The membrane potential of some fibres (which always received powerful phasic depolarizing input from ventral roots) showed transient spontaneous depolarizations of characteristic time course (figure 1). A total of 32 fibres were investigated. The amplitude of spontaneous potentials varied from fibre to fibre over a range 0.5–2.0 mV. These spontaneous potentials appear in each fibre at random intervals, but occasionally there were transient bursts of high-frequency activity. The time course and the frequency of intrafibre spontaneous potentials are quite distinct from those of miniature synaptic potentials recorded from amphibian motoneurones[4]. The rising phase of individual potentials in the present experiments was 8.0–20.0 msec and their exponentially decaying falling phase lasted 70–150 msec. Thus their size and time course agrees closely with the time course and amplitude of the minimal depolarizing responses elicited in the same fibres by threshold stimuli applied to the ventral roots, as shown in figure 1, A.

Picrotoxin (0.1–0.5 mM), which is known as a specific antagonist of presynaptic inhibition[7,8], invariably and completely antagonized both the ventral root responses and spontaneous synaptic potentials (figure 1, B) suggesting that both are associated with activity of GABA-ergic inhibitory endings. This blocking effect was produced in a graded manner.

Tetrodotoxin (Sankyo, 1.5×10^{-7} to 2.10^{-7} g/ml) caused a marked reduction in the frequency of spontaneous synaptic activity in primary afferents, and eventually abolished all discriminable spontaneous potentials. The effect of tetrodotoxin was partly reversible (figure 2). Spontaneous synaptic potentials were also reversibly eliminated by removal of external Ca^{2+} and addition of Mn^{2+} (2 mM). As neither Mn^{2+} ions nor tetrodotoxin affect nonimpulse-related miniature synaptic potentials[9,10], it leads to the conclusion that the spontaneous potentials recorded from dorsal root fibres are produced by ongoing spontaneous impulses in interneurones and that individual quanta of transmitter at axo-axonic synapses, if present, produce such small potential changes as to be unrecordable under the present conditions. The latter fact may be due to the unfavourable recording conditions due to long distance between the site of impalement and the synaptic contact.

The marked sensitivity of spontaneous potentials to picrotoxin and the depolarizing nature of these potentials must be related to presynaptic inhibitory mechanism which is probably GABA mediated.

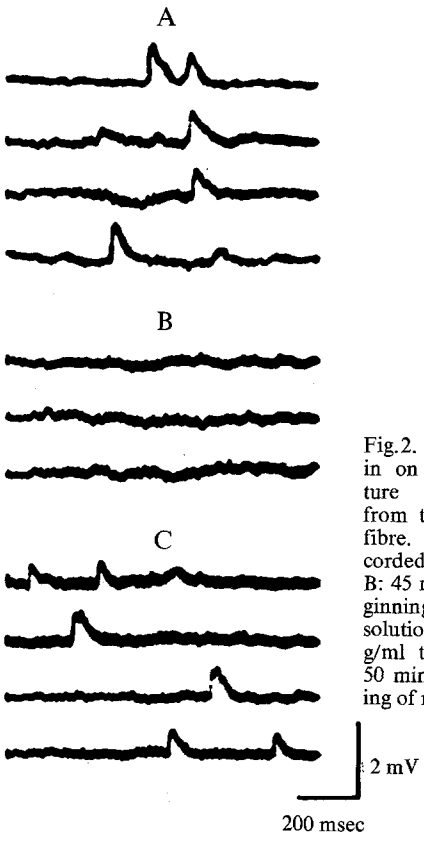

Fig. 2. Effect of tetrodotoxin on spontaneous miniature potentials recorded from the same dorsal root fibre. A: potentials recorded in normal solution. B: 45 min following the beginning of perfusion with solution containing 2.10^{-7} g/ml tetrodotoxin. C: 2 h 50 min following readmitting of normal solution.

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Effects of ovariectomy on the oxidative metabolism of the central nervous system and adrenal glands in female hamster *(Mesocricetus auratus)*

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Summary. We have studied the influence of ovariectomy on the oxidative activity of hypophysis, hypothalamus, posterior cortex, septal area, amygdala and adrenal glands, in female hamsters, because their neuroendocrine behavior seems to differ from that of rats. Our results show a decreasing the O_2 uptake in the hypothalamus and adrenal glands and an increase in the rest of the structures.

The oxidative metabolism of the hypothalamus in rats has been shown to be related to the increase of gonadotropin secretion from the anterior hypophysis[1–3]. Changes in levels of gonadotropins and sexual hormones, have caused modifications in O_2 uptake, not only of the hypothalamic[4,5] but also of the limbic system[6]. Ovariectomy causes alterations in the oxidative metabolism, in the rat, of both structures[4–7].

The probable role played by the posterior cortex (laterooccipital) in sexual cycle control, has been studied in recent years[8–10]. Likewise, also in rats, participation of the adrenal glands in the processes of ovulation and follicular development has been reported very recently[11].

Since there exist a number of works [12–15] showing that neuroendocrine processes in hamsters are different from

Oxidative metabolism of the hypophysis, hypothalamus, posterior cortex, septal area amygdala, adrenal glands, in ovariectomized female hamsters and controls

Tissues under study	QO_2: µl O_2/mg wet tissue/h Ovariectomized (A)	Estrus (B)	Diestrus (C)		t	p-value
Hypophysis	1.23±0.17 (5)	0.82±0.04 (6)	1.03±0.11 (7)	A vs B	2.54	0.05
Hypothalamus	0.99±0.14 (10)	1.29±0.04 (12)	1.04±0.10 (11)	A vs B	2.17	0.05
Posterior cortex	1.60±0.16 (10)	1.16±0.08 (9)	0.90±0.05 (9)	A vs B	2.28	0.05
				A vs C	3.77	0.01
Septal area	1.33±0.06 (5)	0.93±0.09 (7)	0.91±0.13 (8)	A vs B	3.10	0.05
				A vs C	2.40	0.05
Amygdala	1.48±0.11 (10)	1.14±0.06 (10)	1.41±0.06 (10)	A vs B	2.63	0.05
Adrenal glands	0.46±0.05 (10)	0.49±0.04 (12)	0.61±0.06 (15)	A vs C	3.64	0.01

Mean± SE. Number of determinations in parenthesis.

those in rats and other species of vertebrates, we set out to study the effects of castration on the O_2 uptake of these cerebral structures and on the adrenal glands.

Material and methods. 35 female hamsters, weighing 126–146 g, fed 'ad libitum' with standard diet of the Department and free access to drinking water, were used. The animals were under conditions of controlled lighting (12 h light, 12 h dark) temperature (23±3 °C) and absolute humidity. Animals were selected after studying their vaginal cytology and only those with 5 day cycles were utilized. Ovariectomy was performed with a group of 12 females under ether anesthesia. Following a postoperative period of 30 days, all animals (ovariectomized, estrus and diestrus) were decapitated at the same time of day (16 h). According to Hoffman and Robinson's[15] neuroanatomical description, the following tissues were dissected: hypophysis, hypothalamus, posterior cortex (latero-occipital), septal area, amygdala and adrenal glands. The determination O_2 uptake was realized by Warburg's manometric method[17] in 6.5–7 ml vessels, containing 2 ml Krebs Ringes pH 7.4 phospahte buffer and 7.7 mM glucose. The central well of the vessel contained 0.2 ml of saturated aqueous NaOH solution. The vessels were gassed for 5 min with 100% O_2. After 10 min to allow for the equilibrium of the system, the study was executed at 37 °C and 120 beats per min for 1 h. The results are expressed as µl O_2/mg wet tissue/h. Statistical treatment of results was determined by Student's t-test, following Fisher and Yates[18].

Results. The table shows the results of the oxidative metabolism of the different structures under study. Ovariectomy produces alterations of all these structures, decreasing O_2 uptake in the hypothalamus and adrenal glands and increasing it in the rest.

Comparing the values of ovariectomized female hamster with females at estrus, statistically significant differences appear in all the structures studied with the exception of the adrenal glands. If female animals at diestrus were used instead, then significant differences occur in posterior cortex, septal area and adrenal glands. Taking into account that there is no difference in the weight of the animals, however, our results show highly significant variations in the weight of adrenal glands in ovariectomized animals at estrus ($t=4.92$; $df=20$; $p\leq 0.001$), while no such differences are recorded at diestrus ($t=0.90$; $df=25$; $p=NS$).

Discussion. Our experimental data revealed, firstly, that ovariectomy modified the activity of the nervous structures and/or the hypophysial-adrenal axes, involved in the regulation of the sexual cycle in hamsters, and, secondly, that variation of O_2 uptake depended upon the sexual phases.

In the present study, results show a similarity of the neural activity between female hamsters and rats[2,3,5,18], however, values of both septal area and amygdala differ substantially in both species[6,7]. Ovariectomy has resulted in significant modifications on the oxidative metabolism of several nervous structures clearly involved in gonadotrophin regulation, a fact previously demonstrated in rats[7,18]. On the other hand, the different metabolic behaviour obtained in the glandular or nervous structures related to estrus and diestrus should be emphasized. This metabolic difference being more interesting in the case of diestrus, since castration represents the end of the ovarian hormonal production[18].

The role of cortico-adrenal steroids, on the one hand and on the other, the fact that gonadectomy causes a rise of gonadotrophin levels in hypophysis and plasma[3,18,19] allows us to understand the functional difference obtained in the studied nervous areas both after castration and at diestrus. With reference to castration and estrus, interesting significant differences which reveal once more the hormonal action in glandular and/or neural activities have also been reported. Finally, differences manifested in the posterior cortex (latero-occipital) must be underlined. In this regard it is still premature to determine the role played by this cortical area in sexuality, inspite of having found significant results in previous works[8–10]. It is necessary to determine how the sexual activity, basically limbic, affects, through the hypothalamo-thalamo-cortical path, the posterior cortex (latero-occipital).

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