Intact

BNL 7766

401025

MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS, NINE YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH, 1963).

Interim Report

Robert A. Conard, M.D., Leo M. Meyer, M.D.,

Wataru W. Sutow, M.D., William C. Moloney, M.D.,

Bradford Cannon, M.D., Arabati Hicking, Practitioner,

and Ezra Riklon, Practitioner

BROOKHAVEN NATIONAL LABORATORY

Associated Universities, Inc.
under contract with the
United States Atomic Energy Commission
and in coordination with the
Trust Territory of the Pacific Islands

The Medical Research Center

Brookhaven National Laboratory

Upton, L. I., New York

5007261

REPOSITORY BNL Records

COLLECTION Marshall Island

BOX No. MIMD Dept. Office (Rm 5-134)

FOLDER DA

MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS, NINE YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH, 1963).

Interim Report

Robert A. Conard, M.D.[1], Leo M. Meyer, M.D.[2],
Wataru W. Sutow, M.D.[3], William C. Moloney, M.D.[4],
Bradford Cannon, M.D.[5], Arabati Hicking, Practitioner[6],
and Ezra Riklon, Practitioner[6]

with the technical assistance of
William A. Scott[1], Douglas Clareus[1], Irving Jones[2],
Ernest Libby[3], Kosang Mizutoni[6], Sebio Shoniber[6],
and Kalman Kittien[6]

[1]Brookhaven National Laboratory, Upton, New York
[2]South Nassau Communities Hospital, Rockville Centre, New York
[3]M.D. Anderson Hospital, University of Texas, Houston, Texas
[4]Boston City Hospital, Boston, Massachusetts
[5]Massachusetts General Hospital, Boston, Massachusetts
[6]Department of Public Health, Trust Territory of the Pacific Islands

5007262

This report represents a summary of the major findings of the Medical Survey of the peoples of Rongelap and Utirik atolls carried out in March 1963, 9 years after exposure to fallout radiation. Complete data for the survey, including a complete review of past findings, individual findings, and appendicies will be published in a report to be combined with complete data of the ten year post-exposure survey to be carried out in March 1964.

Brief summary of past findings:

These people had been accidentally exposed to fallout radiation following a detonation of a high yield thermonuclear device during experiments at Bikini in the Pacific Proving Grounds in March 1954. Of the inhabitants of the Island of Rongelap, 105 miles away from detonation, 64 people received the largest fallout exposure, an estimated dose of 175 roentgens (r) whole body gamma radiation; contamination of the skin sufficient to result in beta burns, and slight internal absorption of radioactive materials through inhalation and ingestion. Other Rongelap people away on a nearby island (Ailingnae), where less fallout occurred, received only an external gamma dose of 69 r. The people of Utirik Island about 200 miles east of Rongelap, received an estimated dose of 14 r whole body radiation. Fallout was not visible on this Island and no skin and beta burns developed.

The exposed people were evacuated by planes and ships about 2 days after the accident. Because of contamination of their home island, the people of Rongelap were not moved back until 1957 when radioactivity had subsided to a safe level. On their return, they were established in a new village built for them. The Utirik people were returned to their Island after several months, (following initial medical examinations), since contamination levels there were not considered hazardous. Annual medical examinations have been carried out on the Rongelap people and the Utirik people have been examined 4 times including the present survey. A group of over 200 unexposed Rongelap men, women and children, who have

5007263

moved back to Rongelap Island serve as a comparison population.

Detailed information on past findings of the effects of fallout radiation exposure on these people may be found in published survey reports (1-9). Past examinations of the Utirik people showed only a minimal early effect on their blood levels, but with no other findings at any time suggestive of radiation effects. The Rongelap people, on the other hand, had slight transitory gastro-intestinal and skin symptoms during the first two days due to radiation exposure, followed by significant depression of blood elements, the development of wide-spread beta burns to the skin with some loss of hair, and measurable internal absorption of radionuclides. However, the gamma dose (175 r) received by the more heavily exposed 64 people of Rongelap was not lethal, since no deaths have occurred in the group that appeared to be related to their exposure. In spite of some early loss of weight in a number of the group, and the depression of their blood elements, none showed any signs of illness, infections, or bleeding that might be related to the penetrating gamma effect, and no special therapy was necessary. The beta burns healed within several months without complications, though residual pigmentation changes and scarring remain in some cases. The hair regrew by six months. Radiochemical urine analyses showed rapid excretion of the radionuclides that had been absorbed, the levels not being distinguishable from the nonexposed Marshallese by two years after exposure. Subsequent return to their home island resulted in slight increases in body burdens of radionuclides, but the levels attained have remained far below the stated maximum permissible levels. During the first five years after exposure, a somewhat higher incidence of mis-carriages and stillbirths were noted in the exposed women. Another effect believed to be a residual radiation effect, was the finding of slightly retarded growth and development in some of the exposed children. Fertility did not appear to be significantly impaired since the birth rate in the exposed group has been comparable

5007264

to that of the comparison population. Mortality in the exposed group remained about the same as in the comparison population and no evidence of premature aging was recognized and no leukemia developed. One death from cancer in an older exposed woman occurred at five years postexposure - too early it is believed to be related to radiation exposure. No skin malignancies have been noted as a sequelae to beta burns, but there appears to be an increase in the number of pigmented nevi in the beta irradiated skin areas. No specific genetic studies have been carried out but no increase in congenital malformations has been noted in the children of exposed parents.

THE 1963 SURVEY

The survey team consisted of 10 physicians and technicians from the United States and ten from the Trust Territory. Just prior to the survey, an epidemic of poliomyelitis, type 1, had spread through the Islands and Rongelap was among the islands affected. Twenty-three children and three adults developed the disease, with one death occurring in a woman in the exposed group and several cases of partial paralysis in the children. Fortunately the epidemic did not affect Utirik. At the time of the survey, the epidemic had been brought under control by widespread immunization with Sabine oral vaccine by Navy and Public Health teams.

Examinations were carried out on 70 Rongelap people in the exposed group, 35 children of exposed parents, 195 unexposed Rongelap people (adults and children) comprising the comparison population, and 84 Utirik people who had been exposed. A Trust Territory cargo ship was used to transport the team and equipment to Rongelap and Utirik. The team lived ashore at both Islands during the period of the examinations. Smaller groups of Rongelap and Utirik people were also examined at Ebeye, (Kwajalein Atoll), and Majuro. The attitude of the people as usual was most cordial and cooperative on both Islands.

5007265

Interval Medical History:

Rongelap. During the past year, the only disease epidemic of note was the recent poliomyelitis epidemic. No children in the exposed group were affected. All cases in children were less than 7 years of age. Eleven children of exposed parents and 12 of unexposed parents were involved. Mild residual facial or limb paralysis (as of March 1) was noted in 8 and more severe paralysis in 2 children. One adult died of bulbar paralysis (see below).

Deaths - A. Four deaths had occurred in the exposed group: (1) #30, female, 60 years of age. Died, July 1962, with a stated diagnosis of cancer of the cervix. Previous examinations had shown progressive loss of weight and increasing hypertension. On the past survey, bleeding was noted from the cervical os and a gynecological checkup had been recommended but death occurred before this was carried out. No autopsy was obtained. (2) #46, male, 84 years of age. Died July 1962. History of arteriosclerotic heart disease, a stroke a number of years ago, and senility. No autopsy was obtained. (3) #26, male, 21 years of age. Died in December 1962, two months after a fall from a coconut tree. Death was preceded by disorientation and amnesia with convulsive seizures and finally coma. Autopsy showed meningeal damage grossly and histologically. Brain damage was the likely cause of death. Other findings were few, but of interest was notation of giant and multinucleated cells in the meninges area. (4) #52, female, 55 years of age. Died in February 1963, with larnygeal paralysis during the poliomyelitis epidemic. Death appeared to be from poliomyelitis with bulbar involvement. No autopsy was obtained.

- B. Death in a child of exposed parent: #107, female, 4 years of age. Died in October 1962 of acute gastroenteritis and dehydration. Child had a history of malnutrition and weakness, skin infections, loss of pigment in hair. No autopsy was done.

5007266

- C. Death of a man in the comparison group: #953, male, 47 years of age. Died in July 1962 with acute asthmatic attack. He had a long history of asthma. No autopsy was obtained.

During the past nine years since exposure, 9 deaths have occurred in the exposed group. This represents 12.2 deaths per 1000 compared with 8.3 per 1000 for the Marshall Islands as a whole in 1960. The greater mortality in the exposed Rongelap people may be related to the larger percentage of older people in the group. In regard to the death from cancer in the exposed woman, there is no justification for establishing causal relationship with radiation exposure, in view of the small number of people involved in this study, and the pausity of vital statistics on malignancies in the Marshall Islands.

Births, miscarriages, stillbirths and neonatal deaths - Three healthy babies were born to exposed parents and 4 to unexposed parents. The birth rate in the exposed group parallels fairly closely that in the unexposed group. One neonatal death (one month) due to infant diarrhea occurred in a twin born to exposed parents. A stillbirth (full term) with congenital abnormalities (ectromelus) was born to exposed parents. Since this anomaly is not too uncommon, it is not possible to incriminate radiation exposure in view of obvious statistical difficulty.

Utirik. It was difficult to get accurate demographic data due to poorly kept records. It appeared, however, that during the past four years, since last examined, the people of Utirik have been generally free of major epidemics of disease. Several bouts of dysentery-type diarrhea occurred involving a dozen or so people on each occasion, but therapy with penicillin was effective. Some sickness from eating improperly prepared arrow-root starch was reported. About five deaths had occurred in older people from pneumonia, skin infections, and diarrhea. Six infant deaths were recorded. There did not appear to have been any unusual illness or deaths and the birth rate appeared to be about the same as had been previously noted.

5007267

Results of examinations. The people of Rongelap and Utirik were found to be generally in good health. Their nutrition was reasonably good with no apparent deficiencies of vitamins or other dietary components. Fewer fungus and other skin infections were noted and this was thought to be related to the generally improved hygienic and sanitary conditions on the Islands.

Adult examinations. In Table I (next page) are listed the incidences of various physical abnormalities in the adult populations of Rongelap and Utirik examined. The general incidence of various abnormalities in the exposed people did not appear to be significantly different from that in the unexposed people. The incidence of moderate to severe arteriosclerosis was somewhat greater in the exposed Rongelap group, but this might be accounted for by the fact that there was a larger number of older people in this group. No malignant lesions were detected in either the exposed or unexposed groups. Pelvic examinations revealed the usual large number of cervical erosions, lacerations, etc. inthe Marshallese women. Rectal examinations revealed prostatic hypertrophy in several older men but with no evidence of malignancy. It was noted that there were fewer infections of the skin than previously observed.

Pediatric examinations. A total of 212 children were examined. This number consisted of 25 children exposed on Rongelap, 32 children exposed on Utirik, 35 children born after the fallout to exposed parents, and 120 controls. The list of abnormal physical findings in the exposed and control groups of children have been summarized in Table II, page 8. Of particular interest was the development of a palpable nodule in the thyroid gland of a 12 year old girl (#17), who had been exposed to fallout irradiation on Rongelap. Histological study of the nodule has been planned. During the poliomyelitis epidemic on these atolls, 23 children in the study developed symptoms and signs suggestive of poliomyelitis. Residual weakness of muscle groups was evident in 13 of these children at the time of the examinations.

5007268

TABLE I

PHYSICAL FINDINGS IN RONGELAP AND UTIRIK

ADULTS, 1963

	R*	C*	U*
No. examined	45	75	52
Adenopathy		1	
Anemia, anemic tendency	4	2	
Aphakia	2		
Argyll Robertson pupil	1		
Arteriosclerosis, peripheral, mild		14	1
Arteriosclerosis, peripheral, moderate to severe	12	10	3
Asthma	2		
Auricular fibrillation w/myocardial damage	1		
Biadycardia	1	1	
Bronchitis		4	3
Cardiac enlargement	3	3	
Cervical erosion, bleeding	8	14	4
Cervical lacerations	4	5	
Choroiditis	1		
Congenital defects			
a) dislocation of hip	1		
b) prominent head of ulna	2	4	
c) bilateral shortening of 5th finger	2	3	
d) polydactyliasm		1	
e) shortened left thumb	1		
f) flexion deformity, fingers		1	
Corneal ulcer	1		
Cystocele		2	
Diabetes mellitus		7	
Dupuytrens contracture		1	
Furunculosis	1		
Gynecomastia	1		
Hallux valgus	1		
Hemorrhoids		2	1
Hypertension >(140/90)	3	2	6
Hypotension	2	5	
Inguinal hernia			1
Intestinal parasites	3	7	
Kyphosis, scoliosis	4	3	2
Lenticular opacities, cataracts	12	19	9
Leprosy, arrested	1		
Leukoplakia	1		

	R*	C*	U*
	45	75	52
Liver, palpable	2	7	4
Myocardial damage or insufficiency (EKG)	1	10	1
Obesity	7	9	4
Osteoarthritis	10	15	
Paralysis	1		1
Parotid enlargement	1		
Perirectal abscess	1		
Pharyngitis, acute			2
Pinguecula	1	3	
Pleural thickening or adhesions	1	2	
Prostatic Hypertrophy	5	5	
Pregnancies	6	5	2
Proteinuria		4	
Pterygium	16	32	1
Rheumatic heart dis.	1		
Senility	4	1	
Syphilis (?)arrested	2	2	
Thyroid nodule		1	
Tonsilar hypertrophy, tonsilitis	1	3	
Tumor, benign	5	8	1
Urethral caruncle	1	1	1
Uterus enlargement, fibroids?			2
Uterus retroversion		1	
Varicose veins	1		
Vitiligo		1	

* R - Rongelap exposed (including Ailingnae)
* C - Rongelap Unexposed
* U - Utirik Exposed

5007269

TABLE II

SUMMARY OF PHYSICAL FINDINGS

IN CHILDREN, 1963

	Exposed		Control		Nonexposed children of exposed parents
	Rongelap (25)*	Utirik (30)	Born before Jan. 1,1955 (38)	Born after Jan. 1,1955 (51)	(35)
Active skin lesions	1	0	2	13	4
Adenopathy	5	0	4	9	2
Palpable liver	0	0	0	1	1
Palpable spleen	0	0	0	2	0
U.R.I.	8	1	4	8	5
Blood pressure taken	19	29	30	3	2
Hypertension	1	0	0	0	0
Acute otitis media	6	1	2	2	1
Chronic otitis media	0	0	0	1	1
Molluscum	1	0	1	7	3
Tinea versicolor	2	3	5	1	0
Vitiligo	0	0	2	0	0
Warts	3	2	1	4	2
Papilloma	1	1	1	0	0
Cheilosis	0	1	0	0	0
Excoriation of lip	0	1	0	1	2
Black spots - tongue	2	0	1	0	0
Geographic tongue	0	0	0	1	0
Conjunctivitis	0	0	0	1	1
Thyroid mass	1**	0	0	0	0
Tracheotomy scar	1	0	0	0	0
Thoracotomy scar	0	0	1	0	0
Pes excavatum	0	0	1	0	0
Rales in lungs	0	0	0	1	3
Systolic cardiac murmur (Grade II)	0	0	2	2	0
Extrasystoles	0	0	1	0	0

* Number examined.

** Subject No. 17, female, 12 5/12 years of age.

5007210

Analysis of the statural data from the survey indicated the persistence of the trends previously reported. As shown in Figures 2 and 4 (page 10), no difference was apparent in median statures between girls in the exposed and control groups and between girls born to exposed and unexposed parents. Among the boys, however, retardation in statural growth of the exposed group between the ages of 10 and 17 years as compared to that of the control group was again noted (Figure 1, page 10). The difference in median statures between boys born to exposed parents and those of nonexposed parents was also evident in 1963 (Figure 3, page 10). This difference has been attributed to the fact that the boys in the group with exposed parents were on the average 4 months younger than the boys in the group with nonexposed parents.

Leukemia survey. Careful examinations for physical signs of leukemia and examinations of the blood cells including basophil counts of 4000 white cells, revealed no evidence of leukemic tendency in either exposed or unexposed people.

Residual beta burns. These are listed in Table III, page 11. Very few changes were noted in the lesions as compared with last year. The number of pigmented macular and papular nevus-like lesions previously noted in burned areas seem to have slightly increased in some cases. No cases of chronic radiation dermatitis or skin cancer were noted.

Hematological examinations. The hematological findings are summarized in Table IV, page 12, and in Figures 5 through 7 (pages 13, 14, 15). As has previously been done, the data in Table IV have been broken down into age groups. In general the exposed Rongelap people continued to show slightly lower mean values for the total leukocytes, neutrophils, and lymphocytes, particularly in the older age groups. Platelet levels this year were lower in the exposed group than last year with greater deficit of this element in nearly all age groups than noted with the leukocytes.

5007271

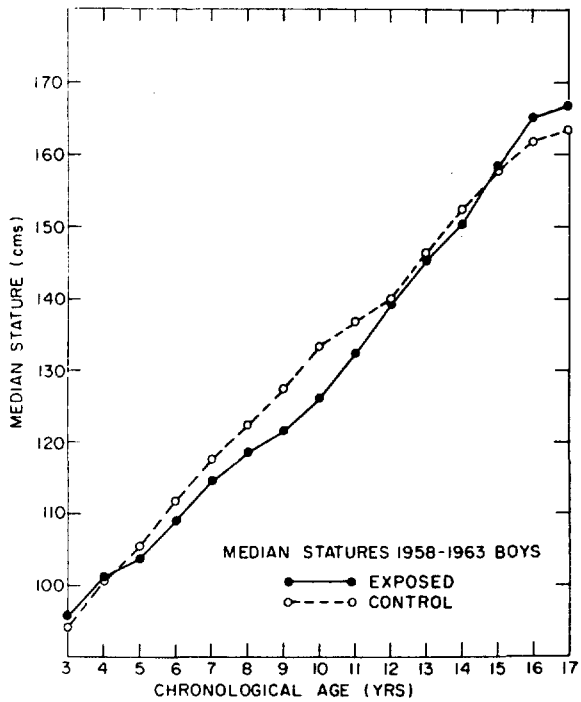

Figure 1

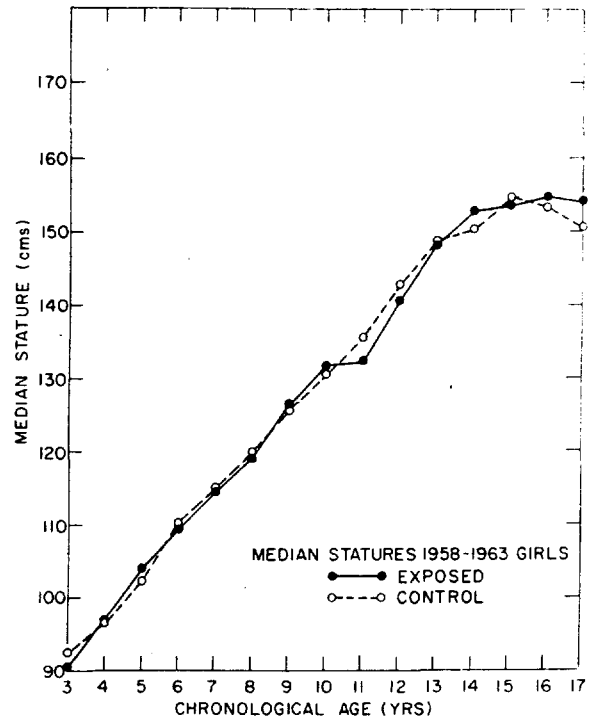

Figure 2

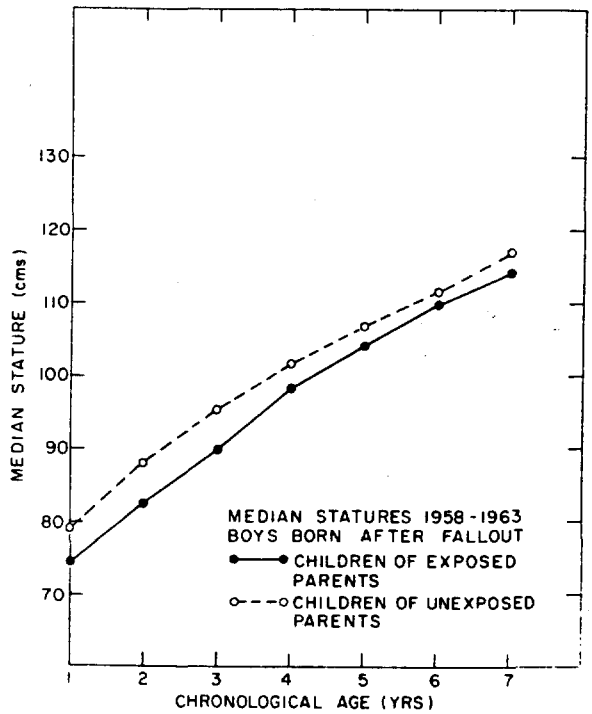

Figure 3

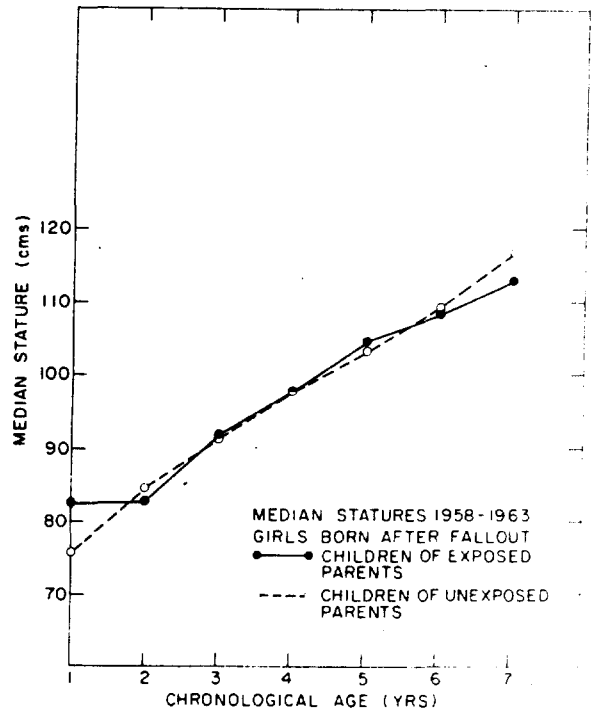

Figure 4

5007272

TABLE III

Residual Beta Burns

Pt. #	Age	Sex	Data	Pt. #	Age	Sex	Data
1	12	M	Roughening & pigment variation front neck; several pigmented macules. ACF* biopsy left axilla & anterior neck.	49	25	F	Numerous pigmented macules both sides neck; few on arms, ACF front neck; biop. right neck; mole left ACF.
11	60	M	Pigment changes left ACF, dorsum first right toe; pigmented nevi axilla; biop. left ACF first toe	54	11	M	Mottled pigmentation & depigmentation front neck
17	14	F	Scarring & pigmentation left ACF.	59	44	F	Mottled pigmentation & depigmentation back neck; biop. back neck.
20	17	M	Pigmented patch back neck; biop. back neck.	63	46	F	Slight rugosity & pigmentation ridges back neck; biop. back neck
23	14	M	Pigmented macules chest and back; axilla, few pigmented spots & roughening; biop. right axilla.	64	40	F	Mole back neck; slight pigment variation; few macules front neck
24	23	F	Slight pigment variation front neck; several pigmented macules; dorsum left foot.	65	11	F	Pigment variation & roughening front neck; biop. front neck.
34	55	F	Slight roughening & pigmentation back neck; biop. back neck	67	24	F	Depigmented scars dorsum left foot.
39	25	F	Slight roughening & pigmentation back neck; pigment variations & slight hyperpigmentation dorsum, right foot.	75	22	F	Slight pigmented area dorsum right first toe; biop. neck.

* ACF - antecubital fossa.

5007273

TABLE IV

MEAN LEVELS OF PERIPHERAL BLOOD ELEMENTS OF EXPOSED GROUPS COMPARED WITH THOSE OF THE UNEXPOSED GROUP BY AGE AND SEX

				1963				
Males 9-15 yr	Plate ($x10^{-3}$)	WBC ($x10^{-3}$)	Neut. ($x10^{-3}$)	Lymph ($x10^{-3}$)	HCT (%)	RBC (10^{-4})	HGB (g)	Serum Protein (g)
Rongelap Exposed*	287	8.47	3.92	3.25	38.7	428	13.8	7.7
Ailingnae "	194	6.64	2.79	3.19	36.0	377	12.4	7.5
Utirik "	419	9.20	4.57	3.89	37.9	442	15.0	7.6
Rongelap Unexposed	286	8.37	4.07	3.27	39.4	433	14.1	7.8
Females 9-15 yr								
Rongelap exposed**	314	8.50	4.42	3.31	39.5	449	13.9	8.0
Ailingnae exposed	226	7.15	3.69	2.97	41.0	435	15.0	8.0
Utirik exposed	402	9.01	4.81	3.33	38.0	427	14.0	7.9
Rongelap unexposed	373	8.90	3.77	3.86	38.3	424	13.7	7.9
Males 15-40 yr								
Rongelap exposed	204	6.58	3.27	2.82	45.6	458	16.1	7.6
Ailingnae exposed	-	-	-	-	-	-	-	-
Utirik exposed	342	6.55	3.42	2.55	44.6	460	16.2	7.6
Rongelap unexposed	284	6.61	4.07	2.96	45.7	473	16.1	8.0
Females 15-40 yr								
Rongelap exposed	297	8.02	4.35	2.86	37.9	409	13.2	7.8
Ailingnae exposed	227	7.96	5.46	2.05	37.0	406	12.9	7.7
Utirik exposed	410	7.17	3.96	2.67	37.1	405	13.2	7.6
Rongelap unexposed	294	7.21	4.23	2.83	38.3	421	13.6	7.9
Males>40 yr								
Rongelap exposed	214	6.33	2.88	2.99	41.2	410	14.5	7.6
Ailingnae exposed	245	6.38	3.24	2.46	44.0	469	15.8	7.6
Utirik exposed	344	6.88	3.49	2.80	41.3	428	14.8	7.8
Rongelap unexposed	294	7.77	3.19	2.85	42.1	429	14.7	7.9
Females>40 yr								
Rongelap exposed	238	5.82	2.86	2.56	38.1	376	13.3	7.8
Ailingnae exposed	249	7.20	3.84	2.37	38.0	403	13.9	8.4
Utirik exposed	355	7.08	3.47	3.07	38.0	405	13.8	8.1
Rongelap unexposed	318	7.65	3.68	2.98	38.3	393	13.7	8.0
Males<9 yr								
Of exposed parents	374	10.60	4.49	5.15	36.5	438	12.6	7.3
Of unexposed "	376	10.91	4.40	5.29	36.9	434	12.5	7.3
Females<9 yr								
Of exposed parents	386	12.20	4.76	6.07	36.8	424	12.8	7.7
Of unexposed parents	383	10.15	3.83	5.31	37.6	415	13.0	7.7

* Includes 2 children exposed in utero
** " 1 child exposed in utero

5007274

5001215

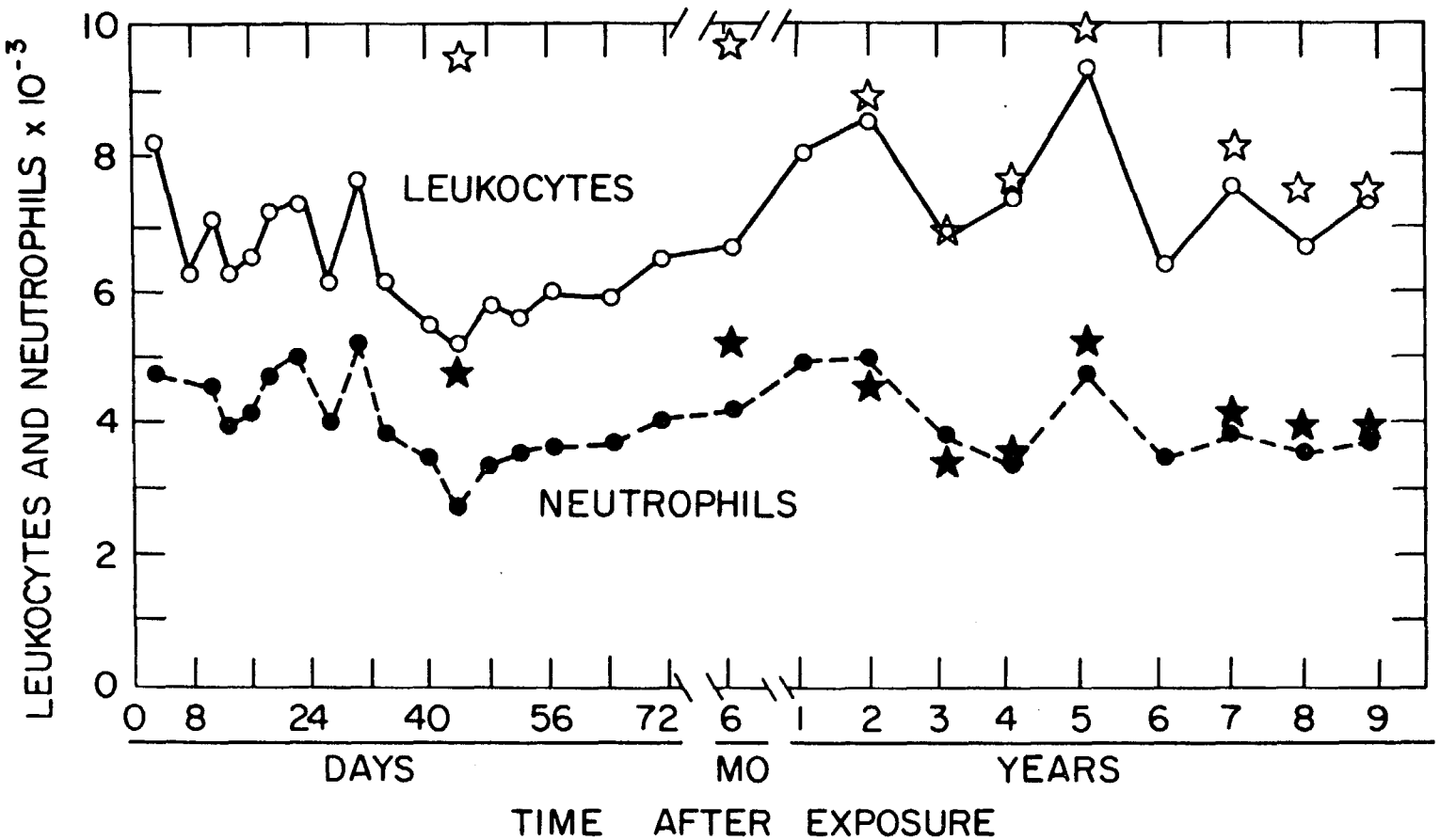

FIGURE 5. Mean neutrophil and white blood counts of exposed Rongelap people from time of exposure through 9 yr. postexposure. Stars represent mean values of comparison population.

5001276

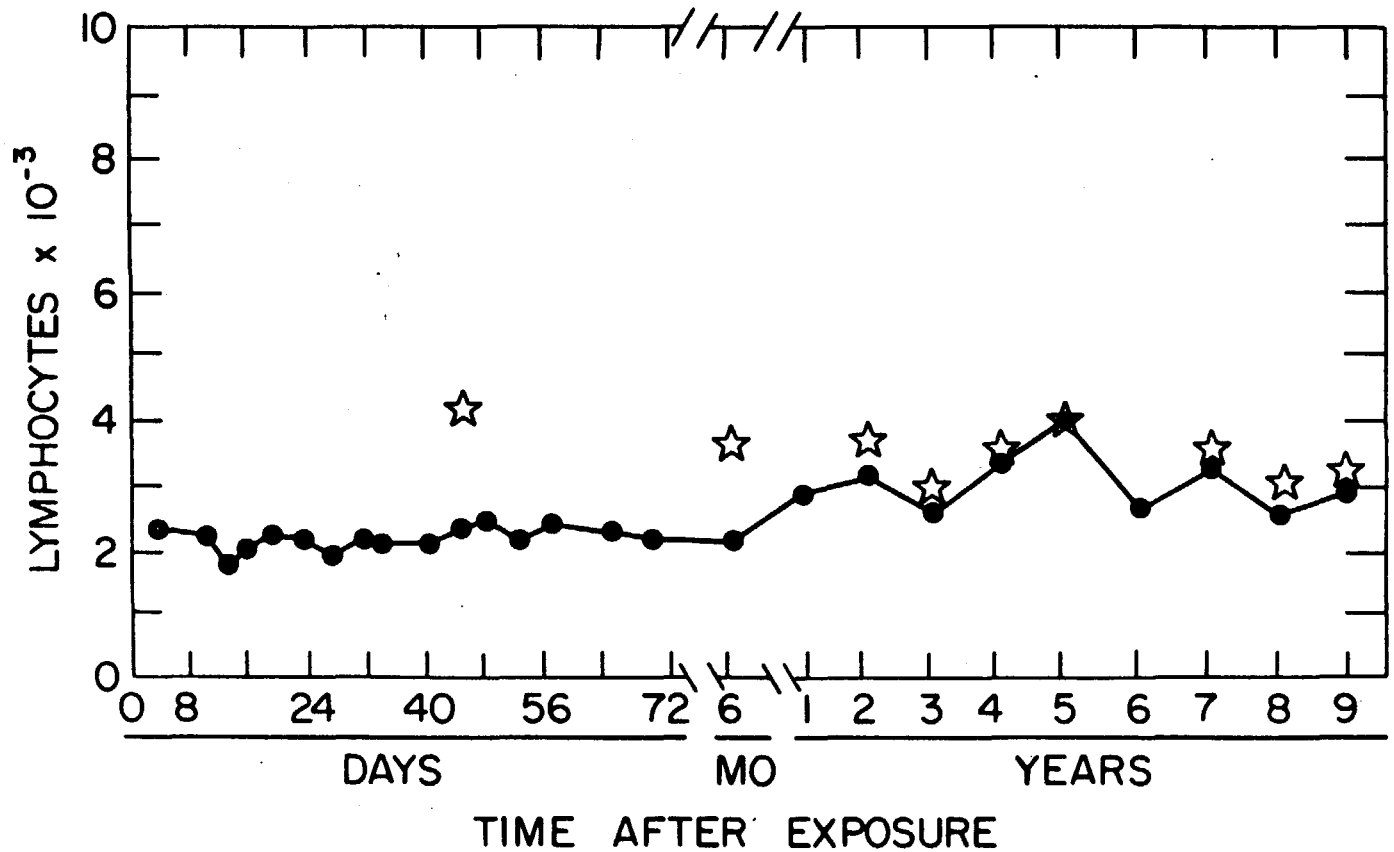

FIGURE 6. Mean lymphocyte counts of exposed Rongelap people from time of exposure through 9 yr postexposure. Stars represent mean values of comparison population.

5001271

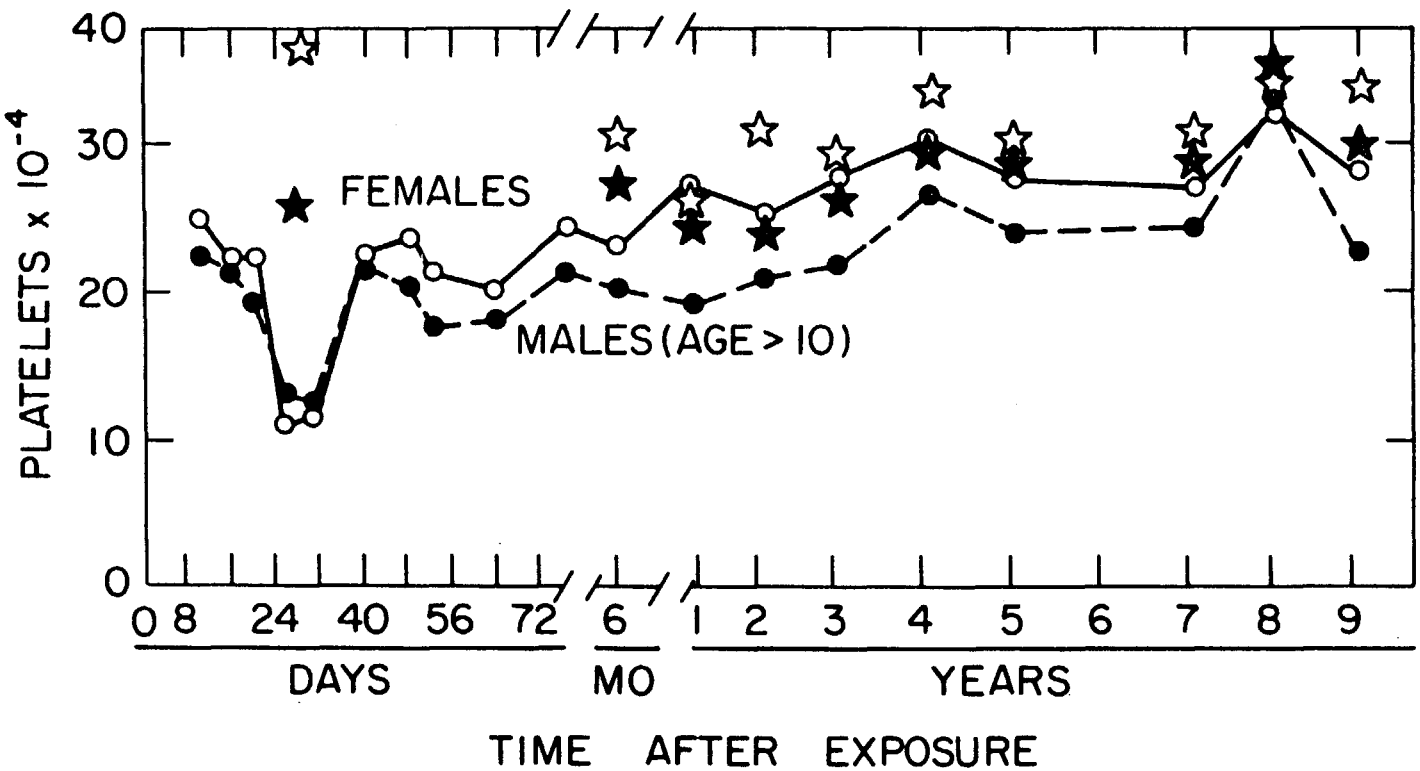

FIGURE 7. Mean platelet values of exposed Rongelap people from time of exposure through 9 yr postexposure. Stars represent mean values of unexposed comparison population.

The erythrocytic levels, hemoglobin and hematocrits were only very slightly lower in the exposed as compared with the unexposed Rongelap population.

The Utirik people who had been exposed to only an estimated dose of 14 roentgens of whole body gamma radiation had leukocyte, neutrophil and lymphocyte counts about the same as in the control population of Rongelap. However, it was of interest that the platelet counts for all age groups averaged considerably higher in the Utirik people. The explanation for this is not apparent. The erythrocytes, hemoglobin and hematocrit levels were about the same as in the unexposed Rongelap group. Very little difference was noted this year between levels of peripheral blood elements in children of exposed and unexposed parents. Serum protein values were about the same in the exposed Rongelap and Utirik people as in the unexposed comparison population. The protein values, as have been previously noted, were on the high side of normal.

Chromosome studies - There has been considerable interest as to whether or not chromosomal aberrations may have been induced by radiation exposure in the Marshallese and if so, whether or not they still may persist. Therefore a considerable number of peripheral blood cultures were attempted as well as some 40 skin cultures from biopsies taken from areas showing residual beta burns. Unfortunately, the laboratory setup on Rongelap was not conducive to successful cultures of the skin, and in spite of great caution, contamination occurred and all skin cultures were lost. About 30 successful blood cultures on the Rongelapese were obtained (control and exposed), and about 12 successful preparations were obtained in the Utirik people. Chromosome smears from these cultures are in the process of being analyzed and will be reported on later.

Other laboratory examinations - Among other laboratory examinations, protein-bound iodine determinations were repeated in blood from about 10 Marshallese and 10 of the medical team (Americans). The results definitely showed the Marshallese

5007278

levels to be higher than in the American team members and thus substantiated the findings reported on previous surveys.

Radiochemical urine analyses - Radiochemical urine analyses of 24 hr. and pooled samples showed that Cs^{137} levels had decreased somewhat since 1958 (around 5 nC/l in 1958 and 3 nC/l in 1963). The levels in the Utirik samples were about four times less. The Sr^{90} levels in the Rongelap people were about the same or slightly less than in 1962. The levels in the Utirik people were more than four times less than in the Rongelap samples.

Interpretation of these results in terms of body burdens of Cs^{137} indicates that equilibrium with environmental contamination has been attained for that isotope. The fact that urinary excretion of Sr^{90} showed no increase over 1962 levels is encouraging.

SUMMARY

This is an interim report of the medical surveys of the people of Rongelap and Utirik Islands at nine years after accidental exposure to fallout radiation in 1954. Only the major findings were outlined and details will be included in a combined Brookhaven National Laboratory report following the 10 year survey in 1964.

Medical status of the people of these Islands during the past year had been generally good except for a poliomyelitis epidemic which involved some 23 children and 2 adults on Rongelap resulting in death of a 55 year old woman in the exposed group. Utirik was spared the epidemic. A total of 4 deaths had occurred in the exposed Rongelap group, 1 in a child of exposed parents, and 1 in a man in the unexposed comparison population. Deaths in the exposed group could not be related to radiation exposure. The six deaths that occurred on Utirik Island in the exposed population since the people were last examined four years ago appeared to represent about the usual mortality rate and no illnesses or deaths could be related to radiation exposure. Birth rates were about normal on both Islands during the

5007279

past year.

Physical examinations revealed the people of both Islands to be generally in good health with the usual number and type of medical abnormalities. No malignancies or leukemia were noted. Beta burn areas of the skin showed no evidence of cancer. Slight retardation of exposed children, particularly males, exposed below 12 years of age, was again noted. No evidence for "catching up" in this group has been noted as yet. Hematological examinations revealed that the peripheral blood elements, particularly platelets of the Rongelap exposed group were again on the average, slightly below levels of the unexposed comparison population. No serious effect of this has been apparent. Body burdens of the radionuclides Cs^{137} and Sr^{90}, based on urinary excretion determinations, showed no increase since last examined.

5007280

REFERENCES

1. Cronkite, E.P., Bond, V.P. and Dunham, C.L., eds., The effects of ionizing radiation on human beings: A report on the Marshallese and Americans accidentally exposed to radiation from fallout and a discussion of radiation injury in the human being. U.S. Government Printing Office, Washington, D.C. 1956.

2. Bond, V.P., Conard, R.A., Robertson, J.S. and Weden, E.A. Jr., Medical examination of Rongelap people six months after exposure to fallout. WT-937, Operation Castle Addendum Report 4.1A, April 1955.

3. Cronkite, E.P., Dunham, C.L., Griffin, D., McPherson, S.D., and Woodward,K.T., Twelve-month postexposure survey on Marshallese exposed to fallout radiation, BNL 384 (T-71), August 1955.

4. Conard, R.A., Huggins, C.E., Cannon, B., Lowrey, A. and Richards, J.B., J.A.M.A. 164, 1192-7, 1957.

5. Conard, R.A., Meyer, L.M., Rall, J.E., Lowrey, A., Bach, S.A., Cannon, B., Carter, E., Eicher, M. and Hechter, H., March 1957 Medical survey of Rongelap and Utirik people three years after exposure to radioactive fallout, BNL 501 (T-119). June 1958.

6. Conard, R. A., Robertson, J.S., Meyer, L.M., Sutow, W.W., Wolins, W., Lowrey, A., Urschel, H.C., Barton, J.M., Goldman, M., Hechter, H., Eicher, M., Carver, R.K., and Potter, D.W., Medical survey of Rongelap people, March 1958, Four years after exposure to fallout, BNL 534 (T-135), May 1959.

7. Conard, R.A., Macdonald, H.E., Lowrey, A., Meyer, L.M., Cohn, S., Sutow, W.W., Blumberg, B., Hollingsworth, J.W., Lyon, H.W., Lewis, W.H., Jaffe, A.A., Eicher, M., Potter, D., Lanwi, I., Riklon, E., Iaman, J. and Helkena, J., Medical survey of Rongelap people five and six years after exposure to fallout, BNL 609 (T-179) Sept. 1960.

5007281

8. Conard, R.A., Macdonald, H.E., Meyer, L.M., Cohn, S., Sutow, W.W., Karnofsky, D., Jaffe, A.A. and Riklon, E., Medical survey of Rongelap people seven years after exposure to fallout, BNL 727 (T-260) May 1962.

9. Conard, R.A., Meyer, L.M., Sutow, W.W., Moloney, W.C., Lowrey, A., Hicking, A. and Riklon, E., Medical survey of Rongelap people eight years after exposure to fallout, BNL 780 (T-296) January 1963.

5007282

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.
UPTON, L.I., N.Y.
TEL. YAPHANK 4-6262

REFER:

MEDICAL DEPARTMENT

From Box 3108
Job # 7238

May 17, 1963

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

Dear Chuck:

I have just gotten back the signed statement on the preliminary results of the recent survey, which I am enclosing along with an extra copy, (unsigned). Mr. Goding has been sent a signed copy of this statement and today I am mailing one also to Ambassador Sidney Yates, who is the chief U. S. representative at the Trusteeship Council Meeting of the UN, which is to take place the first week in June. I have offered my services at the time of this meeting.

I am also enclosing a copy of a letter from Mr. Goding which I just received. It was quite a shock to learn of Dr. Macdonald's sudden death. For some time he had not been a well man. I am wondering who they will get to replace him.

Vic and I, along with Jim Robertson and Stan Cohn, have been discussing the need for a whole body counting facility at Rongelap and the permanent building there. Vic will no doubt be in touch with you at an early date for further discussion of this matter.

With best regards,

Sincerely yours,

Bob

R. A. Conard, M.D.

:gmd
Encs.
CC Dr. Bruner

P.S. The Eight Year report should be out soon and I will send you copies -
Bob

5007283

4426