

TRANSCRANIAL MAGNETIC STIMULATION: A REVIEW

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In recent years there have been a remarkable number of papers about the potential therapeutic effects of repetitive transcranial magnetic stimulation (rTMS) across a diverse range of conditions including stroke, depression, schizophrenia and tinnitus. There is a large body of evidence to support the conclusion that rTMS can have lasting effects on the brain which can affect some basic behaviours. However the rationale for applying the same methods to treat such a diverse range of diseases is not always clear.

In my presentation I will firstly give a general introduction to the principles of TMS and how it can be used to test the integrity of the motor system in single pulse mode. Then I will go on and discuss how it can be employed in repetitive mode to produce lasting effects in the cortex. I will discuss a number of different protocols and highlight how the variables of stimulus frequency, intensity and duration are critically important in determining the outcome on cortical excitability. Also, I will briefly outline what is known about the mechanisms that underlie the effects induced by rTMS.

I will next discuss how rTMS has been used to modulate cortical excitability in preliminary studies in a variety of conditions. In particular, I will outline the approaches adopted in stroke, depression and pain conditions. These examples will serve to highlight some of the strategies available for rTMS intervention. For example, it is possible to target both the cortical regions primarily affected by the disease/condition and also more remote but connected cortical areas. For example, both the lesioned and non-lesioned motor cortical areas have been targeted with rTMS with varying degrees of success.

I will conclude by summarising the findings in both normal subjects and patients and discussing possible future directions.