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Environmental health aspects of lead

Die gesundheitlichen Aspekte
der Umweltverschmutzung durch Blei

Les problèmes sanitaires posés par le plomb
présent dans l'environnement

CONTRIBUTION TO THE STUDY OF METABOLISM OF
LEAD IN MAN THROUGH MEASUREMENT OF LEAD-210,
AS A NATURAL TRACER

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SUMMARY

The aim of the present work is research the Pb-210 in teeth, as a natural metabolic tracer. Measurements have been carried out on 500 deciduous and permanent teeth. The teeth of adults came from smokers and non smokers.

A correlation has been found between the amount of lead and the age of subjects on one side and tobacco smoking on the other side.

Many research works have been carried out recently on the distribution of Pb-210 and Po-210 in different organs and tissues of human body, mainly in smokers, according to the presence of those nuclides in tobacco. (1-12)

Some researches have also been made in bones and teeth of smokers and non smokers. (13-19)

The aim of the present work is to search for a possible increase of Pb-210 - Po-210 in teeth depending on the age of subjects with a trend similar to the one found by the Authors in a previous work in cattle bones. (20-21)

MATERIALS AND METHODS

About 300 teeth extracted at the Dental Clinic of the University of Pavia were examined. Approximately one third was decayed, anyway the discarded teeth presenting large decays.

Teeth were carefully cleaned and possible fillings were taken off; then they were shared in deciduous and permanent. The last group was again subdivided according to the age of the subjects to whom they belonged.

Smokers and non smokers teeth were examined separately.

The teeth were cut at the junction of crowns and roots.

Pb-210 was measured as Po-210 and, to check the obtained values, Bi-210 was also measured any time it was possible to have enough material.

About 10 g. of each crown and root sample were wet ashed with a mixture of nitric and perchloric acid. The solution was neutralized and brought to pH 0.3, with HCl and added with 200 mg. of ascorbic acid.

Po-210 was then deposited on a 2 cm. diameter silver disk, shaken for 6 h. at a t of 85°C.

Bi-210 was deposited on a nickel disk using the same method. Under the above said conditions the deposition efficiency both for Po-210 and Bi-210 was 90%.

Po-210 was determined by alpha spectroscopy using a solid state detector. The total efficiency (chemical and physical) was 22%.

Bi-210 was measured using a low background gas flow counter.

An absorber of 8,8 mg/cm² was inserted to stop α -particles. The total efficiency (chemical and physical) was 32%.

C_a was determined as oxalate.

Values of Pb-210 were referred per g. of Calcium, which is in a constant ratio with ashes.

The standard error of measures is 2% with a probability of 95%.

RESULTS AND DISCUSSION

Results are shown in table 1 and graphs 1 - 2 - 3 and 4. From these it appears that:

1) teeth of non smokers adults don't show any significant difference in connection with the age. The Pb-210 content is much higher than in deciduous teeth;

2) in teeth crowns the higher values of Pb-210 were found in subjects between 10 and 20 years of age; after this age the values of the nuclide decrease, both in smokers and non smokers, with a trend similar to that of its physical half-life.

3) in teeth roots Pb-210 is practically constant during non smokers life; viceversa it increases with age in smokers.

100

- # Number of teeth

Table 1 - 1b continued in text.