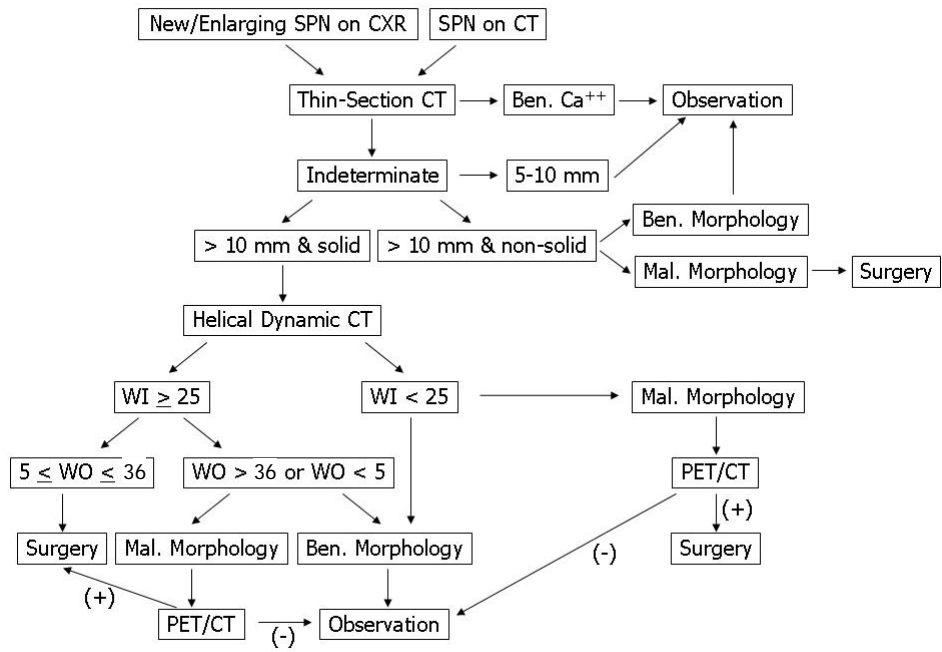**Solitary Pulmonary Nodule: Differential Diagnosis by Thoracic Imaging**

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Solitary pulmonary nodules (SPNs) are defined as focal, round or oval areas of increased opacity in the lung with diameters of $\leq$ 3 cm. The characterization of SPNs is a major concern not only to radiologists but also to clinicians, because SPNs have a 30%-40% chance of being malignant. The goal of the radiologic evaluation of SPNs is to noninvasively differentiate benign from malignant lesions as accurately as possible. Morphologic evaluations can help differentiate benign and malignant nodules when they have typical benign or malignant features, but there is considerable overlap between benign and malignant nodules in terms of their morphologic presentations. Various strategies other than morphologic evaluations have been applied to the differentiation of malignant and benign nodules, which include growth rate assessment, Bayesian analysis, and hemodynamic characteristics by helical dynamic (HD) CT. In addition, the assessment of nodular metabolic characteristics by 18F-fluorodeoxyglucose (FDG) positron emission tomography (PET), and pathologic evaluations using transthoracic needle aspiraton/biopsy or video-assisted thoracoscopic surgery (VATS) have also been used for characterizing SPNs. However, no single diagnostic algorithm can be applied to all cases.

CT screening has increased the detection rate of small pulmonary nodules. Information on the morphologic and hemodynamic characteristics of SPNs provided by HDCT, with high specificity and reasonably high accuracy, can be used for initial assessment. PET/CT is more sensitive at detecting malignancy than HDCT, and all malignant nodules may be correctly diagnosed as malignant by both modalities. Therefore, PET/CT may be selectively performed to characterize SPNs that show indeterminate results at HDCT. The tissue characterization of sub-centimeter nodules, still a challenge to radiologists, can be performed by serial volume measurements using CT. Video-assisted thoracoscopic surgery removal after nodule localization may be performed for the diagnosis and treatment of a sub-centimeter nodule. The effective algorithmic approaches for SPN diagnosis may be suggested with following pathways:

New/Enlarging SPN on CXR   SPN on CT

Thin-Section CT → Ben. Ca⁺⁺ → Observation

Indeterminate → 5-10 mm

> 10 mm & solid   > 10 mm & non-solid

Ben. Morphology

Mal. Morphology → Surgery

Helical Dynamic CT

WI ≥ 25   WI < 25 → Mal. Morphology

5 ≤ WO ≤ 36   WO > 36 or WO < 5

PET/CT
(+)
Surgery

Surgery   Mal. Morphology   Ben. Morphology

(+)

PET/CT →(-)→ Observation

(-)

The aim of my talk is to improve our understanding of the clinical issues involved in making a diagnosis and to guide further diagnostic workup and treatment of SPNs.