Neurophysiological Mechanisms underlying the memory formation at the Medial Temporal lobe

Memory is the cognitive function by through information is encoded, stored and recalled for the purpose of learning, the process by which animals acquire and modify their skills, knowledge and behaviour.

Over the years, neuropsychological and neurobiological studies have demonstrated the existence of multiple and distinct memory systems, supported by peculiar cellular and molecular mechanisms, each of which involves specific brain regions.

As clearly shown by the clinical case of Henry Gustav Molaison (1926-2008), the famous H.M. patient, declarative (or explicit) memory, the cognitive process by through learned information requires a conscious effort to be retrieved, critically depends on the functional integrity of the Medial Temporal Lobe (MTL), a structure including both the hippocampus and the parahippocampal cortices, such as Entorhinal and Perirhinal cortex. Numerous lesion studies have been performed by researchers to identify the specific anatomical structures of the MTL, that are crucial to encode and recall explicit memories. Based on these studies, it has been shown that the Parahippocampus is fundamental to encode a specific subcategory of declarative memory, the "recognition memory", which is the ability to recognize previously encountered stimuli and identify them as familiar.

The aim of our research is to investigate, by means of electrophysiological techniques (i.e.whole-cell patch clamp recordings), the computational capabilities of the parahippocampal cortices by through nerve signals are elaborated and integrated to support memory encoding and recall.

Other Scientific Interests:
Sensory Physiology of the Vestibular System
Stem Cell Electrophysiological Characterization