

**12<sup>th</sup> Annual Master Class in Congenital Cardiac Morphology  
October 9, 10 and 11 2019**

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## Introduction

The first Master Class in Congenital Cardiac Morphology at UPMC Children's Hospital of Pittsburgh was held in 2008. This was the first advanced course in cardiac morphology that one of us (RHA) had produced in North America. The genesis of this course was based on popular events that had been held in London over the last several years. Based on the success of the first course, we have had an annual course, since then, each year focusing on different aspects of cardiac morphology in the congenitally malformed heart. Based on the positive feedback from those who attended these previous meetings, all eleven courses have been a great success. Again, this year, we are fortunately to be able to host the twelfth Annual Master Class in Congenital Cardiac Morphology.

The success of this course is in great part due to the important feedback of past-years' attendees. Each year, we carefully review all the evaluations that we have received, and continue to modify the course, striving to retain the best elements of the course and adding new features to improve the experience for attendees. This year, as has become traditional, we will begin with considerations of normal cardiac anatomy and sequential segmental analysis. Thereafter, we will explore the variations found with interatrial communications, coronary arterial anomalies, ventricular septal defect, anomalous pulmonary veins, and vascular rings. We will finish the course with attention to so-called visceral heterotaxy, discussing whether this is better understood on the basis of bodily isomerism. The format for each set of presentations will include correlations with imaging, using cross-sectional and three-dimensional echocardiography, as well as the three-dimensional clinical images provided by computed tomography and/or magnetic resonance imaging. In addition, we include pertinent clinical presentations from our surgeons and interventional cardiologists. We have allowed time for discussion, but we hope that this will extend beyond the heated debates that can often develop between the members of our faculty. We hope that these exchanges will encourage robust audience participation! There is no such thing as a silly question!! And, as has always been the case, we hope that attendees will take advantage of the opportunity to enjoy hands-on demonstration of pathologic specimens of each lesion, guided by our excellent faculty.

For each set of presentations, we will continue to use the format developed over the last few years. Thus, each session will commence with a discussion of development, provided by Robert Anderson on the basis of his ongoing research into the developing human and murine heart. For each topic, there will then be a didactic pathology presentation, given by Diane Spicer, followed by a 'live' video demonstration of autopsy specimens from the Frank E. Sherman and Cora C. Lenox Heart Museum given by Diane, Robert, or Bill Devine. Adequate time will then be allowed for examination of numerous specimens reflecting the range of morphology for each given lesion. Diane and Bill, supported by Bob and Christine Anderson, will be present to assist the small groups in the hands-on examination of the specimens. The provision of imaging correlations has proved highly popular during the first eleven courses, so we will continue with this component this year. Imaging will be ably demonstrated by Drs. Mark DeBrunner and Libby Lanford from the University of Pittsburgh School of Medicine, Division of Pediatric Cardiology, by Dr. Tony Hlavacek from the Medical University of South Carolina, and Dr. Justin Tretter from Cincinnati Children's Hospital. They will use cross-sectional and three-dimensional echocardiography, as well as computed tomography and magnetic resonance imaging, to demonstrate the various congenital defects that we will have discussed during the slide and video presentations. We will round out the discussion with a surgical and/or interventionalist viewpoint for selected lesions. These perspectives will be given by our surgical colleagues from Children's Hospital of Pittsburgh of UPMC, including the director of cardiothoracic surgery, Dr. Victor Morell. Dr. Sara Trucco of the interventional cath laboratory, will provide the interventionalist's perspective to the treatment of pulmonary atresia with intact ventricular septum. These clinicians will focus on the importance of accurate description of cardiac anatomy for cardiac interventional and surgical planning. We are particularly pleased this year to

be joined by Dr Julie Brothers, from Children's Hospital of Philadelphia, who will present Grand Rounds based on her experience with the diagnosis and treatment of coronary arterial anomalies, and also contribute to our own session on that topic. To allow even more time for supervised hands-on inspection of the specimens from the Frank E. Sherman and Cora C. Lenox Heart Museum, we will make all the specimens available for an intensive hands-on workshop on Friday afternoon.

The development and pathology slide presentations have again been updated and revised, and we are pleased to provide you with this copy of the slides as part of the course handbook. Unfortunately, the video demonstrations and imaging slide presentation do not lend themselves to hardcopy versions. We have recorded these presentations and it remains our hope that, in the fullness of time, we will create an electronic version available for online education.

Once again, it is our expectation that this be an interactive class, with vigorous discussion and debate. Disagreement and controversy are encouraged, since as this presents the ideal way for everyone's learning experience to be optimal!

We are grateful to many individuals for bringing this course to fruition. Firstly, to all the faculty who are making presentations during this course. We particularly appreciate the ongoing contributions of Bill Devine, the former Curator of the Frank E. Sherman and Cora C. Lenox Heart Museum, and Diane Spicer, Curator of the Lodewyk Van Mierop Archive at the University of Florida. We also owe a large debt of gratitude to the various staff that has helped with coordination of the meeting, publicity, and with production of the program book. Lynda Cocco has performed the majority of administrative work and has been central to the success of these meetings. We are very indebted to her for all her hard work in making these meetings a success. We also wish to thank the staff of the John G. Rangos Sr. Research Center. We are also very grateful to the Heart Institute of UPMC Children's Hospital of Pittsburgh for generously supporting this important educational event.

Thank you for your participation in this meeting. We look forward to seeing you at many more Master Classes in the future.

Robert H. Anderson and Vivek Allada

Pittsburgh, October 2019

## **Master Class in Congenital Cardiac Morphology**

**John G. Rangos Sr. Conference Center  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania  
October 9, 10 and 11, 2019**

### **Overview and Objectives**

This comprehensive two and a half-day course in congenital cardiac morphology will use didactic presentations, live video demonstrations, and hands-on examination of cardiac specimens from the Frank E. Sherman and Cora C. Lenox Heart Museum to cover a wide range of congenital cardiac malformations. There will be an emphasis on imaging and surgical correlations for each lesion. Upon completion of this class, participants will understand the usefulness and practicality of the sequential segmental analytical approach to the examination of congenitally malformed hearts, as well as be familiar with the morphology of a large variety of congenital heart defects. This year, we will focus on the cardiac valves. The program will be divided into two parts. On the first and second days, and the morning of the last day, we will systematically review the chosen topics with focus on didactic presentations, video demonstrations of cardiac specimens, and imaging correlations. On the last day, there will be an intensive hands-on workshop examining cardiac specimens.

At the conclusion of the program, the participants should be able to:

- explain the clinical usefulness and practicality of the sequential segmental approach to the examination of congenitally malformed hearts
- describe normal cardiac morphology and how each malformation deviates from normality
- describe the morphology of the defects presented in a fashion that is descriptive and anatomically correct
- discuss the utility of advanced imaging to display cardiac morphology
- discuss the salient clinical features of each lesion as it relates to surgical and catheter-based interventional procedures.

### **Who Should Attend**

This course is designed for seasoned, junior, and trainee pediatric and adult cardiologists, cardiothoracic surgeons, pathologists; pathology assistants; cardiac morphologists; echocardiography sonographers; and other medical professionals interested in congenital heart disease.

Course Presented by the Heart Institute and Division of Pediatric Pathology  
UPMC Children's Hospital of Pittsburgh

**Faculty Listing**

**Hosts:** Heart Institute Co-Directors – Drs. Vivek Allada, Jackie Kreutzer and Victor O. Morell and  
Chief, Pediatric Pathology, Dr. Miguel Reyes-Mugica

**Course Directors:**

Professor Robert H. Anderson, MD, FRCPath  
Visiting Professor,  
Institute of Genetic Medicine  
Newcastle University  
Newcastle-upon-Tyne  
United Kingdom

Vivek Allada, MD  
Executive Director, Heart Institute  
Professor of Pediatrics  
University of Pittsburgh School of Medicine  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

**Faculty and Guest Faculty:**

Christine Anderson  
Video Photographer  
London, England

Julie Brothers, MD  
Associate Professor of Pediatrics  
The Children's Hospital of Philadelphia  
Philadelphia, Pennsylvania

Mark DeBrunner, MD  
Assistant Professor of Pediatrics  
University of Pittsburgh School of Medicine  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

William Devine, BS  
Retired Curator of the Frank E. Sherman and Cora C. Lenox Heart Museum  
Department of Pathology  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

Anthony Hlavacek, MD, MSCR  
Associate Professor of Pediatrics and Radiology  
Division of Pediatric Cardiology  
Medical University of South Carolina  
Charleston, South Carolina

Jacqueline Kreutzer, MD, FACC, FSCAI  
Professor of Pediatrics  
University of Pittsburgh School of Medicine  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

Lizabeth Lanford, MD  
Professor of Pediatrics  
University of Pittsburgh School of Medicine  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

Victor O. Morell, MD  
Eugene S. Wiener Endowed Professor and Chair, Pediatric Cardiothoracic Surgery  
Surgeon-in-Chief, UPMC Children's Hospital of Pittsburgh  
Vice Chair & Director of Cardiovascular Services, Dept. CT Surgery  
Co-Director, UPMC Heart and Vascular Institute  
Co-Director, CHP Heart Institute  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

Diane Spicer, BS, PA (ASCP)  
Curator of the Lodewyk Van Mierop Archive  
University of Florida  
Gainesville, Florida

Justin Tretter, MD  
Assistant Professor of Pediatrics  
University of Cincinnati  
Cincinnati Children's Hospital  
Cincinnati, Ohio

Sara Trucco, MD  
Assistant Professor of Pediatrics  
University of Pittsburgh School of Medicine  
UPMC Children's Hospital of Pittsburgh  
Pittsburgh, Pennsylvania

Noon Registration

12:30 PM Welcome and Course Introduction (Allada/Anderson 15 min)

### **Session 1**

#### **MORPHOLOGY OF THE NORMAL HEART**

12:45 PM Normal development of the heart (Anderson 15 min)

1:00 PM Normal heart Didactic Pathology presentation (Spicer 15 min)

1:15 PM Living Cardiac Anatomy (Anderson 15 min)

1:30 PM The Essence of Sequential Segmental Analysis

Didactic presentation (Anderson 15 min)

Video demonstration (Spicer 20 min)

2:05 PM Echocardiography (Tretter 25 min)

2:30 PM Virtual DISSECTION with CT imaging (Hlavacek 25 min)

### **Session 2**

#### **ATRIAL SEPTAL DEFECTS**

3:00 PM Development of the Atrial Septum (Anderson 15 min)

3:15 PM Didactic presentation (Spicer 15 min)

3:30 PM Video demonstration (Devine 15 min)

3:45 PM Echocardiography (Tretter 20 min)

4:05 PM CT/MRI imaging (Hlavacek 15 min)

4:20 PM Lecture: "Catheter-Based Options for atrial septal defects" (Trucco 30 min)

**4:50 PM Discussion** (Anderson/Spicer/Trucco 10 min)

**5:00 Hands on** (Anderson/Spicer/Devine 20 min)

**5:20 PM Adjourn**

**THURSDAY October 10, 2019**

8:00 AM – 9:00 AM **Special Pediatric Grand Rounds**

**“Sudden Death in Young Athletes” Julie Brothers, MD**, Associate Professor, Pediatrics,  
Medical Director, Coronary Anomalies Management Program, The Children’s Hospital of  
Philadelphia

*\*All Master Class course attendees are welcome to attend Special Grand Rounds\**

9:00 AM Registration / Optional Hospital Tour

9:45 AM Welcome to Day 2 (Allada 5 min)

**Session 3**

**CORONARY ANOMALIES**

9:50 AM Development of the Coronary arteries (Anderson 15 minutes)

10:05 AM Didactic presentation (Spicer 20 min)

10:25 PM Video demonstration (Devine 20 min)

10:45 AM Echocardiography (DeBrunner 20 min)

11:05 AM CT/ MRI imaging (Hlavacek 20 min)

11:25 AM Lecture: “Controversies in Coronary Management” (Brothers 20 min)

11:45 PM Discussion (Anderson/Spicer/Brothers 15 min)

**12:00 PM – 1:00 PM Lunch (and hands-on) (Anderson/Spicer/Devine 60 min)**

**Session 4**

**VENTRICULAR SEPTAL DEFECTS**

1:00 PM Development of the ventricular septum (Anderson 15 min)

1:15 PM Didactic presentation (Spicer 20 min)

1:35 PM Video demonstration (Anderson 20 min)

1:55 PM Echocardiography (DeBrunner 30 min)

2:25 PM CT/ MRI imaging (Hlavacek 30 min)

2:55 PM Lecture: “Controversies in the DESCRIPTION of VSDs” (Anderson 30 min)

3:25 PM Discussion (Anderson/Spicer 15 min)

**3:40 PM Hands-on (Anderson/Spicer/Devine 35 min)**

**4:15 PM Adjourn**



7:30 AM Breakfast

8:00 AM Welcome to Day 3 (Allada/Anderson 5 min)

### **Session 5**

#### **ANOMALOUS PULMONARY VEINS**

8:05 AM Development of pulmonary veins (Anderson 15 minutes)

8:20 AM Didactic presentation (Spicer 20 min)

8:40 AM Video demonstration (Devine 20 min)

9:00 AM Echocardiography (Lanford 30 min)

9:30 AM CT/ MRI imaging (Hlavacek 30 min)

10:00 AM Lecture: “Surgical Management of Anomalous Pulmonary veins” (Morell 30 min)

10:30 AM Discussion (Anderson/Spicer/Morell 10 min)

**10:40 AM Break and hands-on** (Anderson/Spicer/Devine 10 min)

### **Session 6**

#### **VASCULAR RINGS**

10:50 AM Development of Vascular Rings (Anderson 15 min)

11:05 AM Didactic presentation (Spicer 20 min)

11:25 AM Video demonstration (Anderson 20 min)

11:45 AM Echocardiography (Lanford 20 min)

12:05 AM CT/ MRI imaging (Hlavacek 20 min)

12:25 AM Discussion/Hands-on (Anderson/Spicer 5 min)

**12:30 PM – 1:30 PM Lunch**

### **Session 7**

#### **“WHAT IS VISCERAL HETEROTAXY & ISOMERISM?”**

1:30 PM Professor Anderson’s insight (30 min)

2:00 PM Echocardiography Lanford (30 min)

2:30 PM CT/ MRI imaging Hlavacek (30 min)

### **Session 8**

#### **Hands-On Workshop**

3:00 PM – 4:00 PM All lesions presented will be available for inspection and demonstration

**4:00 PM Adjourn**

## **CME Accreditation and Designation Statement**

In support of improving patient care, the University of Pittsburgh is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME) and the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

### **Physicians:**

The University of Pittsburgh School of Medicine designates this live activity for a maximum of 17.25 *AMA PRA Category 1 Credits™*. Physicians should only claim credit commensurate with the extent of their participation in the activity.

### **Other health care professionals:**

Other health care professionals will receive a certificate of attendance confirming the number of contact hours commensurate with the extent of participation in this activity.

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No other planners, members of the planning committee, speakers, presenters, authors, content reviewers and/or anyone else in a position to control the content of this education activity have relevant financial relationships to disclose.