

SAMRC Diarrhoeal Pathogens Research Unit



Prof MJ Mphahlele
Co-Director



Dr LM Seheri
Deputy Director



Prof AD Steele
Co-Director

The MRC Diarrhoeal Pathogens Research Unit (DPRU) was established at the former MEDUNSA in April 1996, and was the first MRC unit to be founded at a previously disadvantaged institution.

The DPRU was founded on the principle that it will address a national and continental disease that was under-researched in Africa. Diarrhoeal diseases remain a leading cause of mortality among infants and young children in Africa. It is estimated that diarrhoeal disease is the primary cause of death in children younger than 5 years, leading to about 160 - 200 deaths per day in South Africa.

The mission of this Unit is:

- to study microbial agents associated with diarrhoea in infants and young children in Southern Africa
- to investigate the molecular epidemiology of rotavirus infection in Southern Africa with a view to optimising the future implementation of a rotavirus vaccine strategy
- to study the molecular pathogenesis of rotavirus infection, using the vast array of clinical material available as well as detailed molecular analysis of the associated viruses
- to support biotechnological developments in the field of anti-diarrhoeal vaccines, which could have a dramatic effect on our population
- to promote a public understanding and awareness of diarrhoeal disease and the importance of research in this area
- to develop human capital capacity through training of young researchers, equipping them to join the local scientific community;
- to collaborate actively with both national and international researchers
- to contribute to the science system through a range of scholarly activities

MRC DIARRHOEAL PATHOGENS RESEARCH UNIT (DPRU)

The Unit was formerly under the directorship of Prof AD (Duncan) Steele from 1996 to 2005. Prof Steele was seconded to WHO Geneva from 1 December 2002 to facilitate, inter alia, global rotavirus vaccine development, testing and introduction into national immunisation programmes. Subsequently, Prof Steele took up a challenging position in 2007 at PATH, Seattle, USA, as Senior Technical Advisor in the Division of Vaccines and Immunization, in charge of diarrhoeal vaccines worldwide. This was followed by another prestigious international position of Senior Programme Officer at the Bill and Melinda Gates Foundation (BMGF) in the Enteric and Diarrhoeal Diseases Programme since September 2011 up to present.

In the interim, Prof MJ (Jeffrey) Mphahlele, assisted Prof Steele initially with the management of the Unit in capacity as Acting Director of DPRU from April 2006, and later with scientific and strategic direction of the Unit.. The 4th peer-review panel of the Unit in October 2010 officially recommended both Prof AD Steele and Prof MJ Mphahlele as co-Directors of the Unit, with Dr LM (Mapaseka) Seheri as Deputy Director.

DPRU has grown to become an internationally recognized premier research center in Africa, and is conducting groundbreaking research work in the field of rotaviruses, providing training for postgraduate students and African scientists, and has performed rotavirus vaccine trials to facilitate regulatory pathways for licensing vaccines in Africa and post-marketing surveillance studies. The DPRU has successfully co-established the African Rotavirus Surveillance Network (AFR RSN) and has been appointed as the WHO Regional Rotavirus Reference Laboratory (RRL) for Africa since 2005 by the World Health Organization (WHO) and Programme for Appropriate Technology and Health (PATH). The core functions of RRL are to conduct basic science research, surveillance and burden of disease studies, and provide technical support to other African laboratories conducting rotavirus research and surveillance

CURRENT PRIORITY RESEARCH PROGRAMS

- ❖ WHO Rotavirus Regional Reference Laboratory core functions
- ❖ Rotavirus epidemiology and genomics in Africa
- ❖ Microbiome and metagenomics of the gut
- ❖ Epidemiology and surveillance studies of diarrhoeal pathogens

HIGHLIGHTS ON IMPACT TO POLICY AND PRACTICE

The research priority of the DPRU is to contribute towards Target 4 of the UN's MDG i.e. "to reduce by two thirds the under-five mortality rate (U5MR) between 1990 and 2015". The introduction of rotavirus vaccine in the South African Expanded Programme on Immunisation in August 2009 was a success story and the vaccine has already shown to significantly reduce rotavirus mortality and morbidity in children less than 5 years. DPRU as part of the national rotavirus surveillance programme coordinated by the National Institute for Communicable Diseases (NICD) aimed to monitor the impact of rotavirus vaccine at its sentinel site of Dr George Mukhari Academic hospital, where there was clear evidence of changing pattern of rotavirus epidemiology after introduction of rotavirus vaccine. For example, the surveillance confirmed substantial reduction in the number of diarrhoeal related hospitalizations and rotavirus diarrhoea. In addition, there were changes in age-specific and seasonal incidence of disease and timing of rotavirus season. As many African countries begin to introduce the rotavirus vaccine into childhood immunization programs, the Unit as the WHO Rotavirus Regional Reference Laboratory continues to assist African countries through regional workshops to generate data required for rotavirus vaccine advocacy and implementation, as well as future monitoring of vaccine effectiveness.

SELECTED RECENT PUBLICATIONS

- Seheri M, Nemarude L, Peenze I, et al. Update of rotavirus strains circulating in Africa from 2007 through 2011. *Pediatr Infect Dis J.* 2014; 33 1:S76-84.
- Seheri LM, Mwenda JM, Page N. Report of the 7th African Rotavirus Symposium, Cape Town, South Africa, 8th November 2012. *Vaccine.* 2014; 32(48):6336-6341.
- Nyaga MM, Stucker KM, Esona MD, et al. Whole-genome analyses of DS-1-like human G2P[4] and G8P[4] rotavirus strains from Eastern, Western and Southern Africa. *Virus Genes.* 2014; 49(2):196-207.
- Nyaga MM, Esona MD, Jere KC, et al. Genetic diversity of rotavirus genome segment 6 (encoding VP6) in Pretoria, South Africa. *Springerplus.* 2014; 3:179.
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- Pukuta ES, Esona MD, Nkongolo A, et al. Molecular surveillance of rotavirus infection in the Democratic Republic of the Congo August 2009 to June 2012. *Pediatr Infect Dis J*. 2014; 33(4):355-359.
- Kiulia NM, Nyaga MM, Seheri ML, et al. Rotavirus G and P types circulating in the eastern region of Kenya: predominance of G9 and emergence of G12 genotypes. *Pediatr Infect Dis J*. 2014; 33 1:S85-88.
- Pursem VN, Peeroo BM, Mangar TI, et al. Epidemiology of rotavirus diarrhea and diversity of rotavirus strains among children less than 5 years of age with acute gastroenteritis in Mauritius: June 2008 to December 2010. *Pediatr Infect Dis J*. 2014; 33:S49-53.
- Mukaratirwa A, Berejena C, Nziramasanga P, et al. Epidemiologic and genotypic characteristics of rotavirus strains detected in children less than 5 years of age with gastroenteritis treated at 3 pediatric hospitals in Zimbabwe during 2008-2011. *Pediatr Infect Dis J*. 2014; 33 1:S45-48.
- Odiit A, Mulindwa A, Nalumansi E, et al. Rotavirus prevalence and genotypes among children younger than 5 years with acute diarrhea at Mulago National Referral Hospital, Kampala, Uganda. *Pediatr Infect Dis J*. 2014; 33 1:S41-44.
- Abebe A, Teka T, Kassa T, et al. Hospital-based surveillance for rotavirus gastroenteritis in children younger than 5 years of age in Ethiopia: 2007-2012. *Pediatr Infect Dis J*. 2014; 33 1:S28-33.

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- Tsolenyanu E, Seheri M, Dagnra A, et al. Surveillance for rotavirus gastroenteritis in children less than 5 years of age in Togo. *Pediatr Infect Dis J.* 2014; 33 1:S14-18.
- Ahmed SF, Mansour AM, Klena JD, et al. Rotavirus genotypes associated with acute diarrhea in Egyptian infants. *Pediatr Infect Dis J.* 2014; 33 1:S62-68.
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- Seheri LM, Page NA, Mawela MP, et al. Rotavirus vaccination within the South African Expanded Programme on Immunisation. *Vaccine.* 2012; 30 :C14-20.
- Jere KC, Mlera L, O'Neill HG, et al. Whole genome sequence analyses of three African bovine rotaviruses reveal that they emerged through multiple reassortment events between rotaviruses from different mammalian species. *Vet Microbiol.* 2012; 159:245-250.

NATIONAL AND INTERNATIONAL COLLABORATIONS

- WHO AFRO Brazzaville, Congo in capacity as Rotavirus Regional Reference Laboratory for Africa.
- Noguchi Memorial Institute for Medical Research, Accra, Ghana
- University of Ghana Medical School/Korle Bu Teaching Hospital, Accra, Ghana
- National Institute for Communicable Diseases (NICD).
- UNISA
- Kenya Medical Research Institute (KEMRI), Kenya
- University Teaching Hospital, Zambia
- Universitaire de Yaounde, Cameroon
- Ethiopian Health and Nutrition Research Institute, Ethiopia.
- Institute Pasteur, Dakar, Senegal
- Federal Ministry of Health, Tanzania
- Ministry of Health, Uganda
- University of Zimbabwe, College of Health Sciences, Harare, Zimbabwe
- Research Institute Royal Children's Hospital, Australia,
- Gastroenteritis and Respiratory Virus Laboratory Branch, CDC, Atlanta.
- Onderstepoort Veterinary Research Institute,
- North West University Potchefstroom
- University of Stellenbosch
- University of Cape Town
- University of Pretoria
- J. Craig Venter Institute, Maryland, Washington DC, United States of America
- University of Cincinnati, Ohio, United States of America
- Centre for Infectious Disease Research in Zambia (CIDRZ)
- Rega Institute for Medical Research Laboratory For Clinical And Epidemiological Virology-University of Leuven Belgium

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