Evidence for Spectral Imaging CT is mounting...

Incredible breadth of research on GSI

- Journal publications 2010-2017: 300+
- Avg. yearly growth in # of publications 2011-2017: 33%

Professional society consensus statements on DECT clinical utility for:

- Quantitative assessment of fatty liver and contrast uptake in focal hepatic lesions
- Renal masses and urothelial tumors
- Improved iodine sensitivity from DECT angiography
- Reduced artifacts in patients with orthopedic metallic implants
- Known or suspected pancreas neoplasms
- Routine clinical use for carotid/cerebral and extremity CTA
- Routine pulmonary CTA
- Renal stones to discriminate uric acid stones
- Radiation doses are reliably comparable to SECT

BY CLINICAL APPLICATION

Oncology 31%
- Cardiology 17%
- Orthopedic 12%
- Liver damage/Fat 4%
- Vascular/Perfusion 18%
- Renal Stone 3%
- Other 14%

ONCOLOGY BY ANATOMY

- Abdo-pelvic 38%
- Chest 32%
- Head & Neck 15%
- Renal 16%
- Bone 1%

GSI: DELIVERING VALUE BASED CARE

Example findings from peer reviewed GSI publications*

ANGIOGRAPHY

- Low keV images can reduce iodine load by at least 50% benefitting patients with compromised renal function

- Pulmonary Angiography, Total iodine, g:
  - Low keV: 22.2 g
  - Conventional: 50 g

- CT Aortography, No difference in CNR or SNR, Total iodine, g:
  - Low keV: 11.1 g
  - Conventional: 15 g

ABDOMEN – ONCOLOGY

- Improves liver lesion detection 17% and kidney lesion characterization 12% reducing unnecessary follow-ups

- Liver Lesion Detection after transarterial chemoembolization (TACE), Specificity:
  - GSI: 94.4%
  - Conventional: 45%

- Kidney Lesion Characterization, Specificity:
  - GSI: 93%
  - Conventional: 81%

ORTHOPEDICS – REDUCED METAL ARTIFACT

- 6x reduction in non-diagnostic scans with GSI MAR
- Enhancing evaluation of metal implants and adjacent bone or tissue

HEAD AND NECK TUMOR VISIBILITY

- 2.3x higher average tumor attenuation for increased tumor conspicuity and improve tumor evaluation

RENUAL STONE CHARACTERIZATION

- 100% Sensitivity and 99.7% Specificity for uric acid stones and atomic number for stone composition
- for faster and simplified diagnosis workflow

GOUT

- 100% detection by uric acid (calcium) mapping
- for non-invasive diagnosis

*The example findings cited are limited to the referenced studies only and may not be broadly applicable to your clinical practice.
The results of our study demonstrate that analysis of contrast-enhanced dual-energy material attenuation significantly improves the specificity for characterization of small (1–4 cm) renal lesions compared with that of conventional attenuation measurements. This improvement in specificity may decrease the frequency of unnecessary work-up for small indeterminate renal lesions.

Compared with conventional CT, GSI could significantly improve the detection of small and multiple lesions without increasing the radiation dose. Based on spectrum features, GSI could assess tumor homogeneity and more accurately identify residual tumors and recurrent or metastatic lesions during efficacy evaluation and follow-up in HCC after TACE treatment.

Low-contrast agent dose DECT monochromatic imaging in pulmonary angiography accommodates superior intravascular enhancement and contrast in pulmonary arteries, and improves diagnostic confidence with compatible radiation dose.

70% reduced iodine DECT aortography may result in similar aortic attenuation, CNR, SNR, and lower although acceptable subjective image scores when compared to standard iodine SECT aortography in the same patient.

GSI-MARS technology demonstrated the ability to reduce periprosthetic artifacts, improving image quality and diagnostic interpretability particularly when associated with virtual monochromatic spectral images at high energy levels.

The ability to obtain VMS images gives dual-energy CT potential advantages over conventional CT in reducing metal artifacts and improving image quality and diagnostic value. Evaluation of metal implants and adjacent bone or tissue is enhanced with VMS images reconstructed from dual-energy CT datasets. However, understanding principles of dual-energy CT data processing and image generation is necessary to derive maximum benefit from the dual-energy CT datasets.

Dual-energy spectral CT can detect gout tophi within the peripheral joints of the patients. The quantitative measurement of the tophi concentration provides a new imaging method for quantitatively monitoring clinical outcomes of tophi.

Using multiple lines of evidence, our results suggest that 40 keV VMIs objectively improve tumor visibility compared with SECT and, furthermore despite the increased noise levels, are preferred for targeted tumor evaluation subjectively. These conclusions seem suitable both for specialized centers as well as in general practice settings where head and neck cancer imaging is performed.

References


Imagination at work

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