



USRT Update 2008

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

Dear Study Participant:

We're very excited to be celebrating the 25th anniversary of the U.S. Radiologic Technologists Study. This important milestone could not have been reached without the long-term commitment of so many dedicated study participants. We truly appreciate the time and effort you have given to be part of this study, including completing the questionnaires and, for some, donating a blood sample. Your participation has been crucial in helping us learn more about the prevention and causes of diseases like cancer. The USRT Study continues to focus on understanding the risk of long-term, low-dose exposure to ionizing radiation. The dedicated efforts of study participants and steady advances in science have allowed the USRT Study to contribute to a much broader understanding of cancer and other complex diseases.



Dr. Bruce H. Alexander

The USRT Study provides unique contributions to the field of cancer research. It is the largest study of people exposed to long-term, low-dose ionizing radiation in the medical field. The use of radiation in health care and other industries resulting in similar exposures is becoming more common. While we know that ionizing radiation can cause cancer at high doses, effects at lower doses are not as well studied and may only be measurable within small subsets of the population. A natural extension of the knowledge gained from the USRT Study contributes to a better understanding of risks to patients receiving radiation exposure during diagnostic procedures and treatment of diseases.



Dr. Martha S. Linet

In the USRT Study, occupational ionizing radiation exposure, primarily from working in the early years of the profession, has been associated with small risks of breast cancer, thyroid cancer, leukemia, melanoma and other skin cancer, as well as other diseases, including heart disease and cataracts. In more recent years, occupational radiation exposure has not been linked with increased risk of these health outcomes in the U.S. radiologic technologist population as a whole.

Another unique feature of the USRT Study is that it includes people from all states in the nation. This geographic diversity allows for the exploration of beneficial as well as harmful effects of sunlight exposure. It is known that intense sun exposure can increase the risk of skin cancer and cataracts, and the lack of adequate sun exposure may result in low vitamin D levels. Vitamin D may be an important factor in the body's ability to resist developing and succumbing to cancer. In the coming year, we will begin to explore how sun exposure relates to vitamin D levels by collecting blood samples from USRT participants across the country during different seasons. The results will set the stage for improving the understanding of how vitamin D is related to cancer and other conditions.

Once again, thank you for the contributions you have made toward the understanding of cancer and we hope you will continue to participate in the future.

Sincerely,

Bruce H. Alexander, Ph.D.
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BLOOD SAMPLE COLLECTION

We know that ionizing radiation can cause damage to genetic material in cells, which may cause the cells to become cancerous. Fortunately, the human body has systems to repair the damage as well as ways to get rid of the damaged cells. How that process works from one person to the next is still a mystery.

Thanks to nearly 6,000 USRT Study participants who have donated blood samples, we are able to study this complex process. We are now beginning to understand how measures of DNA repair are associated with cancer risk and the range of DNA repair capability among persons with cancer and without cancer.

next page...

Today we are also looking at other factors, such as vitamin D, that may be related to cancer risk or other serious health outcomes.

An important first step is to study how sun exposure relates to vitamin D levels across the country and during different seasons of the year.

We will explore this relationship by inviting approximately 13,000 USRT Study participants from across the country to donate a sample of blood. Participants will receive a preassembled collection kit complete with instructions and supplies for drawing, packing, and shipping a blood sample to the study laboratory (at no cost to the participant).

While participation in the blood sample collection is voluntary, it is important to include blood samples from as many participants as possible, in different regions and during different seasons of the year, to ensure that the results are valid and reliable.

DOSIMETRY AND BIODOSIMETRY

The greatest challenge for the USRT Study is to reconstruct exposure based on work history information. Any health effects of low-dose radiation exposure will be difficult, if not impossible, to identify if we don't have a good estimate of relative exposure in the study participants. The USRT Study group has recently completed a dosimetry reconstruction project that allows the dose to specific organs from working as a radiologic technologist to be estimated. In a special analysis, the results of this model were compared to biological markers of radiation dose using blood samples. The cumulative estimated dose to the red bone marrow was found to correlate with the number of chromosomal translocations, which indicates the exposure reconstruction model will be very useful for studying health effects of these exposures.

The biodosimetry tests were also compared to the exposure participants received from routine diagnostic procedures, including CT scans and mammography. The cumulative exposure from these procedures was also related to the number of chromosomal translocations. There is considerable debate about the overall safety of routine diagnostic radiation exposure from multiple diagnostic procedures. The USRT Study will be able to help resolve these lingering questions.

BREAST CANCER CONSORTIUM

The human genome is an enormously complex puzzle, and finding the pieces that determine the risk of certain diseases, like cancer, can be like looking for a needle in a haystack. Because of this complexity, studying large numbers of people with and without cancer is necessary. Even a study as large as

the USRT Study is not big enough to have the statistical power to determine which parts of the genome are related to genetic causes of cancer. To overcome this problem, researchers from around the world have joined forces to create the Breast Cancer Association Consortium (BCAC) to explore genome wide associations with breast cancer. The BCAC allows researchers to combine the results of up to 21,000 women who have breast cancer with a similar sized group that does not.

Breast cancer and several other cancers associated with ionizing radiation are of particular interest to the USRT Study investigative team. Understanding who in a population is at risk from radiation-induced breast cancer is a priority of the USRT Study. Our studies and the combination of the USRT Study with other studies will also help put the pieces of the genomic puzzle together and begin to identify which genetic markers are most likely to explain the ionizing radiation and breast cancer associations.

RECENT RESEARCH FINDINGS

Single nucleotide polymorphisms (SNPs) are small variations in the DNA sequences between individuals. These small differences may or may not change how the gene works, so they may or may not actually influence an individual's health. Identifying SNPs in people with and without a disease is used to locate the regions of the gene that influence disease. The USRT Study has been exploring potential SNPs that may be related to breast cancer and thyroid cancer within the study and in collaboration with the international Breast Cancer Consortium. Recently, analyses using USRT Study data identified SNPs potentially related to how damaged DNA is repaired and how cells are programmed to die in participants with and without breast cancer (Sigurdson, et. al., CEBP 2007, and Bhatti et. al., 2008). These SNPs may be related to the effects of radiation exposure on cancer risk and will continue to be evaluated as potential markers for radiation susceptibility.

The USRT Study is investigating cancer and other diseases that may be related to radiation exposure. A recent publication by Chodick, et al (2008) suggests that occupational ionizing radiation exposure may be associated with cataract formation. While these findings are preliminary and need to be replicated, the exposures experienced by radiologic technologists are lower than what is currently believed to cause cataracts. These findings underscore how important it is to include conditions other than cancer when evaluating the health of a population.

To view all research findings please visit the USRT website at: <http://radtechstudy.nci.nih.gov/>

PRIVACY

As a participant, you have provided us with personal information, and sometimes biological samples, that are vital to our efforts to evaluate potential health risks related to occupational radiation exposure. We are grateful for your trust and want to assure you that we take great care to protect your privacy and keep confidential all information you have provided to the study. Only authorized study personnel have access to

your information and we do not share your name or other personal information with anyone outside the study. Furthermore, we have obtained a Certificate of Confidentiality on behalf of the Secretary of the Department of Health and Human Services that ensures that the researchers on this study cannot be forced to disclose any information about you that we collect as part of the genetic studies, including any DNA samples.