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Chairman's Note

HealthTech Week is here again and we look forward to a stimulating mix of science, business and healthcare policy in Auckland. The CMDT is host of Healthtech Week in partnership with the Medical Technology Association NZ and NZ Health IT.

The MedTech CoRE annual conference starts this week and we have another interactive and exciting day planned. The theme of the day is "The Pulse of Innovation" which revolves around the challenges of developing solutions for healthcare and taking this innovation into the clinical setting and to market. Our plenary speakers, Richard Little (REX Bionics and Exsurgo Rehab) and Matthew Parsons (Waikato DHB and The University of Auckland) are well placed to discuss this.

There are also three interesting keynote presentations on driving innovation (Colart Miles, Velox Innovation), the use of innovative medical imaging support tools in precision medicine (Balaji Ganeshan, Texrad Ltd, UK) and the latest on artificial intelligence in biomedical and healthcare (Stefan Harrer, IBM Research – Australia and University of Melbourne). A/Prof Duncan Babbage

from AUT, one of our MedTech Associate Investigators is Master of Ceremonies.

The first annual report for the MedTech CoRE was recently submitted to the Tertiary Education Commission (TEC) and it has been interesting to reflect on the first year of operation. The bid to TEC was based firmly around translational science, networking as well as clinical and community engagement. This builds on the strong base in basic research funded by Marsden and HRC, and substantial international connections. However, what was now needed was to work together across the country and to turn all this great science into clinical and business outcomes.

In the CoRE's first year of operation, a Doctoral Training Programme (DTP) has been initiated to train post-graduates that have skills better suited for MedTech innovation, several clinical trials are underway, outreach activities have begun and several new MedTech university spinout companies have either now been formed or are in planning. Watch out for the CoRE's 2016 outreach event, an exhibition of MedTech innovation at The Silo, Auckland later in October.

The future for CMDT and the MedTech CoRE is bright. The Government sees med tech as an important contributor to growth of the high value manufacturing sector (HVMS) in New Zealand – med tech is currently \$1.2b in export sales of \$6b HVMS exports. The first year of operation of the MedTech CoRE was largely about getting new processes underway and creating a national 'NZ-Inc.' approach to translating med tech research into clinical and business outcomes. The focus for the second year will of course be to continue to build on the promising start, but we now plan for the CMDT and CoRE to engage much more with international innovation opportunities for NZ Inc. – in particular with Australia, Singapore, Germany (building on the partnership with the Fraunhofer Institute and the Enterprise Europe Network), the US (initially via the Texas Medical Centre), Canada (via MedTeq in Quebec) and the UK (via innovation centres in Oxford and Cambridge).

We look forward to seeing many of you during the upcoming HealthTech week.

*Peter Hunter and Diana Siew
CMDT Co-chairs*

 MEDTECH CORE DAY	 HEALTHCARE CONGRESS	 INNOVATION & INVESTMENT FORUM
 20 JUNE 2016	 21-22 JUNE 2016	 23 JUNE 2016

HealthTech Week 2016 events. More at: www.healthtechweek.org.nz

Research aims to break the cycle of violence

An AUT-led research team is working on a pioneering project aimed at curbing family violence. The four-year study will culminate in the implementation of a Healthy Relationships App for young people and their friends and family, and is funded by the Ministry of Business, Innovation & Employment.

Research shows that experiencing healthy relationships during adolescence leads to greater wellbeing and healthier relationships in adulthood. Yet violence prevention efforts currently pay little attention to the formative stage of life when people begin having their first relationships.

“Most people’s early relationships are influenced by what they see at home, in the media and in their communities, and for some people these aren’t safe or healthy models to repeat,” says study lead Professor Jane Koziol-McLain. “Young people are telling us they want more information.”

Young people have also been clear about what they do not want, leading the team to tap into the ubiquity of technology and include young people, schools and communities in the project. The research team is working alongside a Taitamariki Youth Advisory Group to co-create the app.

In New Zealand, at least one in three women experience physical or sexual violence by a partner, with higher rates for Māori women. Add to that psychological abuse and the rise of cyber bullying, and the need to do more to foster healthy relationships is clear.

“One of our hopes is that we’ll influence young men and women’s understanding of what makes a healthy relationship – what is mutual consent, what does choice look like and more. These are things everyone needs to know about,” says Professor Koziol-McLain.



For now, the team is engaging with school communities and running taitamariki youth focus groups. This evidence base will inform development and testing of the app, and enable the team to create a tool that is ready for use and well placed to make a difference at the close of the four-year project.

“We hope that by strengthening young people’s knowledge, skills and support, they can have healthier relationships and take that into adulthood, into parenting and that they will positively influence their communities,” says Professor Koziol-McLain.

“It’s about trying to interrupt the cycle of violence, with an understanding of the root causes of violence – including the effects of trauma and inequity, particularly for Māori. It’s going to take a social change in attitudes towards violence, and we hope the app will contribute to that positive change.”

Auckland University of Technology is working in conjunction with researchers from Child Youth & Family, the University of Otago, John Hopkins University and the Oregon Health Sciences University.

NZ Standing Trial Population Centres

Four Standing Trial Population (STP) Centres have been set up to support fast-early stage validation studies of medical devices and digital health systems to accelerate technology development.

Each of the four STPs offers a different value propositions:

1. STP targeting technologies for older population care
2. STP for rehabilitation and assistive technologies (Rehabilitation Innovation Centre)
3. STP for technologies used in rural and remote community care
4. STP for the design and development of new devices

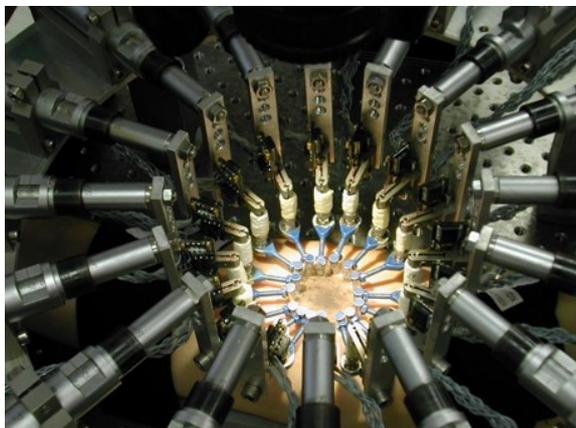
The STPs are available for access by local and international medical technology and digital health companies and researchers.

For more information, visit www.standingtrialpopulations.nz



Understanding Skin at Auckland Bioengineering Institute

Auckland Bioengineering Institute (ABI) has a team of researchers studying the mechanical, optical and thermal properties of skin. Skin is the most visible and accessible part of the body with the potential to provide information on underlying structures and pathologies.



2D force sensitive actuators for in-vivo biaxial skin deformations

The aim of their research is to develop instrumentation and biophysical models to understand how skin behaves in its natural environment, and when subjected to mechanical, optical, thermal, chemical, electrical and biological perturbations. To obtain this information, they have built a variety of novel instruments and modelling techniques. The data sets obtained from the research, including those on microstructure of the skin, can be used to predict behaviour of skin at larger scales. Understanding pathologies and their influence on properties of skin can provide effective diagnostic and monitoring tools.

One such diagnostic tool is tracking skin perfusion by looking at the dynamics of speckle formation resulting from laser illumination. Over time, the of speckle formation pattern gives a measure of the flow of red blood cells underneath the skin, that can be correlated to pathologies such as diabetes, ulcers, inflammation or cancer lesions.

A pilot study is currently being undertaken for quantitative measurements of subdermal blood flow in patients with diabetic foot ulcers.

The techniques developed by the ABI team can also be applied to other soft tissues. For instance, accurate measurements of surface deformations that occur upon depressing the skin has led to development of algorithms to identify the mechanical properties of soft tissue. Such techniques can be used in computational models of breast deformation for accurate predictions of tumour displacement during mammography. Professor Poul Nielsen at ABI commented on their philosophy of combining model-based approaches to interpret measurements, using novel instrumentation, of complex biological systems. "We are in quite a nice position that we have the facilities to close the loop between instrumentation development, experimental measurements, and model development and validation." These unique skills have enabled development of a number of technical advances in quantitative understanding of skin properties with distinct clinical applications. ABI team is also engaged in a number of collaborative projects in prosthetics, quantification of soft materials, and textile interactions with the skin.

NZALS: Empowering Amputees

New Zealand Artificial Limb Service (NZALS) is a Crown entity and a national provider of artificial limbs and associated rehabilitation services; with a vision of independence and productive lives for amputees. NZALS' CEO Sean Gray believes that the key to the NZALS vision is through the empowerment of amputees and with his background in strategy and management in healthcare and disabilities through Diabetes Australia NSW, AIMEDICS and 'Life Without Barriers' - Sean should know.

The needs of amputees are the core activity for the NZALS, with primary focus placed on ensuring an overall great service experience. NZALS is developing a patient-friendly communication programme providing a warm, engaging and supportive experience. Sean believes that moving towards patient-centred delivery where patients receive all their services from one provider will enable NZALS to provide quality, individualised care.

NZALS is currently focusing on developing an expert workforce, supporting R&D and new technology for improved

prosthetics, and providing an equitable service in NZ for all. In support of its vision, it is providing expert training for all clinical personnel, establishing an internal communications programme, and developing partnerships with Auckland University, Victoria University of Wellington and Auckland University of Technology to develop a research-based understanding of the values and needs of the amputee community.

Sean believes that NZALS is uniquely positioned at the intersection of industry, researchers, clinicians and patients; and that there is a huge opportunity for this coalition to embrace new technology. NZALS has recently invested in microprocessor technologies that will enable a higher degree of independence and mobility for the people using this prosthetic. "This is an exciting time to be part of the NZ MedTech ecosystem that is full of innovative ideas and technologies. There is real potential for our MedTech sector to provide some really agile solutions in rehabilitation."

The Script App

AUT's award winning Design and Health Wellbeing lab has recently teamed up with pharmacists and researchers from Auckland District Health Board and the University of Auckland for an app just for medical students and junior doctors.

SCRIPT is an app that teaches the user to learn correct antibiotic treatment guidelines.

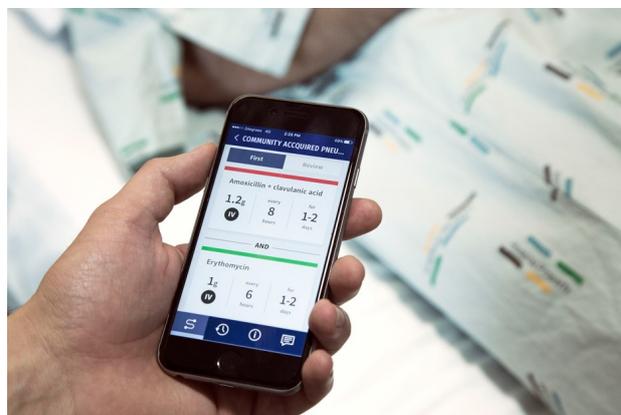
These guidelines differ between hospitals in New Zealand.

Previously students and doctors have relied on a desktop site or wall charts, SCRIPT allows them to have the APP on their mobile phones. Designed to support their own understanding of antibiotics, Script will help students and clinicians gain a stronger knowledge of prescription drugs and minimise incorrect prescriptions.

The app is available for both iPhone and Android, and is currently undergoing a clinical beta trial with a select group of participants.

It is the first digital design project undertaken by the lab since it opened its doors a year ago.

The lab is believed to be the first of its kind in the world, and took home the top Design Award in 2015's Best Awards.



Innovation at a Nanoscale

Nonotechnology has taken mega steps in technology advancements and innovation by allowing more precise manoeuvring and manipulation of material properties. University of Otago Researcher and MacDiarmid Institute Investigator Carla Meledandri and a nanofiber company Revolution Fibres are using their fields in nanotechnology towards new and exciting MedTech applications right in our backyard.

Carla's research focuses on synthesizing and characterizing nanoparticles, and applying them to solve various problems. Her team recently presented their emergent platform technology, Bioactive Silver, at Pitch on a Peak. Bioactive Silver is a platform using silver nanoparticles that is currently being applied in dentistry. In collaboration with a clinician, they have developed products designed to solve clinical problems of bacterial infection not currently solved by drilling, filling and other dental treatments. One of the products that has been licensed to a global manufacturing company, is a liquid formulation that contains silver nanoparticles designed to penetrate deep down into the tooth structure to kill bacteria remaining after drilling. Another product, currently in pre-

clinical trials, is a self-dissolving gel formulation containing silver nanoparticles to prevent loss of tooth or implant caused by gum disease.

Carla commented that the properties of silver are enhanced and improved at a nanoscale and can be modulated to increase the potential applications. The applications can be expanded to many other forms of medical treatments, implants, and devices.

Revolution Fibres, a nanofiber manufacturer and innovator noticed a gap in nanofiber manufacturing while looking at nanofiber filter options to improve air quality. The team investigated and created their own electrospinning techniques. Ian Hosie, Chief Scientific Advisor, considers nanofiber an advanced material that typically needs to be customized to fit end user's specifications.

Revolution Fibres offers a surface platform to develop the nanofiber product as per the user's requirements. Their range of polymers and materials with different properties allows tailoring as required – the fibres can be customized to be anti-bacterial, conductive, have high or low density or be elastic. In MedTech, they are working in facemasks and looking at more applications – anything from cellular scaffolds to wound dressings. Their strategy for growth is developing new nanofiber products in partnerships and collaborations.

From improved air filtration and breathable surgical masks to inherently anti-microbial implants, and much more, the nanotechnology platforms offer endless opportunities for innovation and improvement in MedTech.



Silver Nanoparticles—in gel, solution and implants

NZ HealthTech Review

Thank you for your participation in the HealthTech Review. Your views and insights into the MedTech Sector were very valuable in improving our understanding of the strengths, opportunities and challenges for companies in this sector.

The report from the review is available at: www.cmdt.org.nz/usefulinfo

The findings will be useful in identifying factors that can support the growth of the MedTech ecosystem.



Upcoming Events

MedTech Silo Showcase

MedTech CoRE and the TestPod are collaborating to celebrate innovators in medical technologies and inspire young New Zealanders. The week long interactive exhibit will take place on 28 October to 06 November, 2016 at Silo Park in the Auckland Viaduct.

The focus on work of the MedTech CoRE and showcasing various technologies, projects, and new ventures.

For more information, stay updated at: www.cmdt.org.nz/events

Look out for the D4 Conference

Diagnostic|Drug|Device|Discovery

Meet up with a key theme on medical care and point-of-care technology solutions in Otago on 23-24 November, 2016. For more information, visit: www.otago.ac.nz/d4

Healthcare Hackathon

An exciting weekend that brings together healthcare and technology professionals to come up with innovative technology solutions to address issues in healthcare is in planning for early 2017. We will look at assessing winning technologies with healthcare provider partners.

More details to come - stay updated at: www.cmdt.org.nz/events

Let us know what you think...

For any feedback or story you would like to contribute to our quarterly CMDT newsletter, please email: Jyoti.Chugh@callaghaninnovation@govt.nz
We would love to hear from you!

Don't forget to keep an eye out on what's happening at cmdt.org.nz or follow us on twitter at [@medtechnz](https://twitter.com/medtechnz)