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### **CHEMICAL AND PHYSICAL FACTORS AS CAUSES OF THE DEVELOPMENT OF EROSION AND ATROPHY OF DENTAL TISSUE**

Non-carries dental lesions, particularly erosion and atrophy, result from the complex interaction of various chemical and physical factors that negatively affect the structure, strength, and functionality of dental tissue. These defects play a significant role among dental diseases and can have serious consequences for oral health, including increased sensitivity, pain, and impaired chewing function. Dental erosion is the result of chemical degradation of enamel due to the action of aggressive acids found in certain food products or as a result of disruption in the acid-base balance in the oral cavity. On the other hand, atrophy of dental tissue manifests as a reduction in its volume, which is often associated with age-related changes, disturbances in mineralization, or insufficient nutrient supply to the dental tissues. Studying and understanding the mechanisms behind the development of these lesions significantly improves the methods for their prevention and treatment [1,2].

The main objective of this study is to thoroughly investigate the impact of chemical and physical factors on the development of erosion and atrophy of dental tissue, as well as to evaluate current methods of their prevention and treatment. Understanding these mechanisms at the molecular and cellular levels allows for the development of more effective strategies for preventing and treating these conditions.

Given the constantly increasing consumption of aggressive products such as carbonated drinks, acidic juices, and sugary foods, cases of dental enamel erosion have become significantly more widespread in recent decades. In addition, dietary changes, lack of systematic oral care, and high levels of stress in the modern world also contribute to the development of dental tissue atrophy. The issue of erosion and atrophy is not only clinical but also aesthetic, as these defects can significantly reduce the attractiveness of a smile and the functionality of the teeth. Timely detection and treatment of such lesions are crucial for preserving dental health and oral function.

Dental erosion is the process of chemical degradation of enamel caused by prolonged exposure to aggressive acids. Erosion is most commonly caused by frequent consumption of products high in organic acids, such as citrus fruits, acidic juices, carbonated beverages, as well as acids formed due to gastric reflux or smoking. Microscopic analysis of dental tissue affected by erosion reveals significant enamel loss, accompanied by the formation of microcracks and considerable thinning. Such enamel becomes more porous, leading to a loss of its protective properties and increased sensitivity of the tooth to temperature and chemical stimuli. Figure 1 shows a microscopic image of a tooth affected by erosion, clearly demonstrating the reduced thickness of the enamel and the numerous cracks formed as a result of aggressive acid exposure [1,3].

Tooth erosion can cause a significant reduction in the aesthetic characteristics of a tooth, as the altered enamel loses its natural shine, and the teeth take on a dull appearance. Over time, erosion can lead to deeper damage, requiring surgical intervention, such as the placement of fillings or crowns. To combat erosion, it is important to limit the consumption of acidic products and to use fluoride toothpaste, which strengthens enamel and reduces tooth sensitivity.

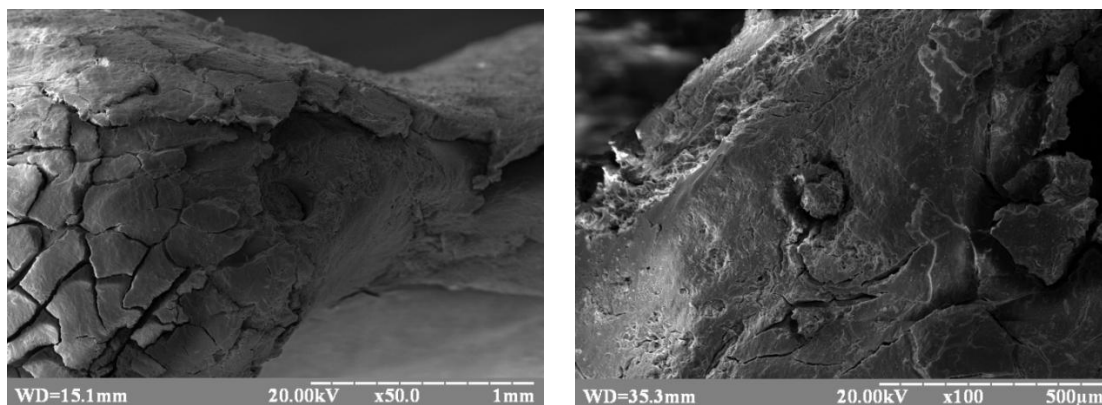


Figure 1 – Microscopic image of a tooth affected by erosion due to chemical acid exposure. The image clearly shows enamel loss, the formation of microcracks, and its porous structure.

Atrophy of dental tissue, on the other hand, is the process of tissue volume loss due to various physiological changes, such as aging, impaired blood supply, or insufficient nutrient intake. Atrophy often manifests as a reduction in the height of the tooth crown and a decrease in the thickness of the enamel and dentin. In cases of atrophy, teeth lose their resistance to stress, leading to an increased risk of cracks and fractures. Microscopic examination of a tooth affected by atrophy reveals a decrease in tissue density, thinning of the dentin, and uneven distribution of minerals. Figure 2 illustrates the manifestations of dental tissue atrophy, showing signs of wear and volume loss of the tooth, leading to a decline in its functional capabilities [2-4].

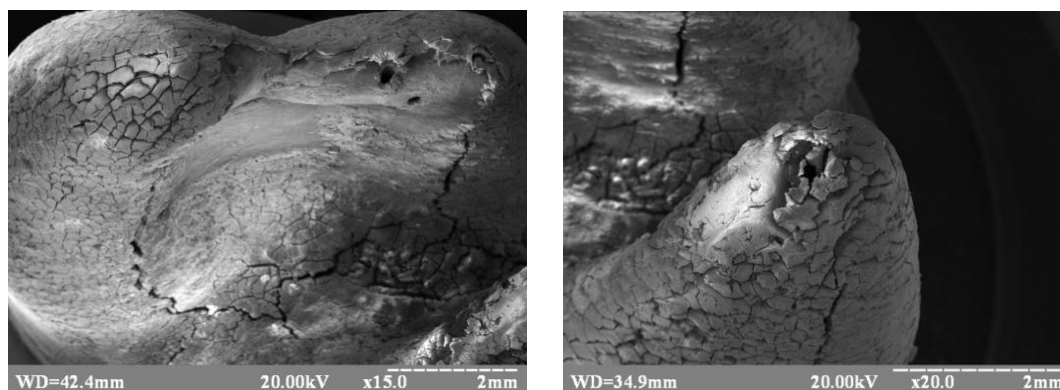


Figure 2 – Microscopic image of a tooth showing signs of atrophy. The image demonstrates a reduction in tissue volume, wear of the crown, and a decrease in its functional properties.

Atrophy can be the result of age-related changes or deficiencies of minerals such as calcium and phosphorus. It can also occur due to inadequate intake of vitamins and trace elements necessary for maintaining dental tissue health. An important aspect of prevention is a balanced diet and regular use of dental products that contain essential minerals to strengthen the dental tissue [2].

Conclusions. Erosion and atrophy of dental tissue are serious dental problems resulting from chemical and physical influences on the teeth. It is recommended to avoid excessive consumption of aggressive products such as acids and sugar, as well as regularly use fluoridated toothpaste that helps restore enamel. Prevention of atrophy includes a proper diet enriched with necessary vitamins and minerals, as well as regular visits to the dentist to detect early signs of changes in the dental tissue. Various restorative methods are used to treat erosion and atrophy, such as fillings, veneers, and crowns, which not only restore the function of the tooth but also improve its aesthetic characteristics.

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