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- Older Adults' Responses to Traumatic Injury
- Infections in Critically Ill Burn and Trauma Patients



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AWARDS

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With the aging of the U.S. population, traumatic injury in older adults is expected to reach epidemic levels and has already created a major impact on trauma systems. At our Level I Trauma and Regional Burn Center, falls surpassed motor vehicle crashes as the leading cause of trauma deaths for the first time in 2006. The mean age in this group of patients was 69 years old. Approximately 10% of burn patients admitted to our institution are over 60 years of age, but they account for 45% of hospital deaths. Appropriate treatment strategies are therefore critical in order to improve outcomes for injured older adults.

Older Adults' Responses to Traumatic Injury

We seek to better understand why outcomes in older injured adults remain far inferior to those of younger patients. Although trauma centers deliver superior care for the injured, a recent national study found that patients \geq 55 years did not similarly benefit. Thus, better stratifications of outcomes and improved understanding of aged responses to injury are necessary to develop effective treatment strategies. We have analyzed the National Burn Repository (NBR) to assess risks for complications and excess resource utilization in older adults with burns. Our most recent study highlighted the importance of co-morbidities over chronological age in pneumonia development in older adults with burns. Our ongoing projects focus on practice variations in the care of older patients and post-injury outcomes.

Our translational program aims to delineate unique aspects of the response to injury in older adults. Cohort studies have indicated an association between beta-adrenergic blockade and decreased mortality after traumatic brain injury. In burn patients, beta-antagonist treatment markedly reduces post-burn hypermetabolism. We propose that beta-adrenergic blockade may influence innate immune responses, and confer protective effects in older patients. We are evaluating the impact of aging and beta adrenergic antagonist exposure on monocyte activation, a key initiating event in innate immunity. We are conducting a prospective observational study of trauma patients (younger adults and older subjects) admitted to Harborview Medical Center (HMC). In this study, peripheral blood mononuclear cells (PBMC) from enrolled subjects are isolated, and activation assays performed with and without exposure to the non-selective beta antagonist propranolol. We are also performing *in vitro* studies to characterize adrenergic effects on monocyte gene expression.

Infections in Critically Ill Burn and Trauma Patients

Lung and bloodstream infections represent common nosocomial infections in mechanically ventilated patients in the Burn and Surgical Intensive Care Unit. Many tools and guidelines developed for the general ICU population remain to be studied and validated in the injured patient population. Our burn center is a participating site in the American Burn Association/ Department of Defense-funded study on early detection of *Staphylococcus* sepsis in burn patients using the polymerase chain-reaction technique (PCR). This study

Our recent study highlighted the importance of comorbidities over chronological age in pneumonia development in older adults with burn injuries.

technique (PCR). This study will enroll subjects over the next three years. Pneumonia is the most common nosocomial infection in mechanically ventilated patients. Prompt diagnosis of ventilator-associated pneumonia (VAP) constitutes a high priority in surgical critical care. We have evaluated the limitations of a standard scoring system (Clinical Pulmonary Infection Score) compared with bronchoscopy for VAP detection in burn

patients. We have authored the most recent American Burn Association guideline on the prevention, diagnosis and treatment of VAP in burn patients. Our recently completed project compared vancomycin vs. linezolid in treating methicillin-resistant *Staphylococcus aureus* (MRSA) VAP in critically ill patients. Our ongoing project aims to correlate bronchoscopic findings of inhalation injury and subsequent risks of lung infection.

RELATED PUBLICATIONS

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