Dual-Layer Spectral CT – New Diagnostic Approaches

What Spectral CTA could add in the (follow up) Diagnostics of Aortic Diseases
I have no actual or potential conflict of interest in relation to this presentation.
Introduction

➢ X-ray attenuation:

➢ Two different energy spectra needed for discrimination
Different approaches:

- Dual Source
- kV Switch
- Dual Detector
Detector design

➢ Simultaneous detection of two energy spectra
➢ 2-layer detector design (Yttrium based layer for detection of low energy radiation and Gadolinium Oxysulphide based layer for detection of higher energy spectra)
Advantages 2-layer detector design:

- Spectral data is acquired in each scan without additional scan time
- No temporal mismatch between the two acquired energy spectra
- No change in established scan protocol needed

No change in workflow
Spectral data analysis:

- HU based Grayscale Images
  MonoEnergy

- Modified HU (HU*), Processed results
  VNC

- Non HU, Material Density Images
  Iodine - no water

- Non HU, Color Images
  Fused
  Effective atomic number
Clinical examples
Case I (Aortic imaging):

- 87yo female patient
- Chronic renal failure
- Severe aortic valve stenosis
- Aortic CT scan with reduced amount of iodine contrast agent (50 ml)
Case I (Aortic imaging):
Case I (Aortic imaging):
Case I (Aortic imaging):

Conventional CT

MonoE 40 kvp
Case II (Aortic PAU):

- 77yo male patient
- PAU treated with stent
- History of acute renal failure after the last application of iodine-containing contrast agent

Task: Rule out endoleak with Gadolinium-CTA
Case II (Aortic PAU):

Before stent procedure
Case II (Aortic PAU):

Conventional CT

MonoE 40 kvp

Gadolinium
Case II (Aortic PAU):

Z effective (material density)
Conclusion – Dual-Layer Spectral CT

- Each scan results in both conventional and spectral data
- No additional time or change in scan protocol needed
- Reduction of iodine-based contrast agents; aortic imaging with gadolinium-based CA in patients with contraindications for iodine-based CA
Thanks for your attention!