Relationship between Metabolic Syndrome and Glisodin

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Redox balance to maintain a physiological state.

Reactive Oxygen Species (ROS) are produced during normal cellular function. ROS are oxidising compounds including free radicals such as: hydroxyl radicals, superoxide anion, hydrogen peroxide and nitric oxide. They are very transient species due to their high chemical reactivity that leads to lipid peroxidation and oxidation of DNA and proteins.

In normal health, there is a balance between the formation of these oxidising chemical species and their effective removal by reducing compounds such as the protective antioxidants. Antioxidant systems of the cell minimize the perturbations caused by ROS controlling the prevailing relationship between reducing or oxidising (redox) conditions in biological systems. Antioxidants are substances that delay or prevent the oxidation of cellular oxidizable substrates. The various antioxidants exert their effect by scavenging superoxide, or by activating a battery of detoxifying/defensive proteins.

Antioxidants are a diverse group of molecules with diverse functions. For example, they range from large highly specific proteins molecules with catalytic properties to small lipid- and water-soluble molecules with non-specific scavenging or metal chelating properties.

The redox balance disruption and oxidative stress.

When ROS generation is increased to an extent that overcomes the cellular antioxidants, the redox balance is disrupted and it results an oxidative stress. It is now clear that several biological molecules, which are involved in cell signalling and gene regulation systems are very sensitive to redox statue of the cell. The prevention of the redox imbalance is an essential process in all the aerobic organisms, as decreased antioxidant protection may lead to cytotoxicity, mutagenicity and/or carcinogenicity *(Gutteridge JM., 1999: Redox Rep. vol 4(3):129-3 and Mates JM., 2000: Toxicology. vol 153(1-3):83-104).*

The Scientific Societies.

The Society for Free Radical Research is dedicated to promote interest in all aspects of research related to Free Radicals in any scientific effort. Over the

last few years the society has been fortunate to witness a widespread recognition of the important role free radicals play in many processes including diseases such as atherosclerosis and the inexorable process of ageing. The Society plays a central role in maintaining this pioneering spirit by providing a forum through its web site and regular conferences for scientists to meet with and share the latest ideas and, hopefully, shape the future.

The Society consists of six regional groups to which any individual can belong: The European Region, the Americas region or "Society for Free Radical Biology and Medicine ", The Australasian Region, the Asian region, the Asean region and the African region.

Established in 1987, the Society for Free Radical Biology and Medicine (formerly The Oxygen Society) is a professional organization comprising over 1,350 scientists, researchers and clinicians with an interest in the field of free radical chemistry, biology and medicine.

Overseeing the activities of all the regions is " The Society for Free Radical Research International " to which all members automatically belong when they join a region and is run by a committee comprised of four officers, elected by the World-wide membership, plus two representatives from each regional group.

The metabolic syndrome

The prevalence of the metabolic syndrome vary from 25% to 45% in human older than 40 (OMS Source) and present a strong incidence for type II diabetes and cardiovascular diseases.

Many predictive biological markers allowed scientists to confirm that oxidative stress and inflammation are involved in the pathogenesis of cardiovascular diseases, they now also clearly attest the relationship between metabolic syndrome (MetS), inflammation, and oxidative stress *(Guerrero-Romero F., 2006: Diabetes Metab Res Rev. Apr 5).*

In an attempt to be fully effective a therapeutic treatment against MetS may target the modulation of biological markers predictive to risk factors for cardiovascular diseases or diabetes and so prevent their future occurrence.

Diabetes-associated oxidative stress is a consequence of both increased production of free radicals and reduced capacity of antioxidant defences.

Prolonged hyperglycemia is the major factor in the pathogenesis of atherosclerosis in diabetes which can lead to cardiovascular complications.

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During atherogenesis, generation of ROS such as superoxide or hydrogen peroxide is dramatically increased in vascular endothelial cells (EC) in response to oxidized LDL (oxLDL) or glycated LDL (gly-LDL) and strongly correlate with reduced antioxidant defences such as SOD, catalase et gluthation peroxydase *(Zhao R., 2005: Atherosclerosis. Vol 179(2):277-84. and Kesavulu MM., 2000: Diabetes Metab. Vol 26(5):387-92. and Colak E., 2005: Ann Med. Vol 37(8):613-20).*

Several antioxidant enzymes, including copper, zinc-superoxide dismutase (Cu,Zn-SOD) and catalase, have been shown to be protective against oxidative stress caused by oxLDL but also attenuates the proliferation of vascular smooth muscle cells exposed to oxidative stress avoiding their accumulation and their involvement in atherogenesis *(Fang X., 1998: Circ Res. Vol 82(12):1289-97. and Lin SJ., 2006: Atherosclerosis. 2006 Apr 4; [Epub ahead of print].*

Glisodin activities

Glisodin is a combination of a natural SOD and of a gliadin extract able to promote antioxidant and anti-inflammatory defences of the host to fight against cellular damages caused by an excess of ROS (*Vouldoukis I., 2004 : J Ethnopharmacol, vol 94 (1) :67-75 and Muth CM., 2004: Free Radic Res, vol 38 (9) : 927-32.)* or again to prevent tumour progression promoted by inflammation and to reduced metastatic ability of tumour cells (*Okada F., 2006: Br J Cancer, vol 94 (6) : 854-62)* or finally to reduce the rate of nephropathy induced during type II diabetes *(Naito Y, 2005, Biofactors, vol 23(2):85-95).*

These properties of Glisodin are fully consistent with that required to fight metabolic syndrome.