



A heart-felt desire to advance stem cell science

“It would be great to see what we have learned from stem cell research and stem cell science being applied in mainstream cardiology practice,” says Associate Professor James Chong.

“It will still take some time yet, but I would like to see the therapies my colleagues and I are developing being able to give opportunities to patients who simply don’t have them at the moment.”

James heads the Cardiac Regeneration laboratory at Sydney’s Westmead Institute for Medical Research, and is an interventional cardiologist at Westmead Hospital. It is a combination that provides a unique balance of experimental and clinical practice.

As his interest in using stem cells to treat damaged hearts grew, he took up a post at the University of Washington in the US, where he concentrated on producing heart muscle cells, known as human pluripotent stem cell-derived cardiomyocytes. He demonstrated that it was possible to produce a large enough quantity of these so they could be transplanted into non-human primate injured hearts. The potential for them to be used to repair damaged human hearts continues to be an important aim of his work.

“Using current protocols, we get various degrees of heart muscle cell differentiation and we also think there are different types of heart muscle cells being produced, but the key aspect is that they are all spontaneously beating,” he says. “You can see them contract in the dish.”

Heart repair, however, is not the only task to which they are put. “They are also useful in terms of drug discovery,” James explains. “We keep the cells in the dish, and we can grow billions of them, and then we can use them to screen potentially toxic compounds contained in drug candidates being created by pharmaceutical companies or other researchers.”

One project in which these two research paths intersect is the primary concern of James’ colleague and PhD student, Dr Sujitha Thavapalachandran.

Sujitha is a trained cardiologist and shares James’s passion for translational science. In her project, she has been investigating the treatment potential of a particular platelet-derived growth factor—a protein that regulates cell development. It is a line of research for which she was awarded the prestigious Ralph Reader Basic Science Prize in 2018. The protein

may be useful as a treatment option for people who have suffered a heart attack. To test this, she has been experimenting with it in large animals that have hearts roughly the same size as human ones.

“What we found were astounding results,” Sujitha says. “The animals all had a reduction in what’s known as sudden cardiac death as well as greatly improved heart function.” The research may lead to new types of intervention that reduce the complications that often arise after a heart attack. In effect, Sujitha’s work could lead to new options for patients who currently have none—an outcome that would greatly please James.

