

# NICD PULSE

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NATIONAL INSTITUTE FOR  
COMMUNICABLE DISEASES

Division of the National Health Laboratory Service

WHEN A MOMENTARY  
PAUSE IS NEEDED,  
NATURE IS NEAR.

P6.

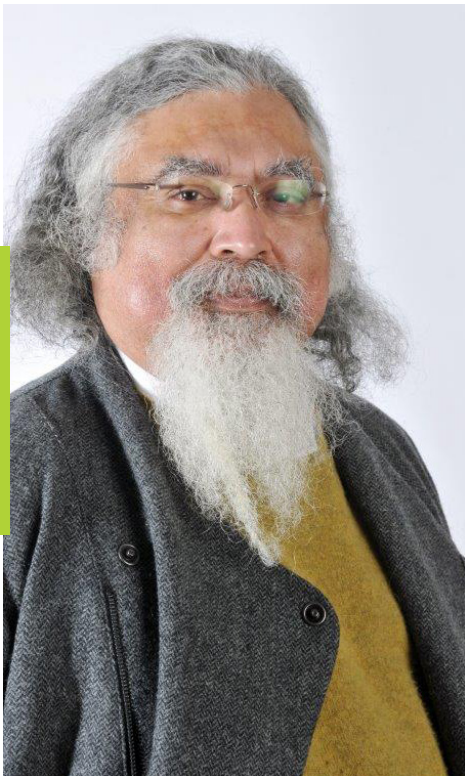


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# MESSAGE FROM ACTING EXECUTIVE DIRECTOR



Prof Adrian Puren

## Dear colleagues

The theme for this edition of NICD Pulse is "Are we there yet?" as in, have we arrived yet? The rhetorical answer is "No" or just when you think. I enjoyed reading the latest edition of the NICD Pulse, particularly the piece on antimicrobial resistance (AMR) written by Prof Olga Perovic. AMR is a significant threat to healthcare. The NICD, supported by global partners, such as the Fleming Fund Grants Programme in the United Kingdom, contributes to preventing this problem. The External Quality Assessment (EQA) in pathogen identification is essential for ensuring quality AMR surveillance. In Africa, the NICD is working with three other organisations in establishing an EQA program. The NICD hosted and trained the Institute Pasteur de Dakar in EQA,

imparting key skills and knowledge that they will use towards AMR prevention in their corner of the world.

You've heard the one about the photograph never lies. An extra feather in the institute's cap is Dr Monica Birkhead's 'Groundbreaking Electron Microscopy Confirms Vertical Transmission of SARS-CoV-2' piece. Dr Birkhead describes how the institute successfully presented ultrastructural evidence that supports the vertical transmission of SARS-CoV-2 from an infected mother to her child through the placenta. The definitive proof is a remarkable achievement because numerous predecessors have been unsuccessful in presenting this evidence. We are proud of Dr Birkhead and her team.

At present more than 24 million doses of COVID-19 vaccines have been administered in South Africa, with over 16 million of our citizens vaccinated. The Gauteng province is leading the provincial race with 6.5 million doses administered. Although the numbers are encouraging, more needs to be done to reach the 70% target by New Year's Eve. Please read about it in the comprehensive COVID-19 vaccine rollout update and why vaccination is key to preventing new variants from emerging and limiting the spread of the disease. We're not there yet. You'll still have to wear your mask and apply all the other non-pharmaceutical interventions.

Many wonder where their laboratory specimens go (well I hope you do!). We called on team members from the Receiving Laboratory, Busisiwe Masengemi and Lazarus Ngwenya, to shed some light on their work. They describe the journey a specimen

takes. From collection to result, the importance of capturing information correctly, handling specimens with care and working with haste to ensure each specimen reaches its correct destination.

The month of September recognised Childhood Cancer Awareness Month. The awareness piece details the importance of early detection that will facilitate early diagnosis and help save lives. In addition, the activities that Dr Elvira Singh spearheaded from the NCR and the Communications Unit are highlighted, and we thank them for their efforts.

The Poliomyelitis Research Foundation hosted the 15th James HS Gear Memorial Lecture, presented by Prof Penny Moore. The lecture was on 15 November and focused on the change in focus from HIV vaccine research to COVID-19 vaccine research, and Prof Moore reviewed the lessons learned for the next pandemic.

In conclusion, a refreshing piece about the Sandringham campus will have you grabbing at your sneakers in no time. The campus spans more than 980 hectares and offers a tranquil environment for employees to take a quick pause and recharge their batteries. The variety of fauna, flora, and all-around natural beauty can improve physical health and mental wellness.

And finally, a round of applause for Clement Adu-Gyamf from CVI, who recently obtained his PhD in Clinical Immunology from Wits. Sure it's not Clement's end of journey but new beginnings! Well done!



# EXTERNAL QUALITY ASSESSMENT- KEY TO AMR SURVEILLANCE

By Prof Olga Perovic

Countries in low- and middle-income countries (LMICs) in Asia and Sub-Saharan Africa commonly bear the highest burden of antimicrobial resistant (AMR) infections. In order to resolve this health challenge, the United Kingdom (UK) Department of Health and Social Care are addressing the critical gaps in surveillance of antibiotic resistance in these countries under the Fleming Fund Grants Programme and the Global Action Plan on AMR, a blueprint for a multi-stakeholder global response to preventing the burden of AMR.

The aim of the Fleming Fund Grants Programme is to improve the ability of recipient countries and regions to undertake surveillance and monitoring of AMR. This includes enhancing diagnosis of drug resistant infections, with an emphasis on antibiotics and priority bacterial diseases, and improving the quality, monitoring and reporting of antimicrobial resistance surveillance data.



During the week of 23 - 27 August 2021, four members of the Institute Pasteur de Dakar visited the NICD for training on the EQA program for AMR.

The two key areas of work that have been identified as priorities at a regional level include:

1. Responding to data and evidence gaps to enhance the appropriate use of antibiotics in LMICs.
2. Establishing and sustaining regional mechanisms for supporting AMR surveillance efforts. For example, supporting external quality assessment, regional training in advanced diagnostics, addressing barriers to regional data sharing and action.



**enhancing diagnosis of drug resistant infections, with an emphasis on antibiotics and priority bacterial diseases..**



The External Quality Assessment (EQA) in pathogen identification and antimicrobial susceptibility testing is identified as having the greatest impact on AMR surveillance. On the African continent there are four organisations included in the consortium partnership, namely the lead organisation, African Society for Laboratory Medicine (ASLM); The National Institute for Communicable Diseases (NICD); Africa Centres for Disease Control (CDC) and the Food and Agriculture Organization (FAO), to establish an African regional EQA program for AMR. In addition, Public Health England (PHE) is a consortium



outside Africa.

The Centre for Healthcare-Associated Infections, Antimicrobial Resistance and Mycoses (CHARM) at the NICD is a unique organisation in the region with expertise in One Health EQA programs for AMR and with the strategic approach to capacitate another two sites on the African continent to produce and distribute high quality EQA panels.

The NICD supports these two selected sites in strengthening the technical capacity of laboratory personnel and harmonised testing protocols across laboratories through the provision of training on the EQA program for AMR, by utilising AST methods.

The NICD aims is to provide ongoing support to One Health coordination and training, and to provide regional technical assistance and support across the African region.





# AWARENESS, THE GREATEST AGENT FOR CHANGE

By Lesego Sibilanga

Creating awareness and communication is a strategic priority for the National Institute for Communicable Diseases. As such, the National Cancer Registry (NCR) rolled out its first awareness campaign during September, namely Childhood Cancer Awareness Month. The NCR hosted a series of inspired activities to raise awareness of common childhood cancers in South Africa while being mindful of the new normal of COVID-19 protocol. The activities included the staff donning their best yellow/gold outfits, colours that are representative of childhood cancers; weekly informative emails detailing the various types of childhood cancers, diagnosis & treatment options; an informative online Q&A session on Twitter with the Head of the NCR, Dr Elvira Singh; and finally having special guest, Dr Charlotte Ingram, Medical Director and CEO for the South African Bone Marrow Registry (SABMR) present at the Monthly Scientific Meeting. Dr Ingram shared more about being a bone marrow donor in South Africa. An attention-grabbing banner was also on display at the PRF building to keep awareness of the campaign top of mind!

## The gap left by lack of awareness

At present, between 800 to 1,000 South African children are diagnosed with cancer every year. It is however estimated that half



Childhood

CANCER



Awareness

MONTH

of these children are never diagnosed.

This is due to a lack of knowledge regarding childhood cancers and how it presents in children. As a result, many children are only diagnosed once the cancer is at an advanced stage, thus diminishing the possibility of successful treatment.

Childhood cancer symptoms and signs are similar to other illnesses. At least 85% of all paediatric cancers are associated with the St SILUAN group of signs and symptoms as we have

learned. Through this initiative, the hope is that greater awareness of the warning signs of childhood cancers have been created and that early detection can lead to improved outcomes for children suffering from cancer.

Kudos to the NCR team and other NICD parties who collaborated and successfully executed the very first NCR health awareness campaign.

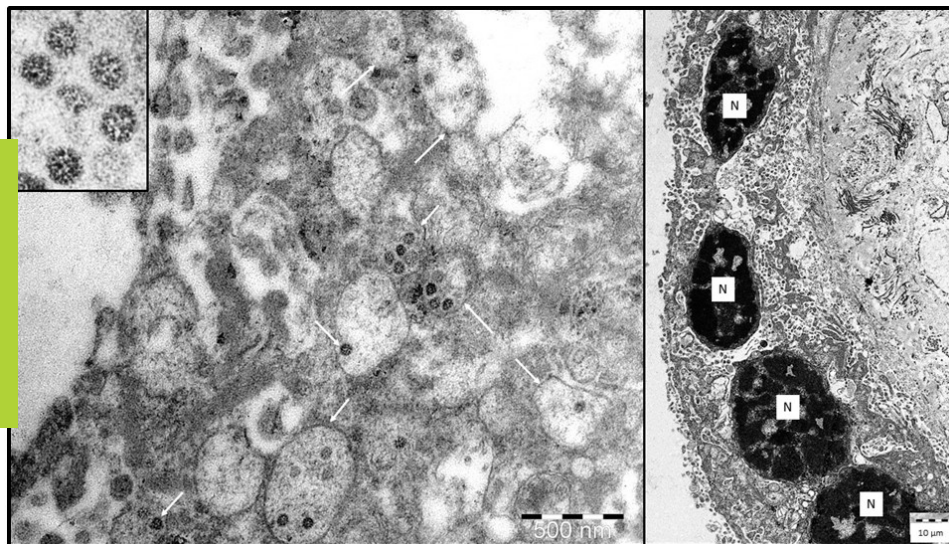


NATIONAL HEALTH  
LABORATORY SERVICE  
National Cancer Registry



# GROUNDBREAKING ELECTRON MICROSCOPY CONFIRMS VERTICAL TRANSMISSION OF SARS-COV-2

By Dr Monica Birkhead



Section through the syncytiotrophoblast in which numerous vesicles (white arrows) containing virions, are evident. Inset: nucleocapsid profiles (black dots) within virus particles.

**T**ransmission electron microscopy (TEM) provides direct imaging of virus particles within the cells of the infected tissues, thus providing irrefutable evidence for the presence of the pathogen. For SARS-CoV-2, due to the difficulties in distinguishing virus particles from normal cellular structures at the ultrastructural level, more than 22 published descriptions of SARS-CoV-2 virions in various tissues were dismissed as misidentifications by a group of expert electron microscopists. Three of these publications reported finding virions in placental tissue, however, the published images were either unidentifiable by the assessing electron microscopists or were considered to be clathrin or coatomer-coated vesicles.

Before the National Institute for Communicable Diseases publication, there were no ultrastructural evidence for SARS-CoV-2 being vertically

transmitted from an infected mother to her child through the placenta (in utero), although viral spike proteins and ACE-2 receptors had been shown, indirectly, to occur in the syncytiotrophoblast using light microscopy (antibody



**Coronavirus virions are typically spherical, forming in clusters within membrane-bound vesicles**



labelling and in situ hybridisation). The syncytiotrophoblast, a foetal tissue, is the outermost barrier layer of the placenta, composed of a continuous layer of multinucleate cells derived from the underlying cytotrophoblast

layer. COVID-infected placental tissue had also been described as having distinctive histology typified by necrotic trophoblast layers and histiocytic intervillitis.

A private laboratory had performed COVID-PCR testing on a mother, her 30 week-old neonates, and a wax-embedded section of the placenta, all of which were positive for SARS-CoV-2. Histological examination of the placental tissue supported a case of vertical transmission, and a piece of formalin-fixed placenta was referred to the NICD EM laboratory for ultrastructural confirmation. Coronavirus virions are typically spherical, forming in clusters within membrane-bound vesicles, and appearing 'dotted' (these 'dots' being sections through the nucleocapsid). Virion spikes are seldom observed in sectioned material unless stained, selectively. TEM confirmed the light microscopical observations of the sloughing of necrotic trophoblast layers, and numerous virions were observed in the syncytiotrophoblast layers of the villi. Virions were always within vesicles, and most of the sectioned particles within a vesicle had obvious nucleocapsid profiles.

The multinucleate nature of the syncytiotrophoblast (N=nucleus) is evident, with numerous virus particles visible as small circular structures within the lumina of the endomembrane systems.





# WHERE DO LABORATORY SPECIMENS GO?

By Puseletso Kobedi



**T**oday, laboratory testing is performed in many different settings, from the large reference laboratory that performs many complex tests to your own home, where you might take a pregnancy test or monitor your blood glucose levels. If you've had a sample taken at a health facility, you may wonder what happens to your specimen and where it goes.

The Communications Unit reached out to Busisiwe Masengemi (Laboratory Support Supervisor) and Lazarus Ngwenya (Admin Officer) to help us get a better understanding of the Receiving Laboratory at the NICD. But before we dive in, it's important to first understand what a reference laboratory is.

## One size does not fit all

Not all laboratories perform the same functions, simply because all tests are not the same. Just as tests vary, so do laboratories in complexity, the volume of tests performed, the technology, and the number and type of professionals who perform the testing. Almost all hospitals house a laboratory and the tests that are performed include those needed in emergency situations, such

as markers for heart attacks, tests where results are needed rapidly for patient care, and other high volume testing, for instance, electrolytes.

Reference laboratories, however, are used for specialised tests that are ordered occasionally or that require specialised equipment. Most of the tests performed are referred from physician's offices, hospitals, and other healthcare facilities. Several NICD laboratories provide reference diagnostic services and surveillance for communicable diseases, including influenza, poliomyelitis, tuberculosis, measles, rabies, and SARS-CoV-2.

## First stop- Receiving Laboratory

The Receiving Laboratory is a sample's first stop at the NICD and it is crucially important that no mistakes are made during this stage. Specimen reception plays one of the most important roles, a place where patient samples are sorted and dispatched to assigned centres for testing. "The receiving and processing of samples are one of the most important elements of the analytical process," says Masengemi. She stresses that if the unit is not properly organised, the integrity of

the complete analytical process is at risk. She adds that, "proper specimen collection, handling, labelling and transport are essential for accurate laboratory results. And if a specimen is not accurately identified, it can lead to delayed or wrong diagnoses, missed or incorrect treatments."

Ngwenya, who has been in employ at the NICD since 1998, shares, "I used to hear people talking about doing tests, but the only test I knew was a blood test." To his surprise, the Receiving Laboratory received more than just blood samples. Other sample types included sputum, tissue swabs, bronchiole lavage fluid, cerebral spinal fluid, urine and faeces. He further explains that on average, their laboratory receives between 4,000 to 11,000 specimens a month.

When asked what the most challenging part of his job is, Ngwenya says "from the time we receive the specimen, it needs to be delivered to the specific centre within two hours". He continues to explain that the team is required to act quickly, whilst at the same time paying meticulous attention to detail. This is to ensure that samples are sent as fresh as possible to the correct laboratory with the right information.

It is safe to say that with every job comes challenges and joys. "What I love most about my job is that I get to make a difference in people's lives," exclaims Masengemi. She continues that it goes beyond just being able to pay attention to detail and making sure that the specimen is delivered to the correct centre. The specimen is an answer to a patient's unanswered medical problem."

Thank you to the team at the Receiving Laboratory for the dedication, hard work and vital role they fulfil at the NICD.



# WHEN A MOMENTARY PAUSE IS NEEDED

By Lesego Sibilanga

The Sandringham campus, home to the National Institute for Communicable Diseases is where lifesaving science transpires, however it is also a space filled with natural wonderment. Spanning more than 980 hectares, the campus features relaxing scenery, including forest-like trees, lush vegetation, a variety of fauna, inspiring sunsets, not to mention the beautiful horses, sheep, occasional rabbits and the gaggle of the turkeys.

Many staff members have taken advantage of the campus to improve both their physical health and mental wellness. Here are few campus wellness tips:

## Meet your daily steps requirements

The campus circumference is nearly 2km long and a brisk walk can cover the area in 20 minutes. Walking, or jogging is a great way to increase your heart



rate, lung function and to improve overall health. Other benefits include reducing one's risk of heart disease and stroke.

## Make time to collect your thoughts

Nature can generate a multitude of positive emotions, such as calmness, joy, creativity and it can also facilitate concentration. Spending time in nature is linked to both cognitive benefits and

improvements in mood, mental health and emotional wellbeing.

It is easy to get caught up in the demands of everyday work life, but occasionally one needs to slow down, connect with nature and stop to smell the flowers.

## ACHIEVEMENTS



By Nileen Gale



## Heritage Day Celebration

CHIVSTI's HIV Virology Section recently donned their best traditional outfits in celebration of Heritage Day. The team celebrated the day through a traditional lunch and by preparing tasty desserts representative of their cultures.

## Career Milestone

Congratulations and elbow shakes are in order for **Clement Adu-Gyamfi** who recently obtained his PhD in Clinical Immunology from Wits

University. "The long hours and hard work have finally paid off, and I'm incredibly proud of achieving a career milestone," an enthused Adu-Gyamfi quips. Adu-Gyamfi has been a respected member of the Centre for Vaccines and Immunology (CVI) team since 2015 and his colleagues are overjoyed by his accomplishment.





# WHAT IT MEANS TO BE FULLY VACCINATED AGAINST COVID-19

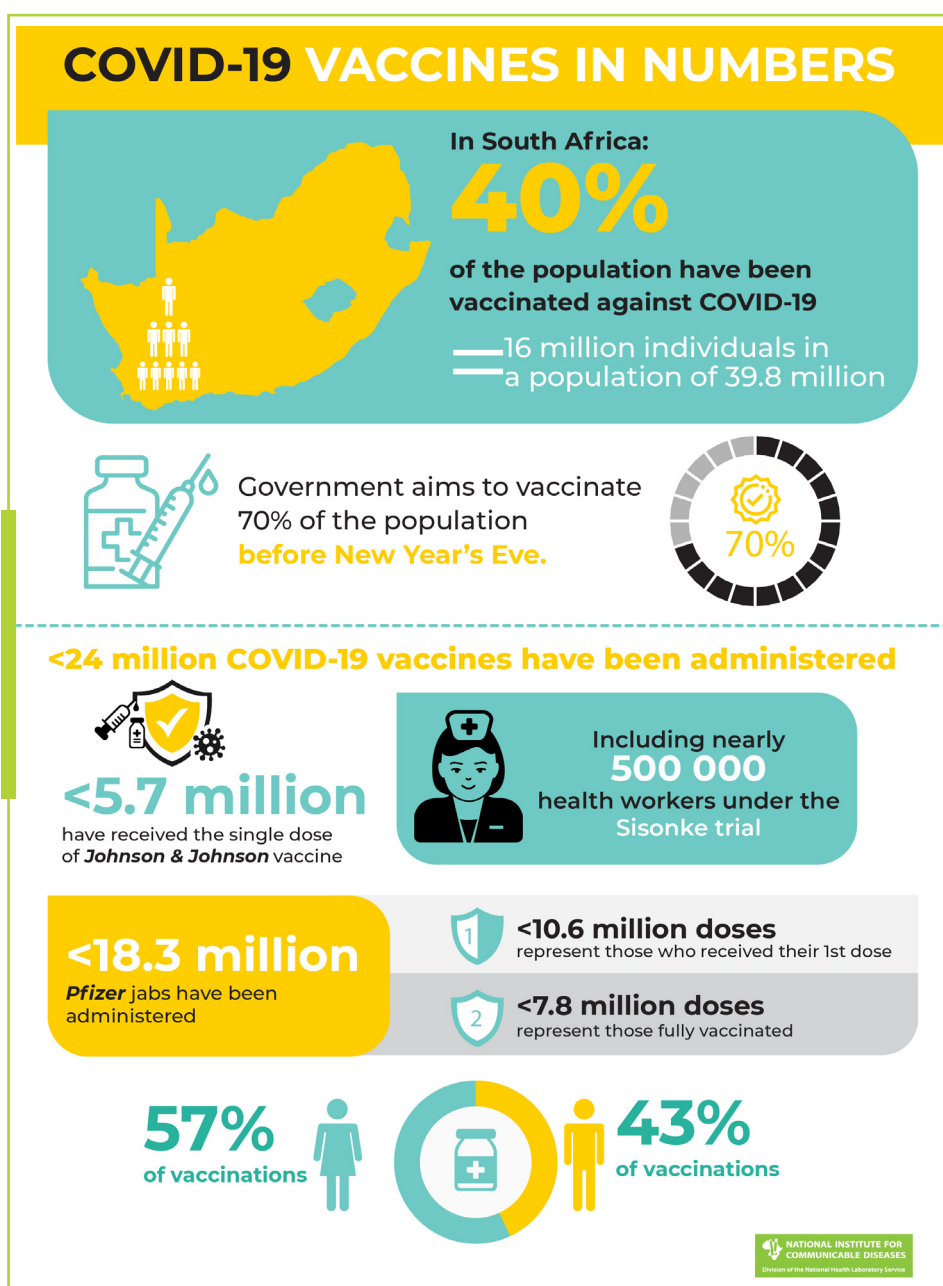
By Nileen Gale

If you understand the benefits of COVID-19 vaccination and if you have received the single dose Johnson & Johnson, or double dose Pfizer vaccine, then congratulations on being fully vaccinated. You join more than 16 million South Africans who have taken a step to protect themselves and those around them.

Presently 40% of the South African population have been vaccinated, with Government hard at work to reach the 70% target set for New Year's Eve. More than 24 million vaccines have been administered, of which more than 5.7 million doses represent Johnson & Johnson, and the remaining 18.3 million doses represent the Pfizer vaccine.

On a provincial level in South Africa, Gauteng, considered the economic heartbeat of the country, is currently leading the race with more than 6.5 million individuals vaccinated against COVID-19. This is followed by the Western Cape Province on 3.9 million people, and thirdly the KwaZulu-Natal province on 3.7 million administered doses. Females dominate vaccinations by 57%, mainly in the 35 – 49 and 18 – 34 age groups. Whereas males account for 43% of vaccinations, with the 35 to 49 years old and 18 to 34 year old also more prone to rolling up their sleeves.

National vaccination statistics are encouraging, but what does it mean to be fully vaccinated? The answer is simple. You can now enjoy maximum protection against developing severe COVID-19 disease, hospitalisation and death. And for those around you, it means reducing community disease transmission, which in turn lessens the burden on healthcare facilities. It also means that those who are unable



to get vaccinated and those awaiting their second Pfizer dose also enjoy some protection.

Being fully vaccinated is not a “get out of jail free card” and if you are tempted to throw preventative measures into the wind, don't. Reason being that a fully vaccinated individual, especially the elderly and those with underlying

medical conditions, can still contract the virus and pass it on to others. Ultimately, caution needs to be exercised in order to safeguard the current freedoms we enjoy and we need all hands on deck to curb a potential COVID-19 resurgence.



# ANNUAL JAMES HS GEAR MEMORIAL LECTURE

By Lesego Sibilanga



On November 15, 2021, The Poliomyelitis Research Foundation (PRF) hosted another successful James HS Gear Memorial Lecture. The 15th James HS Gear Memorial Lecture, presented by respected colleague, Prof Penny Moore, was impressive by virtual webinar standards.

The lecture of huge topical interest, focused on the pivot from HIV vaccine research to COVID-19 and the lessons learnt for the next pandemic. Alastair Moffat, Chairman at the foundation (PRF) commended the session, "the session portrayed the history of James Gear and the PRF in such a positive way, and Prof Penny Moore prepared and delivered an outstanding lecture."

The session had more than 200 attendees, reaching a potential of more than 1,300 viewers through the different screens.



Moore is the South African Research Chair of Virus-Host Dynamics and Reader at the University of the Witwatersrand and the NICD. She holds a joint appointment as CAPRISA Honorary Senior Scientist in Virus-Host Dynamics at the Centre for the AIDS Programme of Research (CAPRISA), University of KwaZulu-Natal and is an Adjunct Member of the Institute of Infectious Disease and Molecular Medicine (IDM) at the University of Cape Town.

Moore co-directs a team of more than 25 scientists and students working on HIV, SARS-CoV-2 and other viruses, combining Virology, Immunology, Bioinformatics and Structural Biology to define the interplay between viruses and our immune system. She has published more than 100 papers, many in high impact journals such as Nature, Nature Medicine, the New England Journal of Medicine and Cell Host Microbe. Moore also has a strong focus on teaching. She mentors many students and post-docs in her lab and other institutes and contributes to capacity strengthening initiatives across Africa.

**MORE ON PROF MOORE:**

**Thank you to the authors for their contributions!**

On behalf of the editorial and production team, happy reading!

**Sinenhlanhla Jimoh | Senior Communications Manager**

**National Institute for Communicable Diseases**

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