## Traumatic Brain Injury (TBI) definition

TBI is defined as an alteration in brain function, or other evidence of brain pathology, caused by an external force.

## Explanatory notes:

1. Alteration in brain functionis defined as one of the following clinical signs:

* Any period of loss of or a decreased level of consciousness (LOC);
* Any loss of memory for events immediately before (retrograde) or after the injury (PTA);
* Neurological deficits (weakness, loss of balance, change in vision, dyspraxia, paresis/plegia, sensory loss, aphasia, etc.);
* Any alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.);

It is important to recognise that factors other than TBI may be responsible for alterations in mental state at the time of the injury (e.g. pain, posttraumatic shock, medication, alcohol intoxication/abuse and/or recreational drug use). However, these confounders may be associated with well documented TBI, and present particular diagnostic challenges with mild TBI (where the evidence of TBI may be subtle). Consequently, the presence of these confounding factors should not preclude a diagnosis of TBI; however, careful clinical review may need to be employed before assigning a given set of clinical findings as being caused by TBI in such settings. Similarly, focal motor deficits due to spinal, plexus, or other peripheral nerve injury may provide an alternative cause of focal neurological deficit. This may be a less common confound, unless the level of consciousness is decreased, but must still be considered before a robust diagnosis of TBI is possible.

Typically, TBI has been diagnosed when the symptoms and signs are closely temporally related to the insult. However, we need to recognise that clinical manifestations may be delayed. This issue is particularly relevant for neuropsychiatric sequelae (depression, impulsivity, apathy, etc), which may only be documented some time after the insult, and may also be the consequence of non-TBI etiologies. In this context, a diagnosis of TBI may be dependent on diagnostic tests (see [B] below) that are undertaken some time after the acute event.

1. Or other evidence of brain pathology: Such evidence may include visual, neuroradiologic or laboratory confirmation of damage to the brain.

Classically, TBI has been defined based on clinical criteria. However, modern imaging techniques (e.g. diffusion tensor MRI) show increasing sensitivity, and it is possible that other sensitive biomarkers may be developed in the future. Such diagnostic techniques may enable a diagnosis of TBI where:

* clinical consequences are subtle or delayed
* clinical diagnosis is confounded by a difficult context (e.g. battlefield TBI), or
* there is a need to differentiate TBI induced clinical signs from those due to other causes (e.g. chemical warfare)

1. Caused by an external force may include any of the following events:

* the head being struck by an object,
* the head striking an object,
* the brain undergoing an acceleration/deceleration movement without direct external trauma to the head,
* a foreign body penetrating the brain,
* forces generated from events such as a blast or explosion,
* Or other force yet to be defined.