Learn about the causes and consequences of cerebral ischemia

by Thais Guillen Otero

This article was originally published on **Infotiti** (Neurology & Mental Health Platform) on June 16, 2019. The version below has been translated and updated in 2025.

➞ Read the original article in Spanish here.

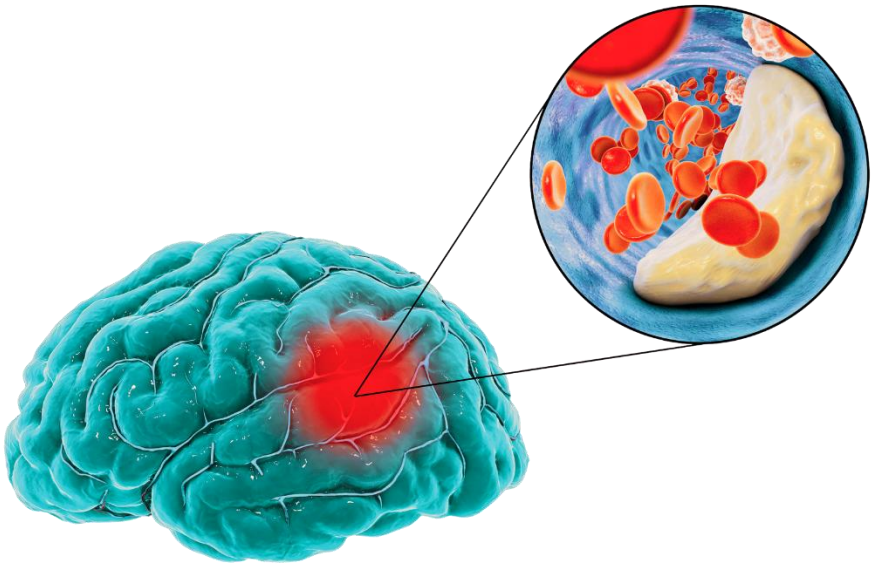
Cerebral ischemia is caused by a decrease in blood flow and, therefore, oxygenation in the brain. The effects can be mild or severe depending on the duration and intensity.

Cerebrovascular diseases include any disorder where an area of the brain is temporarily or permanently damaged. Depending on their nature, they are classified as hemorrhage or **ischemia**. Hemorrhage occurs due to the rupture of a cerebral blood vessel. **Ischemia is caused by a decrease or interruption in the blood flow to the brain (1)**.

Below, we will take a closer look at the mechanisms that trigger cerebral ischemia and the effects of this condition on human health.

See also: Analyzing the immune response after a stroke could indicate the risk of cognitive impairment and dementia

How Does Cerebral Ischemia Occur?



The brain requires an adequate supply of oxygen and nutrients to function properly. It also needs to eliminate waste products. This process of transport and elimination is carried out by the bloodstream. When cerebral ischemia occurs, **the blood reaching the brain tissue is not enough for its normal functioning**. Biochemical changes increase lactic acid concentration, deplete energy provisions, and promote free radical formation in the affected tissue. As a consequence, cellular components are destroyed resulting in neurons death.

Neurologists classify cerebral ischemia as global or focal, depending on the degree of reduction in blood flow (2). Global ischemia is caused by a disruption in the mechanisms that control blood pressure and heart rate, for example, during a **cardiac arrest or surgery with extracorporeal circulation.** On the other hand, focal ischemia happens when the **obstruction of an artery** causes an interruption of blood flow in a specific brain region.

The consequences of both global and local ischemia can be very severe. Some patients experience temporary loss of attention or memory, while others may suffer cortical necrosis leading to total loss of brain function. When the effects reverse within 24 hours, the patient has faced a **transient ischemic attack**. However, if the symptoms persist, the patient has suffered an **ischemic stroke or cerebral infarction**.

Symptoms and treatment depend on the type of ischemia, the affected artery, and the extent of the damage.

You can also review: ProMIS™ Neuroscience: Canadian science in search of a treatment for neurodegenerative diseases

Cerebral Ischemia: Diagnosis, Symptoms and Treatment

When diagnosing cerebral ischemia, doctors identify **neurological deficit symptoms:**

- vertigo
- visual disturbances
- aphasia (loss of the ability to produce or understand language)
- facial or half-body paralysis

However, given the complexity of this condition, they should perform a complete clinical and neurological examination of the patient to determine the most effective treatment (3).

Early recognition of the symptoms and seeking immediate medical attention are critical steps to maximize the possibilities of recovery. During the first hours, physicians will focus on restoring blood flow to the affected area while minimizing complications. A common treatment is using r**eperfusion therapy** with thrombolytic agents (intravenous alteplase, for example) that break blood clots. It is also usual to apply recanalization strategies such as **mechanical thrombectomy** to directly remove blood clots from a large cerebral artery (4).

Likewise, scientists have developed and continue testing **non-invasive treatments** for cerebral ischemia (5). Near-infrared light therapy, non-invasive brain stimulation (NIBS) techniques, and non-invasive gene therapy intend to reduce brain damage and accelerate recovery. However, more clinical tests are needed to understand their efficacy in improving the patient's quality of life.

According to medical experts, hypertension and heart condition are the **main risk factors** for cerebral ischemia (3). Other important threats can be physiological, such as diabetes, obesity, and atherosclerosis, or behavioral such as sedentarism, alcoholism, and tobacco and drug use. Lifestyle change is crucial to avoid cerebrovascular accidents. Experts propose adopting a healthy diet, doing regular physical exercise and controlling blood pressure and blood glucose levels consistently. **The best strategy to avoid the possibility of ischemic events is prevention.**

You may also be interested in: Stroke and dementia: the relationship is that close

Bibliographic Sources

1. DeSai C, Hays Shapshak A. Cerebral ischemia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. Updated April 3, 2023. Accessed August 27, 2025. https://www.ncbi.nlm.nih.gov/books/NBK560510/

2. Díez-Tejedor E, Del Brutto O, Álvarez-Sabín J, Muñoz M, Abiusi G. Clasificación de las enfermedades cerebrovasculares. Rev Neurol. 2001;33(5):455-464.

3. Rivera-Nava SC, et al. Guía de práctica clínica de enfermedad vascular cerebral isquémica. Rev Med Inst Mex Seguro Soc. 2012;50(3):335-346.

4. Wu JY, Prentice H. Potential new therapeutic intervention for ischemic stroke. J Transl Int Med. 2021;9(1):1-3. doi:10.2478/jtim-2021-0014

5. Markowska A, Tarnacka B. Molecular changes in the ischemic brain as non-invasive brain stimulation targets—TMS and tDCS mechanisms, therapeutic

challenges, and combination therapies. Biomedicines. 2024;12(7):1560. doi:10.3390/biomedicines12071560