Are Biomarkers The Future To Explaining Concussion?

For many people, the term “mild” concussions doesn't seem very scary. You would prefer to find out that you have a minor brain traumatic injury (TBI) rather than a severe one, right? For many people, however, "mild" has long-term repercussions. Sleep disorders, migraines, dementia, and other cardiovascular problems are among the effects of mild to severe traumatic brain injury (TBI).

Classifying brain injury symptoms into mild, moderate, and severe categories has been a common practice among doctors and physicians. Cancer patients are never told that their tumor is classified by a level. Instead, they are told the cause, how it formed, and other specificities. The system of classifying brain injury is very inaccurate in predicting what can be the long or short-term repercussions of brain injuries

What are Biomarkers

Knowing that these can be harmful for patients, professionals have been pushing for change for several years now. In order to provide patients with correct information about the severity of their brain damage, doctors and clinicians can use blood-based biomarkers from the CBI-M model, which incorporates clinical symptoms, blood-based biomarkers, imaging, and modifiers. Biomarkers are proteins that enter our bloodstream following an injury. Then, new technology can measure the concentrations of these proteins in the bloodstream. In general, blood-based biomarkers are measurable components of the body.

Let's take a closer look at how these biomarkers help impact a concussions assessment.

To accurately assess the extent of damage, medical professionals have undergone blood tests for the kidneys, liver, and heart. For instance, if you complain of chest pain, a blood test is probably going to be done. This allows healthcare professionals to measure the amount of a protein called troponin-I, which is released into the bloodstream in greater amounts when the heart muscle is more damaged. Similarly, following a brain injury, two biomarkers are released into the bloodstream: ubiquitin carboxyl-terminal hydrolase L1 (UCH-L1) and glial fibrillary acidic protein (GFAP). Just as troponin revolutionized for heart damage, these brain-specific biomarkers might have the potential to do the same.

Additionally, biomarkers like GFAP and UCH-L1 can not only evaluate a traumatic brain injury, but also help demonstrate a person's course of recovery and the repercussions of their concussion. Although imaging does impact a concussions assessment, these biomarkers are a better use then invasive imaging techniques like CT scans or MRIs.

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Or maybe not.

Revolution..?

Although we've seen progression in healthcare with troponin for heart attacks can we see this for GFAP and UCH-L1 for concussions?

Many studies have shown positive aspects of brain specific biomarkers. Many people have even made a comparative analogy to troponin for heart attacks. But at the end of the day, a heart and a brain are two different organs. Can we really see them similarly?

According to a systematic review article, these brain specific biomarkers still need to be researched more. In this article, two reviewers retrieved studies to make a systematic review synthesis on biomarkers associated with secondary outcomes following a concussion. The studies collectively have shown evidence of GFAP being an effective biomarker, in adults. However, a lot of the "progress has been limited by heterogeneous study cohorts and unstandardized definitions of concussions and mTBI". This means that although there have been efforts made to clinically identify useful biomarkers with some success, variability in study population (such as age, severity of injury, etc) makes it difficult to generalize the results. This limits the clinical application of biomarkers. Pediatric cohorts were also underrepresented in these studies. Because of this insufficient research on the pediatric population, this creates a gap in developing relevant biomarkers for this young group. In addition to these complications, there

isn't a standardized definition for concussion and mild traumatic brain injury. From this article it is heavily recommended to do more research with different age groups and severity of injury.

Although healthcare providers have been taking mild traumatic brain injuries more seriously, the need for further investigations to better understand biomarkers is extremely crucial. It is not fully determined yet that biomarker proteins like GFAP and UCH-L1 are going to rule out imaging techniques to paint a better picture of brain injuries and how to take care of the repercussions. However, with continued research in diverse populations (age groups, severity of injury, etc), biomarkers can have a revolutionary impact.