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THE TOXICITY OF TRITIUM

R. LOWRY DOBSON

Biomedical Sciences Division,
Lawrence Livermore Laboratory,
University of California,
Livermore, California,
United States of America

Abstract

Among radionuclides of importance in atomic energy, ^{3}H has relatively low toxicity. There is concern, however, because very large amounts are involved in nuclear fission and fusion, impressive quantities are released to the environment and tritium in its preferred state, water, has free access to living cells and organisms. The main health and environmental worry is the possibility that significant biological effects may follow from protracted exposure to low concentrations in water. To examine this possible hazard and measure toxicity at low tritium concentrations, chronic exposure studies were done on mice and monkeys. During vulnerable developmental periods animals were exposed to ^{3}HOH and mice were exposed also to ^{60}Co gamma irradiation and energy-related chemical agents. The biological endpoint measured was the irreversible loss of female germ cells. Effects from tritium were observed at surprisingly low concentrations where ^{3}H was found more damaging than previously thought. Comparisons between tritium and gamma radiation showed the relative biological effectiveness (RBE) to be greater than 1 and to reach approximately 3 at very low exposures. For perspective, other comparisons were made: between radiation and chemical agents, which revealed parallels in action on germ cells; and between pre- and postnatal exposure, which warn of possible special hazard to the foetus from both classes of energy-related byproducts.