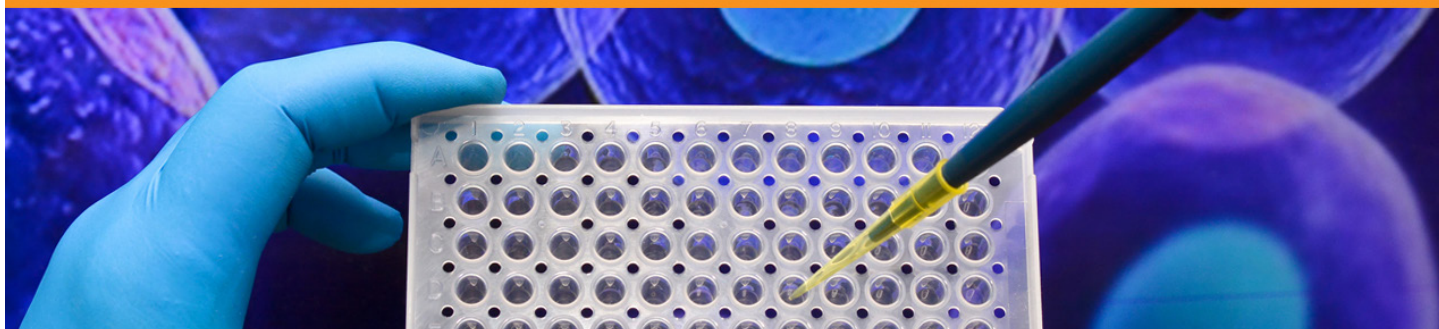
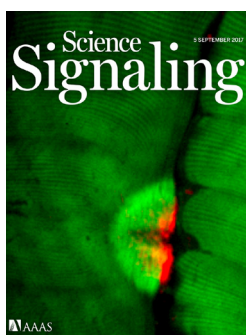
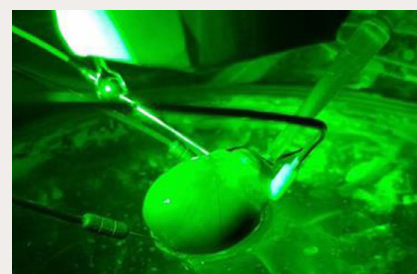


2017 Research Discoveries



A BANNER YEAR FOR INNOVATION

In 2017, clinicians and research faculty working at Children's National Health System published more than 850 research articles about a wide array of topics. A Children's Research Institute review group selected the top articles for the calendar year considering, among other factors, work published in top-tier journals.



Science Signaling

Mitochondria help injured muscle cells repair by soaking up calcium that enters from the site of injury and using it to trigger increased production of reactive oxygen species. According to an article featured on the journal's cover, reactive oxygen species that can damage cells when produced in high amounts are also crucial signals that start the process of repairing injured myofibers.

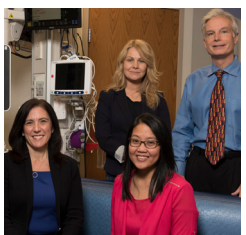
"Mitochondrial redox signaling enables repair of injured skeletal muscle cells." A. Horn, et al. *Science Signaling*. Sept. 5, 2017.



Science Translational Medicine

The subventricular zone in normal newborns' brains is home to the largest stockpile of neural stem/progenitor cells, with newly generated neurons migrating from this zone to specific regions of the frontal cortex and differentiating into interneurons. Findings derived from a preclinical model and featured on the journal's cover point to the importance of restoring these cells' neurogenic potential, possibly through therapeutics, to lessen children's long-term neurological deficits.

"Abnormal neurogenesis and cortical growth in congenital heart disease." P.D. Morton, et al. *Science Translational Medicine*. Jan. 25, 2017.

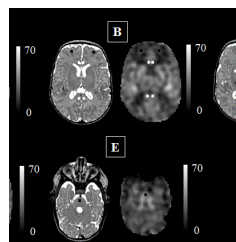


Mary T. Donofrio, Josepheen De Asis-Cruz, Catherine Limperopoulos, Gilbert Vezina

NeuroImage: Clinical

Using a novel imaging technique, a multidisciplinary Children's research team demonstrates for the first time that the brains of high-risk infants with congenital heart disease already show signs of functional impairment even before they undergo corrective open heart surgery.

"Aberrant brain functional connectivity in newborns with congenital heart disease before cardiac surgery." J. De Asis-Cruz, et al. *NeuroImage: Clinical*. Sept. 28, 2017.



Cerebral blood flow maps

The Journal of Pediatrics

Cerebral blood flow of key regions of newborns' brains is altered in very premature infants and may provide an early warning sign of disturbed brain maturation well before such injury is visible on conventional imaging, according to a prospective, observational study.

"Altered cerebral perfusion in infants born preterm compared with infants born full term." M. Bouyssy-Kobar, et al. *The Journal of Pediatrics*. Dec. 4, 2017.

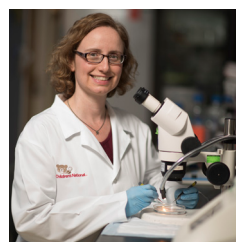


Kazue Hashimoto-Torii

Nature Communications

Transcription factor Heat Shock Factor 1 (Hsf1), which the developing brain releases to shield it from the ravages of environmental stress, actually can contribute to impairing the embryonic brain when too much Hsf1 is produced.

"Variations in brain defects result from cellular mosaicism in the activation of heat shock signaling." S. Ishii, et al. *Nature Communications*. May 2, 2017.



Irene E. Zohn

Birth Defects Research

The study authors report that iron supplementation can prevent neural tube defects and forebrain truncations in an experimental model. While iron appears to be essential for neural tube closure, high levels of iron supplementation and iron overload may contribute to neural tube defects.

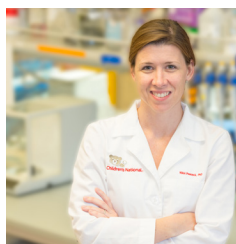
"High levels of iron supplementation prevents neural tube defects in the Fpn1^{fl} mouse model." B. A. Stokes, et al. *Birth Defects Research*. Dec. 23, 2016.



Kirsten M. Williams

The Lancet Haematology

The authors showed that ^{18}F -fluorothymidine (FLT) was safe and could map subclinical engraftment after hematopoietic stem cell transplantation. FLT objectively revealed early stem cell settling and showed a previously unknown path of cellular recovery in vivo, mirroring fetal ontogeny. **"Imaging of subclinical haemopoiesis after stem-cell transplantation in patients with haematological malignancies: A prospective pilot study."** K.M. Williams, et al. *The Lancet Haematology*. Dec. 13, 2017.



Nikki Gillum Posnack

American Journal of Physiology-Heart and Circulatory Physiology

An experimental model exposed to di-2-ethylhexyl-phthalate, a chemical that can leach from plastic-based medical devices, experienced altered autonomic regulation, heart rate variability and cardiovascular reactivity.

"Plastics and cardiovascular health: Phthalates may disrupt heart rate variability and cardiovascular reactivity." R. Jaimes III, et al. *American Journal of Physiology-Heart and Circulatory Physiology*. Nov. 1, 2017.



Karun V. Sharma

The Journal of Pediatrics

Doctors from the Sheik Zayed Institute for Pediatric Surgical Innovation at Children's National Health System completed a pilot study that demonstrates how osteoid osteoma, a painful bone tumor that commonly occurs in children and young adults, can be safely and successfully treated using an incisionless surgery method, magnetic resonance-guided high-intensity focused ultrasound.

"Comparison of noninvasive high-intensity focused ultrasound with radiofrequency ablation of osteoid osteoma." K.V. Sharma, et al. *The Journal of Pediatrics*. November 2017.



Kavita Parikh

The Journal of Pediatrics

Disparities in pediatric readmission rates for chronic conditions vary. Racial and ethnic differences exist for some chronic conditions experienced by children, such as asthma, diabetes, seizures and migraines - but not for depression, according to retrospective analyses of hospitalizations at 48 children's hospitals. The study findings should help to highlight untapped opportunities to personalize care to reduce readmission disparities.

"Racial and ethnic differences in pediatric readmissions for common chronic conditions." K. Parikh, et al. *The Journal of Pediatrics*. July 2017.

CREDITS: Jan. 25, 2017, cover courtesy of *Science Translational Medicine*. Sept. 5, 2017, cover courtesy of *Science Signaling*.

NEW CRI LEADERS NAMED

Vittorio Gallo, Ph.D., a neuroscientist working in the field of white matter disorders, was named Chief Research Officer at Children's National Health System. Gallo, Director of the Center for Neuroscience Research at Children's National for the past decade, is Wolf-Pack Chair in Neuroscience at Children's Research Institute, Children's academic arm. As Chief Research Officer, Gallo will be instrumental in developing and realizing Children's Research Institute's long-term strategic vision, which includes building out the nearly 12-acre property once occupied by Walter Reed National Military Medical Center to serve as a regional innovation hub and to support Children's scientists conducting world-class pediatric research.



Vittorio Gallo

Catherine "Cath" Bollard, M.D., M.B.Ch.B., former chief of the division of allergy and immunology, was chosen to serve as Director of the Children's Research Institute's Center for Cancer and Immunology Research (CCIR). CCIR, with annual National Institutes of Health and other external funding exceeding \$10 million, includes more than 50 clinicians and scientists performing groundbreaking clinical and translational research in understanding the origins and developing and testing novel therapies for childhood cancers and immunologic disorders. "Cath's unique background and pioneering work in T-cell immunotherapy have established her as an international leader in research and treatment of children with cancer and immunologic disorders," says Vittorio Gallo, Ph.D., Chief Research Officer.



Catherine "Cath" Bollard

Eric Vilain, M.D., Ph.D., an internationally renowned geneticist working in the field of gender-based biology, was named Director of the Center for Genetic Medicine Research at Children's Research Institute. Dr. Vilain also will become the A. James Clark Distinguished Professor of Molecular Genetics. "We are very excited about the vision and expertise that Dr. Vilain brings to the study and use of precision medicine approaches, and to the understanding and developing of novel treatments for common and rare diseases of childhood," says Mark Batshaw, M.D., Executive Vice President, Physician-in-Chief and Chief Academic Officer at Children's National.



Eric Vilain