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JOURNAL ARTICLE

Hormonal regulation of spermatogenesis in the hypophysectomized rat: cell viability after hormonal replacement in adults after intermediate periods of hypophysectomy

A. El Shennawy, R. J. Gates and L. D. Russell
Department of Physiology, Southern Illinois University, School of Medicine, Carbondale 62901-6512, USA.

A quantitative analysis of germ-cell populations in normal, hypophysectomized (Hx), and Hx-hormone-treated animals was undertaken during periods of regression that were characterized as intermediate, between short-term and long-term regression of the testis. Twenty-one groups of adult rats were administered either follicle-stimulating hormone (FSH), growth hormone, thyroid-stimulating hormone (TSH), or testosterone (T) in various doses and combinations. The dosage of T administered was less than that expected to achieve maximum testis weight. Flutamide and Casodex were used to compete with androgen binding to receptors in Hx animals, as it is known that small amounts of androgen are secreted in the absence of pituitary stimulation. Follicle-stimulating hormone, T, and TSH all significantly maintained testis weight as compared with Hx controls, although FSH and T, singly or in combination, were the most effective. Contamination of the TSH preparation with trace amounts of FSH was apparently responsible for the slight maintenance of testis weight. A novel assay for determination of the numbers of viable germ cells was used in a subset of these groups to determine the cellular sites of FSH and T action. Numbers of type A spermatogonia were lowered after Hx and were maintained by either FSH or T or a combination of these hormones. Other phases of germ-cell development most susceptible to FSH and/or T were the successive conversions of type A spermatogonia to intermediate spermatogonia, intermediate spermatogonia to type B spermatogonia, preleptotene spermatocytes to pachytene spermatocytes, and early pachytene spermatocytes to intermediate maturity pachytene spermatocytes during early and midcycle phases of pachytene spermatocyte development. Germ-cell loss during meiosis and virtually every phase of spermatid development was largely prevented by FSH or T or a combination of these hormones. Thus, in testes in advanced stages of regression, both FSH and T were capable of preventing cell loss, suggesting that both hormones can affect the survival of the same cell type. The present study demonstrated that FSH can partially compensate for lowered T levels. The combined administration of FSH and T was more effective in preventing overall cell degeneration than either hormone alone. Unlike the initial phase of spermatogenesis, in which there is a largely midcycle loss of germ cells due to Hx, the loss of cells during testis regression is more widespread and impacts several cell types in more than one stage of the spermatogenic cycle.

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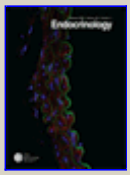

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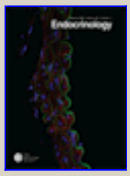

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