Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **UNITED STATES OF AMERICA**
ORGANISATION: **GORDAGEN PHARMACEUTICALS PTY LTD**

INNOVATION STORY

2016 PRIMING GRANTS

DR GLENN TONG

Science and business seem as though they're different schools of thought. But making the transition from scientist to businessman was a natural progression for Dr Glenn Tong.

As CEO and co-founder of Gordagen Pharmaceuticals, the Melbourne-born businessman says his skills are more suited to management than "shaking test tubes". With a strong background in chemistry, the scientist-cum-businessman says understanding science is an advantage, particularly as his company is highly technology-oriented.

"I know enough about the scientific discipline to be dangerous but I'm not an expert on anything," he says.

Founding Gordagen Pharmaceuticals in 2012, Dr Tong says while the company practises science daily, his skills are in negotiations and strategy.

"It's important for people to recognise what their strengths and weaknesses are," he says.

"My weakness is that I have no patience, and I'm not going to spend seven days a week in a lab with a test tube and a centrifuge. I'm out there doing deals, flying to meetings, raising money and using that money."

Dr Tong says he's learned on the job for the last two and a half decades, keeping companies afloat – even if just barely.

"I've never ever had a company fail, but one of the companies I ran got so close to failing I actually paid my staff using my credit card," Dr Tong says.

And he is a recipient of the Priming Grant, collaborating with Associate Professor Lonnie Lowerie and his team of experts from the University of Mount Union in the US. The US partner conducted a clinical study on a new supplement (nE1-ElitE) that Dr Tong calls "a real blockbuster".

The supplement effectively reduces muscle pain after an intense workout, challenging what's considered an inevitable downside to a gym session. By enhancing muscle recovery after exercise and improving muscle power maintenance, exercise-enthusiasts can return to training sooner.

Thanks to the Priming Grant, the supplement is fast-tracked to be marketed and is due to hit shelves in the US by late 2017.

"People get really sore and really stiff the next day if they push themselves," Dr Tong says. "Using this natural product, we can reduce that dramatically to almost nothing."

Dr Tong was awarded his PhD at the University of Melbourne in the development of synthetic DNA probes to detect HIV, and then worked as a Post-Doctoral research associate at a Danish university.

He says it was in Denmark, when he filed his first patent in 1995, that he realised he preferred to pursue management.

"Over here if you discover intellectual property, usually the institution would take a lot of control over the next steps you take. In Denmark back then, they leave it up to you - they throw you into the deep end."

Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **THE NETHERLANDS**
ORGANISATION: **UNIVERSITY OF CANBERRA**

INNOVATION STORY

2016 PRIMING GRANTS

PROFESSOR ROB DAVIDSON

Professor Rob Davidson found his calling as a researcher. With more than 20 years as an academic in medical imaging, Professor Davidson says he's still passionate about his work.

"I have held previous jobs where I've woken up and thought, 'why am I going to work'? Ever since I've become an academic there isn't one day that's not exciting," he says.

"There are new things to think about, new ideas popping into your head and you're being challenged on those ideas. It is extremely mentally stimulating."

The radiographer from the University of Canberra started his science career as a clinician and then broke away for a stint in sales and marketing selling x-rays, CT scans and MRIs.

While he says he didn't particularly enjoy working in sales, the experience enlightened him to the mentality of salespeople when they approach him.

"You go into a meeting with those people and they've got certain objectives, but I already know what they are," Professor Davidson says.

"In that relationship, there's a difference in power balance. But I can redirect the conversation so there are no inequities."

But research is where Professor Davidson flourishes most.

He was recently named in the top ten researchers in medical imaging in the world, and as the second person to be appointed at a professorial level in medical imaging in Australia, he says he takes pride in being one of the leaders of the profession.

"My biggest achievement has been able to progress the profession academically," he says.

Most of his academic career has been devoted to researching the safety of radiation to patients during medical imaging procedures.

Professor Davidson says there is a risk for potential cancer induction to every patient that receives a dosage of radiation.

And more widespread use of computer topography (CT) scans – which has almost 100 times the radiation dosage of an x-ray scan – can be attributed to more cancer-related deaths in Australia, Dr Davidson says.

So why not just minimise the radiation?

Professor Davidson, who has been on radiation safety committees in the past, says toning down the dosage translates to poorer quality images.

This means the effectiveness of medical imaging to diagnose health problems would be substantially impacted.

The Priming Grant will help him create a novel tool to assess image quality, which may ultimately lead to minimising radiation dosages without tarnishing sharpness.

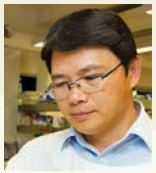
"CT is a really good diagnostic tool, clinicians are relying on it more and more. But we're increasing the overall dosage of radiation to the population," Professor Davidson says.

Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **CHINA**
ORGANISATION: **QUEENSLAND UNIVERSITY OF TECHNOLOGY**

INNOVATION STORY

2016 PRIMING GRANTS



PROFESSOR YIN XIAO

Before Professor Yin Xiao became an academic in biomedical engineering at the Queensland University of Technology, he worked as a clinical dentist for more than a decade.

There, he noticed gaping gaps in knowledge at the clinic, prompting him to make the switch to academia in the early 2000s to better translate research into the clinic.

In particular, periodontal disease and the associated resorption of the bone drove Dr Xiao into research to try and find answers.

"When I was working in the clinic I would try and regenerate lost bones, but there was no way we could do it. Still today it's very challenging," Professor Xiao says.

Since then, Professor Xiao has become a leading expert in tissue regeneration that's not limited to teeth – his research is focused on developing bone filler materials, arthritis and stem cell repair and regeneration.

And importantly, he founded the Australian-China Centre for Tissue Engineering and Regenerative Medicine (ACCTERM) in 2013.

ACCTERM is a network between China and Australia for scientists in bioengineering disciplines to collaborate.

Dr Xiao says this team is very productive and they train many students, some of whom have become professors.

"We try to work together to solve some of the clinical problems to train the next generation of biomedical researchers," he says.

His main motivation, he says, is to progress the field so new knowledge can be transferred to a clinical setting.

"All the clinical problems come from a lack of understanding, basically," Professor Xiao says.

"We really need innovative solutions, and the only way to solve that is to create more knowledge in the field."

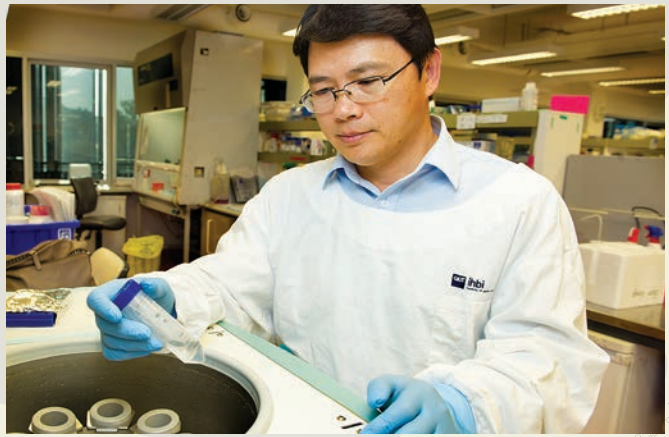
Professor Xiao, who was a recipient of a Priming Grant, recently collaborated with the company Asia Biomaterials to widen its commercial net and transform its stem cell technology and bone materials into a product.

Specifically, Asia Biomaterials were interested in Dr Xiao's unique calcium phosphate-based materials, or bio-ceramic, that Professor Xiao's team creates.

Bio-ceramic material is what is put into a bone defect to help drive the production of more bone tissues. But these commercialised products don't work as well as they could, Professor Xiao explains.

For a more effective material, Professor Xiao and his team try to make the bio-ceramic more 'bone-like'. That is, to make the material speckled with other essential and nutrient elements just like a real bone – rather than constructed from calcium phosphate only.

This collaborative research funded by the Priming Grant was published in the journal Nanoscale, highlighted on the cover page.



Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **GERMANY**
ORGANISATION: **AUSTRALIAN SENSING & IDENTIFICATION (AUSSI) SYSTEMS**

INNOVATION STORY

2016 PRIMING GRANTS

PROFESSOR JOHN CANNING

What does a smart fridge have in common with a malaria test strip?

University of Technology Sydney photonics expert and AusSI Systems director John Canning combines the technology behind the Internet of Things (the network of interconnected smart devices) with medical diagnostic test strips.

Just as a smart fridge can relay its settings to your phone in real time, these test strips, called the AusSI Systems Analyser, can quantify a medical condition in real time, from pregnancy to malaria.

Previously, test strips could only determine whether a medical condition was present. The AusSI Systems Analysers, on the other hand, can track a disease as it grows in the body.

AusSI Systems – a new start-up headed by Dr Sandra Ast – is developing this technology in collaboration with a German scientific and technical institute, BAM, thanks to the award of a Priming Grant.

"For example with malaria, you can monitor the disease on a day-to-day basis on a smart phone," Professor Canning says.

"And what becomes important is the rate of the growth of disease within you. If you see a rapid change in a few days you know this person needs urgent attention. Now you can make much smarter and more refined diagnosis."

This technology can potentially play a major role in quashing a pandemic.

Professor Canning explains how during the recent Ebola outbreak in West Africa, human operating errors were widespread as data from blood samples were affected by the environment.

The data would be sent away to be analysed more carefully in a laboratory, and then sent back to field, wasting up to a week. In this time, the virus could have spread in another direction.

"We realised you could instead automatically archive the data to the cloud, collate all the instruments in the field and map it in real time," he says.

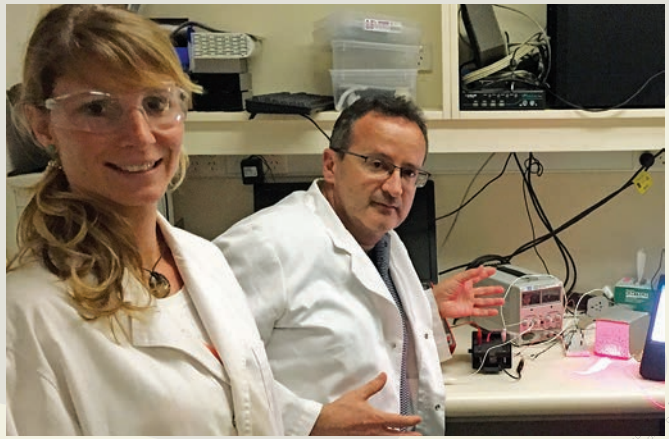
"Then theoretically you could map in real time the spread of disease and therefore be much more efficient in targeting the concentrated areas to contain it as quickly as possible."

It not only works for diseases, however. These test strips can be used for industrial purposes, such as testing the chemical make-up of a swimming pool.

Professor Canning's research specialty is in photonics – technology associated with the transmission of light particles, 'photons' – and as a multi-award-winning academic, he helped pioneer field.

And as millions of smart devices are becoming hooked up to the internet, Professor Canning says 'dead data' will cause delays and become a major problem – and not just for getting real-time data from your fridge, but for security systems.

"There are different solutions, but at the end of the day photonics is the fastest we have. I see photonics by default as the long-term solution. But it still won't end there," he says.



Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **UNITED STATES OF AMERICA**
ORGANISATION: **THE UNIVERSITY OF QUEENSLAND**

INNOVATION STORY

2016 PRIMING GRANTS

DR MARK BLASKOVICH

The risk of bacteria resistant to antibiotics is fast becoming a global crisis – and Dr Mark Blaskovich from The University of Queensland is on the front line fighting to find a way to keep a potential pandemic at bay.

The medicinal chemist, who has more than 15 years' experience in drug development, creates new antibiotics specifically designed to treat drug-resistant pathogens.

"What we're trying to do is raise public awareness that this is an issue that people should be concerned about, because the potential danger down the road is real," Dr Blaskovich says.

Already, around 700 thousand people die each year from drug-resistant infections, but this number is expected to rise to ten million by 2050 if nothing changes.

Drug resistant bacteria, however, are nothing new, Dr Blaskovich says. For decades, new antibiotics were developed faster than the bacteria could adjust.

But scientists are no longer able to keep up with the rate that bacteria form resistance, and Dr Blaskovich says this is predominately due to a lack of funding.

"Most major pharmaceutical companies are no longer investing in basic antibiotic research, and that's largely due to the lack of financial return."

Dr Blaskovich was a recipient of the Priming Grant, which he used to collaborate with Visterra Inc in Boston, USA.

They explored the possibility to create a 'guided missile' – an antibody drug conjugate that works by targeting and then killing drug-resistant bacteria without harming human cells.

"You can compare it to carpet bombing in World War II, where to destroy a factory you had to bomb a whole city because the bombs weren't selective enough," he says.

"Now with a guided missile you can selectively just hit that factory and avoid killing all the innocent people surrounding it."

The Canadian-born scientist worked in Seattle for around a decade in multiple molecular science companies before moving to Australia in 2005, where he has taken on both academic and commercial positions.

But not all his roles have been in science. When his sons began to play baseball, he says having a North American accent threw him into a coaching position, despite not having much baseball experience.

"The baseball community in Australia is small, but there are some really high-calibre people you rub shoulders with."

Dr Blaskovich is also known for being the sole author of the comprehensive book, The Handbook on Syntheses of Amino Acids.

"That was an over ten-year labour of love that took up a lot of my spare time. It was a larger than anticipated task," he says, explaining that he might have been too thorough in covering "literally all the literature on amino acid synthesis".

But he adds that seeing his book on a bookshelf in Oxford was a highpoint.

Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **SINGAPORE**
ORGANISATION: **UNIVERSITY OF NEWCASTLE**

INNOVATION STORY

2016 PRIMING GRANTS

DR JAMES WELSH

The University of Newcastle's Dr James Welsh made the transfer from working in industry to academia and has never looked back. The engineer, who specialises in building mathematical models of dynamic systems, says working in industry is mundane compared to academia.

"In academia, you determine your own pathway with your research," Dr Welsh says.

And since transitioning into biomedical engineering, Dr Welsh constantly has multiple projects and theoretical work keeping him busy.

The scope of his projects in the biomedical field are, indeed, varied, thanks to his widely applicable engineering expertise.

"Every day is different in terms of the research, which makes it very fulfilling to come in to work and do something you're very passionate about and try to solve a problem no one has ever solved before."

One project, for instance, is helping improve the way scientists map mice's vestibular system – the balance system in the inner ear – from inserting a probe into a mouse's brain to removing the system from the animal and running tests on the benchtop.

Dr Welsh's job is to work out whether the benchtop method is still effective using mathematical models.

Another project he was involved in and which was funded in part by the Priming Grant was improving the current mechanisms used for therapeutic and cosmetic limb lengthening.

Dr Welsh established a collaboration with two Singapore-based researchers: a medical researcher-entrepreneur, and an orthopaedic surgeon.

"We used the Priming Grant to set up a meeting between the three of us, sat down and went through all the pros and cons of existing systems and what were the highly desirable properties."

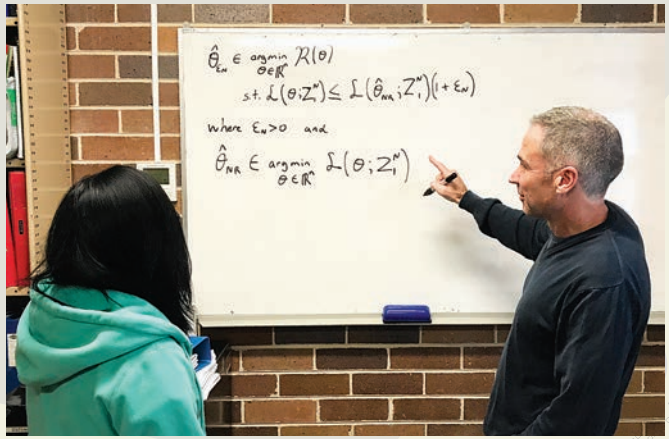
Their solution was an intelligent implant system that features embedded control, a miniaturised motor, and a bi-directional drive mechanism.

"The idea is to get something internal to the leg without making open wounds so the patient doesn't have to be in the hospital, can go home and still have a little bit of mobility around the house," Dr Welsh says.

This project is currently being taken on by a PhD student.

And as a senior lecturer, seeing his students at The University of Newcastle graduate is one of the major highlights in his career.

"I see after three or four years, someone who has come in not knowing anything leaving very knowledgeable in a particular area, it's very pleasing."



Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **UNITED STATES OF AMERICA**
ORGANISATION: **SPEEDX PTY LTD**

INNOVATION STORY

2016 PRIMING GRANTS

COLIN DENVER

Sexually transmitted infections aren't as easily treatable now that antibiotics are exhausting their might against bacteria. STIs associated with the 19th century, like syphilis, are making a comeback and it's not just up to scientists to find solutions – SMEs are also on the frontline fighting the problem.

Australian Diagnostics Firm SpeeDx's mission is to develop multi-faceted solutions for clinical diagnostics, and while their technology and platform can be used for a variety of areas, their current focus is on STIs.

"There really is an explosion of STIs at the moment, it's a really essential area to be focusing on from our side," according to SpeeDx CEO Colin Denver.

"STIs are massively stigmatised in society and if you think about people diagnosed with STIs, it's quite a low part of their life. Antibiotic resistance is just a compounding factor to that."

One STI that has been prevalent in the news is gonorrhoea, as the bacteria has formed a resistance against antibiotics faster than treatments can keep up.

SpeeDx is developing a test to help identify people with gonorrhoea infections when they present with symptoms.

"In the first case, we can tell you if you've got gonorrhoea, and in the same test we can tell whether you'll be resistant to the front-line treatment currently being used," Mr Denver says.

"It's a really interesting bacteria, in that it's quite genetically flexible."

SpeeDx have successfully developed the same test for a different STI called Mycoplasma genitalium with funding from the Priming Grant.

It detects whether a person has the infection, and if they do, whether the bacteria has mutated to resist the antibiotics that would be used to fight it.

The Priming Grant allowed the company to form a relationship with key collaborators at John Hopkins University in Baltimore, USA.

Mr Denver says they've generated a strong network of key leaders within the STI field.

"There are bacteria in certain infections that are at the last line of antibiotics. They're basically incurable, which takes you back to the pre-penicillin days."

And having successfully developed the initial test for Mycoplasma genitalium, SpeeDx have continued to form more collaborations that allow them to continue their work on STI resistance.

"We've found a really exciting area that we're able to be successful in with STIs right now," he says.

Medical Technologies and Pharmaceuticals

PARTNER ECONOMY: **JAPAN**
ORGANISATION: **CANCERPROBE**

INNOVATION STORY

2016 PRIMING GRANTS

PROFESSOR ELS MEEUSEN

The path from science to business isn't one often tread by scientists. For Professor Els Meeusen, who left academia four years ago to concentrate on a biotechnology company called CancerProbe that she set up with two colleagues, it was a transition that came with a few learning curves.

"I've done what I wanted to do in the academic field, and I wanted to try this out. I thought it would be very important and worthwhile," Professor Meeusen says.

"I'm learning new skills about other companies and presenting work to them, rather than writing papers. It's a very different mindset, but I've always been on the more translational side of things anyway."

Professor Meeusen's expertise wasn't initially in cancer, but in immunology.

While she was researching at Monash University, she discovered that worm parasites and cancer both escape and manipulate the immune system in the same way when they grow larger.

Professor Meeusen developed CancerProbe to explore this idea further with the goal of developing diagnostic treatments for cancer.

"I suppose I have come up with it separately but I think people are coming up with it independently from my own idea as well," she says of using parasites as the scaffold for cancer research.

"Cancer and immunology together isn't a new research field, it has been around for a long time, but it hasn't been really popular in the cancer or biology fields which are more about chemotherapy and surgery."

CancerProbe specifically researches ovarian and breast cancers. Its approach is unique – the company uses a tissue in the body, called the lymph node, to detect tumour antigens.

But getting access to lymph nodes of ovarian cancer patients in Australia isn't easy, Professor Meeusen says. In Australia, when a tumour is removed in surgical procedures, the lymph node isn't also taken out.

The Priming Grant awarded to Professor Meeusen addresses this issue and funded a trip for Professor Meeusen to Japan, where lymph nodes are removed and can therefore be studied.

"The trip was very successful. I told them how to continue collecting the tissue while I'm away, but it depends on how many patients they get so it's a slow process," she says.

"There's still a lot of work to be done before we get a final product, we're continuously working to find new funding."

Professor Meeusen currently lives in Melbourne, having moved to Australia from Belgium in 1983.

GLOBAL CONNECTIONS FUND

The Global Connections Fund (GCF) is a component of the Global Innovation Strategy under the Australian Government's National Innovation and Science Agenda. The GCS enables Australian SMEs to link with international researchers and Australian researchers to collaborate with international SMEs to seize opportunities in priority areas of importance to the strategic growth sectors of Australia.

The GCF is comprised of two types of grants: Priming Grants and Bridging Grants. Priming Grants are small grants of $7,000 to enable Australian SMEs and Australian researchers to physically meet with their international partners and develop their collaborative ideas. Bridging Grants are larger grants (up to $50,000) designed as seed funding capital to enable viable projects to grow in scope and scale, to test commercialisation and proof of concept activities.

www.globalconnectionsfund.org.au

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NATIONAL INNOVATION & SCIENCE AGENDA

The Global Connections Fund is a project of the Australian Academy of Technology and Engineering (ATSE) and is supported by the Australian Government.
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