PIDDGEN
Primary immunodeficiency diseases (PIDs), which are a heterogeneous group “inborn errors of immunity” that underlie a variety of phenotypes including increased susceptibility to infection, autoimmunity, autoinflammation, allergy, and tumors. Individually, these disorders are rare, however collectively they represent a significant burden of disease.

It has recently been estimated that almost one million people in Africa suffer from some form of PID, with South Africa contributing approximately 42,000 cases. However, the human immunodeficiency virus (HIV), tuberculosis (TB) and other infectious epidemics in sub-Saharan Africa, limited clinical and laboratory infrastructure for PID, as well as a general lack of awareness of PID, have been major obstacles to diagnosis.

In 2013, a working group of clinicians and molecular biologists was established at Stellenbosch University to provide clinical and molecular diagnosis to PID patients in South Africa. This working group, called the Primary Immunodeficiency Diseases Genetics Network (PIDDGEN), has been actively recruiting PID patients from across South Africa. Over the past three years, PIDDGEN, in collaboration with a number of international partners, has identified several PID-causing mutations and achieved a diagnostic rate of 44% using Whole Exome Sequencing. Previously, molecular diagnosis of these patients were only available through collaborations with international laboratories which often resulted in extended turn-around times for diagnoses. However, through the efforts of PIDDGEN, local capacity for molecular PID diagnosis has been established in South Africa, allowing for quicker and more cost effective diagnosis of our patients.

The South African National PID Registry, established in 2008, at present comprises 315 PID. To date, disease-causing mutations have been identified in 49 of these patients of which 14 were diagnosed by PIDDGEN. Therefore, in two and a half years, this newly formed working group has contributed more than 25% of the identified PID-causing mutations on the South African Registry. PIDDGEN strives to provide molecular diagnosis of PID patients from all over South Africa and is currently forming valuable collaborations with various African partners in order to expand into the rest of Africa.

More information about PIDDGEN go to: http://www.sun.ac.za/english/faculty/healthsciences/Molecular_Biology_Human_Genetics/piddgen/

BUILDING CAPACITY IN STUDIES ON THE GENETIC AETIOLOGY OF PARKINSON’S DISEASE IN SUB-SAHARAN AFRICA
What does it mean to have Parkinson’s disease (PD)? People who suffer from this condition experience motor problems including extremely slow movement and reflexes, muscle stiffness, involuntary tremors as well as problems with balance and gait. They also have other symptoms such as depression, dementia, apathy, psychosis, hallucinations, pain, loss of smell, sleep disturbances and autonomic dysfunction. PD predominantly affects middle-aged and elderly people. It is progressive and currently incurable, and symptomatic anti-PD medications typically provide good control of the motor signs for about five years. After this, the disability progresses despite best medical management with many patients developing long-term motor complications such as dyskinesias.
PD is associated with degeneration of the basal ganglia of the mid-brain and a deficiency of the neurotransmitter dopamine. As stated, increased age is an important risk factor for PD, but what may not be apparent is that PD has a significant genetic component, with a number of PD-causing genes identified. The PD Research Group at Stellenbosch University has been investigating the genetic component underlying the disease in South African patients for the past nine years (www.sun.ac.za/parkinsons). Some of our notable achievements include the finding of evidence for mitochondrial dysfunction in dermal fibroblasts from PD patients, a potential protective effect of curcumin against mitochondrial dysfunction and apoptosis in PINK1 deficient cells, a possible founder effect in Afrikaner PD patients, and the fact that we do not find many of the known PD-causing mutations in South African patients.

What is notable, however, is the lack of genetic studies on PD in sub-Saharan Africa (SSA). This is a cause for concern as therapies that are developed based on genes and mutations identified in Asian and Caucasian populations may not be transferable to populations in Africa. To this end, our group has established a collaboration with researchers, Dr. Komolafe and Prof. Olaogun at Obafemi Awolowo University Teaching Hospitals’ Complex (OAUTHC) in Ile-Ife, Nigeria to study the genetic causes in Black South African and Nigerian PD patients. Nigeria is the most populous nation in Africa with approximately 189 million people, and given the rapidly changing population demographics in SSA with people living longer, Nigeria is set to have a large number of people at risk of developing PD. In 2016, this collaboration was awarded an NIH R21 grant to build capacity in genetic studies on PD in South Africa and Nigeria. We will also collaborate with Prof. Ross from the Udall Center of Excellence in Parkinson’s Disease Research at Mayo Clinic, Florida, USA.

As part of this project, Profs. Soraya Bardien and Helena Kuvaniemi are supervising a Nigerian PhD student Mr. Oluwafemi Oluwole at Stellenbosch University. In November 2016, Mr. Oluwole visited the facilities at OAUTHC and trained some of their technicians in DNA isolation (Figures 1 and 2). It is anticipated that this collaboration between South Africa and Nigeria will be a start to address the lack of knowledge of genetic causes of PD in SSA. More importantly, this project aims to facilitate the building of sustainable genomics and bioinformatics research capacity in Africa on disorders of importance to Africa and led by African researchers.

Figure 1: Nigerian nurse counselling out-patients at the Neurology Clinic at Obafemi Awolowo Teaching Hospital, Ile-Ife, Nigeria.

Figure 2: Participants attending the DNA extraction training at Obafemi Awolowo University.
1. What is your current area of research?
   I am currently a postdoctoral fellow working on the discovery of novel disease causing variants in patients with primary immunodeficiency diseases.

2. What is your background and how did you become interested in your field of research?
   I did my PhD under the supervision of Prof. Soraya Bardien and I was afforded the opportunity of working on whole exome sequencing and testing the waters with bioinformatics – without her guidance I would never have had the courage to try something new! My new project focuses a lot on whole exome sequencing but specifically in young children. The fact that I am able to help make a small difference to the life of a patient is what drew me to my current project.

3. What piece of advice would you give to somebody beginning their career in human genetics?
   Hang in there... it is going to be the ride of your life and it isn't always fun.

4. Do you know any science jokes that you can share?
   Two cats on a sloping roof. Which one falls first?

   The one with the lowest μ.
1. **What is your current area(s) of research?**
   
   My current research focus is investigation into the genetic aetiology and pathways involved in the development of Parkinson’s disease (PD). More specifically my research investigated differential gene expression between PD patients and healthy controls using RNA-Sequencing to identify genes and pathways involved in PD aetiology.

2. **What is your background and how did you become interested in your field of research?**
   
   I completed my undergraduate studies in BSc Human Life Sciences In Genetics, Physiology and Biochemistry. Genetics always captivated my interest and I found the topics related specifically to human genetics engaging and enjoyed learning about different diseases. I then went on to complete my BSc Honours in Human Genetics in 2014 with a project entitled: A study of gene and protein expression of parkin in dermal fibroblasts from Parkinson’s disease patients with parkin mutations. Parkinson’s research was extremely fascinating and understudied in the South African context and therefore I decided to further my studies in the field with my MSc.

3. **What piece of advice would you give to somebody beginning their career in human genetics?**
   
   Never give up and stay positive, all the hard work will be worth it!

4. **How do you like to relax?**
   
   Working out and wine tasting with friends

5. **Do you have any secret talents?**
   
   I can sing