

RADIOACTIVE IODINE IN THE PROBLEM OF RADIATION SAFETY

L. A. Il'in
G. V. Arkhangel'skaya
Yu. O. Konstantinov
I. A. Likhtarev

Atomizdat
Moscow
1972

4

RADIOACTIVE IODINE IN THE PROBLEM OF RADIATION SAFETY

Complete translation of Russian-language book by L. A. Il'in, G. V. Arkhangel'skaya, Yu. O. Konstantinov, and I. A. Likhtarev, edited by L. A. Il'in; Moscow, Radioaktivnyi iod v probleme radiatsionnoi bezopasnosti, Atomizdat, 1972, 272 pages

CONTENTS	Page
FOREWORD	1
CHAPTER 1: RADIOACTIVE IODINE IN THE ENVIRONMENT	4
1.1 The Formation and Properties of the Radioactive Isotopes of Iodine	4
1.2 Radioactive Iodine in the Products of Nuclear Explosions ..	12
1.3 Discharge of Radioiodine Into the Environment From Nuclear Reactors and Irradiated Nuclear Processing Facilities	21
1.4 The Migration of Radioactive Iodine in the Biosphere	30
CHAPTER 2: QUANTITATIVE CHARACTERISTICS OF IODINE EXCHANGE IN THE HUMAN BODY AND ELEMENTS OF THE NORMAL PHYSIOLOGY OF THE THYROID GLAND	53
2.1 General Principles of Iodine Exchange in the Body	53
2.2 The Exchange of Radioactive Iodine in the Body of Pregnant Women, the Fetus, Newborn Infants, and Children ..	64
2.3 A General Block Diagram of Iodine Exchange in the Body (Chamber Models of Transport)	71
CHAPTER 3: RADIATION DANGER AND THE PROBLEMS OF SETTING STANDARDS FOR IODINE RADIOISOTOPES.....	115
3.1 Dosimetric Evaluation of the Inhalation Danger of a Mixture of Iodine Radioisotopes	115
3.2 Controlled Discharge of Radioiodine Into the Atmosphere ...	121
3.3 Emergency Situations	127
3.4 Local Fallout of Radioactive Products of Nuclear Explosions	137
3.5 Certain Data on the Medical and Biological Danger of the Incorporation of Radioactive Iodine	146
3.6 The Setting of Hygienic Standards for Radioiodine	151
3.7 The Decision-Making Criterion in an Emergency Situation ...	164
CHAPTER 4: PROTECTING THE HUMAN BODY FROM THE EFFECTS OF RADIOACTIVE IODINE	175
4.1 Ways of Protecting Against Radioiodine in Links of the Biological Chain Up To Man	175

4.2 Preventing the Accumulation of Radioactive Iodine in the Thyroid Gland, and Accelerating Its Elimination From the Body	180
4.3 On the Problem of Protecting Pregnant Women and the Fetus From Exposure to Radioactive Iodine	202
4.4 Quantitative Aspects of the Protective Effect of Stable Iodine in Man	208
CONCLUSION	260

ANNOTATION

The present monograph is devoted to one of the pressing problems of radiation hygiene and radiation protection. In it are considered situations accompanied by the release of radioactive isotopes of iodine into the environment and the principles of their migration in the biosphere and their metabolism in the human body, including the body of pregnant women, the embryo, and the newborn, are discussed. Mathematical models of iodine transport in the human body and the particulars of the deformation of these models when protective preparations are used are presented. An evaluation is made of the radiation danger of iodine isotopes. The problems of setting standards for the intake of radioactive iodine by the body are discussed. Much attention is paid to the problem of protecting man against the effect of radioactive iodine. Measures for preventing the intake of radioactive iodine by the human body from links of the biological chain are considered. The effectiveness of various therapeutic and prophylactic measures that reduce the dose load on the body from radioactive iodine is analyzed. There are 55 figures, 62 tables, and 676 bibliographic entries.