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Development of Durable Polymeric Trans-catheter Prosthetic Pulmonary Valves (TPPVs) for use in Pediatric Population

Congenital heart defects are the most common type of birth defect in the United States, and the leading cause of birth defect-associated infant death. Patients born with congenital pulmonary valve and right ventricular outflow tract abnormalities (the most common type of defect) frequently require surgical repair early in life, and multiple repeat surgical operations for valve repair are often necessary given the limited durability and growth capacity of currently available valve replacement technologies. Transcatheter pulmonary valve replacement is an attractive alternative to surgery as it obviates the need for repeat sternotomy and cardiopulmonary bypass, but the current approved devices are made from bovine jugular vein graft which is known to have an increased rate of endocarditis and limited durability. In this proposed work, we aim to develop a highly durable transcatheter pulmonary valve with flexible polymeric leaflets engineered specifically to address the widely known drawbacks of tissue based valves including endocarditis and calcification buildup. A more durable device is essential to the treatment of young patients as limiting the number of necessary operations to a single, interventional procedure would dramatically improve their quality of life.

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