Effects of adult enriched environment on cognition, hippocampal-prefrontal plasticity and NMDAR subunit expression in MK-801-induced schizophrenia model

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Schizophrenia is a mental disorder characterized by psychosis, negative symptoms and cognitive impairment. Cognitive deficits are enduring and represent the most disabling symptom but are currently poorly treated. N-methyl D-aspartate receptor (NMDAR) hypofunction hypothesis has been notably successful in explaining the pathophysiological findings and symptomatology of schizophrenia. Thereby, NMDAR blockade in rodents represents a useful tool to identify new therapeutic approaches. In this regard, enriched environment (EE) could play an essential role. Using a multilevel approach of behavior, electrophysiology and protein analysis, we showed that a short-term exposure to EE in adulthood ameliorated spatial learning and object-place associative memory impairment observed in postnatally MK-801-treated Long Evans rats. Moreover, EE in adult life restored long-term potentiation (LTP) in hippocampal-medial prefrontal pathway abolished by MK-801 treatment. EE in adulthood also induced a set of modifications in the expression of proteins related to glutamatergic neurotransmission. Taken together, these findings shed new light on the neurobiological effects of EE to reverse the actions of MK-801 and offer a preclinical testing of a therapeutic strategy that may be remarkably effective for managing cognitive symptoms of schizophrenia. © 2019

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Rats

Rats, Long-Evans

Receptors, N-Methyl-D-Aspartate

Schizophrenia