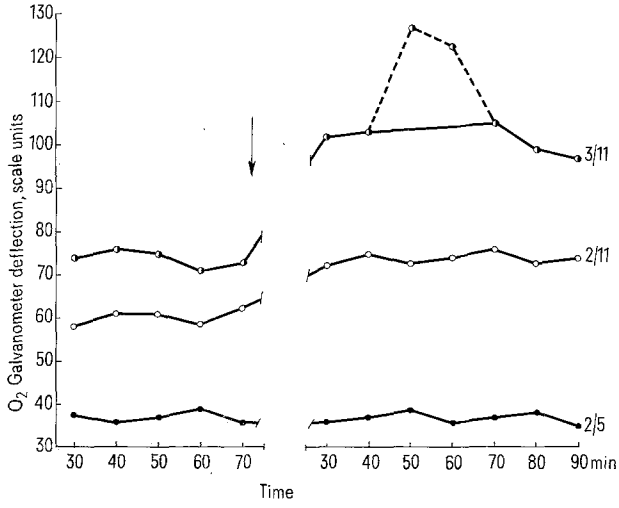
mainly on carbohydrate metabolism for heat production and that the small thermogenic effect of NA found in the more than 1-week-old piglets may be due to the action of the amine on white fat, the contant of which increases markedly a few days after birth. However, MOUNT[7] later came to the conclusion that fat metabolism plays a considerably role in energy metabolism of piglets from the second day of life. Our results confirm MOUNT's conclusion, as RQ values found in the 4–6-day-old piglets ranged from 0.77 to 0.87. In spite of that no calorigenic effect of NA has been found in the piglets at this age. Therefore, one can conclude that although NA stimulates lipolisis in the piglets less than a week old[6], it does not stimulate fat oxidation. This conclusion is consistent with that of PERSSON et al.[8] who suggested that the newborn pig has a relative inability to increase oxidation of NA-mobilized FFA. In the older piglets, which react to NA by increasing their heat production, a small but highly significant decrease of the RQ was observed. The decrease attributed to NA action (as the time of fasting was the same as in the case of the younger piglets) would suggest that in piglets more than 10 days old the proportion of fat catabolized increases following NA administration.



O_2 consumption (expressed in units of galvanometer deflection) of piglets at different times after placing the animals in a respiration chamber. 2/5, piglet No. 2 at the age of 5 days, 2/11, the same piglet at the age of 11 days; 3/11, piglet No. 3 at the age of 11 days; an arrow, NA injection. Broken line connects the readings probably elevated by physical activity of the piglet.

Résumé. La production de chaleur, la température du corps et du QR de 6 porcelets âgés de 4 à 13 jours, avant et après l'injection s.c. de noradrénaline (200 μg/kg) ont été déterminées. On n'a pas constaté l'effet de l'injection de noradrénaline sur les animaux de 4–6 jours, pendant que le métabolisme et la température du rectum des porcelets âgés de 11–13 jours augmentaient distinctement, et que la valeur du QR a baissait significativement.

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An Inhibitory Effect of Prolactin on the Response of Rat Myometrium to Oxytocin

The hormonal control of uterine muscle is still not fully understood. At the end of human pregnancy, pituitary prolactin plasma levels are 10–20 times above non-pregnant levels and the hormone seems to be specifically concentrated in amniotic fluid[1]. Yet there appear to be no reports in the literature of any action of prolactin on the myometrium. This paper describes an inhibitory action of ovine prolactin on rat myometrium.

Ten virgin female hooded rats weighing about 140 g were studied. Five were treated for 3 days prior to experimentation with 0.25 μg stilbestrol per day given i.m. in oil. The other 5 were similarly treated with stilbestrol for 3 days with the addition of 2.5 mg progesterone on the 2nd and 3rd days. After killing an animal by a blow on the head, 2 parallel pieces of myometrium, 1.5 cm long and from the same uterine horn were prepared[2]. Each one was mounted in a bath in Krebs-Csapo solution[3] maintained at 37°C and bubbled continuously with 5% carbon dioxide in oxygen. Each piece was connected to a Devices isometric force transducer with a range of 100 g whose output was recorded on a moving paper chart. The transducers were mounted on micromanipulators allowing the lengths of the muscle strips to be accurately measured. After mounting the strips were left in the solution for 30 min in order to allow development of spontaneous rhythmic activity. Responses to oxytocin (Pitocin, Parke Davis) were tested by adding increasing concentrations to the baths. Maximal responses were achieved with concentrations ranging from 150 to 500 μU/ml. Once the maximal effect had been obtained the strips were washed 3 times with Krebs-Csapo solution and the following procedures followed: 1. The length of each strip was adjusted so that baseline tension was 1.5 g. 2. Oxytocin sufficient to cause an 80% of maximal effect was added to both baths: both strips contracted rhythmically and steadily. 3. Both strips were left for a 30 min control period. 4. Sheep pituitary prolactin (Ferring, Sweden, guaranteed free of other anterior and posterior pituitary hormones with the possible exception of growth hormone) was then added to one bath in a concentration of 10 μg/ml. The strip in the other bath acted as a control. 5. The experiment was continued for a further 12 h. At 3-hourly intervals both strips were washed and baseline tension readjusted until it was again 1.5 g. After each wash oxytocin was again added to both baths and prolactin to the test bath.

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Means and standard errors of the mean for the percentage changes in the frequency and amplitude of the contractions and in the length and total activity of the myometrial strips

Time (h)	Frequency C	P	$p <$	Amplitude C	P	$p <$
3	93.5 ± 2.8	89.9 ± 3.1	ns	110.4 ± 2.0	109.9 ± 1.9	ns
6	86.8 ± 3.4	83.4 ± 5.4	ns	114.8 ± 2.8	104.6 ± 2.3	0.05
9	77.9 ± 5.0	74.6 ± 5.8	ns	113.5 ± 2.5	99.5 ± 5.4	0.05
12	59.2 ± 5.8	73.6 ± 6.1	ns	105.9 ± 3.6	81.1 ± 6.2	0.01
Time (h)	Length C	P	$p <$	Activity C	P	$p <$
3	99.86 ± 0.20	101.12 ± 0.39	0.05	105.2 ± 3.7	95.8 ± 2.8	0.05
6	99.23 ± 0.40	101.54 ± 0.41	0.01	131.7 ± 8.7	99.0 ± 4.6	0.01
9	97.83 ± 0.64	102.38 ± 0.39	0.001	179.2 ± 9.8	101.8 ± 3.0	0.001
12	96.78 ± 1.11	102.94 ± 0.49	0.001	244.7 ± 11.0	94.5 ± 6.7	10^{-6}

All figures are expressed as precentages of the control values obtained at the beginning of the 12 h period. C indicates the control strip treated with oxytocin alone while P indicates the test strip treated with prolactin and oxytocin. ns means not significant.

After the experiment the following data for each strip were obtained from the record: 1. The number of contractions and their mean amplitude during the 30-min control period and the 30-min period before each wash. 2. The total 'activity' (area above the baseline and beneath the tracing of the contractions) during the control period and the 30-min period before each wash. The 'activity' took into account the amplitude, frequency and duration of the contractions. 3. The length of each strip after adjustment of the baseline tension to 1.5 g. The values for these parameters obtained during the control period were taken as 100% and the changes during the experiment are expressed as percentages of the control values in the Table. Results using the animals treated with stilbestrol alone and those treated with stilbestrol plus progesterone were first analyzed separately but as there were no significant differences between them they were then grouped together.

During the experiment there was a greater fall in contraction frequency in the control strips but the 2 groups were not significantly different. The contraction amplitude increased slightly in the control strips but after an initial slight rise fell substantially in the prolactin-treated strips, the 2 groups becoming statistically significantly different ($p < 0.05$) after 6 h. The most striking difference between the 2 groups was in the duration of individual contractions. In the prolactin-treated strips this rose by about 50% but in the control strips it showed an approximately 4-fold increase at the end of 12 h. Primarily as a result of these differences in the duration of individual contractions the 'activity' of the 2 groups became significantly different after only 3 h and the significance reached the $p <$ much less than 10^{-6} level after 12 h. In the control strips, therefore, the activity progressively increased during the experiment but this increase was prevented in the prolactin-treated strips. There were also small but significant differences in the length of strip required to produce a baseline tension of 1.5 g. The prolactin-treated strips progressively relaxed so that greater degrees of stretch were required to produce the same baseline tension while the control strips moved in the opposite direction.

The experiments demonstrate that sheep prolactin is able to modify the contraction pattern which develops in rat myometrium in response to oxytocin. The results give no indication as to whether this effect may be of importance but they do suggest that the actions of lactogenic hormones on the myometrium may be worth investigating further. At term in human pregnancy the concentration of pituitary prolactin in amniotic fluid is of the order of 0.5–6.0 μg/ml[1] while the plasma concentration of placental lactogen is 6–10 μg/ml[4,5]. The concentration of lactogenic hormone used in this study was therefore not unphysiological[6].

Résumé. L'action de la prolactine pituitaire du mouton sur les contractions activées par l'oxytocine dans les fibres isolées des muscles utérins du rat fut étudiée durant une période de 12 h. La prolactine parut suspendre le cours du développment normal des contractions activées par l'oxytocine.

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