



ThiOx Test: Rapid assay to measure thiol antioxidant capacity in cells and tissues

Unmet Need

Restoring thiol homeostasis in cells is an imperative to recover from most oxidative stresses such as tissue ischemia, tissue ischemia/reperfusion injury and radiation or chemical toxicities.

Indeed, oxidative stresses are poisonous when uncorrected by the natural thiol antioxidant systems present in the body.

The most important thiol antioxidant molecule is glutathione (GSH). Protein and non-protein thiols contribute to maintaining overall thiol homeostasis. Methods to monitor GSH levels or activity alone can be invasive and rely upon tissue extract preparations and complex biochemical methods. Furthermore, they may overestimate the extent of oxidative stress, since GSH depletion measured by biochemical assays may include GSH oxidation caused by cell/tissue extract preparation.

Currently, there are no straightforward tests to monitor the overall thiol redox activity in a biological specimen. Thus, a simple metabolic test to monitor overall thiol redox status is needed.

Opportunity

LIMR researchers have developed a fast, accurate and inexpensive assay, the ThiOX test, that measures the overall thiol redox status of any biological specimen. ThiOX addresses the need for a rapid test to monitor thiol oxidative stress in live cells and tissues.

The stability of free thiol groups and disulfide bonds (dithiols) in proteins is essential to maintain proper protein function that, in turn, is vital for cell and tissue functions and homeostasis. ThiOX quickly and accurately measures the overall level of thiol oxidation in tissues, blood, cells or other biological sources, providing an overall determination of thiol antioxidant capacity in the specimen. The test is based on colorimetric detection of beta-mercaptoethanol produced by metabolic reduction of the added dithiol reporter compound hydroxyethyl disulfide.

The ThiOX test enables research on the role of thiol oxidation stress in metabolic pathology, but it also provides a tool to study thiol redox status as a biomarker of disease states or clinical responses. This test reveals evidence of a natural variation in thiol antioxidant capacity in humans (1). In applications of this discovery, it may be exploited to enhance therapeutic responses or predict sensitivity to delayed nausea in cancer patients receiving chemotherapy (2,3).

Unique Attributes

ThiOX is the only simple metabolic test available to quickly monitor the overall thiol redox activity in a biological specimen.

Clinical Applications

LIMR researchers have developed a rapid laboratory test to measure the thiol antioxidant capacity of blood cells and tissues, which helps correct oxidative damage caused by noxious chemicals, radiation, ischemia/reperfusion and other tissue insults. In humans, there is significant natural variation in local and systemic thiol antioxidant capacity, but a simple metabolic test to rapidly monitor overall thiol redox status has not yet been available. LIMR's test addresses this need.

Stage of Development

The test has market sales from Lankenau and is available for wide distribution.

Intellectual Property

Methods and kits for measuring toxicity and oxidative stress in live cells. U.S. Patent No. 9,766,226, issued 19 Sept 2017.

Collaboration Opportunity

Actively seeking a licensees and distribution partners.

References and Publications

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