

Diffuse axonal injury

A primary lesion of rotational acceleration/deceleration head injury

Diffuse axonal injury is clinically defined by coma lasting 6 h or more after [traumatic brain injury](#) (TBI), excluding cases of [swelling](#) or ischemic brain lesions ¹⁾.

[Diffuse axonal injury](#) was first described by Strich and colleagues from the [Radcliffe Infirmary](#) ²⁾ in [1956](#) and later characterized by the work of Adams and coworkers ³⁾ and Gennarelli and associates ⁴⁾

Epidemiology

It occurs in about half of all cases of [severe traumatic brain injury](#), making it one of the most common traumatic brain injuries. It can also occur in moderate and mild brain injury.

The occurrence of DAI depends on the mechanism of injury; it is more common in higher energy trauma, especially traffic accidents ^{5) 6) 7)}.

Classification

[Diffuse Axonal Injury Classification](#)

Etiology

Traumatic [axonal injury](#) has been associated with [concussions](#) (also referred to as [mild traumatic brain injury](#)), yet the pathological course that leads from injury to recovery or to long-term sequelae is still not known.

Diffuse axonal injury isn't the result of a blow to the head. Instead, it results from the brain moving back and forth in the skull as a result of acceleration or deceleration. Automobile accidents, sports-related accidents, violence, falls, and child abuse such as [Shaken Baby Syndrome](#) are common causes of diffuse axonal injury. When acceleration or deceleration causes the brain to move within the skull, axons, the parts of the nerve cells that allow neurons to send messages between them, are disrupted. As tissue slides over tissue, a shearing injury occurs. This causes the lesions that are responsible for unconsciousness, as well as the vegetative state that occurs after a severe head injury.

A diffuse axonal injury also causes brain cells to die, which cause swelling in the brain. This increased pressure in the brain can cause decreased blood flow to the brain, as well as additional injury. The shearing can also release chemicals which can contribute to additional brain injury.

Symptoms

The main symptom of diffuse axonal injury is lack of consciousness, which can last up to six hours or more. A person with a mild or moderate diffuse axonal injury who is conscious may also show other signs of brain damage, depending upon which area of the brain is most affected.

Diagnosis

[Diffuse axonal injury diagnosis.](#)

Diffuse axonal injury MRI

[Diffuse axonal injury MRI](#)

Treatment

see [Diffuse axonal injury treatment.](#)

Outcome

see [Diffuse axonal injury outcome.](#)

Case series

[Diffuse axonal injury case series.](#)

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Gennarelli TA. Cerebral concussion and diffuse brain injuries. 3rd ed In: Cooper PR, editor. , editor. Head Injury. Baltimore: Williams & Wilkins; (1993). p. 137-58.

2)
STRICH SJ. Diffuse degeneration of the cerebral white matter in severe dementia following head injury. J Neurol Neurosurg Psychiatry. 1956 Aug;19(3):163-85. doi: 10.1136/jnnp.19.3.163. PMID: 13357957; PMCID: PMC497203.

3)
Adams JH, Doyle D, Ford I, Gennarelli TA, Graham DI, McLellan DR. Diffuse axonal injury in head injury: definition, diagnosis and grading. Histopathology. 1989 Jul;15(1):49-59. doi: 10.1111/j.1365-2559.1989.tb03040.x. PMID: 2767623.

4)
Gennarelli TA, Thibault LE, Adams JH, Graham DI, Thompson CJ, Marcincin RP. Diffuse axonal injury and traumatic coma in the primate. Ann Neurol. 1982 Dec;12(6):564-74. doi: 10.1002/ana.410120611. PMID: 7159060.

5)

Gennarelli TA. Cerebral concussion and diffuse brain injuries. 2nd ed In: Cooper PR, editor. , editor. Head Injury. Baltimore: Williams & Wilkins; (1987). p. 108-24.

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Lagares A, Ramos A, Alday R, Ballenilla F, Pérez-Nuñez A, Arrese I, et al. Magnetic resonance in moderate and severe head injury: comparative study of CT and MR findings. Characteristics related to the presence and location of diffuse axonal injury in MR. Neurocirugia (Astur) (2006) 17(2):105-18.10.1016/S1130-1473(06)70351-7

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