

**brainbox**

initiative

**Fundamentals & Applications  
of TMS**

Sample Programme

- 09:00** Welcome and introduction
- 09:15** Lecture: **TMS Physiology and Common Measures**  
Physiology of transcranial motor cortex stimulation  
Basic principles of magnetic and electrical stimulation  
Physiology of transcranial magnetic and electrical motor cortex stimulation  
Common measurements and applications of single-pulse TMS
- 10:15** Lecture: **TMS Safety - Contraindications & Ethics**
- 10:45** Break
- 11:00** Practical session: **Single Pulse TMS**  
Brief familiarisation with hardware and setup, followed by demonstration of TMS. Delegates will be asked to:  
Locate motor hotspot for a hand muscle  
Find resting motor threshold  
Recognise relevant features of the motor evoked potential (MEP) and how they are affected by intrinsic and extrinsic factors  
Stimulus-response curve
- 13:00** Lunch
- 14:00** Lecture: **Applications of TMS in Research**  
Overview of how TMS is applied, looking at and discussing studies that have used TMS as a tool to investigate causal brain-behaviour relations  
Effects on behaviour (online/offline lesions)
- 15:00** Practical session: **Neuronavigation and TMS**  
Delegates will have the opportunity to practice:  
Locating and recording the hotspot using Brainsight (MEP guided approach)  
Attempt to map a hand representation of the motor cortex  
Locate the hotspot using MRI image of the brain (anatomy guide approach)
- 16:30** Lecture: **Influences on the Excitability of the Brain / rTMS for the induction of plasticity**  
Induction of plasticity-life processes via rTMS (intrinsic and extrinsic plasticity)  
rTMS protocols  
Safety  
Effects on intracortical excitability and cortico-cortical connectivity  
Note of caution: inter- and intra-individual variability
- 17:30** Wrap up day one

- 09:30** Lecture: **Paired-Pulse TMS**  
Insights into intracortical circuitry  
Basic principles of paired-pulse TMS  
Physiology of cortical circuits investigated with paired-pulse TMS  
Research and clinical applications
- 10:30** Practical session: **Paired-Pulse TMS**  
Initial demonstration of paired-pulse TMS paradigms  
Delegates will be asked to:  
Find the hotspot, resting, and active motor thresholds  
Use and interpret some intracortical inhibitory and facilitatory paradigms:  
Short-interval intracortical inhibition (SICI)  
Intracortical facilitation (ICF)  
Short-interval intracortical facilitation (SICF)  
Long-interval intracortical inhibition (LICI)
- 13:00** Lunch
- 14:00** Lecture: **Twin-coil TMS**  
Insights into cortico-cortical connectivity  
Basic principles of twin-coil TMS  
Intra- and inter-hemispheric circuits activated by twin-coil TMS  
Research and clinical applications
- 14:30** Practical session: **Twin-coil TMS**  
Initial demonstration of twin-coil TMS to assess cortico-cortical connectivity  
Delegates will be asked to:  
Find bilateral hotspots  
Use and interpret intracortical and facilitatory paradigms  
Inter-hemispheric inhibition (IHI)
- 15:30** Practical session: **rTMS and Robot Positioning**  
Delegates will be split into two groups who will rotate between the two practical sessions:  
Group A: **rTMS systems and protocols**  
1Hz, 10Hz, cTBS, iTBS, and QPS  
Group B: **TMS using navigated robotics**
- 16:30** Group Q&A session  
Discuss and review delegates' research concepts and ideas  
Discuss the potential and relevance of TMS in future research projects  
Future training/workshop requirements
- 17:00** Workshop summary and wrap up