

Lung VCAR clinical case studies

Using Volume 3D measurements
supports confirmation of
benign diagnosis

Malignant pulmonary nodule
assessment using Lung VCAR

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Case study 1 – Using Volume 3D measurements confirm benign diagnosis

Patient history:

62-year-old woman with a smoking history of 30 pack years.

A nodule was seen 7 years previously on a chest X-ray that the patient provided at the time of the CT scan.

A follow up was performed for other reasons but was used to evaluate the nodule

Examination and technical data

Two thin sliced CT scans were collected with a scan interval of 6 months and compared to a chest X-ray done 7 years prior.

Interpretation:

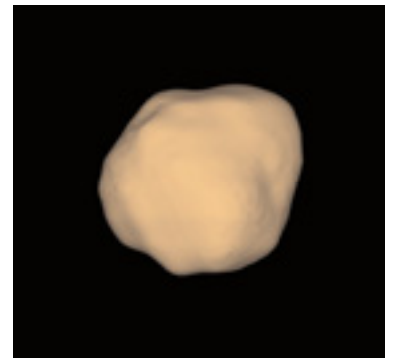
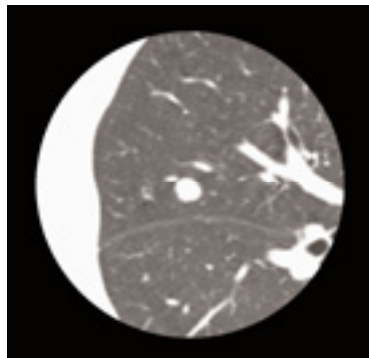
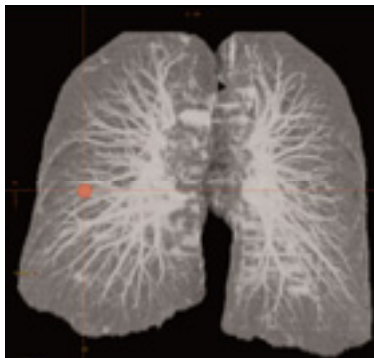
There is a right middle lobe nodule measuring 10mm. The nodule margins are smooth. The nodule segmentation is accurate with good segmentation of vessels.

Considering the GE Lung VCAR™ measurements, the nodule was determined to be very stable with a volume change of four percent as expected since the nodule was confirmed to be benign because of its presence on a chest X-ray 7 years prior:

| | | |
|----------------------|---------------------|---------------------|
| Slice index | 37 | 94 |
| Calcification | No | No |
| Density | Solid | Solid |
| Shape | Round | Round |
| Surface | Smooth | Smooth |
| L-R/A-P/I-S | 10.5mm/9.7mm/10.6mm | 10.5mm/9.5mm/10.0mm |
| Volume | 415mm ³ | 392mm ³ |
| Days growth | | 189 d |
| % growth | | -4% |

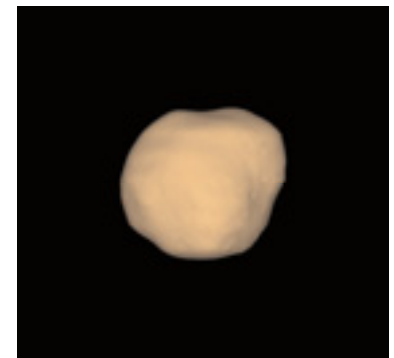
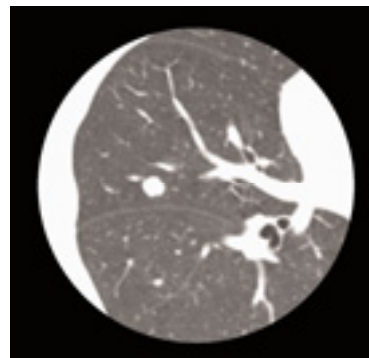
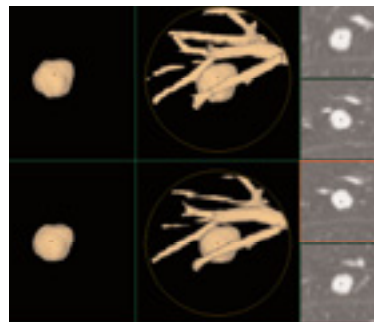
Scan 1

Slice thickness: 1.25
MA: 120
Rotation: .8
Algorithm: Standard



Scan 2

Slice thickness: 1.25
MA: 70
Rotation: .8
Algorithm: Standard



Case study 2 – Malignant pulmonary nodule assessment using Lung VCAR

Figure 1

Unenhanced axial transverse CT image demonstrating a slightly lobulated solid nodule in the right upper lobe. The nodule had been detected on a routine chest radiograph.

Figure 2

3D surface rendering view of the nodule after software segmentation. The lobulated contours are well demonstrated. The calculated volume is 769mm³.

Figure 3

No obvious change in nodule size is apparent on the second CT examination, performed 3 months and 19 days later. The diameter variation measured with manually positioned electronic calipers is less than 1mm.

Figure 4

The software-measured volume on the second CT examination is 1038mm³, representing a 35% increase. The software-estimated doubling time is 255 days. This value for doubling time is suggestive of malignancy as reported by Hasegawa et al.¹ Pathological examination after surgical resection showed a stage I lung adenocarcinoma.

Figure 5

3D surface rendering view of the nodule on the second CT examination, before segmentation. Comparing Figure 4 and 5 shows that the software segmentation is accurate as it does not take in account vascular connections to calculate the volume on the second CT scan. Thus, the measured increase in volume is not due to inappropriate segmentation including vessels but it corresponds to a real increase in size of the lesion. Using a volumetric approach, it is possible to detect an increase in size which is not apparent with a 2D approach, comparing diameters. Variations smaller than 1mm of the diameter cannot be considered as significant as reported by Hasegawa et al.¹

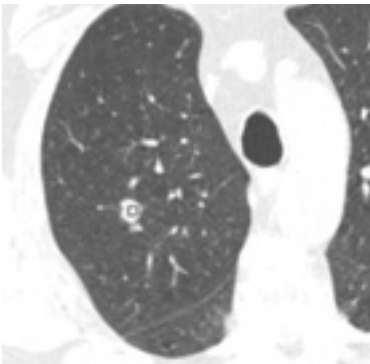


Figure 1
Initial axial image

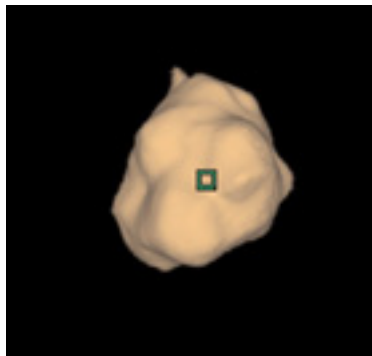


Figure 2
Initial segmented view

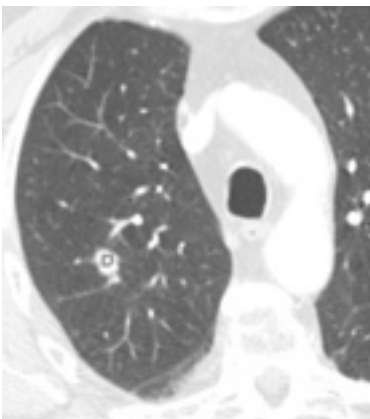


Figure 3
Follow-up axial image

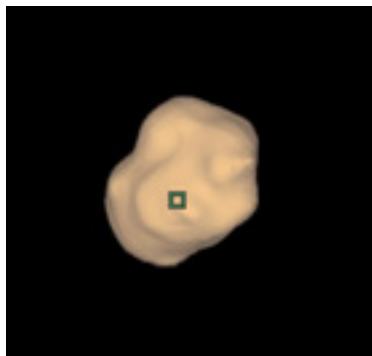


Figure 4
Follow-up segmented view

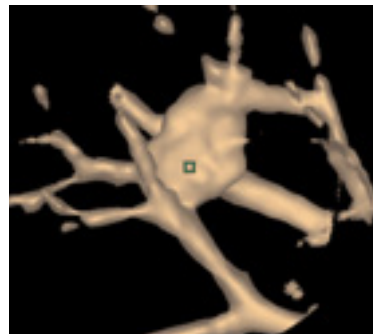


Figure 5
3D surface rendered view

Reference:

- ¹ M Hasegawa, MD, S Sone, MD, S Takashima, MD, F Li, MD, Z-G Yang, MD, Y Maruyama, MD and T Watanabe, MD. Growth rate of small lung cancers detected on mass CT screening – *The British Journal of Radiology*, 73 (2000), 1252±1259 E 2000

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