

news

summer | 2015

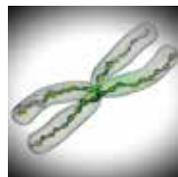
LAUNCH EDITION:
**SUPPORTING HUDSON
RESEARCH**
**PETER FIELDING'S GIFT TO EARLY
CAREER RESEARCHERS**



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DIRECTOR'S MESSAGE

Since the Institute was renamed 'Hudson Institute of Medical Research' in May, we have had many major developments, starting with the implementation of our new strategic plan, which outlines our priorities for the next three years. Key to this plan will be addressing Australia's financially uncertain research environment, providing outstanding support to our researchers to ensure they continue to deliver world-class research and ensuring our discoveries have a direct impact on the community.

The last few months have brought some outstanding successes for the Institute. In July, Dr Claudia Nold's innovative research into the dangerous diseases associated with premature birth was recognised with a prestigious Paul Korner Innovation Award from the Heart Foundation. Dr Nold's research is world class and she is highly deserving of this honour.

Hudson's Associate Director, Professor Peter Fuller, has been appointed to the important role of Chair of the Victorian Cancer Agency Consultative Council. In addition to providing independent strategic advice to the State Minister for Health and the Department of Health and Human Services' Executive on matters relating to cancer research, the Council also funds translational cancer research.

In August, Hudson gained a world-renowned researcher who will head our Centre for Cancer Research. Associate Professor

Ron Firestein has come all the way from San Francisco with his young family to take up the role. We feel extremely privileged to have Associate Professor Firestein join the Institute, as he is a highly esteemed researcher and physician who will provide significant clinical insight into Hudson's cancer research. He will undertake clinical hours as a consultant molecular pathologist for Monash Health, our partnering hospital. Read more about why Associate Professor Firestein has chosen to undertake his research at the Hudson Institute in this edition of Hudson News.

Last year we announced the \$1 million commitment made by the Fielding Foundation to support our bright young researchers and research innovation for the next five years. The first round of Fielding funding has now been awarded to Dr Rebecca Lim and Associate Professor Marcel Nold. Read more about the outstanding research these scientists are conducting in this newsletter.

In August, one of our most eminent Institute leaders, Professor Euan Wallace, was honoured for his outstanding record in clinical research and research training in perinatal medicine with a Career Recognition Award by the Victorian Clinician Researcher Network (VCRN). Professor Wallace has dedicated his career to translational research excellence as Director of Obstetric Services at Monash Health, Head of Department of Obstetrics and Gynaecology, Monash University, and Co-Head of The Ritchie Centre at the Hudson Institute.

Hudson's Board of Governance has received a major boost with the appointment of two extremely high calibre individuals. Distinguished scientist, Professor Warwick Anderson AM and Ms Maria Trinci bring to the Institute their vital insights into how the Hudson Institute can generate new funding and ensure its financial sustainability. Read more in this newsletter.

As we look towards the end of the year there are still many exciting developments to come, as we have just completed the construction of our new Translational Research Facility which we share with our partners Monash Health and Monash University. Hudson's cancer, baby and women's health researchers will begin moving into the building in November ready for its opening in early 2016. The facility sits side by side with the Institute and will enhance our ability to turn our discoveries into improved prevention, diagnosis and treatments for the world's most pressing diseases.

Professor Bryan Williams
Director, Hudson Institute of Medical Research

“
...in Australia's financially uncertain research environment, providing outstanding support to our researchers to ensure they continue to deliver world-class research and ensuring our discoveries have a direct impact on the community.”

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Single cell genomics medicine taken to a new level

“Single cell genomics technology enables scientists to analyse an individual cell from a diseased organ or tumour to establish which cells are actually causing disease”



(L-R): The honourable Frank McGuire MP, Professor Bryan Williams



(L-R): A/Prof Jose Polo, Fluidigm Representative Hana Gage, Prof Martin Pera, Prof Bryan Williams, Prof Ian Smith, Prof Paul Hertzog, The Hon. Frank McGuire MP, A/Prof Phil Hansbro

Imagine the human body is like a galaxy, encompassing billions of cells that, to the untrained eye, appear like stars from thousands of kilometres away – just tiny specks. Now, imagine being able to hone in and analyse just one of these ‘stars’ in isolation, to determine its make-up, environment and whether it poses a threat to its surroundings. Welcome to the world of single cell genomics technology, which is revolutionising cell analysis.

Previously, when scientists analysed groups of cells, they did so assuming that all cells that appear the same must be similar in their make-up. However, new data are revealing that individual cells that appear similar may in fact differ significantly in their genetic make-up, with this difference driving the health and function of the entire cell population.

Single cell genomics technology enables scientists to analyse an individual cell from a diseased organ or tumour to establish which cells are actually causing the disease, or responding to a treatment. In short, it allows researchers to further unravel the human genome by analysing one cell at a time.

The Hudson Institute’s Single Cell Genomics Centre opened at the Medical Genomics Facility, part of the Monash Health Translation Precinct (MHTP), in 2014. Its technology is already enabling researchers from the Hudson and its partners to analyse cells that cause inflammation, cancer and chronic autoimmune diseases, such as lupus.

Monash University Associate Professor Jose Polo is using single cell technology in his quest to discover how adult stem cells work.

“Single cell technology is revolutionising genomic medicine and allowing us to discover different cell types that have remained elusive until now.

“Before having access to Fluidigm’s single cell technology at the Hudson Institute, my current research was not possible as it would have been too costly and taken time I don’t have. Profiling the appropriate cells now takes me just one day using single cell technology whereas it would have taken 22 using the old system. That’s the equivalent of six months versus 12 years.”

Characterising these cellular variations is advancing research into stem cell immune responses to cancer and neurodegenerative

diseases, such as Alzheimer’s or Parkinson’s. In future, single cell technology will prove crucial to research in areas like infection and immunity, regenerative medicine and drug discovery.

The MHTP’s Single Cell Genomics Centre was recently named the first Fluidigm Single Cell Genomics Centre of Excellence in the southern hemisphere. As part of this award, the Institute entered into an agreement with biotechnology company Fluidigm, giving it first access to new technologies and providing opportunities for Hudson scientists to present their findings at global conferences.

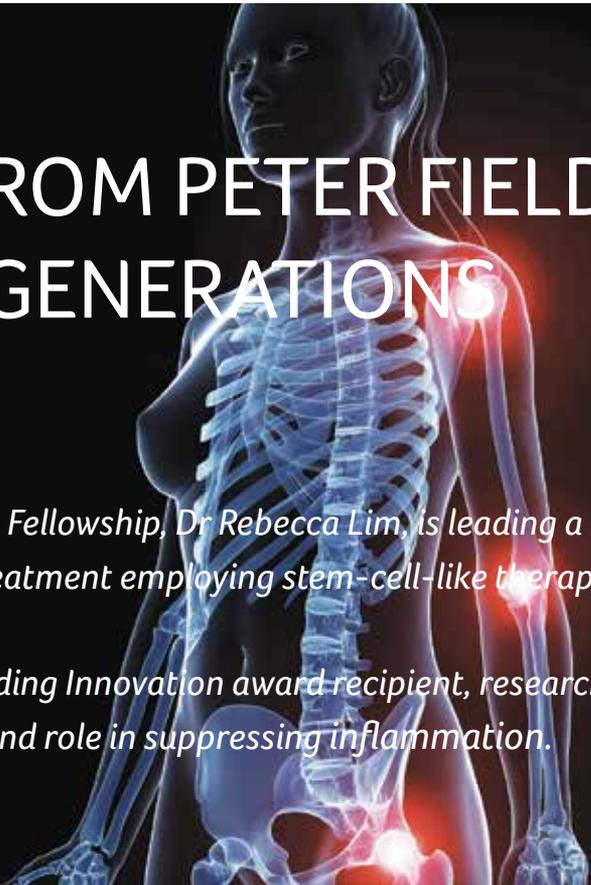
Victorian Parliamentary Secretary for Medical Research, Frank McGuire MP, officially opened the centre in early September, praising the work of both the facility and the MHTP.

The centre is the result of an Australian Research Council grant, through a partnership between the Hudson Institute, Monash University, the University of Melbourne and the University of Newcastle. With the help of the technology, researchers from the Hudson Institute are shining a light on the furthest corners of the ‘galaxy’ of the human genome to tackle disease.

A MESSAGE FROM PETER FIELDING – A GIFT FOR GENERATIONS

Inaugural recipient of the Fielding Fellowship, Dr Rebecca Lim, is leading a research group that is pioneering a world-first treatment employing stem-cell-like therapy to treat lung damage in premature babies.

A/Prof Marcel Nold is the first Fielding Innovation award recipient, researching small proteins called cytokines, their signalling and role in suppressing inflammation.



“The Fielding Foundation has supported the Hudson Institute and its work for many years, but in 2014, we decided to cement that commitment by making a real and lasting contribution.

To this end, the Foundation has pledged \$1 million over five years to support the Institute’s areas of greatest need – research innovation and assisting its bright young researchers, through the establishment of the Fielding Foundation Innovation Award and Fielding Fellowship.

Due to critical funding gaps, many young medical researchers will take their vital intellect offshore to conduct research overseas or exit the profession altogether, often leaving their research projects, and potentially countless vital discoveries, unfulfilled.

The Fielding Foundation Fellowship was created to stem

this flow, by addressing these gaps to support young scientists when they need it most and put them on the path towards a quest for knowledge and making discoveries that help to improve and save lives.

Meanwhile, the Fielding Innovation Award supports the commercialisation of medical research, to help ensure discoveries are translated from the lab into patient treatments.

Coming from a background in business, I recognise the importance of commercialising research and agree that the success of the Hudson Institute will depend on how well its researchers can connect their innovative ideas with companies. This will generate additional funding for their research and provide an avenue for scientists to turn their discoveries into new therapies to improve the health and quality of life of patients in need.

As a donor, I see no greater



(L-R): Peter Fielding, Professor Bryan Williams

cause to direct funds to than improving the health and wellbeing of the community. Health affects us all. It is the one critical need we all share, and sadly, disease and injury will affect either us or someone we love in our lifetime.

We are very proud to have our contribution reflect areas we feel passionate about. The Hudson Institute is an

outstanding organisation and one with which the Fielding Foundation feels honoured and proud to be associated.”

Peter Fielding,
Fielding Foundation



Dr Rebecca Lim

PIONEERING TREATMENT GIVEN AN INJECTION

The inaugural recipient of the Fielding Fellowship, Hudson's Dr Rebecca Lim, is leading a research group that is pioneering a world-first treatment employing stem-cell-like therapy to treat lung damage in premature babies.

Dr Lim's research group has commenced clinical trials involving premature babies from the Monash Children's Hospital here on the Monash Medical Centre site. The babies are administered the stem cell treatment in the days after their birth.

If it proves successful, this technique could be used in hospitals to improve survival rates and quality of life of babies suffering from conditions like lung respiratory distress syndrome and bronchopulmonary dysplasia.

Preterm babies are often born with immature lungs, requiring life-saving respiratory support. The side effect is that around 50 per cent will experience lung damage, for which there is currently no effective treatment. This is where Dr Lim's amnion epithelial cell treatment could have life-saving effects. As part of the treatment, amniotic epithelial cells are extracted from the amniotic membrane,

which surrounds the baby during pregnancy. These cells then attach themselves to the baby's damaged lungs, kick-starting the repair process. Like stem cells, these cells can grow into any type of cell in the body, but because they are discarded as part of the afterbirth, they lack the same ethical dilemmas.



Prof Marcel Nold

MARCEL NOLD RECEIVES FIELDING INNOVATION AWARD

Associate Professor Marcel Nold has been awarded the inaugural \$50,000 Fielding Innovation Award to help develop his work on small proteins called cytokines, their signalling and role in suppressing inflammation.

Associate Professor Nold and his wife Dr Claudia Nold led an international study which was published earlier this year in the highly regarded journal Nature Immunology.

From the study they discovered the mechanisms by which interleukin 37 (IL-37), a cytokine of the IL-1 family, acts to regulate immune responses and control inflammation in the body.

The team is now looking to translate the powerful functions of this small protein into new drugs that could be used to control or unleash the immune system. This could have wide-reaching implications for treating strokes, heart attacks and auto-immune diseases such as lupus.

Once further testing is completed, the team envisages this research program will arouse the interest of pharmaceutical companies.

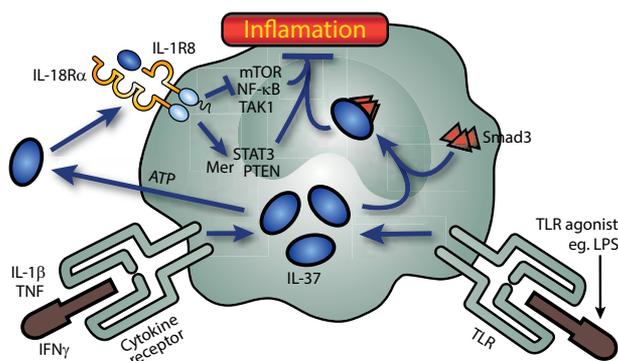
"Now that we've discovered the mechanisms of IL-37 in controlling inflammation, we are looking into how to make that research medically useful," Dr Nold said.

"The Fielding Innovation Award will greatly help us to get the extensive amount of work done over the next 12 months and beyond in order to take our findings through to a commercial stage of developing drugs to improve life for

those suffering dangerous and debilitating inflammation."

The Innovation Award supports the Hudson scientist who is producing major advancements in the commercialisation of their research. Next, Associate Professor Nold's team will begin experiments to test modulators of the protein's function, accelerating the research and strengthening the team's position.

"The Fielding Innovation Award will greatly help us to get the extensive amount of work done over the next 12 months and beyond in order to take our findings through to a commercial stage of developing drugs to improve life for those suffering dangerous and debilitating inflammation."
- Associate Professor Marcell Nold



FORMER NHMRC BOSS JOINS HUDSON BOARD

The Hudson Institute is pleased to announce the appointment of distinguished scientist Professor Warwick Anderson AM to its board of governance.

Professor Anderson led the NHMRC, Australia's major governmental funding body for health and medical research, for almost nine years until March this year.

He is also the former Head of Monash University's School of Biomedical Sciences and former Deputy Director of the Baker Medical Research Institute.

Hudson Director, Professor Bryan Williams, says the Institute

is privileged to welcome a board member of Professor Anderson's calibre.

.....
"Professor Anderson brings varied experience as a medical researcher, and at the helm of Australia's foremost funding body," Professor Williams said.
.....

"Professor Anderson's knowledge will be invaluable as we work to galvanise our research strengths, particularly in Australia's shifting medical research funding landscape."

Professor Anderson completed research fellowships at the University of Sydney and Harvard Medical School.

His research has focused on renal causes of hypertension, including the roles of renal vascular remodeling, renal innervation and the renin-angiotensin system.

He has a history of serving on medical and scientific boards and committees, and currently serves on the International Advisory Committee on Biomedical Science for Singapore and the Dana-Farber Cancer Institute's Presidential Visiting Committee.



"The Hudson Institute has a long and celebrated history in medical research and discovery. I look forward to playing a role in these transformative years for the Hudson Institute and eagerly await the real and lasting impact the Institute will make on human health," Professor Anderson said.

Q&A WITH ASSOCIATE PROFESSOR RON FIRESTEIN



Associate Professor Ron Firestein talks about why he moved from the US (where he worked for biotech company Genentech in San Francisco) to become the Hudson Institute's new Director of the Centre for Cancer Research.

Why did you decide to go into medical research after becoming a doctor? Why is medical research so important?

My own path started in the laboratory and led me to the clinic. As an undergraduate student, I instantly was drawn

to the unique experiences and perspectives of clinician-scientists who go back and forth between the lab and the clinic and can serve as 'translators' of medical research.

Tell us about some of your most notable discoveries so far?

One of the major projects I led at Genentech involved finding biomarkers that can predict which patients will respond to epigenetic therapies. I'm particularly excited about this work because of its potential to directly impact patient care in the next 3 years.

You have just moved to Australia to begin working at the Hudson Institute. Why did you choose the Hudson over other medical research institutes?

Joining the Hudson Institute is a fantastic opportunity to be in

the right place at the right time. Two key Institute strengths that led me to come here were the strong culture of collaboration and multi-disciplinary research and the clinical and translational strength on the Monash Health campus. It's exciting to see how 'out of the box' thinking can come together as project ideas are spawned between our scientists and other Hudson Centres that focus on orthogonal questions in immunity, endocrinology, and reproductive health.

How is your family settling into Australian life?

I came here with my wife, Naama, and two daughters Eliana (age 6) and Emily (age 3). My family loves Australia! Aside from being attacked by a grumpy neighbourhood magpie we've

found non-avian Australians to be very welcoming and friendly. The girls have settled in to their new school and already have many friends. At this point, they have both started to sing the Australian national anthem and declared that they are never leaving Australia.

What do you hope to achieve as head of Hudson's Centre for Cancer Research?

The Cancer Centre is an exciting and growing theme area at the Hudson Institute. Many of our members are early career scientists and I am particularly looking forward to mentoring and working collaboratively with them to cultivate and promote the Centre's unique strengths and attributes.

HUDSON BREAKTHROUGH IDENTIFIES A NEW SYNDROME LEADING TO INTERSEX



Hudson researchers are leading an international study that has identified a new intersex syndrome, Craniosynostosis with Sex Reversal (CSR).

Hudson Institute sex genetics experts Professor Vincent Harley and Dr Stefan Bagheri-Fam have led an international study which identifies a new rare disorder that forms another piece of the puzzle in understanding why some people are born intersex.

People who are intersex have reproductive organs, sexual anatomy or chromosome patterns that do not fit the typical definition of male (XY) or female (XX).

The study, published in the journal *Human Molecular Genetics*, shows how a mutated form of the *FGFR2* gene, already known to cause craniosynostosis (where the joints between the bones of a baby's skull close before it is fully formed), can also cause XY sex reversal. The team has identified a new intersex syndrome, called Craniosynostosis with Sex Reversal (CSR).

"The umbrella term 'intersex' has many genetic causes, the majority of which go

undiagnosed, leading to health and social impacts later in life," Professor Harley said.

Researchers analysed genetic data from a German patient who, as a teenager, was diagnosed with the form of intersex called XY gonadal dysgenesis. Genetic sequencing by Dr Makoto Ono, visiting pediatrician at the Hudson, revealed that the patient carried the mutated *FGFR2* gene, already a known cause of craniosynostosis.

The question remained as to whether the *FGFR2* mutation was also responsible for the XY male-to-female sex reversal. The breakthrough came when Hudson scientist and lead author of the paper, Dr Bagheri-Fam, working with Yale University researchers, demonstrated that mice with a very similar mutation also showed XY male-to-female sex reversal.

Professor Harley says that one to two per cent of live births are intersex, which can result in psychological trauma, infertility, lifelong endocrine care,



(L-R): Professor Vincent Harley, Dr Stefan Bagheri-fam

multiple surgeries and increased risk of conditions like gonadal cancer.

"By identifying the genetic causes, clinicians are better equipped to diagnose the condition, and precisely treat and manage the health risks associated with specific genetic intersex conditions," Professor Harley said.

The work is supported by the National Health and Medical Research Council (NHMRC) Australia, and the US National Institute of Dental and Craniofacial Research.

COMMUNITY SUPPORT

COMMUNITY SUPPORTS NEW CEREBRAL PALSY THERAPIES FOR BABIES

Hudson Institute's Ritchie Centre enjoys a strong relationship with Inner Wheel Australia (IWA), which supports researchers through its annual appeal, Coin for a Cord Day. To date, IWA funding for the Hudson Institute has enabled preclinical studies in premature birth and birth asphyxia, two of the major causes of cerebral palsy, whilst supporting key women in science.

Earlier this year, Victorian Certificate of Applied Learning (VCAL) students from The Centre for Continuing Education in Wangaratta put their money where their mouth is in support of IWA and the Hudson Institute. The students, aged 16 to 18, have been raising funds for IWA through merchandising and cake stalls in Wangaratta.

A group of 25 students toured the Institute, where researchers are investigating the use of stem cells from babies' umbilical cords to improve brain function after severe birth asphyxia and to

treat and prevent cerebral palsy. The students participated in a Q&A session Professor Graham Jenkin's and Dr Suzie Miller's group. Director, Professor Bryan Williams, says Hudson researchers are deeply committed to sharing discoveries with the community and rewarding their commitment to science.

"The community is essential to our ability to make vital discoveries. Research such as this is not possible with government funding alone."

Through grants from IWA, the results obtained by Professor Jenkin's and Dr Miller's research group have supported the establishment of a world-first clinical trial to test the use of cord blood before it can be used to treat the damaged brains of babies who have suffered a loss of oxygen at birth.

VCAL teacher, Rebecca Higginson, said opportunities like the visit to the Hudson Institute build self-confidence and belief in the students.

"The students thoroughly enjoyed seeing first-hand how the funds they raise really make a difference," said Ms Higginson.



Dr Kevin Knower ('Dr Kev')

SCIENTISTS IN SCHOOLS

Hudson Institute researchers have participated in the CSIRO 'Scientists in Schools' program for many years, forging long-lasting partnerships between scientists, school students and teachers.

Our researchers find the program highly rewarding, as the interaction with enthusiastic students gives them a fresh perspective on science.

Dr Kevin Knower has taken part in the program for four years. He recently visited Mossgiel Park Primary School in Endeavour Hills to conduct practical science lessons with the students.

The students learnt about melting points and freezing by using dry ice, bacterial hygiene by growing bugs in petri dishes and how to isolate DNA from strawberries.

Year six teacher, Cathy Cavedon, said, "It's been wonderful to be involved in the Scientists in Schools program with Doctor Kev. The students have embraced the program and always look forward to doing activities that are engaging and outside the normal classroom parameters."



Above: Mossgiel Park Primary School students work on one of Dr Kev's assignments

Mossgiel Park Primary School student, Aina, says, "Dr Kev is interesting to listen to and is a very good scientist", while 12-year-olds Chelsea and Zhenni say, "Dr Kev's experiments are fun, interesting and unique."

A GIFT IN YOUR WILL

Including a gift to the Hudson Institute in your Will supports our scientists and students to work side by side with clinicians to solve some of our most challenging contemporary health problems.

Your bequest will help our researchers to unravel the mysteries of nature to cure disease and improve healthcare now and for future generations.

For a confidential conversation about including a gift to the Hudson Institute in your Will, or to receive further information, please contact Stuart Lowe our Fundraising Manager, on 03 8572 2701.

