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Perspectives on methods development for oxidative stress biomarkers quantification

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EDITORIAL

Oxidative stress is defined as an imbalance of antioxidants and oxidants in favour of the latter, potentially leading to damage and disruption of redox signalling and/or control of molecular damage (Jones, 2006; Sies, 2015). Oxidative stress status determination has been a challenge for scientific community worldwide. So far, different biomolecules involved in this process have been pointed out as biomarkers for oxidative stress, such as glutathione and 3-nitrotyrosine (3-NT) (Ho, Karimi Galougahi, Liu, Bhindi, & Figtree, 2013; Teixeira, Fernandes, Prudêncio, & Vieira, 2016).

Measurement of 3-nitrotyrosine (3-NT) in biological samples and the determination of serum levels of both reduced (GSH) and oxidized (GSSG) glutathione have proved to be important biomarkers for the evaluation of the nitrosative and oxidative status of an individual, respectively (Jansen & Ruskovska, 2015; Teixeira, Prudêncio, & Vieira, 2017). Increased 3-NT levels and abnormal glutathione ratio (GSH/GSSG) have been associated with several physiological and pathological conditions (Rahal et al., 2014; Teixeira et al., 2016).

During the last decade, different strategies for quantification of these biomolecules have been applied, all of them presenting pros and cons. Chromatography-based methods are clearly the ones that show better sensitivity and specificity. However, they often require time consuming steps, as is the case of sample derivatization. On the other hand, derivatization can lead to artifact formation which is a clear disadvantage (Teixeira et al., 2016).

Currently, it is primordial that the development of new methods for quantification of such biomolecules meets some important requirements. Most importantly, newly developed methods should i) be fast and straightforward, so that they can easily be implemented, for instance, in the medical laboratory field; (ii) be highly sensitive, since most of these biomolecules are present in extremely low concentrations, both under physiological and pathological conditions; and (iii) allow multi-analysis, for simultaneous quantification of different molecules, with further savings in time and cost.

By complying with these features, newly developed methods could be suitable for diagnosis and therapeutic monitoring of various oxidative stress-related pathologies in biological matrices.

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