Pulmonary Nodules

A **pulmonary nodule** is an abnormal area in the lung that is less than 3 cm in size.

Pulmonary nodules are often discovered when a chest x-ray or chest computed tomography (CT) scan is performed for another reason. Approximately 50% of patients who undergo CT screening for lung cancer are found to have a pulmonary nodule. Approximately 95% of pulmonary nodules are **benign** (not caused by cancer).

**Causes of Solitary (Single) Pulmonary Nodules**

A benign solitary pulmonary nodule may be a residual scar from a previous infection with fungus, tuberculosis, bacteria, or parasites; less commonly, it may be due to an active infection. Other causes include benign lung tumors, cysts, pulmonary blood vessel abnormalities, lung inflammation from rheumatoid arthritis or sarcoidosis, impacted mucus, or a contained pocket of fluid in the lung. When a solitary pulmonary nodule is due to cancer, the most common causes are lung cancer or a single metastasis, which is cancer that has spread from another location, most frequently from the breast, head and neck, colon, kidney, skin (melanoma), or bones or soft tissues (sarcoma).

**Causes of Multiple Pulmonary Nodules**

In addition to the conditions that cause solitary pulmonary nodules, other causes of multiple pulmonary nodules include prolonged exposure to coal dust or mineral dust (silica or beryllium) and blood clots mixed with bacteria that travel to the lungs through the bloodstream. Multiple pulmonary nodules may also be caused by metastatic cancer, most commonly from the lung, breast, kidney, thyroid, ovary, uterus, testicle, or pancreas.

**What Makes Pulmonary Nodules More Likely to Be Due to Cancer?**

The risk of cancer increases with pulmonary nodules that are larger in size, have irregular borders, have a more solid appearance, and are located in the upper lobes of the lung. Some patient factors that increase the likelihood of a pulmonary nodule being cancer include current or previous cigarette smoking, older age, personal history of cancer, family history of lung cancer, emphysema, and exposure to asbestos or radon.

**How Are Pulmonary Nodules Managed?**

All patients diagnosed as having a pulmonary nodule should undergo a chest CT scan. If a chest x-ray or chest CT scan has been done in the past, it should be compared with the most recent radiology images to see if the pulmonary nodule is new or if it has changed in size. Depending on patient risk factors and pulmonary nodule characteristics, an individualized plan should be developed in consultation with a physician familiar with current guidelines regarding the management of lung nodules.

Nodules considered at low risk of being cancer may undergo repeat CT scans within a designated time interval to assess for growth. If nodules remain stable in size over a 2-year period, they are generally considered to be benign. Nodules at intermediate to high risk of cancer should undergo further evaluation. Management options for these nodules may include a positron emission tomography (PET) scan, biopsy, and/or surgery.