Short Report

Effect of Corticosterone and Cortisol on Corticosteroidogenesis in Isolated Rat Adrenal Cells

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ABE, K. AND HIROSE, T. Effect of Corticosterone and Cortisol on Corticosteroidogenesis in Isolated Rat Adrenal Cells. Tohoku J. exp. Med., 1974, 112 (2), 195-196 —— Isolated rat adrenal cells were incubated with corticosterone or cortisol in the presence of ACTH. When the corticosterone production in the absence of exogenous corticoids was taken as 100%, it was decreased to 77±3 and 62±4% by the addition of 1.0 and 2.0 µg of corticosterone to 1 ml of incubation medium, respectively. However, the same concentration of cortisol did not show any inhibitory effect on corticosterone production. —— isolated rat adrenal cell; negative feedback on corticosteroidogenesis; negative feedback at the adrenal level

It has been reported that the exogenous adrenal steroids have inhibitory effects on corticosteroidogenesis at the adrenal level (Birmingham and Kurlents 1958; Peron et al. 1960; Black et al. 1961; Fukui et al. 1961; Fekete and Görög 1963). However, the results of these studies are not in agreement with one another. As a cause of this discrepancy the differences in experimental conditions may be considered. Therefore, in the present investigation the effect of exogenous corticosterone and cortisol on corticosterone production was studied by the use of isolated rat adrenal cells in order to control experimental conditions exactly.

Suspension and incubation of the rat adrenal cells were carried out by a modification of the method of Sayers et al. (1971). The adrenals from male adult rats of the Wistar strain were suspended by agitating with a glass paddle at 450 rpm for 15 min in 0.25% trypsin. Cell suspensions from five 15 min-dispersions were filtered through 4-fold of siliconized gauze and centrifuged at 100 × g for 25 min at 4°C. The pellet was resuspended and aliquots of 1 ml of resuspended cells (10⁶ cells/ml) were incubated in the presence of various concentrations of corticoids and 100 µU of ACTH. After incubation for 2 hours 5.0 ml of methylene chloride were added to each incubate. The mixture was shaken and filtered through Whatman filter 1 PS (phase separating paper). The quantity of corticosterone in the filtrate was measured by the fluorescent method of Silber et al. (1958). The quantity of corticosterone produced by ACTH was calculated as the difference in the quantity of corticosterone between in the presence of ACTH and in the absence of ACTH. The precision of this method was calculated in the manner described by Brown et al. (1957). The 95% confidence interval was ±0.03 µg for the measurement of 1 µg of corticosterone in an incubate and ±0.04 µg for 2 µg.

In the absence of exogenous corticoids, 0.35±0.02 µg (mean±S.E.M. of 10 experiments) of corticosterone was produced in an incubate by 100 µU of ACTH. The addition of 0.4 and 0.8 µg of corticosterone to incubation medium did not affect the production of corticosterone. When the corticosterone production in the absence of exogenous corticoids was taken as 100%, it was significantly (P<0.001) decreased to 77±3 and 62±4% by the addition of 1.0 and 2.0 µg of corticosterone, respectively. These concentrations (1-2 µg/ml) are in the range of those found in rat adrenal vein plasma (Cheifetz et al.

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Fig. 1. Effect of exogenous corticosterone and cortisol on corticosterone production by 100 μU of ACTH. The production of corticosterone on the absence of exogenous corticoids was taken as 100% (mean ± S.E.M. of 8 experiments).

1969). On the other hand, the corticosterone production was decreased to 95±1, 97±4 and 89±5% by the addition of 0.8, 1.0 and 2.0 μg of cortisol, respectively. This decrease was, however, not significant (Fig. 1). These results suggest that the corticosterone production may also be controlled by the negative feedback mechanism at the adrenal level.

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References