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PLASMA ACTH IN BULBUS SUPERIOR VENAE JUGULARIS AND BIOLOGICAL HALFLIFE OF ENDOGENOUS ACTH

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Plasma ACTH activities were determined by the Lipscomb-Nelson technique. In our modification of the technique a linear response of corticosterone secretion per 8 min. to doses from 0.01 to 1.00 mU ACTH was obtained (limit of sensivity: 0.015 mU, index of precision: $\lambda = 0.19$).

Using this assay 15 patients with elevated plasma ACTH levels have been studied (7 m. Addison, 7 adrenalectomy for Cushing's-syndrome, 1 adreno-genital syndrome). Blood was drawn 10 min. after puncture of bulbus superior venae jugularis and of the cubital vein, and plasma prepared by refrigerated centrifugation within 5—8 min. and kept frozen until determination, performed no more than 3—4 days later. In these 15 patients ACTH levels were 0.600 mU/ml plasma (number of determinations: $n = 39$) in bulbi sup.v.j. and 0.377 mU/ml ($n = 38$) in cubital veins, the mean difference being significant ($p < 0.01$). Plasma ACTH levels are higher in bulbus sup.v.j. than in the cubital vein by a quotient (Δ ACTH) calculated when the amount of ACTH secreted by the pituitary during one half-life for ACTH (numerator) is divided by the plasma volume passing the bulbi sup.v.j. within one half-life (numerator). The mean biological half-life of endogenous ACTH was calculated as 53.8 min. using the equation:

$$\Delta \text{ ACTH} = \frac{0.5 \times \begin{bmatrix}\text{Volume of}\\ \text{distribution}\\ \text{ACTH}\end{bmatrix} \times \begin{bmatrix}\text{Peripheral}\\ \text{ACTH level}\end{bmatrix}}{\begin{bmatrix}\text{Cerebral plasma}\\ \text{flow per min.}\end{bmatrix} \times \begin{bmatrix}\text{Biological}\\ \text{halflife ACTH}\end{bmatrix}}$$

where:

Δ ACTH = difference of plasma ACTH levels from bulbus sup.v.j. and cubital vein

Peripheral ACTH level = ACTH in cubital vein.

Values for volume of distribution of ACTH and for cerebral plasma flow have been adopted from the literature (*Scriba et al.* 1966; 1967).

Arterio-venous differences have been determined in 8 of the above patients. The means of plasma ACTH levels were 0.612 mU/ml (femoral artery, $n = 24$) and 0.452 mU/ml (cubital vein, $n = 21$). The mean a.v. difference was significant ($p < 0.025$).

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