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REDUCTION IN ESTIMATED LIFETIME CANCER INCIDENCE AND MORTALITY USING CARDIAC PROSPECTIVE ECG TRIGGERED CT COMPARED TO RETROSPECTIVE GATED CT

ACC Poster Contributions
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Background: Prospective ECG-triggered cardiac CT (P-CT) lowers radiation dose significantly compared to retrospective ECG-gated cardiac CT (R-CT), but potentially provides less information, such as cardiac function. We report the estimated lifetime attributable risk (LAR) of cancer and estimated the cancer reductions using P-CT compared to R-CT .

Methods: For this observational study, 2122 patients who underwent 64-slice P-CT were compared to 179 R-CT patients matched for age and gender. Effective CT radiation dose (mSv) was calculated using patient exam dose length product (DLP) mGy·cm and k-factor, 0.014 mSv*mGy-1*cm-1. Using cancer risk tables from BEIR VII report, patient LAR for cancer incidence and mortality were calculated. Patients were divided by gender, age decile, and whole chest (WC) and dedicated cardiac (CCT) scans for P-CT and R-CT comparisons. Reductions in LAR of cancer and the number needed to scan (NNS) to reduce 1 cancer with P-CT were calculated.

Results: Overall P-CT effective dose was 3.7 mSv (95% CI 3.6, 3.8) compared to 21.6 mSv (20.5, 22.7) for R-CT ($p<.00005$). P-CT dose was 75% and 81% lower than R-CT for WC and CCT scans, respectively ($p<.00005$). Mean estimated additional LAR cancer incidence and mortality with P-CT was 0.02% and 0.01% compared to 0.13% and 0.08% for R-CT, respectively. Cancer incidence and mortality for P-CT was decreased in each age decile and for WC and CCT scans as compared to R-CT. Cancer reductions were more pronounced for females as compared to males ($p=0.01$) and young compared to older patients ($p=0.0001$). The relative risk reduction for P-CT induced cancer decreased from 87% to 60% across age deciles. The NNS with P-CT to reduce one cancer incidence ranged from 550 to 3000 and NNS to reduce one fatal cancer ranged from 1100 to 3900.

Conclusions: Results suggest the estimated LAR for radiation-induced cancers from cardiac CT are rare, but significantly reduced with P-CT compared to R-CT. The relative cancer reduction with P-CT is beneficial from a population perspective, but should be balanced with any potential loss of information obtained with R-CT.