Commentary

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Journal of Diabetes Research and Endocrinology

2021
Vol.5 No.S2:003

# A Note on Diabetes and Free Radicals

**Jack Walton***

Department of Medicine ,University of Osmania, Hyderabad, Telangana, India

***Corresponding author:** Jack Walton, Department of Medicine, University of Osmania, Hyderabad, Telangana, India, E-mail: jackwalton@gmail.com

**Citation:** Walton J (2021) A Note on Diabetes and Free Radicals. J Diabetes Res Endocrinol Vol.5 No.S2:003.

**Received date:** November 8, 2021; **Accepted date:** November 22, 2021; **Published date:** November 29, 2021

## Description

Diabetes is a chronic disease in which the body does not produce insuffient insulin resulting in the blood and glucose in balance in the body. The World health organization estimates that maximum people have diabetes worldwide. Long term diabetes is often associated with secondary complications, including cerebral ischemia, heart disease, high blood pressure, blindness, kidney and nervous system diseases, dental disease complications of pregnancy, among others. Cerebral ischemia and heart disease account for 84% of mortality among diabetics in the USA alone. Epidemiological studies suggest that diabetes increases the risk of cerebral ischemi by 2-4 fold over non-diabetic population and also exacerbates studies are also confirmed in studies of experimental cerebral ischemia in animal models of diabetes. Free radicals play an important role in cerebral ischemic damage in diabetics.

Free radicals are atoms or groups of that contain an unpaired electron in their valence shell. Reactive oxygen species owing to the presence of one unpaired electron in an oxygen atom and a nitrogen atom, respectively. In biological systems, free radicals are produced naturally and are essential in certain cellular and homeostatic functions. The majority of ROS are produced during the mitochondrial respiration. With an abundance of oxidation-reduction reactions occurring at each complex of the electrons will occasionally diffuse from these complexes and if one is accepted by molecular oxygen it becomes the superoxide anion. Oxygen serves as the precursor for almost all other ROS, which include hydrogen peroxide and the hydroxyl radical. Nitric oxide is the foundation for most reactive nitrogen species, which include highly oxidative free radical peroxynitrite. More complex organisms have evolved ways to use these reactive oxygen species and reactive nitrogen species as signalling molecules in a wide variety of physiological functions. By performing the tasks they process intergral roles in the normal functioning of cells that include signal transduction, vasodilatation and defense against bacteria.

Antioxidants comprise a type of defence mechanism against free radicals, as they protect cells by behaving against free radicals, as they protect cells by behaving like scavengers of free radicals and thus neutralize their damaging capacity. The entire spectrum of antioxidants can be divided into two different classes based upon their mechanism of action, these are the enzyme anti-oxidanbts and the non-enzyme anti-oxidants. Enzyme anti-oxidants include superoxide dismutase catalase and glutathione peroxidase among others, which scavenge free radicals by converting them into less reactive molecules which later may be easily metabolized. Non-enzyme anti-oxidants cover a wider range of compounds, such as the anti-oxidant vitamins A, C and E and glutathione which compete for oxidation by free radicals with other substrates of molecules that should not otherwise undergo oxidation.

Normally, the cells anti-oxidant defence system prevents oxidative damage by neutralizing free radicals effectively, and the resultant products are then metabolized by the complementary anti-oxidant enzymes. However, in numerous pathological states that include but are not limited to ALS, parkinsons disease, Alzheimers disease', certain cancers heart attack, stroke and diabetes, avariety of mechanism lead to the overwhelming generation of free radicals which causes saturation of the anti-oxidant defense system and finally results in increased oxidative stress.