

# Vertebral Compression Fracture – Fresh or Old?

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## History

An 87-year-old female patient, with a history of lumbar spinal stenosis for the past 10 years, came to our hospital complaining of sudden back pain with physical limitation. A spinal fracture was suspected and a Dual Energy CT (DECT) examination was requested for further evaluation.

## Diagnosis

Sagittal reformation, using mixed images reconstructed from DECT, showed a wedge-shaped vertebral body of T12 (Fig. 1a), suggesting a compression fracture. An extensive bone marrow edema of T12 was unmasked (Fig. 1b) using calcium subtraction offered by DECT. This correlated with the diagnosis of a fresh fracture. The same pattern was confirmed in MRI (Fig. 1c), which was performed to evaluate the status of the spinal stenosis prior to establishing a treatment plan.

## Comments

Standard CT imaging is commonly applied in the work-up of spinal fractures as it clearly depicts bony struc-

## Examination Protocol

Scanner	SOMATOM Force
Scan area	Spine
Scan length	323 mm
Scan direction	Cranio-caudal
Scan time	7 s
Tube voltage	90 / Sn150 kV
Tube current	88 / 65 mAs
Dose modulation	CARE Dose4D™
CTDI <sub>vol</sub>	4.73 mGy
DLP	167.6 mGy cm
Effective dose	2.5 mSv
Rotation time	0.5 s
Pitch	0.6
Slice collimation	128 × 0.6 mm
Slice width	1.5 mm
Reconstruction increment	1 mm
Reconstruction kernel	Qr40

In clinical practice, the use of ADMIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.

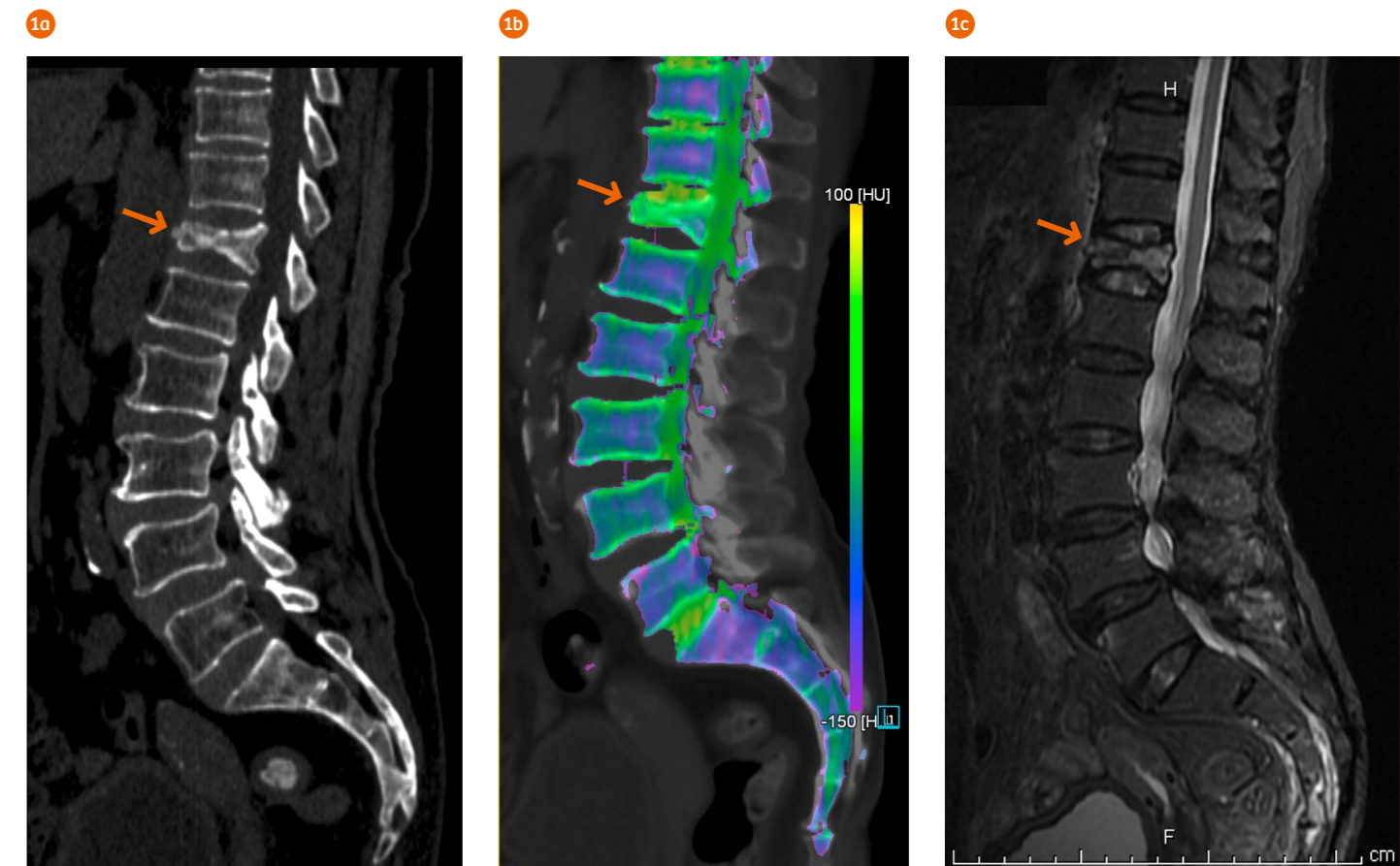
The outcomes by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

tures. However, it is also important to know whether the fracture is fresh or old since this has a clear impact on patient management. Although MRI offers the unique feature of showing bone marrow edema as a sign of fresh trauma, it is limited by its availability and contradictions such as patients with claustrophobia or metal implants or patients who are unable to lie quietly for the duration of the examination due to severe pain. DECT, with calcium subtraction technique, reveals not only the distorted anatomy

but also the pattern of bone marrow edema allowing physicians to distinguish between a fresh and an old spinal fracture. Consequently, the diagnostic process can be sped up and the time to causative treatment can be shortened.

With a newly developed technique, the Selective Photon Shield (SPS II), the energy spectra at two different kV settings can be significantly better separated enabling a clear depiction of the bone marrow edema. In addi-

on, dose reduction techniques, such as advanced modeled iterative reconstruction (ADMIRE) and CARE Dose4D™ (real-time anatomic exposure control), can help to achieve excellent image quality in a dose neutral DECT examination. ●



1 A sagittal MPR image shows a wedge-shaped vertebral body of T12 (Fig. 1a, arrow), suggesting a compression fracture. DECT unmasked an extensive bone marrow edema of T12 (Fig. 1b, arrow), correlating with the diagnosis of a fresh fracture. The same pattern was confirmed in MRI (Fig. 1c, arrow).