IMPLICATIONS OF ENVIRONMENTAL STRONTIUM 90 ACCUMULATION IN TEETH AND BONE OF CHILDREN

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1. Introduction

In order to define and document possible hazards of environmental radioactive pollutants that occur from fallout or nuclear reaction emissions, my laboratory has been studying the accumulation of strontium 90 in teeth and bone of children as related to dietary consumption of the nuclide. Following the suggestion of Kalckar [1], we selected to study strontium 90 for the following reasons:

(1) Strontium 90, deposited during formation of stable calcified tissues, such as teeth, represents a marker atom that indicates the maximum amount of nuclide deposited during formation of the teeth.

(2) Strontium is biochemically similar to calcium and is permanently deposited in calcified tissues.

(3) Strontium 90 is a potentially hazardous nuclide because of its long physical half-life ($T/2$ = 28 yrs.) and its very slow biological turnover time, ranging between no turnover for teeth to less than eight per cent per year in vertebral bone [2].

We have concentrated our studies on deciduous and permanent teeth because deposition of alkaline earth radionuclides is only minimally affected by such factors as mineral turnover, exchange, accretion, and remodeling during the time the tooth crown is formed. Thus, the concentration of radionuclide in the tooth crown represents the equilibrium established between the crown and the diet at the time the crown is mineralized. Once the crown is complete, the nuclide concentration becomes a permanent record and is representative of the total mineralization process when mineralizing tissues are in their most active metabolic state.

Our previous data [3], [4], [5], [6] demonstrated that the accumulation of strontium 90 in the deciduous and permanent teeth of children was adequately described by a linear equation of the form $C_T = KC_D$ where C_T and C_D represent tooth crown and diet strontium 90 concentrations respectively, and K is a constant. The constant K differs for each specific kind of tooth formed *in utero* and after birth (Table I), chronological age for tooth development, attendant discrimination factors, and other factors as far as they are known.