

Journal of Andrology, Vol 15, Issue 4 302-308, Copyright © 1994 by The American Society of Andrology

JOURNAL ARTICLE

Acute immobilization stress disrupts testicular steroidogenesis in adult male rats by inhibiting the activities of 17 alpha-hydroxylase and 17,20-lyase without affecting the binding of LH/hCG receptors

T. E. Orr, M. F. Taylor, A. K. Bhattacharyya, D. C. Collins and D. R. Mann

Department of Physiology, Morehouse School of Medicine, Atlanta, Georgia 30310-1495.

We have investigated the effect of acute immobilization (3 hours) stress on testicular steroidogenesis in the adult rat. Immobilization did not alter plasma luteinizing hormone (LH) levels, but plasma testosterone (T) levels were reduced by 82%. Plasma levels of corticosterone in stressed rats were elevated more than ninefold over control levels. After 3 hours of stress, testicular levels of progesterone were elevated 33%, and levels of 17 alpha-hydroxyprogesterone and T were reduced 47% and 37%, respectively, compared to controls. Immobilization for 3 hours had no effect on the association or dissociation rate constants of LH/human chorionic gonadotropin (hCG) receptors of testicular interstitial cells and did not alter specific hCG binding. The effect of 3 hours of immobilization on testicular 17 alpha-hydroxylase and 17,20-lyase was assessed by incubating testicular microsomes from stressed and control animals in the presence of $^{21}[^{14}C]$ progesterone and $[^3H]$ 17 alpha-hydroxyprogesterone. Immobilization of rats reduced the V_{max} values of 17 alpha-hydroxylase and 17,20-lyase by 47% and 48%, respectively, but had no effect on the K_m values. These results support the hypothesis that stress for 3 hours disrupts rat testicular steroidogenesis via a mechanism that is independent of changes in circulating levels of LH and the binding characteristics of LH/hCG receptors. The effects of immobilization on the content of testicular steroids and on the activities of 17 alpha-hydroxylase and 17,20-lyase suggest that stress inhibits the activities of both 17 alpha-hydroxylase and 17,20-lyase.

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 Orr, T. E.](#)
- ▶ [Articles by Mann, D. R.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Orr, T. E.](#)
- ▶ [Articles by Mann, D. R.](#)



Endocrinology

[HOME](#)

C. L. Rivier

Urocortin 1 Inhibits Rat Leydig Cell Function

Endocrinology, December 1, 2008; 149(12): 6425 - 6432.

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

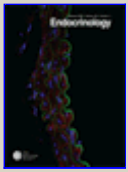


L. J Martin and J. J Tremblay

Glucocorticoids antagonize cAMP-induced Star transcription in Leydig cells through the orphan nuclear receptor NR4A1

J. Mol. Endocrinol., September 1, 2008; 41(3): 165 - 175.

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

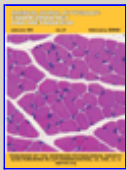


D. Meffre, A. Pianos, P. Liere, B. Eycheenne, A. Cambourg, M. Schumacher, D. G. Stein, and R. Guennoun

Steroid Profiling in Brain and Plasma of Male and Pseudopregnant Female Rats after Traumatic Brain Injury: Analysis by Gas Chromatography/Mass Spectrometry

Endocrinology, May 1, 2007; 148(5): 2505 - 2517.

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



B. A. Weissman, C. M. Sottas, P. Zhou, C. Iadecola, and M. P. Hardy
Testosterone production in mice lacking inducible nitric oxide synthase expression is sensitive to restraint stress

Am J Physiol Endocrinol Metab, February 1, 2007; 292(2): E615 - E620.

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



J. N. Stellflug

Comparison of cortisol, luteinizing hormone, and testosterone responses to a defined stressor in sexually inactive rams and sexually active female-oriented and male-oriented rams

J Anim Sci, June 1, 2006; 84(6): 1520 - 1525.

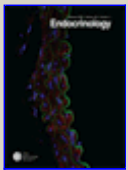
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Q. Dong, A. Salva, C. M. Sottas, E. Niu, M. Holmes, and M. P. Hardy
Rapid Glucocorticoid Mediation of Suppressed Testosterone Biosynthesis in Male Mice Subjected to Immobilization Stress

J Androl, November 1, 2004; 25(6): 973 - 981.

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

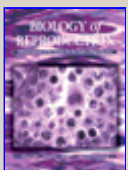


D. J. Selvage and C. Rivier

Importance of the Paraventricular Nucleus of the Hypothalamus as a Component of a Neural Pathway between the Brain and the Testes that Modulates Testosterone Secretion Independently of the Pituitary

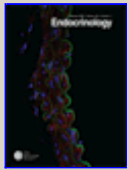
Endocrinology, February 1, 2003; 144(2): 594 - 598.

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



M. P. Hardy, C. M. Sottas, R. Ge, C. R. McKittrick, K. L. Tamashiro, B. S. McEwen, S. G. Haider, C. M. Markham, R. J. Blanchard, D. C. Blanchard, *et al.*

Trends of Reproductive Hormones in Male Rats During Psychosocial Stress: Role of Glucocorticoid Metabolism in Behavioral Dominance
Biol Reprod, December 1, 2002; 67(6): 1750 - 1755.



Endocrinology

▶ HOME

S. Lee, R. Miselis, and C. Rivier

Anatomical and Functional Evidence for a Neural Hypothalamic-Testicular Pathway that Is Independent of the Pituitary

Endocrinology, November 1, 2002; 143(11): 4447 - 4454.

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



BIOLOGY of REPRODUCTION

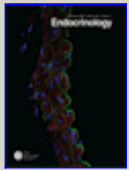
▶ HOME

C. E. Roselli, F. Stormshak, J. N. Stellflug, and J. A. Resko

Relationship of Serum Testosterone Concentrations to Mate Preferences in Rams

Biol Reprod, July 1, 2002; 67(1): 263 - 268.

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



Endocrinology

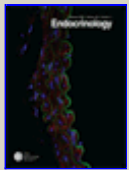
▶ HOME

G.-M. Wang, R.-S. Ge, S. A. Latif, D. J. Morris, and M. P. Hardy

Expression of 11 β -Hydroxylase in Rat Leydig Cells

Endocrinology, February 1, 2002; 143(2): 621 - 626.

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



Endocrinology

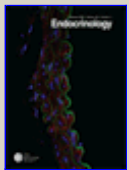
▶ HOME

H.-B. Gao, M.-H. Tong, Y.-Q. Hu, Q.-S. Guo, R. Ge, and M. P. Hardy

Glucocorticoid Induces Apoptosis in Rat Leydig Cells

Endocrinology, January 1, 2002; 143(1): 130 - 138.

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



Endocrinology

▶ HOME

K. Ogilvie and C. Rivier

The Intracerebroventricular Injection of Interleukin-1 β Blunts the Testosterone Response to Human Chorionic Gonadotropin: Role of Prostaglandin- and Adrenergic-Dependent Pathways

Endocrinology, July 1, 1998; 139(7): 3088 - 3095.

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