

METABOLISM AND GENETIC ACTION OF BIOGENIC TRITIUM  
IN MAMMALS

M.I. Balonov, T.V. Zhesko, M.E. Chetchueva,  
M.D. Pomerantseva and L.K. Ramaya  
Institute of Radiation Hygiene  
8 Mira ul., Leningrad 197101, U.S.S.R

ABSTRACT

In the process of biosynthesis the general metabolic behaviour of  $^3\text{H}$ -labeled precursors of biopolymers consists in stable binding of 5-80% of tritium activity by mammalian tissues and simultaneous chipping of 90-10% of the label and its incorporating as THO into the body liquids. When injected into the body of mice and rats,  $^3\text{H}$ -glucose and  $^3\text{H}$ -amino acids will cause the tissue dose exceeding that from the equal quantity of THO by 1.1 - 10 times. The nonreplaceable amino acid L-lisin- $^3\text{H}$  will cause the greatest dose and within the space of 3-5 months increase the frequency of dominant lethal mutations (DLM) in male mice by 2-4 times as compared with THO.

$^3\text{H}$ -desoxynucleosides are incorporated into chromosomes during S-phase of the cell cycle for about an hour. The retention function of  $^3\text{H}$ -TdR and  $^3\text{H}$ -CdR depends on their dosage owing to reparation of DNA damages and labeled cells destruction. The injection of activity in several fractions in 10-15 hours conduces to prolonged DNA-bound tritium retention in tissues and increased radiobiological effect than does a single injection of the same dosage. Dependence of DLM and reciprocal translocations frequency in spermatogonia on the dosage of  $^3\text{H}$ -TdR is non-linear. The effect per unit activity administered is the greatest at 37 kBq/g (1  $\mu\text{Ci/g}$ ) and reduces by 2-4 times or by one order of magnitude with increasing dosage up to 0.37 MBq/g and 1.11 MBq/g respectively. By the genetic tests in male mice injection of 37 kBq/g of  $^3\text{H}$ -TdR and of  $^3\text{H}$ -CdR is equivalent to 0.2 - 0.4 and 0.05 - 0.01 Gy of gamma-radiation respectively.

The materials of the investigation have been used for developing radiation standards.