

# Proper Care and Handling of Personnel Radiation Monitors

Presented By:

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# Luxel Personnel Monitors

## Function

The Luxel badge detects radiation with a  $\text{Al}_2\text{O}_3:\text{C}$  crystal by optical stimulation by a green laser. The emitted blue light's intensity is proportional to the radiation received by the crystal. It is not a "film badge". Why is this important?

# Important Advantages of a Luxel Badge Over a Film Badge

- Not sensitive to light, heat, or water
- Sensitive down to 1 mREM not 10 mREM
- Not subject to directional effects (C-arm)
- Can be processed months after exposure

# Luxel vs. Pocket Dosimeter

- You can drop a Luxel and it won't break
- A Luxel badge is about \$5, a Pocket Dosimeter is about \$130, and needs a \$130 charger
- A pocket dosimeter can provide an instant readout of exposure – Luxel takes days to get data back, after badges mailed in
- Pocket dosimeters can be used by multiple people consecutively – Luxel is for one person, and not to be shared

# Where to Wear a Badge?

- If you have but one badge, then the answer is on the collar (outside a lead apron) for X-ray exposure, and on your pocket on the side of your “handedness” in nuclear medicine.
- If you are assigned two badges, then one is worn on the collar outside the lead apron, and one is worn under the lead apron at your waist. **DO NOT SWITCH THESE!** The Luxel badge holder cover has a little diagram of a humanoid telling you where to wear the specific badge (collar or abdomen area).

# What must you do if you loose a badge?

- Immediately inform your supervisor, so that they can order a “stat” replacement (1-2 work days).
- If you have misplaced your badge, and then find it in the X-ray room, do not continue to wear it. Take it to your supervisor, and have them reorder a “stat” replacement. The badge is to monitor YOUR exposure, not all the exposure that goes on in the X-ray room.

# What should I do if I Forget My Badge After Taking it Home By Mistake?

- Don't compound the error of taking it home by forgetting to bring it back
- If you do forget to bring it back, inform your supervisor, who will contact the person who is able to get you a pocket dosimeter to monitor your exposure that day. That day's data will NOT be added to your lifetime records history, so try very hard not to forget your badge at home.

# Where to Keep Your Badge?

- A rack should be provided for all badges to be stored. The badge should be picked up each day from this rack, and returned to the rack at the end of your shift.
- Under no circumstances should you leave a badge clipped to a pocket of a lead apron or vest – even if the protective garb has your name on it, as someone else may unknowingly pick up that apron and go about exposing YOUR badge, and it accidentally fall off and get lost by someone else using your lead apron. Servicemen and medical physicists pick up the most convenient lead apron- regardless of whether it has a person’s name on it. Hopefully, the medical physicist would notice the badge, and not wear that apron, and report the abuse of badge privilege to the supervisor.

# Responsibility

- It is called a personnel monitor for a reason. It is your responsibility to wear it, keep it safe from erroneous exposure. You should not have another person “change out” your badge each month, as some physicians do. Everyone must take personal responsibility for their badge. It is a privilege, and sometimes a requirement to wear your badge.

# Purposely Causing False Exposures

- Any personnel found to have purposely exposed another person's or their own badge to direct or scattered radiation is subject to dismissal, as this is against the law!

# Who Must Wear A Personnel Monitor ?

- Any person deemed occupationally exposed to >500 mREM of ionizing radiation a year.
- This can be determined by pocket dosimeter use for a month, or by badge assignment temporarily for a few months.
- It is completely safe, and also legal in Pennsylvania, to work around radiation, but not be monitored directly by a personnel monitor.
- Remember, a personnel monitor cannot keep you safe, only time, distance, and shielding can do that.

# Policing Badge Wear

- So who's job is it to police the wearer of a personnel monitor to wear it? The immediate supervisor is responsible to see that all staff, who are required to wear a badge, do so.
- Physicians cannot be forced to wear a badge. If they do not wear a badge, the Radiation Safety Officer should be notified. He/she will have a talk with the physician. If they continue to not use a badge, they may be asked to sign a waiver or responsibility on behalf of the hospital. This issue would be decided at a Radiation Safety Committee Meeting.

# Personnel Monitoring Records

- Reading and understanding your personnel monitoring records is the responsibility of your immediate supervisor
- Putting exposures in perspective and addressing outliers is the RSO's responsibility.
- The RSO reviews all badge records each month and initials them, then distributes them to the supervisors, who post them for you to see.
- Answers to many questions about badge reports can be found on the flip side of the report

# What's with this DDE, LDE, and SDE?

- The Deep Dose Equivalent (DDE) is an exposure at a few centimeters into your body (Limit: 5000 mREM/yr)
- The Lens Dose Equivalent (LDE) is the exposure to your eyes (Limit: 15,000 mREM/yr)
- The Shallow or Skin Dose Equivalent (SDE) is the exposure to the epidermis of your skin (Limit: 50,000 mREM/yr.)

## So what's this Assigned Dose?

- The assigned dose is the Effective Dose Equivalent Dose (EDE) reported. It can be with two different formulas depending on whether one or two badges are worn with a lead apron.
- If one badge is worn on the collar when a lead apron is routinely worn, the the EDE is =  $0.3 \times$  collar badge reading.
- If two badges are worn: one badge is worn on the collar outside the lead apron, and one is worn at waist level under the lead apron, the EDE is =  $1.5 \times$  waist badge reading +  $0.04 \times$  the collar badge reading. This formulary usually produces the lowest EDE value.

# So How About the Baby Badge?

- A second badge called the “baby” badge is usually worn by a declared pregnant woman who also is required to wear a lead apron. The collar badge and the EDE both overestimate the fetal dose.
- The fetal dose is still about 50% of the waist badge worn under the lead apron, as the fetus is not on the surface of the body-obviously. This baby badge reading is required to be below 50 mREM/month and <500 mREM during the entire pregnancy to be considered “absolutely safe”.

# Questions?

- In case this presentation has not answered all your questions, feel free to contact your immediate supervisor for answers. If they do not have them, they will contact me, and I will provide them.....

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