

Oxidative Stress & Ageing

Electron Paramagnetic Resonance

Detecting Radicals

Protecting Cells

Understanding Ageing

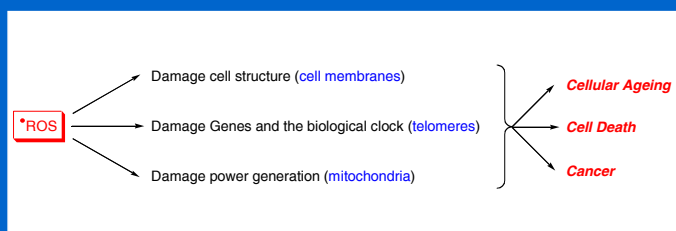
Chemical Biology and EPR Spectroscopy

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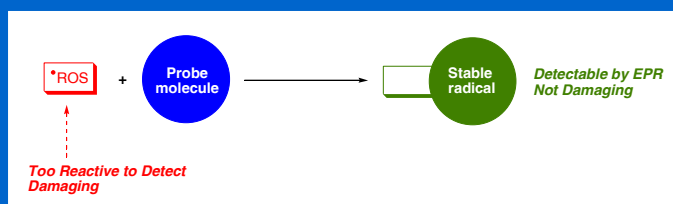
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The Investigation

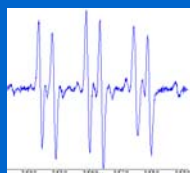
Reactive oxygen species (ROS) cause oxidative stress. They damage cells and tissues and lead to ageing:



Chemical probes can destroy the ROS:



Destroying ROS protects cells and tissues from damage and by targeting the probes to different places the biological responses to oxidative stress can be studied, and sites of oxidative stress identified. EPR (electron paramagnetic resonance) is the only spectroscopic technique that detects the radical ROS unambiguously; other techniques such as fluorescence provide only indirect evidence of their presence. The use of probes allows the different types of radicals to be seen, quantified and identified by EPR spectroscopy.



EPR Spectrometer and Spectrum of a Stable Radical

Potential Benefits

Ageing at a cellular level is largely the result of damage caused by radicals, particularly by oxygen-centred radicals known as reactive oxygen species (ROS). ROS not only cause pathologies associated with ageing such as arteriosclerosis, neoplasia, and cataracts, but also mediate the deleterious effects of other major diseases that particularly affect older people, e.g. stroke, neurodegeneration, diabetes and autoimmune diseases.

The probes produced will help us understand the biological sources of radical ROS, their behaviour in different environments, organelles and tissues, and the cellular responses to them. This will be key to understanding the process of ageing itself, and of ameliorating the diseases of old age.

Because the probes convert the damaging ROS into non-damaging compounds, they may be useful drugs: e.g. they may prevent the death of nerve cells during stroke and also slow neurodegeneration. This will be of particular benefit to older people.



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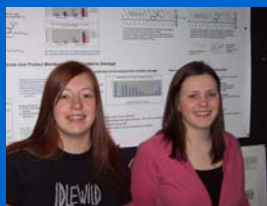
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