Hypertension and the Nature of Stress

Friedman and Iwai (1) showed that psychic stress can produce some degree of hypertension in rats. This effect was shown in rats that give a strong hypertensive reaction to excessive salt ingestion but not in rats that were not selected for this characteristic. Friedman and Iwai conclude that ‘‘there is insufficient evidence to allow attributing to stress a primary etiological role in essential hypertension.’’

The failure of Friedman and Iwai to produce hypertension in unselected rats agrees with other studies in which electrical shock or other unpleasant physical stimuli were used as stressors; in these studies it proved difficult to demonstrate marked lasting changes in blood pressure (2). Other studies, however, have demonstrated lasting and clear changes in blood pressure after exposure to stress. How do the studies that show such changes differ from those which do not? It appears that the nature of the stressor is important. If the experimental animals are confronted with conspecifics (3) or species enemies (4) in agonistic encounters, marked and lasting hypertensive reactions can be shown. Such reactions may be highly specific, as suggested by the opposing responses of the iliac artery of a cat confronted with another cat or a dog (5). In some species, local vascular responses to agonistic encounters with conspecifics can be extremely strong.

Tree shrews, for instance, may die of uremia after repeated exposure to such encounters; the uremia was presumably caused by severe and lasting constriction of the renal arteries (6).

Different stressors are probably not equally effective in activating the mechanism underlying hypertension. One dimension along which stressors can differ is in the type and intensity of emotional reactions they produce (7). It may be argued that as far as the experimental production of hypertension through psychic stress is concerned, stress imposed by physical means, such as electrical shock, is less effective in eliciting strong appropriate emotional reactions than stress imposed through encounters with species enemies or conspecifics. Thus, in establishing an animal model of hypertension produced by psychic stress it may prove useful to take into account the differential sensitivity of mechanisms underlying hypertension to stressors differing in nature.
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