
BIOTECHNOLOGY SCIENCE AND ENGINEERING PROGRAM

SPECIAL SEMINAR

**Wednesday October 21, 2009
UAH Shelby Science Center Room 218
3:00p.m.**

Resonant Recognition Model of protein activity/interactions

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With a large number of DNA and protein sequences already known the crucial question is to find out how the biological function of these macromolecules is “written” in the sequence of nucleotides or amino acids. Biological processes in any living organism are based on selective interactions between particular biomolecules, mostly proteins. The rules governing the coding of the protein’s biological function, i.e. its ability to selectively interact with other molecules, are still not elucidated. Our team has developed a unique model (the RRM model) for analysis of protein and DNA structure-function relationships. The RRM concept is based on the finding that there is a significant correlation between spectra of the numerical presentation of amino acids and their biological activity. It has been found through an extensive research that proteins with the same biological function have a common frequency in their numerical spectra. This frequency was found then to be a characteristic feature for protein biological function or interaction. Furthermore, the RRM proposes that the selectivity of protein interactions is based on resonant energy transfer at the specific characteristic frequency between interacting biomolecules. This energy, electromagnetic in its nature, is in the frequency range of 10^{13} to 10^{15} Hz, which incorporates infra-red (IR), visible and a small portion of the ultra-violet (UV) radiation. The RRM model has been successfully validated for prediction of protein active sites design of proteins/peptides with the desired biological function/activity including HIV envelope analogues for vaccine development as well as for modulating protein activity via the electromagnetic radiation of the specific (RRM predicted) frequency. This theory has been already successfully validated on a number of examples both using EMF radiation to modulate protein function as well as designing de novo peptides based on the RRM theory and number of these examples will be presented.

Professor Irena Cosic

Professor Irena Cosic is currently a Professor of Biomedical Engineering and an Associate Pro-Vice Chancellor, Research and Innovation, Science Engineering and Health College at RMIT University. She is also Research Director of the Australian Centre for Radiofrequency Bioeffects Research (ACRBR), NHMRC centre of Research Excellence (2004-2009), and a Research Leader in the newly established RMIT Research Institute of Health Innovations.

Prof Cosic's research is in the area of biomedical engineering and electronics particularly in influence of electromagnetic radiation on the living systems from biomolecules, cells, tissues and the whole human body,

The main breakthrough in her research is the Resonant Recognition Model (RRM), which propose that selectivity of protein interactions is electromagnetic in nature

She published a research book and over 150 papers including book chapters, journal and refereed conference papers. She holds international patents protected in USA, Europe, Japan and Australia. Prof. Cosic has been the Chief Investigator in a number of major government grants including NHMRC (Australia), ARC (Australia). NIH (USA), NSF (USA), CNRS (France). In 2004 she was awarded RMIT Research Award and Vice-Chancellor Award for Excellence in Research and Leadership. She is a senior member of IEEE, Fellow of Engineers Australia and an active member of a number of other national and international professional societies.