

TOXIC EFFECTS OF ALCOHOL ON CELLS OF THE CENTRAL NERVOUS SYSTEM

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INTRODUCTION

Alcoholism is toxic to many different organs, but its effect is of particular importance in the central nervous system (CNS). According to one hypothesis, atrophy of the cerebral cortex and corpus callosum may result from the neurotoxic effects of alcohol therefore in alcoholics may develop permanent or transient cognitive deficits. Moreover ethanol exposure in brain results in disturbances in the structure of neuroglia, to impair diverse aspects of neuronal function.

AIM

Due to the important role played by the cerebral cortex and the corpus callosum in CNS, it was decided to perform a morphological analysis of neurons and glial cells in the brains of patients who abused alcohol.

METHODS

Sections of the cerebral cortex and corpus callosum from the brains of six adult men with alcohol addiction (there were concomitant diseases) were collected for the study. The comparison was a control group, derived from the brain sections of a patient who died of natural causes. The collected material was subjected to the standard histological procedure. Nissl staining was used to visualize diseased and normal cells in the CNS. Observation of morphological changes and photographs were made in the Olympus BX43 light microscope.

RESULTS

Morphological changes were observed on the slides from cerebral cortex and corpus callosum in patients of the research group. The comparison between the study groups was only qualitative. In the area of the corpus callosum on the slides, the pale color of the myelin was observed, which was associated with the disappearance of white matter. Moreover changes in the morphology and arrangement of oligodendrocytes were observed in the area of the corpus callosum. In cortex cerebri in the alcoholics patients, changes around the blood vessels, such as proliferation of endothelial cells, lesions of neurons and neuroglia with visible swelling and vacuolization were observed. Only in some samples in control group they could also be seen but were very rarely.

CONCLUSIONS

The study concerned only morphological changes and the obtained results are consistent with the literature data. Ethanol causes direct injury to neurons and glial cells. Major consequences include impaired function of neuroglia, leading to neuronal pathology. White matter pathology ranges from dysmyelination, to demyelination to myelin degeneration, and it occurs in all forms of alcohol-related CNS pathology. We hope that the growing availability of knowledge on the effects of ethanol on the nervous system, combined with morphological and biochemical studies, will allow for a better assessment of the effects of ethanol on the nervous system.

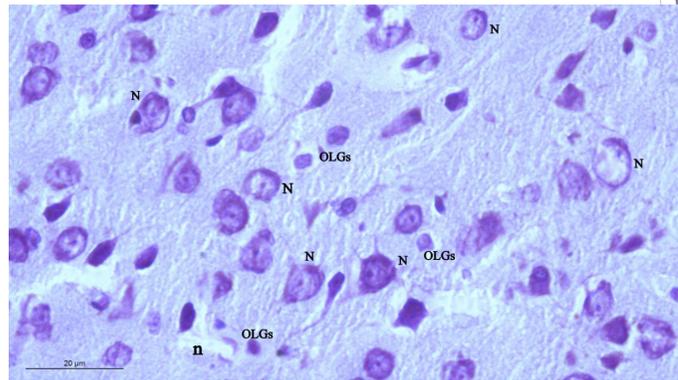


Fig 1. Histological image of cerebral cortex in patient who died of natural causes. In the image, numerous nerve cells (N), next to which there are oligodendrocytes (OLGs) nearby which there are blood vessels (n). Nissl staining. Scale bar 20 μm.

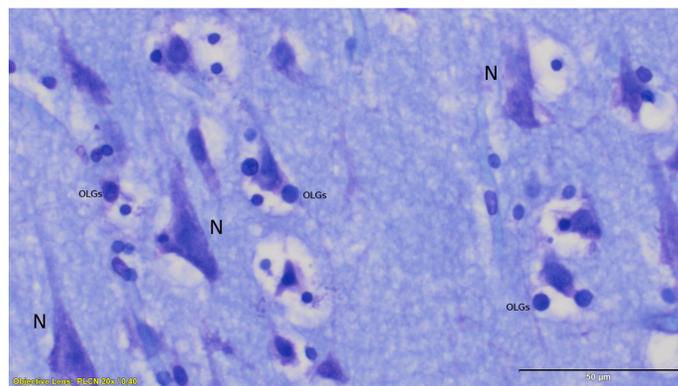


Fig 2. Histological image of cerebral cortex from alcoholic patient. Hypertrophy of nerve cells (N) due to edema with vacuolization. In the area between nerve cells histological image presents oligodendrocytes (OLGs). Nissl staining. Scal bar 50 μm.

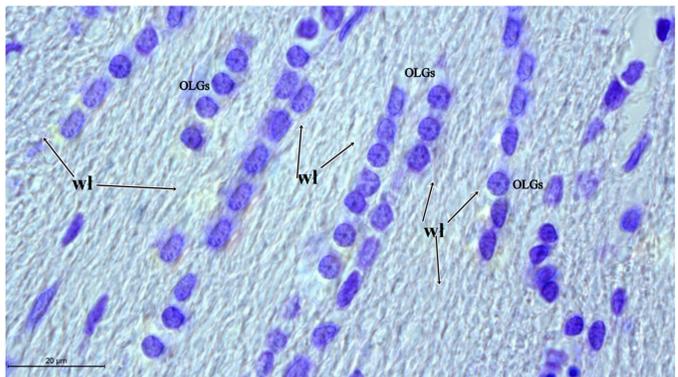


Fig. 3. Sections of the corpus callosum in patient who died of natural causes. Correct, morphology of oligodendrocytes (OLGs) with characteristic serial arrangement along the nerve fibers (wl). Nissl staining. Scal bar 20 μm.

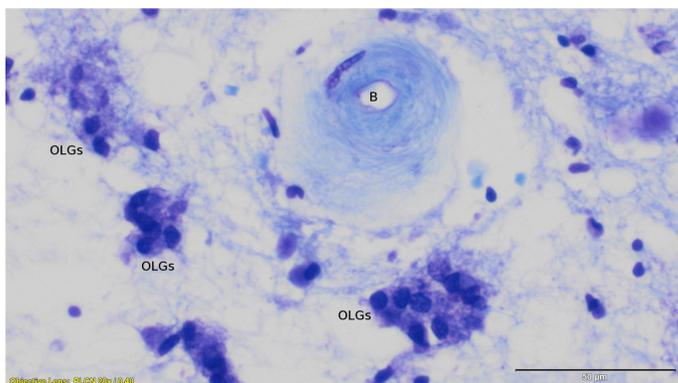


Fig. 4. Histological image of corpus callosum from alcoholic patient. Changes in the arrangement and size of oligodendrocytes (OLGs) in the perivascular region and hyperplasia of vascular endothelial cells were observed. Nissl staining. Scal bar 50 μm. B – blood vessel