Developmental Biology eapsa.org
Transplantation Clinical Surgery
Critical Care Clinical Care
Basic Science Quality Improvement
Oncology Innovation
Fetal Surgery Trauma

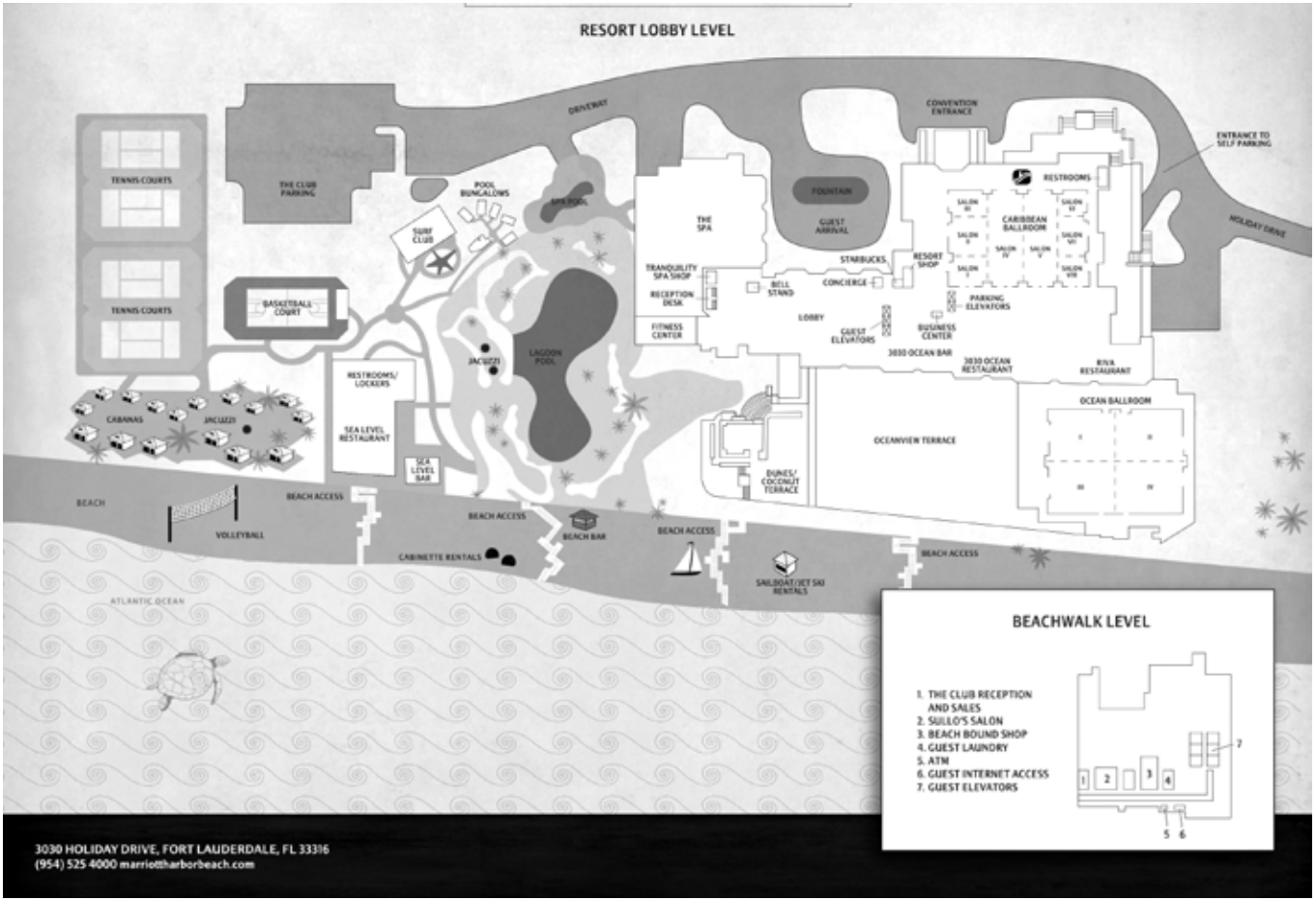
APSA 2015

46th Annual Meeting

Final Program

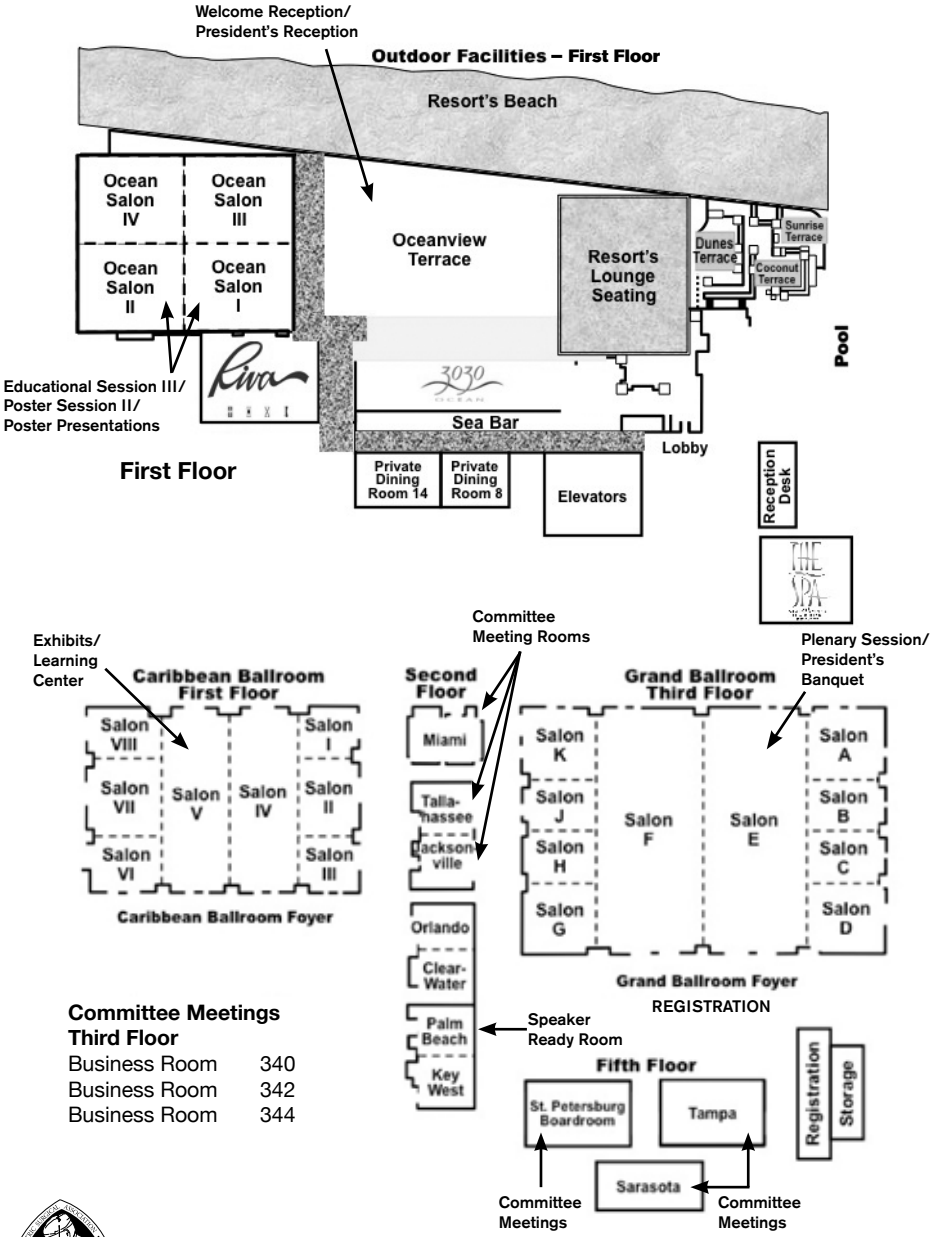
April 30 – May 3, 2015
Marriott Harbor Beach Resort & Spa
Fort Lauderdale, Florida USA

www.eapsa.org



Hotel Floorplan

Hotel Floorplan



Committee Meetings
Third Floor

Business Room	340
Business Room	342
Business Room	344

American Pediatric Surgical Association Mission

To ensure optimal pediatric surgical care of patients and their families, to promote excellence in the field, and to foster a vibrant and viable community of pediatric surgeons.

We do this by:

- Developing and advocating for standards of care for infants and children and influencing public policy around the surgical care of children
- Encouraging discovery, innovation and improvement of care
- Providing rich venues for the dissemination of up-to-date knowledge
- Offering high quality continuing education to members
- Creating identity and community among pediatric surgeons
- Promoting a supportive health care environment for patients, staff and surgeons and making certain that it is sustained by economic health

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lclark@eapsa.org

Marina Petrulla
Administrative Director
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Abra Alscher
Administrator
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Conference Director
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Christopher Viglione
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Meagan Comerford
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Marti Buckely
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John Waxman
Managing Partner
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Go to the APSA website at www.eapsa.org and:

- Join the discussions on the All-Member Group
- Update your profile
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Table of Contents

Governance

Board of Governers 2014-2015

Michael D. Klein
President 2014-2015
+1-313-745-5840
mdkleinmd1@me.com

Daniel von Allmen
Treasurer 2014-2017
+1-513-636-7365
daniel.vonallmen@
cchmc.org

Mary E. Fallat
President-Elect 2014-2015
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Erik D. Skarsgard
Governor 2012-2015
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eskarsgard@cw.bc.ca

Thomas M. Krummel
Immediate Past President
2014-2015
+1-650-498-4292
tkrummel@stanford.edu

Marleta Reynolds
Governor 2013-2016
+1-312-227-4334
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luriechildrens.org

Mary L. Brandt
Secretary 2012-2015
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David J. Schmeling
Governor 2014-2017
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APSA Congratulates Incoming Board Members

Diana L. Farmer
President-Elect
2015-2016
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John H.T. Waldhausen
Secretary
2015-2018
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john.waldhausen@seattlechildrens.org

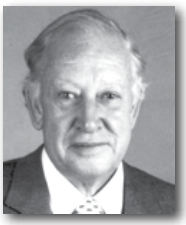
Rebecka L. Meyers
Governor 2015-2018
+1-801-662-2950
rebecka.meyers@imail.org

Past Presidents

Robert E. Gross
1970-1971

Orvar Swenson
1973-1974

C. Everett Koop
1971-1972



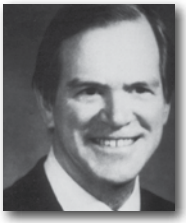
Harvey E. Beardmore
1974-1975

H. William Clatworthy, Jr.
1972-1973

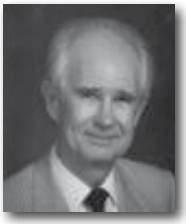
Thomas M. Holder
1975-1976

Past Presidents (cont.)

Alexander H. Bill
1976-1977



E. Thomas Boles, Jr.
1977-1978



Morton M. Woolley
1978-1979

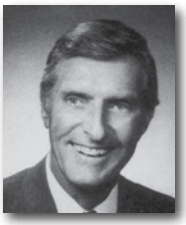
Robert G. Allen
1979-1980

Thomas V. Santulli
1980-1981

William B. Kiesewetter
1981

W. Hardy Hendren
1981-1983

Lester W. Martin
1983-1984

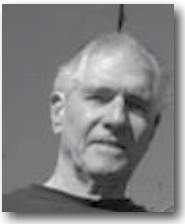


Judson G. Randolph
1984-1985

Dale G. Johnson
1985-1986

Past Presidents (cont.)

J. Alex Haller, Jr.
1986-1987



Alfred A. deLorimier
1991-1992

Robert J. Izant, Jr.
1987-1988

Dick G. Ellis
1992-1993

James A. O'Neill, Jr.
1988-1989

Raymond A. Amoury
1993-1994

Eric W. Fonkalsrud
1989-1990

Jay L. Grosfeld
1994-1995

Robert M. Filler
1990-1991

Arvin I. Philippart
1995-1996

Past Presidents (cont.)

Keith W. Ashcraft
1996-1997

Arnold G. Coran
2001-2002

H. Biemann Othersen, Jr.
1997-1998

R. Peter Altman
2002-2003

Marc I. Rowe
1998-1999

Bradley M. Rodgers
2003-2004

Kathryn D. Anderson
1999-2000

Robert J. Touloukian
2004-2005

David Tapper
2000-2001

M. Judah Folkman
2005-2006

Past Presidents (cont.)

Patricia K. Donahoe
2006-2007

Marshall Z. Schwartz
2010-2011

Moritz M. Ziegler
2007-2008

Robert C. Shamberger
2011-2012

Michael R. Harrison
2008-2009

Keith T. Oldham
2012-2013

Keith E. Georgeson
2009-2010

Thomas M. Krummel
2013-2014

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Thomas M. Holder 1970–1973
Dale G. Johnson 1973–1976
James A. O'Neill, Jr. 1976–1979
Robert J. Touloukian. 1979–1982
Anthony Shaw 1982–1985
Raymond A. Amoury 1985–1988
Kathryn D. Anderson 1988–1991
Keith W. Ashcraft 1991–1994
Howard C. Filston. 1994–1997
Keith T. Oldham 1997–2000
Robert M. Arensman 2000–2003
Donna A. Caniano 2003–2006
Ronald B. Hirschl 2006–2009
Diana L. Farmer 2009–2012

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Robert G. Allen. 1975–1978
Dick G. Ellis 1978–1981
J. Alex Haller, Jr. 1981–1984
Dick G. Ellis 1984–1987
William P. Tunell 1987–1990
Bradley M. Rodgers 1990–1993
Donald R. Cooney 1993–1996
Robert M. Arensman 1996–1999
Moritz M. Ziegler 1999–2002
Michael D. Klein 2002–2005
Neil J. Sherman 2005–2008
Dennis P. Lund 2008–2011
Charles J. Stolar. 2011-2014

Governor

Federico A. Arcari. 1970–1971
Robert J. Izant 1970–1972
Tague C. Chisholm 1971–1973
Robert G. Allen. 1972–1974
Morton M. Woolley 1973–1975
Marc I. Rowe 1974–1976
George W. Holcomb, Jr 1975–1977
Eric W. Fonkalsrud 1976–1978
Dale G. Johnson. 1977–1979
Lester W. Martin 1978–1980
Bernard J. Spencer 1979–1981
Harry C. Bishop 1980–1982
Judson G. Randolph 1981–1983
Robert M. Filler. 1981–1984
Keith W. Ashcraft 1982–1985
Alfred A. deLorimier 1983–1986
Jay L. Grosfeld 1984–1987

Past Officers (cont.)

Robert T. Soper 1985–1988
H. Biemann Othersen, Jr 1986–1989
Robert J. Touloukian. 1987–1990
Arvin I. Philippart 1988–1991
Albert W. Dibbins 1989–1992
Patricia K. Donahoe 1990–1993
Arnold G. Coran 1991–1994
Moritz M. Ziegler 1992–1995
David Tapper 1993–1996
Eugene S. Wiener. 1994–1997
Samuel H. Kim 1995–1998
R. Peter Altman 1996–1999
Michael D. Klein 1997–2000
Richard G. Azizkhan. 1998–2001
Thomas M. Krummel 1999–2002
Keith E. Georgeson 2000–2003
Marshall Z. Schwartz 2001–2004
John Noseworthy 2002–2005
George W. Holcomb, III 2003–2006
Kurt D. Newman. 2004–2007
Thomas F. Tracy 2005–2008
Robert C. Shamberger 2006–2009
Mary E. Fallat 2007–2010
Henri R. Ford 2008–2011
Fredrick J. Rescorla 2009–2012
Brad W. Warner 2010–2013
Kevin P. Lally. 2011-2014

APSA Representatives

APSA members volunteer and hold positions within many professional organizations worldwide, and we commend their dedication to advancing the field of pediatric surgery. The list below consists of those representatives who have been elected, nominated or otherwise appointed by the APSA Board of Governors. We appreciate their time serving as official APSA representatives.

Alliance for Childhood Cancer
Anthony D. Sandler

American Academy of Orthopaedic Surgeons
Writing Panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Fizan Abdullah

Review Panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Sara K. Rasmussen

American Board of Surgery
Ronald B. Hirschl

Pediatric Surgery Board
Ronald B. Hirschl
John H.T. Waldhausen

American College of Radiology
Appropriateness Panel on Pediatric Imaging
Henry E. Rice

American College of Surgeons
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Dennis P. Lund

Young Surgeon Representative
Jacqueline M. Saito

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Commission on Cancer
Elizabeth A. Beierle

American Medical Association
Relative Value Update Committee (RUC)
Mustafa H. Kabeer
Samuel D. Smith

Trauma Center Association of America
Pediatric Committee
Michael L. Nance

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dlund@phoenixchildrens.com
John J. Aiken, 2013-2016
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Gail E. Besner, 2013-2016
Peter W. Dillon, 2013-2016
Stephen C. Raynor, 2013-2016
Charles J. Stolar, 2014-2017

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mefall01@louisville.edu
Kenneth S. Azarow, 2013-2016
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Roshni A. Dasgupta, 2013-2016
John W. DiFiore, 2013-2015
Romeo C. Ignacio, Jr., 2014-2017
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Jacob C. Langer, 2013-2016
Grace Mak, 2014-2017
Christopher R. Newton, 2013-2015
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Jacqueline M. Saito, 2014-2017

Cancer
Andrea A. Hayes-Jordan, *Chair*
2013-2015
ahJordan@mdanderson.org
Max R. Langham, Jr., *Vice Chair*
2013-2015
mlangham@uthsc.edu
Jae-O Bae, 2012-2015
Bill Chiu, 2014-2017
Roshni A. Dasgupta, 2012-2015
John M. Draus, 2014-2017
Gerald Gollin, 2009-2014
Ankush Gosain, 2013-2016
Angela V. Kadenhe-Chiweshe,
2013-2016
Erika Newman, 2014-2017
Sanjeev A. Vasudevan, 2014-2017
Michael P. LaQuaglia, *Ex Officio*

Childhood Obesity
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Matias Bruzoni, 2013-2016
Joy Collins, 2014-2017
Daniel DeUgarte, 2011-2014
J. Craig Egan, 2012-2015
Mohamman Emran, 2014-2017
Thomas H. Inge, 2010-2015
Sarah A. Jones, 2012-2015
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Marc P. Michalsky, 2010-2016
Holly L. Neville, 2014-2017
Ann O'Connor, 2014-2017
Samir R. Pandya, 2014-2017
Faisal G. Qureshi, 2013-2016
Elizabeth J. Renaud, 2014-2017

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Kurt F. Heiss, *Chair*, 2012-2015
kurt.heiss@choa.org
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marca@chw.org
Georges Azzie, 2012-2015
Joanne E. Baerg, 2012-2015
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Elizabeth A. Beierle, 2013-2016
John C. Bleacher, 2012-2015
Guy F. Brisseau, 2013-2016
A. Alfred Chahine, 2012-2015
J. Craig Egan, 2012-2015
Colleen M. Fitzpatrick, 2014-2017
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Romeo C. Ignacio, Jr., 2013-2016
Rodrigo B. Interiano, 2014-2017
Joseph A. Iocono, 2011-2017
Aviva L. Katz, 2012-2015
Brian Kenney, 2014-2017
Patricia Lange, 2013-2016
Steven L. Lee, 2013-2016
Kenneth W. Liechty, 2012-2015
Grace Mak, 2012-2015
Andreas H. Meier, 2008-2017
Biren P. Modi, 2014-2017
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Wolfgang Stehr, 2014-2017

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Eugene D. McGahren, 2010-2015
Rebecka L. Meyers, 2014-2019
Charles L. Snyder, 2009-2015

Simulation Subcommittee
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Georges Azzie, 2012-2015
Joanne E. Baerg, 2012-2015
Joseph A. Iocono, 2011-2017
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Grace Mak, 2012-2015
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Biren P. Modi, 2014-2017
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Marjorie J. Arca, 2012-2015
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Kenneth W. Gow, 2013-2017
Kurt F. Heiss, 2012-2015
Andreas H. Meier, 2012-2017

Ethics and Advocacy
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aviva.katz@chp.edu
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Annie H. Fecteau, 2012-2015
Stephanie A. Kapfer, 2012-2015
Fawn C. Lewis, 2014-2017
Deborah S. Loeff, 2013-2016
Abigail E. Martin, 2012-2015
Claudia M. Mueller, 2013-2016
David J. Schmeling, 2013-2015
Robert L. Weinsheimer, 2014-2017
John R. Wesley, 2010-2016

Fetal Diagnosis and Treatment
Christopher S. Muratore, *Chair*, 2014-2016
Christopher_Muratore@brown.edu
Terry L. Buchmiller, *Vice Chair,* 2014-2016
N. Scott Adzick, 2014-2017
Brad A. Feltis, 2010-2016
Kathleen Graziano, 2014-2017
Shinjiro Hirose, 2011-2017
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Shaun M. Kunisaki, 2014-2017
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Foong-Yen Lim, 2012-2015
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Karl G. Sylvester, 2013-2016
Amy J. Wagner, 2012-2015
Abdalla E. Zarroug, 2012-2015
Darrel L. Cass, *Ex Officio,* 2013-2016

Global Pediatric Surgery
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mwbutler@gmail.com
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donald.meier@ttuhsc.edu
Georges Azzie, 2012-2015
Amina M. Bhatia, 2014-2017
Stephen W. Bickler, 2012-2015
Matias Bruzoni, 2013-2016
Robert A. Cusick, 2011-2015
Diana L. Farmer, 2012-2015
Ai-Xuan L. Holterman, 2013-2016
Sanjay Krishnaswami, 2009-2015
Marc A. Levitt, 2009-2015
Harold N. Lovvorn, III, 2014-2017
Benedict C. Nwomeh, 2012-2015
Keith T. Oldham, 2012-2015
David H. Rothstein, 2011-2014
Doruk E. Ozgediz, 2012-2015

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Matthew S. Clifton, 2014-2017
Mike K. Chen, 2014-2017
Karen A. Diefenbach, 2013-2016
James D. Geiger, 2013-2016
Timothy D. Kane, 2013-2016
Todd A. Ponsky, 2013-2016
Steven S. Rothenberg, 2010-2016

Informatics and Telemedicine
Danielle S. Walsh, *Chair*, 2012-2014
walshd@ecu.edu
Todd A. Ponsky, *Vice Chair,* 2010-2016
tponsky@gmail.com
Gudrun Aspelund, 2014-2017
Jason Fisher, 2014-2017
Ronald B. Hirschl, 2012-2015
Benedict C. Nwomeh, 2010-2016
Steven S. Rothenberg, 2013-2016
Matthew T. Harting, 2013-2016, *Consultant*
Gretchen Jackson, *Ex Officio*

Membership & Credentials
Michael A. Skinner, *Chair*, 2013-2015
Michael.Skinner@childrens.com
Harry Applebaum, *Vice Chair,* 2013-2015
happlebaum@mednet.ucla.edu
Gail E. Besner, 2012-2015
Adela Casas-Melley, 2012-2015
Robert A. Cowles, 2010-2016
Bryan J. Dicken, 2012-2015
Julie R. Fuchs, 2012-2015
Loretto A. Glynn, 2012-2015
Stephen S. Kim, 2012-2015
Tarun Kumar, 2014-2017
Richard H. Pearl, 2010-2016

New Technology
Christopher K. Breuer, *Chair*, 2013-2015 christopher.breuer@nationwidechildrens.org
Erik D. Skarsgard, *Vice Chair,* 2013-2015
eskarsgard@cw.bc.ca
Sean S. Barnett, 2013-2016
Sanjeev Dutta, 2013-2016
Timothy J. Fairbanks, 2012-2015
Marcus Jarboe, 2012-2015
Tamir H. Keshen, 2012-2015
Hammin Lee, 2014-2017
Stefan Scholz, 2014-2017
Steven Teich, 2013-2016
Russell K. Woo, 2013-2016
James K. Wall, 2013-2016, *Consultant*

Nominating
Gail E. Besner, *Chair*, 2014-2015
gail.besner@nationwidechildrens.org
Douglas C. Barnhart, 2014-2015
Cathy A. Burnweit, 2014-2015
Frederick M. Karrer, 2014-2015
Eugene D. McGahren, 2014-2015
Keith T. Oldham, 2013-2016
Robert C. Shamberger, 2012-2015

Outcomes and Evidence-based Practice
Saleem Islam, *Chair*, 2013-2015
islamsa@surgery.ufl.edu
Cynthia D. Downard, *Vice Chair,* 2013-2015
c0down01@louisville.edu
Meghan A. Arnold, 2014-2017
Mary T. Austin, 2012-2015
Casey M. Calkins, 2010-2014
Li Ern Chen, 2012-2015
Roshni A. Dasgupta, 2012-2015
Katherine J. Deans, 2013-2016
Adam B. Goldin, 2010-2015
Julia E. Grabowski, 2014-2017
Kathleen Graziano, 2012-2015
Tim Jancelewicz, 2014-2017
Monica E. Lopez, 2012-2015
Milissa A. McKee, 2013-2016
Pramod S. Puligandla, 2012-2015

APSA Committees 2014-2015 (cont.)

Elizabeth J. Renaud, 2012-2015
Regan F. Williams, 2014-2017
Fizan Abdullah, 2013-2015, *Ex Officio*
Shawn Rangel, 2014-2016, *Ex Officio*

Eblast/Literature Review Subcommittee

Monica E. Lopez, *Chair*, 2012-2015
melopez@bcm.edu
Milissa A. McKee, *Vice Chair,* 2013-2016
milissa.mckee@gmail.com

IT/Website Subcommittee

Pramod S. Puligandla, *Chair,* 2012–2015
pramod.puligandla@mcgill.ca
Regan F. Williams, *Vice Chair,* 2014-2017
rfwillia@uthsc.edu

Survey Subcommittee

Elizabeth J. Renaud, *Chair*, 2013-2014
bj_renaud@yahoo.com
Julia E. Grabowski, *Vice Chair,* 2014-2017
jgrabowski@luriechildrens.org

Practice

David M. Notrica, *Chair*, 2014-2016
dnotrica@surgery4children.com
James C. Gilbert, *Vice Chair,* 2014-2016
james.gilbertmd@hhsys.org
Lisa Abramson, 2012-2015
John F. Bealer, 2014-2017
Anthony Chin, 2012-2015
John Densmore, 2014-2017
John J. Doski, 2012-2015
Nicholas F. Fiore, Jr., 2012-2015
Michael J. Goretsky, 2014-2017
Donavon Hess, 2014-2017
Tamir H. Keshen, 2012-2015
Stephen G. Kimmel, 2013-2016
Marc S. Lessin, 2012-2015
Don K. Nakayama, 2010-2016
Barry M. Newman, 2014-2017
Ann O'Connor, 2012-2015
David J. Schmeling, 2013-2016
Andrew M. Schulman, 2013-2016
Donald B. Shaul, 2012-2015
Samuel D. Smith, 2014-2017
Dennis W. Vane, 2010-2016
David E. Wesson, 2014-2017

Program

Peter F. Ehrlich, *Chair*, 2012-2015
pehrlich@med.umich.edu
Daniel J. Ostlie, *Vice Chair,* 2012-2015
ostlie@surgery.wisc.edu
Jennifer Aldrink, 2014-2017
Casey M. Calkins, 2012-2015
Catherine C. Chen, 2014-2017
Allan M. Goldstein, 2012-2015
Gerald Gollin, 2014-2017
Kenneth W. Gow, 2012-2015
Andre V. Hebra, 2012-2015
Sundeep G. Keswani, 2013-2016
Eugene S. Kim, 2014-2017
Steven L. Lee, 2012-2015
Tippi C. MacKenzie, 2012-2015
Peter S. Midulla, 2014-2017
George B. Mychaliska, 2013-2016
Peter F. Nichol, 2013-2016
Eric R. Scaife, 2012-2015
Samuel Z. Soffer, 2014-2017
Anthony Stallion, 2012-2015
Adam M. Vogel, 2013-2016

Publications

Anne C. Fischer, *Chair,* 2013-2015
Anne.Fischer@beaumont.edu
Doug Miniati, *Vice Chair,* 2013-2015
dminiati@yahoo.com
Robert A. Cowles, 2012-2015
John Densmore, 2012-2015
Patrick Dillon, 2013-2016
Mary J. Edwards, 2014-2017
David M. Gourlay, 2014-2017
Thomas E. Hamilton, 2013-2016
Michael A. Helmrath, 2012-2015
Ai-Xuan L. Holterman, 2012-2015
Eunice Huang, 2014-2017
David A. Partrick, 2012-2015
Aimen F. Shaaban, 2012-2015
Edmund Yi-Bin Yang, 2014-2017
Peter F. Ehrlich, 2012-2015, *Ex Officio*
David L. Sigalet, 2013-2016, *Ex Officio*

APSA Committees 2014-2015 (cont.)

Surgical Critical Care
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pramod.puligandla@mcgill.ca
Marjorie J. Arca, 2012-2015
Kelly M. Austin, 2012-2016
David W. Bliss. 2012-2015
Anthony Chin, 2012-2015
Samir K. Gadepalli, 2012-2017
Raquel Gonzalez, 2012-2016
Chad E. Hamner, 2012-2016
Ronald B. Hirschl, 2012-2015
David Juang, 2012-2017
Peter C. Minneci, 2012-2015
Daniel J. Ostlie, 2012-2015
Faisal G. Qureshi, 2012-2016
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Jill M. Zalieckas, 2012-2017

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APSA Foundation

APSA Foundation History

The APSA Foundation is a 501(c)(3) tax-exempt charitable corporation. Its intent is to foster support for scientific investigation in the field of children's surgery by providing an Annual Enrichment Grant to qualified applicants.

Since its inception, the APSA Foundation has provided $535,325 in grant support for our young pediatric surgeon-scientists (see list below). The return on investment has been extraordinary! Grant receipients are chosen through a formal grant application process with stringent peer review.

The stipend for each grant has gradually increased and in the past five years has reached $25,000 per grant. In 2014, two grants were awarded. In addition, with APSA and a generous grant from Sidra Medical and Research Center, APSAF has funded the Travel Fellowship.

Most of the recipients have used their Enrichment Grants from the APSA Foundation as a springboard from which to acquire significant external funding from the National Institutes of Health (NIH) and other sources.

The Foundation was established in the state of Florida in 1993, thanks to a group of APSA members led by Dr. Albert H. Wilkinson, Jr., and included former presidents Kathryn D. Anderson, James A. O'Neill, Jr., the late Alfred A. de Lorimier, Dick G. Ellis, Bradley M. Rodgers and Keith W. Ashcraft.

Dr. Jay L. Grosfeld was installed as the Chairman of the Board of Directors serving indefinitely at the discretion of the Board.

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APSA Foundation Grant Recipients

Your tax-exempt contributions to APSAF have energized young and deserving pediatric surgeons to become some of the leading surgeon-scientists of the future.

2014
Hannah G. Piper, MD
The Role of Intestinal Microbiota in Children with Intestinal Failure and Bacterial Overgrowth

David Stitelman, MD
In-utero Delivery of Synthetic Nanoparticles for Gene Editing in the Central Nervous System

2013
Ankush Gosain, MD
Splenic Neurovascular Units in Hirschsprung's Associated Enterocolitis

David M. Gourlay, MD
IAP Prevents Intestinal Inflammation in the Newborn Intestine

Shawn D. Larson, MD
Inflammasome Activation is Critical for Neonatal Emergency Myelopoiesis and Expansion of Hematopoietic Stem Cells for Inflammation

2012
Harold N. Lovvorn, III, MD
Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis

KuoJen Tsao, MD
Errors and Adverse Events in the Setting of the Neonatal Surgery Performed in the NICU

2011
Shaun M. Kunisaki, MD
Mesenchymal Stem Cell Regulation of Fetal Lung Development in Diaphragmatic Hernia

Peter F. Nichol, MD
Using a Genetic Model of Duodenal Atresia to Understand Regenerative Mechanisms within the Intestine

2010
Cynthia D. Downard, MD
Control of Intestinal Microcirculation in NEC

Cassandra M. Kelleher, MD
Extracellular Components Critical to Alveolarization: Contributions of Elastin

APSA Foundation Grant Recipients (cont.)

2009
Tippi C. MacKenzie, MD
Maternal Immune Response *in Utero* Hematopoietic Stem Cell Transplantation

Kelly A. Miller, MD
The Pathogenic Role of Enteric Glia in Hirschsprung's Enterocolitis

2008
Douglas N. Miniati, MD
Role of Notch4 Signaling in Aberrant Pulmonary Vascular Development

2007
Alan M. Goldstein, MD
Role of Sonic Hedgehog in Enteric Nervous System Development

2006
James C.Y. Dunn, MD
Enteric Nervous System Regeneration for Hirschsprung's Disease

2005
Elizabeth A. Beierle, MD
Focal Adhesion Kinase and Vascular Endothelial Growth Factor Receptor-3 in Human Neuroblastoma

Kerilyn K. Nobuhara, MD
Intestinal Dysmotility in Fetal Repair of Gastroschisis

2004
Karl G. Sylvester, MD
Liver Regeneration and Stem Cell Regulation via the WNT Signaling Pathway

Christopher K. Breuer, MD
Do Tissue Engineered Venous Conduits Grow? Investigating the Growth Potential of Tissue Engineered Venous Conduits in a Juvenile Lamb Model

2003
Peter F. Ehrlich, MD
Injury Prevention through Brief Intervention: A Novel Approach to Pediatric Injury Prevention

APSA Foundation Grant Recipients (cont.)

2002
Mary Beth Madonna, MD
Growth Factor Receptor Signaling and its Relationship to Cell Proliferation and Differentiation in a Neuroblastoma Cell Line

2001
Anthony Stallion, MD
Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome

2000
Edward M. Barksdale, Jr., MD
The Therapy of Neuroblastoma-Induced Disorders of Dendropoiesis of Dendritic Cell Development

1999
Steven Stylianos, MD
Evidence-Based Guidelines for Resource Utilization in Pediatric Spleen/Liver Injury

1998
Gail E. Besner, MD
Heparin-Binding EGF-Like Growth Factor (HBEGF) and Intestinal Ischemia Reperfusion Injury

1997
Charles N. Paidas, MD
Septation of the Cloaca

1996
Michael G. Caty, MD
Preservation of Intestinal Mucosal Structure and Function with Intraluminal Oxygenated Perfluorocarbon

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Mike K. Chen - 2015
Max R. Langham, Jr. - 2014
Steven Teich - 2013
Peter W. Dillon - 2012
Patrick V. Bailey - 2011
Aviva L. Katz - 2010
Dennis P. Lund - 2009
George W. Holcomb, III - 2008

APSA/Association of Pediatric Surgery Training Program Directors M. Judah Folkman Memorial Award Recipients

Best Podium Presentation
2013
Basic Science
Eric D. Girard, MD
Amniotic Fluid Stem Cells in a Bioengineered Scaffold: a New Frontier in Patient Specific Therapy for Premature Lung Disease

Clinical Science
Ryan P. Cauley, MD
Higher Costs Charges and Resource Utilization do not Affect Survival in Congenital Diaphragmatic Hernia

2012
Amar Nijagal, MD
Fetal Intervention Triggers the Activation of Paternal Antigen-Specific Maternal T Cells

Award Recipients (cont.)

2011
Amar Nijagal, MD
The Maternal Adaptive Immune Response Against Paternal Antigens Incites Fetal Demise After Fetal Intervention

2010
Mehul V. Raval, MD
Pediatric ACS NSQIP: Feasibility of a Novel Prospective Assessment of Surgical Outcomes — a Phase I Report

2009
Eric Jelin, MD
Effects of Notch4 on Lung Vascular Remodeling

2008
Emily T. Durkin, MD
The Ontogeny of Human Fetal NK Cell Allorecognition: A Potential Barrier to *in Utero* Transplantation

Best Poster Presentation

2012
Eric J. Stanelle, MD
Pediatric Synovial Sarcoma: Prognostic Factors, Management of Pulmonary Metastasis, and Survival Outcomes

2011
Barrie S. Rich, MD
Predictors of Survival in Childhood and Adolescent Cutaneous Melanoma

2010
Allison L. Speer, MD
Tissue-Engineered Esophagus is a Versatile *in Vivo* Mouse Model with Intact Architecture

2009
Laura A. Boomer, MD
Cholangiocyte Apoptosis During Lamprey Metamorphosis

2008
Henry L. Chang, MD
In Vivo Metastatic/Invasion Assay to Identify Cancer Stem Cells and their Markers

APSA Posters of Distinction

Basic Science

2013
Leo Andrew O. Benedict, MD
Spinal Cord Expression of Virally Derived Mullerian Inhibiting Substance Extends Life and Promotes Survival of Motor Neurons in Transgenic SOD1 Mutant Mice

2012
Syamal D. Bhattacharya, MD
Temporal Relationships Between Positive Urine Culture and Onset of Necrotizing Enterocolitis

2011
R. Dawn Fevurly, MD
Novel Zebrafish Model Reveals Critical Role for MAPK in Lymphangiogenesis

2010
Hayden W. Stagg, MD
Matrix Metalloproteinase-9 Induces Hyperpermeability Following Traumatic Burn Injury

2009
Francois I. Luks, MD
Reflectance Spectrometry for Realtime Hemoglobin Determination of Placental Vessels During Endoscopic Laser Surgery for TTTS

Clinical Science

2013
Deidre C. Kelleher, MD
Impact of a Checklist on ATLS Task Performance During Pediatric Trauma Resuscitation

2012
Alejandro Garcia, MD
The Role of Notch Inhibition in a Novel Hepatoblastoma Orthotopic Model

2011
Jesse R. Gutnick, MD
Circulating Thyrotropin Receptor MRNA for Evalution of Thyroid Nodules and Surveillance of Thyroid Cancer

Award Recipients (cont.)

2010
Diana L. Diesen, MD
Temporal Association Between Blood Transfusion and Necrotizing Enterocolitis in Premature Infants

2009
Henry L. Chang, MD
Mullerian Inhibiting Substance Inhibits Migration of Epithelial Cancer Cell Lines

The Sheikh Zayed Institute Award for Innovation in Pediatric Surgery
This award, in the amount of $10,000, is presented for Best Innovation abstract. The award is supported by a generous grant from the Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Medical Center, Washington, DC. The winning presentation is selected by a special committee.

2014
Shahab Shaffiey, MD
Generation of an Artificial Intestine and Validation in Dogs: a Proof-of-Concept Study

2013
Veronica F. Sullins, MD
A Novel Biodegradable Device for Intestinal Lengthening

2012
Sabina Siddiqui, MD
Development of an Isolation Bed for Patients Undergoing MIBG Treatment for Neuroblastoma

2011
Maridelle B. Millendez, MD
Evaluation of Intestinal Viability Using 3-CCD (Charge Coupled Device) in Children Undergoing Appendectomy

Award Recipients (cont.)

Travel Fellowship
The Travel Fellowship, supported by APSA and the APSA Foundation, is an annual award for young surgeons from a resource-poor area outside the United States and Canada to attend and experience the educational and networking opportunities of the APSA Annual Meeting. The winner attends and presents at the APSA Annual Meeting. The Travel Fellowship is supported by a generous grant from Sidra Medical and Research Center.

2015
Opeoluwa Adesanya, MBBS
Federal Medical Centre, Abeokuta
Ogun State, Nigeria
Pediatric Surgery in Nigeria — Defying the Odds

Tiyamike Chilunjika, MBBS
COSECSA, Queen Elizabeth Central Hospital
Blantyre, Malawi
Pediatric Surgery in Malawi

2014
John K.M. Nyagetuba, MB, ChB
Bethany Kids at Kijabe Hospital
Nairobi, Kenya
Paediatric Surgery in Kenya: Challenges and Solutions

Tran Anh Quynh, MD, PhD
National Hospital of Pediatrics
Hanoi, Vietnam
The Development of Vietnam Pediatric Surgery

2013
Omolara Williams, MD
Lagos State University College of Medicine and Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria
Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones

New Members 2014-2015

The APSA Board of Governors and Membership Congratulates Our Newest Members

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New Members 2014-2015

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New Members 2014-2015

Pledge for New Members of the American Pediatric Surgical Association

This pledge will be read before the New Member Induction Ceremony.

As president of the American Pediatric Surgical Association, it is my pleasure to welcome you into regular membership and to stress the obligations that you assume by such membership.

The American Pediatric Surgical Association was founded on April 15, 1970, by 200 surgeons drawn together to encourage specialization in the field of pediatric surgery; to make available the benefits to be derived from the services of qualified pediatric surgeons; to promote and maintain the quality of education in pediatric surgery through meetings, lectures and the distribution of printed materials; to raise the standards of the specialty by fostering and encouraging research and scientific progress in pediatric surgery and by establishing standards of excellence in the surgical care of infants, children and teenagers; and to provide a forum for the dissemination of information with regard to pediatric surgery.

The association expects its new members to support the objectives and obligations of the association as set forth in the Articles of Incorporation and to reflect the values expressed in the Principles of Medical Ethics as stated in the Preamble to the Bylaws. The members are also expected to support the association through active participation in its meetings. We look forward to your contributions in advancing its proud traditions.

If you pledge to exemplify the high ethical and professional standards of the American Pediatric Surgical Association in your practice of surgery, and if you will participate actively in future meetings, please respond by stating “I will.” Since you have indicated your intent to become an active and worthy member and since you have been duly elected, I now declare you to be a regular member of the American Pediatric Surgical Association.

I now call upon the current members and guests of the American Pediatric Surgical Association to rise and join me in welcoming our new colleagues.

In Memoriam (2014–2015)

Ann M. Kosloske, 2014
Raymond A. Amoury, 2014
Earle L. Wrenn, Jr., 2014
John H. Seashore, 2014
Robert T. Schaller, Jr., 2014
Sigmund H. Ein, 2015

Founding Members

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Morton M. Woolley, Rancho Mirage, CA
Earle L. Wrenn, Greensboro, NC

Schedule & Program

Wednesday, April 29

8:00 a.m. – 2:00 p.m.	APSA Board of Governors Meeting	*Caribbean Ballroom 1 & 2, 1st FL*
2:00 p.m. – 6:00 p.m.	Registration Open	*Grand Ballroom Foyer, 3rd FL*
2:00 p.m. – 6:00 p.m.	Internet Café Open	*Grand Ballroom Foyer, 3rd FL*
2:00 p.m. – 6:00 p.m.	Speaker Ready Room Open	*Key West/Palm Beach, 2nd FL*
2:30 p.m. – 8:00 p.m.	Pediatric Surgery Training Program Directors Meeting	*Caribbean Ballroom 5, 1st FL*

Thursday, April 30

EDUCATION DAY

6:00 a.m. – 8:00 a.m.	Committee Meetings See page 59 for Ancillary Meeting Schedule	
6:30 a.m. – 5:00 p.m.	Registration Open	*Grand Ballroom Foyer, 3rd FL*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Key West/Palm Beach, 2nd FL*
6:30 a.m. – 5:00 p.m.	Internet Café Open	*Grand Ballroom Foyer, 3rd FL*
7:15 a.m. – 7:45 a.m.	Continental Breakfast	*Grand Ballroom Foyer, 3rd FL*
7:45 a.m. – 8:00 a.m.	President's Welcome	*Grand Ballroom, 3rd FL*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room *Open to Registered Companions*	*3030 Ocean, 1st FL*
8:00 a.m. – 11:00 a.m.	**Education Session I** Improving and Advancing Trauma Care	*Grand Ballroom, 3rd FL*
11:00 a.m. – 11:15 a.m.	Refreshment Break	*Grand Ballroom Foyer, 3rd FL*
11:00 a.m. – 3:00 p.m.	Exhibitors Set Up	*Caribbean Ballroom, 1st FL*
11:00 a.m. – 3:00 p.m.	Learning Center Set Up	*Caribbean Ballroom Foyer, 1st FL*
11:15 a.m. – 12:15 p.m.	**Jay and Margie Grosfeld Lecture** Henri R. Ford, MD, MHA	*Grand Ballroom, 3rd FL*
12:15 p.m. – 12:30 p.m.	Box Lunch Pick Up	*Grand Ballroom Foyer, 3rd FL*
12:30 p.m. – 1:30 p.m.	**Outcomes and Evidence-based Practice Committee Systematic Reviews** Gastro Esophageal Reflux Disease and Congenital Pulmonary Airway Malformations — Management and Controversies	*Grand Ballroom, 3rd FL*
1:30 p.m. – 2:00 p.m.	**APSA Foundation Scholars** Hannah G. Piper, MD David Stitelman, MD	*Grand Ballroom, 3rd FL*
2:00 p.m. – 4:00 p.m.	**Education Session II** Humanitarian Efforts: Pediatric Surgery and Global Health	*Grand Ballroom, 3rd FL*

Schedule-at-a-Glance

Thursday, April 30 (cont.)

2:00 p.m. – 4:00 p.m.	**Education Session III** Building a Quality Improvement Roadmap for General Pediatric Surgery	*Ocean Ballroom 1 & 2, 1st FL*
3:00 p.m. – 5:30 p.m.	Exhibits Open	*Caribbean Ballroom, 1st FL*
3:00 p.m. – 5:30 p.m.	Learning Center Open	*Caribbean Ballroom Foyer, 1st FL*
4:00 p.m. – 5:00 p.m.	Wine and Cheese Reception with Exhibitors	*Caribbean Ballroom, 1st FL*
4:30 p.m. – 6:15 p.m.	**Poster Session I** Basic Science	*Grand Ballroom, 3rd FL*
	Poster Session II Pediatric Surgery Clinical Medicine	*Ocean Ballroom 1 & 2, 1st FL*
6:30 p.m. – 7:00 p.m.	New Member Rehearsal *(By Invitation)*	*Grand Ballroom, 3rd FL*
7:00 p.m. – 9:00 p.m.	Welcome Reception	*Oceanview Terrace, 1st FL*

Friday, May 1

6:15 a.m. – 7:30 a.m.	APSA Foundation Board Meeting	*Miami, 2nd FL*
6:30 a.m. – 7:30 a.m.	Committee Meetings See page 59 for Ancillary Meeting Schedule	
6:30 a.m. – 10:00 a.m.	Poster Set Up	*Ocean Ballroom 1, 1st FL*
6:30 a.m. – 1:30 p.m.	Learning Center Open	*Caribbean Ballroom Foyer, 1st FL*
6:30 a.m. – 1:30 p.m.	Registration Open	*Grand Ballroom Foyer, 3rd FL*
6:30 a.m. – 1:30 p.m.	Internet Café Open	*Grand Ballroom Foyer, 3rd FL*
6:30 a.m. – 1:30 p.m.	Exhibits Open	*Caribbean Ballroom, 1st FL*
6:30 a.m. – 2:00 p.m.	Speaker Ready Room Open	*Key West/Palm Beach, 2nd FL*
6:45 a.m. – 7:30 a.m.	Continental Breakfast	*Caribbean Ballroom, 1st FL*
6:45 a.m. – 7:30 a.m.	Learning Center Demonstration	*Caribbean Ballroom Foyer, 1st FL*
7:30 a.m. – 9:00 a.m.	**Scientific Session I** Trauma and Fetal Medicine	*Grand Ballroom, 3rd FL*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room *Open to Registered Companions*	*3030 Ocean, 1st FL*
9:00 a.m.	Companion Book Club — Swap Book Titles *Open to Registered Companions*	*3030 Ocean, 1st FL*
9:00 a.m. – 10:00 a.m.	**Robert E. Gross Lecture** Robert S. Langer, ScD	*Grand Ballroom, 3rd FL*
10:00 a.m. – 10:45 a.m.	Refreshment Break	*Caribbean Ballroom, 1st FL*
10:00 a.m. – 10:45 a.m.	Learning Center Demonstration	*Caribbean Ballroom Foyer, 1st FL*

Schedule-at-a-Glance (cont.)

10:00 a.m. – 1:00 p.m.	Posters Open for Viewing	*Ocean Ballroom 1, 1st FL*
10:45 a.m. – 11:15 a.m.	**Travel Fellow Presentations** Opeoluwa Adesanya, MBBS Tiyamike Chilunjika, MBBS	*Grand Ballroom, 3rd FL*
11:15 a.m. – 11:30 a.m.	Introduction of New Members	*Grand Ballroom, 3rd FL*
11:30 a.m. – 12:45 p.m.	**Scientific Session II** Clinical Surgery I	*Grand Ballroom, 3rd FL*
12:45 p.m. – 1:45 p.m.	**International Guest Lecture** Paul K.H. Tam, MBBS, ChM	*Grand Ballroom, 3rd FL*
1:45 p.m. – 3:30 p.m.	Benjy Brooks Meeting and Luncheon *Pre-registration Required*	*Ocean Ballroom 3, 1st FL*
1:45 p.m.	Leisure Time	
2:00 p.m. – 9:00 p.m.	Committee Meetings See Page 59 for Ancillary Meeting Schedule	
4:30 p.m. – 6:00 p.m.	Residents Reception	*Ocean Ballroom 2, 1st FL*
5:00 p.m. – 6:30 p.m.	*Journal of Pediatric Surgery* Reception *(By Invitation)*	*Ocean Ballroom 4, 1st FL*
6:30 p.m. – 7:30 p.m.	New Member Reception *(By Invitation)*	*President's Suite*

Saturday, May 2

6:30 a.m. – 7:30 a.m.	Member Business Meeting with Breakfast	*Grand Ballroom, 3rd FL*
6:30 a.m. – 7:30 a.m.	Breakfast for Non-members	*Caribbean Ballroom, 1st FL*
6:30 a.m. – 11:30 a.m.	Exhibits Open	*Caribbean Ballroom, 1st FL*
6:30 a.m. – 11:30 a.m.	Learning Center Open	*Caribbean Ballroom Foyer, 1st FL*
6:30 a.m. – 3:30 p.m.	Registration Open	*Grand Ballroom Foyer, 3rd FL*
6:30 a.m. – 3:30 p.m.	Internet Café Open	*Grand Ballroom Foyer, 3rd FL*
6:30 a.m. – 4:00 p.m.	Speaker Ready Room Open	*Key West/Palm Beach, 2nd FL*
6:30 a.m. – 4:00 p.m.	Posters Open for Viewing	*Ocean Ballroom 1, 1st FL*
7:30 a.m. – 9:00 a.m.	**Scientific Session III** Basic Science	*Grand Ballroom, 3rd FL*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room *Open to Registered Companions*	*3030 Ocean, 1st FL*
9:00 a.m. – 10:00 a.m.	***Journal of Pediatric Surgery* Lecture** Robert W. Block, MD	*Grand Ballroom, 3rd FL*
9:00 a.m.	Companion Meeting *Open to Registered Companions*	*3030 Ocean, 1st FL*
10:00 a.m. – 10:30 a.m.	Refreshment Break	*Caribbean Ballroom, 1st FL*
10:00 a.m. – 10:30 a.m.	Learning Center Demonstration	*Caribbean Ballroom Foyer, 1st FL*

Schedule-at-a-Glance

Saturday, May 2 (cont.)

10:30 a.m. – 11:30 a.m.	**Scientific Session IV** Clinical Care and Quality Improvement	*Grand Ballroom, 3rd FL*
11:30 a.m.	Exhibits and Learning Center Dismantle	*Caribbean Ballroom, 1st FL*
11:30 a.m. – 11:45 a.m.	Workforce Abstracts	*Grand Ballroom, 3rd FL*
11:45 a.m. – 12:45 p.m.	**Presidential Address** Michael D. Klein, MD	*Grand Ballroom, 3rd FL*
12:45 p.m. – 1:00 p.m.	Box Lunch Pick up	*Grand Ballroom Foyer, 3rd FL*
1:00 p.m. – 2:00 p.m.	Town Hall Meeting	*Grand Ballroom, 3rd FL*
2:00 p.m. – 3:00 p.m.	**Innovation Session**	*Grand Ballroom, 3rd FL*
3:00 p.m. – 4:00 p.m.	**Video Session**	*Grand Ballroom, 3rd FL*
4:00 p.m. – 5:30 p.m.	Poster Dismantle	*Ocean Ballroom 1, 1st FL*
4:00 p.m. – 6:30 p.m.	Leisure Time	
6:30 p.m. – 7:00 p.m.	President's Reception	*Oceanview Terrace, 1st FL*
7:00 p.m. – 10:00 p.m.	President's Banquet	*Grand Ballroom, 3rd FL*

Sunday, May 3

6:00 a.m. – 8:00 a.m.	Committee Meetings See Page 59 for Ancillary Meeting Schedule	
7:00 a.m. – 8:00 a.m.	Continental Breakfast	*Grand Ballroom Foyer, 3rd FL*
7:00 a.m. – 10:30 a.m.	Speaker Ready Room Open	*Key West/Palm Beach, 2nd FL*
7:00 a.m. – 11:30 a.m.	Registration Open	*Grand Ballroom Foyer, 3rd FL*
7:00 a.m. – 11:30 a.m.	Internet Café Open	*Grand Ballroom Foyer, 3rd FL*
8:00 a.m. – 9:15 a.m.	**Scientific Session V** Oncology and Clinical Surgery II	*Grand Ballroom, 3rd FL*
9:15 a.m. – 10:15 a.m.	**COG Surgeon Updates**	*Grand Ballroom, 3rd FL*
10:15 a.m. – 10:30 a.m.	Refreshment Break	*Grand Ballroom Foyer, 3rd FL*
10:30 a.m. – Noon	**Pediatric Surgery Case Debates and Controversies**	*Grand Ballroom, 3rd FL*
Noon	Annual Meeting Concludes	

Ancillary Meeting by Group

Committee	Date/Time	Room
APSA Board of Governors Board Meeting	Wednesday, April 29, 8:00 a.m. – 2:00 p.m.	*Caribbean 1 & 2, 1st FL*
APSA Foundation Board Meeting	Friday, May 1, 6:15 a.m. – 7:30 a.m.	*Miami, 2nd FL*
APSTPD – Association of Pediatric Surgery Training Program Directors	Wednesday, April 29, 2:30 p.m. – 8:00 p.m.	*Caribbean 5, 1st FL*
BCM Reunion – Baylor College of Medicine	Friday, May 1, 5:30 p.m. – 7:00 p.m.	*Miami, 2nd FL*
Cancer Committee	Sunday, May 3, 6:45 a.m. – 7:45 a.m.	*Miami, 2nd FL*
Childhood Obesity Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*St. Petersburg Boardroom, 5th FL*
DHREAMS (Diaphragmatic Hernia Research and Exploration: Advancing Molecular Science)	Friday, May 1, 3:00 p.m. – 4:30 p.m.	*Tallahassee, 2nd FL*
Education Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Tampa Boardroom, 5th FL*
Ethics Committee	Sunday, May 3, 7:00 a.m. – 8:00 a.m.	*Tallahassee, 2nd FL*
Fetal Diagnosis & Treatment Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Sarasota Boardroom, 5th FL*
Global Pediatric Surgery Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Business Room 342, 3rd FL*
Global Pediatric Surgery Task Force	Friday, May 1, 6:30 p.m. – 7:30 p.m.	*Jacksonville, 2nd FL*
HDRC – Hirschsprung Disease Research Collaborative	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Tallahassee, 2nd FL*
History Ad Hoc Committee	Friday, May 1, 3:30 p.m. – 5:00 p.m.	*Sarasota Boardroom, 5th FL*
Industry Advisory Committee	Thursday, April 30, 7:00 a.m. – 8:00 a.m.	*Sarasota Boardroom, 5th FL*
Informatics and Telemedicine Committee	Sunday, May 3, 7:00 a.m. – 8:00 a.m.	*Jacksonville, 2nd FL*
JPS Reception *By invitation*	Friday, May 1, 5:00 p.m. – 6:30 p.m.	*Ocean Ballroom 4, 1st FL*

Ancillary Meeting by Group (cont.)

Committee	Date/Time	Room
Junior Surgeons Interested in Funding for Trauma and Critical Care Research	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Business Room 340, 3rd FL*
NAT (Not a Textbook) *By invitation*	Saturday, May 2, 4:00 p.m. – 5:00 p.m.	*Caribbean 1-5, 1st FL*
New Technology Committee	Wednesday, April 29, 4:00 p.m. – 5:00 p.m.	*Tallahassee, 2nd FL*
Outcomes & Evidence-based Practice Committee	Thursday, April 30, 6:00 a.m. – 7:30 a.m.	*Miami, 2nd FL*
PedSRC – Pediatric Surgery Research Collaborative	Thursday, April 30, 7:00 a.m. – 8:00 a.m.	*Tallahassee, 2nd FL*
Practice Committee	Thursday, April 30, 7:00 a.m. – 8:00 a.m.	*Business Room 342, 3rd FL*
Program Committee	Thursday, April 30, 7:00 a.m. – 8:00 a.m.	*Tampa Boardroom, 5th FL*
Publications Committee	Wednesday, April 29, 6:30 p.m. – 10:00 p.m.	*Miami, 2nd FL*
Residents Reception	Friday, May 1, 4:30 p.m. – 6:00 p.m.	*Ocean 2, 1st FL*
Simulation Subcommittee	Thursday, April 30, 6:00 a.m. – 7:00 a.m.	*Sarasota Boardroom, 5th FL*
Simulation-based Education	Friday, May 1, 2:00 p.m. – 4:00 p.m.	*Jacksonville, 2nd FL*
Surgical Critical Care Committee	Thursday, April 30, 7:00 a.m. – 8:00 a.m.	*Jacksonville, 2nd FL*
Surgical Quality & Safety Committee	Saturday, May 2, 4:00 p.m. – 6:00 p.m.	*Tallahassee, 2nd FL*
Trauma Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Jacksonville, 2nd FL*
Workforce Committee	Friday, May 1, 6:30 a.m. – 7:30 a.m.	*Business Room 344, 3rd FL*

Ancillary Meeting by Day

Committee	Time	Room
Wednesday, April 29		
APSA Board of Governors Board Meeting	8:00 a.m. – 2:00 p.m.	*Caribbean 1 & 2, 1st FL*
Association of Pediatric Surgery Training Program Directors (APSTPD)	2:30 p.m. – 8:00 p.m.	*Caribbean 5, 1st FL*
New Technology Committee	4:00 p.m. – 5:00 p.m.	*Tallahassee, 2nd FL*
Publications Committee	6:30 p.m. – 10:00 p.m.	*Miami, 2nd FL*
Thursday, April 30		
Industry Advisory Committee	7:00 a.m. – 8:00 a.m.	*Sarasota Boardroom, 5th FL*
Outcomes & Evidence-based Practice Committee	6:00 a.m. – 7:30 a.m.	*Miami, 2nd FL*
PedSRC – Pediatric Surgery Research Collaborative	7:00 a.m. – 8:00 a.m.	*Tallahassee, 2nd FL*
Practice Committee	7:00 a.m. – 8:00 a.m.	*Business Room 342, 3rd FL*
Program Committee	7:00 a.m. – 8:00 a.m.	*Tampa Boardroom, 5th FL*
Simulation Subcommittee	6:00 a.m. – 7:00 a.m.	*Sarasota Boardroom, 5th FL*
Surgical Critical Care Committee	7:00 a.m. – 8:00 a.m.	*Jacksonville, 2nd FL*
Friday, May 1		
APSA Foundation Board Meeting	6:15 a.m. – 7:30 a.m.	*Miami, 2nd FL*
BCM Reunion – Baylor College of Medicine	5:30 p.m. – 7:00 p.m.	*Miami, 2nd FL*
Childhood Obesity Committee	6:30 a.m. – 7:30 a.m.	*St. Petersburg Boardroom, 5th FL*
DHREAMS (Diaphragmatic Hernia Research and Exploration: Advancing Molecular Science)	3:00 p.m. – 4:30 p.m.	*Tallahassee, 2nd FL*
Education Committee	6:30 a.m. – 7:30 a.m.	*Tampa Boardroom, 5th FL*

Ancillary Meeting by Day (cont.)

Committee	Time	Room
Friday, May 1 (cont.)		
Fetal Diagnosis & Treatment Committee	6:30 a.m. – 7:30 a.m.	*Sarasota Boardroom, 5th FL*
Global Pediatric Surgery Committee	6:30 a.m. – 7:30 a.m.	*Business Room 342, 3rd FL*
Global Pediatric Surgery Task Force	6:30 p.m. – 7:30 p.m.	*Jacksonville, 2nd FL*
HDRC – Hirschsprung Disease Research Collaborative	6:30 a.m. – 7:30 a.m.	*Tallahassee, 2nd FL*
History Ad Hoc Committee	3:30 p.m. – 5:00 p.m.	*Sarasota, 5th FL*
JPS Reception *By invitation*	5:00 p.m. – 6:30 p.m.	*Ocean Ballroom 4, 1st FL*
Junior Surgeons Interested in Funding for Trauma and Critical Care Research	6:30 a.m. – 7:30 a.m.	*Business Room 340, 3rd FL*
Residents Reception	4:30 p.m. – 6:00 p.m.	*Ocean 2 Ballroom, 1st FL*
Simulation-based Education	2:00 p.m. – 4:00 p.m.	*Jacksonville, 2nd FL*
Trauma Committee	6:30 a.m. – 7:30 a.m.	*Jacksonville, 2nd FL*
Workforce Committee	6:30 a.m. – 7:30 a.m.	*Business Room 344, 3rd FL*
Saturday, May 2		
NAT (Not a Textbook) *By invitation*	4:00 p.m. – 5:00 p.m.	*Caribbean 1–5, 1st FL*
Surgical Quality & Safety Committee	4:00 p.m. – 6:00 p.m.	*Tallahassee, 2nd FL*
Sunday, May 3		
Cancer Committee	6:45 a.m. – 7:45 a.m.	*Miami, 2nd FL*
Ethics Committee	7:00 a.m. – 8:00 a.m.	*Tallahassee, 2nd FL*
Informatics and Telemedicine Committee	7:00 a.m. – 8:00 a.m.	*Jacksonville, 2nd FL*

Education Overview

The APSA Annual Meeting is designed to provide comprehensive continuing education in the field of pediatric surgery. APSA strives to bring together the world's leading pediatric surgery authorities to present and discuss the most recent clinical and research efforts. Education Day features sessions on surgical critical care, surgeon wellness, innovation, systematic reviews, as well as two poster sessions focusing on clinical and basic science. There will be five scientific sessions with abstract presentations, a video session, an innovation session, a COG update session and case debates and controversies. There will be four invited lecturers, the presidential address and three APSA Foundation Scholar presentations.

The APSA Annual Meeting covers the breadth of pediatric surgery and is intended to acquaint attendees with the latest research findings, updates on evidence-based care guidelines, innovations in quality improvement and clinical discoveries and trends that influence the day-to-day practice of pediatric surgery. Specific sessions relating to educating members on new developments in medical technology have been added to supplement the traditional sessions on clinical practice and basic science research chosen by the Program and Education Committees. The scientific sessions consist of basic research and practical clinical presentations. The poster sessions are intended to provide young investigators an opportunity to share preliminary clinical research, basic science work and novel ideas.

Accreditation Statement
The American Pediatric Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. This live CME activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME).

CME Credit for Session Participation
APSA designates this live activity for a maximum of 24 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

MOC Credit for Session Participation
Attendees earn maintenance of certification (MOC) CME credits for session attendance. As with general meeting CME credits, attendees will be able to claim their credits online during the meeting.

The American Pediatric Surgical Association education credentials have been recognized and upgraded by the Accreditation Council for Continuing Medical Education (ACCME) from Accreditation to Accreditation with Commendation. The ACCME is the national accrediting board for all medical education organizations in the U.S. that administer courses and confer Continuing Medical Education (CME) credits to physicians and health care providers.

Disclosures

Disclaimer: These materials and all other materials provided in conjunction with CME activities are intended solely for purposes of supplementing CME programs for qualified health care professionals. Anyone using the materials assumes full responsibility and all risk for their appropriate use. APSA makes no warranties or representations whatsoever regarding the accuracy, completeness, currentness, noninfringement, merchantability or fitness for a particular purpose of the materials. In no event will APSA be liable to anyone for any decision made or action taken in reliance on the materials. In no event should the information in the materials be used as a substitute for professional care.

Policy on Faculty Disclosure
It is the policy of the ACCME and APSA that the planning committee and faculty disclose and resolve real or apparent conflicts of interest relating to the content of the educational activity, and also disclose discussions of unlabeled/unapproved uses of drugs or devices during their presentations.

Faculty Disclosures
In the case of faculty presentations the following faculty members have disclosed a financial relationship with an industry partner. The relationship was proven not to have an impact on the science presented at this annual meeting. All other faculty indicated that they have no financial relationships to disclose.

Robert J. Obermeyer
Consulting: Biomet Microfixation, LLC.

Robert E. Kelly, Jr.
Consulting: Biomet Microfixation, LLC

Michael R. Harrison
Stockholder/Ownership: Pectus Medical, Inc.

Robert S. Langer
Consultant: Microchips, In Vivo, Bind.
Ownership Interest: Alkermes, Microchips, In Vivo, Bind.

Disclosures

Committee Disclosures

Disclosures were collected from all committee members with influence over the educational content of the annual meeting program. These committee members have reported the following financial relationships and it has been determined that no conflict of interest exists with any of these relationships. All other committee members indicated that they have no financial relationships to disclose.

Christopher K. Breuer, MD — New Technology Committee
Cook Biomedical, scientific advisory board; Gunze Limited, research grant; Pall Corporation, research grant.

James K. Wall, MD — New Technology Committee
Independent Living, stockholder; Magnamosis, stockholder; InSite Medical Technologies, patent ownership; Breath Technologies, stockholder; Cardica, Consultant; Kona Medical, stockholder.

Sean J. Barnett, MD — New Technology Committee
Kaleidoscope, salary, support, partial ownership; Ascend Innovations, salary support, partial ownership.

Amina M. Bhatia, MD — Global Pediatric Surgery Committee
Aminex, stock holder.

Jay And Margie Grosfeld Lecture

Thursday, April 30, 11:15 a.m. – 12:15 p.m.
Henri R. Ford, MD, MHA
Vice President & Surgeon-in-Chief
Children's Hospital Los Angeles
Los Angeles, CA USA

Insights into the Pathogenesis of Necrotizing Enterocolitis: The Role of the Intestinal Microbiota

Henri R. Ford, MD, MHA, is vice president and chief of surgery at Children's Hospital Los Angeles (CHLA), Vice-Dean of Medical Education, professor and vice chair for clinical affairs in the Department of Surgery and at the Keck School of Medicine of the University of Southern California.

Ford was professor and chief of the Division of Pediatric Surgery and surgeon-in-chief at Children's Hospital of Pittsburgh and the University of Pittsburgh School of Medicine prior to joining CHLA in January 2005. Ford is a member of the executive committee of the board of trustees of CHLA and a member of the board of directors of the Children's Hospital Los Angeles Medical Group. He is also a member of the Executive Leadership Team and the medical executive committee of CHLA. As surgeon-in-chief and vice president for Surgical and Perioperative Services, he oversees the entire perioperative services area at CHLA. Under his leadership, CHLA has developed a robust, state of the art minimally invasive surgery program.

As a professor in the Department of Surgery at the Keck School of Medicine, he is an important role model for young physicians and medical students. As the Vice-Dean for Medical Education at the Keck School, Ford advances the medical school's educational mission by promoting excellence in medical education as one of its highest priorities. Ford recently led a very successful accreditation visit for the MD program which resulted in the maximum eight-year, full accreditation from the Liaison Committee on Medical Education (LCME), the best results achieved since a 10-year accreditation was granted in 1981. His current priorities include revising the Year III/IV medical student curriculum; strengthening research opportunities for medical students; and developing new sources of funding for medical student scholarships.

Ford has demonstrated "…truly exceptional leadership…" in pediatric surgery and has conducted the definitive studies on pediatric trauma in the United States and his investigative studies have generated new insights into the pathogenesis of necrotizing enterocolitis, the most common and the most lethal disorder affecting the gastrointestinal tract of newborn infants. He is the author of more than 300 publications, book chapters, invited manuscripts, abstracts and presentations.

In addition Ford has served on a variety of professional and scientific committees and on the editorial board of respected journals. He has received numerous prestigious honors and awards; most recently he was the recipient of the Arnold P. Gold Humanism in Medicine Award from the Association of American Medical Colleges.

Robert E. Gross Lecture

Friday, May 1, 9:00 a.m. – 10:00 a.m.
Robert S. Langer, ScD
David H. Koch Institute Professor
Massachusetts Institute of Technology
Cambridge, MA USA

Biomaterials and Biotechnology: from the Discovery of the First Angiogenesis Inhibitors to the Development of Controlled Drug Delivery Systems and the Foundation of Tissue Engineering

Robert S. Langer, ScD, is one of only 11 Institute Professors at MIT, which is the highest honor that can be awarded to a faculty member. His h-index of 198 is the highest of any engineer in history, and he has 1,050 issued and pending patents worldwide. Langer's patents have licensed or sublicensed to more than 250 companies. He served as chairman of the FDA's SCIENCE BOARD, its highest advisory board, from 1999-2002.

Langer is also one of only three individuals ever elected to the Institute of Medicine of the National Academy of Sciences, the National Academy of Engineering, the National Academy of Sciences and the National Academy of Inventors. He is one of only seven people to ever receive both the United States National Medal of Science and the United States National Medal of Technology and Innovation. He has also received the Charles Stark Draper Prize (considered the "engineering Nobel Prize"), Albany Medical Center Prize, the Wolf Prize for Chemistry, the Millennium Technology Prize, the Priestley Medal (highest award of the American Chemical Society), the Gairdner Prize, the Kyoto Prize and the Lemelson-MIT prize for being "one of history's most prolific inventors in medicine." He holds 21 honorary doctorates including honorary degrees from Harvard and Yale.

International Guest Lecture

Friday, May 1, 12:45 p.m. – 1:45 p.m.
Paul K.H. Tam, MBBS, ChM
Li Shu Pu Professor in Surgery & Chair of Pediatric Surgery
The University of Hong Kong
Pok Fu Lam, Hong Kong

Hirschsprung's Disease: a Bridge for Science and Surgery

Professor Paul K.H. Tam is a surgeon, scientist, educator and university leader. He has been Chair of Paediatric Surgery at The University of Hong Kong since 1996 and Li Shu-Pui Professor in Surgery since 2013. He is also the Vice-President for Research of the University of Hong Kong.

Tam graduated from The University of Hong Kong in 1976, and worked in the Department of Surgery until 1986. He was senior lecturer at the University of Liverpool in 1986-90, and reader and director of paediatric surgery at the University of Oxford in 1990-96. Tam has special interests in minimal invasive surgery, genetics and regenerative medicine of birth defects such as Hirschsprung's disease.

He has published more than 352 articles in internationally refereed journals. With 13,668 citations and h-index = 36, Tam is ranked amongst the top 1% of most-cited scientists (ESI) and has been awarded grants totaling > US$20m. He serves on many international professional associations and was president of the Pacific Association of Paediatric Surgeons (2008-2009). Tam also serves on editorial boards of several international journals including the *Journal of Pediatric Surgery* as the associate editor.

He has given invited lectures at many conferences including BAPS, EUPSA, AAPS and Days of Molecular Medicine 2012. He has received numerous awards including the BAPS Prize, Lifetime Achievement Award (AAPS) and Honorary Fellowship of the American Surgical Association.

Journal of Pediatric Surgery Lecture

Saturday, May 2, 8:00 a.m. – 9:00 a.m.
Robert W. Block, MD
Professor Emeritus, Pediatrics
University of Oklahoma School of Community Medicine, Tulsa
Tulsa, OK USA

All Adults Once Were Children

Robert W. Block, MD, is an emeritus professor of pediatrics and immediate past Daniel C. Plunket Chair, Department of Pediatrics, The University of Oklahoma School of Community Medicine in Tulsa. He was elected by the membership of the American Academy of Pediatrics (AAP) as president-elect in October 2010, served as president from October 2011 through October 2012, and as immediate past president from October 2012 through December 2013.

Block received his MD degree from the University of Pennsylvania and completed his pediatric residency at the Children's Hospital of Philadelphia. He was appointed the first chair of the newly formed sub-board on Child Abuse Pediatrics by the American Board of Pediatrics (ABP) from 2006-2009, and continued to serve on the sub-board through 2012. He holds Certificate #1 from the ABP in Child Abuse Pediatrics.

Block is a Fellow of the American Academy of Pediatrics and former member and chair of the Academy's Committee on Child Abuse and Neglect. Block is a former president and board chair of the Academy on Violence and Abuse (AVA), the relatively new national organization focused on increasing health care professionals' education and academic research on the health effects of violence and abuse. Block was appointed Oklahoma's first Chief Child Abuse Examiner in 1989 and served in that capacity until October 2011.

Presidential Address

Saturday, May 2, 11:45 a.m. – 12:45 p.m.

Michael D. Klein, MD
Arvin I. Philippart MD Endowed Chair of Pediatric Surgical Research
Professor of Surgery
Children's Hospital of Michigan
Detroit, MI USA

The Surgeon and the Child

Michael D. Klein, MD, is the Arvin I. Philippart MD Endowed Chair of Pediatric Surgical Research Professor of Surgery at Children's Hospital of Michigan. His research work has focused on extracorporeal life support, blood-materials interactions, tissue engineering, robotic surgery, Raman spectroscopy for medical diagnosis and quantitative decision making.

Klein has served as chair of the executive committees of the Extracorporeal Life Support Organization, the Surgical Section of the American Academy of Pediatrics (AAP) and the Organization of Children's Hospital surgeons-in-chief. He was the first surgeon nominated as candidate for president of the AAP and is currently chair of the Surgical Advisory Panel of the AAP.

He graduated from the University of Chicago and studied medieval history at Princeton before attending Case Western Reserve University where he received the MD in 1971. He completed training in general surgery at the New England Deaconess Hospital in Boston where he first began doing medical research with engineers in the laboratory of Judah Folkman. He completed training in pediatric surgery at the Children's Hospital of Michigan and served on the faculty at the University of New Mexico and the University of Michigan before returning to the Children's Hospital of Michigan and Wayne State University in 1983.

APSA 2014 Foundation Scholars

Thursday, April 30, 1:30 p.m. – 2:00 p.m.

Hannah G. Piper, MD
University of Texas Southwestern
Dallas, TX USA

The Role of Intestinal Microbiota in Children with Intestinal Failure and Bacterial Overgrowth

David Stitelman, MD
Yale School of Medicine
New Haven, CT USA

***In Utero* Gene Editing**

"The APSA Foundation Grant has offered me the opportunity to focus my initial research efforts on finding new treatments for challenging diseases in Pediatric Surgery such as necrotizing enterocolitis. Due to this funding, I have been able to complete significant preliminary studies which have formed the basis for competitive national grants. The APSA Foundation is making a great investment in the future of Pediatric Surgery and Pediatric Surgery Research."

Cynthia D. Downard, MD, MMSc
University of Louisville, Kentucky, USA
2010 APSA Foundation Scholar

APSA 2015 Travel Fellows

Friday, May 1, 10:45 a.m. – 11:15 a.m.

Opeoluwa Adesanya, MBBS
Federal Medical Center, Abeokuta, Abeokuta, Nigeria

Pediatric Surgery in Nigeria—Defying the Odds

"I look forward to interacting and sharing ideas with colleagues on contemporary issues in pediatric surgery. I hope to forge partnerships that will help to improve the practice of pediatric surgery in my home country."

Dr. Adesanya is the pioneer consultant pediatric surgeon who established the pediatric surgery unit at the Federal Medical Centre, Abeokuta, Ogun State, Nigeria, as well as a visiting pediatric surgeon to Sacred Heart Hospital, Lantoro, Abeokuta. He plans to attain the highest level of proficiency in pediatric surgery with a special emphasis on neonatal and gastrointestinal surgery and pediatric urology. He also aspires to attain the status of a centre of excellence in pediatric surgical care for his unit at the Federal Medical Centre Abeokuta.

Friday, May 1, 10:45 a.m. – 11:15 a.m.

Tiyamike Chilunjika, MBBS
Queen Elizabeth Central Hospital, Blantyre, Malawi

Pediatric Surgery in Malawi

"I believe this is one great opportunity where I will get to know more pediatric surgeons with whom I will keep in touch and discuss the interesting cases I will come across in Malawi."

Dr. Chilunjika is currently the only pediatric surgery trainee at the College of Surgeons of East Central and Southern Africa (COSECSA), Blantyre, Malawi. There are only four pediatric surgeons in the entire country; only one is permanent and none are Malawian. When Chilunjika completes her training in a year, she will be the first Malawian to become a pediatric surgeon and establish surgical practice in her native country. She plans to do research along with clinical practice.

Journal of Pediatric Surgery Lectures

2014
Eric A. Rose, MD
Understanding Translational Research

2013
David B. Hoyt, MD
The American College of Surgeons Model for Quality Improvement

2012
Brad W. Warner, MD
Adaptation: Paradigm for an Academic Career and the Gut

2011
Professor Lewis Spitz
The History of Paediatric Surgery in the United Kingdom and the National Health Service

2010
Robert H. Bartlett, MD
ECMO: Gross, Beethoven, Krummel and Georgeson

2008
Thomas M. Krummel, MD
Inventing Our Future: Training the Next Generation of Surgeon Innovators

2007
Alan W. Flake, MD
Stem Cell Biology and Pediatric Surgery – Deciphering the Venn Diagram

2006
Pedro Rosselló, MD
The Unfinished Business of American Healthcare

2005
Alberto Peña, MD
Luck and Serendipity, the History of a Surgical Technique

2004
R. Scott Jones, MD
The American College of Surgeons Initiatives for Safety and Quality Improvement

2003
Patricia K. Donahoe, MD
Sustained Inquiry and Perseverance in the Clinic and at the Bench

APSA Past Meeting Lectures (cont.)

2002
Michael R. Harrison, MD
Fetal Surgery: Trials, Tribulations and Territory

2001
Joseph P. Vacanti, MD
The History and Current Status of Tissue Engineering

Robert E. Gross Lectures

2014
Diana L. Farmer, MD
Standing on the Shoulders of Giants: From Singapore to Stem Cell Therapy

2013
Jorge D. Reyes, MD
Intestinal Transplantation: an Unexpected Journey

2012
Daniel M. Green, MD
The Evolution of Treatment of Wilms' Tumor

2011
Judson G. Randolph, MD
Notes on the Early Development of Pediatric Surgery in the United States

2010
John D. Birkmeyer, MD
Measuring and Improvement the Quality of Pediatric Surgery

2009
Stanley B. Prusiner, MD
Designer Prions and a Quest for Therapy

2008
Michael W.L. Gauderer, MD
Creativity and the Surgeon

2007
Francisco G. Cigarroa, MD
Leading an Academic Health Center in the 21st Century: A Pediatric Surgeon's Perspective

2006
Diana Bianchi, MD
Fetomaternal Cell Trafficking: A Story that Begins with Prenatal Diagnosis and May End with Stem Cell Therapy

APSA Past Meeting Lectures (cont.)

2005
W. Hardy Hendren, MD
Looking Back 50 Years

2004
Giulio (Dan) D'Angio, MD
The Role of the Surgeon in the Past, Present and Future of Pediatric Oncology

2003
Lucien Leape, MD
Safe Health Care — Are We Up to It?

2002
Harold Shapiro, PhD
The Ethical Dimensions of Scientific Progress

2001
M. Judah Folkman, MD
Angiogenesis-Dependent Diseases

2000
J. Bruce Beckwith, MD
Pediatric Renal Tumors at the New Millennium: Myths, Misunderstandings, Controversies and Opportunities

1999
Samuel A . Wells, Jr., MD
(Title not available)

1998
Richard M. Satava, MD
Medicine in the 21st Century

1997
Douglas W. Wilmore, MD
Will Organ Growth Replace Transplantation? Lessons from Patients with Short Bowel Syndrome

1996
Robert H. Bartlett, MD
Surgery, Science and Respiratory Failure

1995
David A. Williams, MD
The Role of Interleukin-II on the Pathophysiology of the Small Intestine

1994
W. French Anderson, PhD
Human Gene Therapy

APSA Past Meeting Lectures (cont.)

1993
M. Judah Folkman, MD
Clinical Applications of Angiogenesis Research

1992
Warren Zapol, MD
Inhaled Nitric Oxide: A Selective Vaso-Dilator

1991
Joel Cooper, MD
History and Current Status of Lung Transplantation

1990
Richard Simmons, MD
Role of the Gut Flora in Surgery

Jay & Margie Grosfeld Lectures

2014
Gail E. Besner, MD
A Pain in the NEC: Research Challenges and Opportunities

2013
Jessica J. Kandel, MD
Serendipity, Translational Research, High Quality Care, and the Children's Hospital

2012
M. James Kaufman, PhD
Heath Care Reform – The Impact on Children

2011
Anthony Atala, MD
Regenerative Medicine: New Approaches to Healthcare

2010
Christopher K. Breuer, MD
The Development and Translation of the Tissue Engineered Vascular Grafts

2009
Michael T. Longaker, MD, MBA
Regenerative Medicine: A Surgeon's Perspective

2008
Frederick J. Rescorla, MD
What's New in Pediatric Surgery

International Guest Lectures

2014
Professor Jacques Marescaux
Next Step in Minimally Invasive Surgery: Hybrid Image-Guided Surgery

2013
Agostino Pierro, MD
Across the Ocean: Perspectives for Clinical Care, Training and Research

2012
Benno M. Ure, MD
Enthusiasm, Evidence and Ethics: the Triple E of Minimally Invasive Pediatric Surgery

2011
Professor Takeshi Miyano, MD
A Brief History of Pediatric Surgery and Healthcare Delivery Systems in Japan

2010
Jan Alice Marcel Deprest, MD
Prenatal Management of the Fetus with Isolated CDH

2009
Marcelo Martinez Ferro, MD
New Approaches to Pectus and Other MIS in Argentina

2008
Tadashi Iwanaka, MD
Technical Innovation, Standardization and Skill Qualification of Pediatric Minimally Invasive Surgery in Japan

2007
Claire Nihoul-Fékété, MD
Is Regionalism of Complex Pediatric Malformations Desirable and Feasible? The Example of Disorders of Sexual Development

2005
Prof. Frans W.J. Hazebroek, MD, PhD
Is Continuation of Life Support Always the Best Option for the Surgical Neonate?

2004
David A. Lloyd, MD
Tomorrow's Surgeons: Who Cares for the Patient?

2003
Claire Nihoul-Fékété, MD
Modern Surgical Management of Congenital Hyperinsulinemic Hypoglycemia

APSA Past Meeting Lectures (cont.)

2002
Takeshi Miyano, MD
Biliary Tree: A Gardener's 30-Year Experience

2001
Pedro Rosselló, MD
One Nation, with Liberty and Justice…and Healthcare for All

2000
Leela Kapila, MD
Are These the Children of a Lesser God?

1999
Bernardo Ochoa, MD
Pediatric Surgery in Latin America

1998
Sidney Cywes, MD
Some of the Little Things We Do — Something Old, Something New

1997
Justin Kelly, MD
Bladder Exstrophy — Problems and Solutions

1996
Prem Puri, MD
Variant Hirschsprug's Disease

1995
Sir Lewis Spitz, MD, PhD
Esophageal Atresia — Past, Present and Future

1994
Sean J. Corkery, MCh
In Pursuit of the Testis

1993
Edward M. Kiely, MD
The Surgical Challenge of Neuroblastoma

1992
Yann Revillon, MD
Intestinal Transplantation in France

APSA Past Meeting Lectures (cont.)

1991
Shemuel Nissan, MD
The History of Surgery and Medicine in the Holy Land from the 19th Century

1990
Jan C. Molenaar, MD
Congenital Diaphragmatic Hernia — What Defect?

APSA 46th Annual Meeting Program in Detail

Program in Detail

Thursday, April 30, 2015

7:45 a.m. – 8:00 a.m.	**President's Welcome**	
8:00 a.m. – 11:00 a.m.	**EDUCATION SESSION I** Improving and Advancing Trauma Care	*Grand Ballroom, 3rd FL*

Moderator: Richard A. Falcone, Jr., MD

Using Simulation and Video Review to Improve Your Trauma Team Performance
Richard A. Falcone, Jr., MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Run a simulation program for trauma
- Partner with risk management to make videotaping of resuscitations a reality
- Apply results to care and safety

Damage Control for Pediatric Abdominal Trauma
Steven Stylianos, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Recognize when to consider damage control
- Assess when to use retroperitoneal packing vs. interventional radiology for pelvic trauma
- Describe management of an open abdomen — VAC vs. poor man's VAC

Disaster Management and the Pediatric Patient: Are you Prepared?
Jeffrey S. Upperman, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Define the role of the pediatric trauma program in disaster management
- Determine the unique concerns for pediatric patients
- Support the hospital's preparedness — share recent examples involving children

Massive Transfusion in the Pediatric Trauma Patient
David M. Gourlay, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Assess the need for massive transfusion protocols and triggers for activating your protocol
- Perform coagulation monitoring during resuscitation
- Define the role of tranexamic acid in pediatric trauma

11:15 a.m. – 12:15 p.m.	**Jay and Margie Grosfeld Lecture** Henri R. Ford, MD, MHA	*Grand Ballroom, 3rd FL*

Insights into the Pathogenesis of Necrotizing Enterocolitis: The Role of the Intestinal Microbiota

Learning Objectives
At the conclusion of this session, participants will be able to:
- Review the mechanism of nitric oxide-mediated intestinal injury in NEC
- Define the characteristics of early microbiota
- Review lessons learned from known NEC pathogens
- Define approaches to identifying new NEC pathogens

12:30 p.m. – 1:30 p.m.	**Outcomes and Evidence-based Practice Committee Systematic Reviews**	*Grand Ballroom, 3rd FL*

Gastro Esophageal Reflux Disease and Congenital Pulmonary Airway Malformations—Management and Controversies

Moderators: Saleem Islam, MD; Cynthia D. Downard, MD

GERD
Adam Goldin, MD, MPH; Milissa A. McKee, MD; Monica E. Lopez, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Assess the effectiveness of fundoplication for symptoms of reflux
- Point out the differences in effectiveness between different approaches of fundoplication
- Distinguish the differences in effectiveness of the operation depending on the diagnosis

CPAM
Casey M. Calkins, MD; Cynthia D. Downard, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Describe the issues of long term risk of CPAM, and the optimal timing for resection
- Access whether an anatomic or non-anatomic resection is preferable
- Recognize and explain the indications for fetal intervention

1:30 p.m. – 2:00 p.m.	**APSA Foundation Scholars** Hannah G. Piper, MD University of Texas Southwestern, Dallas, TX	*Grand Ballroom, 3rd FL*

The Role of Intestinal Microbiota in Children with Intestinal Failure and Bacterial Overgrowth

David Stitelman, MD
Yale School of Medicine, New Haven, CT

***In Utero* Gene Editing**

Program in Detail

Thursday, April 30, 2015 (cont.)

2:00 p.m. – 4:00 p.m. **EDUCATION SESSION II** *Grand Ballroom, 3rd FL*
Humanitarian Efforts:
Pediatric Surgery and Global Health

Moderator: Robert A. Cusick, MD

Building a Career in International Work
Sanjay Krishnaswami, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Define what is academic global surgery
- Describe strategies for getting started in the field of global surgery
- Explain pathways to promotion as a global surgeon

Education Collaborations: Fellows and Surgical Residents
Benedict C. Nwomeh, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Describe the benefits of educational collaboration
- List the potential benefits and risks of global rotation
- Cite current RRC and ABS policies on global rotation

Perspective of a LMIC Surgeon on Educational Collaborations
Opeoluwa Adesanya, MBBS

Molecular Research in the Developing World
Harold N. Lovvorn, III, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Recognize the impact of molecular research as one means to improve outcomes from lethal childhood diseases, such as Wilms' tumor, in developing countries having little scientific knowledge
- Explain the challenges and limitations of conducting sustainable molecular research in resourceconstrained countries that allows optimization of cancer treatment protocols
- Express that human subjects research in developing countries raises many ethical concerns, from enrollment of vulnerable patients to encroachment on local cultural beliefs and healthcare priorities
- Demonstrate the value of local physician involvement in research as a useful tool to educate and inspire a new generation of care providers practicing in developing countries to discover new drugs and treatment paradigms, which together build sustainability

Perspective of a LMIC Surgeon on Research Collaborations
Tiyamike Chilunjika, MBBS

Surgery and the Global Health Agenda: Is APSA and the Surgical Community Voice Being Heard?
Fizan Abdullah, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Appraise the global health landscape and current public health priorities at WHO and UN
- Cite examples of sucessful public health movements
- Implement advocacy tools dedicated to the neglected surgical patient

2:00 p.m. – 4:00 p.m.	**Education Session III** **Building a Quality Improvement Roadmap for General Pediatric Surgery: Where Should We Focus, What Should We Measure and How Can We Learn from Those Doing it Better?**	*Ocean Ballroom 1 & 2, 1st FL*

Moderator: Shawn J. Rangel, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Identify the six domains of healthcare quality as defined by the Institute of Medicine, and how each can be applied to improving the quality of pediatric surgical care
- Analyze how the perioperative surgical home approach to comprehensive quality improvement can improve care along the entire care pathway
- Cite the procedures in pediatric surgery that are associated with the greatest relative burden of morbidity, mortality, cost and practice variation
- Distinguish the available comparative performance platforms for measuring and reporting the quality of pediatric surgical care, including the limitations and benefits of each
- Apply collaborative knowledge-sharing networks to accelerate quality improvement by identifying and disseminating best practices from high-performing hospitals

Quality Improvement 101 for the Pediatric Surgeon: What it is and Why it Should Matter to You
Kurt F. Heiss, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Illustrate QI in healthcare as defined by the IOM's six domains of QI
- Interpret the increasing emphasis on these domains by regulatory and funding agencies for reimbursement considerations, performance assessment and public reporting

Program in Detail

Thursday, April 30, 2015 (cont.)

The "Perioperative Surgical Home" and Beyond: A Comprehensive Approach to Improving Quality Along the Entire Care Pathway
Adam Goldin, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Repeat the PSH approach for identifying comprehensive QI opportunities for surgical conditions/procedures along the entire care pathway
- Describe how patient education and other patient-centered efforts can be folded into the PSH to provide a "model" of QI addressing all six IOM domains
- Determine how such an approach could be applicable for pediatric surgical conditions where variation in care surrounding diagnosis, operative indications, operative approach and postoperative care are great

Prioritizing QI in Pediatric Surgery: Use of Morbidity, Mortality and Cost Data to Identify Procedures with the Greatest Room for Improvement
Shawn J. Rangel, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Classify procedures and conditions with the greatest relative contribution to morbidity, mortality and resource utilization in pediatric surgery
- Employ a prioritization approach based on identifying pediatric surgical conditions with a high cost and morbidity burden, which are also associated with high variation in cost/morbidity between hospitals

Measuring "Quality" in Pediatric Surgery: The Evolving Role of NSQIP-pediatric and Other Multi-center QI Registries
Douglas C. Barnhart, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Differentiate the existing multi-center registries that measure, compare and report for the purpose of improving quality and safety in pediatric surgery (e.g., NSQIP, Ohio collaborative, CHND, etc.)
- Explain why NSQIP may be considered the "premier" QI registry (history, evolution away from the adult "model," planned changes for next few years to more effectively capture data that matters)

Positive Deviance as a Strategy for Accelerating QI in Surgery: How Can We Learn from Those Who are Doing it Better?
Shawn J. Rangel, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Identify the "positive-deviance" concept and how it has been leveraged to improve "outcomes" in education, business and healthcare
- Compare existing/past surgical collaboratives, how they function in the context of identifying and disseminating best practices, and the impact they have had in pediatric and adult surgery
- Discuss the preliminary results of the CHA and NSQIP-P appendectomy collaboratives, and how these can be used as a model for accelerating QI across other "high-priority" conditions and procedures
- Analyze the QSC's efforts to create/support a knowledge-sharing and implementation strategy repository for "high-priority" diseases and procedures

4:30 p.m. – 6:15 p.m. **Poster Session I** *Grand*
Basic Science *Ballroom, 3rd FL*

Moderators: Casey M. Calkins, MD; Peter S. Midulla, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Evaluate basic science research as a basis for advancing pediatric surgical therapy
- Discuss the role of stem cells in pediatric health and surgical disease
- Explain the role of antibiotics in experimental necrotizing enterocolits

P1

DONOR PHENOTYPE INFLUENCES PERFORMANCE OF HUMAN AMNIONTIC FLUID DERIVED MESENCHYMAL STROMAL CELLS AS THERAPY FOR TRAUMATIC BRAIN INJURY

George P. Liao, MD, Robert A. Hetz, MD, Daniel J. Kota, PhD, Travis G. Hughes, BS, Christopher J. Corkins, MD, Hasen Xue, MD, Kenneth J. Moise Jr., MD, Anthony Johnson, DO, Scott D. Olson, PhD, Fabio Triolo, PhD, Charles S. Cox Jr., MD.

University of Texas Health Science Center at Houston, Houston, TX, USA.

P2

GLUCAGON-LIKE PEPTIDE-2 AND MASSIVE DISTAL BOWEL RESECTION EXHIBIT DISPARATE EFFECTS ON INTESTINAL ADAPTATION IN A RAT MODEL OF SHORT BOWEL SYNDROME

Sarah W. Lai, MD, MSc, FRCSC[1], Elaine de Heuvel, BSc[1], Laurie E. Wallace, BSc[1], Bolette Hartmann, PhD[2], Jens J. Holst, PhD[2], Mary E. Brindle, MD, MPH, FRCSC[1], Prasanth K. Chelikani, MVSc, PhD[1], David L. Sigalet, MD, PhD, FRCSC[3].

[1]University of Calgary, Calgary, AB, Canada, [2]University of Copenhagen, Copenhagen, Denmark, [3]Sidra Medical and Research Center, Doha, Qatar.

Program in Detail

Thursday, April 30, 2015 (cont.)

P3

MATERNAL ALLO-ANTIBODY RESPONSE LIMITS ENGRAFTMENT FOLLOWING FULLY MISMATCHED *IN UTERO* HEMATOPOIETIC CELL TRANSPLANTATION IN A PRECLINICAL CANINE MODEL

Jesse D. Vrecenak, MD, **Erik G. Pearson, MD**, Matthew M. Boelig, MD, Aliza Olive, MD, Haiying Li, Mark P. Johnson, MD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

P4

ESOPHAGEAL TISSUE ENGINEERING UTILIZING AN AUTOLOGUS CELL SOURCE FOR THE TREATMENT OF SEVERE ESOPHAGEAL DISEASE

Alex Blanchette, BS, Michael Canfarotta, BS, Apeksha Dave, BS, Todd Jensen, MSc, Christine Finck, MD.

University of Connecticut, Farmington, CT, USA.

P5

REG4 EXPRESSION IS INCREASED IN INFANT SMALL INTESTINE AFTER NECROTIZING ENTEROCOLITIS AND LUMINAL NUTRITION DEPRIVATION

Minna Wieck, MD, Christa Grant, MD, Salvador Garcia, MS, Tracy Grikscheit, MD.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

P6

CHARACTERIZATION OF 3D PULMONARY ORGANOIDS DERIVED FROM HUMAN PLURIPOTENT STEM CELLS IN CONGENITAL DIAPHRAGMATIC HERNIA

Guihua Jiang, MS, Briana E. Rockich, Julie Di Bernardo, PhD, K. Sue O'Shea, PhD, Jason R. Spence, PhD, **Shaun M. Kunisaki, MD.**

University of Michigan, Ann Arbor, MI, USA.

P7

SEROTONIN SIGNALING PROMOTES GROWTH OF POSTNATAL-DERIVED ENTERIC NEURONAL STEM CELLS

Lily S. Cheng, MD, Ryo Hotta, MD, PhD, Hannah K. Graham, BS, Allan M. Goldstein, MD.

Massachusetts General Hospital, Boston, MA, USA.

P8

AUTOLOGOUS TRANSPLANTATION OF ENTERIC NEURONAL STEM CELLS IN HIRSCHSPRUNG'S DISEASE

Ryo Hotta, MD, PhD, Lily S. Cheng, MD, Hannah K. Graham, BS, Nandor Nagy, PhD, Weihua Pan, MD, PhD, Allan M. Goldstein, MD.

Massachusetts General Hospital, Boston, MA, USA.

P9

CHARACTERIZATION OF TISSUE ENGINEERED TRACHEAL GRAFTS IN AN OVINE MODEL

Elizabeth Clark, DVM[1], Tadahisa Sugiura, MD[1], Cameron Best, BA[1], Iyore James, MD[1], Brad Bolon, DVM, MS, PhD[2], Andrew Niehaus, DVM[2], Narutoshi Hibino, MD[1], Toshiharu Shinoka, MD, PhD[1], Jed Johnson, PhD[3], Christopher Breuer, MD[1].

[1]The Research Institute at Nationwide Children's Hospital, Columbus, OH, USA, [2]College of Veterinary Medicine, The Ohio State University, Columbus, OH, USA, [3]Nanofiber Solutions, Columbus, OH, USA.

P10

DIRECT PERITONEAL RESUSCITATION WITH MINIMAL ESSENTIAL MEDIUM INCREASES SURVIVAL AND MODULATES INTESTINAL TISSUE INFLAMMATION FOLLOWING INTESTINAL ISCHEMIA AND REPERFUSION INJURY

Troy A. Markel, MD, Trevor D. Crafts, BA, E. Bailey Hunsberger, Frederick J. Rescorla, MD, Mervin C. Yoder, MD.

Indiana University School of Medicine, Indianapolis, IN, USA.

P11

NON-CANONICAL TRANSFORMING GROWTH FACTOR BETA (TGF-β) SIGNALING IN HUMAN INTESTINAL SMOOTH MUSCLE DYSFUNCTION: IMPLICATIONS FOR GASTROSCHISIS RELATED INTESTINAL DYSFUNCTION

Diana M. Hook-Dufresne, Juehui Lui, Stacey D. Moore-Olufemi, MD.

University of Texas Health Science Center at Houston, Houston, TX, USA.

P12

LL-37 ENHANCES HOMING AND LONG-TERM ENGRAFTMENT AFTER *IN UTERO* HEMATOPOIETIC CELL TRANSPLANTATION (IUHCT)

Matthew M. Boelig, MD**,** Aimee G. Kim, MD, Michael A. Conner, Stavros P. Loukogeorgakis, MBBS, PhD, Alan W. Flake, MD, **William H. Peranteau, MD**.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

P13

SOMATIC EXPRESSION OF A GAIN-OF-FUNCTION PIK3CA MUTATION IS SUFFICIENT TO PRODUCE COMPONENT FEATURES OF CLOVES AND KLIPPEL-TRENAUNAY SYNDROME

Rudy Murillo, MD, Joana Lopes, PhD, Samantha Lessard, BS, Steven J. Fishman, MD, Kyle Kurek, MD, Matthew Warman, MD.

Boston Children's Hospital, Boston, MA, USA.

P14

FABRICATION OF A NOVEL NEURAL STEM CELL HYDROGEL PATCH FOR FETAL SPINA BIFIDA REPAIR

Julie Di Bernardo, PhD, Guihua Jiang, MS, K. Sue O'Shea, PhD, **Shaun M. Kunisaki, MD.**

University of Michigan, Ann Arbor, MI, USA.

Program in Detail

Thursday, April 30, 2015 (cont.)

P15

EXPERIMENTAL NECROTIZING ENTEROCOLITIS IS DECREASED BY TARGETED ANTIBIOTIC PROPHYLAXIS

Joanna Lim, MD, Brandon Bell, BA, Gene Jang, BA, Daniel Hawkins, Debi Thomas, BS, Stephanie Papillon, MD, Jamie Golden, MD, Jin Wang, MS, Larry Wang, MD, PhD, Anatoly Grishin, PhD, Henri Ford, MD, MHA.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

4:30 p.m. – 6:15 p.m. **Poster Session II** Pediatric Surgery Clinical Medicine *Ocean Ballroom 1 & 2, 1st FL*

Moderators: Anthony Stallion, MD, Allan M. Goldstein, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- Evaluate neurodevelopmental outcomes in children with congenital diaphragmatic hernia
- Prepare for complications of peritoneal dialysis outcomes
- Apply DVT in pediatric trauma

P16

HEMATOLOGIC OUTCOMES AFTER SPLENECTOMY FOR CONGENITAL HEMOLYTIC ANEMIA: USE OF RANDOM EFFECTS MIXED MODELING

Brian R. Englum, Henry E. Rice, MD.

Duke University Medical Center, Durham, NC, USA.

P17

PATIENT-CENTERED OUTCOMES RESEARCH IN APPENDICITIS IN CHILDREN: BRIDGING THE KNOWLEDGE GAP

Danielle B. Chau, MS, Sean S. Ciullo, MD, Debra Watson-Smith, RN, Thomas H. Chun, MD, MPH, Arlet G. Kurkchubasche, MD, Francois I. Luks.

Brown Medical School, Providence, RI, USA.

P18

NEURODEVELOPMENTAL OUTCOMES AT 5 YEARS OF AGE IN CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa M. Herkert, CRNP, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

Children's Hospital of Pittsburgh, Philadelphia, PA, USA.

P19

ENDOSCOPIC BUTTON GASTROSTOMY: COMPARING A SUTURED ENDOSCOPIC APPROACH TO THE CURRENT TECHNIQUES

Jessica Gonzalez-Hernandez, MD[1], Anne C. Fischer, MD, PhD[2], Bradley Barth, MD[3], Hannah G. Piper, MD[3].

[1]Baylor University Medical Center, Dallas, TX, USA, [2]Beaumont Children's Hospital, Royal Oak, MI, USA, [3]Children's Medical Center/UT Southwestern, Dallas, TX, USA.

P20

FEATURES ASSOCIATED WITH PERITONEAL DIALYSIS CATHETER COMPLICATIONS

Camille L. Stewart, MD[1], Shannon Acker, MD[1], Laura Pyle, PhD[1], Melissa Cadnapaphornchai, MD[2], Ann Kulungowski[2], Frederick Karrer, MD[2], Jennifer Bruny, MD[2].

[1]University of Colorado School of Medicine, Aurora, CO, USA, [2]Children's Hospital Colorado, Aurora, CO, USA.

P21

DETERMINING TRAUMA QUALITY INDICATORS IN PEDIATRICS TO IMPROVE OUTCOMES

Janelle Rekman, Tiffany Locke, Maureen Brennan, Ahmed Nasr, MD, MS, FRCSC.

Children's Hospital of Eastern Ontario, Ottawa, ON, Canada.

P22

PRE-OPERATIVE BLOOD ORDERING AND UTILIZATION IN PEDIATRIC SURGERY

Rachel E. Mednick[1], Cary W. Thum, PhD[2], **David H. Rothstein, MD, MS[3]**.

[1]Northwestern University, Chicago, IL, USA, [2]Children's Hospital Association, Overland Park, KS, USA, [3]Women and Children's Hospital of Buffalo, Buffalo, NY, USA.

P23

ROUTINE INTRA-OPERATIVE TUBE THORACOSTOMY IS NOT INDICATED IN REPAIR OF ESOPHAGEAL ATRESIA AND TRACHEO-ESOPHAGEAL FISTULA

Joanna C. Lim, MD, Jamie M. Golden, MD, Jeffrey S. Upperman, MD, Henri R. Ford, MD, MHA, Christopher P. Gayer, MD, PhD.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

P24

DEEP VENOUS THROMBOSIS IN PEDIATRIC TRAUMA

Casey J. Allen, Jonathan P. Meizoso, Juliet J. Ray, Laura Tiesch, Juan E. Sola, Holly L. Neville, Carl I. Schulman, Nicholas Namias, Kenneth G. Proctor.

University of Miami Miller School of Medicine, Miami, FL, USA.

P25

AUTOLOGOUS INTESTINAL RECONSTRUCTION: A SINGLE INSTITUTION STUDY COMPARING THE STEP TO THE LILT

Ashanti L. Franklin, Mikael Petrosyan, MD, Alfred Chahine, MD, Anthony D. Sandler, MD, Clarivet Torres, MD.

Children's National Medical Center, Washington, DC, USA.

Program in Detail

Thursday, April 30, 2015 (cont.)

P26

"A-OK": CHEST RADIOGRAPH DURING PRIMARY SURVEY FACILITATES FASTER, MORE ACCURATE ENDOTRACHEAL TUBE POSITION IN INJURED CHILDREN

Andrea N. Doud, Olivia Hostetter, BS, Alison R. Gardner, MD, John Petty, MD.

Wake Forest Baptist Health, Winston Salem, NC, USA.

P27

SURGICAL WOUND CLASSIFICATION IMPROVES BUT REMAINS UNRELIABLE DESPITE MULTIFACETED INTERVENTIONS

Luke R. Putnam, MD[1], Shauna M. Levy, MD, MS[1], Martin L. Blakely, MD, MS[2], Kevin P. Lally, MD, MS[1], Deidre L. Wyrick, MD[3], Melvin S. Dassinger, MD[3], Robert T. Russell, MD, MPH[4], Eunice Y. Huang, MD, MS[5], Adam M. Vogel, MD[6], Christian J. Streck, MD[7], Akemi L. Kawaguchi, MD[8], KuoJen Tsao, MD[1], for the Pediatric Surgical Research Collaborative[1].

[1]Children's Memorial Hermann Hospital, University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Vanderbilt Children's Hospital, Vanderbilt University Medical Center, Nashville, TN, USA, [3]Arkansas Children's Hospital, University of Arkansas for Medical Sciences, Little Rock, AR, USA, [4]Children's of Alabama, University of Alabama Birmingham School of Medicine, Birmingham, AL, USA, [5]Le Bonheur Children's Hospital, The University of Tennessee Health Science Center, Memphis, TN, USA, [6]St. Louis Children's Hospital, Washington University School of Medicine, St. Louis, MO, USA, [7]MUSC Children's Hospital, Medical University of South Carolina, Charleston, SC, USA, [8]Children's Hospital Los Angeles, Keck Medical Center of USC, Los Angeles, CA, USA.

P28

NECROTIZING ENTEROCOLITIS IS ASSOCIATED WITH EARLIER ACHIEVEMENT OF ENTERAL AUTONOMY IN CHILDREN WITH SHORT BOWEL SYNDROME

Eric A. Sparks, MD[1], Faraz A. Khan, MD[1], Jeremy G. Fisher, MD[1], Brenna Fullerton, MD[1], Amber Hall[2], Bram P. Raphael, MD[3], Christopher Duggan, MD[3], Biren P. Modi, MD[1], Tom Jaksic, MD[1].

[1]Center for Advanced Intestinal Rehabilitation, Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, [3]Division of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital, Harvard Medical School, Boston, MA, USA.

P29

CUMULATIVE SUM: AN INDIVIDUALIZED PROFICIENCY METRIC FOR LAPAROSCOPIC FUNDAMENTALS

Yinin Hu, MD[1], Harry L. Warren, MD[1], Robyn N. Goodrich[2], Joanna Choi[2], Adela Mahmutovic[2], Helen Kim[2], Sara K. Rasmussen, MD, PhD[1].

[1]University of Virginia School of Medicine, Charlottesville, VA, USA, [2]University of Virginia, Charlottesville, VA, USA.

P30

RECTOVESTIBULAR FISTULA WITHOUT VAGINA: CLINICAL CHARACTERISTICS AND CHALLENGES

Juan L. Calisto[1], Kimberly Cogley, MSN, MBA[1], Karla Santos, MD[2], Jose Alejandro Ruiz, MD[2], Luis De La Torre, MD[1].

[1]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [2]Centro Colorectal de Mexico, Puebla, Mexico, Mexico.

P31

THORACOSCOPIC RESECTION OF CONGENITAL CYSTIC LUNG DISEASE-UTILIZATION AND OUTCOMES IN THE UNITED STATES

Stephanie F. Polites[1], Elizabeth B. Habermann, PhD[1], Abdalla E. Zarroug, MD[1], Kristine M. Thomsen, BA[1], Donald D. Potter, MD[2].

[1]Mayo Clinic Rochester, Rochester, MN, USA, [2]University of Iowa, Iowa City, IA, USA.

P32

PREDICTORS OF OUTCOMES IN PEDIATRIC ADRENOCORTICAL CARCINOMA

Brian C. Gulack, MD, Kristy L. Rialon, MD, Brian R. Englum, MD, Jina Kim, MD, Lindsay J. Talbot, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.

Duke University, Durham, NC, USA.

Friday, May 1, 2015

7:30 a.m. – 9:00 a.m. **Scientific Session I** *Grand Ballroom, 3rd FL*
Trauma and Fetal Medicine

Moderators: George B. Mychaliska, MD; Michael D. Klein, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- Distinguish the differences between pediatric and adult trauma centers
- Describe prenatal predictors of outcomes in children with omphalocele
- Explain how to manage challenges in congenital diaphragmatic hernia

1

EXPOSURE TO PRENATAL CONSULTATION DURING PEDIATRIC SURGERY FELLOWSHIP

Loren Berman[1], Rashmi Kabre, MD[2], Anne Kazak, PhD[1], Barry Hicks, MD[1], Francois Luks, MD[3].

[1]A.I. duPont Hospital for Children, Wilmington, DE, USA, [2]Ann and Robert H. Lurie Children's Hospital, Chicago, IL, USA, [3]Hasbro Children's Hospital, Brown University School of Medicine, Providence, RI, USA.

2

EFFECT OF MULTIPLE COURSES OF MATERNAL BETAMETHASONE ON PRENATAL CONGENITAL LUNG LESION GROWTH AND FETAL SURVIVAL

William H. Peranteau, Nahla Khalek, Julie S. Moldenhauer, Juan Martinez-Poyer, Holly L. Hedrick, Alan W. Flake, Mark P. Johnson, N. Scott Adzick.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Program in Detail

Friday, May 1, 2015 (cont.)

3

PEDIATRIC EMERGENCY DEPARTMENT THORACOTOMY FOR BLUNT TRAUMA: AN ANALYSIS OF THE NATIONAL TRAUMA DATA BANK 2007-2012

Katherine T. Flynn-O'Brien[1,4], Barclay Stewart, MD, MPH[1], Mary E. Fallat, MD[2], Ronald V. Maier, MD[3], Saman Arbabi, MD, MPH[3,4], Fred P. Rivara, MD, MPH[4], Lisa McIntyre, MD[3].

[1]University of Washington, Seattle, WA, USA, [2]Kosair Children's Hospital, Louisville, KY, USA, [3]Harborview Medical Center, Seattle, WA, USA, [4]Harborview Injury Prevention and Research Center, Seattle, WA, USA.

4

RISK-STRATIFICATION OF SEVERITY FOR INFANTS WITH CDH: PRENATAL VERSUS POSTNATAL PREDICTORS

Adesola C. Akinkuotu, Stephanie M. Cruz, MD, Paulette I. Abbas, MD, Timothy C. Lee, MD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD, Christopher I. Cassady, MD, Amy R. Mehollin-Ray, MD, Rodrigo Ruano, MD, PhD, Michael E. Belfort, MD, PhD, Darrell L. Cass, MD.

Texas Children's Hospital, Baylor College of Medicine, Houston, TX, USA.

5

THE FACTORS ASSOCIATED WITH ELECTIVE TERMINATION OF PREGNANCY OF FETUSES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Sonia Thomas, BSc[1], **Jean-Martin Laberge**[2], Robert Baird, MD, MSc[2], Maria Lalous, MSc[1], Erik Skarsgard, MD, MSc[3].

[1]Jewish General Hospital, McGill University, Montreal, QC, Canada, [2]Montreal Children's Hospital, McGill University, Montreal, QC, Canada, [3]BC Women's and Children's Hospital, Vancouver, BC, Canada.

6

TRANS-AMNIOTIC STEM CELL THERAPY (TRASCET) MITIGATES INTESTINAL DAMAGE IN A MODEL OF GASTROSCHISIS

Christina Feng, MD, Christopher D. Graham, MD, John P. Connors, BS, Joseph Brazzo III, MS, Amy HS Pan, BA, James R. Hamilton, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.

Boston Children's Hospital and Harvard Medical School, Boston, MA, USA.

7

CAN PRENATAL OMPHALOCELE RATIO DETERMINE POSTNATAL OUTCOMES? ASSESSMENT OF POSTNATAL MORBIDITY, QUALITY OF LIFE AND LONG-TERM FOLLOW-UP

Jason Fawley, MD[1], Erika Peterson, MD[2], Melissa Christensen[1], Amy Wagner, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Medical College of Wisconsin, Milwaukee, WI, USA.

8

DIFFERENCES IN TRAUMA EVALUATION AND TREATMENTS BETWEEN ADULT AND PEDIATRIC TRAUMA CENTERS FOR SEVERLY INJURED ADOLESCENTS

Ashley E. Walther[1], Richard Falcone, MD, MPH[2], Timothy Pritts, MD[1], Dennis Hanseman, PhD[1], Bryce Robinson, MD[1].

[1]University of Cincinnati, Cincinnati, OH, USA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

9

DESMOPLASTIC SMALL ROUND CELL TUMOR TREATED WITH CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY: RESULTS OF A PHASE 2 TRIAL

Andrea A. Hayes-Jordan, Holly Green, Lianchun Xiao, Keith Fournier, Winston Huh, Cynthia Herzog, Joseph Ludwig, Mary McAleer, Peter Anderson.

MD Anderson Cancer Center, Houston, TX, USA.

9:00 a.m. – 10:00 a.m.	**Robert E. Gross Lecture** Robert S. Langer, ScD	*Grand Ballroom, 3rd FL*

Biomaterials and Biotechnology: from the Discovery of the First Angiogenesis Inhibitors to the Development of Controlled Drug Delivery Systems and the Foundation of Tissue Engineering

Learning Objectives:
At the conclusion of this session participants will be able to:
- Discuss angiogenesis
- Explain drug delivery
- Describe tissue engineering

10:45 a.m. – 11:15 a.m.	**Travel Fellow Presentations** Opeoluwa Adesanya, MBBS	*Grand Ballroom, 3rd FL*

Pediatric Surgery in Nigeria—Defying the Odds

Tiyamike Chilunjika, MBBS

Pediatric Surgery in Malawi

11:15 a.m. – 11:30 a.m.	**Introduction of New Members**	*Grand Ballroom, 3rd FL*
11:30 a.m. – 12:45 p.m.	**Scientific Session II** **Clinical Surgery I**	*Grand Ballroom, 3rd FL*

Moderators: Peter S. Midulla, MD; Daniel von Allmen, MD

Learning Objectives:
At the conclusion of this session participants will be able to:
- Assess the quality of life in children with ulcerative colitis
- Discuss the non-palpable testes
- Discuss the nutritional consideration in children with Hirschsprungs's enterocolitis

Friday, May 1, 2015 (cont.)

10

SURGICAL OUTCOMES, STOOLING HABITS AND QUALITY OF LIFE IN EXTREMELY YOUNG PATIENTS AFTER ILEOANAL ANASTAMOSIS FOR ULCERATIVE COLITIS

Jennifer L. Knod[1], Monica Holder[1], Alex Cortez[2], Bruno Martinez-Leo, MD[1], Patricia Kern[1], Shehzad Saeed, MD[3], Brad W. Warner, MD[4], Belinda H. Dickie, MD[1], Richard Falcone, MD[1], Daniel von Allmen, MD[1], Jason S. Frischer, MD[1].

[1]Colorectal Center, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]University of Cincinnati,Cincinnati, OH, USA, [3]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [4]Division of Pediatric Surgery, Department of Surgery, St. Louis Children's Hospital, St. Louis, MO, USA.

11

PEDIATRIC SURGICAL CARE IN THE HUMANITARIAN SETTING: THE MEDECINS SANS FRONTIERES EXPERIENCE IN 2012-2013

Maeve O'Neill Trudeau, MD[1], Emmanuel Baron, MD[2], Patrick Herard, MD[3], Amy Labar, MPH[4], Xavier Lassalle, MS[3], Carrie Lee Teicher, MD, MPH[4], David H. Rothstein, MD, MS[5].

[1]University of Toronto, Toronto, ON, Canada, [2]Epicentre, Paris, France, [3]Médecins Sans Frontières (France), Paris, France, [4]Epicentre, New York, NY, USA, [5]Médecins Sans Frontières (USA), New York; Women & Children's Hospital of Buffalo, Buffalo, NY, USA.

12

ALTERED FECAL SHORT CHAIN FATTY ACID METABOLISM IN CHILDREN WITH A HISTORY OF HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS

Farokh R. Demehri[1], Philip K. Frykman[2], Zhi Cheng[2], Chunhai Ruan[1], Tomas Wester[3], Agneta Nordenskjold[3], Akemi Kawaguchi[4], Thomas T. Hui[5], Anna L. Granstrom[3], Vince Funari[2], Daniel H. Teitelbaum[1].

[1]University of Michigan, Ann Arbor, MI, USA, [2]Cedars-Sinai Medical Center, Los Angeles, CA, USA, [3]Karolinska University, Stockholm, Sweden, [4]Children's Hospital Los Angeles, Los Angeles, CA, USA, [5]Children's Hospital Oakland, Oakland, CA, USA.

13

LAPAROSCOPIC GASTROSTOMY AND FUNDOPLICATION IN PATIENTS WITH HYPOPLASTIC LEFT HEART SYNDROME: A SINGLE-CENTER EXPERIENCE

Brian T. Craig, MD, Eric J. Rellinger, MD, Bret A. Mettler, MD, Scott C. Watkins, MD, Dai H. Chung, MD.

Vanderbilt Children's Hospital, Nashville, TN, USA.

14

ILEOSTOMY PROLAPSE IN CHILDREN WITH INTESTINAL DYSMOTILITY

Eric A. Sparks[1], Brenna Fullerton, MD[1], Amber Hall[2], Jeremy G. Fisher, MD[1], Faraz A. Khan, MD[1], Tom Jaksic, MD[1], Lenoel Rodriguez, MD[3], Biren P. Modi, MD[1].

[1]Center for Advanced Intestinal Rehabilitation, Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [3]Center for Gastrointestinal Motility and Functional Disorders, Department of Medicine, Division of Gastroenterology, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA.

15

THE ANATOMIC FINDINGS DURING OPERATIVE EXPLORATION FOR NONPALPABLE TESTES, A PROSPECTIVE EVALUATION

Katherine W. Gonzalez, MD[1], Brian G. Dalton, MD[1], Charles L. Snyder, MD[1], Charles M. Leys, MD[2], Shawn D. St. Peter, MD[1], Daniel J. Ostlie, MD[2].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Department of Surgery, University of Wisconsin, Madison, WI, USA.

16

ENTERAL AUTONOMY, CIRRHOSIS AND LONG-TERM, TRANSPLANT-FREE SURVIVAL IN PEDIATRIC INTESTINAL FAILURE PATIENTS

Brenna Fullerton, MD, Eric A. Sparks, MD, Tom Jaksic, MD, PhD, Biren P. Modi, MD.

Boston Children's Hospital, Boston, MA, USA.

17

THORACOSCOPIC PLEURAL CLIPPING FOR THE MANAGEMENT OF CONGENITAL CHYLOTHORAX

Margaret E. Clark, MD[1], Russell K. Woo, MD[2], Sidney M. Johnson, MD[2].

[1]Tripler Army Medical Center, Honolulu, HI, USA, [2]Kapi'olani Medical Center, Honolulu, HI, USA.

12:45 p.m. – 1:45 p.m. **International Guest Lecture** *Grand Ballroom, 3rd FL*

Paul K.H. Tam, MBBS, ChM

Hirschsprung's Disease: a Bridge for Science and Surgery

Learning Objectives

At the conclusion of this session participants will be able to:

- Describe how advances in the understanding of Hirschsprung's disease have been made in the past century through the positive interaction of "big" science and "small" surgery
- Evaluate the strengths and weaknesses of current management of Hirschsprung's disease
- Appraise the relevance of genomic and regenerative medicine to the future of pediatric surgery

Program in Detail

Saturday, May 2, 2015

7:30 a.m. – 9:00 a.m. **Scientific Session III** *Grand Ballroom, 3rd FL*
Basic Science

Moderators: Eugene S. Kim, MD; Marleta Reynolds, MD

Learning Objectives
At the conclusion of this session participants will be able to:
- Apply basic science research as a basis for advancing pediatric surgical therapy
- Describe the role of cyclophilinin in an animal model of biliary atresia
- Discuss congenital chylothorax and propranolol

18
SINGLE DOSE ADENO-ASSOCIATED VIRUS 9 (AAV-9) SUSTAINED DELIVERY OF HUMAN MIS SHOWS ROBUST INHIBITION IN EPITHELIAL OVARIAN CANCER PATIENT DERIVED XENOGRAFT (PDX) MODELS

Amanda B. Sosulski, MD[1], David Pepin, PhD[1], Katie Hendren[1], Andrew Benedict, MD[1], Li Hua Zhang[1], Fotini Nicolaou[1], Dan Wang[2], Guangping Gao, PhD[2], Patricia Donahoe, MD[1].

[1]Massachusetts General Hospital, Boston, MA, USA, [2]University of Massachusetts, School of Medicine, Worcester, MA, USA.

19
ORTHOTOPIC EPITHELIAL CELL REPLACEMENT IN THE SMALL INTESTINE

Hassan A. Khalil, MD[1], Nan Ye Lei, MS[1], Garrett Brinkley, BS[1], Andrew Scott, MD[1], Clara Posner, BS[1], Puneet Rana, MS[1], Jiafang Wang[1], Michael Lewis, MD[2], Martin G. Martin, MD, MPP[1], Matthias G. Stelzner, MD[1], James CY Dunn, MD, PhD[1].

[1]UCLA, Los Angeles, CA, USA, [2]VA Greater Los Angeles Medical Center, Los Angeles, CA, USA.

20
WNT PATHWAY IS ESSENTIAL FOR INTESTINAL ADAPTATION IN THE SETTING OF SHORT BOWEL SYNDROME IN A ZEBRAFISH MODEL

Kathy A. Schall, MD, Kathleen Holoyda, MD, Salvador Garcia, MS, Ching-Ling Lien, PhD, Tracy C. Grikscheit, MD, FACS.

Children's Hospital of Los Angeles, Los Angeles, CA, USA.

21
A FUNCTIONAL SINGLE NUCLEOTIDE POLYMORPHISM OF IL-6 IS ASSOCIATED WITH NEC DEVELOPMENT IN CAUCASIAN PREMATURE INFANTS

Ashanti L. Franklin, MD, Mariam Said, MD, Zohreh Tatari-Calderone, PhD, Stanislav Vukmanovic, PhD, Khodayar Rais-Bahrami, MD, Naomi L.C. Luban, MD, Joseph M. Devaney, PhD, Anthony D. Sandler, MD.

Children's National Medical Center, Washington, DC, USA.

22

TRANSPLANTATION OF AMNIOTIC FLUID-DERIVED NEURAL STEM CELLS AS A POTENTIAL NOVEL THERAPY FOR HIRSCHSPRUNG'S DISEASE

Yu Zhou, MD, PhD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

23

BREAKDOWN IN MATERNAL-FETAL TOLERANCE AFTER FETAL INTERVENTION IN MICE

Cerine Jeanty, MD, Camilla S. Dugonjic, BA, Michela Frascoli, PhD, Patriss W. Moradi, BS, Tippi C. MacKenzie, MD.

University of California, San Francisco, San Francisco, CA, USA.

24

HOST AND BACTERIAL FACTORS COOPERATIVELY DISRUPT HEALING OF INTESTINAL ANASTOMOSES

Baddr A. Shakhsheer, MD[1], James N. Luo, BS[1], Robin Klabbers, BS[2], Alexander Zaborin, PhD[1], Natalia Belogortseva, PhD[1], Olga Zaborina, PhD[1], John C. Alverdy, MD[1].

[1]University of Chicago Pritzker School of Medicine, Department of Surgery, Chicago, IL, USA, [2]Department of Surgery, Radboud University Nijmegen Medical Centre, Nijmegen, Netherlands.

25

CYCLOPHILIN BLOCKADE PREVENTS BILIARY ATRESIA AFTER VIRAL INFECTION IN THE ANIMAL MODEL

Tatiana Iordanskaia, PhD[1], Michael Bukrinsky, PhD[2], **Evan P. Nadler**[1].

[1]Children's National Medical Center, Washington, DC, USA, [2]The George Washington University School of Medicine and Health Sciences, Washington, DC, USA.

26

CONGENITAL CHYLOTHORAX: A FORM OF LYMPHATIC ANOMALY RESPONSIVE TO PROPRANOLOL

Julie Monteagudo, MD[1], Christine A. Schad, MD[1], June K. Wu, MD[1], Russell S. Miller, MD[1], Sonia L. Hernandez, PhD[2], Jessica J. Kandel, MD[2], Carrie J. Shawber, PhD[1], Angela Kadenhe-Chiweshe, MD[1].

[1]Columbia University Medical Center, New York, NY, USA, [2]Comer Children's Hospital, University of Chicago Medicine & Biological Sciences, Chicago, IL, USA.

27

PUMPLESS ARTERIO-VENOUS EXTRACORPOREAL MEMBRANE OXYGENATION IN THE MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA

Emily A. Partridge, MD, PhD, Marcus G. Davey, PhD, Kevin C. Dysart, MD, Robert Caskey, MD, Aliza M. Olive, MD, James T. Connelly, BSc, Andrew Misfeldt, MD, Holly L. Hedrick, MD, William H. Peranteau, MD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Program in Detail

Saturday, May 2, 2015 (cont.)

9:00 a.m. – 10:00 a.m.	***Journal of Pediatric Surgery* Lecture** Robert W. Block, MD	*Grand Ballroom, 3rd FL*

All Adults Once Were Children

Learning Objectives
At the conclusion of this session participants will be able to:
- List several reasons childhood experiences are important for both brain and body heath
- Apply appropriate screening as part of a medical history when evaluating children for conditions needing attention
- Explain the relationship between Adverse Childhood Experiences (ACE) and childhood heath

10:30 a.m. – 11:30 a.m.	**Scientific Session IV** **Clinical Care and Quality Improvement**	*Grand Ballroom, 3rd FL*

Moderators: Gerald Gollin, MD; Mary L. Brandt, MD

Learning Objectives
At the conclusion of this session participants will be able to:
- Interpret the role of morbidity and mortality rounds and surgical quality improvement
- Assess the feasibility of non-operative management of appendicitis
- Discuss malpractice claims in pediatric surgical disorders

28
IMPLEMENTATION OF A PEDIATRIC SURGICAL QUALITY IMPROVEMENT (QI)-DIRECTED M&M CONFERENCE

Barrett P. Cromeens, DO, PhD, Richard J. Brilli, MD, Kelli J. Kurtovic, BS, Brian D. Kenney, MD, MPH, Benedict C. Nwomeh, MD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

29
NONOPERATIVE TREATMENT OF ACUTE APPENDICITIS IN CHILDREN – A FEASIBILITY STUDY

Joseph Hartwich, MD, Francois I. Luks, Debra Watson-Smith, RN, Arlet G. Kurkchubasche, MD, Christopher S. Muratore, MD, Hale E. Wills, MD, Thomas F. Tracy, MD.

Brown Medical School, Providence, RI, USA.

30
SUB-SPECIALIZATION WITHIN PEDIATRIC SURGICAL GROUPS IN NORTH AMERICA

Jacob C. Langer, MD[1], Jennifer Gordon[1], Li Ern Chen, MD[2].

[1]Hospital for Sick Children, Toronto, ON, Canada, [2]Baylor University Medical Center, Dallas, TX, USA.

31

PARAVERTEBRAL REGIONAL BLOCKS DECREASE LENGTH OF STAY FOLLOWING SURGERY FOR PECTUS EXCAVATUM IN CHILDREN

Patrick D. Loftus, HBS, Craig T. Elder, BA, Katie W. Russell, MD, Stephen P. Spanos, MD, Douglas C. Barnhart, MD, Eric R. Scaife, MD, David E. Skarda, MD, Michael D. Rollins, MD, Rebecka L. Meyers, MD.

University of Utah, Salt Lake City, UT, USA.

32

PROPRANOLOL VERSUS STEROIDS FOR THE TREATMENT OF ULCERATED HEMANGIOMAS

Bentley B. Rodrigue, BS, Carol Chute, RN, CNP, Denise Adams, MD, Belinda Dickie, MD, PhD, Adrienne Hammill, MD, PhD, Roshni Dasgupta, MD, MPH.

Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

33

ANALYSIS OF MEDICAL MALPRACTICE CLAIMS INVOLVING PEDIATRIC SURGICAL CONDITIONS

Veronica F. Sullins, MD, Steven L. Lee, MD.
Harbor-UCLA Medical Center, Torrance, CA, USA.

11:30 a.m. – 11:45 a.m. **Workforce Abstracts** *Grand Ballroom, 3rd FL*

Moderator: Michael D. Klein, MD

Evolution in the Surgical Care of Children: A Concern for Competency?
Ronald B. Hirschl, MD, Colin Gause, MD, Samir K. Gadepalli, MD, Thomas W. Biester, MS, Thomas F. Tracy, MD, Kenneth S. Azarow, MD, Michael D. Klein, MD, Fizan Abdullah, MD

Learning Objective
At the conclusion of this session participants will be able to:
- Determine the effect that the number of pediatric surgeons may have upon experience in the performance of complex children's surgery

A Survey Assessment of the Pediatric Surgery Workforce
James D. Geiger, MD

Learning Objective
At the conclusion of this session participants will be able to:
- Assess the current state of the APSA workforce and new graduates entering the workforce

Modeling the Future Pediatric Surgery Workforce
William T. Adamson, MD

Learning Objectives
At the conclusion of this session participants will be able to:
- Interpret how a new interactive forecasting tool predicts supply of pediatric surgeons for the next 25 years based on our current training and practice patterns
- Identify how practice patterns and population shifts are predicted to affect regional concentration of pediatric surgeons for the next 25 years

Program in Detail

Saturday, May 2, 2015 (cont.)

- Recognize the impact of factors that influence demand for pediatric surgeons including scope of practice for pediatric surgeons, regionalization of care and other subspecialties performing pediatric surgical cases

11:45 a.m. – 12:45 p.m.	**Presidential Address** Michael D. Klein, MD	*Grand Ballroom, 3rd FL*

The Surgeon and the Child

Learning Objectives
At the conclusion of this session participants will be able to:
- Describe one model of how expertise in a field is developed
- Describe one model of how medical expertise is developed and how that differs from expertise in other fields
- Recall at least three mechanisms for replacing volume of patients in the education of pediatric surgeons in performing operative procedures

1:00 p.m. – 2:00 p.m.	**Town Hall Meeting** **Clinical Resources and Clinical Competence**	*Grand Ballroom, 3rd FL*
2:00 p.m. – 3:00 p.m.	**Innovation Session** **Abstracts on New and Innovative Techniques and Procedures**	*Grand Ballroom, 3rd FL*

Moderators: Steven L. Lee, MD; Erik D. Skarsgard, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Explain the role of magnets in chest wall deformities
- Use a novel educational tool for pediatric colorectal learning
- Use an MRI-compatible positioning device to assist in anoplasty surgery

i1
DEVELOPMENT OF A PEDIATRIC COLORECTAL RAPID LEARNING HEALTHCARE SYSTEM

Peter C. Minneci, MD, MHSc, Kristine Nacion, MPH, Jennifer N. Cooper, PhD, Victoria Lane, MD, Richard Wood, MD, Gordon Lo, MBA, Lawrence Hoff, BS, Yungui Huang, PhD, MBA, Simon Lin, MD, MBA, Marc A. Levitt, MD, **Katherine J. Deans, MD, MHSc**.

Nationwide Children's Hospital, Columbus, OH, USA.

i2
DEVELOPMENT OF AN ENDOLUMINAL INTESTINAL ATTACHMENT FOR A CLINICALLY APPLICABLE INTESTINAL LENGTHENING DEVICE

Farokh R. Demehri, Brent Utter, Jennifer J. Freeman, Yumi Fukatsu, Jonathan Luntz, Diann Brei, Daniel H. Teitelbaum.

University of Michigan, Ann Arbor, MI, USA.

i3

MAGNETIC MINI-MOVER PROCEDURE FOR PECTUS EXCAVATUM IV: EVOLUTION OF IMPLANT DESIGN, EXTERNAL BRACE CONFIGURATION AND WIRELESS COMPLIANCE MONITORING

Corey W. Iqbal, MD[1], Dillon A. Kwiat, BS[2], Anupama Arun, PhD[2], Jill Imamura-Ching, RN[2], Richard Fechter, BS[2], Gary W. Raff, MD[3], Darrell Christensen, CO[2], Shinjiro Hirose, MD[3], Michael R. Harrison, MD[2].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of California, San Francisco, San Francisco, CA, USA, [3]University of California, Davis, Sacramento, CA, USA.

i4

A NOVEL MULTIMODAL COMPUTATIONAL SYSTEM USING NEAR-INFRARED SPECTROSCOPY (NIRS) TO MONITOR CEREBRAL OXYGENATION DURING ASSISTED VENTILATION IN CDH PATIENTS

Stephanie M. Cruz, MD, Adesola C. Akinkuotu, MD, Darrell L. Cass, MD, Timothy C. Lee, MD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD

Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

i5

DEVELOPMENT OF AN OPERATIVE SUSPENSION SYSTEM FOR THE PERFORMANCE OF MRI-OR GUIDED LAPAROSCOPIC ANOPLASTY

Marcus Jarboe, MD, Ranjith Vellody, MD, Dragan Spremo, Robert Ladouceur, David Nagy, Daniel Teitelbaum, MD.

University of Michigan, Ann Arbor, MI, USA.

i6

GENERATION OF FUNCTIONAL INTESTINE FROM PATIENT DERIVED PLURIPOTENT STEM CELLS

Maxime M. Mahe, PhD, Carey L. Watson, MD, Jorge Munera, PhD, Nambirajan Sundaram, PhD, Noah F. Shroyer, PhD, James M. Wells, PhD, Michael A. Helmrath, MD.

Cincinnati Children Hopsital Medical Center, Cincinnati, OH, USA.

3:00 p.m. – 4:00 p.m. **Video Session** *Grand Ballroom, 3rd FL*

Moderators: Adam M. Vogel, MD; David J. Schmeling, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- Evaluate the role of a novel 5mm stapler in thorascopic surgery
- Perform laparoscopic hernia repair
- Perform laparoscopic median arcuate ligament release

V1

RESECTION OF A RECTAL DUPLICATION CYST USING TRANSANAL ENDOSCOPIC MICROSURGERY

Philip J. Spencer, MD[1], Helen Mayer[1], Kwadwo Oduro, MD[1], David Lawlor, MD[2], Patricia Sylla, MD[1].

[1]Massachusetts General Hospital, Boston, MA, USA, [2]Massachusetts General Hospital for Children, Boston, MA, USA.

Program in Detail

Saturday, May 2, 2015 (cont.)

V2
THORACOSCOPIC MANAGEMENT OF BILATERAL CONGENITAL PULMONARY AIRWAY MALFORMATION WITH SYSTEMIC BLOOD SUPPLY: USE OF A NOVEL 5MM STAPLER

Sandra M. Farach, MD, Paul D. Danielson, MD, Nicole M. Chandler, MD.
All Children's Hospital Johns Hopkins Medicine, Saint Petersburg, FL, USA.

V3
RECTAL ATRESIA: VIDEO PRESENTATION

Victoria A. Lane, MBChB, Richard J. Wood, MBChB, Rajan K. Thakkar, MD, Katherine J. Deans, MD, MHSc, Peter C. Minneci, MD, MHSc, Marc A. Levitt, MD.
Nationwide Children's Hospital, Columbus, OH, USA.

V4
THORACOSCOPIC RESECTION OF AN IATROGENIC ESOPHAGEAL DIVERTICULUM

Steven S. Rothenberg, **Saundra M. Kay, MD.**
The Rocky Mountain Hospital for Children, Denver, CO, USA.

V5
LAPAROSCOPIC RETROGASTRIC MEDIAN ARCUATE LIGAMENT RELEASE

Juan L. Calisto. MD, Isam Nasr, MD, Marcus Malek, MD.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA.

V6
FROM BENCHTOP TO BEDSIDE: EVOLUTION OF THE MODERN LAPAROSCOPIC PEDIATRIC INGUINAL HERNIA REPAIR

Nicholas E. Bruns, MD, Todd A. Ponsky, MD.
Akron Children's Hospital, Akron, OH, USA.

Sunday, May 3, 2015

8:00 a.m. – 9:15 a.m. **Scientific Session V** *Grand Ballroom, 3rd FL*
Oncology and Clinical Surgery

Moderators: Jennifer H. Aldrink, MD; Mary E. Fallat, MD

Learning Objectives
At the conclusion of this session participants will be able to:
- Discuss the role of biopsy of small nodules in osteosarcoma
- Discuss the role of electrical pacers in gastroparesis
- Recognize the challenges in diagnosing pulmonary pleuroblastoma

34
GASTRIC ELECTRICAL STIMULATION MAINTAINS EFFICACY IN CHILDREN WITH SEVERE GASTROPARESIS

Jillian McLaughlin, MD, Justine M. Pierson, BS, Christopher D. Jolley, MD, **Saleem Islam, MD.**

University of Florida, Gainesville, FL, USA.

35
A MULTI-INSTITUTIONAL REVIEW OF THE INITIAL AND SUBSEQUENT MANAGEMENT OF SPONTANEOUS PNEUMOTHORAX IN CHILDREN

Charles M. Leys, MD[1], **Jocelyn F. Burke, MD**[1], Amita Desai, MD[2], Tiffany Wright, MD[3], Shawn D. St. Peter, MD[2], Samir Gadepalli, MD[3], Daniel J. Ostlie, MD[1].

[1]American Family Children's Hospital, Madison, WI, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA, [3]CS Mott Children's Hospital, Ann Arbor, MI, USA.

36
CAN CONGENITAL PULMONARY AIRWAY MALFORMATION BE DISTINGUISHED FROM TYPE I PLEUROPULMONARY BLASTOMA?

Nigel J. Hall[1], Adina Feinberg[1], Yoav H. Messinger[2], Kris Ann P. Schultz[2], Ann Blake[2], Gretchen M. Williams[2], Douglas Miniati[3], Jacob C. Langer[1].

[1]Hospital for Sick Children, Toronto, ON, Canada, [2]International Pleuropulmonary Blastoma Registry, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN, USA, [3]Kaiser Permanente Roseville Women and Children's Center, Roseville, CA, USA.

37
LYMPH NODE SAMPLING DURING MINIMALLY INVASIVE WILMS' TUMOR RESECTION

Steven W. Warmann[1], Jürgen Schäfer[2], Martin Ebinger[1], Guido Seitz[1], Jörg Fuchs[1].

[1]University Children's Hospital, Tuebingen, Germany, [2]University Hospital, Tuebingen, Germany.

Program in Detail

Sunday, May 3, 2015 (cont.)

38

PULMONARY NODULES LESS THAN 5MM IN SIZE STILL WARRANT BIOPSY IN PATIENTS WITH OSTEOSARCOMA AND EWING SARCOMA

Jared Kusma, Cody Young, Han Yin, Nicholas Yeager, **Jennifer H. Aldrink**.

Nationwide Children's Hospital, Columbus, OH, USA.

39

RISK FACTORS AND MANAGEMENT OF NUSS BAR INFECTIONS IN 1717 PATIENTS OVER 25 YEARS

Robert J. Obermeyer, MD[1,2], Erin Godbout[2], Michael J. Goretsky, MD[1,2], James F. Paulson, PhD[3], Frazier W. Frantz, MD[1,2], M. Ann Kuhn, MD[1,2], Michele L. Lombardo, MD[1,2], E. Stephen Buescher, MD[1,2], Ashley Deyerle[1], Robert E. Kelly Jr., MD[1,2].

[1]Children's Hospital of The King's Daughters, Norfolk, VA, USA, [2]Eastern Virginia Medical School, Norfolk, VA, USA, [3]Old Dominion University, Norfolk, VA, USA.

40

LONG-TERM OUTCOMES OF PATIENTS WITH TRACHEOESOPHAGEAL FISTULA/ ESOPHAGEAL ATRESIA: SURVEY RESULTS FROM TEF/EA SOCIAL ONLINE COMMUNITIES

Charles W. Acher, MD, MPH, Daniel Ostlie, MD, Charles Leys, MD, Shannon Struckmeyer, RDH, Matt Parker, Peter Nichol, MD, PhD.

University of Wisconsin, Madison, WI, USA.

41

THE MORBIDITY OF A DIVIDED STOMA COMPARED TO A LOOP COLOSTOMY IN PATIENTS WITH ANORECTAL MALFORMATIONS

Shawn T. Liechty, Jordan T. Huber, Sarah T. Zobell, Douglas C. Barnhart, Michael D. Rollins.

Primary Children's Hospital, University of Utah, Salt Lake City, UT, USA.

9:15 a.m. – 10:15 a.m. **COG Surgeon Update** *Grand Ballroom, 3rd FL*

Moderators: Michael P. LaQuaglia, MD; Andrea A. Hayes-Jordan, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- Analyze the results of the recent Wilms' tumor trials
- Apply interventional radiology in pediatric cancers
- Assess the role of High Frequency Ultrasound in pediatric cancer

Recently Completed Wilms' Tumor COG Studies: Implications for Surgeons and Patients
Peter F. Ehrlich, MD

Advances in Interventional Radiology for Treating Pediatric Cancer
Stephen Solomon, MD; Michael P. LaQuaglia, MD

10:30 a.m. – Noon	**Pediatric Surgery Case Debates and Controversies**	*Grand Ballroom, 3rd FL*

Moderators: Carroll M. Harmon, MD; Todd A. Ponsky, MD

Learning Objective
- Participants in this session will debate treatment options for difficult pediatric surgical cases

Noon	**Annual Meeting Concludes**

Poster Session I

Basic Science
Thursday, April 30, 2:00 p.m. – 4:00 p.m.

P1

DONOR PHENOTYPE INFLUENCES PERFORMANCE OF HUMAN AMNIONTIC FLUID DERIVED MESENCHYMAL STROMAL CELLS AS THERAPY FOR TRAUMATIC BRAIN INJURY

George P. Liao, MD, Robert A. Hetz, MD, Daniel J. Kota, PhD, Travis G. Hughes, BS, Christopher J. Corkins, MD, Hasen Xue, MD, Kenneth J. Moise Jr., MD, Anthony Johnson, DO, Scott D. Olson, PhD, Fabio Triolo, PhD, Charles S. Cox Jr., MD.

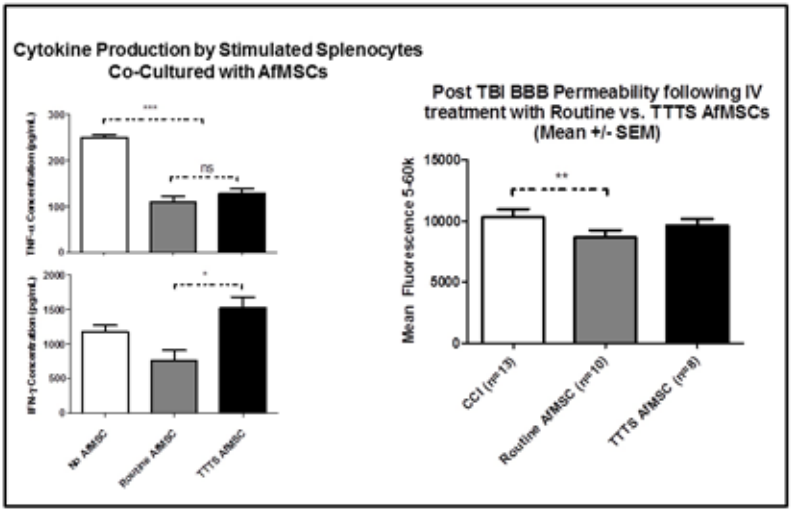
University of Texas Health Science Center at Houston, Houston, TX, USA.

Purpose:
Amniotic fluid stem cells are unique for regenerative medicine due to rapid self-renewal, pluripotency, low teratoma risk, hypoxic tolerance and immunomodulation. In traumatic brain injury (TBI), mesenchymal stromal cells (MSC) have been shown to vary in potency/efficacy in modulating the innate immune response, a process that involves splenic interaction. We applied *in vitro* and *in vivo* assays to equal passage human amniotic fluid derived MSCs (hAfMSC) obtained from second trimester routine versus twin-twin transfusion syndrome (TTTS) pregnancies to determine if hAfMSCs from these two common donor phenotypes vary in therapeutic performance for TBI.

Methods:
In vitro: Rat splenocytes co-cultured with routine or TTTS hAfMSCs (20:1) were stimulated with lipopolysaccharide and production of TNF-α and IFN-γ measured. *In vivo*: Rats underwent controlled cortical impact (CCI) injury, followed by intravenous delivery of vehicle (n=13), or 10 million cells/kg of either routine (n=10) or TTTS (n=8) hAfMSCs at 24 hours post injury. At 72 hours, all rats received Alexa Fluor 680 dye intravenously to measure blood brain barrier (BBB) permeability. The brains were imaged using an infrared laser scanner to assess degree of Alexa dye extravasation.

Results:
In vitro: TNF-α was significantly suppressed by routine (48%) and TTTS (56%) hAfMSCs compared to controls ($p<0.0001$). IFN-γ levels were unchanged by TTTS hAfMSCs compared to control ($p=0.13$). However a 50% reduction of INF- γ was achieved by routine compared to TTTS hAfMSCs ($p=0.02$). *In vivo*: Routine hAfMSCs reduced the mean fluorescence (BBB permeability) by 36% ($p<0.05$) and significantly improved splenic weight by 26% ($p<0.0001$) compared to CCI alone. TTTS hAfMSCs did not significantly alter BBB permeability nor splenic weight compared to CCI alone.

Conclusion:
Variations in immunomodulation by hAfMSCs in this study suggest that donor characteristics may impact the ability of these cells to achieve the desired therapeutic effect in TBI and regenerative medicine.


Cytokine Production by Stimulated Splenocytes
Co-Cultured with AfMSCs
TNF-α Concentration (pg/mL)
300
200
100
0
***
ns
IFN-γ Concentration (pg/mL)
2000
1500
1000
500
0
*
No AfMSC
Routine AfMSC
TTTS AfMSC
Post TBI BBB Permeability following IV
treatment with Routine vs. TTTS AfMSCs
(Mean +/- SEM)
Mean Fluorescence 5-60k
15000
10000
5000
0
**
CCI (n=13)
Routine AfMSC (n=10)
TTTS AfMSC (n=8)

Notes:

Poster Session I (cont.)

P2

GLUCAGON-LIKE PEPTIDE-2 AND MASSIVE DISTAL BOWEL RESECTION EXHIBIT DISPARATE EFFECTS ON INTESTINAL ADAPTATION IN A RAT MODEL OF SHORT BOWEL SYNDROME

Sarah W. Lai, MD, MSc, FRCSC[1], Elaine de Heuvel, BSc[1], Laurie E. Wallace, BSc[1], Bolette Hartmann, PhD[2], Jens J. Holst, PhD[2], Mary E. Brindle, MD, MPH, FRCSC[1], Prasanth K. Chelikani, MVSc, PhD[1], David L. Sigalet, MD, PhD, FRCSC[3].

[1]University of Calgary, Calgary, AB, Canada, [2]University of Copenhagen, Copenhagen, Denmark, [3]Sidra Medical and Research Center, Doha, Qatar.

Purpose:
Glucagon-like peptide-2 (GLP-2) is trophic for small bowel mucosa, mimicking intestinal adaptation in short bowel syndrome (SBS) after a massive bowel resection. The role of enteric neurons in adaptation is unclear. We hypothesized that GLP-2 would induce a trophic effect on intestinal mucosa and neurons that recapitulates post-resection adaptation in rats maintained with parenteral nutrition (PN).

Methods:
With ethics approval (#AC12-0103), SD rats were randomized to Transected Bowel (TB) Control (n=7), TB GLP-2 (2.5 nmol/kg/h, n=7), SBS Control (n=5), or SBS GLP-2 (2.5 nmol/kg/h, n=7) groups. SBS rats underwent a 60% jejunoileal resection with cecectomy. Rats were fasted and maintained on PN for 7 d. Parameters measured included plasma GLP-2 concentration, intestinal morphometry and immunohistochemistry (proliferation), PCR (hexose transporters, GLP-2 receptor), and whole mount immunohistochemistry for neurons (neuronal nitric oxide synthase [nNOS]). Data were analyzed using ANOVA and t-tests (significant if $P < 0.05$).

Results:
Plasma GLP-2 concentration decreased with resection and increased with exogenous GLP-2. Weight gain reduced with resection, while GLP-2 treatment had no effect. GLP-2 increased jejunal weight, length and mucosal surface area, while bowel resection increased jejunal and colonic muscularis propria thickness, crypt cell proliferation and myenteric nNOS immunopositivity. Decreases in GLUT-2 mRNA abundance with resection were attenuated by GLP-2. Although exogenous GLP-2 alone had no effect on jejunal GLP-2R, GLP-2 treatment in SBS groups decreased GLP-2R mRNA.

Conclusions:
Massive distal resection stimulates intestinal muscularis propria thickness, crypt cell proliferation and myenteric nNOS immunopositivity, despite decreasing endogenous GLP-2 concentrations. Exogenous GLP-2 is intestinotrophic for jejunal mucosa, but does not recapitulate the native adaptive response to distal resection with no effects on myenteric nNOS seen after 7 d. We conclude that short term intestinal adaptation after massive distal resection is unlikely to be mediated by GLP-2, and that nNOS is an unlikely effector of GLP-2-induced structural jejunal adaptation.

Notes:

P3

MATERNAL ALLO-ANTIBODY RESPONSE LIMITS ENGRAFTMENT FOLLOWING FULLY MISMATCHED *IN UTERO* HEMATOPOIETIC CELL TRANSPLANTATION IN A PRECLINICAL CANINE MODEL

Jesse D. Vrecenak, MD, **Erik G. Pearson, MD,** Matthew M. Boelig, MD, Aliza Olive, MD, Haiying Li, Mark P. Johnson, MD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

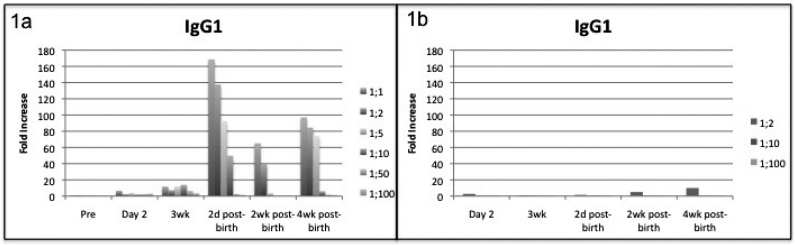
Purpose:
Though we have previously shown that *in utero* hematopoietic cell transplantation (IUHCT) allows stable alloengraftment and donor specific tolerance in a haploidentical canine model, a maternal allo-antibody response has been shown to induce a postnatal adaptive immune response in murine recipients of allogeneic grafts. Because IgG1 readily crosses the canine placenta, we sought to determine whether IUHCT would induce maternal immunization in a preclinical model, and whether maternal immunization limits engraftment in the fetal recipient.

Methods:
Seventeen fetuses of two pregnant beagle dams were injected with bone marrow from an unrelated male mongrel dog following CD3 depletion to a 1% concentration via magnetic-activated cell sorting (MACS). Injections were performed according to our optimized model, with ultrasound-guided intra-cardiac injection at 40 and 42 days' gestation. Chimerism was assessed in peripheral blood by SRY in female recipients and a variable number of tandem repeats assay (VNTR) in all offspring at 2 weeks, 1 month and 2 months. In the second litter, chimerism was also measured 3 days post-birth. Maternal immunization was assessed via flow cytometric allo-antibody assay.

Results:
No engraftment could be detected by VNTR at any timepoint. More sensitive assessment using SRY revealed micro-chimerism (0.1-0.8%) in 3/4 females tested at the 3-day timepoint, which was nearly undetectable (0-0.003%) by 2 weeks and entirely absent at 1 month. Maternal allo-antibody assay revealed mild elevation in donor-directed IgG1 by 3 weeks post-injection, with a significant spike by 2 days post-delivery (Fig. 1a). No significant immunization response was seen to a third party at any timepoint (Fig. 1b).

Conclusion:
Our findings support the existence of a maternal immune response responsible for elimination of chimerism in a preclinical model. The complete absence of stable engraftment confirms that maternal donor cells should be used for a clinical trial of *in utero* hematopoietic cell transplantation.

Poster Session I (cont.)



Notes:

P4

ESOPHAGEAL TISSUE ENGINEERING UTILIZING AN AUTOLOGUS CELL SOURCE FOR THE TREATMENT OF SEVERE ESOPHAGEAL DISEASE

Alex Blanchette, BS, Michael Canfarotta, BS, Apeksha Dave, BS, Todd Jensen, MSc, Christine Finck, MD.

University of Connecticut, Farmington, CT, USA.

Purpose:
Esophageal atresia occurs in 1:3,000 to 1:5,000 live births in the United States. In the most severe form, long-gap esophageal atresia, esophageal replacement by gastrointestinal transposition may be necessary. While a variety of reconstructive options are available to replace the esophagus, these procedures are associated with substantial short and long-term complications such as stenosis and dysmotility. Besides esophageal atresia, caustic injuries to the esophagus add to the demand for esophageal replacement, with an estimated 5,000 - 15,000 caustic ingestions occurring per year in the US. A tissue-engineered esophageal construct may therefore offer a real surgical alternative to conventional treatments for severe esophageal disease.

Methods:
Donor rat esophageal tissue was physically and enzymatically digested to isolate organoid units. These organoid units were seeded onto biomimetic de-cellularized scaffolds or electrospun synthetic PLGA scaffolds and cultured in a physiologic bioreactor system. After 2 weeks of *in vitro* culture tissue-engineered constructs were orthotopically transplanted as a patch. Recipient sprague dawley rats were closely monitored and euthanized 2 weeks after transplantation.

Results:
Organoid Units were shown to give rise to epithelial, smooth muscle, fibroblast and neural cell types, as shown by immunofluorescence and RT-PCR. These cell types were observed to migrate to their respective cell layer forming a conduit in close resemblance to a normal rat esophagus. Transplanted constructs integrated into the host's native tissue and recipients of the engineered tissue demonstrated normal GI, urinary and feeding habits.

Conclusion:
We conclude that organoid units can be seeded onto both decellularized and electrospun scaffolds to create a viable esophageal patch. Although allogeneic organoid units were used in this study, we believe that autologous organoid units could be isolated from human patients following esophageal biopsy. Further studies will be needed to evaluate human cell sources, large-animal models as well as the immune response to these esophageal scaffolds.

Notes:

Poster Session I (cont.)

P5

REG4 EXPRESSION IS INCREASED IN INFANT SMALL INTESTINE AFTER NECROTIZING ENTEROCOLITIS AND LUMINAL NUTRITION DEPRIVATION

Minna Wieck, MD, Christa Grant, MD, Salvador Garcia, MS, Tracy Grikscheit, MD.
Children's Hospital Los Angeles, Los Angeles, CA, USA.

Purpose:
In adults, elevated levels of the pro-proliferative and anti-apoptotic Reg4 protein are implicated in inflammatory bowel disease (IBD) and gastrointestinal cancers. Association with environmental enteropathy in children has also been reported, but its role in pediatric intestinal disease is otherwise unknown. Given its role in these inflammatory and malabsorptive diseases, we hypothesized that Reg4 levels would normalize upon resolution of inflammation caused by infection or obstruction, but increase during luminal nutrition deprivation.

Methods:
At least 6 weeks after intestinal resection for necrotizing enterocolitis (NEC), ileal atresia or meconium ileus with perforation, tissue samples were collected during ileostomy closure from 8 children under 2 years old. Tissue was obtained from both the proximal limb (PL), which was exposed to luminal nutrition, and the distal limb (DL), which was not fed. Microarray analysis was performed for four patients to identify genes differentially expressed between the limbs. Reg4 expression was localized and quantified with immunofluorescent antibody detection, and then compared with 2- tailed student t-tests.

Results:
Microarray analysis identified two *Reg4* loci with log2 transformed expression values of 6.3-13.2. *Reg4* levels increased by a factor of 7.4-9.9 ($p<0.05$) in DL vs. PL. Immunofluorescence localized Reg4 to some neuroendocrine and all goblet cells, predominantly in the villus. After initial resection for NEC, the number of Reg4+ cells/villus was significantly increased in DL vs. PL (55.7 ± 3.0 cells/mm vs. 35.6 ± 2.1 cells/mm $p<0.01$).

Conclusion:
Following surgical resection for previous intestinal infection or obstruction, Reg4 expression remains elevated at levels similar to those reported in IBD. Additionally, strong Reg4 expression in goblet cells persists, in contrast to the minimal goblet cell expression seen in normal adult ileum. In former NEC patients, the lack of luminal nutrition further increases Reg4 levels, suggesting that intestine proximal and distal to the ileostomy remain unequal in terms of proliferative capacity.

Notes:

P6

CHARACTERIZATION OF 3D PULMONARY ORGANOIDS DERIVED FROM HUMAN PLURIPOTENT STEM CELLS IN CONGENITAL DIAPHRAGMATIC HERNIA

Guihua Jiang, MS, Briana E. Rockich, Julie Di Bernardo, PhD, K. Sue O'Shea, PhD, Jason R. Spence, PhD, **Shaun M. Kunisaki, MD.**

University of Michigan, Ann Arbor, MI, USA.

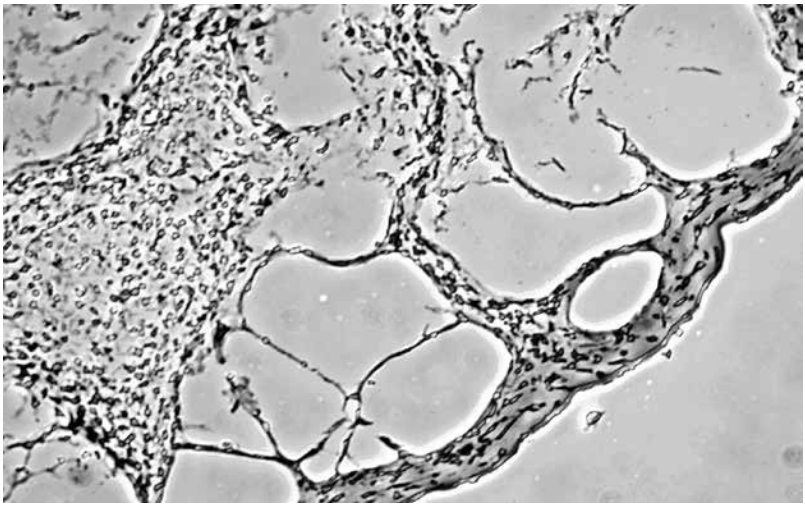
Purpose:
The analysis of induced pluripotent stem cells (iPSCs) in congenital diaphragmatic hernia (CDH) may provide unique insights into disease pathogenesis and novel treatment strategies for pulmonary hypoplasia and pulmonary hypertension. We have previously demonstrated that primitive 3D lung-like structures (lung organoids) can be generated from iPSCs derived from CDH neonates. The purpose of this study was to further characterize the ability of these organoids to fully differentiate into pulmonary epithelial and interstitial structures *in vitro*.

Methods:
After IRB approval, dermal fibroblasts from two left CDH neonates and one control neonate were reprogrammed into transgene-free iPSCs prior to controlled differentiation into the pulmonary lineage in 3D culture. The organoids were evaluated by histology, quantitative gene expression, and immunocytochemistry with human fetal lungs as positive controls.

Results:
Successful reprogramming of dermal fibroblasts into iPSCs was shown in multiple assays for pluripotency markers. At day 4 of lung differentiation, there were no significant differences in spheroid quantification (9.6±3.1 vs. 7.2±2.1 per well) between CDH and controls groups, respectively. Directed differentiation towards an embryonic lung phenotype was confirmed based on increased expression of Nkx2.1 and decreased expression of NANOG and OCT4. At day 40, H&E revealed multicellular structures composed of alveolar-like tissue with an adjacent mesenchyme in all groups (Figure). Further evidence of distal epithelial cell maturity was shown by a temporal upregulation in SOX9 and surfactant protein-C (SPC). Immunofluorescence demonstrated an alpha-smooth muscle active-positive mesenchyme with local expression of PDPN and SPC within alveolar-like structures, consistent with the terminal differentiation of iPSCs into type I and type II pneumocytes, respectively.

Conclusions:
Mature 3D lung organoids can be reliably generated from somatic cells derived from CDH patients. Subsequent work utilizing this human "disease-in-a-dish" technology may serve as a novel platform for patient-specific disease modeling and autologous cell replacement therapies in fetuses and neonates affected by severe CDH.

Poster Session I (cont.)



Notes:

P7

SEROTONIN SIGNALING PROMOTES GROWTH OF POSTNATAL-DERIVED ENTERIC NEURONALm STEM CELLS

Lily S. Cheng, MD, Ryo Hotta, MD, PhD, Hannah K. Graham, BS, Allan M. Goldstein, MD.
Massachusetts General Hospital, Boston, MA, USA.

Purpose:
Transplantation of enteric neuronal stem cells (ENSCs) offers an innovative approach for treating enteric neuropathies, including Hirschsprung's disease. However, postnatal-derived cells, a potential autologous source, are less proliferative than embryonic precursors. Since serotonin (5-HT) promotes enteric neuronal growth during development, we hypothesized that nanoparticles expressing a 5-HT receptor agonist would augment growth of neurons derived from postnatal ENSCs.

Methods:
Postnatal ENSCs were isolated from 2-4 week-old mouse colon and cultured 7 days without additive (n=3) or with nanoparticles loaded with 5-HT_4 receptor agonist (RS67506; n=3). ENSCs were cultured *ex vivo* with colon explants for 7 days in the presence of RS67506-loaded (n=3) or empty nanoparticles (n=3). ENSCs were also transplanted into mouse rectum *in vivo* for 14 days with RS67506-loaded (n=4) or empty nanoparticles (n=3). Neuronal density, proliferation, and neurite extension were analyzed immunohistochemically. Results were compared statistically using Chi-square and Student's t-test.

Results:
Cultured ENSCs and co-cultured explants both contained more neurons in the presence of 5-HT_4 agonism than without *(*34.4±5.8 vs. 8.2±0.2%, $p<0.05$; and 74.6±3.3% vs. 53.1±15.5%, $p<0.01$, respectively). Neurite length was also greater with 5-HT_4 agonism than without both *in vitro* and *in vivo* (425.9±27.4μm vs. 223.7±33.4μm and 116.7±14.2μm vs. 74.3±7.0μm, respectively; $p<0.05$). ENSCs cultured *in vitro* with RS67506-loaded nanoparticles had significantly more neuronal proliferation than controls (17.5±5.1% vs 3.8±0.8%, $p<0.05$). Similarly, ENSCs co-cultured with colon explants and RS67506-loaded nanoparticles exhibited more neuronal proliferation than controls (28.0±7.7% vs. 15.1±2.9%, $p<0.05$). Importantly, ENSCs transplanted *in vivo* with RS67506-loaded nanoparticles had significantly more neuronal proliferation than control transplants (20.8±6.4% vs. 5.0±2.1%, $p<0.01$).

Conclusion:
Co-transplantation of ENSCs with nanoparticles expressing a 5-HT_4 receptor agonist led to significant increases in neuronal density, proliferation, and neurite extension. Optimization of postnatal ENSCs supports their potential use in cell-based therapies for Hirschsprung's and other neurointestinal diseases.

Poster Session I (cont.)

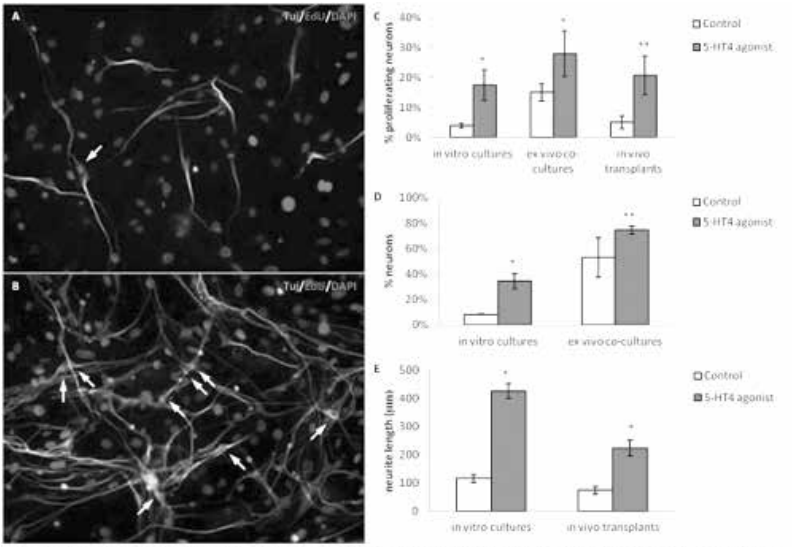


FIGURE: Cultured enteric neuronal stem cells (ENSCs) exhibit more neuronal proliferation in the presence of a serotonin receptor agonist. Neurons are labeled with the neuronal marker, Tuj1, and proliferative cells are labeled with thymidine analog, EdU. More proliferating neurons (marked with arrows) are seen in the presence of serotonin agonist, RS67506 (B) than without (A). Significantly more neuronal proliferation is seen with serotonin agonism *in vitro*, *ex vivo* in co-culture with colon explants, and *in vivo* following rectal transplantation (C). ENSCs with serotonin agonism also exhibited significantly more neuronal differentiation (D) and greater neurite extension (E). Results are represented as mean ± SEM: *p<0.05, **p<0.01.

Notes:

P8

AUTOLOGOUS TRANSPLANTATION OF ENTERIC NEURONAL STEM CELLS IN HIRSCHSPRUNG'S DISEASE

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Purpose:
Transplanting autologous patient-derived enteric neuronal stem cells (ENSC) is an innovative approach to replacing missing enteric neurons in patients with Hirschsprung's disease (HD). Using autologous cells eliminates immunologic and ethical concerns raised by other stem cell sources, but whether ENSC from patients with HD can be isolated, cultured, and transplanted has not been demonstrated. Here we isolate, characterize, and transplant ENSC from mice and humans with HD and test their potential utility for cell therapy in this disease.

Methods:
ENSC were isolated from postnatal ganglionic intestine of Ednrb$^{-/-}$ mice, a model of HD (HD mENSC, n=14) and their wild-type littermates (WT mENSC, n=15), or from resected bowel from children with and without HD (n=4). ENSC were expanded as neurospheres and characterized immunohistochemically to determine their capacity for proliferation and neuronal differentiation. ENSC were co-cultured with normal or aganglionic postnatal mouse colon *ex vivo,* and transplanted via a perineal approach into aganglionic rectum of Ednrb$^{-/-}$ mice *in vivo*.

Results:
ENSC from mouse and human HD gut formed neurospheres containing cells immunoreactive to neural crest (p75, Ret), neuronal (Tuj1), and neuronal stem cell (Nestin) markers. HD and WT mENSC produced equal numbers of neurospheres (22.4±2.9 vs 20.6±1.5, $p>0.05$) and yielded equivalent neuronal densities ($2.84x10^5 \pm 0.32$ μm^2 vs $2.81x10^5 \pm 0.54$ μm^2, $p>0.05$), confirming that mutant ENSC are potential sources for cell therapy. Both HD mENSC and human ENSC from HD patients successfully engrafted into mouse colon *ex vivo* and following transplantation *in vivo,* migrating longitudinally within the intermyenteric layer and forming enteric neurons with interconnecting dendritic extensions.

Conclusions:
ENSC can be isolated and cultured from mice and humans with HD, and transplanted into aganglionic bowel to generate enteric neuronal networks. These results establish the potential of using autologous-derived stem cells to treat HD and other intestinal neuropathies.

Notes:

Poster Session I (cont.)

P9

CHARACTERIZATION OF TISSUE ENGINEERED TRACHEAL GRAFTS IN AN OVINE MODEL

Elizabeth Clark, DVM[1], Tadahisa Sugiura, MD[1], Cameron Best, BA[1], Iyore James, MD[1], Brad Bolon, DVM, MS, PhD[2], Andrew Niehaus, DVM[2], Narutoshi Hibino, MD[1], Toshiharu Shinoka, MD, PhD[1], Jed Johnson, PhD[3], Christopher Breuer, MD[1].

[1]The Research Institute at Nationwide Children's Hospital, Columbus, OH, USA, [2]College of Veterinary Medicine, The Ohio State University, Columbus, OH, USA, [3]Nanofiber Solutions, Columbus, OH, USA.

Purpose:
Tracheal agenesis and tracheal clefts are rare but life-threatening congenital defects with limited therapeutic options. Development of a tissue-engineered tracheal graft (TETG) holds the promise of an autologous airway conduit with the ability to grow and self-repair over the course of a patient's life. To this end, we evaluated efficiency of seeding bone marrow-derived mononuclear cells on a polymeric scaffold and evaluated the effect of cell seeding on graft performance in an ovine model (*Ovis aries*).

Methods:
Autologous bone marrow was aspirated from juvenile sheep isolated by either centrifugation or filtration. Seeding efficiency of high porosity (HP, n=2) and normal porosity (NP, n=6) electrospun polyethylene terephthalate and polyurethane tracheal grafts were characterized by cell counts, DNA quantitation, and histology. Sheep received unseeded (n=2) or seeded (n=4) NP grafts as tracheal interposition grafts. Animals were survived until an end-point of 14 or 42 days.

Results:
Seeding efficiency of NP grafts (60-75%) was markedly increased when compared to HP grafts (20-29%) by cell counts and DNA analysis (NP: 249.4 ± 6.66 $x10^3$ cells/mm^2, HP: 97.4 ± 20.99 $x10^3$ cells/mm^2; $p<0.04$). After implantation, epithelial cells were demonstrated on the TETG lumen by cytology. Three animals were terminated early due to respiratory complications at day 30 (unseeded), 34 (seeded), and 36 (unseeded). All animals had tracheal stenosis at autopsy. Histology of TETG explants demonstrated epithelial migration, hyperplasia, and wound healing at the sites of anastomoses.

Conclusion:
We present the first large animal study demonstrating the feasibility of using mononuclear-seeded polymeric scaffolds for implantation as tracheal interposition grafts. These grafts function as airway conduits up to 6 weeks after implantation, and induce neotissue formation, but are limited by the formation of stenosis. These results provide the foundation for development of a novel tracheal graft for use in the repair of major congenital tracheal defects.

Notes:

P10

DIRECT PERITONEAL RESUSCITATION WITH MINIMAL ESSENTIAL MEDIUM INCREASES SURVIVAL AND MODULATES INTESTINAL TISSUE INFLAMMATION FOLLOWING INTESTINAL ISCHEMIA AND REPERFUSION INJURY

Troy A. Markel, MD, Trevor D. Crafts, BA, E. Bailey Hunsberger, Frederick J. Rescorla, MD, Mervin C. Yoder, MD.

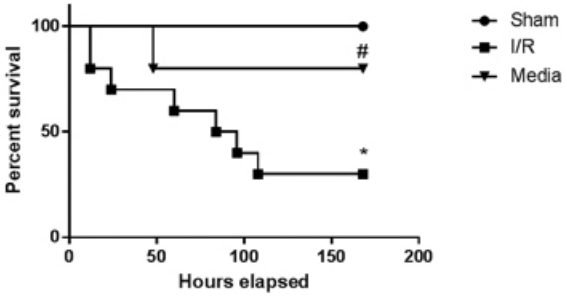
Indiana University School of Medicine, Indianapolis, IN, USA.

Purpose:
Direct peritoneal resuscitation has previously been shown to alter blood flow in the small bowel mesenteric vessels in models of intestinal ischemia and necrotizing enterocolitis. However, a survival advantage or its effect on local tissue inflammation has not been previously demonstrated. We hypothesized that direct peritoneal resuscitation with a balanced minimal essential medium (MEM) would increase survival and decrease intestinal tissue angiogenic and inflammatory cytokine production following intestinal ischemia and reperfusion (I/R) injury.

Methods:
Eight week old male C57Bl6J mice were anesthetized and underwent midline laparotomy. I/R and Media groups were exposed to superior mesenteric artery occlusion for 60 minutes with a non-traumatic clamp. Immediately following removal of the clamp, 1 ml of MEM was placed into the abdominal cavity. Animals were then closed in two layers and allowed to reperfuse for 6 hours (cytokine analysis) or 7 days (survival analysis). Following 6 hour reperfusion, animals were euthanized. Intestines were harvested and homogenized in protein lysis buffer (N=6/group). Extracts were quantified for total protein content (Bradford Assay) and analyzed by multiplex beaded assay for inflammatory and angiogenic cytokines. $P<0.05$ was significant.

Results:
I/R caused marked intestinal ischemia, significant mortality, and a significant increase in tissue cytokine levels ($p<0.05$). Seven day survival was 30% for I/R, while application of Media following ischemia increased seven day survival to 80% ($p<0.05$, Figure). Media also significantly decreased intestinal tissue levels of amphiregulin, sALK-1, leptin, betacellulin, endothelin, follistatin, HGF, SDF-1, Eotaxin, IL-1a, IL-2, IL-9, and MIP-1a ($p<0.05$).

Conclusion:
Direct peritoneal resuscitation with minimal essential medium increases survival and decreases intestinal angiogenic and inflammatory cytokine production following intestinal I/R injury. Translational applications are readily achievable and should be considered for patients with intestinal ischemic pathology.



* = p<0.05 versus Sham
# =p<0.05 versus I/R

Notes:

P11

NON-CANONICAL TRANSFORMING GROWTH FACTOR BETA (TGF-β) SIGNALING IN HUMAN INTESTINAL SMOOTH MUSCLE DYSFUNCTION: IMPLICATIONS FOR GASTROSCHISIS RELATED INTESTINAL DYSFUNCTION

Diana M. Hook-Dufresne, Juehui Lui, Stacey D. Moore-Olufemi, MD.

University of Texas Health Science Center at Houston, Houston, TX, USA.

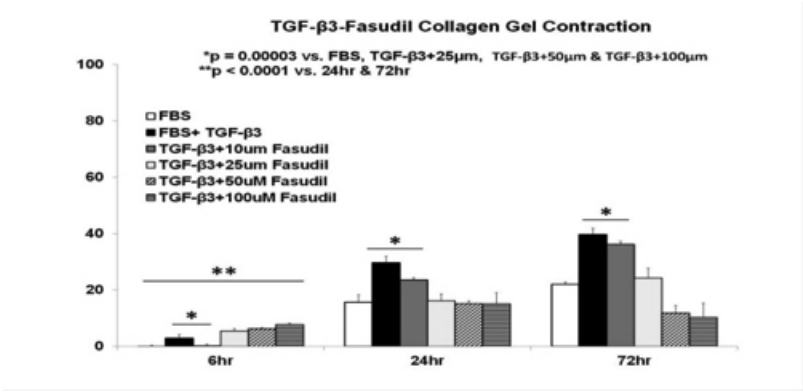
Purpose:
Gastroschisis (GS)-related intestinal dysfunction (GRID) is a common cause of pediatric intestinal failure (IF) leading to poor outcomes and intestinal transplantation. Our lab is focused on elucidating the mechanisms contributing to GRID and recently showed infants with GS have significantly elevated levels of TGF-β3 in the intestinal smooth muscle layer. We hypothesized that TGF-β3 activates the TGF-β non-canonical axis to contribute to intestinal smooth muscle dysfunction.

Methods:
Human intestinal smooth muscle cells (hISMCs) were incubated with fetal bovine serum (FBS) ± TGF-β3 (100 ng/ml) for 6, 24 and 72 hours. The effects of TGF-β3 on hISMC contractility ± TGF-β3 neutralizing antibody (0.5 or 2 μg/ml) or Fasudil, a ROCK kinase inhibitor, (10μM-100μM) were measured using a collagen gel contraction assay. Collagen gel discs were measured and percent contraction calculated. Myosin light chain phosphorylation (MLC-P) was measured using Western blot. ROCK kinase activity was measured using ELISA. Data are expressed as mean ± SEM, ANOVA (n=3-4/group).

Results:
TGF-β3 significantly increased hISMC contraction. After treatment with the higher dose of TGF-β3 neutralizing antibody, we demonstrated a significant decrease in the gel contraction produced with TGF-β3 alone ($p=0.0002$). Treatment with Fasudil at doses > 25 μM significantly decreased hISMC contraction produced by TGF-β3 exposure ($p=0.00003$). ROCK activity was significantly decreased after Fasudil treatment ($p=0.01$). MLC-P was abolished after treatment with Fasudil.

Conclusions:
TGF-β3 is a potent stimulator of hISMC contraction. Our results suggest that the non-canonical TGF-β pathway contributes to increased contraction in hISMCs based on the decreased contraction seen in hISMCs treated with TGF-β3 when given the neutralizing antibody and Fasudil. This finding is further supported by the decrease in ROCK activity and MLC-P after Fasudil treatment. Further characterization of the TGF-β signaling pathway(s) involved may provide a foundation for identifying novel therapeutics to improve intestinal smooth muscle dysfunction in GS patients.

Poster Session I (cont.)



Notes:

P12

LL-37 ENHANCES HOMING AND LONG-TERM ENGRAFTMENT AFTER *IN UTERO* HEMATOPOIETIC CELL TRANSPLANTATION (IUHCT)

Matthew M. Boelig, MD, Aimee G. Kim, MD, Michael A. Conner, Stavros P. Loukogeorgakis, MBBS, PhD, Alan W. Flake, MD, **William H. Peranteau, MD.**
Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Introduction:
IUHCT can induce donor-specific tolerance (DST), allowing for non-myeloablative postnatal cellular and organ transplantation. Donor cell manipulation to enhance trafficking to the fetal hematopoietic niche is a promising strategy to increase engraftment and frequency of DST. A potential target is the SDF-1α/CXCR4 pathway, which plays a critical role in the trafficking of hematopoietic stem/progenitor cells (HSPCs) to hematopoietic niches. LL-37, an endogenous antimicrobial antimicrobial peptide, enhances HSPC migration toward an SDF-1α gradient. We hypothesized that LL-37 would augment homing and long-term engraftment of allogeneic donor cells after IUHCT.

Methods:
10 million BM mononuclear cells (MNCs) or 250,000 lineage-depleted BM MNCs from B6-GFP transgenic mice were injected intravenously into embryonic day 14 Balb/c fetuses with or without pre-treatment with 2.5 μg/mL LL-37. Fetal liver (FL) homing and engraftment were observed with fluorescence stereoscopic microscopy and quantified by flow cytometry. Long-term hematopoietic chimerism was quantified monthly in peripheral blood (PB) of mice. Statistical analysis was performed using 2-way ANOVA with Bonferroni correction.

Results:
LL-37 pre-treatment produced a significant homing advantage to the FL up to 72 hours post-IUHCT ($p < 0.05$). This effect was more pronounced with use of an enriched, lineage-depleted graft. Long-term hematopoietic chimerism in PB after IUHCT was significantly increased in LL-37-treated animals versus untreated animals at all postnatal time-points. No significant toxicity or growth impairment was observed with LL-37 treatment.

Conclusion:
We observed a significant treatment effect with LL-37 regarding homing and long-term engraftment in our allogeneic murine model of IUHCT. LL-37 may facilitate the establishment of DST, thereby increasing the clinical applicability of IUHCT to enable non-myeloablative postnatal cellular or organ transplantation.

Long-Term Hematopoietic Chimerism in Peripheral Blood			
Age (Months)	LL-37 Treated (% PB Chimerism +/- SEM)	Untreated (% PB Chimerism +/- SEM)	p-value (Bonferroni)
1	29.98 +/- 6.56	8.00 +/- 1.74	< 0.001
2	21.32 +/- 5.05	3.89 +/- 0.94	< 0.01
3	16.47 +/- 3.88	2.71 +/- 0.72	< 0.05

Notes:

Poster Session I (cont.)

P13

SOMATIC EXPRESSION OF A GAIN-OF-FUNCTION PIK3CA MUTATION IS SUFFICIENT TO PRODUCE COMPONENT FEATURES OF CLOVES AND KLIPPEL-TRENAUNAY SYNDROME

Rudy Murillo, MD, Joana Lopes, PhD, Samantha Lessard, BS, Steven J. Fishman, MD, Kyle Kurek, MD, Matthew Warman, MD.

Boston Children's Hospital, Boston, MA, USA.

Purpose:
Somatic gain-of-function mutations in *PIK3CA*, which encodes the catalytic subunit of PI3 kinase, are consistently detected in affected tissue from patients with Congenital Lipomatous Overgrowth, Vascular malformations, Epidermal nevi, and Skeletal anomalies (CLOVES) syndrome, Klippel-Trenaunay syndrome (KTS), and lymphatic malformations. Here we use genetically modified mice to test whether a common somatic *PIK3CA* mutation (p.H1047R) is sufficient to cause disease.

Methods:
Pik3ca$^{H1047R/H1047R}$ female mice (n=9), which have a gain-of-function *PIK3CA* mutation that becomes active following Cre-mediated recombination, were crossed with hemizygous Tg:*Prrx1-Cre* male mice, which express Cre-recombinase in developing limb buds beginning at embryonic day nine. Progeny from this cross have genotypes that are either *Pik3ca*$^{H1047R/+}$ or *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre*. We examined the progeny from this cross the day after birth (P1) and at embryonic day seventeen (E17).

Results:
Four litters were studied at P1, and each of the 17 living pups had the genotype *Pik3ca*$^{H1047R/+}$. One carcass of a partially eaten pup had the genotype *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre*. Five litters were studied at E17; twenty-three embryos had the genotype *Pik3ca*$^{H1047R/+}$ and twenty-two embryos had the genotype *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre*. The E17 *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre* embryos all had forelimb post-axial polydactyly and subcutaneous vascular malformations that were not seen in any *Pik3ca*$^{H1047R/+}$ embryo.

Conclusions:
Somatic activation of a gain-of-function *PIK3CA* mutation in the distribution of Tg:*Prrx1-Cre* expression is sufficient to cause post-axial polydactyly and vascular malformations, which are component features of CLOVES and KTS. This is the first report of a murine model for a somatic mosaic *PIK3CA* associated disease. Unfortunately, the phenotype is severe, with pups being cannibalized by their dams. Other Cre transgenes that produce less severe malformations, and that are compatible with post-natal life, should generate a mouse model of CLOVES, KTS, and lymphatic malformations that can be used to understand disease mechanism and to test novel therapies.

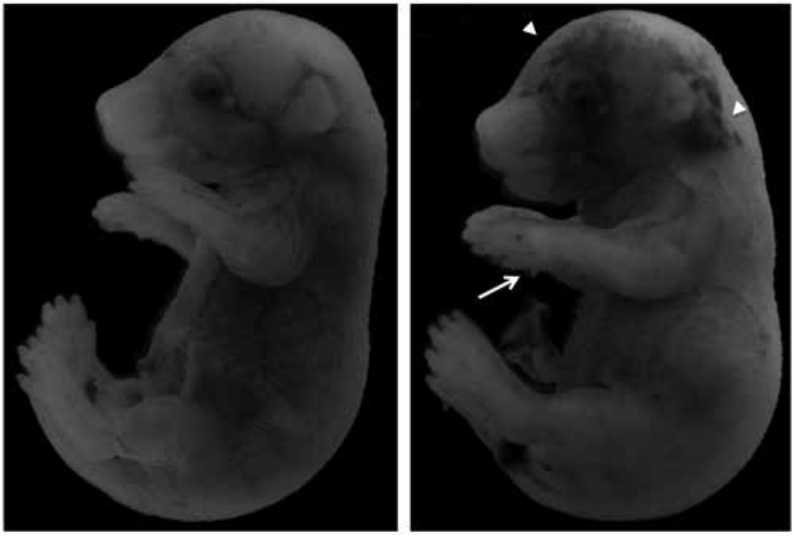


Figure. Photographs of a normal appearing E17 *Pik3ca*$^{H1047R/+}$ embryo (left) and an abnormal E17 *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre* embryo (right). Post-axial polydactyly (arrow) and vascular malformations (arrowheads) are always present in the *Pik3ca*$^{H1047R/+}$;Tg:*Prrx1-Cre* pups.

Notes:

Poster Session I (cont.)

P14

FABRICATION OF A NOVEL NEURAL STEM CELL HYDROGEL PATCH FOR FETAL SPINA BIFIDA REPAIR

Julie Di Bernardo, PhD, Guihua Jiang, MS, K. Sue O'Shea, PhD, **Shaun M. Kunisaki, MD.**
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Purpose:
Fetal surgery has been shown to improve outcomes in selected cases of myelomeningocele (MMC). The local delivery of cells at the time of MMC closure has been investigated as a promising adjunctive therapy aimed at promoting spinal cord regeneration. The purpose of this study was to examine the *in vitro* characteristics of an injectable neural stem cell bioprosthesis containing transgene-free neural progenitor cells (NPCs) within a self-assembling peptide nanofiber hydrogel.

Methods:
With IRB approval, human mid-gestation amniotic fluid mesenchymal stromal cells (n=2) were isolated and reprogrammed towards pluripotency using Sendai RNA viral vectors. The resultant induced pluripotent stem cells were differentiated into NPCs under defined conditions and subsequently resuspended within a 3D hydrogel patch (0.5% Puramatrix 16-mer) for an additional 96 hours prior to implantation. The neurogenic characteristics of the bioprosthesis were assessed in multiple assays, including confocal microscopy, quantitative gene expression, and immunofluorescence, and compared with the appropriate controls.

Results:
Human neural cells with a normal karyotype were successfully obtained from amniocentesis samples as demonstrated by the expression of early neural markers, including SOX1, Nestin, PSA-NCAM, Musashi1, and TuJ1. NANOG, OCT4, PAX6, MAP2, GFAP, and OLIG2 expression remained uniformly low, confirming the presence of a NPC phenotype. There was prolonged cell survival of NPCs when cultured within the self-assembling peptide. Additionally, the neural progenitor phenotype was maintained within this 3D microenvironment as revealed by continued expression of SOX1, Nestin, Musashi1, and TuJ1.

Conclusions:
To our knowledge, this is the first investigation to report the fabrication of an injectable neural stem cell patch for potential use in minimally invasive fetal MMC repair. This pilot study supports the clinically feasible concept of a NPC-based hydrogel patch for either autologous or allogeneic use and sets the stage for further evaluation of the neurotrophic effects and reparative capacity of this prosthesis in animal models of MMC.

Notes:

P15

EXPERIMENTAL NECROTIZING ENTEROCOLITIS IS DECREASED BY TARGETED ANTIBIOTIC PROPHYLAXIS

Joanna Lim, MD, Brandon Bell, BA, Gene Jang, BA, Daniel Hawkins, Debi Thomas, BS, Stephanie Papillon, MD, Jamie Golden, MD, Jin Wang, MS, Larry Wang, MD, PhD, Anatoly Grishin, PhD, Henri Ford, MD, MHA.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

Purpose:
Necrotizing enterocolitis (NEC) is the most lethal gastrointestinal disorder in the neonatal intensive care unit. Although the etiology of NEC is unclear, bacterial colonization is a critical component. *Cronobacter muytjensii* is an opportunistic pathogen that has been identified in clinical outbreaks and confirmed in experimental models. We hypothesize that antibiotic prophylaxis targeted to opportunistic pathogens decreases the incidence of NEC.

Methods:
We utilized a neonatal rat NEC model, consisting of thrice daily formula feeding and hypoxia. Ampicillin-resistant or ampicillin-sensitive *C. muytjensii* 10^7 CFU was introduced with every formula feeding; control animals received no bacteria. Ampicillin treatment (20 mg/kg PO thrice daily) was started on day 1 or day 3. Animals were sacrificed on day 4. The terminal ileum was scored histologically. Microbiota of the terminal ileum and stool were characterized by culture-based 16S rRNA sequencing.

Results:
The neonatal rat model produced an NEC incidence of 33%. *C. muytjensii* increased incidence to 59%. Early ampicillin with *C. muytjensii* decreased incidence to 25%. Late ampicillin appeared to have no effect on the *C. muytjensii*-exposed rats, incidence 71%. Ampicillin without *C. muytjensii*, regardless of timing, increased NEC: early with 67% incidence and late with 75% incidence. When ampicillin was given with ampicillin-resistant *C. muytjensii*, NEC incidence increased similar to ampicillin alone: early 50% and late 60%. Microbiota profiling showed overall paucity of bacteria in animals with NEC compared to those without NEC. Utilizing Shannon's diversity index, no significant trends were found between treatment groups or NEC scores.

Conclusions:
Antibiotics showed positive impact only when given early and in the presence of a sensitive opportunistic pathogen. Therefore, we suggest that at-risk neonates be screened for opportunistic pathogens to guide antibiotic therapy.

Notes:

Poster Session II

Poster Session II
Pediatric Surgery Clinical Medicine
Thursday, April 30, 2:00 p.m. – 4:00 p.m.

P16

HEMATOLOGIC OUTCOMES AFTER SPLENECTOMY FOR CONGENITAL HEMOLYTIC ANEMIA: USE OF RANDOM EFFECTS MIXED MODELING

Brian R. Englum, Henry E. Rice, MD.
Duke University Medical Center, Durham, NC, USA.

Purpose:
Total or partial splenectomy is performed for severely affected children with congenital hemolytic anemia (CHA); however, the advantage of each procedure remains poorly understood. This report compares the outcomes of TS and PS using data from the Splenectomy in Congenital Hemolytic Anemia (SICHA) consortium registry.

Methods:
We collected hematologic outcomes of children with CHA undergoing total splenectomy (TS) or partial splenectomy (PS) up to 1 year after surgery. Using random effects mixed models, we evaluated the association of operative characteristics with change in hematologic parameters after surgery, including TS versus PS and laparoscopic versus open approach.

Results:
The analysis included 130 children, with 63.6% (n=82) undergoing TS and 36.4% (n=47) undergoing PS. Most children had sickle cell disease (SSD; 53.1%) while the remaining children had hereditary spherocytosis (HS). The indications for splenectomy included splenic sequestration (56.9%), transfusion dependence (21.5%), splenomegaly (16.9%), and pain (10%). More than 70% of children underwent a laparoscopic procedure. Patients with HS experienced increased hemoglobin and decreased reticulocyte percentage and bilirubin after surgery compared to baseline (Figure). Children with HS had a greater increase in hemoglobin following TS compared to PS ($p<0.001$). For children with SSD, there was no significant change in hemoglobin after surgery, although reticulocyte percentage decreased by 4.3% (0.9-7.7%) and bilirubin decreased by 1.1 (0.4-1.8) mg/dl. Laparoscopy was not associated with any differences in hematologic outcomes versus open procedure. Changes from baseline were seen at 4 weeks postoperatively and maintained over 1 year follow-up.

Conclusion:
Children undergoing TS or PS for CHA can expect excellent hematologic outcomes after surgery, although TS appears to have a greater hematologic response compared to PS. There is no difference in hematologic outcomes after laparoscopic versus open surgery. Future research will need to examine these outcomes in the context of other potential benefits from these procedures.

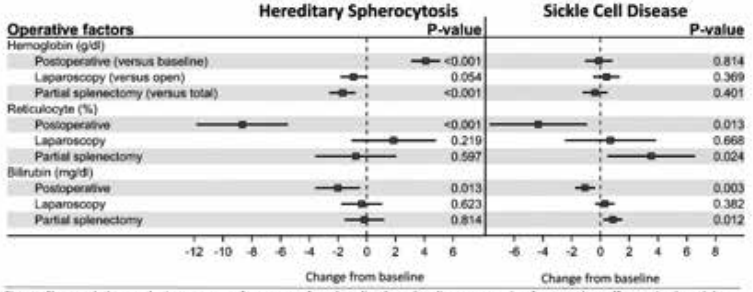

Figure. Changes in hematologic outcomes after surgery from baseline based on linear regression from random effects mixed models. Blue square represents point estimate for change in hematologic outcome from baseline. Black lines represent 95% confidence interval. Postoperative change is difference in hematologic variable at all times after surgery (from 4 to 52 weeks) compared to baseline. Laparoscopy and partial splenectomy represent change in addition to postoperative change. For example, patients with hereditary spherocytosis experienced a 4.1 g/dl increase in hemoglobin after total splenectomy, but this increase was 1.7 g/dl less (i.e. only 2.4 g/dl) after partial splenectomy.

Notes:

Poster Session II (cont.)

P17

PATIENT-CENTERED OUTCOMES RESEARCH IN APPENDICITIS IN CHILDREN: BRIDGING THE KNOWLEDGE GAP

Danielle B. Chau, MS, Sean S. Ciullo, MD, Debra Watson-Smith, RN, Thomas H. Chun, MD, MPH, Arlet G. Kurkchubasche, MD, Francois I. Luks.

Brown Medical School, Providence, RI, USA.

Purpose:
Patient-centered outcomes research (PCOR) aims to enable optimal patient participation in decision-making. We evaluated whether providing basic medical information would affect patients'/families' perception of appendicitis and their willingness to consider treatment alternatives.

Methods:
Families of children aged 5-18 presenting with suspected appendicitis were recruited for a tablet-based interactive educational survey. They were questioned before and after an education session about appendicitis, including questions on three hypothetical treatment options: urgent appendectomy, antibiotics alone, or initial antibiotics followed by elective appendectomy.

Results:
100 subjects (caregivers and patients ≥15 years) participated. Only 14% of respondents correctly identified the mortality rate of appendicitis (17 death/year, 2010 US census), compared with other extremely rare causes of death. Eighty-two percent of respondents believed it "likely" or "very likely" that the appendix would rupture if operation was at all delayed, and 81% believed that rupture of the appendix would rapidly lead to severe complications and death. In univariate analysis, this perception was significantly more prevalent for mothers (OR 5.19, CI 1.33 - 21.15) and subjects who knew at least one friend/relative who had a negative experience with appendicitis (OR 5.53, CI 1.40-25.47). Following education, these perceptions changed significantly (53% still believed that immediate operation was necessary, down from 82%, and 47% believed perforation led to great morbidity/mortality, down from 81%, $P < 0.001$). Regarding potential treatment options for early appendicitis, urgent appendectomy was considered a "good" or "very good" option by 74% of subjects, compared with 68% for antibiotics only, and 49% for initial antibiotic therapy followed by elective appendectomy.

Conclusions:
There was a striking knowledge gap in the participants' perceptions of appendicitis. Appropriate education can correct anecdotally supported misconceptions. Adequate education may empower patients to make better-informed decisions about their medical care, and may be important for future studies in alternative treatments for appendicitis in children.

Notes:

P18

NEURODEVELOPMENTAL OUTCOMES AT 5 YEARS OF AGE IN CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa M. Herkert, CRNP, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

Children's Hospital of Pittsburgh, Philadelphia, PA, USA.

Purpose:
Adverse neurodevelopmental sequelae are common among CDH infants. This study was undertaken to identify deficits that become apparent as these children develop.

Methods:
The study cohort consisted of 36 CDH patients who were enrolled in our follow-up program between 06/2004 and 09/2014. The neurodevelopmental outcomes assessed at a median of 5 years (range, 4-6) included cognition (Wechsler Preschool and Primary Scale of Intelligence, n=36), visual-motor-integration (VMI, n=36), academic achievement (Woodcock-Johnson Tests of Achievement, n=26), and behavior problems (Child Behavior Check List, n=27). Scores were grouped as average, borderline, or extremely low by SD intervals.

Results:
Although mean Full (93.9±19.4), Verbal (93.4±18.4), and Performance (95.2±20.9) IQ were within the expected range, significantly more CDH children had borderline (19%) and extremely low (17%) scores in at least one domain compared to normative cohorts ($P<0.02$). The mean VMI score was below population average (87.9±17.8, $P<0.001$). Academic achievement scores were similar to expected means ($P=0.93$). CBCL scores for the emotionally reactive (22%) and pervasive developmental problems scales (27%) were more likely to be borderline or clinically significant, ($P=0.03$ and $P=0.0005$, respectively). Autism was diagnosed in 11% of female and 15% of male patients, which is significantly higher than the general population (0.5% and 2.4% respectively, $P<0.01$). Prolonged NICU stay, prolonged intubation, tracheostomy placement, pulmonary hypertension, autism, hearing impairment, and developmental delays identified during infancy were significantly associated with worse performances ($P<0.05$).

Conclusions:
The majority of CDH children had average neurodevelopmental outcomes at 5 years of age. However, rates of borderline and extremely low IQ scores were significantly higher than in the general population. CDH survivors are at increased risk for developing emotionally reactive and pervasive developmental problems. Risk of autism is significantly elevated. Disease severity and early neurological dysfunction appear to be predictive of longer-term impairments.

Notes:

Poster Session II (cont.)

P19

ENDOSCOPIC BUTTON GASTROSTOMY: COMPARING A SUTURED ENDOSCOPIC APPROACH TO THE CURRENT TECHNIQUES

Jessica Gonzalez-Hernandez, MD[1], Anne C. Fischer, MD, PhD[2], Bradley Barth, MD[3], Hannah G. Piper, MD[3].

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Purpose:
Button gastrostomy (BG) is a low profile enteral feeding device preferred in children. Commonly, a primary BG is placed open or laparoscopically. Alternatively, a percutaneous endoscopic gastrostomy (PEG) can be placed and subsequently exchanged for a BG. The endoscopic button gastrostomy (EBG) requires only one incision allowing primary BG placement without laparoscopy, while still suturing the stomach to the abdominal wall. We reviewed long-term outcomes and potential costs for EBG compared to the other techniques.

Methods:
From 2010 to 2013, children undergoing EBG were compared to those with laparoscopic BG (LBG) and those with PEG during the same time period. Patient characteristics, procedure duration, related complications, as well as clinic and emergency room (ER) visits for an eight-week follow-up period, were collected for each group and evaluated by Chi-square and ANOVA. P-values <0.05 were considered significant.

Results:
Each group of 32 children had similar demographics. The mean procedure time (min) for EBG was 38±9, compared to 58±20 for LBG ($p<0.0001$), and 31±10 for PEG. Conversion to an open procedure was 0% for EBG, 3.1% for LBG and 6.3% for PEG ($p=0.2421$). The most common complications were granulation tissue (68%) local infection (34%) and leakage (7%). There was a trend toward a lower local infection rate in the EBG group (Figure 1). The average ER visits (EBG 0.50 vs LBG 0.31 vs PEG 0.16, $p=0.0985$) were similar among groups, but the PEG group had fewer clinic visits (EBG 2.38 vs LBG 2.03 vs PEG 1.34, $p<0.0001$).

Conclusion:
EBG is a safe technique and comparable to LBG and PEG in terms of postoperative complications. EBG has a significantly shorter procedure time compared to LBG and eliminates the need for laparoscopy, potentially reducing costs. Compared to PEG, EBG does not require delayed exchange to BG and subsequent fluoroscopic confirmation of placement.

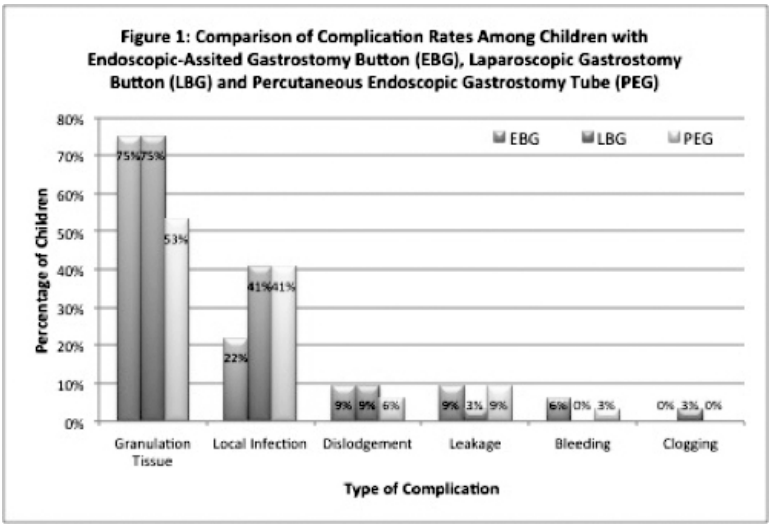
Figure 1: Comparison of Complication Rates Among Children with Endoscopic-Assited Gastrostomy Button (EBG), Laparoscopic Gastrostomy Button (LBG) and Percutaneous Endoscopic Gastrostomy Tube (PEG)
EBG
LBG
PEG
Percentage of Children
80%
70%
60%
50%
40%
30%
20%
10%
0%
75%
75%
53%
22%
41%
41%
9%
9%
6%
9%
3%
9%
6%
0%
3%
0%
3%
0%
Granulation Tissue
Local Infection
Dislodgement
Leakage
Bleeding
Clogging
Type of Complication

Notes:

Poster Session II (cont.)

P20

FEATURES ASSOCIATED WITH PERITONEAL DIALYSIS CATHETER COMPLICATIONS

Camille L. Stewart, MD[1], Shannon Acker, MD[1], Laura Pyle, PhD[1], Melissa Cadnapaphornchai, MD[2], Ann Kulungowski[2], Frederick Karrer, MD[2], Jennifer Bruny, MD[2].
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Purpose:
Peritoneal dialysis (PD) is the preferred method of renal replacement therapy for children; however, PD catheters can be associated with complications and some are ultimately never used. Our aim was to identify features predictive of PD catheter complications and non-use.

Methods:
After IRB approval, we performed a retrospective chart review of children at our institution that had a PD catheter placed from 2000 – 2013. Logistic regression models and receiver operating characteristic analyses were used to identify covariates associated with complications and appropriate cut off values for prediction of complications.

Results:
There were 176 children with PD catheters placed during the study period; 92 with acute kidney injury, 84 with chronic kidney disease, and average age of 5.9 ± 0.4 years. Complications developed in 71 children (40.3%), 46 requiring operative intervention (26.1%). Complications included: poor drainage (28, 15.9%), leak (18, 10.2%), infection (12, 6.8%), hernias (7, 4.0%), other (6, 3.4%). Children who weighed <12.5 kg had 7.6 times greater odds of developing a leak (95% CI 2.3-24.7, $p<0.001$). The duration of time between PD catheter placement and first use (median 1 day, range 0-38 days) was not associated with leak ($p>0.05$). Twelve children never used their PD catheters prior to removal. No specific patient or operative feature was associated with PD catheter non-use.

Conclusions:
PD catheter placement can be done in children with relative safety, but complications are common, particularly with leak in lower weight children. Further, time from PD catheter placement to first use is not associated with leak. This suggests that waiting for healing prior to first use may not be necessary, and that decreased volumes of dialysate should be used in smaller children. PD catheter non-use may also be reduced if dialysis is permitted the day of placement.

Notes:

P21

DETERMINING TRAUMA QUALITY INDICATORS IN PEDIATRICS TO IMPROVE OUTCOMES

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Children's Hospital of Eastern Ontario, Ottawa, ON, Canada.

Purpose:
Quality-of-care models currently being used at pediatric centres have been uniquely designed for adult trauma populations, making their applicability to pediatric trauma populations questionable. We aimed to modify the existing American College of Surgeons Committee on Trauma (ACSCOT) adult trauma quality indicators to establish a set of validated pediatric trauma quality indicators.

Methods:
We retrospectively reviewed data collected from 1996 - 2014 in the children's hospital trauma database, identifying 1451 patients. The main outcome was a composite outcome of death or any major complication (pneumonia, pulmonary embolism, acute respiratory distress syndrome, sepsis, post-operative complication, convulsion, CNS infection, or dehiscence). Cases of shaken baby syndrome, drowning, hangings, deaths occurring within 1 hour, and unsurvivable injuries were excluded. We assessed the sensitivities and specificities of the 16 ACSCOT indicators on the patient cohort. Eight new pediatric quality indicators were identified, by chart review and expert consensus, and tested on the patient cohort. A final model of pediatric trauma quality indicators was created, by selecting the best indicators from the ACSCOT and the new pediatric indicators.

Results:
The original adult ACSCOT indicators reached a maximum sensitivity of 42.4% and a specificity of 54.4%, 1114 false positive, 41 false negatives when applied to our population. We developed a new Pediatric Trauma Quality Indicator (PTQI) model using 6 ASCOT indicators and adding 8 new pediatric indicators. This produced a new model with a sensitivity of 81.2%, specificity of 45.7%, 727 false positives, and 19 false negatives.

Conclusions:
Overall, the original adult ACSCOT model did not fit the pediatric population well. The new PTQI indicator model is more applicable, and of better use for tracking quality of care, than the currently used adult ACSCOT model. Further research is needed to validate this model at other pediatric hospitals and to investigate other potential pediatric indicators.

Notes:

Poster Session II (cont.)

P22

PRE-OPERATIVE BLOOD ORDERING AND UTILIZATION IN PEDIATRIC SURGERY

Rachel E. Mednick[1], Cary W. Thum, PhD[2], **David H. Rothstein, MD, MS[3]**.

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Purpose:
To characterize pre-operative red blood cell (RBC) ordering (type and cross) and peri-operative transfusion patterns in surgical patients at free-standing children's hospitals.

Methods:
Using the Pediatric Hospital Information System database for the years 2009-2013, we identified all patients less than 19 years of age who underwent a surgical procedure. We calculated type and cross-to-transfusion ratios (TCTR) for each procedure and used a multivariable logistic regression model to assess the frequency of cross-matching and blood utilization for common pediatric surgical procedures stratified by co-morbidity burden.

Results:
Of the 590,780 patients identified, 125,942 (21.3%) were cross-matched pre-operatively or on the day of surgery. Only 40,399 (6.8%) received an RBC transfusion within 24 hours of the procedure, with a resultant overall TCTR of 3.12. Cross-match frequency and TCTR were stratified by pre-operative co-morbidity burdens for each procedure (table). The average TCTR was 4.72 (interquartile range, 2.0-5.5). Forty-nine percent of all procedures had a TCTR > 2.0, considered the goal standard to reduce waste and improve efficiency and safety.

Conclusion:
Pre-operative RBC preparation varied widely by procedure, and in many cases increased in proportion to pre-operative patient co-morbidity burdens. In this cohort of patients at free-standing, tertiary care children's hospitals, the TCTR frequently exceeded a goal value of 2.0, suggesting overuse of laboratory services and blood preparation. Tailoring pre-operative testing to specific procedures and/or patients at higher risk for requiring perioperative blood transfusion may help avoid unnecessary blood preparation and reduce overall hospital costs. Further studies are needed to determine whether these results are generalizable to broader pediatric surgical practices and to delineate meaningful pre-operative blood testing guidelines.

Cross-match & Transfusion: Most Common Procedures by Type and Cross Utilization (n=33,492)						
Procedure	CCC (Complex Chronic Conditions)	Number of T&C	Number_of Transfusions	T&C/ Transfusion_ Ratio	Odds_Of_ ReceivingT&C OR (95% CI)	p-value
Posterior Spinal Fusion	3+ 2 1 0	471 2468 8697 765	244 996 2157 166	1.93 2.47 4.03 4.60	1.13 (0.88 - 1.45) 1.00 (0.84 - 1.19) 0.93 (0.80 - 1.09) Ref	0.3524 0.963 0.3742 --
Excision Brain Lesion	3+ 2 1 0	382 2142 3017 681	103 370 343 65	3.70 5.78 8.79 10.47	1.41 (1.15 - 1.72) 1.41 (1.23 - 1.61) 1.38 (1.22 - 1.57) Ref	<0.001 <0.001 <0.001 --
Cranial Osteoplasty	3+ 2 1 0	55 293 1912 345	24 123 743 52	2.29 2.38 2.57 6.63	2.55 (1.51 - 4.31) 2.28 (1.76 - 2.95) 2.01 (1.70 - 2.38) Ref	<0.001 <0.001 <0.001 --
ECMO	3+ 2 1 0	294 485 819 363	209 357 513 217	1.40 1.35 1.59 1.67	0.61 (0.48 - 0.77) 0.68 (0.55 - 0.84) 0.77 (0.63 - 0.94) Ref	<0.001 <0.001 0.0102 --

Notes:

Poster Session II (cont.)

P23

ROUTINE INTRA-OPERATIVE TUBE THORACOSTOMY IS NOT INDICATED IN REPAIR OF ESOPHAGEAL ATRESIA AND TRACHEO-ESOPHAGEAL FISTULA

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Purpose:
Intra-operative chest tubes (CT) are often placed following repair of esophageal atresia and tracheo-esophageal fistula (EA/TEF) for intrathoracic air evacuation and anastomotic leak management. We evaluated the utility of CT in patients undergoing EA/TEF repair. We hypothesize that routine intra-operative tube thoracostomy after repair of EA/TEF is unnecessary.

Methods:
After IRB approval, we performed a retrospective chart review of patients with EA/TEF treated at a single children's hospital from 2007-2013.

Results:
Seventy patients with Type C EA/TEF were identified. Three patients expired prior to EA repair and were excluded. CT utilization varied, with 49 patients (73.1%) managed with and 18 (26.9%) without CT initially. Only 1 of 18 patients initially managed without CT required tube thoracostomy post-operatively. Among patients managed with intra-operative CT, 38 (77.6%) received 1 CT and 11 (22.4%) received ≥2 CT. The table shows operative technique and complications in patients with and without intra-operative CT placement. Of the 11 patients requiring both intra- and post-operative CT, 7 underwent retropleural dissection, and 4 still had the intra-operative CT in place when pneumothorax was identified. One patient required CT re-insertion after initial removal. Of the 3 patients with anastomotic leak requiring CT, 1 was detected by chest x-ray and 2 by esophagram. No leak was detected by intra-operative CT output.

Conclusions:
Our data suggest that routine intra-operative CT placement is not necessary in patients undergoing EA/TEF repair, especially when using a retropleural approach. We conclude that tube thoracostomy does not aid in the prevention or detection of complications, including anastomotic leak or pneumothorax.

Operative technique and complications in patients with and without intra-operative C T placement			
	Intra-Op CT	No Intra-Op CT	Fisher's Exact Test
n	49	18	
Retropleural dissection	32 (65.3%)	18 (100.0%)	0.0032
Patients requiring post-op CT	11 (22.4%)	1 (5.6%)	0.1579
Indications for post-op CT			
- pneumothorax	8 (16.3%)	1 (5.6%)	0.4528
- chylothorax	3 (6.1%)	0 (0.0%)	0.5581
- anastomotic leak	3 (6.1%)	0 (0.0%)	0.5581

Notes:

Poster Session II (cont.)

P24

DEEP VENOUS THROMBOSIS IN PEDIATRIC TRAUMA

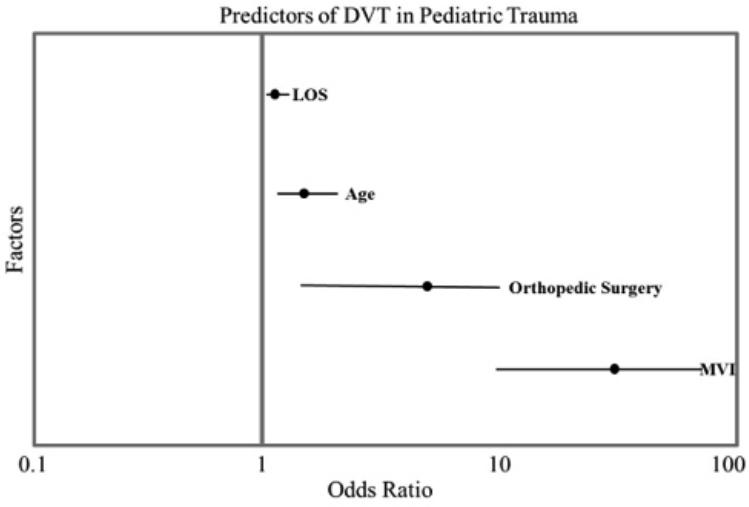
Casey J. Allen, Jonathan P. Meizoso, Juliet J. Ray, Laura Tiesch, Juan E. Sola, Holly L. Neville, Carl I. Schulman, Nicholas Namias, Kenneth G. Proctor.
University of Miami Miller School of Medicine, Miami, FL, USA.

Purpose:
Although adults and pediatric patients manifest a similar hypercoagulable state following traumatic injury, rates of deep vein thrombosis (DVT) are lower thus making recognition of children at high risk difficult. The purpose of this study is to identify factors associated with the development of DVT after pediatric trauma.

Methods:
From January 2000 to December 2012, 1,928 consecutive pediatric admissions (≤17y) at a Level I trauma center were reviewed. Univariate and multivariate analysis defined factors associated with DVT. Significance was determined at $p<0.05$.

Results:
Of the total cohort, 19 (1.0%) children developed DVT. Comparing those with DVT to those without, characteristics included age 16±1 vs 11±6 years, 90% vs 69% male, 58% vs 76% blunt injury, base excess -5±5 vs -3±5, age-specific hypotension 22% vs 6%, age-specific tachycardia 80% vs 31%, traumatic brain injury 0% vs 4%, injury severity score (ISS) 16(10-27) vs 9(4-18), operative intervention 79% vs 22%, major vascular injury (MVI) 74% vs 5%, orthopedic surgery 63% vs 13%, length of stay (LOS) 26(11-42) vs 3(1-7) days (all $p<0.05$), and mortality 5.3% vs 3.4% (p=NS). Multiple logistic regression identified independent predictors as age (OR: 1.49, CI: 1.04-2.15), orthopedic surgery (OR: 4.10, CI: 1.39-12.09), MVI (OR: 30.37, CI: 9.74-94.74), and LOS (OR: 1.04, CI: 1.02-1.06), see figure. DVT developed in 5% of those requiring orthopedic surgery, 14% of those with MVI, and 36% of those with both. Most (84%) of all DVT were diagnosed at the primary site of MVI or orthopedic injury. DVT at an uninjured site occurred infrequently (3/19) and represented 0.16% of the total population.

Conclusions:
In pediatric trauma patients, MVI and orthopedic surgery are strong independent and synergistic predictors of DVT, with a 36% associated rate with combined MVI and orthopedic surgery. The majority of all DVT occur at the primary site of injury.


Predictors of DVT in Pediatric Trauma
LOS
Age
Orthopedic Surgery
MVI
Factors
0.1
1
10
100
Odds Ratio

Notes:

P25

AUTOLOGOUS INTESTINAL RECONSTRUCTION: A SINGLE INSTITUTION STUDY COMPARING THE STEP TO THE LILT

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Children's National Medical Center, Washington, DC, USA.

Purpose:
Longitudinal intestinal lengthening and tailoring (LILT) and serial transverse enteroplasty (STEP) are the two principle procedures aimed at lengthening the intestine in children with short bowel syndrome (SBS). The purpose of this study is to evaluate utility and compare both procedures in a single cohort of patients.

Methods:
With IRB approval, we conducted a retrospective analysis of children with the diagnosis of short bowel syndrome treated at our institution from 2006 until February 2014. Children aged 0 days to 18 years with the diagnosis of SBS who underwent autologous intestinal reconstruction were included in the study. The choice of operation was dependent on the blood supply, dilation and nature of the short bowel.

Results:
There were 21 patients included in the study. 11 patients underwent LILT, 9 underwent STEP and 1 had both a LILT and STEP as their primary lengthening procedures. Median intestinal length at the time of surgery was 40.857cm (12-94cm). There was no difference in gain of intestinal length after LILT (mean 29.50cm) vs. STEP (mean 25.57) $p= 0.6588$. Length of stay and initiation of feeds were similar. There were no acute surgical complications in either group. Serum albumin increased after autologous bowel lengthening ($p<0.001$). 8/11 LILT, 5/9 STEP and 1/1 combined patients (14/21 or 66%) were weaned off TPN. 11 patients had a secondary lengthening procedure and no patients to this time have undergone intestinal transplantation.

Conclusion:
In patients with SBS, LILT and STEP procedures are similarly effective for autologous intestinal reconstruction and enable intestinal rehabilitation. With meticulous medical/surgical management, patients with autologous intestinal lengthening show significant improvement in enteral tolerance and nutritional parameters and can avoid the need for transplant.

Notes:

P26

"A-OK": CHEST RADIOGRAPH DURING PRIMARY SURVEY FACILITATES FASTER, MORE ACCURATE ENDOTRACHEAL TUBE POSITION IN INJURED CHILDREN

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Wake Forest Baptist Health, Winston Salem, NC, USA.

Purpose:
The Advanced Trauma Life Support (ATLS) algorithm postpones radiographic confirmation of endotracheal tube (ETT) placement until the end of the secondary survey. Correct ETT depth is critical in major pediatric trauma, and bedside confirmation techniques may be inaccurate. We hypothesize that early chest X-Ray (CXR) in pediatric trauma resuscitation would overcome the inaccuracies of bedside confirmation and allow faster intervention for improperly positioned ETTs.

Methods:
We implemented a novel algorithm ("A-OK") of immediate CXR following intubation in injured children ≤ 15 years old. Patients were compared to historical controls for baseline characteristics, intubation circumstances, ETT depth accuracy, time to CXR, and time to intervention for improperly positioned ETTs.

Results:
Twenty-eight "A-OK" patients were compared to 25 controls (n=53). The groups did not differ in age, weight, race, gender or mechanism of trauma. Time to first CXR was significantly shorter in the "A-OK" patients (18.4 minutes vs. 27.1 minutes in controls, p=0.01). ETT repositioning was needed in 50% of "A-OK" patients and in 40% of controls. Time to ETT repositioning was significantly shorter in the "A-OK" patients (21.7 minutes vs. 35.2 minutes in controls, p=0.04). "A-OK" patients did not have an increased number of CXRs, an increased time to intravenous access, or delays in circulatory interventions related to earlier CXR. Among all patients <40 kg (n=33), ETT depth prior to CXR matched standard length-based recommendations in only 24.2% of cases. Standard length-based recommendations were accurate in only 63.6% of patients < 40 kg who had appropriate ETT position confirmed on CXR.

Conclusions:
Inclusion of CXR during primary survey leads to more rapid correction of improperly positioned ETTs in injured children. Early CXR is superior to length-based recommendations for ETT depth in smaller children.

Notes:

Poster Session II (cont.)

P27

SURGICAL WOUND CLASSIFICATION IMPROVES BUT REMAINS UNRELIABLE DESPITE MULTIFACETED INTERVENTIONS

Luke R. Putnam, MD[1], Shauna M. Levy, MD, MS[1], Martin L. Blakely, MD, MS[2], Kevin P. Lally, MD, MS[1], Deidre L. Wyrick, MD[3], Melvin S. Dassinger, MD[3], Robert T. Russell, MD, MPH[4], Eunice Y. Huang, MD, MS[5], Adam M. Vogel, MD[6], Christian J. Streck, MD[7], Akemi L. Kawaguchi, MD[8], KuoJen Tsao, MD[1], for the Pediatric Surgical Research Collaborative[1].

[1]Children's Memorial Hermann Hospital, University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Vanderbilt Children's Hospital, Vanderbilt University Medical Center, Nashville, TN, USA, [3]Arkansas Children's Hospital, University of Arkansas for Medical Sciences, Little Rock, AR, USA, [4]Children's of Alabama, University of Alabama Birmingham School of Medicine, Birmingham, AL, USA, [5]Le Bonheur Children's Hospital, The University of Tennessee Health Science Center, Memphis, TN, USA, [6]St. Louis Children's Hospital, Washington University School of Medicine, St. Louis, MO, USA, [7]MUSC Children's Hospital, Medical University of South Carolina, Charleston, SC, USA, [8]Children's Hospital Los Angeles, Keck Medical Center of USC, Los Angeles, CA, USA.

Purpose:
Surgical wound classification (SWC) is unreliable for surgical site infection risk stratification. In a multicenter study, we previously demonstrated overall agreement between hospital-based and reviewer SWC of only 56%. In response, institutions implemented targeted, resource-intensive interventions and hypothesized that SWC reliability would subsequently improve.

Methods:
With a multi-institutional approach, operative notes from 8 common pediatric operations were reviewed to compare the SWC utilizing an AORN/NSQIP-based algorithm to the hospital-based SWC before and after a 1 year intervention interval. During the intervention period, study centers independently performed various SWC interventions. SWC agreement was analyzed with Cohen's kappa and chi-square.

Results:
Of the 11 initial study centers, 8 conducted interventions and provided data for analysis. 2034 cases were reviewed from period 1 and 1415 cases from period 2. Overall SWC agreement improved from 56% to 75% ($p<0.01$) and weighted kappa from 0.45 (95% CI 0.42-0.48) to 0.70 (95% CI 0.67-0.73). Median agreement improved most for appendectomy (12% to 62%, $p<0.01$) and inguinal hernia repair retained the highest agreement (92% to 96%, $p=0.1$). Median (range) improvement per institution was 17% (7-35%). Centers implementing a combination of interventions including standardized SWC documentation timing, SWC-specific education, increased surgeon-nurse communication, and/or SWC-specific checklist modifications demonstrated significant improvement in SWC agreement (Table).

Conclusions:
Multifaceted interventions aimed at surgeon-nurse communication, wound class education, and standardizing processes significantly improved surgical wound class documentation. However, despite intensive efforts, overall agreement remains poor. Whether wound class should continue to be used as a risk modifier for surgical site infection remains a valid question.

Improvement in Surgical Wound Classification Agreement					
Institution	Period 1 Agreement	Period 2 Agreement	Improvement in Agreement	p-value	Interventions*
1	47%	82%	35%	<0.01	SNC, SE, ST, CM
2	55%	80%	25%	<0.01	SNC, SE, ST, CM
3	58%	81%	23%	<0.01	SNC, SE
4	59%	77%	19%	<0.01	SNC, SE, ST, CM
5	49%	64%	15%	<0.01	SE only
6	56%	69%	13%	0.02	SNC, ST
7	66%	76%	10%	0.04	SNC, SE
8	65%	72%	7%	0.14	SE only
*SNC = surgeon-nurse communication; SE = staff education; ST = standardized timing; CM = checklist modifications					

Notes:

P28

NECROTIZING ENTEROCOLITIS IS ASSOCIATED WITH EARLIER ACHIEVEMENT OF ENTERAL AUTONOMY IN CHILDREN WITH SHORT BOWEL SYNDROME

Eric A. Sparks, MD[1], Faraz A. Khan, MD[1], Jeremy G. Fisher, MD[1], Brenna Fullerton, MD[1], Amber Hall[2], Bram P. Raphael, MD[3], Christopher Duggan, MD[3], Biren P. Modi, MD[1], Tom Jaksic, MD[1].

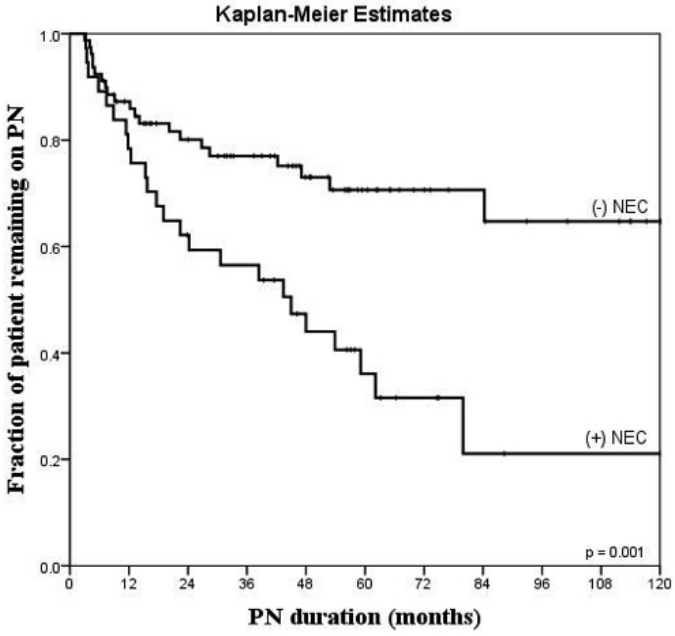
[1]Center for Advanced Intestinal Rehabilitation, Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital, Harvard Medical School, Boston, MA, Boston, MA, USA, [3]Division of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital, Harvard Medical School, Boston, MA, USA.

Purpose:
Necrotizing enterocolitis (NEC) remains one of the most common underlying diagnoses of short bowel syndrome (SBS) in children. The relationship between the etiology of SBS and ultimate enteral autonomy has not been well studied. This investigation sought to evaluate the rate of achievement of enteral autonomy in SBS patients with and without NEC.

Methods:
Following IRB approval, 113 patients (2002-2014) at a multidisciplinary intestinal rehabilitation program were reviewed. The primary outcome evaluated was achievement of enteral autonomy (i.e. fully weaning from parenteral nutrition). Patient demographics, primary diagnosis, residual small bowel length, percent expected small bowel length, median serum citrulline level, number of abdominal operations, status of ileocecal valve (ICV), presence of ileostomy, liver function tests, and treatment for bacterial overgrowth were recorded for each patient.

Results:
Median age at PN onset was 0 weeks [IQR 0-0]. Median residual small bowel length was 32cm [IQR 20-70]. NEC was present in 37 of 113 (32.7%) of patients. 45 patients (39.8%) achieved enteral autonomy after a median PN duration of 15.3 [IQR 7.2-38.4] months. Overall, 64.9% of patients with NEC achieved enteral autonomy compared to 26.7% of patients with a different primary diagnosis ($p=0.001$, Figure 1). Patients with NEC remained more likely than those without NEC to achieve enteral autonomy after two (45.5% vs. 12.0%) and four (35.7% vs. 6.3%) years on PN (Figure 1). Logistic regression analysis demonstrated the following as independent predictors of enteral autonomy: diagnosis of NEC ($p<0.001$), median citrulline level ($p<0.001$), presence of ICV ($p<0.001$), absence of ileostomy ($p=0.004$), lower peak bilirubin ($p=0.009$), and percent expected small bowel length ($p=0.009$).

Conclusions:
Children with SBS due to NEC have a significantly higher likelihood of fully weaning from parenteral nutrition compared to children with other causes of SBS. In addition, they continue to attain enteral autonomy even after prolonged durations of PN support.


Kaplan-Meier Estimates
Fraction of patient remaining on PN
1.0
0.8
0.6
0.4
0.2
0.0
(-) NEC
(+) NEC
p = 0.001
0
12
24
36
48
60
72
84
96
108
120
PN duration (months)

Notes:

Poster Session II (cont.)

P29

CUMULATIVE SUM: AN INDIVIDUALIZED PROFICIENCY METRIC FOR LAPAROSCOPIC FUNDAMENTALS

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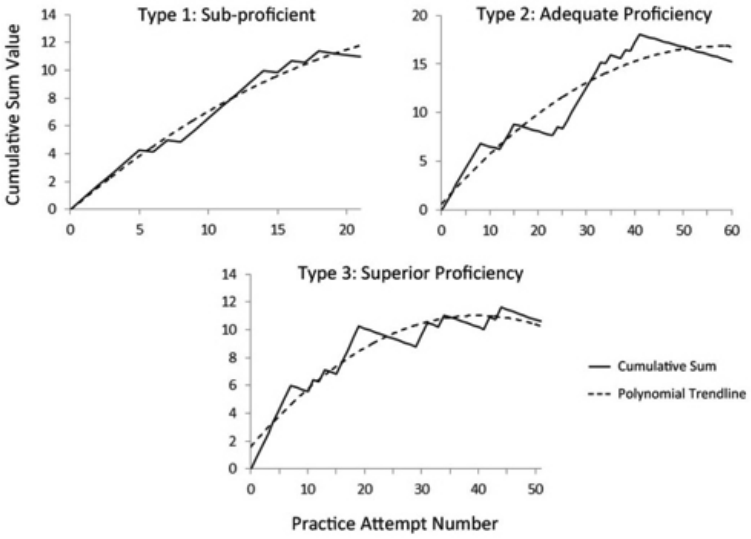
Background/Introduction:
Training paradigms are consistently pressured to produce competent pediatric surgeons in fewer hours with lower costs. Thus, effective proficiency metrics to guide self-directed learning are critical. The purpose of this study is to assess the utility of a novel longitudinal proficiency metric: Cumulative Sum (Cusum). We hypothesized that Cusum can augment self-directed learning within the Fundamentals of Laparoscopic Surgery (FLS) curriculum.

Methods:
Twenty medical students repetitiously practiced three FLS tasks: Peg-transfer, Circle-cut, and intracorporeal Knot-tie. Every attempt was scored using standard FLS criteria. Participants self-dictated practice volume for each task, up to a maximum of 7 combined hours, before an attending-supervised post-test. Task-specific Cusum curves based on repeated performances during practice were categorized into three types based on the terminal slope of fitted trendlines (Figure 1). An up-trending (Type 1) curve indicates inadequate proficiency by traditional Cusum standards. Univariate associations between post-test scores, Cusum curve type, and volume metrics (number of practice attempts, total practice time) were measured using the Wilcoxon rank-sum test.

Results:
Eighteen participants completed the study (90%). Median adjusted post-test scores were 103.2, 85.3, and 81.6 for Peg-transfer, Circle-cut, and Knot-tie, respectively. All trainees achieved Type 3 Cusum curves for Peg-transfer, compared to 72% (13/18) for Circle-cut and only 56% (10/18) for Knot-tie. For Knot-tying, Type 1 curves in practice were associated with lower post-test performance (79.6 vs 83.3, $p = 0.040$), indicating that practice should continue until a Type 2 or Type 3 curve is attained. Conversely, volume metrics were not associated with post-test score on any task, signifying a discord between self-directed practice volume and proficiency.

Conclusions:
Novices are poorly capable of determining what constitutes adequate practice. By setting adaptive training recommendations tailored to the learning rate of each trainee, Cusum promotes efficient time allocation and individualized curricula


Type 1: Sub-proficient
Type 2: Adequate Proficiency
Type 3: Superior Proficiency
Cumulative Sum Value
Practice Attempt Number
Cumulative Sum
Polynomial Trendline

Notes:

Poster Session II (cont.)

P30

RECTOVESTIBULAR FISTULA WITHOUT VAGINA: CLINICAL CHARACTERISTICS AND CHALLENGES

Juan L. Calisto[1], Kimberly Cogley, MSN, MBA[1], Karla Santos, MD[2], Jose Alejandro Ruiz, MD[2], Luis De La Torre, MD[1].

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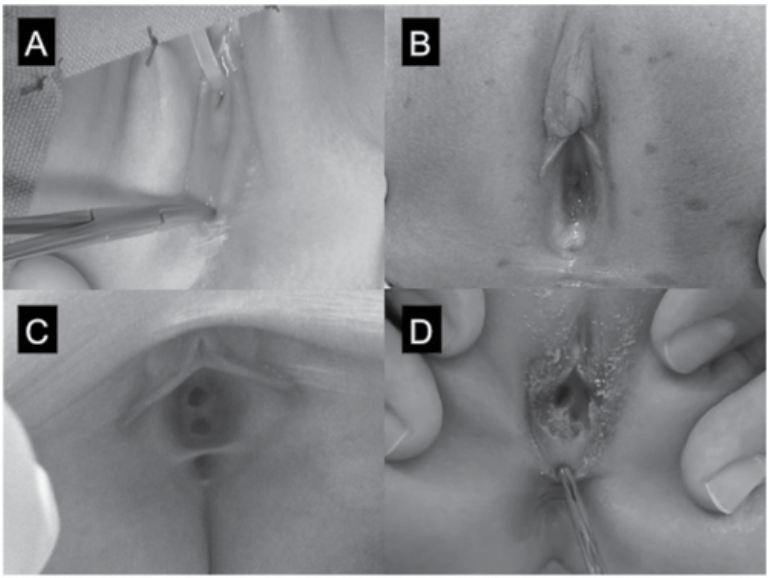
Purpose:
Rectovestibular fistula is one of the most frequent anorectal malformations. Vaginal agenesis occurs in every 5000 births. Rectovestibular fistula associated with vaginal agenesis poses a diagnostic and management challenge. Delays in diagnosis are common due to inadequate perineal evaluation, low index of suspicion or misunderstanding of the anatomy. We analyzed clinical data of seven patients with this association and describe our management.

Methods:
We performed a retrospective chart review of 260 patients with anorectal malformation from our database, collected during the years 2004 - 2013. Forty-three girls with rectovestibular fistula were analyzed to identify patients with associated vaginal agenesis. Age at diagnosis, clinical and surgical characteristics were recorded.

Results:
Seven girls with this association were found, accounting for an incidence of 16% (7/43). Vaginal agenesis was diagnosed before anorectoplasty in four, at the time of repair in two and after the repair in one. Five vaginal replacements were performed using distal ileum. Sacral ratio ranged from 0.3 to 1. All patients had an absent or hypoplastic uterus.

Conclusion:
A high index of suspicion will help avoid oversight in diagnosing this association. Thorough assessment of the vulva as well as internal genitalia in patients with this association is mandatory to identify the urethra, vagina and uterine abnormalities. Delayed vaginal replacement after anorectoplasty is a technically demanding procedure. We recommend performing the replacement during the anorectoplasty. Our results show an increased incidence of this association, 16% compared 9.5% previously reported. This association is rarely recognized and deserves more attention to allow adequate surgical planning and reconstruction.



A. Sixteen month-old, the perineum has two orifices: the urethra (foley) and the fistula (forceps).
B. Four year-old with only urethral opening after neonatal anorectoplasty.
C. Six month-old, the opening between the urethra and fistula is a blind sinus.
D. Newborn, the perineum has two openings, urethra and fistula (probe) but there is no patent vagina.

Clinical characteristics						
Patient	Diagnosis of rectovestibular fistulas	Diagnosis of vaginal agenesis	Delayed diagnosis vaginal agenesis	Colostomy	Anorectoplasty	Vaginal replacement
1	3d	3d	no delay	3d	7m	7m
2	2d	4m	4m	2d	16m	16m
3	3d	6m	6m	3d	11m	11m
4	1d	3y	3y	No	10d	4y
5	5m	7m	2m	5m	7m	11y
6	3m	3m	no delay	3m	to be determined	to be determined
7	1d	6y	6y	1d	6m	to be determined

Notes:

Poster Session II (cont.)

P31

THORACOSCOPIC RESECTION OF CONGENITAL CYSTIC LUNG DISEASE-UTILIZATION AND OUTCOMES IN THE UNITED STATES

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[1]Mayo Clinic Rochester, Rochester, MN, USA, [2]University of Iowa, Iowa City, IA, USA.

Purpose:
To determine if utilization of thoracoscopic resection of congenital cystic lung disease is increasing and if this approach is associated with improved outcomes using a large national sample.

Methods:
Children ≤20 years old who underwent resection of a congenital cystic adenomatoid malformation (CCAM), bronchopulmonary sequestration (BPS), or bronchogenic cyst (BC), were identified from the Healthcare Cost and Utilization Project Kids' Inpatient Database (2009) and Nationwide Inpatient Sample (2008, 2010-2011). Patient characteristics and outcomes, including length of stay (LOS) and complications were compared between thoracoscopic and open approaches using chi square, Fisher's exact, and rank sum tests.

Results:
Thoracoscopic resection was used in 136 (27.4%) of 497 children who underwent resection of congenital cystic lung disease. From year to year, there was no significant increase in utilization of thoracoscopic resection (Table). Type of lung disease or magnitude of resection did not impact approach; however, age <1 year (75.5 vs 67.1%), congenital cardiac conditions (87.9 vs 70.3%), preoperative mechanical ventilation (93.3 vs 71.3%), and care at a children's hospital (77.7 vs 61.1%) were associated with open resection (all p<.05). Mean postoperative LOS was shorter following thoracoscopic resection (4.2 vs. 7.6 days, p<.001). Overall complications were similar between approaches (14.7 vs 17.2%, p=.51). Pulmonary complications were most frequent (13.2 thoracoscopic vs 14.4% open, p=.74), followed by wound complications (1.5 vs. 3.3%, p=.37).

Conclusion:
Utilization of the minimally invasive alternative to open resection of congenital cystic lung disease is relatively low and not increasing over time despite shorter postoperative length of stay combined with similar complication rates.

Characteristics of Children Who Underwent Open vs. Thoracoscopic Resection				
Patient Characteristic		Open	Thoracoscopic	P value
Diagnosis Procedure	CCAM or BC (n=316)	73.1%	26.9%	.81
	BPS (n=157)	71.3%	28.7%	
	Multiple diagnoses (n=24)	75.0%	25.0%	
Procedure (excluding 9 patients who underwent pneumonectomy)	Lobectomy (n=380)	74.2%	25.8%	.13
	Segmental Resection (n=108)	65.7%	34.3%	
Year	2008 (n=94)	71.3%	28.7%	.21
	2009 (n=258)	75.6%	24.4%	
	2010 (n=78)	73.1%	26.9%	
	2011 (n=67)	62.7%	37.3%	

Notes:

Poster Session II (cont.)

P32

PREDICTORS OF OUTCOMES IN PEDIATRIC ADRENOCORTICAL CARCINOMA

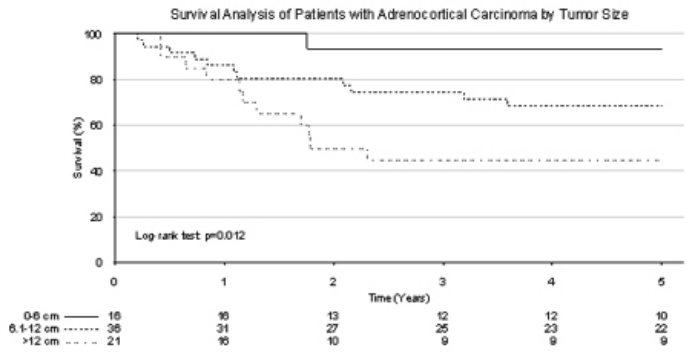
Brian C. Gulack, MD, Kristy L. Rialon, MD, Brian R. Englum, MD, Jina Kim, MD, Lindsay J. Talbot, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.
Duke University, Durham, NC, USA.

Purpose:
Adrenocortical carcinoma (ACC) is a rare neoplasm in childhood which is thought to be a distinct entity from adult disease. We reviewed the National Cancer Data Base (NCDB) to better characterize this tumor in children and to determine prognostic factors for survival.

Methods:
The NCDB was queried for patients less than 18 years of age who were diagnosed with ACC between 1998 and 2011. Demographics, tumor characteristics, operative characteristics, and outcomes were compiled. Kaplan-Meier analysis was used to determine factors significantly associated with survival.

Results:
A total of 130 patients were included (median age: 5 years, 68.5% female). ACC was more common in the youngest cohort, with 48.5% (n=63) of cases occurring in children under the age of 5. Children with ACC were more commonly of higher socio-economic status, with 92.8% (n=116) of patients having private insurance and 40.8% (n=51) living in neighborhoods within the top median household income quartile. Median tumor size was 9.5 cm [Interquartile Range (IQR): 6.9, 13.8). 105 (80.8%) of patients underwent some form of surgical resection, and 45.7% (n=59) were treated with chemotherapy. 19 (30.2%) of 63 children with data presented with metastases. Overall 1-year survival was 83.4% and 5-year survival was 65.2% (95% CI: 55.8%, 76.1%). Patients under the age of five had a survival advantage compared to patients five and older (1-Year survival: 91.3% vs 75.0%, $p<0.001$). Tumor size under 6 cm was a predictor of improved outcome (Figure), as was margin status with 91.1% of patients with negative margins surviving to 1 year compared to 72.7% of patients with positive margins ($p=0.003$). Gender, nodal status, and the presence of metastatic disease were not found to be significant unadjusted predictors of mortality

Conclusion:
Age, tumor size, and margin status are significant predictors of survival in children with adrenocortical carcinoma.


Survival Analysis of Patients with Adrenocortical Carcinoma by Tumor Size
Survival (%)
100
80
60
40
20
0
Log-rank test: p=0.012
0
1
2
3
4
5
Time (Years)
0-6 cm 16 16 13 12 12 10
6.1-12 cm 36 31 27 25 23 22
>12 cm 21 16 10 9 9 9

Notes:

Scientific Session I

Scientific Session I
Trauma and Fetal Medicine
Friday, May 1, 2015, 7:30 a.m. – 9:00 a.m.

1

EXPOSURE TO PRENATAL CONSULTATION DURING PEDIATRIC SURGERY FELLOWSHIP

Loren Berman[1], Rashmi Kabre, MD[2], Anne Kazak, PhD[1], Barry Hicks, MD[1], Francois Luks, MD[3].

[1]A.I. duPont Hospital for Children, Wilmington, DE, USA, [2]Ann and Robert H. Lurie Children's Hospital, Chicago, IL, USA, [3]Hasbro Children's Hospital, Brown University School of Medicine, Providence, RI, USA.

Purpose:
Prenatal consultation is an important skill that should be learned during pediatric surgery training, but there are no formal guidelines for fellowship programs at this time. We sought to characterize the fellowship experience of recent pediatric surgery graduates and assess preparedness for providing prenatal consultation.

Methods:
An anonymous online survey of pediatric surgery fellows graduating in 2012 and 2013 was performed. We asked respondents to describe participation in prenatal consultation and preparedness to perform consultation. We measured demographics and fellowship characteristics and tested associations between these variables and preparedness to perform prenatal consultation.

Results:
A total of 49 out of 80 fellows responded to the survey (61% response rate). Most respondents (55%) saw five or fewer prenatal consults during fellowship, and 20% had not seen any prenatal consults. 47% said that fellowship could have better prepared them to perform prenatal consults. Fellows who saw more than 5 prenatal consults during fellowship (33% vs 77%, $p=0.002$) or described their fellowship as being structured to facilitate participation in prenatal consults (83% vs 27%, $p<0.0001$) were more likely to feel prepared. Stepwise logistic regression revealed that after adjusting for covariates, fellows graduating from programs that were 1) structured to facilitate participation in prenatal consults (OR 18, 95% CI 3.7-86.7), or 2) did NOT have an established fetal program (OR 5.5, 95% CI 1.1-27.8) were more likely to feel prepared.

Conclusion:
Exposure to prenatal consultation varies greatly across pediatric surgery fellowships, and many recent graduates do not feel prepared to perform prenatal consultation. The presence of an established fetal program did not necessarily translate into improved fellow training. Efforts should be made to standardize the approach to fellow education in this area and ensure that adequate guidance and resources are available to recently graduated pediatric surgeons.

Notes:

2

EFFECT OF MULTIPLE COURSES OF MATERNAL BETAMETHASONE ON PRENATAL CONGENITAL LUNG LESION GROWTH AND FETAL SURVIVAL

William H. Peranteau, Nahla Khalek, Julie S. Moldenhauer, Juan Martinez-Poyer, Holly L. Hedrick, Alan W. Flake, Mark P. Johnson, N. Scott Adzick.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose:
A single course of maternal betamethasone improves survival in select fetuses with large congenital lung lesions. We evaluated the effect of multiple courses on the growth of congenital lung malformations and survival in patients with persistently large lesions after initial betamethasone treatment.

Methods:
A retrospective review of patients diagnosed with a congenital lung lesion who received greater than one course of maternal betamethasone from 2003-2014. CCAM volume ratio (CVR) growth rate is the change in CVR over time from initial betamethasone administration to 28 weeks' gestation, the time at which CCAM growth is believed to plateau.

Results:
Eighty-seven patients received maternal betamethasone. Eight patients (9%) (CCAM, N=7; bronchial atresia, N=1) received either one (N=6) or two (N=2) additional courses (Table). Average GA at initial steroid administration was 23±1.8 weeks with 14±7 days between betamethasone courses. Lung lesions continued to grow in 75% of patients (Figure). Hydrops resolved in 40% (2/5) of patients following steroid administration (15 and 53 days post steroids). Overall survival was 63% (5/8). 40% of patients with hydrops survived including one patient with persistent hydrops requiring open fetal resection for lobar bronchial atresia. This compares to historical survivals of 0 and 44% in nontreated controls with hydrops and CVR>1.6 respectively and 100% in fetuses with hydrops/CVR>1.6 who responded to a single course of betamethasone.

Conclusion:
Fetuses who fail to respond to a single course of maternal betamethasone may benefit, as indicated by improved survival, from additional courses. However, failure to respond to the initial course is indicative of a lesion which is less responsive to betamethasone and may require fetal or immediate neonatal resection.

Table 1. Study population

Patient	CVR prior to steroid 1	CVR prior to steroid 2	CVR prior to steroid 3	Hydrops	Hydrops resolution	Outcome
1	2.8	2.9		no	N/A	neonatal resection; alive
2	2.4	3.7	3.4	yes	yes	EXIT; neonatal demise
3	2.1	2.5		yes	no	neonatal demise
4	1.6	3.2		yes	no	fetal resection; alive
5	1.8	2.2		no	N/A	neonatal resection; alive
6	2.3	2.4	3.0	yes	no	fetal demise
7	1.9	3		yes	yes	neonatal resection; alive
8	3.4	2.9		no	N/A	awaiting resection; alive

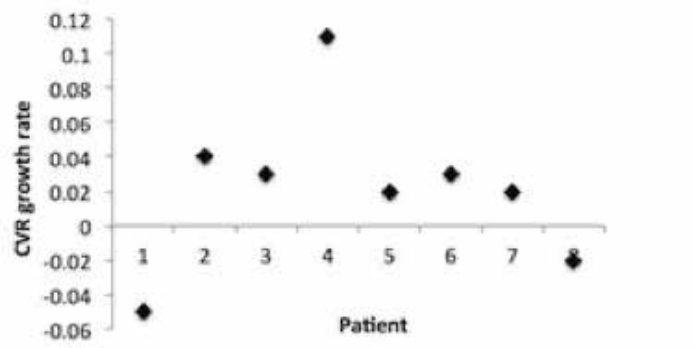


Figure 1. CVR growth rate following multiple courses of maternal betamethasone administration. "Positive" values indicate an increase in lesion size from time of initial steroid dose to 28 weeks' gestation.

Notes:

3

PEDIATRIC EMERGENCY DEPARTMENT THORACOTOMY FOR BLUNT TRAUMA: AN ANALYSIS OF THE NATIONAL TRAUMA DATA BANK 2007-2012

Katherine T. Flynn-O'Brien[1,4], Barclay Stewart, MD, MPH[1], Mary E. Fallat, MD[2], Ronald V. Maier, MD[3], Saman Arbabi, MD, MPH[3,4], Fred P. Rivara, MD, MPH[4], Lisa McIntyre, MD[3].

[1]University of Washington, Seattle, WA, USA, [2]Kosair Children's Hospital, Louisville, KY, USA, [3]Harborview Medical Center, Seattle, WA, USA, [4]Harborview Injury Prevention and Research Center, Seattle, WA, USA.

Purpose:
To determine the chances of survival in a national study of pediatric patients with blunt trauma undergoing emergency department thoracotomy (EDT).

Methods:
A retrospective review of the National Trauma Data Bank was performed from 2007-2012 to identify children < 18 years of age who underwent EDT for blunt trauma.

Results:
A total of 84 children < 18 years of age were identified as having EDT after blunt trauma. Between 2007 and 2012, EDT was performed at 57 different facilities, with no single facility doing more than two per year. Every child died during their hospitalization. Sixty-five percent of the population was male, with a median age of 15 (IQR 6-17) years. Mean injury severity score (ISS) across all children was 34.2 (SD 20.8), with 56.0% having an ISS of 26-75. Sixty percent of patients died in the emergency department (ED). Of those who survived to the operating room (OR), 65.6% died on the table. Only four children (4.8%) survived more than 24 hours in the intensive care unit (ICU), all of whom expired during their hospitalization. Data for "signs of life" upon arrival only was coded starting in 2011, and was available for 21 patients, of whom 6 (28.6%) had no signs of life but subsequently underwent EDT.

Conclusion:
Based on this limited dataset, there are no survivors after EDT for blunt trauma in the pediatric population. Usual indicators for EDT in adults may not apply in children. We conclude the use of EDT for pediatric blunt trauma should be discouraged without compelling evidence of a reversible cause of extremis**.**

Notes:

4

RISK-STRATIFICATION OF SEVERITY FOR INFANTS WITH CDH: PRENATAL VERSUS POSTNATAL PREDICTORS

Adesola C. Akinkuotu, Stephanie M. Cruz, MD, Paulette I. Abbas, MD, Timothy C. Lee, MD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD, Christopher I. Cassady, MD, Amy R. Mehollin-Ray, MD, Rodrigo Ruano, MD, PhD, Michael E. Belfort, MD, PhD, Darrell L. Cass, MD.

Texas Children's Hospital, Baylor College of Medicine, Houston, TX, USA.

Purpose:
Recently, the CDH study group database was used to develop a clinical prediction model for mortality based on postnatal parameters in neonates with CDH. The purpose of this study was to apply this model to a cohort of patients treated at our fetal center and to compare the prediction accuracy to risk-stratification based on fetal imaging-based markers of disease severity.

Methods:
We performed a retrospective review of all CDH patients treated at a tertiary fetal center from January 2004 to January 2014. Prenatal data obtained included lung-to-head ratio (LHR), observed/expected-total fetal lung volume (O/E-TFLV) and percent liver herniation (%LH). Based on CDH Study Group predictive model based on postnatal findings, neonates were categorized as low, intermediate and high risk of death. The primary outcome was mortality at 6 months.

Results:
Of 189 CDH patients, 64 had a major cardiac anomaly and 28 had a genetic anomaly. 53 (28%) patients died at a median of 14 days of life. Patients with O/E-TFLV <35% and %LH>20% were at increased risk of mortality (Table 1). Based on the postnatal-based model there was a significant difference in mortality between low, intermediate and high-risk groups (4% vs.26% vs. 68%; $p<0.001$). With ROC analysis, O/E-TFLV<35% had the highest AUC (0.76, $p<0.001$) with a sensitivity and specificity of 91.8% and 53.5%, respectively. On multivariate regression, O/E-TFLV<35% was the best predictor; associated with a 9.7-fold increase in mortality ($p=0.036$).

Conclusions:
The postnatal CDH score provides good discrimination among three risk groups in our patient cohort. However, the prenatal MRI-based O/E-TFLV is the strongest predictor of 6-month mortality in CDH patients.

Comparison of prenatal and postnatal predictors of mortality between CDH survivors and non-survivors				
Variable	Survivor (n=136)	Non-survivor (n=53)	% Survival	p-value
LHR >1.4 1-1.4 <1.4	58 19 13	10 14 11	85% 58% 54%	0.001
O/E-TFLV >35% <35%	46 39	3 33	94% 54%	<0.001
Liver herniation 0% 1-20% >20%	54 26 26	4 5 17	93% 84% 61%	<0.001
Post-natal model based CDH risk group Low Intermediate High	48 63 25	2 22 29	96% 74% 54%	<0.001
** Postnatal parameter-based clinical prediction model: +1 for low birth weight (<1500g), + 1 for low Apgar (<7), + 2 for missing Apgar, +2 for severe pulmonary hypertension (right-to-left shunting or suprasystemic pulmonary pressure), + 2 for major cardiac anomaly (any anomaly other than patent foramen ovale or ductus arteriosus), +1 for chromosomal anomaly. Patients were stratified into low, intermediate and high risk of death (0: low, 1-2: intermediate, ≥3: high).				

Notes:

5

THE FACTORS ASSOCIATED WITH ELECTIVE TERMINATION OF PREGNANCY OF FETUSES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Sonia Thomas, BSc[1], **Jean-Martin Laberge**[2], Robert Baird, MD, MSc[2], Maria Lalous, MSc[1], Erik Skarsgard, MD, MSc[3].

[1]Jewish General Hospital, McGill University, Montreal, QC, Canada, [2]Montreal Children's Hospital, McGill University, Montreal, QC, Canada, [3]BC Women's and Children's Hospital, Vancouver, BC, Canada.

Purpose:
Multiple factors may affect the decision of termination of pregnancy (TOP) after the prenatal diagnosis of congenital diaphragmatic hernia (CDH). We hypothesized that a low Lung-to-Head-ratio (LHR) is an independent risk factor for TOP.

Methods:
With REB approval, a large prospectively collected database was analysed for factors potentially associated with TOP, including maternal (age, parity, ethnicity, gestational age at diagnosis); fetal (LHR, gender, associated anomalies) and "system" (Center volume, region). Statistical analysis proceeded with univariate followed by multivariable regression analysis for covariates of $p \leq 0.1$, expressed as an adjusted odds ratio (AOR) and 95% confidence interval [95%CI].

Results:
Over an 8-year period, 498 patients with complete files were entered in the database. Groups compared were TOP (n=56) and non-TOP with prenatal diagnosis (n=305), yielding a termination rate of 15.5%. Of all patients with prenatal diagnosis, 127/361 (35%) had LHR recorded. No maternal or system factors were found to significantly predict TOP rates, while fetal LHR and the presence of associated anomalies were found to be significant (figure 1). On multivariable analysis, associated malformations (AOR [95%CI] = 9.43[4.24, 20.8] chromosomal/cardiac/CNS vs. none; AOR [95%CI] = 4.52[1.56, 13.2] other malformations vs. none) and LHR<1 (AOR [95%CI] =7.62[2.18, 26.6] vs. LHR≥1) remained predictive of TOP.

Conclusion:
While the presence of concomitant anomalies unsurprisingly increased Termination of Pregnancy rates, Lung-to-Head-Ratio also appears to independently play a role in prenatal decision-making. Internal validation of LHR is important in order to provide site-specific counselling.

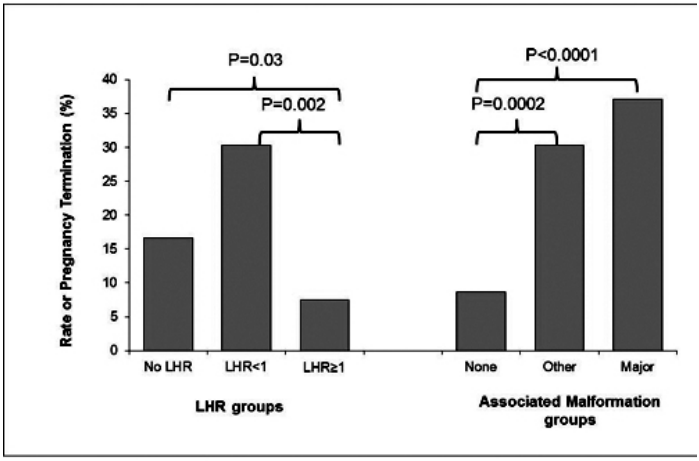


Figure 1. The relationship of pregnancy termination with Lung Head Ratio (LHR) groups and associated malformations. Major malformations comprise Chromosomal, Cardiac or CNS, while 'Other' represent Genitourinary, Skeletal, other, or Unspecified associated malformation.

Notes:

6

TRANS-AMNIOTIC STEM CELL THERAPY (TRASCET) MITIGATES INTESTINAL DAMAGE IN A MODEL OF GASTROSCHISIS

Christina Feng, MD, Christopher D. Graham, MD, John P. Connors, BS, Joseph Brazzo III, MS, Amy HS Pan, BA, James R. Hamilton, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.

Boston Children's Hospital and Harvard Medical School, Boston, MA, USA.

Purpose:
Morbidity from gastroschisis stems primarily from bowel damage sustained during prolonged intra-uterine exposure to amniotic fluid. Mesenchymal stem cells have been shown to minimize tissue damage in a variety of settings. We sought to determine whether intra-amniotic delivery of large amounts of amniotic-derived mesenchymal stem cells (afMSCs) could reduce bowel damage in the setting of gastroschisis.

Methods:
A gastroschisis was surgically created in 117 rat fetuses at 17-18 days of gestation (term=21-22 days). Animals were then divided into three groups. One group (untreated; n=62) had no further manipulations. Two groups received volume-matched intra-amniotic injections of either saline (n=25) or a suspension of $2x10^6$ cells/mL of afMSCs (n=30) at the time of operation. Infused afMSCs consisted of syngeneic rat cells with identity confirmed by flow cytometry for CD29, CD44, CD45, CD73, and CD90 expressions, labeled with fluorescent cytoplasmic nanocrystals. Non-manipulated fetuses served as normal controls (NL). Animals were killed before term for analyses. Comprehensive computerized measurements of total and segmental (serosa, muscularis, and mucosa) intestinal wall thicknesses - established surrogates for bowel damage in gastroschisis - were performed by two blinded observers. Statistical comparisons were by ANOVA ($P<0.05$).

Results:
Overall survival was 25%. Among survivors with gastroschisis, there were statistically significant decreases in total bowel wall, serosal, muscular, and mucosal thicknesses in the afMSC group vs. the untreated group (P=0.001/0.035/0.001/0.005, respectively) and vs. the saline group (P=0.003/0.05/<0.001/0.026, respectively). There no differences between the afMSC group and NL, except for a significantly thicker muscular layer in the afMSC group (P=0.014). There were no differences between the untreated and saline groups. Labeled cells were identified in the afMSC group, albeit scarcely, suggesting a paracrine effect.

Conclusions:
Amniotic mesenchymal stem cells mitigate bowel damage in experimental gastroschisis after concentrated intra-amniotic injection. Trans-amniotic stem cell therapy (TRASCET) may become a practical component of the treatment of gastroschisis.

Notes:

7

CAN PRENATAL OMPHALOCELE RATIO DETERMINE POSTNATAL OUTCOMES? ASSESSMENT OF POSTNATAL MORBIDITY, QUALITY OF LIFE AND LONG-TERM FOLLOW-UP

Jason Fawley, MD[1], Erika Peterson, MD[2], Melissa Christensen[1], Amy Wagner, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Medical College of Wisconsin, Milwaukee, WI, USA.

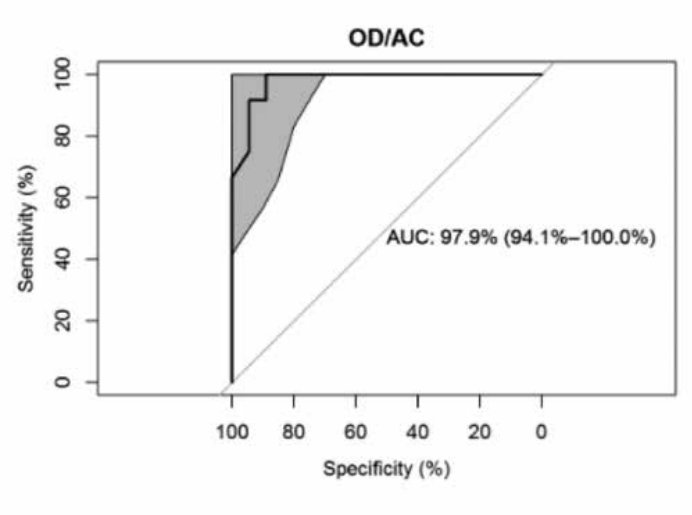
Purpose:
The clinical course of patients with omphalocele is challenging to predict and variable. There is no standard method to characterize omphalocele size. Previous studies suggest that the ratio of abdominal circumference to omphalocele defect *in-utero* is indicative of postnatal outcomes. We hypothesize that omphalocele ratio correlates with outcomes of primary closure versus staged closure. Secondary outcomes are time to full enteric feeds, length of mechanical ventilation, and length of stay.

Methods:
Retrospective review of all neonates diagnosed with omphalocele from 2002-2013 with prenatal ultrasounds available (n=30). Omphalocele ratio is defined as omphalocele diameter to abdominal circumference (OD/AC). Data collected included ability to primarily close versus staged repair. Additionally, time to full feeds, ventilation, and length of stay were assessed. Long-term outcomes and quality of life is also reported.

Results:
ROC curve analysis generated optimal OD/AC ratio of 0.26 (Sensitivity - 100; Specificity - 88.9; PPV - 85.7; NPV - 100; AUC - 0.979). 20 of 30 patients had a ratio less than this cutoff. 60% (12/20) in the low-ratio group achieved primary closure compared to zero (0/10) in the high-ratio group (p=0.001). Time on mechanical ventilation was 15.8 days (low-ratio) versus 79 days (high-ratio) (p=0.02). LOS was 33.8 days (low-ratio) versus 85.6 days (high-ratio) (p=0.03). Pediatric Quality of Life Inventory™ mean score was 85.5 ± 11.0 (n=20) at long-term follow-up. Median length of follow-up was 806 days (range 21-3319). Readmission rates yielded no difference between groups.

Conclusion:
The omphalocele ratio is a promising predictor of postnatal outcomes. However, prospective studies are needed to elucidate its potential.

Outcomes			
	Ratio <0.26	Ratio >0.26	p Value
Primary Closure	12/20 (60%)	0/10 (0%)	0.001
Days on Mechanical Venilation	15.8	79.0	0.02
Length of Stay	Mean: 33.8 Median: 21 [3-152]	Mean: 85.6 Median 52.5 [10-274]	0.03
Days to Full (Enteric) Feeds	14.3	23.3	0.25
Days on TPN	13.2	47.5	0.09


OD/AC
Sensitivity (%)
100
80
60
40
20
0
AUC: 97.9% (94.1%–100.0%)
100
80
60
40
20
0
Specificity (%)

Notes:

8

DIFFERENCES IN TRAUMA EVALUATION AND TREATMENTS BETWEEN ADULT AND PEDIATRIC TRAUMA CENTERS FOR SEVERLY INJURED ADOLESCENTS

Ashley E. Walther[1], Richard Falcone, MD, MPH[2], Timothy Pritts, MD[1], Dennis Hanseman, PhD[1], Bryce Robinson, MD[1].

[1]University of Cincinnati, Cincinnati, OH, USA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

Purpose:
To investigate differences in imaging, treatment, and clinical outcomes of severely injured adolescents treated at adult (ATC) versus pediatric trauma centers (PTC).

Methods:
The National Trauma Database was queried for adolescents 15-19 years old with a length of stay (LOS) >1 day and ISS >25 treated at ATC (Level 1) or PTC (Level 1) from 2007-20111. Age, gender, race, mechanism of injury, admission vital signs, Glasgow Coma Score (GSC) totals, and Injury Severity Score (ISS) were reviewed. The utilization of imaging and invasive procedures was compared. Outcome comparisons were made between groups.

Results:
Of 12,861 adolescents examined, (89% blunt, 11% penetrating) 51% were treated at ATC. Older age and higher proportions of non-Caucasian were seen at ATC ($p<0.01$). No significant differences were found for gender, admission GCS, and ISS between centers. Imaging, including CT of the head, chest, and abdomen and abdominal U/S was more common at ATC (Table 1). With the exception of chest tube insertion, invasive procedures were more common at ATC and included exploratory laparotomy, thoracotomy, ventriculostomy, and craniotomy (Table 1). Intracranial pressure monitoring was more common at PTC. ICU ($p<0.01$) and hospital ($p=0.03$) LOS were shorter for adolescents treated at PTC. More adolescents treated at PTC versus ATC were discharged home ($p<0.01$). There was no difference in ventilator days ($p=0.08$) or mortality ($p=0.57$).

Conclusions:
Severely injured adolescents experience shorter lengths of stay, increased rates of home discharge, decreased invasive procedures, and reduced imaging when treated at pediatric trauma centers. The data supports that PTC should be considered an appropriate destination for severely injured adolescents.

Scientific Session I (cont.)

Differences in Imaging and Treatment of Adolescents at ATC versus PTC			
	ATC (n=6582)	PTC (n=6279)	p-value
CT Head	37.8%	26.4%	<0.01
CT Chest	26.7%	21.4%	<0.01
CT Abdomen	41.4%	28.8%	<0.01
U/S Abdomen	16.2%	5.1%	<0.01
Exploratory Laparotomy	13.9%	11.5%	<0.01
Thoracotomy	1.6%	1.1%	0.01
Ventriculostomy	8.2%	6.8%	<0.01
Craniotomy	8.2%	5.8%	<0.01
ICP Monitoring	6.4%	7.8%	<0.01

Notes:

9

DESMOPLASTIC SMALL ROUND CELL TUMOR TREATED WITH CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY: RESULTS OF A PHASE 2 TRIAL

Andrea A. Hayes-Jordan, Holly Green, Lianchun Xiao, Keith Fournier, Winston Huh, Cynthia Herzog, Joseph Ludwig, Mary McAleer, Peter Anderson.

MD Anderson Cancer Center, Houston, TX, USA.

Purpose:
Desmoplastic Small Round Cell Tumor (DSRCT) is a rare sarcoma of childhood and adolescents. Overall survival is estimated 15%. HIPEC is a novel treatment for children with up to hundreds of intra-abdominal metastases.

Methods:
Patients aged 22 months to 50 years were enrolled on a phase 2 trial of cytoreductive surgery and HIPEC using Cisplatin, in DSRCT and other sarcomas. All patients received neoadjuvant chemotherapy. All but one patient received adjuvant chemotherapy.

Results:
From January 2012 to December 2013, accrual was met and 20 patients were enrolled. Of 20 patients, 14 had DSRCT. DSRCT patients had a longer OS than patients with other sarcomas. 1-year overall survival rate was 93% (95% CI: 0.8, 1) for DSRCT patients and 67% (95% CI: 0.3, 1) for other sarcoma patients. (p=0.0073) The median survival was not reached for DSRCT patients. DSRCT patients had a longer RFS time than patients with other sarcomas (p=0.0029) Three DSRCT patients relapsed in the abdomen, for a 77% local control rate. The overall survival for DSRCT patients was 80% (95% CI: 0.57, 1) at 2 years. On further analysis, these patients were included in a larger cohort of 56 DSRCT patients who had HIPEC. Patients with only one tumor implant had a 3-year overall survival of 100%; >2-~400 implants 71%; abdominal and liver metastasis, 40%; and disease outside of the abdomen, 31%. Patients without extra-abdominal disease had a lower risk of death or disease recurrence compared to those with distant metastases (HR=0.31, 95% CI of 0.12 to 0.79, p=0.014). Patients with incomplete resection (HR=4.79, p=0.03) had a higher risk of death and patients without liver disease (HR=0.43, p=0.046) had a lower risk of death.

Conclusions:
HIPEC is an effective therapy for DSRCT patients. Prolonged survival can be achieved with complete resection. HIPEC in DSRCT should be evaluated in a randomized trial.

Notes:

Scientific Session II

Scientific Session II
Clinical Surgery
Friday, May 1, 11:30 a.m. – 12:45 p.m.

10

SURGICAL OUTCOMES, STOOLING HABITS AND QUALITY OF LIFE IN EXTREMELY YOUNG PATIENTS AFTER ILEOANAL ANASTAMOSIS FOR ULCERATIVE COLITIS

Jennifer L. Knod[1], Monica Holder[1], Alex Cortez[2], Bruno Martinez-Leo, MD[1], Patricia Kern[1], Shehzad Saeed, MD[3], Brad W. Warner, MD[4], Belinda H. Dickie, MD[1], Richard Falcone, MD[1], Daniel von Allmen, MD[1], Jason S. Frischer, MD[1].

[1]Colorectal Center, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]University of Cincinnati,Cincinnati, OH, USA, [3]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [4]Division of Pediatric Surgery, Department of Surgery, St. Louis Children's Hospital, St. Louis, MO, USA.

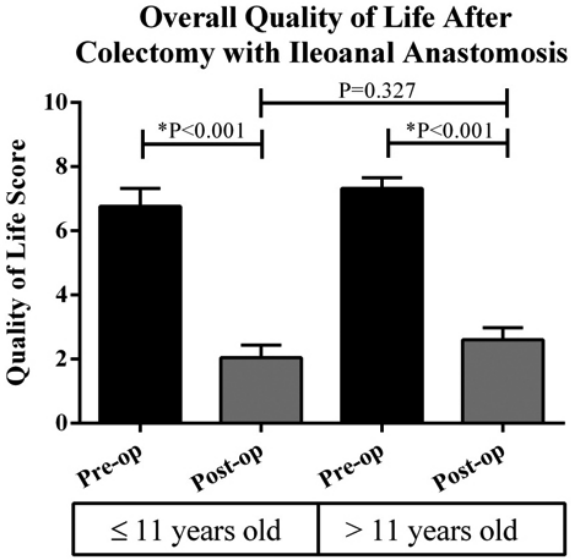
Purpose:
We aim to investigate extremely young ulcerative colitis (UC) patients after surgical intervention regarding their post-operative outcomes, bowel habits and quality of life (QoL).

Methods:
Medical records of ulcerative colitis patients after colectomy with ileoanal reconstruction (2002-2013) at our institution were reviewed. Patients/parents completed a QoL (ranging 0-best to 10-worst, assessing physical, social and psychological aspects), bowel habits and disease course questionnaire, then compared younger (age ≤11, n=26) to older (age >11, n=38). Data was analyzed by t-test or Fisher's exact test, expressed as mean±SEM with significance of P≤0.05.

Results:
The mean age at colectomy was 7.04±0.63 vs 14.71±0.32 in the two groups. A change in diagnosis, often to Crohn's disease (CD), occurred in 13-15% of patients (P=0.705). Follow-up (months) was similar between groups (19.03±5.36 younger vs 14.31±2.65 older, P=0.391). Rate of pouchitis was similar between younger (23.8%) and older (29.4%) patients, as was post-operative small bowel obstruction (Table1). Dehydration was slightly increased in the younger population, 15% vs 5%. Anastomotic leak (7.7% vs 10.5%) and stricture (11.5% vs 21.1%) rates were reduced in younger patients. Questionnaire return rate was high (71%). Both age groups expressed a significant and similar improvement in QoL (Fig.1) after surgery (6.76±0.56 to 2.05±0.39 in younger and 7.32±0.33 to 2.6±0.379 older cohorts). Patients had a significant reduction in stooling frequency compared to pre-colectomy in younger (P<0.001) and older (P<0.001) patients.

Conclusions:
A colectomy with ileoanal anastomosis for extremely young children (≤11 years old) with UC is without increased complications relative to older patients, even a slightly decreased anastomotic stricture and leak rate, and offers similar improvement in quality of life and stooling patterns.

Demographics and outcomes after colectomy and ileoanal anastomosis for ulcerative colitis.						
	≤11 yo Cohort		P-value	>11yo Cohort		P-value
Age at Colectomy	7.04 ± 0.64 (2-11)			14.71 ± 0.32 (12-18)		*P<0.001
Year of Initial Surgery	2010 ± 0.48 (2004-2012)			2009 ± 0.51 (2002-2013)		P=0.647
Pouchitis	5 (23.8%)			10 (29.4%)		P=0.761
Anastomotic Leak	2 (7.7%)			4 (10.5%)		P=1
Anastomotic Stricture	3 (11.5%)			8 (21.1%)		P=0.502
Small Bowel Obstruction	5 (19.2%)			9 (23.7%)		P=0.765
Dehydration	4 (15.4%)			2 (5.26%)		P=0.213
	Pre-op	Post-op		Pre-op	Post-op	
Daily Stooling Frequency	12.89 ± 1.86	4.61 ± 0.47	*P<0.001	14.74 ± 1.91	5.04 ± 0.29	*P<0.001



Notes:

11

PEDIATRIC SURGICAL CARE IN THE HUMANITARIAN SETTING: THE MEDECINS SANS FRONTIERES EXPERIENCE IN 2012-2013

Maeve O'Neill Trudeau, MD[1], Emmanuel Baron, MD[2], Patrick Herard, MD[3], Amy Labar, MPH[4], Xavier Lassalle, MS[3], Carrie Lee Teicher, MD, MPH[4], David H. Rothstein, MD, MS[5].

[1]University of Toronto, Toronto, ON, Canada, [2]Epicentre, Paris, France, [3]Médecins Sans Frontières (France), Paris, France, [4]Epicentre, New York, NY, USA, 5Médecins Sans Frontières (USA), New York; Women & Children's Hospital of Buffalo, Buffalo, NY, USA.

Purpose:
To characterize pediatric surgical care provision by a major non-governmental organization (NGO) in specialized humanitarian settings and conflict zones as a means to better inform surgical humanitarian responses. Pediatric surgeries have not routinely been reported in previous humanitarian surgery case series.

Methods:
Surgical interventions carried out by Médecins Sans Frontières, Operational Centre Paris in 2012-2013 were categorized by indication and type of operation, and crude peri-operative mortality rates (CMR) were derived. Interventions were stratified by age group to qualify the distribution of cases.

Results:
59,741 surgical interventions were performed in dedicated trauma, obstetric and reconstructive centers over two years. 17,996 (30.1%) were pediatric (<13 years), and 4,562 (7.6%) were youth (13-17 years) (Table 1). The proportion of violence-related injuries in the pediatric group was significantly lower than in the youth group (4.8% vs 17.5%, respectively, $p<0.0001$). (Pediatric vs Youth comparisons all $p<0.0001$ by Chi-square analysis)

Conclusions:
This study provides an overview of pediatric surgical interventions by a major NGO working in specialized, resource-poor settings. This represents one of the first overviews of pediatric surgery delivery in humanitarian settings. Burns, other accidental injuries and infection comprised the bulk of indications in the pediatric age group, while interventions in the youth age group were principally trauma-related – expertise in these fields should be expected as part of professionalization of humanitarian surgical interventions. Further work is needed to examine long-term outcomes of pediatric surgeries in these settings. Moreover, context-specific surgical competency requirements may vary with population factors, requiring further qualitative and quantitative elaboration.

Table 1. Summary of MSF OCP Pediatric and Youth Surgical Caseloads

		Pediatric (<13 years)	**Youth (13-17 years)**
	Total cases (% overall)	17,996 (30.1%)	4,562 (7.6%)
	Crude mortality rate	0.07%	0.15%
Mechanism of	Burn	50.1%	22.9%
Injury	Abscess	23.4%	18.4%
	Trauma	21.2%	36.0%
	Violence (subset)	4.8%	17.5%
Type of	Wound surgery	49.4%	30.4%
Intervention	Minor surgery	36.8%	28.3%
	Gyn/OB, Urology	0.7%	18.6%
	Orthopedic	6.2%	10.5%

Notes:

12

ALTERED FECAL SHORT CHAIN FATTY ACID METABOLISM IN CHILDREN WITH A HISTORY OF HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS

Farokh R. Demehri[1], Philip K. Frykman[2], Zhi Cheng[2], Chunhai Ruan[1], Tomas Wester[3], Agneta Nordenskjold[3], Akemi Kawaguchi[4], Thomas T. Hui[5], Anna L. Granstrom[3], Vince Funari[2], Daniel H. Teitelbaum[1].

[1]University of Michigan, Ann Arbor, MI, USA, [2]Cedars-Sinai Medical Center, Los Angeles, CA, USA, [3]Karolinska University, Stockholm, Sweden, [4]Children's Hospital Los Angeles, Los Angeles, CA, USA, 5Children's Hospital Oakland, Oakland, CA, USA.

Purpose:
Children with Hirschsprung's disease(HD) with enterocolitis(HAEC) develop active colonic inflammation. As short chain fatty acids(SCFA) play a critical role in preserving colonic epithelium, we hypothesized that HAEC alters fecal SCFA composition. This study examined SCFA production in HD and then correlated composition with SCFA-producing microbial populations.

Methods:
An IRB-approved study enrolled 18 HD children (3 months-7.6 years), screening medical records for antibiotic/probiotic use and enterocolitis symptoms. HAEC status was determined per Pastor, et al. criteria and patients with active HAEC were excluded. Fresh feces was collected, and SCFA analysis performed via solvent extraction followed by gas chromatography-mass spectrometry. Absolute quantities of SCFAs were normalized to sample mass. Results (mean±SEM) were analyzed for significance by t-test.

Results:
Nine patients met HAEC criteria and were matched to non-HAEC HD patients by age, length of aganglionosis, feeding type and antibiotic/probiotic received. Fecal SCFA composition of HAEC children showed a 4-fold decline in total SCFA concentration vs. non-HAEC HD patients (56.98±14.10 mM/g stool vs. 255.20±86.57 mM/g; p=0.038; **Fig. A**), as well as an absolute reduction in acetate (34.03±13.47 mM/g vs. 224.59±88.70 mM/g; p=0.049). We then compared the composition of individual SCFAs (expressed as %total SCFAs), and found significantly reduced acetate (46.70±9.96% vs. 78.66±6.36%; p=0.016) and increased butyrate (24.99±5.21% vs. 6.75±2.47%; p=0.006) in HAEC children (**Fig. B**). Finally, we compared our previously reported microbiome pyrosequencing data to SCFA composition. Interestingly, 10 of 12 butyrate-producing strains identified by 16S sequencing markedly increased with HAEC (**Fig. C)**, with mean increase of 638.98%.

Conclusion:
Children with HAEC history have markedly reduced fecal SCFAs, and altered SCFA profile. The significant butyrate increase was associated with altered colonic microbiota composition, potentially representing an adaptive response to colits. These findings suggest a complex interplay between altered local environment and changes in intestinal microbiota, which may influence the pathogenesis of HAEC.

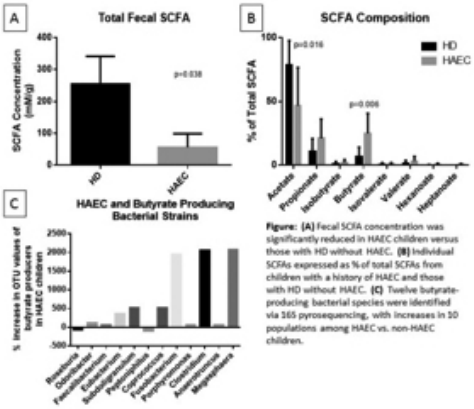


Figure: **(A)** Fecal SCFA concentration was significantly reduced in HAEC children versus those with HD without HAEC. **(B)** Individual SCFAs expressed as % of total SCFAs from children with a history of HAEC and those with HD without HAEC. **(C)** Twelve butyrate-producing bacterial species were identified via 16S pyrosequencing, with increases in 10 populations among HAEC vs. non-HAEC children.

Notes:

13

LAPAROSCOPIC GASTROSTOMY AND FUNDOPLICATION IN PATIENTS WITH HYPOPLASTIC LEFT HEART SYNDROME: A SINGLE-CENTER EXPERIENCE

Brian T. Craig, MD, Eric J. Rellinger, MD, Bret A. Mettler, MD, Scott C. Watkins, MD, Dai H. Chung, MD.

Vanderbilt Children's Hospital, Nashville, TN, USA.

Purpose:
Patients with hypoplastic left heart syndrome (HLHS) experience feeding difficulties, failure to thrive, and a higher risk for complications from gastroesophageal reflux, resulting in the frequent need for gastrostomy and fundoplication. Laparoscopic approach for these procedures has become the standard for pediatric patients; however, its safety in HLHS is relatively unknown. We sought to determine the perioperative physiologic burden of a laparoscopic gastrostomy and/or fundoplication in HLHS patients.

Methods:
IRB approval was obtained, and the records of all HLHS patients at our institution over an 8-year period was reviewed. Demographics, intra- and post-operative blood pressure, oxygen saturation and heart rate were evaluated according to specified criteria.

Results:
Among 183 children who had a Norwood palliation procedure, 89 underwent gastrostomy and/or fundoplication. Fifteen patients underwent laparoscopic approach between stage I and stage II HLHS palliation. Median age at time of laparoscopic operation was 73 days (IQR: 46-113), and was performed a median of 64 days (IQR: 32-100) after Norwood procedure. Mean operative time was 99.2 minutes. Seven patients (46.7%) experienced hemodynamic instability during the operation. Seven patients (46.7%) exhibited postoperative need for increased respiratory or hemodynamic support. There was only one death (6.7%) within 30 days of operation, from an undetermined etiology. One patient (6.7%) required extracorporeal membrane oxygenation postoperatively after experiencing precipitous intraoperative hypoxemia that persisted despite termination of the procedure and ventilator manipulations.

Conclusions:
Patients with HLHS represent an important cohort whose survival is a key benchmark for evaluating pediatric cardiac surgical centers, and therefore warrant careful study of outcomes for the general surgical procedures they require. Perioperative hemodynamic instability during laparoscopic gastrostomy and fundoplication was common (46.7%), but was associated with a low rate of significant morbidity in the perioperative period. These findings highlight the relative safety of a laparoscopic approach for this high-risk population.

Notes:

14

ILEOSTOMY PROLAPSE IN CHILDREN WITH INTESTINAL DYSMOTILITY

Eric A. Sparks[1], Brenna Fullerton, MD[1], Amber Hall[2], Jeremy G. Fisher, MD[1], Faraz A. Khan, MD[1], Tom Jaksic, MD[1], Lenoel Rodriguez, MD[3], Biren P. Modi, MD[1].

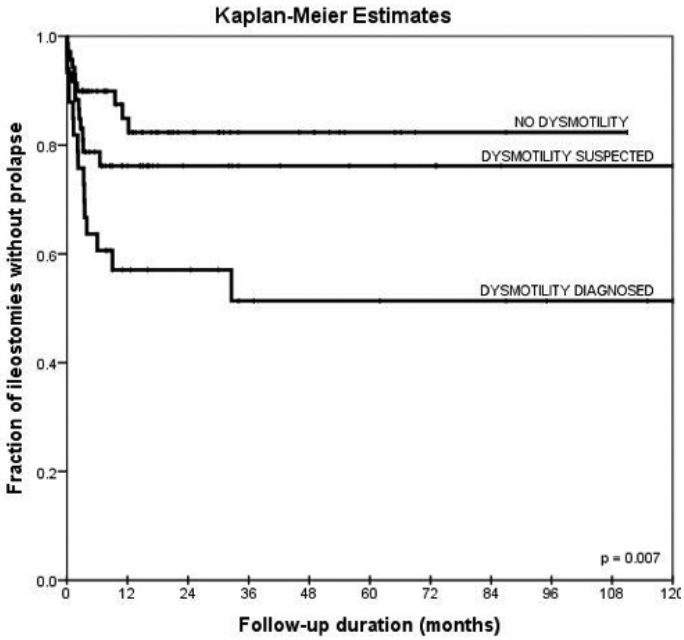
[1]Center for Advanced Intestinal Rehabilitation, Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [3]Center for Gastrointestinal Motility and Functional Disorders, Department of Medicine, Division of Gastroenterology, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA.

Purpose:
A relationship between disorders of intestinal motility and ileostomy prolapse has been suggested anecdotally, yet this link has not been demonstrated objectively. This study evaluated the incidence of ileostomy prolapse in children with and without intestinal dysmotility.

Methods:
Following IRB approval, 163 patients with ileostomies (1998-present) at a single institution were reviewed. Each patient was categorized as having (i) clinical dysmotility as a primary diagnosis (n=33), (ii) clinically suspected dysmotility based on underlying diagnosis (n=60), or (iii) clinically normal motility (n=70) at the time of ileostomy placement. As a validating measure, patients were also categorized as having small bowel dysmotility present (n=10) or absent (n=13) on available intestinal manometry studies. The primary outcome was any pathologic stoma prolapse. Differences in demographic and clinical characteristics were assessed using non-parametric testing. Multivariate analysis was performed using a logistic regression model. Log-rank test was used for "survival analysis" to compare stoma prolapse rates between motility groups.

Results:
Clinical dysmotility ($p \leq 0.0001$) and manometric dysmotility ($p=0.024$) were associated with stoma prolapse on univariate analysis. Dysmotility correlated well with manometric findings ($\kappa=0.53$). Logistic regression analysis demonstrated an association between clinical dysmotility and stoma prolapse ($p=0.002$). None of the other patient and operative characteristics assessed were associated with stoma prolapse. Overall, prolapse occurred in 45.5% of patients with clinical dysmotility, 21.7% of patients with clinically suspected dysmotility, and 14.3% of patients with clinically normal motility. One year prolapse-free stoma "survival" was 63.6% for clinical dysmotility, 84.8% for clinically suspected dysmotility, and 89.9% for clinically normal motility ($p=0.007$, figure 1).

Conclusions:
Children with small bowel dysmotility are at greater risk for stoma prolapse than those with normal motility. Assessment of intestinal dysmotility by manometry could help identify these patients preoperatively. Prospective studies are needed to identify operative and medical strategies which may prevent this complication.


Kaplan-Meier Estimates
Fraction of ileostomies without prolapse
1.0
0.8
0.6
0.4
0.2
0.0
NO DYSMOTILITY
DYSMOTILITY SUSPECTED
DYSMOTILITY DIAGNOSED
p = 0.007
0
12
24
36
48
60
72
84
96
108
120
Follow-up duration (months)

Notes:

15

THE ANATOMIC FINDINGS DURING OPERATIVE EXPLORATION FOR NONPALPABLE TESTES, A PROSPECTIVE EVALUATION

Katherine W. Gonzalez, MD[1], Brian G. Dalton, MD[1], Charles L. Snyder, MD[1], Charles M. Leys, MD[2], Daniel J. Ostlie, MD[2], Shawn D. St. Peter, MD[1].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Department of Surgery, University of Wisconsin, Madison, WI, USA.

Purpose:
We conducted a pilot randomized trial comparing 1 and 2-stage laparoscopic orchiopexy after division of the testicular vessels for high intra-abdominal testes. During recruitment, it became apparent that based on intra-operative criteria most patients with non-palpable testes do not require vascular division. In the current study, we outline the location and quality of testes found during operative exploration in patients who consented for the study but were not randomized.

Methods:
Analysis was performed on 82 consented non-randomized patients undergoing operative exploration for non-palpable testes between 2007 and 2014. These patients were examined for location and pathology of undescended testes. Comparative analysis was performed utilizing chi squared tests.

Results:
There were 90 preoperative non-palpable testes in 82 patients that did not require vascular division, compared to the 27 patients that were randomized. During operative exploration, 40 (44%) testes were atrophic or absent and 50 (56%) were normal in appearance. Seventy one testes were evaluated via laparoscopy. Of those approached open, 17 were palpated within the inguinal canal and 1 remnant was suspected in the scrotum. The most common location for normal (76%) and absent/atrophic (68%) testes was the inguinal canal. Atrophic testes were found more often on the left ($p=0.05$). Patients with an atrophic or absent testicle were also more likely to have a closed internal inguinal ring ($p<0.01$).

Conclusions:
This study shows that the majority of patients undergoing operative exploration for non-palpable testes will not require vascular division, and atrophic or absent testicles will be identified in approximately 40% of patients.

Notes:

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ENTERAL AUTONOMY, CIRRHOSIS AND LONG-TERM, TRANSPLANT-FREE SURVIVAL IN PEDIATRIC INTESTINAL FAILURE PATIENTS

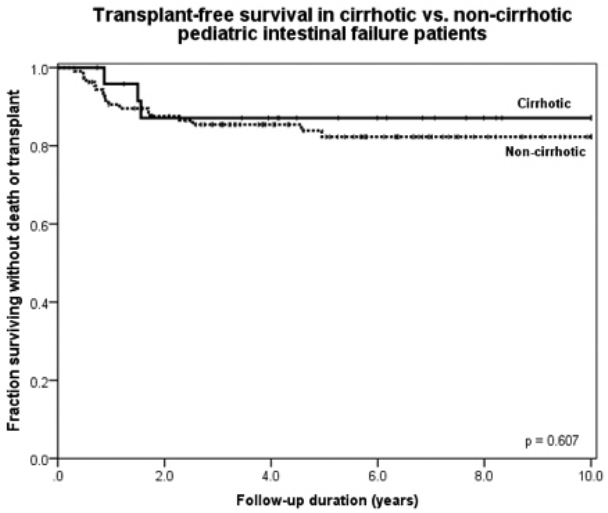
Brenna Fullerton, MD, Eric A. Sparks, MD, Tom Jaksic, MD, PhD, Biren P. Modi, MD.
Boston Children's Hospital, Boston, MA, USA.

Purpose:
Patient selection and timing of referral for transplant evaluation in pediatric intestinal failure is predicated on the ability to assess long-term transplant-free survival. We sought to determine if the presence of biopsy-proven cirrhosis or the eventual achievement of enteral autonomy were associated with transplant-free survival.

Methods:
After IRB approval, records of all pediatric intestinal failure patients (parenteral nutrition (PN) >90 days) treated at a single intestinal failure center from 2002 to present were reviewed. Chi-square and log-rank testing were performed as appropriate.

Results:
Of 313 patients, 174 eventually weaned off PN. Liver biopsies were obtained in 133 patients (most common indication was intestinal failure associated liver disease, IFALD), with 25 diagnostic of cirrhosis. Transplant-free survival for the whole cohort of 313 patients was 94.7% at 1 year and 89.2% at 5 years. Among patients with liver biopsies, predicted transplant-free survival in cirrhotics vs. non-cirrhotics was 95.8% vs. 90.6% at one year and 87.1% vs. 82.3% at 5 years (P=0.607). Predicted transplant-free survival in patients who achieved enteral autonomy compared with patients who remained PN dependent was 98.2% vs 90.3% at one year, and 98.2% vs 76.9% at 5 years (P<0.001). There was no association between cirrhosis and eventual enteral autonomy (P=0.53).

Conclusions:
Eventual enteral autonomy was associated with improved transplant-free survival in pediatric intestinal failure patients. There was no association between diagnosis of cirrhosis and transplant-free survival in this cohort. These data suggest that automatic transplant referral may not be required for cirrhosis alone and that ongoing efforts aimed at achievement of enteral autonomy remain paramount in pediatric intestinal failure.


Transplant-free survival in cirrhotic vs. non-cirrhotic pediatric intestinal failure patients
Fraction surviving without death or transplant
1.0
0.8
0.6
0.4
0.2
0.0
Cirrhotic
Non-cirrhotic
p = 0.607
.0
2.0
4.0
6.0
8.0
10.0
Follow-up duration (years)

Notes:

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THORACOSCOPIC PLEURAL CLIPPING FOR THE MANAGEMENT OF CONGENITAL CHYLOTHORAX

Margaret E. Clark, MD[1], Russell K. Woo, MD[2], Sidney M. Johnson, MD[2].

[1]Tripler Army Medical Center, Honolulu, HI, USA, [2]Kapi'olani Medical Center, Honolulu, HI, USA.

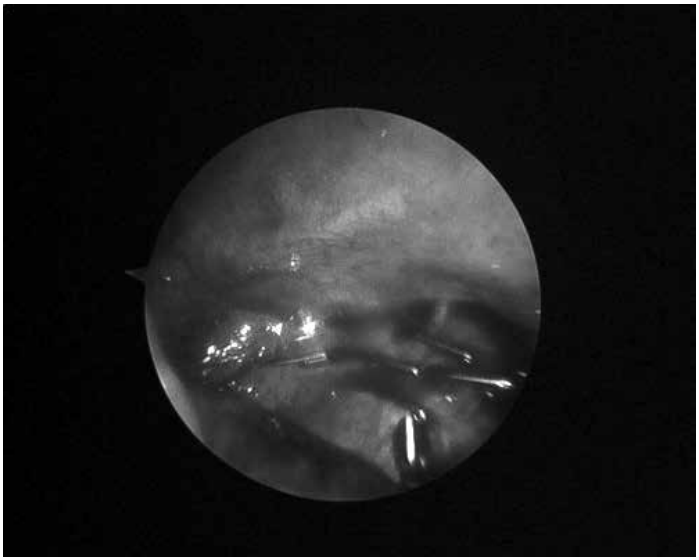
Purpose:
Medical management of congenital chylothoraces consists of total parental nutrition, tube thoracostomy, and IV octreotide. However, these infants are exposed to significant fluid shifts and the related neutropenia carries a high infection risk. Moreover, medical management has ill-defined endpoints and in some series has been associated with higher mortality than surgical management. Surgical options include thoracic duct ligation, pleurectomy and pleurodesis. The purpose of this review is to describe the minimally invasive technique of parietal pleural clipping for treatment of congenital chylothorax.

Methods:
The medical records of all patients with a chylothorax diagnosis during the study period of January 2002 to April 2014 were retrospectively reviewed. 14 infants were identified as having a congenital chylothorax.

Results:
Of the 14 patients identified, nearly all had bilateral congenital chylothorax (11/14). Eight patients were managed with tube thoracostomy and supportive medical care. Four of these babies died; the remaining four resolved with medical management. Six of 14 infants underwent thoracoscopic parietal pleural clipping to disrupt the pleural lymphatic channel flow as visualization of the thoracic duct and lymphatics was not possible. Nearly all surgical patients had bilateral disease (5/6). Resolution of chylous leakage was dramatic following parietal clipping. In the surgical patients, chest tube output 2 days prior to surgery averaged 88.1 ml/kg/day. After parietal clipping, chest tube output dropped to an average of 6.5 ml/kg/day on post op day 2. Thereafter, chest tube output remained low to negligible and chest tubes were removed variably thereafter as enteral feeds were started.

Conclusions:
We describe a straightforward minimally invasive technique of thoracoscopic parietal pleural clipping as a safe and successful option for treatment of congenital chylothoraces. Parietal clipping results in rapid control of congenital chylothorax and the relative ease of clipping may have advantages over pleurectomy, pleurodesis or thoracotomy and thoracic duct ligation.

Clip placement along pleurodiaphragmatic interface.



Notes:

Scientific Session III
Basic Science
Saturday, May 2, 7:30 a.m. – 9:00 a.m.

18

SINGLE DOSE ADENO-ASSOCIATED VIRUS 9 (AAV-9) SUSTAINED DELIVERY OF HUMAN MIS SHOWS ROBUST INHIBITION IN EPITHELIAL OVARIAN CANCER PATIENT DERIVED XENOGRAFT (PDX) MODELS

Amanda B. Sosulski, MD[1], David Pepin, PhD[1], Katie Hendren[1], Andrew Benedict, MD[1], Li Hua Zhang[1], Fotini Nicolaou[1], Dan Wang[2], Guangping Gao, PhD[2], Patricia Donahoe, MD[1].

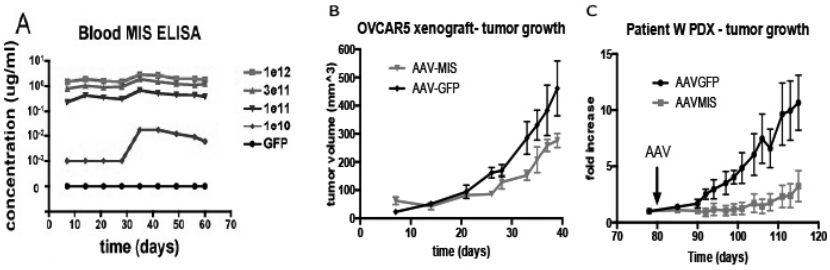
[1]Massachusetts General Hospital, Boston, MA, USA, [2]University of Massachusetts, School of Medicine, Worcester, MA, USA.

Purpose:
Mullerian Inhibiting Substance (MIS) protein can inhibit ovarian cancer cells *in-vitro* and *in-vivo*, particularly targeting an enriched progenitor population. Recent application of gene therapy revealed that a single injection of AAV9-human MIS caused sustained delivery of MIS and inhibited xenotransplanted tumors from established ovarian cancer cell line, OVCAR5. Therefore, we examined whether AAV9-human MIS could also inhibit primary human ovarian cancer cell lines and xenotransplants from patient ascites.

Methods:
AAV9 viral vectors carrying 3e11 or 1e12 virions of human MIS transgenes modified to enhance bioactivity, compared to a GFP control construct, were injected into female nude mice (n=20), and blood levels were monitored weekly using a sensitive ELISA for human MIS. After peak levels of MIS were reached, human ovarian cancer (OVCAR5) cells (10^6) were xenografted subcutaneously. Multiple patient cell lines were cultured and xenografts established. After showing inhibition of spheroid growth in 4/6 patient cell lines *in-vitro*, patient W cells in NOD/SCID mice (n=10) were treated with a single injection (3e11) of an optimized MIS(AAV9-LRMIS) or control (AAV9-GFP)construct. Tumor volumes and toxicity were monitored.

Results:
Single dose AAV9 constructs resulted in MIS expression at sustained concentrations (Figure 1A) and inhibited OVCAR5 tumors ($p = 0.0003$; Figure 1B). Patient derived xenografts (PDX) in NOD/SCID mice, treated after tumors became palpable (Figure 1C), were inhibited (40% undectectable) after a single treatment with AAV9-LRMIS ($p = 0.03$) without signs of toxicity.

Conclusion:
AAV9-hMIS provides a feasible, safe, efficacious, and patient friendly systemic single dose therapy. A resurgence of gene therapy, with the patient as his or her own bioreactor, holds promise for delivery of complex, clinically relevant, functionally active, previously unavailable proteins, such as MIS, which can be combined with standard chemotherapy for future patient management.


A
Blood MIS ELISA
concentration (ug/ml)
time (days)
1e12
3e11
1e11
1e10
GFP
B
OVCAR5 xenograft- tumor growth
tumor volume (mm^3)
AAV-MIS
AAV-GFP
time (days)
C
Patient W PDX - tumor growth
fold increase
AAVGFP
AAVMIS
AAV
Time (days)

Notes:

19

ORTHOTOPIC EPITHELIAL CELL REPLACEMENT IN THE SMALL INTESTINE

Hassan A. Khalil, MD[1], Nan Ye Lei, MS[1], Garrett Brinkley, BS[1], Andrew Scott, MD[1], Clara Posner, BS[1], Puneet Rana, MS[1], Jiafang Wang[1], Michael Lewis, MD[2], Martin G. Martin, MD, MPP[1], Matthias G. Stelzner, MD[1], James CY Dunn, MD, PhD[1].

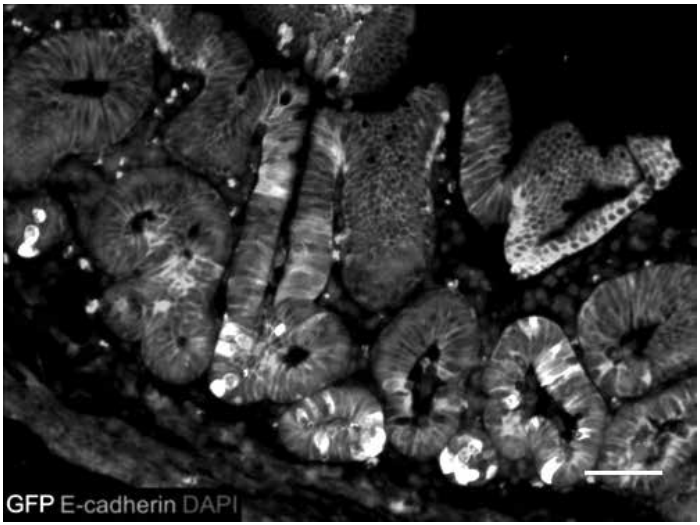
[1]UCLA, Los Angeles, CA, USA, [2]VA Greater Los Angeles Medical Center, Los Angeles, CA, USA.

Purpose:
Intestinal stem cells (ISCs) have been grown in culture, but orthotopic engraftment from cultured ISCs has not been demonstrated in the small intestine. We will examine the feasibility of epithelial cell replacement with cultured ISCs in the mouse jejunum.

Methods:
Small intestinal crypts were isolated from C57BL/6J mice expressing green fluorescent protein (GFP) and were cultured in Matrigel with medium containing EGF, noggin, and Rspondin1 ("ENR medium") with or without 50% Wnt3a conditioned medium (CM). Twelve to 20 week old C57BL/6J mice underwent laparotomy and side-to-side entero-enteric bypass of a 5-cm segment of mid-jejunum. Within this segment, a 2-cm segment was partially denuded of mucosa with 10 mM EDTA and 1mM DTT. Mice either underwent denuding alone (n=19) or denuding with implantation of GFP enteroids (n=4) or spheroids (n=3). The bypass segment was procured after 3 or 9 days for analyses.

Results:
Elevated expression of differentiation markers (CD10, Muc2, chromogranin A, and lysozyme) were noted in enteroids grown in ENR medium. Spheroids grown in ENR medium with Wnt3a-CM had lower expression of the differentiation markers. In the bypass segment, crypts and villi were successfully denuded, with preservation of the submucosal architecture. All mice with enteroid and spheroid implantation showed engraftment on post-operative day 3 and 9 based on double staining for GFP and E-cadherin (Figure; scale bar 50 μm). Differentiation of implanted ISCs into enterocyte, goblet, enteroendocrine, and Paneth cell lineages was confirmed by double staining for GFP and CD10, Muc2, chromogranin A, and lysozyme, respectively.

Conclusions:
We show successful orthotopic implantation and lineage differentiation of ISCs in the mouse small intestine. This method may be employed to correct inherited disorders such as tufting enteropathy using ISCs-based therapy.



Notes:

20

WNT PATHWAY IS ESSENTIAL FOR INTESTINAL ADAPTATION IN THE SETTING OF SHORT BOWEL SYNDROME IN A ZEBRAFISH MODEL

Kathy A. Schall, MD, Kathleen Holoyda, MD, Salvador Garcia, MS, Ching-Ling Lien, PhD, Tracy C. Grikscheit, MD, FACS.

Children's Hospital of Los Angeles, Los Angeles, CA, USA.

Purpose:
The Wnt pathway is integral to intestinal regeneration, and its components are conserved between humans and zebrafish. As a potential human therapeutic target for intestinal lack or loss, we sought to further determine the role of Wnt signaling in short bowel syndrome (SBS). We hypothesized that intestinal adaptation would be impaired by Wnt inhibition in a zebrafish intestinal resection model.

Methods:
With IACUC approval, SBS was generated in male wildtype zebrafish (laparotomy, proximal stoma, distal ligation) and compared to sham (laparotomy alone). Both were treated with 5mM monensin, a Wnt pathway inhibitor (SBS n=9, sham n=9), 100% ethanol, a vehicle control (SBS n=10, sham n=12), or water (SBS n=13, sham n=13) for 4 weeks. Serial weights and resected intestine were collected. H&E, villus heights were measured and averaged on all intact villi from 5 samples of each group with ImageJ. Student's T-test determined significance.

Results:
Zebrafish exposed to monensin lost significantly more weight and had reduced intestinal adaptation compared to control conditions over 4 weeks. SBS zebrafish exposed to monensin weighed 70.02% (±7.72%) of the initial weight on average, compared to 86.37% (±7.76%) in the ethanol SBS group and 87.13% (±4.69%) in the water SBS. This is greater weight loss compared to monensin-sham zebrafish that weighed 84.99% (±10.64%)of initial weight, compared to 101.02% (±9.42%) in the ethanol-sham group and 101.77% (±5.91%) in the water-sham group. Monensin SBS had significantly decreased villus height compared to ethanol and water groups (151μm vs 189μm vs 195μm; $p<0.05$) demonstrating decreased intestinal adaptation. Monensin-sham also had significantly decreased villus height compared to ethanol and water groups (123μm vs. 159μm vs. 150μm; $p<0.05$).

Conclusions:
Inhibition of the Wnt pathway severely truncates weight gain and intestinal adaptation in a novel SBS model in the zebrafish. Further analysis of this pathway may identify rational translational targets.

Notes:

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A FUNCTIONAL SINGLE NUCLEOTIDE POLYMORPHISM OF IL-6 IS ASSOCIATED WITH NEC DEVELOPMENT IN CAUCASIAN PREMATURE INFANTS

Ashanti L. Franklin, MD, Mariam Said, MD, Zohreh Tatari-Calderone, PhD, Stanislav Vukmanovic, PhD, Khodayar Rais-Bahrami, MD, Naomi L.C. Luban, MD, Joseph M. Devaney, PhD, Anthony D. Sandler, MD.

Children's National Medical Center, Washington, DC, USA.

Purpose:
Necrotizing enterocolitis (NEC) is a devastating gastrointestinal emergency that affects approximately 10% of premature neonates. An exaggerated inflammatory response may pre-dispose premature infants to developing NEC. The purpose of this study is to determine if functional single nucleotide polymorphisms (SNPs) in inflammatory cytokines genetically pre-disposes infants to NEC.

Methods:
Institutional Review Board approval and parental/guardian consent was obtained. Buccal swabs for DNA extraction were collected from infants that were of the following clinical characteristics: ≤32 weeks gestation and/or a diagnosis of NEC (≥ Bell's Stage II). Patients with congenital heart disease (except patent ductus arteriosus), major congenital anomalies, genetic disorders, and inherited blood/metabolic disorders were excluded. Controls consisted of infants ≤32 weeks gestation without NEC or spontaneous intestinal perforation. TaqMan allelic discrimination assay was used to determine genotypes of six different inflammatory cytokines. (TGFβ, TNFα, IL6, IL1B, IL12, TLR4). Statistical analysis was completed using logistic regression.

Results:
A total of 201 neonates were enrolled in the study. African-Americans consisted of 67% (134). Caucasians made up 31% (62) of the study population. Forty-six African-Americans and 18 Caucasian infants had NEC. Caucasian premature neonates with IL-6 (rs1800795) were almost 8 times more likely to have NEC (p= 0.010; OR: 7.793; 95% CI: 1.643-36.98). Il-6 (rs1800795) was not associated with NEC in African-American neonates.

Conclusion:
In premature Caucasian neonates, the functional SNP, IL-6 (rs1800795) is associated with an increased odds ratio of NEC. The IL-6 (rs1800795) C allele is associated with higher levels of IL-6 in serum. While IL-6 is previously implicated in the pathogenesis of NEC, its role in T-cell differentiation and neutrophil trafficking may be altered. Alternatively, higher levels may also be implicated in an exaggerated inflammatory response.

Notes:

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TRANSPLANTATION OF AMNIOTIC FLUID-DERIVED NEURAL STEM CELLS AS A POTENTIAL NOVEL THERAPY FOR HIRSCHSPRUNG'S DISEASE

Yu Zhou, MD, PhD, Gail E. Besner, MD.
Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
We have shown that embryonic enteric neural stem cells (NSCs) isolated from the intestine colonize Hirschsprung's aganglionic intestine upon transplantation, but post-transplantation cell survival limits efficacy. The aims of this study were to investigate whether transplantation of amniotic fluid (AF)-derived NSCs could improve survival of the engrafted cells and promote functional recovery of the diseased colon.

Methods:
AF cells were collected from second trimester pregnant EGFP mice, induced into NSC with neurogenic medium, and further differentiated into neurons and glial cells. The expression levels of neuronal and glial cell markers during AF-NSC proliferation and differentiation states were measured by immunocytochemistry and real-time PCR. Ednrb knockout mice received an intestinal intramuscular injection of 20,000 AF-derived NSCs into three sites of the distal colon. After 2 and 7 days, engrafted cells were visualized and characterized by immunohistochemistry for GFP, neuronal and glial cell markers. Colonic motility was assessed using the bead propulsion test and quantified by colonic bead expulsion time.

Results:
Expression of the NSC marker nestin and the glial cell marker GFAP were significantly increased during AF-derived NSC proliferation and differentiation compared to their expression in enteric NSC. Transplanted AF-derived NSCs had decreased apoptosis and increased survival at 2 and 7 days post-transplantation compared to enteric NSC transplantation. Colonic motility was significantly improved in Ednrb knockout mice transplanted with AF-derived NSCs, as demonstrated by significantly decreased colonic bead expulsion time (18.4 ± 2.8 minutes for AF-derived NSCs; 26.4 ± 3.2 minutes for intestinal NSCs; $p<0.05$).

Conclusion:
These results demonstrate that AF-derived NSCs have enhanced survival upon transplantation into a defective enteric nervous system. Transplantation of AF-derived NSCs may represent a potential novel future therapy for the treatment of Hirschsprung's disease, especially in light of their ease of availability and minimal ethical issues.

Notes:

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BREAKDOWN IN MATERNAL-FETAL TOLERANCE AFTER FETAL INTERVENTION IN MICE

Cerine Jeanty, MD, Camilla S. Dugonjic, BA, Michela Frascoli, PhD, Patriss W. Moradi, BS, Tippi C. MacKenzie, MD.

University of California, San Francisco, San Francisco, CA, USA.

Purpose:
Fetal surgery can be life-saving but remains limited by preterm labor. We hypothesize that sterile inflammation after prenatal intervention results in the breakdown of maternal-fetal tolerance, with maternal T cell recognition of fetal antigens. We used a transgenic mouse that tracks maternal T cells bound to foreign antigen and determine whether there is increased activation of these and antigen presenting cells (APC) after fetal intervention. Additionally, we studied whether regulatory mechanisms compensate to protect pregnancy.

Methods:
We used Nur77GFP.Foxp3RFP reporter mice in which T cells are labeled with green fluorescent protein (GFP) and regulatory T cells (Tregs) with red fluorescent protein (RFP). Antigen-experienced T cells are quantified by increases in the mean fluorescence intensity of GFP. We bred these mice to genetically identical (syngeneic) or genetically different (allogeneic) males and performed fetal intervention with intrahepatic injection of saline on gestational day E13.5. We harvested the reproductive organs 5 days later, stained for T cells and APCs, and analyzed using flow cytometry (Figure 1A). Non-pregnant and allogeneic-bred mice without intervention were used as controls.

Results:
The rate of fetal loss was significantly higher in allogeneic compared to syngeneic pregnancies after fetal intervention (Figure 1B). Consistent with our hypothesis, antigen-experienced CD4 and CD8 T cells with an effector memory phenotype in allogeneic pregnancies with intervention were significantly increased compared to controls (Figure 1C, D). Accordingly, there was maturation of APCs with increased CD86, which is an activation marker (Figure 1E). Tregs were decreased in allogeneic matings compared to controls and there was no compensatory activation (data not shown).

Conclusions:
Fetal intervention in allogeneic matings leads to maternal T cell awareness of fetal antigens, activation of APCs, and absence of a protective Treg response correlating with increased fetal demise. Our results have clinical implications for understanding the mechanism behind pregnancy complications after fetal surgery.

Scientific Session III (cont.)

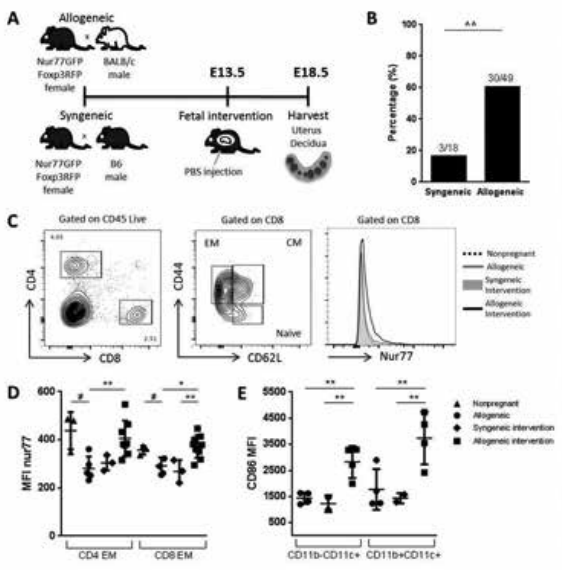

Figure 1: (A) Experimental design. Breedings were performed between Nur77GFP.Foxp3RFP females and either BALB/c (allogeneic) or B6 (syngeneic) males. Fetal intervention with injection of phosphate buffer saline (PBS) was performed on E13.5 and reproductive tissues were harvested on E18.5. **(B)** Percentage of fetal loss with fetal intervention in syngeneic (n=18 pups) and allogeneic (n=49 pups) pregnancies. **(C)** Gating strategy to identify subtypes of T cells including effector memory (EM), central memory (CM) and naive, and evaluate nur77-GFP expression using flow cytometry. All plots are from uterus. **(D)** Graphic representation of nur77-GFP mean fluorescence intensity (MFI) in T cell subsets in syngeneic and allogeneic pregnancies with and without fetal intervention. **(E)** Graphic representation of CD86 MFI in antigen presenting cell subsets in syngeneic and allogeneic pregnancies with and without fetal intervention. Number of dams in each experimental group: nonpregnant (n=3), allogeneic (n=5), syngeneic intervention (n=2), and allogeneic intervention (n=7). ^^p<0.01 by Fisher exact test; *p<0.05, **p<0.01 by ANOVA with Sidak's multiple comparison; #p<0.05 by Student's t-test.

Notes:

24

HOST AND BACTERIAL FACTORS COOPERATIVELY DISRUPT HEALING OF INTESTINAL ANASTOMOSES

Baddr A. Shakhsheer, MD[1], James N. Luo, BS[1], Robin Klabbers, BS[2], Alexander Zaborin, PhD[1], Natalia Belogortseva, PhD[1], Olga Zaborina, PhD[1], John C. Alverdy, MD[1].

[1]University of Chicago Pritzker School of Medicine, Department of Surgery, Chicago, IL, USA, [2]Department of Surgery, Radboud University Nijmegen Medical Centre, Nijmegen, Netherlands.

Purpose:
Anastomotic leakage can be a devastating complication for pediatric surgical patients, particularly in those colonized with resistant organisms. Recent studies suggest that the intestinal microbiome contributes to failure of healing after anastomosis and specifically implicates factors elaborated by *Enterococcus faecalis*. We tested the hypothesis that the gelE/sprE operon, known to regulate collagenase production in this microorganism, plays a key role in *E. faecalis*-mediated anastomotic leakage.

Methods:
All experiments were approved by the Institutional Animal Care and Use Committee. Following prophylactic injection of intramuscular cefoxitin (50 mg/kg), 9-week-old, 250-300g male Wistar rats (n=37) were subjected to segmental distal colectomy and primary anastomosis. Rats were then randomized to receive enemas with isogenic strains of *E. faecalis* lacking gelE/sprE (ΔgelE/ΔsprE) or expressing gelE/sprE (VT07). Animals were sacrificed on postoperative day 6 and evaluated for gross evidence of anastomotic leak. Anastomotic tissues were examined for bacterial species identification, collagenase production, and MMP9, a host matrix metalloprotease known to play a key role in anastomotic complications.

Results:
Anastomotic leakage was significantly greater in rats inoculated with the collagenase-producing VT07 strain of *E. faecalis* (12/17, 70%) compared to its isogenic null mutant ΔgelEΔsprE (1/20, 5%) ($p<0.01$). More severe leaks appeared to be associated with high adherence of *E. faecalis* to the mucosa, penetration into the serosa, and high collagenase activity. Zymography demonstrated increased MMP9 activity in VT07 compared to the null mutant.

Conclusions:
Our data suggests that collagenase-producing *Enterococcus faecalis* is associated with anastomotic leak in a rat model of intestinal anastomosis. Mechanisms that involve the quorum sensing-regulated gelE/sprE operon may promote collagenase production and are associated with host MMP9. Further understanding of the contribution of antibiotic-resistant organisms to anastomotic failure may improve the care of chronically hospitalized children.

Notes:

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CYCLOPHILIN BLOCKADE PREVENTS BILIARY ATRESIA AFTER VIRAL INFECTION IN THE ANIMAL MODEL

Tatiana Iordanskaia, PhD[1], Michael Bukrinsky, PhD[2], **Evan P. Nadler[1]**.

[1]Children's National Medical Center, Washington, DC, USA, [2]The George Washington University School of Medicine and Health Sciences, Washington, DC, USA.

Introduction:
We have previously shown that pre-treatment with our novel cyclophilin (Cyp) inhibitor, MM284, could prevent disease in the animal model of biliary atresia (BA) by decreasing SMAD phosphorylation and TIMP-4 and MMP-7 expression. We hypothesized that MM284 treatment after viral infection would be similarly effective, and *in vitro* MM284 could prevent Cyp stimulation of hepatic stellate cells (HSCs).

Methods:
Newborn Balb/c mice were randomized to receive an intraperitoneal (i.p.) injection with saline control (n=5) or 1.5 x 106 fluorescence forming units (n=11) of rhesus rotavirus (RRV) within 24 hours of birth. Animals receiving RRV were further randomized to receive either 20mg/kg i.p of MM284 or control vehicle starting day of life 2, and then thrice weekly. Livers were harvested post-injection day 14. For the *in vitro* experiments, HSCs were cultured in supplemented Stellate Cell Medium. HSCs were treated with recombinant CypA (800 ng/ml) with or without MM284 (400ng/ml) and incubated for 72 hours. Liver homogenates were evaluated for RNA expression using quantitative real-time PCR. ELISA was used to evaluate SMAD2/3 phosphorylation in the HSCs. Statistical analysis was performed using ANOVA with statistical significance assigned to p-values < 0.05.

Results:
Mice treated with MM284 were normal weight (7.9g±2.0 v 4.7±0.6, p=0.02), had an approximately 5-fold decrease in TIMP-4 (5.4±1.1, $p<0.01$) and a 10-fold decrease in MMP7 (9.9± 0.7, $p<0.01$) mRNA expression when compared to RRV mice. SMAD2/3 phosphorylation in the HSC lysates revealed significant 1.5-fold increase after CypA treatment relative to untreated cells (1.4±0.09, $p \leq 0.01$) which was completed abrogated by MM284.

Conclusions:
MM284 results in prevention of BA in the animal model after viral inoculation. Similarly, MM284 prevents SMAD2/3 phosphorlyation after CypA stimulation in HSCs. These findings suggest that Cyp blockade may be a novel treatment strategy in not only BA, but other liver diseases that are putatively mediated by HSC activation.

Notes:

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CONGENITAL CHYLOTHORAX: A FORM OF LYMPHATIC ANOMALY RESPONSIVE TO PROPRANOLOL

Julie Monteagudo, MD[1], Christine A. Schad, MD[1], June K. Wu, MD[1], Russell S. Miller, MD[1], Sonia L. Hernandez, PhD[2], Jessica J. Kandel, MD[2], Carrie J. Shawber, PhD[1], Angela Kadenhe-Chiweshe, MD[1].

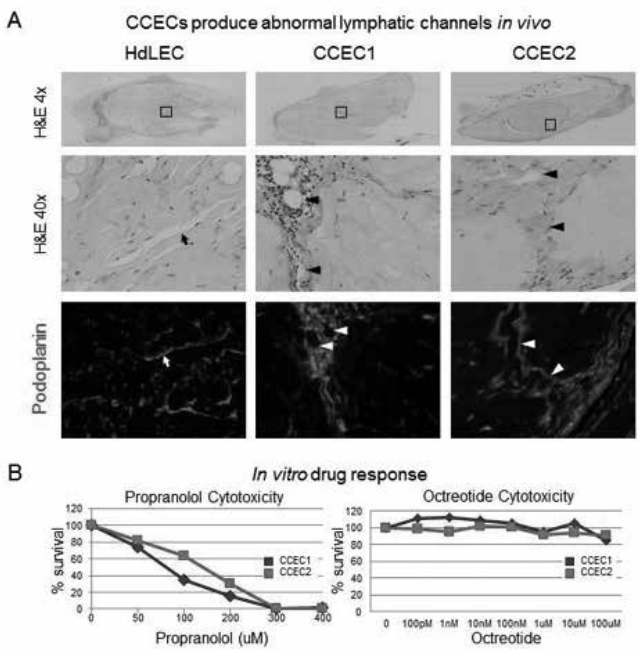
[1]Columbia University Medical Center, New York, NY, USA, [2]Comer Children's Hospital, University of Chicago Medicine & Biological Sciences, Chicago, IL, USA.

Purpose:
Congenital chylothoraces (CC) are pleural effusions resulting from lymphatic leakage, and are associated with significant morbidity. We hypothesized that CC are a form of lymphatic anomaly. We tested this by isolating lymphatic endothelial cells (LECs) from CCs (CCECs). CECCs were characterized *in vitro*, *in vivo* in a mouse model, and in a screen for drug responsiveness.

Methods:
CCECs were isolated from CC effusions (n=6; IRBAAAA7338) and compared to endothelial cells isolated from lymphatic malformations (LMECs), a form of lymphatic anomaly. Normal human dermal lymphatic endothelial cells (HdLECs) served as a control. Flow cytometry was performed for markers of circulating endothelial progenitors (CD90, CD146, VEGFR2), LECs (VE-Cadherin, podoplanin) and lymphocytes (CD45). qRT-PCR was performed (podoplanin, prox1, LYVE1, VEGFR2/3, beta-adrenergic receptors (BARs)). Selected CCECs (n=3) resuspended in Matrigel were xenografted in athymic mice, imaged by ultrasound, and harvested at 4 weeks. Sections were evaluated by H&E and immunohistochemistry for the human LEC marker, podoplanin. CCEC cytotoxicity in response to octreotide, a drug commonly used for CC treatment, and propranolol (a nonselective BAR-blocker), was assessed.

Results:
CCECs, HdLECs, and LMECs were all CD45-/CD90+/podoplanin+ by flow cytometry. Unlike HdLECs, CCECs and LMECs did not express CD146, VEGFR2 or VE-Cadherin. CCECs demonstrated significantly decreased expression of BAR, Prox1, VEGFR3 ($p<0.001$), LYVE1, VEGFR2 ($p<0.01$), and podoplanin ($p<0.05$) by qRT-PCR. In the mouse, CCECs implants displayed disorganized, dilated podoplanin+ vessels, with abnormal lumens, resembling clinical LM histology and distinct from HdLEC implants (Figure 1A). Propranolol induced cytotoxicity (LD_{50} at 150 uM, $p<0.05$), whereas octreotide was not cytotoxic (Figure 1B).

Conclusion:
CCECs resembled LMECs in expression profile, and in their ability to form disorganized lymphatic vessels. Propranolol but not octreotide was cytotoxic to CCECs. Our data suggest that CCs resemble LMs, and that CCECs may be useful for preclinical studies.



In vivo characterization and drug screening of CECCs. A. HdLEC and CECC xenografts were H&E stained (top; boxed areas enlarged in middle) and stained for podoplanin (bottom; red). CCECs developed abnormal dilated lymphatic vessels (arrowheads) not observed in HdLEC xenografts (arrows). **B.** CCECs were exposed to increasing doses of propranolol or octreotide and cytotoxicity assessed.

Notes:

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PUMPLESS ARTERIO-VENOUS EXTRACORPOREAL MEMBRANE OXYGENATION IN THE MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA

Emily A. Partridge, MD, PhD, Marcus G. Davey, PhD, Kevin C. Dysart, MD, Robert Caskey, MD, Aliza M. Olive, MD, James T. Connelly, BSc, Andrew Misfeldt, MD, Holly L. Hedrick, MD, William H. Peranteau, MD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose:
Extracorporeal membrane oxygenation (ECMO) is commonly required in neonates with congenital diaphragmatic hernia (CDH) complicated by severe pulmonary hypertension (PH). Conventional ECMO requires a complex circuit with significant risk of thromboembolic and hemorrhagic complications, and results in continuous non-pulsatile end-organ perfusion. Pumpless arterio-venous extracorporeal membrane oxygenation may represent an appealing alternative for lung support in these patients, offering a simplified circuit with provision of pulsatile autoregulated perfusion and circumventing the requirement for systemic anticoagulation. The present study summarizes our initial experience with pumpless ECMO in a lamb model of CDH.

Methods:
Surgical creation of CDH was performed in five time-dated ewes at 65-70 days' gestation. At term (135-145 days), cannulas were placed in the carotid artery and jugular vein for connection to a hollow-fiber membrane oxygenator. Animals were maintained in a warmed incubator with continuous infusions of PGE-2 (0.1 mcg/kg/h) and total parenteral nutrition. Two animals were maintained on a low-heparin infusion protocol (target ACT 140-180) and three animals were maintained with no systemic heparinization.

Results:
Animals were supported by the circuit for 351.6 +/- 160.1 hours (range, 102-504 hours). One experiment was terminated prematurely due to technical failure of the oxygenator membrane, while the remaining four animals were maintained throughout the planned period of support (2 weeks, n=2; 3 weeks, n=2) with stable hemodynamics. Circuit flow rates ranged from 100 to 200 ml/kg/min, with adequacy of organ perfusion demonstrated by stable serum lactate levels (2.5 +/- 1.9) and pH (7.4 +/- 0.2). Necropsy demonstrated no evidence of thrombogenic or hemorrhagic complications.

Conclusions:
In a lamb model of CDH, pumpless extracorporeal membrane oxygenation achieved long-term support of animals for up to three weeks. This therapy has the potential to bridge neonates with decompensated respiratory failure to CDH repair with reduced complexity and expense, while abrogating the requirement for systemic anticoagulation.

Notes:

Scientific Session IV

Scientific Session IV
Clinical Care and Quality Improvement
Saturday, May 2, 10:30 a.m. – 11:30 a.m.

28

IMPLEMENTATION OF A PEDIATRIC SURGICAL QUALITY IMPROVEMENT (QI)-DIRECTED M&M CONFERENCE

Barrett P. Cromeens, DO, PhD, Richard J. Brilli, MD, Kelli J. Kurtovic, BS, Brian D. Kenney, MD, MPH, Benedict C. Nwomeh, MD, Gail E. Besner, MD.
Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
For decades, our traditional pediatric surgical M&M conference primarily categorized failures as surgical technical error or natural progression of patient disease, but failure mode categories were never precisely captured, action items rarely assigned, nor loop closure accomplished. In 2013 we developed a QI-directed M&M conference, allowing for implementation of directed actions with the intent of improving quality of care and outcomes.

Methods:
A classification, derived from a taxonomy of failure modes provided with permission by Healthcare Performance Improvement LLC, was developed to enhance analysis of complications presented during M&M conference. Complications are logged and presented by pediatric surgery fellows in the multidisciplinary conference. Each complication is categorized as an individual or system failure with sub-categorization of root cause, a level of preventability assigned, and action items with the responsible party and due dates designated. The pediatric surgery QI coordinator tracks all action items to ensure timely completion. Determinations from 11/2013-9/2014 were reviewed to evaluate the distribution of failure modes and action items.

Results:
One-hundred ninety-eight cases were reviewed (see Table). There were 96 (78.7%) individual failures and 26 (21.3%) system failures identified. One-hundred twenty-five action items were implemented including education initiatives, optimizing communication, establishing criteria for interdisciplinary consultation, resolving equipment inadequacies, removing high risk medications from procedure protocols, modifying order sets, restructuring physician handoffs, and individual practitioner counseling/training.

Conclusion:
Development of a QI-directed M&M conference allowed us to categorize complications beyond individual surgical or patient disease categories, ensuring added focus on system solutions and reliable loop closure for assigned interventions intended to address failures. We believe this has led to improvements in the processes of patient care.

Scientific Session IV (cont.)

Level of Preventability	(n,%)	Distribution of Failure Modes (n,%)			
		Individual Failure (96, 78.7)		System Failure (26, 21.3)	
Level 1 - expected M or M appropriately dealt with. Even though a complication occurred, actions were taken to prevent the complication, it was recognized in a timely fashion, and it was managed correctly.	139 (70.2)	**Competency** • Uniformed Skills • Inadequate Knowledge	(78, 63.9) (61, 50) (17, 13.9)	**Structure** • Resource allocation • Collaboration mechanisms	(3, 2.5) (0, 0) (3, 2.5)
Level 2 - unexpected M or M, but no identifiable opportunity for improvement.	24 (12.1)	**Consciousness** • Inattention • Distraction	(4, 3.3) (4, 3.3) (0, 0)	**Culture** • Non-collaboration • Normalized deviance	(5, 4.1) (5, 4.1) (0, 0)
Level 3 - unexpected M or M, potentially avoidable with possibility to improve care.	33 (16.7)	**Communication** • Incorrect assumption • Misinterpretation	(7, 5.7) (6, 4.9) (1, 0.8)	**Process** • Inadequate interface • Inadequate checks	(4, 3.3) (2, 1.6) (2, 1.6)
Level 4 - unexpected M or M with high likelihood to improve care. Also, a morbidity that would have been Level 1, but actions not taken to prevent complication, event not recognized in a timely fashion, event managed incorrectly.	2 (1.0)	**Critical thinking** • Failure to validate/verify • Tunnel vision	(7, 5.7) (5, 4.1) (2, 1.6)	**Policy & Protocol** • Lacking or informal • Usability • Understandability	(12, 9.8) (12, 9.8) (0, 0) (0, 0)
		Compliance • Shortcut • Overconfident • Reckless	(0, 0) (0, 0) (0, 0) (0, 0)	**Technology & Environment** • Arrangement • Environment • Human capability	(2, 1.6) (0, 0) (1, 0.8) (1, 0.8)

Notes:

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NONOPERATIVE TREATMENT OF ACUTE APPENDICITIS IN CHILDREN — A FEASIBILITY STUDY

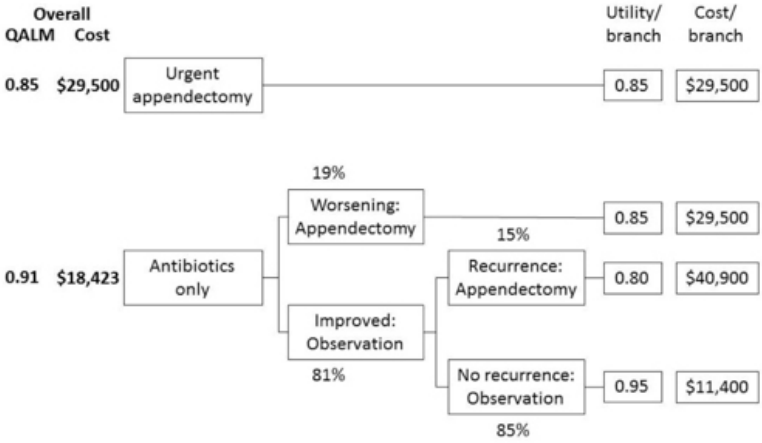
Joseph Hartwich, MD, Francois I. Luks, Debra Watson-Smith, RN, Arlet G. Kurkchubasche, MD, Christopher S. Muratore, MD, Hale E. Wills, MD, Thomas F. Tracy, MD.
Brown Medical School, Providence, RI, USA.

Purpose:
Nonoperative treatment of acute appendicitis seems feasible in adults. It is unknown whether the same is true for children.

Methods:
Children 5-18 years with <48 h symptoms of acute appendicitis were offered nonoperative treatment: 2 doses of piperacillin IV, then ampicillin clavulanate PO x1 wk. Exclusion criteria included penicillin allergy and clinical/radiologic suspicion of advanced appendicitis. Treatment failure (worsening on therapy) and recurrence (after completion of therapy) were noted, and these patients underwent appendectomy. Patients who declined enrollment were asked to participate as controls. Cost-utility analysis was performed using Pediatric Quality of Life Scale (PedsQL) to calculate Quality-Adjusted Life Month (QALM).

Results:
Over 14 months, 318 children presented with appendicitis: 148 with perforation, 44 who met exclusion- and 126 who met inclusion criteria. Sixty were further excluded for clinical or noncompliance reasons. Sixteen patients agreed to undergo nonoperative management (50 controls). At 1-year mean follow-up, three of the 16 failed on therapy, and two of the remaining 13 returned with recurrent appendicitis at 43 and 52 days, respectively. Appendectomy-free rate at one year was therefore 69% (C.I. 44-86%) - not significantly different from adults (73%, C.I. 67-79% in a meta-analysis of >300 patients; $P=0.77$, $\chi 2$ analysis). No patient developed perforation or other complications. Based on PedsQL results, appendectomy was assigned a value of 0.85 QALM and successful nonoperative treatment 0.95 QALM. Cost/utility analysis (figure) shows a 0.06 QALM increase, from 0.85 to 0.91 (C.I. 0.88-0.94), and an $11,077 saving, from $29,500 to $18,423 (C.I. $13,764-$26,245) per nonoperatively treated patient.

Conclusions:
Despite the early treatment failures and late recurrences, antibiotic-only treatment of early appendicitis in children is feasible and safe. In a cost-utility analysis, attempted treatment with antibiotics was associated with an improvement in utility (quality of life), as well as savings of more than $10,000 per patient.


Overall
QALM Cost
Utility/ branch
Cost/ branch
0.85 $29,500
Urgent appendectomy
0.85
$29,500
19%
Worsening: Appendectomy
15%
0.85
$29,500
0.91 $18,423
Antibiotics only
Recurrence: Appendectomy
0.80
$40,900
Improved: Observation
81%
No recurrence: Observation
0.95
$11,400
85%

Notes:

30

SUB-SPECIALIZATION WITHIN PEDIATRIC SURGICAL GROUPS IN NORTH AMERICA

Jacob C. Langer, MD[1], Jennifer Gordon[1], Li Ern Chen, MD[2].

[1]Hospital for Sick Children, Toronto, ON, Canada, [2]Baylor University Medical Center, Dallas, TX, USA.

Purpose:
Individual surgeon volume may influence outcomes for complex and rare pediatric surgical conditions. Sub-specialization represents one potential strategy for optimizing care within individual pediatric surgical groups. The goal of this study was to assess the current status of sub-specialization in North American pediatric surgical practices and to evaluate the factors that are associated with the degree of sub-specialization.

Methods:
A survey was sent to one member of each pediatric surgical practice in the United States and Canada. A list of 44 operation types, ranging in complexity and volume, was presented and the surgeon chose one of the following responses for each operation type: 1. everyone in the group does the operation; 2. group policy - only some surgeons do the operation; 3. group policy - anyone can do the operation but requires mentorship from an expert within the group; 4. only some do the operation due to referral patterns. Sub-specialization ratio was defined as # operation types rated as 2-4 / # operation types rated 1-4. Association of various factors with degree of sub-specialization was analyzed using non-parametric statistical tests with $p<0.05$ considered significant.

Results:
130 of 210 surveys were completed (62% response rate). There was significant variability in level of sub-specialization among groups. Factors found to be significantly associated with increased sub-specialization included free-standing children's hospitals, presence of a pediatric surgery training program, higher number of surgeons in the group, and higher total and inpatient case volume. Country, academic affiliation, outpatient case volume, and percentage of cases that are tertiary/quaternary were not associated with degree of sub-specialization.

Conclusions:
There is wide variation in the degree of sub-specialization among North American pediatric surgery practices. These data will help to inform ongoing debate around strategies that may be useful in optimizing pediatric surgical care and patient outcomes in the future.

Notes:

31

PARAVERTEBRAL REGIONAL BLOCKS DECREASE LENGTH OF STAY FOLLOWING SURGERY FOR PECTUS EXCAVATUM IN CHILDREN

Patrick D. Loftus, HBS, Craig T. Elder, BA, Katie W. Russell, MD, Stephen P. Spanos, MD, Douglas C. Barnhart, MD, Eric R. Scaife, MD, David E. Skarda, MD, Michael D. Rollins, MD, Rebecka L. Meyers, MD.

University of Utah, Salt Lake City, UT, USA.

Purpose:
Management of postoperative pain following surgical correction of pectus excavatum has typically included the use of epidural analgesia and narcotics. Unlike epidural, regional block catheters may be left if place at discharge for a smoother and possibly earlier transition to home care. We hypothesized that the use of an intercostal or paravertebral regional block might result in decreased inpatient length of stay (LOS) and decreased cost.

Methods:
We conducted an IRB approved (IRB#00061391) retrospective cohort study of 137 patients who underwent surgical repair of pectus excavatum with pain management via epidural, intercostal, or paravertebral catheters between January 2009 and December 2012. Nine outliers were identified using the modified Thompson-tau technique and excluded. The following variables were evaluated: LOS, pain scores, benzodiazepine and narcotic requirements, complications, vomiting, professional fees, and hospital charges. Hospital charges were sub-categorized by point of origin as operating room, PACU, or inpatient surgical unit.

Results:
Key findings are shown in TABLE. LOS was significantly reduced in the paravertebral group ($p<0.005$). Line-item analysis of charges revealed increases in operating room charges for both types of regional blocks that were offset by decreased inpatient surgical unit charges in the paravertebral group. Compared to epidural, pain scores were higher for both intercostal and paravertebral on day one ($p<0.005$), but equivalent for paravertebral on day three ($p=0.60$).

Conclusion:
Using paravertebral blocks for pectus excavatum repair is a safe and effective alternative to epidural analgesia, resulting in a significantly shorter length of stay ($p<0.005$) without a significant increase in total hospital charges ($p=0.37$).

Scientific Session IV (cont.)

RESULTS LOS, CHARGES, MEDICATIONS, AND PAIN SCORES POST-OP PECTUS EXCAVATUM					
	Epidural	Intercostal	Paravertebral	ANOVA	Paravertebral vs. Epidural
Number of Patients	76	28	24	-	-
Length of Stay (days)	4.9 (range 3-8)	4.3 (range 2-7)	2.9 (range 2-5)	p<0.005	p<0.005
Total Hospital Charges ($)	17958.6 (range 8756-38715)	20602.92 (range 15928-30059)	19430.89 (range 13233-43479)	p=0.076	p=0.37
Benzodiazepine Doses/Day	1.6 (range 0-4.7)	2.2 (range 0-4.5)	2.2 (range 0-5.8)	p=0/06	p=0.11
Narcotic Doses/Day	3.1 (range 0-8.4)	5.4 (range 3.5-8.5)	6.6 (range 2.8-12.5)	p<0.005	p<0.005
Pain Scores (0-10) Post-Operative Day #1	2.4 (range 0-7.5)	3.6 (range 0.25-6.6)	3.6 (range 0.47-6.5)	p<0.005	p<0.005
Pain Scores (0-10) Post-Operative Day #2	2.7 (range 0-7.1)	3.9 (range 1.8-7.3)	3.4 (range 0.14-5.8)	p<0.005	p=0.03
Pain Scores (0-10) Post-Operative Day #3	2.6 (range 0.09-6)	3.6 (range 1.6-7.2)	2.8 (range 0.38-5.5)	p<0.005	p=0.60

Notes:

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PROPRANOLOL VERSUS STEROIDS FOR THE TREATMENT OF ULCERATED HEMANGIOMAS

Bentley B. Rodrigue, BS, Carol Chute, RN, CNP, Denise Adams, MD, Belinda Dickie, MD, PhD, Adrienne Hammill, MD, PhD, Roshni Dasgupta, MD, MPH.

Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

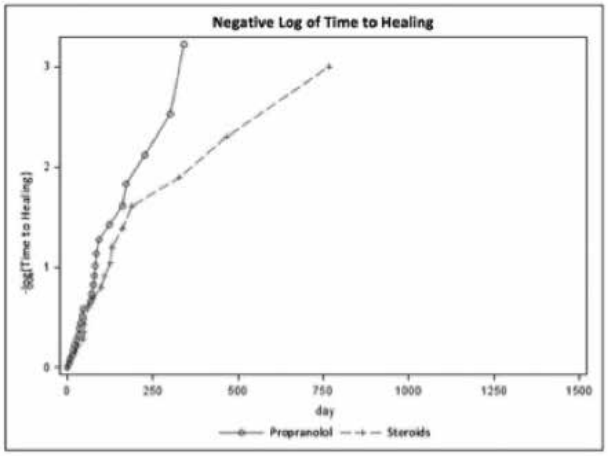
Purpose:
Infantile hemangiomas are the most common tumors of infancy. There has been a recent paradigm shift from steroids to the use of propranolol for treatment. Ulceration of infantile hemangiomas is one of the common indications for medical intervention. This study compares the efficacy of steroids and propranolol for the treatment of ulcerated hemangiomas.

Methods:
A retrospective chart review was conducted on 152 patients with ulcerated hemangiomas who presented to a single tertiary care institution between 2007 and 2014.The time to heal was compared between patients treated only with propranolol (n=29) and those treated only with steroids (n=27). For treatment of ulcerations, the propranolol dose was 1mg/kg/day. Multivariate logistic regression and Kaplan Meier survival methods were used for data analysis.

Results:
There were no significant differences in the demographics of the two treatment groups including age, gender, size of ulceration, insurance status or location. Patients treated with steroids had mean time to healing of 198 days while those treated with propranolol had a mean healing-time of 105 days ($p<0.05$). 7 patients (26%) treated with steroids and 4 (14%) treated with propranolol did not heal and ultimately underwent surgical resection. 11 (41%) steroid patients and 13 (45%) propranolol patients also underwent laser treatments. Propranolol and steroid treatment groups heal at a comparable rate in patients receiving treatment for less than 125 days. Propranolol shows faster healing rates after 125 days.

Conclusions:
This is the largest study of ulcerated hemangiomas and the first to compare propranolol versus corticosteroids. Propranolol appears to be more efficient in the treatment of ulcerated hemangioma, however the overall time to healing is still lengthy and can cause significant issues with quality of life. Further studies are required to examine the role of propranolol dose escalation and the use of laser treatments to improve overall healing time of ulcerations.

Scientific Session IV (cont.)



Notes:

33

ANALYSIS OF MEDICAL MALPRACTICE CLAIMS INVOLVING PEDIATRIC SURGICAL CONDITIONS

Veronica F. Sullins, MD, Steven L. Lee, MD.

Harbor-UCLA Medical Center, Torrance, CA, USA.

Purpose:
Pediatric surgery is a high-risk specialty. We examine allegations and outcomes in malpractice claims involving index pediatric surgical conditions.

Methods:
A retrospective review of malpractice claims concerning 11 index pediatric surgery diagnoses from 1984 to 2013 was performed using a publicly available database of state and federal court records.

Results:
Of the 411 cases reviewed, 284 (69%) documented a cause for alleged malpractice and 183 (45%) had outcome data. Results are summarized in the Table. Of the 183 cases with known outcomes, 44% went to trial, 53% reached a settlement, and 13% were dismissed. Jury verdicts were in favor of the defendant in 69% of cases. Wrongful death was alleged in 46% of cases with the highest percentage of wrongful death claims in cases of abdominal wall defects (54%), CDH (53%), and malrotation/volvulus (52%). The most common cause for alleged malpractice was a delay or failure in diagnosis (53%), followed by negligence in postoperative care (20%), and negligence in surgery (8%). Forty-seven percent of all deaths were the result of an alleged failure or delay in diagnosis. Overall, the median jury trial award was $1,648,000 (IQR $655,000-6,125,000) and the median settlement was $1,103,668 (IQR $475,000-3,250,000). The most commonly named defendants were hospitals/medical groups (62%), followed by pediatricians (30%) and surgeons (26%).

Conclusions:
Delays or failures in diagnosis are the most common allegation in cases of malpractice in index pediatric surgery diagnoses and account for nearly half of all cases of wrongful death. Limiting patient complications and reducing medicolegal risk in pediatric surgery may be achieved by focusing on timely and accurate diagnosis across all pediatric specialties.

Scientific Session IV (cont.)

Table: Case outcomes by diagnosis.* Fewer than 3 cases

DIAGNOSIS	SETTLEMENT	TRIAL	PLAINTIFF VERDICT	MEDIAN SETTLEMENT PAYMENT	MEDIAN TRIAL PAYMENT	DEATHS
Malrotation/ Volvulus (n = 66)	56%	32%	2%	$1,002K	$2,425K*	52%
NB/Wilm's Tumor (n = 42)	52%	45%	7%	$750K	$1,513K*	45%
CDH (n = 36)	47%	47%	24%	$475K	$6,125K	53%
Hirschsprung's (n = 35)	54%	33%	8%	$1,280K	$1,625K*	49%
AWD (n = 28)	54%	53%	16%	$2,305K	$1,548K	54%
Biliary Atresia (n = 17)	75%	50%	13%	$400K*	$16,500K*	29%
Pyloric Stenosis (n = 14)	56%	56%	11%	$2,337K*	$1,898K*	29%
ECMO (n = 14)	44%	67%	22%	$4,650K*	$430K*	36%
Other (Imperforate anus, EA/TEF, Intestinal atresias) (n =32)	48%	52%	15%	$2,250K	$1,050K	38%

Notes:

Workforce Abstracts
Saturday, May 2, 11:30 a.m. – 11:45 a.m.

Evolution in the Surgical Care of Children: A Concern for Competency?

Ronald B. Hirschl, MD[1], Colin Gause, MD[2], Samir K. Gadepalli, MD[1], Thomas W. Biester, MS[3], Thomas F. Tracy, Jr., MD[4], Kenneth S. Azarow, MD[5], Michael D. Klein, MD[6], Fizan Abdullah, MD[2].

[1]University of Michigan, CS Mott Children's Hospital, Ann Arbor, MI, USA, [2]Johns Hopkins University, Baltimore, MD, USA, [3]American Board of Surgery, Philadelphia, PA, USA, [4]Brown University, Hasbro Children's Hospital, Providence, RI, USA, [5]Oregon Health Sciences University, Doernbecher Children's Hospital, Portland, OR, USA, [6]Children's Hospital of Michigan, Detroit, MI, USA.

Objectives:
To assess whether routine children's surgical care has transferred from general surgeons (GS) to pediatric surgeons (PS) with an associated increase in the number of PS and resulting dilution in the PS index case experience.

Methods:
We examined recertification data submitted to the American Board of Surgery for GS (1980-2013) and PS (2009-2013). "Index" procedures were determined by the leaders of the major PS organizations (APSA, AAP, ABS, RRC, APSTPD).

Results:
Between 1980 and 2013 the mean number of pediatric surgery cases performed by GS decreased from 10.0 to 1.4/surgeon/year, the number of ACGME-approved PS North America training programs increased from 20 to 53 (165%), and the number of ABS-certified PS increased from 383 to 889 (132%). Recertification data from 2009-2013 demonstrated that in each of 10 "rare" PS index procedure categories PS performed a median of ≤ 2 cases/surgeon/year.

Conclusions:
The proportion of pediatric surgery cases performed by GS has declined. Simultaneously, the number of PS has increased. As a result, individual pediatric surgeon ongoing experience in rare index cases is limited. The model of pediatric surgery care should be reexamined if sufficient experience is to be maintained in the care of rare index cases in children.

Notes:

Workforce Abstracts (cont.)

A Survey Assessment of the Pediatric Surgery Workforce

James D. Geiger, MD

University of Michigan, CS Mott Children's Hospital, Ann Arbor, MI, USA.

Purpose:
Workforce and clinical competence are critical areas for pediatric surgery and are receiving great attention by both the American Academy of Pediatrics and American Pediatric Surgical Association, especially with the number of pediatric surgeons expected to increase significantly over the next two decades.

Results:
Almost 15 years ago, the AAP conducted a survey of pediatric medical subspecialists and surgical specialists about education and practice issues. The resulting analysis was the first comprehensive examination of characteristics of the pediatric subspecialty workforce. APSA too has also conducted surveys of its workforce and new graduates entering the market. This current survey effort has built on those efforts to provide up to date workforce data.

Conclusion:
The preliminary results of two surveys will be presented. The first is a "pipeline" survey of graduates of pediatric surgery training programs 2012-1014 and the second is a survey of all pediatric surgeons that are members of the AAP or APSA. This data will assist the AAP, APSA and other societies on advocacy and recruitment of the next generation of pediatric surgeons.

Notes:

Modeling the Future Pediatric Surgery Workforce

William T. Adamson, MD

University of North Carolina, Chapel Hill School of Medicine, Chapel Hill, NC, USA

Purpose:
A focus on both maintaining competency and on quality of care within our field has questioned the impact of the relatively recent increase in the number of pediatric surgery training programs.

Methods:
APSA and the American College of Surgeons have jointly sponsored application of a newly designed, web-based, interactive plasticity model to predict supply and demand trends for the pediatric surgery workforce. Applied to pediatric surgery, this model, the FutureDocs Forecasting Tool, can project the impact of predicted numbers of newly trained pediatric surgeons, changes in retirement patterns, and geographic clustering of pediatric surgeons. 'Plasticity' within the model recognizes that varying configurations of surgeons, including both pediatric and general surgeons, may provide surgical care to children within a given region.

Results:
The model demonstrates that the number of pediatric surgical cases will remain relatively flat over the next two decades, while the projected number of pediatric surgeons will more than double from 2011 to 2030.

Conclusion:
With its capacity to project the impact of changes in factors that may influence supply and demand for pediatric surgeons, this interactive model may help shape the discussion regarding the optimal pediatric surgery workforce of the future. The FutureDocs Forecasting Tool can be explored by all at the following open source website https://www2.shepscenter.unc.edu/workforce.

Notes:

Innovation Session

Innovation Session
Abstracts on New and Innovative Techniques and Procedures
Saturday, May 2, 2:00 p.m. – 3:00 p.m.

i1

DEVELOPMENT OF A PEDIATRIC COLORECTAL RAPID LEARNING HEALTHCARE SYSTEM

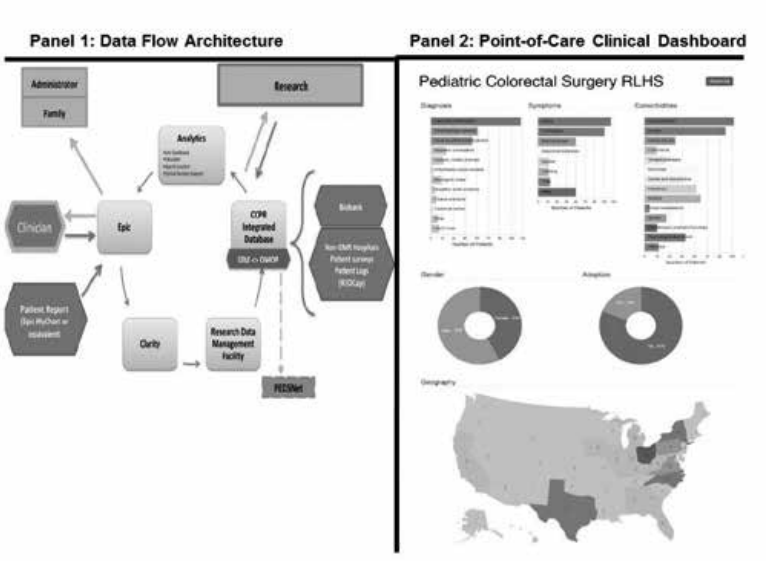
Peter C. Minneci, MD, MHSc, Kristine Nacion, MPH, Jennifer N. Cooper, PhD, Victoria Lane, MD, Richard Wood, MD, Gordon Lo, MBA, Lawrence Hoff, BS, Yungui Huang, PhD, MBA, Simon Lin, MD, MBA, Marc A. Levitt, MD, **Katherine J. Deans, MD, MHSc**.
Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
A Rapid Learning Healthcare System (RLHS) identifies the best treatment for each patient and facilitates its delivery by transforming ongoing data accrual into near real-time, actionable knowledge at the point-of-care. Our objective is to develop a multi-institutional RLHS for pediatric colorectal surgery that serves as a demonstration project for other rare pediatric diseases.

Methods:
The architectural plan for our RLHS encompasses 4 key features: (1) automated processes for data integration of electronic medical record data from a variety of platforms and patient reported data via survey tools; (2) application of cohort development tools that permit automated data sharing between institutions; (3) generation of dynamic near real-time clinical dashboards that facilitate shared decision-making at the point-of-care; and (4) capability for pre-specified research questions to be answered automatically when statistical power is achieved.

Results:
We present the initial 4 months of data on patients treated in our center (n=289). Panel 1 of the figure illustrates the data flow architecture and panel 2 provides an example of how 6 of the over 300 variables being collected can be presented at the point-of-care. The dynamic nature of this data can be illustrated in a presentation such that selection of a particular characteristic in one field causes the other widgets to adjust to report their specific results for that subpopulation of patients.

Conclusions:
Our pilot colorectal RLHS successfully imports data from multiple sources and generates dashboards that can be used at the point-of-care to inform shared decision-making. Continued data accrual and expansion to other institutions will allow for other capabilities to be utilized including development of risk-adjusted models, generation of comparative performance metrics, and integration of patient portal input to assess issues important to patients/families. This type of RLHS can allow for faster evolution of knowledge into practice while minimizing research expenditures and maximizing usable targeted data.


Panel 1: Data Flow Architecture
Panel 2: Point-of-Care Clinical Dashboard
Administrator
Family
Research
Analytics
Clinician
Epic
CCHI Integrated Database
Biobank
Patient Report
Clarity
Research Data Management Facility
PECSNet
Pediatric Colorectal Surgery RLHS

Notes:

Innovation Session (cont.)

i2

DEVELOPMENT OF AN ENDOLUMINAL INTESTINAL ATTACHMENT FOR A CLINICALLY APPLICABLE INTESTINAL LENGTHENING DEVICE

Farokh R. Demehri, Brent Utter, Jennifer J. Freeman, Yumi Fukatsu, Jonathan Luntz, Diann Brei, Daniel H. Teitelbaum.

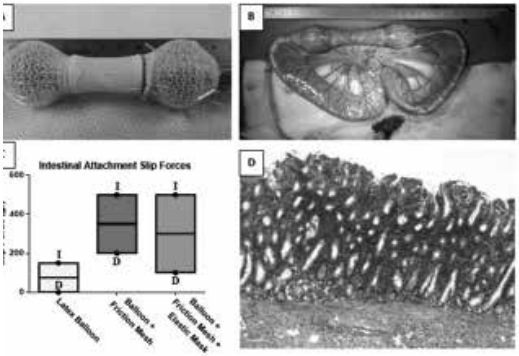
University of Michigan, Ann Arbor, MI, USA.

Purpose:
Distraction enterogenesis(DE), or mechanical lengthening of intestine, may provide a novel therapy for short bowel syndrome(SBS). Previous methods have relied upon isolated small bowel or transmural device fixation, requiring multiple operations and potential bowel injury. This work had two objectives: To create a fully endoluminal DE device; and to develop a novel approach to reversibly couple device to bowel wall, allowing for multiple-expansion/retraction cycles.

Methods:
A telescoping hydraulic device was designed with novel attachments allowing reversible, fully endoluminal anchoring. Attachments trialed were: 1) latex balloons; 2) high-friction mesh-coated balloons; or 3) mesh-coated balloons covered with a fenestrated elastic mask(dilating/fenestrated/mesh), allowing mesh-mucosa contact only with inflation (**Fig A,B**). Yorkshire pigs underwent jejunal Roux-en-Y creation with device placement via jejunostomy. The device underwent cycles of balloon inflation and hydraulic extension/retraction, 3x/day for 7-days. Results (mean±SEM) were analyzed for significance by t-test.

Results:
The dilating/fenestrated/mesh provided ideal coupling, generating high attachment strength on inflation (>500-gf; superior to uncoated latex) with ready detachment upon deflation (80-gf; superior to unmasked mesh;**Fig C**). Intestinal coupling was achieved without significant reduction in bowel perfusion (per laser Doppler;0.21±0.07 P.U. vs. 0.30±0.09 P.U.; inflation vs. deflation; p=0.46)) or histologic injury. After 7-days, distracted segments achieved a 44.2±2.0% increase in length vs. fed, non-distracted bowel, corresponding to a 13.9±2.4 cm absolute gain. Attachment sites demonstrated villus flattening (265.3±7.9 vs. 535.2±13.6 μm; p<0.001; **Fig D**), but increased crypt depth (594.3±13.5 vs 546.3±6.4 μm; p=0.009), thicker muscularis mucosa (57.7±2.4 vs. 41.3±3.5 μm; p=0.002), and unchanged muscularis propria thickness (534.2±15.3 vs. 559.0±6.9 μm; p=0.169) vs. fed control. PCNA staining of distracted bowel demonstrated increased epithelial cell proliferation vs. fed control (53.4±4.4% vs. 41.0±2.5%; p=0.039).

Conclusion:
A hydraulic device utilizing novel dilating/fenestrated/mesh attachments allows for fully endoluminal placement, with successful DE. This approach may allow development of clinically applicable technology for SBS treatment.



igure. **(A)** The hydraulic distraction enterogenesis device with high-friction mesh-coated balloons nd elastic mesh to allow reversible attachment. Between balloons is a set of hydraulic cylinders vhich expand longitudinally. **(B)** Device implanted in jejunal Roux limb, actuated and producing listractive force. **(C)** Tangential force at which device slippage occurred with balloon inflation (I) and leflation (D) with uncoated balloon, balloon coated with high friction mesh, and balloon coated with nesh and then silicone elastic mask. **(D)** H&E staining of attachment site after explant demonstrates ntact mucosa with villus flattening. Scale = 200um

Notes:

Innovation Session (cont.)

i3

MAGNETIC MINI-MOVER PROCEDURE FOR PECTUS EXCAVATUM IV: EVOLUTION OF IMPLANT DESIGN, EXTERNAL BRACE CONFIGURATION AND WIRELESS COMPLIANCE MONITORING

Corey W. Iqbal, MD[1], Dillon A. Kwiat, BS[2], Anupama Arun, PhD[2], Jill Imamura-Ching, RN[2], Richard Fechter, BS[2], Gary W. Raff, MD[3], Darrell Christensen, CO[2], Shinjiro Hirose, MD[3], Michael R. Harrison, MD[2].

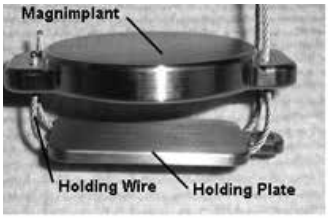
[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of California, San Francisco, San Francisco, CA, USA, [3]University of California, Davis, Sacramento, CA, USA.

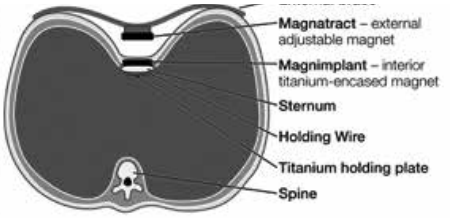
Purpose:
We describe major new improvements in the design of the Magnetic Mini-Mover that evolved from experience with the first 10 patients in a phase 2 clinical trial and are now being implemented in another 15 patients in a phase 3 multicenter trial. Improvements include changing the implant fixation to the sternum, changing the external orthotic device to improve alignment and prevent torque, and improving compliance monitoring.

Methods:
A redesign team of surgeons, electrical engineers, mechanical engineers and orthotists met twice weekly to produce CAD drawings, print prototypes and test components. The redesigned finished devices were manufactured, sterilized and packaged.

Results:
The original implant "rivet" design (two discs with a male-female central post) proved difficult to implant and remove. So we designed and tested a cable and back plate system that solved the problem. The original orthotic brace allowed misalignment and torqueing of the external and internal magnet. This was corrected by redesigning the brace to allow the two magnets to be held parallel and offset, if necessary, to prevent torqueing. The onboard data logger for compliance monitoring proved inaccurate, so we redesigned the data logger and incorporated Bluetooth Smart wireless compatibility that can automatically download data daily to the cloud.

Conclusion:
The Magnetic Mini-Mover Procedure has evolved. The design of the titanium-enclosed magnet has evolved to allow easier implantation and explant as a simple outpatient procedure. The external orthotic brace has evolved to allow better alignment of magnetic forces. The data logger with onboard data storage has been replaced by a Bluetooth Smart compatible device which wirelessly and automatically initiates daily downloads to a mobile device that then uploads to the cloud. This improved second-generation configuration is now being tested in a phase 3 trial of 15 patients, and should soon be available under Humanitarian Device Exemption (HDE).


Magnimplant
Holding Wire
Holding Plate


Magnatract – external adjustable magnet
Magnimplant – interior titanium-encased magnet
Sternum
Holding Wire
Titanium holding plate
Spine

Notes:

Innovation Session (cont.)

i4

A NOVEL MULTIMODAL COMPUTATIONAL SYSTEM USING NEAR-INFRARED SPECTROSCOPY (NIRS) TO MONITOR CEREBRAL OXYGENATION DURING ASSISTED VENTILATION IN CDH PATIENTS

Stephanie M. Cruz, MD, Adesola C. Akinkuotu, MD, Darrell L. Cass, MD, Timothy C. Lee, MD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD.

Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

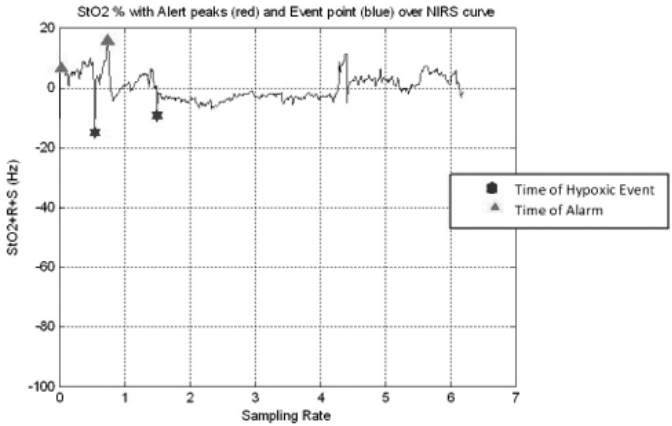
Introduction:
Near-Infrared Spectroscopy (NIRS) has been used to monitor cerebral oxygenation in infants. However, the clinical implications of this data and its therapeutic use remains poorly understood. The purpose of this study was to develop a clinically-applicable early alert for cerebral hypoxia using a computational simulation model (MATLAB©).

Methods:
Following IRB-approval, neonates with congenital diaphragmatic hernia (2010-2014) were recruited to collect continuous measurement of cerebral tissue oxygen saturation (StO2) using a NIRS device (FORE-SIGHT®, CASMED). Clinicians were blinded to NIRS data and treated infants based on pre-established clinical protocols. Charts were reviewed retrospectively to identify clinical events of hypoxemia (spontaneous, sustained, decreased preductal SpO2 85% leading to ventilator changes). Data that met criteria (>24 hours of continuous data and high signal: noise ratio) were analyzed using MATLAB©--codified to determine baseline, variability and event data for each patient.

Results:
Ten of 20 patients met data criteria. Following MATLAB© simulation, 21 events were detected by computer analysis, only 11 of which were identified clinically. Of these 21 events, the program could anticipate an event at least 15 minutes prior in 77% of cases, with an average pre-event detection of 47 (range 16-122) minutes. Baseline StO2 (%) pre-event was (79.42±7.9) and post-event StO2 was 58.69±10.4 with variability from baseline >17%. In this computational model, the sensitivity to distinguish low states of cerebral perfusion was 88% with a specificity of 93%. To test validity, our model was applied to the other 10 patients. In these patients, the program successfully detected 71 of 73 events with an alarm >15 minutes in 70 of 71, and 1 false positive alarm.

Conclusion:
We have developed a computational model that can anticipate hypoxic events up to 15 minutes in advance. This model holds potential for an early warning system for clinicians to optimize clinical care.

Figure 1. Sample Analysis of StO2% over a 12 hour period in the Frequency domain where two events of low cerebral oxygen saturation were detected in a patient with projected times of alarms.



Notes:

Innovation Session (cont.)

i5

DEVELOPMENT OF AN OPERATIVE SUSPENSION SYSTEM FOR THE PERFORMANCE OF MRI-OR GUIDED LAPAROSCOPIC ANOPLASTY

Marcus Jarboe, MD, Ranjith Vellody, MD, Dragan Spremo, Robert Ladouceur, David Nagy, Daniel Teitelbaum, MD.

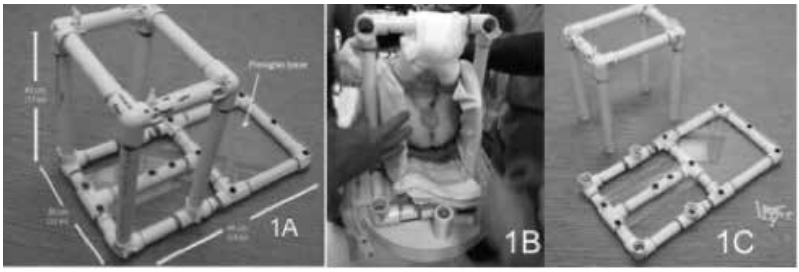
University of Michigan, Ann Arbor, MI, USA.

Background:
MRI-guided anorectal surgery is a new approach helping surgeons perform surgical correction of anorectal atresia. Unlike most intraoperative MRI-guided surgeries, which are cranial, the infant must be placed in lithotomy position with the buttocks exposed to allow MRI-compatible needle placement through the sphincter muscle complex. In addition MRI coils must be placed and supported in a position allowing optimal reception of signal for image resolution. Because the scanner is not designed for this procedure and there are no readily available devices made for this purpose, we report on the design of a unique MRI-compatible support structure.

Methods and Device:
The device requirements included MRI-compatible materials, size constraints allowing for suspension of legs for a <10kg infant, ability to position and support MRI flex coils, and ability to fit within the constraints of the MRI bore (Seimens 1.5T). The device was constructed from 1.25" polyvinylchloride (PVC) tubing and poly-methyl methacrylate (Plexiglass®) platform allowing for the safe suspension of the infants lower extremities and buttocks, as well as adequate access for needle placement (Fig 1A). In institutions without an MRI-OR the PVC-suspension structure was mounted with Velcro® straps to the MRI-OR table, permitting safe infant transfer from MR-room to Operating room.

Results:
Children are suspended to the structure using Webril® cotton to prevent pressure ulcerations (Fig 1B). Patients up to 10.5 kg have been successfully imaged and accessed for needle placement. The upper structure was designed to break away, allowing the child to remain on the device for laparoscopy (Fig 1C).

Conclusions:
We describe a unique MRI-compatible positioning device allowing safe and optimal positioning for an MRI-guided procedure. The device is easily secured, adjustable and relatively inexpensive. It provides a stable structure in which to position and transport a patient with a needle in a tenuous position without dislodgement.



Notes:

Innovation Session (cont.)

i6

GENERATION OF FUNCTIONAL INTESTINE FROM PATIENT DERIVED PLURIPOTENT STEM CELLS

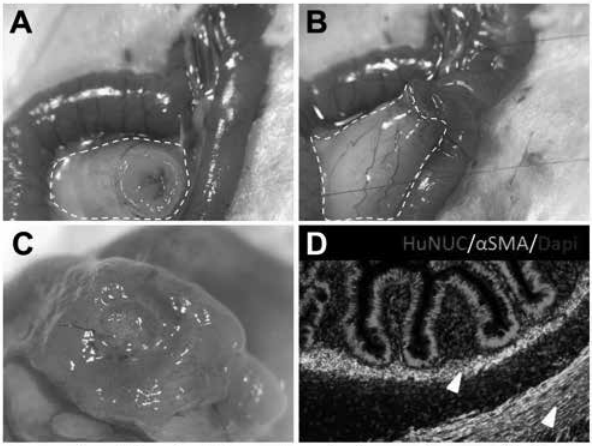
Maxime M. Mahe, PhD, Carey L. Watson, MD, Jorge Munera, PhD, Nambirajan Sundaram, PhD, Noah F. Shroyer, PhD, James M. Wells, PhD, Michael A. Helmrath, MD.
Cincinnati Children Hopsital Medical Center, Cincinnati, OH, USA.

Purpose:
The differentiation of human pluripotent stem cells into organ-specific subtypes offers an exciting resource for therapeutic transplant. To date, limited tissue-engineering models exist for patient-derived human intestine. In this study, we developed a murine model utilizing intestinal organoid transplantation to generate patient derived specific intestinal tissue.

Methods:
Human intestinal organoids are generated *in vitro* from step-wise directed differentiation of patient induced pluripotent stem cells. After 28 days, intestinal organoids contain epithelial and mesenchymal cell types that are highly similar to their *in vivo* counterpart. Intestinal organoids cultured for 28-35 days are embedded into collagen and are transplanted in immunocompromised mice. Six weeks following transplantation, the engrafted organoids are processed for analysis or grafted in the mouse intestinal continuity (Fig. 1A-B).

Results:
We demonstrated that intestinal organoids engrafted *in vivo* to form mature human intestinal epithelium (Fig. 1C) with intestinal stem cells contributing to the crypt-villus architecture and a laminated human mesenchyme (Fig. 1D), both supported by the ingrowth of functional host vasculature. *In vivo* transplantation resulted in significant expansion and maturation of the epithelium and mesenchyme as demonstrated by differentiated intestinal cell lineages (enterocytes, goblet cells, Paneth cells, tuft and enteroendocrine cells), presence of functional brush-border enzymes (lactase, sucrase-isomaltase, dipeptidyl peptidase 4), and visible subepithelial and smooth muscle layers when compared with intestinal organoids grown *in vitro.* Furthermore, we demonstrated that engrafted intestinal organoids expressed active brush border enzymes and exhibited intact intestinal epithelial barrier and absorptive functions.

Conclusion:
We conclude that intestinal organoids from patient-derived induced pluripotent stem cells can be efficiently transplanted *in vivo* and generate a vascularized and fully functional human intestine. This system should pave the way for patient disease specific therapies and customized treatment approaches.



Generation of functional human intestine from patient specific iPSCs. **(A)** Intestinal organoid (dashed line) 6 weeks after transplantation in the mesentery of immunocompromised mouse. **(B)** Engrafted intestinal organoid (dashed line) sutured to the host intestinal continuity. **(C)** Intestinal mucosa of engrafted intestinal organoid (dashed line). **(D)** Section of engrafted intestinal organoid 6 weeks post-transplantation. Engraftment is almost entirely human with epithelium and majority of mesenchyme staining positive for human anti-nuclear antibody (HuNuc; red). Staining for smooth muscle actin (α-SMA; green) reveals contribution of supporting laminated smooth muscle (white arrowheads).

Notes:

Video Session

Video Session
Saturday, May 2, 3:00 p.m. – 4:00 p.m.

V1

RESECTION OF A RECTAL DUPLICATION CYST USING TRANSANAL ENDOSCOPIC MICROSURGERY

Philip J. Spencer, MD[1], Helen Mayer[1], Kwadwo Oduro, MD[1], David Lawlor, MD[2], Patricia Sylla, MD[1].

[1]Massachusetts General Hospital, Boston, MA, USA, [2]Massachusetts General Hospital for Children, Boston, MA, USA.

Purpose:
Transanal endoscopic microsurgery (TEM) is a minimally invasive technique for local excision of benign rectal lesions, low-risk carcinoid and T1 rectal cancers, and palliation of advanced rectal tumors (1).

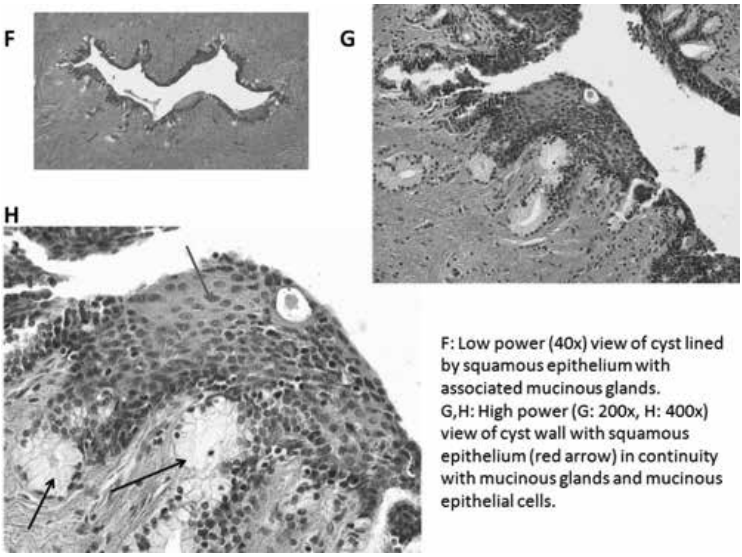
Recently TEM has been used to resect benign pre-sacral tumors in adults (2, 3, 4). This vignette describes a resection of a presacral duplication cyst using TEM. This lends support to TEM as a technique to resect presacral tumors leading to less postoperative pain, decreased hospital stay, and at least an equivalent probability of resection with negative margins.

Methods:
A 21 y/o woman presented with a history of recurrent abscesses in the presacral space. She first presented at the age of 17 complaining of rectal pain. An MRI demonstrated a multiloculated fluid collection. She was taken to the OR for coccygectomy, incision and drainage. The patient continued to have recurrences and a low anterior resection (LAR) with attempted resection of the cyst was performed 2 years later. However, the patient continued to have recurrent infections requiring percutaneous drainage about 2 times annually.

At this presentation an opening was apparent posteriorly, just distal to the anal verge. On fluoroscopy contrast could be seen filling presacral space. The patient was offered resection of the cyst with a temporary loop sigmoid colostomy. In the operating room we followed the fistula anterior to the sphincter complex. As the dissection continued cranially exposure was insufficient. We transitioned to TEM and were able to resect the cyst completely from the rectal wall. The defect was closed by approximating the rectum to the anal verge using full thickness stitches.

Results:
Pathology revealed a cyst with intestinal type epithelium and mucinous glands (*figure 1)*. The patient was discharged POD 2 after an uneventful stay.

Conclusion:
Her colostomy was reversed 6 weeks postoperatively and her recovery has been without complication.



F: Low power (40x) view of cyst lined by squamous epithelium with associated mucinous glands.
G,H: High power (G: 200x, H: 400x) view of cyst wall with squamous epithelium (red arrow) in continuity with mucinous glands and mucinous epithelial cells.

Notes:

Video Session (cont.)

V2

THORACOSCOPIC MANAGEMENT OF BILATERAL CONGENITAL PULMONARY AIRWAY MALFORMATION WITH SYSTEMIC BLOOD SUPPLY: USE OF A NOVEL 5MM STAPLER

Sandra M. Farach, MD, Paul D. Danielson, MD, Nicole M. Chandler, MD.
All Children's Hospital Johns Hopkins Medicine, Saint Petersburg, FL, USA.

Purpose:
Congenital pulmonary airway malformations (CPAM) and bronchopulmonary sequestrations (BPS) are two commonly discussed congenital lung malformations (CLM). We present a case of bilateral thoracoscopic lobectomy in a patient with bilateral, combined CPAM and BPS and report the novel use of a 5 mm linear stapling device.

Methods:
This is a retrospective review of a 9-month-old female patient with bilateral, combined CPAM and BPS who underwent bilateral thoracoscopic lower lobectomy.

Results:
The left lower lobectomy is demonstrated in this video. This was performed via a modified lateral position with the left side up using two 3 mm ports and two 5 mm ports. The lower lobe was resected cephalad. The systemic vessel was identified and secured. Polymer clips were placed, and the vessel was divided with a 5 mm stapling device. The pulmonary artery was divided with a vessel sealing instrument. The pulmonary vein was identified and was divided with the 5 mm stapler after endoscopic clips were placed. The bronchus was then identified and was divided with the 5 mm stapler. The most inferior port was removed and the incision widened to allow for extraction of the specimen. A 12 French chest tube was inserted into the left chest cavity under direct visualization. Total operative time was 146 minutes. The patient did well and was discharged on post-operative day two. Pathology revealed intralobar pulmonary sequestration with pulmonary systemic and pulmonary artery hypertensive changes and congenital cystic pulmonary airway malformation Type I.

Conclusion:
The literature has reported good outcomes with thoracoscopic lobectomy for congenital airway malformations. We present a successful case of bilateral thoracocsopic lobectomy for a rare finding of bilateral, combined CPAM and BPS as well as the effectiveness and safety of using a 5 mm linear stapling device.

Notes:

V3

RECTAL ATRESIA: VIDEO PRESENTATION

Victoria A. Lane, MBChB, Richard J. Wood, MBChB, Rajan K. Thakkar, MD, Katherine J. Deans, MD, MHSc, Peter C. Minneci, MD, MHSc, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:

Rectal atresia is a rare, and accounts for 1% of all anorectal malformations. The malformation can be easily missed in the immediate newborn period, as the anus typically appears to be of a normal caliber, and situated within the sphincter complex, but the infant fails to pass meconium. It is important to note that the future for bowel control in these patients is excellent, as they have a normally sited anus and well developed dentate line, however many surgeons may disrupt the normal anatomy during operative repair using standard trans anal dissection. This video demonstrates the key principles of a novel technique for the repair of rectal atresia through a posterior sagittal incision, without circumferential dissection of the anal canal. This results in complete preservation of the dentate line, maximizing the future chances of bowel control. The technique is difficult to appreciate in photographic form and we believe the video will help clarify the fundamental operative steps.

Methods & Results:

A 2-month-old male infant with rectal atresia is presented. His initial management is discussed together with presentation of the initial radiographs and distal loop colostogram through the mucus fistula. The operative technique is demonstrated and narrated.

Conclusion:

Rectal atresia is rare. This novel operative technique through a posterior sagittal incision allows for complete circumferential preservation of the dentate line, resulting in an excellent prognosis with regards to fecal continence. In the case of a rectal stenosis, this technique can also avoid the need for anterior dissection, minimizing the risk of urethral injury.

Notes:

Video Session (cont.)

V4

THORACOSCOPIC RESECTION OF AN IATROGENIC ESOPHAGEAL DIVERTICULUM

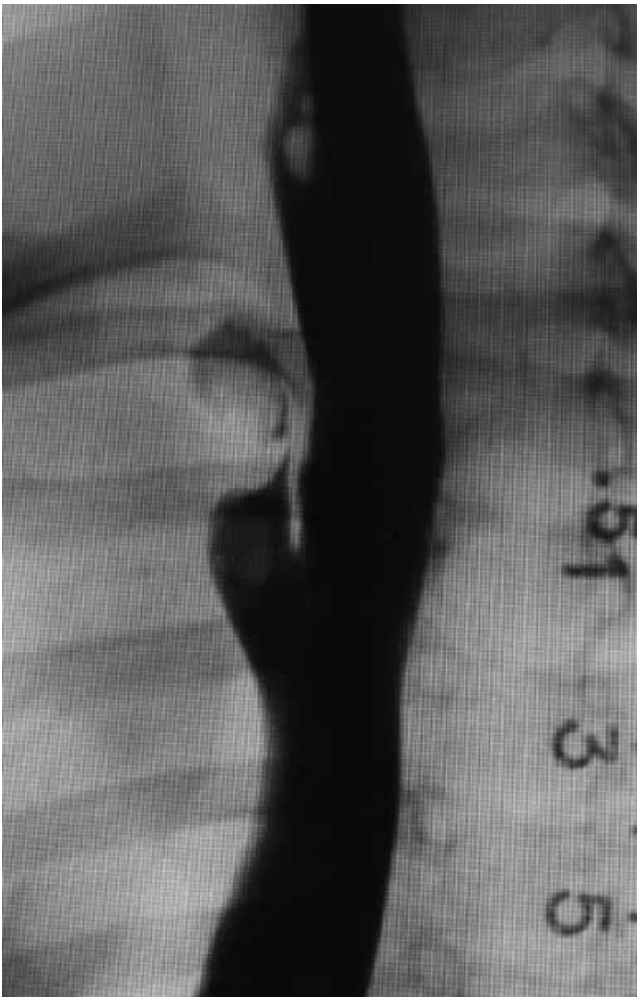
Steven S. Rothenberg, **Saundra M. Kay, MD.**
The Rocky Mountain Hospital for Children, Denver, CO, USA.

Purpose:
This video demonstrates a thoracoscopic resection of an iatrogenic esophageal diverticulum in a 8 yo male.

Methods:
A 7 yo male swallowed a key with a small wire ring on it. He sustained a esophageal perforation of the upper thoracic esophagus during endoscopic removal. The patient was transferred and admitted to our hospital where he was treated conservatively with antibiotics, TPN, and NPO for 10 days. He remained Asymptomatic and tolerated a regular diet but an esophagram at 10 days showed a walled off perforation. He had follow-up esophagrams at 3, 6, and 12 months and these showed a persistence of the diverticulum. At this point a decision was made to resect the diverticulum to avoid future complications. Because of its location high in the thoracic inlet on the left, a left thoracoscopic approach was chosen. The procedure was performed under single lung ventilation with a right mainstem intubation. The patient was in a modidied lateral decubitus position being angled slightly prone. Three ports were used for the procedure and combined thoracoscopic and endoscopic views were used to identify and resect the diverticulum.

Results:
The procedure was completed successfully thoracoscopically. Operative time was 85 minutes. A chest drain was left post-op. An esophagram was obtained on POD # 1 which showed resolution of the diverticulum and no leak. The drain was removed and the patient was stared on po. The patient was discharged on POD #2 tolerating a soft diet with no complications.

Conclusions:
This video demonstrates a unique approach to a rare problem high in the thoracic inlet. The combined endoscopic and thoracoscopic technique allowed safe for identification and resection of an iatrogenic pseudo-diverticulum and avoided the morbidity of a major thoracotomy.



Notes:

Video Session (cont.)

V5

LAPAROSCOPIC RETROGASTRIC MEDIAN ARCUATE LIGAMENT RELEASE

Juan L. Calisto, MD, Isam Nasr, MD, Marcus Malek, MD.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA.

Purpose:
Film reporting retrogastric laparoscopic release of median arcuate ligament

Methods:
18yo male with post prandial pain, weight loss and early satiety. Barium swallow, endoscopy and gastric emptying study disclosed no abnormalities. Compute tomography revealed compression of celiac axis and ultrasound revealed increased velocities.

Results:
Patient has resolution of pain at 1 month follow up.

Conclusions:
Retrogastric laparoscopic release provides good visualization of the celiac trunk and allow a safe release.

Notes:

V6

FROM BENCHTOP TO BEDSIDE: EVOLUTION OF THE MODERN LAPAROSCOPIC PEDIATRIC INGUINAL HERNIA REPAIR

Nicholas E. Bruns, MD, Todd A. Ponsky, MD.
Akron Children's Hospital, Akron, OH, USA.

Purpose:
Laparoscopic pediatric inguinal hernia repair is an evolving procedure. We have previously shown certain maneuvers in the laparoscopic high ligation improve efficacy in the animal model. The purpose of this video presentation is to define a laparoscopic technique in children that provides equivalent efficacy of the open repair and to implement elements of the technique that were learned from an animal model.

Methods:
Based on animal research, braided suture and peritoneal injury have been suggested to improve durability of repair in the animal model likely by stimulating inflammation and scar tissue. We have thus modified Patkowski's method of percutaneous internal ring suturing to include the use of braided suture and peritoneal thermal injury.

Results:
This technique anecdotally has shown to be durable and effective.

Conclusions:
This technique is safe and efficacious for indirect inguinal hernia repair in children and may show promise in adults. Further study is needed to determine long term outcomes.

Scientific Session V
Oncology and Clinical Surgery
Sunday, May 3, 8:00 a.m. – 9:15 a.m.

34
GASTRIC ELECTRICAL STIMULATION MAINTAINS EFFICACY IN CHILDREN WITH SEVERE GASTROPARESIS

Jillian McLaughlin, MD, Justine M. Pierson, BS, Christopher D. Jolley, MD, **Saleem Islam, MD.**

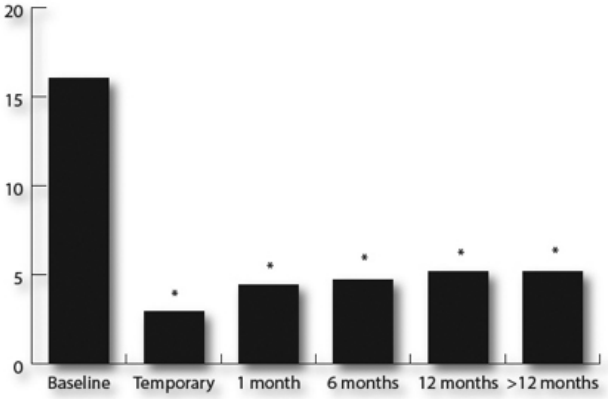
University of Florida, Gainesville, FL, USA.

Purpose:
Gastroparesis is a condition associated with severe nausea, emesis, bloating, and pain resulting in poor quality of life. In adults who fail medical management, gastric electrical stimulation (stimulation) has been used with success, but the device remains off-label for children. The purpose of this study is to describe long-term outcomes of stimulation therapy from the largest pediatric series to date.

Methods:
A retrospective analysis of children who had stimulation therapy (2004-2014) was conducted. Demographics, disease course, comorbidities, outcomes, and treatment related data were collected. Symptoms were recorded using the validated gastroparesis cardinal symptom index score (0-5 scale for nausea, emesis, pain, bloating, anorexia), as well as a total score.

Results:
A total of 98 patients underwent stimulation therapy (permanent or temporary), with a majority being teenagers (13.7 +/- 3.5 years), Caucasian (85.3%) and females (75.8%). Idiopathic/ post viral etiology was the most common cause (72.6%). Temporary stimulation was performed in 97 cases, with 65 (67%) significantly improving all symptoms ($p<0.001$), 21 (21.3%) not responding, while 11 were non-verbal, and excluded from further analysis. Permanent implants were performed in 66 patients, with an initial success rate of 96.8%. Two patients had no initial response. Significant relief of individual and total symptom scores were noted ($p<0.005$, Figure), which maintained beyond 12 months duration in a majority. Need for hospitalization ($p=0.0006$), antiemetic and promotility agent use ($p<0.001$), and ability to consume full diet ($p<0.001$) were all improved. Twelve had the stimulator removed, 7 from late failure (including two unrelated deaths), and 5 from symptom resolution. There have been no other long-term complications noted.

Conclusions:
Gastric stimulation was an effective and safe treatment for select children with severe, medically refractory gastroparesis. There was significant improvement in all symptoms, decreased hospitalization and medication use, and improved oral intake. This study confirms the long term efficacy of this therapy.



Total Symptom Scores with Gastric Electrical Stimulation. Total Symptom Scores were calculated at baseline (n=65), with temporary stimulation (n=65), 1 month (n=66), 6 months (n=63), 12 months (n=53), >12 months (n=42). All marked with (*) showed a significant decrease in total symptom score compared to baseline with a *p*-value <0.005.

Notes:

35

A MULTI-INSTITUTIONAL REVIEW OF THE INITIAL AND SUBSEQUENT MANAGEMENT OF SPONTANEOUS PNEUMOTHORAX IN CHILDREN

Charles M. Leys, MD[1], **Jocelyn F. Burke, MD**[1], Amita Desai, MD[2], Tiffany Wright, MD[3], Shawn D. St. Peter, MD[2], Samir Gadepalli, MD[3], Daniel J. Ostlie, MD[1].

[1]American Family Children's Hospital, Madison, WI, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA, [3]CS Mott Children's Hospital, Ann Arbor, MI, USA.

Purpose:
The best initial treatment for primary spontaneous pneumothorax (SPTX) in children is unclear. While a small SPTX may be observed, most patients undergo SPTX evacuation with a chest tube (CT) initially. Options for definitive treatment include CT alone, CT followed by thoracoscopy (VATS) for ongoing air leak, or immediate VATS. The purpose of this study is to compare outcomes of these initial treatments for SPTX in children.

Methods:
After IRB approval at three academic children's hospitals, all patients treated for SPTX from Jan 2000 - Oct 2013 were identified. Patient demographics, initial and subsequent treatments, and outcomes were collected.

Results:
81 (M:F=69:12) patients were identified. Mean age at presentation was 15.8+/-2.9 years. Laterality favored the left side (L=53, R=25, Bilateral=3). Initial treatment, recurrence rates, and mean time to first recurrence are shown in table 1. Recurrence rates and time to recurrence statistically favored immediate VATS compared to the other treatment options ($P<0.05$). 22 patients developed an ipsilateral SPTX recurrence and 9 patients developed contralateral recurrence. Of the 22 patients that suffered an ipsilateral recurrence after initial treatment, 8 developed a second recurrence and were treated with VATS. Two of those 8 developed a third recurrence, both treated again with VATS and neither recurred.

Conclusions:
While approximately half of patients with spontaneous pneumothorax can be treated with evacuation alone, initial treatment with thoracoscopy results in significantly lower recurrence rates. Therefore, treatment algorithms for pediatric spontaneous pneumothorax should include a low threshold for early thoracoscopy. Future studies should aim to identify factors that predict which patients will ultimately fail treatment by evacuation alone.

Table 1: Outcomes of initial treatment			
Initial Treatment	N	Recurrence (%)	Mean Time to Recurrence (mo)
Chest Tube	31	13 (42)	11.8
Chest Tube then VATS	8	4 (50)	7.0
Immediate VATS	38	4 (11)	24.0
Observation	4	2 (50)	4.2

Notes:

36

CAN CONGENITAL PULMONARY AIRWAY MALFORMATION BE DISTINGUISHED FROM TYPE I PLEUROPULMONARY BLASTOMA?

Nigel J. Hall[1], Adina Feinberg[1], Yoav H. Messinger[2], Kris Ann P. Schultz[2], Ann Blake[2], Gretchen M. Williams[2], Douglas Miniati[3], Jacob C. Langer[1].

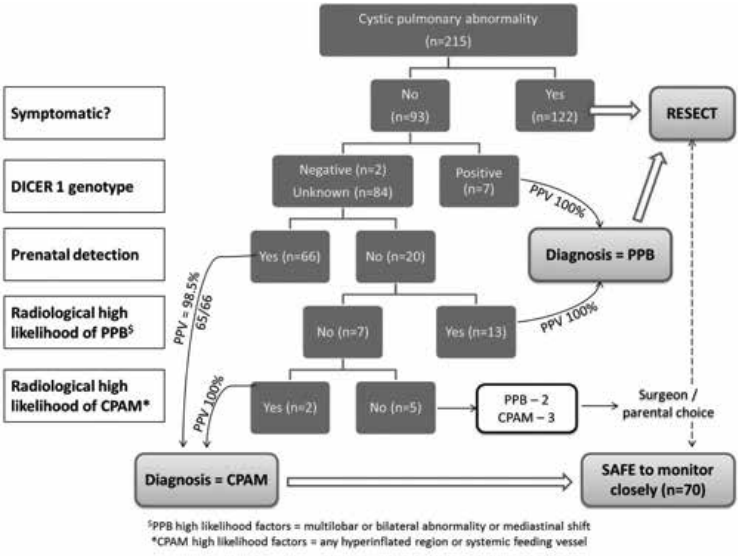
[1]Hospital for Sick Children, Toronto, ON, Canada, [2]International Pleuropulmonary Blastoma Registry, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN, USA, [3]Kaiser Permanente Roseville Women and Children's Center, Roseville, CA, USA.

Purpose:
The management of congenital cystic lung lesions is controversial. Arguments for routine lobectomy during infancy include the possibility of the lesion being Type I pleuropulmonary blastoma (PPB) rather than congenital pulmonary airway malformation (CPAM). We aimed to identify clinical and radiological features that might distinguish between CPAM and PPB and to develop a diagnostic and treatment algorithm based on these features.

Methods:
Data were retrieved from the International PPB Registry on all recorded cases of Type I PPB. A comparison cohort comprised all children undergoing resection of CPAM at our institution between January 2002 and December 2013 that was noted at some stage to be at least partially cystic. Univariate and multivariate logistic regression models were created to identify variables that might differentiate CPAM from PPB. Odds ratio (OR) and positive predictive value (PPV) were calculated and a decision algorithm developed. P <0.05 was considered to be statistically significant.

Results:
There were 112 cases of Type I PPB and 103 of CPAM. In univariate analysis, statistically significant factors favoring a diagnosis of CPAM included prenatal detection (OR 89.4), systemic feeding vessel (OR 61.7), asymptomatic (OR 7.4) and hyperinflated lung (OR 11.7). Factors significantly favoring a diagnosis of PPB included bilateral or multilobar involvement (OR 2.4). No multivariate logistic regression model was able to improve on the diagnostic accuracy of univariate associations. A decision algorithm (Figure) was developed to inform the decision of which lesions require resection and those which can be safely managed with close clinical and radiological observation.

Conclusion:
Clinical and radiological features can help to differentiate between CPAM and PPB. Our algorithm allows identification of children at higher risk of PPB in whom we would recommend resection and those at low risk in whom continued close observation is safe. This algorithm will require validation in a prospective study.


Cystic pulmonary abnormality (n=215)
Symptomatic?
No (n=93)
Yes (n=122)
RESECT
DICER 1 genotype
Negative (n=2) Unknown (n=84)
Positive (n=7)
PPV 100%
Prenatal detection
Yes (n=66)
No (n=20)
Diagnosis = PPB
PPV = 98.5% 65/66
Radiological high likelihood of PPB$
No (n=7)
Yes (n=13)
PPV 100%
Radiological high likelihood of CPAM*
PPV 100%
Yes (n=2)
No (n=5)
PPB – 2 CPAM – 3
Surgeon / parental choice
Diagnosis = CPAM
SAFE to monitor closely (n=70)
$PPB high likelihood factors = multilobar or bilateral abnormality or mediastinal shift
*CPAM high likelihood factors = any hyperinflated region or systemic feeding vessel

Notes:

37

LYMPH NODE SAMPLING DURING MINIMALLY INVASIVE WILMS' TUMOR RESECTION

Steven W. Warmann[1], Jürgen Schäfer[2], Martin Ebinger[1], Guido Seitz[1], Jörg Fuchs[1].
[1]University Children's Hospital, Tuebingen, Germany, [2]University Hospital, Tuebingen, Germany.

Purpose:
Lymph node (LN) sampling is essential for risk stratification, decision on further treatment regimens, and prognosis in children with Wilms' Tumors (WT). According to the SIOP protocol, laparoscopic tumor nephrectomy for WT is possible under certain circumstances. Initial experiences revealed however a high rate of inadequate LN sampling with this technique. We analysed children undergoing laparoscopic WT resection. Technical aspects for an adequate LN sampling are highlighted.

Methods:
IRB approval was obtained. Between August 2010, and September 2014, 6 children underwent transperitoneal laparoscopic nephrectomy for WT at our institution. Patients' data, tumor characteristics, surgical, and oncological outcome were assessed. LN sampling was reviewed with special emphasis.

Results:
Median age at surgery was 24.25 months (range 15-40). All children received neoadjuvant Actinomycin-D/Vincristin. All tumors showed response to chemotherapy; median tumor volume was 170.5 ml (162-360) at diagnosis and 69.5 ml (15-207) at surgery. Complete tumor resection was achieved via a 4 trocar-technique in all children, resulting in local stage 1 in all cases. No tumor rupture occurred. Resected specimens were retrieved from the abdomen via Pfannenstiel incision using a retrieval bag. Adequate lymph node sampling (6 or more) was realized in all cases by applying surgical steps similar to other procedures on the upper urinary tract (elevation with stay sutures, vascular dissection before tumor mobilisation, positioning of trocars, and others). There were no complications and all children are alive without evidence of disease after a median follow up of 28.5 months (0-48).

Conclusions:
Minimally invasive surgery is a safe option for WT resection when patients are carefully selected and operating surgeons have sufficient expertise in pediatric oncology and minimally invasive urology. Adequate LN sampling is possible via the minimally invasive approach. However the laparoscopic technique must not be reason for not complying with the general guidelines for WT surgery.

Notes:

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PULMONARY NODULES LESS THAN 5MM IN SIZE STILL WARRANT BIOPSY IN PATIENTS WITH OSTEOSARCOMA AND EWING SARCOMA

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Purpose:
Osteosarcoma (OS) and Ewing sarcoma (ES) have a high propensity to develop pulmonary metastases. Lung lesions with calcification, peripheral location, and size >5mm are more likely to represent malignant metastases. We evaluated the incidence of malignancy in nodules 5mm or less to potentially guide decisions between biopsy and observation.

Methods:
A retrospective review of patients <25 years of age with metastatic OS and ES treated at our institution between 2001-2014 who had undergone pulmonary nodule biopsy was performed. Computed tomographic (CT) scans were reviewed to evaluate nodule size and change over time. Categorical variables were compared using Pearson's chi-square test. Continuous variables were compared using Wilcoxon rank-sum test. Multiple logistic regression was used to determine the effect of cancer type and nodule size on malignant status.

Results:
35 patients (27 OS, 8 ES) met inclusion criteria. 116 nodules were identified (97 OS, 19 ES). Nodule size at biopsy was significantly different between the malignant (median 6mm, range 1-79mm) and benign (median 3mm, range 1-21mm) lesions (p=0.01). Nodule size at diagnosis, and change in nodule size from diagnosis to biopsy were not predictive of malignancy (p=0.27 and 0.08, respectively). The sensitivity and specificity for predicting malignancy using 5mm, 4mm, and 3mm size criteria for pulmonary nodules is listed in Table 1.

Conclusion:
In ES, 5mm may be a reasonable size cutoff for predicting malignancy; however, the number of nodules evaluated for this group was small (n=19). In OS, pulmonary nodules <5mm cannot be excluded from biopsy based upon size alone.

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Table 1. Sensitivity and Specificity for predicting malignancy based upon nodule size.

Tumor Type	Nodule size	Sensitivity (%)	Specificity (%)
OS	5mm	53	65
	4mm	61	47
	3mm	70	35
ES	5mm	78	90
	4mm	78	80
	3mm	78	80
Both (OS+ES)	5mm	55	74
	4mm	63	59
	3mm	71	52

Notes:

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RISK FACTORS AND MANAGEMENT OF NUSS BAR INFECTIONS IN 1717 PATIENTS OVER 25 YEARS

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Purpose:
An increase in postoperative infections after Nuss procedures led us to seek risks and review management. We report potential risk factors and make inferences for prevention of infections.

Methods:
An IRB-approved retrospective chart review was used to evaluate demographic, clinical, surgical and postoperative variables of patients operated on between 10/1/2005 and 6/30/2013. Those with postoperative infection were evaluated for infection characteristics, management, and outcomes with univariate analysis.

Results:
Over this 8-year period (2005-2013) 3.5% (30) of 854 patients developed cellulitis or infection by CDC definitions, significantly more than 1.5% (13) in our previous report of 863 patients, 1987-2005 (p=.007). The most frequent organism cultured was methicillin-sensitive Staphylococcus aureus. Patients who were given clindamycin preoperatively (5 of 26 patients) had higher infection rates than those who received cefazolin (25 of 828) (19% vs 3%, p<.001). Patients treated with an ON-Q (I-Flow, Kimberly-Clark, Irvine, CA) also had higher infection rates (8.3% vs 2.4%, p<.001). Of the 30 patients who developed an infection, eighteen (60%) with cellulitis or superficial infections did not require surgical treatment or early bar removal. The other twelve patients (40%) with deep hardware infections required an average of 2.2 operations (range 1 - 6), with 3 (25%) requiring removal of their stabilizer and 3 (25%) requiring early bar removal. None of these three patients experienced recurrence of pectus excavatum at 2 to 4 years follow-up.

Conclusions:
Preoperative antibiotic selection and use of ON-Q's may influence infection rates after Nuss repair. Nuss bars were able to be preserved in 90% of all patients with an infection and even 75% of those with a deep hardware infection. Attempts to retain the bar when an infection occurs may help prevent pectus excavatum recurrence.

Notes:

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LONG-TERM OUTCOMES OF PATIENTS WITH TRACHEOESOPHAGEAL FISTULA/ ESOPHAGEAL ATRESIA: SURVEY RESULTS FROM TEF/EA SOCIAL ONLINE COMMUNITIES

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Purpose:
Long-term outcome studies of tracheoesophageal fistula(TEF) and/or esophageal atresia(EA) are limited to retrospective chart reviews. With the growth in social media, online communities have developed for TEF/EA. This study surveyed parents/patients with TEF/EA engaged in these communities to determine long-term outcomes.

Methods:
A 50-point survey was developed to determine demographics, presentation, initial and subsequent surgical interventions, and symptoms of patients with TEF/EA. The survey was validated using a test population and made available on TEF/EA online communities for two months. Data was analyzed using R.

Results:
445 subjects completed the survey. Mean age when surveyed was 8.7 years (range 0-61) and 56% were male. Of the seven choices for approach of initial repair, the most common was a standard open repair (56%) followed by primary esophageal replacement (13%) and thoracoscopic repair (13%). Postoperative leak occurred in 26% of patients, and was least likely in primary esophageal replacement (19%), primary open repair (20%) and thoracoscopic repair (32%). Regarding disease symptomatology, dysphagia was reported in 54% of patients, with resolution by age 5 in only 40%. Symptoms of GERD were reported in 76%. Complications of GERD included upper respiratory infection (21%), pneumonia (17%), failure to gain weight (18%) and asthma (13%). Antireflux surgery was required in 22% of patients, most commonly Nissen (75%) followed by partial wrap (11%); and 29% of those required more than one procedure. There was no difference in dysphagia rates or GERD symptoms based on type of repair.

Conclusion:
Based on this online survey, we conclude that regardless of repair approach TEF/EA patients continue to have symptoms of dysphagia and GERD that are unresolved in long-term follow-up. Additionally, approximately one-fourth of patients will require an antireflux procedure, with up to one-third of those requiring repeat surgery. When required, Nissen fundoplication is the most common antireflux procedure performed.
Notes:

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THE MORBIDITY OF A DIVIDED STOMA COMPARED TO A LOOP COLOSTOMY IN PATIENTS WITH ANORECTAL MALFORMATIONS

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Purpose:
Loop colostomies may contaminate the genitourinary (GU) tract in patients with anorectal malformations (ARM) due to incomplete diversion of stool. Stoma complications are also thought to be higher with a loop versus divided colostomy. We sought to examine the morbidity of both types of colostomies in children with ARM.

Methods:
A review was performed at a tertiary care children's hospital from 1989 to 2014. Children with ARM who had a loop or divided colostomy performed as a newborn were identified. Demographic data and outcome variables were collected. Analyses included Student's t-test, Fischer's exact and logistic regression as appropriate.

Results:
Gestational age, birth weight and presence of a GU anomaly were similar between groups. Children with a divided stoma were more likely to have a recto-urinary fistula (64% vs 40%)(p=0.005). 30% of patients with a divided colostomy and 24% with a loop experienced a stoma complication (p=0.5); with 17% and 14% requiring stoma revision (p=0.7) respectively (Table). A subgroup analysis of children with a recto-urinary fistula (54 divided, 26 loop) was performed to assess for effect of colostomy type on urinary tract infection (UTI) risk. Patients with renal dysplasia, vesicoureteral reflux, or neurogenic bladder were at increased risk of developing a UTI (RR=3.1, p=0.001) regardless of stoma type. When this effect was accounted for using logistic regression, stoma type was not associated with risk of UTI (OR 0.85, 95% CI 0.28-2.7).

Conclusions:
Our experience suggests that children born with ARM who undergo loop colostomy are not at increased risk of experiencing a UTI and that the rate of stoma complication is high regardless of the type of stoma created.

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Colostomy complications		
Complication	Divided (n=93)	Loop (n=78)
Peristomal hernia	2	0
Necrosis	2	0
Prolapse	9	6
Retraction	2	6
Skin breakdown	4	2
Stricture	1	0
Wound cellulitis	3	2
Other	5	3

Notes:

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