Journal of Andrology, Vol 19, Issue 3 335-340, Copyright © 1998 by The American Society of Andrology

JOURNAL ARTICLE

Hormonal regulation of spermatogenesis in the hypophysectomized rat: quantitation of germ-cell population and effect of elimination of residual testosterone after long-term hypophysectomy

L. R. Franca, G. G. Parreira, R. J. Gates and L. D. Russell
Department of Physiology, Southern Illinois University, School of Medicine, Carbondale 62901-6512, USA.

Spermatogenesis continues after long-term hypophysectomy (Hx), but massive cell degeneration prevents seminiferous tubules from attaining the full complement of cells. One objective of this study was to determine the vulnerable sites for completion of spermatogenesis in long-term Hx rats. It is now known that Leydig cells continue to secrete small amounts of androgen after Hx. A second objective was to determine the cellular sites that are maintained by residual androgen secreted by Leydig cells post-Hx. Two groups of adult animals were utilized. Both groups were Hx for 36 days, but one group of rats received the androgen antagonist flutamide during the 26th through the 36th day of Hx (10 days). Germ-cell numbers were quantified using a method that allowed their expression as numbers of cells present per hour of development. In the long-term Hx rat, the germ-cell population increased to preleptotene, but the divisions that led to preleptotene were inefficient due to cell degeneration. Subsequent to preleptotene, there was a gradual loss in cells such that there were few germ cells remaining by steps 9-13. Flutamide given to Hx rats did not result in a significant difference in the numbers of intermediate and type B spermatogonia or significant differences in progenitor cells. A significant and major depression of cell numbers in Hx-flutamide-treated rats occurred in the cell division of type B spermatogonia to form preleptotene spermatocytes. There was a less dramatic, although significant, depression of cell numbers in Hx-flutamide-treated animals that occurred from preleptotene until late pachytene as well as an increased loss of round spermatids at midcycle (step 5-6). These data demonstrate that cell loss after long-term Hx occurs at numerous phases of spermatogenesis. The data also demonstrate that the presence of residual androgen action after long-term Hx results in enhanced germ-cell survival. Although the major blockage in cell viability occurs at midcycle steps in the long-term Hx rat, there are several other hormone-sensitive phases of spermatogenesis.

This article has been cited by other articles:

Reproduction HOME

T. J Kaitu'u-Lino, P. Sluka, C. F H Foo, and P. G Stanton
Claudin-11 expression and localisation is regulated by androgens in rat Sertoli cells in vitro
Reproduction, June 1, 2007; 133(6): 1169 - 1179.
[Abstract] [Full Text] [PDF]

MOLECULAR ENDOCRINOLOGY HOME

S. M. Eacker, J. E. Shima, C. M. Connolly, M. Sharma, R. W. Holdcraft, M. D. Griswold, and R. E. Braun
Transcriptional Profiling of Androgen Receptor (AR) Mutants Suggests Instructive and Permissive Roles of AR Signaling in Germ Cell Development
Mol. Endocrinol., April 1, 2007; 21(4): 895 - 907.
[Abstract] [Full Text] [PDF]

Proceedings of the National Academy of Sciences HOME

M.-Y. Tsai, S.-D. Yeh, R.-S. Wang, S. Yeh, C. Zhang, H.-Y. Lin, C.-R. Tzeng, and C. Chang
Differential effects of spermatogenesis and fertility in mice lacking androgen receptor in individual testis cells
PNAS, December 12, 2006; 103(50): 18975 - 18980.
[Abstract] [Full Text] [PDF]

Journal of Endocrinology HOME

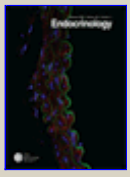
S. J Meachem, D. M Robertson, N. G Wreford, R. I McLachlan, and P. G Stanton
Oestrogen does not affect the restoration of spermatogenesis in the gonadotrophin-releasing hormone-immunised adult rat
J. Endocrinol., June 1, 2005; 185(3): 529 - 538.
[Abstract] [Full Text] [PDF]

JOURNAL OF MOLECULAR ENDOCRINOLOGY HOME

M Vigier, M Weiss, M H Perrard, M Godet, and P Durand
The effects of FSH and of testosterone on the completion of meiosis and the very early steps of spermiogenesis of the rat: an in vitro study
J. Mol. Endocrinol., December 1, 2004; 33(3): 729 - 742.
[Abstract] [Full Text] [PDF]

Development HOME

R. W. Holdcraft and R. E. Braun
Androgen receptor function is required in Sertoli cells for the terminal differentiation of haploid spermatids
Development, January 15, 2004; 131(2): 459 - 467.
[Abstract] [Full Text] [PDF]



Endocrinology HOME

M. Haywood, J. Spaliviero, M. Jimemez, N. J. C. King, D. J. Handelsman, and C. M. Allan
Sertoli and Germ Cell Development in Hypogonadal (hpg) Mice Expressing Transgenic Follicle-Stimulating Hormone Alone or in Combination with Testosterone
Endocrinology, February 1, 2003; 144(2): 509 - 517.
[Abstract] [Full Text] [PDF]

BIOLOGY *of* REPRODUCTION HOME

L. R. França, M. C. Leal, E. Sasso-Cerri, A. Vasconcelos, L. Debeljuk, and L. D. Russell

Cimetidine (Tagamet) Is a Reproductive Toxicant in Male Rats Affecting Peritubular Cells

Biol Reprod, November 1, 2000; 63(5): 1403 - 1412.

[Abstract] [Full Text]