

**CONCLUSION** This study is the first to show the clinical impact of clot strength and endogenous fibrinolytic activity on MACE after PCI in CAD patients, which may indicate that coagulation profiles can be important risk factors for atherothrombotic events in these patients.  
**CATEGORIES CORONARY:** PCI Outcomes

**RADIATION EXPOSURE - I**

Abstract nos: 313 - 317

**TCT-313**

**Lens Changes Associated with Radiation in the Cardiac Catheterization Laboratory: An Update from the IC-CATARACT (CATaracts Attributed to Radiation in the CaTh Lab) Study**

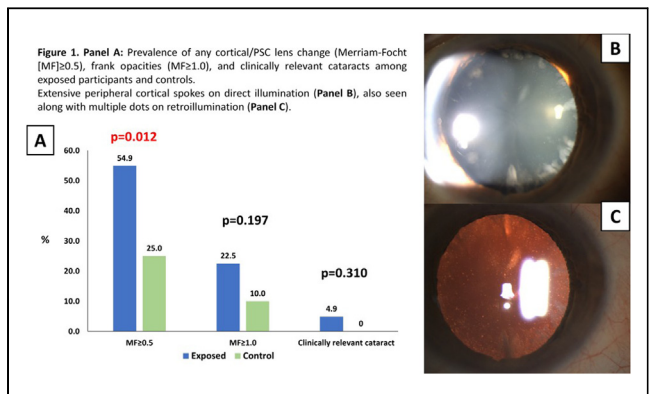


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**BACKGROUND** Exposure to ionizing radiation is associated with the development of lens opacities. We examined the relationship between occupational exposure to ionizing radiation and the prevalence of lens changes in interventional cardiologists (ICs) and catheterization laboratory (“cath-lab”) staff.

**METHODS** We conducted a cross-sectional study at an interventional cardiology conference for two consecutive years (2016 and 2017). Study participants completed a questionnaire about occupational exposure to radiation and potential confounders for the development of cataracts, followed by slit-lamp examination and grading of lens findings.

**RESULTS** A total of 162 participants were examined: 88% had occupational radiation exposure (49.5± 11 years-old, 83% men) and 12% were unexposed controls (37.7 ± 12 years-old, 60% men). The prevalence of cortical and posterior subcapsular lens changes was higher in exposed participants as compared with controls (55% vs. 25%, p=0.012) based on the Merriam-Focht (MF) scale. The following factors were independent predictors of lens changes: occupational exposure (odds ratio [95% CI]: 4.98 [1.30-25.58] p=0.018); age 40-60 years (OR 3.48 [CI 1.45-8.95] p=0.0049); age > 60 years (OR 16.90 [CI 4.73-71.67] p<.0001); and female gender (OR 3.37 [CI (1.27-9.63] p=0.014). The prevalence of frank opacities (23% vs. 10%, p=0.197) and clinically relevant cataracts (4.9% vs. 0%, p=0.310) were similar between the two groups; however, all the clinically relevant cases were in the exposed group.



**CONCLUSION** ICs and cath-lab staff have a higher prevalence of lens changes as compared with unexposed controls, highlighting the importance of minimizing staff radiation exposure.

**CATEGORIES OTHER:** Public Health Issues

**TCT-314**

**Implementation of noise reduction technology to reduce patient radiation dose in chronic total occlusion percutaneous coronary interventions: a propensity-matched analysis**



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**BACKGROUND** Chronic total occlusions (CTO) percutaneous coronary intervention (PCI) is associated with high radiation exposure for both patients and operators. Our study aim was to evaluate the impact of the implementation of a noise reduction technology (NRT) on patient radiation exposure during CTO PCI.

**METHODS** A total of 187 CTO PCIs performed between February 2016 and May 2017 was analyzed according to two angiographic systems, Standard and NRT. Propensity score matching (PSM) was performed to control for differences in baseline clinical and angiographic characteristics. Standard group and NRT group were matched (1:1 ratio) by age, sex, body mass index, contrast volume, fluoroscopy time, number of cine acquisitions, use of 7.5 frames-per-second setting, and Japanese-CTO (J-CTO) score. The study primary endpoints were Cumulative Air Kerma at Interventional Reference Point (AK at IRP),

which correlates with patient's tissue reactions, and Kerma Area Product (KAP), a surrogate measure of patient's risk of stochastic radiation effects. Study secondary endpoint was if the procedure exceeded one of the trigger level points for a potential skin injury (KAP of 500 Gy $\cdot$ cm $^2$  and/or AK at IRP of 5 Gy).

**RESULTS** After PSM, n=56 pairs were identified. Baseline and angiographic characteristics between the two groups were well matched. Compared to the Standard protocol, NRT was associated with lower AK at IRP [2.514 (1.804-3.660) vs. 3.257 (2.089-5.343) Gy, p=0.025] and a strong trend towards reduction for KAP [167 (127.25-243) vs. 203 (140.25-359.75) Gy $\cdot$ cm $^2$ , p=0.053]. No difference between groups was found with regards to KAP trigger level dose. However, the Standard group had a higher incidence of exceeding AK at IRP trigger level dose, compared with NRT [n=15 (26.8%) vs n=5 (8.9%), p=0.014].

**CONCLUSION** The use of NRT in CTO PCI is associated with markedly lower patient radiation exposure, compared with a Standard protocol.

**CATEGORIES CORONARY:** Complex and Higher Risk Procedures for Indicated Patients (CHIP)

**TCT-315**

**Safety and Feasibility of Low Dose Compared With Standard Dose Radiation for Cardiac Catheterization and Intervention**



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**BACKGROUND** Radiation exposure from various imaging modalities increases the risk for malignancy. Coronary angiography is a common source of radiation. The safety and feasibility of low dose versus standard dose radiation in adult cardiac catheterization and intervention has not been previously evaluated.

**METHODS** We performed a retrospective study of 393 consecutive patients (61±12 years), who underwent coronary angiography or percutaneous coronary intervention from September 2016 to June 2017. Patients were divided into a low dose radiation group (n=81) consisting of 1, 4, and 7.5 frames/second (f/s) fluoroscopy and 7.5 f/s cine angiography vs. standard dose (n=310) of 10, 15, and 30 f/s fluoroscopy and 10, 15, or 30 f/s cine angiography. Primary endpoints included dose area product, air kerma (skin dose), fluoroscopy time, and contrast use.

**RESULTS** In the low dose radiation group vs. the standard dose, there was a statistically significant reduction in dose area product (3,999.35 ± 5,125.35 mGy·cm $^2$  vs. 8,027.61 ± 9,461.12 mGy·cm $^2$ , p<0.005) and air kerma (525.51 ± 838.89 mGy vs. 1,111.05 ± 1,431.72 mGy, p= <0.005). However, no significant difference was noted in the fluoroscopy time (21.43 ± 17.72 minutes vs. 17.31 ± 14.20 minutes, p=0.054) or contrast use (148.06 ± 99.48 ml vs. 137.80 ± 83.60 ml, p=0.434).

**CONCLUSION** Low dose radiation showed a significant radiation reduction without an increase in fluoroscopy time or contrast utilization. Thus, use in adult cardiac catheterization is technically feasible and safe for the patient and operator. Such radiation protocols can have a clinically meaningful impact for society and the future of cardiology.

**CATEGORIES CORONARY:** Complications

**TCT-316**

**Radiation Exposure to Interventional Echocardiographers and Interventional Cardiologists during Structural Heart Interventions - Impact of Shielding**

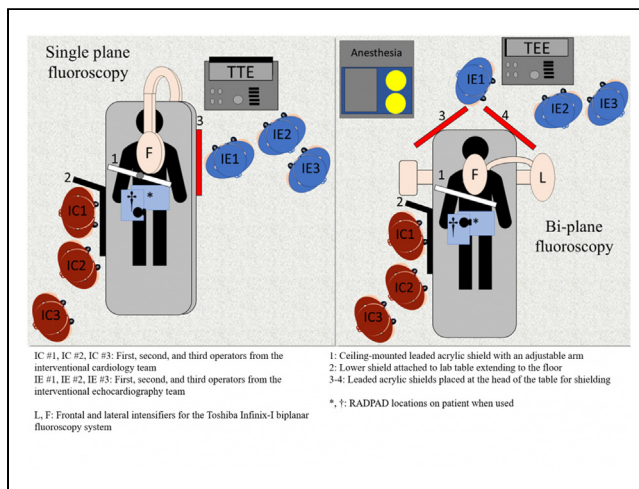


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**BACKGROUND** Structural heart interventions are increasing in complexity with reliance on Interventional Echocardiography (IE). Recent reports have demonstrated concerning exposure and higher radiation to IE. We investigated radiation exposure during structural heart interventions with the use of external shielding for IE and disposable radioprotective drapes for interventional cardiology (IC).

**METHODS** We monitored 32 structural interventions - 19 TAVR's (4 with TEE guidance, 15 with TTE guidance), 6 TMVR's, 5 PVL closures, and 2 ASD closures. Three members of both the IC and IE teams wore dosimeters on the chest, collar, ankle, wrist, and finger. The deep, lens, shallow dose and the assigned deep dose equivalent (DDE, LDE, SDE, ADDE) were reported. IE shielding was used for each case with room orientation as described in Figure 1. Disposable radioprotective drapes (RADPAD<sup>®</sup>) were used at the discretion of the primary IC.



**RESULTS** Cumulative radiation dose was highest for the primary IC followed by the secondary IC and primary IE: IC#1 - 3.18, 7.11, 12.10; IC#2 - 1.96, 2.32, 8.80; IE#1 - 1.52, 1.66, 13.30 (ADDE, LDE, and finger SDE in mSv). Comparing 5 TAVR's with and 5 without radioprotective drapes with similar fluoroscopy time, cumulative dose was reduced: IC#1 - 0.23 vs. 4.12, 1.10 vs. 4.90; IC#2 - 0.13 vs. 0.38, 1.40 vs. 2.90 (LDE and finger SDE in mSv. ADDE was low in both groups).

**CONCLUSION** Radiation exposure during increasingly complex structural heart interventions is concerning. With shielding, IE's received lower doses than IC's. Radioprotective drapes may provide further protection for the IC.

**CATEGORIES STRUCTURAL:** Congenital and Other Structural Heart Disease

**TCT-317**

**Propensity Score-Matched Analysis of Operator Radiation Exposure in Percutaneous Coronary Intervention with Radial versus Femoral Approach**



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**BACKGROUND** Data regarding operator radiation exposure related to radial versus femoral arterial access in patients undergoing percutaneous coronary intervention (PCI) remain controversial. This study sought to compare operator and patient radiation exposure during PCI with radial versus femoral access.

**METHODS** This study evaluated prospectively 542 patients between October 2014 and August 2016 undergoing PCI either using the radial or femoral access. In 74 pairs of propensity-score matched (PSM) patients, baseline characteristics, procedural data such as individual radiation to operator, fluoroscopy time, dose-area product (DAP) and Kerma-area product (KAP) were documented and analyzed. Personal