

INDUCED OVULATIONS IN ADULT HYSTERECTOMIZED RATS

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Summary. The influence of the removal of the uterus and of the interruption of its vascular supply on the ovulatory response to pregnant mare serum gonadotrophin (PMSG) and human chorionic gonadotrophin (HCG) was studied in adult female rats. Both procedures significantly decreased the proportion of rats ovulating after PMSG/HCG treatment. In intact animals, the number of ova shed differed when PMSG was administered at different stages of the oestrous cycle but no such relationship existed in operated rats.

The presence of the uterus can influence ovarian function (Bland & Donovan, 1966; Anderson, 1968; Clemens, Minaguchi & Meites, 1968). Exogenous gonadotrophins can induce ovulation in both immature and mature rats but the number of ova released is much higher in 3- to 5-week-old, than in older, animals (Zarrow & Wilson, 1961; France & Pincus, 1964). To test whether the presence of a functionally mature uterus is of significance in determining the number of ova shed in response to gonadotrophin treatment, ovulations were induced with PMSG and HCG in intact and hysterectomized mature rats.

Young adult (approximately 180 g) female rats of the Charles River CD strain were divided into three groups: (1) intact, (2) bilaterally hysterectomized, and (3) sham-operated, i.e. with the vascular supply of the uterus interrupted by blunt dissection or sutures in the same way as in Group 2 but with uterine horns left *in situ*. Seven to 14 days after surgery, the animals received 30 i.u. of PMSG (Equinex) at 08.30 hours followed by 25 i.u. HCG (APL Chorionic Gonadotropin) 2 days later at 16.30 hours. On the following day, between 13.30 and 15.00 hours, the animals were killed, ova were removed from the oviducts and counted, and pituitaries, uteri and ovaries were weighed. The injections, PMSG s.c. and HCG i.p., were administered in 0.1 ml volume; the solutions were stored frozen until used. Vaginal smears were taken daily throughout the experiments.

The results obtained in animals operated on during different stages of the oestrous cycle did not differ and therefore the data were pooled for calculations.

Ovulation was induced in all but two intact females. The incidence of ovulations following the PMSG/HCG treatment in hysterectomized and in sham-operated females was significantly lower than in intact controls ($\chi^2 = 5.45$; $P < 0.02$).

Intact rats treated with PMSG and HCG released, on average, 14.1 ± 1.1 ova. Untreated, adult females of the same strain, maintained under the same environmental conditions, ovulated 14.4 ± 0.7 ova (R. E. Urzua, personal communication). The mean number of ova shed was not significantly altered by hysterectomy or sham operation (Table 1). Intact females injected with PMSG in pro-oestrus ovulated an average of 13.4 ± 2.8 ova, those injected in oestrus

TABLE 1
OVULATION IN MATURE HYSTERECTOMIZED RATS TREATED
WITH PMSG AND HCG

Treatment	No. of rats	No. of rats ovulating	Mean no. of ova \pm S.E.
Intact	37	35	14.1 ± 1.1
Hysterectomized	42	32*	12.7 ± 1.0
Vessels interrupted	24	17*	15.3 ± 1.1

* Significantly different from intact controls ($P < 0.02$).

15.6 ± 1.5 ova, in di-oestrus, Day 1, 17.7 ± 1.9 ova, in di-oestrus, Day 2, 9.5 ± 1.3 ova. (These values represent the mean \pm S.E.) The difference between females injected in di-oestrus, Day 2, and females injected during any of the remaining stages of the cycle was significant ($P < 0.01$ by Student's *t* test on crude and on square root transformed data). In hysterectomized and in sham-operated females, the timing of PMSG injection had no noticeable influence on the number of ova shed. The mean weights of pituitaries, ovaries and uteri were not changed in any of the groups.

In a batch of six rats (two intact, two hysterectomized and two sham-operated), the ova counts were much higher than in over 100 remaining animals: sixty-seven and seventy-three ova in intact females and twenty to sixty (mean thirty-five) ova in operated females. These animals are not included in Table 1.

The results of this work indicate that, in adult female rats, the presence of the uterus and/or the integrity of its vascular supply may influence the ovulatory response to moderate doses of PMSG and HCG. The mean number of ova was not changed but the proportion of females ovulating was significantly reduced in hysterectomized and in sham-operated groups. Moreover, in intact females, the mean number of ova shed appeared to depend on the stage of the oestrous cycle when the treatment was initiated but there was no evidence of such relationship in hysterectomized or sham-operated animals.

An isolated observation of several very high ova counts indicates that adult female rats treated with PMSG and HCG can occasionally release as many ova as are usually observed in similarly treated immature rats.

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