

SUMMARY FACTSHEET HUMAN EXPERIMENTATION SFS1.001

Project Category: Metabolism and Biological Effects of Plutonium, Polonium, Radium, Thorium, Uranium and Lead-212

Funding Source(s): MED
AEC (one patient)

Institution(s): University of Rochester, University of California, University of Chicago, Clinton Laboratories (Oak Ridge)

Principal Investigator: Robert S. Stone

Objective(s) of Project: To determine the excretion rate of plutonium in man in order to provide the information necessary for setting safety criteria for the several thousand MED workers handling plutonium.

Short Description: During the period 4-10-45 to 7-18-47 a total of 18 patients with an estimated life expectancy (because of existing disease) of less than 10 years were injected with on the average 0.3 microcurie of plutonium-239 or -238 (range: 0.05 to 6 microcurie) at: MED Hospital, Oak Ridge, TN (1 patient); Strong Med. Hosp., Rochester, NY (11); Billings Hosp., U. of Chicago, IL (3); Univ. Hosp. UCSF, San Francisco, CA (3).

The patients included 13 males and 5 females. By race there were 15 whites and 3 blacks. The ages of 13 were 45-65 years, 4 were 18-45 and one was 4 years old. Body excretions were collected and measured for plutonium content for several weeks after injection. These data have been analyzed many times in efforts to find the best mathematical parameters.

Follow-up Data: Six of the patients died in less than 1 year, three in 1 to 3 years, three in 8 to 14 years, and four after 20 years. One is still living (Oct. 1983) and the status of one is unknown. None of the deaths was related to plutonium exposure and there is no evidence to suggest that plutonium injection influenced the course of the diseases. The bodies of four of the deceased patients have been studied for residual plutonium content. With the excretion data these studies provide a basis for estimating plutonium body burdens from plutonium urinary excretion rates.

1064903

DOE/HQ

SUMMARY FACTSHEET HUMAN EXPERIMENTATION - SFS1.002

Project Category: Metabolism and Biological Effects of Plutonium, Polonium, Radium, Thorium, Uranium and Lead-212

Funding Source(s): AEC

Institution(s): Massachusetts Institute of Technology

Principal Investigator(s): Robley Evans

Objective(s) of Project: To determine the relative uptake via the gut of radium and thorium. This information was considered to be necessary in the interpretation of the toxicity data of radium dial painters.

Short Description: During the period 1961-1965, tracer doses of the short-lived nuclides radium-224 and thorium-234 were given by mouth to 20 volunteers (ages 63 to 83 years), and the relative absorptions measured. Metabolic studies, conducted over a period of 21 days for Ra and 4 months for Th, included measurements of blood, urine, feces and breath samples, and on the whole body and the upper 20% of the body with the GI tract shielded.

SUMMARY FACTSHEET HUMAN EXPERIMENTATION - SFS1.003

Project Category: Metabolism and Biological Effects of Plutonium, Polonium, Radium, Thorium, Uranium and Lead-212

Funding Source(s): MED/AEC

Institution(s): Univ. of Rochester (Polonium, Lead 212)
Los Alamos Scientific Laboratory (Uranium)
Massachusetts General Hospital (Uranium)
Oak Ridge National Laboratory (Uranium)

Principal Investigator(s): N. E. Silberstein (Polonium)
J. B. Hursa (Lead-212)
W. H. Sweet (Uranium)

Objective(s) of Project: Data on the distribution and metabolism of these substances in the body was needed for evaluation of the health hazards of exposure to these and related substances.

Short Description: In 1947 at Rochester, four human subjects were injected intravenously with 0.17 to 0.3 microcurie of polonium per kg body weight, and a fifth subject was given polonium orally. Fecal and urinary excretion rates were measured.

In Boston, Hexavalent uranium was given to 12 terminal brain tumor patients. Blood, urine and feces samples were obtained. Tissue samples were obtained at biopsy and autopsy and were studied at Oak Ridge (Oct. 1953-Oct. 1959).

In 1965 at Los Alamos the mean transit times for microspheres labeled with uranium-235 through the gastrointestinal tract was studied in 57 normal adults. Particle sizes were about 100 to a few hundred micrometers diameter. The mean transit times were 34.5 ± 16.6 hours.

In 1967 at Rochester, lead-212 was administered by mouth to three human subjects. Gastrointestinal absorptions of 1.3, 8.1 and 16.0% were found. Excretion rates were compared with those for two subjects who received lead-212 intravenously. The uptake and retention of lead in red blood cells was studied.

Follow-up Data: All of the brain tumor patients died of their disease within less than one and one-half years after entering the study. No follow-up was obtained in the other studies.

1064905

DOE/HQ