Dual-Energy CT:
Painting the Horizon of Musculoskeletal Imaging

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- OBJECTIVE: Discuss how dual-energy CT (DECT) adds value as a problem-solving tool in emergency musculoskeletal imaging
• DECT can highlight monosodium urate deposits in gout
• Non-invasive nature permits examination of inaccessible areas, such as the spine, small joints, periarticular tissues, tendons, and ligaments.
• Can allow clinicians to visualize disease burden and track resolution

74-year-old man with a history of gout. DECT (a) Sagittal and (b) 3D reformats display urate deposits (green) with encroachment on the right L5/S1 neural foramen (a)

BONE MARROW EDEMA

- Virtual non-calcium (VNCa) technique subtracts bone, allowing evaluation of bone marrow edema
  - Added problem-solving power in trauma
  - Highlights marrow abnormalities such as in multiple myeloma, osteomyelitis, or sacroiliitis

(a) Conventional CT of a 95 year-old female demonstrates a very subtle pubic ramus fracture. (arrow)
(b) DECT VNCa technique demonstrates bone marrow edema on a 3D image, highlighting the fracture

DECT can highlight collagen, permitting evaluation of tendons, ligaments, menisci, and discs.

Adding VNCa to non-contrast CT has been shown to increase sensitivity and specificity for detecting disc herniations.

- 20-year-old female with a twisting injury.
- (a) DECT tendon application demonstrates discontinuity of ACL fibres (arrow).
- (b) Confirmation on subsequent PD MRI.
37-year-old female with breast cancer. Metastases (arrows) can be rendered more conspicuous with:

- (b) **Virtual non-contrast images**: subtraction of contrast can confirm enhancement of lesions
- (c) **VNCa**: subtraction of bone highlights abnormal soft tissue
- (d) **Iodine overlay**: confirmation of vascularity