

THE POPULAR SCIENCE ABSTRACT

In general, the project is dedicated to the effect of the orthodontic treatment with a use of the fixed, metal appliance on the properties of the minerals forming human tooth enamel. We will investigate, the **incorporation of metal ions leaching out of the orthodontic tools into the enamel**. Particular interest will be focused on Ni, as it is a serious allergen. The research results will answer to a number of questions raised recently in the field of orthodontics and mineralogy, among which the most important are: **Does the metal fixed orthodontic appliance significantly change the composition of enamel minerals during the orthodontic treatment? Does the formation of dental plaque during the orthodontic treatment affect the composition of the enamel minerals? Is the homogeneity of the tooth enamel affected by the use of the fixed metal appliance during the orthodontic treatment?**

The study will be carried out on human teeth extracted for orthodontic or dental reasons, as long as the average orthodontic treatment. The experiments will be run in the laboratory, where the teeth will be exposed to the solutions simulating daily acid attack in the oral cavity, dental plaque environment and contact with an orthodontic appliance. After the experimental part, the enamel samples will be analyzed for the average and local trace metal composition, contains of carbonates, crystal size and structural parameters of the minerals and for the morphology.

There is a gap in the data reported in the currently available literature related to the process of the incorporation of trace metal ions leaching out of orthodontic appliances by the enamel during the teeth correction. It remains unexplored whether the duration of the orthodontic treatment is long enough to change the mineralogical parameters of the enamel. Given the reports in the current literature, it is impossible to estimate, whether the changes within the enamel observed after the treatment result only from the applied medical technique and patient's habits or also from the nature of the fixed metal appliance. Paradoxically, teeth are excluded from the current approach to the subject of the metal ions leakage out of fixed orthodontic appliances, and yet, the teeth are the direct beneficiaries of the treatment, and it should not worsen their condition. The problem stems from the fact, that it is impossible to test the teeth of the orthodontic patients. The access to a tooth after the treatments does not solve the issue, since it is impossible to analyze its parameters before the correction. The study concept brings the complicated medical problem of metal ions leaching out of the orthodontic appliances, down to fundamental research in the experimental mineralogy. The experiments carried out on the natural human teeth, combine the advantages of the clinical research and studies on synthetic material, steering clear of the traps related to both of the methods.