



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Injury Models

Chemokine Ligand 2 (CCL2) Levels in Cerebrospinal Fluid (CSF) as an Early-Response Biomarker for Blast-Induced Neurotrauma

The neuroinflammatory response is an early pivotal immune process following brain injury. The inflammatory mediator CCL2, also known as monocyte chemoattractant protein-1 (MCP-1), has been implicated in the pathogenesis of brain ischemia, Alzheimer's disease, and other neurodegenerative diseases. Using a rat model of single and repeated blast exposures in a shock tube, researchers at WRAIR investigated the time-course of changes in MCP-1/CCL2 levels in the cerebrospinal fluid and blood. Striking 40 fold elevations in MCP-1/CCL2 levels in CSF were detected at six hours and persisted for three days post-blast exposures in a severity-dependent manner and were accompanied by greatly increased CCL2 gene expression and protein overexpression in multiple brain regions. The result indicates that CSF CCL2 can be used as an early-response biomarker for diagnosis and prognosis after blast neurotrauma. Since cytokines, such as CCL2 are known to have both beneficial and detrimental effects in the milieu of the injured brain, and contribute to degenerative and regenerative processes, the timing of these responses is critical to their neurobiological importance.