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HEALTH AND SAFETY CONFERENCE - APRIL, 1948

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HEALTH AND SAFETY CONFERENCE - APRIL, 1948

CHICAGO, ILLINOIS

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Research Service Division

Dr. Brues, Director of the Biology Division and Dr. Lisco, Director of the Medical Division, Argonne National Laboratory, kindly volunteered to meet the U.K. party at the Englewood Union Station at 9:00 A.M., on April 8, 1948.

Arriving from Rochester were Drs. J. S. Mitchell, J. F. Loutit and E. F. Edson of the United Kingdom party.

Dr. A. J. Cipriani of the Canadian Group and Dr. Harold Copp of the University of California Radiation Laboratory were also present at the first meeting in Dr. Austin M. Brues' office.

[Mr. A. Tammaro, Manager, Office of Chicago Directed Operations, welcomed the visitors and turned the meeting over to Dr. Brues.

The meetings opened with general discussion of the organization of Health and Medical Units of the Argonne National Laboratory and included discussion of the periodic examinations given to employees whether or not exposed to harmful radiations or toxic materials.

The next specific item discussed was the matter of the determination of plutonium in urine. These questions were tabled until the later meetings with Dr. J. J. Nickson.

The next topic covered was the scope and components of the routine blood checks and the technical as well as the psychological and medico-legal bases were considered. Specific mention was made of the relationship between the abnormality in the number of granules associated with the lymphocytes and the amount of absorbed radiation. Dr. Mitchell indicated that in his work doses as low as .5r have been detected. Dr. Mitchell then raised the question of whether a threshold dose had been detected in white blood cell count in laboratory animals or in man. No satisfactory answer could be given.

The possibility of using bone biopsy for the determination of retained plutonium was discussed both from the standpoint of determining its feasibility as a routine health check and also on the matter of considering from what part of the skeleton the bone sample should be taken.

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In reply to Dr. Loutit's questions on the study of animals subjected to Pu in the form of suspensions, Dr. Lisco mentioned the work done in administering Pu by tracheal intubation and by means of aerosols.

The discussions on Pu were summarized by general agreement that the presence of Pu in the urine indicates absorption in the body and the presence of Pu in the feces probably indicates no absorption in the body of the form of Pu present. Fecal assay is thus felt to be relatively unimportant and furthermore sputum assay should probably yield comparable data on the rapid elimination of Pu from the lungs although the accuracy of the latter means may be somewhat complicated by the discharges from the upper respiratory passages.

The second session which included Dr. J. G. Allen, ANL, opened with discussions of two fatal accidents at Los Alamos and the clinical sequence was outlined primarily by means of charts based on blood counts.

The discussion then went to the clinical treatment of dogs subjected to 450r single doses of X-ray. The treatment of hemorrhage was outlined and implications of the change in heparin was discussed.

Dr. Harriett Hardy of the Los Alamos Scientific Laboratory and Dr. J. J. Nickson of New York Memorial Hospital joined the conference for a discussion on toxicity of beryllium and its compounds. Among the items discussed were experience with personnel working with Be at AEC installations, preventive measures, analyses of Be in the body and determination of the safety level for Be in air. Dr. J. J. Nickson stated that an arbitrary maximum tolerance level of 5 micrograms of Be per cu. liter of air had been established at ANL and it was felt that the limit was quite conservative. No adverse experience with ANL personnel had been reported.

Further discussions on the toxicity of Be touched on a forthcoming paper by a British team investigating Be tolerance in animals. The balance of the discussion concerned experience in American industry where Be compounds have been used for several years in the fluorescent light industry.

The opening session on April 9, 1948 was attended by the entire visiting party together with Drs. Brues, Lisco, Nickson and Schubert and opened with the discussion of the tolerance levels for retained Pu in the body in man. Dr. Copp reported that the tolerance level at UCRL is .1 microgram. Dr. Brues reported that the level at Los Alamos is 1 microgram.

Assay methods for Pu in urine were requested by the visitors. Dr. Cipriani pointed out that the Cupferron method published by Wright Langham of Los Alamos was exceedingly cumbersome and he requested information on the method actually in use at the other AEC installations. Dr. Schubert reported on the bismuth phosphate-lanthanum fluoride method used by ANL which claims Pu recovery of not less than 90%.

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Alternate assay methods discussed included alpha counting of samples and a proposed fission recoil counting method which would necessitate exposing the sample in a pile with appreciable slow neutron flux.

In answer to questions from the UK representatives, Dr. Nickson reported that in the one case in his experience where Pu was detected in urine the excretion fell off very rapidly indicating rapid and almost complete elimination.

Dr. Schubert indicated that urine of ANL personnel is assayed for Pu as frequently as once each month for exposed personnel and not less frequently than once each year for personnel not believed to have been exposed.

Dr. Schubert reported on his work on use of zirconium in increasing excretion of Pu in urine by a supposed displacement mechanism. Dr. Copp added that the Zr method also showed promise in increasing excretion of radio-yttrium. Dr. Copp compared the toxic effects of various radio elements and outlined them as follows:

Group I - Strontium, radium and barium which are largely deposited in the bone and for which no really effective treatment has been developed. The only successful approach has been the decalcification of bone and its replacement by new calcium.

Group II - Plutonium and yttrium largely deposited in bone; very little deposited in liver. The zirconium displacement treatment, administered very early offers great promise.

Group III - Cerium, americium and curium, 50 to 60% deposited in the liver, most of which is excreted in one month.

Dr. Barron then joined the group and outlined his work on the mechanism of radiation effects on the inhibition of enzymes. The meeting adjourned at about 12:30 P.M., April 9.

On the afternoon of April 9, Drs. Cipriani and Edson visited the Chemistry Division Laboratories where the Price-Schwartz fluorescence photometers are in use. Dr. Cipriani brought up many technical questions on the construction and operation of the instruments and the preparation and standardization of blanks and samples.

After the meeting, there was a short informal tour of the laboratory by Dr. Brues with Drs. Copp, Edson, Loutit and Mitchell. Three specific places in the laboratory were visited: (1) the photographic room, where a motion picture of the circulation of the bat wing after total body radiation was shown; (2) the penthouse laboratory where there were demonstrations of technique used in studying the metabolism of radioactive

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CO₂ by animals and tissue cultures, the effects of heavy localized beta radiation on tissue cells and cultures, and the effects of X and gamma radiation in Pu on cell division in the regenerating rat liver.

There was a discussion of recent results using these techniques and Dr. Brues discussed the use of hydraulic models in estimating turnover and diffusion rates as applied to CO₂ problems. It was stated that recent experiments indicate that a large proportion (between 50 and 100%) of inhaled CO₂ passes into the circulation. (3) Dr. Mitchell also spent some time with Dr. Powers discussing recent results and calculations on the genetic effects of P³² and Sr⁸⁹.

During their stay in Chicago, the party also visited Dr. Zirkle and Dr. Boche at the Institute of Radiobiology and Biophysics, and Dr. Allen and Dr. Jacobson at Billings Hospital. These talks were limited to declassified matters.

On Monday, April 12, Dr. Loutit visited the Laboratory of Dr. Miriam Finkel where the major topic of discussion was the administration of laboratory animals injected with radioactive substances and related problems.

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