Electroconvulsive seizure before conditioning inhibits fear memory formation

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Many studies report that the electroconvulsive seizure (ECS) administered immediately after the training (fear conditioning) impairs the memory formation. In contrast, there are only few studies asking whether or not the ECS before the training influence the learning. Here, we trained mice by fear conditioning and investigated which timing of the ECS abrogates the memory formation. Contextual and auditory memories were tested 1 h, 24 h, and 8 d after the conditioning to assess the formation of short-term (STM) and long-term memories (LTM). The ECS 2 h before the conditioning caused a decrease in contextual-freezing, but did not affect the auditory-freezing, when the memory was tested 24 h after the conditioning. However, the ECS 2 h before the conditioning did not decrease in either contextual- or auditory-freezing, when the memory was tested 1 h after the conditioning. In addition, the ECS 2 h before the conditioning did not affect the contextual- or auditory-freezing, when the memory was tested 8 days after the conditioning. The data suggest that the ECS 2 h before the conditioning inhibits the transition from the contextual STM to the LTM one. As the ECS strongly induces various immediate-early genes, some of the gene products might be involved in the abrogation of the transition of the STM to the LTM.