Preface

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The field of pediatric traumatic brain injury (TBI) has expanded and progressed since the publication of the first special issue on this topic in *Developmental Neuroscience* in 2006. It was evident that investigators found it valuable to have a compendium of such high-quality papers from leaders in the field, from the number of highly cited manuscripts and the more than 100 individual copies sold. This second special issue on pediatric TBI starts off with an outstanding update on progress in the field by Patrick M. Kochanek, MD, a leader in pediatric TBI, who as Professor and Vice Chairman of the Department of Critical Care Medicine, Professor of Anesthesiology, Clinical and Translational Science, and of Pediatrics, and as Director of Safar Center for Resuscitation Research, University of Pittsburgh School of Medicine, is uniquely qualified to provide the 'Quo vadis' 2010 perspective on where this increasingly important field is headed. We thank Pat and his colleagues Michael Bell and Hülya Bayır for embracing the opportunity to provide this update, and for identifying important areas of research as well as challenges and opportunities in the field.

In 2003 the 'Guidelines for the acute management of severe traumatic brain injury in infants, children, and adolescents' [1] were published by a group of multidisciplinary experts. Many steps on the pathway to treatment of intracranial hypertension in children were based on

'expert opinion'. These guidelines have provided an important framework for guiding research over the last 7 years. We look forward to the publication of the new guidelines in 2011, with continued progress in the field of pediatric neurotrauma.

Despite ongoing advances in neurologic monitoring and neurointensive care, clinicians at the bedside of children with severe accidental or nonaccidental TBI and critically injured infants are still often limited to supportive care. Several studies in this issue address the relationship of intracranial pressure to outcome, and other reports address the effects of hypothermia and clinical biomarkers. The importance of these studies should not be underestimated as many details of the clinical approach are extrapolated from adult studies, and there is still a great need for prospective, controlled studies in children with severe TBI.

The lack of a complete understanding of the basic pathologic mechanisms operating in the developing brain after injury is still a major limitation to the advancement of care for pediatric TBI patients. How the developing brain responds to injury is guided by the type, location and severity of the insult and varies according to its maturational state. Moreover, subsequent wound healing is superimposed on maturational processes that define emerging neuronal networks and, ultimately, cogni-

tive abilities. The challenge here is to develop therapeutics tailored to the unique terrain and requirements of the developing brain that will limit secondary tissue damage and support subsequent brain development. This will require a combined effort of basic scientists and clinician scientists with a broad range of expertise utilizing in vitro studies, cellular and subcellular analyses, age-appropriate animal models, and data from pediatric patients.

Since there is such a critical need for more studies and effective neuroprotective strategies, we are pleased to again have the opportunity to bring together an outstanding collection of clinical studies and basic science research as a second special issue of *Developmental Neuroscience* in the field of pediatric TBI. It is exciting to have three papers related to imaging since, as Pat Kochanek and coauthors note, advances in imaging and spectroscopy are 'catapulting forward our understanding' of TBI. Several basic science studies deal with the important effect of developmental age on response to injury, and with the relationship of age to neurogenesis after injury. Two other basic science studies show promising results of neuroprotection by folic acid and acetyl-L-carnitine, compounds that are strong candidates for future clinical trials. The potential of modulating neurogenesis and stem cells after injury points to future therapeutic approaches.

In contrast, studies addressing nonaccidental and repeated trauma remind us of the sobering reality and magnitude of this problem. As in the first special issue, original research in the field is balanced by several focused reviews aimed at summarizing current knowledge, identifying key gaps in knowledge, and defining future research directions.

We would like to sincerely thank all of the investigators who have enthusiastically contributed their knowledge and time in writing and reviewing manuscripts for this special issue. We hope this issue will serve as a valuable reference tool for all pediatric intensivists, neuroscientists and clinician scientists, and that it will provide an impetus for the promotion of future research in the field of pediatric TBI.

Reference

- 1 Adelson PD, Bratton SL, Carney NA, Chestnut RM, du Coudray HE, Goldstein B, Kochanek PM, Miller HC, Partington MD, Selden NR, Warden CR, Wright DW: Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents. *Pediatr Crit Care Med* 2003;4:S2–S75.