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KRISP Newsletter

KwaZulu-Natal Research Innovation and Sequencing Platform

Introduction:

The concept behind this newsletter is that anyone with 15 minutes to spare can learn about the work of the KwaZulu-Natal Research Innovation and Sequencing Platform (KRISP), which is hosted at UKZN, Durban, South Africa

In our April/May issue of 2019, we focus on **new genomics, bioinformatics and artificial intelligence technologies**. This month newsletter also highlights our travel to the Wellcome Trust Sanger Institute and a prestigious Royal Society Award to KRISP. We also cover our recent publication on TB and mental health in South Africa and four new training workshops organized with ThermoFisher Scientific.

KRISP wants to want to challenge the status quo and create a scientific environment in South Africa that drives innovations in global health and reverses the brain drain. A critical function of KRISP will be to make genomics, epigenetics and bioinformatics accessible to academic, industrial and commercial users.

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Highlights:

Genomics & Bioinformatics: **A KRISPER is inspired at the Wellcome Sanger Institute!**

Artificial Intelligence: **KRISP at IndabaX Deep Learning and Artificial Intelligence Conference, South Africa 2019**

Talks: **ASSAf Consensus Study on Genetics & Genomics Seminar, 7 May 2019**

Award**: KRISP team leader Dr. Veron Ramsuran joins a select club of Royal Society Research Fellows in Africa**

Publication: **Spatial structure of depression in South Africa, Nature Scientific Reports 2019**

Publication: **Neurocognitive Impairment Risk Among Individuals With Multiple Drug-Resistant TB and HIV Coinfection, J Nerv Ment Dis. 2019**

Workshops: **KRISP & ThermoFisher Scientific Training Site in Africa: Four new qPCR and Sanger Sequencing workshops in June 2019**

News: **KRISP work highlighted at SAFM, Sunday Times and U.K. Royal Society**

KRISP Talks and KRISPER is inspired at the WTSI

KRISP Talks: ASSAf Consensus Study on Genetics & Genomics
Speaker: Prof. Michael Pepper, Director, ICMM, University of Pretoria & SAMRC Unit for Stem Cell Research & Therapy
Date: Tuesday, 7 Mayl 2019
Time: 9:00am – 12:30pm
Venue: K-RITH tower building, Durban, South Africa

A KRISPER is inspired at the Wellcome Sanger Institute (WTSI)!

Course participants from Canada, United Kingdom, Italy, South Sudan, Ireland, Argentina, Saudi Arabia and South Africa (Zandile Sibisi at the back smiling).

State of the art training facilities at the Wellcome Trust Sanger Institute.

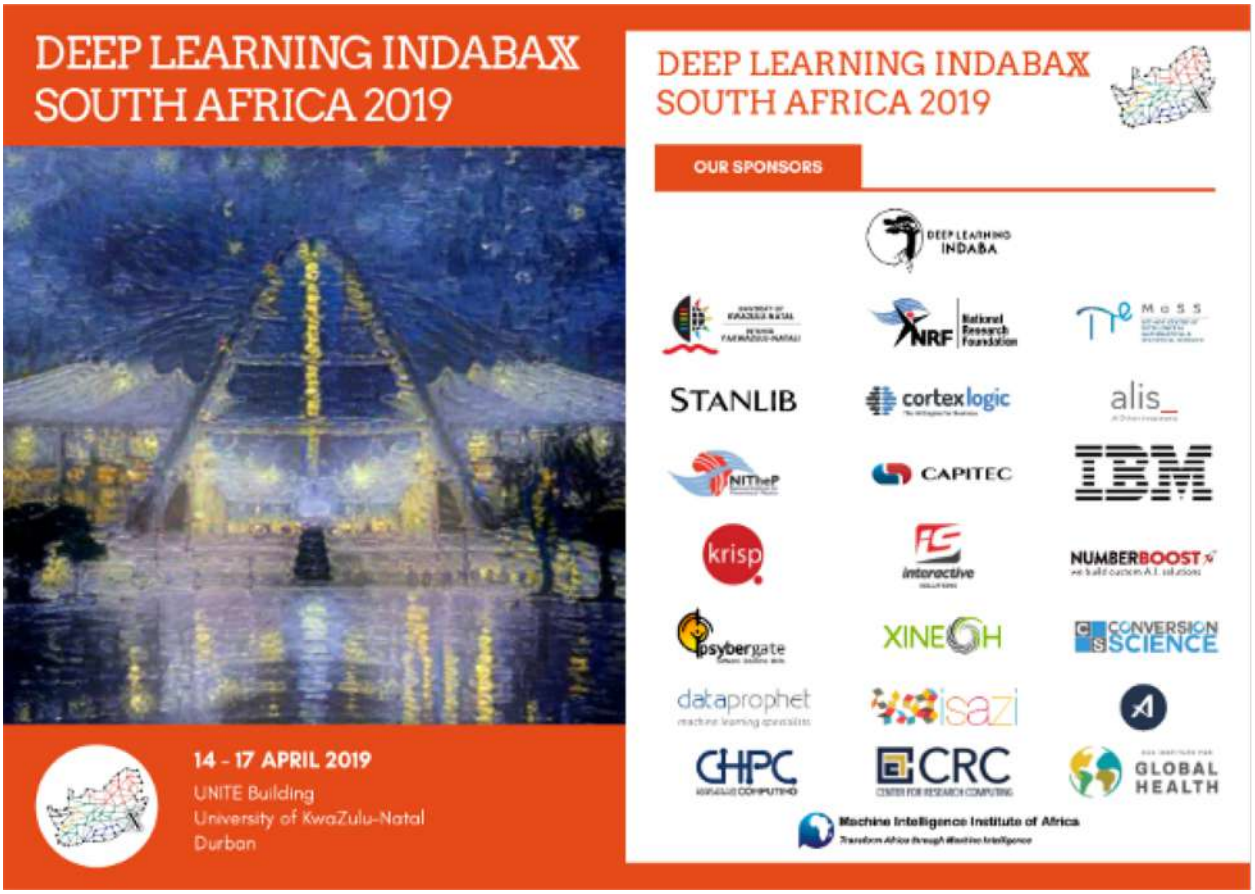
By Zandile Sibisi, Wellcome Genome Campus, 4 April 2019.

It was at the beginning of the festive season that I received the great news that my application to attend a WGC advanced course had been successful. My submission was chosen from many applicants by a stringent selection process, involving a highly regarded selection panel; I merrily accepted the invitation. Titled **"WGC Advanced Course in Genomics and Clinical Virology".** This course was very timely as my PhD research project focuses on elucidating phylogenetic transmission networks in a hyper-endemic setting in South Africa**. We are also using novel sequencing and analysis methods, many of which are cutting edge and covered in this workshop.`**

Being authors of a Nature publication based on the utilization of MinION sequencing, **Dr. Joshua Quick** and **Dr. Nick Loman** are probably the most qualified scientists to give laboratory training on this topic.
We also had informative seminars conducted by authors whose publications I read and cite frequently, such **as Prof. Andrew Leigh Brown, Prof. Oliver Pybus** and **Dr. Chris Wymant.** Additionally, Dr. Chris Wymant gave us a two-day practical on his Phyloscanner platform; it was like receiving piano lessons from Beethoven!

Blog: http://www.krisp.org.za/blogs.php?id=46

KRISP at IndabaX Deep Learning and Artificial Intelligence Conference, South Africa 2019



The IndabaX is a means with which to experiment with the ways in which we strengthen African machine learning, artificial intelligence and its local communities. KRISP is a sponsor of the Deep Learning IndabaX 2019, 14 to 17 April, South Africa.

The Deep Learning IndabaX is a locally-organised meeting that helps ensure that knowledge and capacity in machine learning are spread more widely across the continent. The IndabaX is a means with which to experiment with the ways in which we strengthen African machine learning and its local communities, allowing more people to contribute to the conversation around machine learning and artificial intelligence. IndabaX events are local versions of the Deep Learning Indaba, which will be held this year in Nairobi, Kenya.

This opening discussion addressed Africa's impact on all things artificial intelligence. This panel also served to introducing the narrative for the discussion: **focusing on AI and its complexities from our African perspectives rather than Africa from an AI perspective. The keynote was given by Prof. Tshilidzi Marwala,** Vice-Chancellor of University of Johannesburg on Rationality of Artificial Intelligent Machines.

The conference welcomed a diverse and experienced group of people to introduce what AI means to them and how it is influencing our world. This includes Prof. Francesco Petruccione, the Pro-Vice Chancellor of Big Data and Informatics at UKZN. KRISP has a boot in the conference and participated in many discussions with computer scientists, including hiring a new PhD student that will focus on AI and Genomics!

KRISP team leader Dr. Veron Ramsuran joins a select club of Royal Society Research Fellows in Africa…

The picturesque environment in Naivasha provided a space for Africa's next generation of scientific leaders to network and plan their research which seeks to address the challenges of the continent…

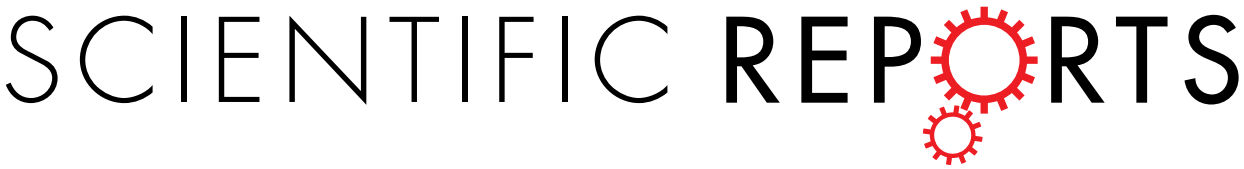
KRISP Team Leader Dr. Veron Ramsuran is one of 30 leading scientists to receive the prestigious AAS and UK Royal Society FLAIR Fellowship. The 2019 FLAIR funded scientists were selected from a competitive pool of more than 700 applicants. Their research is diverse, ranging from providing renewable energy solutions and addressing climate change, to tackling food security and targeting health and environmental problems that are most acute for people living in African countries.

Ramsuran's research will explore the role human genes have on diverse HIV outcomes specifically within individuals of African descent. He will be supported by the prestigious FLAIR fellowship which offers £300,000 for two years, in addition, each fellow will receive support, training, mentoring and opportunities to network both regionally and with the UK to develop international collaborations. **Dr Lenine Liebenberg**, a CAPRISA scientist, also received the FLAIR fellowship. A total of 16 of the 30 awardees were from South Africa. **Professor Salim Abdool Karim, Director of CAPRISA, was also elected a Fellow of the Royal Society this month!**. The UK Royal Society, established in 1660, includes an impressive list of scholarly fellows e.g. Sir Isaac Newton and Charles Darwin to Albert Einstein and Stephen Hawking…

UKZN and KRISP associated researchers with UK Royal Society Fellowships:
- Prof. Salim Abdool Karim (Royal Society Fellow)
- Prof. Tulio de Oliveira (Newton Fellowship)
- Prof. Frank Tanser (Newton Fellowship)
- Dr. Veron Ramsuran (FLAIR Fellowship)
- Dr. Lenine Liebenberg (FLAIR Fellowship)

The next round of FLAIR fellowships is currently open till 15th May 2019. Please find more information about the call on the Royal Society website (https://royalsociety.org/grants-schemes-awards/grants/flair/).

www.nature.com/scientificreports



OPEN

Spatial structure of depression in South Africa: A longitudinal panel survey of a nationally representative sample of households

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Diego F. Cuadros[1,2], Andrew Tomita[3,4], Alain Vandormael[3,5], Rob Slotow[6,7], Jonathan K. Burns[8,9] & Frank Tanser[5,10]

Wider recognition of the mental health burden of disease has increased its importance as a global public health concern. However, the spatial heterogeneity of mental disorders at large geographical scales is still not well understood. Herein, we investigate the spatial distribution of incident depression in South Africa. We assess depressive symptomatology from a large longitudinal panel survey of a nationally representative sample of households, the South African National Income Dynamics Study. We identified spatial clusters of incident depression using spatial scan statistical analysis. Logistic regression was fitted to establish the relationship between clustering of depression and socio-economic, behavioral and disease risk factors, such as tuberculosis. There was substantial geographical clustering of depression in South Africa, with the excessive numbers of new cases concentrated in the eastern part of the country. These clusters overlapped with those of self-reported tuberculosis in the same region, as well as with poorer, less educated people living in traditional rural communities. Herein, we demonstrate, for the first time, spatial structuring of depression at a national scale, with clear geographical 'hotspots' of concentration of individuals reporting new depressive symptoms. Such geographical clustering could reflect differences in exposure to various risk factors, including socio-economic and epidemiological factors, driving or reinforcing the spatial structure of depression. Identification of the geographical location of clusters of depression should inform policy decisions.

Mental health is a major global public health concern[1,2], with the Global Burden of Disease Study highlighting the full extent of depressive illness as a high impact disorder that is commonly comorbid with other mental and physical diseases, and that has major public health implications[3]. Depression is the single largest contributor to global disability (7.5% of all years lived with disability), with more than 300 million cases worldwide in 2015[3]. Importantly, while 80% of the disease burden due to depression is located in low- and middle-income countries (LMICs), only 10% of these sufferers access effective treatments (reduced to 1 in 27 sufferers in low-income countries)[4,5]. In South Africa, an estimated 9.8% of the adult population experience major (clinical) depression at some point in their life[6,7], and despite treatment being available, only 25% have sought treatment and care for a mental

[1]Department of Geography and Geographic Information Science, University of Cincinnati, Cincinnati, USA. [2]Health Geography and Disease Modeling Laboratory, University of Cincinnati, Cincinnati, USA. [3]KwaZulu-Natal Research Innovation and Sequencing Platform (KRISP), Nelson R Mandela School of Medicine, College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa. [4]Centre for Rural Health, School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa. [5]School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa. [6]School of Life Sciences, University of KwaZulu-Natal, Durban, South Africa. [7]Department of Genetics, Evolution & Environment, University College, London, United Kingdom. [8]Department of Psychiatry, University of KwaZulu-Natal, Durban, South Africa. [9]Institute of Health Research, University of Exeter, Exeter, United Kingdom. [10]Africa Health Research Institute, University of KwaZulu-Natal, Durban, South Africa. Correspondence and requests for materials should be addressed to D.F.C. (email: diego.cuadros@uc.edu)

KRISP & ThermoFisher Scientific Training Site in Africa: 4 new qPCR & Sanger Sequencing workshops in June 2019

Quantitative PCR I - 20 June 2019

Quantitative PCR II - 21 June 2019

Sanger Sequencing I (Amplicons) - 24 & 25 June 2019

Sanger Sequencing II (Microsatellite) - 27 & 28 June 2019

KRISP in the Media: SAFM, Sunday times, Royal Society, UKZNDABA.

SAFM Interview Story Telling for Health Research following our BMJ Medical Humanities 2019 paper

"Radio interview by Dr. Astrid Treffry-Goatley about the use of story telling of our BMJ Medical Humanities 2019 paper entitled: Community engagement with HIV drug adherence in rural South Africa: a transdisciplinary approach."

http://www.krisp.org.za/news.php?id=307

TB and depression are linking up to devastate SA following our Nature Scientific Report 2019 paper

"Researchers went to SA's depression hot spots and found a second epidemic. Depression and TB often go hand in hand, according to new research in SA..

https://select.timeslive.co.za/news/2019-03-08-tb-and-depression-are-linking-up-to-devastate-sas-ill/

KRISP among the first awards of The African Academy of Sciences and Royal Society £25M FLAIR scheme

"KRISP Team Leader Dr. Veron Ramsuran is one of 30 leading scientists to receive the prestigious AAS and UK Royal Society FLAIR Fellowship.

http://www.krisp.org.za/news.php?id=301

KRISP Twitter:

@krisp_news

Please follow us for up-to-date information and news…

KRISP Papers

Spatial structure of depression in South Africa: A longitudinal panel survey of a nationally representative sample of households
Cuadros DF, Tomita A, Vandormael A, Slotow R, Burns JK, Tanser F, **Scientific Reports** (2019), 9(1):979:doi.org/10.1038/s41598-018-37791-1

Neurocognitive Impairment Risk Among Individuals With Multiple Drug-Resistant Tuberculosis and Human Immunodeficiency Virus Coinfection: Implications for Systematic Linkage to and Retention of Care in Tuberculosis/Human Immunodeficiency Virus Treatment.
Tomita A, Ramlall S, Naidu T, Mthembu SS, Padayatchi N, Burns JK. **J Nerv Ment Dis.** 2019 Apr;207(4):307-310. doi: 10.1097/NMD.0000000000000962.

KRISP Training Workshops

Quantitative PCR I (qPCR), KRISP at Nelson R Mandela School of Medicine, UKZN, Durban, South Africa, 20 June 2019

Quantitative PCR II (qPCR), KRISP at Nelson R Mandela School of Medicine, UKZN, Durban, South Africa, 21 June 2019

Sanger Sequencing I (Amplicon), KRISP at Nelson R Mandela School of Medicine, UKZN, Durban, South Africa, 24-25 June 2019

Sanger Sequencing II (Microsatellite), KRISP at Nelson R Mandela School of Medicine, UKZN, Durban, South Africa, 27-28 June 2019

For more information please contact:

Prof Tulio de Oliveira, KRISP, Nelson R Mandela School of Medicine, University of KwaZulu-Natal, Durban, South Africa. Tel : +27 31 260 4898, e-mail : & tuliodna@gmail.com & deoliveira@ukzn.ac.za. Web: www.krisp.org.za

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