

Summer 2021 | Through heart surgery, Dr Victor Chang was able to save hundreds of lives. But he knew that research could save millions.



Mum Kristen Patton was hit by a massive heart attack days after giving birth.

Moments later Kristen was found unconscious by her husband who'd been in another room wrapping gifts.

Kristen wasn't breathing. Emergency workers resuscitated her multiple times. She went in and out of consciousness.

At the hospital, doctors determined that Kristen had suffered a heart attack. But after numerous tests, they still didn't know why.

Kristen was desperate to get home to her four children, but before she could leave hospital she had another heart attack even worse than the first.

Kristen had suffered a spontaneous coronary artery dissection, or SCAD, a tearing of the coronary artery. Doctors rushed her to surgery and performed a triple bypass.

SCAD is a serious condition that results when an inner layer of one of the blood vessels in the heart tears. Blood seeps between the artery layers, forms a blockage and can slow or block blood flow to the heart, causing angina, heart attack, abnormalities in heart rhythm or sudden death.

Women in their 40s and 50s are most at risk of SCAD, although it can occur in adults at any age and also in men. The majority of

## Saving mothers from dangerous heart attacks

It was Christmas eve.

Kristen's three older children had finished putting out food for the reindeer and gone to bed.

Kristen was settling down to feed her newborn when she was struck by an unbelievable pain in her jaw. It spread rapidly across her face and neck and down her arm.

Something was terribly wrong. Kristen carefully laid her baby safely in her bassinette.

And passed out.

people who have a SCAD heart attack are often healthy with no known risk factors of heart disease.

Kristen was just 40 when she had her SCAD. We now know that it is responsible for approximately 25% of heart attacks in women under the age of 50. It is the most common cause of heart attack associated with pregnancy.

The damage to Kristen's heart was so severe that she required a heart transplant to survive. But thankfully, she was lucky enough to receive a new heart and has since gone on to live a happy and healthy life with her husband and four young children.

SCAD is a particular focus of research at the Victor Chang Cardiac Research Institute. Former and current Executive Directors, Professors Bob Graham and Jason Kovacic both, with the help of kind donors, pursue research into this life-threatening condition. Thank you for helping to seek answers for this little understood but potentially deadly disorder.





**1 IN 10 Australians** die suddenly due to an abnormal heart rhythm

**INNOVATION & DISCOVERY** 

# Pioneering discovery delivers hope for children with heart disease

A research breakthrough from the Victor Chang Cardiac Research Institute could save the lives of people around the world who suffer from a type of heart disease called hypertrophic cardiomyopathy.

Hypertrophic cardiomyopathy occurs when a gene mutation causes the heart to become dangerously large and stiff. The resulting rhythm problems can cause a cardiac arrest and lead to sudden death in seemingly young, fit children.

This inherited heart disease is the leading cause of cardiac arrest in children aged 5 to 15.

There are currently no effective treatment options to prevent the development of this disease.

But your kind gifts have supported an exciting research breakthrough by Professor Livia Hool and her team.

# Professor Hool has discovered that targeting a calcium channel in the heart with medication can potentially prevent the disease from even occurring.

For children who are already suffering with an oversized heart, the study using a mouse model, also found a partial reversal of the effects of the disease, with the heart returning to a more normal size.

That means that the treatment could also potentially reduce the risk of patients dying from sudden cardiac arrest.

The discovery builds on a previous breakthrough by the same team here at Australia's home of heart research a decade ago. The scientists discovered that the calcium channel didn't just regulate the heart's rhythm, it also regulated how energy is provided to the organ.

"It was a real Eureka moment", says Professor Hool. "It set us on the path to make this potentially life-changing discovery."

The finding has huge implications. Statistics suggest that 1 in 500 carry the gene mutation for this devastating heart disease, but some experts believe it could be as common as 1 in 200 people. In Australia alone, that could mean as many as 150,000 sufferers.



Professor Livia Hool at the Victor Chang Cardiac Research Institute.



Professor Livia Hool working in her laboratory.

Results like this demonstrate that medical research is the answer to defeating heart disease and that your kind support for heart research can save lives.





Heart disease kills more people than any other single disease

RESEARCH UPDATE

## You're helping to discover bold new ways to combat the most common cause of heart attack

If you or someone you love has atherosclerosis, you'll be pleased to hear that – with your help – the Victor Chang Cardiac Research Institute has opened two new laboratories that focus specifically on what causes atherosclerosis.

So what is atherosclerosis?

Put simply, atherosclerosis is the most common cause of heart attack and heart disease. It refers to a build-up of fatty deposits, cholesterol and plaque on the inside of the arteries and blood vessels of the body. If the build-up becomes too great, it can cause heart attack, stroke and other diseases.

It's well known that atherosclerosis can be caused by unhealthy lifestyle habits such as smoking, poor diet, being overweight and lack of exercise.

But what we now also know is that genetics play a major role.

Led by Professor Jason Kovacic and Dr Renjing Liu, the Victor Chang Cardiac Research Institute is now working to understand the combined effects of both genetics and lifestyle factors.

Better understanding how genetics and lifestyle interact to cause atherosclerosis will lay the groundwork for potential new medication to treat and prevent this deadly disease.

Gifts from kind donors are vital to the Victor Chang Cardiac Research Institute's ability to tackle long-term challenges and drive major, lifesaving research initiatives. If you are one of our generous supporters – thank you. You help fund research that saves lives.



Dr. Renjing Liu (pictured above) is working with Professor Jason Kovacic to understand how genetics and lifestyle interact to cause atherosclerosis.





Celine Santiago.

Researcher Celine Santiago from the Victor Chang Cardiac Research Institute has recently won the prestigious **Ralph Reader Prize**, which is awarded by the Cardiac Society of Australia and New Zealand.

It was named after Dr Ralph Reader who, amongst other things, was a big advocate for young investigators and their work in cardiovascular research.

The prize is highly competitive and any young investigator from Australia or New Zealand can apply.

Celine specialises in a form of inherited heart disease called dilated cardiomyopathy, which causes the heart to enlarge and often leads to sudden cardiac death. Her award winning project looked at the impact of alcohol on dilated cardiomyopathy.

"The key thing that came out of my work," Celine says, "was that if you have a genetic predisposition to dilated cardiomyopathy, specifically a genetic variant in the TTN gene, even lower doses of alcohol could trigger your heart disease. I showed this using a zebrafish model."

It was a huge honour for Celine to win the prize. She was especially proud to be the only woman among the three finalists.

# You're part of a world first discovery

I bet it has never occurred to you that you might share important genetic mechanisms with a sea sponge from the Great Barrier Reef.

In a momentous breakthrough, scientists here at Australia's home of heart research discovered that humans, and most likely the entire animal kingdom, have genetic components that are functioning in the same way as the prehistoric sea sponge.

Lead researcher, Dr Emily Wong from the Victor Chang Cardiac Research Institute was focusing on an ancient gene that is important in our nervous system but which also gives rise to a gene critical in heart development.

What she and her team found was that despite millions of years of evolution, both humans and the sea sponge share a similar set of genomic instructions, which is what controls how genes are expressed.

Dr Wong put it simply: "We were blown away. Who'd have thought these genetic instructions could be the same in two such different organisms separated by over 700 million years of evolution."

So why is it so important? Dr Wong explains: "This is a fundamental discovery which will help us better understand genetic diseases and improve our knowledge of the human genome, which is an incredibly complex and ever-changing instruction manual of life."



Dr Emily Wong (pictured in the centre) is part of a discovery spanning 700 million years of evolution.

The more we know about how our genes are wired, the better we are able to develop new treatments for diseases.

The findings have been published in the highly prestigious research journal *Science*, which a senior colleague acknowledges as something, "very few achieve in a lifetime".

Dr Wong and the other scientists involved in this important discovery want to thank you for contributing to this research. You've helped add to the knowledge needed to better understand the human genome and how it can cause heart disease.

### SPOTLIGHT

## A passion for answers

Professor Diane Fatkin loves being in her garden and exploring the outdoors in the Blue Mountains.

### It's a long way from her world leading laboratory in Sydney that investigates how genes can cause heart disease in families.

Professor Diane Fatkin is a molecular cardiologist with research interests in inherited heart diseases, particularly dilated cardiomyopathy and atrial fibrillation. Both conditions can cause heart failure and stroke.

"Like a good gardener," says Professor Diane Fatkin, "a scientist learns a lot from watching nature, from seeing what occurs naturally and using this knowledge to help solve problems. It's a lot of trial and error before a breakthrough."

Originally a clinical cardiologist, Diane later shifted to heart research, knowing her

genetic studies could potentially benefit more patients.

Her career took a little detour on the way, spending two years training in contemporary dance, before finally returning to science.

These days, Diane leads a team of scientists equally committed to understanding how genetic mutations cause heart disease.

When asked what her ultimate dream would be if she had deeper pockets, Diane's eyes light up. "We envisage a future where all patients have their entire genetic makeup analysed and we can study genetic mutations in the laboratory in 3D."

Knowing a person's genetic makeup would identify potential health issues that could be prevented altogether if detected early. This would save many families from terrible heartbreak.



Meet Professor Diane Fatkin, passionate scientist, former dancer, keen bushwalker and dedicated gardener.







Heart attacks claim the lives of 21 Australians every day



Dr Monique Bax is one of the Institute's talented young researchers.

## Watching heart cells beat independently was "the coolest thing she'd ever seen"

#### Name: Dr Monique Bax

Laboratory: Graham Lab

Dr Monique Bax was inspired to pursue a career in heart disease research after she attended a lecture where she saw heart cells beating by themselves in a microscope. *"I decided it was the coolest thing I'd ever seen,"* she says.

Dr Monique Bax is one of the Victor Chang Cardiac Research Institute's very talented young scientists.

But science was not her first career. Before turning to research, she worked as a Construction Manager. Whilst Dr Bax enjoyed the work, the challenge of a career in science and the knowledge that it makes a difference to the lives of other people, made the change an easy choice.

She started working in neuroscience, but soon she became captivated by the idea of helping people with heart disease. Then she was further inspired to make the heart her area of research because of her grandfather.

"My grandfather is one of those super fit people who has a really healthy lifestyle," she says. "But he's had long term cardiac issues, which seems so unfair," she says.

In October 2020, Dr Bax was awarded a coveted grant for research to better understand the cause of heart attacks in women. She was one of only 40 Australians to share in the AMP's Tomorrow Fund grants.

Dr Bax is using her \$22,600 grant to further her stem cell research that aims to understand SCAD (Spontaneous Coronary Artery Dissection) – the cause of 25% of heart attacks in women aged under 50 and the most prominent cause of heart attack in pregnant women and young mothers.

## Thank you

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As we launch into 2021, I'm sure you, like me, are hoping for a better year than we had in 2020.

Thank you for your support during difficult times. Because of you, we were able to continue working through the pandemic, albeit often from home or in very different working conditions. Because of you, we could keep going.

Thank you too for rising to the occasion by supporting urgent research into the effects of COVID-19 on the heart, which we now know can be extremely damaging.

The experience of the COVID-19 pandemic has reminded us all of the importance of medical research, and how crucial it is to pursue and maintain it. Only through research will answers be found to combat viruses like this and associated medical conditions. Only with a strong medical research capability can a country like Australia – and for that matter the world – tackle challenges like COVID-19.

To everyone who contributes to building and maintaining our medical research capability – thank you.

#### PROFESSOR JASON KOVACIC EXECUTIVE DIRECTOR



# Stories from other supporters like you

Do you have a heart story?

If so please share your story with us by emailing: supportercare@victorchang.edu.au.

From time to time kind supporters like you send us feedback explaining why you donate to the Victor Chang Cardiac Research Institute. Often it's about your own personal experience or that of a close friend or family member. **Here are some of those stories:** 



### Heart attack survivor

"I lost my mother at 62 years old to a massive heart attack which devastated me. She was a real livewire... I had my heart attack aged 57. No warning just "bang" and down I went. Mother and father both went with heart attacks so I'm praying neither of my daughters have that monster in their future. So my advice is *keep on keeping on*. From a survivor 19 years after my heart attack. I'm now 75 years old."

## Sick babies

"Thank you for your kind letter regarding sick babies. I hope that my small donation every month can help and I would like to thank you and your team for the fantastic work you do!"

## 66

#### **Finding answers**

"I admired Victor Chang and the work that he did. My parents both died with heart related diseases. I myself have undiagnosed health (heart) problems. Research is necessary to enable answers."



## Dr Chang's legacy

"I have just had my 93rd birthday and was happily married for 65 years. Although so far escaping heart failure, my father and mother both succumbed to that illness. I remember Dr Chang's untimely death and want to do something to assist his present team continue with their work. We are lucky to live in this country and may God bless you all in your future work."

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## **Saving lives**

"I am a doctor, mostly as a GP. I have personally witnessed people dying of cardiac arrest. I would like to have prevention options and cures for this. Not enough research for this catastrophic illness."



### Improving research

"My father has very recently lost his life due to a sudden cardiac arrest. I hope with improved heart research people wouldn't have to go through a similar experience but have at least an opportunity to say goodbye to their loved ones."



There are various ways you can support vital cardiac research. You can choose to become a **One Heart Supporter** by making a regular monthly gift, hold a fundraising event, organise donations in lieu of presents or even include a gift to the Victor Chang Cardiac Research Institute in your Will. To find out more please visit www.victorchang.edu.au or phone (02) 9295 8759.

Should you wish to discuss including a gift in your Will, please call Deborah Smith on 0415 967 267 or Samantha Burns on (02) 9295 8753. They would be delighted to have a confidential conversation with you.