

CENTRAL ORGANIZING COMMITTEE FOR SENDING NATIONAL DELEGATION TO UNO

to realize an international accord for the complete nuclear
disarmament and the measures banning the use of nuclear weapons

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SPECIAL REPORT (DRAFT)

on

The Reality of Atomic Bombing

and The Situation of A-Bomb Sufferers

to be presented to

The U.N. Secretary General

I. PHYSICAL FACTS ABOUT THE HIROSHIMA AND NAGASAKI ATOMIC BOMBINGS

(note: Table at end of Text)

The Hiroshima bomb was exploded in the air, 570 meters above Saiku, the central block of Hiroshima City at 8:15 a.m., on August 6, 1945. The Nagasaki bomb was exploded in the air, 500 meters above the ground, about 500 meters south-west of Urugami Cathedral, near the northern end of the City. The explosive power of these two bombs was said to be equivalent to 20,000 tons of TNT, but it has been estimated that they were equivalent to 12,500 tons of TNT in the case of Hiroshima, and 22,000 tons of TNT in the case of Nagasaki.⁽¹⁾ The Hiroshima bomb was of uranium and the Nagasaki bomb was of plutonium.

In Hiroshima, as the explosion was almost over the center of the City, an open field, the damage inflicted took the form of concentric circles. In Nagasaki, as the explosion was over the northern part of the City, a valley ringed with mountains, Nishi, Tate, Inasa and others, the damage differed according to location. The center of the city was comparatively little damaged.

In Hiroshima, the explosion produced tens of millions of degrees of heat, and in one ten-thousandth of a second, it turned into a fire ball with a temperature of 300,000 degrees. The fire ball had a maximum radius of 240 meters, and its temperature, which fell to 1,700 degrees after about one hundredth of a second, rose again to 7,000 degrees after 0.3 of a second, and then slowly fell. Of the vast energy produced, 50 percent was mechanical energy, 35 percent heat energy and 15 percent radiation energy.⁽²⁾

1. Mechanical effect of the atomic bomb

The ultra-high temperature inflated the air which sent out a violent shock wave as blast. The blast pressure, as shown in Table 1, was 10 tons/m² in areas up to one kilometer from the hypocenter, and 3 tons/m² up to two kilometers. Most wooden buildings within two kilometers of the center of the explosion were destroyed. Window panes were shattered even in the township of Kuba, 27 kilometers from the center.⁽³⁾ The blast destroyed most of the houses, with the people buried under them burnt to death, unable to escape the fires. People could not stand against the blast, and suffered cuts and lacerations from flying debris of wood and glass.

2. Thermic effect

Table 2⁽⁴⁾ shows how powerful the heat radiation was. It was 29 calories/cm² up to within one kilometer of the hypocenter and 8 calories/cm² up to two kilometers. Even at places two kilometers away, 85 percent of those suffering serious burns died.

These twin mechanical and thermic effects of the nuclear explosion in Hiroshima damaged and burnt more than 71,000 of the some 76,300 houses, either partially or totally. In Nagasaki, the case was similar, with 18,400 of the approximately 51,100⁽⁵⁾ houses destroyed. (see Table 3)

3. Radiation effect

The nuclear explosions had a third effect, the radiation effect which, still today thirty years after the bombing, is causing various atomic

diseases and the possibility of them to all A-bomb survivors. What has to be denounced in the atomic bombing is not only its nature as mass slaughter, but also to this barbarity, the atrocity and inhumanity of the radiation effects.

When the fission of U-235 or Pu-239 takes place, great quantities of neutrons, gamma rays and beta rays are released. Most beta rays are absorbed into the air before they reach the ground, but the neutrons and gamma rays settle on the ground and continue to do serious damage to all living things. The neutrons in particular, even change elements in the ground and buildings into radioactive substances, which, in turn, emit radiation and damage all living things.

Added to all this, is the radiation of nuclear fission products, nuclear substances that have not undergone fission (U-235 and Pu-239). When radiation is viewed in terms of its effects on human bodies, it is convenient to divide them into instantaneous radiations and residual radiations.

(1) Instantaneous radiations. These are radiations released within one minute of the nuclear blast. They are neutrons, gamma rays and beta rays as stated, but the beta rays can be disregarded as they are absorbed into the air and do not reach the ground. Table 4 gives a list of distances from the hypocenter showing how powerful the radiations were. It shows that Hiroshima was exposed to neutron rays three to four times greater than Nagasaki, which conversely was subject to gamma rays three to five times greater than Hiroshima. Gamma rays and neutron rays, given an equal number of rads, the measure of radiation, differ in their effects on the human body: the effect of neutron rays is two to five times greater than that of gamma rays. When radiations are considered in terms of the effect on living bodies, they are shown in "rems". It is estimated that half of those subjected to 400 to 450 rems of radiation, a half-fatal dose, can be expected to die within one month.

(2) Residual radioactivity. Radioactivity induced from primary radiations, affecting the elements of the ground and buildings (Al, Mn, Na, Si, Fe, and others), radiations emanating from fission products, and radiations from materials yet to undergo fission (particularly noxious were the alpha rays released from the Pu-239 bomb dropped on Nagasaki) continued to cause damage to human bodies after the explosion. These radiations take the form of dust in the air and find their way into water, and when taken into the human body, they directly affect the internal organs.

In Hiroshima, an example is those seriously affected by residual radioactivity who came into the city more than one month after the explosion and stayed near the hypocenter. In the case of those who entered the city just after the explosion, it is not rare to find people who were subject to exposure of more than 100 rems. In Nagasaki, in the Nishiyama area where Pu (yet to undergo fission) had accumulated, there was strong residual radiation even a few months after the bombing.

Footnotes

(1) J.A. Auxier et al. Free Field Radiation Dose Distribution from the Hiroshima and Nagasaki Bombings (Health Phys. 12, 425 (1966)).

(2) For example, S. Glasstone: "The Effects of Nuclear Weapons", 1962.

- (3) S. Glasstone: "The Effects of Nuclear Weapons", 1962.
- (4) S. Glasstone: Ibid.
- (5) As to the figures of Hiroshima, refer to the investigation done by the Research Section of Hiroshima City on August 10, 1946. The figure was collected through hearings by town mayors and more than 100,000 citizens, but are not exact, as they include some estimated figures. Particularly, as to the figures of the city center, some modification is expected. (see the report by Mr. Yuzaki and Mr. Kamioka combined with this report) As for Nagasaki, it is a rough calculation regarding buildings within one kilometer of the hypocenter totally destroyed and those within four kilometers of the hypocenter partially destroyed. It is according to figures released by Atomic Bombing Data, Observation Committee, in July, 1950.

Table 1 Atomic Bomb Blast in Hiroshima

Distance from hypocenter (km)	Pressure (m ²)	Velocity (m/sec)	Duration (sec)
0.5	19	480	0.42
1.0	10	280	0.66
1.5	5.3	252	0.89
2.0	3.0	190	1.0
2.5	1.9	150	1.1
3.0	1.5	134	1.2

Table 2 Heat Radiation from Hiroshima Bombing

Distance from hypocenter (km)	Heat value (ca./cm ²)	Remarks
0.5	82	People die from burns when hit directly
1.0	29	
1.5	15	Wood catches fire
2.0	7.9	Serious burns kill 85% or more of victims
2.5	4.7	Few burns are observed on the skin covered by clothing
3.0	3.0	Wood gets scorched

Table 3 Destroyed or burnt buildings by A Bombing

	Hiroshima	Nagasaki
Total number	76,327 (100%)	51,136 (100%)
catch fire	70,121 (91.9%)	18,409 (36%)
burnt totally	47,969 (62.8%)	11,574 (22.6%)
destroyed totally	3,792 (5.0%)	1,326 (2.6%)
burnt or destroyed partially	18,360 (24.1%)	5,509 (10.8%)*

* destroyed partially only

Table 4 Radiations by Atomic Bomb

Distances from hypocenter (m)	Hiroshima		Nagasaki	
	Neutrons (rad)	gamma rays (rad)	neutrons (rad)	gamma rays (rad)
0	14,000	10,000	4,100	28,000
200	10,000	7,700	2,800	22,000
400	5,000	4,400	1,200	11,000
600	1,900	1,700	400	4,200
800	620	590	120	2,200
1000	170	230	35	920
1200	50	82	10	400
1400	16	30	3.2	180
1600	5.4	12	1.0	82
1800	1.7	4.5	-	39
2000	-	1.7	-	19

II. DEATH TOLL OF ATOMIC BOMBS ON HIROSHIMA AND NAGASAKI*

(note: Tables at end of Text)

Because the atomic bombs demolished the city government organizations, particularly in Hiroshima, making wholly satisfactory surveys of damages impossible, no absolute figures about casualties caused by the bombing of these two cities are available. The estimations of casualties vary widely. Moreover, one unique feature of atomic bomb casualties is to be found in the fact that radioactive health troubles are of a continuing nature, so survivors are suffering from bomb damage even now. For this reason, when figures are quoted on deaths, the date of the count must always be stated.

The following figures give death details for both cities.

1. Death Toll of Hiroshima A-Bomb

Several estimates are available for the death toll of the Hiroshima atomic bomb, the main ones of which are shown in Table 1.

Of these data, Statistics (I) and (II), both prepared from surveys in August 1945, just after the bombing, are naturally recognized as inadequate. Moreover, it is known that tens of thousands of A-bomb victims died in September and later. These two records are therefore not directly comparable with the figures of (III) and later. Also note that in Table 1, numbers (III) through (VII) cover casualties up to the end of 1945 (except (III) which is up to the end of November, and except (V), as explained below) all exclude military men and employees; while number (VII) covers the total deaths up to October 1, 1950, and includes military men and employees.

Number (V) comprises data collected in a survey starting August 10, 1945 and ending at the end of that December. Although the statistical period is not stated, it is understood that it included deaths from August to December. (Based on other data, deaths of atomic sufferers throughout the year 1946 can be estimated at between 5,000 and 10,000 persons.) The data of this survey were left forgotten in a storeroom of the Hiroshima City Government for many years till it was discovered in June 1971.

The writer found a problem in the 1960 figures, because of the wide gaps between different versions of the death toll from the Hiroshima A-bomb up till then (numbers (I) through (IV), and (VI) and (VIII)), and especially, why the number (VI) estimate of the number of people in the city on that day and the death toll were so low. A new study therefore became necessary (3) on this question. The death toll was estimated from various bases. A conclusive estimate was reached as follows: first, the number of damaged buildings classified by distance from the epicenter of the bombing--a relatively reliable number taken from the "Revised History of Hiroshima City," 1957)--was

* A close investigation was done on atomic bomb casualties in Hiroshima recently by Minoru Yuzaki et. al. (Minoru Yuzaki and Hiroshi Kamioka: "Study of the number of A-bomb victims, and death toll as viewed through population trends--Part I. Its methodology and outline for Hiroshima", to be printed in Hiroshima Igaku (1976 issue). The writer expresses appreciation for the right to use the manuscript of this study, and regrets that limited space does not allow a more complete introduction.

adopted as the base. From this the distribution of population classified by distance from the epicenter was calculated; then the available data of the death rate, classified by distance from the epicenter⁽⁴⁾, were applied to the population figures. This gave the total population present in the city as of August 6, 1945 and the death toll up to end of 1945, as set out in number (VII).

Number (VI) estimates the August 6 population on the basis of the "population registered by rice ration cards" as of June 1945. This, however, is considered as substantially underestimating the number of people who were in Hiroshima City at 8:15 a.m. on August 6, 1945, since the number of those who were commuting from suburbs to work in the city--and especially to the area around the epicenter--was greatly expanded in those days.

Later, in June 1971, the Number (V) statistics were discovered.

Deaths are classified alike in (V), (VI) and (VII) by distance from the epicenter, as shown in Table 2.

These show the death toll of the Hiroshima A-bomb (excluding military men and employees) approximately up to the end of 1945. Number (VI) is considered to have substantially underestimated the total number of people present in the city at that time, and consequently the death toll is underestimated. It is the writer's view that the corresponding figures in (V) or (VII) are close to the facts.

In addition, temporarily mobilized labor service workers were killed by the bomb when they came from the suburbs, mainly working on demolition of houses to clear fire protection zones (7,560 such people died). There were also military men and employees was killed. The total number of military men and employees in Hiroshima at that time, which stands as the basis on which to calculate their death toll, was assumed to be, according to the "White Paper", approximately 90,000 ("Revised History of Hiroshima City" (1958) Volume 2). Later, however, the number of military men and employees in Hiroshima on that day was estimated in the "Hiroshima A-Bomb Disaster Records (Hiroshima Gembaku Sensai Shi)" Volume I, (1971) edited by Hiroshima City Gov. at approximately 40,000. If such military men and employees are distributed similarly to the general population in the city, their deaths can be estimated at 14,700.

In all, total deaths from the Hiroshima A-bomb up till the end of 1945 can be estimated at approximately 140,900 (calculated on the basis of Statistics (V)).

It is to be especially noted that deaths due to the A-bombing continued through 1946 and the following years, and continue even today. The Hiroshima City Government has the annual statistics of A-bomb sufferers surviving in Hiroshima City since 1968, and the record of their deaths. Death rates are obtained from these data, and compared with the all-Japan death rate of the general population for the corresponding periods, as shown in Table 3.

Table 3 shows the high death rates among atomic bomb victims continuing nearly 30 years from the bombing.

2. Death Toll of Nagasaki A-Bomb

The following estimates are available for deaths and related data of the Nagasaki atomic bomb, as shown in Table 4.

Although the time of the statistical survey is not clear, the data of the City government in Table 4 may be deemed reliable because, unlike Hiroshima City, the municipal administration was not destroyed in Nagasaki. It is to be noted that the Statistics (I) involve military men and employees. The civilian population of Nagasaki City immediately before the bombing was estimated at approximately 210,000. But here again the figures of Oughterson et. al. were less than those announced by the Nagasaki City Government, both in the number of people present in the city on the bombing day, and in the death toll.

In the case of Nagasaki, it must be understood that radioactive deaths still continually occur, as in Hiroshima City, but there is not sufficient data to give precise figures.

As for the effects of radioactivity, Nagasaki recorded 3-5 times as much gamma rays and a 1/3 to 1/4 the neutron rays as Hiroshima. This leads to the assumption that induced radioactivity may be less than in Hiroshima, but, unlike Hiroshima, non-fissioned Pu-239 will have adversely affected the area for a long time. (Much residual plutonium has been measured particularly in Nishiyama area in Nagasaki City).

This is the outline of the number of deaths caused by the atomic bombs on Hiroshima and Nagasaki Cities. As we have stated, any death toll figure quoted always refer to the period covered by the survey because victims have been and still are dying. This continuing occurrence of atomic death through the years and into the future also means that many have been and still are suffering from atomic diseases--a reality which no one should ever forget.

- NOTE: (1) Hiroshima City Government: "Hiroshima Atomic Bomb Disaster Record" Volume I (1971)
- (2) A.W. Oughterson and S. Warren: "Medical Effects of the Atomic Bomb in Japan" (1956)
- (3) GENSUIKYO Special Committee: "White Paper on Atomic and Hydrogen Bomb Sufferings -- Concealed Realities". (Nihon Hyoron Shinsha) (1961)
- (4) Death rates classified by distance from the epicenter are shown in report (2) above, as well as in "Atomic Bomb Disaster Survey Report" Volume I, edited by the Science Council of Japan, Committee for Publication of the Atomic Bomb Disaster Survey Report (published by Science Council of Japan, 1953). The data from both sources almost coincide. The author used a table in (2) for his calculation.

Table I Casualties by Hiroshima A-bomb

Source of statistics	Death	Uncon- firmed loss	Heavily injured	(Unit: person)	
				Slightly injured	Total of people who were present in the city
(I) Aug. 20, 1945 Report by governor of Hiroshima Prefecture	32,959	9,591	13,965	43,517	293,491
(II) Aug. 25, 1945 Report by Hiroshima Prefecture Government	46,185	17,429	19,691	44,979	363,940
(III) Nov. 30, 1945 Report by Hiroshima Prefecture Police Dept.	78,150	13,983	9,428	27,997	306,535
(VI) March 8, 1946 Report by Hiroshima City Government	47,185	17,425	19,691	44,979	364,936
(V) Aug. 10, 1946 Report by Hiroshima City Gov. Survey Sec.(1)	118,661	3,677	30,524	48,606	320,081
(VI) Report by A.W. Oughterson et. al. (1951)(2)	64,601	-	-	72,205	255,200
(VII) "White Paper on A & H Bomb Suffer- ings" by GENSUIKYO Special Committee (1961)(3)	119,000 to 133,000	-	-	-	310,000 to 340,000
(VIII) July 25, 1952 Reported by Chugoku Shimbun, the major Hiroshima daily	282,000	-	-	-	440,000

Table 2 Death Tolls of Hiroshima A-Bomb
(till end of 1945, excluding
military men and employees)

(Unit: person)

Distance from epicenter	Population			Death toll		
	A	B	C	A	B	C
Within 0.5 km	22,432 to 25,236	21,662	6,220	21,647 to 24,353	19,329	6,012
Within 1.0 km	52,236 to 63,265	53,036	24,950	46,676 to 52,510	42,271	20,708
Within 1.5 km	58,392 to 65,691	65,271	45,270	30,072 to 33,831	37,689	23,359
Within 2.0 km	43,008 to 48,384	44,490	67,900	9,419 to 10,596	13,422	14,870
Within 2.5 km	48,672 to 54,756	52,686	30,600	2,388 to 2,683	4,513	1,499
Within 3.0 km	29,528 to 33,219	30,796	30,600	797 to 897	1,139	826
Within 3.5 km	9,732 to 10,948	12,777	29,400	619 to 693	117	735
Within 4.0 km	14,896 to 16,758	15,676			100	
Within 4.5 km	4,720 to 5,310	4,705	20,310	121 to 136	8	223
Within 5.0 km	6,308 to 7,096	6,817			31	
Outside 5.0 km	10,774 to 12,087	12,162			42	
Total	304,668 to 342,750	320,081	255,250	111,736 to 125,700	118,661	68,232

A: (VII) GENSUIKYO Special Committee: "White Paper on A- and H-Bomb Sufferings" (1961)

B: Report by Hiroshima City Gov. Survey Sec., surveyed from Aug. 10, 1946 (discovered in June 1971)

C: A.W. Oughterson and S. Warren: "Medical Effects of the Atomic Bomb in Japan" (1956)

Table 3 Toll of Deaths of Atomic Bomb Survivors
Living in Hiroshima, 1968--1974

Year	Number of A-bomb Survivors	Deaths	Death rate (per 1000)	Death rate of all-Japan general population (*) (per 1000)
1968	92,921	2,311	24.9	(6.8)
1969	91,389	1,333	14.6	(6.8)
1970	90,336	1,348	14.9	9.7 (6.9)
1971	92,090	1,150	12.5	(6.6)
1972	108,764	1,229	11.3	(6.5)
1973	108,690	1,695	15.6	(6.6)
1974	114,411	1,633	14.3	-

(*) The figures in brackets under the item "death rate of all-Japan general population" represent the rate for the whole population, which has an age composition not corresponding to that of the A-bomb victims, and therefore cannot be directly compared with the latter, except for the 1970 figure not in brackets, which is a corrected figure obtained by modifying the age composition of the all-Japan figures to correspond with the A-bomb figures in Hiroshima City. This was possible because the 1970 statistics were prepared by age groups for the Hiroshima City A-bomb victims and their death toll, and the all-Japan general population death rate.

The increased figures of survivors in Hiroshima City after 1971 reflect mergers of neighboring communities done by the city.

Table 4 Death Toll, etc. of Nagasaki Atomic Bomb

Source of statistics	(Unit: person)			
	Dead	Insured	Other sufferers	Total
(I) Announcement by Nagasaki City Gov. (1950)	73,884	76,796	120,820	271,500
(II) Oughterson et. al. (1951)	39,000	25,000	-	174,000

Summary of Medical Conditions of Atomic Bomb Victims

-- of HIROSHIMA and NAGASAKI --

MEDICAL PROBLEMS -- DISEASES RESULTING

The number of Japanese A-bomb victims of the bombs of August 1945 in Hiroshima and Nagasaki are estimated at some 700,000. In addition some tens of thousands of foreigners became victims. Of this number, approximately 240,000 had died by the end of that year, and subsequently another 100,000. At the end of 1975, 360,000 victims were registered with the government as surviving A-bomb victims.

We call all the diseases from the atomic bombs suffered by humans, "atomic diseases". These comprise "injuries caused by the blast", "burns by heat and fire and "diseases caused by radiation". Among these, the diseases caused by radiation are most serious.

Radiation released by the atomic bomb explosions include 1) gamma rays and neutrons produced directly by the explosions; 2) gamma and beta rays resulting from the fission of uranium 235 and plutonium 239; 3) non-fissioned uranium scattered about and alpha rays from the nuclei of plutonium; 4) secondary gamma and beta rays produced by nuclear collision with objects on the ground, producing atomic reactions. The victims therefore classify into those who suffered 1) direct penetration of radioactive particles, 2) radiation from the ashes, dust and rain, 3) the effect of radioactive substances accumulated on the ground, 4) the effect of secondary induced radioactivity, including the secondary radioactivity in bones and other tissues of the body 5) radiation from food and water taken into the body. In many cases two or three different causes combine and produce complex and varied atomic diseases which will be discussed later. The atomic diseases are classified into two categories, acute- and after-diseases.

1. Acute Diseases. The symptoms found in the period between the explosion and the end of December that year are grouped as acute, which are then classified further into acute (first week), semi-acute (from the second week to the end of December); or into acute symptoms (first two weeks) and semi-acute symptoms (from the third to the end of the fifth week), semi-chronic symptoms (from the fifth to the end of the eighth week), recovery stage symptoms (from the third to the end of the fourth week after the blast). This classification depends on whether or not the semi-acute symptoms are sub-divided.

1. Acute diseases. Excluding those who can be said to have just "evaporated" in the blast, the causes of death within the week of the explosion were the intense heat and external injuries. According to anatomical findings however, conspicuous agranulocytose caused by the radioactivity was seen.

2. Semi-acute diseases (including semi-chronic symptoms and the recovery stage symptoms). These are i. symptoms seen from one week to four months after the blast and accompanied by digestive disorders (nausea, vomiting and diarrhea, etc.), ii. asthenia (alopecia-- powerlessness, languor, etc.), iii. internal bleeding and vomiting of blood, melena blood in the urine--hematuria, nose-bleeding, bleeding of the gums, bleeding

in the reproductive organs, extravasation spots, etc.), iv. inflammation symptoms (fever, pains of the pharynx, inflammation of the oral mucosa, inflammation of the skin, etc.), v. blood disorders (decrease of leucocytes, decrease in red corpuscles, etc.), vi. reproductive disorders (lack of spermatozoa, menstrual abnormalcies, etc.), which are pathologically explained as accompanying symptoms, the destruction of the bone marrow by radioactivity. Therefore the reasons for the deaths during this period are considered to be the decline in resistance of the whole body based on granulocytose caused by the growth of the foci of infection, which in turn invited septicemia.

Most important is the pathological conclusion that the nuclei emitted by the explosion caused an atomic reaction with the phosphate in the bones and bone structures, with a continuing effect of induced radioactivity, providing the chief causes of semi-acute diseases. These facts, through the acute and semi-acute periods, together with the astrophysical symptoms seen in endocrine glands, namely, the vacuolation of the alkaline pituitary gland cells, the atrophy of the thyroid gland (occasionally the photographic images of hardening have been observed), the vacuolation of the adrenal cells, the browning and atrophy of the adrenal cortex, may have deep relations with the as yet undetermined chronic disorders in the after-disease stage, which will be discussed in detail later.

As stated above, both the acute diseases and semi-acute diseases are exactly the same as regards the serious disorders caused by the effect of radioactivity on the bone marrow. In the acute type, deaths resulted from the extreme heat and external injuries, while in the semi-acute type, septicemia offers chief cause of death.

Among the deaths before December of that year, which were followed by the after-diseases, it is said that 20% suffered injuries caused by the wind blast, 10% by heat-rays and burning, 20% by diseases caused by radioactivity.

2. After-diseases. Those who survived the acute-period became victims of such after-diseases as keloids, cataracts, blood diseases (including various types of anemia, leukemia, cancer, the so-called "atomic-bomb listlessness" and the signs of early aging.

Keloids are seen in 59% of heat-ray cicatrices of Hiroshima, 67% in Nagasaki, and are most often reported among the teen-age victims. With the years 1946-47 years as the peak, the keloids diminished, healed and the tendency of natural recovery increased, and with the passage of time, relapses characteristically decreased. These symptoms are considered to be related to the damage done to the functions of the endocrinal organs by radiation, since they are closely related to the endocrinal organs, such as of the thyroid and adrenal glands.

Cataracts are one of the most common atomic diseases, bearing a clear relationship between distance from the blast center and their frequency. Characteristic findings are the turbidity of the crystalline lenses, especially posterior subcapsular dotting cloudiness and gyokaigan-yo cloudiness.

Blood diseases, including many types of anemia are also characteristic of atomic diseases. The gamma rays and neutrons radiated at the moment of the explosion naturally reached the bone marrow, the spleen and the lymph glands. Because these blood producing organs are especially sensitive to radioactivity, it is quite reasonable to conclude that the main cause of the blood disorders of the victims was the radioactivity. It is pointed out earlier that the phosphate composing the bone tissues which contain the marrow, hit by neutrons,

turned to ^{32}P and throughout the half-life period of two weeks continuously stimulated the bone marrow. The decrease of red and white corpuscles which occurred as acute symptoms immediately after the blast began to ease after the acute period, but not a few cases of persistent low counts are also reported. One report shows that the rate of abnormalcy in the number of blood corpuscles and the quantity of blood pigments is considerably higher than with an average healthy group, while some reports claim that there is no meaningful difference between the two groups. But strong opinions claim that the counting of red blood corpuscles and the measurement of blood pigments required by the Ministry of Welfare are not a sufficient means of verification of the delicate fluctuations of the physical conditions of victims.

An interesting report that the fluctuations of easinothilic leucocyten and monocytan coincide with the clinical state of the patient seems to prove this.

According to a report by the ABCC, the cases of leukemia of atomic bomb victims started in 1947 and reached a peak in 1950-59, and then levelled off and finally had returned to the national average by 1965.

Here we have to pose three interesting problems. First, when a Japanese doctor made a report on the occurrence of leukemia a little over two months after the blast in 1945, further reports on the studies of leukemia were prohibited by order of the occupation forces. It was not until 1951, the year of the signing of the San Francisco Treaty that the ban was finally lifted. In the meantime, reports on the studies of leukemia cases by Japanese doctors and researchers throughout the country did not appear. Secondly, deaths after the symptoms of nausea and fever were widely talked of among the people during a few years following the blast. Thirdly, the national census makes it clear that there had been tens of thousands of deaths among the Hiroshima atomic bomb victims. For these reasons it is assumed that a considerable number of leukemia cases had occurred even before 1947, contrary to the report of the ABCC.

There are also reports on the high rate of leukemia at shorter distances from the blast center, with more acute cases among victims below 10 years of age and more chronic cases among the older victims. It is important to note that many of those who did not suffer the blast of the explosion but later moved to the city suffered from the residual radioactivity and contracted leukemia. This corresponds with the record of the continued existence of residual radioactivity both inside and outside the human body more than one hundred hours after the explosion. Recently, a certain number of cases of leukemia have been found among the second generation victims who could not have received direct radiation from the blast. A high concentration of plutonium at the reproductive organs, compared with the intestines and the stomach, is reported in a study made in the United States on a death from radioactive contamination. In view of the effect of radioactivity on the genes, serious consideration must be given to the problem of the cases of leukemia among second-generation victims. This problem will be discussed later.

Statistically, the increase of cancer among the A-bomb victims was very marked about 1960, and the peak of leukemia had passed. In particular, the rate of thyroid ailments and cancers of the breast and especially of the lungs and the salivary glands, reportedly highly correlate with the amount of radioactivity received. Notably, an increasingly large number of cases of cancer is found among juvenile victims who were affected by the blast at short distances.

The most important of the A-bomb after-diseases may be what is called "A-bomb listlessness". General "after-diseases" and "scars" carried by the surviving victims for these thirty years since the atomic blast are as follows:

i. In spite of previous good health and no record of illness before the blast, the victims suffer from various chronic ailments after recovery from acute symptoms. The slightest stress aggravates a number of complications in the internal organs. Such cases are common among middle-aged and aged victims.

ii. Although no abnormalcy can be detected by ordinary physical examinations, the patients have weak physical ability and low resistance, and continually complain of becoming easily tired, listlessness and low stamina. Since they cannot do ordinary work, they can neither get regular employment nor even do satisfactory house-keeping. Such cases are common among young and middle-aged victims.

iii. As long as they can avoid stress there are no conspicuous changes, but once the symptoms are aggravated for any reason, there is no recovery and progress of their illness is fast.

iv. They easily become ill, and once ill, the possibility of serious illness is high.

The nature of this "atomic bomb listlessness" as set out in ii. has not yet been determined, and the "symptoms the victims complain of" are both varied and tenacious. Depending on the way they carry on their routine activities, it is possible that no particular abnormalcy can be detected. However, it is important to note that this state greatly resembles the after-effect of prolonged exposure to small amounts of radioactivity, and that radioactivity from the atomic bomb explosions causes various disturbances to the constitution, such as the blood composition, affecting the function of the diencephalon and inducing imbalance in the autonomic ataxia.

In order to determine the nature of this "atomic-bomb listlessness", it is necessary to take the following background into consideration; and, in addition to elimination examinations, various functional tests must be done, utilizing some means not yet tried, systematically and purposefully.

- i. The existence of malignant tumors.
- ii. Diseases in the blood-producing organs.
- iii. The weakening of resistance (mucous membranes, skin, connective tissues)
- iv. Aging (circulatory system, especially the blood vessels, bone tissues, skin, endocrine systems).
- v. The symptoms of listlessness (a) the diencephalon--the autonomic ataxia system--endocrine disorders (including menopausal disorders), (b) neurotic symptoms.

Conclusion

The clarification of the nature and conditions of the various ailments which the atomic-bomb victims are still suffering from, thirty years after the atomic explosion, is necessary not only for the victims of Hiroshima and Nagasaki. It is necessary for the sake of radiation victims now increasing all over the world, which means it is necessary for the future of mankind. All relevant knowledge in the world must be mobilized and concentrated at the United Nations.

It is of utmost urgency to clarify the conditions of the victims in the years 1946 through 1955, including the examination of the tissues of dissected materials and to make public all the information especially the specimens made from dissected tissues and the related data which were taken from Japan to the United States.

A large proportion of this summary is based on the following studies:

1. Naoyoshi Shono and Soichi Iijima, Kaku-hoshasen to Gembaku-Sho (Nuclear Radioactivity and the Atomic Bomb Diseases)
2. Jukichi Amano, Shigeteru Sugiyama, Mitsuaki Shimamoto, Masashi Kimura and Gentaro Unno, Genshi Bakudan Shogai ni Okeru Kyusei Gata Oyobi A-Kyuseigata no Byorigaku no Hikaku Kenkyu (A Pathological and Comparative Study of Acute and Semi-Acute Diseases of the Atomic Bomb) (The Japan Science Council) Lecture by Taro Hattori, Nihon Gakujutsu Kaigi
3. Special report by Kiyoshi Sakuma made at the 21st World Conference against A and H Bombs
4. Research study by J.C. Cobb, Professor of the Medical School, Colorado University, research study by W.T. Aibair and J.N. Thomas, research study by P.D. Smith and S.C. Black.

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SOCIAL ASPECTS OF A-BOMB DAMAGE

1. Social damage immediately after the A-bombs.

The use of A-bombs on Hiroshima and Nagasaki are considered to have caused similar damage in these cities, although there were some differences due to conditions surrounding the epicenters (population density, geographical features, etc.) The sudden explosion of the A-bombs devastated the people, and A-bomb sufferers a short distance from the explosion points were unaware of what had happened and cannot even recall it.

I came to myself to find that I was lying under a collapsed house. I crawled out with all my power and found that it was dark and that in the darkness fires were blazing like devils fires here and there. Then the darkness gradually cleared, and I saw that the rows of houses were no longer there. As far as I could see, there were only piles of collapsed roofs. I heard a hoarse voice saying, "Help me", coming from under a crushed house. I found a hand after pulling wood and bricks aside. It was my wife's hand. I held it tight and tried to pull her out to rescue her. But the fires were coming nearer. Crying, I had to give up the attempt to rescue her and escape. Many people were escaping to a mountain. I escaped with them and then came to realize that everyone's hair was burned and the skin of people's faces, arms and legs just peeled off and dangled like rags. In the train people died standing. On the bank of a river, a crowd of labor-service students, thirteen or fourteen years of age were rolling about, close together. A corpse lay there, one who seemed to be a teacher, surrounded by bodies of pupils. I called my children's names as long as I could, and looked for them. But I couldn't tell which were their bodies. Every corpse had its eyes protruding and tongue sticking out between its teeth, clothes torn off and almost naked. Every corpse looked the same.

Thus the disaster of mass deaths took place in a flash. For the survivors all circumstances surrounding them--in particular, family and community--had collapsed.

The injured survivors, who had barely escaped, could not possibly get life's necessities and rescue their goods. The tragic mass deaths and the break-down of family and community forced survivors into a state of mental vacuum.

2. Societal damage over the past thirty years since A-bombs

(1) Personal difficulties

Most of injured survivors have been suffering acute or chronic effect of radio-activity and keloids. Many A-bomb sufferers have suffered great difficulty in living due to the loss of their property and work. Moreover, many radio-active-affected sufferers have lost even the opportunity to work, due to the concomitant loss and decline of working ability. In addition, the increase in medical expenses seriously affected their economic life.

For all these reasons many young sufferers have lost all chances of finding and experiencing a better life. The effect of radio-activity meant

the loss of working ability to the sufferers, and in the worse cases, those who suffered bad physical disabilities and diseases from radio-activity have sometimes found it impossible to lead a normal life.

Every sufferer was thrown into mental instability and a state of shock from the explosion, the fear of death and the radio-active effects, and the subsequent threat of destitution. In other words, many sufferers lost their power of self-support.

(2) Societal difficulties

In addition to the personal difficulties mentioned so far, there have been many difficulties relating to help or external support.

In the first place, family and community were wholly disorganized from the very day of the A-bomb explosions. The few surviving families needed mutual support, but generally their situation was too difficult for them to help each other. In families where only one person survived, all the rest having died, the shock was too great for such a person to form a new family group. Because of these factors the reconstruction of families could not make steady progress. Family life was often disturbed by diseases and the decline of working and living ability among survivors. Many marriages were broken up. In particular, when victims became pregnant, they worried about the radio-active effects on their progeny. Some sufferers took contraceptive operations for fear of hereditary effects. At the same time, this contributed to the weakening of family stability and added new difficulties to family life.

Both the American and Japanese governments, which tried to justify the A-bombs as terminating the War, always underestimated the afflictions of victims. The Japanese government gave some kind of aid to ex-militarymen, but provided no measures to support A-bomb sufferers until 1957. Then the Japanese government's discriminatory aid, adding to the handicaps of the sufferers encouraged social discrimination against victims, which troubled them even more.

3. Summary of Social effects

Characteristic features of damage caused by the A-bombs can be categorized as follows:

- (1) Instant -- the damage caused by the bomb explosions.
- (2) Indiscriminate -- indiscriminatory attack on people regardless of whether they were combatants or civilians and regardless of age.
- (3) Annihilating -- the damage extended to all living things and the environment as well as people and destroyed the natural environment which enables man to live. It killed all feeling of humanity.
- (4) Total -- to A-bomb survivors, the A-bombs caused total damage, including health, life, spirit - total human destruction.
- (5) Continuing -- from the explosions up until now new effects have been discovered, which in turn creates new fears of the occurrence of new effects in the lives of the sufferers.

In a nutshell, the use of the A-bombs is the most massive destruction ever devised and the most continuing in its effects on human lives ever seen in world history. The Japanese Government began some measures of medical care and life maintenance to aid the sufferers in 1957, and in 1975 ¥25.4 billion was appropriated for this.