Abstracts of the 3rd Scientific Evening to be held on 12 March 2023

Oligodendroglial energy metabolism failure leads to central nervous system diseases such as multiple sclerosis.

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Abstract:

Oligodendrocytes are the myelinating cells of the central nervous system (CNS). Myelination greatly increases the speed of propagation of action potentials as it enables saltatory conduction along the axons. Moreover, it has been shown that oligodendrocytes maintain long-term axonal integrity by providing these with energy fuels. Oligodendroglial dysfunction has been associated with numerous CNS diseases, such as multiple sclerosis (MS), amyotrophic lateral sclerosis (ALS), leukodystrophies, etc. Understanding the mechanisms underlying myelin maintenance and axonal energy support is therefore of major importance.

It has been speculated that oligodendrocytes support up to 100 times their own weight in myelin, which suggests that myelin maintenance is highly demanding in terms of energy. However, the metabolic needs of oligodendroglial cells remain underexplored. While glucose has been traditionally considered as the main energy fuel for all cells, monocarboxylates, such as lactate and ketone bodies can also be used as energy substrates. In fact, in vitro and in vivo studies demonstrate that lactate sustains neuronal activity during glucose deprivation.

Our hypothesis is that lactate may also be used to fulfil energetic demands of oligodendroglia during myelin generation, maintenance, and repair. We have therefore investigated the expression of different lactate transporters (monocarboxylate transporters; MCTs) during oligodendrogenesis *in vitro* and *in vivo* and the role of these molecules in (re)myelination, oligodendrocyte survival, and myelin maintenance. For my PhD project, the aim is to investigate the effect of a specific lactate transporter, MCT2, loss of function on oligodendroglial function *in vitro* and *in vivo.* These results may have important implications for the studies of mechanisms underlying myelin loss in neurological diseases.

Memory, a trace of complexity.

Enrico Ventura, un doctorant (PhD student) à La Sapienza et École Normale Supérieure

Abstract:

Playing a tune by heart on the piano or maybe tasting a meal and recalling our childhood is not just a scene from some novel. This is memory, the ancestral capability of animals to recall past events which appears to be crucial for their survival. Yet, there are many natural non–living systems that can learn and retrieve information from their previous history. Some examples are magnets, granular materials and even water drops. Observing the nature of things seems to suggest that memory may rather belong to a more universal class of processes instead of being limited to the human conception of time. In this talk I will delineate some general traits of memory by means of the language of physics, starting from experiments in granular matter and landing at the interface between neuroscience and artificial intelligence.