

YOUR LUNG CANCER PATHOLOGY REPORT



LUNG CANCER ALLIANCE

1-800-298-2436

LungCancerAlliance.org

CONTENTS

What is a Pathology Report?.....	2
The Basics.....	4
Sections of a Pathology Report.....	7
Glossary.....	10
Your Pathology Report.....	15
For More Information.....	16



A PATHOLOGY REPORT IS A DOCUMENT THAT DESCRIBES THE RESULTS OF TESTS YOUR DOCTOR MAY ORDER IF HE OR SHE SUSPECTS YOU MAY HAVE LUNG CANCER. YOUR PATHOLOGY REPORT IS IMPORTANT BECAUSE IT TELLS:

- If you have cancer
- Where in the body the cancer started
- What kind of lung cancer it is
- Other information that helps your treatment team better understand your cancer and determine treatment options

The terms in your pathology report may be confusing. We hope this brochure helps you to better understand your report but it is not a substitute for the explanation your treatment team can give you. Be sure to ask your doctor or other members of your health care team if you do not understand something or need more information. It is always a good idea to keep a copy of your pathology report(s) for your records.

* See the glossary for definitions of words in *italics*.

POSITIVES AND NEGATIVES

In life, we typically hope for things that are positive and try to avoid those that are negative. In test results related to your diagnosis and treatment, it is not as simple.

A positive biopsy means that there is cancer, while a negative one means no cancer was found.

In other tests, a positive or negative result isn't "bad" or "good" but is information that will help determine your treatment options.

For instance, if cancer tests positive for a genetic mutation, treatment with a therapy that targets that specific mutation may be the best option.

Be sure to ask your treatment team if you do not understand what a "positive" or "negative" result means to you and your treatment.

THE BASICS

WHAT IS A PATHOLOGIST?

A pathologist is a doctor who studies tissue, fluid and blood samples. A cytologist is a surgical pathologist with additional training and certifications. The pathology report is the document that explains what was found in the sample.

HOW DOES THE PATHOLOGIST GET THE SAMPLE?

Most lung cancer diagnoses are made through a procedure called a biopsy, in which a sample of tissue or fluid is removed from the body and then sent to the pathologist for testing. These are the procedures commonly used to get the biopsy sample and may be guided by CT scan or ultrasound:

- Fine needle aspiration (FNA): a thin, hollow needle is used to remove cells. Depending on the location of the tumor, FNA can be done through the skin of the chest or back (transthoracic) with the guidance of a CT scan or during a *bronchoscopy*.
- Core needle biopsy: a wider needle is used to remove tissue.
- Surgical biopsy: tissue is removed through surgery. Small tissue samples may be surgically removed during a *bronchoscopy* or *mediastinoscopy* but sometimes other surgical procedures such as *thoracotomy* or *minimally invasive surgery* are needed.
- Thoracentesis: a hollow needle is inserted into the chest cavity to remove fluid from the space (pleura) around the lungs.
- Sputum analysis: *mucus*, phlegm or saliva is tested to detect abnormal cells that may be an early sign of lung cancer.

For a variety of reasons, sometimes a biopsy procedure needs to be done more than once.

HOW IS THE SAMPLE PREPARED FOR EXAMINATION?

The sample must be prepared by the pathologist to study under the microscope. There are two main ways tissue is prepared; in both a *stain* – a substance used to color tissue to help pathologists better see and examine cells - is used so the doctor can see the cells and their structure better.

- **Permanent section (formalin fixed):** the tissue is put in a substance, usually a solution called formalin, which sets the tissue before it is placed in wax. After the wax has hardened, the sample is cut into very thin slices and placed on microscope slides.
- **Frozen section:** the tissue is frozen and then sliced. This is used when results are needed right away, such as during surgery and is followed by a permanent section.

Immunohistochemistry (IHC) stains commonly used in lung cancer include TTF1, Napsin A, P40 and P63. Stains help determine the type of lung cancer you have.

WHAT ARE THE DIFFERENT TYPES OF LUNG CANCER?

NON-SMALL CELL LUNG CANCER

The most common types are:

- Adenocarcinoma
- Squamous cell carcinoma
- Large cell carcinoma

SMALL CELL LUNG CANCER

HOW LONG DOES IT TAKE TO GET THE RESULTS OF A BIOPSY?

If the biopsy is done during surgery that may lead to the removal of the tumor, the biopsy results may take a matter of minutes (see the description of “frozen section”). In other cases, results can take anywhere from a few days to more than a week. Ask your treatment team when they expect to get your results so you will have an idea how long your wait may be.

HOW DOES THE PATHOLOGIST KNOW THAT IT IS LUNG CANCER?

Cells that are damaged and become cancer look very different under the microscope than cells that are normal. A pathologist is trained to know the difference. The types of lung cancer look different as well. The pathologist may also use tests to determine if there are substances called biomarkers that can show if the cancer started in the lungs or in another part of the body and spread to the lungs.

WHAT ABOUT A PATHOLOGY SECOND OPINION?

Your treatment options will be determined based on the kind of lung cancer you have so it is important to have as much information as possible.

You may want to consider seeking a second opinion if:

- The biopsy result is *inconclusive*.
- If cancer is confirmed but the place in the body it started is not known.
- The type of cancer is not known.

Many major cancer centers offer second opinion consultations on pathology results and some insurance plans cover such opinions. If you would like more information about second opinions, call our HelpLine at 1-800-298-2436.

SECTIONS OF A PATHOLOGY REPORT

THE INFORMATION IN YOUR PATHOLOGY REPORT WILL BE UNIQUE TO YOU BUT MOST HAVE SIMILAR SECTIONS. YOUR REPORT MAY NOT FOLLOW THIS OUTLINE EXACTLY BUT WILL INCLUDE ALL OR SOME OF THE FOLLOWING:

- **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. See box on page 7 for more details.
- **OTHER (ANCILLARY) TEST FINDINGS:** results of additional tests, including molecular testing. See box on page 8 for more details.
- **SUMMARY OR OVERVIEW:** overall results, usually in narrative form.

COMMON TERMS UNDER MICROSCOPIC FINDINGS

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*).

MOLECULAR TESTING

Cancer is moving into an era of “personalized” treatment where therapies are targeted to shut down specific changes and processes in the cancer to stop it from growing and spreading. Knowing if your cancer has certain genes that have been altered, mutated or rearranged may influence your treatment options.

Not all lung cancer should be tested for biomarkers. However, if your report does not indicate that your cancer was, ask your healthcare team if it should be.

COMMON LUNG CANCER BIOMARKERS:

EGFR (epidermal growth factor receptor). If this protein is mutated, it may respond well to drugs that target and inhibit EGFR such as Tarceva (erlotinib).

ALK (anaplastic lymphoma receptor tyrosine kinase). When this gene is damaged and rearranges in a particular way, the cancer will likely respond well to a drug called Xalkori (crizotinib), which gets in the way of how the cancer grows.

ROS1 (c-ros oncogene 1). When this gene is fused or rearranges in a certain way that causes the cancer to grow, it may also respond well to Xalkori.

KRAS (Kirsten RNA Associated Rat Sarcoma 2 Virus Gene). How often this mutation is found increases as the cancer spreads. Its significance is being studied but cancer with this mutation does not occur with the EGFR mutation and thus is unlikely to respond to current targeted therapies.

Your pathology report may note other mutations for which there are not approved treatments, however, there may be clinical trials testing treatments for those mutations.

GLOSSARY

OTHER TERMS YOU MAY READ IN YOUR PATHOLOGY REPORT:

ADENOCARCINOMA OF THE LUNG:

a type of non-small cell lung cancer that begins in the cells that form the air sacs of the lungs.

ANGIOLYMPHATIC: also known as angioinvasion, angiolymphatic invasion, indicates the cancer has spread to the lymph vessels or blood vessels.

ANTIBODY: a protein produced by the immune system when foreign substances called antigens are detected in the body.

ATYPIA: structure that is not normal in a cell. For instance, nuclear atypia is when the nucleus or “brain” of the cell is abnormal.

ATYPICAL ADENOMATOUS HYPERPLASIA IN SITU: precancerous lesion (or spot), which may lead to or be an early stage adenocarcinoma.

BENIGN: not cancer.

BRONCHI: the airway tubes that branch out from the windpipe (trachea), one to the right lung, one to the left.

BRONCHOGENIC CARCINOMA: lung cancer.

IF YOU HAVE ADENOCARCINOMA OF THE LUNG, THESE TERMS MAY BE USED TO DESCRIBE HOW IT APPEARS UNDER A MICROSCOPE:

ACINAR: of or relating to a gland.

LEPIDIC: look like scales (may be mucinous or non-mucinous).

PAPILLARY: looks nipple-like.

MICROPAPILLARY: looks nipple-like but smaller than papillary.

SOLID: looks like solid sheets without the appearance of the other types of growth patterns.

BRONCHOSCOPY: a thin, flexible tube (bronchoscope) is inserted into the lungs through the nose or mouth. A small camera is used to look directly into the airways and the lungs. A needle inserted into the bronchoscope can take samples of the tumor or fluid for testing. A rigid bronchoscopy uses a metal tube in the same way.

CARCINOMA: cancer that begins in tissues that line or cover organs in the body. Lung cancer is a type of carcinoma.

CELL DENSITY: the number of cells in a sample.

CYTOLOGY: the study of a single cell or small group of cells, sometimes from fluid as opposed to a biopsy where a larger tissue sample is used. May not be as accurate as biopsy.

CYTOPLASM: the material outside the nucleus of the cell.

DIFFERENTIATION: how close the cells look to normal cells, on a spectrum. Well-differentiated means the cells look closer to normal cells, poorly differentiated mean they look less like normal cells. In general, the more well differentiated the cell, the better the prognosis or outcome.

DYSPLASIA: the presence of abnormal (atypical) cells.

EXCISION: surgical removal.

FLORESCENCE IN SITU HYBRIDIZATION (FISH): a process that can be used to identify genetic abnormalities and mutations which may help determine treatment options.

GRANULOMAS: inflammation in tissue, usually the result of infection.

HISTOLOGY: the structure of the cells under the microscope.

HYPERPLASIA: when normal tissue or an organ shows increased cell production and may be a sign of changes that happen before cancer develops.

GLOSSARY (CONTINUED)

INCONCLUSIVE: it cannot be determined if cancer is present. This may be because the sample was not big enough or something went wrong in the biopsy process.

INVASION/INVASIVE (infiltrating): indicates the cancer has spread beyond the layer of tissue in which it started and is growing into surrounding, healthy tissues.

IN SITU: means, “in the place it started.” Abnormal cells are found only in the place where they first formed and have not spread.

LARGE CELL CARCINOMA OF THE LUNG: a type of non-small cell lung cancer that begins in the thin, flat cells that line the passages of the respiratory tract.

LOBE: means “section.” The lungs are divided into lobes. There are three lobes in the right lung and two in the left.

LYMPH NODES: part of the lymphatic system, the nodes help circulate lymph fluid throughout the body. Lung cancer can spread through the lymphatic system.

LYMPHOVASCULAR INVASION: the spread of cancer to the blood vessels and/or lymphatic system. If lung cancer is found in these areas, it may have spread beyond the lung.

MALIGNANT: cancer is present.

SCARRING, EMPHYSEMA, EMPHYSEMATOUS CHANGES, INFLAMMATION

These are characteristics that may be noted in the report but are not related to cancer. Scarring may be due to previous lung infections or diseases or inhaling silica dust or asbestos. Emphysema is a lung disease in which the air sacs in the lungs (alveoli) are destroyed and oxygen is not able to get to the blood stream as easily. Emphysematous changes means there is damage to the lungs, often the result of smoking. Inflammation may be due to infection or indicates the lung is attempting to heal from damage to it

MEDIASTINOSCOPY: a procedure where an incision made just above the breastbone allows a device with a camera attached to pass into the middle of the chest (mediastinum) to see if cancer is present there and to check central lymph nodes for cancer. Tissue samples can also be removed for testing.

METASTASIS: the process of the spread of cancer to other parts of the body. In lung cancer this primarily happens through the lymph system. Metastatic lung cancer is cancer that has spread, the word metastases is used to describe where the cancer has spread.

MINIMALLY INVASIVE SURGERY: a series of small incisions allows insertion of a video camera along with small instruments for removing cancerous tissue.

MUCINOUS: filled with mucus-like material (see also *Non-mucinous*).

NECROSIS: cell death from injury, toxins or infections. Includes coagulative necrosis which is caused by lack of oxygen and liquifactive necrosis, when the cell becomes filled with liquid.

NEOPLASM: a growth that is the result of abnormal cell growth. May be *benign* or *malignant*.

NON-MUCINOUS: an immunochemistry marker that gives information about how aggressive the cancer is and may help predict response to certain treatments.

PARENCHYMAL CELLS: make up the tissue that makes up the functioning part of a gland or organ.

PLEOMORPHIC: able to change shape or form.

PLEURA, PLEURAL CAVITY: the *visceral pleura* is the lining that surrounds the lungs, the *parietal pleura* is the lining that surrounds the sac that encompasses the lungs. The space between the two linings is the *pleural cavity*.

SMALL CELL LUNG CANCER: a type of neuroendocrine tumor with cells that are smaller in size than most other cancer cells. It is a fast-growing cancer that spreads rapidly to other parts of the body.

SQUAMOUS CELL CARCINOMA OF THE LUNG: cancer that begins in the thin, flat cells that line the passages of the respiratory tract.

SQUAMOUS DYSPLASIA, IN SITU: precancerous lesion (or spot) which may lead to squamous cell carcinoma.

STAGE: how big the cancer is and/or if it has spread. There is both a *pathological* stage, determined by what the pathologist finds and *clinical* stage, which is determined by imaging tests and/or surgery.

STAINS: used to color tissue to help pathologists better see and examine cells. Immunohistochemistry (IHC) staining is commonly used in diagnosing lung cancer.

STROMAL CELLS: make up the connective tissue of a gland or organ.

THORACOTOMY: an incision is made between the ribs to allow removal of the cancer.

TISSUE BLOCK: the section of tissue removed by biopsy or surgery, which is then sliced very thin for examination by the pathologist.

VASCULAR: describes the part of the circulatory system that includes blood vessels, arteries, veins and capillaries.

MY LUNG CANCER PATHOLOGY REPORT SAYS MY CANCER IS:

Type _____

Grade (level of differentiation) _____

Size _____ Stage _____

Where is my cancer located? _____

WAS MY CANCER TESTED FOR THESE MUTATIONS?

EGFR + or - ALK + or -

ROS1 + or - KRAS + or -

Other _____

WAS MY CANCER STAINED?

TTF1 + or - P63 + or -

Napsin A + or - P40 + or -

HOW DOES THIS INFORMATION AFFECT MY TREATMENT OPTIONS?

WHAT IS THE NAME OF THE PATHOLOGIST OR CYTOLOGIST ON THE REPORT?

OTHER THINGS TO REMEMBER FROM MY PATHOLOGY REPORT:

WHERE CAN I GO FOR MORE INFORMATION?

For more information about lung cancer and current treatments, to discuss support options or for referral to other resources, please contact us:

HELPLINE | 1-800-298-2436

WEBSITE | lungcanceralliance.org

E-MAIL | support@lungcanceralliance.org

MAIL | 1700 K Street NW, Suite 660, Washington, DC 20006

WHAT WE DO

- Offer personalized support, information and referral services at no cost through a team of trained, dedicated staff members to help patients, their loved ones and those at risk.
- Advocate for increased lung cancer research funding and equitable access, coverage and reimbursement for screening, treatment, diagnostics and testing.
- Conduct nationwide education campaigns about the disease, risk and early detection.



LUNG CANCER ALLIANCE

SAVING LIVES AND ADVANCING RESEARCH BY
EMPOWERING THOSE LIVING WITH AND AT RISK FOR
LUNG CANCER



LUNG CANCER ALLIANCE

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