Translation of Traumatic Brain Injury into Human and Clinical Practice
Susan R. Durham, MD, MS
Associate Professor of Pediatric Neurosurgery
Dartmouth-Hitchcock Medical Center
Lebanon, New Hampshire, USA

Objectives:
1. Describe current methods and limitations of modeling human TBI in animal models
2. Discuss development of experimental models of TBI, including subdural and epidural hematomas, cerebral contusions and diffuse axonal injury
3. Describe application of advanced imaging methodologies in the study of experimental and human TBI

A. Introduction:
   1. Experimental models of human TBI
      a. Primate
      b. Rodent
      c. Porcine
   2. Limitations of sub-human TBI models
      a. Species-specific
      b. Age-dependence

B. Development of porcine models of TBI
   1. Review of TBI
      a. Clinical features
      b. Radiographic features
   2. Development of the current porcine model
      a. Laboratory evaluation
   3. Radiographic imaging techniques
      a. CT vs. MRI in traumatic brain injury
      b. fMRI in traumatic brain injury

C. Translation of animal modeling back to human patients
   1. Development of MRI for primary trauma evaluation in children
      a. Motion-insensitive sequences
      b. Potential clinical applications of CBF measurement and spectroscopy in TBI in children and adults
   2. What we have learned about TBI in the immature brain
      a. Age-dependence of injury severity and type
      b. Time course and degree of development of cerebral edema
      c. Pathophysiology of specific injury types
   3. Treatment implications for infants, children, and adolescents