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NMDA OR 5-HT RECEPTOR ANTAGONISTS IMPAIR MEMORY RECONSOLIDATION AND INDUCE VARIOUS TYPES OF AMNESIA

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Highlights

NMDA or serotonin receptor antagonists paired with reminder-induced amnesia
At an early (1 and 3 days) amnesia phase, the retraining was facilitated
In the late phase (10 and 30 days), NMDA-dependent amnesia was resistant to retraining
In the late phase, 5-HT-dependent amnesia retraining caused memory formation

Abstract

Elucidation of amnesia mechanisms is one of the central problems in neuroscience with immense practical application. Previously, we found that conditioned food presentation combined with injection of a neurotransmitter receptor antagonist or protein synthesis inhibitor led to amnesia induction. In the present study, we investigated the time course and features of two amnesias: induced by impairment of memory reconsolidation using an NMDA glutamate receptor antagonist (MK-801) and a serotonin receptor antagonist (methiothepin, MET) on snails trained with food aversion conditioning. During the early period of amnesia (<10th day), the unpaired presentation of conditioned stimuli (CS) or unconditioned stimuli (US) in the same training context did not have an effect on both types of amnesia. Retraining a on1st or 3rd day of amnesia induction facilitated memory formation, i.e. the number of CS+US pairings was lower than at initial training. On the 10th or 30th day after the MET/reminder, the number of CS+US pairings did not change between initial training and retraining. Retraining on the 10th or 30th day following the MK-801/reminder in the same or a new context of learning resulted in short, but not long-term, memory, and the number of CS+US pairings was higher than at the initial training. This type of amnesia was specific to the CS we used at initial training, since long-term memory for another kind of CS could be formed in the same snails. The attained results suggest that disruption of memory reconsolidation using antagonists of serotonin or NMDA glutamate receptors induced amnesias with different abilities to form long-term memory during the late period of development.