Abstract

Despite a great deal of research directed at understanding the pathomechanisms of blast induced neurotrauma (BINT), detailed understanding of pathological changes especially in the spinal cord remains to be investigated. This is particularly important as a vast number of current and future US military personnel continue to be susceptible to blast injuries with the dangers of their deployment remaining as high as ever. With over 1.5 million US citizens having been rotated between various operations in Iraq and Afghanistan, the medical burden from these deployments has been overwhelming. Although, BINT accounts for over 60% of casualties, improvements in blast prevention and management strategies have resulted in high survival rates. However, a vast number of these soldiers suffer from the consequences of multiple hidden injuries following exposure to a blast (sometimes repeatedly) with many often experiencing significant pain following their military service which can contribute to poor physical role function. Pain is the one of the common health concerns of the returning veterans with a high prevalence of chronic pain in the back (58%), head (55%), lower limbs (31.3%), upper limbs (7.5%), neck (6%), and other body regions being reported. Furthermore, those with persistent pain tend to have diagnoses for post traumatic stress disorder (PTSD), traumatic brain injury (TBI) and other co-morbidities. Chronic pain, PTSD and persistent concussive symptoms are often referred to as the polytrauma clinical triad in returning veterans. Whether these painful conditions are a consequence of spinal injury changes is not well studied. As part of this NASS funded project, studies on rats exposed to a single insult of 22 psi blast exposure in the rostrocephalic orientation have shown axonal injury in the spinal white matter tracts and spatial and temporal alterations in the expression of astrocytes and microglia in cervical, thoracic and lumbar spinal cord. Our studies also indicate putative alterations in cytokine expression in the spinal cord. Whether these changes lead to manifestation of altered behavior needs to be further studied.