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PhD Thesis – Abstract

**STUDIES REGARDING THE INTAKE, METABOLISM AND
BIOAVAILABILITY OF FLUORIDE IN HUMAN BODY**

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Intoduction

There is strong evidence that the widespread use of fluoride has played an important role in the caries decline in the last decades. Simultaneously with the caries decrease, an increase in the prevalence of dental fluorosis has been observed due to multiple intake sources. In spite of decades of research in this field, questions still arise on its use at community, self-applied and professional application levels. Finding the most appropriate method of fluoride delivery, the right time when it should be used and the right quantity that can maximize its benefits and still reduce the risks associated with its use are the most debated topics nowadays.

The PhD thesis consists of two major parts, a general and a personal contributions part.

In the **general part** of this thesis we aimed to present the scientific background to understand the importance of each method of fluoride use.

The **personal contribution part** comprises three research directions:

Chapter 1. Study of urinary fluoride excretion in preschool children

The aim of this study was to investigate the daily excretion of urinary fluoride (F) of preschool children under their customary conditions of fluoride intake, to evaluate whether F intake is optimal for caries prevention. The method of urine collection over a period of 16 hours was applied, the urinary fluoride excretion over 24 hours was calculated and the daily

fluoride intake for each child was estimated. An ORION 720A fluoride meter provided with an ion-selective electrode for fluoride was used. The estimated average of daily urinary fluoride excretion value was below the value considered as representatives for an optimal F intake according the WHO guidelines (Marthaler, 1999) for this age group. In children receiving fluoride supplements the mean urinary fluoride excretion was higher, situated on the upper limit for an optimal fluoride intake. The findings suggest that before introducing any fluoridation programme it would be necessary to estimate the fluoride exposure of the children by monitoring the daily urinary fluoride excretion.

Chapter 2. Possible sources of fluoride intake.

Study 1. Fluoride levels in milk marketed in Tg. Mures

Troughout this study we aimed to estimate if milk, by its fluoride content, may represent an important source of fluoride intake, taking into consideration that it represents a universal food for children. After analyzing the milk samples with a fluoride ion specific electrode, low fluoride concentrations was found. It can be concluded that the use of such products is safe, concerning the dosages believed to increase the risk of dental fluorosis.

Study 2. Tea as a source of fluoride intake

The tea plant (*Camellia sinensis*) is known as a fluoride accumulator. The purpose of this study was to determine fluoride concentration in different tea infusions available in Targu-Mures and also to assess the effect of infusion time on the release of fluoride, to be able to control the fluoride intake. Samples from each tea infusion were taken and fluoride content was measured. In a second phase, we measured the level of fluoride after infusing the tea double the recommended time. The mean values (ppmF $\pm$ SD) of the fluoride concentration in tea after the recommended infusion time were 1.205 $\pm$ 0.766 and after doubling the recommended infusion time they were 1.495 $\pm$ 0,811. We concluded that fluoride concentration in tea infusion is high and goes up with the increasing of infusion time. Thus, a regular consumption of tea in appropriate quantities might have beneficial effects in preventing dental caries.

Study 3. Use of dentifrices and fluoride supplements by preschool children

It is well-known that the protective action of fluoridated toothpaste is almost exclusively topical but the ingestion of fluoride from this source is frequent, especially in young children,

Several studies established that the early use of fluoride toothpaste is one of the many factors that may be associated with an increased risk of fluorosis because a high percentage of children under the age of 6 years can swallow a variable amount of the fluoride toothpaste used for brushing. It is a fact that their swallowing reflex is not fully developed at this age. The purpose of this study was to collect information about tooth brushing habits of preschool children in Targu-Mures and also to identify fluoride (F) supplements usage in order to estimate the fluoride intake.

A structured questionnaire was completed by the parents of children aged 3 to 6 years of age regarding the tooth cleaning habits of their children and the use of F supplements. We found that most children comprised in our study brush their teeth using toothpaste after they turn 2, twice a day, using fluoride toothpaste with low fluoride content. Significant association was found between the frequency of tooth brushing, amount of dentifrice used and children's age.

Chapter 3. The influence of water rinsing after tooth brushing and dentifrices fluoride content on salivary pH and fluoride concentration

This study was aimed to establish the influence of toothpaste fluoride concentration and two post brushing regimes— rinsing with water and without rinsing- on salivary F levels and pH in order to evaluate oral fluoride retention. We concluded that toothpaste with higher F concentration could increase efficacy in caries prevention and so could some rinsing habits. A slight increase of salivary pH was recorded right after tooth brushing only to decrease one hour later, regardless of the post brushing attitude adopted.

Keywords: fluoride intake, urinary fluoride excretion, salivary fluoride concentration, fluoridated dentifrices