

9TH MULTIDISCIPLINARY INTERNATIONAL Conference of Biological Psychiatry «Stress and Behavior»

Proceedings of the 9th International Multidisciplinary Conference «Stress and behavior»

Saint-Petersburg, Russia, 16–19 May 2005

Editor: Allan V. Kalueff, PhD

CONFERENCE ABSTRACTS

1. PSYCHOPHARMACOLOGY

ROLE OF THE LEFT AND THE RIGHT BRAIN HEMISPHERES IN REGULATION OF AGGRESSIVE BEHAVIOR INDUCED BY DIFFERENT STRESSORS IN MICE

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Introduction. It is well known that high level of stress produces enhanced aggressiveness. In order to control aggressiveness it is necessary to study the specific neurophysiological and neurotransmitter mechanisms involved in this process. In particular, the role of hemispheres of the brain in the aggressiveness should be investigated to clear regulatory mechanism of aggression formation. In male BALB/c mice was shown to be interhemispheric asymmetry in regulation of aggressive behavior induced by chronic social isolation from relatives qualified as stress. In this stress, aggression is under control of the left hemisphere and sociability is the right one. The aim of the paper was to study the role of the left and the right hemispheres of the brain in organization and control of aggressive behavior induced by different stressors in male mice.

Methods. 92 male CC57W mice were the subjects of the experiment. The first model involves stress of social isolation from relatives within 35–40 days. Intruder-resident schedule was used. The ethological analysis controlled by Etograf-PC complex was processed to estimate mice behaviors. The behaviors of both intruder and resident (0.2 s each behavioral element) were registered within 4 min. Aggressive behavior was qualified on the behavioral schedule: tail vibration, threat, attack. In the second model, the aggression induced by unescapable footshock (300 msec, 2 sec, 20 V) was studied. The latency of the first attack, the number of attacks and total duration of them were registered within 4 min. The Leao's spreading depression with 25% KCl solution 20 min prior to the behavioral test was used to inactivate the cortex of one of the hemispheres.

Results and discussion. 30% of male residents demonstrated aggressive behavior on intruder replacement after social isolation. Inactivation of the right hemisphere (the left one is active) decreased the percentage of aggressive mice. The sociability (the frequency and duration of contacts) was reduced as well. Inactivation of the left hemisphere did not change aggression, but decreased sociability. When the effects of inactivation of hemispheres were compared, the number and duration of both threats and attacks and percentage of aggressive mice were less in the right hemisphere inactivated mice compared to the left inactivated ones. At the same time, all sociability and explorative behavior parameters were similar and demonstrated 50% of intact mice in both inactivated hemispheres. Therefore, the right hemisphere of CC57W mice compared to BALB/c mice dominates in regulation of aggressive behavior. Nevertheless, both hemispheres are involved in the sociability control and explorative behavior. Inactivation of the left or of the right hemisphere after unescapable footshock stress enhanced the latency of the first attack, being shorter in the case of the right inactivation. At the same time, inactivation of the left hemisphere increased, but inactivation of the right one decreased the number of attacks. Thus, the interhemispheric differences (domination or asymmetry) are failed to register on these parameters studied.

Conclusion. Therefore, in male CC57W mice the spontaneous aggressiveness due to long social isolation is lateralized and controlled by the right hemisphere preferably. Aggressive behavior of male CC57W mice provoked by pain stressor is under control of both the left and the right hemispheres in the same degree. Comparison of these results with the data obtained previously (Mikheiev, 2000, Mikheiev, Shabanov, 2002) allows postulate the following. The differences obtained are connected with involvement of different neurotransmitter systems in the aggression forms studied. So, it is known that the spontaneous aggressiveness due to chronic social isolation is associated with catecholaminergic system, whereas the one due to electric footshock involves opioid system preferably.