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EDITORIAL

Biomarkers of oxidative stress, challenges

Biomarcadores de estrés oxidativo, desafíos

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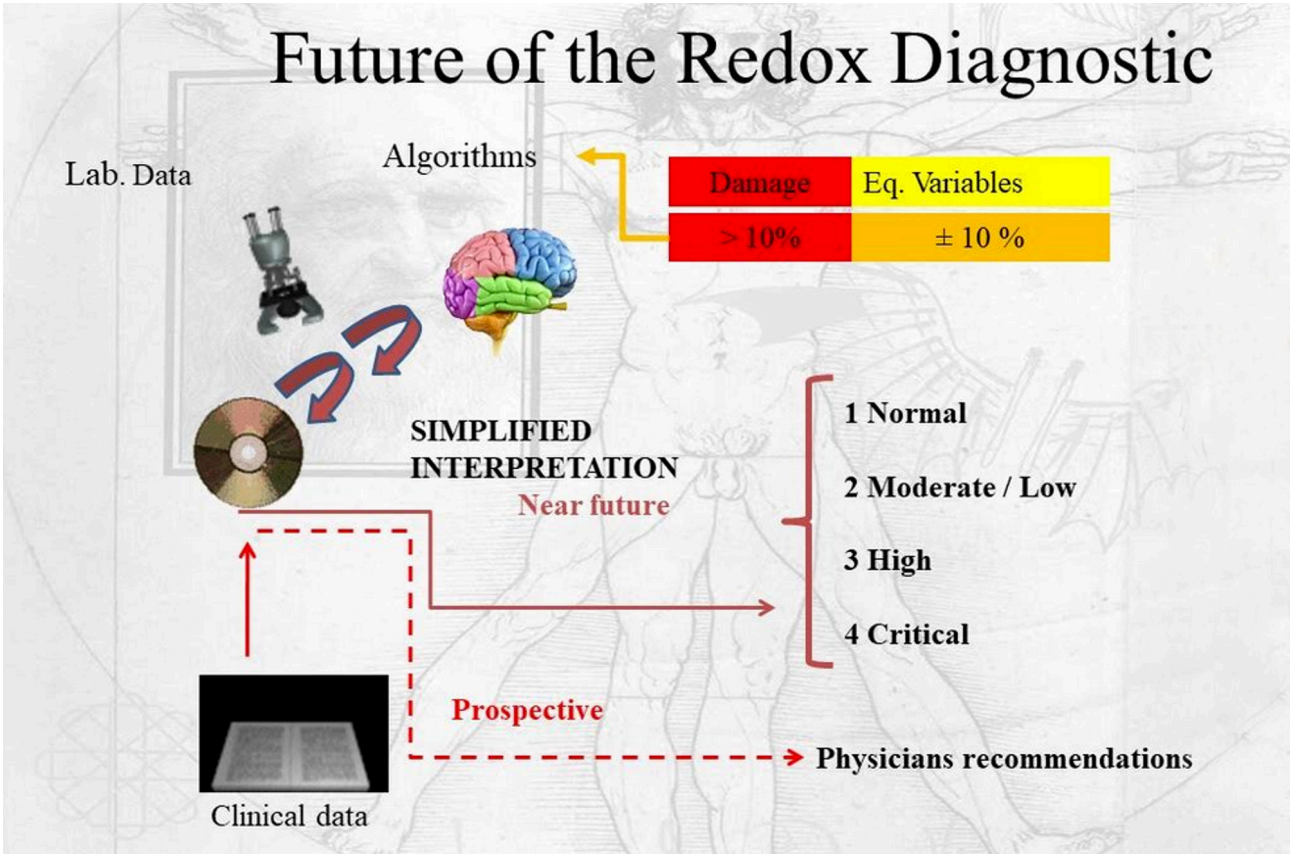

The overproduction of reactive oxygen species (ROS) has been implicated in the development of various chronic and degenerative diseases such as cancer, respiratory, neurodegenerative, and digestive diseases. However, the methodology to detect the oxidative stress status at a clinical level is difficult to find in the literature. There are some useful methods to investigate the oxidative profile, but they are not applicable to the clinical diagnosis. Despite the high morbidity of diseases in which oxidative stress is involved (cancer, diabetes, neurological, cardiovascular, etc.)[1], a comprehensive diagnostic system has not been developed. The education and training of professional staff (doctors, biochemists, nutritionists and health-related personnel) is also insufficient to deal with the analysis of the data that form part of the antioxidant / pro-oxidant diagnosis and its impact on the modification of life styles and another measure aimed at correcting the imbalance of the redox environment[2].

Only one variable of the antioxidant / pro-oxidant system (as indices of total antioxidant activity) is not advisable as unique maker of oxidative stress. Markers of damage to bio-molecules (such as malondialdehyde, advanced products of protein oxidation, etc.), activities of enzymes (e.g., catalase, superoxide dismutase, glutathione peroxidase), antioxidants (e.g., glutathione) and indicators of total antioxidant activity; are recommended[3].

The indicators chosen for the diagnosis must be adjusted to the concept of biomarker. The single measurement of variables of total antioxidant activity such as: TAS, FRAS, DPPH, ORAC, among others, will be useful only in the context of the measurement of other system variables indicative of damage to biomolecules or the functioning of the enzymes involved. Otherwise, errors in the interpretation of the system are incurred, or variables with a high dispersion are determined that although relatively easy to measure from the analytical point of view, do not reflect the real situation of the system[3].

The adequate methodology would be one that includes markers of damage to biomolecules, antioxidant enzymes, the concentration of low molecular weight antioxidants (including thiol balance) and indicators of total antioxidant activity. The ideal analytical method should be low cost, high precision, rapid analysis and should allow the comprehensive evaluation of the redox system. The study of a wide range of oxidative stress indices allows the examination of the role of oxidative stress in different diseases as: in diabetic patients with macro-angiopathic complications[4], HIV[5], dengue[6], infertility, neurological diseases[7],among others and nutritional follow-up[8] or correction of lifestyles and in other cases intervene with supplements, ozone therapy[9] or drugs[10].

Under physiological conditions, the concentrations of ROS are subtlety regulated by antioxidants, which can be either generated endogenously or externally supplemented. However, some results indicate that antioxidants exert no favourable effects on disease control. Thus, more studies are warranted to investigate the complicated interactions between ROS and different types of antioxidants for restoration of the redox balance under pathologic conditions. In this context, is strictly necessary to count with a valid battery of biomarkers to be applied at clinical level.

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