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UCT leads pan-African drive to tackle deadly infectious diseases with cutting-edge imaging

The openScopes AIDDiA consortium gathered for the project kick-off meeting in UCT's IDM. Photo: Sizwe Tyhali.

The University of Cape Town (UCT) is leading a £4.4 million, four-year pan-African research programme to give scientists across the continent advanced imaging tools to better understand and tackle some of Africa's deadliest infectious diseases.

The openScopes AIDDiA (Advancing Infectious Disease Discovery Research in Africa) programme, funded by the Wellcome Trust, will bring advanced microscopy, machine learning and specialised training closer to researchers studying tuberculosis (TB), malaria, Buruli ulcer and other infectious diseases where they occur.

The five-country consortium will establish a network of locally built and maintained light microscopes, enabling African researchers to examine pathogens at unprecedented detail without relying on laboratories outside the continent.

The programme brings together UCT, the Kenya Medical Research Institute (KEMRI), Mbarara University of Science and Technology (MUST) in Uganda, the Centre Suisse de Recherches Scientifiques (CSRS) in Côte d'Ivoire and Imperial College London. It is the only project in the latest Wellcome Bioimaging Technology Development Awards funding round led from outside the United Kingdom.

The programme officially launched at UCT's Institute of Infectious Disease and Molecular Medicine (IDM) during a project kick-off meeting from 7 to 11 September 2026.

"The diseases we're working on – TB, malaria, Buruli ulcer and others – are most prevalent where the tools to study them are hardest to come by," said Dr Caron Jacobs, who co-leads the consortium with Professor Digby Warner, both from UCT's IDM.

"And the questions we care about, such as how these pathogens survive and resist treatment, call for imaging that reveals how the infection actually works. Putting that imaging in researchers' hands, where the patients are, means the scientists closest to these diseases can lead the discovery."

Research manager for Discovery Research at Wellcome Viv Goosens said: "At the very forefront of scientific innovation, our Bioimaging Technology Development Awards are highly competitive. OpenScopes AIDDiA stands out for its multi-pronged approach and the strength of an international team, which will address challenges faced by researchers across Africa."

Infectious diseases targeted by the programme account for more than 292 million cases and 1.7 million deaths globally, with more than 90% of cases occurring in Africa, according to a 2024 World Health Organization report.

Yet researchers working on these diseases often have limited access to advanced imaging technology and the expertise needed to use it.

Commercial microscopy systems can be expensive and difficult to maintain. Researchers may collect samples locally but must send them elsewhere for detailed analysis, thereby slowing research and limiting local scientific capacity.

OpenScopes AIDDiA aims to change this by placing sophisticated imaging capabilities directly in the hands of researchers working most closely with the diseases.

Building technology that can work in Africa

The programme will develop and deploy two open-source microscopy platforms. Mobile travellerScopes, developed through collaboration between researchers at UCT's IDM and the Faculty of Engineering & the Built Environment, will move between research sites, extending access to advanced imaging beyond major national centres.

More advanced, customised microbeScopes will be installed at four African partner sites and adapted to local research priorities. Because the instruments are modular and open source, they can be repaired and upgraded locally.

The programme will also develop training materials in English and French, helping to build a network of researchers across anglophone and francophone Africa. The ambition is to leave behind not only equipment, but also the expertise, infrastructure and research networks needed to sustain the work beyond the four-year grant.

Tackling TB at the level of individual cells

TB will provide the programme's first major test. In countries such as South Africa and Kenya, researchers will use the new imaging capabilities to study drug-resistant TB directly in patient samples. By examining mycobacteria at the single-cell level and within host tissues, researchers hope to better understand how the pathogen responds to treatment and immune pressures.

The programme will also develop approaches suited to the practical realities of research in different African settings, including unreliable electricity, limited cold storage and restricted access to imported biological reagents.

At UCT and KEMRI, high-containment imaging facilities will allow researchers to safely study live, highly infectious pathogens on site. Machine-learning tools will help analyse images and identify drug resistance in TB bacteria at the level of individual cells.

"A microscope captures an image, but the discovery happens afterwards, in how the data is handled and analysed. So, we are building both the pipelines to manage the data, and the machine-learning tools to make sense of it into openScopes AIDDiA from the start," said Dr William Wasswa, who leads the project's image-analysis and machine-learning work at MUST.

Building an African research network

Each African partner will lead research on diseases of local priority. UCT will focus on TB, CSRS on Buruli ulcer, MUST on malaria and KEMRI on other neglected and emerging infections.

Researchers will share tools, methods and data across the network, allowing technologies and findings developed in one setting to benefit researchers elsewhere on the continent. The programme builds on the openFrame, an open-source instrument system developed by collaborators at Imperial College London. Earlier Wellcome funding supported the development of microscope prototypes that are now ready to be refined and deployed through openScopes AIDDiA.

For UCT, the programme strengthens African leadership in infectious disease discovery by placing advanced imaging, technology development and data science within institutions closest to the health challenges being studied.

The longer-term ambition is to establish a self-sustaining African bioimaging research community that can continue to develop and adapt these technologies after the four-year grant ends.

*openScopes AIDDiA *is one of three projects in this Wellcome funding round connected to UCT. The other two are led by the University of Exeter and the University of Oxford, with UCT as co-principal investigators in the Neuroscience Institute and the IDM, respectively.*

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