



Journal of Andrology, Vol 17, Issue 4 382-393, Copyright © 1996 by The American Society of Andrology

JOURNAL ARTICLE

The effects of recombinant FSH on testosterone-induced spermatogenesis in gonadotrophin-deficient (hpg) mice

J. Singh and D. J. Handelsman

Andrology Unit, Royal Prince Alfred Hospital, Sydney, NSW, Australia.

In order to clarify the mechanism of synergism between follicle-stimulatory hormone (FSH) and testosterone (T) in the hormonal regulation of spermatogenesis, we studied the effects of recombinant human FSH (rhFSH) on the induction of spermatogenesis by testosterone in congenitally gonadotropin-deficient hpg mice. Weanling (day 21) homozygous hpg mice were administered daily subcutaneous injections of 1, 5, or 10 IU of rhFSH alone or in combination with a subdermal testosterone implant until day 70 of age. Spermatogenesis was quantitated by stereological estimation of germ cell populations and Sertoli cells as well as measurement of diameter of seminiferous tubules and their lumina in perfusion-fixed testes and by counting homogenization-resistant condensed testicular spermatids. Recombinant human FSH alone increased the absolute numbers of spermatogonia (x3.5-fold) and spermatocytes (x3-fold) compared with untreated hpg mice but did not significantly increase Sertoli cell numbers or form any condensed spermatids or tubular lumen. Relative to Sertoli cell numbers, rhFSH alone increased populations of spermatogonia (x2-fold) and spermatocytes (x2-fold). The addition of T to rhFSH further increased the absolute numbers of spermatogonia (x5-fold) and spermatocytes (x3.5-fold) compared with untreated hpg mice as well as increasing tubular diameter and forming tubular lumina. In addition administration of T allowed the completion of spermatogenesis in the presence of intratesticular T levels that were approximately 2% of non-hpg controls. All effects of the FSH + T combination were however no greater than the effects of the equivalent dose of T alone. The present study therefore indicates that rhFSH alone increases proliferation of premeiotic spermatogenic cells but has no effect on the completion of spermiogenesis or on Sertoli cell maturation. Furthermore we were unable to identify any additive effects of FSH with T in the hormonal regulation of spermatogenesis in the hpg mouse. This suggests that FSH or T both may stimulate initial spermatogenic development, but only T can complete spermiogenesis.

This article has been cited by other articles:

This Article

- ▶ [Full Text \(PDF\)](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)

Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)

Citing Articles

- ▶ [Citing Articles via HighWire](#)
- ▶ [Citing Articles via Google Scholar](#)

Google Scholar

- ▶ [Articles by Singh, J.](#)
- ▶ [Articles by Handelsman, D. J.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Singh, J.](#)
- ▶ [Articles by Handelsman, D. J.](#)



Endocrinology

▶ HOME

D. R. Goldman-Johnson, D. M. de Kretser, and J. R. Morrison
Evidence that Androgens Regulate Early Developmental Events,
Prior to Sexual Differentiation

Endocrinology, January 1, 2008; 149(1): 5 - 14.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



BIOLOGY of REPRODUCTION

▶ HOME

O. E Chausiaux, M. H Abel, F. O Baxter, W. T Khaled, P. J.I Ellis, H. M
Charlton, and N. A Affara

Hypogonadal Mouse, a Model to Study the Effects of the Endogenous
Lack of Gonadotropins on Apoptosis

Biol Reprod, January 1, 2008; 78(1): 77 - 90.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Proceedings of the National Academy of Sciences

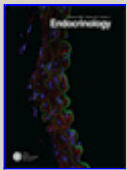
▶ HOME

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.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Endocrinology

▶ HOME

G. Shetty, C. C. Y. Weng, K. L. Porter, Z. Zhang, P. Pakarinen, T. R.
Kumar, and M. L. Meistrich

Spermatogonial Differentiation in Juvenile Spermatogonial Depletion
(jsd) Mice with Androgen Receptor or Follicle-Stimulating Hormone
Mutations

Endocrinology, July 1, 2006; 147(7): 3563 - 3570.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



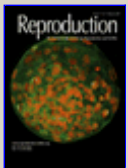
Reproduction

▶ HOME

R Rathi, A Honaramooz, W Zeng, R Turner, and I Dobrinski
Germ cell development in equine testis tissue xenografted into
mice.

Reproduction, June 1, 2006; 131(6): 1091 - 1098.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Reproduction

▶ HOME

H. Baines, M. O Nwagwu, E. C Furneaux, J. Stewart, J. B Kerr, T. M
Mayhew, and F. J P Ebling

Estrogenic induction of spermatogenesis in the hypogonadal (hpg)
mouse: role of androgens

Reproduction, November 1, 2005; 130(5): 643 - 654.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



BIOLOGY of REPRODUCTION

▶ HOME

Y. Wang, H. Newton, J. A. Spaliviero, C. M. Allan, B. Marshan, D. J.
Handelsman, and P. J. Illingworth

Gonadotropin Control of Inhibin Secretion and the Relationship to
Follicle Type and Number in the hpg Mouse

Biol Reprod, October 1, 2005; 73(4): 610 - 618.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



HUMAN REPRODUCTION UPDATE

▶ HOME

N. Sofikitis, E. Pappas, A. Kawatani, D. Baltogiannis, D. Loutradis, N. Kanakas, D. Giannakis, F. Dimitriadis, K. Tsoukanelis, I. Georgiou, *et al.*
Efforts to create an artificial testis: culture systems of male germ cells under biochemical conditions resembling the seminiferous tubular biochemical environment
Hum. Reprod. Update, May 1, 2005; 11(3): 229 - 259.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Endocrinology

▶ HOME

C. M. Allan, A. Garcia, J. Spaliviero, F.-P. Zhang, M. Jimenez, I. Huhtaniemi, and D. J. Handelsman
Complete Sertoli Cell Proliferation Induced by Follicle-Stimulating Hormone (FSH) Independently of Luteinizing Hormone Activity: Evidence from Genetic Models of Isolated FSH Action
Endocrinology, April 1, 2004; 145(4): 1587 - 1593.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



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.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

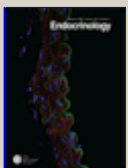


BIOLOGY of REPRODUCTION

▶ HOME

J. A. Spaliviero, M. Jimenez, C. M. Allan, and D. J. Handelsman
Luteinizing Hormone Receptor-Mediated Effects on Initiation of Spermatogenesis in Gonadotropin-Deficient (hpg) Mice Are Replicated by Testosterone
Biol Reprod, January 1, 2004; 70(1): 32 - 38.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Endocrinology

▶ HOME

M. Haywood, J. Spaliviero, M. Jimenez, 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.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of ANDROLOGY

▶ HOME

J. Singh, L. Young, D. J. Handelsman, and Q. Dong
Prostate Epithelial Expression of a Novel Androgen Target Gene
J Androl, September 1, 2002; 23(5): 652 - 660.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



BIOLOGY of REPRODUCTION

▶ HOME

A. Tohda, K. Matsumiya, Y. Tadokoro, K. Yomogida, Y. Miyagawa, K. Dohmae, A. Okuyama, and Y. Nishimune
Testosterone Suppresses Spermatogenesis in Juvenile Spermatogonial Depletion (jsd) Mice
Biol Reprod, August 1, 2001; 65(2): 532 - 537.

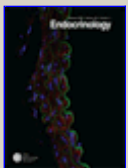
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



ENDOCRINE REVIEWS

▶ HOME

L. O'Donnell, K. M. Robertson, M. E. Jones, and E. R. Simpson
Estrogen and Spermatogenesis
Endocr. Rev., June 1, 2001; 22(3): 289 - 318.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Endocrinology

▶ HOME

C. M. Allan, M. Haywood, S. Swaraj, J. Spaliviero, A. Koch, M. Jimenez, M. Poutanen, J. Levallet, I. Huhtaniemi, P. Illingworth, *et al.*
A Novel Transgenic Model to Characterize the Specific Effects of Follicle-Stimulating Hormone on Gonadal Physiology in the Absence of Luteinizing Hormone Actions
Endocrinology, June 1, 2001; 142(6): 2213 - 2220.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



MOLECULAR ENDOCRINOLOGY

▶ HOME

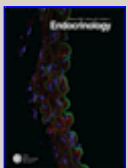
F.-P. Zhang, M. Poutanen, J. Wilbertz, and I. Huhtaniemi
Normal Prenatal but Arrested Postnatal Sexual Development of Luteinizing Hormone Receptor Knockout (LuRKO) Mice
Mol. Endocrinol., January 1, 2001; 15(1): 172 - 183.
[\[Abstract\]](#) [\[Full Text\]](#)



Endocrinology

▶ HOME

F. J. P. Ebling, A. N. Brooks, A. S. Cronin, H. Ford, and J. B. Kerr
Estrogenic Induction of Spermatogenesis in the Hypogonadal Mouse
Endocrinology, August 1, 2000; 141(8): 2861 - 2869.
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Endocrinology

▶ HOME

D. J. Handelsman, J. A. Spaliviero, J. M. Simpson, C. M. Allan, and J. Singh
Spermatogenesis without Gonadotropins: Maintenance Has a Lower Testosterone Threshold than Initiation
Endocrinology, September 1, 1999; 140(9): 3938 - 3946.
[\[Abstract\]](#) [\[Full Text\]](#)

[HOME](#) [HELP](#) [FEEDBACK](#) [SUBSCRIPTIONS](#) [ARCHIVE](#) [SEARCH](#) [TABLE OF CONTENTS](#)

Copyright © 1996 by The American Society of Andrology.