Journal of Andrology, Vol 19, Issue 6 761-768, Copyright © 1998 by The American Society of Andrology

JOURNAL ARTICLE

A pharmacokinetic study of injectable testosterone undecanoate in hypogonadal men

G. Y. Zhang, Y. Q. Gu, X. H. Wang, Y. G. Cui and W. J. Bremner

National Research Institute for Family Planning (World Health Organization Collaborating Center for Research in Human Reproduction), Beijing, People's Republic of China.

Testosterone undecanoate (TU) provides testosterone (T) replacement for hypogonadal men when administered orally but requires multiple doses per day and produces widely variable serum T levels. We investigated the pharmacokinetics of a newly available TU preparation administered by intramuscular injection to hypogonadal men. Eight patients with Klinefelter's syndrome received either 500 mg or 1,000 mg of TU by intramuscular injection; 3 months later, the other dose was given to each man (except to one, who did not receive the 1,000-mg dose). Serum levels of reproductive hormones were measured at regular intervals before and after the injections. Mean serum T levels increased significantly at the end of the first week, from less than 10 nmol/L to 47.8+/-10.1 and 54.2+/-4.8 nmol/ L for the lower and higher doses, respectively. Thereafter, serum T levels decreased progressively and reached the lower-normal limit for adult men by day 50 to 60. Pharmacokinetic analysis showed a terminal elimination half-life of 18.3+/-2.3 and 23.7+/-2.7 days and showed a mean residence time of 21.7+/-1.1 and 23.0+/-0.8 days for the lower and higher doses, respectively. The area under the serum T concentration-time curve and the T-distribution value related to serum T concentration were significantly higher following the 1,000-mg dose than following the 500-mg dose. The 500-mg dose, when given as the second injection, yielded optimal pharmacokinetics (defined as mean peak T values not exceeding the normal range and persistence of normal levels for at least 7 weeks), suggesting that repeated injections of 500 mg at 6-8-week intervals may provide optimal T replacement. The mean serum levels of estradiol were normalized following the injections, and prolactin levels were normal throughout the study. Significant decrease of serum luteinizing hormone (LH) and follicle-stimulating hormone (FSH) levels was observed, with the decrease in LH levels being more pronounced. There were no significant differences in serum LH and FSH levels between the two doses. Sex hormone-binding globulin (SHBG) levels before any T therapy were near the upper limit of normal for adult men and were reduced by approximately 50% just prior to the second dose of TU. The decreased SHBG levels produced by the first TU injection could have led to lower peak total T levels and to a more rapid clearance of T following the second TU injection. We conclude that single-dose injections of TU to hypogonadal men can maintain serum T concentration within the normal range for at least 7 weeks without immediately apparent side effects. It is likely that this form of T would require injections only at 6-8-week or longer intervals, not at the 2-week intervals necessary with

currently used T esters (enanthate and cypionate). This injectable TU preparation may provide improved substitution therapy for male hypogonadism and, in addition, may be developed as an androgen component of male contraceptives.

This article has been cited by other articles:

ENDOCRINE REVIEWS HOME

S. T. Page, J. K. Amory, and W. J. Bremner
Advances in Male Contraception
Endocr. Rev., June 1, 2008; 29(4): 465 - 493.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

C. Wang, Y.-G. Cui, X.-H. Wang, Y. Jia, A. Sinha Hikim, Y.-H. Lue, J.-S. Tong, L.-X. Qian, J.-H. Sha, Z.-M. Zhou, *et al.*
Transient Scrotal Hyperthermia and Levonorgestrel Enhance Testosterone-Induced Spermatogenesis Suppression in Men through Increased Germ Cell Apoptosis
J. Clin. Endocrinol. Metab., August 1, 2007; 92(8): 3292 - 3304.
[Abstract] [Full Text] [PDF]

Journal of ANDROLOGY HOME

A. Qoubaitary, C. Meriggiola, C. M. Ng, L. Lumbreras, S. Cerpolini, G. Pelusi, P. D. Christensen, L. Hull, R. S. Swerdloff, and C. Wang
Pharmacokinetics of Testosterone Undecanoate Injected Alone or in Combination With Norethisterone Enanthate in Healthy Men
J Androl, November 1, 2006; 27(6): 853 - 867.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

Y.-q. Gu, J.-s. Tong, D.-z. Ma, X.-h. Wang, D. Yuan, W.-h. Tang, and W. J. Bremner
Male Hormonal Contraception: Effects of Injections of Testosterone Undecanoate and Depot Medroxyprogesterone Acetate at Eight-Week Intervals in Chinese Men
J. Clin. Endocrinol. Metab., May 1, 2004; 89(5): 2254 - 2262.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

D. J. Handelsman
Hormonal Male Contraception--Lessons from the East When the Western Market Fails
J. Clin. Endocrinol. Metab., February 1, 2003; 88(2): 559 - 561.
[Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

Y.-Q. Gu, X.-H. Wang, D. Xu, L. Peng, L.-F. Cheng, M.-K. Huang, Z.-J. Huang, and G.-Y. Zhang
A Multicenter Contraceptive Efficacy Study of Injectable Testosterone Undecanoate in Healthy Chinese Men
J. Clin. Endocrinol. Metab., February 1, 2003; 88(2): 562 - 568.
[Abstract] [Full Text] [PDF]

ENDOCRINE REVIEWS HOME

R. A. Anderson and D. T. Baird
Male Contraception
Endocr. Rev., December 1, 2002; 23(6): 735 - 762.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

I. T. G. Gonzalo, R. S. Swerdloff, A. L. Nelson, B. Clevenger, R. Garcia, N. Berman, and C. Wang
Levonorgestrel Implants (Norplant II) for Male Contraception Clinical Trials: Combination with Transdermal and Injectable Testosterone
J. Clin. Endocrinol. Metab., August 1, 2002; 87(8): 3562 - 3572.
[Abstract] [Full Text] [PDF]

Journal of ANDROLOGY HOME

S. von Eckardstein and E. Nieschlag
Treatment of Male Hypogonadism With Testosterone Undecanoate Injected at Extended Intervals of 12 Weeks: A Phase II Study
J Androl, May 1, 2002; 23(3): 419 - 425.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

A. Kamischke, T. Heuermann, K. Kruger, S. von Eckardstein, I. Schellschmidt, A. Rubig, and E. Nieschlag
An Effective Hormonal Male Contraceptive Using Testosterone Undecanoate with Oral or Injectable Norethisterone Preparations
J. Clin. Endocrinol. Metab., February 1, 2002; 87(2): 530 - 539.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

A. Vermeulen
Androgen Replacement Therapy in the Aging Male--A Critical Evaluation
J. Clin. Endocrinol. Metab., June 1, 2001; 86(6): 2380 - 2390.
[Full Text] [PDF]

HUMAN REPRODUCTION HOME

D. J. Handelsman, S. Wishart, and A. J. Conway
Oestradiol enhances testosterone-induced suppression of human spermatogenesis
Hum. Reprod., March 1, 2000; 15(3): 672 - 679.
[Abstract] [Full Text] [PDF]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM HOME

A. Kamischke, S. Venherm, D. Plöger, S. von Eckardstein, and E. Nieschlag
Intramuscular Testosterone Undecanoate and Norethisterone Enanthate in a Clinical Trial for Male Contraception
J. Clin. Endocrinol. Metab., January 1, 2000; 86(1): 303 - 309.
[Abstract] [Full Text]

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM

G.-y. Zhang, Y.-q. Gu, X.-h. Wang, Y.-g. Cui, and W. J. Bremner

A Clinical Trial of Injectable Testosterone Undecanoate as a Potential Male Contraceptive in Normal Chinese Men

J. Clin. Endocrinol. Metab., October 1, 1999; 84(10): 3642 - 3647.

[Abstract] [Full Text] [PDF]