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HUMAN RADIATION STUDIES: REMEMBERING THE EARLY YEARS

Oral History of Oncologist
Helen Vodopick, M.D.

Conducted December 28, 1994

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FOREWORD

In December 1993, U.S. Secretary of Energy Hazel R. O'Leary announced her Openness Initiative. As part of this initiative, the Department of Energy undertook an effort to identify and catalog historical documents on radiation experiments that had used human subjects. The Office of Human Radiation Experiments coordinated the Department's search for records about these experiments. An enormous volume of historical records has been located. Many of these records were disorganized; often poorly cataloged, if at all; and scattered across the country in holding areas, archives, and records centers.

The Department has produced a roadmap to the large universe of pertinent information: *Human Radiation Experiments: The Department of Energy Roadmap to the Story and the Records* (DOE/EH-0445, February 1995). The collected documents are also accessible through the Internet World Wide Web under `http://www.ohre.doe.gov`. The passage of time, the state of existing records, and the fact that some decisionmaking processes were never documented in written form, caused the Department to consider other means to supplement the documentary record.

In September 1994, the Office of Human Radiation Experiments, in collaboration with Lawrence Berkeley Laboratory, began an oral history project to fulfill this goal. The project involved interviewing researchers and others with firsthand knowledge of either the human radiation experimentation that occurred during the Cold War or the institutional context in which such experimentation took place. The purpose of this project was to enrich the documentary record, provide missing information, and allow the researchers an opportunity to provide their perspective.

Thirty audiotaped interviews were conducted from September 1994 through January 1995. Interviewees were permitted to review the transcripts of their oral histories. Their comments were incorporated into the final version of the transcript if those comments supplemented, clarified, or corrected the contents of the interviews.

The Department of Energy is grateful to the scientists and researchers who agreed to participate in this project, many of whom were pioneers in the development of nuclear medicine. ❑

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DISCLAIMER

The opinions expressed by the interviewee are her own and do not necessarily reflect those of the U.S. Department of Energy. The Department neither endorses nor disagrees with such views. Moreover, the Department of Energy makes no representations as to the accuracy or completeness of the information provided by the interviewee.

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ORAL HISTORY OF ONCOLOGIST HELEN VODOPICK, M.D.

Helen Vodopick was interviewed on December 28, 1994, by Marisa Caputo of the U.S. Department of Energy (DOE)'s Office of Human Radiation Experiments (OHRE) and David Harrell of Compa Industries, for OHRE.

Dr. Vodopick was selected for the oral history project because of her involvement with the Oak Ridge Institute of Nuclear Studies (ORINS) and Oak Ridge Associated Universities (ORAU) experimental cancer-therapy program involving total-body irradiation.

Short Biography

Helen Vodopick received her M.D. from the Marquette University Medical College of Wisconsin in 1956. From 1956 to 1960, she interned at the University of Iowa. Dr. Vodopick was a Fellow in Nuclear Medicine at the Oak Ridge Institute of Nuclear Studies in 1960 and 1961. She was a Fellow in Hematology at the University of Iowa from 1961 to 1963 and at the University of Utah from 1963 to 1965. From 1965 to 1975, she was the Senior Clinician in Oncology Research at the Oak Ridge Associated Universities Medical Division. At ORINS/ORAU, Dr. Vodopick participated in the treatment of patients with total-body irradiation and chemotherapeutic drugs. She has been in private practice since 1975, specializing in oncology and internal medicine. Dr. Vodopick is a member of six medical societies:

- American Medical Association,
- American Society of Hematology,
- American College of Physicians (Fellow),
- American Institute of Ultrasound Medicine,
- Society of Nuclear Medicine, and
- American Society of Clinical Oncology.

Academic Fellowship at Oak Ridge Institute for Nuclear Studies (ORINS), 1960

CAPUTO: This is Marisa Caputo from the Department of Energy, Office of Human Radiation Experiments. Today is December 28, 1994. We are at Oak Ridge, [Tennessee, and] I'm with David Harrell from Compa [Industries, a contractor to OHRE for this project]. We are here to interview Dr. Helen Vodopick Goswitz who was at the Oak Ridge Institute of Nuclear Studies [from] 1965 [to 1975]. We are going to discuss total-body irradiation and other human radiation experiments with her.

[Dr. Vodopick,] I was hoping you would start with your education and how you got involved in this area.

VODOPICK: I went to premedical school at Marquette University in Milwaukee, Wisconsin, and also to medical school there. At that time it was still affiliated with the Marquette University, so it was the Marquette Medical School, and I graduated in 1956. After graduating from medical

school, my husband, who was a fellow classmate of mine, went to the University of Iowa, in Iowa City, and spent a year in internship there and, then, three years of residency in internal medicine.

At that time there was a "doctor draft" going on, so my husband was drafted and sent to Fort Campbell Army Hospital in Kentucky to serve two years in the [U.S.] Army. While he was there, I was still back in Iowa finishing my residency.

People at Fort Campbell were discussing the things that were going on in Oak Ridge, saying they were developing nuclear medicine[1] there and various forms of treatments for cancer. [My husband] had been exposed to some of the uses of [radio]isotopes at the University of Iowa. He thought it would be interesting and visited the Oak Ridge Institute of Nuclear Studies (ORINS as we called it).[2] We talked to the then-Director, who was Dr. [Gould] Andrews, and asked if would be possible to come and get a fellowship.

When he [(my husband)] finished his tour of duty in the Army in 1960, and I was finished with my residency in internal medicine, we spent one year as fellows [at ORINS], learning the uses of radioactive materials, how to apply the uses, how to handle them, and dispose them with the intent to use this knowledge in doing research. We left [ORINS] in 1961 and went back to the University of Iowa, where my husband had to finish his residency in internal medicine. I became a fellow in hematology[3] for two years at Iowa.

After finishing his internal medicine residency, we both went to the University of Utah in Salt Lake City. There was a very well-known hematologist [there] by the name of Dr. Maxwell Wintrobe, [who] was doing many studies [with radioactive] labeling[4] [procedures]. Under Dr. Wintrobe's tutelage there were several investigators, one of whom was John Athens and the other, George Cartwright, who were doing many studies developing the metabolism and survival of white blood cells. When we were accepted for extended fellowships there, [I was] able to work with Dr. Athens and my husband with another physician doing white blood cell survival and red blood cell [metabolism] studies.

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1 diagnostic and therapeutic medical techniques using radionuclides

2 established in 1946 by the Manhattan Engineer District and operated under a Manhattan Project (and later Atomic Energy Commission) contract. ORINS was responsible for training physicians and researchers in the safe handling of radioisotopes and in the development of isotope applications in medicine. In addition, ORINS was responsible for selecting both students and established scientists for fellowships and other temporary research assignments. Today, the educational and training functions of ORINS are carried out by its successor, Oak Ridge Institute for Science and Education (ORISE).

3 the study of the nature, function, and diseases of the blood and of blood-forming organs

4 incorporating with a radioactive isotope to make a substance traceable

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Appointment to the Staff at ORINS Medical Division

VODOPICK: After two years of study there (it's interesting how things happen), my husband went to a meeting in California and happened to run into Dr. Andrews [from ORINS]. He said, "There is an opening in Oak Ridge for someone to work in the Special Training Division," which is the division in which many physicians from all over the country come to get trained in the use of equipment for radioactive material, their application, and their disposal. My husband was very interested in that position and he said if he came, I would have to have a job, too.

I was fitted into the Medical Division of ORINS at that time; so *I* worked in the Clinical Division and *he* worked in the Training Division initially. He was eventually transferred over to the Medical Division at ORINS, [which] was a Government-supported hospital with approximately 30 beds for people [with certain types of cancer], who were screened before they were accepted into that program.

People have to realize there is a difference between a [local] community hospital and a research hospital. [ORINS Medical Division Facility] was definitely considered a research hospital. In a local hospital, things are done in a customary and usual fashion; in other words, you go by what other people are using at the time. In a research hospital, you try to develop [procedures] so you can improve the things that are currently being used, especially if people aren't surviving from their particular disease. That was one of the main objects of the ORINS, later [called] Oak Ridge Associated Universities [(ORAU)]: to develop the therapeutic effects of radiation, either local or whole-body radiation.

ORINS was quite unique in that it had facilities in which the whole body could be irradiated, [with] either a low-dose level or medium-dose level and, sometimes, at a very high dose at another facility close to the main hospital. When we came, we were [considered medical] clinicians—[that is, we] took care of the patients that were admitted to the hospital and were involved in the programs that were [already in place. These programs had] been going on since 1950. We [came] after [the Institute] had been in [existence] for about 15 years.

HARRELL: Is this in 1965, when you came?

VODOPICK: Yes, it was 1965 and we stayed there until 1975, when the Government decided to close the hospital.

HARRELL: How had things changed from 1960, when you were here for the one year?

VODOPICK: In 1960, the facility was a lot smaller. I don't know if you've ever visited the physical plant, but it used to be the community hospital. It was the Oak Ridge hospital for the city and for all the residents in the community. [At that time,] ORINS was a small, single-story building right next to the Oak Ridge hospital. When the Government built the current Oak Ridge hospital right across the street, they gave that [(the original ORINS building)] to the city. The old Oak Ridge hospital became vacant, and ORINS took over the old Oak Ridge hospital. The facility became much better after the

Government released the building to ORINS. It became a much larger facility and a much better facility as far as patient care was concerned.

HARRELL: Is that the same hospital they used during the war?

VODOPICK: Yes.

The Medium-Exposure-Rate Total Body Irradiator (METBI)

HARRELL: In 1960, what kinds of studies were they doing? What was their overall program like?

VODOPICK: They were doing studies with tracer elements trying to develop things for scanning. We had many patients that came from all over the Southeast for treatment of thyroid[5] cancer. That was one of the foremost and original areas in which radioactive iodine was used for the treatment of thyroid cancer. So we would have a large group of patients who were referred for treatment of thyroid cancer. They had treatment of ovarian cancer with radioactive gold. They had total-body irradiation; this was the medium-level total-body-irradiation [(METBI)][6] facility [being used to treat] various hematologic [conditions]. There was development of other elements as far as tracer elements were concerned.

HARRELL: So that was the METBI facility?

VODOPICK: That was the METBI facility originally.

HARRELL: Did that start about 1960?

VODOPICK: No, it was before 1960.

HARRELL: Do you know when it first came into being?

VODOPICK: I don't know the exact date. It may have been 1955 or 1956. That was being used as whole-body irradiation when we came in back in 1965. As I recall, it was not in operation in 1960, although I may be wrong.

CAPUTO: So was it built for animal experiments?

VODOPICK: No, it was mainly built for human experiments. It was quite unique in that it was set up so there would be a uniform dose [of radiation] given to the whole body. Some [radiation centers gave] whole-body radiation to one side of body and [then], turning [the patient] around, [gave to the other side [of the body], which is not ideal: there may be some overlap [of radiation]. [At ORINS, the radioactive] sources would give a completely uniform dose over the [whole] body [of] the individual, [who was] suspended [on] a stretcher [until the treatment was completed].

HARRELL: Do you know who designed the facility or who gave the program the impetus?

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[5] an endocrine gland located at the base of the neck and secreting two hormones that regulate the rates of metabolism, growth, and development

[6] Medium-Exposure-Rate Total Body Irradiator

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VODOPICK: I know Dr. [Frank] Comas[7] was intimately involved with the program. He's a radiation oncologist[8] and he's still in th[is] area. I know Dr. Andrews was one of [its] foremost proponents, [as well as] Dr. [Ralph] Kniseley,[9] who were the directors at that time.

HARRELL: Did they design this facility based upon experience at other facilities with TBI [(total-body irradiation)]? Did this follow on from work done at M.D. Anderson [Hospital of the University of Houston] earlier, or the MET Lab,[10] or Sloan-Kettering,[11] or other early facilities?

VODOPICK: That I can't answer. I don't know. I wasn't here at the time. I'm not sure what prototype they used to develop this.

HARRELL: But it was conceived as a cancer or a medical treatment facility?

VODOPICK: Yes, as I said initially, the patients were referred here by their local family physicians. They were all screened to see whether they could fit into the program. Patients [who] were selected were those who were potentially able to benefit from total-body irradiation, such as hematologic problems which involved the bone marrow.[12]

[The purpose of the radiation was] to wipe out the bad [cancerous] cells and [to] hope[fully restore] the normal cells. Some lymphomas,[13] some other hematologic problems that would possibly benefit from total body irradiation [were also accepted for admission]. The main emphasis [was] to use this [treatment as an alternative type of therapy to that being used in the community hospital].

HARRELL: So, when you came in 1960 and 1961, was ORINS setting itself up as a cutting-edge experimental cancer treatment facility?

VODOPICK: Well, for the patients that we had, yes.

ORINS Radioisotope Tracer Studies

HARRELL: Did the other tracers studies, the iodine-131 and the [radioactive] gold studies, were these all part of that overall program?

VODOPICK: Yes, these were patients that came back and had follow-ups and also had repeated treatments with large doses of radioactive iodine. In fact, we still follow some of those patients [who] are still alive today.

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7 Comas was a staff physician in the Medical Division, in charge of radiation treatments. In 1994 he retired from the University of Tennessee.

8 a medical specialist who deals with tumors, including the origin, development, diagnosis, and treatment of cancer

9 A medical doctor, formerly a pathologist at Lovelace Clinic in Albuquerque, Kniseley left Lovelace for Oak Ridge, where he served as associate director of the Medical Division.

10 Metallurgical Laboratory, the laboratory set up at the University of Chicago during World War II to lead the secret research and development of controlled nuclear fission under the Manhattan Project

11 Memorial Sloan-Kettering Foundation (New York, New York)

12 the soft, fatty vascular tissue in the cavities of bones; it is a major site of blood-cell production.

13 tumors arising from any of the cellular elements of lymph nodes

HARRELL: Are you familiar with the 1957 uranium injections studies to measure kidney damage?[14]

VODOPICK: No, I'm not familiar with those in 1957.

HARRELL: How about the 1963 lanthanum studies done by [George V.] LeRoy?[15]

VODOPICK: I've heard of those. I wasn't here at the time. I do know that was the tracer study for GI [(gastrointestinal)] absorptions.[16]

HARRELL: Would those all have been involved in the same program?

VODOPICK: That would have been the same attempt to try to develop some of these tracer studies for use in the local community. Obviously, you have a beginning point for anything; for radioactive studies, for drugs, for any therapeutic agents that you're going to use. You will have to use [them] in a fashion in which you try to discern whether it's [useful or] not. It may have many applications [with the potential of transferring] this information [for] community [use].

HARRELL: Was there coordination of all these various studies? Was there one person at the top who was managing all these various studies over time?

VODOPICK: The programs were devised by the chairman, with the input of the investigators. There were certain groups that were called subgroups. Dr. Ray Hayes, who was excellent in the development of radionuclides[17] and radiopharmacy, had one area of developing label[ed] compounds that would be [given to] some cancer patients. Dr. Fred Snyder, who was in the lipid[18] program (and he's still there) [took] blood [and other specimens] from some of these patients [for use] in the lab. His type of stud-

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[14] From 1953 to 1957, Oak Ridge National Laboratory and Massachusetts General Hospital conducted a cooperative study on the distribution and excretion of uranium in humans using terminally ill brain cancer patients as subjects. Participants included male and female patients ranging in age from 26 to 63 years. All were near death (in a coma or semicoma) prior to injection and were receiving usual hospital care for comatose patients. See OR-20, "Uranium Injections Into Terminally Ill Cancer Patients," in *Human Radiation Experiments Associated with the U.S. Department of Energy and Its Predecessors* (210+ pages), DOE/EH-0491, July 1995.

[15] LeRoy had been dean of the University of Chicago medical school. At Argonne Cancer Research Hospital during the 1950s and '60s he researched lipid chemistry to understand the role of cholesterol in atherosclerosis. Several of the publications he coauthored can be found in the University of Chicago section of *Human Radiation Experiments Associated with the U.S. Department of Energy and Its Predecessors* (213 pages), DOE/EH-0491, July 1995.

[16] ORINS Medical Division researchers used lanthanum-140 in human studies to investigate the importance of individual variations that may result in radiation dose to the intestinal tract from internal emitters. The purpose was to verify prevailing assumptions to describe a standardized human intestinal tract. In the first study, 54 normal patients were administered 10 to 20 microcuries of lanthanum-140 citrate under a variety of meal scenarios. In the second study, lanthanum-140 was used to verify the completeness of information from analysis of stool collections for gastrointestinal absorption tests and to calculate the loss of unabsorbed iron-59 when fecal collections were incomplete. Twenty-one patients participated; each received 20 microcuries of lanthanum-140 and 2 microcuries of iron-59 orally. The studies were supported by the U.S. Atomic Energy Commission. See OR-26, "Gastrointestinal Tract Studies Using Lanthanum-140 and Iron-59," *ibid.*

[17] radioactive nuclides

[18] compounds consisting of fat, waxes, or similar substances, that are one of the chief structural components of the living cell

ies was more in vitro[19] rather than in vivo.[20] Dr. Comas, who was a radiation therapist, had certain studies [dealing] with [radiation]. A strong immunology group at the time was headed by Dr. Nazareth Gengozian. He devised some experiments [for] use [with] immunotherapy. Each [of these] groups had specific interests. These [studies] would be [approved] by the chairman, who was then Dr. [Gould] Andrews.

HARRELL: In what way was Dr. [Lowell] Edwards involved?

VODOPICK: He was the immediate chief of the Medical Division.

HARRELL: Was he above Dr. Andrews?

VODOPICK: No, Dr. Andrews was the chief of [the] Medical Division, Dr. Kniseley was his assistant, and below them, as the chief clinical investigator, would be Dr. Edwards.

HARRELL: Did Dr. Andrews do a lot of work himself?

VODOPICK: He was not involved with patient care. He was more involved with the administrative division of the Medical Division. We had a situation in which we would meet once a week with Dr. Andrews and Dr. Kniseley, Dr. Edwards, and all the clinicians. We would discuss all current patients in the hospital and go over their course in the hospital, as far as what program would [be of] best [potential benefit]. We would get input from all the clinicians that were there at the time.

HARRELL: Was there a split between the lab technicians and the clinical people? I guess you worked in separate facilities from the work of Dr. LeRoy did and Dr. [S.R.] Bernard. They weren't in the same building that you were, were they?

VODOPICK: I don't even remember those two individuals. If they were there in 1963, they must have left by 1965.

HARRELL: Were there tracer studies done in 1965, when you came?

VODOPICK: Yes, certainly. I don't know if you're familiar with the gallium [experiments]?

HARRELL: Right.

VODOPICK: That's how gallium-67 was [found to be clinically useful]. People had used various isotopes of gallium and tried to use it as a tracer study. It was almost by serendipity that it was discovered as a valuable tool for scanning various malignancies. It was Dr. [R.L.] Hayes that had developed gallium-67.

When the patients who were in the program were asked to participate in particular studies, there was one person, I believe, who had lung cancer, who was to receive this first dose of gallium-67, and that person for some reason didn't show up. We had another patient in the hospital who

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[19] developed or maintained in a controlled, nonliving environment, such as a test tube

[20] inside the body

had Hodgkin's disease.[21] With the individual's permission she was given radioactive gallium[-67] citrate. All her lymph nodes that were involved with the Hodgkin's [disease] lit up [on scan]. Of course, no one could initially believe it. "Oh, this must be a fluke; this isn't for real!" [they at first concluded].

As it turned out, it was really fortuitous that it [was given to a patient with] Hodgkin's [disease], because th[is] agent is particularly good in Hodgkin's [disease], in some non-Hodgkin's lymphomas, and in some lung cancers. It doesn't necessarily work [as a scanning agent] in some tumors. If [it] ha[d] [been] used in [a patient with a tumor] that did not take up this agent, [it] would have [been disregarded] as nonuseful. [It was] coincidental that [gallium-67 was given to a patient whose disease did test positive]. Now [gallium-67 citrate is used] worldwide as [a tumor scanning agent].

CAPUTO: For diagnostic purposes?

VODOPICK: Yes, for diagnostic purposes. I think some people have tried to use it therapeutically. One of the problems that we have in treating cancer today not only with radiation, but also with drugs, is that there's nothing that's tumor-specific; [that is,] something like a magic bullet that would only go to the diseased areas. You're limited by how much [drug or radiation can be used to treat cancer because] the good cells as well as the bad cells [are killed]. You hope there's enough differential between the two so that more of the tumor cells than normal cells [are killed]. [This] limiting factor [is the reason many cancer treatments are not used].

Somebody has said we have many things today that would cure any cancer in the world, but we would have a dead patient. Because you can't give enough of the agent to kill all the tumor cells [without killing the patient]. All it takes is to have one [tumor cell] left [to] have the disease recur.

CAPUTO: Right.

HARRELL: You're speaking about chemotherapy[22] there?

VODOPICK: Yes, but they're using radioactive substances. There's a program down in Birmingham[, Alabama,] right now that is using what is called *monoclonal antibodies.*[23] They take tumor [cells] and develop antibodies to those tumors and label them with radioactive iodine and [then] give this to the individual [with this particular tumor], hoping this would go

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21 a malignant disorder characterized by enlargement of the lymph nodes and spleen and by lymphoid infiltration along the blood vessels

22 the treatment of disease by means of toxic chemicals that have a specific toxic effect upon disease-producing microorganisms or that selectively destroy cancerous tissue

23 antibodies produced by a laboratory cell clone to achieve greater abundance and uniformity than provided by a natural collection of polyclonal antibodies. Studies are currently ongoing to test the anticancer effectiveness of monoclonal antibodies labeled with iodine-131 at several medical centers in the United States; inital results have been very positive.

to the tumor cells. The antibodies would [home in on the] tumor cells and the [radioactive] iodine that is there will destroy the tumor cells.

CAPUTO: Is that what happened in the Sexton case,[24] with the immunotherapy?

VODOPICK: Yes.

CAPUTO: Is that the same concept?

VODOPICK: It's the same principle.

CAPUTO: Now being done?

VODOPICK: With radioactive materials.

CAPUTO: Okay.

Participation by Regional Universities at Oak Ridge Associated Universities (ORAU)

HARRELL: When did ORINS become ORAU?

VODOPICK: I believe it was 1968. It was a [only a] name change. Dr. William Pollard [at that time] was the head of the [entire] ORINS complex, which [included the] Special Training [Division, the] Medical Division, and the Administrative [Division]. He and his advisors felt that to get more university involvement in the programs in Oak Ridge, the name Oak Ridge Associated Universities would reflect this participation by the Southeastern universities. In addition, [we had] fellows who came from different areas of the country [to study at ORAU]. We had quite a few people from Massachusetts General Hospital [in Boston who] would spend six months to a year learning about the program and how radiation was given. They would work with Dr. Comas or just work with us in the clinical area.

HARRELL: Did the universities have a role in deciding the treatments or the management of the whole program?

VODOPICK: Well, when the Human Use Committee was set up, we did have representatives from some of the universities. We had Dr. Robert Lang from UT [(University of Tennessee)], we had Dr. Hessel from Vanderbilt [University in Nashville], and I can't remember the last gentleman. They would come and review the program and go over the studies that were being done on the patients to get their input as to see whether they felt it was [appropriate]. It was one of the first human use committees that I'm aware of being used in the country. These were outside sources that [reviewed the programs]. The 20 [Southeastern] universities [had no] input, but I'm sure they did have the ability to review some of the things we [were doing]. A yearly medical report, in which various status studies were reported, w[as] sent to all the participants that were in the Oak Ridge Associated Universities.

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[24] Dwayne Sexton, the first patient to be treated at ORINS with immunotherapy. See "Introduction of Immunotherapy," below.

HARRELL: Did these universities provide funding for the program?

VODOPICK: No.

CAPUTO: They provided students?

VODOPICK: The various universities provided participants, either postdocs or summer students, [who] would spend [a limited time] with us.

CAPUTO: Would people from ORAU also be faculty members at the universities?

VODOPICK: No, it didn't work that way.

CAPUTO: No, okay.

Treatment of Cancer Patients With the METBI

HARRELL: When you got here in 1965, that was in the middle of the ten-year study that they were doing, the 1959-to-1968 study that was written up in the report.[25] How did you become involved in that and what did you start doing when you got here?

VODOPICK: [I was] involved in the clinical care of the patients [who were hospitalized in ORAU's] 30-bed [facility]. The patients did have monitoring, either laboratorywise or clinical[ly]. [They were] treated [for all their medical] needs: antibiotics, I.V. [(intravenous)] therapy, and blood transfusions. When you have leukemic[26] patients, you need to have all the resources available to treat those individuals because they do get ill quite quickly.

HARRELL: And, the treatment program that was going on at the time you got here was mostly TBI?

VODOPICK: It was METBI. Mostly METBI.

HARRELL: They used chemotherapy also?

VODOPICK: Later we did. All these [current] revisionists don't seem to realize that back in 1965, there were [a] very limited number of chemotherapy agents. After 1965, as the drugs became more [available] and became much more [effective], then we began to use those drugs instead of the total-body irradiation, especially in the leukemia patients. It was interesting that many of the old drugs, there was one in particular called methotextrate, had been used for years and years. As I've told you, I'd been in a hematology fellowship for four years. All the [acute leukemic] patients that I'd seen or had treated during those four years all died

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[25] Vodopick participated in a long-term study of the efficacy of the METBI facility. G.A. Andrews, F.V. Comas, C.L. Edwards, R.M. Kniseley, C.C. Lushbaugh, and H. Vodopick. *Hematologic and Therapeutic Effects of TBI in Patients with Malignant Lymphoma, Chronic Lymphocytic and Granulocyte Leukemias, and Polycythemia Vera.* Washington, D.C.: U.S. Atomic Energy Commission, ORAU 112, 1970.

[26] relating to leukemia, any of several cancers of the bone marrow characterized by an abnormal increase of white blood cells in the tissues, resulting in anemia, increased susceptibility to infection, and impaired blood clotting

while I was at the various universities. So, even though you had some of the drugs, they weren't [effective].

What happened was that, because of animal experimentation, giving daily doses of methotextrate was not as good as giving biweekly doses in bigger volumes to get the disease [(acute leukemia)] under better control. Some [newer] agents [were developed]. They found that the timing of drugs had a great deal to do with getting some of these [patients] into remission.[27]

Things gradually changed for the better, as far as the patients were concerned, by using drugs. We switched to chemotherapy toward the end of the 1960s. We still have some of those leukemic patients alive today.

HARRELL: So at the time in 1965, when you got here and this METBI program was ongoing, how many other facilities around the country were doing similar things that you know of?

VODOPICK: I know [that] Dr. Johnson at [the] National Cancer Institute was [using] whole-body irradiation. I don't know if it was concomitant [with chemotherapy] or not. I'm not sure about [the Fred Hutchinson Cancer Research Center in] Seattle, where they had the large bone-marrow transplant program.

HARRELL: Cincinnati, were they?

VODOPICK: Yes, Saenger[28] up in Cincinnati was, also.

HARRELL: How did you think of METBI? Was is not your primary treatment at that point?

VODOPICK: For some of [the] patients it was. It worked quite effectively for a certain group of diseases, which are called myeloproliferative disorders, in which there's an abnormal proliferation of cells in the bone marrow. There are several diseases under this myeloproliferative syndrome, one of which is polycythemia vera.[29] Another is chronic granulocytic leukemia.[30] These patients did just as well with METBI as they did with drug therapy. You would try to shut off the bone marrow because it was making too many blood cells. These people did receive periodic doses in order to control their bone marrow production. One of the things in this day and age you have to take into consideration is that it is very expensive to give total-body irradiation versus giving drugs that we have today to control the bone marrow [production].

HARRELL: Are the isotopes very expensive?

VODOPICK: No, [not the isotopes themselves]—the whole-body irradiation program was very expensive. You had to have [qualified] personnel to operate it;

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27 a temporary or permanent decrease or subsidence of the manifestations of the disease

28 Dr. Eugene Saenger, presently emeritus professor of radiation therapy at University of Cincinnati

29 a disease characterized by overproduction of red blood cells

30 Granulocytic leukemias are leukemias involving overproduction of granulocytes (circulating white blood cells residing in the protoplasm).

the [special] facility and [the maintenance of it]. When you take the cost of all that compared to giving somebody a prescription for a drug that's going to turn off the bone marrow, you have to balance the two, as far as the cost is concerned. They both do the same job. It's much easier and safer with giving the drugs, because you can titrate[31] them a little easier, but even the drugs can have very deleterious effects on the bone marrow.

Introduction of Immunotherapy

HARRELL: When did you start to introduce the other methods of treatment, like the immunotherapy[32] and bone marrow transplants, into the program?

VODOPICK: The immunotherapy was [first used in 1965]. The first patient to receive that was Dwayne Sexton, [who] was the first patient I was assigned to when I came in July 1965. This [study] has been devised by Dr. Gengozian, who was the immunologist. The whole concept was to try to get the individual into as good a remission as you can with drugs and to use cells from a donor to destroy whatever remaining cells or abnormal leukemic cells were still in the body. This was the first [of four] patient[s] [in whom this therapy was tried]. But when it didn't seem to be working, it was dropped from the program after [the] four[th] patient.

HARRELL: Was that the first time it was ever tried anywhere?

VODOPICK: There had been some similar studies, which may not have been done the same way, in France. There was a Dr. Mathé in France who was very active in treating leukemia. I don't recall how their experiments were done.

HARRELL: And nowadays, how is immunotherapy used or not?

VODOPICK: Oh yes, immunotherapy is still being tried, [but] not in a fashion we have used. I think there was one criticism in that we took leukemic cells from the patient and killed them with radiation and injected [them] into the donor. The donor was then the source of obtaining lymphocytes,[33] which is a form of white blood cells that would hopefully be sensitized against the leukemic cells. This was a fairly laborious procedure because you had to cannulate[34] a small duct in the neck to retrieve these lymphocytes. The whole [separation] procedure was extremely time consuming and [tedious].

That was one criticism as to how did we know we were transmitting anything to a normal donor. There had been prior data in which people had purposely taken leukemic cells in [the] early 1940s and transfused these into individuals and were never able to document that anything

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31 Titrate, in this context, means to control the flow rate of drug intravenously into the patient.

32 use of tumor-specific antibodies as carrier for a toxic agent for cancer therapy

33 a type of white blood cell important in the production of antibodies

34 install a cannula, a metal tube inserted into the body to draw off fluid or introduce medication

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had happened to these individuals, even though they had been purposely given [live leukemic cells].

HARRELL: Nothing bad?

VODOPICK: Nothing bad happened. Never transferred anything [(any disease)].

CAPUTO: Live cells?

VODOPICK: Yes, live cells [which] were not even irradiated.

HARRELL: Did they transfuse them back to sick patients?

VODOPICK: No, this was done, and I don't know what the basis of the experiments was, but they had used leukemic cells and given them to other individuals and documented that they'd never transmitted anything [(any disease)] to those individuals. So, with that basis, it was felt that it was safe to give killed cells to normal individuals.

HARRELL: So, Dr. Gengozian developed this program?

VODOPICK: He devised the protocol for that study.

HARRELL: Who did the work on the patient and carried it out?

VODOPICK: Well, we did on the clinical service.

HARRELL: Did the whole team work on it?

VODOPICK: Well, I did most bone marrows and the antibiotic therapy of the patient. All the physicians, as far as the immunologic therapy was concerned, [participated]. [We] had to get up every four hours and harvest these lymphocytes. We used to sleep at the hospital and get up every four hours. One person couldn't do that continuously [for four days]; so we each took [one] day to do this.

CAPUTO: Were you there when the protocol was presented, or was that already done by the time you were there?

VODOPICK: That was [already] done when I came.

CAPUTO: Okay.

HARRELL: So did your work influence the way things were being done now?

VODOPICK: Well, as I said, the experiments didn't appear to be doing what we hoped they would do, so after the fourth patient, nothing seemed to work out and it was abandoned. They didn't carry out any further patients.

HARRELL: You didn't write up a report?

VODOPICK: Oh yes, there were several in the open literature. One which may not be [in print] now, called *Experimental Hematology* and the other was another publication in a medical journal. I have a copy of the reprint, if you want the actual name. These were put into the open literature.

Radiation Treatment for Leukemia Patients

HARRELL: Was it fairly common then at research hospitals to try a number of new therapies that may not have worked? Is there a long list?

VODOPICK: Oh, certainly.

HARRELL: Are there treatments all over the country?

VODOPICK: The survival rate for leukemia was zero at that time, actually. St. Jude's [Hospital in Memphis, Tennessee] was just embarking on a new type of treatment at the time which did involve radiation.

One of the problems with acute leukemia sometimes is that you can wipe out all the leukemic cells from the bone marrow, but then they hide in certain areas of the body where they're not affected [by drugs], especially in the brain. They get into the covering of the brain, which is called the meninges. Of course, there's a blood/brain barrier. Some of these drugs given intravenously will [circulate] all over the body and wipe out the [cells in the] bone marrow and the gastrointestinal tract [but] still won't get into the brain, unless it [is given] directly into the spinal fluid.

They devised a program were they would start giving large doses of radiation to the [head] and the whole spinal canal. There were a fair number of children that died from the initial experiments because the doses were too high. There were many complications, especially irradiating [the] spinal canal. There's been a recent study this past year on following up on these patients that received brain irradiation, especially the high doses. This [latter study] was done to [determine] if their cognitive functions are good [in] the survivors, and they have said that some of these survivors are not equivalent to match individuals of the same [age]. There are some long-term side effects from the therapy.

HARRELL: Did they do long-term [follow-up] of the same person?

VODOPICK: Yes, the same person.

HARRELL: You mentioned there were some facilities that do high levels of irradiation.

VODOPICK: It was called CARL. This was a facility operated by the University of Tennessee and it was physically separated about five miles from ORINS [(ORAU)] in which they could deliver an exceedingly high rate of radiation within a short period of time. We used this facility when we started bone marrow transplants at ORAU.

HARRELL: Was that in 1970, when you starting doing that?

VODOPICK: Yes.

HARRELL: What doses would you use for that?

VODOPICK: For total-body irradiation?

HARRELL: Right, for the transplants?

VODOPICK: Approximately 350 [rads].[35]

HARRELL: So, much lower than [the doses] being used today?

VODOPICK: Yes, they are [giving] up to a thousand rads today.

HARRELL: Did you provide the bone marrow support and the antibiotics and all the other?

VODOPICK: [ORAU] had built laminar-flow rooms [for bacteria-free isolation of patients who were marrow transplant recipients]. It was really an elaborate procedure: all their food was irradiated [and] sterilizing antibiotics [were used] to sterilize their gut. People had to dress up [as if] they were going to outer space in order to go into their room. It was very time consuming. The whole staff could spend all their time on one patient.

Bone Marrow Treatment of Leukemia

HARRELL: Was there a natural progression between the METBI program and bone marrow program? Of the things you learn[ed] from the METBI program? Did those help you out when you were doing the high-level radiations and developing the techniques for that?

VODOPICK: I don't know if you call it a normal progression. I think it was another attempt to try to get these patients into a good remission and, hopefully, to restore their bone marrow. We did have a lot of communication between the Seattle, Washington, group where [the] Fred Hutchinson [Cancer Research] Center [is located]. They were doing bone marrow transplants, so we had a lot of information from them as how to do the procedures and how to physically set this all up.

HARRELL: And they had been doing that since 1950s?

VODOPICK: Yes, they've been doing that for a long time.

HARRELL: What was their success rate like out there?

VODOPICK: It was getting better. I think there's a learning curve no matter what you do. Initially it didn't work in all patients, and still doesn't today. [With time] they got better [results], [as] far as being able to keep the graft from reacting against the individual. That big problem is graft-versus-host disease. The thing which killed most patients [was] when the graft reacted against the normal tissue. As new drugs were develop to suppress that immune system, then the procedure became much better.

HARRELL: So, was the University of Tennessee very much involved in the bone marrow program?

VODOPICK: No, that was not [their] part. We just used the facility.

HARRELL: And, you did four bone marrow transplants?

VODOPICK: Yes.

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[35] a measure of the absorbed dose to tissue from exposure to radiation

HARRELL: And none of them were successful?

VODOPICK: Oh no, some were definitely successful. The two things that are really a threat to those [bone marrow grafted] individuals are infection [and], secondly, graft-versus-host disease. You would be fighting both these situations. One of the gentlemen who had a really good graft had developed an infection called *pneumocystis,* which is [now] very prevalent in the AIDS[36] population. This is a devastating illness in the leukemic population, too. He developed this and died because of the pneumocystis, and not because the leukemia had come back. Another man had a terrible graft-versus-host reaction in spite of all the things we tried to suppress the immune system. I don't remember what the others died from, but as I recall, it was in a similar vein. It was either infection or rejection of the grafts.

HARRELL: How long did that program go? Was it about 1970 and your last one was 1974?

VODOPICK: I thought it was earlier than that.

HARRELL: Around 1973?

VODOPICK: Yes, 1973.

CAPUTO: Why did that program end?

VODOPICK: Again, it was because it didn't seem to be working. I don't know if four patients are enough to judge. It was horrendously expensive and I guess there were some budget restraints, as far as being able to pour that much money into any individual. I would estimate that one transplant would cost a hundred thousand dollars even back then for all the supportive therapy you had to give, all the personnel involved, so it didn't seem as though it was fruitful.

HARRELL: Was that AEC[37]-funded?

VODOPICK: As far as I know, yes. I didn't really have anything to do with where the money came from or who was supplying the money. I'm not sure how it was funded. As far as I know, it was AEC-funded.

HARRELL: So, your goal here [at ORINS] was basically to care for the patient in this area?

VODOPICK: The referred patients.

HARRELL: Did you do whatever was necessary as far as new treatments you could conceive of to help them?

VODOPICK: It seems as though it would be therapeutically good as far as the patient was concerned.

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[36] Auto-Immune Deficiency Syndrome

[37] the U.S. Atomic Energy Commission, predecessor agency to the U.S. Department of Energy and Nuclear Regulatory Commission (NRC); established January 1, 1947

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HARRELL: During a lot of that time, you were continuing on this ten-year study or the long-term evaluation of the METBI facility?

VODOPICK: Right.

HARRELL: How did those two goals mesh, or was there a conflict?

VODOPICK: I don't think there was a conflict. I think foremost in these clinical meetings that we had each week was what had happened to the patient, and was the patient doing well or could something different or better be done for the patient. If the patient was doing well with METBI facility, we then pursued that and gave them periodic treatments when their disease seemed to be relapsing and tried to get them back into remission. We did have an outpatient department that handled all these patients that came from different areas to be seen as an outpatient, and evaluated the disease status, and either sent them back home or readmitted them to the hospital for further treatments.

HARRELL: Were there other treatments that you wanted to try but never had the money to do?

VODOPICK: Not I. I'm sure some of the others, like Dr. Gengozian or some of the other program directors, would have other ideas as far as treatments of these individuals. They were limited by the space, by the funds, and it's hard to come up with a new idea.

Low-Exposure-Rate Total Body Irradiator (LETBI)

HARRELL: Was the LETBI a new idea?

VODOPICK: Yes, I think that was a new idea.

HARRELL: And that started in 1967?

VODOPICK: Approximately, yes.

HARRELL: What was the theoretical or the experimental basis to think that a low-dose[-rate] facility was needed?

VODOPICK: Well, again, it would be [used in] patients who had hematologic [diseases] in which you could eradicate some of the abnormal cells or reduce the reproduction of the cells if they were producing too many of the cells and try to control the disease in that fashion, much like you would with drugs. You would titrate the drugs [and in this case radiation doses] to the disease process.

CAPUTO: Did you treat any patients in the LETBI facility?

VODOPICK: Well, we took care of the patients that were treated there.

CAPUTO: Were you there when the protocol was sent to the Human Use Committee?

VODOPICK: No, I wasn't involved with that.

HARRELL: Were there low-dose animal studies to indicate that these lower doses would be effective?

VODOPICK: They were doing animal studies at the same time the patients were receiving LETBI. I wasn't involved with the animal studies, so I don't know how they parallel the human-use studies.

HARRELL: Was the number of patients at LETBI much smaller than METBI?

VODOPICK: Yes.

HARRELL: And it continued for only seven years?

VODOPICK: Approximately.

HARRELL: Were there patients who had LETBI care as their primary therapy, who were successfully treated, and had a long-term remission?

VODOPICK: There are some still alive [who live] in this area.

HARRELL: Just from the LETBI?

VODOPICK: Yes. Especially, the polycythemia [vera] patients. This is the disease in which the bone marrow just goes wild and produces all the elements of the bone marrow to such an extent that it impairs functions in the body. It can cause clotting in the blood vessels because you have too many platelets[38] in the red blood cells, or it can cause breakdown of tissues because of the clots.

There's another lady with chronic lymphocytic leukemia who was treated with LETBI who also is in a remission since she received her treatment back in the mid-1960s. She's doing very well.

CAPUTO: Did you work at all with Dr. [Clarence] Lushbaugh?[39]

VODOPICK: Not directly. I believe he was the head of the LETBI program. He was instrumental in setting that up. Our main course was to take care of the patients.

Treatment of Radiation Accident Victims at ORAU

HARRELL: You did do some work with radiation accidents effects, did you not?

VODOPICK: We treated the patients. There was one [accident] before I came. There was an accident at Y-12[40] in which they all survived at that time. Several of those [people] have died [many years later]. Some of them may have had cancer. I don't know if you believe radiation can induce cancer. I don't know what distinguishes [the effects of] smoking from radiation, [as] far as lung cancer [is concerned]. There was one individual that was accidentally irradiated in that CARL facility that I took care of. It's interesting: He developed acute leukemia almost ten years later, which statistically was very likely due to radiation.

HARRELL: Was that a TBI facility, the CARL?

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[38] elements of blood cells that are essential for enabling the blood to coagulate

[39] For the transcript of the October 5, 1994 interview with Lushbaugh, see DOE/EH-0453, *Human Radiation Studies: Remembering the Early Years; Oral History of Pathologist Clarence Lushbaugh, M.D.* (April 1995).

[40] a large facility constructed at Oak Ridge during the Manhattan Project to enrich uranium for nuclear fuel

VODOPICK: It was TBI. He[, the victim,] was irradiating seeds. It wasn't total-body radiation he was getting. He was going into an area [where] he was supposed to put seeds in front of this holder. He thought the [radiation] source was [shielded but actually it was not]. He [received] a large dose of radiation in just a few minutes by walking in and out of that facility.

CAPUTO: Was CARL normally used for animals?

VODOPICK: For animal study, yes, and for seeds and plant radiation.

HARRELL: Was it a room?

VODOPICK: It was a large room.

CAPUTO: Part of the School of Agriculture?

VODOPICK: Yes, they had cows and who-knows-what-else down there.

HARRELL: So, were the facilities to treat any radiation injuries in the Oak Ridge area at ORAU [(ORINS)]?

VODOPICK: That's where they were all brought, yes. In fact, that is continuing today. It's called REAC/TS.[41] Physically, it is incorporated [in our] local hospital. They do have training for people [from] all over the country that come down here and receive training [in] handling radiation accidents. They have an emergency call line [to] which anybody can call for advice as to what to do for a patient. I imagine they would even accept them here, if they request to do so.

HARRELL: How is the treatment of radiation injuries similar to work that may be done for a cancer patient?

VODOPICK: Well, most of the time it depends upon the dose involved. There is a group, [in Oak Ridge,] here who is collecting the data for DOE. Th[is] epidemiological[42] study is a study of radiation [accidents] all over the world. They have a registry [for] the [various] doses and the outcome [of these accidents]. In fact, there was an individual two years ago who died in Israel from a massive radiation dose. Of course, Chernobyl[43] side effects are still not known, as far as the long-term side effects in the [surviving] individuals exposed. As far as chemotherapy, if you give too big of a dose, you are in the same situation because you wipe out the body's defenses with chemotherapy.

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41 Radiation Emergency Assistance Center/Training Site of the Medical and Health Sciences Division, Oak Ridge; see Vodopick's description of the program later, under "Influence of ORAU on Radiation Therapy."

42 relating to epidemiology, the branch of medicine dealing with the statistics of incidence and prevalence of disease in large populations and with detection of the source and cause of epidemics; *also:* the factors contributing to the presence of absence of a disease

43 the city in the Ukraine where a nuclear power plant accident released large amounts of reactor fuel and fission products into the environment in 1986

I had a professor who said treating leukemia is like brinksmanship:[44] You walk this tightrope and hope you don't fall off. Today it's easier because you have all the supportive therapy, all the blood products that you can give, and all the antibiotics that are available. We now have cytokines[45] that you can give to individuals [to] stimulate recovery of their bone marrow.

HARRELL: Out of those are they the kinds of things you would do to treat someone who was involved in a serious accident?

VODOPICK: Yes, I would think so. You give them supportive therapy, and they've tried bone marrow transplants in those individuals if they have a suitable donor.

HARRELL: How did it develop? Was cancer therapy ahead of treatment of radiation accident victims or which discipline?

VODOPICK: Well, the radiation accident victims were just sporadic, thank God. Those were incidental, but because of the interest in radiation, [ORINS was] happy to take care of those individuals because they felt they could learn [from them]. All the patients that were admitted to ORAU were patients who had malignancies. The radiation accidents were individuals who were [otherwise] normal. If you are going to gain some knowledge of what radiation effects are in a normal individual, these individuals would be best studied, because they would provide information on a normal person rather than a diseased person.

CAPUTO: More like an experiment of opportunity?

VODOPICK: Yes.

HARRELL: And that was Dr. Lushbaugh's area of interest?

VODOPICK: Well, no. Dr. Andrews was the medical director in handling the Y-12 accident patients initially. Dr. Lushbaugh was interested in the effects of radiation from the standpoint of what it could do for therapy for these individuals that we have. Patients with various malignancies, normally.

HARRELL: Right.

VODOPICK: So, the data is somewhat tainted by the fact that they did have a basic underlying disease.

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[44] taking a dangerous situation to its extreme limit. The term was coined in 1956, during the tenure of U.S. Secretary of State John Foster Dulles, to describe the practice of deliberately taking a dangerous international crisis to the brink of nuclear war.

[45] cell-specific proteins that stimulate growth and cell division

NASA Support for LETBI Research

HARRELL: And, that data was used for the NASA study[46] from a lot of the patients that were here?

VODOPICK: Yes, that was the spinoff. But, unlike what has been in the current newspapers and [TV], the intent was not to do the study for NASA. The study was done to try to provide [therapy] for the patients.

I guess that brings up the question of shared data. Most people who are in research think it's fine to the share the data. Why repeat an experiment if you're doing an experiment with one intent, [and why] not share that information with someone else who could use it for another purpose?

CAPUTO: Do you know who designed LETBI?

VODOPICK: As far as I know, it was Dr. Lushbaugh and Dr. Comas.

HARRELL: And, the construction was paid for mostly by NASA or a NASA grant?

VODOPICK: As far as [operating] the LETBI facility, I believe that it only involves approximately six percent of the operating [budget]. Now whether that includes the actual buildup of the facility, [I'm not certain]. [LETBI] was a room in which the individual could live [for extended periods, even days, unlike] METBI, where you had to lie still in a bed for a [shorter] period of time. But [LETBI doses were given in a room where the] individual could move around, sleep, and stay in the room for a long period of time.

HARRELL: How long did the METBI treatments go on? Right up into the closing of ORAU?

VODOPICK: I think we stopped before the closing; I don't recall if was 1974 or 1973.

HARRELL: Was there a shift of a lot of patients from METBI to LETBI when it opened?

VODOPICK: No, as far as I recall, there was no major shift. The patients was selected depending upon their hematologic condition. If they had a disease which theoretically would benefit from low-dose radiation, those were the patients who were selected for LETBI.

HARRELL: So when LETBI started, there were a whole new bunch of patients?

VODOPICK: It was a different group of patients.

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[46] National Aeronautics and Space Administration (NASA) sought to determine whether astronauts would be protected from the radiation flux in the Van Allen belts and from radiation in space in the event of a highly energetic stellar event (such as a supernova). Such exposures, NASA calculated, would amount to about 1.5 roentgens (R) per hour. Some LETBI patients would receive similar rates of exposure for days at a time, as astronauts might. Accordingly, NASA paid ORINS to report on the effects of such exposure on patients in order to develop techniques that could be used to diagnose whether an astronaut was developing radiation sickness. The funding led to charges that NASA was dictating the exposure rates that the LETBI staff administered to patients. See "NASA-Sponsored Studies" and "Questioning the Propriety of NASA-Funded Studies" in the Lushbaugh transcript.

HARRELL: And you still had chemotherapy for them, as well?

VODOPICK: More for the acute leukemia patients, but those [patients] didn't go into LETBI.

HARRELL: Oh.

VODOPICK: Because that was low dose; that wouldn't serve any purpose. The chronic leukemia patients did go into LETBI, because those are individuals in which the process is [a slowly evolving one]. (They do eventually develop acute leukemia.) Those are the individuals that were subjected to LETBI.

HARRELL: In METBI you had 50-rad and 100-rad doses? What were their ranges for LETBI?

VODOPICK: Yes, for a total dose I think it was in the same [dose range] but given over a [longer] period of time.

HARRELL: So is that same kind of dosage treatment being used today that was developed in LETBI?

VODOPICK: For radiation?

HARRELL: Yes.

VODOPICK: Not that I know of. It requires a unique facility and I think, again cost-wise, it is much easier to give drugs that are currently available, [which] weren't available back then, and titrate [them] to get the bone marrow [suppressed]. But, it's interesting that even some of the drugs have major side effects, too, and eventually some of these patients do develop acceleration [of their] leukemia. Chronic myeloid[47] leukemia may develop an acute [phase quickly]; so the therapeutic [trials] that are used now are to try [to] get these individuals into a first remission and then to do bone marrow transplants. This is where bone transplants have come in.

HARRELL: So the different treatments that you've tried here from METBI, to bone marrow, to LETBI—which one was more success than the others or anything that stands out?

VODOPICK: All I know is that we do have survivors. Probably the one thing that stands out the most is the survival of the [patients with] thyroid cancers [treated] with radioactive iodine. There were over 100 patients with thyroid cancer. We've lost only a few of those. Some of those, we are still following.

Care for Patients After the Closing of ORAU

VODOPICK: After ORAU closed, there was one patient in particular who was quite vocal and felt that the patients should not be abandoned, because they had been treated there for such a long time. Some of those patients

[47] pertaining to the spinal cord or bone marrow

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needed continued care, so the Government did set aside money so that these patients could be cared for on a long-term basis in the community. ORAU would pay for treatment of that specific disease [for which they had been treated at ORAU]. If you had leukemia and developed a heart attack, they would not pay for the heart attack. As long as you [had been] participants in the program, they felt they should continue to support treatment [of] those individuals on a long-term basis [if they had no other insurance].

HARRELL: So, there was no one that was seriously harmed by the closure and the ending of care at ORAU because they couldn't get care elsewhere?

VODOPICK: Right, they were provided additional care.

HARRELL: And what kinds of facilities were in the area to take over from ORAU?

VODOPICK: It would be their local community hospital.

HARRELL: Mostly chemotherapy?

VODOPICK: Yes, and if they needed radiation therapy, like multiple myeloma[48] when a bone was involved with a disease process, you could give just local therapy but not total-body irradiation.

HARRELL: So, do you think you could have done just as well here without using the LETBI facility or doing some of the later radiation treatments?

VODOPICK: Later?

HARRELL: Later in time after your initial—

CAPUTO: —Late 1960s.

VODOPICK: In retrospect, if the drugs were available. You have to take into consideration what was available at the time. As the drugs became more useful and more numerous, then yes, you could switch over to any drugs. In fact, that's the way many institutions are now washing out the bone marrow—with massive dosage of drugs rather than radiation. You can do the same with drugs as you can with radiation, but when you're doing the experiment, [you] don't know [that].

When you look back, you can say we should have done it differently, but it's hard to say it could have been better. Sometimes it's serendipity, as with gallium [as a scanning agent], that comes in to play. You don't know. You wouldn't do the experiment if you knew how the experiment was going to work. So, the fact that some of the patients are still surviving after they receive LETBI means that, for them, the experiment did work.

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[48] a malignancy of bone marrow, marked by abnormal plasma cells; causes fatigue and bone pain and is often fatal

ORAU Staffing of Radiation Therapy and Chemotherapy

HARRELL: And, of the people who were here at the facility around the time that it closed, what percentage were chemotherapy people or people who were trained for chemotherapy, and what was the percentage for primarily radiation, or did it break down that way?

VODOPICK: "Trained for" or "treated"?

HARRELL: Doctors who could give chemotherapy versus doctors who were primarily involved with the radiation treatments.

VODOPICK: We didn't break it down that way.

HARRELL: You didn't break it down that way?

CAPUTO: Everyone did everything?

VODOPICK: Well, Dr. Comas obviously wouldn't treat patients with chemotherapy. He was a radiation therapist, just as you are in any local community hospital. The radiation therapist doesn't give chemotherapy. In that respect, there was a division of labor, if you want to call it that, but the people that took care of the patients are the people that would mainly administer the drugs, and it would be Dr. Comas that would set up the plan of treatment as far as radiation was concerned.

CAPUTO: At this staff meeting where you decide a treatment, you would have someone with a radiation background [and] someone with a chemotherapy background?

VODOPICK: We would all be there, yes.

HARRELL: And it was pretty much open as to what course you would follow as to what was happening with the patients.

VODOPICK: Yes.

HARRELL: And that was a group discussion.

VODOPICK: Yes, it was a group discussion [most of] the time.

HARRELL: Was Dr. Lushbaugh in that kind of meeting?

VODOPICK: No, he didn't come to those staff meetings. Dr. Andrews always came and Dr. Kniseley came; Dr. Edwards and all the clinical staff.

HARRELL: How large was the clinical staff?

VODOPICK: Not large. We had Dr. [R.] Tanida, Dr. [D.] White, Dr. [Karl] Hubner,[49] myself, and my husband.

CAPUTO: What is your husband's name?

VODOPICK: Francis Goswitz. That was the clinical staff.

HARRELL: Was Dr. Comas considered clinical staff?

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[49] For the transcript of the interview with Karl Franz Hubner, see DOE/EH-0470 (September 1995).

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VODOPICK: No, he wasn't considered clinical staff. He was the radiation therapist.

HARRELL: And he would just be going [to these meetings] for a technical dose?

VODOPICK: Right, it depended upon what dose was selected or what form of treatment was selected. He would be the one who would set up the plan. He was a mathematician, getting the right dose.

Research With Radioactive Phosphorus and Sulfur

HARRELL: You also did some studies with phosphorus-32?

VODOPICK: DFP-32,[50] right.

HARRELL: What year did you work on those studies?

VODOPICK: Well, I came in 1965. We did them for three or four years. These were tracer studies [of] survival of white blood cells in association with radiation therapy. There was one experiment where Dr. Comas was interested in controlling the blood count [in chronic myeloid leukemia] by irradiating only the spleen, which is an organ in the abdomen. It has to do with the destruction of blood cells. When he irradiated the spleen, we were trying to see what was happening to [white] blood cells. So we did these labeled white cells [with DFP-32 to measure their survival]. I had been involved with [similar studies] at the University of Utah for two years.

HARRELL: They were doing those studies there, as well?

VODOPICK: For two years before I came here.

HARRELL: And, how would the spleen be irradiated—

VODOPICK: —with specified doses of cobalt radiation.

HARRELL: From a point source?[51]

VODOPICK: Yes, it would be a local radiation.

HARRELL: What kind of facility did you have that provided that?

VODOPICK: It was [in] the same area [as] the hospital. I can't remember exactly where that was delivered, if that was delivered in the METBI room. The METBI had numerous sources; you could pick a source out of the control panel and just use that source.

HARRELL: And you could direct it in a narrow enough beam?

VODOPICK: As far as I remember. I'm sorry, this is 30 years ago. I'm getting older.

HARRELL: It wasn't a special machine that you wheeled in and sort of came to the area?

VODOPICK: No.

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[50] diisopropylfluorophosphorate-32, a granulocyte labeling agent

[51] a technique whereby the radiation emanates from a single, collimated source, not from an array of sources as in TBI

HARRELL: How about the sulfur-35 work that you did?

VODOPICK: It was for platelet survival. We did some studies on platelet survival to see if we could demonstrate what was happening to the platelets.

HARRELL: And that didn't involve—?

VODOPICK: It was tracer studies.

HARRELL: Did you do any other studies of other metabolism or any other nuclide studies?

VODOPICK: Not that I recall. Those were the two areas of interest that I had, plus managing the patients that were on the floor.

CAPUTO: Who was your experiment population for phosphorus and sulfur?

VODOPICK: The patients that were receiving METBI or splenic radiation, the leukemia patients.

CAPUTO: So, they [were] getting small tracer amounts?

VODOPICK: Oh yes, they were definitely tracer amounts.

Consent and Deciding on the Use of Human Subjects

CAPUTO: And they had signed consent forms?

VODOPICK: I don't remember if we specifically ask for those consent forms. When [the patient was admitted] into the facility, there was a consent form that said this was a research hospital, [and] that [asked if] you, [the patient], were willing to participate in the[se experimental] studies. [It also stipulated that the patient] could leave [at] any time. It wasn't an armed camp that had locked doors or guards]. The patients all commingled, talked to each other. [There] was [a] sort of camaraderie [but], in a way, it was sad. [Parents of] the leukemic patients would see what happened to the patient [who] had been there for a couple of years. [When some of these children] were dying, they hoped it wouldn't happen [to their child]. They thought "This is process [which my child must pass through]." They would discuss procedures with one another.

There's been this implication that NASA['s research objective] was a hidden agenda, that nobody was informed. The patients all knew it. In fact, one of the young boys who had chronic leukemia often would be quite boastful that he was helping NASA. He didn't sign any documents that said, "I'm going to go into this because NASA has an interest in that." It was a very open type of environment. Everybody knew everything that was going on.

CAPUTO: So you discussed a procedure before—

VODOPICK: —We discussed the procedures beforehand and told them what we were going to do, and I never had any patients object. You take a unit of blood off, label it with radioactive material, and then you give back their

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same unit of blood with labeled cells, then follow it with periodic samples and assay[52] them for decay.

CAPUTO: So, would it be necessary to mark in their chart that "I discussed the procedure and they understand," or it wasn't just done at that time?

VODOPICK: I don't think we did that at that time. We may have, I don't remember.

CAPUTO: Okay, so with these experiments with the phosphorus and sulfur, would you present this to the Human Use Committee before doing it, or would you have to have a protocol? Were you able to do that without going through that process?

VODOPICK: I don't remember. That wasn't considered treatment. I don't think we went through the Human Use Committee.

CAPUTO: The Human Use Committee was just for treatment?

VODOPICK: They reviewed all the programs, so I imagine they reviewed that too. [Our study with WBC[53]] was funded through a different source. We had a grant from the National Institute[s] of Health; I think it was through NCI.[54] Of course, they would review any grant to make sure there was nothing harmful to the patient.

CAPUTO: Right. I'm just asking these questions because the Advisory Committee [on Human Radiation Experiments] is interested in the process of how experiments were approved, and who approved them, and what type of oversight was exercised. Do you have memory of those experiences?

VODOPICK: It was an outside grant. I know we submitted it to NIH and I imagine they had overview of it, as far as they were concerned. I don't know whether the Human Use Committee started [in] 1967, and what they presented. I'm almost positive they [(the researchers)] presented all the studies that were going on at the time to the Human Use Committee.

CAPUTO: But, you weren't involved in that?

VODOPICK: No, I was not on the Human Use Committee.

CAPUTO: Well, in the presentation to the committee for those experiments—

VODOPICK: —I just think [I] looked at the reports and the write-ups of the procedures that were in the yearly annual report.

CAPUTO: Okay, would Dr. Andrews give a "Yes" or "No" before going to the Human Use Committee?

VODOPICK: Well, yes, he gave a "Yes" or "No," if you had something you wanted to do.

CAPUTO: So, he was the final say as to whether you could proceed to the final say?

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[52] determine the amount of material present in tissue, urine or feces by any trial measurement

[53] white blood cells

[54] National Cancer Institute (of the National Institutes of Health)

VODOPICK: He and Dr. Kniseley, I think.

HARRELL: So, were these two studies, both the phosphorus and sulfur, funded by the same grant?

VODOPICK: No, [the] sulfur [study] was in 1960.

HARRELL: That was during the one year when you were here [on a fellowship].

VODOPICK: I did that when I was [here] in 1960, funded by whatever funds that were available at the time and the other one was [funded] through NIH.

HARRELL: So back in 1960, were there other types of tracer studies being done?

VODOPICK: Oh yes, ^{32}P, [and] the sulfur-35, were done in conjunction with Dr. McDonald and I can't remember the other physician out at the [Oak Ridge] National Lab, since they provided the radionuclides for the studies. They were interested in platelets, also. I don't know whether they had any involvement in funding or not. As I say, I didn't know where the money came from or where it went.

HARRELL: So when you came here in 1960, and they were doing this phosphorus study, was that part of a group of studies that was being done at the time?

VODOPICK: That I don't remember, but ^{32}P had been used periodically as a therapeutic agent and we did use ^{32}P to control bone marrow production. Again, it does the same thing that [cytotoxic[55]] drugs would do or METBI or LETBI would do—anything that turns off the bone marrow.

AEC's Decision to Close ORAU Programs

HARRELL: Okay, about the time ORAU had closed, did you have any warning that it would happen? Did it come up suddenly that AEC decided to shut you down?

VODOPICK: Well, I think there was a premonition, because they were closing other facilities at the time. We had an oversight meeting where several doctors from other institutions came and reviewed the program.

HARRELL: Was that 1973, when they came to review?

VODOPICK: It was either 1973 or 1974, I don't remember exactly. I think, as far as my memory serves me, there was some suggestion that the program would have been closed earlier, except they discovered the [use of] gallium [as a scanning agent]. Gallium turned out to be a real plus as far as being useful for tracer studies. That kept the program going longer.

This is what I remember. They may have closed the program [sooner but] because of the gallium [study]. (This was funded, I believe, through AEC.) [This kept the program going longer. However, when gallium scan became commonplace, further investigation was not necessary.] Subsequently, [there was] an oversight meeting and the doctors from

[55] having a toxic effect on certain cells. Cytotoxins are chemotherapy drugs used in cancer treatment.

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these other institutions felt that the program could be closed, [since the radiation program] did not have any therapeutic advantages over drugs that were available at the time.

HARRELL: Was there a sense that [there] were people at [AEC] Headquarters that didn't like this program for some reason or had their own favorite program that they were pushing and wanted to close this and save some money?

VODOPICK. That I don't know. I didn't know the politics involved. If that were the case, I'm not sure. I think it was more that the Government was trying to get out of biomedical research because it was really costly and there [was] a lot of money spent on patient care. I think they felt that the rewards did not justify the cost. The information [that] was coming out was not sufficient to keep that program going. That was my understanding. Now whether there was something else behind the closure, I'm not sure. I thought it was because other therapeutic measure were becoming available and less costly. There were some budget constraints, so they felt they should close the facility.

HARRELL: What do you think would have happened to the program if hadn't been closed at that time? How would it have changed?

VODOPICK: I think it would have taken a new direction. I think it may be more like a pie in the sky, but if we could have pushed the bone marrow transplant program, pushed chemotherapy with radiation, and become more like St. Jude's [Hospital] in this area, where we have a different therapeutic basis for treating some of these patients, it may have stayed open.

One of the things that probably influenced the closure was that we would have to have had a new facility, and Dr. Andrews was pushing them [(AEC/DOE)] to build a new facility right next to where it physically is now, because the building was old. That was one of the criticisms of the people that came through, but it was clean and it was well cared for. The directors all felt that if we would pursue anything and keep going that we would have to have a new facility. AEC didn't want to pour all that money into a new facility.

HARRELL Would they have [had] to build a new METBI, LETBI, and CARL, would you have decided?

VODOPICK: No, I don't think they would have [had] to do that.

HARRELL: You would have used those three facilities, as well?

VODOPICK: I would have thought so. They could have been renovated, but as far as patient care is concerned, and the rooms where the treatments were concerned, that would have been changed.

HARRELL: So this facility could be used today?

VODOPICK: Well, with a lot of renovation; I don't know about the [radiation] sources.

HARRELL: They're not still in there?

VODOPICK: No, I think those have been all taken down.

CAPUTO: I think today people would have strong objections to irradiating animals and humans in the same facility.

VODOPICK: Probably.

Research and Private Practice Compared

HARRELL: But to have constructed three new irradiation facilities, as well as patient care, that would have been horrendously expensive. How did your work change after you moved into private practice?

VODOPICK: Somebody asked me that and I said it's the difference between medical school and internship. In medical school, you have more cognitive functions, you're more focused in trying to learn all that you can about various diseases. In internship you're thrown into the fire and you have to use everything that you've learned.

When you are in research, you're very focused. You're doing a limited number of things as far as patient care is concerned. You really don't treat diabetes and hypercholesterolemia[56] and all these other things. When you get into private practice, you have to treat everything right off the bat, and so it was the same difference.

It was a different pace. You had a lot of time to sit and read and research, although it's not easy. Taking care of leukemic patients and other malignancies is very hard and time consuming. It help[ed] us to stay in touch with treating individuals, whereas if you were solely in [a research] laboratory, I think you would have a much more difficult time going into private practice.

HARRELL: Do you have treatments now waiting for your patients?

VODOPICK: Well, we have a practice involving approximately 50 percent internal medicine and 50 percent oncology/hematology, so we do chemotherapy treatments, and if they need radiation we have a radiation facility right next-door. The internal medicine patients [are treated] for whatever illness they have.

HARRELL: So, what facility exists next-door for radiation?

VODOPICK: They have a 6-MeV [linear accelerator] facility next-door for radiation, but they just built a new cancer center; I believe it is going to be a 23-MeV facility over there. In fact, it should be operational very soon.

HARRELL: That's not TBI. That is a point source?

VODOPICK: That's the point source.

HARRELL: So, it's different kinds of cancer than [the kinds] you were treating at ORAU?

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[56] the presence of an excessive amount of cholesterol in the blood—"high cholesterol"

VODOPICK: Well, some the same. We have chronic leukemias and we have polycythemia vera.

HARRELL: But you're treating with chemotherapy now?

VODOPICK: Well, it depends upon whether they need radiation therapy. If they have a painful bone lesion,[57] that's localized, sometimes you get that under control much better with local radiation than you can with drugs. It depends on the disease and what is [happening to the patient].

CAPUTO: Are the survival rates much better now?

VODOPICK: For some things it is. [For] acute leukemia, there's a recent report from St. Jude's in which they surveyed a 20-year span [for] survival.

There [are] two main kinds [of acute leukemia]: acute lymphocytic and acute myelocytic. The acute lymphocytic has gone from zero to 50 or maybe even 60 or 70 percent survival. The myelocytic survival is still at about ten percent, and those patients almost all get bone marrow transplants at this time. In some areas, it really has improved, especially acute lymphocytic leukemia. [For] some of the other leukemias, like chronic myelogenous leukemia, the survival used to be three years. Some of those patients are living long-term if they have a good bone marrow take.

Influence of ORAU on Radiation Therapy

HARRELL: Do you consider any of the work that you did at ORAU to be pioneering work in a field that has since become more commonplace?

VODOPICK: Well, we took the first step, as far as bone marrow transplants. We were the first in Tennessee. I think the radiation data has provided information for other agencies, especially the space agency [(NASA)]. The gallium [diagnostic scan] was first used here, the radioactive iodine was first used here, and one of the biggest programs here was a special training program. There were thousands of physicians that came, not only from the U.S., but from all over the world, to learn how to use radioactive materials.

HARRELL: Did they come [through] ORAU?

VODOPICK: That was part of ORAU. That was one of the branches of ORAU.

HARRELL: Did they witness [your] daily [routine] here?

VODOPICK: Well, they didn't come necessarily to [the] Medical Division [facility]. Special Training [facility was housed in a separate building, which still exists here]. Some programs [are still given] there. It's sort of a self-destruct program: when you train so many people, they go back to their various institutions and set up their own program. [After] you disseminated all this knowledge, there's not as great a need to have a program [as was given previously]. Initially, nobody knew just how to handle

[57] any localized area of diseased or injured tissue or of abnormal structural change

these [radioactive materials], how to apply them, how to dispose of them, how to use the instruments. In the older doctor population, you [could] find [in] every major institution in this country [someone who had] come to Oak Ridge to get some knowledge as far as use of these isotopes [and their application].

CAPUTO: So, Oak Ridge put itself out of business?

VODOPICK: In a way, yes. The REAC/TS program is still here, which is the registry for radiation accident and training people to come and learn how to treat people who may have been exposed to radiation. That's still in operation. They still have regular courses for those people.

Chemotherapy and Total-Body Irradiation Compared

HARRELL: Do you think LETBI and METBI would still be in use today if there had been funding and a desire to keep this program going?

VODOPICK: I don't think so. I don't know if accruing more data, whether that would have given you more information. Again, drugs have become the therapeutic [mainstream] now. More drugs are being developed and we can cure patients with just drugs, although we don't have the magic bullet.

It's interesting after all this time, you must get to the basic underlying cause of the disease and treat that. One of the most exciting and probably significant experiments came from China. In 1988, they discovered that there was a certain form of acute leukemia that responded to a drug called retinoid that they were able to use. I[n] a very rare type of leukemia, promyelocytic leukemia, this particular agent changed these leukemia cells into normal cells. One of the problems with acute leukemia is that you have lots of cells, but they don't mature. They sit in the bone marrow and stay as young cells [without] the ability to function the way mature cells do. [Retinoid transformed the acute promyelocytic leukemic cells into mature functioning cells.]

CAPUTO: That reversed the process?

VODOPICK: That reversed the process.

HARRELL: Is that a vitamin A derivative?

VODOPICK: Yes. The problem is that they tried this in humans and it works, but they can't maintain it; there's some missing link. [Retinoid] can get the [patient] into remission, but [the patient relapses without additional] chemotherapy. That is similar to what used to happen [in] pernicious anemia.[58] [In this] disease there's an inability of the body to assimilate vitamin B_{12}. These individuals all used to die [with their anemia] until doctors found that if you injected the B_{12} parenterally,[59] bypassing the gut, you [could] reverse the [process]. The bone marrow [pretreatment]

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[58] a severe anemia in which vitamin B_{12} is inadequately absorbed and the production of red blood cells is defective

[59] by being taken into the body in a manner other than through the digestive canal

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looked like leukemia when you had a full-blown case of pernicious anemia.[All] these [abnormalities disappeared with the administration of injectable vitamin B_{12}. Patients live normally if they receive a vitamin] B_{12} shot every four weeks, which keeps the bone marrow functioning very well. So that's what we have to do with some of these malignancies.

HARRELL: Do you think the effectiveness of total-body irradiation was studied thoroughly enough here to come to a definite conclusion about whether it should be continued or ever used again in the same way?

VODOPICK: Well, I don't know if you mean in the same way it's still being used. I had a patient who just went down to M.D. Anderson [Hospital] with leukemia and he's getting bone marrow irradiation and preparation for bone marrow transplants.

HARRELL: Much higher doses?

VODOPICK: Much higher doses, yes, but you have start somewhere. It's easier to start low and build up than kill them with Chernobyl doses and come down. In essence, that's what St. Jude's did. They started with a high enough dose to treat the cranium and the spinal cord. They actually have [reduced the dose and are selecting high-risk patients to receive this therapy].

HARRELL: What are their levels? Where do they start?

VODOPICK: There were 2,400 rads.

HARRELL: That was for the brain, spinal cord?

VODOPICK: It went down to half that.

HARRELL: Whereas you were at the much lower 350 [rads] with Dwayne Sexton?

VODOPICK: Right.

HARRELL: As the last resort. But did you ever come to a definite conclusion about what happened at LETBI as to how effective it was?

VODOPICK: Well, it was limited by the types of patients that [received LETBI]. If you really wanted to broaden the scope of the program, other types of tumors [could be treated to determine] if it would work in [them], which was not done. It was limited to hematologic patients [who had a feasible chance of therapeutic effectiveness].

HARRELL: And now the focus is more to chemotherapy because it seems more safe than low doses of radiation?

VODOPICK: Well, not safer. You can kill someone with chemotherapy, just as [with] radiation. In fact, sometimes, many patients do get seriously ill from wiping out their bone marrow. They die with infection or bleeding, because [immune and blood-clotting functions have been suppressed]. I guess it comes again to that tightrope: you give them as much as they can tolerate, but then you're limited by the reaction of the normal cells to the chemotherapy. You don't want to kill the normal cells, but you in essence do with the chemotherapy.

Some of these doses of chemotherapy are pretty expensive. Taxol is $3,000 a bottle. It's not that inexpensive. Logistically, if you look at the personnel involved, it may be less because you don't need all these auxiliary personnel to keep up a facility, to keep up METBI or LETBI.

HARRELL: So why do you think such a facility was left behind? By the chemotherapy trends in the hospital?

VODOPICK: Oh yes, I think the chemotherapy is far ahead of radiation now.

HARRELL: Why do you think that happened?

VODOPICK: Because there are so many drugs you can use.

HARRELL: It was more effective?

VODOPICK: Unless you give whole-body irradiation, local radiation [will] hit the cells that are under that [particular] field. It you leave a few cancer cells outside of that field, then you haven't accomplished what you really wanted, to eradicate *all* the malignant [cells]. Chemotherapy is the systemic therapy [given] by injection [or orally, where it] gets into the whole body. Hopefully, it's in all the areas where the tumor is. Whether or not it [(the tumor)] would be affected by the chemotherapy, that's another issue.

CAPUTO: I have a few more questions on another topic. Have you ever given yourself radioisotopes, being the subject of one of your experiments?

VODOPICK: I don't think I ever had one of the [radioactive] isotopes. I know we had one physician [on our staff who used himself as a demonstration subject for] special training classes. [He would label his own red blood cells and then reinfuse them, with no obvious ill effect. Bill Nelson is a pathologist [and is alive in this locale].

CAPUTO: I only have wrap-up questions.

HARRELL: No, I don't have any more questions.

CAPUTO: What was it like to be a women in a very male environment?

VODOPICK: It wasn't bad. When I went to medical school, we had 100 men and three women: one was a Maryknoll nun (Marquette was a Catholic university) and one other woman besides myself. Prior to going to medical school, people always said, "Oh, it [will] be terrible. The teachers would be *on* you." I found just the opposite. If you did your job and didn't use your femininity to try and get out of things, you were accepted just [as] everyone else. Maybe I was naïve. That was the way I felt, and fellows treated you okay as long as you did your work.

CAPUTO: And that continued throughout your career?

VODOPICK: Pretty much. Once in awhile you met somebody who was a little obnoxious, but not at ORAU. I think Dr. Andrews was a wonderful, really kind individual. He wouldn't hurt a fly. He just accepted anybody for what they could they do.

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CAPUTO: Did you have any mentors that you feel especially attached to or especially grateful to for where your career has progressed?

VODOPICK: When I was in training, we had several doctors who were very influential.

Public Perception of Radiation and Medical Research

CAPUTO: So, what do you think about this whole project, about this past year in [Energy] Secretary O'Leary's Openness Initiative and the Presidential Advisory Committee on Human Radiation Experiments?

VODOPICK: I think it's been a waste of money. All of this material has been hashed through the media almost every ten years. I hope this is the final ending and we can say this is now complete and open. I think that it has created a lot of fear and misunderstanding in the public, and of many of the [prior] experiments.

I was born in 1931. I can remember sitting in a movie theater in 1941 [when] the movie [was] turned off. An announcement [was] made that Japan had just bombed Pearl Harbor. I can remember [city] blackouts and I can remember sirens, being taught to go under your desk. This was Milwaukee, Wisconsin; this was not in London or Europe. We were being trained to be prepared for an attack on the United States. Thank God we weren't [attacked]. But it would [have been] possible. I think people forgot [this] after the war ended.

It's lucky that we had the [atomic] bomb first. I have no reservations in my mind that Germany would have used it on the U.S. or Japan would have used it on us if they had had the atomic bomb. So the fact that we had the bomb and were able to end the war was a big benefit to the United States. But then came this flurry trying to know what radiation would do, how people would react.

Those plutonium experiments, I wasn't around when it was done, but I'm sure that was done with the intent of learning about the material that people were going to be working with. They were working with it out at the plants, so there was a real need to know.

It's just like medicine today: you have to go through different phases to find out what a material would [do] if used for chemotherapy today. You go through three phases of any study. You do a Phase 1 study to find out whether its going to work in any tumor at all. You do a Phase 2 study to try to define the dose. You try various dose levels, and you may kill patients with that. And you do a Phase 3 study, in which you home in on certain patients.

Well, [it's] the same with radiation. You have to find out what it could do and what the side effects are, to hopefully preserve the people that are going to be working with it all the time. So, for me, looking back, it did seem that the intent was not to harm anybody, [but] to gain knowledge.

It's easier for people to say, "Oh you didn't have [a] Human Use Committee and you didn't tell them." I remember when I was an intern. You'd go into the patient's room who was going to have surgery and say, "Doctor so-and-so is going to operate on you tomorrow, we need your signature," and that's about all you would say to the patient. You can say "They are going to do this" and maybe a little more, and it wasn't spelled out like the three- or four-page [consent-agreement] documents you have today because of the legal climate. They'd sign the paper, and it was a matter of mutual respect and confidence in the individual who was going to do it.

Well today, because of the legal professional (I don't know if you are a lawyer), it's gotten to the point where it has become ridiculous. You can have a four-page document, and you miss one little statement and you get sued because you haven't done an informed consent! Back then, there wasn't much to the form. Sometimes it was even verbal [(oral)]. You [could] say, "Is this okay?" and [if the patient replied, "Yes,"] you went ahead and did it. People just don't look back and see what it was, back in those times, as compared to now.

I think it has possibly influence[d] how willing people are to participate in research. Although the AIDS patients are doing research on themselves. They go out and take these drugs that aren't released yet because they know they are going to die. That was more [or] less the attitude of people that came to ORINS and to ORAU. They had cancer. They knew they were going to die, so they were willing to try anything: "Of course, if you don't know if something is going to work or not, why not try it?"

HARRELL: That was part of your attitude as well?

VODOPICK: Well, certainly. I'd seen all leukemic patients up until that time die. I was involved [at the University of Iowa] with what is called protocol studies, where we [charted all blood changes after chemotherapy]. We put down their blood counts and all the [physical] changes. Eventually they all died. I remember one mentor I had at the time, Willis Fowler. He said, "This is a bunch of garbage. When the real treatment comes, you will not have to do all these Mickey Mouse little things. It will be like pernicious anemia: it's going to change it overnight. You're going to give them an injection and it's going to go away."

Maybe that [is] what the Chinese have in this derivative vitamin A. People have been looking for some way of maturing these cells in bone marrow. Until somebody does, you have to use what's available at the time. If you don't have something better at the time, you might as well start looking for something else, possibly, that will change the disease and get it under control.

HARRELL: So was it a liberating atmosphere at ORINS to be able to try new treatments or do whatever it took?

VODOPICK: No, it's frustrating research, very frustrating. It brings up the questions as to why doctors go into research. Some people think, "Oh well, what a cushy job; its very lucrative or they just don't want to work."

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Well, none of the above. It's very time-consuming. What you don't do when you're working at the hospital, you have to be [doing] at home, writing proposals and reports.

You can be doing an experiment for ten years and it just doesn't turn out right. There goes your funding, also. Who's going to support you if you don't show any positive results? If you show some positive results, you [may] continue to get funding. You need [to have] an idea and [to] develop it. So, that part really is bad [as] far as research is concerned.

As far as the money is concerned, I would be paid $4.60 an hour for all the 12 years of training that I had before. I had as much training from the time I left high school until the time I got the job at ORINS as I did the 12 years before. I don't consider that a very big salary in 1965. That's considering you worked 60 hours a week or maybe more.[60]

The fact that we were treating leukemia patients meant that you had to come in [to the hospital] because every night that you were on call somebody was sick, somebody needed a blood transfusion. [Weekends were no exception]; it's not a leisure job. So, I think it's bad trying to discredit people who have put their lifework into research.

[In view of] some of the things that have been said, one of the problems was that [these revisionists] didn't sort out some of the experiments that may have been [done] with [no] informed consent or [may have been] potentially harmful. But [in] the Vanderbilt studies, those were tracer studies; I mean, they were minute amounts of isotopes. To think that was the cause of cancer—to me it seems a little ridiculous, because you get more radiation flying by plane from New York to San Francisco.

[The use of mentally retarded patients for study is another sticky issue]. We had one young boy who was seven when we treated him at ORINS. He had acute leukemia. He went into remission, and that little boy is still alive; he's 38 years old now. But, he's mentally retarded [and] in an institution. Did we do him a favor? Do you limit who[m] you treat? I guess you gain some knowledge from treating a mentally retarded. They can't give an informed consent. (In this case his guardian did.)

HARRELL: What kind of treatment did he get?

VODOPICK: He got chemotherapy. It was about 1968 or 1969.[61] He only got chemotherapy. To give him chemotherapy took three people to hold him down to inject [him] with some of these drugs.

It's really sad. All the brilliant kids we had there, and they died. Here was one [who survived]. Maybe [he had some] deficiency that may keep [him] in remission. [His retardation was caused by] brain injury [at]

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[60] The fixed weekly salary worked out to about $4.60 an hour when divided by 60 or more hours.

[61] If the patient was 7 years old when treated and 38 in December 1994, the chemotherapy took place in about 1963.

childbirth. It wasn't [as though] he had a metabolic[62] deficiency. It's really sad that he's one of those that survived.

I think one thing that changed the complexion of all this [brouhaha was the statement by Secretary O'Leary,] "We will compensate them." That statement brought the lawyers out of the woodwork. People who have survived 30 years are suing [the treatment institutions]. Why? Because they lived 30 years? Because they are saying they didn't have an informed consent! How ungrateful.

CAPUTO: Well, thank you very much for talking with us today. Is there anything that you feel we missed that you would like to include?

VODOPICK: No, I think we've gone over everything.

CAPUTO: David?

HARRELL: I have no more questions.

CAPUTO: Well, thank you very much. ❐

[62] related to metabolism, the rate at which chemical processes take place in the body

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