

## **MRI/fMRI workshop**

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Magnetic resonance imaging (MRI) is an extremely useful technique in neuroscience nowadays, especially in human neuroscience. It has its strength of providing a non-invasive solution to measure the structure and function of the whole brain. In this workshop, we will cover a wide range of topics related to MRI, including structural imaging, diffusion MRI and functional imaging.

For structural imaging (sMRI), we will focus on the study of cortical and subcortical anatomical measures including white matter, cortical gray matter, cortical thickness, surface area and curvature. For diffusion MRI in general (diffusion tensor imaging (DTI) in particular), we will examine the location, orientation, and anisotropy of the brain's white matter tracts. For functional imaging (also known as functional MRI; fMRI), we will focus mainly on the measurement of brain activity via blood-oxygen-level-dependent (BOLD) signal. We will introduce two major classes of function imaging, namely resting-state fMRI and task-based fMRI. These two are very powerful approaches to study the functions of the brain.

In this workshop, we will focus more on introducing the general concepts of MRI methods, good practices of designing an MRI experiment and the way to interpret results from MRI experiments. We will focus less on the practical steps of data analysis.

**Please bring your own laptop and install the following software before the workshop:**

<http://brainsuite.org>

### **Readings:**

#### *On structural imaging and DTI*

Dale, A.M., Fischl, Bruce, Sereno, M.I., Cortical Surface-Based Analysis I: Segmentation and Surface Reconstruction. *NeuroImage* 9(2):179-194. 1999.

Fischl, B.R., Sereno, M.I., Dale, A. M. Cortical Surface-Based Analysis II: Inflation, Flattening, and Surface-Based Coordinate System. *NeuroImage*, 9, 195-207. 1999a.

Wakana et al. Fiber tract-based atlas of human white matter anatomy. *Radiology* 2004, 230:77-87

#### *On functional imaging*

Ogawa S (2012) Finding the BOLD effect in brain images. *Neuroimage* 62:608-609.

Logothetis NK (2008) What we can do and what we cannot do with fMRI. *Nature* 453:869-878.