EFFECT OF THE WATER-SOLUBLE ANTIOXIDANT HYDROXYPYRIDINE-6 ON INTENSITY OF LIPID PEROXIDATION IN EYE TISSUES IN EXPERIMENTAL HERPES OPHTHALMICUS

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Intensification of free-radical oxidation of lipids in the tissues is known to cause disturbances of vital cell functions: destruction of membranes and inactivation of membrane-bound enzymes [2]. In normal tissues the resistance of lipids to spontaneous oxidation and to the formation of an excess of hydroperoxides is maintained by a system of natural antioxidants [3]. Various pathological processes can lead to a decrease in the content of antioxidants in the tissues, causing an increase in lipid oxidation [1]. Previously, when the writers studied lipid peroxidation (LPO) in the blood cells of patients with herpes ophthalmicus, they found that this process was intensified, depending on the severity of the disease [4].

The aim of the present investigation was to study LPO in the eye tissues in herpes ophthalmicus and the effect of this process of the synthetic water-soluble antioxidant hydroxypyridine-6 (HP6), a compound of the heterocyclic series.

EXPERIMENTAL METHODS

Experiments were carried out on 26 male Chinchilla rabbits weighing 2-2.5 kg. The animals were divided into three groups: Group 1 consisted of intact rabbits, group 2 of rabbits with the deep form of herpetic keratitis, group 3 of animals with herpetic keratitis receiving an injection of the antioxidant. To obtain the deep form of herpes ophthalmicus, rabbits were infected with herpes simplex virus (HSV) of strain II-C (titer of virus 10^{-7} CPD_{50}/0.2 ml). Infection was carried out by application of 0.2 ml virus-containing material to the scarified cornea. HP6 was injected subconjunctivally in a dose of 3.5 mg once a day starting from the 3rd day of infection.

The intensity of LPO was judged from the content of malonic dialdehyde (MDA) and the intensity of chemiluminescence in the aqueous from the anterior chamber and in the tissues of the cornea and iris. The MDA concentration was determined by the method in [6]. The intensity of chemiluminescence was measured on the SSD apparatus, operating under quantum measurement conditions, with an FÉU-86 radiation detector. The intensity of chemiluminescence during interaction between hydrogen peroxide and tissue homogenates was expressed in counts per 300 sec. Protein was determined by the method in [5].

EXPERIMENTAL RESULTS

In the animals of group 2 the course of the disease was much more severe than in the rabbits of group 3 which received the antioxidant. Clinically, deep ulcers of the cornea were observed, with marked infiltration and iridocyclitis. Epithelization was complete on the 30th day, as a rule, with the formation of coarse opacities in the cornea. Determination of the MDA content in the eye tissues in the acute period of the disease showed that its level rose most sharply (sevenfold) in the cornea (Table 1). The MDA concentration in the aqueous of the anterior chamber was increased by 3.5 times, probably due to liberation

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TABLE 1. Effect of Synthetic Antioxidant HP6 on MDA Content and Intensity of Chemiluminescence in Eye Tissues (M ± m)

Tissue	MDA, μmoles/g protein			P_{1-2}	Chemiluminescence, counts/sec			P_{1-2}
	normal	acute period of disease (1)	after treatment (2)		normal	acute period of disease (1)	after treatment (2)	
Cornea	0,71±0,04	4,87±0,04	0,68±0,01	<0,001	2113±371	4319±360	2402±83,5	<0,01
Iris	0,16±0,04	0,45±0,07	0,24±0,01	<0,01	2603±310	4245±290	3872±156	<0,01
Aqueous	0,25±0,02	0,82±0,02	0,17±0,01	<0,001	2248±899	4852±313	1249±69,5	<0,01

Legend. Mean data from 6-10 experiments given.

of end products of LPO from the cornea and other tissues of the eye. The MDA content in the iris increased by a leser degree (by 2.8 times) than in the cornea.

During a parallel study of the intensity of chemiluminescence, an increase in this parameter was found in all tissues studied. The intensity of chemiluminescence increased almost equally (twofold). The increase in the MDA content and in the intensity of chemiluminescence is evidence of intensification of LPO in the eye tissues. Under the influence of HP6 all the rabbits showed a positive therapeutic effect, reflected in absence of corneal ulcers and of inflammation in the uveal tract. Epithelization occurred on the 8th-12th days. In rabbits receiving the antioxidant the MDA level and intensity of chemiluminescence were lower after treatment than in the acute period (Table 1) in all tissues of the eye investigated and in the aqueous from the anterior chamber.

The results thus demonstrate intensification of LPO in the tissues of the eye in experimental herpes ophthalmicus, and it is possible that this process is the trigger mechanism for development of this pathological condition.

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