UNIVERSITY OF TEXAS AT DALLAS - DEPARTMENT OF PHYSICS

PHYSICS COLLOQUIUM

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Wednesday, October 18, 2006; 4:00-5:00 PM
Kusch Auditorium, FN 2.102

Theoretical Investigation of Interaction of Tissue and Implants with Electromagnetic Stimulation in the Radiofrequency Range

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Radiofrequency radiation in the kHz range has been used to stimulate bone growth and to treat spinal and joint pain. Various devices have been approved for these purposes by the FDA and a number of clinical studies have evaluated their efficacy. The effectiveness of non-invasive pulsed electromagnetic fields (PEMF) on stimulating bone formation in vivo to augment fracture healing is still controversial, largely because of technical ambiguities in data interpretation. This seminar gives an overview of devices used for bone growth stimulation and a series of theoretical studies undertaken by the Bioinstrumentation Resource Center to calculate the effective energy distribution when pulsed electromagnetic frequencies are used in the presence of complex metal bone support devices, in particular, a spinal cage implant. Some questions raised and directions for futher study will be discussed. The initial work described was funded by grants from Orthofix, Inc. and Advanced Neuromodulation Systems, Inc.

About the speaker: Dr. Tibbals received his Ph.D. in Chemistry from University of Houston in 1970 for theoretical and experimental research in non-equilibrium statistical mechanics and kinetics of ion-molecule reactions. During the 1970's Dr. Tibbals was on the academic and research staff of Glasgow and Durham Universities in the UK. Before joining UTSW, Dr. Tibbals worked as a senior scientist and product manager for several companies, including Kodak Medical Imaging Systems, as well as a visiting professor at UTD and NTSU. Since 1997 Dr. Tibbals is Director of the Bioinstrumentation Resource Center for the UT Medical Center. His research interests include interface between electrodes and tissue in electrophysiology, methodology for stimulation and data interpretation, signal processing, and evaluation of effects in electro-stimulation for research and therapy; modeling of effects of electromagnetic stimulation on nerve and bone tissue.