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## TOXICOLOGICAL HISTORY

# The grave is wide: the Hibakusha of Hiroshima and Nagasaki and the legacy of the Atomic Bomb Casualty Commission and the Radiation Effects Research Foundation

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### ABSTRACT

Following the atomic bomb attacks on Japan in 1945, scientists from the United States and Japan joined together to study the Hibakusha – the bomb affected people in what was advertised as a bipartisan and cooperative effort. In reality, despite the best efforts of some very dedicated and earnest scientists, the early years of the collaboration were characterized by political friction, censorship, controversy, tension, hostility, and racism. The 70-year history, scientific output and cultural impact of the Atomic Bomb Casualty Commission and the Radiation Effects Research Foundation are described in the context of the development of Occupied Japan.

### ARTICLE HISTORY

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## The bomb

On 6 August 1945, the United States dropped an atomic bomb on Hiroshima, Japan. Three days later, the US dropped another atomic weapon on the city of Nagasaki. The results were unlike anything ever experienced in the history of mankind.

The Hiroshima bomb detonated 1900 feet above the Shima Surgical Clinic at 8:15am. The fireball was 1200 feet in diameter and traveled at 30–40 miles per hour. Surface temperature directly beneath the bomb reached 6000 °C. Everything within a 1-mile radius was incinerated and almost everything 4.4 miles around was set on fire or destroyed.[1]

Approximately 80,000 people were killed immediately and another 70,000 injured, many of them children.[2] Most were horribly burned. Many of those not immediately killed died of their traumatic injuries over the subsequent several days. Gamma radiation released from the bomb soaked their exposed bodies.[3]

On the morning of 6 August 1945, 298 doctors lived in Hiroshima. Two hundred and seventy were killed immediately.[4] The two dozen or so doctors who left to care for the survivors were in the midst of the largest mass radiation poisoning in the history of the world, but they did not know it.[5]

The survivors of the atomic bombs at Hiroshima and Nagasaki were labeled the Hibakusha, which translates as “the bomb-exposed people.”

## The U.S. scientific response

Scientists quickly realized that the Hibakusha were the most valuable scientific subjects in the world. Never before had such a large and homogenous population been exposed to

such a large dose of ionizing radiation all at once. Nobody knew what the short- or long-term effects of such a massive one-time dose might have on an individual or their offspring.

By the time of the Japanese capitulation on 14 August, investigative medical teams from Tokyo and Kyushu were interviewing survivors in Hiroshima and Nagasaki, documenting injuries and keeping records on the injured and their families. In early September 1945, the American military created three medical teams to study the Hibakusha; an Army team, a Navy team, and one from the Army Corps of Engineers.[6]

Japanese investigators had undertaken their own investigations, but occupation forces controlled access to the affected cities. This is one of the contentious issues that characterized the collection and control of information on the bomb survivors. In time, the Japanese scientific community leveled accusations of stolen data and even corpse theft against the Americans. From late 1945 to 1952, U.S. occupation authorities prohibited Japanese medical researchers from publishing scientific articles on the effects of the atomic bombs.[7,8]

Initially there was no attempt to coordinate the efforts of the three American teams. After weeks of independent and secretive data collection, on 12 October, General Douglas MacArthur ordered all three teams to cooperate as a joint commission under the directorship of the Army group's leader, Ashley Oughterson.[9] Colonel Oughterson was a brilliant surgeon and a shrewd tactician. He realized that the 1st order of business for the joint commission was to find out what the Japanese were already doing. Although there had been some impromptu, spontaneous cooperation with the

Japanese investigative teams in the field, there needed to be a formal exchange of information and resources. The joint commission visited bomb-affected parts of the country by traveling, working, and living in three modified railroad cars and invited Japanese scientists to join them in data collection and analysis.[10]

The Joint Commission grew to include the Army, Navy and Manhattan teams, and two Japanese investigative groups. This joint commission was the genesis of what was to become the Atomic Bomb Casualty Commission.

### The formation of the ABCC

Almost immediately, there were problems. In Hiroshima, the bomb had destroyed 18 of the 21 hospitals in the city. So, for the first several months, the ABCC headquarters were a cramped corner of the old Red Cross Hospital.[11]

The Japanese investigators believed that the Americans were responsible for the carnage and the data rightfully belonged to Japan. The Americans thought that the Japanese scientists were incompetent and could not be trusted to objectively collect and analyze valuable and important data, given their close emotional attachment to the circumstances they were studying. Neither side trusted the other and an atmosphere of secrecy and outright racism characterized an effort that was advertised as bipartisan and collaborative.[12]

The early collection and organization of data was arduous for many reasons, not the least of which being the fact that almost everything about the bomb itself including targeting, exact location of detonation, and estimates of radiation release were closely guarded military secrets until as late as 1956.[13]

The combination of military secrecy, resentment and lingering racism, distrust and the practical complexity of working, and living in a country that was rapidly rebuilding itself both physically and spiritually made working conditions in the ABCC tense and bitter.

Despite all these obstacles, in a relatively short period of time, from mid-October through mid-December 1945, the Joint Commission collected data on nearly 14,000 victims. Japanese scientists had been on the ground within days of the bomb blast and collected 145,000 questionnaires of the sickest, most heavily irradiated victims, many of whom had died and were no longer available for examination.[14] Analysis of this frustratingly incomplete dataset convinced American scientists that a “detailed and long-range study of the biological and medical effects upon the human being” was “of the utmost importance to the United States and mankind in general.”[14]

The National Academy of Science (NAS) was chosen as the sponsor agency for the long-term study. The NAS had prestige which the joint commission hoped would attract prominent scientists to participate in the study and the NAS was not associated with the military – an effort to alleviate some of the negative opinions from the Japanese scientific community. Funding was arranged through the Atomic Energy

Commission, which formed from the dissolution of the Manhattan Project.[10]

Construction began on the permanent site for the headquarters of the study group in 1949 and was completed quickly. The site chosen for the research facility was at the top of Hijiyama Hill in the very center of the city. The facilities themselves were a collection of seven large two-story ferro-concrete tubes in the Quonset hut style that required the displacement of a Japanese military cemetery – another missed opportunity for cultural understanding. Located at the top of the tallest hill in the middle of the city, it was a constant, conspicuous reminder of Japan’s defeat.[10,15]

The buildings resembled kamaboko – the inexpensive fishcakes that were a staple of the diet of occupied Japan. The people of Hiroshima derisively referred to the research facility as kamaboko-tei – “the fishcake palace.”[15] A smaller facility opened in Nagasaki in 1948 with a focus on pediatric Hibakusha.

### The cultural conflict

The American scientists tried to create an atmosphere of scientific collaboration within the ABCC – a place where the war could be forgotten and science existed as a language and culture all its own. They soon realized that Japanese science and culture were inextricably intertwined and the shadow of the war hung over the ABCC and the Occupied scientists that worked there.

Tension existed between the American and Japanese scientists from the outset. This can be understood, given that many of the scientists on both sides were military members and had just concluded an exhaustive, excruciating war and were working under extraordinarily difficult conditions. American scientists were frustrated at every turn – none of them spoke Japanese and relied on translators, whom they did not trust.

The Japanese scientists were equally frustrated by the condescending attitude displayed by the Occupation administrators. Every manuscript, every letter, every publication of any kind authored by a Japanese national was required to be submitted to an Occupation approval committee. During 1946 and 47, Japanese scientists all over the country submitted 119 manuscripts for approval but not a single paper was approved – and the manuscripts were never returned. They became lost in the bureaucracy of the Army Institute of Pathology and the Joint Chiefs of Staff, which was the final arbiter of approval.[13,16]

The Japanese scientists felt disrespected and frustrated by the Occupation administrators and resented the fact that the American scientists were free to publish, ate better food, and traveled unchallenged. In addition, the Japanese scientists, as representatives of authority, were frequently targets of contempt and hostility from the Japanese people.[11]

The Japanese scientists working at the ABCC were accused of collaborating with the Occupiers. The ABCC was considered by many to be merely an extension of the Occupation. The Hibakusha were pressured to cooperate and quickly became resentful of all the scientists, American and Japanese.

When the ABCC tried to expand its efforts to include the study of Hibakusha in Nagasaki, only one Japanese physician interviewed for the position.[17]

Two of the principle decisions concerning the role and work of the ABCC fed the resentment among the Hibakusha. First, the biggest, most publicized scientific efforts involved a study of the genetic effects of the radiation resulting from the atomic bombs. Early communications described low expectations among scientists that any meaningful evidence of mutation would be found among Hibakusha or their offspring. The cautiously pessimistic calculation was popularly interpreted as being an attempt by the Occupation to white-wash the harm caused by the atomic weapon.[18]

The second decision was more profound. The charter of the ABCC established it as a pure research institute. The Hibakusha were scientific subjects, not patients. The physicians employed by the ABCC were prohibited from treating the injuries that they were studying.

Much has been written about the No-Treatment policy and the actual reasons for its basis as the operating philosophy of the ABCC. Washington DC was focused on avoiding any suggestion that establishment of the ABCC or any offer of assistance was an act of atonement for the bomb or the war. By emphasizing the purely scientific mission of the organization, scientists at the ABCC thought they were reassuring the people of Hiroshima and Nagasaki that the results of the genetics project and other research endeavors would be trustworthy. To many Japanese, however, devotion to pure science was an example of the dehumanizing attitude the Occupation forces had toward them.[19]

The practical nature of research participation did not lend itself to open and willing enthusiasm either. Cultural indifference, insensitivity, and outright hostility characterized day-to-day interactions. Appointments were scheduled at times that were convenient for the scientists, not the subjects. Subjects were required to come to the ABCC facilities, which were located at the top of Hijiyama Hill a difficult uphill climb.[20]

The Japanese used the Imperial Calendar and three different alphabets so simply recording the names and ages of victims was arduous and confusing. American scientists thought the Japanese style was contrary to universal literacy and democracy, and insisted on using Romanized letters and phonetic nomenclature to record data which made it impossible for later investigators to compare radiation histories of many patients.[21]

The floors and waiting rooms of the ABCC facilities were constructed of polished linoleum and when people arrived wearing the everyday working wooden shoes (*geta*), they frequently slipped and slid all over the place. The magazines in the waiting rooms were all in English and the cafeteria served only western food like spaghetti and meatballs, which was unpalatable to the Japanese subjects.

Subjects who missed appointments were frequently visited by officials from the ABCC and strongly encouraged to keep all future appointments. The officials traveled in military jeeps and the visits, although perhaps not intended to be, were in fact intimidating. Numerous first-person memoirs recount examination visits that were often humiliating and degrading.

The American scientists and physicians, in particular, frequently found themselves at odds with the explicit direction of the Occupation administration. Many of them defied the official No-Treatment policy and worked to acquire and distribute medicine, toiletries and sundries, and even compensation for lost wages for subjects who kept their appointments. Many of the physician leaders of the ABCC spent exhaustive efforts at public relations outreach attending religious ceremonies and even appearing on an amateur television variety show to compete in juggling and dancing contests.[22] The personal letters and records of the physicians at the ABCC reveal dedicated and humane scientists valiantly defending their Japanese colleagues, especially the nurses and midwives who were critical to the work of the ABCC.

Despite the best efforts of some very dedicated and selfless physicians and scientists, the Japanese view of the ABCC was not positive. It was frequently the target of vicious attacks from all sides of every position, not just because of the No-Treatment policy but because of the scientific output, which frequently displaced one group or another.[20]

### The formation of the RERF

By 1950, the ABCC employed over 1060 people, 148 of them American and the rest Japanese.[23] Because of the highly sensitive nature of the Hibakusha, disabled and displaced people seeking reparations, and the American desire to avoid any appearance of atonement for the war, the scientific output of the ABCC frequently was interpreted through the lens of political motivation and advocacy rather than pure science.[10]

The scientists of the ABCC struggled with the definitions and social implications of mutation and the relevance to the human condition and in particular the Japanese condition. Data regarding minor malformations, spontaneous abortions, and reduced fertility in the immediate post-bombing period was intensely debated.[24]

When the data from the genetics project was initially analyzed in 1952, it became apparent that taken in aggregate, the ABCC genetics data was inconclusive and revealed very little. Exposure to radiation in the subject Hibakusha had not produced a dramatic rise in the incidence of abnormal births or mutations. Published in the 6 November 1953 issue of *Science* the report led to the cessation of all epidemiologic data gathering among children and pregnant women.[25] Termination of funding to the ABCC was debated. The Korean War was underway, funding was scarce and there were many competing interests for the money.

The period of 1953–1957 was a time of great uncertainty for the ABCC. In 1956, however, the final and complete results of the genetics study were published in book form by the NAS and the scientific community realized that the preliminary report published 3 years earlier had not told the entire story. The complete report is considered the most important publication of the ABCC. It detailed increased mortality for



exposed survivors and illustrated the need for increased mortality surveillance among the Hibakusha.

One of the early recurrent problems of ABCC had been lack of continuity in leadership. In the first decade, there were six Directors, most of whom served only for a year or two. In 1957, George V. Darling was elected to be the director of the ABCC – his tenure lasted for 15 years until 1972. He took many steps to recognize the accomplishments of the Japanese and to further their involvement in joint studies. During his tenure the physical facilities of ABCC at Hiroshima and Nagasaki were expanded and hospital units were constructed at Hiroshima and Nagasaki Universities to facilitate the care of Hibakusha.[10]

Darling also oversaw the metamorphosis of the ABCC into the Radiation Effects Research Foundation in April 1975. The American recession, inflation, and the declining value of the dollar created serious budget pressures for the ABCC. Japan had rebuilt herself as an economic power so a new organization with joint funding was created to continue the work that had been started 28 years earlier. The RERF is a truly coadministered, private nonprofit foundation funded equally by the Japanese and American governments with an independent bi-national structure. The charter of the RERF created a unique administrative structure with equal sharing of the positions of directors and scientific advisors by Japanese and Americans.

### The legacy of the RERF

The 70 years of combined academic output from the ABCC and RERF is remarkable with hundreds of peer-reviewed studies published on the radiation effects on the Hibakusha.

Despite that, the ABCC and RERF are indistinguishable to most Japanese and hostility and negative emotion remain among many toward the RERF. Although the ABCC/RERF scientists have described bomb-related increases in leukemia and solid tumors in Hibakusha, the genetics study failed to demonstrate a statistical increase in stillbirths, spontaneous abortions or birth defects.[26] Similar studies demonstrate little radiation effects on second-generation residents of post-war Hiroshima, which cause howls of indignation and protest from the Hibakusha interest groups.[26] Numerous large epidemiologic studies have been published by the ABCC and RERF, including important studies of leukemia and cancer incidence that demonstrate linear dose–mutation relationships, large, multigenerational studies of life expectancy, and non-cancer disease; most are available on the RERF website.

Conversely a study published in 2007 demonstrating an increased incidence of cataracts in bomb-affected people created an entirely new grievance cohort. The Japanese government questioned the findings.[27,28]

An undeniable fact is that the study cohort is diminishing by attrition. Staff at the RERF has decreased to about 250 personnel and the role of the foundation is uncertain and evolving.[29]

In 1981, American researchers used ABCC data from Hiroshima and Nagasaki to study the effects of menarche and menstrual patterns on the incidence of breast cancer in

Japanese women. The Hibakusha medical records had been painstakingly collected and were the most complete, comprehensive, and homogenous epidemiologic dataset in the world. The information is being utilized for scientific purposes never imagined by the people that collected it.[30]

After the Tohoku-chiho Taiheiyo Oki Jishin earthquake and subsequent tsunami in 2011, the Fukushima nuclear facility began leaking radiation. The RERF, responding to requests and pressure from Japan's Ministry of Health, Labor and Welfare dispatched three scientists to the area to measure radiation.[31] Field support simply was not in the mission, although over the years, the RERF has hosted conferences and collaborative projects with Russian scientists working with victims of Chernobyl.

Most remarkable, in the 70 years since the atomic bombings in Japan, there have been no formal studies into the psychological state of mind of the Hibakusha. The prevalence of post-traumatic stress syndrome is completely unknown and the question has never even been posed for any scientific study.[32]

The RERF is open for public tours with an appointment. If you go there, make sure to spend a few hours wandering around Hijiyama Hill and the Hiroshima Peace Park. They commemorate 6 August with a breathtakingly beautiful and aching sad flotilla of lanterns on the Motoyasu River.

The title of this essay is taken from the poem "Epitaph for a Child of Hiroshima" by Michael R. Burch:

I lived as best I could, and then I died.  
Be careful where you step: the grave is wide.

### Disclosure statement

The author reports no declarations of interest to report.

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