



## Effects of physical and psychological stressors on behavior, macrophage activity, and Ehrlich tumor growth.

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The present study analyzed the effects of physical and psychological stressors on behavior, immune function, and serum corticosterone in mice. Adult mice were submitted once daily, for 6 days to one of the following conditions: escapable (ES) or inescapable (IS) footshocks (0.2 mA) signaled by a tone cue or to a psychological stressor (PS) generated through the use of a communication box; in this box, mice received no footshock but were exposed to responses delivered by IS mice. Results showed that IS and PS: (1). decreased locomotor activity observed in an open-field; (2). decreased number of entries into the open arms and decreased time spent in the exploration of the open arms of the plus-maze; (3). decreased macrophage spreading and phagocytosis; (4). increased macrophage H<sub>2</sub>O<sub>2</sub> release; and (5). increased growth of the ascitic form of Ehrlich tumor. Behavioral and/or immunological changes were not observed after ES; this absence of effects, however, might not be attributed solely to footshock controllability since mice of groups ES and IS differed with respect to the psychological setting used and the amount of shock they received. An increase of serum corticosterone concentrations was also observed in the stressed mice of all groups; this increment was higher in animals of group IS. These data provide evidence that inescapable footshock and psychological stressors alter, at the same time and in mice, stress levels, macrophage activity, and Ehrlich tumor growth. They also show that ES and PS induced similarly elevated serum corticosterone concentrations, but significantly differ in the immunological and behavioral outcomes they produced in mice. These findings suggest that another factor besides HPA axis activation might be responsible for behavioral and immunological consequences of IS and PS in mice. It is proposed that the final neural link between behavioral and immunological changes observed after physical and psychological stressors might involve catecholaminergic systems within the central nervous system and/or sympathetic autonomic nerve fibers and also opioid peptides.

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