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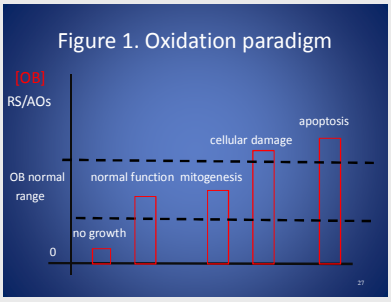
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Oxidative stress following the treatment with levothyroxine

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Abstract

Oxidative stress (OS) is a physiological process that can take place temporarily during the normal cellular activity and follows a paradigm that drives many cellular activities enclose mitogenesis. In few words, an equilibrium should exist (see figure 1) between the cellular oxidant components (reactive species or RS) needed for the transduction mechanisms, and the antioxidant defense (AOs: enzymes and low molecular weight antioxidants).



This equilibrium can be defined as "oxidative balance (OB)" and takes place when RS increase due to energetic, metabolic, and reactive processes.
In case OB is inappropriate (out of the normal range) the OS becomes a permanent condition such as in many common pathologies, from the cardiovascular to the metabolic diseases and also for iatrogenic causes (i.e oral contraceptives or excessive hormones intake). In these circumstances the subjects precipitate in a risk condition.
This is the case of patients suffering from dysthyroidism who frequently are under permanent OS, although due to different mechanisms.
In hypothyroidism, despite the energetic and metabolic production of RS is normally reduced, the OS is caused by the limited availability of the antioxidant defense [1]. Furthermore, inflammatory processes can increase the production of oxidants [2] without the necessary compensation of the AOs.
In hyperthyroidism the increase of metabolic and reactive production of RS induced by thyroid hormones is not compensated by a concomitant increase of AOs [1,3,4].
In a national survey on levothyroxine treatment (USA), about 23 % of the cases [5] were claiming symptoms of hyperthyroidism, mainly during the substitution of one brand of levothyroxine with an equivalent formulation (generic drugs). This indicates that a delicate equilibrium exists in these patients, and even a small modification of the hormones plasma levels can determine the appearance of side effects such as anxiety, sweating, palpitation. In recent clinical trials these symptoms were found to be related to OS [6,7] and may cause a discomfort that sometimes compromise the daily living and the working capacity. The use of a combination of Physiological Modulators (PMs) with antioxidant and anti-inflammatory activity was shown to reduce significantly these symptoms together with the daily discomfort [7], confirming that OS is involved in the generation of these side effects.

Biography

Prof. Umberto Cornelli was graduated in Medicine at the University of Milan in 1969. He started his collaboration with the Loyola University Medical School of Chicago in 1982 and has been studying oxidative stress. In 2001 he received an honorary degree in Science from the Loyola University of Chicago for his contribution to the study on senile dementia. From 2002 to 2008 was the president of SENB (European Society of Biological Nutrition. From 1968 to 2012 he was the author of about 200 publications, 4 books and 14 patents for drugs, food supplements, and analytical methods.