Patients who sustain traumatic brain injury (TBI) and concomitant hemorrhagic shock (HS) are at high risk of high-magnitude inflammation which can lead to poor outcomes and death. Blood purification by hemoadsorption (HA) offers an alternative intervention to reduce inflammation after injury. McKinley et al. tested the hypothesis that HA would reduce mortality in a rat model of TBI and HS.

Male Sprague Dawley rats were subjected to a combined injury of a controlled cortical impact injury (CCI) to their brain and pressure-controlled hemorrhagic shock (HS). Animals were subsequently instrumented with an extracorporeal blood circuit that passed through a cartridge for sham or experimental treatment. In experimental animals, the treatment cartridge was filled with proprietary beads (Cytosorbents; Monmouth Junction, NJ) that removed circulating molecules between 5 KDa and 60 KDa. Sham rats had equivalent circulation but no blood purification. Serial blood samples were analyzed with multiplex technology to quantify changes in a trauma-relevant panel of immunologic mediators. The primary outcome was survival to 96hr post-injury.

HA improved survival from 47% in sham treated rats to 86% in HA treated rats. There were no treatment-related changes in histologic appearance. HA affected biomarker concentrations both during the treatment and over the ensuing four days after injury. Distinct changes in biomarker concentrations were also measured in survivor and non-survivor rats from the entire cohort of rats indicating biomarker patterns associated with survival and death after injury.

Blood purification by non-selective HA is an effective intervention to prevent death in a combined TBI/HS rat model. HA changed circulating concentrations of multiple immunologically active mediators during the treatment time frame and after treatment. HA has been safely implemented in human patients with sepsis and may be a treatment option after injury ¹⁾.

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McKinley TO, Lei Z, Kalbas Y, White FA, Shi Z, Wu F, Xu ZC, Rodgers RB. Blood Purification by Non-Selective Hemoadsorption Prevents Death after Traumatic Brain Injury and Hemorrhagic Shock in Rats. J Trauma Acute Care Surg. 2018 Sep 11. doi: 10.1097/TA.0000000000002069. [Epub ahead of print] PubMed PMID: 30211852.

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