

**The Faculty of Medicine of Harvard University
Curriculum Vitae**

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Place of Birth: Boston, MA

Education:

05/1981	MD / BA	6 year combined MD/BA program	Boston University
02/2004		Clinical Effectiveness Program	Harvard School of Public Health
05/2005	MPH	Clinical Effectiveness	Harvard School of Public Health

Postdoctoral Training:

06/81 – 06/82	Intern	Pediatrics	Massachusetts General Hospital
07/81 – 06/84	Clinical Fellow	Pediatrics	Harvard Medical School
07/82 – 06/84	Resident	Pediatrics	Massachusetts General Hospital
01/86 – 12/88	Resident	Anesthesia	Massachusetts General Hospital
02/86 – 12/88	Clinical Fellow	Anaesthesia	Harvard Medical School

Faculty Academic Appointments:

08/84 – 06/85	Instructor	Pediatrics	University of Oklahoma
12/88 – 06/89	Instructor	Anaesthesia	Harvard Medical School
07/89 – 06/95	Instructor	Anaesthesia (Pediatrics)	Harvard Medical School
07/95 – 07/01	Clinical Instructor	Anaesthesia (Pediatrics)	Harvard Medical School
07/01 – 05/11	Assistant Professor	Anaesthesia	Harvard Medical School
06/11 –	Associate Professor	Anaesthesia	Harvard Medical School

Appointments at Hospitals/Affiliated Institutions:

06/84 – 12/86	Attending Pediatrician	Brigham and Women's Hospital
06/84 – 12/86	Attending Pediatrician	Beth Israel Hospital
06/84 – 12/86	Attending Pediatrician	Milton Hospital
06/84 – 12/86	Attending Pediatrician	Massachusetts General Hospital
08/84 – 07/85	Instructor in Pediatrics	University of Oklahoma's Children's Hospital
12/88 – 12/98	Associate in Anesthesia	Boston Children's Hospital
01/99 –	Senior Associate in Anesthesia	Boston Children's Hospital
01/08 –	Neonatal Intensive Care Privileges	Brigham and Women's Hospital

Other Professional Positions:

07/84 – 09/84	Private Practice Pediatrician	Milton Pediatrics (Milton, MA)
08/85 – 12/85		

Major Administrative Leadership Positions:**Local**

1984 – 1985	Acting Chief of Outpatient Pediatric Clinic	University of Oklahoma Children's Hospital, OKC, Oklahoma
1984 – 1985	Course Director, Pediatrics for Physician Assistants	University of Oklahoma Children's Hospital, OKC, Oklahoma
1988 –	Infection Control Liaison from Department of Anesthesia to Hospital Infection Control Department	Boston Children's Hospital Boston, MA
2006 –	Chief, Spinal Surgery Anesthesia	Boston Children's Hospital Boston, MA
2006 – 2012	Assistant to Director for Mentoring Junior Faculty	Boston Children's Hospital Boston, MA
2009 – 2011	Supervisor of the Clinical Nurse Researchers for the Department of Anesthesia	Boston Children's Hospital Boston, MA
2012, 2014	Chair, Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine review course	Harvard Medical School Boston, MA
2015 – 2017	Co-Chair for Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine review course	Harvard Medical School Boston, MA

Committee Service:

Local

1988 – 1992	Needlestick Committee	Boston Children’s Hospital, Member
2003 – 2010	Joint Committee on the Status of Women	Harvard Medical School and Harvard School of Dental Medicine Member
2003 – 2010	Subcommittee for Flexible Career Options and Maternity Leave	JCSW, HMS and HSDM Co-chairperson
2004 –	Physician Leadership Council	Member
2005 – 2006	Center of Excellence in Women’s Health; Subcommittee on Flexible Work Options	Harvard Medical School, Member
2005 – 2007	Operating Room Infection Control and Safety Committee	Boston Children’s Hospital, Member
2006 – 2012	Hot Topics in Anesthesia	Boston Children’s Hospital, Member
2006 – 2007	Surgical Infection Prevention Collaborative	Boston Children’s Hospital and Child Health Corporation of America Member
2007 –	Program in Patient Safety and Quality-Surgery	Boston Children’s Hospital, Member
2007 – 2010	Subcommittee on Dean’s Award	JCSW, HMS and HSDM Member
2007 – 2008	Anesthesia Hand Hygiene Committee	Boston Children’s Hospital, Chairperson
2009 –	Anesthesia Research Unit Committee	Physician Member
2010 –	Anesthesia Scientific Research Review Committee	Member
2010 –	Focus group on career flexibility at HMS	Harvard Medical School, Invited Member
2011 – 2012	Catalyst focus group on ADHD	Harvard Medical School, Invited Member
2013 – 2015	Standardized Clinical Assessment and Management Plans (SCAMPS) Group	Boston Children’s Hospital, Member

2013 –	Physician’s Organization Benefits Committee	Boston Children’s Hospital, Member
2015 –	Physician’s Organization Congress Subgroup	Boston Children’s Hospital, Member

National

2007 –	Task Force on Epidemiologic Studies of Neurotoxicity	Federal Drug Administration, Member
2010 –	Symposiums on Anesthesia and Neurodevelopment in Children	Columbia Medical School, NYC, member
2012 –	SmartTots/ International Anesthetic Research Society (IARS) committee meetings, annually	Member/Participant
2016 – 2020	FDA Anesthetic and Analgesic Drug Products Advisory Committee (AADPAC)	Member/Special Government Employee
2019 –	FDA Anesthetic and Analgesic Drug Products Advisory Committee (AADPAC)	Acting Chairperson
2020 –	FDA Anesthetic and Analgesic Drug Products Advisory Committee (AADPAC)	Ad hoc member

International

2008 –	Health Technology Assessment appointment to the Trial Steering Committee for General Anesthesia versus Spinal Anesthesia (GAS) project	Member
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Professional Societies:

1998 –	Society for Pediatric Anesthesia	
2003 – present		Member, Education Committee
2008		Vice Chair, Winter Meeting
2009		Vice Chair, Winter Meeting
2010		Chair, Winter Meeting
2012 – 2016		Board Member
1998 –	American Academy of Pediatrics	Member
2003 –	American Society for Anesthesiology	
2003 – 2005		Member, Subcommittee for Pediatrics
2003 –		Member, Infection Control Task Force
2006 – 2008		Member, Subcommittee for Pediatrics
2008 – 2010		Member, Occupational Health Committee
2008 – 2009		Member, Pediatric Anesthesia Committee

2011 –	Member, Educational Track Subcommittee on Pediatric Anesthesia
2011 –	Member, ASA Abstract Review Subcommittee on Pediatric Anesthesia
2014 –	Vice Chair, Educational Track Subcommittee on Pediatric Anesthesia
2016 –	Chair, Educational Track Subcommittee on Pediatric Anesthesia

Grant Review Activities:

2014 –	Trailblazer Grant Review Committee	Permanent Member, Boston Children’s Hospital
2017 – 2018	Translational Research in Pediatric and Obstetric Pharmacology and Therapeutics Study Section	NIH, NICHD Ad hoc member
2017 – 2018	Outcome Measures for Use in Treatment Trials for Individuals with Intellectual and Developmental Disabilities Study Section	NIH, NICHD, NIDCD Ad hoc member

Editorial Activities:

Ad hoc Reviewer

Anesthesiology
 Anesthesia and Analgesia
 Journal of Neurosurgical Anesthesiology
 Journal of Pediatrics
 Acta Anaesthesiologica Scandinavica
 Pediatrics
 Journal of Clinical Anesthesia
 Paediatric Anesthesia
 British Journal of Anesthesia

Honors and Prizes:

1980	Alpha Omega Alpha	Boston University School of Medicine
2004	Leadership Program for Physicians and Scientists	Boston Children’s Hospital, Harvard Medical School
2006	Robert M Smith Award	Department of Anesthesiology, Perioperative and Pain Medicine, Boston Children’s Hospital

Report of Funded and Unfunded Projects

Past

- 2003 – 2006 Does Acupressure Reduce Bispectral Index Values and Stress in Adolescents?
Society for Education in Anesthesia, Protocol 03-05-077
PI
The objective of this study is to determine effect of pressure application on the acupuncture point “extra 1” on the bispectral index values and on stress in adolescents undergoing acupuncture for chronic pain syndromes.
- 2005 Does Anesthesia Harm the Developing Brain?
Robert M. Smith Award, Boston Children’s Hospital
PI
The specific aim of this longitudinal study is to determine whether human infants exposed to general anesthesia before the age of 20 weeks are at increased risk for developing neurocognitive deficits. This study has evolved into the General Anesthesia vs Spinal Anesthesia (GAS) study.
- 2007 A Study to Evaluate the Correlation of the Sedline PSI with the Endtidal Sevoflurane Concentration in a Pediatric Population.
Hospira Company, CP-09-008, Protocol 07-10-0396
Co-PI
The objective of this study was to evaluate the correlation of BIS and the Sedline PSI monitor in children undergoing cardiac catheterizations. The sevoflurane concentrations were to be altered in a stepwise fashion. This study was terminated before enrollment by the company.
- 2007 A Sedline and BIS Data Collection Study in a Pediatric Population
Hospira Company, CP-09-007, Protocol 07-07-0298
Co-PI
This study was terminated after we enrolled 4 patients because the company decided to end pediatric anesthesia research. The objective of this study was to compare the cerebral function monitor, the sedline PSI with the cerebral function monitor BIS.
- 2008 – 2011 Assessment of the Long-term Neurodevelopmental Outcomes in Pediatric Administered Regional and General Anesthesia as Neonates or Infants
Federal Drug Administration, FDA-SOL-08-SAFEKIDS-Clin 002-Project 2
PI (\$657,000)
This is the title of the American arm of the GAS trial, a multinational RCT enrolling 660 infants undergoing either a regional or general anesthesia and evaluating the enrollees at age 2 and 5 for neurodevelopmental outcomes. The secondary outcome measure of this trial is apnea. This grant is for trial infrastructure.
- 2010 – 2015 Effects of general vs regional anesthesia on infant neurodevelopment and apnea
1-R01 HD06 1136-01A1
Co-Principal investigators: David Bellinger, PI, Mary Ellen McCann, Co-PI. \$2,421,699 (total directs and indirects)
The goal of this trial, the GAS trial, a multinational RCT enrolling 660 infants undergoing either a

regional or general anesthesia and evaluating the enrollees at age 2 and 5 to determine whether general anesthesia affects neurodevelopmental outcomes. The secondary outcome measure of this trial is apnea.

- 2013 Efficacy, safety and population pharmacokinetic profile of Tranexamic acid in reducing blood loss in pediatric idiopathic scoliosis surgery: A randomized double-blind placebo-controlled trial.
Scoliosis Research Society Stacy Lewis Award Grant for 2 years (\$50,000 directs)
Co-I (PI: Susan Goobie)
The goal is to determine if tranexamic acid reduces blood loss during surgery for idiopathic scoliosis.
- 2014 The GAS Trial,
Awarding Agency: Mayday Fund
PI (\$25,000)
The goal of this trial is to determine whether general anesthesia affects neurodevelopmental outcomes.
- 2015 – 2018 Neurologic and Neurocognitive Outcomes after Infant Anesthesia
NCE 2019 1R01HD081303-01 Grant Award
Co-Principal investigators: David Bellinger, PI, Mary Ellen McCann, Co-PI. (581,000directs)
The goal of this trial is to determine whether general anesthesia affects neurodevelopmental outcomes.
- 2015 – 2019 Neurocognitive outcomes 5 years after infant anesthesia: The GAS Trial.
Thrasher Foundation
PI (\$361,000 directs)
The goal of this trial is to determine whether general anesthesia affects neurodevelopmental outcomes.
- 2015 – 2018 An open label pilot study of dexmedetomidine, remifentanil plus caudal anesthetic for infant lower abdominal/ lower extremity surgery: The T REXpilot study.
Boston Children’s Anesthesia Foundation
CoPI, (\$ 60,000 directs))
The goal of this study was determine whether a dexmedetomidine, remifentanil intravenous anesthetic coupled with a caudal anesthetic in infants provided adequate surgical and anesthetic conditions.

Current

- 2015 – present T REX Trial
Anesthesia Foundation, BCH
PI (\$ \$60,000 directs)
This is an international randomized controlled superiority trial comparing standard dose sevoflurane anesthesia with low dose sevoflurane/dexmedetomidine and remifantnil for surgical procedures lasting longer than 2 hours in children less than 3 years of age. The outcome measure is neurocognitive testing at age 3.

2019 – 2021 **Tau/pTau as Biomarkers of Anesthesia/Surgery-Associated Neurocognitive Outcomes in Children**
 1R21HD098754-01
 Co-Investigator Zhongcong Xie PI Massachusetts General Hospital, Boston (Boston Children’s Hospital, \$21,910 directs and indirects)
 This study is comparing children who have single versus multiple anesthetics under sevoflurane anesthesia and determining whether there are neurocognitive differences between the 2 groups using the NIH toolbox and whether there are different biomarkers between the 2 groups.

Unfunded Current Projects

2012 – A pilot study of effects of general anesthesia on the infant EEG. CoPI; Charles Berde, PI,
 2013 – Intraoperative incidence and duration of neurodevelopmentally significant physiologic changes in neonates and infants. Raymond Park, PI Mary Ellen McCann, CoPI I am mentoring Dr Park on outcomes research in infants undergoing general anesthetics
 2013 – Pediatric Blood Pressure in anesthetized children. Raymond Park, PI, Mary Ellen McCann CoPI, I am mentoring Dr Park on outcomes research in children undergoing general anesthetics
 2019 – GAS Study machine learning. Mary Ellen PI at Boston Children’s Hospital. This is a collaborative trial with Melbourne, Australia and Children’s Hospital of Philadelphia studying risk factors for poor neurocognitive outcomes in children.
 2020 Methods of measuring Blood Pressure in children with osteogenesis imperfecta (OI) . Mary Ellen PI, Ray Park CoPI, Samantha Spencer CoPI This project assesses the safety of noninvasive BP monitoring in patients with OI

Report of Local Teaching and Training

Teaching of Students in Courses:

1984	Pediatrics for Physician Assistants Physician Assistant Students	University of Oklahoma 12-one hour lectures on general pediatrics
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Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs):

1991 – 2000	Postoperative Nausea and Vomiting/Lecture Clinical Fellows, Rotating Pediatric Anesthesia Residents	Every 3 months Boston Children’s Hospital
2000 – present	Premedication/Lecture Clinical Fellows, Rotating Pediatric Anesthesia Residents	Every 3 months Boston Children’s Hospital

Clinical Supervisory and Training Responsibilities:

1988 – 2003	Advisory Program Anesthesiology Residents and Pediatric Anesthesia Fellows	Boston Children's Hospital 1hr meeting per month/3 trainees per month
1988 – present	Clinical Supervision Anesthesiology Residents, Pediatric Anesthesia Fellows, Nurse Anesthetist, Pediatric ICU Fellows, and/or transport nurse	Boston Children's Hospital Daily/8-12+ hours depending on the cases/3-4 days/week

Research Supervisory and Training Responsibilities:

2000 –	Supervision of anesthesia fellows and residents	Average of 2-3 trainees a year 1:1 supervision one hour/month/per fellow
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Other Mentored Trainees and Faculty:

2001 – 2002	David Hill, MBBS, Attending, Royal Children's Hospital, Herston, Australia Mentoring Stage: Anesthesia Fellow. Mentoring Role: Research mentor; Accomplishments: Mentored David Hill in his fellow's project about the vasotrak device which was published in Anesthesia and Analgesia (2005).
2004 – 2005	Kelly Groeper (Chilson), MD, Associate Chief of the Division of Pediatric Anesthesiology Associate Professor in the Department of Anesthesiology at Washington University School of Medicine, St. Louis, Missouri Mentoring Stage: Anesthesia Fellow. Mentoring Role: Research mentor; accomplishments: Mentored Kelly Groeper in her fellow's project about the acid base imbalances in patient's receiving toperimate therapy which was published in Pediatric Anesthesia (2005) and has 45 citations.
2005 – 2014	Nicole Dobija, MD, Assistant Professor, University of Michigan Medicine Career stage: Fellow and Instructor of Anesthesia, University of Florida Medical Center, Gainesville, FL Mentoring Role: Research Mentor Accomplishments: Mentored Nicole Dobija in her fellow's project about the anesthetic complications and implications of the VEPTTR device. Also mentored her on a small case series of 6 infants with infantile encephalopathy after general anesthesia published in Pediatrics (2014) and cited 87 times
2008 – 2009	Ami Kuisle, MD, Assistant Professor, Anesthesiology, University of Colorado School of Medicine, Denver, CO Career Stage: Anesthesia Fellow, Mentoring Role: Research Mentor; Accomplishments: Mentored Ami Kuisle in her fellow's project: Postoperative Adrenal Crisis in an adolescent with Loeys Dietz Syndrome which was published in the Canadian Journal of Anaesthesia in 2011.
2008 – 2009	Stephanie Gauguet, MD, PhD, Assistant Professor, Pediatrics, University of Massachusetts

Medical School Career Stage: Anesthesia Critical Care Fellow, Mentoring Role: Research Mentor; Accomplishments:
Mentored Stephanie Gauget in writing case report published in the Canadian Journal of Anaesthesia in 2011 on Loeys Dietz Syndrome

2010 Rahul Koka, MD, Assistant Professor of Anesthesiology and Critical Care Medicine at the Johns Hopkins University School of Medicine Career stage :Pediatric Anesthesia Fellow. Mentoring Role: Research mentor; Accomplishments:
Mentored Rahul in writing a case report and abstract on the anesthetic management of a child with hereditary xerocytosis which was presented at the Society for Pediatric Anesthesia meeting in 2010

2011 – 2013 Joy Allee, MD, Assistant Professor of Anesthesiology, University of Florida College of Medicine, Gainesville, FL Mentoring stage: Anesthesia Fellow, Mentoring Role:Research mentor; Accomplishments; Mentored Joy on case report of an infant developing a subarachnoid cerebral spinal leak after a spinal anesthetic which was published in Journal of Clinical Anesthesia in 2013.

2014 – Laura Cornelissen, PhD, Assistant Professor of Anaesthesia, Harvard Medical School and Boston Children’s Hospital. Career Stage: Instructor and Assistant Professor, Mentoring Role: Research mentor; Accomplishments: Mentoring Laura on Anesthesia Project on Neonatal EEGs and collaborated with her on her research on neosaxitoxin. This research was published in Anesthesiology in 2015.

2016 – Ray Park MD, Associate in Anaesthesia, Boston Children’s Hospital, Instructor in Anaesthesia, Harvard Medical School. Career stage: Anesthesia Fellow, Instructor Mentoring Role: Research mentor; Accomplishments: Multiple database projects on adult and pediatric intraoperative blood pressures and the Trex project. Ray presented an abstract on the Society for Pediatric Anesthesia on a dystonic reaction to propofol in a child with a history of hypsarrhythmia in infancy at the Society for Pediatric Anesthesia Meeting in 2020.

2018 – Dusica Bajic MD, PhD, Associate in Anaesthesia, Boston Children’s Hospital, Assistant Professor of Anaesthesia, Harvard Medical School, Career stage: Assistant Professor Mentoring role: Senior mentor and participant on her NIH RO1 application studying the neurocognitive outcomes of long gap esophageal atresia infants who are sedated for weeks during their therapy.

2018 – Andrea Bauer, Assistant Professor of Orthopaedics, Harvard Medical School and Boston Children’s Hospital, Career stage: Assistant Professor, Mentoring role: Research Mentor; Accomplishments: Submission of a Thrasher Grant application on brachial plexus injuries in young children.

2018 – Dominique Arce, Instructor of Anaesthesia, Harvard Medical School, Brigham and Women’s Hospital Associate in Obstetric Anesthesia at BWH- Career stage: Instructor of Anaesthesia, Mentoring Role: Senior Mentor on her Foundation for Anesthesia Education and Research (FAER) grant application (application number 2 in progress) for project studying the neurocognitive effects on infants of maternal fever during epidural analgesia during labor

- 2019 Robert Shaw MD, clinical anesthesia fellow at BCH, Career stage: fellow. Mentoring Role: Research advisor; Accomplishments: ROHHAD syndrome and anesthesia-case report and abstract at the Society for Pediatric Anesthesia spring meeting, 2020.
- 2019 Chinedu Out MD, clinical anesthesia fellow at BCH- Career stage: fellow. Mentoring Role: Research advisor Accomplishments: ROHHAD syndrome and anesthesia-case report and abstract at the Society for Pediatric Anesthesia spring meeting, 2020.

Formal Teaching of Peers (e.g., CME and other continuing education courses):

No presentations below were sponsored by 3rd parties/outside entities

1990	Fluids and Electrolytes Boston Children's Hospital/Massachusetts General Hospital's Biannual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Harvard Medical School Boston, MA
1992, 1994, 2000	Premedication in Children Boston Children's Hospital/Massachusetts General Hospital's Biannual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Harvard Medical School Boston, MA
1996, 1998	Postoperative Nausea and Vomiting CHB/MGH Biannual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Harvard Medical School Boston, MA
2002, 2004	The Approach to the Anxious Child and Parents CHB/MGH Biannual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Harvard Medical School Boston, MA
2006	Awareness Under Anesthesia CHB/MGH Biannual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Harvard Medical School Boston, MA
2008	Neurotoxicity of General Anesthesia in Infants CHB/CHOP 2 nd Annual Pediatric Anesthesiology and Critical Care Medicine Conference	Single presentation and panel discussion Boston, MA
2010	SAFEKIDS Update: Anesthetic-Induced Neurotoxicity CHB/CHOP 4th Annual Pediatric Anesthesiology and Critical Care Medicine Conference	Single Presentation Boston, MA
2011	Does Anesthesia Affect the Developing Brain? A Hard Look at the Data	Single presentation and panel discussion

	Harvard Anesthesia Update: Innovation and Transformation in Anesthesiology	Boston, MA
2012	Update on: Anesthetic induced Neurotoxicity Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Single presentation and panel discussion Boston Children's Hospital Boston, MA
2014	Infantile Cerebral Encephalopathy Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Single presentation and panel discussion Boston Children's Hospital Boston, MA
2015	Anesthetic Effects on Neurocognition Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Single presentation and panel discussion Boston Children's Hospital Boston, MA
2016	Optimizing Neonatal Physiology Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Single presentation and panel discussion Boston Children's Hospital Boston, MA
2017	Anesthetic Effects on Neurocognition Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Breakfast Panel and discussion Boston Children's Hospital Boston, MA
2018, 2019	Pediatric Anesthetic Neurologic Risks Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference	Single presentation and panel discussion Boston Children's Hospital Boston, MA
2021	Anesthesia and the Vulnerable Brain Practical Aspects of Pediatric Anesthesiology, Critical Care and Pain Medicine Conference (invitation)	Single presentation and panel discussion Boston Children's Hospital Boston, MA

Local Invited Presentations:

No presentations below were sponsored by 3rd parties/outside entities

2007	Does General Anesthesia Harm Young Infants? / Grand Rounds Departments of Surgery and Anesthesiology, Critical Care & Pain Medicine, Boston Children's Hospital
2008	GAS Study and Neurotoxicity / Grand Rounds Departments of Surgery and Anesthesiology, Critical Care & Pain Medicine, Massachusetts General Hospital, Boston

- 2008 GAS Study and Neurotoxicity / Lecture
NICU nurses / Brigham and Women's Hospital, Boston
- 2009, 2010 The GAS study-Neurotoxicity in Infants / Grand Rounds
NICU, Beth Israel Deaconess Medical Center, Boston, MA
- 2009 Does General Anesthesia Harm Young Infants? Clinical Correlates / Grand Rounds
Departments of Surgery and Anesthesiology, Critical Care & Pain Medicine, Boston Children's Hospital
- 2009 Anesthetic Neurotoxicity / Grand Rounds
Departments of Surgery and Anesthesia, Mass Eye and Ear Infirmary, Boston
- 2011 Does Anesthesia Affect the Developing Brain? A Hard Look at the Data / Grand Rounds
Department of Anesthesiology, Critical Care & Pain Medicine, Boston Children's Hospital
- 2014, 2015 Anesthesia Toxicity in Young Children / Grand Rounds
Departments of Surgery and Anesthesiology, Critical Care & Pain Medicine, Boston Children's Hospital
- 2014 Anesthesia Toxicity in Young Children / Grand Rounds
Department of Urology, Boston Children's Hospital
- 2016 Anesthesia Toxicity in Young Children / Grand Rounds
Department of Neonatal Research, Beth Israel Deaconess Medical Center, Boston, MA
- 2016 Anesthesia Toxicity in Infants / Grand Rounds
Department of Gastroenterologic, Boston Children's Hospital
- 2017 Pediatric Neurotoxicity / Grand Rounds
Department of Medicine, Brigham and Women's Hospital, Boston, MA
- 2019 Anesthesia Neurotoxicity in Pediatrics / Grand Rounds
Department of Anesthesiology, Brigham and Women's Hospital, Boston, MA

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by 3rd parties/outside entities

Regional

- 2012 Anesthesia Neurotoxicity in Young Children: Interpreting Evolving Science, Exploring/Grand Rounds
Newton Wellesley Hospital, Newton, MA
- 2013 Preventative Strategies, Safe Practices Now and Talking with Parents/ Grand Rounds
Tufts New England Medical Center

- 2013 Anesthesia Neurotoxicity in Young Children: Interpreting Evolving Science, Exploring Preventative Strategies, Safe Practices Now and Talking with Parents/ Keynote Speaker
David M Little MD Memorial Lecture
New England Society of Anesthesiologists Fall Meeting, Lenox, MA
- 2014 Neurotoxicity in Young Children/ Lecture
Department of Anesthesia
Maine Medical Center, Portland, Maine
- 2014 Update on the Neurocognitive Effects of Anesthesia in Children/ Keynote Speaker
Pediatric Surgeon Study Group Meeting,
Boston, MA

National

- 1998 Pharmacokinetics of Lumbar Epidural Ropivacaine in Children and Adolescents
(selected Oral Abstract)
American Society of Anesthesia Annual Meeting
Orlando, Florida
- 2004 Moderator, Oral Poster and Slide Discussion, Neurotoxicity
American Society of Anesthesiologists
San Francisco, California
- 2005 Moderator, Oral Poster and Slide Discussion, Pediatrics
American Society of Anesthesiologists Annual Meeting New Orleans
- 2006 Moderator, Oral Poster and Slide Discussion, Pediatrics
American Society of Anesthesiologists Annual Meeting Chicago
- 2006 Surgical Infection Prevention Collaborative/ Poster and Slide presentation
Child Health Corporation of America
Kansas City, Kansas
- 2007 Moderator, Oral Poster and Slide Discussion, Neurotoxicity
American Society of Anesthesiologists
San Francisco, California
- 2007 Symposium on Pediatric Anesthesia Toxicity/ Plenary Presentation
Federal Drug Administration
Washington DC
- 2008 Pediatric Anesthesia-Induced Neurotoxicity (PAINS) Project, Food and Drug
Administration
Columbia University, NY,

- 2008 Moderator for Oral Poster and Slide Discussion, Pediatric Anesthetic Techniques and the Developing Brain
American Society of Anesthesiologists
Orlando, Florida
- 2009 Moderator for Pulmonary Core Lecture series
Society for Pediatric Anesthesia 2009 Winter Meeting
Jacksonville, FL
- 2009 Pediatric Panel Pediatric Awareness under Anesthesia/ Panel Lecturer
American Society of Anesthesiologists
New Orleans, LA
- 2009 The GAS Project Update/ Lecture and Presentation
SAFEKIDS Initiative, Food and Drug Administration (FDA)
International Anesthesia Research Society
Silver Springs, MD
- 2010 Are we poisoning our patient's brains? / Lecturer for Practical Pediatric Ambulatory Anesthesia,
American Society of Anesthesiologists
San Diego, CA
- 2010, 2011, 2012, 2014, 2016, 2018 Symposium on Anesthesia and Neurodevelopment in Children/ Speaker & Member
Columbia University Vagelos College of Physicians and Surgeons NYC
- 2011 Neurotoxicity and Anesthesia from Research to Clinical Practice/ Lecture to Surgeons, Neonatologists and Anesthesiologists/ Visiting Professor
Dallas Children's Hospital, University of Texas Southwestern Medical School,
Dallas, Texas
- 2011 The General Anesthesia vs Spinal Anesthesia (GAS) Project Update/ Lecture and Presentation Webinar
SmartTots Initiative, FDA, International Anesthesia Research Society
Silver Springs, MD
- 2011 Educational Strategies for the Implementing Infection Control Practices/ Panel Lecturer
American Society of Anesthesiologists,
Chicago, IL
- 2011 Pediatric Awareness/ Lecture
VIII Annual Anesthesiology Convention Sociedad de Anestesiologos
Puerto Rico, San Juan, Puerto Rico
- 2011 Neonatal Anesthesia, Techniques, Perils and Pitfalls/ Vising Professorship
Department of Anesthesia, Albany Medical Center, NY

- 2011 General Anesthesia and Neonatal Neurotoxicity/ Lecture
New York State Society of Anesthesiologists
Albany, New York.
- 2011 Late Effects of Anesthesia in Infants/ Lecture
Hot Topics in Neonatology Conference
Washington DC
- 2012 Update on: Anesthesia Induced Neurotoxicity/ Visiting Professorship
Department of Anesthesia
Seattle Children's Hospital, WA
- 2012 Anesthetic Neurotoxicity in Babies/ Lecture
American Academy of Ophthalmology Meeting
Chicago, IL
- 2014 Neuroprotection and Anesthetic Techniques for Scoliosis Surgery/ Lecture
Society for Pediatric Anesthesia Winter Meeting
Fort Lauderdale, Florida
- 2014 Preliminary Results of the GAS study/ Lecture
Anesthesia and Neurodevelopment in Children Symposium
Columbia University, New York City, NY
- 2014 Confounding Factors in Human Studies/ Lecture
American Society of Anesthesiologist Meeting
New Orleans, LA
- 2015, 2016, 2017 Common Neonatal Emergencies: You can never be better prepared./ Lecturer
American Society of Anesthesiologist Meeting
Various Locations
- 2016 Apnea and the Neonate/ Lecture
International Anesthetic Research Society (IARS) Meeting
San Francisco, CA
- 2016 Pediatric Neurologic Risks: What Do the Data Show/ Lecture
American College of Surgeons Annual Meeting
Washington, DC
- 2018 SPE37 Initial Results of Major Trials-The GAS Trial/ Presentation Session
American Society of Anesthesiologists Meeting
San Francisco, CA
- 2018 Presentation Session SPE22
Featured Session-Anesthesia and the Developing Brain
American Society of Anesthesiologists Meeting
San Francisco, CA

- 2019 Hot Topics in Pediatric Anesthesiology: Editor's Picks 2019 Part 2
American Society of Anesthesiologists Meeting
Orlando, FL
- 2020 Anesthesia Neurotoxicity in Pediatrics The Saban Research Institute (TSRI)/
Research Seminar
The Saban Research Institute of Children's Hospital
Los Angeles, CA
- 2020 Updates in Pediatric Anesthesia; Pediatric Brain and Anesthesia/ Lecture
58th Clinical Conference in Pediatric Anesthesiology,
Pediatric Anesthesia Foundation
Children's Hospital Los Angeles, CA
- 2020 Pediatric Anesthesia Neurotoxicity/ Digby Leigh Speaker,
58th Clinical Conference in Pediatric Anesthesiology, Pediatric Anesthesia
Foundation
Children's Hospital Los Angeles, CA
- 2020 Moderator, Oral Poster and Slide Discussion, Pediatric Anesthesia
American Society of Anesthesiologists Annual Meeting 2020
Virtual Meeting
- 2020 Large Clinical Trials in Anesthesiology – Advanced Methodology and Management
Session, Clinical Trials in Pediatrics-Specific Challenges and Solutions. American
Society of Anesthesiologists Annual Meeting 2020
Virtual Meeting

International

- 2006 Presentation on multinational neurotoxicity project to Association of Paediatric Anaesthetists /
Seminar
Association of Paediatric Anaesthetists
Cardiff, Wales
- 2010 Presentation to international GAS collaborators on US involvement in GAS study
Association of Paediatric Anaesthetists
Glasgow, Scotland
- 2010 Neurotoxicity and Anesthesia: from Research to Clinical/ Lecture, Experts for SARNePI
14th Congresso Nazionale, SARNePI, Genoa, Italy
- 2010 Hot Topics in Anesthesia Pediatrica II, "Awareness in Pediatric Anesthesia"/ Lecture
14th Congresso Nazionale, SARNePI
Genoa, Italy

- 2010 The Science of Newborn Care/ Lecture
NEONATAL UPDATE 2010
Imperial College, London, England
- 2012 Review from the Literature; Cerebral Damage after Surgery and Anesthesia in the Neonate/
Lecture Zomercongres Sectie Kinderanesthesiologie
Bergen, Netherlands
- 2012 Lecture, "Pediatric Anesthetic Induced Neurotoxicity and the GAS Study", Utrecht Children's
Hospital, Utrecht, Netherlands [*Visiting Professorship*]
- 2014 The Importance of Hemodynamics and CO₂/ Lecture
Pediatric Anesthesia and Neurotoxicity
EuroSTAR-SmartTots Scientific Network Meeting
Genoa, Italy
- 2015 Scientific Abstract Judge and Moderator
42nd Association of Paediatric Anesthetists Annual Scientific Meeting
Aberdeen, Scotland
- 2016 Role of Intraoperative Blood Pressure and Neurocognitive Outcomes in Children/ Lecture
British Journal Anesthesia Neurotoxicity Seminar
London, England
- 2016 Neonatal Anesthesia Impacts on Neurodevelopment/ Keynote Lecture
Canadian Pediatric Society Meeting
Charlottetown, Prince Edward Island
- 2016 Managing the Expreature Infant\ Lecture
World Congress of Anesthesiologists
Hong Kong, China
- 2016 Tips for Safe Anesthesia in a Neonate/ Lecture
World Congress of Anesthesiologists
Hong Kong, China
- 2017 Secondary outcomes from the GAS study/ Lecture
The 2nd International Conference on Pediatric Neurotoxicity
Genoa, Italy
- 2018 Pediatric Neurologic Anesthetic Risks/ Visiting Professor Lecture
Shanghai Medical College of Fudan University
Shanghai, China
- 2018 Pediatric Neurologic Anesthetic Risks/ Lecture
Henan Provincial Peoples Hospital and Zhongyuan
International Neuroscience in Anesthesiology Symposium
Zhengzhou, China.

- 2019 Clinical Studies: Do We Have an Answer? / Lecture
International Society of Anesthesia Society Annual Meeting
Montreal, Canada
- 2019 Paediatric anesthesia and neurologic outcome, the need for further research/ Lecture
European Society of Anesthesia Annual Meeting
Vienna, Austria
- 2019 Physiological parameter during general anaesthesia: how low can we safely go? Focus Meeting
on Perioperative Medicine - Mother and Child
European Society for Anesthesia
Rome, Italy
- 2019 Neonatal Anesthesia/ Visiting Professor Lecture
Maternal and Child Hospital of Hubei Province, Tongji Medical College
Wuhan, China
- 2019 Anesthetic Neurotoxicity in Pediatric Anesthesia/ Visiting Professor Lecture
Wuhan Women and Children Medical Care Center
Wuhan, China,
- 2019 Managing the Expreature Infant/ Visiting Professor Lecture
Jiangxi Provincial Children's Hospital
Nanchang, China
- 2019 Neonatal Anesthesia/ Visiting Professor Lecture
Hunan Children's Hospital
Changsha, China
- 2019 Anesthetic Neurotoxicity in Pediatric Anesthesia / Visiting Professor Lecture
Wuhan Women and Children Medical Care Center
Wuhan, China
- 2019 Neonatal Anesthesia / Visiting Professor Lecture
Kunming Children's Hospital
Kunming, China
- 2019 The Pediatric Brain and Anesthesia/ Visiting Professor Lecture
The Children's Hospital of Xi'an City
Xi'an, China

Report of Clinical Activities and Innovations

Current Licensure and Certification:

1982 National Board of Medical Examiners

1984 Massachusetts Registered Physician
 1984 Oklahoma Registered Physician
 1988 American Board of Pediatrics
 1989 American Board of Anesthesiology
 2005 Recertification American Board of Anesthesiology
 2014 American Board of Pediatric Anesthesiology

Practice Activities:

1995 –	Preoperative Clinic	Boston Children’s Hospital	1-2 days per week, 30 patients/day
2010 –	Chief of Pediatric Anesthesia for Scoliosis Surgery	Boston Children’s Hospital	Patient Load: 6/week; critically ill patients with scoliosis over 3 days/week. In addition, meet with multidisciplinary care group 1/week to optimize perioperative care for children with multiple medical issues and them 1/month with surgeons, complex care pediatricians to formulate, review perioperative plan for these patients. Pre-assign all complex cases to pediatric anesthesia team members.

Clinical Innovations:

Clinical Protocols for Scoliosis Surgery. 2007-	Clinical Protocols for Perioperative Management: I have collaborated with orthopedic and neurosurgeons to develop clinical protocols for the perioperative management of complex scoliosis disease and procedures including patients with meningomyeloceles and hydrocephalus. I have also authored “Clinical Pearls of VEPTR and Scoliosis Anesthesia” for my department. These are published on our internal website and help guide the practical care administered by our department. These are complicated patients undergoing complex surgery and the patients are at risk for many complications. By systematically analyzing the points of possible complications, I, with my team, have developed best practice guidelines. For instance, methods to protect the tongue during masseter contraction during motor evoked potentials are suggested on our department website. This information has also been published in several book chapters in <i>Essential Clinical Anesthesia, A Practical Approach to Anesthesia</i> and <i>Monitoring the Nervous System for the Anesthesiologist</i> . I have also lectured about optimal anesthetic management for neuromonitoring at the Society for Pediatric Anesthesia. With my team, we have studied and published methods to decrease recall under anesthesia for scoliosis patients and several articles on the decreasing blood loss through the use of intraoperative tranexamic acid.
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Monitoring Anesthetic results from Scoliosis Surgery 2007-	<p>Back Database: I also developed the back database with Dr. John Emans used by our department to track our anesthetic results for scoliosis surgery. A core group of 2-3 pediatric anesthesiologists led by me meet monthly with complex care pediatricians, orthopedic surgeons and research assistants to review and optimize complicated patients before they undergo difficult surgery. This work has led to decreased intensive care utilization, decreased infection rates and minimization of blood loss and nerve damage perioperatively. Specifically, an initiative was undertaken to decrease the incidence of postoperative infections in children with neuromuscular scoliosis. This involved doing root cause analysis of factors leading to infections with the anesthesia, complex care pediatric and orthopedic teams within BCH. This work was successful and was published in <i>Spinal Deformity</i> in 2019. This working group also coordinates the care of children with congenital cardiac disease needing scoliosis repair with the pediatric cardiac team at BCH. This led to a paper in <i>Pediatric Cardiology</i> in 2019 on risk factors for perioperative adverse events in this patient population.</p>
Infection Control Improvements 2007-	<p>I developed the teaching module for infection control within our department. This includes a video as well as a net learning. My co-producer of the video Elizabeth Norton negotiated with national hospital groups to market the video and our video was presented at the American Society of Anesthesia Meeting in 2008. I also authored the ASA Recommendations for Infection Control, 3rd edition, posted on the ASA website in 2011</p>
Pediatric Anesthetic Induced Neurotoxicity 2012-	<p>I have been the liaison member of the anesthesia department to both the proceduralists and parents/lay public about the risks of prolonged general anesthesia in young children and infants. I provide evidence based consultations 2-3 times each month and an interview with me about anesthetic induced neurotoxicity is available to the clinicians and the public in OPENPediatrics. OPENPediatrics is a nonprofit interactive digital learning platform to promote the best practices and teachings in pediatric medicine nationally and internationally. I have even been asked to provide evidence to surgeons for research papers they are writing.</p>
Advocacy for Perioperative Homeostasis 2012-	<p>I am an internationally known expert on the effects of perioperative hypotension in young infants and neonates. Because of my advocacy of the importance of normotension or near normotension perioperatively in neonates especially ex-premature infants, I receive emails and calls from concerned pediatric anesthesiologists internationally frequently. My interest and expertise in this area has led to many invitations internationally to speak about this topic including China, Thailand, the Netherlands, Italy and the UK. I have published over 11 articles on this topic including a recent article in the <i>British Medical Journal</i>.</p>
Advocacy for Regional Anesthesia, 2012-	<p>As a result of my research in anesthetic neurotoxicity, regional anesthesia (spinal and spinal with caudal catheter) has been reintroduced into practice at BCH. It is now routinely offered to parents who wish to avoid general anesthesia for their young infants undergoing lower body procedures. I have promoted this at our annual pediatric anesthetic review course as well as nationally at the American Society of Anesthesiologists meeting during my review lecture on "Common</p>

Neonatal Emergencies: You can never be better prepared". During this lecture series, I explained the rationale as well as the nuances of establishing a successful regional anesthetic in a young infant. I am also a resource to young attendings, anesthesia fellows in performing these regional blocks.

Report of Education of Patients and Service to the Community

No presentations below were sponsored by 3rd parties/outside entities

Activities

2020 COVID 19 Crisis Face Masks – During the COVID crisis, I machine sewed over 150 face masks and donated them to the Department of Anesthesia at Boston Children’s Hospital. For a suggested donation of \$10, staff, families and children could obtain a mask. The proceeds were donated to Rosie’s Place, a shelter for homeless women. To date, more than \$2500 has been donated.

Recognition:

2008	Could Anesthesia Cause Developmental Disorders?	<i>Newsweek</i> Interview with Claudia Kalb
2009	Calming children who are anxious about anesthesia Q. Does it ease a child’s anxiety to have a parent around before receiving general anesthesia?	Interview with Judy Foreman October 24, 2009, <i>Healthsense</i> , Boston Globe
2019	Why children are complicated patients?	Interview with Susan Moeller Boston Children’s Hospital The Boston Globe special issue magazine September 29, 2019

Report of Scholarship

Peer-Reviewed Scholarship in print or other media:

Research Investigations

1. Davidson AJ, **McCann ME**, Devavaram P, Auble SA, Sullivan LJ, Gillis JM, Laussen PC. The differences in the bispectral index between infants and children during emergence from anesthesia after circumcision surgery. *Anesth Analg*. 2001;93(2):326-30
2. **McCann ME**, Sethna NF, Mazoit JX, Sakamoto M, Rifai N, Hope T, Sullivan L, Auble SG, Berde CB. The pharmacokinetics of epidural ropivacaine in infants and young children. *Anesth Analg*. 2001;93(4):893-7.
3. **McCann ME**, Brustowicz RM, Bacsik J, Sullivan L, Auble SG, Laussen PC. The bispectral index and explicit recall during the intraoperative wake-up test for scoliosis surgery. *Anesth Analg*. 2002;94(6):1474-8.

4. **McCann ME**, Bacsik J, Davidson A, Auble S, Sullivan L, Laussen P. The correlation of bispectral index with endtidal sevoflurane concentration and haemodynamic parameters in preschoolers. *Paediatr Anaesth*. 2002;12(6):519-25.
5. **McCann ME**, Waters P, Goumnerova LC, Berde C. Self-mutilation in young children following brachial plexus birth injury. *Pain*. 2004;110(1-2):123-9.
6. Groeper K, **McCann ME**. Topiramate and metabolic acidosis: a case series and review of the literature. *Paediatr Anaesth*. 2005;15(2):167-70.
7. **McCann ME**, Hill D, Thomas KC, Zurakowski D, Laussen PC. A comparison of radial artery blood pressure determination between the Vasotrac device and invasive arterial blood pressure monitoring in adolescents undergoing scoliosis surgery. *Anesth Analg*. 2005;101(4):978-85.
8. Berde CB, Yaster M, Meretoja O, **McCann ME**, Huledal G, Gustafsson U, Larsson LE. Stable plasma concentrations of unbound ropivacaine during postoperative epidural infusion for 24-72 hours in children. *Eur J Anaesthesiol*. 2008: pp. 1-8.
9. **McCann ME**, Schouten AN, Dobija N, Munoz C, Stephenson L, Poussaint TY, Kalkman CJ, Hickey PR, de Vries LS, Tasker RC. Infantile postoperative encephalopathy: perioperative factors as a cause for concern. *Pediatrics*. 2014 Mar;133(3):e751-7.
10. Lobo K, Donado C, Cornelissen L, Kim J, Ortiz R, Peake RWA, Kellog M, Alexander ME, Zurakowski D, Kurgansky KE, Peyton J, Bilge A, Boretzky K, **McCann ME**, Berde C, Cravero JA. Phase 1 Dose Escalation, Double-Blind, Block Randomized Controlled Trial of Safety and Efficacy of Neosaxitoxin Alone and in Combination with 0.2% Bupivacaine, with and without Epinephrine, for Cutaneous Anesthesia *Anesthesiology* 2015; 123(4):873-885.
 - Invited Editorial: Lahaye LA, Butterworth JF 4th
Site-1 Sodium Channel Blockers as Local Anesthetics: Will Neosaxitoxin Supplant the Need for Continuous Nerve Blocks? *Anesthesiology* 2015 Oct;123(4):741-2
11. Davidson AJ, Morton NS, Arnup SJ, de Graaf JC, Disma N, Withington DE, Frawley G, Hunt RW, Hardy P, Khotcholava M, von Ungern Sternberg BS, Wilton N, Tuo P, Salvo I, Ormond G, Stargatt R, Locatelli BG, **McCann ME**. The General Anesthesia compared to Spinal Anesthesia (GAS) Consortium. Apnea in awake-regional and general anesthesia in infants General anesthesia compared to spinal anesthesia study-comparing apnea and neurodevelopmental outcomes, a randomized controlled trial. *Anesthesiology* 2015; 123(1):38-54.
 - Invited Editorial: Kurth CD, Coté CJ. Postoperative Apnea in Former Preterm Infants: General Anesthesia or Spinal Anesthesia--Do We Have an Answer? *Anesthesiology*. 2015 Jul;123(1):15-7
12. Frawley G, Bell G, Disma N, Withington DE, de Graaf JC, Morton NS, **McCann ME**, Arnup SJ, Bagshaw O, Wolfler A, Bellinger D, Davidson AJ. The General Anesthesia compared to Spinal Anesthesia (GAS) Consortium. Predictors of failure of awake regional anesthesia for neonatal hernia repair: data from the general anesthesia compared to spinal anesthesia study. *Anesthesiology*. 2015; 123(1):55-65.

13. Davidson AJ, Disma N, de Graaff JC, Withington DE, Dorris L, Bell G, Stargatt R, Bellinger D, Schuster T, Arnup SJ, Hardy P, Hunt RW, Takagi MJ, Giribaldi G, Hartmann PL, Salvo I, Morton NS, von Ungern Sternberg BS, Locatelli BG, Wilton N, Lynn A, Thomas JJ, Polaner D, Bagshaw O, Szmuk P, Absalom AR, Frawley G, Berde CB, Ormond GD, Marmor J, **McCann ME** Neurodevelopmental outcome at two years of age after general and awake-regional anaesthesia in infancy: a randomised controlled trial. *Lancet* 2016 Jan 16;387(10015):239-50
- Invited Editorial: Warner DO, Flick RP, Anaesthetics, infants and neurodevelopment: case closed? *Lancet*. 2016 Jan 16;387(10015):202-4.
 - Comments:
 - Slade E, Drysdale H, Heneghan C; COMPare project team. The GAS trial. *Lancet* 2016 Apr 16;387: 1613-4
 - Orser BA, Evers AS, Suresh S, Hertz S. The GAS trial *Lancet* 2016 Apr 16;387: 1614
 - Weiss M, Becke K, Hansen TG, Engelhardt T. The GAS trial *Lancet* 2016 Apr 16;387: 1614
 - Davidson AJ, Disma N, de Graaff JC, Withington DE, **McCann ME**. The GAS trial - Authors' reply. *Lancet*. 2016 Apr 16;387
14. **McCann ME**, Withington DE, Arnup SJ, Davidson AJ, Disma N, Frawley G, Morton NS, Bell G, Hunt RW, Bellinger DC, Polaner DM, Leo A, Absalom AR, von Ungern-Sternberg BS, Izzo F, Szmuk P, Young V, Soriano SG, de Graaff JC; GAS Consortium Differences in Blood Pressure in Infants After General Anesthesia Compared to Awake Regional Anesthesia (GAS Study-A Prospective Randomized Trial). *Anesth Analg*. 2017 Sep;125(3):837-845.
- Invited Editorial: Vutskits L, Skowno J. Perioperative Hypotension in Infants: Insights from the GAS Study. *Anesth Analg*. 2017 Sep;125(3):719-720
15. Disma N, Withington D, **McCann ME**, Hunt RW, Arnup SJ, Izzo F, de Graaff JC, Mattioli G, Morton N, Frawley G, Davidson A, Lynn A, Szmuk P, Thomas JJ, Ragg P, Pini Prato A; GAS Consortium. Surgical practice and outcome in 711 neonates and infants undergoing hernia repair in a large multicenter RCT: Secondary results from the GAS Study. *J Pediatr Surg*. 2018 Sep;53(9):1643-1650.
16. Bartels DD, **McCann ME**, Davidson AJ, Polaner DM, Whitlock EL, Bateman BT. Estimating pediatric general anesthesia exposure: Quantifying duration and risk. *Paediatr Anaesth*. 2018 Jun;28(6):520-527.
17. Goobie SM, Zurakowski D, Glotzbecker MP, **McCann ME**, Hedequist D, Brustowicz RM, Sethna NF, Karlin LI, Emans JB, Hresko MT. Tranexamic Acid Is Efficacious at Decreasing the Rate of Blood Loss in Adolescent Scoliosis Surgery: A Randomized Placebo-Controlled Trial. *J Bone Joint Surg Am*. 2018 Dec 5;100(23):2024-2032.
18. Gentry K, Arnup S, Disma N, Dorris L, Degraaff J, Hunyady A, Withington DE, **McCann ME**, Davidson AJ, Lynn A. Enrollment challenges in multi-center, international studies: the example of the GAS trial *Paediatric Anaesthesia* 2019 Jan;29(1):51-58.

19. **McCann ME**, de Graaff JC, Dorris L, Disma N, Withington D, Bell G, Grobler A, Stargatt R, Hunt RW, Sheppard S, Marmor J, Giribaldi G, Bellinger DC, Hartmann PL, Hardy P, Frawley G, Izzo F, Ungern Sternberg BS, Lynn A, Wilton N, Mueller M, Polaner D, Absalom AR, Szmuk P, Morton N, Berde C, Soriano S, Davidson AJ and the GAS Consortium: Neurodevelopmental outcome at 5 years of age after general anaesthesia or awake-regional anaesthesia in infancy (GAS): an international, multicentre, randomised controlled trial. *Lancet* February 2019, Feb;393(10172):664-677.
- Invited Editorial:
 - O’Leary JD, Orser BA: Neurodevelopment after general anaesthesia in infants. *Lancet* February 2019, Feb;393(10172):664-677.
 - Shukla A, Chowdhary V: Neurodevelopmental outcome at 5 years of age after general anaesthesia or awake-regional anaesthesia in infancy (GAS): An international, multicentre, randomised, controlled equivalence trial. *Acta Paediatr.* 2019 Nov;108(11):2115-6
20. Szmuk P, Andropoulos D, McGowan F, Brambrink A, Lee C, Lee KJ, **McCann ME**, Liu Y, Saynhalath R, Bong CL, Anderson BJ, Berde C, De Graaff JC, Disma N, Kurth D, Loepke A, Orser B, Sessler DI, Skowno JJ, von Ungern-Sternberg BS, Vutskits L, Davidson A. An open label pilot study of a dexmedetomidine-remifentanil-caudal anesthetic for infant lower abdominal/lower extremity surgery: The T REX pilot study. *Paediatr Anaesth.* 2019 Jan;29(1):59-67.
21. Glotzbecker M, Troy M, Miller P, Berry J, Cohen L, Gryzwna A, **McCann ME**, Hresko MT, Goobie S, Emans J, Brustowitz R, Snyder B, Hedequist D. Implementing a Multidisciplinary Clinical Pathway Can Reduce the Deep Surgical Site Infection Rate After Posterior Spinal Fusion in High-Risk Patients. *Spine Deform.* 2019 Jan;7(1):33-39.
22. Przybylski R, Hedequist DJ, Nasr VG, **McCann ME**, Brustowicz RM, Emans JB, Marshall AC, Brown DW. Adverse Perioperative events in children with complex congenital heart disease undergoing operative scoliosis repair in the contemporary era. *Pediatric Cardiology* 2019 Oct;40(7): 1468-75.
23. Ing C, Jackson WM, Zaccariello MJ, Goldberg TE, **McCann ME**, Grobler A, Davidson AJ, Sun L, Li G, Warner DO Systematic review and meta-analysis of prospectively assessed neurodevelopmental outcomes in studies of anesthetic neurotoxicity in children. *British Journal of Anaesthesia* in press

Other peer-reviewed scholarship

1. Casta A, **McCann ME**. Electrocardiographic inscription of diaphragmatic contractions during anaesthesia. *Paediatr Anaesth.* 1999;9(2):175-6.
2. **McCann ME**, Kain ZN. The management of preoperative anxiety in children: an update. *Anesth Analg.* 2001;93(1):98-105.
3. Soriano SG, **McCann ME**, Laussen PC. Neuroanesthesia. Innovative techniques and monitoring. *Anesthesiol Clin North America.* 2002;20(1):137-51.
4. Leissner KB, Holzman RS, **McCann ME**. Bioterrorism and children: Unique concerns with infection control and vaccination. *Anesthesiol Clin North America.* 2004;22(3):563-77.

5. Davidson A, **McCann ME**, Morton N. Anesthesia neurotoxicity in neonates: the need for clinical research. *Anesth Analg.* 2007;105(3):881-2.
6. Davidson AJ, **McCann ME**, Morton NS, Myles PS. Anesthesia and outcome after neonatal surgery: the role for randomized trials. *Anesthesiology.* 2008, 109(6):941-4.
 - Roy RC. Role of randomized trials 2008. Three editorials--three historical allusions. *Anesthesiology.* 2009 Aug;111(2):443
7. **McCann ME**, Soriano SG. Is anesthesia bad for the newborn brain? *Anesthesiol Clin.* 2009 Jun;27(2):269-84.
8. **McCann ME**, Bellinger DC, Davidson AJ, Soriano SG. Clinical Research Approaches to studying Pediatric Anesthetic Neurotoxicity. *Neurotoxicology.* 2009 Sep;30(5):766-71.
9. Brusseau R, **McCann ME**. Anesthesia for urgent and emergent neonatal surgery. *Early Human Development* 2010 Nov;86(11):703-14.
10. **McCann ME**. Anesthetic neurotoxicity in babies. *JAAPOS* 2011 Dec;15(6):515-7.
11. Kuisle AM, Gauguet S, Karline LI, Dauber A, **McCann ME**. Postoperative adrenal crisis in an adolescent with Loeys-Dietz syndrome and undiagnosed adrenoleukodystrophy *Can J Anaesthesia* 2011 Apr;58(4):392-5
12. **McCann ME**, Soriano SG. General anesthetics in Pediatric anesthesia: Influences on the developing brain in "Drugs for Pediatric Intensive Care." *Current Drug Targets* 2012 Jun;13(7):944-51.
13. **McCann ME**, Soriano SG. Perioperative central nervous system injury in neonates. *Br J Anaesth.* 2012 Dec;109 Suppl 1
14. Allee JI, Goins KM, Berde CB, **McCann ME**. A case of cerebrospinal fluid leak in an infant after spinal anesthesia. *J Clin Anesth.* 2013 May;25(3):217-9.
15. **McCann ME**, Soriano SG. Progress in anesthesia and management of the newborn surgical patient. *Seminars in Pediatric Surgery*, 2014 Oct;23(5):244-8
16. **McCann ME**, Schouten AN. Beyond survival; influences of blood pressure, cerebral perfusion and anesthesia on neurodevelopment. *Paediatr Anaesth.* 2014 Jan;24(1):68-73.
17. Davidson AJ, Becke K, de Graaff J, Giribaldi G, Habre W, Hansen T, Hunt RW, Ing C, Loepke A, **McCann ME**, Ormond GD, Pini Prato A, Salvo I, Sun L, Vutskits L, Walker S, Disma N. Anesthesia and the developing brain: a way forward for clinical research. *Paediatr Anaesth.* 2015 May;25(5):447-52.
18. Pinyavat T, Warner DO, Flick RP, **McCann ME**, Andropoulos DB, Hu D, Sall JW, Spann MN, Ing C. Summary of the Update Session on Clinical Neurotoxicity Studies. *J Neurosurg Anesthesiol.* 2016
19. Colon E, Bittner EA, Kussman B, **McCann ME**, Soriano S, Borsook D. Anesthesia, Brain Changes, and

Behavior: Insights from Neural Systems Biology. Prog Neurobiol. 2017 Jun;153:121-160.

20. **McCann ME**, de Graaff J. Current thinking regarding potential neurotoxicity of general anesthesia in infants. Curr Opin Urol. 2017 Jan;27(1):27-33.
21. Disma N, O'Leary JD, Loepke AW, Brambrink AM, Becke K, Clausen NG, De Graaff JC, Liu F, Hansen TG, **McCann ME**, Salorio CF, Soriano S, Sun LS, Szmuk P, Warner DO, Vutskits L, Davidson AJ. Anesthesia and the developing brain: A way forward for laboratory and clinical research. Paediatr Anaesth. 2018 Sep;28(9):758-763.
22. **McCann ME**, Lee JK, Inder TE: Beyond anesthesia toxicity: anesthetic considerations to lessen the risk of neonatal neurologic injury Anesthesia and Analgesia 2019 Nov;129(5):1354-1364.
23. **McCann ME**, Soriano SG. Does general anesthesia affect neurodevelopment in infants and children. British Medical Journal 2019, Dec 9:367.
24. Soriano SG, **McCann ME** Is Anesthesia Bad for the Brain: Current Knowledge of the Impact of Anesthetics on the Developing Brain Anesthesiology Clinics 2020
25. **McCann ME**, Soriano SG. The Unspoken Question. Anesthesia and Analgesia 2020 in press

Scholarship without named authorship

1. Soriano SG, Vutskits L, Jevtovic-Todorovic V, Hemmings HC; 2016 BJA Neurotoxicology and Neuroplasticity Study Group. Thinking, fast and slow: highlights from the 2016 BJA seminar on anaesthetic neurotoxicity and neuroplasticity. Br J Anaesth. 2017 Sep 1;119(3):443-447. doi: 10.1093/bja/aex238.

Non-peer reviewed scholarship in print or other media:

Proceedings of meetings or other non-peer reviewed scholarship

1. Davidson AJ, **McCann ME**, Morton NS and GAS consortium: Protocol 09PRT/9087: A multi-site randomised controlled trial to compare regional and general anaesthesia for the effects on neurodevelopmental outcome and apnoea in infants: The GAS study (ACTRN12606000441516, NCT00756600)

Reviews, chapters, monographs and editorials

Newsletters:

1. **McCann ME**, Houck C. Anesthetic neurotoxicity in human infants warrants further research. Focus on Subspecialties; American Academy of Pediatrics Newsletter Aug 2010.

Chapters:

1. **McCann ME**, Rockoff MA (1990) 'Case No.12'. In: Editor: Wetchler B; Anesthesia for Ambulatory Surgery. 2nd Edition, Lippincott Williams & Wilkins, Philadelphia, PA
2. **McCann ME**, Brustowicz RM, Holzman RS. (2008) 'The Musculoskeletal System and Orthopedic Surgery. In: Editors: Holzman RS, Mancuso TJ, Polaner D; A Practical Approach to Pediatric Anesthesia. Lippincott Williams & Wilkins; Philadelphia, PA.
2. 3.Miller T, **McCann ME**.(2011) 'Anesthetic Considerations for Common Procedures in Children'. In Editors:Vacanti CA, Segal S, Sikka P, Urman R; Essential Clinical Anesthesia ; Cambridge University Press, Cambridge, UK. pg 795-803
3. 4.Gordon N, **McCann ME**.(2011) 'Neonatal Surgical Emergencies'. In Editors:Vacanti CA, Segal S, Sikka P, Urman R; Essential Clinical Anesthesia ; Cambridge University Press, Cambridge, UK. pg 804-812
4. Matthes K, **McCann ME**.(2011) 'Neurophysiologic monitoring' In Editors:Vacanti CA, Segal S, Sikka P, Urman R; Essential Clinical Anesthesia ; Cambridge University Press, Cambridge, UK.
5. Pg 203-208
6. **McCann ME**.(2001) 'Postoperative Nausea and Vomiting' In Editor: Bailin MT, Harvard Electronic Anesthesia Library (HEAL) Cdr edition, Lippincott Williams and Wilkins,New York, Chapter 9, section
7. **McCann ME**, Brustowicz RM, Soriano S G.(2011) 'Surgery for Scoliosis Correction', In Editors: Koht A, Sloan T, Toleikis JR ; Monitoring the Nervous System for the Anesthesiologist. Springer Verlag, New York
8. 8.Loepke AW, **McCann ME** (2013) 'Anesthetic-induced Neurotoxicity', In Editors: Mongan P, Soriano S, Sloan T;Practical Approach to Neuroanesthesia. Walters Kluwer, Philadelphia, PApg 307.**McCann ME**, Brustowicz RM, Holzman RS (2015). The Musculoskeletal System and Orthopedic Surgery. . In: Editors: Holzman RS, Mancuso TJ, Polaner D; A Practical Approach to Pediatric Anesthesia. Lippincott Williams & Wilkins; Philadelphia, PA. pg 561
9. **McCann ME**, Brustowicz R, Soriano S G (2015) 'Surgery for Scoliosis Correction',. In Editors: Koht A, Sloan T, Toleikis JR ; Monitoring the Nervous System for the Anesthesiologist and other health care professionals. Springer Verlag, New York pg 497-505
10. **McCann ME**, Soriano SG (2017), 'Anesthesia Neurotoxicity' In Editors: Pardo M, Miller R; Basics of Anesthesia 7th Edition, Elsevier USA Chapter 12.
11. **McCann ME**, (2016) 'Common Neonatal Emergencies: You Can Never be Better Prepared' In Editor: Schwartz A, ASA Refresher Courses in Anesthesiology.Volume 44
12. **McCann ME** (2018) 'The Term Infant' In Editors: McCann ME, Greco C, Matthes K;Essentials for Anesthesia for Neonates and Infants, Cambridge University Press, Cambridge UK pg 1-9.
13. **McCann ME** (2018), 'Procedure Sedation', In Editors: McCann ME, Greco C, Matthes K;Essentials for Anesthesia for Neonates and Infants, Cambridge University Press, Cambridge UK pg 398-404.

Books/textbooks for the medical or scientific community

1. Essentials for Neonates and Infants, Editors **Mary Ellen McCann**, Kai Matthes, Christine Greco, Cambridge University Press (2018).

Letters to the Editor

1. Davidson A, **McCann ME**, and Morton N. Letter to the Editor Anesthesia Neurotoxicity in Neonates: The Need for Clinical Research. *Anesthesia and Analgesia*. 2007; 105:881-882.
2. Polaner DM, Zuk J, **McCann ME**, Davidson A. Warnings, uncertainty, and clinical practice. *Lancet*. 2017 Jun 3;389(10085):2174-2176. doi: 10.1016/S0140-6736(17)31506-4

Professional educational materials or reports, in print or other media:

1. **Mary Ellen McCann**. Enduring web-based education materials for the Society of Pediatric Anesthesia Reflex Sympathetic Dystrophy. 2007, national <http://www.pedsanesthesia.org/members/webed> Mc
2. **Mary Ellen McCann**. Enduring Web based Learning for the Society of Pediatric Anesthesia Is nitrous oxide a safe anesthetic? 2008, national. <http://www.pedsanesthesia.org/members/webed>
3. **Mary Ellen McCann**. Clinical Pearls-VEPTR and Growing Rods. 2008, Department of Anesthesia, Pain and Perioperative Medicine website, Children's Hospital Boston.
4. **Mary Ellen McCann**, Beth Norton BSN-executive producers and scriptwriters. Safe Care in the Operating Room-An Anesthesiologist Perspective Audiovisual-15 minute DVD on safety practices in the OR, national
5. **Mary Ellen McCann**, Hand Hygiene and Infection Control NET learning, 2009, Children's Hospital Boston
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7. **Mary Ellen McCann**, Department of Anesthesia, Perioperative and Pain Medicine Infection Control Guidelines 2003, 2008, 2009 Boston Children's Hospital website and departmental website.
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1. **Mary Ellen McCann**, Department of Anesthesia, Perioperative and Pain Medicine Infection Control

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Narrative Report

Clinical Expertise and Innovation:

I have focused my career on contributing to the development of safe anesthetics for children with vulnerable neurologic systems. I work on defining risks and answering critical questions about patient safety and consequences, both near and long term, related to anesthesia exposure at a young age. There is compelling preclinical data and retrospective human data that associates general anesthesia with neurotoxicity. Specifically, these patients can suffer from poor neurocognitive outcomes and behavioral issues.

For children exposed to anesthesia at a young age, it is unclear whether these poor outcomes are caused by anesthetic neurotoxicity, perioperative hemodynamic and homeostatic instability, underlying morbidity, or the neuroinflammatory effects of surgical trauma. The question posed is "Does general anesthesia lead to long term neurocognitive or behavioral issues?" To answer this question, I designed a study protocol. Fortunately, a colleague in Australia had also independently begun to think about this topic. We joined forces to develop and conduct the General Anesthesia vs Spinal Anesthesia (GAS) project. This project was an NIH and FDA funded, multinational randomized controlled trial which compared the neurodevelopmental outcomes of 722 infants exposed to either a general or regional anesthetic for inguinal herniorrhaphies in early infancy. This trial involved 7 countries (UK, Australia, New Zealand, Italy, Netherlands, Canada and the USA) and 10 centers in the USA. Our interim results (Lancet 2016) of children at age 2 found that intermediate length general anesthetics were safe. These results were instrumental in influencing the FDA to qualify their 2016 safety warning about the length of anesthetic exposure time. Our results from the 5 years of age follow up also showed no measurable deficits in our population. These outcomes have reassured to the pediatric community and have allayed the fears of parents who were reluctant to let their children undergo needed procedures.

However, there remains an association between anesthetics at a young age and later poor neurocognitive outcomes. I began to focus on perioperative homeostasis. In 2014, I led a root cause analysis on an ex-premature infant who was intraoperatively hypotensive and later developed perioperative infantile encephalopathy. Subsequently, I reached out to the international pediatric anesthesia community and

published a small case series of 6 very young infants (3 from the USA, 3 from the Netherlands) who had postoperative seizures in the setting of moderate intraoperative hypotension, leading to cerebral ischemic injury.

Prior to my work, it was felt that the effects of intraoperative hypotension and hypocarbia were negligible in children and infants. This small case series and my advocacy internationally and nationally have changed the way pediatric anesthesia is practiced. I have spoken locally, nationally and internationally about the need for improved vigilance in maintaining normal physiologic parameters during anesthesia. In 2015, at the Association of Pediatric Anesthetists meeting, my paper was highlighted in a session entitled "Papers that changed my practice". I have published 8 articles with international collaborators about the unique vulnerabilities of young infants undergoing general anesthesia and cerebral ischemia. My collaborators have included renowned neonatologist Terrie Inder MD and Jennifer Lee-Summers MD, an expert on cerebrovascular autoregulation. In 2018, I wrote and edited a textbook, 'Essentials of Anesthesia for Infants and Neonates' to better inform our pediatric anesthesia practitioners about the unique homeostatic vulnerabilities of young children. I have mentored significantly throughout my career and enjoyed including many of our junior faculty and former fellows as contributors to the textbook. As a result of my work in pediatric homeostasis and pediatric anesthetic neurotoxicity, I routinely advise concerned pediatric anesthesiologists caring for sick neonates around the world.

At Boston Children's Hospital, I have served as Chief of Pediatric Anesthesia for Spinal Surgery since 2006. In that role, I developed clinical practice guidelines for patients with ventriculo-peritoneal shunts undergoing prolonged procedures with my orthopedic colleagues and a "Clinical Pearls" guide for our departmental website. I have written several review articles, original research, case reports, and book chapters about blood sparing, neuromonitoring and scoliosis.

My team of spinal surgery pediatric anesthesiologists has developed innovative methods to decrease surgical site infections, spare blood use and limit narcotic use. We bent the curve on surgical site infections and greatly diminished the need for transfusions. These changes and others have led to decreased total time in hospital and ICU length for our patients. We lead education for the department and trainees about the nuances of doing complex cases efficiently and competently and provide consultations routinely. I am also the anesthesia lead on a multidisciplinary team that meets once per month to plan out the perioperative course of complex cases.

Within my department, I have served in various roles, including as Infection Control Administrator. In this role, I created educational materials including a NETlearning, a 15-minute video, departmental guidelines on infection control, and auditing tools. I have also served as mentor to many junior faculty and trainees interested in clinical research and have worked on the Joint Committee on the Status of Women at HMS to help young female physicians balance career and family.

I have also been a leader in the American Society of Anesthesiologists. I authored the pediatric section of the 3rd Edition of the "ASA Recommendations for Infection Control for the Practice of Anesthesia" and have chaired the Educational Track Subcommittee for the past four years. This subcommittee is responsible for the pediatric educational content at our annual meeting. I also currently serve as the ASA liaison to the Anesthesia and Analgesia Drug Products Advisory Committee for the Food and Drug Administration (FDA). I was a board member of the Society for Pediatric Anesthesia for 4 years and served as Chair and Co-Chair for their annual

meeting for 3 years. Between 2012 and 2017, I was the Chair and Co-Chair for the annual review course “Principles of Pediatric Anesthesia and Critical Care” that Boston Children’s Anesthesia Department has run for several years and during that time managed to triple attendance of the meeting.

My academic timeline demonstrates that the vast majority of my many national committees and board work, NIH and other grant funding, leadership roles and major investigative research have been in the last 15 years. I have endeavored throughout my career to be a role model, especially to young female physicians trying to balance career and family. Through my work at the Joint Committee on the Status of Women, I have learned to be an effective counselor and mentor to young physicians starting their careers.

In summary, I am a pediatric anesthesiologist at Boston Children’s Hospital, and I have focused my career on improving the safety and outcomes related to anesthesia in children with vulnerable neurologic systems.