ABSORPTION OF ^{212}Pb FROM THE GASTROINTESTINAL TRACT OF MAN

John B. Hursh and Jorma Suomela

University of Rochester School of Medicine and Dentistry
Rochester, New York

When ^{212}Pb was administered by mouth to three human subjects, gastrointestinal absorptions of 1.3, 8.1, and 16.0% were found. The method used was to compare 24-hour urinary excretion of these subjects with the average excretion in the same period by two subjects who received ^{212}Pb intravenously. The only obvious factor related to the wide range in absorption was age, increasing age being associated with decreased absorption. The average value of 8% is the same as that used for lead by ICRP - NCRP. It is pointed out that this choice may not be conservative for an appreciable fraction of the population. The ^{212}Pb concentration in the blood cells as function of time suggests that loss may occur only after red cell death. The implications of this to chemical toxicity of lead are considered.

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be estimated from the report by Kehoe et al (15). They performed experiments in which 2 human subjects were given supplementary soluble lead by mouth at the rate of 1 and 2 mg per day over periods of years. From examination of their data it is found that the blood level rises to a mean value of about 0.06 mg lead per 100 ml and does not greatly exceed this. If this concentration represents saturation, the blood cell mechanism could turn over about 0.028 mg lead per day with only transient increases in the plasma concentration. Since by hypothesis the cells are able to pick up only half of the lead introduced from the gut, this would conform to a total systemic intake of about 0.056 mg per day. If the systemic intake exceeds this rate, the average plasma lead concentration must rise. This leads to proportionally increased skeletal deposition and urinary excretion. Toxicity symptoms might be anticipated at plasma lead concentrations up 4-5 times above unexposed mean levels on the grounds that equivalent increases in urinary excretion rates have been observed (14) to be associated with lead intoxication.

Comparison of behavior of "carrier-free" Pb-212 and stable lead

In terms of the discussion above, it is apparent that the Pb-212 in oral and intravenous administration was no longer "carrier-free" after it entered the gut or the circulatory system. Accordingly absorption from the gut should not differentiate between Pb-212 and stable lead ions as such. If Pb-212 is introduced with supplementary lead in amounts so large as to saturate the binding sites of the blood cells, marked differences in tissue distribution and urinary excretion might be expected.

SUMMARY

When Pb-212 was administered by mouth to 3 human subjects gastro-intestinal absorptions of 1.3, 8.1, and 16.0 per cent were found. The method used to determine absorption was to compare the 24-hour urinary excretion of these subjects with the average excretion in the same period by 2 subjects who received Pb-212 intravenously. The only obvious factor related to the wide range of absorption was that of age, increasing age associated with decreasing absorption. The average value of 8 per cent is equal to that used by ICRP. It is pointed out that this choice may not be conservative for an appreciable fraction of the population. The Pb-212 concentrations in the blood cells as a function of time after oral or

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intravenous administration suggest that lead may be released from the binding sites only when the red cell dies. The relationship of this proposal to permissible intakes of stable lead is considered.

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