General Manager's Monthly Report to the Commission

July-August 1957

CONTENTS

This document consist of 4 Pages.
Cy: 1 of 1 Cys. Series: HDA

CONTENTS (cont'd)

CONTENTS (cont'd)

CONTENTS (cont'd)

BIOLOGY AND MEDICINE - JULY-AUGUST 1957

Predicted Skeletal Concentrations of Strontium 90

At the suggestion of the Joint Committee on Atomic Energy, the Division of Biology and Medicine invited the principal participants in discussions on this subject at the Congressional Hearings held May 27 - June 6, 1957, to meet in Washington, D. C., on July 29 to try to reduce the degrees of uncertainty involved in various predictions of future skeletal concentrations of strontium 90 in humans.

It was generally agreed by the participants that the average concentration in children of the northeastern United States in the fall of 1956 was about 0.8 micromicrocuries of strontium 90 per gram of calcium and that the average concentrations to be expected in young persons of the same area as a result of strontium 90 actually deposited on the earth's surface up to the end of 1956 fall between 1.5 and 2 micromicrocuries per gram of calcium. Three different estimates of the average skeletal levels of strontium 90 to be expected in young persons of the northeastern United States in 1975 under various conditions of testing nuclear weapons, obtained by following three different approaches, are listed below. All levels are in micromicrocuries of strontium 90 per gram of calcium.

	Predicted concentrations in 1975 from all strontium 90 produced before 1957	Predicted concentrations in 1975 if past tests or equivalent are repeated before 1965
1.	1.5 to 3.5	3.5 to 9
2.	2 to 5	5 to 12
3.	4 to 10	10 to 25

The bases for these estimates are discussed in a summary paper, copies of which may be obtained from the Division of Biology and Medicine. It was the consensus of the group that within one or two years the confidence with which predictions of future concentrations can be made will be so greatly increased that it is unprofitable for the present purpose to extend predictions beyond those given above.

Food Collection Program - Latin America

A member of the Division of Biology and Medicine staff visited Chile, Argentina, Peru, and Brazil to enlist the assistance of persons

in those countries involved in nutrition and food programs in the collection of foods comprising the principal sources of calcium in the diet. These samples are to be analyzed for their strontium 90 content to ascertain the amount of this fission product which may be entering the food chain.

Following discussions in each country to determine the principal foods of interest in the collection program, arrangements were made to collect samples and send them to the Health and Safety Laboratory, New York Operations Office, for analysis. The results of the analytical work will be made available to the countries concerned before they are published here. Those countries which have the necessary equipment and capability will be provided with duplicate samples on which they will perform their own analytical work.

In Chile, five different geographical areas, as well as the City of Santiago, were selected for sampling. Foods to be sampled are wheat, flour, potatoes, green vegetables, and milk.

In Argentina, milk, green leafy vegetables, and potatoes will be sampled from four geographical areas.

In Brazil, five geographical zones will be sampled for a variety of foodstuffs, including local dried milk. Since there are gummed-paper sampling stations in Brazil, the collection of foods will be correlated with the gummed-paper stations whenever feasible.

In Peru, foods will be sampled from the arid coastal area, the high sierras, and the jungle area on the upper Amazon.

Contract Negotiations

During this period the Division of Biology and Medicine evaluated and approved 53 contract renewals totaling $1,424,412. These can be broken down as follows:

Amount of contract	Number of contracts	Total amount
$10,000 and under	21	$170,846
$10,001 - 20,000	17	249,463
$20,001 - 50,000	9	285,924
$50,001 - 100,000	3	247,275
Over $100,000	3	470,904

A contract has been executed with the University of Florida for the evaluation of data on the genetic effects of chronic radiation on mice. These data were collected during the early days of the MED, but the death of the principal investigator resulted in their remaining unevaluated until the present time.

Publication - "Radioactive Contamination of Certain Areas in the Pacific Ocean from Nuclear Tests"

In August the AEC published a summary of data from the radiological surveys and medical examinations conducted since the accidental fallout of radioactive material on the Marshall Islands on March 1, 1954.

The publication gives a picture of the initial contamination, documents the radioactive decay as it has occurred on the Rongelap Atoll over a two and one-half year period, and thus suggests the developing patterns of the transfer of radioactive materials from the soil and water into the food chain.

The agencies involved in the collection of the data were: Joint Task Force 7; Applied Fisheries Laboratory of the University of Washington; Naval Radiological Defense Laboratory; Health and Safety Laboratory, New York Operations Office; and the Office of Naval Research.

Appointments to the Advisory Committee on Biology and Medicine

Three new members have accepted appointments to the Advisory Committee on Biology and Medicine.

Dr. Leonidas D. Marinelli, Associate Director, Division of Radiological Physics, Argonne National Laboratory

Dr. Harland G. Wood, Professor and Director of the Department of Biochemistry, Western Reserve University

Dr. James G. Horsfall, Director, Connecticut Agricultural Experiment Station

At the next meeting of the Advisory Committee (September 13-14), a new chairman will be selected to replcae Dr. Gioacchino Failla whose term has expired.

Activities of the Brookhaven National Laboratory

Experiments to determine the relative biological effectiveness of fast neutrons in producing acute lethality in mice. A number of investigators have performed experiments to determine the relative biological effectiveness (RBE) of fast neutrons in producing acute lethality in mice. Conflicting values have been reported, ranging from 1.5 to 5.0 RBE. An investigation to throw more light on these discrepant results has recently been completed. Measurements have been made of the doses of X rays and neutrons required to produce a lethal effect of 50 percent in 30 days (LD 50/30) in female mice. Two hundred and fifty kvp (kilovolts peak) X rays were used. The fast neutron irradiations were performed with fission neutrons produced in the Brookhaven reactor. Tissue equivalent ionization chambers were employed to measure the neutron dose. The X rays LD 50/30 dose was determined to be 636 rads, and the neutron dose 366 rads, giving an RBE of 1.7. This confirms the low RBE values obtained by other investigators at the Oak Ridge, Los Alamos, and Naval Radiological Defense Laboratories and indicates that there is no difference between cyclotron-pulsed neutrons and continuously produced neutrons from a reactor in producing a lethal dose of 50 percent.

Prevention of thrombocytopenic purpura produced by whole-body radiation. Thrombocytopenic purpura (a decrease of blood platelets to below normal levels) produced by whole-body irradiation can be prevented by transfusion of fresh platelets. In recent experiments, the survival, distribution, and fate of platelets transfused into the irradiated thrombopenic rat were studied using radiosulfur-labeled platelets. A potential mechanism of the role of platelets in the prevention of hemorrhage has been demonstrated in that the radiosulfur-labeled material from the platelet or the intact platelet itself appears to have been selectively incorporated into the capillary lining. Whether this means that platelets contribute some sulfur-rich macromolecular substance that is essential to prevent vessel breakdown, or that they play a more secondary role by initiating fibrin formation at a submicroscopic level is a matter for additional investigation.

Cobalt 60 source installed. A 500-curie cobalt 60 source was supplied from Brookhaven National Laboratory to the Bland Experimental Farm, University of Virginia, on July 15. This irradiation source will be used for the irradiation of plants and seeds.

Studies in Treatment of Irradiation Injury - Oak Ridge National Laboratory

Mammalian recovery studies. Lethally irradiated mice receiving massive and multiple injections of homologous or heterologous bone marrow showed the same delayed death pattern as the controls that received

standard doses of homologous or heterologous bone marrow. Mice that were exposed to 200 roentgens per day for five days and then given either type of bone marrow showed increased mortality over the X-ray controls that were given no bone marrow, indicating a killing effect of foreign bone marrow under these circumstances.

Erythrocyte life-span studies, in which radioactive chromium was used, indicate that the survival time of erythrocytes (red blood cells) from irradiated mice given rat bone marrow is shorter than the survival time of normal rat erythrocytes.

Leukemoid injection in irradiated mice. Mice bearing squamous cell carcinomas frequently exhibit blood cells resembling those in mice with mouse leukemia, and the question arose as to whether these leukemoid cells would promote recovery of the blood when transplanted into lethally X-irradiated mice. A series of mice irradiated at 750 roentgens were injected with either one femur equivalent of bone marrow or about 200×10^6 leukemoid leucocytes. Results indicate that the leukemoid cells may promote development of all three types of blood elements: white cells, erythrocytes, and platelets.