



Communication and Marketing Department
Isebe loThungelwano neNtengiso
Kommunikasie en Bemerkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa
Welgelegen House, Chapel Road Extension, Rosebank, Cape Town
Tel: +27 (0) 21 650 5427/5428/5674 Fax: +27 (0) 21 650 5628

www.uct.ac.za

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Loss of loved ones spur PhD graduand to excel and produce outstanding research



Maxine Höft

Photo: Lerato Maduna/UCT

In September 2021, as Maxine Höft was nearing the end of the fourth year of her PhD, the unthinkable happened. Her dad – her hero, number one supporter and best friend – passed away. As she battled to come to terms with his death, three months later, she lost her grandmother, and her world as she knew it came tumbling down.

With a heavy heart, and many late nights with tears streaming down her face, Maxine put pen to paper. Thankfully, she managed to complete and submit her thesis at the end of February. In June she got word that she had made the cut, and come 22 July, she will

graduate with her PhD in clinical science and immunology from the University of Cape Town (UCT).

"I went through the toughest time of my life. My world fell to pieces so quickly and so unexpectedly. I had to go back home to the Eastern Cape and pack up my dad's house – the home I grew up in. I had to face life without my dad and my gran, and my reality that I had a PhD looming, one that I was so close to finishing," Maxine said.

'Broken and useless'

For four months, Maxine was "broken and useless". In January this year, she almost gave up. She felt she needed more time to grieve, and she came close to extending her degree by another year. But her supervisor, Associate Professor Claire Hoving, encouraged her to keep going. Hoving provided the reassurance Maxine so desperately needed. Hoving committed to supporting her completely even if it meant reviewing her thesis chapters at short notice and with quick turnaround times.

"All my efforts and everything I achieved as a result, I dedicate to my dad, Elwyn Walter Höft, and my gran, Rosemary Ann Raath," Maxine said. "My dad has been jokingly calling me 'Dr Höft' since my honours year. I never imagined that he wouldn't be standing cheering me on with tears in his eyes on my PhD graduation day. But I know that he will have his hand on my shoulder always and I will hear him cheer during all my victories for the rest of my life."

A scientist by nature

Since a young age, Maxine was fascinated by science. She adored time in nature, and biology and science were her favourite subjects at school. It came as no surprise to her parents when she opted to enrol for a Bachelor of Science at Rhodes University when she matriculated. During her undergraduate degree she developed a strong interest and passion for microbiology and molecular cell biology and the medical aspect associated with these areas of study. Therefore, her honours in microbiology and master's in biochemistry involved cancer research. Both degrees followed in quick succession.

Maxine completed her master's at the end of 2016. With little idea of what to do next, she moved to Cape Town and started tutoring high school learners in science and biology to generate an income. But this role didn't last very long. When she successfully applied for a joint national Department of Science and Technology and National Research Foundation internship based in the African International Centre for Genetic Engineering and Biotechnology in UCT's Institute of Infectious Disease and Molecular Medicine, it was the start of something great. The internship paved the way to her PhD, which she formally started in 2018 in UCT's Africa CMM Medical Mycology Research Unit.

"Research has taught me resilience, perseverance, critical thinking and undying problem-solving capabilities. Without life's curveballs, a PhD is not an easy challenge to take on. It requires a specific emotional and academic intelligence, passion, a methodical approach and persistence. It is equally frustrating as it is rewarding," Maxine said.

Ground-breaking research

The topic of Maxine's dissertation was "Understanding the immune response to *Emergomyces africanus*". *Emergomyces* species are a group of fungi that opportunistically cause disease among people with weakened immune systems. *Emergomyces africanus* is a newly discovered fungus within the *Emergomyces* group and was first identified at Groote Schuur Hospital in 2013. The disease affects people with advanced HIV and causes

high fatality rates, especially in patients who don't receive anti-fungal treatment. The true burden of disease in South Africa remains unknown. However, as diagnostic testing improved in recent years, the country recorded a dramatic increase in the number of reported cases.

The aim of Maxine's research project was to better understand the immune response to the *Emergomyces africanus* fungus. She set out to identify key immune mechanisms which a healthy host (body) uses to fight and clear an infection, establish which of these responses are absent in an immunocompromised host and as a result could lead to invasive *Emergomycosis* and ultimately to death.

"Fungal infections kill an estimated 1.5 million people annually and the majority of deaths occur in Africa. Yet, fungi remain underestimated and research in this field is severely neglected. My PhD was an opportunity to understand an emerging disease endemic to South Africa and to identify key immune components that could be used to control this fungal pathogen," Maxine said.

The findings

"This work has laid the foundation to better understand *Emergomyces* and the study has added valuable insight into disease kinetics and fungal clearance mechanisms. From case study reports we see that people living with HIV/AIDS are far more likely to develop serious symptomatic and disseminated *Emergomyces* disease," she said. "Our model could also be further exploited to look at new avenues for therapy. Research focusing on immune therapy and possible vaccine development will have a tremendous impact on the treatment and management of the disease."

Many of Maxine's peers have already relocated abroad to pursue postdoctoral fellowships at various universities. But her feet are firmly planted on South African soil. After all, she pointed out that Africa bears the highest burden of poverty-related and neglected infectious diseases, and desperately requires the skills of clinicians and researchers in the field.

"I have since taken comfort in accepting that tough times will always be inevitable in our lives. But it's how we respond to them that defines our future. I have found that there can be a weird symbiotic relationship between painful experiences and achieving your goals. Working towards a goal can give you purpose during a time when you might have little hope," she said.

Story by Niémah Davids, UCT News.

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Issued by: UCT Communication and Marketing Department

Thami Nkwanyane

Media Liaison and Monitoring Officer
Communication and Marketing Department
University of Cape Town
Rondebosch
Tel: (021) 650 5672
Cell: (072) 563 9500
Email: thami.nkwanyane@uct.ac.za
Website: www.uct.ac.za