Journal of Applied Pharmacy
ISSN: 1920-4159
OPEN ACCESS Freely available online
Brief Report

Free Radicals and its Production

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BRIEF REPORT

Free radicals are oxygen-containing molecules with an uneven number of electrons. The uneven number allows them to easily react with other molecules. Free radicals can cause large chain chemical reactions in your body because they react so easily with other molecules. These reactions are called oxidation.

Any molecular entity capable of independent life that has an unpaired electron in an atomic orbital is referred to as a free radical. The existence of an unpaired electron causes most radicals to have certain features in common. Many radicals are very reactive and unstable. They act as oxidants or reductants depending on whether they give or absorb an electron from other molecules. Hydroxyl radical, superoxide anion radical, hydrogen peroxide, oxygen singlet, hypochlorite, nitric oxide radical, and peroxynitrite radical are the most significant oxygen-containing free radicals in many disease conditions.

These are extremely reactive species capable of disrupting physiologically important components such as DNA, proteins, carbohydrates, and lipids in the nucleus and cell membranes. Free radicals target essential macromolecules, causing cell damage and disturbance of homeostasis. Free radicals attack a wide range of substances in the body. Lipids, nucleic acids, and proteins are among the most common targets. Free radicals are highly reactive and unstable molecules created naturally in the body as a consequence of metabolism (oxidation) or as a result of exposure to toxins in the environment such as cigarette smoke and UV radiation.

Free radicals are unstable chemicals that can harm your body's cells. They are frequently caused by both normal metabolic processes and external stresses. As we become older, our bodies lose their capacity to counteract harmful effects. More free radicals, cell damage, and oxidative stress ensue as a result of this. Many chronic health issues, such as cardiovascular and inflammatory disease, cataracts, and cancer, are linked to free radical damage. Antioxidants protect tissue from free radical damage by inhibiting radical production, scavenging radicals, or encouraging their breakdown.

Antioxidants work by giving up some of their own electrons to neutralise free radicals. They operate as a natural "off" switch for free radicals by making this sacrifice. This aids in the breaking of a chain reaction that can influence other molecules in the cell as well as other cells in the body.

Production of free radicals in the human body

Free radicals and other Reactive Oxygen Species (ROS) are produced by the human body's regular metabolic processes or by external sources such as X-rays, ozone, cigarette smoking, air pollution, and industrial toxins. As a result of both enzymatic and non-enzymatic processes, free radical production happens continually in cells. The respiratory chain, phagocytosis, prostaglandin production, and the cytochrome P-450 system are all examples of enzyme processes that can produce free radicals. Non-enzymatic interactions of oxygen with organic molecules, as well as those triggered by ionising processes, can produce free radicals.

Some internally generated sources of free radicals are:

- Mitochondria
- Xanthine oxidase
- Peroxisomes
- Inflammation
- Phagocytosis
- Arachidonate pathways
- Exercise
- Ischemia/reperfusion injury

Some externally generated sources of free radicals are:

- Cigarette smoke
- Environmental pollutants
- Radiation
- Certain drugs, pesticides
- Industrial solvents
- Ozone

Free radicals in biology

Free radical reactions are believed to cause increasing negative alterations throughout the body as people become older. All people go through "normal" changes as they become older. However, patterns determined by heredity and environmental variables that

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Received: September 26, 2021; **Accepted:** October 09, 2021; **Published:** October 16, 2021

Citation: Sanila B (2021) Free Radicals and its Production. J Appl Pharm 13:318.

control free radical damage is overlaid on this common pattern. At particular ages, they appear as illnesses, which are governed by hereditary and environmental factors. Two primary causes of death, cancer and atherosclerosis, are both "free radical" illnesses.

Chromosomal abnormalities and oncogene activity are linked to cancer start and progression. Endogenous free radical reactions, such as those triggered by ionising radiation, might lead to tumour growth. The strong link between fat and oil intake and death rates from leukaemia and malignant neoplasia of the breast, ovaries, and rectum in those over 55 years old might be due to increased lipid peroxidation. Atherosclerosis may be caused by free radical reactions involving diet-derived lipids in the artery wall and serum, which produce peroxides and other chemicals, according to studies. These compounds induce endothelial cell injury and produce changes in the arterial walls.