

Case 7

Lung Perfused Blood Volume Imaging with Dual Energy

By Ralf W. Bauer, Matthias Kerl, Thomas J. Vogl, MD

Department of Diagnostic and Interventional Radiology, Johann Wolfgang Goethe University, Frankfurt, Germany

HISTORY

A 61-year-old woman with known advanced lung cancer presented to the emergency department with sudden onset of shortness of breath, chest pain, and dropped arterial oxygen-saturation. She was referred to pulmonary CT angiography for clinically suspected pulmonary embolism.

DIAGNOSIS

Pulmonary CTA was performed utilizing the Dual Energy Lung PBV protocol that ruled out pulmonary embolism. Instead,

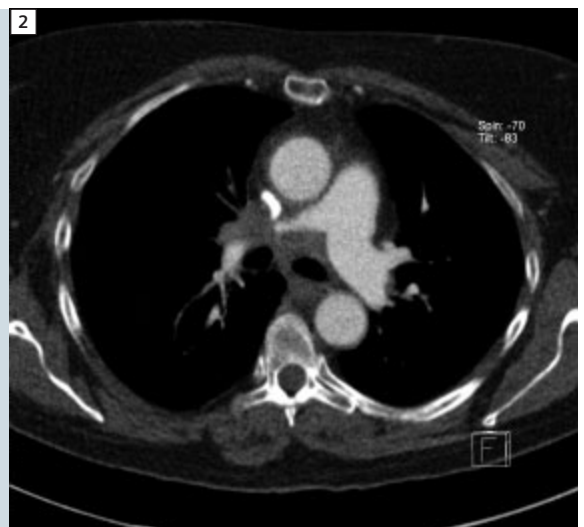
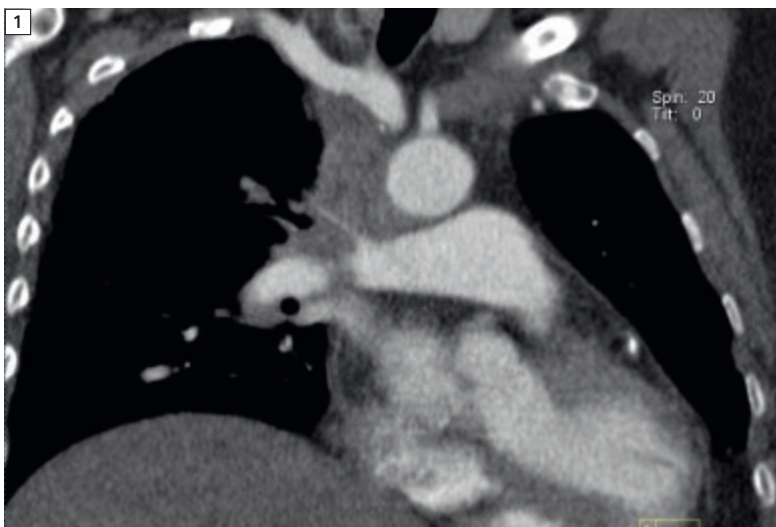
a large lymph node mass in the upper mediastinum was identified. This mass caused encasing of the superior vena cava, the right pulmonary artery, and major obstruction of the right upper lobe branch.

Analysis of the iodine distribution map with Dual Energy revealed a huge perfusion defect of the whole upper lobe of the right lung, explaining the woman's symptoms. The patient was then immediately referred to the Department of Radiation Oncology of our hospital for emergency irradiation.

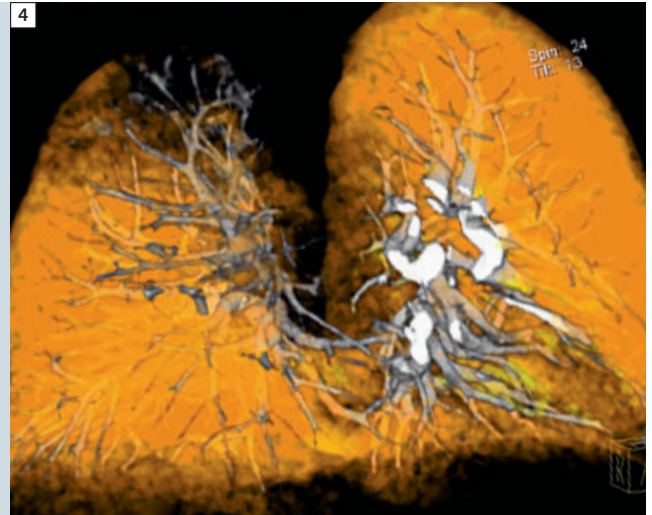
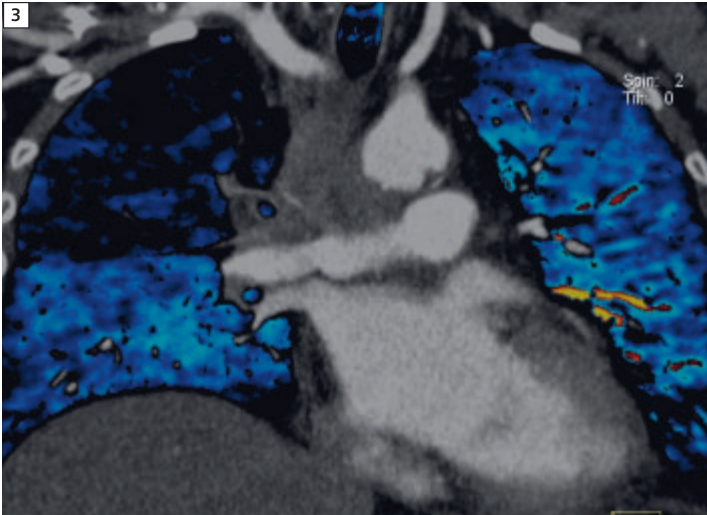
COMMENTS

Analysis of pulmonary iodine distribution with Dual Energy can provide important information, not only about the significance of intravascular obstruction, such as pulmonary embolism, but also about vascular obstruction in general.

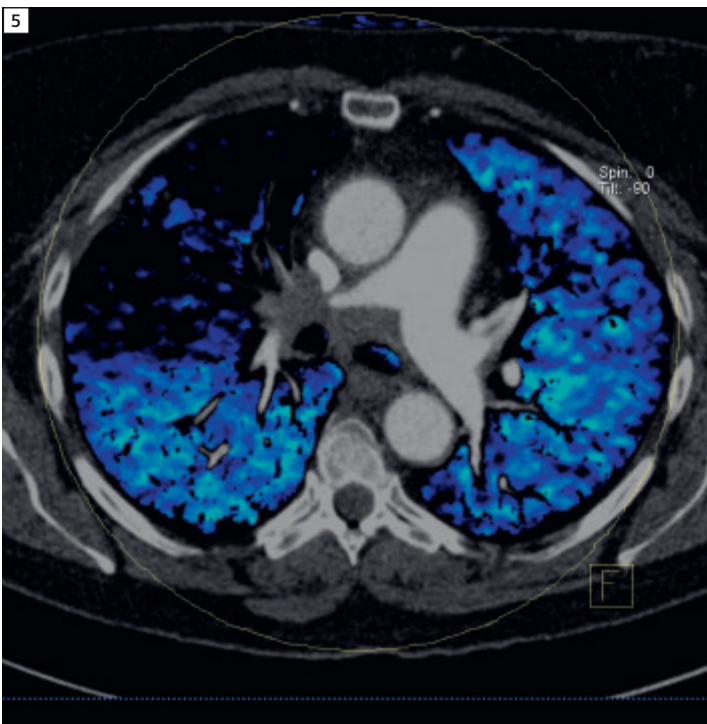
The influence of vascular obstruction identified with the conventional morphological information of CT on hemodynamics can be assessed using different information of the same scan. Thus, Dual Energy CT can provide both morphological and functional information within one scan.



1 2 Conventional gray scale 3D reformates show a huge lymphatic mass in the upper right mediastinum in coronal (Fig. 1) and axial (Fig. 2) plane encasing the right main pulmonary artery and the branches of the upper right lobe.



3 4 5 This subtotal vessel obstruction results in a malperfusion of the whole right upper lobe. Note the significantly reduced iodine content (black) of lung parenchyma compared to the rest of the lung (blue).



EXAMINATION PROTOCOL

Scanner	SOMATOM Definition DS
Scan mode	
Scan area	Thorax
Scan length	180 mm
Scan direction	Caudo-cranial
Scan time	5 s
Tube voltage A/B	140/80 kV
Tube current A/B	28/176 Eff. mAs
Dose modulation	
CTDI _{vol}	mGy
Rotation time	0.33 s
Pitch	
Slice collimation	14 x 1.2 mm
Slice width	1.5 mm
Reconstruction increment	1 mm
Reconstruction kernel	D30f
Volume	ml
Flow rate	ml/s
Start delay	s
Postprocessing	