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Influence of Suckling on Gonadotropin Secretion in the Postpartum Rhesus Monkey[1] (39539)

G. WEISS,[2] W. R. BUTLER,[3] D. J. DIERSCHKE,[4] AND E. KNOBIL

Department of Physiology, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania 15261

Although serum estradiol concentrations in lactating rhesus monkeys fall considerably below those observed during the follicular phase of the menstrual cycle, serum gonadotropin levels fail to rise (1). This finding suggests that suckling or its sequelae may override the negative feedback control system which governs tonic gonadotropin secretion (2). The present study was undertaken to investigate this phenomenon.

Materials and methods. Eight lactating monkeys were ovariectomized on Days 24-25 postpartum. Five of these were allowed to nurse their young while the infants of the remaining three were weaned at the time of surgery. Five of the foregoing animals were previously utilized for a study of the metabolic clearance rate of progesterone between Days 12 and 18 postpartum (3) but we have no reason to suspect that this procedure had any influence on the outcome of the present study.

Blood samples were taken by femoral venipuncture without sedation every other day from the time of parturition until termination of the study 30 days after ovariectomy. The sera were frozen until assayed for LH and FSH by heterologous radioimmunoassays described previously (4, 5) using rhesus LH (WDP-X-47BC, biopotency 1.7 × NIH-LH-S1) and rhesus FSH (WDP-XI-93-4546, biopotency 14 × NIH-FSH-S1) as standards. The limits of sensitivity of these radioimmunoassays were 2-50 ng of LH/ml and 10-250 ng of FSH/ml. For purposes of calculation, gonadotropin levels which fell outside the limits of the assay were assigned the value of the limit. This practice distorts the data only in that it tends to minimize the differences between groups.

Anterior pituitary glands from lactating and cycling adult rhesus monkeys, kindly provided by Drs. P. Varavudho and C. S. Nicoll, were homogenized in a minimum of 4 vol of phosphate-buffered saline (pH 6.8). After centrifugation at 20,000*g*, the supernatants were assayed for FSH and LH by radioimmunoassay (4, 5). The postpartum age of the lactating animals from which the pituitary glands were removed is unknown.

Results. The effect of suckling on the secretion of gonadotropins in response to ovariectomy is shown in Fig. 1. Those animals which continued to suckle their young showed a marked retardation in the rise of serum LH concentrations after ovariectomy; in fact, no change in circulating LH was observed in four out of five animals in this group, the mean increase being attributable to but one monkey. In the animals which were weaned at the time of ovariectomy, serum LH concentrations rose to expected levels after a delay of 6-8 days. Similarly the postovariectomy rise in serum FSH concentration was also inhibited in the lactating animals but not quite as severely as that of LH (Fig. 1).

The LH content of pituitaries from lactating monkeys averaged less than 8% of that seen in normal cycling adults, while the FSH content varied from 38 to 98% of that of pregestational adult animals (Table I).

Discussion. These data suggest that the suckling stimulus and/or its sequelae inhibit pituitary LH secretion and, to a lesser extent, that of FSH. This effect is clearly independent of the ovary.

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[2] Present address: Department of Obstetrics and Gynecology, New York University School of Medicine, New York, N. Y. 10016.

[3] Postdoctoral Fellow of the National Institute of General Medical Sciences. Present address: Department of Animal Science, Cornell University, Ithaca, N. Y. 14850.

[4] Present address: Wisconsin Regional Primate Research Center, University of Wisconsin, Madison, Wis. 53706.

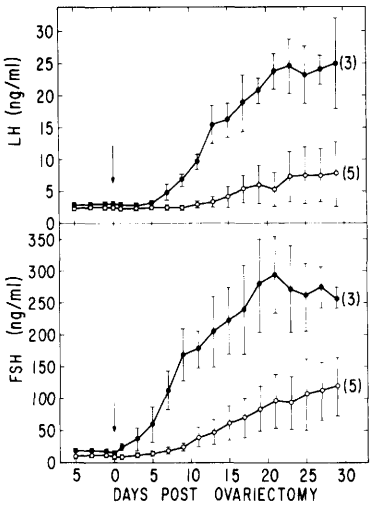

FIG. 1. Effect of suckling (○—○) on serum LH and FSH concentrations (mean ± SE) following ovariectomy of lactating animals (n = 5) on 24-25 days postpartum (↓). The control animals (●—●, n = 3) were weaned at the time of ovariectomy.

TABLE 1. GONADOTROPIN CONTENT OF RHESUS MONKEY ANTERIOR PITUITARY GLANDS.

	LH (μg/ gland)	FSH (μg/ gland)
Cycling females (pool of 20 glands)	119	295
Lactating females (pool of 25 glands)	8	172
(pool of 20 glands)	<8	113
(pool of 5 glands)	9	290

The dichotomy between the FSH and LH responses to ovariectomy in the postpartum period, when taken together with the striking difference in pituitary content of LH in cycling and lactating monkeys, suggests that lactation may selectively inhibit pituitary LH synthesis. These studies in the monkey extend previous work in the rat (6, 7) showing that suckling inhibits gonadotropin production.

A divergence between LH and FSH patterns similar to that seen in the monkey has been observed in lactating women, where elevated prolactin levels are accompanied by constant low serum LH, but rising FSH levels (8), suggesting an inverse functional relationship between prolactin and LH. Whether prolactin plays a direct role in the control of gonadotropin secretion during lactation in the rhesus monkey awaits further study.

Of coincidental interest is the finding that both postpartum and prepubertal female rhesus monkeys show a delayed postcastration rise in gonadotropin levels and a low pituitary LH content coexistent with an FSH content characteristic of the adult cycling monkey (9).

Summary. The increase in serum gonadotropin concentrations which follows ovariectomy in the rhesus monkey is markedly retarded in lactating animals suckling their infants. This inhibitory influence of lactation is more pronounced for LH than FSH. The LH content of the pituitary glands removed from lactating monkeys is 8% of that found in pregestational adult females while the FSH content is not markedly reduced.

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