Protective effects of glucocorticoid on luteinizing hormone secretion under stress conditions

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It has been accepted that reproductive function is suppressed under stress conditions due to stress-induced secretion of glucocorticoids (GC) from adrenal glands. We have previously reported, however, that GC counteract the suppressive effects of TNF-α on both pulsatile and surge secretion of LH, suggesting that GC may have a protective effect on reproductive function under stress conditions. In the present study, we further examined the possible protective effect of GC on both LH pulse and surge under various acute stress conditions. Adrenal-intact and adrenalectomized (ADX) female rats were used in all the experiments. Three different stressors, i.e. infectious (LPS 0.5 μg/kg), hypoglycemic (2-DG 100 mg/kg) or restraint stressors, were applied, and the influences of these stressors to LH pulses in ovariectomized rats and preovulatory LH surge in intact rats were observed. Blood was taken every 5 min for 3 h for the observation of LH pulses and every 1 h from 1200 to 2000 for that of LH surges, followed by determination of serum LH level by RIA. A part of ADX animals were treated with corticosterone (CORT; 25 mg/kg) at the same time of giving stressors. Furthermore, indomethacin (IND; 10 mg/kg) was injected instead of CORT at the observation of LH pulse. In adrenal-intact animals, serum CORT was increased by stressors whereas both secretion patterns of LH were only partially suppressed. On the other hand, ADX remarkably enhanced the suppressive effects of all the stressors on both LH pulse and surge. CORT treatment on ADX rats significantly attenuated the effect of the stressors on both types of LH secretion. These results indicated that increase of endogenous GC is necessary for maintenance of LH secretion under stress conditions. Moreover, IND had a similar effect on LH pulses to CORT, suggesting that prostaglandins suppress reproductive functions as a common mediator of various stressors and that the protective effects of CORT on LH pulses are exerted by suppressing the synthesis of prostaglandins.