EFFECT OF STIMULATION AND INHIBITION OF LIPID PEROXIDATION ON KINETICS OF MYOGLOBIN AND CREATINE KINASE IN UNCOMPLICATED AND COMPLICATED HEALING OF EXPERIMENTAL MYOCARDIAL INFARCTION

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KEY WORDS: myocardial infarct; lipid peroxidation; α-tocopherol

Lipid peroxidation (LPO) has until recently been ascribed an important role in complications of healing of a myocardial infarct (MI), and its products have been regarded as among the principal factors concerned in changes in the ischemic myocardium [3, 10]. In view of the important biological functions of LPO in the maintenance of cell membrane homeostasis under physiological and pathological conditions [5], and also since MI is regarded as a special form of reactive inflammation [1, 11], ensuring uncomplicated healing of the infarct zone by the postinfarct scar, assuming a level of reactivity appropriate for the disease and synchronization of necrotic and reparative processes, but leading to complication of healing through the formation of a postinfarction aneurism for the development of rupture of the heart when reactivity is disturbed due to desynchronization of necrotic and reparative processes [4], reports have been published not only of the destructive, but also of the reconstructive role of LPO in myocardial infarction [8].

Considering the prime importance of the dynamics of necrotic changes in the forms and outcomes of healing of MI and the potential possibility of its optimization by the regulation of these processes, and also considering the links established between necrotic processes and LPO in myocardial infarction, there is an evident need for a goal-directed study of the changes taking place when LPO is influenced by various factors. The absence of any special studies in this direction motivated the present investigation.

EXPERIMENTAL METHOD

Experiments were carried out on 45 dogs weighing 6-18 kg. A model of MI was obtained under general anesthesia after thoracotomy by ligation of the anterior interventricular artery along its course in two regions in its upper and middle third. The animals were divided into three equal groups. In group 1, no drugs disturbing reactivity and, consequently, disturbing the healing of MI were used. In group 2 the animals received pyrogenal daily during the first 7 days in high doses, so that a model of hyperreactive complicated healing of IM was produced [7]. In group 3 the animals were given aminopyrine on a similar schedule, to produce a model of complicated healing of hyporeactive MI [6]. Each group of animals was divided into three equal subgroups. No special effect on LPO was used in the first subgroups of each group. In the second subgroups autologous blood/irradiated with ultraviolet light (UVAB) in a volume of 1.5 ml/kg body weight, and with a wavelength of 254 nm and an exposure of 15 min. According to [9], UVAB activates leukocytes and LPO. In the 3rd subgroups the antioxidant α-tocopherol acetate was used in the average therapeutic dose of 1.5 mg/kg daily. These procedures directed toward LPO in animals constituting the 2nd and 3rd subgroups were carried out 3-4 h after the beginning of myocardial infarction, and continued daily for 4 days. Ten dogs undergoing mock operations, with thoracopericardiotomy, served as the control.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group of animals with different form of MI</th>
<th>Duration of experimental MI, days</th>
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<tbody>
<tr>
<td></td>
<td>Subgroup of animals</td>
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<tr>
<td>MG, ng/ml</td>
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<td>46.8</td>
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<td></td>
<td>Second</td>
<td>61.8</td>
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<td>Third</td>
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<td>Durations of experimental MI, days</td>
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<td></td>
<td>First</td>
<td>68.9</td>
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<td>Second</td>
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<td></td>
<td>Third</td>
<td>51.5</td>
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<td>Duration of experimental MI, days</td>
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<td>CK, U/liter</td>
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Legend. *p < 0.05 compared with control.

Blood samples were taken 3, 7, 10, 15, 18, 24, and 40 h and 3 and 5 days after the beginning of the experiments in order to determine the myoglobin concentration (MG), by radioimmunoassay (using a kit from Radiopreparat, Academy of Sciences of the Uzbek SSR), and creatine kinase (CK) activity was determined biochemically (using a kit of reagents from Lachema, Czechoslovakia).

The outcome of healing of MI was monitored at autopsy. The animals were taken from the experiments on the 15th day of myocardial infarction, in full accordance with the rules.

The results of determination of MG and CK were subjected to statistical analysis.

**EXPERIMENTAL RESULTS**

In animals of all subgroups of group 1 the zone of the MI healed with a postinfarction scar. In the 1st and 2nd subgroups of group 2 and in the 1st and 3rd subgroups of group 3 the experimental MI was complicated by a postinfarction aneurism. The aneurism was larger in the 2nd subgroup of group 2 and in the 3rd subgroup of group 3. The MI in the 3rd subgroup of group 2 and in the 2nd subgroup of group 3 healed by a postinfarction scar despite the initially complicated course. In agreement with these observations, activation and inhibition of LPO in the case of uncomplicated MI had little effect on its healing. During complicated hyperreactive myocardial infarction activation of LPO aggravates the disturbances whereas inhibition of LPO helps to normalize its healing. Conversely, in complicated hyporeactive MI activation of LPO leads to normalization whereas inhibition of LPO aggravates the disturbances of its healing.