J. Reprod. Fert., Suppl. **44** (1991), 666-667

Printed in Great Britain
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GnRH facilitates copulatory behaviour in geldings treated with testosterone

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Introduction

There is growing evidence that gonadotrophin releasing hormone (GnRH) plays an important role in the regulation of sexual behaviour in animals and man. Facilitatory effects on lordosis behaviour have been reported in ovariectomized, oestrogen-treated female rodents (Moss & McCann, 1973; Luttge & Sheets, 1977) and on copulatory behaviour in castrated, testosterone- (T) treated male rodents (Moss *et al.*, 1975; Boyd & Moore, 1985). In all cases, GnRH effects on reproductive behaviour appear to be dependent on the presence of gonadal steroid. GnRH given intravenously (i.v.) to stallions with inadequate sexual behaviour improves their sexual arousal within minutes of administration (McDonnell et *al.*, 1987). In another experiment, GnRH affected pre-copulatory behaviour of T-treated pony geldings (McDonnell et al., 1989). The present experiment was designed to evaluate GnRH effects on copulatory behaviour in geldings with and without testosterone replacement.

Materials and methods

Fifteen mixed-breed pony geldings aged 2.5-20 years were used. Animals were selected for low levels of residual, stallion-like sexual behaviour and gelding lev els of circulating T (< 0.1 ng/ml) before and after i.v. administration of 50 ug GnRH (Cystorelin; CEVA Laboratones, Overland Park, Kansas).

Eight geldings were treated with a low dose of T (5 ug/kg, subcutaneously [s.c.], every other day). beginning 12 days before GnRH treatment was started. This regimen yielded very low (non-detectable) plasma levels of T. The remaining geldings were given oil injections on the same schedule. Half of each group (T-GnRH group, n=4; GnRH group, n=4) was treated with GnRH (25 ug, s.c., every 3 h, for 12 days). The other half of each group (T group, n=4; C group, n=3) received injections of sterile water on the same schedule.

Sexual behaviour was evaluated in 6 standard trials conducted every other day during GnRH treatment. In each trial, the subject was walked from the stall to the test pen (2.7 X 5.5 m) where he was released to interact for 10 min with an oestrous mare tethered in the corner. Trial stallions were selected at random. Pre-copulatory and copulatory responses of the geldings were recorded, using a computer event recorder, and the following behavioural measures were derived: frequencies of (a) sniffing the mare, (b) sniffing the ground, (c) total sniffing, (d) total nipping or biting, (e) flehmen response, (f) vocalization, (g) total pre-copulatory responses (sniffing, nuzzling, licking, biting, vocalization), (h) penis drop, (i) erection, (j) mount, (k) mount with erection and (l) ejaculation; latencies and durations of (m) penis drop. (n) erection, (o) mount, (p) mount with erection and (q) total attention duration. In addition, overall sexual response of each animal was ranked (1-15) for each trial, based on ejaculation, mount and erection frequencies, latencies and durations.

Statistical analyses were performed on transformed data, using square root of (x+0.5) (flehmen response frequency, vocalization frequency, total mount frequency, mount with erection frequency, mount with erection duration, total mount duration, penis drop frequency, penis drop duration, erection frequency, erection duration), natural 1ogX (mount with erection latency) or natural log(x+l) (penis drop latency, erection latency and mount latency).

Results

The 8 T-treated animals showed increased sexual response over baseline. None of the animals not receiving T showed significant changes in sexual behaviour from baseline (dependent *t* test, $P > 0.05$). Animals treated with T plus GnRH showed significantly shorter latencies to penis drop, erection, mount and mount with erection, as well as greater frequencies and durations of erection, mount and mount with

erection than stallions treated with T only (repeated measures ANOVA, $P < 0.05$). Ejaculation frequency was greater for the T-GnRH group than for the T group (Chi square, $P < 0.05$). Similarly, sexual behaviour ranks also were significantly higher for the T-GnRH group than for the T group (Kruskal-Wallis and Mann-Whitney rank tests, $P < 0.01$).

Discussion

These results support the hypothesis that GnRH fills an extra-endocrine role, which facilitates male sexual behaviour. Of 21 behavioural measures analyzed, 12 were significantly affected by GnRH (enhanced sexual arousal and response). Consistent with previous findings, the presence of gonadal steroid was required for these effects, although the level of testosterone replacement was extremely low in this study. Gonadotrophin mediation of behavioural effects was not addressed here. However, studies using hypophysectomized rats (Pfaff, 1973) or an endocrine-inactive fragment of GnRH (Dudley & Moss, 1988), indicate that gonadotrophins are not required for GnRH effects on sexual behaviour.

This project was sponsored by the Dorothy Russell Havemeyer Foundation and conducted at the Georgia and Philip Hofmann Center for Animal Reproduction Research. Cystorelin was provided by CEVA, with the assistance of E. Henderson.

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