

PATTERNS OF LH AND PROLACTIN RELEASE FOLLOWING STEROID MANIPULATIONS IN THE RAT DURING DEVELOPMENT

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The effects of a single injection of 1 µg oestradiol benzoate (OB) on serum luteinizing hormone (LH) and prolactin (PRL) levels have been studied in groups of immature normal male and female Wistar rats, and in immature female rats which had received an injection (s.c.) of testosterone propionate (1.25 mg) on the third day of life. This model has already been described (DÖCKE and DÖRNER, 1965); however, the parameters observed were different. The animals were bred in our colony and kept under regulated lighting and temperature control. Serum LH and PRL levels were measured by double antibody radioimmunoassays using an ovine-ovine system with NIH-LH-S13 standards (NISWENDER, MIDGLEY, MONROE and REICHERT, 1968) and a rat-rat system with NIAMDD-RP/1 standards. The lower limits of sensitivity for the LH and PRL assays were 0.25 ng/ml and 1.95 ng/ml respectively. Blood was collected from the trunk following decapitation and serum samples were stored at -20°C until assay.

Serum LH and PRL levels were measured at different time intervals over a 72-hour period after OB was given at noon on the first experimental day (Day 1) (table 1). In 21-day old females basal LH levels were either low or very high, but they were significantly reduced ($P < 0.05$) to levels $< .25$ ng/ml by 18.00 h on Day 1. LH levels remained low during the whole of Day 2 and the morning of Day 3. By 13.30 h they had started to increase and finally reached a peak (> 30 ng/ml; $P < .001$) at 18.00 h. Basal PRL levels were all low (< 30 ng/ml) but had started to increase by 13.30 h. on Day 2, reaching a level of about 100 ng/ml at 18.00 h on the same day. At 09.00 h on Day 3, they were again low but by 13.30 h they had risen again to a peak (> 300 ng/ml, $P < .001$) at 18.00 h. Both the LH and the PRL peaks were amenable to blocking by Nembutal injected between 13.00-14.00 h on Day 3.

In 18-day old females OB injection again eliminated the occurrence of high LH values but here levels remained low throughout the 3-day test period. Although PRL levels were increased by OB treatment ($P < .05$) they never exceeded

TABLE I
Serum LH and PRL responses in different groups of Wistar rats following a single oestrogen stimulus

	Treatment 12.00 h Day 1	Day 1 12.00 h		Day 2 12.00 h		Day 3 18.00 h	
		LH	PRL	LH	PRL	LH	PRL
21-day-old ♀	1 µg OB	5.2 ± .6	33.4 ± 3.0	.97 ± .16	60.5 ± 13.3	43.5 ± 4.2	296.5 ± 41.6
18-day-old ♀	1 µg OB	4.3 ± .7	28.5 ± 4.2	1.46 ± .33	49.9 ± 10.3	.94 ± .29	77.7 ± 3.0
21-day-old TP-♀	1 µg OB	2.9 ± .8	31.6 ± 4.2	—	—	.38 ± .06	115.6 ± 32.45
21-day-old ♂	1 µg OB	2.2 ± .12	27.5 ± 4.1	—	—	.45 ± .05	49.8 ± 8.3

TABLE 2
Serum LH and PRL responses in different groups of Wistar rats
following a single oestrogen stimulus followed by an injection of progesterone

	Treatment		Blood levels	
	Day 1 12.00 h	Day 3 12.00 h	LH	PRL
18-day-old ♀	1 µg OB	oil	.94 ± .29	77.7 ± 3.0
	1 µg OB	.25 mg P	29.4 ± 6.7	265.4 ± 39.1
9 to 12-day-old ♀	1 µg OB	oil	.29 ± .04	52.3 ± 13.0
	1 µg OB	.25 mg P	.30 ± .02	113.4 ± 17.3
21-day-old ♂	1 µg OB	oil	.25 ± .02	56.5 ± 6.6
	1 µg OB	.25 mg P	.26 ± .04	191.8 ± 33.8
21-day-old TP-♀	1 µg OB	oil	.38 ± 0.6	155.6 ± 32.4
	1 µg OB	.25 mg P	.36 ± .02	271.6 ± 40.1

75 ng/ml. Immature males and androgenized females aged 21 days failed to show an increase in LH levels in response to OB. However, androgenized females, but not males, showed a rise in PRL levels in response to OB treatment which in timing corresponded to that shown by the normal 21-day old female, although the levels reached were somewhat lower.

The effect on serum LH and PRL levels of a single injection of 0.25 mg of progesterone (PROG) given at noon on Day 3 after the preliminary priming dose of OB (1 µg) at noon on Day 1 was also studied in serum samples obtained from the three types of animals at 18.00 h on Day 3 (table 2). This regime provoked LH and PRL responses in the 18-day old female which were equivalent to those seen in the 21-day old female stimulated only by OB.

Female rats between 9-11 days of age failed to show any increase in LH levels, even with the added PROG stimulus although PRL levels showed a small but significant ($P < 0.01$) increase. The male and the androgenized female groups failed to show an increase in LH levels in response to treatment with OB and PROG, although PRL levels were dramatically increased ($P < 0.001$) by this treatment.

These studies suggest that the mechanisms involved with phasic LH release in the female develop and become sexually differentiated between 12 and 18 days of age, but that phasic PRL release remains sexually undifferentiated.

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RÉSUMÉ

LIBÉRATION DE LH ET DE PROLACTINE APRÈS INJECTION DE STÉROÏDES CHEZ LE RAT AU COURS DU DÉVELOPPEMENT

L'injection de 1 µg de benzoate d'estradiol provoque 3 jours plus tard une décharge de LH et de prolactine chez la Ratte impubère de 21 jours, mais n'en provoque pas chez le Rat ou la Ratte androgénisée à la naissance. Une injection de 0,25 mg de progestérone deux jours après l'estradiol permet de provoquer une décharge de LH et de prolactine chez la Ratte de 18 jours et une décharge de prolactine seule chez la Ratte de 12 jours et la Ratte androgénisée ou le mâle de 21 jours.

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