

## KwaZulu-Natal Research Innovation and Sequencing Platform



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 October issue of 2018, we focus on **KRISP learning about new technologies and preparing the next generation of scientists**. This month, we also have many publications on African Health, including on HIV drug resistance, antimicrobial activity, pre-eclampsia and smoking and depression.

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.

**KRISP Talks: Phylodynamics and Phylogeography of HIV-1 in Africa and Americas.**

**Durban SPARK Innovation Breakfast: The Technology Innovation Agency (TIA) Funding Activities and Success Histories**

**Meetings: KRISP learn about new cutting-edge technology in Singapore**

**News: In Epicenter of Global HIV Crisis, Multiple Partners and Age Disparity Part of Problem**

**Education: KRISP Preparing Next Generation Scientists**

**Publication: Predicted antiviral activity of tenofovir versus abacavir in combination with a cytosine analogue and the integrase inhibitor dolutegravir in HIV-1-infected South African patients initiating or failing first-line ART**

**Publication: Evidence on the Association Between Cigarette Smoking and Incident Depression**



UNIVERSITY OF  
KWAZULU-NATAL  
INYUVESI  
YAKWAZULU-NATALI

## Events arising: Innovation Breakfast & KRISP Talks



### **Durban SPARK Innovation Breakfast:**

**Speaker:** Barlow Manilal, CEO TIA  
**The Technology Innovation Agency (TIA)  
Funding Activities and Success Histories**

**Date:** Wednesday, 7 November 2018

**Time:** 7:30 – 8:30

**Venue:** K2 Seminar room, K-RITH tower building, Durban, South Africa

---

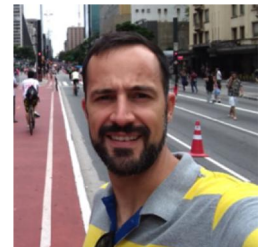
### **KRISP Talks: Phylodynamics and Phylogeography of HIV-1 in Africa and Americas**

**Speaker:** Dr. Dennis Junqueirs, Professor, UKZN & KRISP

**Date:** Wednesday, 21 November 2018

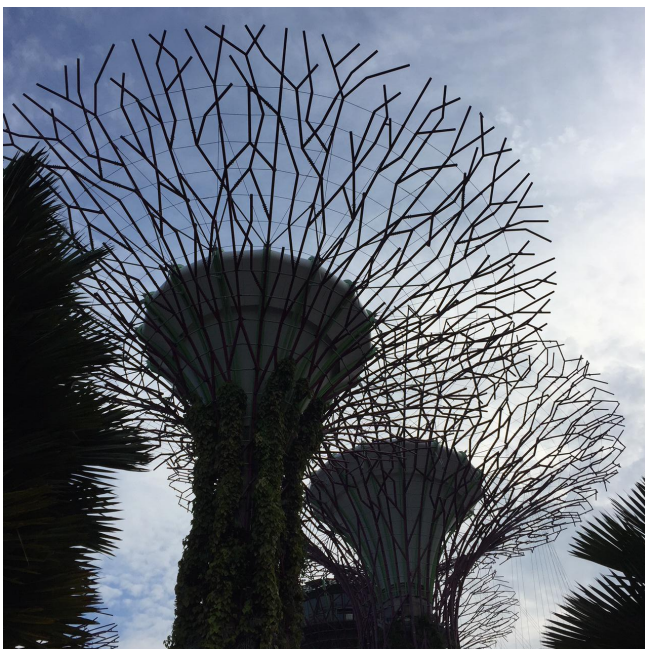
**Time:** 11:00 – 12:00

**Venue:** K-RITH tower building, Durban, South Africa



---

## KRISP learn about new cutting-edge technology in Singapore



By Tulio de Oliveira, Singapore, Oct 2018

I recently spent a week working with colleagues from the the Bioinformatics (BII) and Genomics Institutes of Singapore (GIS) at Biopolis. I was very impressed with the ' Biopolis city', which was constructed to host bioscience developments in Singapore and it is home of both BII and GIS.

In addition to presenting KRISP advances at BII and GIS, I also visited the Singapore SPARK program, which is based at the NTU. The SPARK program is at the forefront of translational medicine.

I was also fortunate to visit many start-ups with a delegation of Investec in South Africa. In these meetings, I learned about the incubation and acceleration programs of Singapore. Some of the cutting-edge technologies that are entering the market include the use of tele-health medicine, artificial intelligence and augmented reality.

## In Epicenter of Global HIV Crisis, Multiple Partners and Age Disparity Part of Problem



BY DARREN TAYLOR, SPECIAL TO THE EPOCH TIMES. October 17, 2018. VULINDLELA, South Africa—Sweat streams from the young men's faces as they pursue a soccer ball across a sun-baked pitch of red dust.

In the crowd of spectators is Gethwana Mahlase, a veteran HIV counselor. **'Those boys, by the time they get to 30, one in three will probably be infected with HIV,'** she said, her voice straining against the screams of supporters.

Mahlase works in Vulindlela, a settlement of about 400,000 people, near the city of Pietermaritzburg in South Africa's KwaZulu-Natal province. Vulindlela has some of the highest HIV infection and prevalence rates in the world.

A large-scale study by scientists in South Africa discovered the virus is mostly being spread by men around 30 years old to younger women. Knowing this can help the government better target prevention and treatment strategies to stop the cycle of transmission.

Global Epicenter: **'If you talked to the HIV research community 10 years ago, [and told them] that HIV prevalence in a heterosexual population, women above 30 years old, would be above 60 percent, no one would have believed it,'** said professor Tulio de Oliveira, an HIV research scientist at the Center for the AIDS Program of Research in South Africa (CAPRISA) in Durban, 42 miles south of Vulindlela.

***'When these women get older there's unbelievably high levels of HIV prevalence among them; we're talking about 66 percent. That means they're likely to infect men of the same age, and those men are then likely to infect the younger women with which they have relationships. So you get this amplification cycle across the generations,'*** said De Oliveira.

In its efforts to ease the impacts of the world's biggest HIV epidemic, CAPRISA has appealed to the South African government to target the **'missing links'** in the state's HIV prevention strategies: women between the ages of 15 and 24 and men between the ages of 25 and 35.

## KRISP Preparing Next Generation Scientists



UKZN's KRISP in collaboration with Thermo Fisher Scientific held a one-day Science, Technology, Engineering and Maths (STEM) training session for Grade 11 pupils and students on basic Polymerase Chain Reaction (PCR).

Participants were briefed on the basics of PCR and also extracted DNA and created thousands of copies of genes using Thermo Scientific™ Direct PCR kits designed to deliver ultimate convenience by allowing PCR directly from crude samples.

As part of UKZN STEM Education, the training is designed to encourage participants to follow science careers as well as lay a foundation for individuals starting careers in genomics. The first training session was conducted in July this year and due to the overwhelming response, KRISP conducted the second session earlier in October.

During training learners experienced working in a state-of-the art science laboratory with qualified scientists. ***'I was excited to see the full involvement of these future scientists,'*** said Ms Gugu Mkhize, who co-ordinated the training.

Mkhize said they had received the following note from one of the participants, Ms Nikisha Naicker: ***'Dear Gugu, I would like to thank you for letting me be a part of the PCR programme. I learnt a lot and I am more motivated than ever to pursue a career in the molecular biology field. I would love to attend future training programmes as I had a lot of fun learning about PCR and DNA isolation. This training programme has inspired me and has given me a better sense of the different possibilities around me.'***

## KRISP Papers

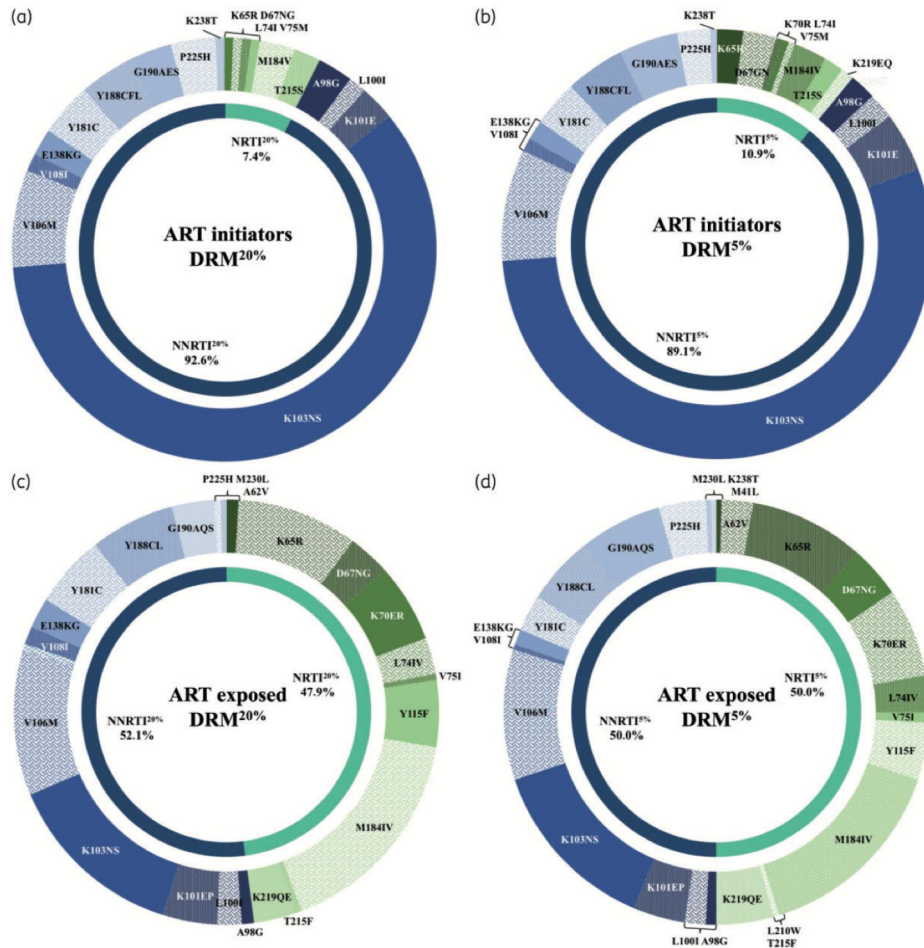


Figure 1. DRMs among ART initiators (a and b) and ART-exposed participants (c and d), at 20% (a and c) and 5% (b and d) levels of detection.

**Title: Predicted antiviral activity of tenofovir versus abacavir in combination with a cytosine analogue and the integrase inhibitor dolutegravir in HIV-1-infected South African patients initiating or failing first-line ART**

**Authors: Derache A, Iwuji CC, Danaviah S, Giandhari J, Marcelin AG, Calvez V, de Oliveira T, Dabis F, Pillay D, Gupta RK,**

**Journal: J Antimicrob Chemother. (2018), doi: 10.1093/jac/dky428**

**SUMMARY:** The WHO recently recommended the use of a new first-line ART containing dolutegravir. We investigated the efficacy of NRTI backbones (tenofovir or abacavir with a cytosine analogue) in low- and middle- income countries where there is significant prior exposure to antiretrovirals and drug resistance to NRTIs. NRTI DRM20% and DRM5% were detected among 5/1193 (0.4%) and 9/1193 (0.8%) of ART initiators, respectively. There was tenofovir exposure in 73/94 (77.7%) of those established on ART, with full susceptibility to abacavir in 57/94 (60.6%) and 56/94 (59.6%) for DRM20% and DRM5%, respectively, while 67/94 (71.3%) and 64/94 (68.1%) were fully susceptible to tenofovir, respectively. NGS detection of variants at the 5% level increased detection of K65R in both naive and treated groups. One of 607 integrase sequences carried a DRM20% (Q148R). Dolutegravir with a cytosine analogue plus tenofovir or abacavir appears to have similar efficacy in South Africans naive to ART. NGS should be considered in HIV drug resistance surveillance.



Brief report

# Evidence on the Association Between Cigarette Smoking and Incident Depression From the South African National Income Dynamics Study 2008–2015: Mental Health Implications for a Resource-Limited Setting

Andrew Tomita PhD<sup>1,2,\*</sup>, Jennifer I. Manuel PhD<sup>3</sup>

<sup>1</sup>Centre for Rural Health, School of Nursing and Public Health, College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa; <sup>2</sup>KwaZulu-Natal Research Innovation and Sequencing, Nelson R Mandela School of Medicine, College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa; <sup>3</sup>Silver School of Social Work, New York University, New York, NY

\*Corresponding Author: Andrew Tomita, PhD, Centre for Rural Health, School of Nursing and Public Health, College of Health Sciences, University of KwaZulu-Natal, Private Bag X7, Durban, South Africa. Telephone: +27 (0)31-260-4321; E-mail: [tomita@ukzn.ac.za](mailto:tomita@ukzn.ac.za)

## Abstract

**Introduction:** As a leading global disease risk factor, cigarette smoking has declined in some developed countries, but its health consequences are not well established in sub-Saharan Africa. This is particularly evident in South Africa, where few investigations have quantified the dually neglected challenges of cigarette smoking and depression, despite decades of research from developed countries. We investigated the association between cigarette smoking and incident depression, with the hypothesis that adolescents are particularly vulnerable.

**Methods:** Panel data from the South African National Income Dynamics Study, a nationally representative sample of households at follow-up periods (years 2008–2015), were used. Our incident cohort consists of 14 118 adult participants who were depression free at baseline. The generalized estimating equation models were fitted to assess the association between current cigarette smoking and incident depression.

**Results:** Current cigarette smoking among individuals aged at least 15 was significantly associated with incidents of depression among men (adjusted relative risk [aRR] = 1.16, 95% CI = 1.01 to 1.34), but not women. When the analyses were restricted to a sample population of older adolescents (ages 15–19), current cigarettes smoking was significantly associated with incident depression in both men (aRR = 1.84, 95% CI = 1.18 to 2.88) and women (aRR = 2.47, 95% CI = 1.15 to 5.29).

**Conclusion:** The results suggest an important relationship between cigarette smoking and incident depression, particularly among older adolescents, who are developmentally vulnerable and socioeconomically disadvantaged to experiencing depression. There is a considerable need to implement and prioritize culturally and developmentally appropriate prevention and cessation measures to reduce cigarette smoking and depression directed at adolescent populations.

**Implications:** There has been little population level research into the role of smoking on depression in sub-Saharan Africa, a region classified as a tobacco epidemic in the making. Our results have major implications for the often neglected crosscutting issues of tobacco control (Sustainable

## KRISP Public Engagement Videos:

We have produced 8 short videos to show the public, in a simple way, how our infrastructure can be used to support collaborative research, reverse brain drain and achieve scientific excellence in Africa!

Videos @ KRISP website (<http://www.krisp.org.za/videos.php> and in our **Youtube Channel**)

### Genomics & Bioinformatics Laboratory Series PLAY ALL



#### World-class genomics infrastructure to support collaborative research in Africa

krisp • 57 views • 3 weeks ago

KRISP Video showing the great scientific infrastructure constructed in Durban, South Africa. Dr. Jennifer Giandhari, platform manager, highlight the high-technology and innovative approaches of a n...



#### Reversing the Brain Drain and Achieving Scientific Excellence

krisp • 143 views • 3 weeks ago

KRISP video describing our new genomics, bioinformatics, epigenetics and epidemiology research centre in Durban, South Africa that reversing brain drain and achieving scientific excellence in Afric...



#### Grants management support to drive innovation and high level research - Gugulethu Mkhize

krisp • 19 views • 3 weeks ago

KRISP video highlighting the important role that grants and project management play in allowing researchers to achieve scientific excellence in South Africa. More info at <http://www.krisp.org.za>



#### Scientific support is key to achieve excellence - Zethu Luthuli important role in KRISP

krisp • 21 views • 3 weeks ago

KRISP video highlighting that key to achieve scientific excellence is to have management structures that allow scientists to focus exclusively in their research. High level support structure is com...

### Publications' Interviews PLAY ALL

KRISP scientific papers: Bioinformatics, phylogenetics, drug resistance, epigenetics, epidemiology and clinical research in Africa



#### HIV drug resistance and treatment response in Afric...

krisp  
43 views • 3 weeks ago



#### Inhibiting natural killer cells in AIDS - Science 2018 - ...

krisp  
181 views • 3 weeks ago



#### Felsenstein Bootstrap for Big Data - Nature 2018 - Eduan...

krisp  
60 views • 3 weeks ago



#### Cycle of HIV Infection in Young Women in South...

krisp  
39 views • 3 weeks ago

## KRISP Papers



**In Vitro Antibacterial Activity of Teixobactin Derivatives on Clinically Relevant Bacterial Isolates**  
Ramchuran EJ, Somboro AM, Abdel Monaim SAH, Amoako DG, Parboosing R, Kumalo HM, Agrawal N, Albericio F, Torre BG, Bester LA, **Front Microbiol.** (2018), 9:1535



**Impact of next generation sequencing defined HIV pre-treatment drug resistance on virological outcomes in the ANRS 12249 treatment as prevention trial.**  
Derache A, Iwuji CC, Baisley K, Danaviah S, Marcelin AG, Calvez V, de Oliveira T, Dabis F, Porter K, Pillay D, **Clin Infect Dis** (2018), doi: 10.1093/cid/ciy881:



**Pre-eclampsia: the role of highly active antiretroviral therapy and immune markers.**  
Phoswa WN, Naicker T, Ramsuran V, Moodley J, **Inflamm Res.** (2018), doi: 10.1007/s00011-018-1190-3:

## KRISP conferences & workshops

**Durban SPARK Innovation Breakfast** , Durban, South Africa, 7 November 2018

**HIV Prevention Workshop**, Midlands, South Africa, 12-15 November 2018

**The South African Genetics Society (SAGS) and the South African Society for Bioinformatics (SASBi) Congress**, Golden Gate, 16-18 October 2018

**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

**Funded by:**



**Disclaimer:** KRISP at UKZN wishes to express its gratitude to the following funders for their generous support for the production of this report: Technology Innovation Agency (TIA), South African Medical Research Council (SAMRC) University Flagship Program, European Commission (EC), Centers for Disease Control and Prevention, Swiss / South Africa Joint Research Initiative and the U.K. Royal Society. The newsletter is published as open access under a Creative Commons ShareAlike 30 Unported (CC BY-SA 30) license (<http://creativecommons.org/licenses/by-sa/30/>) and is available in printed format as well as electronically as PDF, Web-format, etc The contents of this report and the opinions expressed herein are solely the responsibility of the authors and do not necessarily represent the official views or policies of any of the funders.

KRISP Newsletter, volume 2, number 10, Oct/Nov 2018