Advancing Radiation Dose Reduction: A Single-Center Comparison of 1st-Generation Photon-Counting CT and Three Generations of Dual-Energy CT in Body Imaging for High-BMI Adults

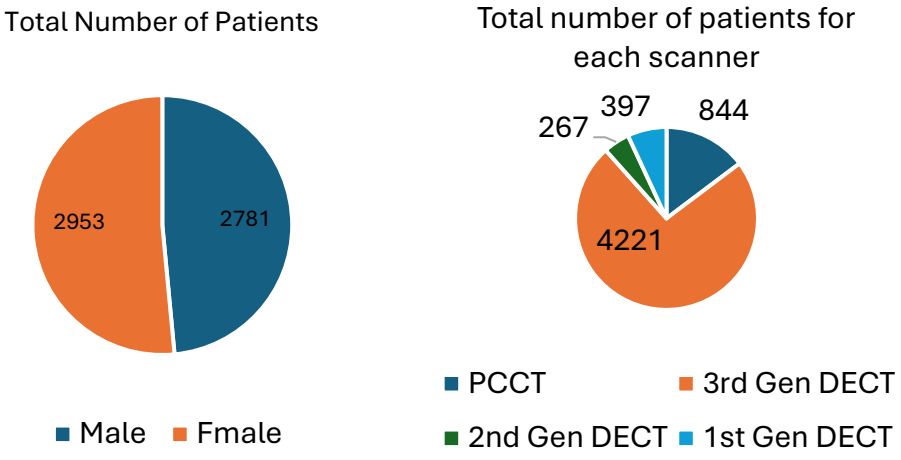
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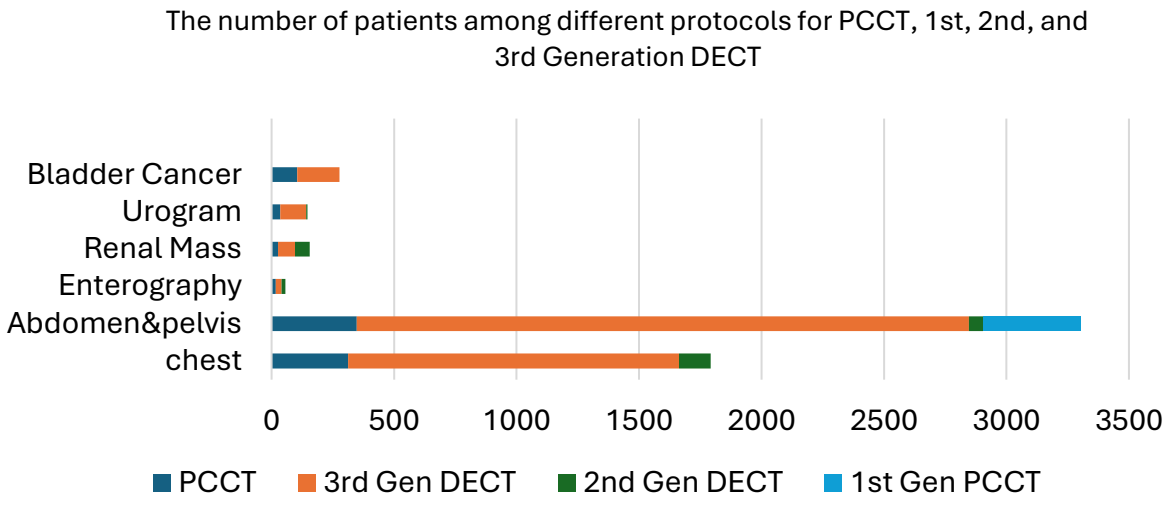
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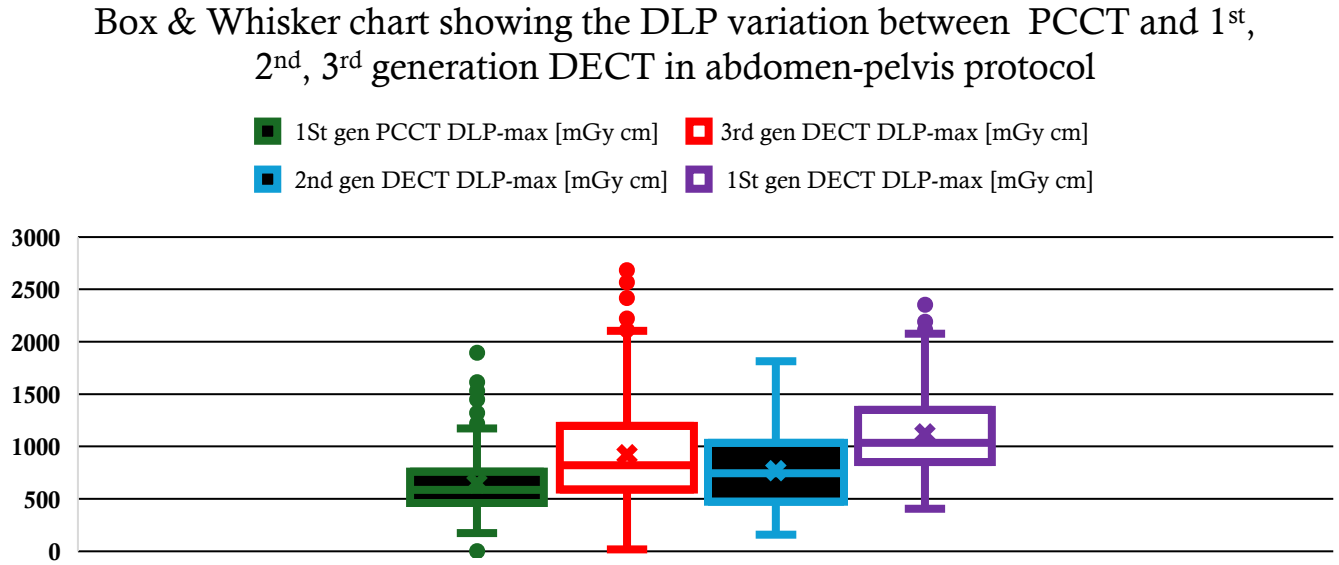
Background

- There is a risk of greater radiation exposure with cumulative imaging especially in higher BMI potentiated with increased life expectancy. This study evaluated first-generation photon-counting CT (PCD-CT) versus three dual-energy CT generations, assessing variations in radiation dose and image quality in single- and multi-phase protocols

Methods







Results

- PCD-CT showed significantly lower DLP values (10–48% reduction) across single-phase protocols compared to all DS-DECT generations ($p < 0.001$).
- PCD-CT: 587–741 mGy·cm
- 3rd-gen: 820–1130 | 2nd-gen: 745–945 | 1st-gen: 1034–1190 mGy·cm.
- In multi-phase protocols (urogram, renal mass, bladder follow-up), PCD-CT achieved statistically significant dose reductions across DLP, CTDIvol ($p = 0.001–0.04$).

Conclusion

Photon-counting CT significantly reduces radiation exposure compared to earlier generations of dual-source dual-energy CT across both single- and multi-phase protocols in high-BMI adults. These results highlight the clinical value of 1st-generation PCD-CT in improving patient safety while maintaining diagnostic image quality.