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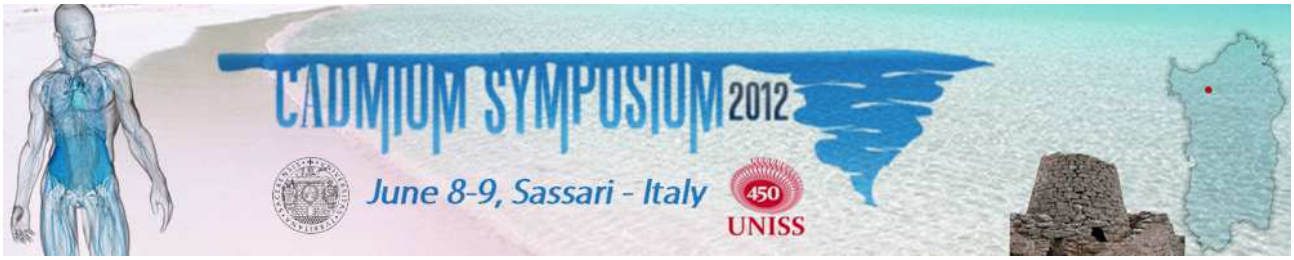

| Abstract Book |

HEAVY METALS: TEETH AS ENVIRONMENTAL BIOMARKERS

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Background and Aims

Aim of this study was to measure the concentration of heavy metals in tooth matrix and to determine the factors that affect their presence. During tooth development and mineralization several metals can be absorbed in the tooth matrix, thus allowing us to use them as biological markers. Like in a bone, calcium can be partially substituted by a small amount of heavy metals (Boivin et al., 1996; Kwapulinski et al., 2003). This is rather a complex process that is affected by various factors including the chemical form of the metal and its binding sites, age, gender, environmental quality (Tvinnereim et al., 2000; Burguera et al., 2002). The way the metals are accumulated in a calcified tissue also reflects the interactions between elements (Lappalainen and Knuuttila, 1982). These elements cannot be eliminated and their toxicity results from their affinity to the sulfhydryl groups, which causes the formation of an insoluble complex by limiting cellular metabolism; abnormal enamel thus originates in the tooth by means of the competition with calcium. Cadmium alters the calcium/phosphorus turnover thus determining demineralization, osteomalacia and pathological fractures (Staessen, 1999).

Methods

Using an inductively coupled plasma mass spectrometry we calculated the concentration of some heavy metals – primarily uranyl ions (50 samples) – in the area of the military base of Escalaplano and then, using a Graphite Furnace Atomic Absorption Spectrometry (GFAA), we calculated the concentration of 4 heavy metals (Pb, Cd, Cu, Ni) in 91 caries-free teeth belonging to patients from three different Sardinian cities: Sassari, Ottana and Porto Torres. These cities were chosen with regard to their position and to the job opportunities they offered. Several dentists and patients took part in this research. Questionnaires were submitted to the patients in order to gather information such as personal data, qualification, residence, profession, diet, drunk water (spring, well or bottled up water), smoking habits and medication taken.

Results

The mean concentration of Pb, Cu, Cd, Ni, was respectively 3,46±3,20 µg/g, 0,419±0,363 µg/g; 0,0257±0,0249 µg/g; <0,02 µg/g. Our results show correlations between different kinds of teeth, age and residence. The Pb e Cd concentration was higher for smokers (Pb 4,44±3,50µg/g, Cd 0,04±0,01 µg/g) than for no smokers (Pb 2,45±2,03 µg/g; Cd 0,028±0,015µg/g).

Conclusions

Our work demonstrates that teeth are valuable markers of environmental pollution exposition and that teeth are permanent markers of exposition to polluting agents.