Radiation, knowledge, and power: colonial ambivalence in the ABCC and *Hibakusha* experience

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Abstract

This article adopts a deliberately circumscribed analytical orientation centered on the institutional—frequently characterized as perpetrator—perspective, in order to interrogate the conditions under which the Atomic Bomb Casualty Commission and its successor, the Radiation Effects Research Foundation came to be canonized as engines of post-atomic scientific advancement.[ii] From this vantage point, Hiroshima and Nagasaki emerge as historically singular laboratories for large-scale human radiation research, facilitating unprecedented advances in cancer epidemiology, quantitative risk assessment, and therapeutic radiology. Such a framing elucidates the extent to which these research programs contributed to a paradigmatic reconfiguration of twentieth-century biomedical science. In this sense, the article advances an explicitly unorthodox methodological stance by foregrounding the standpoint of institutional actors who, through the aggregation and analysis of *hibaksuha*-derived data, enabled significant developments in nuclear medicine, radiation science, and related technological domains.

At the same time, this institutional optic is neither epistemologically neutral nor universally authoritative. *Hibaksuha* accounts, particularly as articulated in testimonies and postwar Japanese publications, frequently express a profound ambivalence structured by both dependency and distrust. The ABCC was subject to sustained criticism for its "no-treatment" policy, which was widely perceived as privileging data extraction over patient care. Even following its reconstitution as RERF, a binational (US–Japan) entity with formal Japanese governmental participation, many survivors continued to experience difficulty in extending full trust toward the institution, despite their ongoing reliance on its research infrastructure and findings. This condition of ambivalence reflects a deeper entanglement, wherein survivors remained epistemically and materially bound to a research apparatus associated with the very structures of US aggression that produced their suffering.

Accordingly, the historical and ethical valence of these institutions resists reduction to a univocal narrative of either scientific progress or moral failure. This article therefore contends that the legacy of ABCC/RERF is most productively theorized through the dual lenses of perspectival divergence and epistemic ambivalence. Drawing on the postcolonial insights of Frantz Fanon, it reconceptualizes the disjuncture between institutional and survivor epistemologies not as contingent disagreement, but as a structural condition of knowledge production under regimes of unequal power. In doing so, it demonstrates that the same corpus of scientific knowledge may simultaneously function as a cornerstone of global medical advancement and as a locus of ethical contestation, thereby revealing the co-implication of empirical authority and epistemic violence in the production of postwar radiation science.

[i]Historiography on the ABCC and RERF has shifted from early institutional accounts framing the program as a humanitarian-scientific enterprise central to postwar radiation research, to critical interpretations emphasizing Cold War biopolitics, occupation power asymmetries, and the objectification of *hibaksuha* within observational medicine, and more recently to revisionist scholarship that highlights Japanese scientific agency and the negotiated, transnational character of knowledge production. Contemporary work thus characterizes ABCC/RERF as an institution marked by scientific innovation and structural ambivalence, simultaneously foundational to radiation epidemiology and embedded in the ethical and political contradictions of the post-atomic order. Radiation Effects Research Foundation.[1] *RERF: A cooperative Japan-US research organization* (30th anniversary publication).

Introduction

The scientific legacy of the Atomic Bomb Casualty Commission and its successor, the Radiation Effects Research Foundation, occupies a central position in the history of modern radiation science. Established in the aftermath of the atomic bombings of Hiroshima and Nagasaki, these institutions generated the most comprehensive longitudinal data on the human effects of ionizing radiation, shaping global standards in epidemiology, radiological protection, and nuclear medicine. Their findings remain foundational to contemporary understandings of cancer risk, dose–response relationships, and medical radiation safety.

This article adopts a deliberate analytical focus on the institutional—often characterized as perpetrator—perspective, in order to examine how ABCC and RERF came to be understood as engines of scientific advancement in the post-atomic era. From this vantage point, the research programs conducted in Hiroshima and Nagasaki are framed as unprecedented opportunities for large-scale human radiation study, enabling major developments in risk assessment, cancer epidemiology, and medical applications of radiation. By foregrounding this perspective, the article highlights the extent to which ABCC/RERF contributed to what can be described as a transformative phase in post-atomic scientific history.

This focus does not assume neutrality or universality. The activities of ABCC—and later RERF—were embedded in the geopolitical and social hierarchies of the US occupation of Japan, giving rise to sharply divergent interpretations of their role. While institutional narratives emphasize methodological rigor and contributions to global public health, survivor accounts frequently foreground experiences of marginalization, unequal power, and the prioritization of research over care. As a result, the historical meaning of these institutions cannot be reduced to either scientific progress or ethical failure alone.

This paper therefore argues that the legacy of ABCC/RERF is best understood through a framework of perspectival divergence and epistemic ambivalence. Drawing on the postcolonial insights of Frantz Fanon, it conceptualizes the gap between institutional and *hibaksuha* perspectives not as a simple epistemic disagreement, but as a structural condition of knowledge production shaped by asymmetrical power relations.[2] [ii]Importantly, I would add this ambivalence is not limited to "victim" subject positions: it also extends to institutional actors themselves. The transformation of ABCC into RERF under binational governance and later Japanese administrative leadership illustrates a shifting institutional identity in which the organization is simultaneously positioned as a producer of victim-centered scientific knowledge and as a state-aligned authority embedded within postwar governance structures. In this sense, RERF embodies a form of institutional or "perpetrator-side" ambivalence, in which scientific neutrality, postwar reconciliation, and state responsibility are continuously negotiated rather than resolved. The same body of scientific knowledge can therefore function both as a cornerstone of global medical advancement and as a site of ethical contestation, reflecting the coexistence of empirical authority, political embeddedness, and epistemic violence within the production of postwar radiation science.

Background

In 1947, the National Academy of Sciences (NAS) of the US initiated the establishment of the ABCC in Hiroshima and extended its reach to Nagasaki a year later. The ABCC was a collaborative facility between the US and Japanese governments and was an extension of a US military project aimed at researching the survivors and effects of the atomic bomb detonations in Hiroshima and Nagasaki. The commission's objective was to conduct an extensive, long-term study on the survivors of the atomic bombings, with a focus on both epidemiological and genetic factors.

The ABCC was subcontracted by the US Bacteriological Warfare Research Institute 406 Unit, a US military facility that conducted biological warfare experiments during WWII. Some of the military doctors such as Shiro Ishii, the leader of Unit 731, had participated in these experiments and escaped prosecution at the Tokyo Trials by providing their data to the US military. The National Institute of Preventive Hygiene, which was established in May 1947, hired many of these doctors and researchers from Unit 731 and other units.[3]

The ABCC's inception, management, and purpose were multifaceted, particularly considering the complex period of US preoccupation in Japan following WWII. As noted by Suzan Lindee, a History and Social Science professor at the University of Pennsylvania, the ABCC played a significant role in what she refers to as 'the colonial science.'[iii] This is akin to indirect colonial rule where existing administrative systems were preserved but were overlaid with a degree of colonial control.[5]

The ABCC also recruited and collaborated with some of the senior medical personnel and scientists of Unit 731 for its studies. The ABCC adhered to the 'No Treatment Policy'(*Ibid*.,117-122) referred to the decision not to provide medical treatment to the survivors of the atomic bombings in Hiroshima and Nagasaki. Instead, the ABCC focused on studying the long-term effects of radiation exposure and extensively collected data on the survivors' health over time to better understand the impact of radiation on human health.

The ABCC demonstrated a particular interest in conducting autopsies on *hibaksuha* who succumbed to atomic bomb-related illnesses. Notably, between 1948 and 1958, the ABCC dispatched approximately 1,500 samples of dissected organs from atomic bomb victims to the US Army Pathology Research Institute, a division of the US Department of Defense. However, this practice drew criticism from atomic bomb survivors, who accused the

[ii]Frantz Fanon does not employ "ambivalence" as a formal analytic category in the same sense later developed in postcolonial theory, but his work systematically theorizes the **psychic and structural fragmentation of the colonized subject** under conditions of racialized domination. In *The Wretched of the Earth*, he describes how colonialism produces internalized inferiority, affective division, and contradictory self-perception, in which the colonized subject is simultaneously positioned within imposed hierarchies of value and engaged in acts of resistance that destabilize those hierarchies. This condition is often read alongside (though not equated with) Du Bois's "double consciousness,[4]" insofar as Fanon emphasizes the splitting of subjectivity under colonial rule and the role of violence—both structural and revolutionary—as a rupture through which this psychic division is articulated and potentially transformed.

[iii]'The colonial science' is defined by several scholars:

Science as practiced in the colonies by Westerners.[10]

Science as racist moral justification for imperialistic practices.[11]

Science affected by colonial ideologies of control.[12]

Science as practiced in the colonies by local scientists.[13]

ABCC of utilizing them as experimental subjects, hence guinea pigs.[6]

Since its establishment in 1946, particularly under the GHQ Press Code (1945-1952), the ABCC has operated under the management of the US government, assuming responsibility for its research, publications, and the *hibaksuha* population. The Japanese government acquiesced to the formation of the ABCC, consenting to individual oversight under the authority of the US government, while Japanese researchers collaborated with the ABCC as research and language assistants. Multiple sources, including literature and testimonies, have documented the ABCC's dominant role over the *hibaksuha* community in Hiroshima and Nagasaki during its early years. Reports indicate that the ABCC treated the *hibaksuha* population harshly, frequently coercing their involvement in medical experiments, such as Life Span Studies (LSS), Adult Health Studies (AHS), Pregnant Cohort Studies (PCS), Microcephaly Studies (MS), and autopsies on deceased *hibaksuha*.[7]

Hibaksuha VS the ABCC

Some historical accounts describe ABCC field operations involving military jeeps and repeated visits to *hibakusha* homes, which survivors often perceived as coercive or intimidating within the broader context of US occupation power. These practices contributed to fears of compulsory participation, even in the absence of formal legal enforcement mechanisms. The ABCC maintained a clinical stance towards the *hibaksuha*, primarily viewing them as subjects for medical research. Essentially, they were utilized as test subjects or "guinea pigs" to document the effects of the unprecedented nuclear weapons deployed in Hiroshima and Nagasaki.[8] The data collected was exclusively managed by the US government, which oversaw the transmission of research results from *hibaksuha* from the ABCC's inception in 1946 for three decades.

The US government not only maintained strict secrecy regarding the research on the radiation effects experienced by *hibaksuha,* but they also issued pseudo-research reports as a facade to avoid public panic and criticism regarding the use of nuclear weapons and their clandestine investigations into the effects on *hibaksuha.* Robert Holmes, the fourth director of the ABCC, published a misleading report on US News and World Report in 1955, titled 'Thousands of babies, no atomic bomb effects, no upsurge of cancer cases.'[iv] In the report, he claimed that the Japanese children were normal, the radiation burns had healed, and there was no radiation blindness.[9] However, these claims were contradicted by the evidence of the long-term effects of radiation exposure on the atomic bomb survivors and their offspring. Holmes retired from his position at the ABCC in 1957 and became a professor of medicine at the University of Rochester, while also advancing his career in the US Military 406 unit.

The NAS, through its operational branch, the National Research Council (NRC), jointly undertook these studies with the Japanese government. The ABCC was established during a tumultuous period in Japan, which was grappling with the aftermath of war, the pain of defeat, and military occupation. The ABCC was a groundbreaking medical research project, unlike anything the Academy had ever done before or since. The NAS didn't fully realize the scale of the project when it started, and if it had, it might not have established the ABCC. To grasp the size of the operation, consider that in 1950, the ABCC in Japan had about as many employees (1,061, with only 143 non-Japanese) as the entire NAS organization.[14]

During and after WWII, Japanese individuals were often depicted negatively in American propaganda. This was particularly true for Japanese Americans, many of whom were incarcerated in concentration camps during the war. The prevailing image of the Japanese at the time was one of subhuman, with comparisons being made to apes and monsters.[15] Following the war, this image shifted to portray the Japanese as docile followers of a previously fascist regime.[16]

The American team at ABCC believed that the Japanese lacked the scientific knowledge, objectivity, and financial resources to independently study the survivors of the atomic bombings.[17] However, they recognized the need for Japanese assistance in overcoming language barriers and gaining cooperation from survivors.

On the other hand, Japanese individuals also harbored distrust towards Americans. American scientists were seen as unethical for confiscating data without properly crediting Japanese scientists. There was a gap in medical care and suspicion about American intentions. Financial difficulties arose due to an uncertain commitment from the Atomic Energy Commission (AEC) and shifts in research direction by the early 1950s.

From 1945 to 1952, Japan was subjected to military occupation, governed by the General Headquarters (GHQ) and subjected to the GHQ Press Code. During this time, the cities of Hiroshima and Nagasaki remained in ruins following the atomic bombings. The country was in a state of disarray as attempts were made to reconstruct civil structures and infrastructure. The Japanese, despite their reservations, had no choice but to interact with the Americans, their former adversaries, particularly in medical and research fields such as the ABCC. For example, fearing potential attacks from the incoming Americans, physicians in Nagasaki advised their nurses to hide.[18] These circumstances led to a difficult first decade for the ABCC, underscoring the effects of propaganda and mutual distrust.

The ABCC has become a symbol of the American presence in Hiroshima. The guinea pig imagery directed at it now represents the various anxious and hostile perceptions held by *hibaksuha* toward America. For many *hibaksuha*, as they testified, the ABCC was 'an atomic bomb wielding annihilator, causer of social and economic suffering, destroyer of the Japanese essence, dispenser of counterfeit nurturance, human experimenter and desecrator of the dead.'[19]

The ABCC has evoked complex, ambivalent and controversial feelings within the *hibaksuha* community. Despite harboring deep resentment and even hatred toward the ABCC, many *hibaksuha* continued to cooperate with its research efforts. Conversely, the ABCC relied entirely on *hibaksuha*s' willingness to expose their bodies for examination. Without their cooperation, the ABCC's research would have been impossible. According to Lifton, *hibaksuhas*' resentment towards America was particularly pronounced due to the ABCC's location and policies. (*Ibid.*, 345)

[iv]U.S. News & World Report. 1955;39(10). Published September 2, 1955.

The US and Japanese governments strategically chose the permanent location for the ABCC atop *Hijiyama* (Mount Hiji) in the heart of Hiroshima City. This decision was based on practical considerations, as *Hijiyama's* elevated position provided better flood protection and safeguarded the ABCC's equipment. However, this choice held deep sentimental significance for the Japanese people, as *Hijiyama* had historical associations with Emperor Meiji's headquarters and an old cemetery. (*Ibid.*, 351) The relocation of the cemetery due to the ABCC's construction caused resentment among many *hibaksuha.* Additionally, the ABCC's placement atop the mountain carried connotations of America figuratively looking down on the city's inhabitants.

The 'No Treatment Policy' faced complexities due to strong opposition from many Japanese physicians in Hiroshima regarding American involvement in providing treatments to *hibaksuha.*(*Ibid.,*347) American doctors were not certified as physicians in Japan, and language barriers further hindered their ability to offer appropriate medical care. Consequently, *hibaksuha* perceived the ABCC's use of them as experimental subjects, akin to guinea pigs.

Despite harboring resentment, many *hibaksuha* continued to cooperate with the ABCC. For them, the ABCC represented an adversary that had inflicted extensive physical and psychological damage through atomic bomb detonations, yet they still provided a place for advanced medical examination. Although the ABCC did not always offer results or treatments, *hibaksuha* remained fearful of unknown atomic diseases.

The ABCC primarily researched the genetic effects of the atomic bombs in Hiroshima and Nagasaki on survivors. Since its inception, the ABCC has faced financial challenges from the US government. In 1951, the AEC reduced ABCC's budget by nearly half. By the late 1950s, both the NRC and the AEC recognized the ABCC's funding difficulties and agreed to send representatives to Japan to evaluate the ABCC and its future. Their assessment led to a further reduction in the ABCC's budget and a decision to discontinue the organization by January 1953.[5] The ABCC was presented with several options: 1. Maintain its current status and face eventual termination, 2. Realign as the Japan Science Council, 3. Transfer control to either the Japanese or American military.[20] These circumstances prompted the ABCC to improve its relationship with the Japanese government.

Following WWII, Japan's economy was in a state of profound turmoil. By 1946, the country was on the precipice of a nationwide famine, a situation largely attributed by the Japanese to the devastation caused by the US during the war.[21] This impending famine was averted solely due to food shipments from the US. The drastic decline in Japan's standard of living necessitated substantial economic recovery assistance from the US. Upon the conclusion of the American occupation in 1952, the US successfully reintegrated Japan into the global economy and reconstructed its economic infrastructure. This catalyzed what would subsequently be recognized as the Japanese economic miracle,[v] and Japan continued to flourish significantly, progressing steadily toward its peak.[vi]

In the 1960s, Japan grappled with a notable inflation rate, which resulted in a significant surge in the ABCC total costs. The expenses rose from $1.9 million in 1959 for a 905-member staff to $4.2 million in 1970 for a reduced staff of 695. The revaluation of the Japanese yen in 1971 further escalated the dollar costs. By the fiscal year 1974, the total had climbed to $6.2 million without any increase in staff, necessitating considerable support from the US National Cancer Institute to prevent a crisis.[22]

In conjunction with the growth of the Japanese economy, the stabilization of Japanese democracy, and the balance of political power between the US and Japan, both governments began to treat *hibaksuha* with increased respect and dignity. The materials related to the atomic bombings, returned from the US government to Japan in May 1973, are primarily classified into three categories: pathological specimens, medical record holders, and photographs. An extensive collection of over 23,000 items from Hiroshima and Nagasaki are preserved at the Hiroshima University Radiation Medical Science Center for the Atomic Bomb and the Nagasaki University Medical Research Institute for Atomic Bomb Aftereffects.

The pathological specimens include 681 specimens of organs from dissected atomic bomb victims preserved in formalin, 953 specimens embedded in paraffin blocks, and 1769 slide specimens for microscopic observation.[vii] A significant portion of these materials were collected and documented by Japanese medical scholars and photographers, including former military personnel, universities, and hospitals, who were involved in treatment and investigative activities immediately following the bombings. These materials were confiscated by the US military under the guise of the "Japan-US Joint Investigation" and transported to the US mainland at the end of 1945.

Subsequently, these materials were stored at the Army Pathology Research Institute (AFIP) in Washington for 28 years. Regarded as "war booty", they were utilized for research to understand the damaging effects (power) of the atomic bomb. Initially, Japanese researchers did not have access to these materials.[viii]

From the ABCC to the RERF

Discussions between the two governments commenced in 1973 and culminated in an agreement in November 1974. This agreement led to the establishment of a new organization, a Japanese foundation created by the Health and Welfare Ministry, to take over from the ABCC. The mission and program of this new entity remained consistent with its predecessor. However, the management was assigned to a binational board of directors for the newly instituted RERF, which succeeded ABCC on April 1, 1975.[ix] The Endowment Act mandated that governance be equally distributed between the two governments via their representatives

[v]The Japanese Economic Yearbooks from 1967 to 1971 recorded a notable growth. The 1967 edition stated that the Japanese economy in 1966 progressed more rapidly than anticipated. The 1968 edition noted that the Japanese economy maintained a healthy growth following a low point in the autumn of 1965. The Oriental Economist (1967). Japan Economic Yearbook. p.23

[vi]*ibid* (1968). P.19

[vii]The numbers are retrieved from the article of Nagasaki University; "Atomic Bomb Disease Institute, Nagasaki University. (1987). RR87-011.

[viii]"Discussion: 40 Years Since the Return of A-bomb Materials to Japan: Another 'Legacy' for Future Generations." Hiroshima Peace Media Center.

[ix]RERF is a joint commission between the US and Japanese governments for the study of the health effects of A-bomb radiation for peaceful purposes. See the objectives at RERF official website.

on the board, an advisory scientific council, and their financial contributions. The US Department of Energy persists in its support through the National Academy of Sciences, mirroring its previous role.

For numerous decades, the ABCC and the RERF have been gracefully ushering in novel phases in their policies. The metamorphosis from ABCC to RERF marked the continuation of survivor studies, a pursuit that has remained relentless. The departure of the ABCC team from Japan and the advent of new stewardship by the Japanese government catalyzed a shift in the focus of radiation effects research, aligning it more harmoniously with Japanese society and the *hibakusha* community.

This transformation engendered a more survivor-centric approach,[x] seamlessly integrating Hiroshima and Nagasaki local communities to cultivate collaboration in research. The RERF wielded influence over the Japanese government and media, dictating the dissemination of information globally. The RERF intensified its efforts to foster a clearer understanding of its management and research objectives, aiming to address past misunderstandings, anger, or grievances within the *hibaksuha* community.[xi] This involved enhancing communication with individuals both before and after data inspections, as well as demonstrating greater sensitivity and attentiveness to the feelings of the *hibaksuha.*

With the transition of control from the US to the Japanese government and the subsequent renaming of the ABCC to the RERF, there has been a significant shift in the organization's approach towards the *hibaksuha* community.[xii] In contrast to the approach taken by the ABCC towards *hibaksuha* in the aftermath of the atomic bombings, the RERF now demonstrates a greater level of respect and courtesy towards them. The RERF acknowledges that the cooperation of *hibaksuha* is indispensable for the ongoing research and data collection efforts.

Furthermore, as of 2025, the average age of the *hibaksuha* was 86 years, [xiii]making their participation in studies increasingly valuable. The RERF is particularly focused on promoting lifespan studies, genome analysis, and second-generation studies within the *hibaksuha* communities. Consequently, the *hibaksuha* have become invaluable assets to both Japan and the US in their ongoing research efforts.

On January 28, 2023, Chugoku Shimbun heralded that RERF will officially migrate to a newly constructed 10-story building on Hiroshima University's Kasumi Campus, which serves as the primary medical facility for atomic bomb survivors. As a result, in 2025, RERF's radiation and survivor's medical research will embark on a journey of collaboration and cooperation in this fresh location.[xiv]

The perspective of *Hibaksuha*

From the perspective of many Japanese survivors, however, the meaning of the atomic bombings and the work of the ABCC differed profoundly from the justificatory narratives advanced by the US. While American policymakers and scientists frequently framed the bombings as a tragic but necessary act to end WWII and prevent further casualties, many *hibaksuha* understood the events primarily through the lens of indiscriminate civilian suffering, colonial violence, and human experimentation. For numerous *hibakusha* in Hiroshima and Nagasaki, the ABCC symbolized this asymmetry of power because researchers collected extensive medical data while initially providing little direct treatment to patients. Historians have noted that this fostered distrust among survivors, who often perceived themselves not as beneficiaries of humanitarian science but as subjects of postwar American scientific inquiry.[24]

Consequently, perpetrator and victim perspectives produced fundamentally divergent historical memories: the former frequently emphasized military necessity, scientific advancement, and the rapid conclusion of war, whereas the latter centered on bodily trauma, social discrimination, loss of family and homeland, and the ethical consequences of transforming mass civilian death into a site of biomedical research. This divergence illustrates how the historical meaning of the ABCC and the atomic bombings remains deeply contested, shaped not only by empirical outcomes in radiation science but also by unequal experiences of power, suffering, and memory in the aftermath of nuclear war.

The narratives of the *hibaksuha*, as chronicled through their interactions with the ABCC, are rich with emotional expression. An analysis of these testimonies, including personal interviews, reveals a spectrum of emotions. Unlike the testimonies of *hibaksuha* against atomic bomb detonations per se, these testimonies of the ABCC contain more intensity, darkness, and continuity in their emotional stories. This symbolizes that atomic bomb destruction was instant and enormous, while their experience with the ABCC was a long-lasting suffering, which they additionally had to deal with the collective wrongdoings in addition to their own health being harmed by the bombings.

The content of these *hibaksuha* testimonies post-WWII is deeply emotional, shaped by the identity of the *hibaksuha* and their unique experiences of the atomic bombings and shifts from the Japanese Shinto imperialism[xv] to the US occupation and democracy in Japan. The intensity of these emotions is often reflective of the individual's mental and physical suffering, the severity of injuries or disabilities incurred from the bombings, and the nature of their encounters with the ABCC.

[x]RERF officially replaced the ABCC in 1975 as a joint U.S.–Japan institution with increased Japanese participation and a greater emphasis on cooperation with hibakusha communities, repeatedly describing its work as conducted "with cooperation from Hiroshima and Nagasaki atomic bomb survivors." See Radiation Effects Research Foundation, "Objective and History," Radiation Effects Research Foundation. (n.d.). *Greetings*. Radiation Effects Research Foundation.

[xi]RERF replaced the ABCC in 1975 as a joint U.S.–Japan institution, expanding Japanese administrative participation and emphasizing cooperation with hibakusha, frequently describing its research as conducted "with cooperation from Hiroshima and Nagasaki atomic bomb survivors." Radiation Effects Research Foundation. (n.d.).23 *Objective and history*. Radiation Effects Research Foundation.

[xii]*ibid*

[xiii]Ministry of Health, Labour and Welfare. (2025). *Current status of atomic bomb survivors (hibaksuha)*. Government of Japan.

[xiv] Chugoku Shimbun (a main newspaper in Hiroshima) wrote an article on January 28 and February 3, 2023.

[xv]The Japanese government used Shinto to promote national unity and loyalty to the emperor. Shinto rituals and symbols were integrated into daily life, education, and military practices to unite the people and reinforce the emperor's divine status. Shinto also justified Japan's militaristic and imperialistic actions. The religion's focus on loyalty, duty, and self-sacrifice encouraged soldiers to fight for the emperor and the nation. This was evident in the inclusion of Shinto rituals in military training and ceremonies.[26]

Each *hibaksuha*'s testimony presents a wide variety of emotional responses, from overwhelmingly negative to sporadically positive, with varying intensities. Factors such as age, gender, political affiliations, involvement in anti-nuclear activist, and the era of their ABCC experiences can influence the emotional nuances expressed in their narratives. The Schachter-Singer theory explains that emotions depend on two factors: the interpretation of physiological responses and the perception of the situation or environment.[25] In other words, emotions arise from a combination of a physiological response and a cognitive label that we attach to that response.

Predominantly negative emotions such as anger, hatred, disgust, distrust, sorrow, grief, fear, threat, betrayal, and guilt are directed towards the ABCC. Since its establishment, the management and doctrine of the ABCC were not *hibaksuha*-friendly, leading many *hibaksuha* to project negative emotions, especially in their early testimonies during the GHQ press code. Many *hibaksuha* realized that the US government related or treated them as experimental objects after their heinous atomic bomb detonation destroyed the whole cities of Hiroshima and Nagasaki.

For *hibaksuha*, the atomic bomb detonations were not just the destruction of their cities, but also their local communities such as their family, neighbors, or close friends. Not only that, many *hibaksuha* criticized post war treatment from the ABCC. Many *hibaksuha* claimed that the ABCC being unjust in addition to major nuclear testing movements the US conducted post WWII. Thus, their negative emotions expressed against the ABCC were strong, political, yet personal.

Robert. J. Lifton observes that the hatred or anger directed towards the ABCC was intertwined with unresolved death guilt stemming from the inability to help others during the atomic bombings. This guilt often shifted the *hibaksuha*'s perception from being victims to seeing themselves as victimizers.[19] For instance, when some *hibaksuha* visited Israel, Holocaust survivors questioned why they did not harbor the same hatred towards the US and the ABCC as the Jewish people did towards Eichmann, whom they had despised all their lives.[xvi] The sustained hatred among Holocaust survivors served as a motivation to seek revenge and hold their enemies accountable.

Lifton's interesting comparison highlights that while many *hibaksuha* accepted the ABCC's presence, their cooperation with the testing was often accompanied by anger. This complex and ambivalent relationship is reflective of the intricate history of post-WWII. Some *hibaksuha* harbored deep resentment towards the ABCC, perceiving it as an exploitative entity, while others appreciated the advanced medical examinations and the potential contributions to nuclear science. This duality underscores the multifaceted nature of human emotions and the capacity to hold conflicting feelings simultaneously.

The ABCC's policy of 'No Treatment Policy' conducting examinations without providing treatment fostered a perception among *hibaksuha* of being treated as experimental subjects rather than patients, leading to enduring feelings of bitterness and distrust.[26] Despite the ABCC's contributions to global scientific understanding, many *hibaksuha* continue to view their involvement in these studies as a source of psychological trauma rather than a testament to technological progress.

The statistics of ABCC and RERF research

This study utilizes longitudinal epidemiological data generated by the ABCC and its successor, the RERF, which together represent the most extensive and methodologically sustained research program on human exposure to ionizing radiation. Established in the immediate postwar period, these institutions developed a large-scale observational infrastructure designed to examine the long-term health consequences of the Hiroshima and Nagasaki atomic bombings, with particular emphasis on cancer incidence, mortality patterns, and radiation-related morbidity.

The primary analytic foundation is the Life Span Study (LSS), initiated in the early 1950s through systematic linkage of census records and survivor registries in Hiroshima and Nagasaki. The LSS comprises approximately 120,000 individuals, including both radiation-exposed survivors and a non-exposed comparison cohort. This population has been maintained as a fixed longitudinal dataset, enabling continuous follow-up of mortality outcomes and disease incidence over multiple decades. Its design constitutes one of the most comprehensive population-based radiation epidemiology studies ever conducted.[27]

In addition to the LSS, this study incorporates complementary RERF cohorts, including the Adult Health Study (AHS), which comprises approximately 20,000–24,000 participants undergoing biennial clinical examinations; the *in utero* cohort, consisting of approximately 3,600–3,800 individuals exposed prenatally; and the F1 cohort of approximately 76,000–77,000 second-generation offspring of exposed parents.[28] These datasets are analytically interlinked and partially overlapping; therefore, they are not treated as additive populations but as stratified components of a unified longitudinal research system.

Collectively, these ABCC/RERF-linked cohorts encompass an estimated 120,000–140,000 unique *hibaksuha*-related individuals over the full study period. This integrated dataset forms the empirical basis for statistical modeling of radiation-associated carcinogenesis, dose–response relationships, and potential intergenerational health effects, providing the foundation for global standards in radiation epidemiology and radiological risk assessment.

Participation in ABCC/RERF research has generally remained high across cohorts, although rates vary depending on study design and follow-up method. In the Life Span Study (LSS), coverage is effectively population-based, with near-complete inclusion of eligible registered survivors at baseline and long-term follow-up primarily maintained through national registry linkage rather than active participation rates.[28]

In contrast, the Adult Health Study (AHS), which involves biennial clinical examinations, has typically reported attendance rates in the range of approximately 60–80% per examination cycle, with variation over time due to aging and mortality. Participation in the in utero and F1 cohorts is more variable, particularly for direct clinical or survey components, generally ranging from approximately 50–70%, depending on the study wave and outcome measure. Collectively, these cohorts function as interconnected components of a unified longitudinal system rather than discrete samples, combining near-complete

[xvi] Lifton notes this contrastive episode of hibaksuha visited Israel and they were asked a question about their feelings toward the US as '*Eichmann Question*,' which aroused some interest in Hiroshima.

registry-based follow-up with sustained though partial clinical participation across generations.

The participation rate of *hibaksuha* in ABCC/RERF examinations has remained consistently high over time, as illustrated in the Chronological Table of ABCC/RERF Participant Enrollment and Examination Scale (see figure below).

Chronological table: ABCC / RERF participant formation and examination scale (1946–2026)[xvii]

[xvii]Radiation Effects Research Foundation. (n.d.). *Overview of research programs and cohorts.*

Atomic Bomb Casualty Commission historical records are commonly documented through successor institutional archives. The dataset is uniquely structured as a long-term observational cohort system designed to examine mortality, morbidity, and intergenerational health outcomes associated with radiation exposure.

Year / period	Institutional phase	Key activity	Participant scale (best available estimate)	Notes / source type
1946–1947	Pre-ABCC groundwork	Planning of U.S. scientific survey of Hiroshima/ Nagasaki survivors	Not systematically recorded	Early U.S. occupation medical surveys
1947–1948	ABCC established	Formal establishment of ABCC in Hiroshima & Nagasaki	Thousands (small pilot studies)	Early clinical/genetic studies; no cohort system yet
1949	Expansion phase	Early registry development	Low tens of thousands (approx.)	Preliminary survivor mapping
1950	Cohort foundation	Hiroshima/Nagasaki census linkage; Life Span Study design begins	~120,000 total cohort framework initiated	Includes exposed + comparison populations
1950–1958	Cohort construction phase	Systematic recruitment into Life Span Study (LSS)	~120,000 individuals (fixed cohort established)	Primary epidemiological dataset
1958	Clinical expansion	Establishment of Adult Health Study (AHS)	~20,000–24,000 enrolled for clinical follow-up	Biennial clinical examinations begin
1960–1964	Mature ABCC operations	Repeated clinical examination cycles	~12,000–13,000 examined per cycle (repeat visits)	Not new recruitment; longitudinal re-examination
1965–1974	Late ABCC period	Continued cohort surveillance	~120,000 LSS + ~20,000 AHS active	Stable longitudinal follow-up
1975	Institutional transition	ABCC becomes RERF	Same cohorts maintained (~120,000 LSS)	No population reset
1975–1980s	Early RERF era	Continued epidemiological + clinical studies	~120,000 LSS; ~20,000 AHS	Expansion of analytic methods
1980s–1990s	Expansion of offspring studies	Introduction of F1 cohort studies	~76,000–77,000 offspring cohort added	Intergenerational research begins
2000s	Modern RERF system	Continued long-term follow-up	~120,000 LSS; ~23,000 AHS; ~77,000 F1	Aging survivor population
2010s	Late-stage cohort follow-up	Reduced but continuous participation	Declining active clinical participants	Survivors reaching advanced age
2020–2025	Contemporary phase	Ongoing mortality/cancer incidence tracking	~99,000 living hibaksuha nationally (not cohort-specific)	Japan MHLW statistics
2026 (projection context)	Current status	Continued follow-up of surviving cohort	~120,000 original cohort still tracked; living participants ~86–87 years average age	No new recruitment

Life Span Study (LSS) cohort

The principal analytic framework is the Life Span Study (LSS), initiated in the early 1950s through census-linked identification of atomic bomb survivors in Hiroshima and Nagasaki. The LSS comprises approximately 120,000 individuals, including both radiation-exposed survivors and a non-exposed comparison group. This cohort has been maintained as a fixed longitudinal population and forms the core dataset for mortality follow-up, cancer incidence analysis, and dose–response modeling.[30]

Supplementary cohorts

In addition to the LSS, this study incorporates subsidiary cohorts within the RERF research system. The Adult Health Study (AHS) includes approximately 20,000–24,000 participants who undergo repeated biennial clinical examinations.[31] The *in utero* cohort consists of approximately 3,600–3,800 individuals exposed during prenatal development.[32] The F1 cohort includes approximately 76,000–77,000 offspring of exposed parents, enabling intergenerational analyses of radiation-related health effects.[33]

Data structure and analytical approach

These cohorts are analytically interlinked and partially overlapping; therefore, they are not treated as additive populations but as stratified components of a unified longitudinal research system. Across all datasets, approximately 120,000–140,000 unique *hibaksuha*-related individuals have been included in ABCC/RERF research activities over time. [28] This integrated structure enables multilevel epidemiological modeling of radiation exposure, dose–response relationships, and long-term health outcomes.

Ethical and historical context

While the datasets underpin foundational advances in radiation epidemiology, their production is historically embedded within the geopolitical context of the U.S. occupation of Japan. Accordingly, the study acknowledges that the epistemic conditions of data production are inseparable from broader historical and institutional asymmetries shaping post-atomic scientific knowledge.

The ABCC research Developments in nuclear medicine, science and technology

The establishment of the ABCC in 1947 played a crucial role in advancing the fields of nuclear medicine, radiological science, and military technology in the early Cold War[xviii] era. At the time, the biological and genetic effects of radiation exposure on human beings were poorly understood. The only substantial human data available to the US and the ABCC came from the *hibaksuha* in Hiroshima and Nagasaki.

The atomic bombings of Hiroshima and Nagasaki in August 1945 marked the beginning of a new and profoundly consequential era in global military and political history. Following the US' successful Trinity test in July 1945[xix] and the subsequent bombings in Japan, a rapid and competitive international nuclear arms race ensued.

The Soviet Union conducted its first nuclear test in 1949,[xx] followed by the United Kingdom in 1952,[xxi] France in 1960,[xxii] and China in 1964.[xxiii] In the following decades, India, Pakistan, Israel (undeclared), and North Korea also acquired nuclear capabilities.[xxiv] By the height of the Cold War in the mid-1980s, it is estimated that more than 70,000 nuclear warheads had been produced worldwide.[34]

This unprecedented accumulation of nuclear arms fundamentally transformed global security frameworks, military strategy, and international diplomacy. Although successive arms control agreements, including the Strategic Arms Reduction Treaty (START) and New START,[xxv] have led to significant reductions in these stockpiles, approximately 12,500 nuclear warheads remain in existence as of 2024, with the United States and Russia maintaining over 90% of this total.[35]

While the ABCC was not involved in nuclear weapons development, its research significantly contributed to normalizing the nuclear age. By framing nuclear technologies through medicalized research and providing critical data on radiation's impact on humans, the ABCC produced knowledge that, at times, was appropriate for military strategy. Consequently, the legacy of the atomic bombings continues to shape the discourse on nuclear technology, deterrence, and ethics, as weapons tested on civilian populations became key instruments of geopolitical power and existential threat.

While incidents like the Chernobyl disaster in 1986 later provided additional cases of mass radiation exposure, it was a Soviet event, unrelated to U.S. research or influence in the postwar period. On April 26, 1986, a reactor explosion during a safety test at the Chernobyl Nuclear Power Plant in Ukraine released vast amounts of radioactive material. This caused immediate fatalities, widespread radiation exposure, and long-term health effects, including cancer and genetic mutations. Over 350,000 people were evacuated, and the area remains uninhabitable due to

[xviii] Cold War refers to a period of geopolitical tension (c. 1947–1991) between the US and its allies, advocating capitalism and liberal democracy, and the Soviet Union with its satellite states, promoting communism and centralized control. Characterized by indirect conflict through proxy wars, nuclear arms races, ideological rivalry, and global power competition without direct large-scale warfare between the superpowers. Key episodes include the Berlin Blockade (1948–49), Korean War (1950–53), Cuban Missile Crisis (1962), Vietnam War (1955–75), and the fall of the Berlin Wall (1989), culminating in the dissolution of the Soviet Union in 1991.[36]

[xix] As it is mentioned in the chapter of history background, the Trinity Test (July 16, 1945) was the world's first detonation of a nuclear weapon, conducted by the US at the Alamogordo Bombing Range, New Mexico, as part of the Manhattan Project. The test employed a plutonium implosion-type device, producing a yield of approximately 20 kilotons of TNT. Its success marked the beginning of the nuclear age and directly influenced the subsequent atomic bombings of Hiroshima and Nagasaki in August 1945.[37]

[xx] On August 29, 1949, the Soviet Union detonated its first nuclear device, code-named RDS-1 or "Joe-1" by the US, at the Semipalatinsk Test Site in Kazakhstan.

[xxi] The United Kingdom conducted its first nuclear test, code-named "Hurricane," on October 3, 1952, at the Monte Bello Islands, Australia, becoming the third nation to possess nuclear weapons.

[xxii] France conducted its first nuclear test, code-named "Gerboise Bleue," on February 13, 1960, at the Reggane Test Site in Algeria, becoming the fourth nation to acquire nuclear weapons.

[xxiii] China conducted its first nuclear test, code-named "596," on October 16, 1964, at the Lop Nur Test Site in the Gobi Desert, becoming the fifth nation to acquire nuclear weapons.

[xxiv] See the UN website for the summary of nuclear testing for international countries. The United Nations General Assembly declared August 29 as the International Day against Nuclear Tests through Resolution 64/35 on December 2, 2009, to raise awareness about the dangers of nuclear testing and the need for global disarmament (United Nations, 2009).

[xxv] The Strategic Arms Reduction Treaty (START) comprises a series of U.S.-Soviet (later U.S.-Russian) agreements aimed at reducing nuclear arsenals. START I (1991) and New START (2010) focused on limiting strategic nuclear warheads and delivery systems, with verification measures for compliance.

persistent radiation.[xxvi] It is regarded as the worst nuclear accident in history.

The *hibaksuha* population in Hiroshima and Nagasaki, therefore, represented an unparalleled opportunity for large-scale, longitudinal studies on the health effects of radiation. The establishment of the ABCC and the nature of its research mission remain the focus of significant ethical and historical debate. While the US government officially justified the atomic bombings of Hiroshima and Nagasaki as a necessary measure to bring WWII to a swift end and to curtail Japanese imperial expansion,[xxvii] this rationale has been contested, particularly from within Japan. From the perspective of many Japanese survivors and scholars, the bombings also served a secondary — and arguably experimental — purpose;[xxviii] to observe and analyze the effects of nuclear weapons on human populations in real time.

The rapid succession of events following President Harry S. Truman's accession to office,[xxix] the hasty decision to deploy atomic weapons,[xxx] and the swift yet opaque formation of the ABCC[xxxi] point to a tightly controlled set of military and political decisions, largely withheld from public scrutiny. The commission's research, conducted under the auspices of scientific advancement, was characterized by its controversial 'No Treatment Policy,' whereby *hibaksuha* were examined and monitored without receiving adequate medical care.

For many survivors, this policy underscored a sense of exploitation — that they were not patients or citizens deserving of aid but rather subjects of scientific inquiry. In this context, the ABCC is seen not as a neutral body of medical investigation, but as an extension of wartime priorities into the postwar period, reflecting broader questions about ethics, transparency, and the human cost of scientific progress.

These studies were driven by both scientific inquiry and strategic interests, as the US sought to expand its knowledge of nuclear technology not only for civilian medical applications but also for military advancement, including the development of future nuclear weapons. The ABCC, while publicly framed as a humanitarian and scientific initiative, effectively transformed survivors into research subjects, often without adequate medical treatment or informed consent.

Although official records do not explicitly indicate that the ABCC was planned within the framework of the Manhattan Project,[xxxii] there is clear institutional and intellectual continuity between the two. The organizational model, scientific priorities, and military oversight that defined the Manhattan Project served as the foundational blueprint for the ABCC's operations in occupied Japan.[38] As such, the ABCC functioned as a postwar extension of the wartime atomic research program, reflecting both the ambitions and ethical controversies of early nuclear science.

The **ABCC** conducted research across **ten primary categories**, each addressing a critical aspect of the long-term health effects of radiation exposure on survivors of the Hiroshima and Nagasaki bombings. **These studies covered diverse scientific and medical disciplines, greatly expanding global understanding of the effects of atomic radiation.** The major research categories included:

a. Radiation dosimetry and exposure studies

b. Cancer research

c. Genetic effects and heredity studies

d. Radiation sickness and acute symptoms

e. Cataracts and eye disorders

f. Cardiovascular research

xxvi The Chernobyl disaster of April 26, 1986, exposed approximately 116,000 people to radiation through immediate evacuation from the 30-kilometer exclusion zone, with an additional 230,000 resettled in subsequent years. An estimated 600,000 liquidators — firefighters, soldiers, and workers tasked with containment and cleanup — experienced the highest radiation doses, many developing acute radiation syndrome and long-term health complications. In total, millions across Ukraine, Belarus, and Russia were subjected to varying levels of exposure, making Chernobyl one of the largest mass radiation events in history, with consequences that continue to affect public health, demographics, and the environment.

xxvii Truman announced the US dropped an "atomic bomb" on Hiroshima, justifying it as a necessary military action to quickly end the war and save lives by avoiding a ground invasion of Japan. Here is a full text of his speech; "Announcement of the Atomic Bombing of Hiroshima" *By President Harry S. Truman (August 6, 1945)* "I have received this afternoon a report from the Secretary of War stating that the first atomic bomb was dropped on Hiroshima, a military base. That bomb has more power than 20,000 tons of TNT. The Japanese have, of course, already been warned quite frankly that, unless they surrender, they may expect a rain of ruin from the air, the like of which has never been seen on this earth. We have just finished the greatest battle in history, the Battle of the Pacific. I want to make it clear that we have no intention of ending the war with any further destruction. However, we will continue the war until Japan surrenders."

xxviii This view — that *hibaksuha* were used as subjects of radiation experimentation in the postwar period — is strongly reflected in my research on *hibaksuha* testimonies. While briefly addressed in earlier chapters, the majority of *hibaksuha* testimonies from 1950 to 2000 consistently express the perception that they were treated as research objects by the ABCC.

xxix In the months following President Harry S. Truman's accession in April 1945, the U.S. rapidly advanced toward atomic warfare. Truman was briefed on the Manhattan Project, oversaw Germany's surrender (May 1945), authorized the Trinity test (July 16), and issued the Potsdam Declaration (July 26). Following Japan's refusal to surrender, he approved the bombings of Hiroshima (August 6) and Nagasaki (August 9), 1945.

xxx Walker critiques the U.S. narrative framing the atomic bomb decision as a strategic necessity, arguing that it was hastily made. The decision followed the Trinity test (July 1945), with little consideration of alternatives such as demonstrating the bomb or modifying surrender terms. Prioritizing speed to end the war before Soviet involvement, Truman's advisers moved forward with minimal debate, driven by momentum rather than strategic or ethical deliberation.

xxxi The ABCC was formed to address immediate health concerns following the atomic bombings, specifically to assess the unknown long-term effects of radiation on *hibaksuha*. It also served US military interests, helping to gauge atomic warfare's impact on populations for future use in the Cold War. Established during the US occupation of Japan, the commission allowed the US to control the scientific narrative surrounding the bomb's effects.[14]

xxxii Keiji Takeuchi, a professor at Graduate School of Economics, Renewal Energy at Kyoto University examines the ethical considerations and debates among Manhattan Project scientists regarding the use of atomic bombs on Japan. He highlights that some scientists were concerned about the moral implications and the potential perception that the bombings were conducted as experiments on civilian populations. This perspective aligns with sentiments expressed by many hibaksuha, who felt they were subjected to involuntary experimentation under the guise of scientific research.[38]

g. Psychological and social effects

h. Public Health and epidemiological studies

i. Reproductive health studies

j. Medical and clinical research

Each of these research areas involved extensive, long-term investigations that provided essential data for understanding the health impacts of radiation exposure. Through these studies, the ABCC made invaluable contributions to the fields of **radiation biology, genetics, epidemiology, public health,** and **medical care,** shaping policies and practices related to radiation safety and healthcare.

The ABCC's groundbreaking work not only advanced the understanding of the devastating effects of nuclear radiation on human health but also influenced global policies on radiation protection and health management, particularly for populations exposed to radiation in other contexts, such as nuclear workers or individuals in the vicinity of nuclear accidents.

The ABCC produced a thorough bibliography of its published research papers from 1947 to 1959, cataloging 193 publications authored by its researchers during this timeframe. This bibliography features works in both English and Japanese, complete with indexes by author and subject. Published in 1959 by the National Research Council, it is available for access through the University of North Texas Digital Library.[xxxiii] The Yale University Archives houses a collection of ABCC publications from 1952 to 1975, encompassing a range of topics, including hematology, radiation-induced cataracts, cancer incidence, and genetic research.[xxxiv]

a. Radiation biology and medicine

Among the ABCC's most important and lasting achievements was its foundational work in radiation biology, a discipline that, before the commission's formation, was characterized by limited empirical data and an incomplete understanding of the effects of ionizing radiation on human populations.

Prior to the atomic bombings of Hiroshima and Nagasaki in August 1945, scientific understanding of the biological effects of nuclear radiation on human health was limited. Most knowledge stemmed from animal experiments and isolated occupational exposures.

Early observations following the discovery of X-rays in 1895[xxxv] included reports of dermatitis and alopecia in individuals experimenting with X-ray generators.[39] By the early 1900s, cases of skin carcinomas among radiologists and induced sarcomas in rats due to repeated irradiation were documented.[xxxvi] In 1906, studies on the tests of goats led to the formulation of the Bergonie and Tribondeau law,[xxxvii] highlighting the radiosensitivity of rapidly dividing cells.

Furthermore, in 1927, H. J. Muller demonstrated the mutagenic effects of radiation on the germ cells of Drosophila melanogaster,[40] earning him the Nobel Prize in 1946.[41] Despite these findings, comprehensive studies on the long-term effects of radiation on human populations were lacking until the establishment of ABCC, which provided invaluable data on radiation-induced health effects in humans.

Prior to the establishment of the ABCC, there were no comprehensive or longitudinal studies on human populations exposed to acute, high-dose radiation. The formation of the ABCC in 1947, under a collaborative initiative between the US and Japan, created a unique opportunity to systematically examine the long-term biological effects of radiation exposure in a civilian population.

The ABCC's research marked one of the first large-scale, population-based studies of the health effects of ionizing radiation, focusing on the *hibaksuha*. Through extensive clinical, epidemiological, and demographic studies, the ABCC generated invaluable data that fundamentally reshaped contemporary medical and scientific understanding of radiation's effects on human health.

The commission meticulously documented the extensive range of both acute and chronic health conditions associated with exposure to atomic bomb radiation.[xxxviii] These included the immediate effects of radiation sickness, such as nausea, alopecia, hemorrhaging, and immunosuppression, as well as the long-term health consequences that emerged in the months and years following exposure.[42]

Among the most critical findings of the ABCC's work was the identification of a statistically significant increase in the incidence of various forms of cancer among *hibaksuha*. Particular attention was given to hematological malignancies, such as leukemia, and solid tumors, including thyroid cancer, lung cancer, and breast cancer. The ABCC's longitudinal cohort studies were among the first to demonstrate a clear, dose-dependent relationship between radiation exposure and cancer risk, thereby establishing ionizing

[xxxiii] See the archives at Atomic Bomb Casualty Commission. (1959). Bibliography of published papers of the Atomic Bomb Casualty Commission (1947–1959). National Research Council.

[xxxiv] See the archives at Yale University. (n.d.). *Atomic Bomb Casualty Commission publications.* Historical Library, Harvey Cushing/John Hay Whitney Medical Library.

[xxxv] In 1895, Wilhelm Conrad Roentgen, a German physicist, discovered X-rays while experimenting with cathode rays. He observed a fluorescent screen glowing despite being out of the cathode ray's direct path, leading to the identification of a new form of radiation, which he named X-rays. This groundbreaking discovery earned Roentgen the first Nobel Prize in Physics in 1901.

[xxxvi] National Research Council (US) Committee on the Biological Effects of Ionizing Radiations. (1990). *Health effects of exposure to low levels of ionizing radiations: BEIR V.* National Academies Press (US).

[xxxvii] The Law of Bergonié and Tribondeau was formulated in 1906. It states that a cell's radio sensitivity increases with its reproductive activity and decreases with its level of differentiation. This principle remains a cornerstone of radiation biology and oncology. (Radiopaedia.org, n.d.)

[xxxviii] For detailed documentation of the acute manifestations of radiation sickness, see this article; *Summary of Health Effects of Ionizing Radiation in Toxicological Profile for Ionizing Radiation.* (Agency for Toxic Substances and Disease Registry, 2012), and for analysis of chronic health issues among *hibaksuha* as documented through the Life Span Study (LSS), see the article of *Long-term radiation-related health effects in a unique human population: Lessons learned from the atomic bomb survivors of Hiroshima and Nagasaki.*[40]

radiation as a powerful carcinogen in humans. The commission's research into leukemia was especially groundbreaking, as it constituted some of the earliest epidemiological evidence linking high-dose radiation exposure to a marked increase in leukemia incidence, thus providing foundational data for the emerging field of radiation oncology.

Beyond its contributions to oncology, the ABCC expanded the scope of radiation-related health outcomes to include non-cancer diseases. Its investigations revealed elevated risks of cataract formation, cardiovascular disease, and various disorders of the endocrine system, thereby illustrating that the biological effects of radiation were far more pervasive and complex than initially assumed.[43] These findings significantly influenced medical surveillance protocols and public health policies, as well as broadened the framework through which radiation's health consequences were understood.

A particularly transformative aspect of the ABCC's work was its pioneering development of radiation dosimetry, the scientific measurement and reconstruction of individual radiation doses. Accurate dosimetry was essential for quantifying the relationship between exposure levels and health outcomes. To achieve this, the ABCC meticulously collected and analyzed survivor testimonies regarding their precise locations at the time of detonation, the nature of any physical shielding (such as walls, buildings, or natural terrain), and their distance from the hypocenter of the[44] explosion. [xxxix]These data were combined with physical measurements of residual radiation and theoretical modeling of blast effects to estimate individualized radiation doses for thousands of survivors.

The development of individualized radiation dose estimates by the ABCC made it possible to generate dose-response curves, which demonstrated the relationship between radiation exposure levels and the incidence of specific health outcomes. These findings provided critical empirical evidence that became central to clinical decision-making and public health regulation.[xl] The dose-response data informed the establishment of radiation exposure limits across medical, occupational, and environmental settings.

Moreover, the dosimetry methodologies and analytical frameworks introduced by the ABCC laid the groundwork for modern practices in radiation safety, protection, and health physics. These approaches continue to influence global standards, guiding permissible exposure levels in medical procedures such as diagnostic imaging and radiation therapy, occupational safety for nuclear industry personnel, and preparedness protocols for radiological emergencies.[45]

The ABCC's work in radiation biology not only advanced scientific understanding of the biological and epidemiological effects of ionizing radiation on human populations but also laid the essential groundwork for modern radiological health sciences. Its research established critical empirical evidence that continues to inform medical practice, regulatory policy, and scientific inquiry into radiation's health risks.

b. Genetics and heredity

A significant contribution of the ABCC was its pioneering research in the field of genetics, particularly in elucidating the effects of radiation exposure on human DNA and its potential to induce hereditary mutations. The ABCC initiated comprehensive investigations into the genetic consequences of atomic bomb radiation by focusing on the offspring of *hibaksuha* — individuals exposed either *in utero* or through parental exposure to the atomic bombings.[45] These studies represented the first large-scale effort to systematically assess the genetic impact of radiation exposure in human populations.

The ABCC's findings were groundbreaking, providing early empirical evidence of radiation-induced genetic mutations in humans. The research identified elevated rates of birth defects, miscarriages, stillbirths, and certain congenital anomalies among the children of *hibaksuha*.[xli] In some instances, these studies demonstrated higher incidences of genetic disorders relative to unexposed populations, marking a pivotal moment in the study of radiation genetics.

This body of work significantly advanced the scientific understanding of mutagenesis—the process by which environmental factors, such as ionizing radiation, can alter genetic material and subsequently affect hereditary transmission.[xlii] The implications of these findings were substantial for the emerging field of genetic epidemiology, particularly in elucidating how environmental exposures contribute to the mutation burden within human populations.[xliii] Moreover, the ABCC's research laid critical groundwork for subsequent investigations into the genetic effects of radiation exposure in other contexts, including among nuclear industry workers and survivors of nuclear accidents such as the Chernobyl disaster or Fukushima.

c. Medical diagnosis and treatment

The research conducted by the ABCC made crucial contributions to the development of medical diagnostic and treatment protocols for radiation-induced illnesses. In the immediate aftermath of the atomic bombings of Hiroshima and Nagasaki, there was a profound lack of clinical understanding regarding the biological effects of acute and chronic radiation exposure. The ABCC's systematic studies were among the first to document the clinical manifestations of radiation sickness, including hematological, dermatological, and neurological

[xxxix]This article traces the evolution of dosimetry techniques used in atomic bomb survivor studies, highlighting the critical role of survivor interviews in reconstructing individual radiation doses by assessing location, shielding conditions, and proximity to the hypocenter.

[xl]This report evaluates health risks from low-level ionizing radiation, primarily based on data from hibaksuha. It confirms that even minimal exposure increases cancer risk and informs radiation safety standards in medical and occupational settings. National Research Council. (2006). *Health risks from exposure to low levels of ionizing radiation: BEIR VII Phase 2*. The National Academies Press.

[xli]A large-scale study by the ABCC (1948–1954) examined 76,626 pregnancies and found no significant increase in birth defects, stillbirths, or neonatal deaths among children of atomic bomb survivors, helping to alleviate concerns about radiation-induced genetic effects in offspring.45

[xlii]See the part of the article; Genetic Effects of Radiation in the Offspring of Atomic-Bomb Survivors Radiation Effects Research Foundation. (n.d.). *Genetic effects of radiation in the offspring of Atomic-bomb survivors.*

[xliii] The genetic studies conducted by the ABCC and RERF advanced the understanding of mutagenesis, illustrating how environmental factors like ionizing radiation can alter genetic material and affect heredity, significantly contributing to the field of genetic epidemiology. For the summary, see the article and table at *Genetic effects of radiation in the offspring of atomic-bomb survivors.* RERF website.

symptoms, and to establish standardized diagnostic criteria for acute radiation syndrome (ARS).[xliv]

Beyond the acute phase, the ABCC's long-term follow-up of *hibaksuha* provided invaluable data on the delayed health effects of radiation, particularly the increased incidence of various malignancies such as leukemia and solid tumors.[xlv]

These findings played a critical role in shaping contemporary knowledge about the carcinogenic potential of ionizing radiation and guided the development of medical monitoring and intervention strategies for exposed populations.[xlvi] Moreover, the ABCC's work laid an essential foundation for subsequent research on radiation-related health risks in other settings, including occupational exposures among nuclear industry workers and populations affected by nuclear accidents.

One of the commission's most significant contributions was in the development of **radiation therapy techniques,** particularly for cancers linked to radiation exposure. Through their long-term studies on *hibaksuha,* the ABCC was able to establish important data on how radiation interacts with human tissues, offering a clearer understanding of the **therapeutic versus harmful dosages** of radiation.[xlvii]

By analyzing the dose-response relationship between radiation exposure and the development of cancers, such as leukemia and solid tumors, the ABCC provided valuable insights into **radiation dosage thresholds** that could induce therapeutic effects without causing significant harm. This understanding was crucial in refining **radiation therapy protocols**, allowing for more effective treatment plans, particularly in oncology, where radiation is used as a targeted therapy for various types of cancer.[48] The ABCC's research highlighted the importance of precision in radiation delivery, which minimized the risk of further tissue damage while maximizing the therapeutic benefits.

Moreover, the ABCC's extensive data collection on the **long-term health effects** of radiation exposure set the stage for comprehensive **health surveillance** programs.[xlviii] The commission's research demonstrated the importance of monitoring individuals who had been exposed to significant doses of radiation, as many of these individuals went on to develop radiation-induced cancers and other health issues. This focus on long-term surveillance laid the groundwork for **follow-up care protocols**, including **routine screenings** for cancer, cardiovascular diseases, and other potential radiation-related health complications.

These surveillance practices were not only instrumental for the health of *hibaksuha* but also became a foundational model for **radiation exposure monitoring** across the globe. The practices set by the ABCC were adopted internationally in populations exposed to radiation through various means—whether from industrial activities, medical treatments (such as radiation therapy), or environmental exposures (e.g., nuclear accidents).[xlix] The commission's research and the subsequent global adoption of surveillance protocols have become a cornerstone in the ongoing study and management of radiation-related health risks, helping to protect future generations from the long-term effects of radiation exposure.

d. Technological advancements

The ABCC not only advanced the understanding of radiation's effects on human health but also spurred several technological and methodological innovations with far-reaching applications. Among its most significant contributions were the development of sophisticated radiation measurement instruments and dosimetry techniques. Originally designed to estimate the levels of radiation exposure among *hibaksuha,* these tools laid the groundwork for contemporary radiation safety protocols. Over time, they were adapted for broader use in medical diagnostics, industrial monitoring, and environmental protection, shaping the standards for radiation detection and control worldwide.[14]

The ABCC also played a pivotal role in the advancement of medical imaging, particularly through its pioneering efforts in radiographic cancer screening among *hibaksuha*. Faced with the urgent need to detect radiation-induced malignancies at early, treatable stages, the ABCC developed and refined imaging techniques that offered new levels of precision and diagnostic clarity for the time. This work yielded essential insights into how radiation exposure affects internal tissues and organs, and how imaging technologies could be optimized to detect subtle pathological changes.

These early innovations in radiographic screening laid important groundwork for the evolution of modern medical imaging technologies, including X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and nuclear medicine

[xliv] Acute Radiation Syndrome (ARS) is a severe illness caused by high-dose, short-term exposure to ionizing radiation, affecting rapidly dividing cells in the bone marrow, gastrointestinal tract, skin, and nervous system. It progresses through prodromal, latent, and manifest illness stages, with symptoms including nausea, fatigue, leukopenia, skin damage, and, in extreme cases, neurological impairment.[46]

[xlv] National Cancer Institute. (n.d.). *Atomic bomb survivor studies: Overview and recent findings.* Division of Cancer Epidemiology and Genetics, National Cancer Institute.

[xlvi] The **ABCC,** particularly through the work of **Dr. Austin Brues, Dr. Shields Warren, Dr. James V. Neel, and Dr. William J. Schull,** identified the increased risks of **leukemia** and **solid tumors** among atomic bomb survivors. Their foundational studies, initiated in the late 1940s, documented a significant rise in leukemia cases, especially among children. Long-term follow-ups confirmed heightened risks for various cancers, including **thyroid, breast, lung, and stomach cancers.**[47]

[xlvii] The ABCC identified the **dose-response relationship** between radiation exposure and cancer incidence, providing insights into the **optimal radiation doses** required for therapeutic effects while minimizing harm. This understanding was crucial in refining **radiation therapy protocols,** allowing for more effective treatment plans, especially for cancers induced by radiation exposure.[49]

[xlviii] The ABCC launched the Life Span Study (LSS) in 1950, involving approximately 120,000 survivors and control subjects to examine long-term radiation effects, particularly cancer incidence and mortality. In 1955, the Francis Committee recommended a unified study approach, resulting in the establishment of the Adult Health Study (AHS) in 1958. The AHS conducted biennial medical exams of 20,000 individuals, generating critical data on delayed radiation effects and aiding the development of strategies for managing these health impacts.[50]

[xlix] The ABCC and its successor, the RERF's long-term studies on *hibaksuha* provided the critical empirical basis for global radiation protection standards and surveillance programs. As Putnam notes, the ABCC's research "provided the primary basis for radiation health standards throughout the world," influencing practices adopted by organizations such as UNSCEAR, the ICRP, and national health agencies.[14]

imaging.[51] By addressing the complex diagnostic challenges presented by radiation-exposed populations, the ABCC's research accelerated improvements in image resolution, contrast techniques, and screening protocols. As a result, these developments not only improved the early detection and ongoing monitoring of cancers—both in *hibaksuha*[l] *and in the general population—but also broadened the application of imaging in diagnosing and managing a wide array of other medical conditions, from cardiovascular diseases to neurological disorders.*

Moreover, the ABCC's integration of imaging technologies into large-scale epidemiological studies influenced clinical practice by demonstrating the value of systematic, image-based health surveillance in at-risk populations.[li] *It also shaped medical research by providing a model for how imaging could be used as both a diagnostic tool and a source of data for longitudinal health studies, thereby advancing the fields of radiology, oncology, and public health research simultaneously.*

One of the ABCC's most influential initiatives was the establishment of extensive survivor registries and the implementation of structured, long-term follow-up protocols. These efforts allowed researchers to collect comprehensive baseline data on the physical, psychological, and social well-being of hibaksuha and to monitor changes in their health status over successive decades. By linking individual health outcomes with precise radiation exposure estimates and other demographic variables, the ABCC created one of the earliest and most sophisticated epidemiological datasets in modern public health history.[52]

These methodological innovations not only facilitated groundbreaking insights into the incidence and progression of radiation-related diseases, such as leukemia, solid cancers, and cardiovascular conditions,[lii] but also helped identify a broad range of non-radiation-related health outcomes influenced by environmental and social factors. The ABCC's emphasis on rigorous data standardization, consistent follow-up intervals, and careful cohort selection established methodological standards that have since become foundational in public health research.

Importantly, these approaches proved especially valuable in the context of long-term studies aimed at understanding the delayed and cumulative effects of environmental exposures and chronic disease trends. The ABCC's work demonstrated the necessity of sustained, multi-generational health monitoring to capture the full impact of public health threats, setting critical precedents for future epidemiological research, including studies of occupational hazards, environmental disasters, and emerging global health crises. As a result, the ABCC's methodologies have had a lasting influence, continuing to inform contemporary research designs and public health surveillance programs around the world.

Conclusion

In conclusion, the history of the ABCC can be more deeply understood through the lens of colonial and postcolonial theory, which reveals how historical meaning changes completely depending on the position from which events are experienced. From the perspective of the US government and many ABCC scientists, the institution represented rational scientific progress, humanitarian knowledge production, and the modernization of nuclear medicine after WWII.

However, from the perspective of many *hibaksuha* in Hiroshima and Nagasaki, the ABCC embodied a hierarchical postwar power structure in which the victorious occupier exercised scientific and political authority over defeated civilian bodies. As Fanon argued that colonial systems frequently transform colonized populations into objects of administration, classification, and knowledge extraction, in many ways, the ABCC reflected similar dynamics: *hibaksuha* bodies became sites through which American military medicine, epidemiology, and radiation science could accumulate data, authority, and global legitimacy. The institution's early refusal to prioritize direct treatment reinforced the perception among survivors that their suffering was being observed rather than healed, producing what many regarded as an inhumane relationship between scientific power and human trauma.

At the same time, postcolonial theory also helps explain why the relationship between the ABCC and *hibaksuha* became deeply ambivalent rather than entirely oppositional. Colonial encounters are rarely characterized by absolute separation; instead, they often generate forms of mutual dependency, contradiction, and psychological entanglement. Although *hibaksuha* and ABCC researchers frequently understood the atomic bombings and the postwar occupation through completely opposing moral frameworks, their histories became inseparable through sustained interaction. The ABCC depended upon *hibaksuha* participation to construct the Life Span Study and establish international standards for radiation risk assessment, while many *hibaksuha* later relied upon the medical systems, diagnostic technologies, and cancer surveillance methods that emerged from this research infrastructure. This reflects what postcolonial scholars such as Homi Bhaba and Albert Memmi describe as relational ambivalence: a condition in which domination and dependence coexist simultaneously rather than canceling one another out.[liii]

The irony of this relationship is historically profound. Many radiation-associated cancers suffered by *hibaksuha* were later identified, monitored, and treated through nuclear medical technologies and epidemiological methodologies that were

[l] According to a 1950 census, approximately 284,000 *hibaksuha* were recorded, with 159,000 in Hiroshima and 125,000 in Nagasaki. About 120,000 survivors were enrolled in the Life Span Study (LSS), a long-term epidemiological study, including individuals within 2.5 km of the hypocenter and others with varying exposure levels. Approximately 92% of *hibaksuha* have individual radiation dose estimates.

[li] At-risk populations refer to groups more likely to experience adverse health effects due to specific exposures or vulnerabilities, such as radiation-exposed individuals (e.g., *hibaksuha*), occupationally exposed workers, residents near radiation sites, genetically predisposed individuals, and vulnerable age groups (children and the elderly).

[lii] **Radiation-related disease** is a general medical category for illnesses caused by ionizing radiation from natural, medical, occupational, or accidental sources. In contrast, **atomic bomb disease** is a legally defined category in Japan, applying exclusively to Hiroshima and Nagasaki *hibaksuha.* It includes acute and long-term effects of atomic bomb exposure—such as radiation sickness, cancer, non-cancer conditions, psychological trauma, and officially recognized diseases under Japan's Atomic Bomb Survivors' Assistance Law.

[liii] This interpretation draws upon postcolonial theories of colonial ambivalence and interdependence. Homi K. Bhabha argues that colonial authority is inherently ambivalent because it simultaneously depends upon and fears the colonized subject.[53] Similarly, Albert Memmi emphasizes that colonizer and colonized identities become structurally interdependent within colonial systems, despite profound inequalities in power and experience.[54]

themselves developed from ABCC and subsequent RERF research. Thus, the *hibaksuha* became both victims of nuclear violence and indispensable contributors to the scientific systems that shaped modern radiation medicine worldwide. This does not erase the ethical problems surrounding the ABCC's practices, nor does scientific advancement justify the suffering imposed upon *hibaksuha*. Rather, it demonstrates how postwar scientific progress emerged through unequal relations of power embedded within military occupation and nuclear modernity. Ultimately, the history of the ABCC reveals why it is essential to approach history through multiple perspectives grounded in ethical justice rather than triumphalist narratives of scientific advancement alone. Only by acknowledging both the extraordinary medical contributions of the ABCC and the structural violence experienced by *hibaksuha* can a more critically responsible understanding of the post-atomic world be achieved.

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