

# Biomarkers help to gauge tissue injury causes

February 10 2014, by Sophie Hepburn

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UWA Assistant Professor Emilie Mas says that oxidative stress is thought to play an important role in many chronic diseases such as obesity, diabetes, atherosclerosis and cancers. Credit: Tony Alter

(Medical Xpress)—Lipid biomarkers of oxidative stress can be measured to confirm the cause of tissue injury in several medical conditions including stroke and pre-eclampsia.

A recent review published in *Prostaglandins and Other Lipid Mediators* summarises the synthesis of lipid metabolites and their use as biomarkers of oxidative stress in humans.

The review was produced by researchers at the University of Western Australia School of Medicine and Pharmacology and Royal Perth

Hospital, in collaboration with several groups throughout Europe and the USA.

The study evaluates the role of lipid biomarkers in a number of clinical situations involving oxidative stress, including anaesthesia/surgery, trauma, Rett syndrome, pre-eclampsia and stroke.

UWA Assistant Professor Emilie Mas says that oxidative stress is thought to play an important role in many chronic diseases such as obesity, diabetes, atherosclerosis and cancers.

Oxidative stress results from an imbalance between the production of [reactive oxygen species](#) (including peroxides and free radicals) and the body's ability for detoxification and repair.

Free radicals are molecules with unpaired electrons that are unstable and highly reactive, which can oxidise biomolecules and cause cell damage.

The biomarkers evaluated in the review include isoprostanes (IsoPs) that are formed by free radical oxidation of arachidonic acid (AA), and neuroprostanes (NeuroPs) which are formed from docosahexaenoic acid (DHA) by a similar mechanism.

In addition, isofurans (IsoFs) have been discovered, which are formed from free radical oxidation of AA under conditions of high oxygen tension.

"The IsoPs, IsoFs and NeuroPs represent a number of lipid biomarkers of oxidative stress," A/Prof Mas says.

"These markers help us to understand and elucidate the role of oxidative stress but at this stage they remain very much a scientific tool rather than having any diagnostic value."

F2-IsoPs are considered to represent the most reliable marker of lipid peroxidation and oxidative stress.

"What needs to be kept in mind is that the IsoPs are biomarkers of [lipid peroxidation](#) but [oxidative stress](#) also targets other biomolecules such as DNA and proteins," A/Prof Mas says.

Damage to cell components disrupts normal cellular signalling and can result in cell death in the affected tissue.

The discovery and study of IsoPs and NeuroPs has provided a major step forward in the field of [free radical](#) research, however, further studies are needed to find out how the [biomarkers](#) relate to disease severity in different [medical conditions](#).

**More information:** "Isoprostanes and neuroprostanes: total synthesis, biological activity and biomarkers of oxidative stress in humans." Galano JM, Mas E, Barden A, Mori TA, Signorini C, De Felice C, Barrett A, Opere C, Pinot E, Schwedhelm E, Benndorf R, Roy J, Le Guennec JY, Oger C, Durand T. *Prostaglandins Other Lipid Mediat.* 2013 Dec;107:95-102. [DOI: 10.1016/j.prostaglandins.2013.04.003](https://doi.org/10.1016/j.prostaglandins.2013.04.003). Epub 2013 May 2

Provided by Science Network WA

Citation: Biomarkers help to gauge tissue injury causes (2014, February 10) retrieved 2 May 2024 from <https://medicalxpress.com/news/2014-02-biomarkers-gauge-tissue-injury.html>

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