Novel Application of Dual Energy CT

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Objectives

➢ To Review:

• Basic physical principals of DECT

• Clinical applications in thoracic radiology

Physical Principals

Different substances will demonstrate different CT HU values at different energies

Knowledge attenuation properties at the 2 different energies

Material Decomposition

DECT Post-processing

➢ Material specific imaging:

• VNC images ⇒ Iodine subtraction

• VC images ⇒ Iodine map

• Bone Removal

• Pulmonary blood volume (PBV)

• Monochromatic series

Iodine Map

Bone Removal

PBV

VNC

Increased Iodine Conspicuity


Disclosures

No financial or other conflicts of interest.
DECT Post-processing

Monochromatic series from 40 to 140/190 keV

Based on a 36cm water phantom:
- 80 kVp ~ 60keV
- 100 kVp ~ 70keV
- 120 kVp ~ 77keV
- 140 kVp ~ 86keV

Clinical Applications

- The advantages of DECT are two-fold:
  - Low kVp/keV imaging ⇒ Increased iodine conspicuity
  - Material specific imaging ⇒ Iodine and calcium detection and quantification

Clinical Applications

- Potential clinical applications of DECT:
  - Thoracic aorta
  - Pulmonary arteries
  - Lung Perfusion
  - Pulmonary nodules and masses
  - Lymph nodes
  - Pleural disease
  - Airways disease

Conclusion

- DECT represents a relatively new technique
- Main advantages: increased iodine conspicuity (low kVp/kVc imaging) and the material differentiation
- Potential new ways to depict and analyze thoracic disease

Thank you!

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