

CHAPTER 6

LUNG CANCER FOLLOW-UP, DIAGNOSIS, TREATMENT AND SURVIVORSHIP

Objectives:

- 1) Understand common follow-up timelines and procedures that can happen after a lung cancer screening CT.
- 2) Describe types of lung cancer treatments and what type of treatments are used by stage of lung cancer at diagnosis.
- 3) Examine important aspects of lung cancer survivorship.

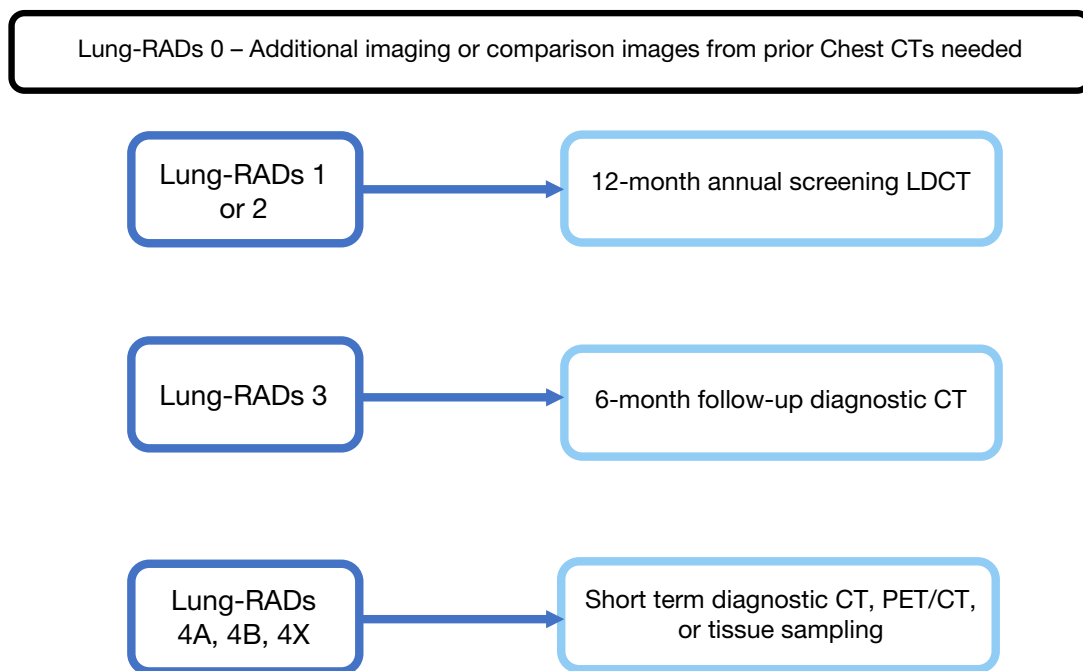
Common Lung Cancer Screening Follow-up Timelines and Procedures

Recall from Chapter 1 that low dose CT scans done specifically for lung cancer screening should be read and managed using a structured evaluation and reporting system called Lung-RADs. Lung-RADs was developed by the American College of Radiology specifically for use in lung cancer screening CTs to standardize follow-up recommendations and minimize harms for patients.¹

Follow-up and care pathways by lung cancer screening Lung-RADs result

Care pathways are examples of follow-up based on pulmonary nodule management algorithms defined by the Lung-RADs results. Pulmonary nodule management recommendations as outlined by Lung-RADs score are summarized in Figure 6-1. Exact recommendations for individual patients will be listed on the screening CT radiology report.

Figure 6-1 Pulmonary Nodule Follow-Up Recommendations Base on Lung-RADs Score



Explore more about Lung-RADs here:

www.acr.org/-/media/ACR/Files/RADS/Lung-RADS/LungRADSAssessmentCategoriesv1-1.pdf

Types and causes of pulmonary nodules

A pulmonary nodule is a spot or growth found in the lung and can be malignant (cancerous) or benign (non-cancerous). They are typically round or oval shaped, less than 1 inch in size, and are detected in 1 out of 4 chest CTs. Most nodules (90%) are NOT cancerous however it is important that a provider monitor them closely. It is not common for individuals with a pulmonary nodule to have any symptoms and they are often found by accident when scans are performed for other reasons.^{2, 3}

Benign nodules have a variety of causes such as inflammation from infection or disease or may be the result of scar tissue. Infection can form what is called a granuloma which is a small clump of cells that form in the lung tissue as a result of the inflammation, and they can calcify over time. Non-cancerous nodules may also be benign tumors such as a fibroma, hamartoma, chondroma, or blastoma.²

Malignant (or cancerous) pulmonary nodules are usually larger in size, have an irregular shape, and are commonly located in the upper lobes of the lungs. Clinicians can usually not tell if a pulmonary nodule is cancerous or not without additional testing. These tests can include CT or PET scans or biopsy of the nodule.²

Common Follow-up Procedures (this information was provided by the Colorado Cancer Screening Program)

Follow-up LDCT scan - This scan will be the same as the original screening scan and will be completed at either 3 or 6 months after the initial scan depending on the screen results. It will be labeled as a diagnostic CT scan but will be low-dose.²

PET Scan- A positron emission tomography scan, known as a PET scan, is an imaging test using a radioactive substance (tracer) to look for active disease and cancer in the lung. This is different from other types of scans as it shows the metabolic activity, not just the structure of an abnormality. The PET scanner detects signals from the tracer which is converted into 3D images. In total the test takes about 90 minutes.⁴ PET scans can be used to see if a cancer has metastasized and can also help stage a diagnosed cancer.⁵

Bronchoscopy - A bronchoscopy is done by feeding a thin tube through either the nose or mouth and into the lungs. This allows for problems to be evaluated and viewed from the inside of the lungs. During this procedure samples of tissue can be obtained (see below).⁶

Biopsy - A biopsy is when a sample of tissue or fluid is removed from the body for further testing by a pathologist. It is possible that a test may need to be completed more than once or that multiple tests may be required. There are different ways a biopsy can be collected including:⁷

- Bronchoscopy (see above)
- CT guided fine needle aspiration (FNA) is when a thin, hollow needle is used to remove cells. The procedure is done by placing a needle through the chest wall using CT guidance.
- Core needle biopsy is similar to the FNA but a wider needle is used to remove tissue.
- Surgical biopsy is when the tissue is removed surgically.
- Thoracentesis is when a hollow needle is inserted into the chest cavity to remove and sample fluid from the pleura.
- Sputum analysis is the testing of mucus, phlegm or saliva to find abnormal cells that may indicate cancer.
- Permanent section (formalin fixed) is the preparing of a tissue sample by placing it in a formalin solution before being set in wax. Once the wax hardens, the sample is cut into thin slices that can be viewed under the microscope.
- Frozen section involves the tissue sample being frozen and then sliced. This is completed when results are needed immediately, such as during surgery, and is usually followed by a permanent section.

Lung Surgery – There are different types of lung surgery that can be used to treat and possibly cure early stage lung cancer.⁸ The type of surgery will depend on the size and location of the nodule/ tumor and how well an individual's lungs are functioning.⁸ During surgery, lymph nodes may also be removed to see if the cancer has spread outside the lungs.⁸

- **Pneumonectomy:** This surgery removes an entire lung.
- **Lobectomy:** The lungs are made up of 5 lobes (3 on the right and 2 on the left). In this surgery, the entire lobe containing the tumor(s) is removed.
- **Segmentectomy or wedge resection:** In these surgeries, only part of a lobe is removed.
- **Sleeve resection:** This operation may be used to treat some cancers in large airways in the lungs. If you think of the large airway with a tumor as similar to the sleeve of a shirt with a stain a few inches above the wrist, the sleeve resection would be like cutting across the sleeve (airway) above and below the stain (tumor) and then sewing the cuff back onto the shortened sleeve.



Learn more about types of lung cancer surgery from the American Cancer Society.

www.cancer.org/cancer/lung-cancer/treating-non-small-cell/surgery.html



Visit the companion navigator training to learn more about anatomy of the lungs.

Follow-up Procedure Results in Radiology and Pathology Reports

Results of follow-up procedures will be contained in reports received from specialty services after the test. Results from imaging procedures (CT scans and PET/CT scans) will be contained in a radiology report and results from a biopsy of the nodule will be reported in a pathology report.

The Radiology Report: Common sections of a radiology report include (this information was provided by the Colorado Cancer Screening Program):⁹

- **Type of exam** - The type of exam section indicates the date, time and type of imaging study that was performed.
- **Clinical history** - The clinical history section lists patient information such as age, gender and relevant clinical information, including any existing disease and symptoms. If a diagnosis is known or suspected, it will be listed here, along with the indication or reason for the imaging study or the clinical question being asked. The availability of this information enhances the radiologist's ability to focus the report on each patient's unique condition.

- **Comparison** - If the radiologist compared the imaging study with any of the patient's previous imaging studies, it will list them in the comparison section. Comparisons are most commonly made to exams of the same body region and study type.
- **Technique** - The technique section describes how the imaging study was performed, including whether or not a contrast material was used. Because it is used for documentation purposes, this section is not typically useful for the patient or the referring physician. It can be very helpful to a radiologist to direct the performance of a future exam.
- **Findings** - The findings section lists the radiologist's observations and findings regarding each area of the body examined in the imaging study. The radiologist indicates whether each area was found to be normal, abnormal or potentially abnormal. Sometimes an area of the body is included and can be evaluated using the images, but is not discussed. This situation typically means that the radiologist did not find the area noteworthy for comment.
- **Impression**—In the impression section, the radiologist combines the findings, patient clinical history and indication for the imaging study and provides a diagnosis. Because this section offers critical information for decision-making, it is considered to be the most important part of the radiology report.

For an abnormal finding, the radiologist may recommend:

- additional imaging
- biopsy
- correlating the finding with clinical symptoms or laboratory test results
- comparing the finding with prior imaging studies, if available.

If the report does not answer the clinical question, additional or follow-up imaging studies may be indicated. Additional studies may also be recommended to follow-up on a suspicious or questionable finding.



See examples of these common radiology report sections from the Radiological Society of North America.

www.radiologyinfo.org/en/info/article-read-radiology-report

Incidental Findings:

The radiology report may additionally note an incidental finding that requires follow-up. An incidental finding is a previously undiagnosed medical condition that is found during routine medical evaluations. Evaluation of incidental findings should follow existing clinical guidelines but will depend on clinician recommendation and patient preference.



Go to Chapter 1 to learn more about incidental findings and lung cancer screening.

The Pathology Report: Common sections of a pathology report (this information was provided by the Colorado Cancer Screening Program):⁷

- **Identification:** your name, date of birth, gender, patient number and pathology number. Each biopsy procedure has its own unique pathology number which can be used for future reference.
- **Sample or specimen details:** who took the biopsy and how, where the tissue or fluid came from, information from other biopsies or cancer diagnoses.
- **Diagnosis or clinical diagnosis:** if it is cancer and if so, the type.
- **Gross description or macroscopic findings:** how the sample looked before it was put under the microscope. May include size, weight and color.
- **Microscopic findings:** how the sample looks under the microscope, including the appearance of the cells, tumor grade, size, margins, special tests or markers.
- **Other (ancillary) findings:** results of additional tests, including molecular testing.
- **Summary or overview:** overall results, usually in narrative form.

Common terms on the pathology report include⁷:

- **Cell structure:** the number, size and shape of the cells and how they look.
- **Grade:** how close the cells in the sample look to normal cells. Cells are graded from low (well-differentiated) to high grade (undifferentiated). The more the sample cells look like normal cells (the lower the grade), the better. Also called histological grade, differentiation or tumor grade.
- **Tumor size:** how big the tumor is.
- **Tumor or surgical margin:** describes either the outer edge of the nodule or tumor or the outer edges of a section of tissue after surgery. How the margins look can help determine treatment options.
 - Negative or clean margins: no cancer cells were found at edge of the tissue, suggesting that all of the cancer has been removed.
 - Positive or involved margins: cancer cells were found at the edge of the tissue, suggesting that all of the cancer has not been removed.
- **Spread:** a description of the cancer, if it has spread and how far (see invasion).



Visit the resources section to see examples of lung cancer screening radiology and pathology reports.



See the Glossary in the resources section for more important common terms found in radiology or pathology reports.



Visit this helpful link from the American Cancer Society to learn more about pathology reports specific to lung cancer.

www.cancer.org/treatment/understanding-your-diagnosis/tests/understanding-your-pathology-report/lung-pathology/lung-cancer-pathology.html

The navigator role during follow-up after lung cancer screening

As a trusted point of contact for participants in lung cancer screening programs, navigators will receive questions about radiology and pathology reports and what they mean. It is very important to remember that navigators cannot give medical advice, instead they should help prepare individuals for a discussion with the clinician and connect with applicable resources.

Navigators should:

- ✓ Listen empathetically to any questions or concerns.
- ✓ Help patients identify and write down questions for their provider.
- ✓ Help patients identify priorities and preferences to use when talking with their provider about treatment options.
- ✓ Connect patients with resources as needed, help schedule appointments as needed, and find someone that can answer questions if you cannot.
- ✓ Facilitate a warm handoff to an oncology navigator is needed.

Navigators should not:

- ✓ Provide statistics or advice about prognosis or survivorship.
- ✓ Give recommendations about next steps or follow-up.
- ✓ Tell concerned patients that they do not know how to help.
- ✓ Identify or give advice on treatment options.

Lung Cancer Types, Staging and Treatment

After the diagnostic workup, if the pulmonary nodule is diagnosed as cancerous (malignant) there may be additional tests to help find out what type of cancer the tumor is and to further help stage the cancer so a treatment plan can be made.

Lung Cancer Types and Stages

There are two main types of lung cancer, non-small cell lung cancer and small cell lung cancer.¹⁰

- **Non-small cell lung cancer** is the most common type of lung cancer, accounting for approximately 85% of disease. There are three main subtypes of non-small cell lung cancers, adenocarcinoma, squamous cell carcinoma, and large cell carcinoma.¹¹

Non-small cell lung cancer is grouped into four stages based on the size of the tumor and whether the cancer has spread outside the lungs (metastasized).

- Stage I is a small tumor that has not spread to lymph nodes and can be completely removed by lung surgery.
- Stage II is a slightly larger tumor and has possibly started to spread to lymph nodes that are close to the site of the tumor.
- Stage III tumors are usually larger and have spread to lymph nodes that are farther from the original tumor site. Additionally, the tumor may have started to grow into nearby structures of the lung.
- Stage IV means that the cancer has spread to areas of the body outside of the chest area. The most common areas non-small cell lung cancer spreads to is the brain, bones, liver, and adrenal glands.

- **Small cell lung cancer** accounts for the remaining 15% of lung cancers and is usually more aggressive and faster growing than non-small cell lung cancer. Small cell lung cancer is typically staged into two distinct groups.¹²

- Limited stage means the small cell cancer is only on one side of the chest and may have spread to lymph nodes that are close to the cancer.
- Extensive stage means that the small cell cancer is widespread throughout the chest and possibly outside the lungs.



Read more about types of lung cancer and staging from the American Cancer Society.

- Types of lung cancer: <https://www.cancer.org/cancer/lung-cancer/about/what-is.html>
- Staging of non-small cell lung cancer: <https://www.cancer.org/cancer/lung-cancer/detection-diagnosis-staging/staging-nscl.html>
- Staging of small cell lung cancer: <https://www.cancer.org/cancer/lung-cancer/detection-diagnosis-staging/staging-sclc.html>



Types of Lung Cancer Treatment

There are 5 main ways to treat lung cancer. Treatment plans will be decided on by the patient and a team of doctors and other healthcare professionals, based on the type of cancer, the stage of the cancer, the genetic profile of the cancer, and patient values about treatment and possible side effects. It is important to remember that each person's cancer will be treated differently. Treatment types may be used in combination or at different times during the treatment process.¹³

- Surgery is used with early-stage cancers to completely remove the lung tumor and close lymph nodes. Read more about different types of lung surgery in the 'Common follow-up procedures' section above.
- Radiation therapy is the use of high energy x-rays or radiation to kill cancer cells. Radiation therapy can only be used to treat large areas of the body because it also damages healthy cells in the area that the radiation is being targeted.
- Chemotherapy is a group of drugs that help destroy cancer cells by keeping them from growing or dividing to make more cancer cells. Patients may receive more than one type of chemotherapy drug at a time depending on the type of cancer. Chemotherapy can be given through an IV or in pill form and may also harm healthy cells in the body causing side effects.
- Targeted therapy is another type of drug that targets the cancer cell's genes, proteins, or environment around the tumor that help the cancer grow and spread. Targeting these genes, proteins, and environment help block growth and spread of the cancer cells. There are many types of targeted therapy and not all targeted therapies work on all tumors. A medical oncologist can run tests on tumor tissue to determine if the tumor will respond to a targeted therapy drug.
- Immunotherapy is also a type of cancer drug that helps boost a person's natural immune responses to fight cancer cells. These drugs help improve or restore immune system function using materials made in the body or the laboratory. Similar to targeted therapy, not all tumors will respond to immunotherapy and medical oncologists may need to run tests on tumor tissue to determine if immunotherapy is a good treatment option.



Read about these treatment options in more detail from the American Society of Clinical Oncology

www.cancer.net/cancer-types/lung-cancer-non-small-cell/types-treatment





Possible Treatment by Stage at Diagnosis

Table 6-1 offers an overview of possible treatment options by stage of lung cancer at diagnosis. It is extremely important to remember that treatment plans are individualized for each person and may include combinations or sequences of possible treatment options.



Learn more about treatment types based on stage of cancer at diagnosis from the American Cancer Society

Non-small cell lung cancer: www.cancer.org/cancer/lung-cancer/treating-non-small-cell/by-stage.html

Small cell lung cancer: www.cancer.org/cancer/lung-cancer/treating-small-cell/by-stage.html

Table 6-1 Lung Cancer Treatment Options by Stage at Diagnosis

Cancer Stage at Diagnosis	Possible Treatment Options
Non-small cell lung cancer¹⁴	
Stage I	<ul style="list-style-type: none"> • Surgery • Radiation therapy (for poor surgical candidates)
Stage II	<ul style="list-style-type: none"> • Surgery • Chemotherapy • Targeted therapy
Stage III	<ul style="list-style-type: none"> • Surgery • Chemotherapy • Radiation therapy • Targeted therapy • Immunotherapy
Stage IV	<ul style="list-style-type: none"> • Surgery • Chemotherapy • Radiation therapy • Targeted therapy • Immunotherapy
Small cell lung cancer¹⁵	
Limited	<ul style="list-style-type: none"> • Surgery • Radiation therapy • Chemotherapy
Extensive	<ul style="list-style-type: none"> • Radiation therapy • Chemotherapy • Immunotherapy

Lung Cancer Survivorship

After a lung cancer diagnosis, the needs of the individual may change by having to attend treatment appointments, cope with possible side effects, and navigate the emotional toll of the diagnosis. There are resources available to help patients face the complicated path of cancer survivorship.

Survivorship Care Plans: A survivorship care plan is recommended for every patient that has received a cancer diagnosis to help keep track of appointments, record side effects from treatment drugs, and monitoring overall health. Lung cancer treatment plans are individualized for each person and use of a care plan may help the patient and family feel organized and in control of each step of the treatment and survivorship process.¹⁶

Emotional Support: After receiving a cancer diagnosis it is very common to experience many different feelings, including fear, anxiety, depression, and sadness. There are many resources available to help people cope and manage these feelings, including online support groups, in-person support groups, and counseling, and education.¹⁷

Common questions navigators may receive about survivorship: Patient navigators may receive questions from individuals after a cancer diagnosis. Get to know what resources are available for survivorship and treatment help from your organization and your local area. Below are some common questions patient navigators may receive about lung cancer survivorship:

- ✓Is there anyone I can talk to about my anxiety or depression?
- ✓How do I deal with the side effects of chemo?
- ✓Will my sleep be disrupted?
- ✓Can I still exercise?
- ✓How do I help my family and caregivers cope with my diagnosis?



Learn more and see examples of survivorship care plans from the American Cancer Society.

<https://www.cancer.org/treatment/survivorship-during-and-after-treatment/survivorship-care-plans.html>



Read about types of psychosocial support available for people living with cancer.

<https://www.cancer.org/treatment/survivorship-during-and-after-treatment/coping/understanding-psychosocial-support-services.html>



Visit the resources section to learn more about lung cancer survivorship and ways to help persons living with cancer.



Chapter 6 References

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