

## NEWS RELEASE

### Uncovering genetic links to the risk of heart disease and diabetes in South Africa



*Professor Alisa Phulukdaree at her inaugural address, where she spoke about the genetic and epigenetic factors influencing cardiovascular disease and Type 2 diabetes*

Pretoria - Cardiovascular disease and Type 2 diabetes have become two of South Africa's most pressing health challenges, yet much of the global research that informs treatment and prevention strategies has been conducted in populations that don't reflect the country's genetic diversity.

During her inaugural address at the [University of Pretoria](#) (UP) Senate Hall, [Professor Alisa Phulukdaree](#) from the [Department of Physiology](#) shed light on the genetic and epigenetic factors influencing these diseases, with a particular focus on their impact in South Africa. At just 38 years old, she recently achieved full professorship in recognition of her academic work and contributions to medical research.

Her work not only explores why some population groups are more vulnerable to these conditions but also points to the potential for personalised medicine, an approach that could allow people to make informed health choices

based on their genetic predisposition.

“We know that heart disease and diabetes are on the rise in South Africa, but the genetic factors driving these conditions in our population remain largely understudied,” says Prof Phulukdaree. “By uncovering how genetic and environmental factors interact, we can develop more precise strategies for prevention, early detection and treatment.”

### **The hidden genetic triggers of disease**

In recent decades heart disease has become one of the leading causes of death in South Africa. Similarly, Type 2 diabetes, often linked to lifestyle factors, is rising sharply.

The question is: what if the risk is written into one’s DNA?

Prof Phulukdaree’s research focuses on how genetic variations and environmental factors interact to influence the development of coronary artery disease (CAD) and diabetes. She studies genetic markers that regulate oxidative stress, inflammation and blood clotting – all of which contribute to the progression of these conditions.

Her findings are particularly relevant to South Africa’s Indian population, who experience significantly higher rates of CAD. However, this trend extends beyond South Africa – Indian populations in countries like Canada, England and Singapore also show disproportionately high rates of heart disease, underscoring the need for genetic research that accurately reflects their unique risk factors.

“We’ve seen that genetic predisposition plays a role, but the real challenge is that the majority of genetic studies have been conducted in European populations. This means we’re applying solutions that might not be as effective for African and South Asian populations,” Prof Phulukdaree explains.

### **Why existing research doesn’t always apply to South Africa**

Most of what we know about the genetic basis of diseases comes from research conducted in developed countries. This means that many of the genetic insights driving global healthcare may not accurately reflect the needs of diverse populations, including those in South Africa.

Prof Phulukdaree’s research aims to close this gap by investigating how genetic and epigenetic changes influence disease progression in South Africans. Epigenetics, which refers to changes in gene expression caused by environmental and lifestyle factors, could provide insights into why some individuals develop severe disease while others don’t.

Her research team has studied specific genetic markers that affect how the body responds to stress and inflammation. One key factor is oxidative stress, a process where unstable molecules called free radicals damage cells, contributing to the hardening of arteries. Some people carry genetic variations that make them less efficient at managing this process, putting them at higher risk of heart disease.

Another focus is blood clotting, particularly the role of Factor XIII-A, a protein that stabilises blood clots. Individuals with certain genetic variations may form clots that are denser and harder to break down, increasing their risk of heart attacks and strokes.

“These conditions don’t develop overnight,” Prof Phulukdaree explains. “They’re the result of a long interplay between genetics, lifestyle and environmental exposures.”

## What this means for prevention and treatment

The ultimate goal of this research is to move towards precision medicine; healthcare that is tailored to an individual's genetic makeup. By identifying high-risk individuals before symptoms appear, interventions can be more targeted, whether through lifestyle changes, medication, or personalised treatment plans.

"We need data from diverse South African populations to develop effective public health strategies," says Prof Phulukdaree. "If we can understand the genetic differences in how diseases progress, we can design more effective screening tools and treatments that actually work for our population."

To this end, she is working towards establishing a comprehensive genetic database that includes individuals from different ethnic backgrounds. This will not only improve disease prediction and prevention but also provide insights into the historical and socio-economic factors that shape health outcomes in the country.

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## 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.

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