Pediatric RESEARCH

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EDITOR'S FOCUS

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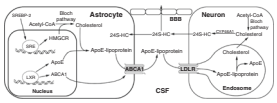
Early career investigator

Congratulations to Andrea Hahn, the Early Career Investigator for July 2021. Dr. Hahn is a pediatric infectious disease specialist at Children's National Hospital, Washington DC. She completed medical school at the Ohio State University, completed her pediatric residency at Nationwide Children's Hospital in Columbus, and trained in pediatric infectious diseases at the Cincinnati Children's Hospital Medical Center. She participated in a T32 training program in pediatric clinical and developmental pharmacology during her fellowship. She is grateful to all the mentors who have shaped her career, including Katalin Koranyi, Robert Frenck, Beverly Connelly, Roberta DeBiasi, Sander Vinks, Mary Rose, John LiPuma, Kirk Harris, Edith Zemanick, Keith Crandall and Robert Freishtat. In this issue, she and colleagues report that long-chain fatty acid (LCFA) biosynthesis pathways in the airway microbiome are upregulated in airway samples collected at follow-up compared with at end of treatment in patients with cystic fibrosis admitted for pulmonary exacerbations. Dr. Hahn's advice to those interested in research is to "find a team of mentors, coaches, and champions. With the right people behind you, you will find a path that fits your interest, needs, and goals". See pages 12 and 99.

Cholesterol metabolism and brain injury in neonatal encephalopathy

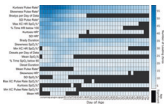


Hypoxic–ischemic injury remains a major etiology for neonatal encephalopathy, and the mechanisms or pathways resulting in brain injury are complex. Pathways of cholesterol metabolism have been implicated in adult neurologic diseases, including traumatic brain injury, stroke, and Parkinson's disease. However, the role of cholesterol metabolic pathways in brain injury in children or neonates has not been reviewed. Dave and Peeples reviewed cholesterol metabolism in brain injury and how it may lead to ischemic and inflammatory brain injury. Their paper includes current preclinical data supporting the involvement of cholesterol in the pathogenesis of neonatal encephalopathy. The review also explores brain-specific cholesterol metabolites as potential serum biomarkers for brain injury and identifies therapeutic targets for management of encephalopathy. The authors speculate that analysis of cholesterol metabolic pathways after hypoxia–ischemia may provide opportunities for rapid diagnosis and therapeutic interventions. See page 37.

EEG abnormalities in infants with mild HIE

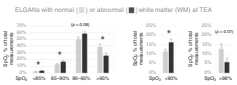
Therapeutic hypothermia (TH) has become the standard of care for infants with moderate to severe hypoxic–ischemic encephalopathy (HIE) and is recommended to be initiated within 6 h of birth. Recent studies have demonstrated adverse neurodevelopmental outcomes in patients with mild HIE, who are typically excluded from TH therapy. EEG abnormalities in mild HIE indicate that all is not right with the brain in these patients. Garvey et al. report that qualitative and quantitative analysis of an EEG in the first 6 h of life identifies abnormal EEG features in mild HIE. Multichannel EEG may help in the objective identification of patients with mild HIE who could benefit from TH. This observation could inform future clinical trials. In a related Comment, Selvanathan and Miller propose that amplitude EEG could contribute to this identification. (Photo: dblight/Getty.) See pages 117 and 18.

Vital sign metrics of VLBW infants in three NICUs



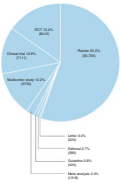
Continuous monitoring of vital signs, heart rate, respiratory rate, and oxygen saturations (SpO_2) is the norm in the NICU. Advances in technology have enabled us to record, derive, and analyze vital sign patterns from continuous monitoring. Early detection of aberrations in vital signs may predict adverse events in NICU patients, including sepsis, necrotizing enterocolitis, or mortality. Zimmet et al. investigated vital sign recordings from 1168 very-low-birthweight (VLBW) infants from birth to 42 days of life in NICUs at three universities. Mean heart rate and SpO_2 were generally similar among VLBW infants at the three NICUs from birth through 6 weeks of age, but bradycardia and desaturation events differed in the first 2 weeks after birth. The investigators conclude that differences may yield mechanism when practices are compared between sites. In a related Comment, Cole notes the importance of examining differences in vital sign data across NICUs before a standard vital sign algorithm can be developed. See pages 125 and 20.

Early oxygen levels contribute to brain injury in extremely preterm infants



Extremely-low-birthweight infants (ELGANS) are at high risk for adverse neurodevelopmental outcomes. Hyperoxia and hypoxia as measured by PaO_2 levels in early in life may affect the developing brain. Rantakari et al., in a cohort of ELGANs born in Finland, correlated hyperoxia and hypoxia in the first 3 days of life with brain abnormalities detected by magnetic resonance imaging, magnetoencephalography (both done at term-corrected age), and neurodevelopmental evaluation at 2 years corrected age. Aberrations in oxygen levels in the first 3 days of life were associated with white matter abnormalities and abnormal magnetoencephalography. The results may indicate that certain brain structures are more vulnerable to hypoxia and others to hyperoxia, thus emphasizing the role of strict saturation targets. In a related Comment, Martin and Harijith discuss the possible role of lung-to-brain signals. See pages 131 and 4.

Trends in pediatric publications over the past two decades



In this fascinating article, Levy-Mendelovich et al. describe the use of text mining to analyze trends in the pediatric literature. Using MEDLINE/PubMed, they found that the most frequently cited articles were clinical guidelines and meta-analyses. Over time, there was a shift in topic areas, with epidemiological studies growing as a field. In a related Comment, Cheng and Devaskar consider how COVID-19 might affect these trends. See pages 212 and 13.

Lithium carbonate exposure and embryonic neural development in a murine model

Lithium remains the mainstay in the treatment of bipolar disorder, which usually manifests during the reproductive years in humans. Lithium may be required to treat mental illness and stabilize mood in pregnant women. Discontinuation of lithium therapy may lead to relapse. Lithium during pregnancy increases the risk for neural tube defects in the fetus; hence, mitigating this adverse effect may be clinically beneficial. Li et al. report on an animal model of lithium-induced neural tube defects in C57/BL6 mice. Enhanced cell proliferation and decreased apoptosis following lithium exposure were closely associated with impairment of inositol biosynthesis. The authors speculate that targeting this pathway might mitigate lithium-induced neural tube defects. See page 82.