navigating the joyful chaos of fatherhood with a house full of ONLY BOYS."

Image: UCT FHS HUB supplied.

Meet **Dr Elizma Atterbury**: Lecturer, Biokinetics Programme, Division of Physiological Sciences

I've always been fascinated by movement, the human body, and humans themselves — how we think, feel, function, and adapt. After completing my Sport Science degree and qualifying as a biokineticist, I found joy in helping people move and feel better. But it was during my master's research on Parkinson's disease that my path shifted: a personal experience introduced me to TRE (Trauma and Tension Releasing Exercises), I began to understand — not just intellectually, but viscerally — how deeply stress and trauma affect the body and brain. This led to my PhD exploring the therapeutic potential of tremor-based interventions for individuals with Parkinson's disease — and I've been asking questions ever since about its broader applications in clinical and performance settings.

Today, I'm thrilled to be part of the Biokinetics programme in a full-time academic role. As a clinical exercise physiologist at heart, this space allows me to explore the questions that energise me — around motor control and learning, stress physiology, and how mind-body coherence can be applied practically from rehab to performance. And how to translate theory into practice while facilitating deep learning in students. I love bringing a practical, client-centred angle into the classroom and shaping students into thoughtful, resilient professionals who understand that their own well-being is foundational to the care they provide. I believe movement is inherently transformative, and I aim to nurture that insight in students while helping them ground their practice in strong evidence and curiosity. I'm always looking to bring innovative methods into the classroom, while staying flexible and real in a changing educational environment.

Outside of work, I love spending quality time with the people I care about. I'm happiest when I'm discovering something new — a gravel road, a tiny town, a wild thought, a piece of art, a state of mind — and especially when I get to share that experience with others. I think having a curious mind and a compassionate heart is a pretty good place to start — in research, in teaching, and in life.

Image: UCT FHS HUB supplied.

Meet **Dr Kyle Paulssen**: Lecturer in Anatomy, Medical Doctor & Creative Communicator

I'm excited to have joined the Department of Human Biology as a Lecturer in Anatomy earlier this year. Although I'm technically new to the staff team, this department has been part of my journey for a much longer time — as you'll discover in this profile! As both a medical doctor and anatomist, I'm passionate about bringing together clinical insight and academic curiosity — whether in the classroom, the lab, or the wider community — and I'm looking forward to contributing my experiences to our vibrant and diverse department.

A little about my background: I am originally Dutch, was born in Amsterdam in the Netherlands but brought up in the very south of that country — the 'city' of Oss (85 000 people) in a semi-rural area known for its industria of both food products, specifically meat, and medicines. Two big international companies you may know started off with factories in Oss: UniLever, producer of margarines and other foodstuffs, and AkzoNobel, producer of paints such as Dulux. A big pharmaceutical factory called Organon in Oss was instrumental in developing the combined oral contraceptive as we know it today and was the first company to produce and promote insulin (derived from the offal from the meat industry) in Europe. The people from this region are generally known for being warm and open — and we speak with a 'soft G', unlike people from the north of the Netherlands (or Afrikaans speakers!).

In 2008, my parents decided to seek a new challenge — and better weather — and made the courageous decision to uproot our family to South Africa. I had just finished high school and was fortunate to begin my studies at UCT. I've always been drawn to health and science — no doubt influenced by my mother, a nurse whose stories about her patients always intrigued me.

I started my academic journey with a BSc in Human Biosciences, majoring in physiology and psychology. Although this programme is no longer offered, it instilled in me a deep appreciation for viewing the human body holistically. My passion grew during my Honours in Applied Anatomy in this very department, where I came to value learning anatomy in three dimensions — something that truly came alive through hands-on dissection — and inspired me to realise the foundational purpose of anatomy in understanding human health and disease.

During my MSc and in the years that followed, I became deeply involved in passing on my experiences through teaching, demonstrating, supervising, and mentoring students across medical, allied health, and science programmes. I've always enjoyed being part of a student's "aha" moment — whether guiding a research project, building anatomical models together, or simply working through a difficult concept one-on-one.

My own research interest became focused on the fascia-nating world of fascia: the connective tissue that holds and links everything together: from skin to organ, to muscle and bone; yet often receives little attention in traditional anatomy curricula. Recent studies have shown that the fasciae play an important role in a variety of pathology (with, for example, links to cancer), in tissue healing, in proprioception, and even in pain processing. Appreciating the tissue network better also has allowed for a more thorough understanding of how it facilitates movement: from coordinating muscle contractions through close relations with the nervous system on a macro-level, to being able to stiffen tissues 'on demand' on a micro-level.

My Honours research — using histology, dissection, and ultrasound imaging to explore post-surgical scar (fascial) tissue in a breast cancer treated patient — evolved into a clinical MSc project focused on patients with axillary web syndrome. This condition involves painful, restrictive fascial bands that impact shoulder functioning following breast cancer treatment. It was deeply rewarding work, combining imaging and real-world clinical impact, demonstrating how we could improve patient care by advancing applied research. These experiences made me an advocate for bringing fascia into the spotlight — both in teaching and research. I've delivered workshops and talks on the topic, and I remain committed to helping our students see the human body not just as a set of isolated systems, but as a dynamic, interconnected whole.

It was during my MSc, working closely with patients, that I felt the pull to medicine. I wanted to deepen my understanding of how anatomy applies in real-world healthcare. So I completed my MBChB at UCT, followed by internship in George and Mossel Bay, and community service in Paarl. These were rich and challenging experiences, working in under-resourced communities where clarity, empathy, and relevance were crucial — not only in care but in communication. Whether explaining a diagnosis to a patient or a complex structure to a student, I've learned that the goal is often the same: to make the information land in a way that's kind, understandable, and useful.

This aspect of medicine — translating knowledge into meaningful communication — reignited my passion for basic science and education. When the opportunity arose to return to the department as a lecturer, it felt like a natural next step. I've been in this role for almost six months now and am thoroughly enjoying it.

Outside of work, I try to maintain a good mental health balance by staying active and creative. I'm an avid trail runner and part of the Tuesday Trails group. I am also very involved in music. I volunteer as a classical music presenter on Fine Music Radio, the classical and jazz music radio station in town, and co-manage a 35-voice choral ensemble called VOX Cape Town, which my partner and I run together. I sing in the group and serve as its 'imagineer' — overseeing everything from poster design to audiovisual direction for our concerts. We aim to create immersive musical experiences that introduce audiences to new repertoire they would otherwise not ordinarily hear in Cape Town. If you see a poster or flyer around campus, there's a good chance I put it there!

I'd like to end by thanking my colleagues in the division for the warm and kind welcome I've received. I look forward to many collaborations and conversations in the months (and hopefully years) ahead.

50TH ASSA ANNUAL CONFERENCE

Division of Clinical Anatomy & Biological Anthropology Presentations

by **Megan Petersen**

Image: UCT FHS HUB supplied.

ANATOMY INTELLIGENCE

50th Annual Conference of the Anatomical Society of Southern Africa

The Anatomical Society of Southern Africa (ASSA) marked a significant milestone in 2025, celebrating its 50th anniversary with its first in-person conference since the start of the COVID-19 pandemic. Hosted by the Department of Anatomical Sciences, University of the Witwatersrand, the four-day event took place in the picturesque Glenburn Spa and Lodge in Muldersdrift, Johannesburg, and brought together anatomy professionals, researchers, and students from across the country.

The conference began on Sunday, 6 April, with a series of dynamic workshops followed by three themed days focusing on Biological Anthropology (Monday), Traditional Anatomy (Tuesday), and Medical Education (Wednesday). The event provided a platform for sharing research, promoting collaboration, and advancing anatomical sciences in Southern Africa.

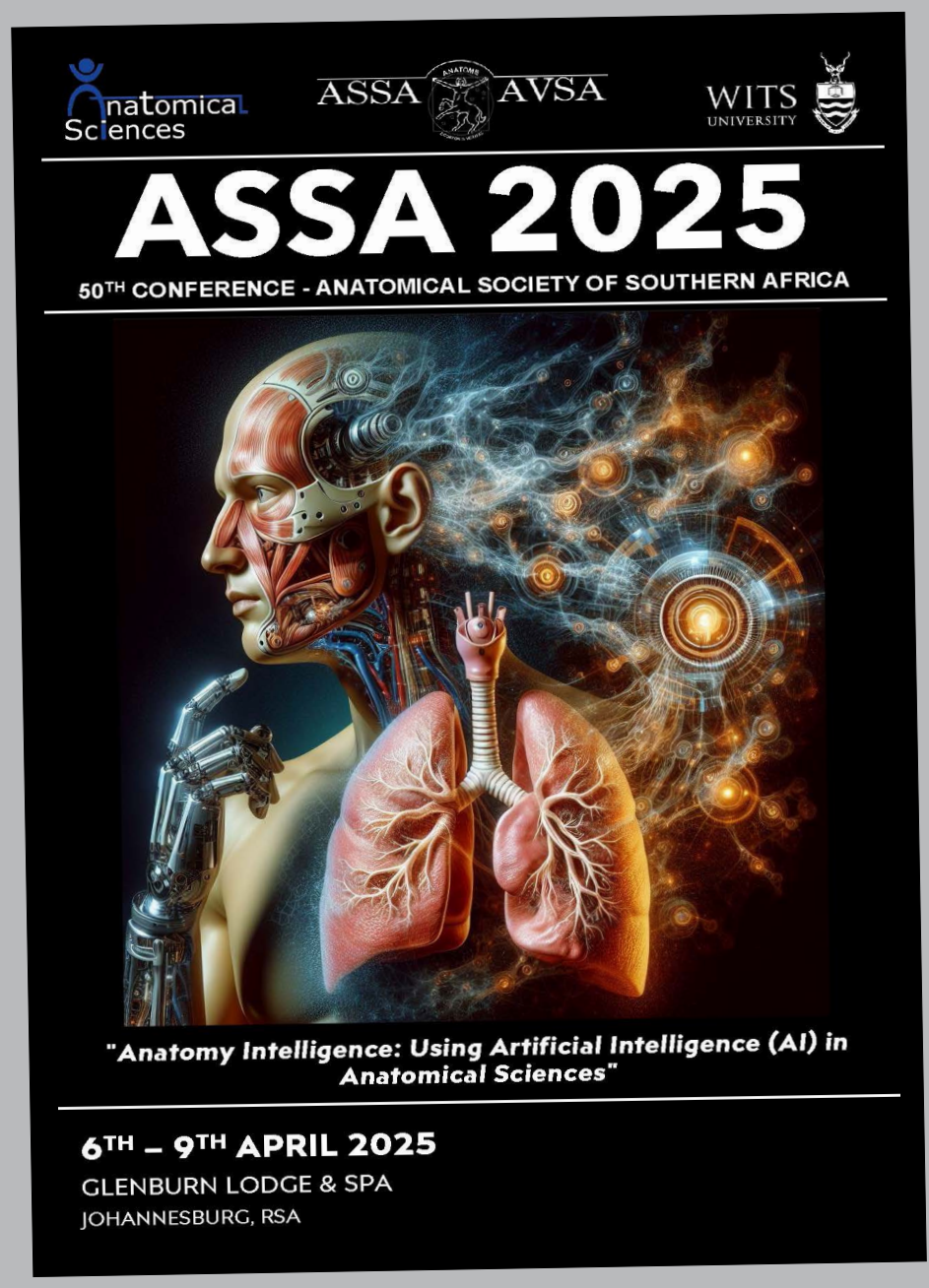
The University of Cape Town's Division of Clinical Anatomy and Biological Anthropology (CABA) was well represented, with members presenting research across all three themes. Among the highlights was PhD student **Kirsten Synckers** who won the ***Willie Voster Award*** for best poster presentation by a first-time presenter. Her poster was titled *"Identifying and Documenting the Effects of the Forensically Relevant Cape Grey Mongoose on Skeletal Tissue".*

PhD student **Lucky Udulu** delivered an oral presentation on the *"Development and Validation of Three-Dimensional Geometric (GM) and Metric Morphometrics (MM) for Sex Estimation from the Tali of a South African Sample".*

Mbali Madolo, a PhD student in CABA, presented findings from her Master's research, adding valuable insights into the field of Clinical Anatomy. The title of her oral presentation was *"An Angiographic Study on the Morphometry of the Anterior Communicating Artery Complex - A South African Sample"*.

MSc students **Phiwe Mfengu**, **Lutho Daza** and **Noku-Lunga Ndima** also impressed attendees with their respective poster presentations titled *"Bioarcheology of Care: A Case Study of Antemortem Skeletal Trauma in a Pre-Colonial Southern African Hunter-Gatherer/Herder (sAHGH),"* and *"An Anatomical Study of the Ulnar Nerve within the Ulnar Tunnel and Hand".*

Colleagues **Megan Petersen** and **Jeshika Luckrajh** showcased some research they have been involved with through poster presentations that explored "*Morphological Variation of Fissures, Lobes, and Hilar Pattern of the Lung in a South African Sample"* and *"Unilateral elongated styloid process: a case report".*



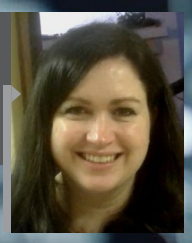
Poster: wits.ac.za/events-archive/2025/50th-conference-and-annual-general-meeting-of-the-anatomical-society-of-southern-africa.php

Rounding off the contributions was **Dr Kentse Mpolokeng**, whose presentation on *"Chalkboard Schematic Drawings in Anatomy Education: Enhancing Medical Student Learning During Dissection"* captured the various ways students learn anatomy during practical sessions.

Images credit: UCT FHS HUB supplied.

Images: UCT FHS HUB supplied.

by **Dr Fleur Warton**



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Treatment for **FASD**?
A Clinical Trial of Choline

Fetal alcohol spectrum disorders (FASD) result from prenatal exposure to alcohol and are the most common preventable form of neurocognitive deficits around the world. The most severe form of FASD is fetal alcohol syndrome (FAS), which is characterised by hallmark facial features, growth impairment and neurocognitive dysfunction. Although not all individuals with prenatal alcohol exposure will be affected this severely, milder conditions on the spectrum are still associated with significant challenges. South Africa has one of the highest rates of FASD in the world, with the incidence in some high-risk communities estimated at over 11%.

Although it's widely understood that alcohol is harmful to the developing fetus, and various psychosocial interventions have been implemented to educate communities about this, these have not always been successful in reducing heavy drinking. As a result, there is strong interest in finding pharmaceutical or nutritional therapies that might target the effects of alcohol exposure.

One such potential therapy that has shown considerable promise is choline, an essential nutrient that is found in eggs, wheatgerm and liver, as well as being produced naturally to some extent within the body. The need for choline increases markedly during pregnancy to support the growing fetus, and a significant proportion of women don't consume the recommended daily allowance. In rat studies of prenatal alcohol exposure, choline supplementation during pregnancy or to exposed pups resulted in improvements across a range of physical and behavioural outcomes. These studies have also demonstrated the treatment is more effective when initiated earlier in pregnancy.

From 2012 - 2015, the Child Development Research Laboratory conducted a pilot clinical trial of choline supplementation. Under the leadership of Prof. Ernesta Meintjes and Profs. Joseph and Sandra Jacobson from Wayne State University in Detroit, Michigan, it was an exploratory study which aimed to see whether the protocol was feasible in the community of interest. Sixty-nine pregnant women from a disadvantaged community in Cape Town were recruited who, based on a well-validated interview method, were considered to have been drinking alcohol heavily during their current pregnancy. The choline supplement was taken twice a day, and consisted of a powder mixed with water to produce a sweet-tasting drink. The placebo looked and tasted identical. The research team investigated how well the women in the study followed the supplementation plan, what side effects they experienced, and whether the treatment protocol increased blood choline levels in the women. They were particularly interested in whether starting supplementation early in pregnancy and at a relatively high dose would prove to be more effective, in line with the animal research.

The results showed the study participants generally followed the treatment plan very well, and side effects were relatively uncommon and mild. Blood choline levels significantly increased during the study in the participants taking the supplement. After the participants gave birth, their infants were assessed across a range of measures known to be affected by prenatal alcohol exposure. The results were exciting: infants whose mothers had taken the choline supplement showed marked improvements in several areas. Although both groups of infants were small at birth, those in the choline group caught up in weight and head circumference in the first year, while those in the placebo group remained growth restricted. The infants in the choline arm also performed better on two tests of neurocognitive functioning, eyeblink conditioning and the Fagan Test of Infant Intelligence. Analysis of structural MRI scans done in the first month after birth showed infants in the choline group had larger brain volumes in several regions which have been shown to be smaller following alcohol exposure, and these volumes were associated with the infants' performance on the Fagan test.

In light of these exciting findings, Ernesta, in collaboration again with the Jacobsons and with Dr Colin Carter, a paediatrician from Columbia University, is currently running a full clinical trial of choline supplementation in heavily alcohol exposed pregnancies. **MOMS** (**M**aternal **M**icronutrient **S**tudy) has recruited over half of 300 pregnant women. The recruitment process involves approaching and screening many women from clinics across the greater Cape Town area. Only women who meet the criteria for heavy alcohol consumption are enrolled. As in the pilot study, participants are randomised to receive either choline supplementation or placebo. The research team follows up monthly to engage with the participants, provide encouragement and assess adherence to the supplementation plan. Women are also brought to the Child Development Research Laboratory for more comprehensive study visits, which include physical, nutritional and mental health assessments, interviews regarding alcohol and drug use, and drawing of blood samples for choline levels. The research team at the lab consists of Anthea van Wyk, Dr. Andrew Lane, Juliet Corder, Tasneem Manuel, Beverly Arendse, Patricia Solomons, Bridgette Baatjies, Nicolette Gertse and Chris van Eck, while Dr Neil Dodge manages the data from Wayne State University in Detroit.

After the infants are born, information about the birth and delivery are collected. The infants are weighed and measured at several visits in the first year. Neurocognitive and behavioural assessments are administered at 6 and 12 months by Rhiannon Changuion and Julia Tubaro. These assessments include the Fagan, which measures visual processing speed and novelty recognition, and Belsky Symbolic Play, which evaluates aspects of early cognitive and language development.

All participants are additionally invited to participate in the associated neuroimaging study, **BAMBI** (**B**aby **A**nd **M**om **B**rain **I**maging study). In this study, the infants are brought to CUBIC for MRI scans at around 1 month after birth, where anatomical, diffusion weighted, spectroscopic and resting state functional data are collected. The MRI images will allow the imaging team to assess whether the choline supplement is associated with measurable structural and metabolic effects on the brain, confirming and extending the findings of the pilot study, and to what extent these changes explain any choline-associated cognitive or behavioural changes. Just over 90 infants have been scanned so far, and the team, which comprises Thandi Hamana, Fleur Warton and Anja Schwär, have brought some of the infants back at 12 months for a second scan.

The Child Development Research Laboratory has been conducting research into FASD for many years. It is truly exciting to be contributing so substantially to investigations that could lead to a safe, accessible and effective treatment.

THE HUB CONNEXION

Meet the HUB Communications Committee

The **HUB Communications Committee** facilitates communication of news, opportunities, successes and achievements of staff, students, and alumni through the Departmental website, social media accounts and the departmental newsletter, The HUB Connexion.

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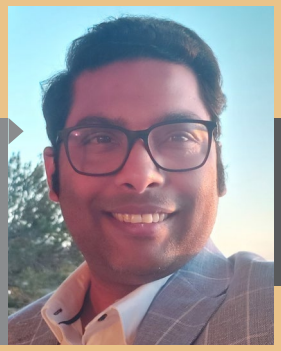
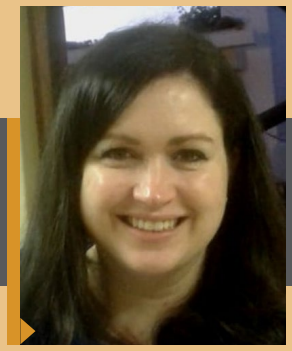


DR SUPRATIM BISWAS
Chair & Division of Cell Biology Representative

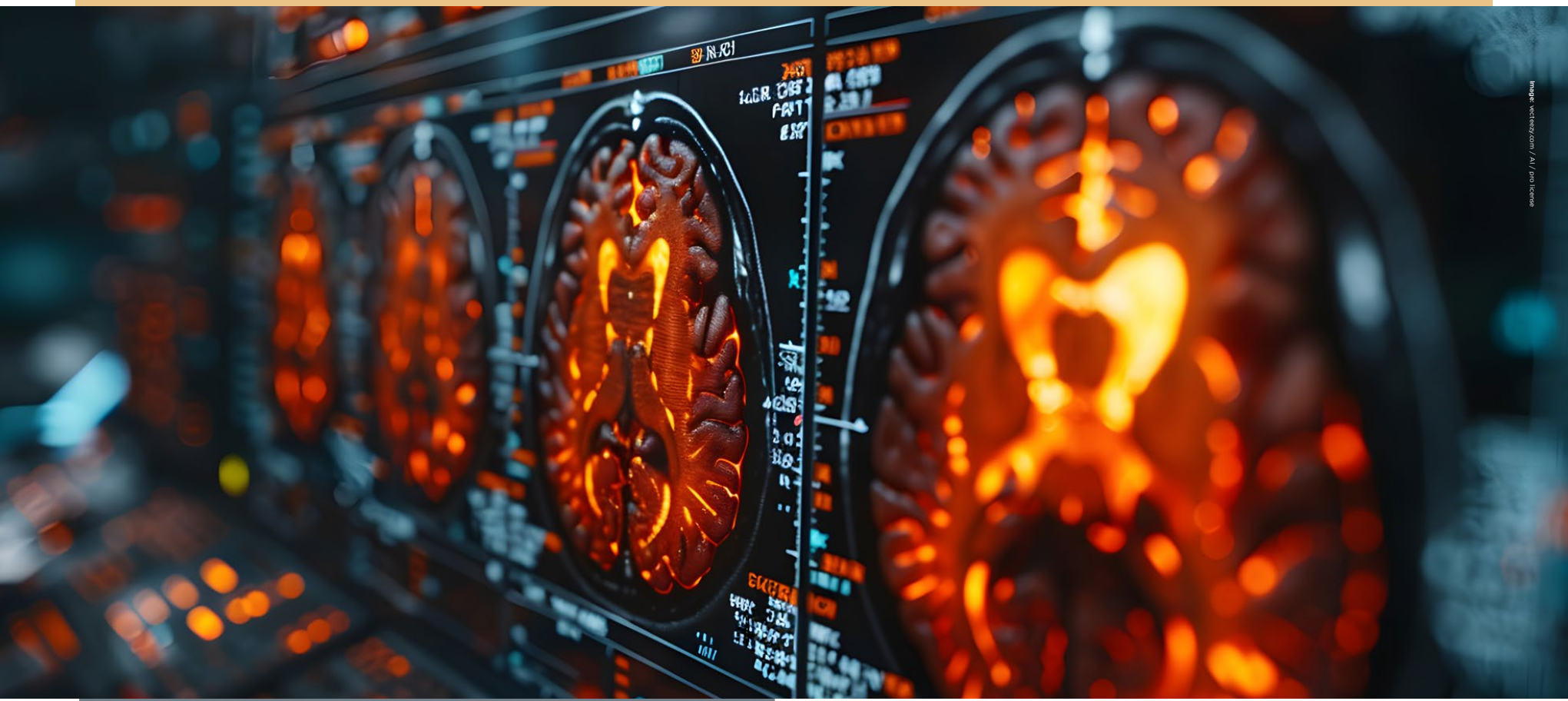


DR FLEUR WARTON
Deputy Chair & Division of Biomedical Engineering Representative

MS AYESHA HENDRICKS
Deputy Chair & Division of Physiological Science Representative

MS MEGAN PETERSEN
Division of Clinical Anatomy and Biological Anthropology Representative

MS MBALI MADOLO
Postgraduate Students Representative



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COUNSELLING SUPPORT (FOR UCT STAFF)

Contact Independent Counselling and Advisory Services (ICAS):

- **Call toll-free** for counselling **0801 11 39 45** /
- Send a **please-call-me** to ***134*905#**
- **Email** uct@icas.co.za / Website
- **Chat live** with an ICAS counsellor via the app, **ICAS On-the-Go** (Google and Apple downloads). ***The code for UCT staff is UNI003.***

SOUTH AFRICAN DEPRESSION AND ANXIETY GROUP (SADAG)

- Access the SADAG webinars and podcasts for tips and coping skills
- **Call 0800 17 11 71** (toll-free from a Telkom line 24 hours a day)
- Send an **SMS** to **31393** to request a **call-back**
- **Email** office@anxiety.org.za for a counsellor to call you back / Website
- Visit SADAG Facebook page **Daily Expert Q&A from 13:00 to 14:00**
- **SADAG UCT Student Careline 0800 24 25 26** (free from a Telkom line)

COUNSELLING SUPPORT (FOR UCT STUDENTS)

UCT Health Services for students
Tel: +27 (0)21 650 1020 / **Email:** faranaz.murat@uct.ac.za / Website

UCT Counselling Services
Tel +27 (0)21 650 1017 / **Email** lerushda.cheddie@uct.ac.za / Website

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FACULTY OF HEALTH SCIENCES