GE Healthcare

Personalize your clinical workflow with Lung VCAR

- Routine validation of nodule growth
- DCA for small lesion identification pre-surgically
- Evaluation of lung nodule shape

A workflow definition by:
Dr. Marie-Pierre Revel
Department of Radiology
Hôspital européen Georges Pompidou

Personalize your clinical workflow with Lung VCAR

Main utilization: evaluation of lung nodules growth and estimation of doubling time

- Lung VCAR™ software is routinely used for evaluating the percentage of growth of solid small nodules, by comparing baseline and follow-up CT.
- It is mainly used for solid nodules measuring between 5 and 10mm, which represent 80% of lung nodules found incidentally.
  - Nodules with a diameter more than 10mm are preferentially referred for PET-CT studies and or core biopsy under CT guidance.
- For nodules less than 10mm, we estimate that the repeatability of manual diameter measurement is not sufficient[1] to allow a reliable estimation of eventual growth; this is why we prefer to perform volumetric software measurements for small nodules. The coefficient of variation of 9 consecutive measurements performed on a single CT acquisition was only 2.26% in a previous evaluation of the software.[2]
- Standard dose CT acquisitions with a 0.625 or 1.25mm slice thickness are performed for evaluating growth with Lung VCAR software. Images are reconstructed with a standard reconstruction algorithm.
- We try to use the same parameters for baseline and follow-up CT scans.
- First follow-up CT is usually performed at 3 months, following Cornell protocol. For nodules with a high suspicion of malignancy, first follow-up CT is performed sooner, at 8 weeks and we use a volumetric approach with Lung VCAR software to estimate growth.
- We consider an increase of 30% of the measured volume to be significant. We use Lung VCAR software to estimate the doubling times of solid indeterminate nodules. We call indeterminate solid non-spiculated non-calcified nodules with a diameter between 5 and 10mm. We consider doubling time a factor in determining malignancy.[2]

Digital contrast agent

This software option is used for improving lung nodules visualization. It is not systematically used. It is mainly used in cases of apparently solitary lesions, to increase the confidence a lesion is really solitary. We use DCA pre-operatively, especially before pneumonectomy which is contraindicated in case of bilateral lesions. DCA highlights can play the role of "second reader", improving the reading confidence.

In summary DCA is not systematically used for visualization of lung cancer or for the research of mets in oncologic patients. It is used in every situation where it is crucial to reveal tiny lesions: before a major surgery or before surgery in fragile patients.

Other use of Lung VCAR software

Evaluation of lung nodules shape: especially of perifissural opacities. Perifissural opacities are a frequent finding on chest CT. This entity has been recently described (Ahn, RSNA 2004). The definition includes several criteria such as location: below the level of the carina, distance less than 1cm to the pleura and size less than 10mm. 3D surface rendering views obtained following software segmentation can be helpful by showing a triangular shape suggesting a lymph node shape. (image: lymph node).

Lung VCAR software: Quantification of the proportions of solid and non-solid components in part-solid nodules. We use the software to help determine the percentage of ground glass versus solid component is correlated to the probability of lymph node metastasis.[4]

References

1 - Revel MP, Bissery A, Bienvenu M, Aycard L, Lefort C, Frija G. Are two-dimensional CT measurements of small non calcified pulmonary nodules reliable?
Radiology 2004; 231:453-458.

2 - Revel MP, Lefort C, Bissery A, Bienvenu M, Aycard L, Chatellier G, Frija G. Pulmonary nodules: preliminary experience with three-dimensional evaluation.
Radiology 2004; 231:459-466.

3 - Matsuguma H, Yokoi K, Anraku M, Kondo T, Kamiyama Y, Mori K, Tominaga K, Tsuura Y, Honjo S. Proportion of ground-glass opacity on high-resolution computed tomography in clinical T1 N0 M0 adenocarcinoma of the lung: A predictor of lymph node metastasis.
J Thorac Cardiovasc Surg 2002; 124:278-84.

4 - Ohde Y, Nagai K, Yoshida J, et al. The proportion of consolidation to ground-glass opacity on high resolution CT is a good predictor for distinguishing the population of non-invasive peripheral adenocarcinoma.
Lung Cancer 2003; 42:303-10.

GE Healthcare
3000 North Grandview
Waukesha, WI 53188
U.S.A.

www.gehealthcare.com

imagination at work