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MOTION STRESS-RELATED CHANGES IN PLASMA HORMONES

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1. The present experiments were carried out to develop a radioimmunoassay for the measurement of dopamine- β -hydroxylase (DBH) and to investigate the effect of motion stress on noradrenaline, adrenaline, cortisol and ATCH levels in plasma.

2. A sensitive and precise radioimmunoassay for bovine DBH was developed. However, the anti-bovine DBH antibody did not react well with adrenal DBH of several animals (dogs, guinea pigs and rats). Therefore, this assay was not suitable for any DBH protein assay other than bovine DBH.

3. Control animals were sacrificed within 1 min after transfer from the home cage. Guinea pigs catheterized chronically to collect blood samples were killed by a blow on the head 4 days after the surgical operation to study the effects of the operation on plasma hormones. There were no significant differences in plasma hormones and adrenal catecholamine contents between catheterized and control animals.

4. In chronically catheterized animals, the motion stimulus induced time-dependent increases in plasma noradrenaline, cortisol and ATCH but not adrenaline. However, in animals killed by a blow, the motion stimulus induced increases in all plasma hormones. The increase in plasma adrenaline was probably due to the effect of the blow.

5. Plasma noradrenaline and adrenaline were not increased by motion stress in reserpine- or guanethidine-treated animals. Neither reserpine nor guanethidine inhibited increases in plasma cortisol and ACTH in response to motion stress.

6. Guinea pigs were placed back in the home cage for 120 min after exposure to the first motion stress for 20 min, and then the second stress was applied. The second stress increased plasma levels of noradrenaline, cortisol and ACTH in a magnitude similar to the first stress.

7. The second motion stress was applied after treatment with antimotion sickness drugs. Scopolamine did not inhibit increases in noradrenaline, cortisol and ACTH in plasma in response to motion stress. Diphenhydramine tended to inhibit increases of these plasma hormones.

8. These results indicate that the motion stimulus activates the sympathetic nerves more than the adrenal medullae and the activity of the pituitary-adrenal-cortical axis also participates in this response. The effects of antimotion sickness drugs on responses to motion stress were discussed.