# Alteration of theta-time scale dynamics of hippocampal neurons by cannabinoids is associated with spatial memory impairment

**David Robbe**
**IDIBAPS. Barcelona**

The hippocampus supports both spatial navigation and episodic memory but how these functions are specifically encoded by the firing patterns of hippocampal neurons is not well understood. The existence of various coding mechanisms underlying hippocampal functions poses the question of their respective relevance (Eichenbaum et al. 1999; Buzsáki 2005; O'Keefe and Burgess 2005; Mizumori 2006). To examine the relationship between memory, spatial representation and firing patterns of hippocampal neurons, we analyzed place cells activity recorded from the CA1 region of the hippocampus in rats engaged in a hippocampus-dependent spatial memory task (delayed alternation in a modified T- Maze), and compared the firing patterns obtained from experiments in which a reversible behavioral impairment was induced by systemic injection of the synthetic cannabinoid CP55940. This pharmacological tool was chosen because cannabinoids impair hippocampus-dependent memories in humans and rats as well as interfere with the synchrony of hippocampal network activity We found that while CP55940 impaired the rat's performance in the spatial memory task, the location-dependent firing of hippocampal neurons was largely preserved. In contrast, temporal aspects of firing patterns at theta-time scale were altered under the drug's influence. We hypothesize that precise temporal coordination of hippocampal neurons is necessary for guiding behavior in spatial memory tasks.