

## Novel Prosthetic Heart Valve



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Researchers from the National University of Singapore (NUS) have developed a novel prosthetic heart valve which can be implanted through a small incision for the treatment of mitral regurgitation. The valve known as VeloX is especially useful in patients who are unsuitable candidates for existing clinical interventions or who are of high surgical risk.

The valves in the heart ensure unidirectional flow of blood between the four chambers. The mitral valve is one of these four valves but when it malfunctions, blood starts to flow backwards into the atrium as the heart contracts. This reduces the amount of blood that flows to the rest of the body and the heart has to pump harder which could lead to congestive heart failure or worsen an existing heart failure.

VeloX is pioneered by Associate Professor Leo Hwa Liang from the Department of Biomedical Engineering at NUS' Faculty of Engineering, and Dr Jimmy Hon from the Department of Surgery at the NUS Yong Loo Lin School of Medicine. It is believed that this device could address a clinical gap.

Nearly 12 million people suffer from mitral regurgitation globally and approximately 250,000 new patients are diagnosed annually. If left untreated, around one in three patients could die from this condition within six years. Currently, several mitral valve regurgitation is treated with open-heart surgery to replace or repair the diseased valve. However, there are elderly patients or those who suffer from multiple chronic diseases who are not ideal candidates for open heart surgery.

VeloX could be useful for treating patients who have mitral valve leaflets of a particular shape. It can be designed to suit different mitral annulus sizes and can be implanted with a minimally invasive procedure. The prosthetic heart valve can be stitched within a self-expanding nitinol alloy stent frame that is designed to prevent leakage. The valve is compressed and loaded into a catheter. The catheter is then inserted into the patient through a small incision made either at the leg or between the ribs to deliver the device straight into the left heart. It is then sent to the patient's diseased mitral valve. A big advantage of VeloX is that it is both retrievable and repositionable.

Assoc Prof Leo explained, "The mitral annulus has a very complex structure, so it is particularly challenging to deploy and anchor a prosthetic valve into the constricted region. Optimal positioning is crucial as any malpositioning can be detrimental for patients. One of the unique features of VeloX is its ability to be self-centring, hence enabling it to achieve an optimal position after being implanted."

The NSU researchers have already filed a patent for VeloX and will be working with medical technology companies to commercialise it.

Source: [National University of Singapore](http://www.nus.edu.sg)

Image Credit: National University of Singapore

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