Radiology Case Reports

Volume 8, Issue 3, 2013

Followup of a solid solitary pulmonary nodule with low metabolic activity

Reijo Takalo, MD

An incidentally found solid solitary pulmonary nodule (SPN) was studied using FDG PET/CT. The SPN (at that time 11mm) showed only minimal FDG uptake, with a maximum standardized uptake value of 1.7 (max SUV). This suggested a benign lesion. When followup CT was performed six months later, the SPN had grown to 12mm. The patient was re-examined by FDG PET/CT five months later to exclude malignancy. The SPN was now FDG avid, and its size was 14mm. The max SUV was 12.7, consistent with a malignant disease. The patient underwent surgery, and histological examination demonstrated a solid adenocarcinoma (gradus III). The increase in glucose metabolism can be attributed to a change in the histopathologic subtype or molecular features of the SPN. The importance of a followup of nonmetabolically active SPNs is emphasized, primarily by CT (due to its convenience and low cost).

Case report

A 73-year-old man with a 30-pack-year history of smoking had quit smoking six years ago. He had been admitted to a hospital for exacerbation of chronic obstructive pulmonary disease. A chest CT was done to rule out pulmonary embolism. The CT scan did not reveal any pulmonary embolism, but it demonstrated a solid SPN in the right upper lobe. The 9-mm SPN (that is, the average of the largest and perpendicular transverse diameters) had somewhat spiculated contours. FDG PET/CT was performed three months later to characterize the lesion. The then 11-mm SPN showed only minimal FDG uptake (Fig 1, A and B), with a maximum standardized uptake value of 1.7 (max SUV). This suggested a benign lesion. At followup CT six months later, the SPN had grown from 11 mm to 12 mm. The patient was re-examined by FDG PET/CT five months later to exclude malignancy. The SPN was now FDG avid and its size was 14 mm (Fig. 1, C and D). The max SUV was 12.7, consistent with a malignant disease. Whole-body FDG PET/CT did not reveal any other hypermetabolic lesions, and right upper lobectomy was performed. Histological examination demonstrated a solid adenocarcinoma (gradus III).

Discussion

FDG PET/CT has been proposed to be used routinely in the diagnostic workup of patients with a SPN (1). For this purpose, FDG PET/CT has been found to be both accurate and cost-effective (2). An SUV cutoff of 2.5 is commonly used to differentiate benign nodules from malignant ones, as initially suggested by Patz et al (3). All histological types of cancer may give rise to pulmonary nodules, but adenocarcinomas are the most frequent (4). Adenocarcinomas of the lungs have become the most common lung cancers (5, 6). In FDG PET studies, false-negative results can occur, most frequently in association with adenocarcinoma in situ (formerly bronchioloalveolar carcinoma), carcinoids, well-differentiated adenocarcinomas, and tumors less than 1 cm in diameter (7, 8). There are widely varied subtypes of lung adenocarcinomas (5, 9), and as they grow they may undergo mutations (10, 11). In the present case, the increased glucose metabolism in the Son can be attributed to a change in the histopathologic subtype or molecular features of the SPN. The 3-mm increase

Citation: Takalo R. Followup of a solid solitary pulmonary nodule with low metabolic activity. *Radiology Case Reports*. (Online) 2013;8:872.

Dr. Takalo is in the Division of Nuclear Medicine, Department of Diagnostic Radiology, Oulu University Hospital, Oys Finland. Contact Dr. Takalo at reijo.takalo@ppshp.fi.

Competing Interests: The author has declared that no competing interests exist.

DOI: 10.2484/rcr.v8i3.872

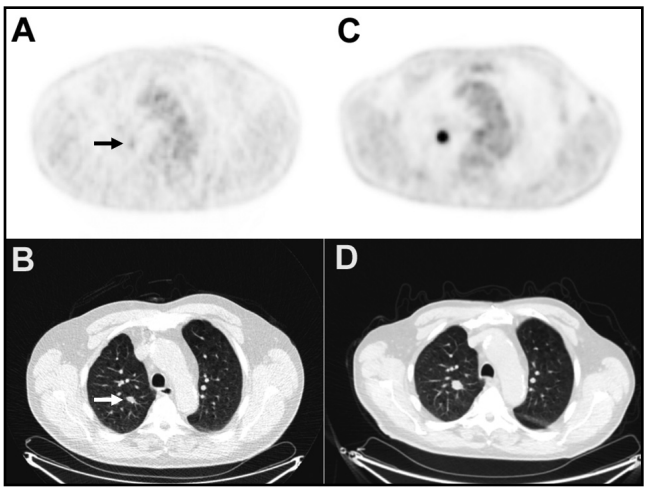

Figure 1. 73-year-old man with solitary pulmonary nodule. FDG PET/CT images at baseline (A and B, arrows point to the SPN) and corresponding images after a followup period of 11 months (C and D).

in size of the SPN cannot explain the increase in FDG uptake, and it is of note that the effect of respiratory motion blur is small in the upper lobe.

In risk populations, the prevalence of lung cancer among nodules measuring more than 10 mm varies between 30 and 80% (12). Even though the negative predictive value of FDG PET/CT is high (13), SPNs with no-to-faint FDG uptake should be followed up, because the molecular biology of lung cancers is highly complex (5). Solid SPNs that remain unchanged on a followup CT after two years are unlikely to be malignant and do not require any further investigations (14). Recently, the Fleishner Society published recommendations for the management of subsolid SPNs detected at CT (15). These recommendations are more varied than the original Fleichner Society guidelines for the solid SPNs (14).

In conclusion, SPNs with no-to-faint tracer uptake on a FDG PET/CT should be followed up to confirm a benign diagnosis. CT is useful for this purpose, due to its convenience and low cost.

References

1. Fletcher JW, Djulbegovic B, Soares HP, et al. Recommendations on the use of 18F-FDG PET in oncology. *J Nucl Med.* 2008;49(3):480-508. [PubMed]
2. Buck AK, Herrmann K, Stargardt T, Dechow T, Krause BJ, Schreyögg J. Economic evaluation of PET and PET/CT in oncology: Evidence and methodologic approaches. *J Nucl Med.* 2010;51(3):401-412. [PubMed]
3. Patz EF Jr, Lowe VJ, Hoffman JM, et al. Focal pulmonary abnormalities: evaluation with F-18 fluorodeoxyglucose PET scanning. *Radiology* 1993;188(2):487-90. [PubMed]
4. Beigelman-Aubry C, Hill C, Grenier PA. Management of an incidentally discovered pulmonary nodule. *Eur Radiol.* 2007(2);17:449-466. [PubMed]
5. Travis WD, Brambilla E, Noguchi M, et al. International association for the study of lung cancer/american thoracic society/european respiratory society international multidisciplinary classification of lung adenocarcinoma. *J Thorac Oncol.* 2011;6(2):244-85. [PubMed]
6. Curado MP, Edwards B, Shin HR, Ferlay J, Heanue M, Boyle P, Storm H. *Cancer incidence in five continents. Vol 9.* Lyon, France: IARC Scientific publications, 2007.
7. Higashi K, Ueda Y, Seki H, et al. Fluorine-18-FDG PET imaging is negative in bronchioloalveolar lung carcinoma. *J Nucl Med.* 1998;39(6):1016-20. [PubMed]
8. Nomori H, Watanabe K, Ohtsuka T, Naruke T, Suemasu K, Uno K. Evaluation of F-18 fluorodeoxyglucose (FDG) PET scanning for pulmonary nodules less than 3 cm in diameter, with special reference to the CT images. *Lung Cancer* 2004; 45(1):19-27. [PubMed]
9. Austin JHM, Garg K, Aberle D, et al. Radiologic implications of the 2011 classification of adenocarcinoma of the lung. *Radiology* 2013; 266(1):62-71. [PubMed]
10. Schmid K, Oehl N, Wrba F, Pirker R Pirker C, Filipits M. EGFR/KRAS/BRAF mutations in primary lung adenocarcinomas and corresponding locoregional lymph node metastases. *Clin Cancer Res.* 2009;15(14):4554-60. [PubMed]
11. Han HS, Eom DW, Kim JH, et al. EGFR mutation status in primary lung adenocarcinomas and corresponding metastatic lesion: discordance in pleura metastases. *Clin Lung Cancer* 2011;12(6):380-6. [PubMed]
12. Aberle RD, Gamsu G, Henschke CI, Naidich DP, Swenson SJ. A consensus statement of the Society of Thoracic Radiology: screening for lung cancer with helical computed tomography. *J Thorac Imaging* 2001; 16(1): 65-8. [PubMed]
13. Veronesi G, Bellomi M, Veronesi U, et al. Role of positron emission tomography scanning in the management of lung nodules detected at baseline computed tomography screening. *Ann Thorac Surg.* 2007;84(3):959-65. [PubMed]
14. MacMahon H, Austin JHM, Gamsu G, et al. Guidelines for management of small pulmonary nodules detected on CT Scans: A statement from the Fleishner society. *Radiology* 2005; 237(2): 395-400. [PubMed]
15. Naidich DP, Bankler AA, MacMahon H, Schaefer-Prokop CM, Pistolesi M, Goo JM. Recommendations for the management of subsolid pulmonary nodules detected at CT: A statement from the Fleichner Society. *Radiology* 2013; 266(1):304-17. [PubMed]