

Quick Review of Model System Research

Exploratory Associations With Tumor Necrosis Factor- α , Disinhibition, and Suicidal Endorsement After Traumatic Brain Injury¹

What is the study about?

This study evaluated whether tumor necrosis factor (TNF)- α is associated with disinhibition and thoughts of suicide 6 and 12 months after traumatic brain injury (TBI). TNF- α is one of the inflammatory cytokines produced early after TBI. TNF- α is associated with thoughts of suicide in the general population and among those with TBI (10%). Depression, aggression, poor cognitive inhibition, and impulsivity are risk factors for thoughts of suicide in the general population. These risk factors are also long-term effects of TBI. TNF- α may also be a biomarker for disinhibition. Disinhibition is a broad term that includes poor cognitive inhibition and impulsivity.

Who participated in the study?

The study examined two groups of adults, 16–70 years of age: study group and control group. The study group included 74 patients with moderate to severe closed-head TBI. These patients were recruited from the neurotrauma intensive care unit of a large medical center. A computed tomography scan of the head confirmed TBI among all patients. All patients scored 12 points or lower on an initial Glasgow Coma Scale. This scale measures a person's conscious state. The control group included 19 healthy adults with no history of brain injury, neurological disease, or bleeding disorder.

How was the study conducted?

Researchers took samples of acute cerebral spinal fluid (CSF) from patients up to two times per day for up to 6 days after the injury. When possible, they also collected acute serum samples from patients daily during the first week after injury. Chronic serum samples were collected up to every 2 weeks for 6 months after the injury. For patients with severe TBI, serum samples were collected again at 12 months. Researchers used the results of the Patient Health Questionnaire-9 to assess thoughts of suicide at 6 and 12 months after the injury. This screening tool is validated for depression and use after TBI. To assess disinhibition, researchers used the Disinhibition Subscale of the Frontal Systems Behavior Scale.

What did the study find?

Compared with the healthy controls, patients with TBI had significantly higher levels of TNF α in their CSF and serum. Low levels of TNF α in acute serum and high levels in chronic serum predicted disinhibition at 6 and 12 months after the injury. Disinhibition at 6 months helped to predict thoughts of suicide at 6 and 12 months. The findings suggest that TNF α in serum is a potential biomarker for disinhibition, which in turn is a significant risk factor for thoughts of suicide after TBI. The link between disinhibition and increased risk for suicide matches past research, but more research is needed to examine how biological mechanisms contribute to disinhibition and thoughts of suicide in individuals with TBI.

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¹ Juengst, S., Kumar, R., Arenth, P., & Wagner, A. (2014). Exploratory associations with tumor necrosis factor- α , disinhibition and suicidal endorsement after traumatic brain injury. *Brain, Behavior, and Immunity*.