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Commentary

Clinical Importance of Proteomic Biomarkers in Traumatic Brain Injury

Abdul Raza*

Department of Neurology, Clinical Dementia Center and DZNE and Georg-August University, Goettingen, Germany

DESCRIPTION

Traumatic brain injury is characterized as brain damage brought on by an external mechanical force, such as impact, fast acceleration or deceleration, blast waves, or projectile penetration. With current technologies, structural damage to the brain may or may not be detectable, and brain function may be temporarily or permanently compromised. One of two subsets of acquired brain injury (brain damage that develops after birth) is Traumatic Brain Injury (TBI); the other type is Non-traumatic Brain Injury (NBI), which does not put an external mechanical force (including stroke and infection). Recently, many inflammatory cytokines, neuron-specific enolase, S100B, glial fibrillary acidic protein, neurofilaments, tau, and other proteins have been found as potential protein biomarkers in TBI patients. Head injuries include damage to various regions of the head but also include all traumatic brain injuries. The diagnosis is hypothesized based on the lesion circumstances and clinical evidence, most notably a neurological examination, which includes determining the Glasgow Coma Score and determining whether the pupils contract normally in reaction to light. Neuroimaging helps with diagnosis, predicting outcomes, and selecting appropriate therapies. The DSM-5 can be used to identify TBI and any psychiatric consequences. Computed tomography (CT) is the recommended radiologic test in an emergency situation because it is quick, precise, and widely accessible. To ascertain if the injury has advanced, subsequent CT scans may be conducted. Compared to CT, Magnetic Resonance Imaging (MRI) can also display more detail and provide information on long-term outcomes. Traditional methods for diagnosing and categorizing TBI include neurological testing such as the Glasgow Coma Score, concussion screening and pupillary examination as well as some neuroimaging scans like CT and MRI scans. A history and neurological examination usually reveal severe TBI, and this necessitates rapid neuroimaging for confirmation and additional assessment. Collectively, the available TBI diagnostic methods are valuable in determining the general level of brain function of TBI patients, but they are unable to clearly identify and quantify the severity of the underlying brain injury. Additionally, mild to moderate TBI patients cannot accurately quantify injury using typical acute examination approaches. The neurological examination findings are frequently normal and might be confused by intoxication or multi-organ system injuries, making the diagnosis of mild to moderate TBI particularly difficult. Despite the possibility that neuroimaging could yield more clinical and predictive data, existing methods are difficult to access, expensive, and have low structural resolution at the microscopic level, which limits their ability to detect mild to severe TBI. Vehicle accidents are a major contributor to Traumatic Brain Injury (TBI), thus preventing them or minimizing the effects of them can both lower the incidence and severity of TBI injury. The usage of seat belts, kid safety seats, motorcycle helmets, roll bars, and airbags can all help limit damage in an accident. There are educational initiatives to reduce collisions. Additionally, alterations to public policy and safety rules, like as those governing helmet and seatbelt use and speed restrictions, may be enacted. The prevalence of head injuries may also be decreased by laws prohibiting risky forms of contact, such as "spear tackling" in American football, which involves one player tackling another head-on. Sports customs that are widespread have also been subject to change. The prevalence of TBI may decline with increased helmet wear. It has been suggested that players should wear protective headgear since continuously "heading" a ball while practicing soccer may result in cumulative brain damage. Better equipment design can increase safety; softer baseballs lower the danger of head injuries. These difficulties to precise diagnosis and monitoring emphasize the requirement for stand-in indicators that capture the essential pathophysiologic components of a person's brain injury. A biomarker, or substitute indicator, of TBI would ideally be sensitive across the injury spectrum and specific to brain tissue, and procedures to identify this biomarker would be easily available at the outset of symptoms. The diagnosis of dysfunction in a number of organs, including the heart, myocardial infarction and brain requires analysis of specific biochemical markers. Proteomic biomarkers can be found and tracked in biologic fluids of brain in TBI, where they can track treatment progress, identify pharmacological therapy targets, and establish the degree of injury based on levels of clinical markers. The time of treatment may be guided by the temporal patterns of changes in biomarkers. In addition, protein biomarkers offers clinical trial outcome measurements that are more readily

Correspondence to: Yang Raza. Department of Neurology, Clinical Dementia Center and DZNE and Georg-August University, Goettingen, Germany, E-mail: razyang88@gmail.com

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available and cost-effective than traditional neurologic tests, lowering the risks and expenses associated with human clinical studies. TBI is challenging to diagnose, and clinical exams are of limited use in the initial hours and days following damage, when therapeutic intervention is most likely to be successful.