Abstract:
In the last decade, there has been a significant shift in hippocampal research from static tasks to dynamic environments that better model real-life animal situations in nature. At the same time, special attention has recently been paid to inhibitory parvalbumin interneurons (PVIs) that modulate hippocampal oscillations. Therefore, the aim of this work was to investigate the role of PVIs in orientation in dynamic environments, or in behavior relative to a potential threat posed by a moving object. In this context, chemogenetic methods were used to allow experimental manipulation of PVIs. In this work, we trained transgenic PV-cre rats in a robot avoidance task. Despite intensive behavioral training, the rats appeared to learn the task only very slowly. Chemogenetic activation of PVI with substance C21 resulted only in increased locomotor activity with a stable robot. The results show that C21 does not otherwise have a major effect on rat behavior, at least not with the relatively low number of hM3Dq expressed in the PVI. Based on local potential recording (LFP) results, we further showed that PVI activation had an effect on theta frequency band power.

Keywords: Behavioral task, Hippocampus, Chemogenetics, LFP, Parvalbumin, Robot