

DEPARTMENT OF NEUROBIOLOGY AND DEVELOPMENTAL SCIENCES

SEMINAR

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***“A Brief Review of Frequency Dependent
rTMS Effects on Cortical Excitability”***

Tuesday, April 7th, 2015

Rayford Auditorium, Room 106-2

Biomedical Research Building 2

12:00 Noon

Abstract

Transcranial magnetic stimulation (TMS) is a technique that utilizes alternating magnetic fields to induce electrical currents in the brain, so as to alter the excitability and function of cortical tissue. When applied repetitively (rTMS), the electrical currents produced by transcranial magnetic stimulation can modulate cortical excitability for extended periods of time. TMS began being used commercially in 1985 as a safe form of non-invasive, nearly painless cortical modulation, and since that time TMS procedures have been widely applied in studies throughout clinical and basic neuroscience. As suggested by the concepts of long-term synaptic potentiation and long-term synaptic depression, high frequency repetitive transcranial magnetic stimulation (rTMS) may saturate the inhibitory capacity of the cortical network and produce increased excitability as assessed by motor evoked potential (MEP), while possibly increasing synaptic efficacy; whereas, low frequency rTMS appears to produce inhibitory changes in excitability, and therefore may decrease synaptic efficacy. Much research has gone into investigating the efficacy of rTMS, but uncertainties still exist concerning the way in which it modulates cortical function and how this may correlate into useful therapy. A number of studies have been conducted investigating the effects of TMS on cortical excitability and inhibition, with many studies yielding contradictory results. Some of the most critical questions raised by these studies are how their results may influence the techniques that are utilized in future investigational and therapeutic endeavors requiring the induction of differing effects on cortical modulation, be it excitatory or inhibitory. The purpose of this seminar will be to provide background information regarding transcranial magnetic stimulation and its mechanisms of action, present a literature review pertaining to how TMS effects cortical excitability and inhibition, specifically comparing low frequency rTMS and high frequency rTMS, and briefly provide information on whether different frequencies of TMS effect its therapeutic potential, specifically as it pertains to the treatment of tinnitus.