



# The 14<sup>th</sup> International Conference on Pediatric Mechanical Circulatory Support Systems & Pediatric Cardiopulmonary Perfusion

Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

May 3 – May 4, 2018

## FINAL SCIENTIFIC PROGRAM



**Conference Co-Chairs:** Michael C. Mongé, MD and Akif Ündar, PhD

### Keynote Lecturers:

James K. Kirklin, MD, Birmingham, AL  
Kristine J. Guleserian, MD, Miami, FL  
David L.S. Morales, MD, Cincinnati, OH  
Mark S. Slaughter, MD, Louisville, KY

### Invited Lecturers and Moderators:

Iki Adachi, MD	Ryan Davies, MD	David Palanzo, CCP
Kiona Y. Allen, MD	James Gangemi, MD	William S. Pierce, MD
Carl L. Backer, MD	Brad Kulat, CCP	Mark Roeser, MD
Aditya Badheka, MD	Greg Matte, CCP	Tami Rosenthal, CCP
Luiz Caneo, MD	Michael Mongé, MD	Marie Steiner, MD
Idágene Cestari, PhD	John L. Myers, MD	Akif Ündar, PhD
Paul Checchia, MD	Arda Özyüksel, MD	Shigang Wang, MD
Keith Cook, PhD		Jeffrey D. Zahn, PhD

# 14<sup>th</sup> International Conference on Pediatric Mechanical Circulatory Support Systems and Pediatric Cardiopulmonary Perfusion

The Heart Center at Ann & Robert H. Lurie Children's Hospital of Chicago is pleased to host the **14<sup>th</sup> International Conference on Pediatric Mechanical Circulatory Support Systems and Pediatric Cardiopulmonary Perfusion** scheduled for **May 3-4, 2018**.

An international symposium of cardiothoracic surgeons, cardiologists, perfusionists, ECMO specialists, bioengineers, basic scientists and other healthcare professionals, this meeting will give attendees the opportunity to network with over 200 healthcare providers. The overall objective of the conference is to bring together internationally recognized clinicians, bioengineers and basic scientists involved in research on pediatric mechanical circulatory support systems and pediatric cardiopulmonary bypass physiology. The 2018 meeting, through didactic sessions and simulations, will provide an overview on the current landscape and innovations of mechanical circulatory support and cardiopulmonary perfusion for the child, adolescent, and adult with congenital heart disease.

On behalf of the planning committee,

Michael C. Mongé, MD  
Attending Cardiovascular-Thoracic Surgeon,  
Ann & Robert H. Lurie Children's Hospital of Chicago

Akif Ündar, PhD  
Professor of Pediatrics, Surgery &  
Bioengineering  
Penn State Hershey Medical Center

## Accreditation Statement

The Northwestern University Feinberg School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

## Credit Designation Statement

The Northwestern University Feinberg School of Medicine designates this live activity for a maximum of 12.5 *AMA PRA Category 1 Credit(s)*<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The American Board of Cardiovascular Perfusion allots the following Category I CEUs to those perfusionists who attend the *14<sup>th</sup> International Conference on Pediatric Mechanical Circulatory Support Systems and Pediatric Cardiopulmonary Perfusion*:

Thursday, May 3	8.6
Friday, May 4	9.1
<b>Total CEUs</b>	<b>17.7 CEUs</b>

Participants must provide a photo ID and sign in once a day to verify attendance.

**WEDNESDAY, May 2, 2018**

**1:00 – 5:00pm**      **ON-SITE REGISTRATION (Only if Space is Available)**  
Exhibit set-ups

**THURSDAY, May 3, 2018**

**7:00 – 8:00am**      **Conference Registration**

**8:00 – 8:10 am**      **WELCOME**  
*Michael Mongé, MD, Chicago, IL*

**8:05 - 10:00 am**      **PLENARY SESSION #1:**  
**Pediatric Mechanical Circulatory Support Systems: 2018 Update**  
*Moderators: Iki Adachi, MD, Houston, TX, Carl L. Backer, MD, Chicago, IL, and William S. Pierce, MD, Hershey, PA*

8:10 – 8:30 am      **An Odyssey in Mechanical Circulatory Support**  
*William S. Pierce, MD, Hershey, PA*

8:30 – 8:50 am      **The Evolution of Ventricular Assist Devices at a Free-standing Children's Hospital**  
*Carl L. Backer, MD, Chicago, IL*

8:50 – 9:10 am      **Mechanical Circulatory Support of the Single Ventricle**  
*Mark Roeser, MD*

9:10 – 9:30 am      **Supporting Children with “Temporary or Short Term” Devices**  
*Ryan Davies, MD*

9:30 – 9:50 am      **Continues-Flow VAD Support in Children: A Paradigm Change**  
*Iki Adachi, MD, Houston, TX*

9:50 – 10:10 am      **New Approaches to Anticoagulation in the Pediatric VAD Patient**  
*Marie Steiner, MD*

10:10 – 10:30 am      **Developing a Pediatric Home VAD Program**  
TBA

**10:30 – 11:15 am**      **Coffee/Posters/Exhibits/Digital Posters**

**11:15 – 11:45am**      **Key Note Lecture #1:**  
**Pediatric MCS: the Pace of Progress on a National Platform**  
  
*James K. Kirklin, MD, Birmingham, AL*

<b>11:45– 12:15 pm</b>	<b>Key Note Lecture #2:</b> <i>Engineering Challenges in Pediatric MCS Development</i>  Mark S. Slaughter, MD, Louisville, KY
<b>12:15 – 12:30</b>	<b>Presentation of Young Investigators' Awards</b>
<b>12:30 - 1:30</b>	<b>Lunch Break</b>
<b>1:30 - 3:30 pm</b>	<b>PLENARY SESSION #2:</b> <b><u>Minimizing Adverse Effects of CPB in Neonates and Infants</u></b> <i>Moderators: John L. Myers, Hershey, PA and Greg Matte, CCP, Boston, MA</i>
1:30 - 1:50 PM	<b>Nitric Oxide Administration during Cardiopulmonary Bypass</b> Paul Checchia, MD
1:50 – 2:10 pm	<b>Neuroprotection during Circulatory Arrest with Regional Cerebral Perfusion</b> James Gangemi, MD
2:10 – 2:30 pm	<b>De-Airing the Heart during Cardiopulmonary Bypass</b> John L. Myers, MD, Hershey, PA
2:30 – 2:50 pm	<b>Minimizing Circuit Size</b> Brad Kulat, CCP, Chicago, IL
2:50 – 3:10 pm	<b>A Novel Wall Water system for Cardiopulmonary Bypass Heat Exchange Reduces the Risk of Aerosolized Infection Posed by Heater-Cooler Units</b> Greg Matte, CCP, Boston, MA
3:10 – 3:30 pm	<b>Is There a Role for MUF?</b> David Palanzo, CCP, Hershey, PA
3:10 – 3:30 pm	<b>Panel Discussion</b>
<b>3:30 – 4:00 pm</b>	<b>Coffee Break/Exhibits/Digital Posters</b>

*Moderators: Michael Mongé, MD, Chicago, IL and Luiz Caneo, MD, São Paulo, Brazil*

**S1. HeartWare Ventricular Assist Device Implantation for Pediatric Heart Failure-A Single Center Approach.**

Kristen Nelson McMillan, MD<sup>1,2</sup>; Narutoshi Hibino, MD<sup>4</sup>; Rajeev Wadia, MD<sup>1,2</sup>; John Young<sup>5</sup>, RRT; William Ravekes, MD<sup>3</sup>; Luca A. Vricella, MD<sup>4</sup>.

*Johns Hopkins University School of Medicine, <sup>1</sup>Department of Anesthesiology and Critical Care Medicine; <sup>2</sup>Department of Pediatrics, <sup>3</sup>Division of Pediatric Cardiology; <sup>4</sup>Department of Surgery, Division of Pediatric Cardiothoracic Surgery, <sup>5</sup>Johns Hopkins Hospital; Baltimore, MD.*

**S2. Successful Physical Rehabilitation after Placement of the 50 cc SynCardia® Total Artificial Heart**

Gary Beasley MD<sup>1,2</sup>, Casey Vogel<sup>1,3</sup>, Kateland Hojnacki<sup>1,3</sup>, McKenzie Hull<sup>1,3</sup>, Kiona Allen MD<sup>1,2,4</sup>, Michael Monge MD<sup>1,5</sup>, Lindsay Jackson MS, CPNP-AC<sup>1,5</sup>, Osama Eltayeb MD<sup>1,5</sup>, Kendra Ward MD<sup>1,2</sup>, Philip Thrush MD<sup>1,2</sup>.

*<sup>1</sup>Ann & Robert H. Lurie Children's Hospital of Chicago, <sup>2</sup>Division of Pediatric Cardiology, Northwestern University Feinberg School of Medicine, <sup>3</sup>Division of Rehabilitation Services, <sup>4</sup>Division of Critical Care, Northwestern University Feinberg School of Medicine, <sup>5</sup>Division of Cardiac Surgery, Northwestern University Feinberg School of Medicine.*

**S3. Bridge to Transplantation with Long-term Mechanical Assist Device in Adults with Transposition of the Great Arteries**

Eriberto Michel, MD<sup>1</sup>, Erik Orarco Hernandez, MD<sup>1</sup>, Daniel Enter, MD<sup>1</sup>, Michael Monge, MD<sup>1,3</sup>, Jota Nakano, MD, PhD<sup>1,2</sup>, Jonathan Rich, MD<sup>4</sup>, Allen Anderson, MD<sup>4</sup>, Carl Backer, MD<sup>1,3</sup>, Patrick McCarthy, MD<sup>1,2</sup>, Duc Pham, MD<sup>1,2</sup>.

*<sup>1</sup>Division of Cardiac Surgery, Department of Surgery, Northwestern University Feinberg School of Medicine, <sup>2</sup>Bluhm Cardiovascular Institute, Northwestern Medicine, <sup>3</sup>Ann & Robert H. Lurie Children's Hospital of Chicago, <sup>4</sup>Division of Cardiology, Department of Medicine, Northwestern University Feinberg School of Medicine.*

**S4. Prothrombin Complex Concentrate Reduces Blood Product Utilization in Heart Transplantation.**

Daniel H. Enter, MD<sup>1</sup>, Anthony L. Zaki, BS<sup>1</sup>, Megan Marsh, PharmD<sup>2</sup>, Nikki Cool, PharmD<sup>2</sup>, Jane Kruse, RN<sup>1</sup>, Zhi Li, MS<sup>1</sup>, Adin-Cristian Andrei, PhD<sup>1</sup>, Adam Idriss, MD<sup>1</sup>, Patrick M. McCarthy, MD<sup>1</sup>, S. Chris Malaisrie, MD<sup>1</sup>, Allen Anderson, MD<sup>3</sup>, Jonathan D. Rich, MD<sup>3</sup>, Duc Think Pham, MD<sup>1</sup>.

<sup>1</sup>Cardiac Surgery, Northwestern University, Chicago, IL; <sup>2</sup>Pharmacy, Northwestern University, Chicago, IL; <sup>3</sup>Cardiology, Northwestern University, Chicago, IL.

**S5. Endothelial Cells Response to Topographical Cues Under Pulsatile Versus Centrifugal Flow.**

Ismar N. Cestari, MD, PhD<sup>1</sup>, Lucas R.X. Cortella, MS<sup>1</sup>, Adélia Kakoi, MS<sup>1</sup>, Andrès F. Lasagni, PhD<sup>2</sup> and Idágene A. Cestari, PhD<sup>1</sup>.

<sup>1</sup>InCor Heart Institute Hospital das Clínicas da Universidade de São Paulo, São Paulo, Brazil; <sup>2</sup>Fraunhofer Institute for Material and Beam Technology IWS Dresden, Germany.

**S6. In Vitro Hemodynamic Evaluation of ECG-Synchronized Pulsatile Flow using i-cor Pump as Short-Term Cardiac Assist Device for Neonatal and Pediatric Population.**

Madison Force, BS<sup>1</sup>, Morgan Moroi, BS<sup>1</sup>, Shigang Wang, MD<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, and Akif Ündar, PhD<sup>1,3</sup>.

<sup>1</sup>Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Department of Surgery and Department of Bioengineering, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.

**RECEPTION FOR MEETING PARTICIPANTS 5:30-7:00 PM – Hors d'oeuvres**

**FRIDAY, May 4, 2018**

**7:00 – 8:00 am**      **Conference registration**

**8:00 – 10:00 am**      **PLENARY SESSION #3:**  
**ECLS: Utilization, Management, Outcomes: An International Approach**  
**Moderator: David L.S. Morales, MD, Cincinnati, OH and TBA**

8:00 – 8:20 am      **ECPR Activation Facilitates Rescue in Patients with Refractory Cardiac Failure with and without ECMO Cannulation**  
Kiona Y. Allen, MD, Chicago, IL

8:20 – 8:40 am      **Neonatal/Pediatric ECMO Management and Outcomes: The CHOP Experience**  
Tami Rosenthal, CCP, Philadelphia, PA

8:40 – 9:00 am      **Outcomes of Neonatal/Pediatric ECMO in Latin America**  
Luiz Caneo, MD, São Paulo, Brazil

9:00 – 9:20 am      **ECMO in the Treatment of Septic Shock**  
Aditya Badheka, MD

9:20 – 9:40 am	<b>Pediatric ECMO Experience in Turkey</b> Arda Özyüksel, MD, Istanbul, Turkey
9:40 – 10:00 am	<b>Impact of Translational Research on Optimization of the Neonatal/Pediatric ECLS Circuits and Clinical Outcomes</b> Akif Ündar, PhD, Hershey, PA
<b>10:00 – 10:45am</b>	<b>Coffee Break/Exhibits/Digital Posters</b>
<b>10:45 – 11:15</b>	<b>Key Note Lecture #3</b>
	<i>Tackling the Zebras with Mechanical Circulatory Support</i>  <i>Kristine J. Guleserian, MD, Miami, FL</i>
<b>11:15 – 11:45</b>	<b>Key Note Lecture #4</b>
	<i>David L.S. Morales, MD, Cincinnati, OH</i>
<b>Noon – 1:00pm</b>	<b>Lunch Break</b>
<b>1:00pm – 2:20pm</b>	<b>MINI-SYMPOSIUM:</b> <b><u>Engineering Approach to Pediatric Cardiovascular Medicine</u></b> <i>Moderators: Idágene Cestari, PhD, São Paulo, Brazil; and Jeffrey D. Zahn, PhD, Piscataway, NJ</i>
1:00 – 1:20 pm	<b>Novel Means of Artificial Lung Anticoagulation</b> Keith Cook, PhD, Pittsburgh, PA
1:20 – 1:40 pm	<b>Pediatric VAD Development in Brazil</b> Idágene Cestari, PhD, São Paulo, Brazil
1:40 – 2:00 pm	<b>Developing Microfluidic Devices for Pediatric MCS &amp; CPB Patient Population</b> Jeffrey D. Zahn, PhD, Piscataway, NJ
2:00 – 2:20 pm	<b>Effects of Pulsatile Control Algorithms for Diagonal Pump on Hemodynamic Energy Output in Simulated Pediatric and Adult ECLS Systems</b> Shigang Wang, MD, Hershey, PA
<b>2:20 – 3:30pm</b>	<b>REGULAR SLIDE PRESENTATIONS #2:</b> <i>Moderator: Akif Ündar, PhD, Hershey, PA</i>
	<b>S7. In Vitro Evaluation of ECG-Synchronized Pulsatile Flow using i-Cor Diagonal Pump in Neonatal and Pediatric ECLS Systems.</b>

Morgan Moroi, BS<sup>1</sup>, Madison Force, BS<sup>1</sup>, Shigang Wang, MD<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, and Akif Ündar, PhD<sup>1,3</sup>.

*<sup>1</sup>Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Department of Surgery and Bioengineering, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

**S8. Numerical Simulation of a Bileaflet Mechanical Valve for Application on a Pediatric Pulsatile Ventricular Assist Device.**

Mohammad Malekan PhD, Simão Bach BSE, and Idágene A Cestari PhD. *InCor Heart Institute, Hospital das Clínicas da Universidade de São Paulo, São Paulo, Brazil.*

**S9. Lactate Clearance in Infants undergoing Surgery for Congenital Heart Disease.**

L. Desplanque MD<sup>1</sup>, F. Hamaide, MD<sup>2</sup>, S. Albinni MD<sup>3</sup>, M. Bojan MD PhD<sup>4</sup>.

*<sup>1</sup>Department of Anesthesia, Bichat Claude Bernard Hospital, Paris, <sup>2</sup>Department of Clinical Research, Tarnier Hospital, Paris, <sup>3</sup>Blood Bank, Necker-Enfants Malades Hospital, <sup>4</sup>Department of Anesthesia, and Critical Care, Necker-Enfants Malades Hospital, Paris, France.*

**S10. Perioperative Outcomes of Different Temperature Management in Pediatric Aortic Arch Surgery: A Single Center 8-Year Experience.**

Yuanyuan Tong, MD<sup>1</sup>, Jinping Liu, PhD<sup>1</sup>, Lihua Zou, PhD<sup>2</sup>, Ruoning Lv, MD<sup>1</sup>, Yu Jin, MD<sup>1</sup>, Zhengyi Feng, MD<sup>1</sup>

*<sup>1</sup>Department of Cardiopulmonary Bypass, Chinese Academy of Medical Sciences and Peking Union Medical College Fuwai Hospital, Beijing, China, <sup>2</sup>Department of Anesthesiology, Beijing Tiantan Hospital, Capital Medical University, Beijing, China.*

**S11. Translational Research Helping Optimization of Pediatric/Neonatal Cardiopulmonary Bypass Practices: An International Multicenter/Multidisciplinary Approach.**

Daniel Peres Guimarães, MD<sup>1</sup>, Luiz Fernando Caneo, MD, PhD<sup>1</sup>, Gregory Matte, CCP, LP, FPP<sup>2</sup>, Guilherme Viotto, MD<sup>1</sup>, Luciana Pereira Carletto, CCP<sup>1</sup>, Marcelo Mazzeto, MS<sup>1</sup>, Idagene Cestari, PhD<sup>1</sup>, Rodolfo A. Neirotti, MD, PhD, FEACTS<sup>4</sup>, Marcelo B. Jatene, MD, PhD<sup>1</sup>, Shigang Wang, MD<sup>3</sup>, Akif Ündar, PhD<sup>3</sup>, Joao Chang, Jr. PhD<sup>5</sup>, Fabio B. Jatene, MD, PhD<sup>1</sup>.

*1-Pediatric Cardiac Division, Heart Institute of University of Sao Paulo Medical School, Sao Paulo, Brazil. 2-Department of Cardiac Surgery, Boston Children's Hospital, Boston, MA, USA. 3-Pediatric Cardiovascular Research Center, Department of Pediatrics; Public Health Sciences; Surgery and Bioengineering, Penn State Health Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA. 4-Clinical Professor of*



*Surgery and Pediatrics, Emeritus Michigan State University, MI, USA. 5-  
Department of Industrial Engineering, FEI University Center, Sao Paulo,  
Brazil.*

**S12. Lower Limit of the Suitable Oxygen Delivery for the Maintenance of  
Aerobic Metabolism During Cardiopulmonary Bypass in Neonates.**

Mirela Bojan, MD, PhD<sup>1</sup>, Enza Gioia, MD<sup>1</sup>, Federica Di Corte, MD<sup>1</sup>,  
Paola Burgos, RN<sup>2</sup>, Laurent Tourneur, RN<sup>2</sup>.

*<sup>1</sup>Department of Anesthesia and Critical Care, <sup>2</sup>Department pediatric  
Cardiac Surgery, Perfusion unit, Necker-Enfants Malades University  
Hospital, Paris, France.*

**S13. Hemodynamic Evaluation of Avalon Elite Bi-Caval Dual Lumen  
Cannulas and Adolescent/Adult Femoral Arterial Cannulas.**

Shigang Wang, MD<sup>1</sup>, Madison Force, BS<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>,  
David Palanzo, CCP<sup>3</sup>, Christoph Brehm, MD<sup>4</sup>, Akif Ündar, PhD<sup>1,5</sup>.

*Penn State Health Pediatric Cardiovascular Research Center, Department  
of Pediatrics<sup>1</sup>, Public Health and Sciences<sup>2</sup>, Perfusion<sup>3</sup>, Heart and  
Vascular Institute<sup>4</sup>, Surgery and Bioengineering<sup>5</sup>, Penn State Milton S.  
Hershey Medical Center, Penn State College of Medicine, Penn State  
Health Children's Hospital, Hershey, PA, USA.*

**3:30pm – 4:00pm Coffee Break/Exhibits/Digital Posters**

**4:00 – 6:00pm PARALLEL SESSIONS**

**4:00 – 6:00pm WET-LABS (at the Exhibit hall )**

***Moderators: Michael Mongé, MD, and Brad Kulat, CCP,***

**Hands-On Simulation with the Newest Pediatric CPB/ECLS/MCS  
Systems**

**4:00 – 6:00pm PARALLEL SESSIONS (Hospital tours)**

**(Advanced Registration is Required) We may add only 2 groups (25  
people for each group) for the tour**

**8:00 am May 3, 2018 – 6:00pm May 4, 2018 DIGITAL POSTER PRESENTATIONS**

**P1. Evaluation of Different Diameter Arterial Tubing and Arterial  
Cannulae in Simulated Pediatric CPB Circuits.**

Shigang Wang, MD<sup>1</sup>, Tami Rosenthal, CCP<sup>4</sup>, Allen R. Kunselman, MA<sup>2</sup>,  
and Akif Ündar, PhD<sup>1,3</sup>.

*Penn State Hershey Pediatric Cardiovascular Research Center,  
Department of Pediatrics<sup>1</sup>, Public Health and Sciences<sup>2</sup>, Surgery and  
Bioengineering<sup>3</sup>, Penn State Milton S. Hershey Medical Center, Penn  
State Hershey College of Medicine, Penn State Hershey Children's*

*Hospital, Hershey, PA, USA. <sup>4</sup>Cardiovascular Perfusion Department, Children's Hospital of Philadelphia, Philadelphia, PA, USA*

**P2. In Vitro Comparison of Pediatric Oxygenators with and without Integrated Arterial Filters in Maintaining Optimal Hemodynamic Stability and Managing Gaseous Microemboli.**

Morgan Moroi, BS<sup>1</sup>, Madison Force, BS<sup>1</sup>, Shigang Wang, MD<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, and Akif Ündar, PhD<sup>1,3</sup>.

*<sup>1</sup>Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Department of Surgery and Bioengineering, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

**P3. Evaluation of Combined ECLS and CRRT on Hemodynamic Performance and Gaseous Microemboli Handling Ability in a Simulated Neonatal ECLS System.**

Kaitlyn Shank, BS<sup>1</sup>, Elizabeth Profeta, BS<sup>1</sup>, Shigang Wang, MD<sup>1</sup>, Christian O'Connor<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, Karl Woitas, CCP<sup>5</sup>, John L. Myers, MD<sup>1,3</sup>, and Akif Ündar, PhD<sup>1,3,4</sup>.

*<sup>1</sup>Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Surgery and <sup>4</sup>Bioengineering, <sup>5</sup>Penn State Heart and Vascular Institute, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

**P4. In Vitro Comparison of Two Neonatal ECMO Circuits using a Roller or Centrifugal Pump with Three Different in-line Hemoconcentrators for Maintaining Hemodynamic Energy Delivery to the Patient.**

Madison Force, BS<sup>1</sup>, Morgan Moroi, BS<sup>1</sup>, Shigang Wang, MD<sup>1</sup>, David A. Palanzo, CCP<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, and Akif Ündar, PhD<sup>1,3,4</sup>.

*<sup>1</sup>Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Department of Surgery, <sup>4</sup>Department of Bioengineering, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

**P5. Impact of Heart Rate on Pulsatile Hemodynamic Performance in a Neonatal ECG-Synchronized ECLS System.**

Shigang Wang, MD<sup>1</sup>, Morgan K. Moroi, BS<sup>1</sup>, Madison Force, BS<sup>1</sup>, Allen R. Kunselman, MA<sup>2</sup>, Akif Ündar, PhD<sup>1,3</sup>.

*Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics<sup>1</sup>, Public Health and Sciences<sup>2</sup>, Department of Surgery and Bioengineering<sup>3</sup>, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

**P6. Impact of Venous Cannula Size and Venous Line Length on Venous Line Pressure in Pediatric VV-/VA-ECLS Circuits.**

Shigang Wang MD<sup>1</sup>, Allen R. Kunselman MA<sup>2</sup>, and Akif Ündar PhD<sup>1,3</sup>.  
*<sup>1</sup>Penn State Health Pediatric Cardiovascular Research Center, Department of Pediatrics, <sup>2</sup>Public Health and Sciences, <sup>3</sup>Department of Surgery and Bioengineering, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital.*

**P7. Evaluation of Two Femoral Arterial Cannulae with Conventional Non-Pulsatile and Alternative Pulsatile Flow in A Simulated Adolescent/Adult ECLS Circuit.**

Shigang Wang, MD<sup>\*</sup>, Madison Force, BS<sup>\*</sup>, Allen R. Kunselman, MA<sup>†</sup>, Christoph Brehm, MD<sup>§</sup>, Akif Ündar, PhD<sup>\*,‡</sup>.  
*Departments of Pediatrics<sup>\*</sup>, Public and Health Sciences<sup>†</sup>, Surgery and Bioengineering<sup>‡</sup>; Penn State Hershey Pediatric Cardiovascular Research Center, Penn State Hershey College of Medicine, Hershey, PA. <sup>§</sup>Heart and Vascular Institute, Penn State Milton S. Hershey Medical Center, Hershey, PA.*

**P8. Evaluation and Comparison of Hemodynamic Performance of Three ECLS Systems in a Simulated Adult Cardiogenic Shock Model.**

Akif Ündar, PhD<sup>\*†</sup>, Shigang Wang, MD<sup>\*</sup>, Morgan Moroi, BS<sup>\*</sup>, Allen R. Kunselman, MA<sup>‡</sup>, and Christoph E. Brehm, MD<sup>§</sup>.  
*\*Department of Pediatrics, Penn State Health Pediatric Cardiovascular Research Center; <sup>†</sup>Department of Surgery and Bioengineering; <sup>‡</sup>Department of Public Health and Sciences; and <sup>§</sup>Heart & Vascular Intensive Care Unit, Penn State Milton S. Hershey Medical Center, Penn State College of Medicine, Penn State Health Children's Hospital, Hershey, PA, USA.*

6:00pm

CLOSING REMARKS