



Département de psychiatrie
Centre de neurosciences psychiatriques
Site de Cery
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Centre de Neurosciences Psychiatriques

JOINT CNP - CIBM SEMINAR

ANNOUNCEMENT

Monday, October 30, 2017, 2:00 p.m.

“Fatty acids as signaling molecules and biomarkers of adult neurogenesis”

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The discovery of adult neurogenesis has opened a new era in modern neurobiology: the brain, after all, has the capacity to regenerate. In the mammalian brain, new neurons are continuously formed in the hippocampus, the center for learning and memory. In animal models, newborn neurons are important for cognition, mood and stress regulation. In humans, it is estimated that about 700 new neurons are integrated daily into the hippocampus, but their functional importance is not known because of the lack of a live and non-invasive measure of this phenomenon. Based on a series of experiments using magnetic resonance spectroscopy (MRS), we identified fatty acid metabolites highly enriched in neuroprogenitors and visible at 1.28ppm on the resonance spectrum. These metabolites function as ligands for an orphan nuclear receptor Tlx, essential for self-renewal of neuroprogenitors. To enable detection of the neuroprogenitors in the human brain, we developed an analytical algorithm that allows automated and objective quantitation of the 1.28ppm spectroscopic signal obtained by MRS. Using this method, we can distinguish neurogenic and non-neurogenic areas in the human brain. Further, we discovered that the neurogenic signal is associated with age and depression. Strikingly, in medication-resistant depressed individuals, electroconvulsive treatment provokes a two-fold signal increase – a leading indicator that predicts subsequent hippocampal plasticity and clinical outcome. Overall, we now have the means to study neurogenesis in the live human brain and provide new insights on the role of this process in human brain function, dysfunction and treatment response.

Selected publications:

1. [Magnetic resonance spectroscopy identifies neural progenitor cells in the live human brain.](#) Manganas LN, Zhang X, Li Y, Hazel RD, Smith SD, Wagshul ME, Henn F, Benveniste H, Djuric PM, Enikolopov G, **Maletic-Savatic** M. *Science*. 2007 Nov 9;318(5852):980-5.
2. [Adult human neurogenesis: from microscopy to magnetic resonance imaging.](#) Sierra A, Encinas JM, **Maletic-Savatic** M. *Front Neurosci*. 2011 Apr 4;5:47.