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A G E N D A

"EFFECTS OF ENVIRONMENTAL RADIATION ON HUMAN BEINGS"

Meeting to be held:

September 30 - October 1, 1958

9:00 A. M.

Room 1167, 1717 H Street, NW
Washington, D. C.

1) Presentation of status statements on the human radiobiology studies now in progress (5 to 10 minutes each).

2) Consideration of steps to be taken in investigation of low level environmental irradiation effects.

U.S. ATOMIC ENERGY COMMISSION
DIVISION OF BIOLOGY AND MEDICINE

As of Sept 29

PARTICIPANTS INVITED FOR CONFERENCE
on
"EFFECTS OF ENVIRONMENTAL RADIATION ON HUMAN BEINGS"

September 30 - October 1, 1958

Part I. Human Studies now in Progress

Robley D. Evans
(and Robert A. Dudley)
Mass. Insti. of Tech.
Cambridge, Mass.
— Radium dial painter investigations.

~~C. E. Miller~~ L.D. Marinelli
Argonne National Laboratory
Lemont, Illinois
— Effects of specific internal emitters (including thorotrast).

John B. Hursh
Univ. of Rochester
Rochester, New York
— Radioactive food and water and radioactivity in the body.

Walter L. Palmer
(and Charles B. Clayman)
University of Chicago
Chicago, Illinois
— Patients who received x-ray therapy for gastral and duodenal ulcers.

Louis H. Hempelmann
University of Rochester
Rochester, New York
— Patients who received x-ray treatment of the thymus.

Wataru Walter Sutow
University of Texas
M.D. Anderson Hospital
Houston, Texas
— Children exposed in utero as a consequence of x-ray pelvimetry and atomic bombing at Hiroshima and Nagasaki.

W. B. Harris
Health & Safety Lab.
New York City, New York
— Miners of radioactive ores.

S. A. Lough, Director
Health & Safety Lab.
New York City, New York

Harry Auerbach
Argonne National Lab.
Lemont, Illinois

Part I. Human Studies now in Progress (contd.)

Robert A. Conard Brookhaven National Lab. Upton, L.I., New York	-- Studies of the Marshallese.
Lowell A. Woodbury National Academy of Sciences Washington, D.C.	-- Hiroshima and Nagasaki studies pertaining to incidence of cancer in specified groups.
Niel Wald University of Pittsburgh Pittsburgh, Penna.	-- ABCC studies dealing with leukemia incidence.
William T. Ham Med. College of Virginia Richmond, Virginia	-- ABCC studies of visual function.
Gerrit L. Hekhuis School of Aviation Medicine Randolph Airforce Base San Antonio, Texas	-- Behavior of human subjects who have received whole body irradiation.
John Bugher Rockefeller Foundation New York City, New York	-- Inhabitants of radioactive areas and the distribution of bone sarcoma in the United States.
Shields Warren Cancer Research Institute New England Deaconess Hosp. Boston, Massachusetts	-- Ankylosing spondylitis and other human radiobiologic studies being done abroad.
C. M. Barnes (Maj.) Reactor Development Div. U.S.A.E.C.	-- Large animal groupings such as may reveal the effects of environmental radiation.
Howard B. Newcomb Atomic Energy of Canada, Ltd. Chalk River, Canada	-- Canadian studies of environmental radiation effects.

Part II. Radioepidemiologic Considerations of Fitness in Human Populations

Seymour Jablon
National Academy of Sciences
Washington, D.C.

-- Requirements for revealing the late effects of radiation in the Hiroshima and Nagasaki populations.

Francis J. Weber
Dept. of Health, Education and Welfare
Washington, D.C.

-- Requirements for an epidemiologic approach in studies of environmental effects on people near the Nevada Test Site; studies being made by the Public Health Service.

Alexander G. Gilliam
National Cancer Institute
National Institutes of Health
Bethesda, Maryland

-- Considerations of the occurrence of cancer and leukemia in relation to the distribution of environmental radiation.

Harold F. Dorn
Division of Research Services
National Institutes of Health
Bethesda, Maryland

-- Radioepidemiologic considerations - requirements of multiple variant correlation analysis techniques.

George A. Sacher
Argonne National Laboratory
Lemont, Illinois

-- Requirements for studies of low level irradiation effects.

Brian McMahon
Harvard School of Public Health
Boston, Massachusetts

-- Radioepidemiologic considerations.

Richard Masland
Institute of Neurological Diseases & Blindness, NIH
Bethesda, Maryland

-- Radioepidemiologic considerations.

Theodore D. Woolsey
(and Walt Simmons)
Div. of Public Health Methods
Dept. of Health, Education and Welfare
Washington, D.C.

-- The National Health Survey.

Thomas Francis
University of Michigan
Ann Arbor, Michigan

-- Radioepidemiologic considerations.

William J. Schull
University of Michigan
Ann Arbor, Michigan

-- Radioepidemiologic considerations.

Irene Taeuber
(Princeton University)
University Park, Maryland

-- Radioepidemiologic considerations.

Thomas D. Dublin
Ofc. of Director, NIH
Bethesda, Maryland

-- Radioepidemiologic considerations.

RADIOEPIDEMIOLOGY

I. The Problem

To consider the feasibility of research designed to evaluate the epidemiological effects of environmental and related kinds of radiation.

Specifically, to outline ideas for development of radioepidemiology as a research approach.

II. Background

1. Features of the problem. Increasingly, there is need for information about the effects of radiation on general health and well-being of individuals and population groups. In particular, there is need for information about the effects of low level environmental radiation on general fitness, tumor incidence and longevity, taking into account combined genetic and somatic effects. Beyond this there is need for information about the relative significance of environmental radiation as one of the various determinants of total health.

2. Definition. The term "health", or "total health", is used here in the sense as defined by the World Health Organization: "Complete physical, social and mental well-being and not the mere absence of disease or infirmity".

3. Epidemiological approach. To evaluate environmental radiation as a determinant of total health, is to employ the approaches of epidemiology — that is, to identify and ascertain the relative significance of different vectors, positive and negative, that act to determine the state of health in existing populations.

4. Specific questions. Every year about 75 million children are born in the world. It is estimated that about 2 percent, or a million and a half of these, are born with obvious serious defects due to bad genes. Many more suffer from less serious hereditary defects. Indications are that 2 to 50 percent of the bad genes are due to background radiation, 10 percent being a representative figure often used. Other indications furnish strong evidence that the induction of mutations is proportional to exposure irrespective of the rate at which exposure occurs. In addition, other evidence (mainly hypothetical) has been brought forth in support of the idea that tumor induction (including leukemia) and life shortening have as their basis the same "hit-type" or non-threshold type process. Apart from derogatory effects, evidence is strong supporting the view that radiation, by increasing genetic diversity has contributed beneficially to evolutionary development and there is fragmentary evidence suggesting that certain biologic processes are stimulated by this agent. There is thus the need for information about the net results of interacting effects when exposures are slightly above background, whether there is an optimum beneficial level and a threshold

deleterious level, and what the levels of environmental radiation may be that constitute an impediment to well-being and a threat to survival. Facts about the effects of environmental radiation is a scientific matter; how much radiation is to be accepted or tolerated by population groups is only in part a scientific matter.

5. Criteria of well-being. Morbidity, as a measure of disease incidence, can be taken at the same time as a measure of general fitness; similarly, longevity as a measure of length of life can be taken as a measure of ability to survive. Means are available for measuring longevity and morbidity. These are epidemiological criteria inasmuch as they apply to whole populations. Physiological criteria are also available -- measureable responses or conditions that reveal the fitness of organs, organ systems and whole organisms. The latter have limited use in the case of human beings because of the need in many cases to use mutilative procedures. Tumor incidence has special significance and also special usefulness in relation to radiation as a vector affecting health: first, cancer is an important disease, the incidence of which is distinctly affected by radiation; and, second, tumor incidence is a feature on which statistical information for whole populations can be obtained. To be emphasized, is the fact that interest is in superior or exceptional fitness as much as in the inferior.

6. Epidemiological data. Reasonably firm longevity data are available. Likewise, causes of death data from which tumor incidence can be ascertained are available, but due to inaccuracies of diagnosis and variation in reporting procedures they are not nearly as reliable as length of life figures. Mortality data are also available, but they also involve uncertainties with respect to completeness and accuracy. Superior and exceptional abilities are revealed by various achievement tests that can be applied with reasonable confidence. The epidemiological approaches deal with subclinical as well as clinical effects, and thus take into account consequences of radiation exposure not commonly considered heretofore.

7. An obvious comparison. With respect to environmental radiation, question has been raised about the comparative fitness of populations receiving different amounts of cosmic radiation. Cities at 5000 feet altitude receive in the range of twice as much cosmic radiation as those at sea level. As a hypothesis, it may be assumed that if tumor incidence is proportional to dose of radiation, more cancer would be present in the higher altitude populations. Testing the hypothesis in this case would be a statistical matter, and consideration of certain details points up the kind of problems that would need to be faced. In a city like San Francisco with a population of about a million, the number of leukemia cases per year is about 50. According to the theory and to genetic considerations then, about 10 percent or 5 cases would be attributable to background radiation and about half of these or 2.5 would conceivably be the consequence of cosmic rays. In Denver, a city with about half the population of San Francisco, the additional amount of leukemia provided by the higher level of cosmic radiation might be only 2 to 3 cases at most ($\frac{1}{2} \times 2\frac{1}{2} \times 2$). Such figures, because

of low statistical significance, direct attention at once to the need for data covering a sequence of years and for other criteria -- criteria such as longevity which vary in degree and apply to whole populations.

8. Related information that has a bearing. Growing amounts of pathological, clinical, biochemical, radiological and other data for large animals and special population groups are becoming available covering long periods following acute irradiation and covering long periods during low level exposure. Systematic analysis of such data gives orientation about probable reactions in human beings. Of more direct significance, growing amounts of similar data are becoming available for human populations. Special sources of human data are: the Japanese at Hiroshima and Nagasaki; the Japanese fishermen; the Marshallese; accident cases; radium dial painters; drinkers of radioactive waters; inhabitants of radioactive sands, miners of radioactive ores; AEC and other workers who deal occupationally with radioactive materials; and radiotherapy cases of many types. Rather large amounts of research materials and data are available pertaining to physiologic aspects and some are available pertaining to epidemiological features. Much in the way of general statistical data is available from census, health, acturial and other sources, including materials on special populations of domestic animals that have a bearing.

9. Uniqueness of the situation. As a rule, fitness and longevity data accumulate over long periods of time -- especially when the test objects are large animals or human beings. Because of the time involved, personnel and leadership change as the work progresses, with the consequence that the claim to materials and to authorship rights (associated more with shorter term work and highly respected by scientific people) tends to be lost; experimental materials tend also to accumulate without attention and sometimes to deteriorate and disappear. This has been especially true in connection with Hiroshima data, and it is true to some extent in connection with the long range dog, primate and large mouse colony data.

10. Need for a coordination center. Inasmuch as human, and to some extent large animal situations, favorable for special study must be found rather than created, and inasmuch as knowledge of such situations exist in the minds of people largely unassociated, benefit would derive from a coordination center at which opportunities could be recorded and evaluated for encouragement and support.

11. Needs for repositories. In order to assure that accumulating data are not lost, benefit would derive also from the delegation of responsibilities to certain agencies for preserving and publishing catalogues of available research materials and data. Locations to be considered are: the National Academy of Sciences; the Atomic Bomb Casualty Commission; the Armed Forces Institute of Pathology; Division of Information Service, AEC: National Laboratories, AEC; University groups; and special analytical groups (commercial).

12. Research design. Perhaps the greatest need is for investigative approaches and plans -- concepts which would identify the most meaningful

questions and at the same time visualize methods of utilizing the full potentiality of materials and data already collected or can be collected in getting answers to the questions. Impressions need to be evolved with respect to the kinds of animal studies needed to supplement human studies and whether the animal studies should include a substantial amount of primate work. Development of leadership, personnel, organization and budgets could be concrete and probably would be comparatively easy after completion of research design.

13. Radioepidemiologic research potential. Dealing with fitness -- exceptional as well as minimal -- means dealing with the capacity of life processes at different levels of cellular organization; single cells, tissues, organs, organ systems, whole organisms and population groups. Fitness involves the combined functional capacity provided by both the germplasm and the somatoplasm. In the life process at any level of cellular organization -- that is, in the constant effort to remain alive and functional -- there are forces that contribute to organization of the living components and other forces that contribute to disorganization of them. Capacity for life can thus be regarded as the net gain of the organizational forces over the disorganizational. In meeting the exigencies of life, most living components have reserve capacity which is drawn upon when emergencies or special needs arise. Measurement of fitness means measurement of reserve capacity as well as the functional. Measurement of fitness likewise means measurement of subliminal as well as the symptomatic effects of stress agents (such as radiation) and therefore goes beyond the investigative considerations usually dealt with heretofore in radiobiology. Measurement of fitness also means measuring the consequences of interacting forces (dynamic operation), and in last analysis, it means measuring the contributions of component forces -- the determinants of total health -- thereby making possible the evaluation and weighting of effects of any one agent (such as radiation) with others of consequence. Radioepidemiology, if successful in dealing with fitness as a characteristic of living entities, would make these things possible.

14. Pressing problems in radiobiology involving fitness and fitness reserves. As indicated or implied already there is need to know: (a) the effects of background radiation at natural levels on the fitness of whole organisms and on population groups; (b) the effects of environmental radiation in the range from natural background levels to 1 r per day; (c) the contribution of low level exposure to tumor incidence and reduced longevity; (d) natural radiation as a determiner of length of life; and (e) the beneficial as well as detrimental effects of low level exposure.

III. Comments

Because a large amount of applicable statistical data are available already, because additional data can be obtained with reasonable effort, because statistical and indexing procedures are to a considerable extent developed already, and because dealing with fitness is the natural province of epidemiology, it is believed important to emphasize radioepidemiology as a research field. This point of view is strengthened by the thought that

inherent in radioepidemiology is the opportunity to deal with fundamental scientific problems as well as programmatic and to deal with wellness the same as illness. With emphasis on ways and means of achieving high level wellness, attention is directed toward the positive aspects of living rather than the mere health status quo. Because of its scientific, economic and biologic influence (positive and negative), atomic energy as generally recognized has vast potential in this respect and it is a matter of importance to assess its impact on health as completely as possible. Of particular importance at the present time, radioepidemiology can be regarded as a means for determining whether the fears about genetic effects are justified. Inherent in the latter consideration is the underlying scientific question of the role of mutation as a causal factor in cancer and as a determiner of total health and length of life.

IV. Recommendations

1. That a review of studies in human radiobiology be prepared and revised from time to time.

2. That the AEC Division of Biology and Medicine, as a staff function, give coordination as much as it can appropriately to work in the combined fields of human and large animal radiobiology and radioepidemiology.

3. That to the extent regarded as advisable, contracts be negotiated for establishment of repositories for research materials deriving from long term studies, and that other contracts be negotiated for the promotion of radioepidemiologic studies of a size such as may be required for significant progress.

P. S. Henshaw
DBM-AEC
September 16, 1958

CRITERIA OF AGING

(FITNESS)

(A hand-out piece for comment and discussion)

Paul S. Henshaw

August 25, 1958

Dealing with aging, it can be said, means dealing with the ability of cells, tissues, organs, organ systems, organisms and population groups to perform particular functions and remain alive or operative. In the life process, there are on the one hand organizing forces favorable to subsistence and on the other disorganizing forces unfavorable to it. Potential for life at the different levels of cellular grouping can thus be regarded as the net gain of organization over disorganization, and measurement of the degree of fitness of the whole or of component parts can be regarded as an approach to the measurement of aging -- the irreversible degenerative changes that occur with time despite reparative or regenerative processes. It is thus a matter of importance to identify criteria and to establish representative approaches for measurement of fitness at the different levels.'

In the study of aging, it is important to keep in mind that what may be called the Principle of Subsistence -- the inherent tendency of organisms to function and remain alive -- operates at all levels of cellular groupings, and that the objective of such a study would be measurement of the "vivipotency", or capacity for life, at the different levels.

In utilizing this approach, it is necessary to remember that the forces for organization and disorganization act on germplasm as well as on somatoplasm, and therefore that it is appropriate, if not actually essential in considering the full meaning of aging, to give interpretation to the vivipotency of population groups as well as of organisms and component parts of organisms.

At the Population Group Level

Population groups, human as well as other, struggle to maintain as high a "standard" of living as possible. Success in doing so, in the case of human beings, is measureable in terms of economic and cultural development. By the application of index analysis techniques, measurements can be made of the status and rate of change of such development and impressions can be obtained of the comparative influence of component determinants. Inasmuch as index procedures are reasonably well developed, there is the possibility of measuring the vivipotency of population groups and thus get at the questions of aging and resiliency of germplasm.

At the Organism Level

Almost universally, organisms struggle to live as long as possible -- that is, to survive. Longevity may thus be taken as an overall measure of ability to live. Length of life is determined by the vivipotency of the weakest vital organ system or the integrated efficiency of the different vital systems. Fertility (measured by birth rates) or ability to resist disease (measured by

morbidity may also be regarded as expressions of fitness of whole organisms (depending on definitions), but utilization of such features involves difficulties in case of the human species inasmuch as the struggle is not for maximum reproduction and morbidity is not easily measureable with accuracy. There is thus the possibility that longevity will prove to have the greatest general meaning when appraising the vivipotency of whole organisms.

Most organisms, in their effort to survive, have not only a vivipotency adequate to meet the normal exigencies of life, but also a reserve which is drawn upon in meeting health crises. Ionizing radiation, as one of various stress agents, reduces the fitness of organisms, and accordingly quantitated exposure can be used as a means of measuring vivipotency. By determining the LD-50 at different times in the life cycle, impressions can be gained of changes in total fitness. Similarly, by utilization of split-dose techniques, impressions can be gained of resiliency, regenerative capacity and fitness reserve, inasmuch as the split-dose LD-50 would be expected to fall as reserve diminishes with time.

At the Organ System Level

Studies of organ system fitness, because of key significance and the multiplicity of measurements of operating efficiency that can be made, may be found to provide the greatest opportunities for elucidating the process of senescence. Deterioration of organ system fitness is a primary cause leading to death, and, as intimated already, can be taken as a measure of aging in the different systems. Measurements of deterioration (apart from the reversible) can be used to reveal the comparative status of aging in different systems and a sequence of measurements to show the rate at which aging progresses in each.

A representative list of approaches for measurement of fitness in organ systems is given as follows:

Hemopoietic system: Erythrocyte, leukocyte and platelet formation. Peripheral blood picture, blood clotting time and resistance to disease under conditions of stress (bleeding, irradiation, exercise, etc.) can be used to reveal hemopoietic fitness.

Cardiovascular system: Maintenance of adequate circulation. Pulse, blood pressure, temperature, blood vessel condition and vascularity under stress can be used to reveal cardiovascular system adequacy and reserve.

Alimentary tract: Nutrition, resistance to disease. Growth, diarrhea, nausea, infection, temperature and the like can be used to indicate something of the GI-tract efficiency. Inasmuch as factors other than deterioration of fitness in this system may affect the conditions mentioned, care would need to be exercised in using them to elucidate senescence.

Central nervous system: Receipt, storage, processing and use of information. Perception, memory, discrimination and coordination

tests carried out while organisms are under different conditions of stress can be used to reveal central nervous system fitness.

Endocrine system: Biochemical balances and physiologic rhythms. Conditions of homeostasis and cyclic regularity of physiologic processes can be employed to reveal adequacy of endocrine functions.

Skeletal system: Epiphyseal, osteoblastic, osteoclastic, peridontal membrane, synovial and other functions. Growth, anthropometric condition, structural strength, calcification and trabeculation (as shown by radiography in different ways), freedom of joint action, alveolar ridge maintenance, etc., can be used to reveal skeletal fitness.

Integumental system: Skin quality, secretory action, hair and nail growth, teeth maintenance. Skin elasticity, wound healing, dentition, epilation and pigmentation provide approaches to measurement of integumental fitness, though not without the involvement of complexities and uncertainties in a significant proportion of the cases.

Reproductive system: Fertility, menstrual regularity. Spermatogenesis, oogenesis, potency, libido, pregnancy, liter size and menopause are conditions or processes capable of being used to show degree of reproductive fitness.

At the Organ Level

Much of what has been implied in connection with organ systems, has application with respect to organs as organ systems. Representative organs involving measureable conditions or processes are listed as follows:

Lens: Light transmission. Lens function is affected by elasticity, transparency and color, all of which change with time and all of which are measureable.

Kidney: Excretion. Kidney function is revealed by the character of excretory products. Various biochemical analyses of urine can be used to determine the working efficiency of the kidney.

Liver: Secretion, storage, regeneration. Like the kidney, liver function is to a large extent biochemical and its operational efficiency can in part be ascertained by analytical biochemical procedures.

At the Tissue Level

Tissue activity apart from organ function, is difficult to analyze, although there are some possibilities -- especially, in the case of progenitive tissues. Analysis of hemopoietic system function, as outlined above, gives at the same time considerable information about hemopoietic tissue elements -- conditions of anemia, polycythemia, leukopenia, leukemia, etc., having meaning. Analysis of

the reproductive system function involves consideration of spermatogenesis and thereby the operative ability of the germinal epithelium of the spermatic tubules. Similarly, analysis of the integumental system function involves squama production and epithelization in wound healing among other things and accordingly the operative efficiency of skin epithelium.

At the Cellular Level

To say that cells age in a manner comparable to the way multicellular organisms age, involves an assumption of some fundamental significance, which is that the irreversible deterioration that occurs with time in living systems is a change at the cellular level. Accepting this concept as an hypothesis, consideration can be given to testing its applicability.

In chemostated cultures of free living cells, investigations can be made of the ability of such cells under different kinds of stress (temperature, ionizing radiation, starvation) to fill their environment -- a question raised above in connection with the functioning of individuals as members of population groups, and one having the same meaning in the two cases. Natural selection and survival of the fittest operates at both levels, causing the less fit to disappear -- a kind of action that can take place in the case of free living individuals, but which cannot take place with equivalent completeness in the case of component parts of somatic cell systems.

The influence of selection pressures can be reduced, if not actually eliminated, by isolating strains developed from single cells of free living cell systems and testing their staying power or endurance from time to time under controlled conditions of stress. Decrease in stamina of one isolated strain over another could be said to constitute evidence of intracellular rather than extracellular aging. Should it be found that a significant portion of the irreversible degenerative change in organisms is intracellular, the question can then be asked whether such change is accomplished mainly by mutation or by acquisition of replicating inhibitory materials.

At the Molecular Level

In the sequence of approaches to the study of aging developed here, it is appropriate and necessary to raise question whether molecules age -- a feature made logical by the fact that reference is made frequently to the "aging of metals" or the "aging of rubber". It is possible that in last analysis, mutation and aging of molecules will be found to be one and the same. Behavior of the self-replicating DNA molecule is of significance in this connection.

Comments

It is noteworthy that many of the criteria and approaches to the study of aging and to elucidation of the principle of subsistence mentioned here have been used in dealing with other problems. It is to be expected, therefore, that much will be learned about the aging process by the study of data already accumulated as well as from that which may be collected specifically for analyzing the aging process.

REFERENCES ON HUMAN RADIOBIOLOGY

(Grouped in Practical Categories)

SOURCES

ABCC list
NAS list
AFIP list
Office Files
(References associated
with published articles
and other)

COMPILED BY:

Paul S. Henshaw, AEC
Anna M. Kubica, AEC

August 1958

COMMENTS:

The attempt here is to bring together references pertaining to the effects of radiation on human beings, excluding therapy and dosimetry.

The listing and grouping (see next page) is being done for administrative purposes, though the material undoubtedly will have other usefulness. The grouping arrangement enables some impressions of the magnitude of accomplishments in certain practical field areas. Information reports (not intended for publication) are listed as well as published articles and articles in press.

Some references are incomplete and it is likely that some are incorrect. Assistance on both would be appreciated -- also in locating materials not listed.

PART II deals with reports, for which single manuscript copies only are available in a great many cases. Although their original data may have been evaluated in connection with acute irradiation effects, it now has new usefulness in connection with late effects. It is considered important to locate as many reports as possible and insure their availability to investigators.

Paul S. Henshaw
DBM-AEC, August 1958

HUMAN RADIOBIOLOGY -- PRACTICAL CATEGORIES

1. Clinical
2. Hematology
3. Burns, Keloids
4. Pathology
5. Reproduction, Fertility
6. In Utero Exposure Effects
7. Pediatrics, Growth Changes
8. Central Nervous System
9. Epidemiology
10. Leukemogenesis, Carcinogenesis
11. Cataracts, Eye
12. Dentition
13. Genetic Changes
14. Late Effects, Aging
15. General

16. Radioactivity in the Body
17. Dial Painters
18. Thorotrast
19. Radioactive Food and Water
20. Accidents
21. Inhabitants of Radioactive Regions

PART I. PUBLISHED ARTICLES AND MANUSCRIPTS

1. Clinical

Oughterson, Ashley W., et al. MEDICAL EFFECTS OF ATOMIC BOMBS. The Report of the Joint Commission for the Investigation of the Effects of the Atomic Bomb in Japan, 1946. Army Institute of Pathology, TIS Issuance Date: April 19, 1951 (6 Vols., NP-3036-3037-3038-3039-3040-3041)

Vol. I - Introduction
- Physics
- Hiroshima City
- Nagasaki City

Vol. II - Materials and Methods (Hiroshima)
- Materials and Methods (Nagasaki)
- Clinical Observations in Hiroshima
- Clinical Observations in Nagasaki

Vol. III - Hematology
- Studies on Bone Marrow Obtained by Biopsy

Vol. IV - Pathology
- A Case of Monocytic Leukemia
- Pathologic Changes in the Eye

Vol. V - Statistical Analysis
- Statistical Study

Vol. VI - (Classified ?)

Tsuzuki, Masao. REPORT ON THE MEDICAL STUDIES OF THE EFFECTS OF THE ATOMIC BOMB. Report appears in "General Report-ABCC, January 1947", National Research Council, 2101 Constitution Avenue, Washington 25, D.C.

LeRoy, G.V. MEDICAL SEQUENCE OF THE ATOMIC BOMB EXPLOSION. J.A.M.A. 134, 1143-1148, 1947.

Dunham, C.L., E.P. Cronkite and G.V. LeRoy. ATOMIC BOMB INJURY: RADIATION. J.A.M.A. 147: 50-54, 1951.

Howland, J.W., and Warren, S.L. THE EFFECTS OF IRRADIATION FROM THE ATOMIC BOMB ON THE JAPANESE. (Unpublished - 1958)

Cronkite, E.P., Bond, V.P., Chapman, W.H., and Lee, R.H. RELATIVE BIOLOGIC EFFECT OF ATOMIC BOMB GAMMA RADIATION. Science, 122: 148-150, 1955.

Tsuzuki, Masao. MEDICAL REPORT ON ATOMIC BOMB EFFECTS. The Medical Section, the Special Committee for the Investigation of the Effects of the Atomic Bomb, prepared by the National Research Council of Japan, 1953.

I. Report of the Medical Studies on the Effects of the Atomic Bomb (Masao Tsuzuki)
II. Clinic of the Atomic Bomb Radiation Sickness (Kanshi Sassa)
III. The Radioactivity of the Atomic Bomb from Medical Point of View (Masanori Nakaidzumi)
IV. Pathological Anatomy and Histology of the Atomic Bomb Injury and its Pathology (Ryojun Kinoshita and Masashi Miyake)

Kusano, Nobuo, Chief Editor. ATOMIC BOMB INJURIES. The Tsukiji Shokan Co., 6-1 Chome Tsukiji Chuo-Ku, Tokyo, 1953.

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Kawaishi, K. DELAYED EFFECTS OF A-BOMB IRRADIATION IN A GROUP EXPOSED TO THE HIROSHIMA A-BOMB UNDER IDENTICAL CIRCUMSTANCES. Research in the Effects and Influences of the Nuclear Bomb Test Explosions" published by Japan Society for the Promotion of Science, Ueno, Tokyo, 1956.

Uraki, Z. STUDIES ON THE SEQUELAE AND AFTER EFFECTS OF THE ATOMIC BOMB IN HIROSHIMA. Research in the Effects and Influences of the Nuclear Bomb Test Explosions" published by Japan Society for the Promotion of Science, Ueno, Tokyo, 1956.

Wald, N., Hoshino, T., and Sears. THERAPY OF POLYCYTHEMIA VERA WITH 1, 4-DIMETHANESULFONOXYBUTANE (MYLERAN). In press-1958.

Tsuzuki, M. ERFAHRUNGEN UBER RADIOAKTIVE SCHADIGUNG DER JAPANISCHEN FISCHER DURCH BIKINI-ASCHE. Munchener Med. Wohschr 97, 988-994, 1955.

Shigeto, F., and Y. Ito. STUDIES ON THE ATOMIC BOMB AND DISEASES OF THE SKIN AND URINARY ORGANS. Research in the Effects and Influences of the Nuclear Bomb Test Explosions" published by Japan Society for the Promotion of Science, Ueno, Tokyo, 1956.

Nakaidzumi, M., and A. Tsuya. THE MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE BLOOD CAPILLARIES OF THE PERSONS EXPOSED TO THE ATOMIC BOMBING (PRELIMINARY REPORT). Research in the Effects and Influences of the Nuclear Bomb Test Explosions" published by Japan Society for the Promotion of Science, Ueno, Tokyo, 1956.

Lange, R.D., and Fujii, T. ADRENAL FUNCTION, AS MEASURED BY THORN TESTS, OF HEAVILY IRRADIATED ADULTS 7 YEARS AFTER EXPOSURE TO AN ATOMIC BOMB. Unpublished report - 1958.

Hayashi, I. PATHOLOGICAL STUDIES ON THE AFTER EFFECTS OF ATOMIC BOMB UPON THE ENDOCRINE GLANDS. Research in the Effects and Influences of the Nuclear Bomb Test Explosions" published by Japan Society for the Promotion of Science, Ueno, Tokyo, 1956.

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PART II

JAPANESE SCIENTIFIC REPORTS
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J-69	Shortening of Swelling (of the skin) Resorption Time on Atomic Bomb Patient.	K. Ichinose, S. Kuroki, S. Matsunaga 1955
J-70	Experimental Studies.	S. Zuckerman, D.Sc. Lond., M.A. Oxfd., M.R.C.S., Dept. of Human Anatomy, University of Oxford
N-2 BH-61	Researches on Patients Injured by the Atomic Bomb.	Kusuncki, Prof. G.
N-6 BH-113	Atomic Bomb Disease in Childhood.	Enjohji, Prof. M.

1. Clinical (Contd.)

AFIP No.		
N-9 BH-41,42	A. Lesions of the Pharynx and Laryns Produced by the Effects of the Atomic Bomb.	Sakasa M., Inoue T., Toriya S.
N-9	B. On a case of Mastoiditis Acuta Due to the Explosion of Atomic Bomb.	(?)
N-10 BH-109	Dermatologial Conditions Produced by the Explosion of the Atomic Bomb.	Mina, Prof. I. - Mimami
N-11 BH-70	The Liver Function (Santonin Excretion)	Ohkura, S.
N-12 BH-116	Bacteriological Researches on the Serum of Patients Who were Injured by the Atomic Bomb in Nagasaki.	Kamura, Prof. R.
N-13 BH-114	Bacteriological and Seriological Researches for Diarrhea of Atomic Bomb Diseases.	Enjohji, Prof. M.
N-15	The Experimental Investigation of the Decrease of Vitamin C in Patients Suffering from Atomic Bomb in Nagasaki.	Fujita, M.
N-19 BH-64	Investigation of Injurious Effect on the Human Body of the Explosion of the Atomic Bomb at Nagasaki City.	Nakashima, Prof. Y.
N-20 BH-12	Survey of the Effects of Radioactivity of the Atomic Bomb which was used at Nagasaki upon the Inhabitants in the District of Chijiwa Town.	Katsuki, Dr. S.
N-21 BH-73	Survey of the Radioactivity Influence Caused by the Atomic Bomb which was Used at Nagasaki Upon the Inhabitants of the City of Shimabara.	Osajima S., Ko E., Dr. Shiro Osajima, Eicho Ko, Dr. Tsuno
N-23 BH-8	Contribution to the Problem of the Cause of Death of the Atomic Bomb Victims.	Kashiwado, T.
N-27	Report on Basal Metabolism.	Kaida K., et al

1. Clinical (Contd.)

AFIP No.		
N-24 BH-19	Concerning the Cachetic Conditions of Patients Injured by the Atomic Bomb in Nagasaki.	Urabe M., and Menjo M., Surg.
N-28 BH-22	Influence of Atomic Bomb Explosion on Ear, Nose, and Throat.	Kashiwado, T.
N-29 BH-20	Gastrointestinal Tract of the Atomic Bombed Patients.	Kishimoto, K.
N-34 BH-20	Examination of the Urine.	Kishimoto, K.
N-35	A. Urine Dilution Test of Kidney Function. B. Notes in the Flash Burns. C. Adrenalin Test.	Yamamura, H.
N-38 BH-23	Clinical Studies Upon the Atomic Bomb Patients at Nagasaki in the Omura Naval Hospital.	Yamamura, Dr. Hideo Otsuki (Dr.)
N-41 BH-64	Investigation of Injuring Effect Upon the Human Body by the Explosion of Atomic Bomb at Nagasaki City	Dr. Ryote Nakajima Dr. Kazuo Dr. Ishikawa
N-44	Urinalysis of the Blood Chlorides.	Dr. Menjo
NH-1	My Experience of the "Atomic Bomb Disease" and Eyewitness Reports of the Atomic Bomb Explosion at Hiroshima.	Yoshinobu Monden August 6, 1945
NH-2,BH65	Medical Effect of Atomic Bomb.	N. Fuse, Osaka University
N-3 BH-56	Clinical Studies of Injuries by Atomic Bomb, with Special Reference to Functional Disturbance of the Adrenal Glands and Liver, and Cause of Blister Formation on the Skin.	Drs. K. Inouye, E. Katsura, M. Yamada, and K. Iwamo, Imp. University
NH-5 BH-47	On the Late Radiation Sickness Caused by the Atomic Bomb.	Dr. S. Yamasaki, Osaka Medical School
NH-9 BH-43	On Atomic Bomb Injury and the Function of the Liver.	Dr. K. Hirao, Kyushu Imp. Univ.

1. Clinical (Contd.)

AFIP No.		
H-1 BH-14	Medical Report of the Atomic Bombing in Hiroshima.	Army Medical College and First Tokyo Army Hospital
H-3 BH-52	The Effects of Atomic Bomb on the Human Beings at Hiroshima. A Report from the Hiroshima Sanatorium.	Drs. M. Fujii, K. Shirai H, Sawazaki, Y. Ogaewara and H. Tanabe
H-4	Report on Patients Injured by the Explosion of the Atomic Bomb at Hiroshima.	Lt. Comdr. J. Juno, Japanese Navy, Iwakuni Naval Hospital
H-6 BH-84	Patho-Anatomical Studies of 34 Atomic Bomb Cases at the Cities of Hiroshima and Nagasaki (The First Report).	M. Miyake, Pathological Institute, Tokyo Imperial University
H-8 BH-115	Active SH Base of Serum Protein of Patients Injured by the Atomic Bomb.	Dr. E. Hamamoto, Okayama, Medical College
H-12 BH-7	Remarkable Facts of the Atomized Patients at Hiroshima.	S. Kuwabara, Kyushu, Imp. University
H-21	List of Patients Whose Records were Available for Study about 9/25/45.	Manhattan District Group
L-1	Japanese Survey of Atomic Bombing of Hiroshima and Nagasaki dated Nov. 10, 1945 with corrections of Dec. 1, 1945, reproduced by HQ US.S.B.S. APO 234.	Yoshio Nishina
L-3	Health Condition of the Inhabitants in the Central Zone of the Atomic Bombardment.	Prof. Takashi Nagai (Translated by Dr. Yasuyama)
L-5 BH-15	Effects of the Atomic Bomb (Medical Aspects) Naval Station.	Sakai Bunzo
L-7 BH-17	Researches on the Biological Effects of the Atomic Bomb.	(Third Report)
L-9 BH-29	Clinical Researches of Ocular Affections Caused by Atomic Bomb Explosion at Hiroshima, Japan.	Yoshiharu Shoji, M.D., Tsunemasa Fukuoka, M.D., Masao Nita
L-10 BH-34	Liver Functions of Atomic Bomb Victims.	Assist: Prof. Fukuda Tamotsu Assist: Watanabe Atsuo

1. Clinical (Contd.)

AFIP No.		
L-11 BH-36	The Investigation of the Atomic Bomb Disease.	Assist. Prof. Dr. K. Kaida., Prof.Dr. T. Sawada, Dr. T. Masuya, Dr. S. Morita, Dr. Y. Ikemi,Dr. K. Hayasahi
L-12 BH-40	Change of the Gastric Intestinal Organ by the Atomic Bomb Injury.	Dr. H. Koga, Prof. Dr. M. Tomoto, Dr. Ichiyoshi,Dr. Sugine,Dr.Ishibashi
L-13 BH-44	Report on Residents of Bombed Areas in Hiroshima and Nagasaki.	Kyoto-Shi, Kamigyo-Ku, Kawara-Machi, Hirokoji
L-14 BH-45	Report on Atomic Bomb Injuries.	Kurusu Masao, Prof. Mochizuki
L-15,BH-46	Report on Nagasaki Atomic Bomb Injuries.	Kameda Kaisuke
L-17 BH-53	Survey of Physical Disorders Suffered by Hiroshima Railway workers caused by Atomic Bomb.	Matsufuji Hajime, Ishida and Kato
L-19 BH-59	Results of Emergency Medical Examination for "Atomic Bomb Disease". Made in Nagasaki Railway Administration Section Personnel.	Yoshimura, Saburo, Hatanaka Toshiro, Sakiyama Takemitsu, Yokota Hiroshi
L-20 BH-63	"Clinical Observations of the Atom-Bomic Disease"	Prof. Dr. T. Misao
L-22 BH-74	Radiation Disease in Nagasaki (Second Report)	Kikuchi Takehiko, Fukase,Masaichi, Node Shinya, Iwagami Ryuichi
--	Examination Results of Atomic Bomb Victims in Nagasaki District (First Report)	Kikuchi Takehiko, Fukase Masaichi, Node, Shinya and Iwagami Ryuichi
L-24 BH-85	Preliminary Report on the Path-Anatomical Studies of the "Atom-Bomb" Cases in the City of Hiroshima.	Dr. Mashi Miyake
L-25 BH-86	Clinical Pathological and Histological Studies on Atomic Bomb Heat Radiation Scar Tissues.	Kajitani Tamaki, Ishihashi Yukio
M-3 NP-328	A Summary Report on Symptoms Caused by the Atomic Bomb.	Michihiko Hachiya, M.D.

1. Clinical (Contd.)

AFIP No.		
M-5 NP-330	Investigation Report of Rinto #1 Hiroshima Medical Relief Party.	(?)
---	Effects of the Atomic Bomb on the Human Organism.	Tage Christiansen, M.D., Ph.D.

2. Hematology

J-5 & J-18 BH-135	Observations on Both the Blood Pictures and Bone Marrow in Atomic Bomb Sufferers in Nagasaki with Special Ref. to Nishiyama District.	Dr. Pierce through Dr. Neel September 23, 1947
J-7 & J-23	Report of the Hemotological Observation in the Atomic Bomb Sufferers in Nagasaki City.	Kaika, received from Dr. Pierce through Dr. Neel, September 23, 1947
J-9 N-19	Nishiyama Counts	Received from Dr. Pierce through Dr. Neel, N.R.C., Sept.23, 1947
J-10	Hemotological Observations in Tsu, City of War Sufferers.	Tukase, received from Dr. Pierce thru Dr. Neel, N.R.C.,Sept.23,1947
J-17 BH-103	Hematological Observations on three Patients injured by the Atomic Bomb.	Dr. Yasushi Tesida and Dr. Susumu Adati
J-18 J-5 BH-135	Observation on Both the Blood Picture and Bone Marrow in Atomic Bomb Sufferers in Nagasaki with Special Reference to Nishiyama District. Feb. 15-20,1947.	T. Kikuchi, M. Fukase, T. Sawada, R. Ishigami, Y. Yamaseba
J-19 BH-140	Data on Blood Studies of Inhabitants Nishiyama Area, near Nagasaki.	Dr. K. Ishi,awa, WBC, Counts done by Dr. Kikuchi, Kyoto Imp. University
J-20	Blood Examination in the Cases of the Atom-Bomb Disease. June 1946.	Hideo Yoshida (Iizuka Med. Room of Kyoto Prefec. College of Medicine)
J-21 BH-136	Report of Hematological Observations in the Sufferers, Who were Injured by the Atomic Bomb One Year Ago in Hiroshima City. (8-19-46 -- 9-10-46)	Prof. Dr. T. Kikuchi, 2nd Clinic of The Kyoto Imperial University
J-23 J-7 BH-139	Report of Hematological Observations in the Atomic Bomb Sufferers in Nagasaki City One Year and Four Months after the Bombing. (11-30-46 -- 12-6-46)	Prof. Dr. T. Kikuchi, G.Wakisaka, T. Yoda, S. Note, H. Yamada, and K. Miki

2. Hematology (Contd.)

AFIP No.		
J-22 J-6 BH-137	Second Report Hematological Observations in the Atomic Bomb Sufferers in Hiroshima City One Year After the Bombing. (8-19-46 -- 9-10-56)	Prof. Dr. R. Kikuchi, G. Wakisaka, T. Setsuda, S. Anzai, T. Oga, T. Hiraoka, K. Murata, S. Itci, T. Umeda, J. Okamoto, O. Hama, T. Murakami, T. Sawada, R. Ishigami, Y. Tegima, S. Akiyama, (2nd Med. Clinic of Kyoto Imp. Univ., Director: Prof. Dr. T. Kikuchi)
N-8	Anemic Retinitis Caused by the Atomic Bomb	Tamura, S. (Prof.)
N-14 BH-99	Concerning the Chemical Constituents of the Blood of Patients Injured by the Atomic Bomb.	Hirohata R., Oda T., Usui M.
N-22 BH-101	Report of a Case of Monocytic Leukemia Occurring Following the Atomic Bomb Disease.	Misao, Dr. T., Harada, Dr. Y., and Hattori, Dr. J.
N-25 BH-91	Behavior of the Eosinophilic Cells in Blood and Bone Marrow of Patients Injured by the Atomic Bomb at Nagasaki in the 3rd and 4th Month after Explosion.	Ueda, H., and Nikaido S.
N-26	Report of Reticulocytes.	Kaida K., et al
N-32 BH-92	Chlorine Content of the Blood of the Atomic Bomb Patients in Omura Naval Hospital.	Hino S.
N-40	Hematologic Studies on Nagasaki.	Kaida K.
N-43	Determination of the Blood Chlorides.	Hino S.
N-46	Questionnaire for K-Series Patients Who had Sternal Biopsy.	See Masuya Report N-1
H-5 BH-94	Hematological Study on the Atomic Bomb Disease.	Drs. K. Nakao, G. Kobayashi, S. Kato, Y. Yano, M. Komiya, Imperial University of Tokyo
H-18	Hematological Report about A.B. Cases.	Drs. Sosa Y., Nokoma Y., Yano M., Kiruya
L-27 BH-93	Statistical Observations on Peripheral Blood Pictures of Atomic Bomb Disease Patients during 3rd and 4th Months.	Nakao Yoshihisa, Ogoshi Masaak, Kakei Hiroki, Tsukada Tooru, Kato Shuichi, Kawamura Motoki

2. Hematology (Contd.)

AFIP No.		
L-28 BH-102	Blood and Bone Marrow Pictures of Atomic Bomb Patients.	Fukushima Kanshi, Kitani Takeo, Saito Shigerkazu, Senda Nobuyuki, Ishida Nobuyoshi, Kashima Shigero, Niwa Tatsuko
L-30 BH-182	Damages to the Leucocytes Formine Function in the Cases of the Atomic Bomb Radiation Sickness.	Minoru Fujii, M.D (Director) Hiroshi Shirai, M.D.; Hiroji Sawasaki, M.D.; Yoshio Ogasawara, MD; Hideo Tabe
42A-42B N-8	A. The "Anemic Retinitis" by the Atomic Bomb.	Prof. Dr. S. Tomura; Asst. Prof. Dr. H. Ikui; Inst. Dr. K. Nakano; Hiwatashi; Dr. S. Oshio

3. Burns, Keloids

J-34	A Study of Keloids Dueto Exposure to Atomic Bomb.	Chuta Tamagawa, Gen Katsube
J-35	About the "Keloid", Due to the Atomic Bomb Injury at Hiroshima.	The Orthopaedic Surgical Clinic of Kyoto Imp. Univ. (Director Dr.Konde Eishi). Tsuruta Toyoshi & Ando Keizo
J-51	A Fundamental Study of Keloid and Its Nature Caused by Atomic Bomb Injuries.	Gen Katsube
L-2	Superficial "Burns" of Skin and Eyes from Scattered Cathode Rays.	L.L. Robbins, M.D.; Joseph C. Aub., M.D.; Oliver Cope, M.D.; David G. Cogan, M.D.; John L. Langohr, M.D.; R.W. Cloud, M.D.; Oliver E. Merrill B.E.E., Radiology 46: 9, 1946

4. Pathology

J-27 BH-125	Pathological Anatomy and Histology of the Atomic Bomb Injury and Its Pathology.	A Report of the Pathology Team, Medical Sec., Special Committee for the Investigation of the Effects of the Atomic Bomb
J-48 BH-87	Pathological Research Report on Atomic Bomb Diseases (Nagasaki).	Yamori, Takeo, M.D.
22A.	Ear - Studies on the Pathological Changes of the Internal Ear, by the Atomic Bomb Explosion.	Kashiwado Teiichi

4. Pathology

AFIP No.		
J-25 BH-125	On the Pathological Anatomization of Wounds by an Atomic Bomb. May 9, 1946	Kiyoo Miyake, Takeshi Yonezawa, Masanobu Yosikawa and Yosokichi Nakamura, (Patholog. Inst. Kyoto Pref. College of Med., Chief, Prof. Masaya Araki)
J-53	Pathological Anatomy and Histology of the Atomic Bomb Injury, and Its Pathology.	Dr. Ryojun, Kinoshita and Dr. Masashi, Miyake
J-59	Report #112. Report on Autopsies (Copies of those we have in files)	- - -
L-26 BH-90	On the Pathologic Anatomic Changes in the Atomic Bomb Disease.	Dr. Kosaku Ono, Prof. Dr. Tamaki Imai Asst.Prof. Dr. Shozo Goto, Asst.Prof. Dr. Haruo Sakane and Dr. Takashi Mitsui and Dr. Nobuhiko Okabe
42A-42B N-8	B. The Patho-Histological Examination of the Injuries of the Eyes in the "Atomic Bomb Disease".	Prof. S. Tomura; Asst. Prof. Dr. H. Ikui; Inst. K. Nakano; R. Hiwatashi; S. Oshio

5. Reproduction, Fertility

J-36	Changes of Menstruation in the Atomic Bomb Sufferers in Hiroshima City One Year after the Bombing. Aug. 19, 1946 -- Sept. 10, 1946	Prof. Dr. T. Kikuchi, G. Wakisaka, T. Setsuda, S. Anzai, T. Oga, T. Hiraoka, K. Murata, S. Itoi, T. Umeda, J. Okamoto, T. Murakami, O. Hama, T. Sawada, R. Ishigami, Y. Tejima and S. Akiyama
J-50	Influence of the Atomic Bomb on the Menstruation of Japanese School Girls at Hiroshima.	Dr. Yutaka, Kariya
J-67	Reports of Atomic Bomb Patients at Hiroshima - Study of Male Reproductive Organs.	Dr. T. Asakura
J-68	The Influence of the Atomic Bomb at Hiroshima upon the Functions of Female Genital Organs.	Y. Mitani, M. Ito, S. Nozu, T. Kiseki, T. Iwai, M. Iwatate, M. Watanabe (1955)
N-30	Investigation of Changes in Menstruation Caused by Injury from Atomic Bombing at Nagasaki.	Kaida K.

5. Reproduction, Fertility (Contd.)

AFIP No.		
H-7 BH-105	Influence of the Effects of the Atomic Bomb on Spermatogenesis.	Dr. K. Shimuzu Tokyo Imperial University
L-29 BH-106	Relationship Between the Atomic Bomb and Menstruation.	Hatanaka Toshiro

6. In Utero Exposure Effects

N-31	Report of Miscarriages and Premature Parturitions.	Kaida K., et al

7. Pediatrics, Growth Changes

(none)

8. Central Nervous System

L-31 BH-183	Some Degenerative Findings of the Brain of the Atomic Bomb Cases (Read before the Tokyo Association of Neurology and Psychiatry on July 6, 1947).	Hirotsugu Shiraki

9. Epidemiology

J-12 BH-25 or 27	Stochastic Studies on the Atomic Bomb Casualties at Hiroshima. III. Comparison of the Death Rate of Male with that of Female.	Motosaburo Masuyama
J-13 BH-26	Stochastic Studies on the Atomic Bomb Casualties at Nagasaki. II. Death Rate Curve.	Motosaburo Masuyama
J-14 BH-27	Stochastic Studies on the Atomic Bomb Casualties at Hiroshima. II. Death Rate Curve.	Motosaburo Masuyama
J-15 BH-28	Stochastic Studies on the Atomic Bomb Casualties at Hiroshima. I. Death Rate Distance Curve.	Motosaburo Masuyama

9. Epidemiology

AFIP No.		
J-30	Mortality of the Victims by the Atomic Bomb.	Prof. Shirabe and His Assistants, Nagasaki Medical College
J-31	The Statistical Observation of the Various Symptoms.	Prof. Shirabe and His Assistants, Nagasaki Medical College
J-32	Time of Deaths by the Atomic Bomb.	Prof. Shirabe and His Assistants, Nagasaki Medical College
J-33 BH-145	Comparative Observation Between The Dead and the Survivors.	Prof. Shirabe and His Assistants, Nagasaki Medical College
M-9 NP-286	Statistical Records and Detailed Notes and Data Nagasaki Atomic Bomb Casualties, Blast and Fire Damage.	Nagasaki Municipal Government Dept. of Public Security Fire and Police Section

10. Leukemogenesis, Carcinogenesis

J-37	One Case of the Acute Leukemia at Kumamoto City, Reported by the Medical Clinic.	Dr. Komiya, Kumamoto Med. College

11. Cataracts, Eye

J-60	Ophthalmologic Survey of Atomic Bomb Survivors in Japan, 1949.	David G. Cogan.,MD; S.F. Martin, M.D.; Samuel J. Kimura., M.D.
N-7 BH-42	Injuries of the Eye Due to the Atomic Bomb.	Tamura, Prof. S.
N-53	Ocular Injuries Produced by the Atomic Bombing of Nagasaki.	Flick Maj., John J., MC.
N-54	Effects of Light and Heat on Human Eye.	Mason, Dr. Verne

12. Dentition (none)
13. Genetic Changes (none)
14. Late Effects, Aging (none)

15. General

AFIP No.		
J-1 BH-117	Radioactivity of the Ground at Nagasaki and its Neighborhood, Part III.	Shinohara, received from Capt. Block, May 1947
J-2 BH-131	Radioactivity of the Atomic Bomb from the Medical Point of View.	Nakaidzuma, received from Capt. Block, May 1947
J-6 & J-22	The Atomic Bomb Sufferers Observation Charts.	Kikuchi, Dr. Pierce through Dr. Neel, September 23, 1947
J-11 N-19	Ohashi District	Received from Dr. Pierce through Dr. Neel, N.R.C., Sept. 23, 1947
J-28 BH-150	Investigative Reports on Patients Caused by the Atomic Bomb.	Asst. A. Kawashima, The Kyoto Prefectural Medical College
J-38	Results of Measurements. Intensity of Radioactivity. January 1948.	Measured by Dr. Fujiwara and Lt. Col. L.H. Cross, G.H.S.C. A.P.(Economic and Scientific Section)
J-39	List of Projects Proceeded as War Time Research During the Last War in Japan.	- -
J-40	The Physical Society of Mapan Meeting on the Theory of Elementary Particles November 24 and 25, 1947	Kyoto University
J-41	Equipment	- -
J-42	Semiannual Report (submitted in compliance with Directive No. 3, Para. No. 8 as amended by Scapin 986). Jan. 1947 to June 1947.	Dr. Nishina, Yoshio, President I.P.C.R.
J-43	Receiving Properties of Radiating Systems	- -
J-44	Progress of Theoretical Physics. July - October 1947	Edited by H. Yukawa
J-45	Concerning the Manufacture of Rare Earth Metals from Monazite.	Prof. Toshie Ishino Assistant Jiro Shiekawa
J-46	Reports of Investigation of the Damages Caused by the Atomic Bomb in Hiroshima (Reports relating to Meteorological Conditions) November 1947.	Edited by the Hiroshima District Central Meteorological Observatory

15. General (Contd.)

AFIP No.		
J-47	A Preliminary Report on the Disaster in Hiroshima City Caused by the Atomic Bomb.	Research Commission of the Imperial University Kyoto
N-18 BH-117	Radioactivity of the Ground of Nagasaki City and Its Neighborhood.	Shinohara K., Prof.
N-37 BH-72	Eyewitness Accounts.	Faculty Members, Nagasaki Medical College
N-39	Summary of a Report from the Prefect of Nagasaki. September 1st (?)	- -
N-45	Miscellaneous Reports.	Omura Naval Hospital
N-47,BH-4	Special Study Occupants of Caves.	Urabe, et al
N-49,BH-13	Special Study Chinzei School.	Urabe, et al
N-50 BH-5	Special Study Shiroyama National School.	Urabe, et al
N-51,BH-6	Special Study Fuchi School.	Urabe, et al
N-52,BH69	Special Study Nagasaki Medical College Casualties.	Koyamo K., et al
NH-4	Atomic Bomb Investigation.	Dr. A. Fugita, Keio University Medical College
NH-6,N-17	The Atomic Bomb	Dr. Y. Nishima
NH-7, BH-1-3	Japanese Atomic Bomb Conference	National Research Council of Japan
H-2 BH-79	Preliminary Report of the Disaster in Hiroshima City caused by Atomic Bomb.	The Research Commission of Kyoto Imperial University
H-9 BH-119	Field Observation at Hiroshima on the Radioactivity Induced by Atomic Bomb.	Prof. B. Arakatsu, Kyoto, Imperial University
H-10 BH-67	Report on the Atomic Bomb Thrown on Hiroshina.	Dr. T. Asada, Osaka Imperial University
H-11 BH-118	Researches on the Radioactivity at Hiroshima.	J. Itoh, S. Ozaki and M. Nagata, Osaka Imperial University

15. General (Contd.)

AFIP No.		
H-13	On the Influence Upon Plants of the Atomic Bomb in Hiroshima.	S. Imamura, T. Fujita, M. Hamada, K. Takasu, Kyoto Imperial Univ.
H-14 BH-81	Preliminary Report of the Damages on Structures Due to Atomic Bomb.	Y. Kondo, Kyoto Imperial Univ.
H-17	Eyewitness Account of the Bombing of Hiroshima. Fr. Siemes, S.J.	USSBS (Pacific) Dec. 6, 1945
H-22	Location of Principal Army Units - Hiroshima.	- - -
H-23	Army Damages -- Hiroshina.	RAF Team
H-24	Personnel and Location of Army Units in Hiroshima.	- - -
H-25	Japanese Atomic Bomb Report for the City of Hiroshima.	Governor Hiroshima Prefecture August 21, 1945
L-4	The Nature of the Radiation to Which the Subjects were Exposed.	V. F. Weisskopf
L-8 BH-18	Survey on the Effects of the Atomic Bomb in Hiroshima.	Fukui Nobutatsu, Kanai Izumi, Kubota Masaji, Nagato Sazamu, Kato Shigezo, Sugahara Tosuke, Tomita, Kamada
L-16,BH-48	Atomic Bomb Victims.	Saito Makota
L-18,BH-55	General Report on Atomic Bomb Victims	Okutani Hiromitsu
L-21 BH-68	Survey of Casualties by Atomic Bomb at Nagasaki.	Dr. Shirabe
L-32	Casualty Study of Yasua Girl's High School. A. Homare Aviation B. Ohashi Shoe Factory C. Komitsu Sewing Machine D. Koa Sewing Machine	Ryo Yasuda (School Principal)
M-1 NP-326	Damage Caused by the Atomic Bomb (Nagasaki)	- - -
M-7 NP-612	Re-Investigation of the Hiroshima Disaster. Report No. 5.	- - -

15. General (Contd.)

AFIP No.		
M-2 NP-327	Corr elation Chart of the Distance from the Center of the Explosion (the position at the time of the explosion), the Presence of External Wounds and Burns and the Number of Leucocytes.	Ayao Koyama, Hiroshima Communications Department, Hospital
M-4 NP-329	Report on the Hiroshima Bomb.	Dr. I. Takagi, Physics, Institute, Kyoto Imperial University
M-8 NP-613	Report by the Re-Investigation Party on the Hiroshima Disaster.	- - -