HISTOPATHOLOGICAL CHANGES IN THE CENTRAL NERVOUS SYSTEM OF MOOSE (*ALCES ALCES*) IN THE IVANOVO REGION OF RUSSIA

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ABSTRACT: This work describes histopathological changes in the central nervous system of moose (*Alces alces*) of different ages from various regions of the Ivanovo District. Moose are affected in certain parts of the world by a variety of infectious agents, such as anthrax, rinderpest, necrobacillosis, and foot and mouth disease, which is contracted by coming into contact with reindeer. All of these agents are capable of causing serious disease. Our present work attempted to detect less conspicuous forms of disease in moose that might reflect disturbances or degradation of ecological systems comprising their habitat. We particularly noted lesions in the central system of moose that were characterized by nonpurulent meningo–encephalitis, edema, perivasculitis in extracellular spaces, and focal ischaemic necrosis because of thrombosis of small vessels. Such changes presumably resulted from neuro–dynamical, vascular, physical–chemical, and fluid disturbances and were pronounced in the central nervous system of moose inhabiting regions with unfavorable environmental conditions. We observed the most serious changes in regions where chemical weed–killers, pesticides, and mineral fertilizers were irrationally applied.

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Results were obtained from a study of histological changes observed in the central nervous system of moose in relation to the use of agricultural chemicals in different regions of Ivanovo District. The brains of different–aged moose were obtained from animals shot by hunters; females predominated over males. Routine tissue samples taken for histological investigation included the following parts of the brain: medulla, pons, cerebellum, quadrigeminal bodies, epithalamus, thalamus, hypothalamus, some parts of the cerebral cortex, and the vascular plexus of the lateral ventricles.

METHODS

The tissues were fixed in 10% formalin, imbedded in paraffin and thin sections were prepared and stained with haematoxylin–eosin. Frozen sections were prepared with specific histochemical stains, including the Spilmayer method for myelin, the Naut–Zeindlow method for nerve fiber degeneration, Alexandrovskaya's modification of the Orthega and Miyagava method for microglial cells, and the gold–sublimate method of Ramon and Kahan for glial astrocytes.

RESULTS AND DISCUSSION

Changes observed in the medulla differed according to weight and location. The soft cerebral membrane was thickened by edema and infiltrating lymphoid cells. Peri– and endovasculitis were visible in the white matter in pyramidal tracts and consisted mostly of macrophages and plasma cells. In the areas of the thin fasciculi (Goll), the wedge–shaped fasciculi (Burdah), and the main ventral fasciculi, there was less perivasculitis but some small glial nodules, and

demyelinated nerve fibers; mononuclear cells were present in the spinal canal.

Atypical changes were observed in the Varolii pons. Instead of a nidus cell reaction of the mononuclear type, there were diffuse accumulations of analogous cells. They were located near the soft cerebral membrane, chiefly in the regions of the posterior long fasciculi, the nuclei of the abducent vestibular and trigeminus nerves, under the ependyma, in the area of the cochlear nerve nuclei, the Gover's fasciculi, and in the base of the cerebellum. Here and there, mononuclear infiltrates extended from the sub–apsidimal zone into the more profound parts of the white and gray matter.

Infiltrations of the white and gray matter by diffuse and focal cell accumulations were characteristic of some moose. Such accumulations consisted of lymphatic–type cells, mostly glial cells and macrophages. Proliferating macroglial cells and some hypotrophic astrocytes were located primarily along vessels. Some animals had a lymphocytic perivasculitis in the epiphysis cerebri.

This histological investigation of the central nervous system of moose living in unfavorable ecological regions allowed us to conclude that pollution of the environment can disturb internal homeostasis; in particular, it provokes irreversible changes in the brain.