

WINTER 2025

HUDSON NEWS

**"It's not acceptable
that 1 in 4 women
globally endure this."**

Sally Maconochie - pelvic organ prolapse patient, advocate and donor.

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**Support us to find cures and
better treatments for women**



Director's message

Professor Elizabeth Hartland AM



Tackling the big issues in women's health from every angle

One in four women in Australia suffers from pelvic organ prolapse (POP). That's unacceptable.

Sally Maconochie used to run marathons. Now, since her injury from giving birth, and after major surgery, she is in pain if she stands or walks too long. She can no longer run. She had never heard of POP until it struck her, just like her mother and grandmother before her. She calls it a hidden pandemic for women because it is rarely spoken of, even in families where generations of women have suffered from it.

In this edition of *Hudson News*, you will read about researchers working on pelvic organ prolapse (POP), ovarian cancer and endometriosis. As well as searching for cures, they are developing better and faster methods of detecting these debilitating diseases.

Associate Professor Shayanti Mukherjee combines engineering and 3D printing expertise with Hudson's own stem cell technologies to create safer transvaginal meshes that work with a woman's body, not against it. Building on our world-first stem cell research, she is also targeting ways to identify and treat birth injuries early, rather than wait until POP develops later.

As with many women's health issues, this research is under-funded but vitally important.

Leading the fight for new and better treatments for ovarian cancer, the silent killer.

Dr Maree Bilandzic was the first in the world to identify leader cells in ovarian cancer, the cells responsible for the two biggest challenges in this disease – spread (metastasis) and resistance to treatment.

She and her team have now developed an antibody that targets leader cells, with clinical trials planned, bringing new hope to women with this deadly cancer.

Dr Nicole Campbell's research is taking a different route to help the immune system tackle the spread of cancer cells from

the ovaries to other parts of the body. Her research builds on 20 years of Hudson Institute discoveries.

Associate Professor Simon Chu is using cutting-edge techniques like cryo-electron microscopy to identify drugs that can specifically target granulosa cell tumours (GCT), a rare and under-researched subset of ovarian cancer.

A simpler, faster endometriosis diagnosis is much closer.

Nearly 1 million Australians (1 in 7 people assigned female at birth) are living with endometriosis – making it just as common as asthma or diabetes.

Endometriosis can cause excruciating pain and massive disruption to everyday activities. Sadly, this situation has not changed in decades. Diagnosis is still primarily done through surgery, treatments largely remain focused on hormonal options (such as oral contraceptive pill and progestogens), or more surgery, and none of these options is permanent or universal.

Professor Caroline Gargett and Dr Shanti Gurung are working to address the diagnosis challenge without the need for invasive surgery. They are building on their team's discovery that menstrual fluid could be used as a non-invasive diagnostic, no more complicated than a blood test, to detect endometriosis earlier, without pain.

I ask you to please give generously this end of financial year. With your commitment, together we can support the innovative research that may help a woman close to you live a better, more fulfilling life.

Every dollar you gift to research helps our researchers move closer to cures and better treatments.

Professor Elizabeth Hartland AM
Director and CEO

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SCAN ME





The hidden pandemic

Associate Professor Shayanti Mukherjee in her Hudson Institute laboratory

Two women from different backgrounds met for the first time at Hudson Institute because they have one thing in common. For Associate Professor Shayanti Mukherjee, born in India and now living and raising her family in Melbourne, it's her life's work; For Sally Maconochie, Brisbane major projects consultant and mother, it is the thing that turned her from a super-fit marathon runner to a person living with a disability.

The 'thing' in question is pelvic organ prolapse (POP), a common medical condition, that many have never heard of.

POP develops when tissues, pelvic floor muscles and ligaments that support the pelvic organs (bladder, uterus and bowel) become damaged, usually in childbirth, causing organs to shift or 'drop' into or outside the vagina. POP is essentially a hernia through which organs protrude because supporting tissue is weak.



1 in 4

women **globally** suffer from the devastating impacts of Pelvic Organ Prolapse



L-R: Dr Saeedeh Darzi, Dr Kallyanashis Paul and Associate Professor Shayanti Mukherjee at Hudson Institute
Right: Associate Professor Shayanti Mukherjee, Professor Caroline Gargett and Sally Maconochie



Horrorifying and traumatic

In Sally's words, the impact on her life was horrifying and traumatic, so severe that she decided to find out as much as she could about POP and spread the word. That is how she found Hudson Institute.

"The way the prolapse affected me in everyday life was quite obvious and something I found I couldn't hide – I couldn't stand for 10 minutes, let alone run."

Sally Maconochie

A/Prof Mukherjee, Head of the Translational Tissue Engineering Research group, specialises in innovative cell-based therapies for pelvic floor disorders and birth trauma injuries.

Next-generation therapies

She and her team are designing degradable meshes to regenerate vaginal tissue using a polymer material approved by the US Food and Drug Administration (FDA), to create tissue engineering therapies for treating POP. It is a vexed area of research since the surgical use of synthetic, non-degradable meshes was banned after they were found to be responsible for serious and life changing damage in a significant number of patients.

Her team combines engineering and 3D printing expertise with Hudson Institute's own stem cell technologies to develop a safer alternative that works with a woman's body, not against it.

It is no wonder that when they met in the lab, Sally and Shayanti had plenty to discuss.

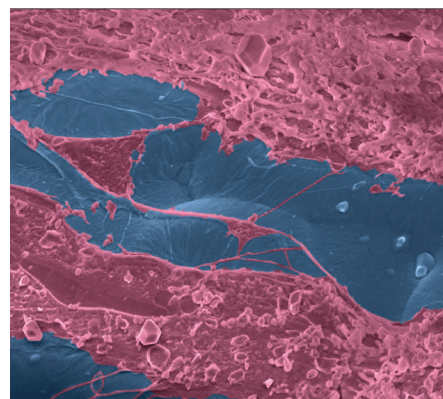
"The 3D bio-printed mesh is something I'm really excited about," Sally said. "The fact that Hudson Institute is looking at a potential mesh alternative is really exciting, because for people like me who have muscle away from bone, that's the only way we have of re-attaching it."

Prevention and cure

Hudson Institute team are focused on prevention, as well as a cure. Building on Professor Caroline Gargett's research with mesenchymal stem cells, A/Prof Mukherjee is also working to develop ways to better identify and treat birth injuries when they happen, rather than waiting until they develop into something much more serious, like POP, in later years.

Sally wants to do whatever she can to ensure that future generations of women are better prepared and informed as they approach birth. "My mother, my grandmother and her mother all had prolapses after childbirth, but no-one mentioned it to me until it was too late, and it turns out that a family history of prolapse is one of the biggest risk factors."

The researcher and the advocate now have a mutually beneficial relationship, born of pain but promising so much joy and relief for women everywhere.



The Hudson Institute team is investigating using mesenchymal stem cells from the uterus (endometrial mesenchymal stem cells) together with nano biomaterials (such as polymers) to treat and prevent POP.

We have developed new methods for culturing the mesenchymal stem cells that improve their performance for clinical translation. We now need to ensure the innovative culture methods we have developed are safe.





Dr Maree Bilandzic in her laboratory at Hudson Institute

Three leading researchers attack ovarian cancer from all angles in their search for new treatments for the silent killer of women

You will often hear it said that someone is battling or fighting cancer – the imagery is hard to escape. When it comes to Hudson Institute’s work on ovarian cancer, it is a war being fought on several fronts and our troops are making great inroads.

Ovarian cancer is one of the deadliest cancers, with only 48 per cent of patients surviving beyond five years. It affects about 1,500 Australian women annually.

There are many types of ovarian cancer, all of which behave differently and respond in varying ways to treatments.

Most patients are diagnosed when the cancer is already advanced, often after it has spread to other parts of the body. While first-line treatments can have good results, the cancer usually returns in a state that makes it resistant to chemotherapy.

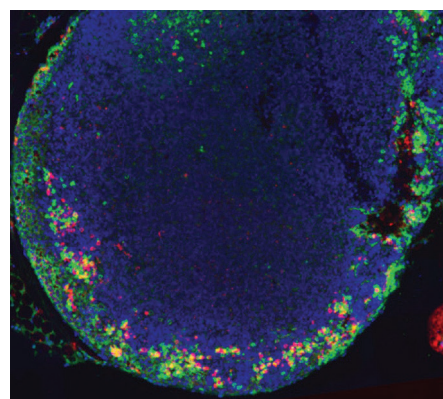
These two factors – spread (metastasis) and chemoresistance, are at the heart of Dr Maree Bilandzic’s work. “We found that so-called leader cells promote tumour progression by suppressing anti-tumour immunity,” Dr Bilandzic said.

“By targeting these cells, we aim to develop new therapies to reduce metastasis, enhance immune responses, and improve outcomes for ovarian cancer patients.”

Dr Maree Bilandzic

“We have developed a novel antibody targeting leader cells and are now advancing towards first in-human clinical trials to bring new hope to women with ovarian cancer.”

Dr Maree Bilandzic



An advanced-stage tumor after 8 weeks, showing specific areas where cancer-spreading leader cells (KRT14+ LCs) and immune-suppressing cells (Tregs) are concentrated, driving tumor growth and immune evasion

New ovarian cancer treatments are long overdue

Treatment for ovarian cancer has barely changed in 30 years. Dr Bilandzic has met women going through the cancer battle who are receiving the same treatment their mothers or grandmothers did.

"My research, is the first to demonstrate that targeting leader cells can significantly reduce metastasis and reshape the immune microenvironment, improving the anti-tumour immune response and helping the body fight off the disease." Dr Bilandzic said.

Dr Nicole Campbell is also working on ways to help the immune system recognise and guard against ovarian cancer, but her

approach is different. Her research focusses on a new immunotherapy that targets high-grade serous ovarian cancer by focusing on a naturally-produced protein known as interferon epsilon, which can help activate the immune system to protect against the cancer and prevent its spread.

"Our data shows that interferon epsilon primarily works through activation of the immune system, and it's most effective against metastatic tumour cells, so it could play a major role in tackling the spread of cancer cells from the ovaries to other parts of the body."

Dr Nicole Campbell

Immune-based therapies have been very successful

in treating other cancers, but less so against ovarian cancer.

Rare cancer targeted by new technology treatments

Associate Professor Simon Chu studies a rare sub-group of ovarian cancer cells called granulosa cell tumours (GCT) and because of their rarity (about 5 to 8 per cent of malignant ovarian cancers), research in this area has historically been underfunded, leaving patients with limited options beyond surgery.

He has found that nearly all women with GCT carry a mutation in the FOXL2 gene, which interacts with a key family of proteins to drive tumour growth. He aims to block this interaction.

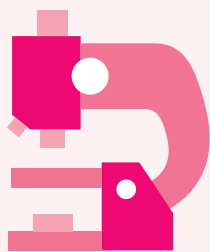
By screening more than 300,000 drug compounds, his team aims to find one that could stop tumour progression—and potentially lead to a targeted treatment for all patients with the FOXL2 mutation.

The war against ovarian cancer is far from won, but Hudson Institute is leading the fight for new and better treatments.

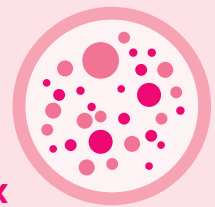
"Using cutting-edge techniques like cryo-electron microscopy to map out the molecular structure of how GCT develops, we aim to better understand it, so then we can develop drugs that specifically target this type of cancer."

A/Prof Simon Chu

There is **no** ovarian cancer **early detection test** for women



30 plus different ovarian cancer subtypes makes detection and treatment complex



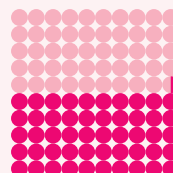
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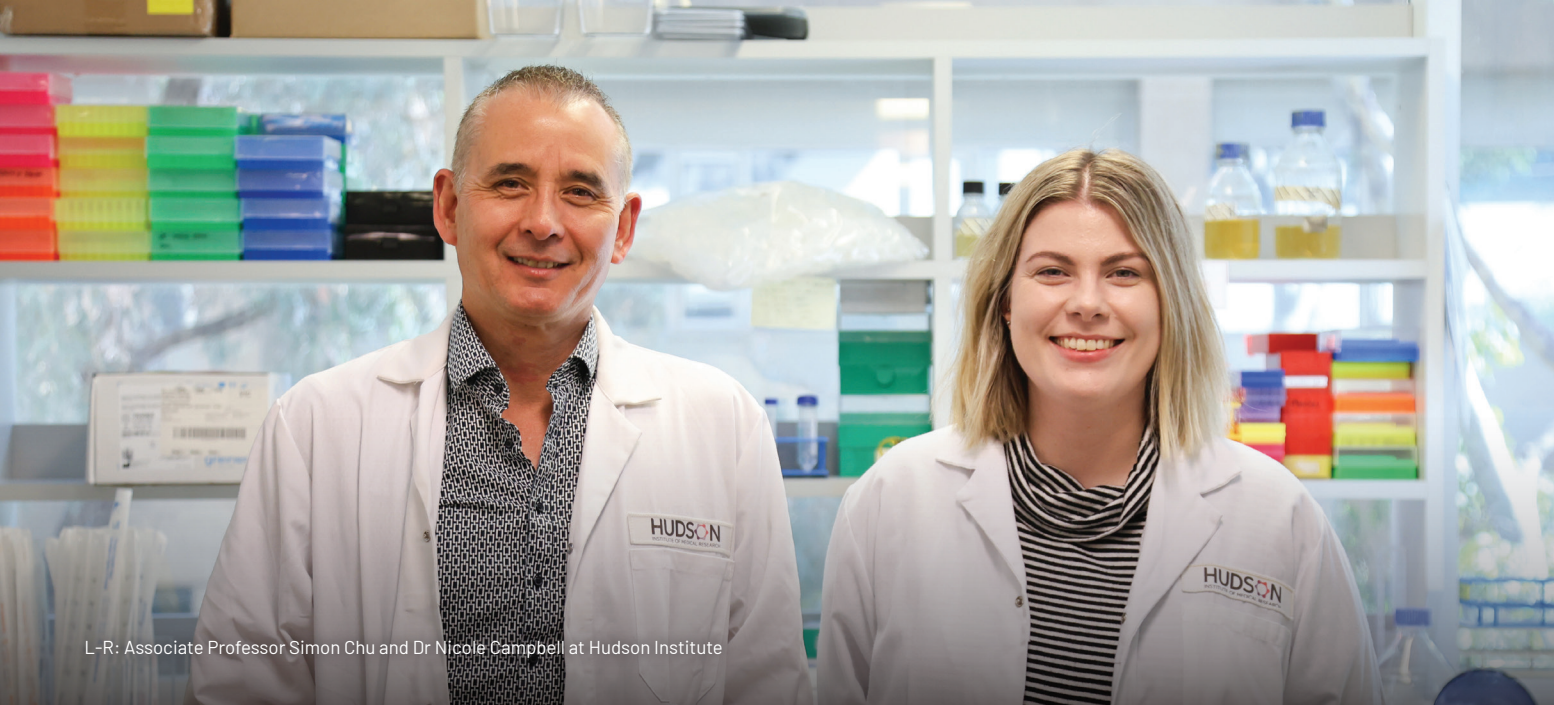
of ovarian cancer cases **diagnosed** in Australia are **women under 60**



49%

of women diagnosed will **survive 5 years +**





L-R: Associate Professor Simon Chu and Dr Nicole Campbell at Hudson Institute

Philanthropic support for research gives hope to ovarian cancer patients

Two cutting-edge Hudson Institute ovarian cancer research projects – led by Associate Professor Simon Chu and Dr Nicole Campbell – have received much needed and generous support from the Ovarian Cancer Research Foundation (OCRF).

These two OCRF grants are focused on research that will improve treatment solutions to improve the quality of life and survival for women who have ovarian cancer, including rarer sub-types.

The 2025 OCRF National Research Grants Program will provide A/Prof Chu:

- \$724,293 over three years to help his work on the rare subtype adult granulosa cell tumours (aGCTs) and focusing on new treatments.

The Program will also provide Dr Nicole Campbell:

- \$892,212 over three years to help her develop the first immune-based treatment for high-grade serous ovarian cancer. The project is supported by the Mother's Day Classic Foundation in association with the OCRF.

Ovarian cancer is the most lethal gynaecological cancer: investing in

high-potential research is the answer to increasing the survival rate of women. A/Prof Chu's research on a rare type of ovarian cancer, granulosa cell tumours (GCT), has found that nearly all women with this cancer carry a mutation in the FOXL2 gene, which interacts with a key family of proteins to drive tumour growth. He aims to block this interaction using cutting-edge technology, and develop a targeted treatment.

Dr Campbell's research focusses on a new immunotherapy that targets high-grade serous ovarian cancer by focusing on a naturally-produced protein known as interferon epsilon, which can help activate

"Immune-based therapies have been really successful in treating other types of cancer, but not so effective against ovarian cancer. Our data shows that interferon epsilon primarily works through activation of the immune system, and it's most effective against metastatic tumour cells."

Dr Nicole Campbell

the immune system to protect against the cancer and prevent its spread.

This year's OCRF grants totalling \$3.5 million (raised by the OCRF's generous community) is granted to eight ovarian cancer researchers in five Australian institutions focussed on treatments and early

detection ovarian cancer research and marks the biggest gift distribution in the Foundation's 25-year history. One of the most

challenging aspects of ovarian cancer is the diversity and complexity of the disease, so it's vital to support research into the rarer subtypes, to ensure better outcomes for all those impacted by ovarian cancer.

"I believe we are on the cusp of change for ovarian cancer. For too long the statistics have been stubborn and progress toward

effective methods of early detection, and development of enduring successful treatments, has been too slow," said Robin Penty, OCRF's Chief Executive Officer.

These Hudson Institute projects offer enormous hope to the many whose lives are upturned by ovarian cancer, and our researchers are very

grateful for the funding. "Thanks to you, we come to work every day knowing there's an entire community backing us, helping to drive new discoveries in ovarian cancer research. Breakthroughs take a team, and we are incredibly grateful to have the OCRF community's support for ours. Thank you!" said A/Prof Chu.



OVARIAN
CANCER
RESEARCH
FOUNDATION

Simpler, faster endometriosis diagnosis just got much closer

Imagine if it took up to ten years to be diagnosed with asthma or diabetes, and the best hope of a cure was temporary at best, via surgery.

For one-in-seven women, that is an everyday reality, but the cause is not asthma or diabetes, it is endometriosis, a condition that's just as common as those other two conditions.

Endometriosis is finally starting to receive the level of public attention it deserves, considering how common and debilitating it is. Two major challenges remain: earlier diagnosis and better treatment.

Professor Caroline Gargett leads a dedicated group of researchers at Hudson Institute working in both these areas, and there has been some exciting news from her lab in recent months.

Menstrual fluid could be the key to early detection

Her team is working to address the diagnosis challenge by finding a way to detect endometriosis sooner and without the need for invasive surgery.

Dr Shanti Gurung is building on the team's discovery that menstrual fluid could be used as a non-invasive diagnostic, and her latest study, published in the *Journal of Extracellular Vesicles*, provides major encouragement.

Her project involves measuring and profiling cells, including stem/progenitor cells and small extracellular vesicles found in menstrual fluid, with the aim of developing a simple diagnostic test, no more complicated than a blood test.

"Extracellular vesicles (EVs) are nano-sized parcels that cells secrete for efficient communication with other cells," Dr Gurung said. "In this project, we investigated proteins in EVs from women with and without endometriosis and identified dysfunctional cellular communication, which could help us in early detection of the disease."

"This is the first study to date to identify a comprehensive list of protein cargo and their differences in the menstrual fluid derived extracellular vesicles from women with endometriosis and unaffected women."

"We are now a big step closer to creating a non-invasive way to detect endometriosis, so it can be treated sooner."

Life changing early detection

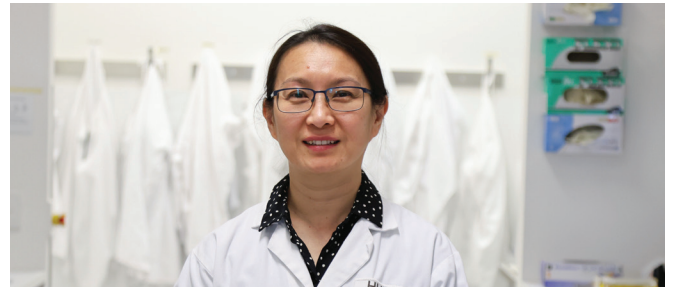
This has the potential to save time, money and huge amounts of pain and discomfort for the estimated one million Australian women who have the condition.

Dr Gurung said endometriosis affects around a million Australians and 200,000 Victorians.

"It has a huge impact on their overall quality of life. Apart from severe pain and fertility issues, it significantly impacts the ability of those affected to attend school, complete education, and establish and maintain careers and families," she said.

"In Australia, the average annual cost of endometriosis is \$21,000 per individual, mainly due to productivity loss."

A simple, painless early detection test would make a life-changing difference to all those women, their families and the entire community.



(Top) Professor Caroline Gargett, (Bottom) Dr Shanti Gurung



Your legacy can save lives

Leaving a gift in your Will to Hudson Institute enables us to work towards innovative treatments and cures for current and future generations.

Our team is here to help with any queries.

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L-R: Lachy Kinsella and his sister, Isabelle Kinsella. Lachy is a survivor of neuroblastoma cancer.