



## **Fund “Nauka” Project № 18036 Resume – Competition-Based Session 2018:**

“Identification of biomarkers in saliva for evaluation of the risk profile of the gingival health at child's age”

**Project leader:** Prof. Diana Georgieva Ivanova, PhD, DSc

The contemporary diagnostic methods increasingly rely on the potentials based on the quantitative and qualitative characteristics of saliva, especially as regards the enhancing social importance of the widespread in worldwide scales oral diseases in childhood. The aim of the study is to be identified biomarkers in saliva for initial risk profile assessment of gingival health in childhood. Taking into consideration the suitability of their implementation for child health assessment, salivary biomarkers are supposed to be minimally invasive and with maximum diagnostic value, reliability and applicability. So far, we have not found a similar diagnostic model for gingival status evaluation among children. The establishment of the values of the GI parameter (Gingival Index by Löe-Silness) is applied for the diagnosis of gum diseases, providing information about the degree of gingival inflammatory disorder. One of the tasks was to be explored the eventual directly proportional relationship between the levels of GI index and the values of gene expression levels of the pro-inflammatory factors (IL-6, IL-1 $\beta$ , TNF- $\alpha$ , CRP). The diagnostic model is associated with a combination of a great variety of markers, using modern molecular biological and biochemical methods. This will be useful for the analysis and investigation of the disease gingivitis in children not only by the application of clinical parameters, but also in the context of utilization of precursors related to initiation and performance of pathological mechanisms. The implementation of this approach will ensure the control and management of the disease gingivitis to be carried out in its multi-aspect clinical manifestations, including at the level of long-term precise diagnosis and preventive cares for the purposes of complete individual and social rehabilitation of the person during the different periods of childhood.

### **Obtained results:**

1. Compared with all the explored indicators, the most considerable diagnostic potentials demonstrated dextran and the pro-inflammatory salivary factors of IL-6, IL-1 $\beta$ , CRP, as well as the protective marker of secretory Ig A (sIgA). For evaluation of the levels of these markers in non-stimulated mixed saliva Enzyme-Linked Immunosorbent Assay (ELISA) was applied;
2. Dextran has been outlined as a reliable marker in prognostic, as well as in diagnostic aspects;
3. The pro-inflammatory salivary factors of IL-6, IL-1 $\beta$ , and CRP, as well as the protective marker of sIg A, are characterized by the potential for distinguishing children with a moderate from those with a severe degree of plaque-induced gingivitis. The highest sensitivity and specificity for differentiation of children with a moderate

from those with a severe degree of plaque-induced gingivitis is a characteristic of the sIg A in non-stimulated mixed saliva;

4. The amino acids proline, glycine, arginine, aspartate, glutamate, serine, and lysine are also distinguished as prognostic and diagnostic tools concerning the progression of plaque-induced gingival inflammation;
5. The amino acid of cysteine has been characterized by the potential of a prognostic and diagnostic marker with a definite protective role for the gingival tissue in children. We established a decrease in the level of that amino acid in non-stimulated mixed saliva under conditions of an inflammatory plaque-induced process affecting the gingival tissue; The specifics of the alimentary regime, application of various forms of fluoride prophylaxis, and oral hygiene habits and care are with explicit significance as prophylactic measures;
6. Based on the inquiries regarding the frequency of consumption of sugar-containing foods and drinks we established that children consuming more frequently sugars are characterized by higher records of the plaque index and gingival index. These results confirm the role of the dietary regime and more precisely the frequency of sugars' intake as a risk factor for the progression of plaque-induced gingivitis in children;
7. Among the participants in the study was an inquiry about the frequency of intake of proteins of plants and animal origin, as well as dairy. It has been established that children who more often consume animal proteins are characterized by higher levels of salivary essential amino acids parallel to reduced values of both the clinical indices of the Plaque index and Gingival index;
8. Among the children who more often consume milk and milk products have been registered levels of the amino acids cysteine, tyrosine, alanine, glutamate, and glycine in saliva in comparison to those who rarely consume dairy. We established a statistically significant increase with a rate of 38.5% for the amino acid cysteine. The last is characterized by definite anti-oxidant properties and a positive effect against gingival inflammation. At the same time, the children with diagnosed plaque-induced gingivitis, who more frequently consume milk and milk products, registered increased values of the clinical indices Plaque index and Gingival index;
9. Among the children who more often consume plants' proteins (beans, nuts) higher levels of the amino acids arginine, glycine, tyrosine, and proline in saliva were registered. All of these amino acids belong to the conditionally essential amino acids with a significant role for adolescents. These organic compounds also influence the resistance of enamel by taking part in the structural organization as constituents of the enamel organic matrix.

The conception of the study corresponds to the institutional priorities of "Management of diseases, programs for prevention" and "Foods and nutrition", more precisely "Dental health and nutrition". The efficient management of oral-dental diseases, including plaque-induced gingivitis in different periods of childhood, corresponds to their effective and adequate control. The achievement of target-oriented results in the short, as well in long-term

perspective is associated with the explicit necessity of a precise risk assessment of the initiation and progression of the disease in the context of specifics of the child's age.

The combined application of clinical indicators, para-clinical characteristics, and biochemical indicators in non-stimulated mixed saliva carries the potential for a qualitative, detailed evaluation of the risk profile of gingival health in a child's age, and that is the aim of our study.