

Molecular fMRI as novel and useful tool in systems neuroscience

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Functional magnetic resonance imaging (fMRI) is currently an indispensable tool in neuroimaging. It is based on the blood oxygenation level dependent (BOLD) signal and aims to understand brain function by investigating diverse neural signaling processes over large tissue volumes in intact animals and humans. However, the 'indirect' formation of the BOLD signal is one of the major drawbacks of the current fMRI methodology, as it leads to ambiguities that are a direct consequence of neurovascular coupling.

Molecular fMRI is a novel approach to study brain function. It combines molecular imaging and fMRI, thereby allowing investigation of biochemical processes involved in neural activity on a molecular level. The lecture aims to introduce principles of this novel neuroimaging technique, highlighting its advantages and limitations. Moreover, it will demonstrate the versatility of molecular fMRI in targeting biological markers using different bioresponsive MRI probes to visualize and map neural activity with outstanding specificity.