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Medical Department
Brookhaven National Laboratory
Upton, Long Island, New York

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28 March 1956

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Dr. Charles L. Dunham, Director
Division of Biology and Medicine
Atomic Energy Commission
Washington 25, D. C.

Dear Dr. Dunham:

The medical team returned 15 March 1956 from the two-year medical resurvey of the Rongelap people and controls. Everything went extremely smoothly with a minimum of difficulties. Johnston Island, however, seems to have a magnetic effect for our group since once again we had to spend 24 hours there due to engine trouble.

Enclosed is a preliminary report of the two-year medical resurvey findings in the Rongelap people and controls.

While we were at Majuro, a United Nations' group visited the atoll. Great Britain, India, Belgium, Guatamala and China were represented. They conferred with us on the status of the Marshallese. A copy of the report which I submitted to them is enclosed. They seemed to be favorably impressed with the handling of the problem.

There are several specific problems and recommendations which I would like to bring up. Most of the problems center around the return of the Rongelap people to their home atoll. Upon their return to Rongelap, the people will be almost completely isolated and their only contact with the outside world will be the visiting Trust Territory field trip ship which will touch off there, at most, every three or four months. This will mean that the people will have to depend almost entirely for medical care on their medical aid man (). His training is such that only the barest first aid care can be expected from him. Since these people have received significant amounts of radiation, the long term effects of which are uncertain, and in view of the unique world-wide interest in these people, disproportionate radiological importance may be attached to any disease that may develop among them and any suggestion of negligence in medical attention may be the cause of great embarrassment. This problem is not easily soluble. The easiest way out would be, in my opinion, to leave the people at Majuro. However, since we are committed to return the people to their homes and that is also their express wish, we must consider other measures. The following might be considered:

(1) Establish radio communications on Rongelap. This would probably also require training one of the Rongelap people in the use

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of the radio (receiving and broadcasting). Or, better still, place a regular radioman there who can also carry out maintenance and repair.

(2) Arrange for evacuation, via air, and treatment of all ill persons through Trust Territory Headquarters, Guam, or through the Navy at Kwajalein.

(3) Arrange for a monthly or semi-monthly visit, by air, of a physician to Rongelap for survey of the people.

(4) At the time of evacuation, hold on Majuro, at the Marshall Island Memorial Hospital, all individuals requiring medical supervision. A fund would probably have to be established to allay expenses for this. ~~The psychic trauma must be considered in such a separation from the families of those selected to stay at Majuro.~~ If adequate medical supervision could be established at Rongelap, this measure might not be necessary.

(5) Arrangements might be made to send any special cases needing careful evaluation or specific therapy for consultation and treatment to the Naval Hospital on Guam. Advantage might be taken of the Military-Medico Symposium held at the U. S. Naval Hospital, Guam, once yearly where a group of well known specialists examine and treat special cases. In this regard, the Rongelap boy, , with rheumatic heart disease might be thoroughly evaluated there for possible cardiac surgery. (Captain H. A. Gross, MC, USN, is Commanding Officer of the Naval Hospital on Guam.)

One of two more problems were discussed with Mr. Neas and others at Majuro concerning the Rongelap people:

(1) Task Force 7 has been sending an allotment for food. As you know, the number of people on Ejit has almost doubled due to the influx of would-be relatives and supposed Rongelap people. The allotment has not been increased to meet this increased demand and, therefore, there apparently is not enough food for all.

(2) ~~New homes will probably have to be built on Rongelap, since it is apparently not feasible to dismantle and reassemble the present homes.~~

(3) Food will probably have to be furnished on Rongelap for a while, at least, until the people can become self-sustaining by processing copra, etc.

One other problem was discussed with Dr. Hicking, the Director of the hospital there, in regard to , the leper. The ideal solution of his problem would be to send him to a leper colony. However, there are apparently none left thereabouts. It was suggested to Dr. Hicking

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that possible employment of _____ at the hospital might help solve his problem. He promised to consider this.

In my opinion, future resurveys of the Rongelap people should continue. Such resurveys should be continued on a yearly basis as has been done in the past in view of the fact that certain of the blood elements are not yet back to normal and there is continued necessity for observation of the residual skin lesions. Since future examinations will no doubt be conducted at Rongelap, plans should be started for either establishing a laboratory with electricity and water supply on the island or arrangements made to use a small ship which might act as a floating laboratory. The latter would probably be preferable.

The group is deeply grateful to you and the members of your staff and to the Navy Department and Trust Territory for the many arrangements which were responsible for the successful completion of this mission.

Respectfully submitted,

Robert A. Conard
ROBERT A. CONARD, M.D.

Encl:

- (1) Preliminary Report
(Rongelap people)
- (2) Medical Survey Report
to United Nations' group

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PRELIMINARY REPORT ON THE TWO-YEAR MEDICAL RESURVEY
OF THE RONGELAP PEOPLE

There has been little illness among the people during the past year and they appeared to be in good health and in a good state of nutrition. An epidemic of chickenpox had occurred during the past year without complications. Many of the older Rongelap people are beginning to become more infirm, such as , the 100-year old woman. , the 78-year old preacher, is getting quite feeble and has given up preaching. Of the Rita controls, 57 of the original 82 were re-examined.

Most of the clinical findings were found to be similar to those that had been seen in previous examinations and occurred with about the same degree of frequency in the controls as in the Rongelap people. A few additional findings, not believed to be new diseases, were noted which probably had been overlooked before. Two Rongelap people had developed serious diseases during the past year. No. 46, a 77-year old man, developed an apparent cerebral accident about 9 months ago and was partially paralyzed in the right arm and left leg. He cannot get around without help, though there is some improvement in function at present. The other case was , a 13-year old boy, who was hospitalized with acute rheumatic heart disease with congestive failure in December. He improved on digitalis and salicylates. Though he is apparently fully active at present, there is evidence of pronounced mitral disease and some degree of cardiomegaly, but with no evidence of decompensation. No. 77, the leper, continues to show active, indolent ulcers on the soles of his feet. He presents a real problem in psychological adjustment since he is ostracized by his people and leads a lonely existence.

None of the clinical entities noted in the Rongelap people appear to be related in any way to radiation effect. It is difficult or impossible to say whether any of the increased aging might be due to radiation effect. Fertility certainly was not affected in view of the number of new babies and increase in pregnancies.

In both control and Rongelap children, impetigenous lesions remain quite common. Fifteen Rongelap people continue to show recognizable residual radiation skin lesions, but all lesions showed some degree of improvement on this examination. Areas of hyperpigmentation, particularly on the back of the necks, showed less hyperpigmentation and in some cases pigment had returned to normal. The dusky color noted earlier was not apparent at this time. All deeper lesions which had shown depigmentation now showed some degree of repigmentation. The foot lesions showing most residual changes were in (No. 25), (No. 26) and (No. 76). These lesions showed depigmentation, atrophy of the skin and some degree of adherence to subcutaneous tissues. The ear lesion in (No. 79) continues to show scarring, atrophy and in one place adherence of the skin to the underlying cartilage. In none of these cases, was there

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any evidence of tissue breakdown or sign of malignancy. Dr. Cannon did not feel that surgical procedures were indicated in any of these cases at this time. Color pictures and biopsies were taken which will be reported on later.

Preliminary survey of the hematological data shows that there is in most cases continued improvement in the blood picture. The degree of improvement depends on which set of control data is used for comparison. The W.B.C. and absolute neutrophils appear to be about normal now. The lymphocytes, though slightly increased over one year, still appear to be slightly below control means. The platelets showed slight increase in the males over the one-year counts, but slight decrease was noted in the females, so that in general the platelet mean counts still remain slightly below control mean counts. The hematocrit was found to be about the same as in the control people. In view of the eosinophilia present in many of the people, both controls and Rongelap, stool examinations were carried out on 10 Rongelap individuals with high eosinophil counts. No ova or parasites were seen. The cause for the eosinophilia remains obscure.

Examination of the eyes by Colonel Lowrey revealed no lens opacities or other findings which could be directly related to radiation effect. Many eye conditions were encountered among both controls and Rongelap people, however. In several cases cataracts had resulted in marked visual impairment and surgical removal was accomplished.

Fifty-seven liters of urine were collected at random from exposed Rongelap people and precipitated for radiochemical analysis at Walter Reed Army Hospital. Preliminary results have revealed measurable activity to be present. A more detailed report, along with specific analysis for radionuclides, will be forthcoming in the near future. Ten individual 24-hour urine samples on Rongelap people were obtained and given to NRDL for analysis. No results have been reported on these samples yet.

Respectfully submitted,

Robert A. Conard, M.D.
ROBERT A. CONARD, M.D.

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**MEDICAL SURVEY REPORT TO THE UNITED NATIONS' GROUP
ON THE STATUS OF THE RONGELAP PEOPLE
Majuro, M.I., March 1956**

On March 1, 1954, following experimental detonation of a thermo-nuclear device in the Pacific, several inhabited islands were accidentally irradiated with fallout. This was the same accident in which the Japanese fisherman were irradiated. The fallout material, a white powdery material, fell most heavily on Rongelap atoll, about 100 miles from the detonation and to a lesser extent on islands further away. The people on these islands were irradiated from the fallout by three routes: 1. Penetrating radiation (gamma) from the ground, trees and houses, resulted in whole body irradiation; 2. Skin contamination, with fallout resulted in spotty localized irradiation of the skin and scalp; and 3. Internal contamination occurred from ingesting of contaminated food and breathing in fallout material. The island groups and extent of involvement was as follows:

<u>GROUP</u>	<u>PERSONS INVOLVED</u>	<u>ESTIMATED PENETRATING DOSE</u>	<u>DEGREE OF SKIN CONTAMINATION</u>
Rongelap	64 Marshallese	175 roentgens	Extensive
Rongelap people on Ailingnae	18 Marshallese	69 roentgens	Less extensive
Rongerik	28 Americans	78 roentgens	Slight
Utirik	157 Marshallese	14 roentgens	None (measurable)

The above people were all evacuated to Kwajalein where they were cared for and studied extensively for several months. The Utirik people who had only the most minimal signs (blood effects) of radiation effects were moved back to their homes on Utirik. The American servicemen who also showed only minimal effects were returned to duty shortly afterward. The more heavily exposed Rongelap people were moved to Rjit Island in Majuro Atoll for further care and study. The following facts concern this latter group.

About 2/3 of the Rongelap group experienced nausea during the first 24-48 hours after the detonation and a few vomited and had diarrhea which was believed due to the penetrating radiation exposure. A large number experienced itching and burning of the skin, and a few of the eyes, which was believed due to the irradiation of the skin. Following this, the people were free of any complaints until about 2 weeks later when skin lesions developed. The results of the three types of radiation were as follows:

1. Penetrating - (175 roentgens - a chest x-ray gives about 4-6 roentgens.) Effects were manifest only on the blood elements as follows:
 - (a) White Blood Cells (which protect the body against infection) were depressed to about 50% of normal by about the 6th week.

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(b) Platelets (which keep the body from bleeding spontaneously) were depressed to about 30% of normal by the 4th week. These blood elements have gradually recovered to normal range at subsequent studies at 6 months, 1 year and 2 years.

2. Skin Contamination - resulted in spotty loss of hair and skin lesions beginning 2 weeks after exposure. About 90% of the children lost hair to some degree and about 30% of the adults. 90% developed skin lesions of spotty distribution over the exposed parts of the body not covered by clothing. The majority of the skin lesions were superficial and were no worse than a sunburn with the outer skin peeling away. They healed and repigmented rapidly. About 20% of the people developed deeper lesions which became weeping ulcers. However, even these healed rapidly, but a few show some scarring and lack of repigmentation to present. The hair began regrowing about 3 months after exposure and by six months was completely regrown in all cases.
3. Internal Contamination - Radiochemical studies of urine samples showed some degree of internal absorption of radioactive materials. However, the total body burden was found to be below the "tolerance" levels that have been established. By 6 months, insignificant amounts could be detected.

Other than the skin lesions, loss of hair and early symptoms there have been no illnesses or disease processes that have been encountered which could be attributed to radiation effects, either during the first survey or subsequent resurveys. There have been no deaths, though many of the people are quite old. The diseases encountered have been no more severe or frequent than in the unirradiated population. This was true even during the period when the greatest depression of their blood cells occurred. For instance, at that time an epidemic of common colds occurred, but was no worse in the Rongelap people compared to others. Therefore, at no time has it been necessary to resort to any specialized treatment for radiation effects on the blood such as use of prophylactic antibiotics, blood transfusions, etc. However, careful consideration and treatment has been given to all conditions which needed attention. The skin lesions did require careful treatment and as a result we have been rewarded with little or no secondary infection of these lesions. We cannot be certain that cancer will not develop at the site of skin lesions, but it does not seem too likely at this time.

Fertility did not appear to have been effected in view of the fact that about 10 sound babies have been born in the group since the exposure and new pregnancies are in evidence.

The people have reacted to this event philosophically. They are an intelligent and charming people and have given us the highest degree of cooperation. There is mutual respect and affection between us. They appear to be comfortably quartered and well fed on Ejit Island. They, of course, wish to return to their homes on Rongelap. It is my understanding that the only thing that has delayed their return is the completion of surveys of their home islands by the Atomic Energy Commission to be certain that the islands are safe.

Respectfully submitted,

ROBERT A. CONARD, M.D.
Head of the Medical Resurvey Group

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