Radiation Exposure to the Eye with Mini C-arm Use
During Hand Surgery

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INTRODUCTION
Fluoroscopic radiation exposure is a potential occupational health risk to the Hand Surgeon, given operator proximity and the relative lack of eye shielding. At present, the amount of radiation exposure to the eye, associated with the routine use of mini C-arm fluoroscopy is unknown. The association of eye radiation exposure and the early development of cataracts have been previously reported. The purpose of this study is to test that eye radiation exposure, sustained during routine mini C-arm use, does not exceed that of previously reported critical radiation dosages to the eye.

METHODS AND MATERIALS
Eye dosimeters were secured to surgical loupes at the level of the orbit. Accumulated radiation dosage was analyzed and compared to control badges on a monthly basis, and background exposure was eliminated. For each procedure, mini C-arm radiation output was logged, including the dose rate, total accumulated dosage, and total exposure time.

RESULTS
Average monthly eye dosimetry values included the following: dose rate was $0.50 \pm 0.03$ mGy/sec, total accumulated dosage was $32.16 \pm 7.88$ mGy, and total exposure time was $75.72 \pm 16.36$ sec. Average monthly eye radiation exposure values were less than 30 mrem (previously reported maximum eye dosage is 1,250 mrem per month). 46 procedures were performed over the collection period. The most commonly performed procedures included ORIF distal radius fractures (14), metacarpal and phalangeal surgery (9), and basilar thumb arthritis surgery (7). ORIF of the distal radius fracture was associated with higher average exposure time (93.57 sec) and average accumulated dosage (51.73 mGy).

CONCLUSION
Our study is limited by low procedure numbers and underestimates radiation exposure. This study suggests that eye radiation exposure, from routine mini C-arm fluoroscopy use, on an average monthly basis, does not approach previously reported critical eye radiation loads associated with cataracts.

REFERENCES