

## **Development of novel methods to characterize and quantify oxidative stress in cells**

**Host School/Institute: School of Medical Sciences**

**Project Code: SMS6**

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Description of Project:

This project will develop novel and advanced liquid chromatography-mass spectrometry (LC-MS) based assays to chemically define and quantify oxidative stress in cultured cells and specific cellular compartments.

It is now well recognized that many diseases, including cancer and cardiovascular disease, are associated with increased oxidative stress, and that different reactive oxygen species can have physiological and pathological roles, depending on the circumstances involved. For example, the interplay between activation of receptor tyrosine kinases and inhibition of protein tyrosine phosphatases is regulated tightly by redox-dependent posttranslational protein modifications. However, for many signaling systems, the molecular mechanism underlying such regulation remains elusive.

The aim of this project is to establish LC-MS based methods employing a range of novel probes that are specific for superoxide anion radical, hydrogen peroxide, peroxynitrite and hypochlorous acid, and that can be targeted to specific cellular compartments, including mitochondria, the outer and inner plasma membrane, endoplasmic reticulum and nucleus. The methods to be developed will allow quantification of both parent and reacted probes. This includes the chemical characterization of the different products formed to facilitate the establishment of footprints for the different oxidants/probes involved. This project will provide the basis for a better understanding of redox-modulated pathways in research related to both health and disease.

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