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THE ASSESMENT OF LIPID PEROXIDATION PROCESSES DISTURBANCES IN ANIMALS` LUNGS IN CONDITION OF EXPERIMENTAL PARODONTITIS DEVELOPMENT

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Abstract

An imbalance between generation of free radicals and antioxidant defence leads to an oxidative stress Pulmonary damage caused by oxygen toxicity occurs due to the generation of reactive oxygen species and subsequent formation of more potent oxidants in experimental peridontitis development. Furthermore, the reactive oxygen species content may be a useful and practical parameter for evaluating periodontal disease activity.

Key words: **experimental periodontitis; peroxide lipid oxidation; ceruloplasmin; superoxiddismutase; catalase.**

Periodontal diseases, including gingivitis and periodontitis, are among the most common infections of humans. They are induced by bacteria and bacterial products of dental plaque and are characterised by inflammatory destruction of tooth-supporting connective

tissues and alveolar bone [1]. Experimental animal periodontitis causes increased serum levels of acute phase proteins (such as C-reactive protein and serum amyloid A) and inflammatory cytokines (for example, IL-1β and IL-6) and is thus an appropriate model to study the periodontitis connection with systemic comorbidities. [2].

Oxidative stress is a central feature of many diseases. Reactive oxygen species (ROS) are implicated in the destruction of the periodontium during inflammatory periodontal diseases. The imbalance in oxidant/antioxidant activity may be a key factor in the damaging effects of ROS[3].

The aim of our study was to make an assessment of role of oxidative stress in experimental parodontits development.

Material and research methods

Experimental studies were performed on 55 guinea pigs (males) weighing 300-350 g, divided into 5 groups of 9 animals each, except the first (10 animals). Group I (control) included intact guinea pigs, II — animals with experimental parodontitis EP (4^{th} day), III — guinea pigs on the 7^{th} day of the model process, IV — animals with EP (14^{th} day), V — guinea-pigs on the 21^{th} day of EP. For the purpose of detailed analysis and interpretation of indicators of prooxidant and antioxidant systems (AOS) in different days of experiment two periods of development of EP were conditionally distinguished: early (4^{th} and 7^{th} days of experiment) and late (14^{th} and 21^{rd} days).

The experimental parodontitis model was reproduced in guinea pigs by the method of Voskresenskuj O.N. [4]. All experimental animals were kept in standard conditions vivarium of Danylo Halytsky Lviv National Medical University. Euthanasia of animals was performed by decapitation under ether anesthesia in compliance with the European Convention for the protection of vertebrate animals used for experimental and other scientific purposes (Strasbourg, 1986), Council Directive 2010/63 / EU, the Law of Ukraine 3447- IV "protection animals from the cruelty" the general ethics of animal experimentation adopted by the first national Congress on bioethics in Ukraine (2001).

Condition of free radical oxidation in the lungs was determined by the content of diene conjugates (DC) by the method of V.G. Gavrylov, M.I. Myshkorudna [5], and malonic dialdehyde (MDA) by the method of E.G. Korobeynikov [6]. The degree of antioxidant system activity was estimated by the content of enzymes — superoxide dismutase (SOD) by the method of R. Fried [7], catalase (CT) by the method of R.Holmes, C. Masters [8] and

ceruloplasmin – by the method of V.H. Kolb and V.S. Kamyshnikov method [9]. Statistical processing of the obtained data was carried out according to the Student's method.

Research results and their discussion

Data from experimental studies have detected that inexperimental parodontitis development elevation of DC content in animal`s lungs was observed. It was characterized by 26.6%($p \leq 0.05$) respectively with control group of animals on the 4th day of disease experimental modeling. Maximal activity this enzyme atchieved, on 24th day of the experiment, by 28,6% ($p < 0.01$) relatively to group of intact guinea pigs. The same character changes of MDA activity was observed. Gradual elevation of malonic dialdehyde level in the lungs was revealed during all periods of experimental parodontitis development with the highes level on the 24th day- by 50%%($p \leq 0.05$) in comparison with intact animals. Obtained results indicate excessive accumulation of reactive oxygen species.

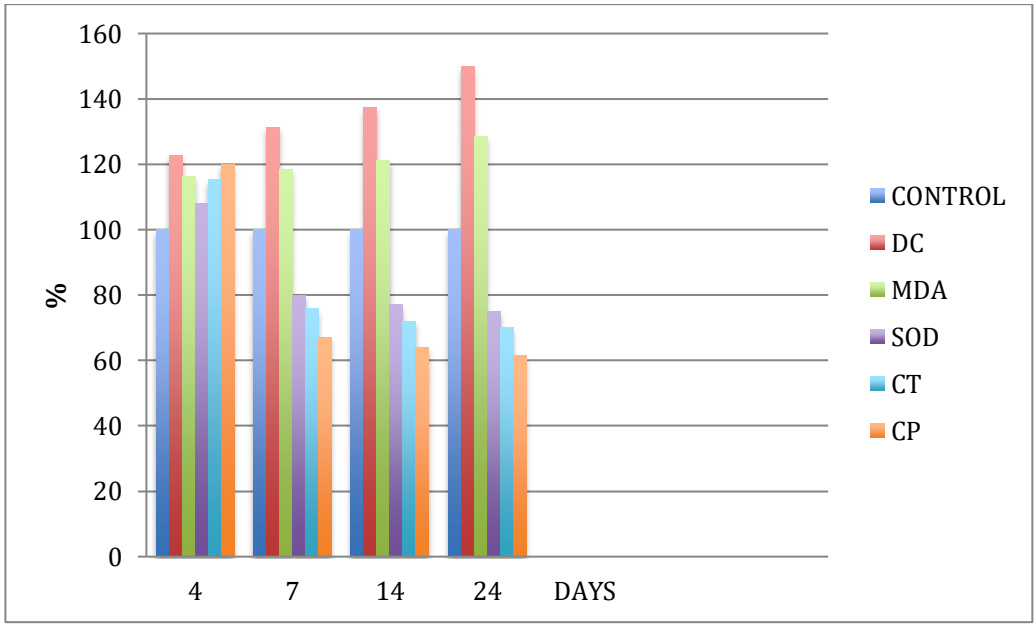

Fig 1. Changes of prooxidant and antioxidant system indicators in animals lungs in experimental parodontitis development

Indicators of the antioxidant system underwent multidirectional changes. We have observed of superoxidedismutase, catalase and ceruloplasmin level elevation on the the 4th day of the experiment what indicates a compensatory reactions intended to protect cells against damaging effect of free radicals, but starting from the 7th day of disease a supression of all indicators activity was detected with the greatest oppression namely on the 21th,day

respectively, for superoxiddismutase by 25.1% ($p \leq 0.05$), catalase by 45.1 % ($p \leq 0.05$) and ceruloplasmin by 38.6 % ($p \leq 0.05$)) respectivly against control values. That fact reveals exhausation of ensymatic and non- ensymatic branches of an antioxidant system whay leads to homestasis disorders and oxidative stress amplification.fig.1.

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