

## **Single-cell electrophysiology in humans: Perception, memory, and mechanisms of seizure generation**

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Until very recently, invasive microelectrode recordings were restricted to animal electrophysiology where they have produced an immensely rich body of insight into the basic mechanisms underlying cognitive brain function. Recent recordings of single neuron activity in humans, on the other hand, have yielded unprecedented findings related to higher cognitive functions that are found specifically in humans. One key finding was that neurons in the medial human temporal lobe explicitly encode representations of our environment in the form of object categories and beyond this even abstract concepts like the identity of a person. These explicit representations of concrete and abstract semantic concepts, which are found in a brain region known to play a crucial role in the formation of declarative memories, offer a unique window to investigate the mechanisms of higher cognitive functions related to perception and memory. At the same time, these recordings, which are obtained in human epilepsy patients allow to monitor network dysfunctions leading to the emergence of the hypersynchronous activity that eventually evolves into the avalanche-like spread of excessive neural discharge activity known to cause the clinical manifestations of an epileptic seizure.

### **Projektbeteiligte**

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