Experiments on cats showed that interhemispheric generalization of strychnine seizure potentials from the orbitofrontal cortex takes place mainly by the callosal route. Unlike other projection and association areas of the cortex, not the whole of the corpus callosum but only its anterior part (genu and rostrum) participates in the transmission of strychnine spikes. The results agree with the general concept of the determinant dispatch station (DDS) in the integrative activity of the nervous system. They show that DDS formation induces secondary foci of excitation which exactly reproduce the pattern of activity of the DDS. Removal of these "mirror" foci, which behave as "destination stations," from the influence of DDS leads to abolition of the activity induced in them.

KEY WORDS: orbitofrontal cortex; corpus callosum; strychnine seizure activity; determinant dispatch station.

To investigate interhemispheric pathways of spread of seizure activity (SA) the method of creating a strychnine epileptiform focus in the neocortex is widely used. It is considered that the potentials thus produced are equivalent to SA of the cortex in certain forms of epilepsy [13]. The elucidation of the mechanisms of bilateralization of epileptiform discharges is important for the understanding of the pathogenesis of the generalized epileptic fit and of interhemispheric functional interaction. The study of this problem is interesting in connection with the elaboration of the principle of the determinant dispatch station (DDS) and its role in integrative activity of the nervous system [2-5], for the primary strychnine focus, inducing a focus of activity in the opposite hemisphere, is a hyperactive DDS.

As yet there is no general agreement regarding the role of callosal [1, 6, 8] and extracallosal pathways [7-9] in the interhemispheric transmission of excitation or the part played by various regions of the corpus callosum (CC) in this process.

To shed light on these problems the pathways of generalization of strychnine seizure potentials were studied during the creation of an epileptogenic focus in the orbitofrontal cortex (OFC), the commissural pathways of which, unlike those of other cortical zones, are not diffusely distributed in CC but occupy a narrow bundle in the rostrum and genu of CC [14], whereas subcortical connections with the brainstem reticular formation and diencephalic structures have well-developed projections [10-12].

EXPERIMENTAL METHOD

Acute experiments were carried out on 30 cats. Under barbiturate anesthesia (25-35 mg/kg, intraperitoneally) and with a midline incision running from the nasal bones to the occiput, the skin and subcutaneous fascia were divided. The eyes were drained. Burr-holes in the vault of the skull and orbit gave wide access to OFC of both hemispheres. The dura was divided with a cruciate incision 1 mm laterally to the longitudinal

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During strychninization of different parts of the orbital and preoral gyri strychnine spikes appeared at homotopical points of OFC of the opposite hemisphere, identical in their frequency and amplitude characteristics to spikes in the focus of strychninization (Fig. 1). Division of the anterior commissure did not interfere with conduction of the strychnine discharges to the "mirror" focus of the opposite hemisphere (Fig. 1: II B). Division of the rostral part of CC completely blocked interhemispheric transmission of strychnine spikes (Fig. 1: II C). In the primary DDS SA showed no substantial changes under these circumstances, which did not confirm the possible nonspecific inhibitory effect of brain trauma.

To enhance excitability in the "mirror" zone of the opposite OFC strychnine was applied to it in a convulsive dose (0.03-0.05%). Under these conditions of increased excitability, however, no activity likewise was induced from the strychnine focus (DDS), indicating complete division of the connections between these symmetrical points of OFC (Fig. 1: II D).