Longer Lasting Heart Valve without Need for Anticoagulant Therapy

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Technology description

Decreases Likelihood of Clot Formation Due to Innert, Durable Silicon Valve

This replacement heart valve eliminates the need for dangerous anti-clotting medications and is, therefore, much safer than existing artificial prostheses. Each day, valves in the human heart make it possible for cardiac muscles to move about 2,000 gallons of glucose-rich oxygenated blood throughout body tissues. Opening and closing more than one billion times during the course of a normal lifespan, these four valves open to allow blood to pass, then quickly close to prevent backflow. Valve malfunctions can cause serious health problems, including clot-induced strokes, heart attacks and congestive heart failure. Defects are sometimes seen at birth (so-called congenital abnormalities), but such conditions also develop subsequent to poor lifestyle choices, aging and certain infections. Mechanical and biological replacement valves have significant drawbacks. Biological replacement valves, typically harvested from pigs, only work for 10 to 15 years. Though mechanical replacement valves last significantly longer, they encourage the formation of deadly clots, forcing patients to take anticoagulant medications (e.g. warfarin) and undergo monthly blood tests for the rest of their lives. Researchers at the University of Florida have created a highly durable artificial valve that is much smoother than existing mechanical valves. Because blood can pass more easily, lifelong anticoagulant therapy is unnecessary with this prosthetic device. In addition to the convenience it provides, the invention has tremendous financial implications. The U.S. cardiac surgery market is projected to reach more than $4.4 billion by 2017. Population aging will ensure that a significant proportion of this figure is spent addressing valvular heart disease.

Technology

This tri-leaflet replacement valve is made of silicone that has been smoothed to such a degree that peak-to-valley roughness measures less than 2 microns. In order to avoid the clotting problems that have plagued every artificial valve to date, University of Florida researchers employed a new smoothing technique. Called magnetic abrasive finishing, the process involves dragging powerful magnetic substances along the silicone’ s surface to clean and polish it.

Application area

A smoother, longer-lasting prosthesis designed to work more like a natural human heart valve

Advantages

Created using a special curing method, resulting in greater durability
Tri-leaflet design mimics natural human valves, reducing the chance of failure
Ultra smooth surface promotes forward flow, decreasing the risk of dangerous blood clots and mitigating the need for lifelong anti-clotting medications
Single-piece construction eliminates gluing or stitching during production, simplifying the manufacturing process
Composed of readily available medical-grade silicone, ensuring that supply keeps pace with growing demand

Institution

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