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Human Guinea Pigs at Oak Ridge?

Scientists respond to a report that they used cancer patients to test man's tolerance of radiation in space

The investigations subcommittee of the House Committee on Science and Technology is planning to hold hearings later this month on a report that got a lot of attention on 20 August: a charge that during the 1960's cancer patients at a small clinic linked with the Oak Ridge National Laboratory in Tennessee may have received unnecessary doses of gamma rays in an experiment aimed at learning just how much radiation astronauts could tolerate before becoming sick and choking in their oxygen masks. The hearings will be chaired by a Tennessean, Representative Albert Gore, Jr. (D).

Oak Ridge officials were caught somewhat unprepared when the author and publisher of the report, Howard Rosenberg and *Mother Jones* magazine, held a press conference before network television cameras in Washington, D.C. A spokesman for the medical division at Oak Ridge, Wayne Range, essentially denied the thrust of the article, but challenged few of the facts. (The hospital itself has been closed since 1974.) Although the National Aeronautics and Space Administration (NASA) did pay for some of the research, Range said, its involvement was passive. Cancer therapy given at the hospital, he claimed, was a standard variety for 1965, and all that NASA gained was an opportunity to examine some patients' records.

Rosenberg's report focused on the case of Dwayne Sexton, a child with acute leukemia who was treated at the Oak Ridge Institute of Nuclear Studies between 1965 and 1968. The author explained that Sexton was the only one of "at least 89 cancer patients . . . systematically exposed to large doses of radiation between 1960 and 1974 in two specially designed chambers" whose record he was able to reconstruct. Rosenberg said he had spent 18 months canvassing Tennessee for information on patients, interviewing officials, and reading "thousands of pages" of government documents.

The 20 August press conference made a splash on the national evening news. Among those who spoke before the cameras were Mary Sue Sexton, distraught mother of Dwayne, the 6-year-old Tennessean who died at the hospital in 1968; Karl Morgan, former chief health physicist at Oak Ridge, who said he felt "sorrow and dismay" that he had once sent a friend to the Oak Ridge clinic; and Peter Wiernick, a physician from the Baltimore Cancer Center, who said that he thought the clinic made a mistake in not telling patients about the uses to be made of the radiation research. He also thought the Sexton child might not have received normal care in that he was not given a standard course of chemotherapy before other, untested therapies were used.

> Rosenberg claimed that the cancer program was "corrupted" by the desire to find data for NASA, and that patients were given nontherapeutic doses of radiation.

According to Rosenberg, doctors at the Oak Ridge Institute of Nuclear Studies who treated Sexton between 1965 and 1968 "belatedly began treating Dwayne Sexton with chemotherapy" only after they tried and failed to help him with an unusual experiment in immunology. Rosenberg also stressed that Sexton was later given a large dose of total-body radiation and sent to recover in a radiation chamber (not in operation) used to treat other patients. Beneath the chamber was an area where animals were kept. When the room was in use, they were exposed to gamma rays along with patients. Rosenberg suggested that people like Sexton, highly susceptible to infection, could have been exposed to dangerous bacteria. Sexton did, in fact, die of strep and staph infections, a common pattern for acute leukemia patients. Oak Ridge officials insist that bacteria from animals were not a problem, since the chamber was the cleanest area in the hospital, and no animals were present until 1969, the year after Sexton's death. The animals had a separate air supply system. Cages and debris were moved through hallways where patients walked, but laboratory officials say there was no risk of contamination because the trash was kept in airtight plastic bags.

Rosenberg released other documents, including the summary of an unfavorable review given the clinic by the parent agency, the old Atomic Energy Commission (AEC), in 1974. According to the AEC summary, the clinic's facilities were "substandard with respect to licensing and accreditation guidelines," the entire medical division was "essentially isolated from the critical climate of academic clinical investigation," the main laboratories were inadequate, and the hematology program was particularly deficient. The irradiation programs were declared to be "without adequate planning, criticism, or objectives." The bone marrow immunology program was cited for "severe criticism" because "ethical questions were raised with respect to the protocols employed. . . ."

In addition, Rosenberg cited the fact that NASA financed some of the clinic's equipment and paid the salaries of some researchers. He claimed that the cancer program was "corrupted" by the desire to find data for NASA, and that patients were given nontherapeutic doses of radiation.

A team led by Oak Ridge pathologist Clarence Lushbaugh, now chairman of Oak Ridge's entire medical division, was recruited to study the nausea-inducing effects of radiation. Lushbaugh analyzed the records of 3000 patients in 46 hospitals to learn about the dangers that would confront the astronauts. Oak Ridge was not the primary source of Lushbaugh's information, for it gave radiotherapy to no more than 186 patients.

The man who was then chairman of Oak Ridge's medical division and designer of the treatment protocols, Gould Andrews, died in 1980. Speaking in his place, Lushbaugh now claims that Andrews made all decisions on therapy and was in no way influenced by NASA's concerns. Karl Hübner, a member of the hematology staff, said that the therapy offered at Oak Ridge in the 1960's and early 1970's was perfectly in keeping with standard approaches of the day.

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Range said. "We are quite proud of our record. At a time when patients with acute leukemia had a survival outlook of about 6 months to a year, our patients were surviving on the average something like 4.5 years." The record compares well with those of other clinical centers in the 1960's. Range said.

William Bibb, the former AEC official in charge of funding the program, said that the Oak Ridge clinic was opened in 1950 "to take advantage of some of the technology coming out of the atomic energy business before it was generally available." The clinic was closed in 1974 for two reasons: other centers nearby with broader skills were giving comparable medical care, and the meager research output from Oak Ridge no longer justified the cost. Bibb said that in the final years, the clinic had only about seven patients at any given time.

Bibb described NASA's involvement as minimal. NASA came to him in the early 1960's because it was worried about the possible effects of solar flares, encounters with the Van Allen belt, and other radiation hazards in space. In 1964, 14 years after the Oak Ridge clinic had opened, the AEC agreed to run a retrospective study to collect the data NASA wanted from its own records and from other places. Later on, Bibb said, NASA agreed that in addition to paying the salaries of those doing the paper analysis, it would also provide some state-of-the-art monitoring equipment to record changes in the vital signs of patients undergoing whole-body irradiation at Oak Ridge. Patients sometimes stayed 3 days in the specially designed whole-body irradiation room, a chamber suspended in a concrete cell and flooded with gamma radiation at a level of about 1.6 roentgens* per hour. With the aid of NASA's equipment, nurses could monitor a patient's pulse and temperature without entering the room. The data were examined by the physicians and then turned over to Lushbaugh's staff. NASA also paid for a computer to help sort through the voluminous files.

"It would have been as stupid as hell," Bibb said, for NASA to try to get significant data from the Oak Ridge clinic alone, because it treated only 186 patients. Any conclusion based on data, he said, "wouldn't have been worth the paper it was written on because there wouldn't be enough data points to mean a damn thing."

Bibb pointed out that much of the research done for NASA was incorporated in the book, *Radiobiological Factors in Manned Spaceflight*, published by the National Academy of Sciences in 1967. Nevertheless, he conceded that Oak Ridge did perform some NASA-financed prospective studies with cancer patients between 1969 and 1974. The purpose, he said, was to use the new monitoring system to try to find physiological signals indicating that a patient was about to become nauseous before the patient sensed nausea himself. No warning signals were found. Although the research was funded by NASA, Bibb insisted that the space agency had no influence over clinical procedures.

Hübner specifically denied the charge that Dwayne Sexton was given improper treatment. According to the medical records, Hübner said, the doctors first extracted a sample of bone marrow from the child in July 1965. Then they immediately started him on a course of chemotherapy lasting 17 days. The chemotherapy was stopped while they attempted an immunologic experiment. They irradiated the child's leukemic marrow cells, injected them into his mother, and then reinjected fluid from the mother back into the boy. The hope was that the mother would produce antibodies to fight the leukemia. Meanwhile, the leukemia was judged to be in remission, probably as a result of the first dose of chemotherapy. For 15 weeks the child received no chemotherapy. Then the disease reasserted itself, proving that the immunologic experiment had failed. The child was given chemotherapy again. The remission-relapse-chemotherapy routine was repeated for five more cycles, until December 1968.

Then the physicians decided that the drugs were failing. On 3 December 1968, the child was given his first and only radiation: a whole-body dose of 353 roentgens (or 265 rads) over a period of 3 hours and 38 minutes. The hospital record states: "Definite relapse from the acute leukemia had occurred. . . . It was decided to try to induce another remission by giving total-body irradiation. . . . The patient received 353 roentgens of exposure. . . . The patient experienced no adverse effects during the time of the irradiation and amazingly did not have any nausea nor vomiting during the time of exposure or immediately thereafter. The patient was then kept in as sterile an environment as possible. . . . It became quite apparent that the leukemic process was still not under control." He began to bleed internally and developed infections which could not be controlled by antibiotics. On 29 December, a little more than three weeks after irradiation, he died.

Radiologists at Harvard's Joint Center for Radiotherapy, at the National Cancer Institute (NCI), and at St. Jude's Hospital in Memphis, Tennessee (which has a renowned childhood leukemia program), agreed that the treatment given Sexton sounded reasonable in its context, that of an experimental center in the mid-1960's. Samuel Hellman of Harvard added, however, that the record "doesn't sound to me like anything that approaches conventional therapy." Yet he said, "One could make a rationale for its efficacy, and there are people who believe in whole-body irradiation." Today, whole-body doses are given only to prepare a patient for a bone marrow transplant, a procedure quite different from the one tried at Oak Ridge and not in use then. When large doses (over 100 rads) are given these days, they are nearly always focused in small areas and spread over many days.

Eli Glatstein, chief of the NCI's radiation oncology branch, said, "I don't think whole-body irradiation is a particularly good treatment myself, but a lot of it was done in the 1960's and 1970's, and is still done for certain types of chronic leukemia."

Alvin Mauer of St. Jude's Hospital said that several centers experimented with whole-body irradiation in the 1960's, although they never produced techniques considered useful now. By the mid-1960's, he said, it was "pretty well recognized" that chemotherapy was the standard technique for treating childhood leukemia. It was also generally known, he claimed, that the major sanctuary for leukemic cells which could not be reached by drug therapy was the central nervous system. By 1965 St. Jude's had started a program in which chemotherapy was augmented with strong doses (2400 rads) of radiation to the cranium to kill leukemic cells in the nervous system. The exposures were spread over a period of 2½ weeks. The procedure was improved in 1967 to include radiation of the spinal cord. From then until the mid-1970's, Mauer claimed, this was the standard approach for treating acute lymphocytic leukemia in children. Although he would not have used Oak Ridge's techniques, Mauer said, "I don't think they were necessarily out of keeping with what other people were doing at this time."

Oak Ridge officials have begun to respond to questions raised by the 20 August press conference, and Bibb said that he looks forward to appearing at Representative Gore's inquiry, for he thinks the laboratory will benefit from a closer scrutiny of the record.

—ELIOT MARSHALL

*Roentgens measure radioactive emissions, and rads measure absorbed radiation.

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