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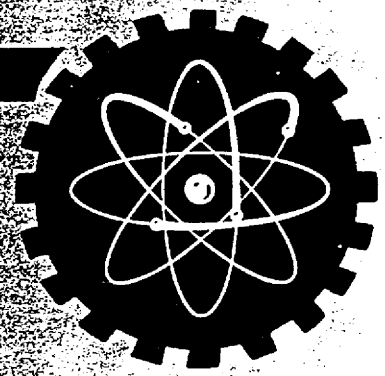
PROGRESS REPORT on Selected Programs



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Part V

Biology and Medicine

STUDIES OF THE ATOMIC BOMB CASUALTY COMMISSION (ABCC) IN JAPAN (UNCLASSIFIED)

Eighty thousand atomic bomb survivors from Hiroshima and 15,000 from Nagasaki were within 2,000 meters of the blast hypocenter. In accordance with plans made during the 1956-1958 period, certain of those survivors as well as special control populations have been established as the "Master Sample" for close study. Results of these studies to date indicate that radioactivity induced in or acquired by the survivors is probably negligible or nonexistent. Dosimetry relative to distance from hypocenter is becoming relatively better known as physical dosimetric studies continue. Other results of the studies to date are summarized below.

Congenital Effects

Neither still births nor major congenital abnormalities occurring in the irradiated groups were found to be in excess of those occurring in controls. Negative findings also resulted from study of birth weights, simple anthropometric measurements, and postnatal death and infant mortality rates. With this size population there would be 95 chances out of 100 that a doubling of the natural rate of these genetic effects would have been detected. However, there were some alterations in sex-ratio of these children (a shift to a preponderance of males) suggesting that there had been effects on the reproductive cells of the parents.

Cataracts and Other Eye Damage

Overt lesions, visible by the ophthalmoscope, were found in a total of only 154 survivors in the two cities. Loss of visual acuity due to the cataracts was small, with all but four patients achieving effective vision with appropriate corrective lenses. In the four instances the visual defect was sufficient to require operation.

A measurable reduction in visual acuity has been found in children who were 7 to 10 years of age at the time of exposure. The causes of this weakness have not been determined.

Leukemia

Leukemia is a recognized effect of irradiation in experimental animals and in man. In Hiroshima an increased incidence of leukemia became noticeable in 1948 and reached a peak in 1950-52: a total of 122 cases has occurred in residents of Hiroshima. The incidence rate has decreased since then, but is still somewhat higher in the exposed population than in the control group. Among survivors within the 1,000-meter radius, the incidence rate may be 10 to 50 times higher than in the controls. Data on the Nagasaki survivors are being summarized.

Tumor Incidence

A short-term preliminary study of the incidence of tumors in general among the irradiated survivors in Hiroshima suggests an increased rate related to proximity to the hypocenter. This two-fold increase over the control population needs to be studied further. An increased incidence of carcinomas of the lung, stomach, breast, ovary, and uterus was noted. Comparable data from Nagasaki do not show an increase.

Effects in Children

Growth and development of children have not proved a useful index since changes, if any, cannot be clearly ascribed to radiation effects. Better dosage data, however, will be of assistance in constructing a dose-effect curve which may indicate some meaningful correlations.

Microcephaly (small skull and brain) in children exposed in utero has been a fairly regular occurrence following exposure of women carrying a fetus of less than four months gestational age. In 15 children the condition was found to be associated with retarded mentality. Another 16 children had the condition without mental retardation.

Premature Aging

Accelerated aging, if it occurs in man, cannot as yet be determined from the data.

Other Findings

Specific or general changes of a medical nature in adults have not been identified. To the clinicians most of the irradiated subjects are grossly normal; exposure has not caused new clinical syndromes to appear. The data, however, are now being developed for machine analysis and unsuspected correlations may yet be discovered.

The "A-Bomb Survivors" have a chronic psychological problem with frequent acute exacerbations. Remembrance, identification as being a survivor, news of "Another A-Bomb Death," etc., create repeated stresses which may bias the data.

Future Program

The future program is based on a defined sample of exposed and normal subjects maintained under close surveillance. The epidemiological concept is prospective and selective rather than one of recording as much data on as many patients as possible whenever the opportunity presents itself. Although many of the epidemiological techniques and tools needed to conduct the ABCC study have been used before, this combined application to such a large population with so many variables, over and above the variable of radiation dosage, has never before been attempted. The solutions to the methodological problems will be a highly important product of the study.

Longevity as an end point for evaluating radiation effects will receive special attention. Cancer, leukemia, hypertension, arteriosclerosis, and cataract will be the major defects to be looked for and evaluated, but the current systematic machine analyses may at any time direct the attention of the clinical groups toward other medical conditions. More precisely individualized radiation dosimetry will be of great value in getting at the threshold versus no threshold problem of the effects of acute radiation in man.

FALLOUT STUDIES RESEARCH

Significant changes have occurred in the atmospheric sampling program. The research aspects of atmospheric radioactivity measurements are receiving stronger emphasis. Some reshaping of the current program was required by (1) advance planning for aerospace nuclear safety problems, (2) termination of the Department of Defense High Altitude Sampling Program (HASP), and (3) a need for reinstituting stratospheric sampling to obtain later data in the Southern Hemisphere.

Several AEC projects have been planned, initiated, or altered in revising to the current program. The world-wide gummed film fallout sampling network has been discontinued and replaced by a reduced number of pot and ion exchange sampling stations. Surface air filter stations operated in the Northern and Southern Hemispheres by the Naval Research Laboratory with AEC support are being reduced in number and equipped with larger capacity sampling equipment. Better quantitative data will result from these advanced methods for testing theories regarding inventories of specific isotopes in the air and soil, and associated rates of fallout. Increases in efforts and data from foreign sources have reduced the need for many United States overseas stations.

Efforts to relate the remaining stratospheric reservoir of radioactivity and its vertical and horizontal distribution to the times and locations of the various contributory weapons tests are continuing. An intermittent aircraft program to sample the upper air, sponsored jointly by the AEC and the Air Force, has been initiated. Both hemispheres will be sampled by aircraft up to 70,000 feet in conjunction with the AEC balloon sampling program. This program, which replaces Project HASP, includes a new aircraft sampling station in Australia as announced by the Australian Minister of Defense in July. Sampling was under way during November and December 1960.

Plans are progressing toward establishment of a new balloon sampling station (Project HIBAL) at Wildura, in southern Australia. A joint United States-Australia agreement is now being negotiated and the first flight is planned for December 1960. Present balloon systems are capable of sampling above aircraft altitudes up to 90,000 feet. Development is under way to extend balloon sampling capability above 100,000 feet.

The new balloon station in southern Australia is the Southern Hemisphere counterpart of the existing station in San Angelo, Texas. Upper air data will also be available from several balloon flights at a tropical latitude from a balloon sampling station at Hyderabad, India. Participating in this project are the United States Air Force; Cambridge Research Laboratories; and the Department of Atomic Energy, Tata Institute, India, with AEC support. Data will be obtained in India in the spring of 1961 only. The two middle latitude stations (San Angelo and Wildura) will sample continuously, taking 5 air samples monthly at altitudes from 50,000 to 90,000 feet. (End of UNCLASSIFIED section.)

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