

Duke File (IDF) Number

IDF #:T-007968

Meet the Inventors

[Shah, Aditi](#)
[Battapati, Venkata Krishna Chitti Babu](#)
[Kang, Kaylen](#)
[Knight, Carson](#)
[Penmetsa, Sasank](#)
[Rastogi, Nirvika](#)
[Raymundo, Omar "Omar"](#)
[Richardson, Eric](#)

Contact For More Info

Krishnan, Shweta
919-681-7541
shweta.krishnan@duke.edu

Department

Biomedical Engineering (BME)

External Link(s)

- [From inventors with the Duke Design Health program](#)

Transcatheter device for restricting blood flow through the pulmonary artery

Unmet Need

In the United States, approximately 10,000 newborns a year will require surgery for a congenital heart defect such as atrial or ventricular septal defects. These defects can cause excessive blood flow to the lungs and require invasive surgeries, such as pulmonary artery banding, to prevent congestive heart failure. However, this procedure can result in the band migrating and can lead to stenosis of the pulmonary artery. Additionally, these pediatric patients often require multiple surgeries as the vasculature grows over time. Therefore, there is a strong clinical need for a technology that effectively minimizes blood flow to the lungs and replaces invasive surgeries in this vulnerable patient population.

Technology

Duke inventors have developed a non-surgical, transcatheter device that reduces the pathologically high blood flow rate from the heart to the lungs of pediatric patients with congenital heart defects. This is intended to be used as a less invasive alternative treatment for congenital heart defects, in the place of repeated surgeries in pediatric patients. Specifically, this device features a unique design of a 3-petal system that reduces the overly high blood flow from the heart to the lungs, without stopping it completely, which has the same result as the more invasive pulmonary artery banding surgery. The device also has a novel anchoring mechanism that prevents its migration and maintains its position in the pulmonary artery. During the balloon catheterization-based insertion of the device, the petals and anchors can be easily adjusted to fit the size of the patient's artery. The effectiveness of this device has been demonstrated through benchtop flow testing.

Other Applications

This technology could also be used in adult patients who require modulation of flow rate in the pulmonary artery.

Advantages

- Less invasive approach to modulating pulmonary flow rate than pulmonary artery banding surgery, the current gold standard of treatment
- Anchoring mechanism prevents migration of the device from its deployment site in the vasculature, a complication that can occur to the pulmonary artery band
- Device can expand radially to fit the unique size of each patient's pulmonary artery

