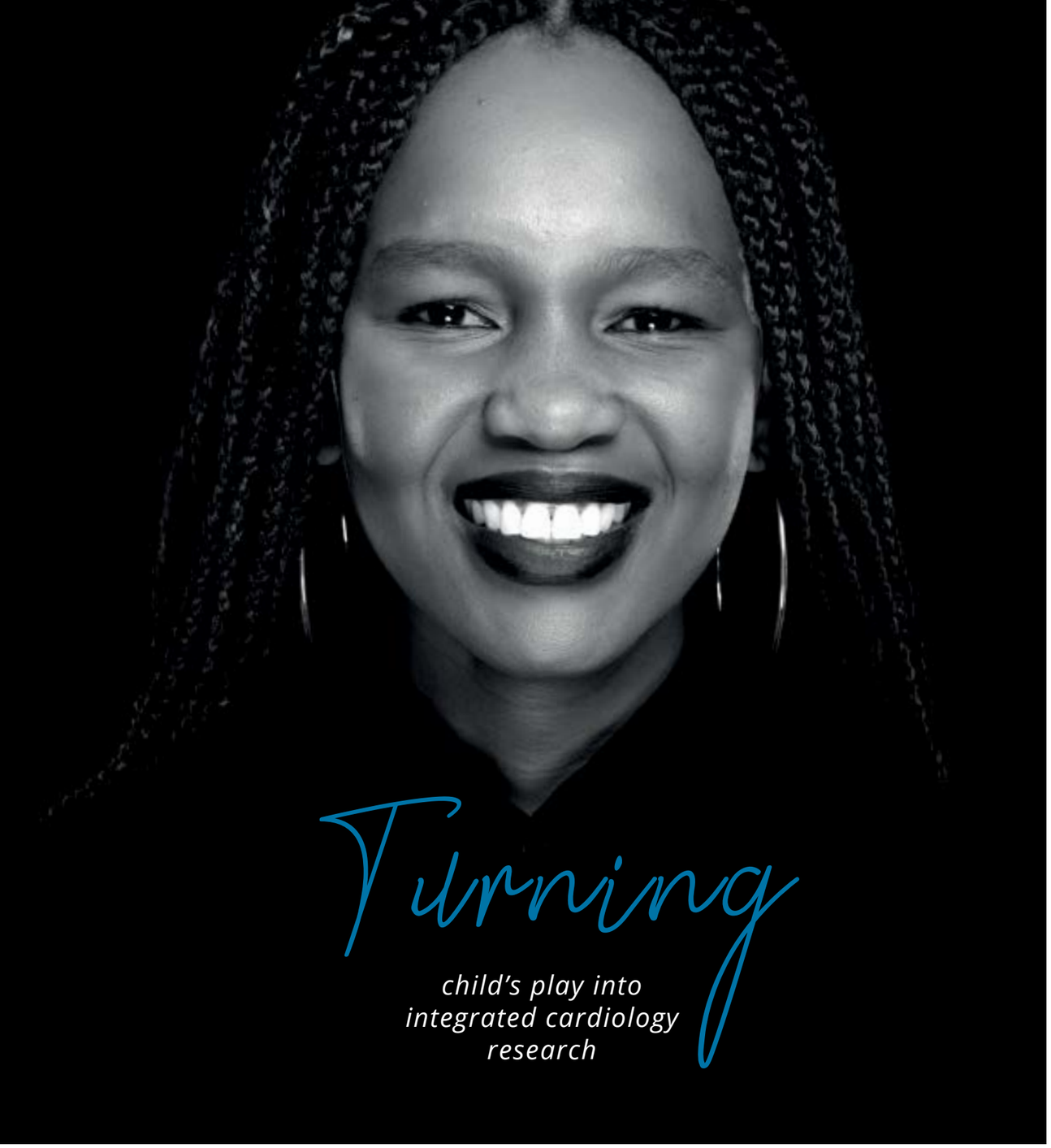

Turning

child's play into integrated cardiology research

DR DINEO MPANYA

Academic Fellowship Award

University of the Witwatersrand

Cardiology

A floppy-disk computer left by her headmaster uncle in the bedroom she shared with her two sisters in Lamontville, Durban in 1996, when she was 12 years old, was all it took to pique Dineo Mpanya's curiosity into the world of medicine.

"I was fascinated by this box thing. My uncle was passionate about building computers using recycled parts. I worked out how to connect it because I had seen him use it. I taught myself how to type and how to put in the floppy disc and store information on it," she recalls. By the time she was a boarder at the Sacred Heart Secondary School in Verulam in Kwa-Zulu Natal, she was so far ahead of her peers that the teacher appointed her Computer Room Monitor and watched her help others.

She and her six-year-older sister, Palesa, would also play with paper dolls, drawing models on cardboard and using tracing paper to design dresses, the wedding theme being a particular favourite. "My sister and friends soon got bored and stopped, but I carried on. I took things to another level and soon had a shoe box full of designs," she adds.

She informed her Guidance teacher at school that she wanted to study graphic design but heard she was "brilliant enough," to be a doctor, lawyer or chartered accountant.

"She advised me to continue designing as a hobby," Dineo chuckles.

Her next seminal influence was when the top academically performing children at her school, (where she ended up as Head Prefect), were taken on a tour of the Nelson Mandela University Medical School in Durban. "I was fascinated by a skeleton we saw. I wanted to know more and I kept asking questions," she says.

Today, thirty years later, Dr Mpanya is a nuclear medicine physician working at the cutting edge of medicine and computer science, using machine learning algorithms on thousands of heart-failure patients. She is also a much sought-after fashion designer among her friends and family, with plans to one day go commercial.

Cutting-edge work

Receiving a Discovery Foundation Academic Fellowship Award, Dineo, will be integrating computer science and medicine to develop supervised machine learning algorithms that predict the risk of in-hospital mortality and hospitalisation in heart failure patients. She will also focus on applying machine-learning principles (artificial intelligence), in image analysis and interpretation. Her Masters was on cardiac patients referred to the nuclear medicine department for imaging with a Positron Emission Tomography (PET) scan.

“There are currently few predictive models derived from data originating in Africa”. Her PhD project will also facilitate precision medicine and enable channelling of resources to those with the greatest need.

Dineo explains, “Internationally, they’re far more advanced with electronic health records and have been collecting data on all their patients for years. We don’t do anything approaching that scale, nor across disciplines. Also, the cause of heart failure in the Western world is primarily coronary heart disease, unlike in Africa, where hypertension and rheumatic heart disease are the leading causes of heart failure.”

There are currently few predictive models derived from data originating in Africa.

Her dataset will be globally unique and fully tailored to local conditions

“Once a predictive model has been created, it will assist clinicians in the risk stratification of patients with heart failure, with high-risk patients being triaged to the appropriate level of care,” she adds. Her research is taking place in the Cardiology Department at Charlotte Maxeke Johannesburg Academic Hospital and involves an estimated 5 000 patients whose data dates back to 2009.

Asked what is next, Dineo says she would like to become a professor and teach, but is also keen to share her gifts with others, collaborating in both medicine and fashion.

“A fashion show would be quite nice,” she laughs. Dineo was expecting ethical clearance of her research with her PhD research nearing completion by December 2020.

Machine learning algorithms for heart-failure patients

Her supervisor, Professor Turgay Celik from the School of Computer Science and Applied Mathematics at the University of the Witwatersrand, says Dineo has an excellent understanding of the research problem and will make “significant contributions,” to both deep learning literature and risk modelling. With the dire shortage of healthcare professionals in South Africa, the ability to stratify heart failure patients according to their risk profile and admit them to the appropriate level of care will reduce pressure on all healthcare facilities. She says the local banking sector has been using machine learning for years, but medicine has lagged behind.