

RHODES EXCHANGE

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*ISSUE 015 / APRIL/MAY 2015



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INNOVATION IS KEY

Some rather exciting research is unfolding within Rhodes University's Biotechnology Innovation Centre (RUBIC) to provide South African solutions to African challenges. The products coming out of this research are causing quite a stir in the global health community and present promising African solutions to diagnostic procedures and healthcare for HIV patients in both urban and rural clinic settings. Read on to discover why UNICEF's Global Innovation Centre has found an innovative partner in Professor Janice Limson, the Director of RUBIC, and her team.





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ACCELERATING HIV CARE IN AFRICA

At a recent visit to New York in early May for the launch of UNICEF's Global Innovation Centre, where she had an opportunity to showcase some of the work being done at the RUBIC, Professor Janice Limson unveiled the first prototype of a rapid testing strip that will allow healthcare workers to measure the CD4 count in HIV patients within 20 minutes.

These portable rapid test strips, which are based on very simple colourimetric sensor technology to detect and indicate disease and likelihoods of infection are set to revolutionise HIV care in the African rural healthcare setting.

the important thing is to develop a portable diagnostic strip to compliment the HIV test so that there is a positive result and an early indicator,

While an HIV test can be conducted on site at the clinic and the patient can be made aware of his or her status, the measurement of the CD4 count which is so crucial to HIV monitoring and indications of how far the disease has progressed, must await a laboratory based testing process for results. This means that an HIV positive patient will need to return to the clinic for these results. As the CD4 count dictates when a patient should begin antiretroviral treatment, patients may receive treatment only after the disease has progressed too far or, as is often the case in remote settings, patients may not be able to travel great distances or afford to travel back to the clinic to get the result. Not having access to the CD4 count on-site when an HIV positive result is returned places many lives at risk.

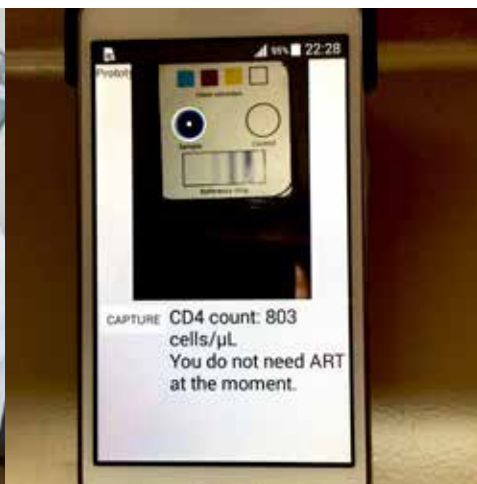


THE RHODES UNIVERSITY BIOTECHNOLOGY INNOVATION CENTRE BOOTH AT THE UNICEF GLOBAL INNOVATION CENTRE LAUNCH IN NEW YORK IN MAY 2015.

"So the important thing is to develop a portable diagnostic strip to compliment the HIV test so that there is a positive result and an early indicator," said Prof Limson. "It is not as sensitive as a laboratory based test but it provides a really good range, allowing patients to be helped on the spot."

Colleague and previously a mentor to Prof Limson, the world acclaimed Distinguished Professor Tebello Nyokong, Director of the DST/Mintek Nanotechnology Innovation Centre, sums up how we applaud this African innovation to the challenge of providing healthcare to the people

of our continent: "Partnerships such as the one between Rhodes University Biotechnology Innovation Centre (RUBIC) and UNICEF are a major step in addressing the innovation chasm. Innovation chasm negatively affects African Science, with an insufficient amount of research directly influencing the economy or promoting healthcare for Africans. Even though the involvement of UNICEF is welcomed and essential, African science cannot rely completely on outside assistance. Governments have to invest in science and technology as a way of training future innovators. What I like about the



Prof Limson's recent visit to New York for the launch of UNICEF's Global Innovation Centre has received excellent media coverage. Follow these links to learn more:

- <http://bit.ly/1HGZE6H>
- <http://tinyurl.com/pd3s3yl>
- <http://tinyurl.com/nkskozp>
- <http://bit.ly/1J0dYIT>

LEFT: HONOURS STUDENT TAMIKA FELLOWS FROM BIOTECHNOLOGY WHO IS WORKING ON MAKING THE CD4 COUNT TEST MORE SENSITIVE. (IMAGE BY RUAAN GELDENHUYS) • MIDDLE: CELLPHONE APP DIGITISED BY A COMPUTER SCIENCE HONOURS STUDENT (PART OF DR JAMES STAPLEY'S GROUP) AND DEVELOPED FOR COUNTING CD4 CELLS. (IMAGE BY JANICE LIMSON) • RIGHT: CELLPHONE IN ITS 3D PRINTED CASE WITH THE TEST STRIP BEING INSERTED FOR DIGITISING.



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RUBIC-UNICEF partnership, is that the innovation came from Africa by Africans aimed at solving an African healthcare problem. UNICEF came in as an enabler of an African Innovation."

The stir that Prof Limson is causing in the global community of biotechnology innovation has caused members of alumnus Donovan Neale May's Sable Network and CauseTech to take note of the massive contributions RUBIC's research team is making toward the South African, African and international scientific communities. He recently invited Prof Limson to join the advisory board of CauseTech, a community of the world's top innovators, technologists, researchers and entrepreneurs. Their common purpose is to leverage and scale their solutions to address global needs. Prof Limson is hoping to find technology partners through networks such as these to enhance sensitivity of the results by boosting the efficiency of the prototype.

The model Prof Limson is developing at RUBIC is also a unique innovation in the university environment in that it serves as a bridge between research and product development, creating a space for innovative research. She hopes to raise funding not only to create this parallel space for innovation but also to allow postgraduates to work at RUBIC after they have completed their degrees to further evolve the prototypes they have developed.

In a letter thanking her postgraduate research team and colleagues at Rhodes, Prof Limson wrote: "The UNICEF-Rhodes partnership will be an important one for the Biotechnology Innovation Centre. It is a big first step for us towards turning ideas into products and processes that will change lives, from our work in parasites, to stem cells, to energy and water treatment and certainly to early disease detection. Thank you all for being a part of this trans-disciplinary innovation team."

- Read more about how the prototype came about and Prof Limson's vision for the future of research and innovation in the university space: <http://bit.ly/1Q728x8>
- For more information about the CauseTech board visit <http://tinyurl.com/pyokjw5>

Professor Janice Limson is a Professor of Biotechnology, Director and Head of Department at the Rhodes University Biotechnology Innovation Centre and she now holds a South African Research Chair in Biotechnology Innovation & Engagement.

She is also the Associate Editor of IEEE Sensors and the Editor of Science in Africa Magazine

- Web: <http://www.scienceinAfrica.com>
- Web: <http://tinyurl.com/oydcxhr>



PHD STUDENT RESEARCHER AND DEMONSTRATOR JAN KRUID INTERVIEWED ON FILM BY ALUMNUS SHERWIN BRYCE-PEASE FOR THE SABC NEWS.



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UNICEF COMMITS R3MILLION TO FUTURE RESEARCH

The Development & Alumni Relations Division has developed a relationship with alumnus, USA Trustee and UNICEF Senior Adviser on Innovation, Ms Tanya Accone that has seen a deepening interest by UNICEF in the work of the Rhodes University Biotechnology Innovation Centre (RUBIC). On a visit to campus during 2014, demonstrations were performed of the work conducted in domestic water treatment, nanofibres, fuel cells, diagnostics & sensors, 3D printing and an algal ponding system for sewage treatment.

In January this year Ms Accone and UNICEF's Director of the Global Innovation Centre, Dr Sharad Sapra visited the Rhodes campus to get a sense of work being done in the innovation sector. Dr Sapra's primary interest was in early disease detection and maternal health but they were also given a broader sense of the innovative research being done in Biotechnology as a discipline. This included a look at sewerage and domestic wastewater treatment, alternative energy generation and 3D printing for prototype development.

Following this visit UNICEF generously offered to collaborate with the Rhodes University Biotechnology Innovation Centre (RUBIC) through a grant of R3 million towards their work in foetal and maternal health over a period of three years. "We are finalising the MOU from UNICEF but we are pretty confident that we are going to continue our work in this exciting area," said Prof Limson who is keeping the details of this interesting work on early indicators of foetal health under wraps for now. If the RUBIC's current track record is anything to go by, watch this space carefully to see which innovations they birth next. The United Nations Children's Fund (UNICEF) focus on gathering knowledge, particularly in Sub-Saharan Africa, with a view to distribute innovations to benefit women and children. The UNICEF Innovation Centre has laboratories in Africa, Asia, Europe, South America and forms partnerships with private sector innovation labs, academic research labs, development partner's innovation initiatives and fellowships.



PROFESSOR JANICE LIMSON DEMONSTRATING THE PROTOTYPE TO AMBASSADOR HAHN CHOONG-HEE, DEPUTY PERMANENT REPRESENTATIVE OF THE REPUBLIC OF KOREA TO THE UN IN NEW YORK ALONG WITH UNICEF'S EXECUTIVE DIRECTOR, ANTHONY LAKE

PRINT ON DEMAND

During their January visit, the 3D printing suite caught UNICEF's eye. Not only are these printers useful in the RUBIC's teaching, research and community engagement work, but the print-on-demand readiness of the unit gives RUBIC additional engineering skills that can be explored not only for their research but also in a rural setting to provide authentic solutions to the daily challenges faced by these communities.

Recognising this, UNICEF made a gift-in-kind and sent one 3D printer to Rhodes to add to the two that already formed part of RUBIC's suite of printers. This printer has already been used at Scifest Africa, the National Science Festival, for engagement work. One of the printers in the 3D Printer Makerspace led by Dr Earl Prinsloo was used by another colleague, Dr Ronen Fogel to create a plastic case featuring a slot in which the CD4 count testing strips can be correctly photographed.

"The kind donation of the Makerbot Thing-O-Matic has expanded on the additive manufacturing capacity in the Biotechnology Innovation Centre at Rhodes University," explained Dr Prinsloo. "The rapid prototyping capacity of the 3D printers provides us with the ability to produce biological models for teaching at the undergraduate level and further enhances our research and innovation pipeline capacity (at the Honours, Masters, Doctoral

and Postdoctoral levels) from the design and production of the HIV test unit and microbial fuel cells through to the manufacturing of mammalian cell scaffolds and prototyping of a 3D bioprinting unit for tissue engineering at the higher end."

According to Dr Prinsloo the printers also allow for the potential reduction in equipment costs: "For example, a routine inverted light microscope used in mammalian cell culture typically costs R30 000 to R40 000. We are currently in the process of building a base microscope unit to serve the same high-end purpose in our laboratories for just under R1500 by using a combination of the 3D printers and open source electronics such as Raspberry Pi computers and the Arduino project.

The printers also form an integral role in science communication and public engagement where models are currently being modified and/or designed to eventually provide educational science kits, including basic microscopes, for underprivileged schools in the Grahamstown surrounds as well as to educate the public on what 3D printing is and what it can do.

UNICEF further invited a proposal from Dr Earl Prinsloo and Prof Janice Limson for a suite of 3D printing technology. This proposal has been submitted and conversations are in progress.

RHODES' NEWEST SARCHI CHAIR

The official title of Professor Janice Limson's SARCHI research chair was recently announced as the SARCHI Chair in Biotechnology Innovation and Engagement. With a specific focus on engaging around biotechnology innovation, Prof Limson aims to take RUBIC's work in early disease detection, bioremediation, parasitology, alternative energy and even stem cell research, out into the world at large as real solutions to some of global society's enduring challenges. Community engagement work has been steadily underway for some time where RUBIC researchers take prototypes out into the communities and engage with the intended recipients of their technology to help inform and guide the final prototype. "It is a win-win situation – our research and innovation work is informed by our engagement with a targeted community, our students become more conscientised about social issues and finally the community itself becomes an active participant in engaging on future technology that can have direct benefit socio-economically". To help advance its goals, RUBIC has evolved unique partnerships with social scientists, languages, business and journalism. Educate, innovate, communicate – it is the RUBIC way.

With RUBIC having grown naturally with the scope of the research undertaken under Prof Limson's directorship, researchers and collaborators have outgrown the space in which to do their work. With a dedicated space for the Chair still under discussion, Prof Limson hopes to raise sufficient funds that will allow a consolidated space for the innovation and engagement activities of the Chair to unfold in parallel to the research facilities.



DR SIZWE MABIZELA, THE VICE-CHANCELLOR OF RHODES UNIVERSITY, DR NALEDI PANDOR, THE MINISTER OF SCIENCE AND TECHNOLOGY, PROFESSOR JANICE LIMSON, NRF SARCHI CHAIR IN BIOTECHNOLOGY INNOVATION & ENGAGEMENT, AND DR ALBERT VAN JAARSVELD, CEO OF THE NRF