Prolongation of Dioestrus in Rats with Diencephalic and Mesencephalic Lesions

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Summary. Diencephalic and mesencephalic lesions in albino rats elicited a disturbance of the vaginal oestrous cycle characterized by "pseudopregnancy-like" prolongation of dioestrus; occasionally decidual responses could be elicited by uterine traumatization. Oestrogen administration on the day before traumatization failed to enhance significantly the frequency of decidual responses in rats with diencephalic lesions, but succeeded in doing so in rats with mesencephalic lesions. It is assumed that the lesions destroy partially the mesencephalo-hypothalamic afferent system containing nerve fibres stimulating the hypothalamic cells producing the luteotrophin (prolactin) inhibiting factor.

Key Words: Prolongation of dioestrus — Brain-stem — Rat

Prolongation of dioestrus of the white rat's cycle following diencephalic lesions was described simultaneously by COOK (1959) and FLERKÓ and BÁRDOS (1959). The lesions were localized on the thalamo-hypothalamic border dorsal the paraventricular and dorsomedial nuclei and in most cases destroyed also the dorsal part of these nuclei.

Repeated phases of prolonged dioestrus interrupted by short (one or two days) vaginal oestrous periods were often found associated with ovaries containing more and larger corpora lutea than in rats with normal cycles (COOK, 1959; FLERKÓ and BÁRDOS, 1959) and with signs of prolonged effect of progesterone on the endometrium (FLERKÓ and BÁRDOS, 1959). Since the effect might be due to a disturbance of a neural mechanism inhibiting luteotrophin (LTH) release, the decidual response to uterine traumatization was tested (COOK, 1959; FLERKÓ, 1959, 1962). Also, McCANN and FRIEDMAN (1960) mentioned that lesions of the dorsal hypothalamus induced variable periods of prolonged dioestrus in the rat, and a decidual response was obtained in 3 of the 6 cases studied.

In spite of a few positive responses (FLERKÓ, 1959, 1962) the results did not unequivocally support this hypothesis; however, in view of the clear positive cases it could not be rejected either.

Our experiments can not be compared directly with those of FLAMENT-DURAND and DESCLIN (1964) who reported decidual mata after uterine traumatization in rats bearing diencephalic lesions, since they traumatized the uteri already four days after the lesion and, therefore, no data are available whether their animals developed prolonged dioestrus later on.

Two factors might be responsible for the small number of decidual reactions in animals with prolonged dioestrus: (1) inappropriate localization of the lesion and
Fig. 1. Localization of electrolytic lesion, ovaries and uterine horns of rats with diencephalic lesions + oestrogen treatment (DO5; on the left side) and with mesencephalic lesions without oestrogen treatment (MS; on the right side).—
a. Frontal section of the brain with electrolytic lesions on the thalamo-hypothalamic border. — b. Frontal section of the brain with electrolytic lesions situated dorsally to the cerebral aqueduct. — c. and d. Ovaries stained with hematoxylin-Scharlach-B. Note the abundance of lipids in the interstitial tissue and absence of it in the corpora lutea. — e. and f. Intense decidual reaction of the left side uterine horns seven days after traumatization. — g. and h. Control uterine horns of the right side (without traumatization). All slides were stained with hematoxylin-eosin except c. and d. and photographed with the same (about 30 x) power.