UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS

Research News and Key Focus Area Story

COVID-19: A hopeful prospect for African solidarity through medical research

South Africa is at the forefront of SARS-CoV-2 genomics surveillance in Africa, and the University of the Free State (UFS) Next Generation Sequencing (UFS-NGS) Unit is playing a major role in responding rapidly to public health threats in South Africa and other African countries.

Prof Martin Nyaga, Associate Professor in the UFS-NGS Unit and Director of the WHO Collaborating Centre (WHO CC), and Dr Peter Mwangi, a Postdoctoral Research Fellow in the UFS-NGS Unit, say medical research in Africa is seriously deficient when benchmarked against other developed continents in terms of the capacity to perform SARS-CoV-2 genomics. According to them, an article published in a nature science journal provided evidence that African nations were largely uninvolved in clinical trials for the development of a COVID-19 vaccine.

“If African leaders are to learn one thing from the current pandemic, it is the need to provide adequate resources and funding for medical research, especially in next-generation sequencing facilities. Anyone keen on real-time data and information on the COVID-19 pandemic understands how fundamental sequencing the SARS-CoV-2 genome is. Rapid sequencing of the SARS-CoV-2 genome has played a key role in accelerating the development of emergency vaccines against this devastating disease,” say the two researchers.

Genome sequencing projects are collaborative efforts

Prof Nyaga is heading the WHO CC after the UFS was designated as a collaborating centre for vaccine-preventable diseases (VPD) surveillance and pathogen genomics last year. The centre is located in the Division of Virology in the Faculty of Health Sciences. It is also part of the Network for Genomic Surveillance in South Africa (NGS-SA), a genomics network/consortium established to respond rapidly to public health threats in South Africa.

Genome sequencing projects are usually collaborative efforts involving different stakeholders, including the national government through the Ministry of Health, scientists, and clinicians. The UFS-NGS Unit is actively involved in sequencing SARS-CoV-2 samples in the Free State channelled through the National Health Laboratory Services (NHLS-FS).

The sequenced data generated by the unit is continuously deposited in the Global Initiative on Sharing Avian Influenza Data (GISAID) database through the code name UFS-VIRO-NGS. The UFS-NGS Unit is currently performing whole-genome sequencing runs of approximately 100 SARS-CoV-2 samples per month.

“Through continuous processing of SARS-CoV-2 samples, the UFS-NGS Unit has optimised several techniques for COVID-19 genomics, from wet-lab to dry-lab analysis, captured in the internal protocols of the unit. The unit is continuously generating quality SARS-CoV-2 sequence data for the national consortium that is important for vaccine immunogenicity research projects geared towards regional vaccine development,” says Prof Nyaga.

Analysis of genome sequence data plays significant role in vaccine development

According to Prof Nyaga and Dr Mwangi, the sequence data generated in the UFS-NGS Unit has been key to establishing the SARS-CoV-2 variants of interest (VOI) and variants of concern (VOC). The VOI and VOC require one or more appropriate public health actions, including enhanced sequence surveillance, enhanced laboratory characterisation, or epidemiological investigations to assess how easily the virus spreads, the severity of disease, the risk of infection, and whether currently authorised vaccines offer protection.

“An example of a VOC strain is the 20H/501.V2 in lineage B.1.351 that was first discovered in South Africa after analysis of whole-genome sequence data, highlighting the importance of whole-genome SARS-CoV-2 surveillance. Consequently, analysis of the whole genome sequence data plays a significant role not only in

vaccine development efforts, but also in advising policy to global and African governments on protection measures to be undertaken to curtail COVID-19 transmission," explain the researchers.

The UFS-NGS Unit has been working collaboratively with other African scientists and actively training African students from different cultural backgrounds, not only on SARS-CoV-2 genomics, but also on different research clusters. The diversity of ideas through engagement with African researchers to share knowledge and push scientific innovation exemplifies the value of working together in the spirit of Ubuntu to develop solutions to our African problems. As we commemorate Africa Month 2021, let us be inspired by our hardworking UFS researchers, who are promoting African solidarity by working collaboratively in medical research to strive for a safe, healthy, and prosperous Africa.

- The key members of NGS-SA working on SARS-CoV-2 genomics samples from the Free State, are Prof Dominique Goedhals (Head: Division of Virology), Prof Martin Nyaga, Mr Phillip Bester (Medical Scientist: Division of Virology), Dr Peter Mwangi, Mr Milton Mogotsi (Research Assistant: UFS-NGS Unit), and Mr Ayodeji Ogunbayo (Research Assistant: UFS-NGS Unit).

Photo captions

Prof Martin Nyaga, an Associate Professor: Next Generation Sequencing (UFS-NGS) and Director of the WHO Collaborating Centre (WHO CC), says there is a need to invest heavily in medical research, especially in next-generation sequencing facilities.

Dr Peter Mwangi is a Postdoctoral Research Fellow: NGS and Research Scientist in the WHO Collaborating Centre (WHO CC) at the University of the Free State (UFS).