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ELIMINATION OF INTRAVENOUS CARBON^{14} BICARBONATE BY MAN

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SUMMARY

A body of data has been obtained concerning the excretion rates and tissue retention of inorganic carbon^{14} administered to rats and mice. The present study compares the human excretion of injected $NaHC^{14}O_3$ to rates observed in smaller animals in order to provide a basis for the computation of permissible human doses of this isotopic compound. In this work 10 microcuries of material were injected intravenously into healthy human volunteers and all expired CO_2 was collected in fractions during the following 3 hours. With the subject at rest approximately 75 per cent of the radioactivity is exhaled as CO_2 during the first hour; 90 per cent is gone in 2 hours; and 95 per cent has been blown off at the end of the third hour.

Within the error of the methods used the rate of isotope excretion by different sized animals is proportional to the metabolic rate per unit mass of animal. When published data of others are included this relationship seems valid for animals as large as the cow (Kleiber) and as small as the mouse. On this basis the extrapolation to man of information obtained in long term experiments with rats and mice indicates that an intravenous injection of 20 to 40 mc of $NaHC^{14}O_3$ or the inhalation of a comparable amount of $C^{14}O_2$ would be required to give a 70-kg man a total radiation dose of 1 roentgen equivalent over his entire life span.

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