DIVISION OF RESEARCH CAPACITY DEVELOPMENT (RCD)

SAMRC INTRA-MURAL POSTDOCTORAL PROGRAMME

Request for Applications 2024/2025

PROJECTS OPEN FOR APPLICATIONS

Project 1

Research Unit	Unit /Project Contact details	Project Title
Strategic Research Initiatives (BRILLIANT Consortium)	• Dr Niresh Bhagwandin Tel: 0219380652/ Email: Niresh.bhagwandin@mrc.ac.za • Prof Wendy Burgers Tel: 0214066090/ Email: Wendy.burgers@uct.ac.za • Prof Glenda Gray Email: glenda.gray@mrc.ac.za	HIV Vaccine Innovation, Science and Technology Acceleration in Africa: for the BRILLIANT Consortium

Project Background

Although we are in the ART era of the HIV pandemic, new HIV infections continue to occur and the development of an HIV vaccine is still a global priority. Less than 1% of vaccines administered in Africa are manufactured on the continent, and there is an urgent need to strengthen the infrastructure for vaccine research, development, pre-clinical testing, pilot-scale production and regulation in Africa, which has the potential to contribute to the sustainable production of vaccines. The BRILLIANT Consortium (BRinging Innovation to cLinical and Laboratory research to end HIV In Africa through New vaccine Technology) is a Cooperative Agreement with the US Agency for International Development (USAID) and SAMRC, which is supported by its partners and a network of diverse community organisations. The overall aim of the BRILLIANT Consortium is to develop and evaluate HIV vaccines. The Consortium conducts clinical trials of promising immunogens and adjuvants, as well as discovery medicine studies of novel immunogens, including those developed on the continent. It plans to move the regional and global HIV vaccine field forward by rapidly evaluating and optimising immunogen design with a multi-country discovery medicine clinical trial platform supported by laboratory research infrastructure.

Project 2

Research Unit	Unit/Project Contact details	Project title
Non-Communicable Diseases Research Unit	• Prof Zandile Mchiza Tel: 0219380673/ Email: Zandile.Mchiza@mrc.ac.za • Prof Nasheeta Peer Tel: 031-2034882/Email: Nasheeta.peer@mrc.ac.za • Dr Jillian Hill Tel: 0219380811/Email: Jillian.hill@mrc.ac.za	Comorbid Diabetes and Depression (CODAD) Study

Project Background

The influences on optimal glucose control in people living with type 2 diabetes mellitus (PLWD) are multifactorial. Among the key patient factors, a less examined influence on diabetes control, particularly in Africa, is co-morbid depression. This is pertinent to South Africa, where the burden of both diabetes (15%) and depression in PLWD (36-47%) is high.

Project 3

Research Unit	Unit/Project Contact details	Project title
Mental Health, Alcohol, Substance Use and Tobacco Research Unit	• Prof Jason Bantjes Tel: +27 21 938 0993/ Email: jbantjes@mrc.ac.za • Prof Nadine Harker Tel: +27 21 938 0425/ Email: Nadine.harker@mrc.ac.za	National survey of university students' mental health care needs in South Africa.

Project Background

This project is an extension to an existing research project (Ethics Reference #: N13/10/149), which was initiated in 2015 to investigate the mental health of university students at Stellenbosch University (SUN) and the University of Cape Town (UCT). The initial project set out to investigate the prevalence and correlates of common mental health problems, hazardous substance use and suicidality among university students at SUN and UCT to collect information needed to plan effective support services, establish priorities for intervention, and implement strategies to promote the mental health of students and reduce suicide risk. This project has been expanded to include all registered students at universities in South Africa (SA), and survey questions are compliant with the DSM-5. The project is part of the World Health Organization World Mental Health Surveys International College Student Initiative.

Project 4

Research Unit	Unit/Project Contact details	Project title
HIV and other Infectious Diseases Research Unit	• Dr Fareed Abdullah Tel: 0123398577/ Email: Fareed.abdullah@mrc.ac.za • Prof Marian Loveday Tel: 031 203 4733/Email: Marian.loveday@mrc.ac.za	Investigating novel 6-month regimens for MDR/RR-TB in pregnancy and lactation

Project Background:

Rifampicin-resistant tuberculosis (RR-TB) is a global public health threat, with an estimated annual incidence of 450,000 and 191,000 estimated deaths in 2021.1 Pregnant and postpartum women are at increased risk of TB and RR-TB,2,3 especially those with HIV.4 Maternal TB increases the risks of hospitalisation and death,5,6 adverse pregnancy outcomes5-7 and transmission of both TB and HIV to their infants.5,8 Effective treatment depends on medication adherence, which may be compromised in the ante- and postpartum periods. Poor adherence to antiretroviral therapy (ART) in women with HIV has been documented in the postpartum period, with depression identified as a contributing factor,10,11, but this has not been studied in TB. Determining factors associated with adherence to MDR/MDR/RR-TB treatment during pregnancy and the postpartum period is critical for the development of appropriate interventions.

Project 5

Research Unit	Unit/Project Contact details	Project title
Health Systems Research Unit	• Prof Tamara Kredo Tel: +27 21 938 0508/ Email: Tamara.kredo@mrc.ac.za • Dr Bey-Marrie Schmidt Email: bey-marrie.schmidt@mrc.ac.za	Partnership for evidence-informed decision-making for UHC in South Africa

Project Background:

The South African Medical Research Council (SAMRC), through the Health Systems Research Unit (HSRU), are supporting the National Department of Health in establishing National Health Insurance (NHI) to achieve Universal Health Coverage (UHC) in South Africa. NHI implementation requires major changes to the health system, including funding, management, and policy regulations. To ensure the development of transparent

and effective NHI policies, these policies must be informed by the best available evidence of what works, alongside consideration of contextual factors, costs and feasibility. A key challenge is the lack of collaboration between researchers and policymakers, hindering timely, relevant research. Success depends on an ongoing partnership between these groups to ensure evidence informs health sector decisions. As such, the Evidence to Decision (E2D) collaborative initiative was established within the HSRU in partnership with another SAMRC unit (Cochrane South Africa), the National Department of Health and Stellenbosch University.

Project 6

Research Unit	Unit/Project Contact details	Project title
Gender and Health Research Unit	• Dr Pinky Mahlangu Tel: 0123398554/Email: Pinky.mahlangu@mrc.ac.za • Prof Yandisa Sikweyiya Tel: 012 339 8619/Email: Yandisa.sikweyiya@mrc.ac.za	Engaging young men (ages 18-30) in the process of adapting the Stepping Stones and Self Help+ interventions to improve mental health and prevent sexual violence

Project Background:

Male-perpetrated sexual violence is a worldwide public health concern that has serious negative impacts on the women and girls who experience it. While there are several drivers of male-perpetrated sexual violence, men's masculinity/ies are key. Masculinity refers to idealised notions of what it means to be a man in any given context. Violent masculinities do not simply 'exist' but emerge out of poverty, men's own experiences of violence, poor mental health, and inequitable gender norms, including the acceptability of violence. Addressing sexual violence perpetration by creating more gender-equitable masculinities is critical for improving men's, women's, and children's health and well-being and achieving the Sustainable Development Goals. Despite this, there is little empirical evidence about the overlap between multiple forms of sexual violence (e.g., partner and non-partner rape) perpetrated by men, nor effective strategies for preventing it.

Project 7

Research Unit	Unit/Project Contact details	Project title
Genomics Centre	• Prof Craig Kinnear Tel: 0219389406/ Email: ckinnear@mrc.ac.za	Characterisation of Autophagic flux in Mycobacterium tuberculosis-infected macrophages

Project Background:

Tuberculosis (TB), caused by Mycobacterium tuberculosis (Mtb), remains a leading cause of death worldwide, particularly in sub-Saharan Africa. Despite efforts to control TB, challenges such as drug-resistant strains and ineffective vaccines persist. An estimated quarter of the global population has been infected with Mtb, though only 3-10% develop active TB. This variation is linked to factors such as genetics, immune responses, and co-existing conditions. A key immune response in bacterial infections, including TB, is autophagy, where cells degrade damaged organelles or pathogens for recycling. Autophagy helps with nutrient conservation and boosts immune defense by degrading Mtb. Studies have shown that inducing autophagy in infected macrophages can enhance Mtb clearance. However, the detailed mechanisms of autophagy in TB remain unclear. Mtb survives by inhibiting the fusion of phagosomes (which engulf the bacteria) with lysosomes, thus avoiding degradation. Research has shown that Rapamycin, an autophagy inducer, reduces bacterial load in infected macrophages, indicating potential therapeutic targets. Combining Rapamycin with antibiotics in mice has shown promise in lowering bacterial load and lung inflammation, though its effectiveness in humans is still uncertain. The World Health Organization reports that 90% of people infected with Mtb clear it without developing active TB, highlighting the need for immune-strengthening strategies. However, there is a gap in understanding how autophagy levels in healthy individuals relate to TB risk. Developing reliable methods to measure autophagy in humans could lead to better TB prevention strategies.

Project 8

Research Unit	Unit/Project Contact details	Project title
Centre for Tuberculosis Research	• Prof Robin Warren Tel: 0219389251/ Email: Rw1@sun.ac.za • Prof Desiree Petersen Tel: 0219389412/ Email: Dp3@sun.ac.za	Identifying structural variants associated with Tuberculosis and Type 2 Diabetes Comorbidity using long-read sequencing technology

Project Background

The co-occurrence of tuberculosis (TB) and type 2 diabetes (T2D) poses a significant global health challenge, particularly in low- and middle-income countries where both conditions are prevalent. With diabetes rates projected to rise sharply in Africa, understanding the interaction between TB and T2D is critical. Notably, specific genetic variants, such as those affecting red blood cell lifespan and glucose metabolism, may influence disease diagnosis and outcomes. The underrepresentation of sub-Saharan populations in genetic studies further complicates this issue. This research aims to explore the genetic underpinnings of TB-T2D comorbidity in South Africa's diverse population using advanced sequencing technologies. By leveraging long-read and Hi-C sequencing, we intend to identify ancestry-specific structural variants and gene-gene interactions that contribute to this dual burden. We will conduct a comprehensive study involving participants from various backgrounds, focusing on those with TB, T2D, and their comorbidities. Key methodologies include library preparation for sequencing, ancestry inference, and genomic data analysis.

Project 9

Research Unit	Unit/ Project Contact details	Project title
Cochrane South Africa	• Prof Mark Engel Tel: 0219380307/ Email: Mark.engel@mrc.ac.za • Prof Sara Cooper Tel: 0219380340/ Email: Sara.cooper@mrc.ac.za	Enhancing Healthcare Insights: Building Qualitative Evidence Synthesis in South Africa and Beyond

Project Background

Qualitative Evidence Synthesis (QES) is increasingly being used in healthcare decision-making processes, including global guideline development and policy formulation. However, to date, most QES outputs and methodological tools have emerged from the Global North. The knowledge, skills, and competencies required to analyse and apply qualitative evidence in decision-making processes are scarce in South Africa and other African countries.

Over the past decade, there has been growing recognition of the potential contribution of qualitative evidence to global healthcare decision-making. Those working in these arenas increasingly seek evidence beyond the effects of interventions to wider questions about local norms and preferences, equity and human rights issues, acceptability and feasibility of interventions, implementation processes, and the impact of socio-political and cultural contexts. Qualitative research and reviews of qualitative evidence are increasingly seen to offer important insights for answering this broader range of questions. 'Qualitative evidence syntheses' (QES) - or systematic reviews of qualitative evidence – is a term for the broad group of methods for systematically synthesising the findings from multiple primary qualitative studies. QES has recently become an important method for incorporating qualitative research into healthcare decision-making processes, including guideline development and policy formulation.

Project 10

Research Unit	Unit/Project Contact details	Project title
Biomedical Research and Innovation Platform	• Prof Rabia Johnson Tel: 0219380866/Email: Rabia.johnson@mrc.ac.za	Identification of Novel Phenotypic Groups in Hypertension Using Machine Learning Approaches

Project Background

Bioinformatics, big data, and machine learning (ML) algorithms are increasingly used to discover disease biomarkers and manage complex diseases like hypertension. By integrating large datasets from various sources—such as genomic, epigenomic and clinical data—bioinformatics can allow for a deeper understanding of disease mechanisms. Machine learning (ML) algorithms will then be used to analyse these vast amounts of data to identify key patterns and potential biomarkers, which are critical for early diagnosis, risk prediction and targeted treatment interventions. In the case of hypertension, a multifactorial disease, machine learning can help predict disease progression and treatment outcomes by simultaneously evaluating numerous clinical and genetic risk factors. The fusion can be used as a personalised approach to enhance patient management by offering tailored therapeutic strategies, making it a crucial tool in modern healthcare.

Project 11

Research Unit	Unit/Project Contact details	Project title
Biomedical Research and Innovation Platform/Centres & Platforms Office	• Prof Johan Louw Tel: +27 21 938 0627/johan.louw@mrc.ac.za • Dr Pritika Ramharack Tel: +27219380206/ Email: Pritika.ramharack@mrc.ac.za	Catalysis in the Synthesis of Aspalathin, an Antidiabetic Compound from South African Rooibos

Project Background

Aspalathin, a flavonoid derived from South African rooibos, has shown significant potential as a selective sodium glucose co-transporter 2 (SGLT2) inhibitor, making it a promising alternative for type 2 diabetes treatment. With over 422 million people living with diabetes globally and 4.2 million in South Africa alone, the availability of affordable and effective treatments is crucial. While SGLT2 inhibitors like empagliflozin and dapagliflozin are effective, they remain expensive. Aspalathin offers a "Proudly South African" solution with additional benefits such as enhancing insulin signalling and promoting insulin-mediated glucose uptake. However, earlier synthesis methods for aspalathin and its related compound, nothofagin, faced challenges with complex steps and low yields. This project will focus on upscaling the synthesis using glycosylation, functionalisation, and transition-metal catalysed cross-coupling reactions, employing sustainable resources and recyclable catalysts, as well as validating the synthesised aspalathin's structure and biological activity.