U.S. Radiologic Technologists Study

Vol. 2, Spring 2004

USRT Newsletter

A collaborative effort between the University of Minnesota School of Public Health, the National Cancer Institute and the American Registry of Radiologic Technologists

Our Sincere Thanks

Dear Participant,

You are part of the largest health study of medical radiation workers ever conducted. With the information you provided, we are learning much more about health risks from long-term exposure to low and moderate doses of radiation. This is one of few studies that can shed light on this important scientific and public health issue. All people, not just medical radiation workers, are repeatedly exposed to low doses of radiation from medical and environmental sources. So results from this study will have broad implications for human health.

In this update, we want to tell you what we have learned since our last Newsletter in 2001. We also want to let you know about a **Third Survey** that many of you will be receiving in a few months (see **"On the Horizon"** below for more details).

But first we want you to know how much we truly appreciate your efforts and participation. All of you have completed one or more detailed questionnaires and some of you have provided blood samples for genetic studies. This has taken a real commitment on your part. In turn, we want to give you the highest quality scientific investigation, with timely communication back to you about what we learn. Using the enormous amount of information you've provided, we have discovered important new findings. Your continued participation will undoubtedly bring new discoveries.

Sincerely yours,

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University of Minnesota

Jerry B. Reid, Ph.D.
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Martha S. Linet, M.D.
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On The Horizon

Third Survey

In October 2003, we began administering a very detailed job-specific questionnaire by telephone interview to the radiologic technologists who first worked before 1950. Because of their unique experience as "pioneers" in the radiologic technology field, these participants can provide important information about the work practices that were common in the early years, before the routine use of dosimeters. We are continuing to locate and interview these early workers. *During the next few weeks, we will be mailing a self-administered version of the questionnaire to the technologists who began working in 1950 or later.*

The main goals of the Third Survey are to obtain key information about your work history as a radiologic technologist, your medical history and sun exposure history.

Why We Need this Information:

Work History – To date we have used the year first worked and number of years worked in various time periods as the main measures of radiation exposure. Recently, we made an initial estimate of lifetime radiation doses. To help us better estimate these doses, we need to revisit your work histories to learn more about the things people

do while working as a radiologic technologist. We will be asking about the number of times you did certain radiologic procedures and about your use of aprons and shields over the years.

Medical History – Diseases that may be linked to radiation exposure generally occur later in life, so continued follow-up is important to ensure that all such diseases are identified and studied.

Exposure to the Sun – To better understand the role of radiation in skin cancers, we need to know about other known risk factors such as sunlight exposure.

Congratulations and Thank You ... *to the more than 1,200 retired radiologic technologists who recently participated in a telephone interview to discuss their experiences working in the field before 1950. We are extremely gratified by the overwhelming response and willingness of these* ***"Pioneers"****, many of whom are more than 80 years old, to give their time and energy to this important interview!*

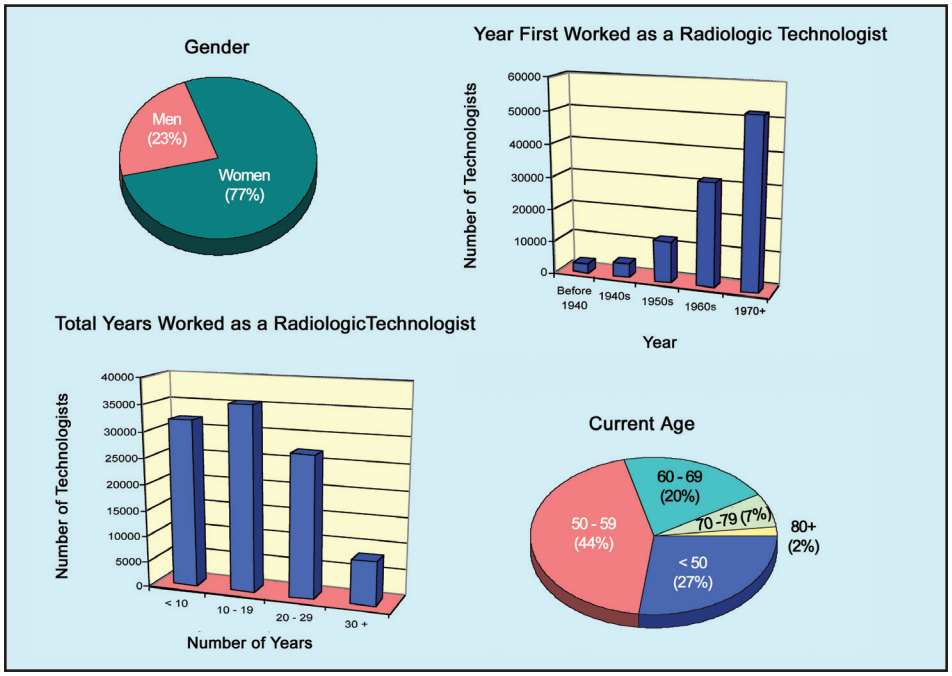
Biological Sample Collection

Just as on-going surveys provide important updates about your work history, health and other risk factors, much can be learned by collecting very small samples of blood or saliva from study participants. We use these samples to study whether a person's genetic make-up influences their response to radiation and the chance that they will develop cancer or other health conditions. During the next several months, we will be asking many of you to provide a biological sample through the mail. If you are contacted to provide a sample, we hope that you will choose to participate. For information about how we protect the confidentiality of your genetic data, see *"Questions and Answers"* on page 5.

Watch your mail! ***The Third Survey will arive in a few weeks. Your responses to this survey are important to the success of the study. Please complete and return it as soon as possible.***

About Study Participants

Among 146,000 radiologic technologists who were eligible for the study, more than 110,000 participated by completing at least one of two questionnaire surveys. About three-fourths of you are women and, on average, you are 56 years old, began working in 1968, and worked as a radiologic technologist for 16 years.



Recent Research Findings

Our primary focus is the relationship between radiation and cancer. We look at the distribution of the causes of death, also called mortality patterns, to get a complete picture of what happened before and after the study began in the early 1980s. We also study cancer incidence, that is, cancers that were diagnosed after the study began. We learn about these cancers mainly from your responses on questionnaires. It is equally important to receive questionnaires from those of you who have not had cancer so we can compare the work experiences of people who have cancer with those who do not. This is why it so important for you to complete the Third Survey when it arrives, and any other surveys in the future.

Mortality Patterns (1926-1997)

We recently updated our mortality findings through 1997. Similar to what we found for deaths through 1990, radiologic technologists had a 24% lower risk of dying from all causes compared to similar people in the general U.S. population. Cardiovascular disease and cancer mortality rates were decreased in both men and women technologists. Even though, as a group, your cancer

mortality is lower than the general population, we want to understand how different levels of long-term radiation exposure might affect risk of developing cancer. The pioneering radiologic technologists who worked in the early decades of the last century were, in general, exposed to much higher radiation doses. So we compared cancer mortality among different groups of technologists according to decade first employed. Among the 90,305 technologists who completed the First Survey in the mid-1980s, there were 1,283 deaths from cancer. Compared with others who started working in the 1960s or later, technologists who began working before 1940 had a slightly higher risk of dying from any type of cancer. The risks were not elevated in technologists who began working in subsequent decades.

Radiologic technologists who began working before 1950 also had a somewhat higher risk of dying from leukemia compared to technologists who started working in 1950 or later. Of a total of 37 leukemia deaths among the 90,305 technologists who completed the First Survey, 10 occurred among technologists who first worked before 1950. The elevated risks that we observed for leukemia and breast cancer (see details below) are consistent with greater occupational exposures to radiation before 1950. (Mohan *et al.* Int J Cancer 2003; 103:259-67)

Breast Cancer Mortality

Breast cancer has been linked with short-term, high-dose radiation exposures in studies of the Japanese atomic bomb survivors and patients irradiated for various medical conditions. Previous studies of medical and other radiation-exposed workers have not been able to evaluate breast cancer risk because most study groups included very few women or because the women had very low radiation exposures. Since more than 75% of the radiologic technologists in our study are women, we are intensively studying breast cancer risks to learn more about this very important issue.

As mentioned above, we used the decade you first began working as an indicator of the level of occupational radiation exposure received. Compared to women technologists who started working in the 1960s or later, the risk of dying from breast cancer was only slightly higher in technologists first employed in the 1950s; however, the risk was two and a half times higher in women who first worked in the 1940s, and about three times greater in those who began working before 1940. Even though these comparative or "relative" risks might seem high, it is important to realize that these research findings correspond to a small number of breast cancer deaths. Among 802 women who started working before 1940, 19 died from breast cancer. Among 2,859 women who began working in the 1940s, 45 died from breast cancer. Moreover, many of these breast cancers were not due to occupational radiation exposure. (Mohan *et al.* J Natl Cancer Inst 2002; 94:943-8)

The higher risks for breast cancer mortality in women who started working before 1950, and the decline in risk for those who began working in the decades after 1950, coincide with improvements in radiation technology. These improvements led to reduced workplace exposures and a dramatic reduction in the permissible radiation limits over time. Our next goal is to try to learn more about the influence of radiation dose on the development of breast cancer. See the section *"Estimating Radiation Doses"* for an update on our progress in determining individual radiation exposures.

Cardiovascular Disease Mortality

We found that radiologic technologists have a lower rate of dying from cardiovascular disease compared to the general U.S. population. But other studies have reported increased mortality from cardiovascular disease in patients treated with radiation. So we examined the risk for all cardiovascular disease mortality by decade of first employment, using these decades as an indicator of radiation exposure level. We found that technologists who began working before 1940 had a 40% greater risk than those who started working in 1960 or later. The risk of dying from stroke was about twice as high for technologists who began work-

How can I get more information about the study?

The easiest way to get up to date information about the study is to visit our website at ***www.radtechstudy.org****. You can also request copies of publications by writing our study office at:*

U.S. Radiologic Technologists Study
University of Minnesota
Health Studies Section
MMC 807
420 Delaware Street S.E.
Minneapolis, MN 55455

If you change your name or address, please let us know by calling us at ***612-625-1151*** *or faxing us at* ***612-626-4837****, so we can send you future study updates and contact you if we need additional information.*

If you have questions or concerns about your health, we encourage you to discuss these matters with your personal physician. We are not able to address questions about individual medical conditions.

ing before 1940 compared to technologists who began work in 1960 or later. But, importantly, the actual number of additional deaths is small. Among the more than 90,000 technologists who completed the First Survey, there were 1,070 total cardiovascular disease deaths, 174 of which were due to stroke; among technologists who began working before 1940, the corresponding numbers of total cardiovascular disease and stroke deaths were 214 and 52, respectively, many of which were not due to occupational radiation. (Hauptmann *et al.* Am J. Epidemiol 2003; 157:239-48)

Cancer Incidence Patterns (1983-1998)

We also studied incident cancers diagnosed between when each of you completed the First Survey (during the 1980s) and the Second Survey (in the mid-1990s). Compared to women in the general U.S. population, women radiologic technologists had modestly higher risks for developing all solid tumors combined (6% higher) and breast cancer (16% higher), and moderately higher risks for thyroid cancer (54% higher) and melanoma (66% higher). Compared to men in the general population, male technologists had increased risks for thyroid cancer (about twice the risk) and melanoma (29% higher), but a decreased risk for all solid tumors combined. Risks for developing oral cavity, rectal, and lung cancers were lower in both men and women technologists than in the general U.S. population. (Sigurdson *et al.* Cancer 2003; 97:3080-9)

Melanoma Incidence

Some studies, but not all, have identified increased risks of melanoma from ionizing radiation exposure. As in other studies, we found that melanoma incidence was related to lighter skin tone, blue or green eye color, red or blond hair color, a family history of melanoma, and indicators of sunlight exposure. After adjusting for these factors, we also found that technologists who began working before 1950 had somewhat higher risk of melanoma than others who first worked in 1970 or later, while risks were not increased in technologists who started working in the 1950s or 1960s. Among the 3,925 men and women technologists who began working before 1950, 15 developed melanoma. (Freedman *et al.* Int J Cancer 2003; 103:556-62)

Estimating Radiation Doses

The analyses we have conducted so far use substitute measures of radiation exposure, like year first worked as a radiologic technologist. These measures make sense because radiation exposures have declined over time with improvements in radiation technology and improved radiation standards over the years. But the ideal exposure measure is the actual total radiation dose received. Because few people wore dosimetry film badges before the mid-1950s, and because few badge dose records were computerized before 1977, it is not possible to know exact exposures for individual technologists for each year worked. We recently completed an initial attempt to estimate annual film badge doses and doses to specific organs in the body. We used the work history information you provided, plus available data on actual doses radiologic technologists received in different time periods.

The two charts show the estimated levels of radiation exposure according to the time period in which you worked. The median (mid-point) doses are where half the technologists in the group will be above and half below. Chart 1 shows estimated yearly film badge dose for all technologists by time-periods. And Chart 2 shows estimated total breast dose for women technologists. You can see that doses decreased dramatically from before 1940 to the most recent time period. Also, technologists who worked in physicians' offices generally had lower doses than those who worked in hospitals.

Chart 1

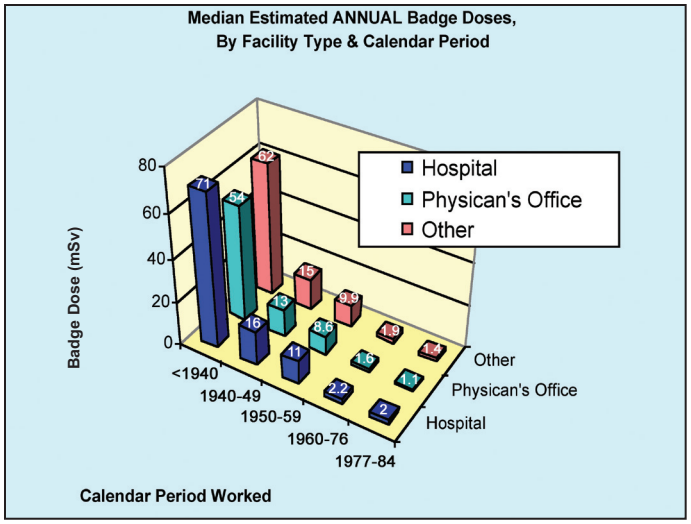
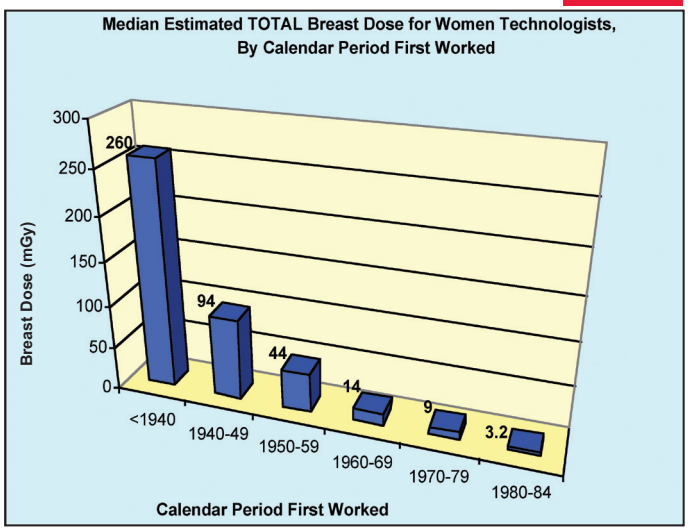


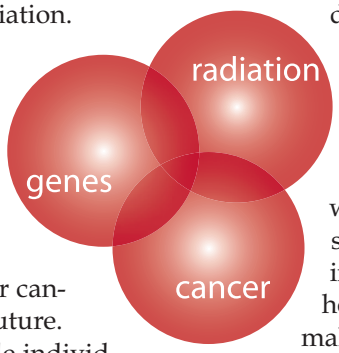
Chart 2



Do Genes Play A Role?

Every day more is learned about how and why some people get diseases, like cancer, while others don't. Fitting together all the pieces of the puzzle about how and why some people get cancer will improve the chances of preventing and curing cancer in the future. An important piece of the puzzle is the relationship between a person's genetic make-up, their environmental exposures, and the risk of cancer. What is known about genetic susceptibility (sensitivity) to cancer is that all humans possess their own unique responses to cancer-causing agents, such as ionizing radiation. These responses, which may be coded in the genes we carry, can either increase or decrease our chances of getting certain cancers or other diseases. This study provides an opportunity to evaluate genetic susceptibility to radiation.

Over the past five years, more than 3000 study participants have donated blood samples. We are currently focusing on a few cancer sites, primarily breast, ovary, prostate, and thyroid, but will study other cancers and conditions in the future. For these studies, we include individuals who have cancer and others who do not have cancer for comparison.



Many of these studies are still in the beginning stages, focusing on detecting differences in genes responsible for repairing the type of damage caused by radiation. In light of the overwhelming positive response by participants, we believe these studies will eventually yield some very important information about how a person's genetic make-up influences their chance of getting cancer.

Questions and Answers

Q. Does my participation really make a difference?

A. Yes, you are one of 146,000 radiologic technologists who are eligible for this study. Because of the scientific selection process, we can't replace you. If too many people who were selected do not participate, the study results will not be as meaningful. Your individual participation makes a big difference!

Q. I am no longer working as a radiologic technologist. Should I still be in the study? How will my participation help?

A. Yes, it is important for both current and former radiologic technologists to continue to participate in the study. Even if you only worked a short time, or have been out of the profession for many years, your participation will help the study. The study needs people who received a wide range of doses over different decades.

Q. How can I be sure my participation is confidential?

A. Protecting your confidentiality is of utmost concern to us. Your name and the information you provide is for the sole purpose of this research study. Questionnaire data and biological samples are stored and analyzed using only study identifiers, NOT names or other personal information. To further safeguard the genetic information we get from your biological samples, we have a Certificate of Confidentiality issued by the National Cancer Institute on behalf of the Secretary of the Department of Health and Human Services. The Certificate protects against the involuntary release of information about you collected during the course of the genetic studies, although such information can be released if you request it in writing. As researchers on this study, we cannot be forced to disclose your identity or any information about you collected in the genetic studies in any legal proceedings at the Federal, State, or local level. All published reports will present data in statistical summaries only and you will never be identified or identifiable.

Q. I was diagnosed with cancer. Was this cancer caused by working as a radiologic technologist?

A. We can only speak in broad statistical terms about any causal relationship between an exposure and a cancer outcome. Given our scientific knowledge, it is essentially impossible to determine the cause of cancer for any specific person. One of the goals of the study is to determine the cancer risk—across the entire group—of low dose, occupational exposure. But it is not possible scientifically to determine if any particular individual's cancer was caused by his or her exposure. If you have concerns or questions about your health, we encourage you to discuss these matters with your personal physician.

Visit Our Web Site For Additional Information

www.radtechstudy.org

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