

Early history of the Medical Division of the Oak Ridge Institute of Nuclear Studies

(As published in The Oak Ridger's Historically Speaking column on November 28, 2016)

Dr. William "Bill" R. Bibb, then Director, Research Division Oak Ridge Operations, Office U. S. Department of Energy presented a statement before the Subcommittee on Investigations and Oversight Committee on Science and Technology, U. S. House of Representatives on September, 23, 1981. From 1965 until 1970 Dr. Bibb was a member of the Medical Research Branch, Division of Biology and Medicine of the Atomic Energy Commission.

I was honored to have Dr. Bibb take the time to meet with me recently when he was in the area. He spoke at length about one of the programs for which he had oversight responsibility, the Medical Division of Oak Ridge Institute of Nuclear Studies/Oak Ridge Associated Universities. He also provided me the text of his statement before the House of Representatives.

So, Bill Bibb had, in 1981, experience in medical research into radiation. In the statement, he was addressing the Biomedical Research Program of the AEC. The goals of that program were, increased knowledge of effects of radiation, control of biological hazards of radiation, and to seek uses for nuclear radiation in medical diagnosis and therapy.

The work was done by contractors with oversight by the AEC. One of the contractors was the Oak Ridge Institute of Nuclear Studies. ORINS was contracted to train scientific personnel from institutions throughout the country in the use of radioisotopes and the primary target students were graduate students.

In February 1948, ORINS was asked by the AEC to consider establishing and operating an Oak Ridge clinical research facility. Other facilities were also being established at Argonne National Laboratory in Chicago and at Brookhaven National Laboratory in New York. One month later, ORINS convened a meeting of Southern medical schools and the decision was made to proceed, primarily because of the exceptional research tools available in Oak Ridge.

So, after gaining approval from AEC of a proposed operating plan, construction of a laboratory building and renovation of the adjacent unused and existing hospital wing in the AEC-owned community hospital was completed. And a major step forward in medical research into the use of radiation was begun, another first in research here in Oak Ridge.

Dr. Marshall H. Brucer was appointed Chairman of the Medical Division of ORINS and in May 1950, the first patient was admitted to the hospital/research facility. Early efforts at internal radioisotope therapy were largely unsuccessful. External radioisotope sources were being considered to be used in place of x-rays and to produce an external beam that could possibly treat cancer without placing a radioactive substance inside the body.

Cobalt-60 was considered a good candidate for external teletherapy. A machine was designed in 1951 and placed in a specially built room at ORINS. After being proven to be an efficient method for providing a radiation dose using Cobalt-60, the machine was sent to M. D. Anderson Hospital in Houston, TX, for clinical trials. The trial proved so successful that Cobalt-60 became the most widely used teletherapy source.

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Radioiodine-131 became available from Oak Ridge National Laboratory and was used to diagnose and treat thyroid cancer. Just a few days ago, I provided a tour of the Y-12 History Center for a group of elderly visitors on a commercial tour of Oak Ridge. One of the ladies on the tour spoke up and asked to see the copper-63 that I had mentioned as being an early isotope separated in Y-12's Calutrons which led to other elements being separated, some of which were used for nuclear medicine.

She went on to tell me that as a child of 12 years of age, she had been diagnosed with thyroid cancer. She said she was treated using iodine given to her in a "cocktail" of red juice which she drank daily. She was very proud to show that she had lived a long life having survived thyroid cancer through the use of radioisotopes from Oak Ridge!

ORINS initiated a radioiodine uptake calibration program in 1954. They used mannequins to place artificial thyroid glands with accurately known levels of mock iodine in their necks. These calibration kits were sent to clinics where local instruments were used to measure the thyroid dose and uptake of mock iodine in the mannequin. The local instruments were not consistent in their readings and thus the treatment was inconsistent around the country.

Working jointly with the Oak Ridge National Laboratory, a new instrument was designed which quickly became widely available commercially. This technological advancement initiated by ORINS, which featured the ability to concentrate on the gamma energy from radioiodine, made radioiodine thyroid diagnosis and treatment a standard and reliable medical procedure.

On June 16, 1958, the world's first industrial nuclear criticality accident occurred in the C-1 Wing of Building 9212 at Y-12. Eight men were exposed to high enough levels of radiation that they were treated at the ORINS Medical Division. All eight recovered and were monitored over the next 21 years by Dr. Gould Andrews who had a special interest in the hematologic effects of radiation.

Another result of the lessons learned from the 1958 criticality accident was the need to improve the radiation monitoring of workers. The film badges were improved significantly as a result of this need to know more about exposures to be able to know when treatment was needed.

Dr. Andrews also developed an acute interest in the hematologic response of patients exposed to total-body irradiation therapeutically. He used the knowledge gained through these studies to predict and treat the effects in exposed workers. As a result, Dr. Andrews became a recognized expert in the field and over the years was called to consult at other institutions where accidents had occurred.

In 1960, when the new Oak Ridge Hospital was completed, the AEC community hospital was renovated and ORINS Medical Division patients moved into the old hospital. This would be the home to the Medical Division until the inpatient care hospital was closed in 1974.

Total body irradiation studies were introduced to treat leukemia and lymphoma. A total of 194 patients were treated in the medium exposure-rate total-body irradiator (METBI), built in 1960 and low exposure-rate total-body irradiator (LETBI), built in 1967.

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The METBI was designed and constructed by ORINS with concrete shielded room containing eight radiation sources which delivered a uniform dose to the patient. The LETBI was designed to allow longer exposures at lower dose.

These facilities were also used to conduct research on bone marrow transplants. NASA was a partner in the development of these whole body techniques and provided support through the use of monitoring equipment developed by NASA.

In 1961 a colony of South American marmosets was established expressly for the study of bone marrow transplantation. By 1963 the marmosets were being used for experimental immunology studies as well. A microbiology research program was initiated also to study the types of infections that occur in patients with bone marrow damage from radiation and chemotherapy.

It was later discovered that the tiny cotton-top tamarin, a ferocious looking creature that weighed less than one pound, spontaneously developed colon cancer. This colony allowed researchers to observe how the disease progressed without artificially inducing the cancer.

Whole body radiation continued to be studied and a cytogenetics program was formalized. A conceptual design for a low-dose rate whole body irradiator was completed in 1965.

Oak Ridge Associated Universities became the new name for ORINS on January 1, 1966. The name changed but not the mission. ORAU continued the focus on new and unique medical research and experimentation as well as education and training while adding national security, emergency preparedness and environmental monitoring in the years to come.

Directors of the Medical Division were Dr. Marshall H. Brucer (1948 – 1961), and Dr. Gould Andrews (1961 – 1975). When the clinical inpatient care facility was closed in 1974, Dr. Clarence Lushbaugh was named the director of the newly named Medical and Health Sciences Division in 1975 and served in that capacity until 1984.

The Medical Division, from 1948 to 1974, resulted in many pioneering studies with regard to radiation and its effects on humans and animals. The people associated with that unique time in our history contributed greatly to our understanding human interaction with the Nuclear Age.

The primary reason for the closure of the clinical inpatient care facility was because other hospitals were by the 1970's able to practice nuclear medicine. This came about because the AEC hospitals, including this facility in Oak Ridge, were responsible for developing the whole new field of nuclear medicine. The influence spread quickly to other medical centers and universities and just as quickly became advanced techniques widely utilized because of their effectiveness.

Oak Ridge Associated Universities can be proud of the role they played in the Atomic Energy Commission's highly successful efforts to jumpstart nuclear medicine through the training and experiences of the Medical Division at ORINS/ORAU. Yet another example of Oak Ridge leading the nation and the world into effective utilization of emerging technology.

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ORAU Medical Division

The Medical Division of Oak Ridge Institute of Nuclear Studies/Oak Ridge Associated Universities was located on Vance Road - note the "Hymn of Life" mosaic by Charles Counts, originally on the building wall, is now mounted in the main lobby of the Pollard Technology Center (Photo courtesy of Oak Ridge Associated Universities)

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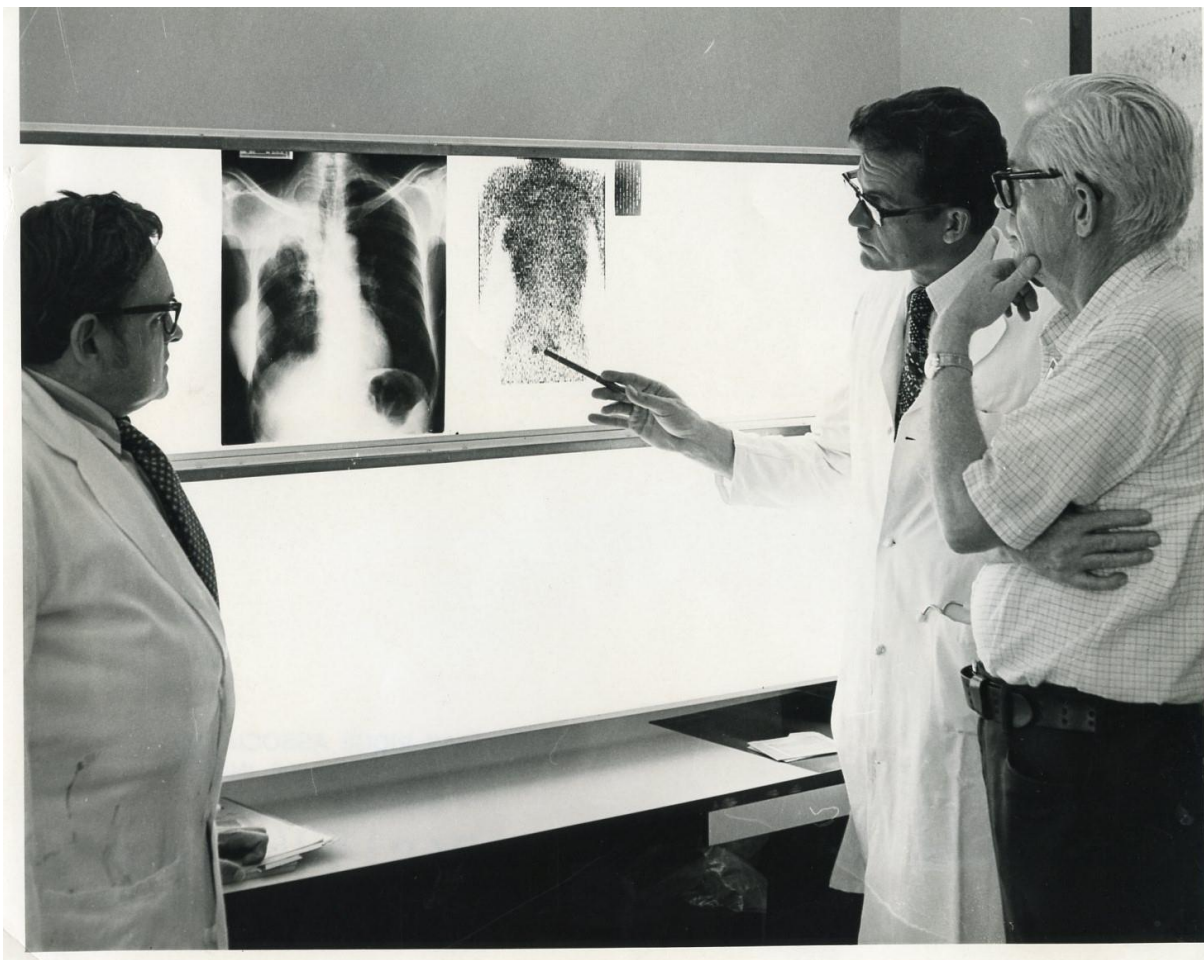
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Marshall Brucer, far left, was the first chairman of the ORINS Medical Division, and was responsible for a highly successful radioiodine-uptake-calibration program - note the mannequin loaded with a known level of mock iodine was used to calibrate instrumentation (Photo courtesy of Oak Ridge Associated Universities)

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Gould Andrews, far left, began his career with ORINS in 1949 and later served as division chairman and director of clinical applications. He is seen here examining a gallium whole body scan with other members of the ORINS medical staff -- Karl Hubner and Ray Hayes (Photo courtesy of Oak Ridge Associated Universities)

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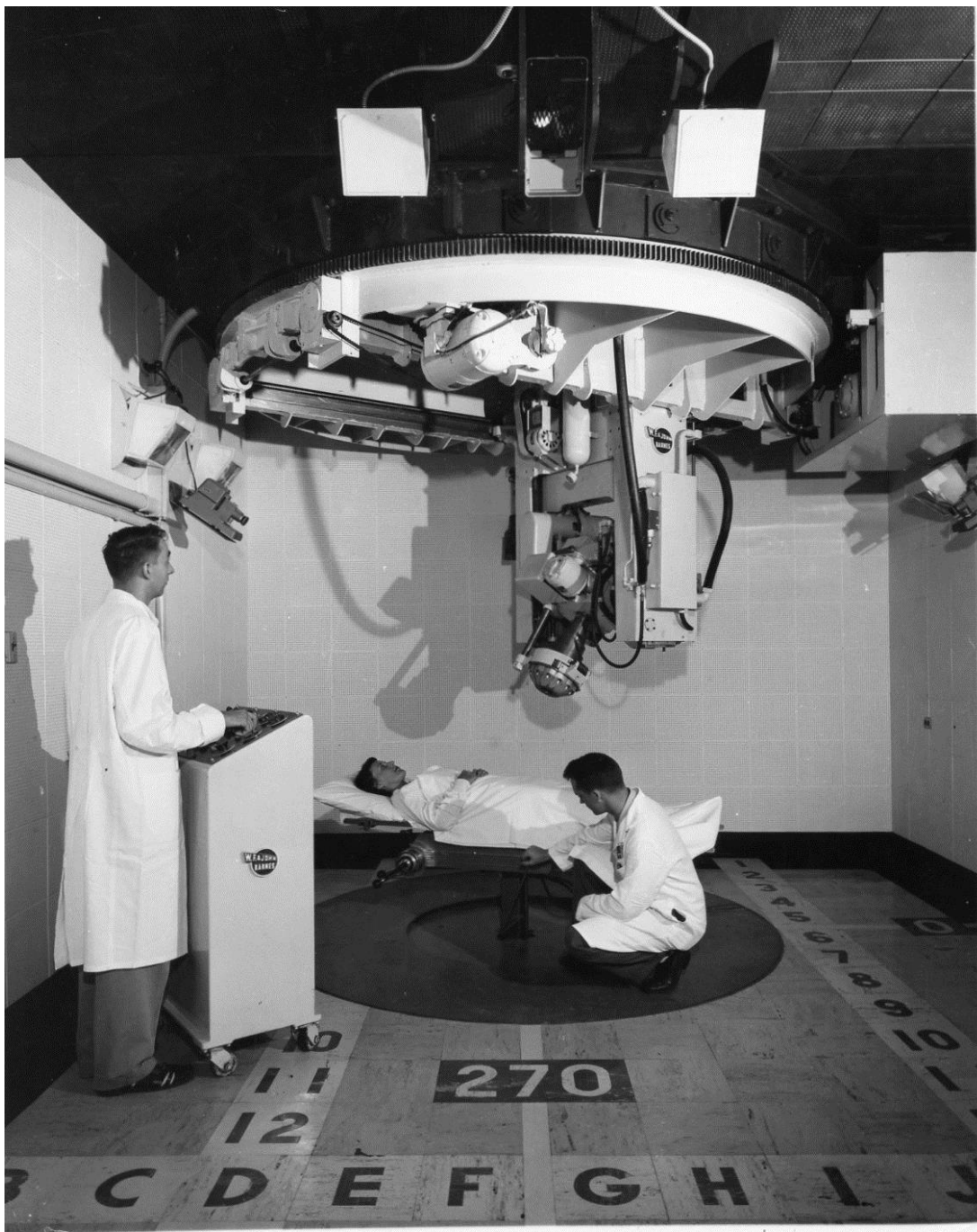


Photo from Dr. Pollard's Book *ORAU – From the Beginning*, a major development of 1955 was the installation in the Medical Division of a cesium-137 teletherapy unit. The machine was capable of focusing a beam of radiation on diseased tissue and minimizing the effects on surrounding healthy tissue. (Photo courtesy of Oak Ridge Associated Universities)

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Marmosets were used for bone marrow transplant and immunology studies (Photo courtesy of Oak Ridge Associated Universities)