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## Growth-accommodating heart valve system

Tech ID: 33462 / UC Case 2022-977-0

### BRIEF DESCRIPTION

This technology describes a prosthetic heart valve system designed to accommodate the growth of children.

### SUGGESTED USES

- Pediatric Cardiac Surgery: Primary application in pediatric cardiac surgery for replacing diseased or malfunctioning heart valves in children with congenital heart disease.
- Congenital Heart Defect Treatment: Specifically designed to address congenital heart defects in pediatric patients, providing a tailored solution for their unique needs.
- Long-Term Valve Replacement: Offers a solution for long-term valve replacement in pediatric patients, potentially reducing the need for multiple surgeries as the child grows.
- Growth-Responsive Valve: Designed to accommodate the natural growth of children, ensuring continued functionality and efficacy as the child's heart grows.
- Preventing Valve Dysfunction: Helps prevent valve dysfunction by adapting to the changing dimensions of the child's heart over time.
- Customized Treatment: Provides a customizable treatment option based on the unique needs and growth trajectory of each pediatric patient.
- Advancing Pediatric Cardiology: Represents an advancement in pediatric cardiology by addressing the challenges associated with valve replacement in growing children, potentially leading to improved outcomes and long-term prognosis.
- Minimally Invasive Procedures: Suitable for transcatheter implantation, allowing for minimally invasive procedures compared to traditional open-heart surgery.
- Enhancing Quality of Life: Aims to improve the quality of life for pediatric patients with congenital heart disease by providing a durable and effective valve replacement option.
- Reducing Complications: Designed to mitigate complications such as paravalvular leak, enhancing the safety and effectiveness of the valve replacement procedure.

### FEATURES/BENEFITS

#### Features:

1. Expandable Stent:
  - » Designed to expand radially to accommodate the child's growth.
  - » Constructed with support beams interconnected by joints, forming a web-like cylindrical cage.
2. Leaflets:
  - » Multiple leaflets forming the valve.

### CONTACT

Alvin Viray  
aviray@uci.edu  
tel: 949-824-3104.



### OTHER INFORMATION

#### KEYWORDS

Pediatric prosthetic valve, Growth-accommodating valve, Child heart valve replacement, Transcatheter valve implantation, Expandable stent valve, Congenital heart disease treatment, Pediatric cardiac surgery, Leaflet attachment method, Paravalvular leak prevention, Prosthetic valve for children

#### CATEGORIZED AS

- » **Medical**
  - » Delivery Systems
  - » Devices
  - » Disease: Cardiovascular and Circulatory System

» Attached to the expandable stent along a path that maintains length during expansion.

### 3. Transcatheter Implantation:

» Can be implanted transcatheterly, minimizing the invasiveness of the procedure.

### 4. Size Range:

» Lower limit diameter of 9 mm and upper limit diameter of 25 mm, suitable for pediatric patients.

### 5. Leaflet Material Options:

» Leaflets can be made from biological tissue or stretchable polymeric material, providing flexibility in material selection.

### 6. Skirt for Paravalvular Leak Mitigation:

» Includes a skirt around the outer surface to mitigate paravalvular leak, made from a stretchable polymer.

### 7. Technical Design for Functionality:

» Utilizes excessive leaflet tissue in the contracted configuration to facilitate expansion without requiring increased blood pressure to open the valve.

» Attachment path for leaflets remains relatively unchanged during expansion, preventing tearing.

» Leaflets maintain valve closure at different three-dimensional configurations as the stent expands.

## Benefits:

### 1. Growth Accommodation:

» Addresses the challenge of accommodating the growth of pediatric patients, reducing the need for multiple valve replacements.

### 2. Minimized Invasiveness:

» Transcatheter implantation reduces the invasiveness of the procedure compared to traditional open-heart surgery.

### 3. Versatility:

» Provides options for leaflet material, allowing customization based on patient needs and preferences.

### 4. Reduced Risk of Complications:

» Skirt design helps mitigate paravalvular leak, reducing the risk of complications post-implantation.

### 5. Long-Term Functionality:

» Designed to maintain valve functionality as the child grows, potentially enhancing long-term outcomes and quality of life.

### 6. Innovative Design:

» Incorporates unique technical features to ensure functionality and durability during growth and expansion.

## TECHNOLOGY DESCRIPTION

This invention addresses a significant need in pediatric cardiology by providing a prosthetic valve system that can grow with the child, potentially reducing the need for multiple valve replacements as the child matures.

### 1. Summary of the Invention:

» The prosthetic valve system includes an expandable stent and multiple leaflets forming a valve.

» The stent expands radially while maintaining the length of the path to which the leaflets are attached, ensuring the valve's functionality as the child grows.

» The system can be implanted transcatheterly.

» The expandable stent is constructed with support beams interconnected by joints, forming a web-like cylindrical cage.

### 2. Embodiments:

» The expandable stent may have a lower limit diameter of 9 mm and an upper limit diameter of 25 mm.

» Leaflets can be made from biological tissue or stretchable polymeric material.

» A skirt around the outer surface of the system may be included to mitigate paravalvular leak, made from a stretchable polymer.

### 3. Technical Features:

» The invention utilizes excessive leaflet tissue in the contracted configuration to allow for expansion without requiring more blood pressure to open the valve.

» The attachment path for leaflets does not change significantly during expansion, preventing tearing.

» Leaflets maintain valve closure even as the stent expands, adapting to different three-dimensional configurations.

## STATE OF DEVELOPMENT

Prototype developed

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230263627	08/24/2023	2022-977

**UCI Beall**  
Applied Innovation

5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



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