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Safety/QA/QI Projects

# COMPARISON OF OCCUPATIONAL RADIATION EXPOSURE IN INTERVENTIONAL PAIN MEDICINE PHYSICIAN WEARING CHEST VERSUS RING DOSIMETERS

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## Introduction

Occupational radiation exposure amongst interventional pain medicine physicians is an essential topic in the discussion of workplace safety and career longevity. Many opinions from across all medical specialties exist for the varying types of dosimeters to accurately estimate exposure during radiation producing procedures. Some argue that ring dosimeters worn on the finger are superior due to proximity of the hands to the working field and source of radiation (1). Others note the variability in physician technique affecting the accuracy of ring dosimeters as well as their perceived effect on dexterity and discomfort while performing procedures (2). Similarly, there is the theoretical chance a ring could lead to glove breakage and loss of sterility.

## Materials and Methods

This study's aim was to compare radiation exposure recordings between the commonly worn chest dosimeter and ring dosimeters to elucidate any potential discrepancies that may lead to more impactful safety measures. A secondary aim was to examine any differences in broken glove events or breeches of sterility during procedures. The Institutional Review Board of Oregon Health and Science University reviewed this study's quality improvement protocol and waived the need for approval. We conducted a randomized control trial over a period of six months that included ten interventional pain medicine physicians practicing at Oregon Health and Science University's Comprehensive Pain Center. Subjects were randomly divided into two equal numbered cohorts consisting of a control group (torso) that was assigned to wear the standard chest dosimeter only and an experimental group (hand) that wore both chest and ring dosimeters. Dosimeter wearing compliance and radiation exposure measurements were collected for each of the subjects' dosimeter(s) and compared using unpaired or paired student t-test where appropriate. Any glove breaks were also recorded during this time period.

## Results/Case Report

There was no significant difference in average six-month radiation exposure per individual between the torso and hand groups detected by chest dosimeters (158.8 mrem vs. 122.8 mrem  $P = 0.473$ ) indicating a similar overall exposure within the time period. Per OSHA guidelines, the acceptable six-month absolute radiation exposure for the

chest is substantially lower than the extremities (2500 mrem vs. 37500 mrem). Due to these differing thresholds and in order to appropriately compare radiation recordings between the chest and ring dosimeters within the hand group, absolute radiation exposure recordings were interpreted as a percent of the allowable six-month maximum to compare the relative recordings between the two devices. The average percent of six-month maximum radiation exposure was significantly higher on the chest dosimeter compared to the ring (4.9% vs. 0.56%  $P = 0.0068$ ). Neither group had any recorded glove breaks.

## Discussion

Although within acceptable limits, our study indicates the chest dosimeter recorded nearly nine times the acceptable percent maximum compared to the ring dosimeter. This discrepancy highlights that chest dosimeters may be the safer, more conservative, option when monitoring occupational exposure when compared to ring dosimeters. This data also indicates that the use of a ring dosimeter alone may underestimate radiation to other parts of the body.

## References

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2. Koukorava C, Carinou E, Simantirakis G, Vrachliotis TG, Archontakis E, Tierris C, Dimitriou P. Doses to operators during interventional radiology procedures: focus on eye lens and extremity dosimetry. *Radiat Prot Dosimetry*. 2011 Mar;144(1-4):482-6. doi: 10.1093/rpd/ncq328. Epub 2010 Nov 2. PMID: 21044993.

## Disclosures

Yes

## Tables / Images