

Comprehensive Exam Question: Translational

Probably you have watched the movie “Concussion.” Concussion, or mild traumatic brain injury (TBI), especially sports-related concussion, has drawn national attention in the last few years. In moderate or severe TBI, such as with an automobile accident, injury in the brain can be revealed with current clinical imaging techniques. These same imaging techniques, however, are often insensitive to the more subtle changes that occur in the brain after a mild TBI. Some of the common symptoms associated with concussion or mild TBI include loss of consciousness (the most dramatic event), amnesia, dizziness, nausea, subtle cognitive disturbances, mood disorders, sleep abnormalities, and headaches. Clearly, concussive impacts negatively affect the brain. Furthermore, pathology studies have found evidence of long-term effects from repetitive concussive impacts. Research utilizing animal models of TBI have greatly improved our understanding of the neuropathology at the molecular and cellular levels, as well as the behavioral changes associated with TBI. Neuroimaging studies have also been conducted to understand the effect of concussion on the human brain over both short and relatively long terms. However, additional research is still needed. In the end, with respect to sports-related concussion, the goal is to make the sports safer by improving diagnosis, prognosis and treatment strategies.

To develop an overall understanding of the effect of concussion on the brain, for this exam, you will need to:

- (1) Conduct a thorough literature review on the neurobiology of concussion (at the molecular and cellular levels), and include the related behavioral and clinical changes that may follow.
- (2) Describe the potential long-term consequences that result from concussive impacts.
- (3) Integrate your response to (1) and (2) to guide potential new diagnostic testing, monitoring and treatment strategies for concussion or mild TBI.

Please limit your answer to 10-15 pages, double-spaced, excluding references.
Be sure to support your statements with proper literature citations.