Case Study

Dual Energy Composition Analysis

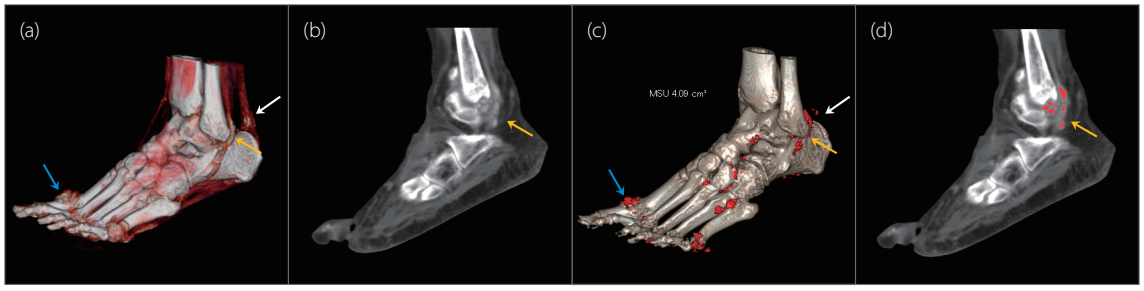
"The Dual Energy capability of the Aquilion Prime SP makes for comprehensive evaluation of arthropathies. In addition to the traditional soft tissue and bone images, I am empowered to check for the presence of monosodium urate as an extra index when gout is suspected. This increases the diagnostic confidence."

Dr. M. Chandramohan
Consultant MSK Radiologist Bradford Teaching Hospitals
Bradford, United Kingdom

Patient History

This 69-year-old male patient with known psoriatic arthritis has increasing symptoms which did not respond to conventional biological treatments. Blood analysis revealed raised serum urate levels, which indicated the possibility of gout. X-ray showed bony erosions in both wrists/hands and ankle/feet but were inconclusive. DE Composition Analysis of a Dual Energy scan of the left ankle and foot was performed.

Results

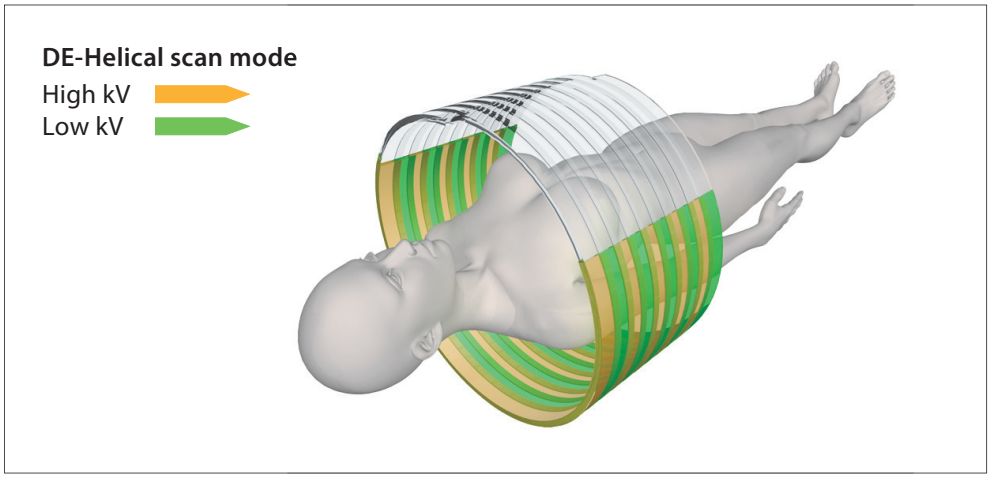


(a) 3D Tendons view, (b) Sagittal MPR view without MSU overlay, (c) 3D with MSU overlay, (d) Sagittal MPR view with MSU overlay of the left foot

Many high density soft tissue areas are seen in images (a) and (b) such as the first metatarso-phalangeal (MTP) joint (blue arrows), peroneous tendons (yellow arrows) and achiles tendon (white arrow). Images (c) and (d) show there are mono sodium urate (MSU) depositions in the corresponding areas. The software depicts the MSU as red color and outputs an estimate of the total MSU volume, 4.09 cm^3.

Technology

Dual Energy Composition Analysis is an application for identifying the presence of monosodium urate in peri-articular anatomic regions. It utilizes the attenuation information of 2 scans covering the same anatomy: a High kV scan and a Low kV scan. The Aquilion Prime SP has the DE-Helical scan mode to acquire high kV and low kV images which are input to the application. The DE-Helical scan mode allows generating the high kV image and the low kV image in a single acquisition. The kV is rapidly alternated between high kV and low kV while the mA is predefined for each kV to achieve equal noise balance of the images.



Conclusion

The Dual Energy Composition Analysis software allows identification of monosodium urate in dense peri-articular regions and may save the need for joint synovial fluid aspiration. While joint aspiration is the definitive method to identify the presence of monosodium urate, it is a painful procedure which may fail due to a lack of synovial fluid in the target region.

Acquisition

Scanner Model:	Aquilion Prime SP
Scan Mode:	DE-Helical
Collimation:	0.5 mm x 80
Exposure:	135/80 kV, 100/570 mA
Rotation time:	0.5 second
Dose Reduction:	AIDR*1 3D Standard
DLP:	274.8 mGy·cm
Effective Dose:	0.22 mSv
k-factor:	0.0008*2

*1 Adaptive Iterative Dose Reduction
*2 CT Dose version 0.6.7, National Board of Health, National Institute of Radiation Hygiene, Denmark

CANON MEDICAL SYSTEMS CORPORATION
https://global.medical.canon

Model number: TSX-303B MCACT0319EAA 2018-02 CMSC/Produced in Japan

Canon Medical Systems Corporation meets internationally recognized standards for Quality Management System ISO 9001, ISO 13485. Canon Medical Systems Corporation meets the Environmental Management System standard ISO 14001.

Clinical results may vary due to clinical setting, patient presentation and other factors.

Made For life