West Virginia University
Radiation Safety Department

RSD Newsletter

SUMMER · WVU • WVUH • HSC • BRNI · 2009

SPECIAL POINTS OF INTEREST:

- **RSD requires dosimeters to be returned in a timely manner.**
- **ARU/PIs are financially responsible for the procurement and disposal of all radioactive materials they obtain.**
- **Please be aware of radiation safety training history and keeping training current.**

INSIDE THIS ISSUE:

Welcome

The purpose of this newsletter is to keep all departments updated on the changes in state and federal policies governing radioactive materials. The newsletter will also provide interesting and informative articles regarding radiation and radiation safety. In addition, it will serve as a way to inform all users of the introduction of new policies or changes made by the Radiation Safety Department (RSD) to WVU existing policies and procedures. The RSD, under oversight of the Vice President for the Health Sciences Center, the University's Chief Executive Official, who had federal licensing authorities, is responsible for the development of the comprehensive radiation safety program adopted by WVU, WVU Hospitals, Inc., and Robert Byrd Health Sciences Center to ensure the safe handling, transportation, use, and disposal of radiological materials. We enforce all the written directives established by the Radiological Safety Committee within the scope of the USNRC license mandates and regulations, as well as oversee the safe and legal use of radioactive sources.

Newest ARU/PI at WVU

The RSD would like to welcome West Virginia University's newest faculty member: Dr. Thomas Nelson, Blanchette Rockefeller Neurosciences Institute (BRNI).

Dr. Nelson earned his Ph.D. in Biochemistry from the University of Rhode Island. He is a Principal Investigator studying proteins and protein interactions in Alzheimer's Disease. Formerly, he was the Radiation Safety Officer for BRNI located in Rockville, MD where he developed and supervised their radiation safety program.

We wish him the best of luck in his career as part of our WVU team!

Welcome and best wishes Dr. Thomas Nelson!

Radiation Exposure from CT Scans Should be Reduced

Alice Carver (eFluxMedia)
February 5, 2009

Radiation dose during CT scans used to diagnose heart and vascular disease is a concern for many patients as they may be equivalent to 600 chest X-rays, according to a new study, published in the *Journal of the American Medical Association*. The researchers concluded that radiation exposure from a single new-generation CT imaging test was equivalent to exposure from 600 conventional chest X-rays.

An advisory committee convened by the American Heart Association's Council on Clinical Cardiology and Council on Cardiovascular Radiology and Intervention recommends that people without chest pain or other symptoms who have a low risk of heart disease should not use these scans.

Studies have shown that newer CT scans that use multiple X-rays to produce spectacular 3-D images for the heart are beneficial in identifying patients who need treatment, but they aren't ready to replace the standard procedure of coronary angiography.

These types of tests use a multiple dye and multiple radiation-generating X-rays, which are assembled into a three-dimensional image of the heart. More and more doctors are recommending CT scanning to their patients and the number of those who chose this method is expected to rise in the following years.

Overuse of CT scans and the subsequent exposure to dangerous radiation from X-rays could pose a risk of cancer. Children are more vulnerable to radiation because their tissues are more sensitive to the effects of radiation.

Artificial Tanning Booths and Cancer

National Cancer Institute

"Long-term exposure to artificial (or natural) sources of ultraviolet rays increases one's risk of developing skin cancer."

WHAT'S THE PROBLEM?

Long-term exposure to artificial sources of ultraviolet rays like tanning beds (or to the sun's natural rays) increases both men and women's risk of developing skin cancer. In addition, exposure to tanning salon rays increases damage caused by sunlight because ultraviolet light actually thins the skin, making it less able to heal. Women who use tanning beds more than once a month are 55 percent more likely to develop malignant melanoma, the most deadly form of skin cancer.

According to the National Cancer Institute, more than one million people are diagnosed with non-melanoma skin cancer in the United States every year. In fact, non-melanoma skin cancer is the most common type of cancer in the country. Forty to 50 percent of Americans who live to age 65 will have this form of skin cancer at least once. These are startling statistics for a cancer that can, for the most part, be prevented.

WHO IS AT RISK?

Almost everyone who frequents a tanning salon or exposes themselves to the sun is putting themselves at risk for skin cancer. The risk is greatest for people with fair skin; blonde, red, or light hair; and blue, green, or gray eyes. Artificial tanning can also be more dangerous for those who burn easily, have already been treated for skin cancer, or have a family member who has had skin cancer. In addition, women have a higher risk of contracting skin cancer on their legs, and men have a higher risk of getting it on their backs.

CAN IT BE PREVENTED?

There are various things than one can do to prevent their exposure to artificial sources of ultraviolet rays:

Avoid tanning beds and booths

Instead of going to a tanning salon, try tanning sprays. In fact, some salons now provide only tanning spray services.

Regardless of your exposure to natural or artificial UV rays, conduct a monthly skin self-exam looking for any abnormalities (like bumps or sores that don't heal) or moles that have changed size, color or shape. Be sure to check all areas. Have a friend or family member check your back.

Visit your physician or a dermatologist to get annual exams. If caught early skin cancer is now almost 100 percent curable.

THE BOTTOM LINE

Long-term exposure to artificial (or natural) sources of ultraviolet rays increases one's risk of developing skin cancer. However there are alternatives one can take to minimize the risk associated with artificial rays such as using sunless tanning lotions or sprays in concert with regular skin checks by your physician or dermatologist.

FOR MORE INFORMATION:

Cancer Information Service
1-800-4-CANCER
www.cancer.gov

Training

All Radiation Protection Training for WVU Research Laboratories is available online at the WVU SOLE website. Successful completion of online testing is required in order for any laboratory radiation worker and Authorized User to actively use radioactive materials within an authorized laboratory (Note: This also includes sealed source irradiators and portable gauges containing radioactive materials). Principle Investigators, and potential users under their direct supervision, must complete this course regardless of their past training history at other institutions.

All Authorized Users and laboratory radiation workers will then be required to complete each section applicable to them of this training course every other year thereafter, to ensure laboratory is in compliance with institutional Radiation Safety and NRC guidelines. It is the responsibility of each individual to keep track of his/her own training history.

If there are any problems accessing the online training, please contact the Radiation Safety Department.

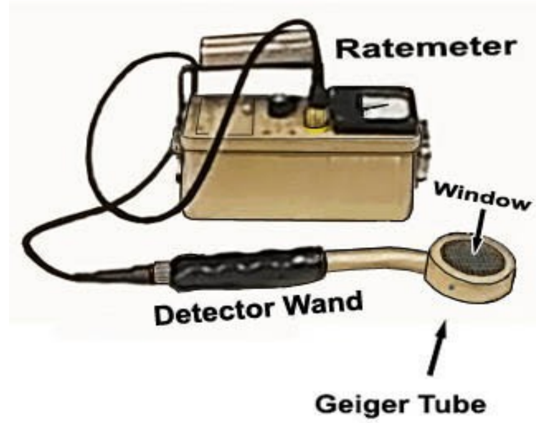
Geiger-Müller Counters

Did you know the most familiar survey meter is the Geiger-Müller (G-M) Counter? The G-M counter is easy to operate, it is relatively inexpensive and it is durable. It is also sensitive, reliable and versatile. The sensing portion of a G-M counter is essentially an ionization chamber. Shapiro (2002) provides the following description of a simple G-M counter:

Put a gas whose molecules have a low affinity for electrons (for example helium, neon or argon) into a conducting shell, mount at the center a fine wire that is insulated from the shell, connect a positive high-voltage source between the wire and the shell and you will have a Geiger counter.

The walls of the detection tube are negatively charged (the cathode) and the wire rod in the center is positively charged (the anode). If a radioactive particle ionizes even just one of the gas molecules, it will institute a succession of ionizations and discharges within the counter that will cause the center of the wire to build up an excess of electrons. This results in a large multiplication of charge, which may amount to as many 109 electrons. A typical G-M circuit will generate a signal of about 1 volt. This potential then activates the counting circuit. The current that flows through the detector, the amplifier and the metering circuit is called the pulse. The most common G-M detector is the end-window variety. Think of it as a cylindrical or tubular shell covered at one end with a very thin window. The window must be of such thinness as to allow low-power beta particles and in some cases, even less-penetrating alpha particles, to pass through. Yet at the same time, it must be impermeable to the gas to prevent it from escaping. A 30-micron window thickness will allow about 65% of the beta particles emitted by carbon-14 to pass. If the window can be no thicker than 15 microns. Gamma rays, of course do not require a special window and will penetrate the counter from any direction.

G-M counters are most effective in detecting charged beta particles. Almost every beta particle that reaches the counter gas will include a charge and thereby register on the counting equipment. One the other hand, gamma radiation is composed of photons (rays) that have no charge.



When they encounter the detector, a small portion interacts with the walls and an even smaller portion will interact with the gas inside to produce electrons that will generate discharge. Most gamma photons will pass completely through the chamber without any interaction with gas molecules and go unrecognized and unrecorded.
Regardless of the kinds of particles or photons detected or their energies, the signals from a G-M counter are all of constant size. For this reason, a G-M counter is purely a particle/pulse counter. Its output provides no information on the particles that triggered its response.

The ABCs-and Xs-and Zs of Radiation

Alpha and beta rays are particles. Gamma rays are electromagnetic radiation, like X-rays but at higher energies. Health physicists worry most about HZE cosmic rays, those with high mass (Z stands for atomic number, which also implies mass) and energy (E). They have two principal sources, the Sun and the galaxy.

Solar Energetic Particles (SEPs) are largely high-energy protons, naked hydrogen nuclei. Radiation from a solar flare can be debilitating or even fatal in an unshielded exposure. Galactic cosmic rays (GCRs) come in a variety of naked atomic nuclei spewed from supernovas or from dust pummeled by older cosmic rays. Most are made of lightweight stuff, about 85 percent hydrogen (Z=1) and 14 percent helium (Z=2) nuclei. The remaining 1 percent are mostly heavier, stable elements. The heaviest element that is sufficiently abundant to be of concern for radiation protection is (mass around 56), although traces of all stable elements have been observed in GCRs. The median velocity of GCRs is approximately 95 percent of the speed of light.

The radiation content changes with the solar cycle. At support maximum, the expanded heliosphere moderates GCRs, but emits more SEPs.

Like a bullet fired through a cinderblock wall, a cosmic ray hitting metal shatters the target nucleus and is itself shattered. Although the total energy remains the same, the intentions showers secondary and tertiary particles, some of which produce gamma rays. All in all, it is a messy business.

"Like a bullet fired through a cinderblock wall, a cosmic ray hitting metal shatters the target nucleus and is itself shattered."

Radiation Safety Department

West Virginia University

G-139 Health Sciences North
P.O. Box 9006
Morgantown, WV 26506-9006

Phone: 304-293-3413
Fax: 304-293-4529
Pager: 304-987-1586

Nasser Razmianfar, Ed.D. ☼ Director and Radiation Safety Officer
Stephen Root, M.S. ☼ Program Coordinator
Dawit Woldemikael, M.S. ☼ Senior Radiation Safety Specialist
Chad Mason, M.S. ☼ Senior Radiation Safety Specialist
Teresa Fisher, M.S. ☼ Senior Radiation Safety Specialist
Rhonda Stevens ☼ Administrative Secretary Sr.
Matt McKibbin ☼ Graduate Assistant

Radiation Safety can be contacted 24 hours a day, 7 days a week by using our on-call pager number :

(304) 987-1586

Please provide your full, 7-digit phone number when paging.

In case of an emergency, or if you need to contact RSD after regular business hours, please use this number.

RSD is currently revising the Radiation Safety Manual. Your suggestions/questions/concerns are welcome. Feel free to contact either Chad Mason (cmason@hsc.wvu.edu) or Teresa Fisher (tfisher@hsc.wvu.edu).

Thank you!!!

Welcome to the newest members of the Radiation Safety Department:

Matt McKibbin, Graduate Assistant for the 2009-2010 school year. Matt is from Hollidaysburg, PA. He graduated WVU with a Bachelor's degree in Physics and is currently pursuing a Master's degree in Industrial Hygiene.

Wayne Davis, summer intern. Wayne is from Guyana. He graduated WVU with a bachelor's degree in Geography and is currently pursuing a Master's degree in Safety Management.

Elizabeth Skinner, office assistant. Elizabeth is from Greensboro, Pa and graduated from Fairmont State University with Bachelor's degrees in National Security and Intelligence and Political Science.

Good luck in all your endeavors!!!

Visit our website:
http://www.hsc.wvu.edu/rsafety/

Dosimetry

Under Federal Regulation 10 CFR 20.2126(a) and State Regulation 64 CSR 23.6.41.e, a record must be kept of Occupational Dose Radiation Workers. In order for this to happen, dosimeters and TLDs must be returned to RSD for evaluation. If a lab or department fails to return dosimeters in a timely fashion, they will be cited by the RSO for failure to use radiation monitoring device or return monitor to RSD as stated in the RSM, Ch. 8, Sect. 8.4.2, Paragraph 6.

Radiation users are required to start using the new dosimeters at the beginning of the applicable quarter. Old dosimeters need to be collected and returned to the RSD Office no later than the 10th of the first month of the next quarter (or the next month), depending on whether you have a quarterly or a monthly dosimeter, if they are not received by that time they will be considered delinquent.

RSD would like to thank you for your continued diligence in maintaining this program.