It has been reported that ovarian vesicles in ovariectomy can be induced experimentally by injection of ACTH (Lipton, 1970; Close and Lipton, 1975; Lipton and Bailey, 1979), progesterone (Ulber et al., 1981; Harker et al., 1984) or indomethacin (Hornstein et al., 1979). The present authors (Kawata and Tanaka, 1980) suggested that HCG also seems to be potent to induce ovarian vesicles in ovariectomy.

This paper deals with the effects of HCG administered to cyclic or non-cyclic pigs on ovarian morphology and serum concentrations of progesterone (P) and estradiol-17β (E2).  

Fourteen sows and two gilts were allotted to several experimental groups as described below. Blood samples (10 ml) were taken from Penn carotid arteries before and during the course of experiment every day or 2-3 days apart. The blood was placed for 2 hours at room temperature and then centrifuged (3,000 g, 10 minutes). Sera obtained were kept at -20°C until serum estradiol was carried out. The serum P level was measured by enzyme immunoassay (Ohnishi et al., 1980), and the serum P level by radioimmunoassay (Kohno, 1975).

Three sows in the follicular phase (Group A) were intra muscularly injected 2,000-4,000 IU of HCG. The ovaries were examined by serial palpation during the course of the experiment. On 4.3 days after the injection, the ovaries reached a small-ovary size, developing 7-8 cystic follicles, 1-2.2 cm in diameter. These cystic follicles lasted for 4.3 days, and then regressed. The estrous cycle was prolonged only 2 days. Fluorescent stage of estrus P and P levels after treatment were similar to those in the previous normal cycle.

Three sows in the luteal phase (Group B) were intra muscularly injected 2,000-4,000 IU of HCG. On 4.3 days after treatment, the ovaries reached a large-ovary size, developing 7-9 cystic follicles, 2-3.3 cm in diameter and lasting for 7.0 days, the estrous cycle was prolonged for 12.0 days. The serum levels of P increased gradually and the high P level persisted for 21.0 days, then decreased. The P levels also increased during cyclic period.

Three sows in the luteal phase (Group C) received a combination of 2,000 IU of HCG and 1,000 IU of HCG. On 6.0 days after treatment, the ovaries increased in size up to a small-ovary size, forming 7-9 large follicles, 1-2.3 cm in diameter. Some follicles ovulated without estrus and formed corpora lutea, while others became cystic, lasting for 5.0 days and then regressing. The estrous cycle was prolonged for 12.0 days. Marked increases of serum P and P were seen during the cyclic period.

Four cows with quiescent ovaries (Group D) were treated by 2,000-4,000 IU of HCG. On 8-9 days after treatment, the ovaries were shrunken and the ovaries were examined. The ovaries reached a large-ovary size to a small size, weighing 20-170 g. Multiple cystic follicles, 1.5-2.5 cm or more in diameter, developed. Thus, the ovaries strongly resembled to a naturally occurring cases of cystic ovary.

The ovarianfollicles of 6 months (Group D) received 2,000-4,000 IU of HCG. Before injection of HCG, the ovaries were unreacted and examined with inactive ovaries. On 5-6 days after treatment they were sacrificed. The ovaries showed a large-ovary size to an orange size, weighing 22-34 g. Many cystic follicles developed.

In 4 cows in Groups D and E, the serum P level increased rapidly 5 days after HCG injection. However, the serum P increased slightly.

There were some linear changes in the induced cystic follicles and the follicular fluid contained a high level of P and a low level of E2.

No estrous sign was observed in any sows or gilts during the period of induced cyclic conditions.

In conclusion, it is apparent that HCG is potent to induce ovarian vesicles in ovariectomy. In cyclic cows (groups A-C) the induced cysts are relatively small and capable to recover spontaneously in a short duration, whereas in noncyclic cows (groups D and E) the ovarian response to HCG is more drastic and typical multiple cysts can be induced. The high concentration of P would be due to the linear tissue formed in the induced cysts.

Selected references: