



Types and Causes of Acute Ischemic Stroke due to Oxidative Stress

Giuse Rea*

Department of Chemical Engineering, University of Tehran, Tehran, Iran

ARTICLE HISTORY

Received: 01-Nov-2022, Manuscript No. EJMOAMS- 22-79585;
Editor assigned: 04-Nov -2022, PreQC No. EJMOAMS- 22-79585 (PQ);
Reviewed: 21-Nov -2022, QC No. EJMOAMS- 22-79585;
Revised: 28-Nov-2022, Manuscript No. EJMOAMS- 22-79585 (R);
Published: 05-Dec-2022

Description

Stroke is a serious health, social and economic problem for society. It is the third leading cause of death after cancer and myocardial infarction and the first cause of disability in patients in the Western world.

Oxidative stress is defined as an imbalance between pro- and antioxidants that is involved in the pathogenesis of several chronic diseases such as stroke. It plays an important role in the central nervous system and can directly cause tissue damage through several mechanisms. The brain uses glucose as an energy source and requires a constant flow of blood and glucose due to the brain's low energy storage capacity. Low blood flow reduces the amount of oxygen and glucose, which follows a cascade of events that lead to the production of Reactive Oxygen Species (ROS) and free oxygen radicals.

ROS are essential for various functions such as the vascular tunic, monitoring of oxygen pressure, and production of erythropoietin at low concentrations. In contrast, excessive amounts of oxidants can irreversibly oxidize macromolecules and cause severe cell damage. The antioxidant defense system is a special mechanism for dealing with damage caused by free radicals in the body. Healthy individuals have a balance between free radical production and the antioxidant defense system, but dysregulation of this balance induces the production of oxidative stress that contributes to stroke progression.

Oxidative stress can be measured using oxidized products of macromolecules such as nucleic acids, lipids, proteins, and De-Oxy Ribonucleic Acid (DNA). Lipid peroxides are unstable lipid radicals that are derived from the oxidation of polyunsaturated fatty acids and can be converted to other compounds such as Malondialdehyde (MDA). MDA can cause irreversible disruption of enzymes, receptors and membrane transport mechanisms. In addition, a direct correlation between an increase in MDA and poor functional recovery in acute

ischemic stroke has been demonstrated. Measurement of Total Antioxidant Capacity (TAC) is a useful tool for evaluating antioxidant capacity to prevent oxidative damage to membranes and other cellular components.

Malondialdehyde (MDA) is the end product of Lipid Peroxidation (LPO). This compound is a reactive aldehyde and is one of several reactive electrophilic species that cause cellular toxicity. Aldehyde production is used as a biomarker to measure the level of oxidative stress. Moreover, high circulating levels of MDA were found in patients with ischemic stroke, and an association between high levels of circulating MDA and neurological functional outcome in patients with ischemic stroke was found. Oxidative stress biomarkers can be classified as molecules that are modified by interactions with ROS in the microenvironment; and molecules of the antioxidant system that change in response to increased redox stress.

Types

A stroke can happen in two main ways; something blocks blood flow or something causes bleeding in the brain.

Ischemic stroke: In 8 out of 10 strokes, the blood vessel that supplies blood to your brain becomes blocked. This happens when fatty deposits in the arteries break off and travel to the brain or when poor blood flow due to an irregular heartbeat forms a blood clot.

Haemorrhagic stroke: This is less common than ischemic stroke, but can be more serious. A blood vessel in your brain swells and bursts or a weakened vessel leaks. Uncontrolled high blood pressure and taking too many blood-thinning medications can lead to this type of stroke.

Causes

High blood pressure: Your doctor may call this hypertension. It is the biggest cause of strokes.

Tobacco: Smoking or chewing increases the risk of stroke. Nicotine increases blood pressure. Cigarette smoke causes fatty deposits in the main artery of the neck. It also thickens your blood and makes it more likely to clot.

Heart disease: This condition includes a defect in the heart valves, as well as atrial fibrillation, or an irregular heart rhythm, which causes a quarter of all strokes among the very elderly. You may also have clogged arteries with

fatty deposits.

Diabetes: People with diabetes often have high blood pressure and are more likely to be overweight. Both increase the likelihood of stroke. Diabetes damages blood vessels, which increases the chance of stroke. If you have a stroke, when your blood sugar is high, the brain damage is more severe.