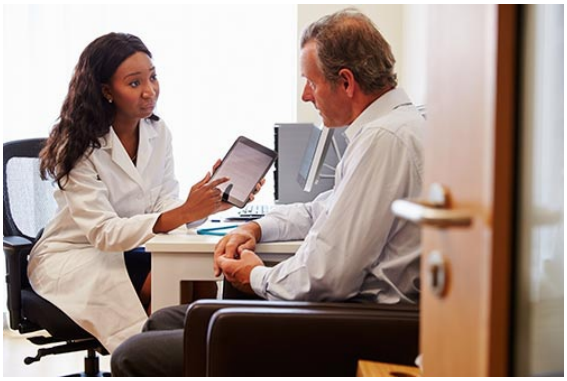
Lung Cancer Screening

What is lung cancer screening?



Screening exams find disease before symptoms begin. The goal of screening is to detect disease at its earliest and most treatable stage. In order to be widely accepted and recommended by medical practitioners, a screening program must meet a number of criteria (https://www.radiologyinfo.org/en/info/safety-hiw_05) , including reducing the number of deaths from the given disease.

Screening tests may include lab tests that check blood and other fluids, genetic tests that look for inherited genetic markers linked to disease, and imaging exams that produce pictures of the inside of the body. These tests are typically available to the general population. However, an individual's needs for a specific screening test are based on factors such as age, gender, and family history.

In lung cancer screening, individuals who have a high risk of developing lung cancer but no signs or symptoms of the disease undergo low-dose computed tomography (http://www.radiologyinfo.org) (LDCT) scanning of the chest.

LDCT combines special x-ray equipment with sophisticated computers to produce multiple, cross-sectional images or pictures of the inside of the body. LDCT produces images of sufficient quality to detect many abnormalities while using up to 90 percent less ionizing radiation than a conventional chest CT (https://www.radiologyinfo.org/en/info/chestct) scan.

In the past, doctors used *chest x-ray (https://www.radiologyinfo.org/en/info/chestrad)* and sputum cytology (http://www.radiologyinfo.org) to check for lung cancer. A chest x-ray makes images of the heart, lungs, airways, blood vessels and the bones of the spine and chest. Sputum cytology is a lab test in which a sample of sputum (http://www.radiologyinfo.org) (mucus that is coughed up from the lungs) is viewed under a microscope to check for cancer cells. However, the use of chest x-ray and sputum cytology, individually or in combination, has not resulted in a decreased risk of dying from lung cancer.

Who should consider lung cancer screening – and why?

About Lung Cancer

Lung cancer (https://www.radiologyinfo.org/en/info/lung-cancer) forms in tissues of the lung, usually in the cells lining air passages.

Lung cancer is the leading cause of cancer-related death in the United States and worldwide. About 85 percent of lung cancer deaths occur in current or former cigarette smokers.

The type of cancer diagnosed is based on how the cells look under a microscope. The most common type is non-small cell lung cancer.

Lung cancer that is detected early — before spreading to other areas of the body — is more often successfully treated. Unfortunately, when lung cancer is diagnosed, occasionally the disease has already spread outside the lung.

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Risk Factors for Lung Cancer

Anything that increases an individual's chances of developing disease is called a risk factor. Risk factors for lung cancer include:

- tobacco smoking
- exposure to radon (http://www.radiologyinfo.org) , asbestos (http://www.radiologyinfo.org) or other cancer-causing agents
- a personal or family history of lung cancer
- certain chronic lung diseases

Screening Trials

Before a screening program is widely accepted and recommended by medical practitioners, it must do more than detect disease at an early stage. The accepted measure of screening effectiveness is that it helps reduce the number of deaths from the given disease.

Clinical screening trials (https://www.radiologyinfo.org/en/info/screening-clinical-trials) are research studies that help determine to what extent screening methods actually reduce mortality (death rate) and at what cost.

If you would like more information on screening trials using imaging tests to screen for the presence of disease, visit the *Eastern Cooperative Oncology Group and the American College of Radiology Imaging Network (ECOG-ACRIN) (https://ecog-acrin.org/)* . Information on clinical trials studying both cancer screening and treatment methods is also available at the *National Cancer Institute (http://cancer.gov/clinicaltrials/search)* .

National Lung Screening Trial

Current recommendations for lung cancer screening followed publication of a large, randomized clinical trial sponsored by the National Cancer Institute called the National Lung Screening Trial (https://www.cancer.gov/newscenter/qa/2002/nlstqaQA) (NLST).

The NLST was performed to determine whether screening low-dose chest CT exams could reduce death rates from lung cancer among those at high risk for the disease. The trial studied more than 53,000 men and women aged 55 to 74 who were current or former heavy smokers at 33 sites across the United States. Each participant was randomly assigned to receive screenings with either low-dose CT (LDCT) or standard chest x-ray once per year for three consecutive years. The trial demonstrated 15 to 20 percent fewer lung cancer deaths among participants screened with LDCT.

New Screening Recommendations

Based on the NLST results and other studies, the National Comprehensive Cancer Network (https://www.nccn.org/patients/guidelines/content/PDF/lung_screening-patient.pdf) , American Lung Association (https://www.lung.org/) , American Association for Thoracic Surgery (https://www.aats.org/about-the-aats/governance) , American College of Chest Physicians (https://www.chestnet.org/Guidelines-and-Resources) , American Thoracic Society (https://www.thoracic.org/statements/) and the American Cancer Society (https://www.cancer.org/cancer/latest-news/new-lung-cancer-screening-guidelines-for-heavy-smokers.html) all recommend that individuals at high risk for developing lung cancer consider annual screening with LDCT.

The U.S. Preventive Services Task Force (USPSTF) recommends annual screening for lung cancer with LDCT in adults age 50 to 80 who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years. For more information, please visit the USPSTF website (https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening) .

Ask your doctor whether lung cancer screening is right for you. They will review your medical history and advise you on the benefits, limitations, and potential risks of lung cancer screening. If you qualify, your doctor may enroll you in a screening program.

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How to Compute "Pack-Years"

To translate your smoking history into "pack years," simply multiply the number of cigarette packs you have smoked per day by the number of years you have smoked. For example: 1 pack a day smoked over a 20-year period = 20 pack years.

How is lung cancer screening performed?

A lung cancer screening program should:

- be run by medical professionals and facilities that have expertise in LDCT screening
- include multiple specialties involved in lung cancer care such as pulmonologists (http://www.radiologyinfo.org) , radiologists (https://www.radiologyinfo.org/en/info/article-your-radiologist) , interventional radiologists, thoracic surgeons (http://www.radiologyinfo.org) , medical oncologists (http://www.radiologyinfo.org) , primary care doctors and pathologists (http://www.radiologyinfo.org)
- not be a substitute for quitting smoking; not smoking is the best way to prevent lung cancer

CT scanning and LDCT work like other x-ray exams. X-rays are a form of radiation that can be directed through the part of the body being examined. Different body parts absorb x-rays to varying degrees. See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about x-rays.

With CT scanning, numerous x-ray beams and a set of electronic x-ray detectors rotate around you, measuring the amount of radiation being absorbed throughout your body. At the same time, the exam table is moving through the scanner so that the x-ray beam follows a spiral (helical) path. A special computer program processes this large volume of data to create two-dimensional cross-sectional images of your body and display them on a monitor. This is called helical or spiral CT.

LDCT for lung cancer screening does not require contrast material. To perform the exam, the technologist will position you on your back on the CT exam table. They may use straps and pillows to help you maintain the correct position and remain still during the exam. They will usually ask you to raise your arms over your head. Next, the table will move quickly through the scanner to determine the correct starting position for the scans. Then, the table will move slowly through the machine while you hold your breath for each short five- to 10-second scan.

What are the benefits and risks of lung cancer screening?

Benefits

- Because CT scans can detect even very small nodules in the lungs, LDCT of the chest is especially effective for diagnosing lung cancer at its earliest, most treatable stage.
- CT is fast, which is important for patients who have trouble holding their breath.
- CT scanning is painless and noninvasive. LDCT does not require contrast material.
- No radiation remains in a patient's body after a CT exam.
- X-rays used in LDCT of the chest have no immediate side effects and do not affect any metal parts in your body, such as pacemakers or artificial joints.
- LDCT scans of the chest produce images of high enough quality to detect many abnormalities while using up to 90 percent less ionizing radiation than a conventional chest CT scan.
- Studies prove that lung cancer screening with LDCT reduces the number of deaths from lung cancer in patients at high risk.
- When cancer is found with screening, it is often at an early stage. Patients can more often undergo minimally invasive surgery and have less lung tissue removed.

Risks

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- False positive results occur when a test appears to be abnormal, but no lung cancer is found. Abnormal findings may require additional testing to determine whether cancer is present. These tests, such as additional CT exams or more invasive tests in which a piece of lung tissue is removed (called a lung biopsy), have risks and may cause a patient anxiety.
- Test results that appear to be normal even when lung cancer is present are called false-negative results. A person who receives a false-negative test result may delay seeking medical care.
- Not all cancers detected by LDCT will be found in the early stage of the disease. Screening that detects lung cancer may not improve your health or help you live longer if the disease has already spread beyond the lungs to other areas of the body.
- All screening exams can find slow-growing cancers. While these cancers may never harm you, their discovery can result in unnecessary treatment, complications and cost.
- Health insurance companies and Medicare will only cover the cost of an LDCT scan to screen for lung cancer in patients who meet certain criteria.

What happens if something is detected on my screening exam?

Lung cancer typically occurs in the form of a lung nodule (http://www.radiologyinfo.org) , an area of abnormal tissue within the lung. Most nodules (more than 95%) are not cancer. If your LDCT scan detects a nodule larger than a certain size, your doctor will likely recommend a follow-up LDCT scan several months later to check that the nodule does not change in size. If the nodule grows or looks suspicious, your doctor may recommend further evaluation with a contrast-enhanced CT and/or removal of a small piece of the nodule (called a lung biopsy (http://www.radiologyinfo.org)). A pathologist can analyze the cells from the biopsy under a microscope to determine whether the nodule is malignant (http://www.radiologyinfo.org) (cancerous) or benign (non-cancerous). *See the Needle Biopsy of the Lung (https://www.radiologyinfo.org/en/info/nlungbiop) page for more information.*

If the nodule is cancerous, your doctor may recommend additional blood and imaging tests to determine the stage of the tumor. The imaging tests usually include additional CT scanning of the body and may include a bone scan (https://www.radiologyinfo.org/en/info/bone-scan) or a PET/CT scan (https://www.radiologyinfo.org/en/info/pet) . Treatment options and expected results depend on the stage of the tumor. *For detailed information regarding treatments see the Lung Cancer Treatment (https://www.radiologyinfo.org/en/info/lung-cancer-therapy) page.*

What is the cost of a LDCT for lung cancer screening?

Lung cancer screening is fully covered by insurance with no co-pay for anyone who is eligible. You may be required to pay for the exam up front and then submit a claim to your insurance company for possible reimbursement. Each institution sets their price for the exam. Prices may vary up to several hundred dollars, so consider calling at least a few places for pricing prior to having your exam.

Where can I find more information about lung cancer screening?

You can find more information on lung cancer screening at:

- GO2 Foundation for Lung Cancer (https://go2foundation.org/)
- National Comprehensive Cancer Network (https://www.nccn.org/patients/guidelines/content/PDF/lung_screening-patient.pdf)
- American Lung Association (https://www.lung.org/lung-health-and-diseases/lung-disease-lookup/lung-cancer/learn-about-lung-cancer/lung-cancer-screening/)
- The American Cancer Society (https://www.cancer.org/cancer/types/lung-cancer/detection-diagnosis-staging/detection.html)
- The National Cancer Institute (https://www.cancer.gov/types/lung/patient/lung-screening-pdq)

Find a lung cancer screening location at:

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- ACR Lung Cancer Screening Locator tool (https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Screening-Resources/lung-cancer-resources/locator-tool)

Which test, procedure or treatment is best for me?

- *Lung Cancer Screening (https://www.radiologyinfo.org/en/info/acs-lung-cancer-screening)*

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