

## **RESEARCHERS DISCOVER POTENTIAL NEW TOOLS TO IDENTIFY AND TREAT PEOPLE AT HIGH RISK OF HEART ATTACK**

- Australian scientists develop an “early warning system” that could lead to heart attack prevention in the future
- A MRI scan could be used to diagnose those likely to suffer a heart attack
- High activity of an inflammatory enzyme may increase the chance of a heart attack
- Scientists identify new drug target that may decrease heart attacks by preventing dangerous plaque formation
- Exciting research published in the world’s premier cardiovascular medical journal
- Scientists in Sydney preparing for human trials following successful mouse study

World first research, led by the Victor Chang Cardiac Research Institute, has shown it may be possible to both identify those at risk of a heart attack and prevent it from occurring.

Heart attacks are a major cause of death in Australia and, on average, claim one life almost every hour.

The underlying cause of a heart attack is a build-up of *plaque* composed of fatty material and inflammatory cells on the inside of the heart’s arteries. Some plaques are ‘unstable’ and vulnerable to rupture, resulting in the formation of a clot that blocks blood flow to the heart. This causes a heart attack.

For decades, doctors and scientists from around the globe have sought to distinguish dangerous plaques that are likely to rupture, from stable and dormant plaques.

Using a highly sophisticated mouse model, Professor Roland Stocker and his team at the Victor Chang Institute discovered that the activity of an inflammatory enzyme, known as myeloperoxidase, is significantly higher in unstable compared to stable plaques.

The researchers then demonstrated that a magnetic resonance imaging (MRI) scan, after injection of a chemical probe, can be used to accurately and selectively identify the presence of dangerous plaques in coronary arteries.

Administered into the blood stream, the chemical probe highlights dangerous plaque that has increased myeloperoxidase activity, like a neon sign. This makes it easily visible on an MRI scan. No one has been able to do this before and it will provide doctors with early warning that they need to intervene.

“We now have the potential tools to specifically identify those at high risk of heart attack by using non-invasive MRI to detect vascular inflammation” commented Professor Stocker, Head of Vascular Biology.

“Aside from leading a healthy lifestyle, this “early warning system” could be our best defence against heart attacks, many of which may be fatal. Identifying in whom and when heart attacks will occur remains a holy grail of clinical cardiology and personalised medicine”, he added.

The team then investigated whether elevated enzyme activity *causes* plaque destabilization. “The results were really exciting! When we administered a drug that inhibits myeloperoxidase activity, we discovered it stabilized the plaque by making its lining sturdier and less prone to rupture. There was also decreased bleeding and clotting in the artery wall under the plaque”, explained Professor Stocker.

The next steps in this promising development are to adjust the chemical MRI probe for human use, and then carry out clinical trials to confirm the utility of both the new imaging techniques and myeloperoxidase inhibitors to identify and treat high-risk patients.

The research has been applauded by the Victor Chang Institute’s Executive Director, Professor Bob Graham. “This is a discovery that Australians should be very proud of. The MR imaging technique has the potential to be the first non-invasive method to provide information on coronary plaque *activity*, enabling researchers to potentially diagnose those at risk of a heart attack.

“Angiography is the current gold standard of coronary imaging, and while it can accurately define arterial narrowing it falls short and cannot identify other features of high-risk plaque. To translate the new tools into the clinic will take time, as well as funding that we are currently seeking,” Professor Graham revealed.

The research led by the Victor Chang Cardiac Research Institute was an international collaboration involving Melbourne’s Baker Heart and Diabetes Institute, the University of New South Wales, the National University of Singapore and the University of Otago.

The work, entitled “*Myeloperoxidase is a Potential Molecular Imaging and Therapeutic Target for the Identification and Stabilisation of High-Risk Atherosclerotic Plaque*” by Imran Rashid *et al.* will be published in *European Heart Journal* ([doi:10.1093/eurheartj/ehy419](https://doi.org/10.1093/eurheartj/ehy419)). A copy of the paper is available upon request.

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#### **HEART ATTACK STATISTICS**

- Every year around 54,000 Australians suffer a heart attack. That’s one every 10 minutes!
- Heart attacks claim the lives of approximately 24 Australians every day
- Heart attacks claim the lives of over 8,600 Australians every year
- 50 Australian women have a heart attack every day

#### **ABOUT THE VICTOR CHANG CARDIAC RESEARCH INSTITUTE**

The Victor Chang Cardiac Research Institute is dedicated to finding cures for cardiovascular disease through world class medical research. Established in 1994, it is renowned for the quality of its breakthroughs. The Victor Chang Institute uses innovative transplantation techniques, advanced stem cell research, bioengineering and complex molecular and genetic analysis – to discover better ways to diagnose, treat and ultimately prevent the onset of heart disease.