

AINSE Gold Medal - 1999 Professor Jim Camakaris



Professor Ron MacDonald, AINSE President, (left) presents Professor Jim Camakaris (right) with the AINSE Gold Medal

Use of copper radioisotopes to investigate copper metabolism in normal and mutant cultured cells

Radiocopper has been utilised to answer fundamental questions about the role of the trace element Cu in health and disease. This is part of a major program of research on copper metabolism being undertaken by Assoc. Professor Jim Camakaris at the Department of Genetics, University of Melbourne.

Copper is essential for life as it is required by a number of enzymes (biological catalysts) in living cells. However Cu levels need to be tightly regulated as excess Cu is potentially highly toxic. There are several acquired and inherited diseases due to either copper deficiency or Cu toxicity. The inherited diseases provide "experiments of nature" which allow the normal genes and proteins involved in copper transport to be identified and characterised. Jim Camakaris and his research group (also in collaborative studies with Professor Julian Mercer) have focused on the function of the Menkes (MNK) protein. Mutations in the gene coding for this protein cause a potentially fatal inherited copper deficiency disorder in humans, Menkes disease. Using ^{64}Cu , Jim Camakaris and research colleagues have discovered that the Menkes protein functions as a molecular pump that drives copper across biological membranes. This has laid the framework for current studies where mutant forms of the MNK gene have been introduced into cells and the activity of the various mutant proteins is being assessed. This will allow detailed structure-function analysis and will also be important in determining which Menkes patients may benefit from copper therapy. Using radiocopper kinetic studies the researchers found that a normal copy of the MNK gene introduced into Menkes mutant cells can correct the fault in copper metabolism. This is an important and exciting finding in terms of possible future gene therapy.

The Camakaris group has also commenced studies with a research group in Germany on the role of copper in Alzheimers disease - studies that also depend on the crucial radioisotope of copper, ^{64}Cu .

Dr Camakaris was presented with the 1999 AINSE Gold Medal for excellence in research at a plenary meeting of AINSE Council and Specialist Committees on Thursday 25 May held at Lucas Heights.