In 2012, in an effort to reduce radiation exposure during coronary procedures, our institution reduced the standard setting for x-ray digital pulse rates (DPF) from 15 frames per second (FPS) to 10 FPS for fluoroscopy and cine-angiography. Previous work in our institution demonstrated this intervention was associated with a 38.3% reduction in x-ray dose as measured by the Air Kerma (P<.0001). We sought to quantify the impact of the reduction in DPF rate on angiographic image quality.

A non-inferiority cohort study was designed, randomly selecting 53 patients from 2011 (group 1 – default DPF 15 fps) and 53 patients from 2012 (group 2 – reduced DPF (10fps)); balancing the groups for clinical variables. Board certified attending interventional cardiologists blindly assessed the images for angiographic quality on a 1-10 scale. Each attending reviewed 18 cases from the randomly selected dataset; as well as 5 common cases to assess for inter-observer variability. The study was designed to have 80% power to detect a 10% reduction in measured angiographic quality.

Groups 1 and 2 were matched for all patient and procedure characteristics including fluoroscopy time. There were 105 angiographic cases reviewed (52 from group 1 and 53 from group 2). The mean angiographic quality score in group 1 was 7.98(+/-0.144); while the mean angiographic quality score in group 2 was 8.06 (+/-0.146) p=0.6438 (NS). The non-significant difference in angiographic image quality persisted when adjusted for patient age, gender, BMI, and inter-observer variability in image assessment. (Odds Ratio for DPF change on image quality adjusted for age, gender and BMI: -1.02 P= 0.47)

Reducing DPF rates yields significant reductions in total X-Ray energy during invasive cardiac procedures. There is no significant impact on angiographic image quality associated with the reductions in pulse rates. In fact the non-significant difference in image quality slightly favored the reduced pulse rate group, making it unlikely that an important difference in image quality was missed in this analysis. Pulse rate reduction is an easily achievable technique to reduce operator and patient radiation exposure with no impact on angiographic quality.