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**SEMINAR BY FRANCESCO VERGANI PhD, FRCS (SN)**  
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**(King's College Hospital, London, UK)**  
**February 20th, 2020**  
**3:00 p.m. – 4:00 p.m.**  
***Seminar Hall at VIMM (Via G. Orus, 2 - Padova)***

**Title of the Seminar: *The primary motor cortex seen by a neurosurgeon: an anatomical and functional appraisal***

**Abstract:** Knowledge of the anatomical and functional relationship between brain tumours and surrounding cortical and subcortical structures is essential in neuro-oncology when planning overall treatment and surgical approach. This is particularly true for tumours in close relationship to the primary motor cortex and the corticospinal tract (CST), where surgery carries the risk of inducing a permanent motor deficit. In recent years, multiple techniques have been developed to assist neurosurgeons in maximising the extent of resection while minimising the risk of inducing paralysis. These techniques include advanced Diffusion tractography, preoperative mapping with fMRI and Transcranial Magnetic Stimulation (TMS) and intraoperative mapping and monitoring (IOM) with direct electrical stimulation. The present review focuses on different aspects of the motor network.

First, the anatomy of the primary motor cortex is reviewed in the context of its connectivity. In particular, the anatomy of short (U-shaped) fibres and their functional role in connecting the pre-central and post-central gyri is analysed. Second, we review functional data from preoperative fMRI and TMS and from IOM collected during the resection of tumours in eloquent motor cortex. New findings related to the effect of tumour grading and CST invasion on the excitability of the motor cortex are presented and discussed.

Finally, we describe our experience using an integrated approach combining pre-operative TMS mapping, tractography delineation of the CST and IOM. The anatomo-functional information obtained at both cortical and subcortical levels is used in the surgical decision making process, with particular relevance to surgical indication, patients counselling and extent of resection.