

# MEASUREMENT OF Ca, Cl, K, Mg, Mn, Na, P, Sr CONTENTS AND Ca/P RATIO IN THE ENAMEL OF PERMANENT TEETH OF TEENAGERS USING NEUTRON ACTIVATION ANALYSIS

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An examination of teeth condition requires exact knowledge of the nature and variation of the mineral matrix including the contents of some apatite and related bulk chemical elements such as Ca, P, Mg, Na, K, and Cl. Data of Ca and P content allow calculate Ca/P ratio with is a very important parameter of teeth apatite. It is known also that apatite phases can apparently be affected by trace element incorporation into teeth with effects on the physicochemical properties. This is why deficiency or excess of some trace elements, for example, such as Sr is one of the factors which determine the degree of susceptibility to caries and other dental diseases. So, chemical element analysis of teeth expands the knowledge of etiology of dental diseases and may be used for diagnostic, therapeutic and preventive purposes. Furthermore, teeth have been suggested as monitors for human exposure to elements which concentrate in calcified tissues.

In present study chemical element contents and the effect of gender on chemical element contents in intact enamel of permanent teeth of apparently healthy teenagers 11-13 year old was investigated. Mass fractions of Ca, Cl, K, Mg, Mn, Na, P, and Sr in tooth enamel samples were determined by instrumental neutron activation analysis (INAA) using activation by neutrons of nuclear reactor with next a high resolution spectrometry of gamma-radiation of activated short-lived radionuclides.

For all investigated chemical elements and Ca/P ratio some basic statistical parameters such as arithmetic mean, standard deviation, standard error of mean, minimal and maximal values, median, percentiles with 0.025 and 0.975 levels were estimated for tooth enamel in group of males and females separately and combined. Gender-related comparison using the Student's *t*-test did not show any statistically significant differences in Ca, Cl, K, Mg, Mn, Na, P, and Sr contents in tooth enamel, however the significant difference was found for Ca/P ratio. Obtained results were in good agreement with most reported data for tooth enamel.

The developed method of INAA is an efficient technique for the determination of many important chemical elements in tooth enamel. The method is simple, fast, multielemental, and non-destructive. Our data for Ca, Cl, K, Mg, Mn, Na, P, and Sr mass fractions in intact tooth enamel may serve as indicative normal values for teenagers of the Russian Central European region.