



## Children of the Atomic Bomb: An American Physician's Memoir of Nagasaki, Hiroshima, and the Marshall Islands

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[Editor's Note: Among the legacies of the atomic bombings of Hiroshima and Nagasaki has been a 50-year effort to understand the medical effects of exposure to radiation. Dr. James Yamazaki, an American-born pediatrician who had been captured by the Germans while serving as a combat surgeon during the Battle of the Bulge, was among those physicians sent to Japan in 1949 to study the effects of radiation on children. Dr. Yamazaki's research and writing not only on the Japanese survivors of the bomb, but also on the Marshall Islands victims of atmospheric nuclear testing in the Pacific, has spanned five decades. On August -- the 50th anniversary of the bombing of Hiroshima -- Duke University Press will publish Dr. Yamazaki's memoir, "Children of the Atomic Bomb." Part autobiography, part eyewitness account, and part scientific review of the medical evidence to date, Dr. Yamazaki's book, brief excerpts from which follow, is a moving reminder not only of the horrors of nuclear weapons, but also of the redemption that can be found in the attempt to heal. MGS 1995;2:101-05]

There is a history of ties to the Western world unique to Nagasaki. This was the first port of entry for the Portuguese when Japan was opened to them in 1571. The Dutch maintained a foothold on Deshima in the bay when the rest of Japan was sealed off from the outside world by the Foreign Exclusion Act in 1636. The Dutch brought modern medicine to Japan through Nagasaki. Roman Catholic priests, despite persecution, maintained a Christian hold within the city, and their followers were among those who suffered the most in the bombing.

But this mixture of contrasts and historical contradictions only served to bewilder me when we arrived that January day in

1950. There had been no briefings. I was the only American doctor. My assignment as chief physician of the Atomic Bomb Casualty Commission (ABCC) in Nagasaki had been thrust on me after my arrival in Japan. I had accepted reluctantly, always suspecting that it was a form of exile because I had protested the racial discrimination my family and I had suffered from the British occupation officers in Hiroshima.

I did not have time to reflect on my anxieties, however. From the moment of my arrival, I sensed the need to get busy. The first thing to do was to deal with the inevitable hostility of people still overwhelmed with anger after the bombing. Many survivors thought we had come to use them simply as guinea pigs, and that our sole interest was to gain information to protect Americans in the United States in the event of

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an atomic attack. They were skeptical about our real concern for their well being. They doubted that there would be any treatment for those suffering the long term effects of radiation.

Somehow, urgently, I had to gain their confidence, assure them that we were genuinely concerned about their well being and were not there to treat them as experimental laboratory animals....

It is hard for me to believe today how little I knew then about the bomb and its devastation. There had already been a thorough and authoritative survey of the short-term medical impact of the two bombs on the people of Hiroshima and Nagasaki. But the reports were all classified, and none of their contents had been made available to me.

Even though I had served as a combat officer in the U.S. Army in the European Theater, was on special assignment for the ABCC, and had security clearance from the Atomic Energy Commission (AEC), I was told nothing. I did not even know of the existence of these reports until shortly before I left Japan. Certainly no reference was made to them in the interviews I had with the principal scientists in the investigation before I came to Japan. It would have been immensely helpful to have had access to these findings as we groped our way toward establishing our research on the effects of the radiation.

There has never been an official explanation of the secrecy. I think it may have stemmed from a desire to avoid greater backlash from the Japanese themselves if the full story of the bombs' effects on people, especially children, had been told at that time. There certainly was a determination among the American authorities then to suppress most of the relevant information. Even the press coverage was severely censored under rules of the occupation.

So I first learned the human dimensions of the Nagasaki bomb from Chief of Police Deguchi. He had been an assistant chief of air raid defense for the prefectural police department when the bomb exploded.

"Tell me about it," I said, trying to conceal my vast ignorance of the bomb's impact on the population.

He was alive and able to tell the story only because the building where he was working at the time, Katsuyama Primary School [in the Nishiyama Valley], was protected by the mountain ridge that separates the Urakami and Nishiyama Valleys.

There had been an air raid alarm earlier that morning, but no bombs fell. Some people had come out of shelters as eleven o'clock approached, only to hear the distant throb of bomber engines. Before many could take

cover again, there was a flash of extremely bright light, blinding even on the far side of the mountain ridge, then a thunderous blast that shook the school building for a full minute, followed by terrifying darkness as the atomic cloud eclipsed the sun.

Deguchi ordered a police patrol to find out what had happened on the other side of the ridge. The policemen were back in minutes. The industrial area was engulfed in flames, they said, thousands appeared dead, and the survivors were running in panic, many of them left with only burning shreds of their clothing. The railroad station, a quarter of a mile away, was destroyed. Health services were paralyzed with the destruction of the University Medical Center. The new prefectural offices had burned to the ground. The fires were spreading.

Three hours later, the first refugees from the Urakami Valley struggled around and over the ridge to reach the Katsuyama School where Deguchi was working. They collapsed in utter shock. No organized rescue effort had been possible in the first hours. Rescue teams from the navy hospitals that tried to enter the Urakami Valley on the first day were driven back by a wall of flame. Trucks and trains were able to transport those escaping to the north, but many died in the crowded vehicles before they ever reached neighboring towns....

Over the next three days, the police began to gather the dead. The bodies of those who could be identified were turned over to relatives, who had joined the search. Those who could not be identified were cremated, the ashes buried in common graves. Two weeks were required to remove all of the dead from the Urakami Valley.

"The first reports to Tokyo were that there had been no serious damage," Chief Deguchi told me. In fact, every part of the city had suffered some damage, ranging from broken windows in outlying areas to incineration at the hypocenter. From the minute the bomb detonated, there was general despair, he said.

As the hours passed and the extent of the damage of that single bomb became clearer, there was a growing realization that resistance to the Western Allies by Japan was no longer possible.

As I heard this report I began to question whether we would ever find survivors who could help us discover the medical lessons of this incredible exposure to radiation. The trauma, both physical and psychological, obviously had been universal....

## **Expanding Research**

[E]very effort was being made to

strengthen and enlarge the genetic study that had been set in motion in Hiroshima and Nagasaki by Dr. [James] Neel [a medical geneticist at the University of Michigan at Ann Arbor]. The program included a professional examination of each newborn to look for evidence of abnormal pregnancy outcomes that might be traced to the bomb radiation exposure of their parents. This was no small task. In Nagasaki alone, five hundred to eight hundred babies were being delivered each month....

The genetic study was under the overall direction of Dr. William J. Schull, a geneticist from Ohio State University who was based in Hiroshima. He later joined the staff of the Graduate School of Biomedical Sciences at the University of Texas, Houston, as director of the Genetics Center. I managed the program in Nagasaki alone until, months later, additional staff assistance was provided. Fortunately, Dr. Schull paid periodic visits to Nagasaki to iron out problems and to keep the work in the two cities closely coordinated.

In anticipation of expanding the program, the ABCC had been conducting a census of the entire city, with census tract maps. In this way we were able to identify and classify the survivors by their initial exposure to the bomb. This proved essential when we initiated the more detailed studies months later.

Our work in Nagasaki was made much easier by the willingness of the Japanese to integrate the research being undertaken by the ABCC with their own academic medical programs. It was a cooperative arrangement that eventually ensured the continuation of the research, under Japanese direction, to the present time.

The close cooperation between Japanese and American scientists facilitated another major research program, studying fallout to determine its impact on the population. But the fact of the matter is that I had never heard the word fallout before I came to Japan. I had received no information about the bomb itself, let alone the risks of fallout that had been anticipated from the time of the first test in New Mexico....

Our earlier ABCC census provided us with most of the information we needed to locate survivors. Japanese officials readily agreed to provide the missing data by including in the national census questions that would locate survivors who had moved away from Hiroshima and Nagasaki. Thus we had identified those we needed to contact to do the research. We were ready to go.

My own time in Nagasaki was running out, and I realized, as I worked out the final parameters of the study, that none of us

would know all the answers for years to come.

We decided to use two groups of children for the intrauterine study. The most important group would be those who were in the womb and within two thousand meters of the hypocenter at the moment of detonation, and whose mothers had developed the triad of radiation disease symptoms: loss of hair, bleeding skin lesions, and throat and gum ulcerations. The other would be children who were in the womb at the moment of detonation but were four to five thousand meters from the hypocenter -- a control group, as it were.

We were also continuing our studies of children caught in proximity to the blast. In the end, we were able to identify only 134 surviving children who had been within a thousand meter radius, and only 12 who had been within five hundred meters.

We needed to keep careful track of the development of the 134 survivors for comparison with those exposed while fetuses. At that time we had not yet confirmed that the risk of radiation damage is even greater for the fetus than for children after birth. Nor had we devised research techniques that would allow us to differentiate between defects caused by radiation of the fetus and defects caused by the trauma of the bomb or such other factors as infection and the malnutrition prevalent in Japan during and immediately after the war....

## Emerging Answers

In 1953, at an AEC symposium for embryologists, I was able to present the first findings of the work we had done in Nagasaki. We met at Oak Ridge, Tennessee, in a structure overlooking the giant laboratory complex where weapons-grade uranium and the techniques for the production of plutonium had been developed. I had come to one of the birth places of the Hiroshima and Nagasaki bombs....

The report we presented at Oak Ridge covered the thirty pregnant women who had suffered extensive radiation illness after exposure to the Nagasaki bomb. They had been within 2,200 yards of the hypocenter and had somehow survived. In this group, 43 percent of the pregnancies ended in death through spontaneous abortion, stillbirth, or neonatal or infant death; 17 percent of the babies were born with abnormalities, including mental retardation, eye defects, and urinary incontinence. Forty percent were born with no significant observable abnormalities. Among the survivors, the mean head circumference, body height, and weight were significantly reduced.

We had to acknowledge that we could not specify the degree to which radiation had been responsible for the morbidity and mortality. These women had suffered extensive trauma, burns, malnutrition, and infection, each of which could have had a role in the negative pregnancy outcomes...

The discovery of leukemia among the survivors set the stage for what would become the largest cancer research program of its type in the history of medicine. By 1957, more than 100,000 people in Nagasaki and Hiroshima were participating in the program.

When the study began, the emphasis was on using death statistics to calculate the medical consequences of the bombs. But it soon became clear that this would not yield a full and complete answer. Because of modern treatments and other factors, it was likely that many with radiation-induced cancer might survive and eventually die of other causes. So a lifetime study of the incidence of cancer among the survivors was proposed by the ABCC. Each case of cancer was recorded at the time of diagnosis. Hospital records were monitored. Complete tumor registries were established in Nagasaki and Hiroshima. And the actual radiation exposure for each person in the study was calculated using the DS86 dosimetry, providing accurate estimates according to the individual's distance from the hypocenter and any shielding that might have modified the exposure.

The first comprehensive report on the incidence of cancer among the survivors was issued in February 1994 [1], and it covered an extraordinary base of eighty thousand persons. Building on the continuing mortality study, the research confirmed and quantified with new precision the cancer risks of radiation....

We still cannot measure with assurance the extent of late-developing cancers among the survivors. However, the 1994 cumulative report on the incidence of cancer and the ongoing mortality study have demonstrated increases attributable to bomb radiation in the incidence of nine different cancers: breast, colon, lung and respiratory tract, ovary, salivary gland, skin (excluding melanoma), stomach, thyroid, and urinary bladder. At the same time, the study found no increase due to radiation in cancer of the cervix, esophagus, gall bladder, kidney, larynx, oral cavity, pancreas, pharynx, prostate, rectum, and uterus.

In the span of two generations, we have come to know many, perhaps most, of the short-term risks of radiation. Children are the most at risk, particularly for mental retardation, retarded development, and elevated incidence of cancer....

We must wait another twenty years, I think, until the end of the normal life span of the youngest survivors, before we can know the full story of the effects on those exposed to the radiation of the bombs. ☹️

## Reference

1. Radiation Effects Research Foundation. RERF special report 1994. Radiation Research 1994.

