UCRL 68
y 8D/A
c.2

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

TWO-WEEK LOAN COPY

This is a Library Circulating Copy
which may be borrowed for two weeks.
For a personal retention copy, call
Tech. Info. Division, Ext. 5545

BERKELEY, CALIFORNIA

UCRL-68
c.2

Lawrence Radiation Laboratory Library
University of California, Berkeley

UNIVERSITY OF CALIFORNIA
RADIATION LABORATORY

Cover Sheet
Do not remove

UNCLASSIFIED

INDEX NO. UCRL-68
This document contains 7 pages
and 4 plates of figures.
This is copy 83 of 95. Series A
Issued to: INFORMATION DIVISION

RESTRICTED

Classification

Each person who received this document must sign the cover sheet in the space below.

Route to	Noted by	Date	Route to	Noted by	Date

UNCLASSIFIED

UCRL-68

Health & Biology-General

RESTRICTED

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

Contract No. W-7405-eng-48

UNCLASSIFIED

Classification chan

by

By Date

Person making change

N-4-55

COMPARATIVE DEPOSITION OF Zr^{95} IN A RETICULO ENDOTHELIAL TUMOR TO NORMAL TISSUES IN A HUMAN PATIENT

by

B. V. Low-Beer, M.D., K. G. Scott, Ph.D.
Joseph G. Hamilton, M.D., R. S. Stone, M.D.

March 15, 1948

Berkeley, California

Special Review of Declassified Reports
Authorized by USDOE JK Bratton
Unclassified TWX P182206Z May 79

REPORT PROPERLY DECLASSIFIED

Authorized Der... ...er 8-15-79 Date

8-20-79 Date

by

UNCLASSIFIED

Standard Distribution	Copy Nos.
Argonne National Laboratory	1-10
Atomic Energy Commission, Washington	11-13
Battelle Memorial Institute	14
Brookhaven National Laboratories	15-22
Carbide & Carbon Chemicals Corp. (K-25 Area)	23-24
Carbide & Carbon Chemicals Corp. (Y-12 Area)	25-26
Oak Ridge National Laboratories	27-34
General Electric Company	35-38
Hanford Engineer Works	39-40
Iowa State College	41
Los Alamos	42-44
Office of N. Y. Directed Operations	45
Massachusetts Institute of Technology	46
Monsanto Chemical Company, Dayton	47
National Bureau of Standards	48
Patent Advisor	49
Library Branch (for NEPA), Oak Ridge	50
Library Branch, Oak Ridge	51-65
University of Rochester	66-67
Declassification Procedure	68-77
J. G. Hamilton	78-82
J. H. Lawrence	83-84
R. L. Dobson	85
N. Garden	86
R. S. Stone	87
Chemistry Department	88
University of California, Radiation Laboratory	89-95
Total	95

University of California
Berkeley, California
Radiation Laboratory

UNCLASSIFIED

ABSTRACT

A test dose of Zr^{95} was given to a female patient which had a metastatic reticulo endothelial tumor at the distal portion of the left femur. A comparison of the deposition of Zr^{95} showed greater uptake 24 hours after administration than any of the normal tissues investigated.

COMPARATIVE DEPOSITION OF Zr^{95} IN A RETICULO ENDOTHELIAL TUMOR TO NORMAL TISSUES IN A HUMAN PATIENT

By B. V. Low-Beer, M.D., K. G. Scott, Ph.D., Joseph G. Hamilton, M.D., and R. S. Stone, M.D. March 15, 1948

For eventual publication.

Contract No. W-7405-eng-48

University of California
Radiation Laboratory
Berkeley, California

COMPARATIVE DEPOSITION OF Zr^{95} IN A RETICULO ENDOTHELIAL TUMOR TO NORMAL TISSUES IN A HUMAN PATIENT

by

B. V. Low-Beer, M.D., K. G. Scott, Ph.D.
Joseph G. Hamilton, M.D., R. S. Stone, M.D.

Recent studies have demonstrated that radioactive Zr^{95} is deposited in the reticulo endothelial system of the rat (1). This radioactive isotope of zirconium is available in large quantities owing to the fact that it is produced by the fission of uranium in the pile. In decaying to Cb^{95} it emits beta particles which have a maximum energy of 0.4 Mev rays. Owing to these decay characteristics the major portion of the ionizing radiation is expended close to the area of Zr^{95} deposition. The gamma rays which are emitted allow precise investigation of deep regions of deposition in the body by external measurement using such a device as a Geiger Muller counter.

On January 5, 1948, a 55 year old female patient with a reticulo endothelial tumor, which arose apparently in the spleen and later metastasized to the liver and the distal epiphysis of the left femur, was given a test dose of Zr^{95}. This was administered as an isotonic saline solution intravenously 24 hours prior to the mid-thigh amputation of the left leg.

The amount of Zr^{95} given was 1.76 millicuries. Owing to the fact that the liver is the major site of deposition, the size of the test dose was limited to a safe radiation level for that organ, assuming 100% retention of Zr^{95}. This amount of radioactivity would give the liver less than 100 r over a period of two weeks. Its subsequent excretion by the

liver and the relatively short half-life of 65 days precluded any risk to the patient with respect to radiation damage. Samples of the tumor as well as normal tissues were obtained from the limb for radioactive assay. The distribution of Zr^{95} in these tissues is given in Table I as percent of the administered tracer dose per gram of tissue.

TABLE I

Percent of Tracer Dose Per Gram Wet Weight*

Tissue	
Tumor	.0005
Femur	.0003
Tibia	.0002
Marrow from femur (yellow)	.00006
Marrow from tibia (yellow)	.00001
Muscle (gastronemius)	.00001
Fat	.00001
Blood	.0003
Skin	.00003

An examination of Table I demonstrates the relatively greater uptake of tumor compared to the normal tissues of the body which were available for assay. Since the probable volume of all of the metastatic tumor growths could not be determined, it was impossible in this case to determine what percent of the total activity was taken up by tumor or if the concentration of Zr^{95} in tumor was dependent upon its anatomical location.

* The sensitivity of the measuring instrument was such that the determination had an error of less than + - 6%.

This work was done in the Divisions of Medicine and Radiology, University of California, San Francisco, and Crocker Radiation Laboratory, Division of Medical Physics, University of California, Berkeley, under contract W-7405-eng-48AI with the U. S. Atomic Energy Commission.

FIGURE I

RADIOAUTOGRAPH 140 HOUR EXPOSURE
OF TUMOR SECTION SHOWN IN FIG. III.

FIGURE II

RADIOAUTOGRAPH 216 HOUR EXPOSURE OF TUMOR SECTION SHOWN IN FIGURE III.

FIGURE III

SECTION THROUGH TUMOR AND DISTAL PORTION OF FEMUR. PREPARED BY CUTTING THROUGH PORTION OF FROZEN LIMB.

FIGURE IV

PHOTOMICROGRAPH OF TUMOR TISSUE
SHOWN GROSSLY IN FIGURE III