Abstract:

A single exposure to a severe stressor (either cold swim or inescapable shock) impairs subsequent performance in a shuttle avoidance-escape task (1), a deficit attributed to reduction in brain noradrenergic activity produced by these stressors. In the present paper, two experiments are described which examine how repeated exposure to such stressors affects (a) shuttle avoidance-escape performance (Experiment 1), and (b) aspects of brain norepinephrine metabolism (Experiment 2). Experiment 1 showed that, whereas subjects receiving the single exposure to cold swim or shock showed a large avoidance-escape deficit, subjects that received repeated exposure to these stressors for 14 days performed similarly to the control group that received no stressor. Experiment 2 showed that, whereas subjects that received one session of the inescapable shock stressor showed a lower level of norepinephrine in hypothalamus and cortex than did subjects that received no shock, subjects that received repeated exposure to inescapable shock or cold swim showed neurochemical "habituation." Subjects that received repeated shock showed elevated tyrosine hydroxylase activity and no depletion of norepinephrine level, and both repeated shock and cold swim caused a decrease in uptake of 3H-norepinephrine by slices of cortex in vitro. Thus, it is concluded that the behavioral and neurochemical changes that were observed after the stressful conditions studied are consistent with the hypothesis that changes in avoidance-escape responding following exposure to these stressful events are due to changes in brain noradrenergic activity