
Spectral CT:

What Is the Intrinsic Dose Reduction?



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Disclosures

None



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Background

- Spectral CT utilizes one of several mechanisms to accomplish multi energy imaging.
- Among the many promises of dual energy CT is modulation of contrast in reformat images to assist with lesion characterization.
- Furthermore, radiation dose reduction has been purposed by replacing the noncontrast phase and by offsetting lesion conspicuity.



Purpose

The purpose of this study was to evaluate the radiation dose reduction intrinsic of using a spectral CT scanner over conventional monoenergy/monodetector



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Methods

- Retrospective review of studies performed November 2018 at a community hospital and tertiary care hospital
- Both facilities have conventional monoenergy scanners and Phillips iQon (Koninklijke Philips N.V.) dual energy CT scanners
- Inclusion criteria: CT scan of Abdomen and Pelvis in patients >18 years



Methods (cont.)

- Total dose length product (DLP) of each scan was reviewed
- As some DLPs included multiple scans performed in the same session and some included multiple phases or high mA imaging, the upper 50% of DLPs were excluded from each group



Results

	Traditional	Spectral
Number of scans (%)	929 (69)	417 (31)
Males, %	42.5%	38.6%
Age	52.0	55.4
Setting	-	-
Emergency	62.3%	61.8%
Inpatient	16.8%	13.0%
Outpatient	20.9%	25.1%
Not Stat	26.8%	27.5%

Table 1: Demographics of patient population by scanner type.



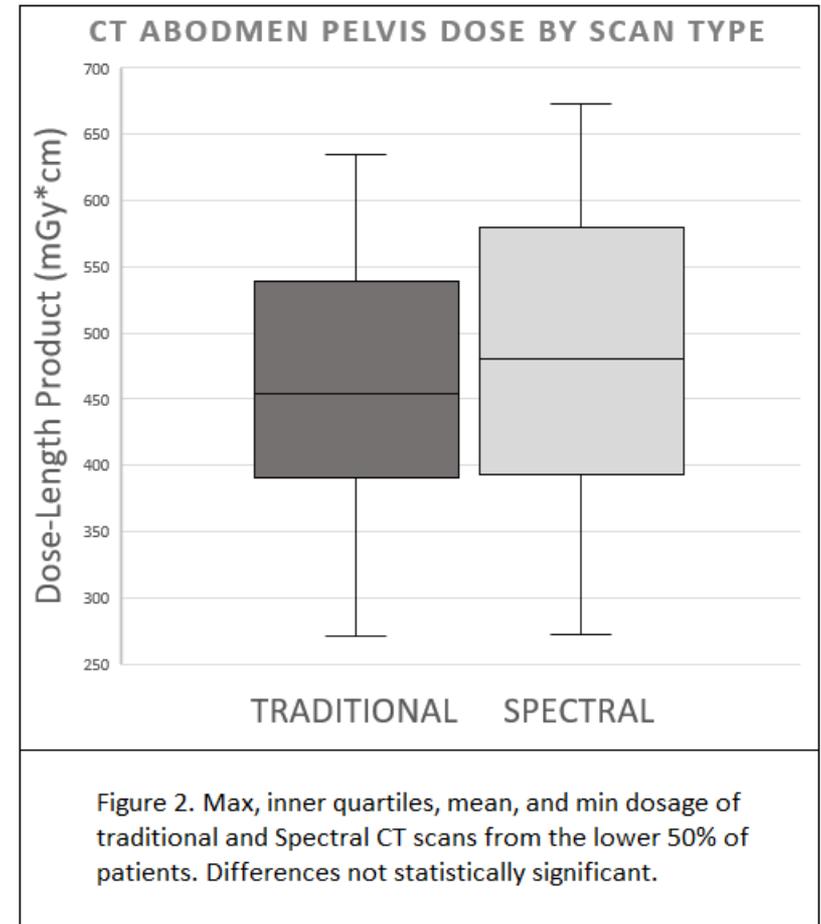
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Results

	Traditional	Spectral
Full population		
Min	270.9	272.2
Mean	863.2	815.8
Max	5010.6	3933.5
T-test	p = 0.45	
Lower 50%		
Min	270.9	272.2
Mean	460.4	484.9
Max	634.1	673.3
T-test	p = 0.10	
Table 2. Min, Mean, and Max of the each full population and lower 50% of each group. No significant difference.		



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Results

- No intrinsic dose reduction by switching from conventional CT scanner to dual energy scanner.
- No statistical significance was seen in the entire population.



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Discussion

- Simply switching to a spectral CT scanner does not reduce radiation dose.
- Requires conscientious effort to reduce dose given improved lesion conspicuity from the multitude of tools available from spectral imaging.



Discussion (cont.)

As stewards of medical radiation, we must strive to both protect and best serve our patients by optimizing the imaging studies at radiation doses in keeping with the tenets of As Low As Reasonably Allowable (ALARA), Imaging Wisely®, and Image Gently®.



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Limitations

- Evaluation only performed on a single model, dual-detector, always-on spectral CT scanner—results may be different with fast-kv switching
- Retrospective analysis—no control of which scanner is used may result in confounding variables—weight not accounted for.



Conclusion

Spectral CT offers multiple avenues for improving patient care. Dose reduction will not be achieved passively--we need to design the protocols to make progress.



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