

A Method for Evaluation of Milk "Let-Down" in Lactating Rat.* (23098)

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It has been generally accepted(1-5) that oxytocin is released from the posterior pituitary gland in response to neural impulses generated by stimulation of nursing or milking. Upon reaching the mammary gland oxytocin causes contraction of myoepithelial elements (6-8) surrounding mammary alveoli and small ducts thus forcing milk into larger ducts where it is available for withdrawal. The phenomenon of milk "let-down" appears to be one of the more important factors determining amount of milk obtained from milking or nursing.

In the present study data have been obtained in an attempt to evaluate "let-down" in the rat as a result of nursing stimuli in terms of amount of milk obtained under standard conditions by litters of lactating rats during the period of maximum lactation.

Materials and methods. Forty albino rats each with its first litter and weighing 180-260 g were housed in individual cages and fed Purina Lab Chow and water *ad libitum*. Each litter was reduced to 6 young shortly after birth and when 14 days old was isolated from its mother for 10 hours. The young were then replaced and allowed to suck for 30 minutes. Length of time before each litter began sucking was recorded. Each litter was then removed from the nest, weighed, killed by decapitation and stomach contents removed and weighed. Each mother's weight also was recorded.

Results. It was observed previously(9) that after 10 hours isolation stomachs of litters contained no milk. In each case upon placing the litter back with their mother, she was observed to gather her young and to commence nursing in 1-3 minutes. The young appeared to be satiated within 30 minutes and very frequently disengaged the nipple or else

fell asleep while still attached to the mother. Amount of milk obtained by litters of lactating rats in 30 minutes varied from 2.5-10.5 g/litter. There was no appreciable difference in milk volume between any 2 young of a litter. Weight of milk expressed as percent litter body weight shows more uniformity with a mean of $3.8 \pm .19$, a median value of 3.7 and normal distribution (Table I).

Discussion. Previous work in this laboratory(9) indicated that weight of milk expressed as percent litter body weight after 20 minutes nursing gave a mean of 3.7 whereupon experimental results following ergotamine treatment were statistically evaluated. The expanded results of this study are almost identical. Comparable results also have been obtained from basically the same procedure by Mayer(10) and by others from calculating litter weight gain during timed nursing periods(11,12).

One might justifiably point out that heavier lactating rats would have more mammary tissue, produce more milk and thus make more available to the young per unit time. However, there was no apparent direct correlation when milk yield per timed nursing was expressed as percent mother body weight (Table I). The observation that 14-day-old litters are satiated by 30 minutes sucking does not mean all milk is withdrawn from the nursed glands for unpublished work indicates more milk is available than is normally withdrawn at a nursing.

It has been demonstrated(13) that a litter of 6 young will suck all 12 nipples of a lactating rat during lactation thus maintaining all mammary glands in the state of active secretion. Variance in data obtained in this study is therefore interpreted to reflect variance in amount of oxytocin released and/or variance in requirements of the mammary gland for the hormone. Other factors, of course, such as nipple diameter and intensity of nursing stimuli might influence amount

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TABLE I. Milk Removal by Litters of Nursing Rats at 14th Day of Lactation.

No. of rats	Avg wt of litters (g)	Avg wt of milk (g)	Avg %	Avg wt of mothers (g)	Avg %
			Wt of milk Wt of litter		Wt of milk Wt of mother
4	139.6	2.8	2.0 (1.3-2.2)	204.5	1.4 (1.2-1.6)
8	135.4	3.7	2.7 (2.3-3.2)	214.5	1.8 (1.4-2.2)
15	150.9	5.6	3.7 (3.3-4.2)	216.4	2.7 (2.3-3.4)
7	144.4	6.7	4.6 (4.3-5.2)	198.4	3.4 (2.8-4.0)
5	133.9	7.5	5.6 (5.3-6.2)	225.3	3.4 (3.0-3.7)
1	156.0	10.5	6.7	230.0	4.6
Mean	144.0	5.5	3.8 $\pm$.19	213.1	2.6 $\pm$.19

of milk obtained but these factors are difficult to evaluate.

The results under the conditions of this experiment are believed to evaluate to some extent milk "let-down" resulting from nursing stimuli and thus serve as a basis for future work concerned with experimental alteration of milk "let-down" in mature primiparous lactating rats.

Summary. A method for evaluation of milk "let-down" in mature lactating rats on 14th day postpartum is described. Amount of milk obtained by litters of 6 young after 30 minutes nursing expressed as percent litter body weight is used as criterion of response. Results obtained follow a normal distribution pattern with a mean value of $3.8 \pm .19$. The results of this study may serve as a basis for evaluating data from experimental alteration of milk "let-down" in lactating rats.

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