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Psychoneuroendocrine Influences on Immunocompetence and Neoplasia

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"Stress" is a widely used term for describing emotional and biological responses to novel or threatening situations. There is, thus, an extensive variety of experimental or other circumstances in which "stress" serves as a convenient word to express complex and incompletely understood psychological and physiological phenomena (*1–3*).

In studies at this laboratory, we use the term "stress" in a more restricted experimental sense to relate specific stress-inducing stimuli, or stressors, to their physiological consequences. The latter include specific biochemical, cellular, and tissue alterations that are associated with an emotional activation of the adrenal cortex by way of the pituitary and its secretion of adrenocorticotropic hormone (*4, 5*). Within the biological systems that we have used, several key parameters characterize the physiological manifestations of stress, and relate to pathological and other changes that may be observed in stressed experimental animals.

Although emotional stress brings about many biochemical changes, in our studies with mice we have focused our attention on the adrenal cortex and have measured with precision the most conspicuous, and what appears to be the most relevant, of the biochemical substances elaborated by this organ in response to anxiety, namely, corticosterone. Immediately after an animal is subjected to an emotional stimulus, or perceives a situation that generates anxiety, the adrenal cortex in response to signals from the hypothalamus, via the pituitary, produces increased quantities of corticosterone. The rapidity of the appearance of corticosterone in the plasma can be readily measured by appropriate microassay techniques (*6–8*).

Immunological and Pathological Consequences of Stress

Secondary manifestations that result from increased corticosterone in the blood plasma that are readily observed include (i) lymphocytopenia, or decreased circulating lymphocytes, (ii) thymus involution, and (iii) related loss of tissue mass of the spleen and peripheral lymph nodes. Details of these cellular and tissue stress effects will be discussed later, but it is relevant to note here that the physiological consequences of such stress-mediated events have significant

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