

ENDEAVOURS TO RESOLVE THE SPACE WITHIN AND BETWEEN PROTEINS WITH RADICALS AND MASS SPECTROMETRY

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Captain James Cook is famous to Australians from his voyages to chart the new world on his vessels the HMS Endeavour and Resolution. We have charted a new course for mass spectrometry using a radical probe in endeavours to resolve the space within and between proteins in terms of their structures and interactions. The important attributes of mass spectrometry for protein analysis: namely speed of analysis, sensitivity, and the ability to study components within mixtures without their separation are all carried forth in these investigations.

Although radicals are responsible for protein damage *in vivo*, we have convincingly shown in a series of published work [1-6] that, when exposed with radicals on millisecond timescales, proteins undergo limited oxidation at amino acid side chains without any measurable alteration to their structure. Furthermore, the degree of oxidation is highly dependent on the accessibility of amino acid residue side chains facilitating the measure of protein structure [1,3,5,6], the dynamics of protein folding events [3] and the interaction of proteins with other macromolecules [4-6] by mass spectrometry.

This presentation will describe our latest applications of the approach to probe the interactions of calcium-binding proteins that are incompletely understood and to study the onset of structural damage to tissue proteins of physiological relevance.

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- (6) S.D. Maleknia, J.W.H. Wong, K.M. Downard (2004) *Photochem. Photobiol. Sci.* 3: 741-748.