P023 Working memory deficit and increased theta oscillations in metabotropic glutamate receptor 7 KO mice

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Metabotropic glutamate receptors (mGluRs) are known to play a role in synaptic plasticity and learning. Here, we report the effect of mGluR7 gene ablation in different learning tasks and EEG activity. In the acoustic startle response, no differences were seen between KO mice and wild-type littermates in prepulse inhibition, prepulse facilitation, and habituation. No differences were seen between genotypes neither in an open field test in motor activity, exploratory and fearful behaviour. However, when increasing the demands on working-memory in a 4-arm and 8-arm maze task, KO mice committed more WM errors than WT littermates (ANOVA $p>0.0001$) persistently for all 9 days of the experiment. In a 4-arm maze with 2 arms baited, KO and wild-type mice committed the same number of LTM errors, but KOs committed more WM errors ($p>0.001$). When recording EEGs in the hippocampus of mice during performance of a 4 arm maze task, Theta band activity (6-12Hz) but not Gamma (30-40) or Delta (0-2Hz) activity was highly increased in KO mice ($p>0.0001$). Altogether, these findings suggest that a lack of mGluR7 mainly impairs WM but not LTM performance while having no effect on sensorimotor processing, non-associative learning, or spatial orientation. The results also suggest that mGluR7 are involved in modulating and controlling Theta activity but not Delta or Gamma oscillations, and that Theta oscillations play a crucial functional role in WM formation and maintenance.