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JOURNAL ARTICLE

Differential actions of gonadotropin-releasing hormone and human chorionic gonadotropin on interstitial fluid volume and immunoglobulin G concentrations in adult rat testis

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Gonadotropin-releasing hormone (GnRH) agonists regulate testicular interstitial fluid (tIF) volume, most probably via specific receptors on Leydig cells. The aim of this study was to confirm the interaction between GnRH and Leydig cells in regulation of testicular fluid, and to examine the effects on serum proteins in testis. Unilateral intratesticular injection of a GnRH agonist (100 ng/testis) caused a 50% reduction in tIF volume within 2 hours. Destruction of Leydig cells by treatment with ethane dimethane sulfonate also caused a similar decline in tIF volume; however, GnRH agonist treatment had no additional influence on this response in Leydig cell-depleted testes. GnRH agonist treatment had no effect on serum protein permeability in testis as indicated by maintenance of the tIF/serum immunoglobulin G (IgG) concentration gradient. Injection of human chorionic gonadotropin (hCG, 100 IU) had no effect on tIF volume at 2 hours, but increased the permeability of the testicular vasculature to serum IgG. At 20 hours after hCG injection, tIF volume was increased twofold, while the testicular permeability barrier to IgG appeared to have been restored. These data indicate that the acute inhibitory action of GnRH on vascular fluid permeability is dependent upon Leydig cells, confirming that these cells are the primary site of GnRH action on testicular vasculature. The data also indicate that supraphysiological doses of hCG cause a rapid increase in testicular permeability to serum proteins, which occurs prior to the well-characterized stimulation of tIF volume. These data provide further evidence that the concentration of serum proteins in tIF and the volume of tIF are both under regulatory control involving Leydig cells, but are independently regulated.