The Impact of Accidentally Washing and Drying Your Personal Dosimetry Badges in the Laundry - Does It Matter?

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ABSTRACT

Purpose: Occasionally radiation therapy staff accidentally place their personal radiation dosimeter badges in the laundry. This study assessed the effects of standard household laundry wash/dry cycles on the dose readings of Landauer Luxel®+ Optically Stimulated Luminescence (OSL) dosimeter badges.

Methods: Prior to placement in the laundry, dosimeter badges were exposed to scatter and leakage radiation from either a 10 MV or 18 MV photon beam for 0 to 2500 monitor units (MUs) in 500 MU increments, using a clinical TrueBeam linear accelerator. Irradiation conditions were gantry 0°, collimator 0°, field size 20x20 cm^2, dose rate 500 MU/min, MLC retracted and nothing in the primary beam. For each exposure, two sets of three badges were placed on a counter, 3 meters away from isocenter, in the treatment room. A radiation survey meter (Victoreen 451P SN1340) and myOSLchip dosimeters (RadPro Int.) were also used to estimate the doses at the measurement location. For each set of exposed badges, one badge was not placed in the laundry, one was placed in a wash cycle (cold water), and one was both washed and dried (medium heat). Two different models of washers and dryers were used for the two badge sets. After washing and drying, all badges were sent to Landauer® for reading. Survey meter readings were used to correct for slight variations in dose between the badge locations on the counter.

Results: Badge readings differed from myOSLchip and survey meter readings by up to 0.12 mSv and 0.06 mSv respectively. Washing and drying the badges had no noticeable effect on the dose readings (maximum difference 0.07 mSv). There was no clear trend observed across test conditions.

Conclusion: Luxel®+ OSL dosimeter badge readings were unaffected by laundry washing and drying. If not physically damaged, replacement of accidentally washed and dried badges may not be necessary.

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INTRODUCTION

- Occasionally radiation therapy staff accidentally place their personal radiation dosimeter badges in the laundry.
- This study assessed the effects of standard household laundry wash/dry cycles on the dose readings of Landauer Luxel®+ Optically Stimulated Luminescence (OSL) dosimeter badges.

METHODS AND MATERIALS

- Prior to placement in the laundry, dosimeter badges were exposed to scatter and leakage radiation from either a 10 MV or 18 MV photon beam for 0 to 2500 monitor units (MUs) in 500 MU increments, using a clinical TrueBeam linear accelerator.
- Irradiation conditions were:
  - Gantry 0°
  - Collimator 0°
  - Field size 20x20 cm^2
  - Dose rate 500 MU/min
  - MLC retracted and nothing in the primary beam
- For each exposure, two sets of three badges were placed on a counter, 3 meters away from isocenter, in the treatment room.
- A radiation survey meter (Victoreen 451P SN1340) and myOSLchip dosimeters (RadPro Int.) were also used to estimate the doses at the measurement location.
- For each set of exposed badges:
  1. One badge was not placed in the laundry
  2. One was placed in a wash cycle (cold water)
  3. One was both washed (cold water) and dried (medium heat)
- Two different models of washers and dryers were used for the two badge sets.
- After washing and drying, all badges were sent to Landauer® for reading.
- Survey meter readings were used to correct for slight variations in dose between the badge locations on the counter.

Figure 1 Dosimeter badges (along with survey meter and OSL chip) placed on a counter, for each exposure, at 3 meters away from isocentre, in the treatment room.

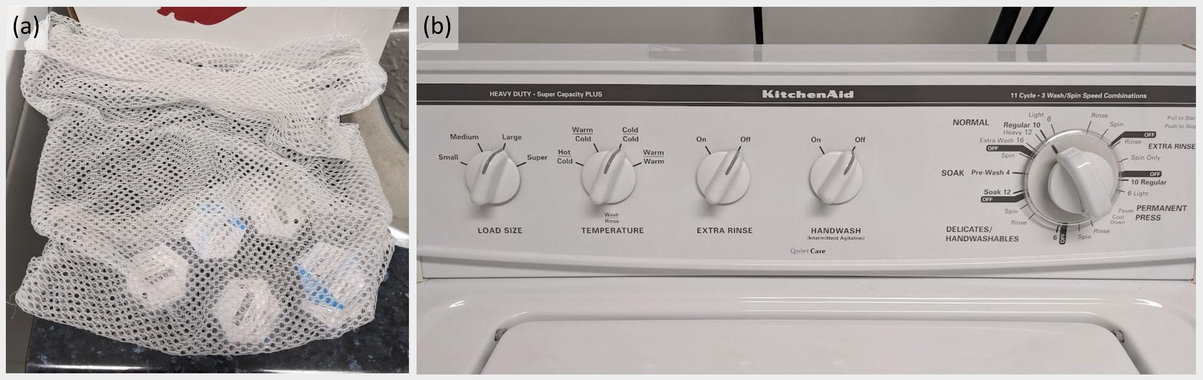

Figure 2 (a) Dosimeter badges placed in a laundry mesh bag; (b) Washer settings used for laundry.

RESULTS

- Badge readings differed from myOSLchip and survey meter readings by up to 0.12 mSv and 0.06 mSv respectively.
- Washing and drying the badges had no noticeable effect on the dose readings (maximum difference 0.07 mSv).

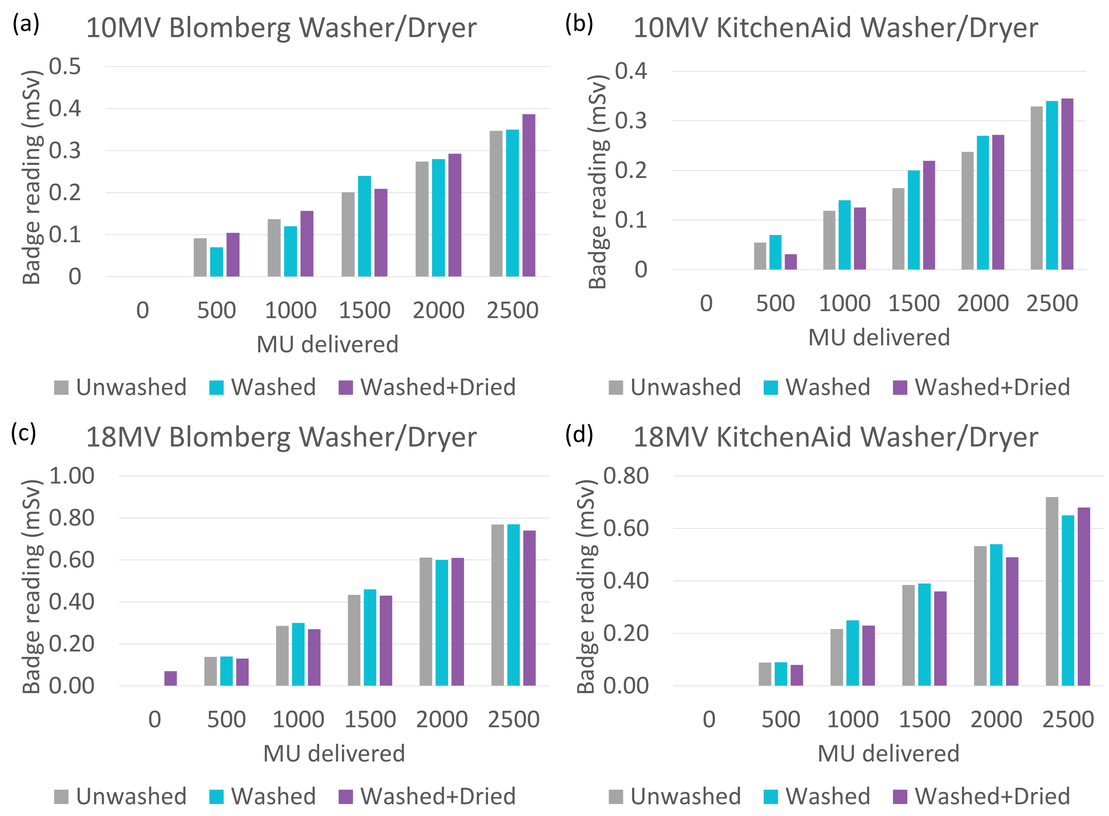

Figure 3 Unwashed, washed, and washed+dried dosimeter badge readings for 10 MV and 18 MV exposures and two different models (Blomberg and KitchenAid) of washers and dryers.

DISCUSSION

- There was no clear trend observed across test conditions.
- Landauer Luxel®+ OSL dosimeter badges are claimed to withstand extreme temperatures and submersion in water, as long as the plastic casing remains intact.

CONCLUSIONS

- Luxel®+ OSL dosimeter badge readings were unaffected by laundry washing and drying.
- If not physically damaged, replacement of accidentally washed and dried badges may not be necessary.