

MARSHALL ISLANDS

RECOMMENDATIONS FOR ADDITIONS TO THE HEALTH CARE
PROPOSAL SUBMITTED ON 3 DECEMBER 1980 TO THE U.S.
DEPARTMENT OF THE INTERIOR BY LOMA LINDA UNIVERSITY
SCHOOL OF HEALTH IN RESPONSE TO P.L. 96-205 AND RFP
#14-01-0001-80-R-75

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At the request of

MARSHALL ISLANDS ATOMIC TESTING LITIGATION
PROJECT

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A Health Care Proposal For The Marshall Islands was submitted on 3 December 1980 to U. S. Department of the Interior by Loma Linda University School of Health in response to Public Law 96-205 and RFP #14-01-0001-80-R-75.

This law directed the Secretary of the Interior to:

"Provide for the People of the atolls of Bikini, Enewetak, Rongelap, and Utirik and for the people of such other atolls as may be found to be or to have been exposed to radiation from the nuclear weapons testing program, a program of medical care and treatment and environmental research and monitoring for any injury, illness, or condition which may be the result directly or indirectly of such nuclear weapons testing program."

In addition, the law directed that the plans for that program set forth :

"An integrated, comprehensive health care program including primary, secondary and tertiary care with special emphasis upon the biologic effect of ionizing radiation."

The Department of the Interior (DOI) awarded the contract for the RFP to Loma Linda University and upon further clarification stipulated that the contractor prepare two health plans, as follows:

1. "Comprehensive Care (primary, secondary, and tertiary) for the peoples of Rongelap, Utirik, Bikini, and Enewetak),"
2. "Comprehensive Care as in 1..., plus comprehensive care for the peoples of all other atolls of the Marshall Islands."

The contractor submitted to DOI a health care proposal for an "Integrated, comprehensive health care program" with respect to all the peoples of the Marshall Islands. The proposal addresses health care, health care administration, and hospital administration in a comprehensive manner. As such, the proposal does address the general care and needs of all the Marshallese but it does not positively address the radiation related health care needs of those Marshallese who "may be found to be or to have been exposed to radiation from the nuclear weapons testing program" nor does it provide "a program of medical care and treatment... for any injury, illness or condition which may be the result directly or indirectly of such nuclear weapons testing program." In other words, the Loma Linda Proposal does not present an integrated preventive medical program for radiation related health effects and diseases.

Cancer of the breast, lung and thyroid, and of lymphatic tissues, as well as leukemia are well known adverse health effects of ionizing radiation. Other adverse health effects include genetic or mutational outcome, and reproductive effects. Also, radiation is believed to have a causal relationship in the production of other major human health problems, namely heart disease and possibly, aging.

Tables 4 and 5 in the Loma Linda Proposal display data which are strongly suggestive that such radiation related adverse health effects

may be occurring in the Marshallese. In Table 4, of the 17 leading causes of death in the Marshall Islands, 1974 to 1976, cancer and cerebral vascular diseases are tied as the two leading causes of death. Prematurity is the third leading cause of death. Congenital defects accounted for 3.3% of all deaths, indicating the substantial severity of these defects. In Table 5, prematurity, with 22.3%, ranks first among the causes of death in children of ages 0 to 4, 1974 to 1976, and congenital defects and birth related injuries, second with 19.4%, for a combined total of 42% of all deaths. Section V of the report states that "People of Rongelap and Utirik have significantly increased thyroid pathology, undoubtedly radiation related, and manifested by hypothyroidism and an increase in both benign and malignant thyroid tumors." It also adds that "There is the possibility of other radiation related diseases in the Rongelap population (e.g. leukemia)." It is surprising, therefore, that the Loma Linda Report states in the introduction to Section XII "It is increasingly evident that the actual health impact of radiation on even the most directly affected is minimal. This not only further complicates any attempt to distinguish these individuals from others, but also raises the question of the need for maintaining this distinction. In many respects, the categorical separation of the affected and non-affected groups appears to be primarily a political issue."

In part B of the same section, the statement is made that "It is medically impossible to distinguish in any particular individual whether a disease complex or symptom is radiation related or not. Epidemiological studies over time on groups of people can establish increased incidences of particular problems, but this

evidence is not particularly helpful in deciding specific causation in any individual." Both of these statements are incorrect. First, it is well known that epidemiologic studies have documented that radiation not only causes cancer but also that radiation causes cancer of specific histologic type.

In fact, there can be little doubt that, under a wide variety of circumstances, ionizing radiation is carcinogenic and leukomogenic in humans. This conclusion is supported by numerous epidemiologic studies conducted among human populations which have experienced a diversity of exposure to radiation. Epidemiologic studies of uranium miners exposed to alpha and gamma radiation have demonstrated a large excess of bronchogenic cancer. In addition, these studies have demonstrated a preponderance of a specific histologic type of cancer, viz small cell undifferentiated carcinoma, when compared to the general population. Epidemiologic studies of the survivors of the atomic bomb explosions at Hiroshima and Nagasaki provide reliable data on the carcinogenic effects of whole body exposure to gamma rays and neutrons. Among those individuals, an excess of lung, thyroid and breast cancer, as well as leukemia, has been demonstrated. This excess of leukemia was shown to be predominantly of the myelogenous and granulocytic type. Conclusive evidence that therapeutic radiation can be carcinogenic and leukomogenic comes from studies of patients irradiated for ankylosing spondylitis, thymic enlargement and gynecological disorders. In like manner, epidemiologic studies have shown that radiologists exposed to radiation have an excess of leukemia when compared to other physicians not so exposed.

With regard to the methods of early diagnosis and medical treatment of cancer, The National Cancer Institute recently has reported major gains in survival. Specifically, leukemia and breast cancer are among those cancer sites which show the greater gains in survival following therapy.

In light of these facts and because cancer is the leading cause of death amongst the Marshallese, the health care plan for the Marshall Islands must include an intensive cancer control program. This cancer control program should include, as a minimum, the following elements:

1. A Cancer Registry. Current estimates of morbidity and mortality in the Marshall Islands come primarily from hospital discharge and clinic sick call data. Efforts should be made to ensure complete reporting of all cancers. Only by such a registry system can the full extent of cancer incidence and cancer control be fully evaluated.
2. Cancer Screening. This element should be directed toward the early diagnosis of radiation related cancer, i.e. breast, lung, lymphatic and thyroid cancer, as well as leukemia.

In addition, the health care proposal must include a program of genetic screening. This should entail studies involving large scale genetic analysis of the Marshallese and also more diversified, specific studies of those exposed to radiation. Results from both of these efforts would contribute significantly to the interpretation

of and correlation with isolated findings. Presently, genetic screening techniques should be regarded as the best instrument for detecting genetic injury at a stage when corrective action can be taken for the benefit of effected individuals.

The following genetic screening techniques are recommended:

1. Establishment of a Birth Defects Registry.

The establishment of birth defects registry is necessary to document and systematically classify all congenital abnormalities foreign to the Marshall Islands.

2. Cytogenetic Monitoring of Exposed Population.

Cytogenetic monitoring of exposed population should be performed as was done in studies of the atomic bomb survivors of Hiroshima and Nagasaki. As in the Japanese studies, comparisons should be made with chromosomal aberration frequencies and cancer incidences in order to identify high risk groups.

3. Establishment of a Genetic Counselling Program.

Genetic counselling should be made available to all the Marshallese, so that they can assist medical scientists to better investigate radiation effects.

4. Analysis of Amniotic Fluid.

Amniotic fluid analysis should be performed in all high risk pregnancies for the prenatal detection of radiation effects.

5. Chromosome Monitoring of Newborns.

Chromosomal monitoring of all newborns would allow for the direct determination of the extent of increased incidences of genetic abnormalities.

With respect to all the peoples of the Marshall Islands, the Loma Linda University Health Care Proposal is an "Integrated, comprehensive health care program," which addresses health care, health care administration, and hospital administration in a comprehensive manner. However, for radiation-related health effects and diseases, the Loma Linda Proposal does not present an integrated preventive medicine program.

It is recommended that the Loma Linda Proposal be enlarged to include both the study of the most obvious health effects of radiation exposure -- namely, cancer, genetic or mutational outcome, and reproductive effects -- and the corresponding preventive measures associated with these public health problems.

Radiation is capable of adversely interacting with the human organism and, as such, presents an increased risk of damage to individuals who are exposed. Radiation interacts with and causes permanent changes in the individual's genetic material or genetic processes. Thus, radiation is a known mutagen, and mutagens are believed to play a causative role in four major human health problems:

1. Hereditary Defects (ranging from minor physical deviations to severe mental retardation);
2. Cancer;
3. Heart Disease and, possibly, aging (atherosclerosis).

After a mutation has occurred, one of three results is possible:

1. The mutation can be repaired;
2. The mutation can lead to cell death; or
3. The mutation can persist through cell division.

It is the last result that is of the greatest concern, because cell division results in increasing the population of new cells. If the mutation occurs in somatic (body) cells, there are three possible outcomes: Mutation in the somatic cells of embryos may lead to embryo death (spontaneous abortion or miscarriage), or embryopathy (abnormal development), whereas mutations in adult tissues are believed to result in malignancies and are possibly involved in the aging process. Finally, mutations in gametic cells can lead to abnormal gametes (eggs or sperm cells) or sterility, both of which are forms of reproductive toxicity. If the mutant gametes are viable, the subsequent fertilization can result in embryo death, embryopathy, or some hereditary effects.

The Loma Linda Proposal presents suggested evidence of radiation-related effects in the Marshallese. As seen in Table 4 of the Proposal, of the 17 leading causes of death in the Marshall Islands, 1974 to 1976, cancer is tied with cerebrovascular diseases as the leading cause of death. Prematurity (a form of embryopathy) is the next and third leading cause of death. In addition congenital defects accounted for 3.3% of all deaths, indicating the substantial severity of these defects.

At present, the greatest need is both for studies involving large scale genetic analyses of the Marshallese and for more diversified, specific studies of those exposed. Results from both of these efforts would contribute significantly to the interpretation of and correlation with isolated findings. Presently, genetic screening techniques should be regarded as the best instrument for detecting genetic injury at a stage when corrective action can be taken for the benefit of affected individuals.

The following specific genetic screening techniques are recommended:

1. Establishment of a Birth Defects Registry.

The establishment of a birth defects registry is necessary to document and systematically classify all congenital abnormalities foreign to the Marshall Islands.

2. Cytogenetic Monitoring of Exposed Population.

Cytogenetic monitoring of exposed populations should be performed as was done in studies of the atomic bomb survivors of Hiroshima and Nagasaki. As in the Japanese studies, comparisons should be made with chromosomal aberration frequencies and cancer incidences in order to identify high risk groups.

3. Establishment of a Genetic Counselling Program.

Genetic counselling should be made available to all the Marshallese, so that they can assist medical scientists to better investigate radiation effects.

4. Analysis of Amniotic Fluid.

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DR. JOSEPH WAGONER, S.D.Hyg.

December 14, 1980

Loma Linda University School of Health submitted to DOI a Marshall Islands health care plan. While that plan does address the general health care needs of the people of the Marshall Islands, it does not positively address the needs of those people with regard to illnesses which are known to be associated with radiation. As such, the plan for the people of the Marshall Islands should be enlarged to include health care activities specifically directed toward carcinogenic, genetic and reproductive effects.

There can be little doubt that under a wide variety of circumstances, ionizing radiation is carcinogenic and leukemogenic in humans. This conclusion is attested to by numerous epidemiologic studies conducted among human populations experiencing a diversity of exposure to radiation. Epidemiologic studies of uranium miners exposed to alpha and gamma radiation have demonstrated a large excess of bronchogenic cancer. In addition, these studies have demonstrated a preponderance of a specific histologic type of cancer, i.e., small cell undifferentiated carcinoma, when compared to the general population. Epidemiologic studies of the survivors of the atomic-bomb explosions at Hiroshima and Nagasaki provide reliable data on the carcinogenic effects of whole body exposure to gamma rays and neutrons. Among those individuals, an excess of lung, thyroid and breast cancer, as well as leukemia, has been demonstrated. This excess of leukemia was shown to be predominantly of the myelogenous and granulocytic type. Conclu-

sive evidence that therapeutic radiation can be carcinogenic and leukemogenic comes from studies of patients irradiated for ankylosing spondylitis, enlargement of the thymus, and gynecological disorders. In like manner, epidemiologic studies have shown that radiologists have an excess of leukemia when compared to other physicians.

These epidemiologic studies document that radiation not only causes various forms of cancer but also causes cancer of a (radiation) specific histologic type.

With regard to the benefits of cancer screening, early diagnosis and early medical treatment, the National Cancer Institute recently has reported major gains in survival. In fact, leukemia and breast cancer are among those sites of cancer showing the greatest gains in survival following therapy.

In light of these facts and because cancer is the leading cause of death among the Marshallese, the health care plan for the Marshall Islands must include an intensive program of cancer control. This cancer control should include, as a minimum, the following elements:

- 1) A Cancer Registry. Current estimates of morbidity and mortality in the Marshall Islands came primarily from hospital discharge and clinic sick call data. Efforts should be made to ensure complete reporting of all cancers. Only by such a registry system can the full

extent of cancer incidence and cancer control be fully evaluated.

- 2) Cancer Screening. A program should be directed toward the early diagnosis of radiation-related cancer, i.e., breast, lung, lymphatic and thyroid cancer as well as leukemia.