



The Application of Remineralizing Means and Methods of Early Diagnostics of the Caries in the Process of Enamel Maturation: A Review

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Abstract

Non-mineralized enamel in childhood is a risk factor for the development of caries in the stage of macula cariosa, therefore it is very important at this age to provide remineralizing therapy, especially in the risk groups, in order to promote the normal maturation of enamel, so early diagnosis of initial caries is extremely important for the timely implementation of preventive measures leading to its reverse development only at the initial stages.

Keywords: Colorimetry; Laser Fluorescence; Immature Enamel

Abbreviations: CTC: Circulating Tumor Cel; TMP: Trans Membrane Pressure.

Introduction

The prevention of dental caries in children and adolescents is related to a priority for dental services and found to be more cost-effective rather than its treatment. Evidentially, the level of resistance of hard tissues is dependent on many factors: the external environment, mode of life, social conditions, heredity, imbalanced diet, increased consumption of carbohydrates, decreased immunity, endocrine disorders, conditions of teeth mineralization after their eruption, intake of fluorides and others [1-5]. The enamel structure and its chemical properties are quite important factors in caries development and teeth demineralization. When exposing enamel with a weak acid a demineralized lesion emerges.

Actually, the lesions may vary in depth depending on the properties of the enamel of the tooth. The solubility of enamel to acidic solutions is a function of the chemical content and degree of porosity in the tissue. This is clearly apparent when comparing enamel of the primary and permanent teeth. Certain differences in the morphological structures exist between the permanent and primary enamel. The degree of porosity in the primary enamel explains the differences in demineralization and the tendency to dissolution of the primary enamel compared with the permanent teeth [6-11]. How large is impact of degree of porosity in the enamel of primary and permanent teeth onto demineralization process *in vivo* is not yet known. The chemical content and level of mineralization of enamel are known to vary between different teeth. Thus, the degree of mineralization and chemical content of enamel seem to be of great importance for the diffusion rate of minerals in case of the primary and

the permanent teeth [3,5,10]. It is still not known whether there is a quantitative difference in the chemical composition in the proximal enamel compared with the buccal one; moreover, there are no studies regarding any differences in the primary enamel considering demineralization changes. To obtain this information we studied the enamel surface after etching it with an acid under the conditions close to clinical [12].

During the experiment, it was detected that the acid resistance of enamel is associated with the relief of its surface, which, as it was mentioned above, is more indicative of the degree of maturity of this tissue. According to some authors, the etched enamel in the oral cavity is not being restored to its original level even after 4 months. Repair occurs due to organo-inorganic precipitates and erasure of the surface relief of the etched enamel. The processes of enamel's de- and remineralization are inextricably connected with the qualitative and quantitative composition of the oral fluid, which performs a mineralizing, protective and cleansing function. Therefore, early diagnosis of initial caries is extremely important for the timely administration of the preventive measures that lead to its reverse development only at the initial stages. Currently, the electrometric, colorimetric methods, transillumination, laser fluorescence, and X-ray microscopy are commonly used to detect early carious impairments to the enamel of teeth. The level of caries detection by laser fluorometry is making up 74.8%. Colorimetric parameters of the light-induced fluorescence spectrum can potentially be used to assess various levels of caries [12-16].

However, the considerable efforts of the doctor and patient, the complexity of the methods, and the necessity to use expensive equipment prevent some of these methods from being widely used in dentistry. Many authors note that the main increase in caries is observed during the eruption of permanent teeth. This is due to incomplete mineralization of tooth enamel and their highest susceptibility to acidic demineralization during this period [3,9,10]. According to some authors, the final maturation of tooth enamel occurs in 1-2 years after eruption, and then for 2-3 years this process continues in just the fissure area. Full-fledged mineralization during this period is carried out due to the absorption of minerals from saliva, especially in respect to fluorine, calcium and phosphorus ions [17]. Calcium phosphate and fluoride delivery systems claim to facilitate enamel remineralization.

The rationale for caries preventive effect of fluoride has been known for many decades. The fact that fluoride can be incorporated into the crystalline lattice of dental hard tissues resulting in a tissue less soluble being in the acidic medium has become the scientific principal and milestone for the caries prevention. According to Knappvost A. (2004),

for the effective stimulation of remineralization processes, the influence of ordinary fluorides becomes insufficient due to their low solubility, rapid removal of calcium fluoride crystals from the surface of the teeth caused by food intake, mouthwash or abrasion. The use of remineralizing drugs ensures a pronounced therapeutic effect in the treatment of the initial form of dental caries and mineralization of tooth hard tissues with their incomplete mineralization, as evidenced by the data of colorimetric test, laser fluorometry and other methods of early detection of dental caries. CTC and TMP exhibited similar efficacy in remineralizing artificially induced carious lesions. Nevertheless, net of the mineral gain or the lesion consolidation following CTC use was higher than TMP [17-21].

Conclusion

Therefore, regular monitoring of indicators that assess the state of hard dental tissues and oral hygiene is an important component of a set of measures that help to reduce diseases of the organs and tissues of the oral cavity. Only if the parents of patients are compliant with the use of preventive measures, professional oral hygiene and the use of effective therapeutic and preventive means, considering the risk of developing caries the ultimate positive effect can be achieved.

Conflicts of Interest

The authors have declared that no conflict of interest exists.

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