



Anoxic and Hypoxic Brain Injury (lack of oxygen)

Brain injury can occur when there is a reduction in (hypoxic) or complete lack of (anoxic) oxygen supply to the brain. .

In this article:

- About anoxic and hypoxic brain injury
- Types of anoxic and hypoxic brain injury
- Effects of anoxic and hypoxic brain injury
- Outcomes and recovery

About anoxic and hypoxic brain injury

Oxygen is crucial to the brain as it is used to metabolise glucose, which provides energy for all body cells. Brain cells are sensitive to the effects of restricted oxygen supply and can die within minutes of oxygen restriction. The immediate outcome of severe oxygen restriction is often coma and in very severe cases brain death.

Causes include:

- near drowning
- drug overdose
- strangulation
- severe asthma
- accidents involving anaesthesia
- carbon monoxide inhalation and poisoning
- stroke
- heart attack

Hypoxia can also occur as a secondary injury following a traumatic brain injury, e.g. when there is serious blood loss resulting in low blood pressure, or as a result of brain swelling that restricts oxygen supply to areas of the brain.

Types of anoxic/hypoxic brain injury

Anoxic anoxia occurs when inadequate oxygen is breathed in and absorbed by the body, e.g. altitude sickness or suffocation

Anaemic anoxia is an inadequate oxygen supply due to a decrease in total haemoglobin or change in the haemoglobin's ability to carry oxygen

Stagnant hypoxia is inadequate oxygen supply to the brain due to the reduction of cerebral blood flow or pressure, e.g. stroke, heart attack

Toxic anoxia occurs when toxins or substances interfere with oxygen supply, e.g. carbon monoxide, cyanide, narcotics, alcohol.

Effects of anoxic and hypoxic brain injury

The overall effects of a hypoxic/anoxic brain injury vary depending upon the severity of damage. Areas of the brain particularly vulnerable to lack of oxygen include those responsible for coordination, movement and memory. A significant hypoxic brain injury can result in coma and possibly post-coma unresponsiveness.

Symptoms following a return to consciousness can include memory difficulties, abnormal movements, weakness in arms and legs, lack of coordination and visual problems. Movement disorders are quite common, including lack of coordination, spasticity (involuntary muscle tightness), tremors and an impaired ability to adjust the body's position.

As with other types of brain injury, people can develop challenging behaviours and emotional problems, such as depression, agitation or a reduced ability to tolerate stress and frustration.

Outcomes and recovery

Recovery is similar to that of other types of brain injury, but because a hypoxic injury usually results in widespread injury to the brain, outcomes are likely to be lower than other brain injuries.

A holistic level of support is important, e.g. a physiotherapist and occupational therapist for movement disorders, speech pathologist for communication difficulties, and a neuropsychologist to assess for cognitive deficits. Support from a good team of specialists and family and friends will ensure the best recovery possible.

References and further information

Hypoxic-Anoxic Brain Injury- http://www.caregiver.org/caregiver/jsp/content_node.jsp?nodeid=575

Hypoxic Brain Injury Treatment Rehabilitation- <http://brainstimulant.blogspot.com/2008/01/hypoxic-brain-injury.html>

National Institute of Neurological Disorders and Stroke- NINDS Cerebral Hypoxia Information Page- <http://www.ninds.nih.gov/disorders/anoxia/anoxia.htm>

References

[1] Powell, T. (1994). Head Injury: A Practical Guide. United Kingdom: Winslow Press (IN BIAQ LIBRARY)

[2] Family Caregiver Alliance. (2004). Hypoxic-Anoxic Brain Injury. Retrieved April 1, 2008, from http://www.caregiver.org/caregiver/jsp/content_node.jsp?nodeid=575

[3] The Free Dictionary. (2007). Hypoxia. Retrieved April 1, 2008 from <http://medical-dictionary.thefreedictionary.com/hypoxia>

[4] Wikipedia. (2008). Cerebral Hypoxia. Retrieved April 1, 2008 from http://en.wikipedia.org/wiki/Cerebral_hypoxia

[5] Brain Injury Association of America. Frequently Asked Medical Questions. (2008). Anoxia. Retrieved April 1, 2008, from <http://www.biausa.org/Pages/askthedoctor.html#anoxia>

[6] The National Institute of Neurological Disorders and Stroke (NINDS). (2007). NINDS Cerebral Hypoxia. Retrieved April 1, 2008, from <http://www.ninds.nih.gov/disorders/anoxia/anoxia.htm>

[7] Middelkamp, w., Moolaert, V. R., Verbunt, J. A., van Heugten, C. M., Bakx, W. G., & Wade, D. T. (2007). Life after survival: long-term daily life functioning and quality of life of patients with hypoxic brain injury as a result of cardiac arrest. *Clinical Rehabilitation*, 21, 425-43

Rehabilitation aims to:

- Help you understand and adapt to your difficulties
- Regain skills
- Prevent secondary complications
- Help you and your family to come to terms with the stroke.

Knowledge of rehabilitation following a stroke is growing steadily, as neurologists and neuropsychologists experiment with using mirrors or offset treadmills to retrain muscle groups and nerve pathways. As with any other form of brain injury, the key is understanding, persistence and a close relationship with the medical team.

The Rehabilitation Team

The team involved in rehabilitation can be quite confusing for some patients.

A **physiotherapist** may be involved in assessing and assisting with muscle strength, balance and mobility.

An **occupational therapist** helps with relearning practical tasks of everyday life such as dressing, washing and using cutlery.

A **speech language pathologist** works not only with communication difficulties but also with problems of swallowing.

A **social worker** may assist with counselling and advice about community support, financial issues and other services.

A **Neuropsychologist** may assist with Cognitive changes and problems controlling emotions.

The **rehabilitation doctor's** role is to integrate medical requirements and treatments with the other therapies.