Short Communication

THE RESPONSE OF THE PIG UTERUS TO OXYTOCIN AT DIFFERENT STAGES IN THE OESTRUS CYCLE

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KNAUS (1926) showed that the uterus of the pregnant rabbit was insensitive to doses of Pituitrin which were sufficient to elicit large contractions in the non-pregnant state. This effect was later shown to be due to the influence of progesterone. But this difference in response between pregnant and non-pregnant uteri did not hold for some other species; thus in the rat and guinea-pig, the uterus responds to posterior pituitary extract (Pituitrin) in the gravid and non-gravid state. The evidence is reviewed by Reynolds (1949).

Adams (1940) tentatively suggested that in the sow, progesterone increases the sensitivity of the myometrium to posterior pituitary extract (Pituitrin). The present investigation was carried out in order to examine further this apparent anomaly.

MATERIALS AND METHODS

Fresh pig uteri were collected from a nearby abattoir. A longitudinal strip was cut from one horn of each uterus, a circular strip from the cervix, and each strip suspended in a 10 ml. tissue bath containing oxygenated Tyrode solution at 39°. Each strip was connected by a thread to a lever to give a 10 × magnification of the contractions recorded on a smoked drum.

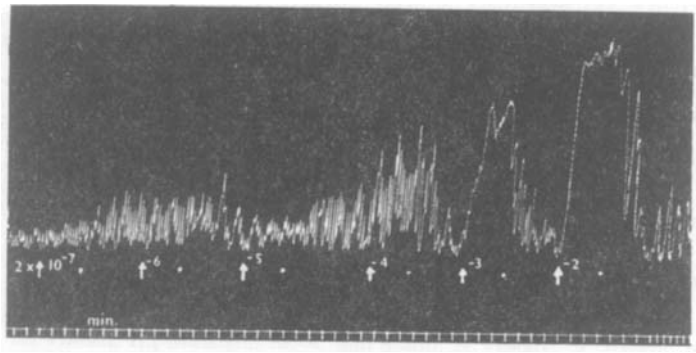

FIG. 1. Responses to oxytocin of a logitudinal strip from the body of a uterus in the luteal phase of the oestrus cycle. Oxytocin (units) was added to a 10 ml. bath at the times indicated by the arrows and washed out at the dots. The last three doses of oxytocin produced a rise in the base line, and this was therefore scored as a 50 per cent response.

After setting up each preparation, 1½ hr. was allowed to elapse for the uterine contractions to become regular before any drug was added to the bath. Oxytocin B.P. (Pitocin, Parke-Davis) was then added in increasing concentrations from 2×10^{-7} to 2×10^{-2} so that each uterus was tested with six different concentrations of drug (Fig. 1).

The response of each uterus was recorded as the number of times that a rise in the base line or an increased frequency of contraction was observed after the addition of each concentration of drug to the bath; this was scored as a percentage response. The stage in the oestrus cycle of each uterus was assessed by Corner's method (1921) which is based on histological examination of the uterus and corpora lutea. It was possible in this way to compare the response of uteri to oxytocin at various stages of the oestrus cycle and of pregnancy.

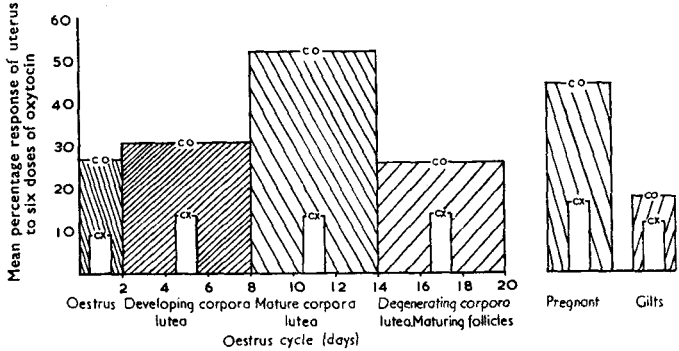

FIG. 2. The response of the cervix (cx) and body (co) of the pig uterus to oxytocin at different stages of the oestrus cycle and in pregnancy.

RESULTS AND DISCUSSION

Fifty-three sow uteri were examined, 50 at various stages of the oestrus cycle and 3 in early pregnancy; 15 uteri from immature gilts were also studied. The results (Fig. 2) show that uteri taken from animals between the 8th and 14th day of the oestrus cycle were the most sensitive. Since this is the phase at which the uterus is under the full influence of progesterone, it is clear that the sow uterus is more sensitive in the presence of this hormone than when under the influence of oestrogens. This is further supported by the evidence that uteri of pregnant sows were more sensitive than those of immature gilts in which the corpus luteum had not yet developed. In all cases the response of the body of the uterus was more sensitive than that of the cervix.

These results are in general agreement with those reported by Adams who used Pituitrin—presumably an extract of posterior pituitary gland containing both oxytocin and vasopressin. It is clear therefore that the response of the pig uterus, unlike that of the rabbit is enhanced in the presence of progesterone. This is probably an example of species difference in response to drugs. An important point to establish is whether the pig uterus under the influence of progesterone responds more effectively to oxytocin than to vasopressin and further work is in progress to investigate this using synthetic oxytocin and vasopressin.

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The paper was presented by THE AUTHOR.