# Nodules with fat density

Edson Marchiori[1], Bruno Hochhegger[2], Gláucia Zanetti[1]

A 52-year-old male former smoker (30 pack-years) with no symptoms or comorbidities had a routine chest X-ray, which revealed a nodule at the right lung base. A chest CT identified a smooth-bordered nodule in the right lower lobe measuring approximately 1 cm in diameter and with a mean density of −30 HU (Figure 1).

A nodule is defined as a focal rounded opacity measuring up to 3 cm in diameter. An opacity greater than 3 cm in diameter is termed a mass, and an opacity smaller than 1 cm in diameter is termed a small nodule. Nodules can be solitary or multiple, and their density can indicate soft tissue, ground-glass pattern, water, calcium, air (cavitated nodules), or fat. A solitary pulmonary nodule is a common problem for radiologists and pulmonologists, having numerous causes of benign and malignant etiology. Differential diagnosis from lung cancer is the major challenge.

Some imaging criteria, such as nodule stability for more than 2 years or presence of specific patterns of calcification (e.g., calcification of the whole nodule, central/bull's eye calcification, eggshell calcification, etc.), are suggestive of benignity. However, one of the most reliable findings indicative of benignity is the presence of fat within the nodule. Fat is confirmed when the measured density is between −30 and −150 HU.

Two benign tumors can have the aforementioned density values: lipomas and hamartomas.[1,2] Hamartomas are benign neoplasms composed of variable proportions of mesenchymal tissues, such as cartilage, fat, connective tissue, and smooth muscle. Hamartomas often have heterogeneous density, with focal areas of fat and/or calcification.[2] Lipomas are benign mesenchymal tumors composed of adipose tissue. Although lipomas are a common form of soft tissue tumor, intrapulmonary lipomas are very rare. Most intrapulmonary lipomas are asymptomatic and are generally incidentally found on routine X-rays, presenting as solitary opacities indistinguishable from malignant neoplasms. On CT, the presence of intranodular fat is a reliable indicator of benignity. Magnetic resonance imaging also allows distinction between the different components of the lesion, including fat.[1] One caveat should be made regarding the benignity of nodules with fat: the possibility of their being metastatic liposarcoma. In such cases, however, the discovery of lung metastases rarely precedes the diagnosis of the primary tumor.

Our patient received a diagnosis of pulmonary lipoma on the basis of the CT findings. He is being followed, and the nodule has shown no changes since its detection 5 years prior.

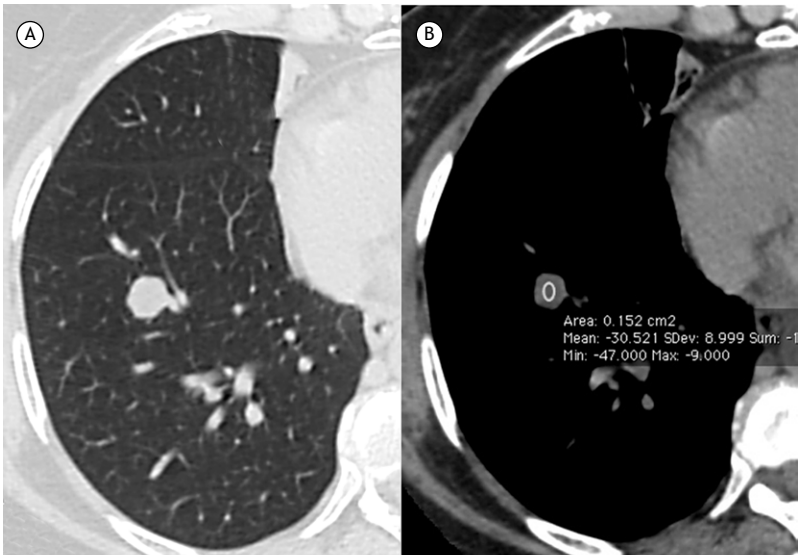


**Figure 1.** Chest CT in lung (A) and mediastinal (B) windows shows a well-defined nodule, measuring approximately 10 mm in diameter, in the right lower lobe. Note in B that the nodule has fat density (mean density, −30 HU).

## REFERÊNCIAS

1. Menna-Barreto M, Zanetti G, Marchiori E. The role of imaging methods in the diagnosis of pulmonary lipoma. Arch Bronconeumol. 2016;52(4):223. https://doi.org/10.1016/j.arbres.2015.04.014
2. Hochhegger B, Nin CS, Alves GR, Hochhegger DR, de Souza VV, Watte G, et al. Multidetector Computed Tomography Findings in Pulmonary Hamartomas: A New Fat Detection Threshold. J Thorac Imaging. 2016;31(1):11-14. https://doi.org/10.1097/RTI.0000000000000180

1. Universidade Federal do Rio de Janeiro, Rio de Janeiro (RJ) Brasil.
2. Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre (RS) Brasil.