RELATIONSHIP BETWEEN Ca, Cl, K, Mg, Mn, Na, P, AND Sr CONTENTS IN THE INTACT CROWNS OF FEMALE TEETH INVESTIGATED BY NEUTRON ACTIVATION ANALYSIS

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The bioaccumulation of chemical elements in human bone and teeth is rather a complex process. Factors that influence bioaccumulation include age, gender, genetic inheritance, dietary habits, environmental quality, and so on. Many chemical elements in human organism act antagonistically and/or synergistically. Some elements in the teeth can be substituted by other elements and, as a result, change biochemical reactions in humans. Variations in relative content of chemical elements in the teeth lead to modulation/dysfunction of teeth metabolism.

To use chemical element composition as estimation of teeth health in clinical, geographical, environmental and occupational medicine, paleoanthropology, and other directions, it is necessary to know normal levels and age- and gender-related changes of chemical element ratios.

This work had three aims. The first one was to determine the Ca, Cl, K, Mg, Mn, Na, P, and Sr mass fractions in the intact crowns of female teeth by instrumental neutron activation analysis with high resolution spectrometry of short-lived radionuclides (INAA-SLR) and to calculate some statistical parameters of Cl/Ca, K/Ca, Mg/Ca, Mn/Ca, Na/Ca, P/Ca, Sr/Ca, Ca/P, Cl/P, K/P, Mg/P, Mn/P, Na/P, Sr/P, Ca/Mg, Cl/Mg, Mn/Mg, Na/Mg, P/Mg, Sr/Mg, Ca/Cl, K/Cl, Mg/Cl, Mn/Cl, Na/Cl, P/Cl, Sr/Cl, Ca/K, Cl/K, Mg/K, Mn/K, Na/K, P/K, Sr/K, Ca/Na, Cl/Na, K/Na, Mg/Na, Mn/Na, P/Na, and Sr/Na mass fraction ratios. The second aim was to evaluate the effect of age on mean values of ratios of chemical element mass fractions in the intact crowns of female teeth. The third aim was to estimate the inter correlations between Ca, Cl, K, Mg, Mn, Na, P, and Sr mass fractions in the intact crowns of female teeth.

In the intact crowns of female teeth it was found a statistically significant age-related decrease of the Sr/Ca, Sr/P, Sr/Mg, Sr/Na, and Cl/Na ratios accompanied an increase of the K/Cl, Na/Cl, and P/Cl ratios.

The positive inter-correlations of P mass fractions with Ca (p <0.001) and Cl (p <0.01), as well as Mn mass fractions with K (p <0.05) and Sr (p <0.01) mass fractions were found in female teeth crowns. If some correlations between the elements were predictable (e.g., Ca–P), the interpretation of other observed relationships requires further study for a more complete understanding.