

Editorial

Advances in the radiological diagnosis of pulmonary nodules

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The solitary pulmonary nodule (SPN) continues to pose a challenge for radiologists and pulmonologists. Due to recent technological advances in the area of radiology, the study of SPNs has taken on new characteristics. Such advances, however, have not altered the basic question of whether a nodule is benign, dispensing with a specific approach, or indeterminate, being potentially a malignant lesion.

The criteria that define benignity for SPN are still valid⁽¹⁾: total or near-total calcification of nodules; central, ring, bull's-eye or popcorn pattern of calcification (except in cases of calcified metastasis, which can also present these patterns); and fat densities in the nodule, as determined using computed tomography (CT). Stability for at least two years is another accepted criterion for benignity. However, slow-growing tumors, especially cystic or semi-cystic nodules (with ground-glass attenuation) can present a duplication time of more than two years. The comparison with previous radiological findings is of fundamental importance and should therefore be carried out whenever possible.

For nodules larger than 1 cm in diameter, the use of some new technologies,^(2,3) such as the evaluation of nodule enhancement after injecting iodinated contrast material (enhancement of less than 15 Hounsfield units is strongly indicative of benignity), and positron emission tomography in association with CT (a standardized uptake value of less than 2.5 is indicative of benignity), can be considered. However, the exact role played by these techniques, which are rather promising, in the study of SPN has not yet been defined, especially due to false-positive and false-negative results that both techniques can produce. It is also important to consider the conditions under which the test was performed – was the nodule found on a CT scan as part of a screening program, which is generally performed in patients who meet the criteria for higher risk of malignancy (being over 40 years of age, having a history of previous neoplasia, having been exposed to asbestos or other elements and, principally, having a history of smoking), or was it an incidental finding on a test performed for other reasons? In practice, for high-risk patients, these techniques are more useful to confirm malignancy than to minimize the concern of both pulmonologists and patients regarding the benignity

of the nodule: as a rule, the nodules end up being either biopsied or surgically excised.

The principal problem caused by the new technological resources, however, was the considerable increase in the number of nodules detected. In chest X-rays, even those of excellent quality, nodules smaller than 9 mm in diameter are rarely identified. On CT scans, especially those made using spiral CT, it is common to detect smaller nodules, even those with diameters of only 1 or 2 mm.⁽⁴⁾ The clinical importance of these tiny nodules seems to be quite different than that of the larger nodules identified on chest X-rays.

This new situation raises a series of questions: What is the real value of identifying such tiny nodules?; Which approach should be taken under these circumstances?; and What is the legal responsibility of the radiologist in this process?

Regarding the significance of such tiny nodules, studies have shown that, in patients with no history of cancer, less than 1% of nodules presenting a diameter of less than 5 mm are malignant. However, studies carried out in the USA have shown that approximately half of the nodules presenting a diameter of greater than 2 cm are malignant.⁽³⁾ In Brazil, due to the high incidence of tuberculosis, this percentage is probably smaller. Nevertheless, malignancy is directly proportional to the size of the nodule. The currently recommended approach for very small nodules – control CT scans after 3, 6, 12 and 24 months – need not be followed. When there is no growth, control CT scans can be carried out at longer intervals, after 12 and 24 months. Other groups defend the idea that, for patients at low risk for cancer, these nodules can be ignored.⁽⁴⁾ Volumetric measurement of nodules can permit the evaluation of growth in smaller intervals of time than those required when measurements of diameter are employed. However, even this process is not error-free, especially if nodules are very small. Nevertheless, with the routine use of this technique, the control intervals will probably be shortened.

In the current issue of the *Brazilian Journal of Pulmonology*, there is an interesting study, conducted by Capobianco et al.,⁽⁵⁾ in which a preliminary evaluation of computed-assisted diagnosis, with the use of multidetector (64-channel) CT, is presented. This technique allows the

radiologist to have a 'second opinion', provided by the computer, which is important, especially if we consider that, with the use of the modern, multidetector tomography scanners, the number of sections obtained from a single scan of the thorax can reach into the hundreds, causing the evaluation of the scans to be tiresome and susceptible to error. Although the results of the by Capobianco et al. study showed that the software program cannot, at least at its present stage of development, replace the radiologist, it should be seen as a tool that will become very useful, especially under those circumstances that are closer to the reality in Brazil, where tests are evaluated by a single professional who has not always been submitted to specific training in thoracic radiology.

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