

Journal of Andrology, Vol 16, Issue 1 18-27, Copyright © 1995 by The American Society of Andrology

JOURNAL ARTICLE

Effects of lipoprotein, equine luteinizing hormone, equine follicle-stimulating hormone, and equine prolactin on equine testicular steroidogenesis in vitro

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A stallion testicular cell incubation system was developed and used to investigate the regulation of steroidogenesis in stallion testes. Cells isolated from testes of 2- to 4-year-old stallions ($n = 6$) were cultured for 12 hours in a defined medium with and without varying doses of lipoprotein, equine luteinizing hormone (eLH), human chorionic gonadotropin (hCG), equine follicle-stimulating hormone (eFSH), and/or equine prolactin (ePRL). Estrogen conjugate (EC), testosterone (T), and estradiol-17 beta (E2) production were determined by RIA. Increasing doses of lipoprotein significantly ($P < 0.001$) increased basal, hCG- and eLH-stimulated EC production, resulting in a maximal fourfold increase in each case. A maximal dose of lipoprotein (3 mg/ml) significantly ($P < 0.001$) increased basal T production threefold, whereas hCG- and eLH-stimulated T production were increased 76- and 30-fold, respectively. In the presence of 0.5 mg/ml of lipoprotein, increasing doses of eLH significantly ($P < 0.001$) stimulated EC, T, and E2 production. The increase in T production (5.6-fold) at a physiological dose of eLH (5 ng/ml) was significantly ($P < 0.05$) greater than the increase in EC or E2 production (2.1- and 2.3-fold, respectively). However, the total mass of EC produced was significantly greater ($P < 0.05$) than the total amount of T produced at both basal (15 ng vs. 148 pg) or hormone-stimulated (48 ng vs. 2,427 pg at 5 ng/ml eLH) levels. hCG significantly ($P < 0.001$) stimulated EC and T production and was 82-fold more active in stimulating EC production and 41-fold more active in stimulating T production than was eLH. FSH had no significant effect on steroidogenesis either alone or in the presence of eLH, except at the highest dose tested (50 ng/ml), which was above the physiological level of circulating FSH (4-7 ng/ml) in the stallion. PRL (1-50 ng/ml) had no significant effect on steroidogenesis either alone or in the presence of eLH. These data suggest that in the postpubertal stallion, both estrogen and T production are regulated by LH, and this regulation appears to be dependent on the availability of lipoprotein-derived cholesterol. Furthermore, the observation that testicular cells produced a larger mass of EC than T, but responded to eLH with a larger relative increase in T production, suggests that production of these two steroids may be independently regulated.

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