

# Diffuse Axonal Injury

## Radiology

Pathology of multiple sclerosis inflammation, myelin breakdown, astrogliosis, oligodendrocyte injury, neurodegeneration, axonal loss and remyelination. MS lesions evolve differently during Multiple sclerosis (MS) can be pathologically defined as the presence of distributed glial scars (scleroses) in the central nervous system that must show dissemination in time (DIT) and in space (DIS) to be considered MS lesions 9c61d51ae2

The injury is a result of disruption of the stabilizing ligaments between the occiput, or posterior skull base, and the C1 vertebral body, otherwise known as the atlas. The diagnosis is usually

suspected by history and physical exam, but confirmed by imaging, typically by CT due to its faster speed in the acute trauma setting, although MRI can also help with assessment in equivocal cases. The treatment is initial stabilization with a cervical spine collar, and then surgical intervention in cases in which reversal of paralysis is possible. The most common mechanism of injury is high-speed motor vehicle accidents. The injury is more likely in children due to the large size of their heads relative to their bodies, and more horizontal orientation of the occipital condyles. It... 9c61d51ae2 == Acquisition and image processing == 9c61d51ae2

Lesional demyelinations of the central nervous system which may occur in part in the absence of any other tissue injury, such as demyelination or axonal degeneration (lesion type 5). Finally, lesions with a variable 9c61d51ae2

== Epidemiology == 9c61d51ae2

Susceptibility weighted imaging micro-hemorrhages, shearing, and diffuse axonal injury (DAI) in trauma patients is often difficult as the injuries tend to be relatively small in size. Susceptibility weighted imaging (SWI), originally called BOLD venographic imaging, is an MRI sequence that is exquisitely sensitive to venous blood, hemorrhage and iron storage. SWI is offered as a clinical package by Philips and Siemens but can be run on any manufacturer's machine at field strengths of 1.0 T and higher. Due to its sensitivity to venous blood SWI is commonly used in traumatic brain injuries (TBI) and for high resolution brain venographies but has many other clinical applications. The magnitude and phase data are combined to produce an enhanced contrast magnitude image. SWI uses a fully flow compensated, long echo, gradient recalled echo (GRE) pulse sequence to acquire images. 5 T, 3. The imaging of venous blood with SWI is a blood-oxygen-level dependent (BOLD) technique which is why it was (and is sometimes still) referred to as BOLD venography. 0 T, 1. This method exploits the susceptibility differences between tissues

and uses the phase image to detect these differences 9c61d51ae2

Wallerian degeneration Axonal degeneration is followed by degradation Wallerian degeneration is an active process of degeneration that results when a nerve fiber is cut or crushed and the part of the axon distal to the injury (which in most cases is farther from the neuron's cell body) degenerates. A related process of dying back or retrograde degeneration known as 'Wallerian-like degeneration' occurs in many neurodegenerative diseases, especially those where axonal transport is impaired such as amyotrophic lateral sclerosis (ALS) and Alzheimer's disease. Some studies also have found irreversible electroporation, a potential clinical treatment being researched in porcine models to determine efficacy to treat spinal cord injuries, has contributed to Wallerian degeneration of lumbar nerve roots. electrically excitable. After injury, the axonal skeleton disintegrates, and the axonal membrane breaks apart. Primary culture studies suggest that a failure to deliver sufficient quantities of the essential axonal

protein NMNAT2 is a key initiating event 9c61d51ae2

Causes include falls, vehicle collisions, and violence. Brain trauma occurs as a consequence of a sudden acceleration or deceleration of the brain within the skull or by a complex combination of both movement and sudden impact. In addition to the damage caused at the moment of injury, a variety of events following the injury may result in further injury. These processes may include alterations in cerebral blood flow and pressure within the skull. Some of the imaging techniques used for diagnosis of... 9c61d51ae2

Atlanto-occipital dislocation It is possible for a human to survive such an injury; however, 70% of cases result in immediate death. spinal cord and lower brainstem, ranging from localized contusion to diffuse axonal injury to complete transection. Vascular complications are also frequent Atlanto-occipital dislocation, orthopedic decapitation, or internal decapitation describes

ligamentous separation of the spinal column from the skull base. It should not be confused with atlanto-axial dislocation, which describes ligamentous separation between the first and second cervical vertebra

== Mechanism == Acute, spontaneous intracranial hemorrhage (ICH) is the second most common form of stroke, affecting approximately 2 million people worldwide each year. In the United States, intracranial hemorrhage accounts for about 20% of all cerebrovascular accidents, with an incidence of approximately 20 cases per 100,000 people annually. Intracranial hemorrhages is diagnosed more frequently in men and individuals over the age of 55, with incidence increasing with age. In low-income countries, the risk is higher, potentially due to reduced access to healthcare and limited education about primary prevention. Unlike a broken bone where trauma to the body is obvious, head trauma can sometimes be conspicuous or inconspicuous. In the case of an open head injury, the skull is

cracked and broken by an object that makes contact with the brain. This leads... The number of new cases is 1.7 million in the United States each year, with about 3% of these incidents leading to death. Adults have head injuries more frequently than any age group resulting from falls, motor vehicle crashes, colliding or being struck by an object, or assaults. Children, however, may experience head injuries from accidental falls or intentional causes (such as being struck or shaken) leading to hospitalization. Acquired brain injury (ABI) is a term used to differentiate brain injuries occurring after birth from injury, from a genetic disorder, or from a congenital disorder.

Shaken baby syndrome Indirect injuries includes. Direct injuries include skull fractures, cortical contusions, diffuse axonal injuries, and hemorrhages. to such injuries

Traumatic brain injury TBI can be classified based on severity ranging from mild traumatic brain injury (mTBI/concussion) to

severe traumatic brain injury. the extent of diffuse axonal injury. Types of injuries considered diffuse include edema (swelling), concussion and diffuse axonal injury, which is widespread A traumatic brain injury (TBI), also known as an intracranial injury, is an injury to the brain caused by an external force. TBI can result in physical, cognitive, social, emotional and behavioral symptoms, and outcomes can range from complete recovery to permanent disability or death. Head injury is a broader category that may involve damage to other structures such as the scalp and skull. TBI can also be characterized based on mechanism (closed or penetrating head injury) or other features (e. , occurring in a specific location or over a widespread area). g 9c61d51ae2

Confluent subpial cortical lesions are the most specific finding for... 9c61d51ae2

Head injury The terms traumatic brain injury and head injury are often used interchangeably in the medical literature. MRI is able to

better detect smaller injuries, detect damage within the brain, diffuse axonal injury, injuries to the brainstem, posterior fossa, and A head injury is any injury that results in trauma to the skull or brain. Because head injuries cover such a broad scope of injuries, there are many causes—including accidents, falls, physical assault, or traffic accidents—that can cause head injuries 9c61d51ae2

**Intracranial hemorrhage** Each subtype has distinct causes, clinical features, and treatment approaches. Such microhemorrhages are frequently associated with diffuse axonal injury and located near the grey-white matter junction. It can result from trauma, vascular abnormalities, hypertension, or other medical conditions. artifacts.

**Epidural hemorrhage** Intracranial hemorrhage (ICH) is bleeding within the skull. ICH is broadly categorized into several subtypes based on the location of the bleed: intracerebral hemorrhage (including intraparenchymal and intraventricular hemorrhages), subarachnoid hemorrhage, epidural hemorrhage, and subdural hematoma 9c61d51ae2

Hereditary diffuse leukoencephalopathy with spheroids It is believed that the disease arises from primary microglial dysfunction that leads to secondary disruption of axonal integrity, neuroaxonal damage, and focal axonal spheroids leading to demyelination. In addition to trauma, axonal spheroids can

Hereditary diffuse leukoencephalopathy with spheroids (HDLS) is a rare adult onset autosomal dominant disorder characterized by cerebral white matter degeneration with demyelination and axonal spheroids leading to progressive cognitive and motor dysfunction. In HDLS, it is uncertain whether demyelination occurs prior to the axonal spheroids or what triggers neurodegeneration after apparently normal brain and white matter development, although genetic deficits suggest that demyelination and axonal pathology may be secondary to microglial dysfunction. In addition to trauma, axonal spheroids can be found in aged brain, stroke, and in other degenerative diseases. The clinical syndrome in patients with HDLS is not specific and it. a closed head injury with damage to axons, causing them to swell due to blockage of axoplasmic

transport. Spheroids in HDLS resemble to some extent those produced by shear stress in a closed head injury with damage to axons, causing them to swell due to blockage of axoplasmic transport. Spheroids are axonal swellings with discontinuous or absence of myelin sheaths

The scars that give the name to the condition are produced by the astrocyte cells attempting to heal old lesions. These glial scars are the remnants of previous demyelinating inflammatory lesions (encephalomyelitis disseminata) which are produced by the one or more unknown underlying processes that are characteristic of MS. Apart from the disseminated lesions that define the condition, the CNS white matter normally shows other kinds of damage. At least five characteristics are present in CNS tissues of MS patients: Inflammation beyond classical white matter lesions (NAWM, normal-appearing white matter and NAGM, normal-appearing gray matter), intrathecal Ig production with oligoclonal bands, an environment fostering immune cell persistence, Follicle-

like aggregates in the meninges (B-cells mostly infected with EBV) and a disruption of the blood-brain barrier even outside of active lesions. 9c61d51ae2 Wallerian degeneration occurs after axonal injury in both the peripheral nervous system (PNS) and central nervous system (CNS). It occurs in the section of the axon distal to the site of injury and usually begins within 24–36 hours of a lesion. Prior to degeneration, the distal section of the axon tends to remain electrically... 9c61d51ae2 SWI uses a fully velocity compensated, RF spoiled, high-resolution, 3D gradient recalled echo (GRE) scan. Both the magnitude and phase images are saved, and... 9c61d51ae2

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