

## Research gives heart to transplant wait list



Less than 100 hearts are donated each year in Australia and recipients of donor hearts wait on average 9-12 months. This is not only because Australians have the lowest levels of organ donation in the developed world<sup>1</sup>, but also because the Australian population is spread across great geographic distances. The time lapse between a donor dying, and a recipient obtaining donor heart from a distant site can, result in the heart becoming too damaged for use.

Professor Frank Rosenfeldt (pictured) in Monash's

Department of Surgery and who leads the Research Unit of the Alfred's Department of Cardiothoracic Surgery, and Prof Don Esmore, the head of Cardiac Surgery and Transplantation at the Alfred are researching techniques for increasing the viability of transplant hearts.

"Of all the transplant organs, the heart is most vulnerable as it burns energy faster than other organs, and become damaged quickly if its blood supply is cut off. Most heart donations are from brain-dead donors already in hospitals, from whom organs can be rapidly retrieved and transplanted," said Frank.

"An alternative source of hearts for transplantation, as yet untapped, is through donation after cardiocirculatory death (DCD). The main reason for not being able to use these DCD hearts is that, for those patients dying in hospital, there is an interval of at least thirty minutes after the heart has stopped beating and the patient is declared dead before organs can be removed for transplantation. Using current protocols this interval can inflict irreversible damage on the heart muscle, so we've been investigating an alternative method of recovery and sustenance for the heart muscle.

"Current practice for preserving the heart involves simple storage in ice. We decided to investigate a new method of improving the heart's chance of recovering function, namely perfusion, or 'feeding', the heart with a flow of cold, oxygenated electrolyte-nutrient solution."

So far, Frank and the Monash-Alfred team have shown in animals that the safe 'ischemic' time – the time of reduced blood flow while the heart is being maintained outside its donor and before transplant – can be extended from four hours to up to 12 hours. This technique, of low temperature, low pressure and low flow of micronutrients to perfuse the heart in transit, especially in DCD hearts may make it possible to increase heart donation rates from by up to 30%.

"The research is very promising, and we're looking to move to a clinical trial in 2012," said Frank. "With anything like this, you can do all the research in the world, and of course, the closer the animal model to the human system, and the more it's tested, the more likely it is to work in humans. But in the end in the first human transplant there will still be a leap of faith, in this case, by my colleague Professor Don Esmore, a highly experienced transplant surgeon. He did the world first human Ventrassist ventricular assist device implant back in 2003 [see feature box], and that technology has now helped hundreds of people worldwide. I'm looking forward to the first heart transplant at the Alfred using our new technique, possibly in 2012."

Anne Poole, 65, has been waiting for a donor heart for 12 months, her wait is a little longer than the average because her blood type is not common.

Anne was a fit, active, slim, non-smoker who had a good diet, rode her bike everywhere and looked after her grandchildren 5 days a week. Unknown to her, she had developed severe atherosclerotic heart disease. In June 2010 an unrelated infection precipitated cardiogenic shock with severe fluid build up in her lungs.

She was transferred from the Epworth Hospital to the Alfred, where, Don Esmore, operated. Don removed a large section of her heart and installed a heart pump, technically known as a Ventrassist Left Ventricular Assist Device (LVAD).

The LVAD itself is the product of research done by and Don Esmore, Frank Rosenfeldt, their Alfred team and the (Australian) Ventracor Company in the early 2000s. This device was used at the Alfred and subsequently worldwide. The VAD enables patients to stay active, as they will recover much better from the major surgery involved in a heart transplant if they are strong, fit and healthy beforehand. Nearly all patients on the waiting list for donor hearts now are kept alive by LVADs.

Anne would learn, months later, that Don Esmore had thought she only had a 1% chance of survival. She was in intensive care for two months at the Alfred from which she emerged, so weak she could not get out of a wheelchair without help.

With the dedicated assistance of physiotherapist Katie Hayes and senior clinical physiotherapist, Louise Fuller, from Alfred's Transplant service, Anne worked at recovering strength and function. She said, "I was so feeble and what they made me do was so tough and painful, but it has worked. Here you see me today walking and moving about perfectly independently, but if it hadn't been for Katie and Louise, I couldn't have achieved this. And of course, I wouldn't be here at all without the heart surgery and the LVAD." Louise said that Anne brought an incredible persistence and diligence to her rehabilitation.

Now, 12 months after the heart attack and operation, Anne says, "I feel like a horse in peak condition at the barrier – I'm just waiting for my transplant!"



<sup>1</sup> <http://www.donatelife.gov.au/Discover/Facts-and-Statistics.html>