

Frontiers in Behavioral Neuroscience, July 2014 | volume 8 | Article 231 | page 1 ~13

Impairment in extinction of contextual and cued fear following post-training whole body irradiation.

Reid H. J. Olsen, Tessa Marzulla and Jacob Raber

Most efforts to study the effects of radiation on this process have utilized paradigms, wherein animals are irradiated well before learning and memory tests with interesting results. Less is known about the earliest radiation effects on the brain. To address the question of how radiation exposure might affect the processing and recall recently acquired memories, they performed a fear conditioning paradigm wherein animals were trained, and subsequently irradiated (whole-body X-ray irradiation) 24 h later. Animals were given 2 weeks to recover, and were tested for retention and the extinction of hippocampus dependent contextual fear conditioning or hippocampus independent cued fear conditioning. They showed that cued freezing levels and measures of anxiety 2 weeks after training were also higher in irradiated than sham-irradiated mice. In contrast to contextual freezing levels cued freezing levels were even higher in irradiated mice receiving 5 shock during training than sham-irradiated mice receiving 10 shocks during training, and the extinction of contextual fear were more profound than those on cued fear. In this study, they showed that enhanced fear memory, reduced extinction, and enhanced anxiety levels in mice that received whole body irradiation following acquisition of fear conditioning 2 weeks earlier.