Walter L. Robinson & Associates Presents.....

Note

This presentation is intended for annual in-services or initial radiation safety orientations

What Every Nurse or Nuclear Cardiology Stress Technologist Needs To Know to Safely Work With Or Around Radiopharmaceuticals

Hazards and Risks

There are two hazards in the stress lab.

1) The exposure, measured in mR/hr, primarily coming from the patient.

2) Contamination – the hazard is from ingestion or spreading it over a larger area, thus making clean-up more difficult.

Cardinal Principles of Radiation Protection

- Time - execute specific required tasks as swiftly as effectively possible
- Distance - doubling your distance from a source of radiation reduces the exposure by a factor of four
- Shielding - wear or interpose lead between you and the source of radiation

Time ?

It is best to minimize your time in the stress lab with the patient after they are injected with the radiopharmaceutical.

Since there are still certain job duties that you must perform in the stress lab, try to step back as far as possible away from the patient, and do not linger in the room chatting any longer than absolutely necessary.

Distance ?

Distance is your best tool in the stress lab, after minimizing your contact time. Remember moving back from one foot to 4 feet can reduce your exposure to 1/16 of the exposure.

SHIELDING ?

In Nuclear Cardiology stress lab, the radiopharmaceutical is shielded in a lead container until injected into the patient. From that point, until the patient leaves, THE PATIENT is the the source of radiation exposure to you.

You can stand behind another person, but usually distance is your method of exposure reduction.

Radiation Safety Philosophies and Concepts

- Background (BKG): Inescapable radiation exposure that we are always exposed to. It is three times higher in Denver, Colorado vs. East Coast
- A.L.A.R.A. - A radiation "mission statement" or commitment to keep radiation exposures ***A***s ***L***ow ***A***s ***R***easonably ***A***chievable

RADIATION EXPOSURE REGULATIONS

- 50 REM (50,000 mREM) (0.5 Sv) to extremities, which includes hands, feet, skin and thyroid
- 15 REM (15,000 mREM) (0.15 Sv) to eyes
- 5 REM (5000 mREM) (0.05 Sv) to Total Body, which includes head, torso to knees

Unit Conversions of Interest

1000 mRAD = 1 RAD = 1 cGy

100 RAD = 1 Gy

100 REM = 1 Sv

100 REM = 1 Sv

100 mRAD = 0.1 RAD = 0.1 cGy = 10 mGy

1 Roentgen (R) = 1 RAD = 1 REM for most X-rays so a radiation survey meter reading in mR/hr is also reading mREM/hr. At most there would be a 20% variance. The Gray (Gy) and the Sievert (Sv) are Standard International Units.

Contamination

Contamination is usually from a poor connection at the injection site. The radiopharmaceutical, sometimes mixed with blood, drips onto the floor or treadmill. Sometimes the injection site pops loose, and a stream of the radiopharmaceutical shoots out and falls to objects below, including onto the patient, the patient's clothing, the staff, and the staff's clothing.

Decontamination

Decontamination is the job of the Nuclear Cardiology Technologist, and should not be performed by the stress technologist or nurse. The spill must be wiped-up as to not spread the contamination. Technologists know the decontamination levels required (< 5 mR/hr at patient's waist level, if treadmill is contaminated, and <2000 dpm removable wipe test results). Exposure from patient's clothing or staff should be reduced to background (0.05 mR/hr), or else the clothing should be detained for 24 hours. Patients and staff's skin should be decontaminated to as close to background as absolutely possible with soap, etc.

Personnel Monitoring

If your exposure could exceed 40 mREM/month, you will be required to wear a personnel dosimeter called a Luxel Badge. You, with the help of your employer, are required to keep your exposure to less than 5000 mREM/yr. We strive to keep it below 500 mREM/yr. Exposure limits change if you declare your pregnancy.

Fetal Exposure Limits

- The mother's external badge (worn at waist location) is generally taken to be the fetal dose of record; however, actually it is probably about 30 % of that dose, since the fetus is not on the surface of the body.
- The limit is 0.5 REM/declared pregnancy term (not to exceed 50 mREM/mo.) Without a written "declaration" the woman is allowed to get 5 REM/yr. A woman must also undeclare her pregnancy in writing.

Radiation Exposure During Pregnancy

- Most hospitals have an all-department or “global” policy that allows the A.L.A.R.A. principle (depending upon the depth of trained staff) to be applied to decisions pertaining to changes in job duties following declared pregnancy status.
- Since most staff do not routinely exceed the 0.5 REM limit in 9 months, usually no change in duties is required.

When is a "Badge" Required?

- When staff could reasonably be expected to regularly receive an exposure greater than 40 mREM/mo. (<10% M.P.D.)
- If you are not badged, your employer is required to keep your exposure below a limit that is 10 times lower! (<500 mREM/yr.)
- The average nuclear cardiology technologist gets about 40 mREM/mo. The average nuclear cardiology stress technologist or nurse usually gets less than 40 mREM/mo, unless standing to close to too many patients after they have been injected with the radiopharmaceutical.


•Luxel Total Body Badge
WALTER
ROBINSON
luxel
•T.L.D. Ring Badge

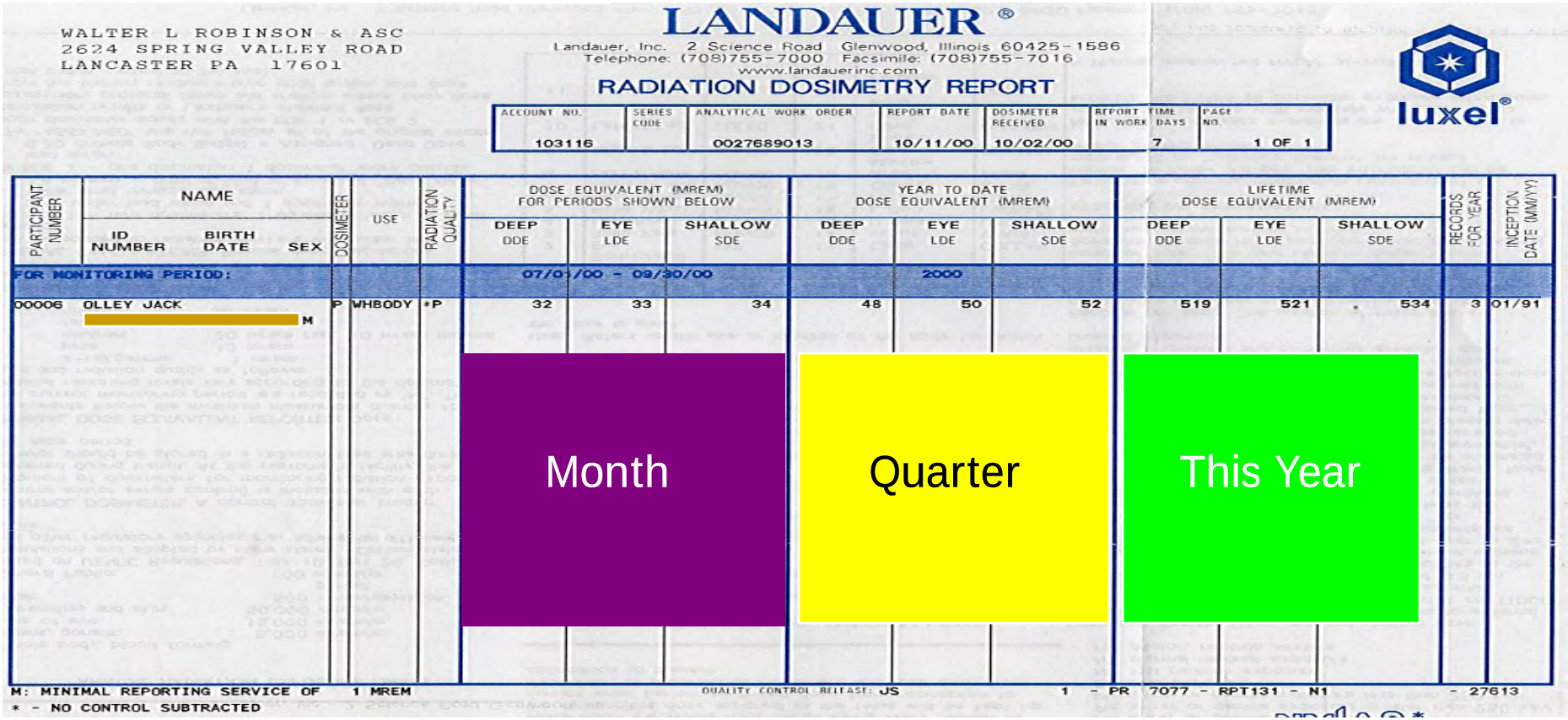
"Care and Feeding" of Badges

- Always leave badges at your workplace-do not take them home (where you could loose or forget it).
- Keep badges in a low radiation background area-especially controls. Controls are important.
- Do not leave badges on clothing or lead apron (others may use)-especially one left in an X-ray room (exposures recorded may not be attributable to you).
- If badge is lost-immediately notify your supervisor for a "stat" (2 day) replacement.
- If required to wear a badge, do not begin work without your badge or temporary dosimeter (which should be available for emergencies).
- Learn how to read your badge report, and put it's readings into perspective-ask RSO

Luxel Badge Storage Rack

How to read your badge report.

- Current month should be <40 mREM
- Current quarter should be <120 mREM
- Current year must be <5000 mREM
- Lifetime should be A.L.A.R.A.
- Once assigned a badge, you are a “occupationally-exposed radiation worker”, as such you are allowed <5000 mREM/yr. As a non-occupational radiation worker you are allowed <500 mREM/yr.



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RADIATION DOSIMETRY REPORT

luxel®

ACCOUNT NO.	SERIES CODE	ANALYTICAL WORK ORDER	REPORT DATE	DOSIMETER RECEIVED	REPORT TIME IN WORK DAYS	PAGE NO.
103116		0027689013	10/11/00	10/02/00	7	1 OF 1

PARTICIPANT NUMBER	NAME / ID NUMBER / BIRTH DATE / SEX	DOSIMETER	USE	RADIATION QUALITY	DOSE EQUIVALENT (MREM) FOR PERIODS SHOWN BELOW: DEEP DDE	EYE LDE	SHALLOW SDE	YEAR TO DATE DOSE EQUIVALENT (MREM): DEEP DDE	EYE LDE	SHALLOW SDE	LIFETIME DOSE EQUIVALENT (MREM): DEEP DDE	EYE LDE	SHALLOW SDE	RECORDS FOR YEAR	INCEPTION DATE (MM/YY)
FOR MONITORING PERIOD:					07/01/00 - 09/30/00			2000							
00006	OLLEY JACK [redacted] M	P	WHBODY	*P	32	33	34	48	50	52	519	521	534	3	01/91

Month

Quarter

This Year

M: MINIMAL REPORTING SERVICE OF 1 MREM QUALITY CONTROL RELEASE: JS 1 - PR 7077 - RPT131 - N1 - 27613
* - NO CONTROL SUBTRACTED

Personnel monitoring report shows number of mREM received in the current month, quarter, year, and lifetime.

Where to wear the badge?

In nuclear cardiology, the badge is worn on the waist, on the side the person injects, or positions closest to the patient. It should not be worn on the collar or shirt pocket or sleeve. You are not required to wear a T.L.D. ring badge, as these are only worn by the nuclear cardiology technologists, who prepare radiopharmaceutical, assay them, and inject them.

What Regulations Apply?

There are two radioactive materials licenses with regulations: One from the N.R.C., and the other from The State Bureau of Radiation Protection.

Which Regulatory Agencies Do Not Have Jurisdiction ?

- O.S.H.A.
- E.P.A.
- J.C.A.H.(O) - recommendations only
- Right-To-Know requirements

Who Reviews Radiation Safety Matters in Your Facility?

In an out-patient facility (office) - the Radiation Safety Officer (R.S.O.), is usually a physician or physicist. Do you know who your R.S.O. is? It is Walt Robinson, a medical radiation physicist, who reviews the radiation safety program status monthly. His emergency pager number is 1-800-265-4925. On a daily basis, contact your direct supervisor.