Role of medial septal GABAergic neurons in learning and extinction

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were tested in the reference memory version prior to the working memory version. Another group of rats was assessed in a lever press avoidance task. In this task, a tone (warning signal) was presented at the start of a trial. If a lever press occurred less than sixty seconds from the start of the trial, the warning signal was terminated and an intertrial interval signaled by a flashing light began with a duration of three minutes; this constituted an avoidance response. If a lever press did not occur prior to sixty s from the start of the trial, intermittent foot shock (0.5-second shock every three seconds) was delivered and continued until a lever press or five minutes occurred. Either lever press or the end of the five-minute duration resulted in termination of the warning signal and foot shock and the start of the intertrial interval. A session consisted of twenty trials, each session occurring three times a week. Acquisition of the lever press avoidance procedure was followed by extinction sessions in which the foot shock was not delivered. Following behavioral testing, immunocytochemistry was performed to assess the damage produced by GAT1-SAP.

Intraseptal GAT1-SAP reduced the number of GABAergic septohippocampal neurons containing the calcium-binding protein, parvalbumin (Figure 1A).[2] The number of cholinergic neurons, identified by the presence of choline acetyltransferase, was not markedly affected. Behaviorally, GAT1-SAP did not alter performance on the reference memory version of the water maze (data not shown), but did impair learning in the working memory version (Figure 1B). The pattern of results was similar to that following MSDB damage with kainic acid.[8] In the avoidance procedure, GAT1-SAP did not alter acquisition (Figure 2) but impaired extinction of the avoidance response (Figure 2). Overall, the results support the view that damage of GABAergic MSDB neurons enhances proactive interference and perseveration, possibly by interfering with hippocampal theta rhythm.[12]

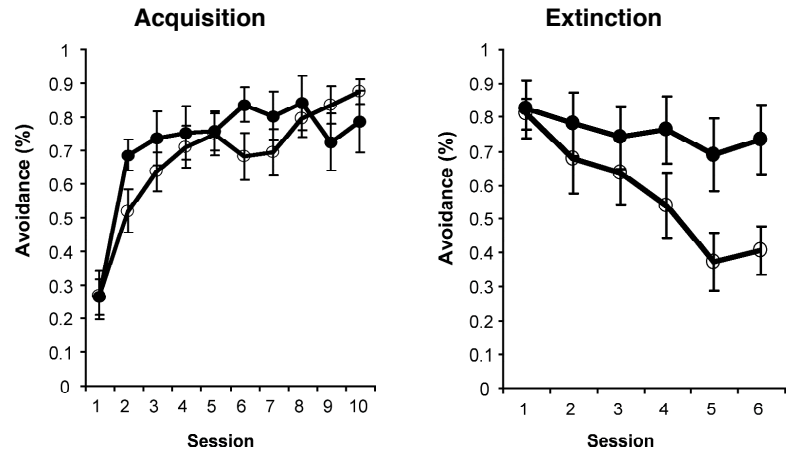

Figure 2. Extinction but not acquisition of an active avoidance response was impaired by intraseptal GAT1-SAP.

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