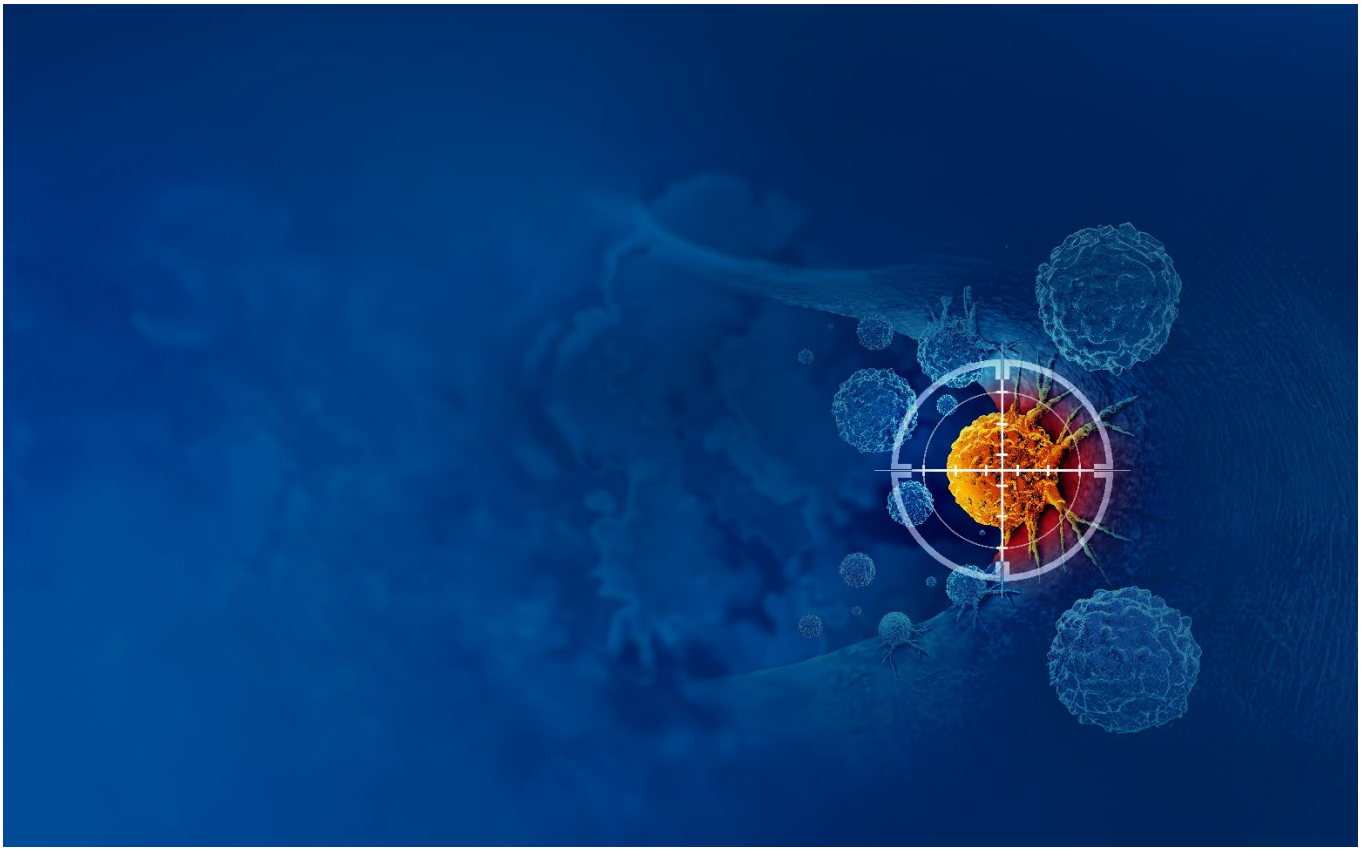
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2 April 2025

NEWS RELEASE
Catching the eye of brain tumours



Source: Shutterstock

PRETORIA - Brain tumours are one of the most formidable challenges in modern medicine: they are difficult to diagnose and expensive to treat, with the best predictor of outcome still being early diagnosis. But what if the eye could be used as the "window to the brain" to extract critical information about pressure on the brain to make an earlier diagnosis and improve the outcomes of this life-threatening condition?

Such a "thermometer of the brain" would be inexpensive, minimally invasive and could provide vital early diagnosis. The Brain Tumour and Translational Neuroscience Centre at the University of Pretoria (BTC@UP), the first of its kind in the country, has developed a state-of-the art Neuro-Ophthalmology Laboratory for assessing the accuracy of various diagnostic methods. These include ultrasound, infra-red pupillometry and optical coherence tomography to view the brain through the eye, and determine pressure and other conditions within the brain.

"Convenient point-of-care diagnosis (literally at the bedside, or in rural clinics) will address the issue of late diagnosis, and brings high-end care to underserved communities," says Professor Llewellyn Padayachy, Head of the Department of Neurosurgery. "The focus of our research at the Neuro-Ophthalmology Laboratory is to

develop and refine these non-invasive diagnostic techniques. Brain tumours present numerous challenges, including late diagnosis, limited access to advanced imaging and molecular testing, and a shortage of trained neurosurgeons, particularly in low- and middle-income countries. These obstacles often result in suboptimal patient management and poor outcomes."

This research into exploring the role of the eye and optic pathway as a mechanism for non-invasively assessing brain pressure is one of many projects at the centre to improve outcomes for people living with brain tumours.

The burden of brain tumours

In Africa, the overall incidence of central nervous system tumours, both benign and malignant, was estimated at about 227 per 100 000 between 1960 to 2017. About one neurosurgeon per 4 million people is available on the African continent to address this burden, falling far short of the World Health Organisation's recommended ratio of one per 200 000 people.

Given the large population of Africa, the total number of reported cases may be underestimated when compared with other continents due to the lack of a central brain tumour registry in Africa.

To address these challenges, the centre conducts research in three groups:

1. The Early Detection and Epidemiology group aims to build a comprehensive database of brain tumour patients to validate local and regional data, and to develop screening and point-of-care tools, such as ultrasound and optical coherence tomography, to enhance early brain tumour detection.
2. The Surgical, Adjunctive and Neurorehabilitation group focuses on safe, effective brain tumour resection using advanced techniques, and emphasises the positive impact of neurorehabilitation.
3. The Translational Neurosciences group studies chemical, molecular and anatomical pathology markers as well as imaging and mathematical modelling-based biomarkers.

"Our transdisciplinary research approach addresses a major global health challenge by enhancing the early detection and treatment of brain tumours to reduce mortality and improve patients' quality of life, especially in developing countries," Prof Padayachy says. "We aim to overcome barriers to effective management, including shortages of trained professionals, inadequate diagnostic and treatment capabilities, and the lack of coordinated care. Our work also advances global knowledge, informing practices and shaping future research with scalable, sustainable interventions for worldwide implementation."

While other projects may focus on isolated aspects of brain tumour care, the centre's work integrates multiple disciplines to address the full spectrum of challenges associated with this condition.

"Our holistic approach sets our work apart, holding great promise for the future," Prof Padayachy says.

--- End ---

This story was originally featured in the Re.Search magazine. Check out Issue 10 of the magazine, which details some of our work, from advancing the field of wound care to understanding supermassive black holes.

Media enquiries can be directed to Mr Sashlin Girraj - Public Relations & Events Manager

Email: sashlin.girraj@up.ac.za | Cell: +27(0)72 447 3784

ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on its Hatfield Campus in Pretoria. This 115-year-old institution is also one of the largest producers of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country with a Faculty of Veterinary Science, which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The 2025 Times Higher Education subject rankings placed UP first in South Africa in the fields of Accounting and Finance; Architecture; Electrical and Electronic Engineering; Law; Sport Science; and Veterinary Science. UP's Faculty of Law has been ranked as the top law school in Africa for a remarkable eighth consecutive year.

Quacquarelli Symonds (QS) ranked the University among the top five in Africa, as part of their 2024 World University Rankings (WUR). UP was the only South African university featured in the 2023 World University Rankings for Innovation (WURI), falling within in the 101-200 range of innovative universities.

For more information, please go to www.up.ac.za