Applications of human brain functional MRI for simultaneous EEG-fMRI experiments and for measuring neural currents

lunedì 24 luglio 2006 – Ore 11.00
Laboratorio di Neuroimmagine Funzionale (LNiF)
Via delle Regole, 95 Mattarello (Trento) (see attached map below)

Abstract

In this seminar I will present my most recent work on two topics: use of simultaneous recordings of EEG and fMRI human brain activity and use of fMRI to measure neuronal currents.

In the first part of the talk I will discuss the use (issues and advantages) of simultaneous EPs-fMRI with respect to the combined approach, which consists of the repetition of the same experimental paradigm in two separate, single-modality EPs and fMRI experiments. Simultaneous EEG-fMRI is a vital tool in order to study cerebral spontaneous activity. Indeed, recent works presented in literature showed that epileptic spikes, sleep stages and several brain rhythms can be localised by means of simultaneous EEG-fMRI. Nevertheless, the advantage of simultaneously recording EPs and fMRI when eliciting evoked responses in the brain is still debated.

In the second part of the talk I will discuss the development of a very recent and promising technique (neuronal current fMRI) which measures direct effects of neuronal activation: the induction of local magnetic field changes detectable by MRI. Given the remarkable growth in biomedical technologies experienced during the last years, complex biological phenomena which now seem impossible to measure will soon become observable. In the field of non-invasive functional neuroimaging, concurrent with an expected increase of the spatio-temporal resolution of BOLD-fMRI techniques, the spatio-temporal feature of the metabolic-hemodynamic response will impose an inherent limitation in order to study brain function. In this context, it is crucial to investigate the existence of MR contrast mechanisms more directly linked to neuronal activity than BOLD effects.
References


Responsabile scientifico: dott. Jorge Jovicich
Driving directions to the LNiF at Mattarello: