

Tuberculosis Biomarker Research Group, School of Laboratory Medicine and Medical Sciences; School of Life Sciences, University of KwaZulu-Natal

Postdoctoral scholarships (2 years; R200 000/year) and PhD studentships (3 years; R100 000/year) available for 2019

We invite applications from ambitious Post-Docs and PhD students, to undertake research in a Flagship project of the University of KwaZulu-Natal, Durban, South Africa, entitled 'Afrocentric Precision Approach to Control Health Epidemics' (**APACHE**).

Novel Pathogen and Host Biomarker Discovery for the development of vaccines and rapid diagnostics for Tuberculosis.

Tuberculosis (TB) is the leading cause of death from an infectious disease worldwide, with one third of the global population infected with *Mycobacterium tuberculosis* (Mtb) and over one million deaths annually from the disease. Diagnostic delays preventing timely initiation of anti-TB therapy contribute to increased TB transmission and high TB burdens globally. For the past 100 years, Bacille Calmette-Guerin (BCG) has been the only licensed vaccine available to the public, but protects against TB only during the first 10 years of life. Therefore, there is an urgent need to develop more effective vaccines that will provide immune protection for adolescent and adults, as well as a rapid point of care test that can be applied at primary health care facilities. This project aims to design novel tuberculosis (TB) vaccines and rapid diagnostics based on pathogen and host biomarkers identified in our previous studies.

Project 1: Recombinant subunit TB vaccines for protective humoral and cellular mediated immunity

This project will compare novel recombinant subunit vaccines and TB protein vaccines for their capacity to elicit protective humoral and T cell mediated immunity against Mtb infection. The project will involve molecular biology (PCR, cloning, expression and purification of recombinant Mtb subunit vaccine), immunology (analysis of in vitro and mouse in vivo immune response, the characterization of humoral and T cell immune response etc.

Requirements:

Postdoctoral Scholarship: PhD in Immunology/Biochemistry/Microbiology (or a closely-related field). Experience in conducting in vivo studies in mouse models, preferably immune response analysis, robust understanding of innate and adaptive immune system, a strong molecular biology background (PCR, cloning and expression of recombinant proteins etc.), bioinformatics. Experience in vaccinology will be an advantage.

PhD studentship: MSc in Microbiology/Molecular Biology/Immunology/Biochemistry (or a closely-related field). Experience in animal handling, recombinant DNA cloning and expression of recombinant proteins, RT-PCR, and basic immunological techniques such as multi-colour flow cytometry, ELISA, RT-PCR, cell sorting etc., will be an advantage.

Project 2: Novel host and pathogen biomarker discovery

High throughput next generation RNA sequencing and global transcriptomics have led to better understanding of TB pathogenesis, and present new opportunities in host and pathogen biomarker discovery.

Post-Doctoral project:

The aim is to develop a RNA Seq bioinformatics pipeline for the discovery of novel host and pathogen molecular biomarker signatures using sets of previously generated data. These markers will be validated using laboratory based functional studies.

Requirements: PhD in Bioinformatics (or equivalent), understand and apply different computing languages such as perl, python, C++, etc; evidence of quality publications in peer reviewed journals. A background in immunology, molecular biology and protein will be an advantage.

PhD project:

The aim is to identify TB-specific host novel transcripts and other complex molecular mechanisms such as alternative splicing, differential exon and intron usage during infection of innate cells by clinical strains of *M. tuberculosis*. In addition, novel pathogen and host transcripts will be investigated using existing RNA-Seq databases arising from our functional genomics/ global transcriptomic studies involving *M. tuberculosis* adhesins. Novel transcripts will be validated by functional assays.

Requirements:

MSc in Bioinformatics (or equivalent) or MMedSc, understand and apply different computing languages. Experience in wet lab based molecular and protein techniques, as well as TB and cell culture will be an advantage.

Interested individuals should send an application, which should contain a CV and a motivation letter (max. 500 words) by **28 February 2019** to: Dr Nonto Mvubu: mvubun@ukzn.ac.za; Dr Thamsanqa Chiliza: chilizat@ukzn.ac.za; and Prof M. Pillay: pillayc@ukzn.ac.za