An Autonomously Expanding Shunt for Pediatric Patients

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Need
Hypoplastic Left Heart Syndrome (HLHS):
• Underdeveloped left ventricle and other defects
Mortality: 100% without surgical intervention

Problem
Shunt implanted during surgery to redirect blood flow does not account for patient growth leading to oxygen deprivation

Solution
Expanding diameter shunt does account for patient growth
Main Requirement: 15-18% inner diameter change

Approach
Math Model
• Expansion Requirement
Gelatin Experiment
• Inner Diameter Change
PLGA Experiment
• Encapsulate Crosslinker

Results & Impact
• Achieved required inner diameter change.
• Encapsulation of crosslinker was unsuccessful
• Theoretical reduction in post surgery mortality.

Scaled Inner Diameter Change

Math Model
• Expansion Requirement
Gelatin Experiment
• Inner Diameter Change
PLGA Experiment
• Encapsulate Crosslinker