Since interstitial lung disease (ILD) is not a single disease but a group of more than 200 different pulmonary disorders, it can be confusing to understand exactly what you are dealing with, how a diagnosis is made and who needs to be involved.

This guide explains some of the most common types of ILD, and how they are diagnosed and treated.

**CHOOSING YOUR CARE**

At Cleveland Clinic, our Sarcoidosis and Interstitial Lung Disease Program is experienced in providing the most advanced diagnostic testing and treatment options for patients with all types of ILD, including rare disorders.

We have designed our services so that all of the specialists you need – including pulmonologists, rheumatologists, thoracic radiologists, thoracic surgeons, pulmonary pathologists, and genetics and transplant experts – work together to provide the most accurate diagnosis and appropriate treatment plan. Whenever possible, our multidisciplinary team utilizes the least invasive procedures and steroid-minimizing or steroid-free treatments.

Cleveland Clinic’s Respiratory Institute has a long history of excellence and innovation, and is ranked the #3 pulmonology program in the nation by *U.S. News & World Report*. Cleveland Clinic also is consistently ranked among America’s Top 4 hospitals.

**USING THIS GUIDE**

Please use this guide as a resource as you learn about interstitial lung disease causes, diagnoses and treatment options. As a patient, you have the right to ask questions and to seek a second option.
What is interstitial lung disease?

Interstitial lung disease, or ILD, is not a specific disease, but a group of more than 200 different pulmonary disorders that cause inflammation and scarring in the air sacs of the lungs.

This scarring can eventually cause difficulty breathing because there isn’t enough oxygen getting into the bloodstream and the lungs cannot expand fully. Coughing and fatigue also are common in ILD. These symptoms are the most common reason that patients seek medical attention.

The diseases called ILD are grouped together because they share common symptoms and physical features, but they have a wide range of causes, treatments and outcomes.

How is ILD diagnosed?

To diagnose ILD, your physician will take a thorough medical history, part of which will try to determine whether you have been exposed to any environmental agents at work or home that are known to cause the disease. A physical exam will be performed, looking for any signs of connective tissue disease such as joint inflammation, joint deformities or a skin rash.

Your doctor also may order imaging tests to view your lungs, which may include the following:

- **X-rays** – A chest X-ray can show if inflammation or scarring of the lungs is present.
- **CT scans** – Computerized tomography scans combine X-ray views from multiple angles, creating a two-dimensional, cross-sectional image. These images show “slices” of the lung tissue to determine if tissue has been damaged.
- **Cardiopulmonary exercise test** – A type of pulmonary function test done using a bicycle or other stationary workout equipment. It may allow your physician to determine what specific component of your cardiorespiratory system is causing your symptoms.
- **Six-minute walk test** – A type of pulmonary function test performed by walking for six minutes in a hallway. It provides useful data about oxygen levels and exercise tolerance that helps determine the severity of lung disease.
- **Bronchoalveolar lavage** – A test that collects epithelial lining fluid (ELF) from the airways and air sacs (alveoli) of the respiratory tract. A flexible tube called a bronchoscope is inserted into the air passages (bronchi) of the lung, and saline fluid is passed through the bronchoscope. After coming into contact with the airways and alveoli, the fluid is drawn out for analysis.
- **Biopsy** – Either standard or minimally invasive procedures may be used to take tissue samples for evaluation.

What are the different types of ILD?

In general, all of the separate disorders that make up ILD are grouped based on cause, what other diseases they are associated with, and their specific microscopic patterns, called pathology.

Here is a look at some of the most common types:
Idiopathic pulmonary fibrosis (IPF)

Idiopathic pulmonary fibrosis (IPF) is a progressive disease limited to the lung. In IPF, lung tissue becomes scarred (fibrosed). The scarring typically starts at the edges of the lungs and progresses towards the center of the lungs, making it more and more difficult for a person to breathe. Unfortunately, IPF is often a disabling disease that can be fatal.

WHAT CAUSES IPF?
The cause of IPF is unknown. In some patients, the disease is genetic (you inherited a risk for the disease from your parents). Environmental factors (particularly exposure to certain types of dusts or smoking) also may play a role. What is known is that IPF changes the lung’s ability to function normally. Typically, mild scarring of the lung tissue occurs first. Then, over months to years, the normal lung tissue is replaced by more heavily scarred lung tissue that makes it difficult to breathe and deliver needed oxygen to the body.

Even though the cause of IPF is still being investigated, the following are considered risk factors for developing the disease:

- Working around dust or fumes. Farmers, ranchers, hairdressers, stone cutters/polishers and metal workers face a moderately increased risk of developing the disease due to exposure to these dusts or occupational fumes.
- Age between 40 and 70 (approximately 2/3 of patients are older than 60 at the time of diagnosis)
- History of smoking
- Being male (more men are diagnosed with the disease than women)

Approximately 50,000 people in the United States have IPF, and an estimated 15,000 new cases develop each year.

WHAT ARE THE SYMPTOMS OF IPF?
Symptoms of IPF usually develop gradually and may not be noticed until the disease is well established. They include a dry cough, shortness of breath (especially during or after physical activity), tiredness, weight loss and fingertip clubbing (enlargement and bulb-like development of the fingertips and nails).

Because lung tissue scarring results in an inability of the lungs to deliver needed oxygen to the body, strain is put on the right side of the heart. This may lead to high blood pressure in the lungs, a condition known as pulmonary hypertension. IPF is also associated with potentially life-threatening conditions, including heart attack, heart failure, respiratory failure, stroke, blood clots in the lungs (pulmonary embolism), lung infections and lung cancer. IPF affects each person differently and the disease progresses at varying rates.

HOW IS IPF TREATED?
There is no cure for IPF. The damage caused from the lung scarring cannot be reversed. While disease progression cannot be predicted or halted, current experimental treatments are aimed at slowing or halting disease progression. Pulmonary rehabilitation is helpful for most patients, by increasing exercise capacity.

In addition to drug treatments, you may need additional oxygen, supplied in a small portable oxygen tank, to help you breathe. Lung transplant surgery may be considered in some patients, usually those under 65 years of age whose disease has not responded to medical treatments.
Sarcoidosis

Sarcoidosis is an inflammatory disease that affects one or more organs, but most commonly affects the lungs and lymph glands. As a result of the inflammation, abnormal lumps or nodules (called granulomas) form in one or more organs of the body. These granulomas may change the normal structure and possibly the function of the affected organ(s).

WHAT CAUSES SARCOIDOSIS?
The exact cause of sarcoidosis is not known. The disease can appear suddenly and then disappear, or it can develop gradually and produce symptoms that persist for a lifetime.

Researchers believe that the disease is caused by an abnormal immune response. (The body’s defense system does not react as it should to a foreign substance “intruder.”) In a healthy person, inflammation occurs as the cells of the body’s immune system come together to fight the intruder at an organ or tissue site. In a person with sarcoidosis, however, cells that come to fight end up clumping together into granulomas.

It’s still uncertain which foreign substance “triggers” the body’s abnormal response. Some researchers suggest that fungi, viruses or bacteria are likely triggers. In fact, cases of sarcoidosis have occurred in groups of people who had close contact with each other, as well as in recipients of heart, lung and bone marrow transplants. But, so far, no data have been able to convincingly and consistently establish this “infectious” connection as the cause of the disease. However, some types of bacteria have recently emerged as possible candidates and continue to be closely studied.

Worldwide, the disease occurs in up to four in 10,000 people. It most commonly strikes adults between 20 and 40 years of age. It is also more common in blacks and in people of Scandinavian, German, Irish and Puerto Rican descent.

WHAT ARE THE SYMPTOMS OF SARCOIDOSIS?
The symptoms of sarcoidosis can vary greatly from individual to individual, and depend on which tissues and organs are affected. In some people, symptoms may begin suddenly and/or severely and subside in a short period of time. Others may have no outward symptoms at all, even though organs are affected. Still others may have symptoms that appear slowly and subtly, but last or recur over a long time span.

The most common initial symptoms include shortness of breath (dyspnea), a cough that won’t go away, reddish bumps or patches on the skin or under the skin, enlarged lymph glands in the chest and around the lungs, fever, weight loss, fatigue, night sweats, and a general feeling of ill health.

Patients also may develop red and teary eyes or blurred vision, swollen and painful joints, enlarged lymph glands (neck, armpits, groin), nasal stuffiness, hoarse voice, pain due to formation of cysts (abnormal sac-like growths) in bones (hands, feet, other bony areas), kidney stones, abnormal or missed heart beats (arrhythmias), inflammation of the covering of the heart (pericarditis), heart failure, hearing loss, meningitis, seizures or psychiatric disorders (dementia, depression, psychosis).

HOW IS SARCOIDOSIS TREATED?
There is no cure for sarcoidosis, but the disease may get better on its own over time. Many people with sarcoidosis have mild symptoms and do not require any treatment at all. Treatment, when it is needed, generally falls into two categories – maintenance of good health practices and drug treatment.
Good health practices include regular checkups, staying current on vaccines, following a well-balanced diet with a variety of fresh fruits and vegetables, getting six to eight hours of sleep each night, exercising regularly, managing and maintaining your weight, quitting smoking, avoiding exposure to substances (dust, chemicals, fumes, etc.) that can damage your lungs, and making sure you don’t have high calcium levels.

Drug treatments are used to relieve symptoms, reduce the inflammation of the affected tissues, reduce the impact of granuloma development and prevent the development of lung fibrosis and other irreversible organ damage. Corticosteroids are particularly effective in reducing inflammation, and are typically the first drugs used in treating sarcoidosis. The oral corticosteroid prednisone is the most commonly used corticosteroid. Alternative treatments are available for patients who cannot tolerate steroids either because they are contraindicated or because side effects cannot be tolerated. However, these treatments are studied much less extensively than corticosteroids and doctors with special expertise in sarcoidosis should manage patients who are on regular prednisone therapy or any alternatives.

Connective tissue-related ILD

ILD is a well-known complication that affects a small number of people with various connective tissue diseases (CTD), or any disease that affects the parts of the body that connect the structures of the body together.

The most commonly involved disorders are scleroderma, rheumatoid arthritis, Sjögren’s syndrome, polymyositis or dermatomyositis, and systemic lupus erythematosus (lupus).

Connective tissue-related ILD causes inflammation and/or scarring in the air sacs and airways of the lungs.

WHAT ARE THE SYMPTOMS OF CONNECTIVE TISSUE-RELATED ILD?

In any of these CTDs, lung involvement may not become apparent until there are significant symptoms. Sometimes the lung disease overshadows or occurs before the symptoms of the CTD in the rest of the body.

When symptoms develop, shortness of breath (dyspnea) and cough are the most common. However, the symptoms and their severity will depend on what type of ILD is associated with the CTD.

HOW IS CONNECTIVE TISSUE-RELATED ILD TREATED?

Your doctor will need to first determine which type of ILD is associated with your CTD. Then, he or she will begin a treatment plan appropriate for that type of ILD. While your care will be tailored to your exact needs, treatment may include medications such as corticosteroids (to reduce inflammation), cytotoxic drugs (to suppress the immune system) or medications designed to treat pulmonary hypertension (high blood pressure in the blood vessels of the lung). Sometimes, the lung manifestations are the most severe part of the CTD, and their severity governs the medication strategy. In other cases, the non-lung features of the CTD are the main treatment target. In general, your physician will try to use medications that are effective for both the lung and the non-lung manifestations of CTD.

Oxygen therapy and pulmonary rehabilitation also may be needed. Lung transplantation may be considered for those with severe ILD that does not respond to conventional treatments.
Vasculitis with pulmonary involvement

There are several conditions that cause inflammation of the blood vessels (vasculitis), which can sometimes occur mainly in the lung. The most familiar of these is granulomatosis with polyangiitis (GPA), previously called Wegener’s granulomatosis. Other vasculitides that can affect the lung include microscopic polyangiitis, Goodpasture’s syndrome, systemic lupus erythematosus, Churg-Strauss syndrome and antiphospholipid antibody syndrome. All of these conditions can involve other organs besides the lung.

WHAT ARE THE SYMPTOMS OF VASCULITIS WITH PULMONARY INVOLVEMENT?
The symptoms and their severity vary among patients. General signs of the disease may include loss of appetite, weight loss, fever and fatigue. A common symptom is coughing up blood.

Many patients first notice symptoms in the respiratory tract. Symptoms may include a persistent runny nose or the formation of nasal crusts and sores, nasal or facial pain, nose bleeds or unusual nasal discharge, cough (may include bloody phlegm), chest discomfort (with or without shortness of breath), middle ear inflammation (with or without pain or hearing loss), voice change, wheezing, shortness of breath, bloody urine, certain rashes, blood clots and severe persistent asthma. Other possible symptoms include eye inflammation and/or bulging (with or without loss of vision), joint pain (arthritis) and muscle pain.

HOW IS VASCULITIS WITH PULMONARY INVOLVEMENT TREATED?
Because vasculitis with pulmonary involvement is often a life-threatening disease, it is treated with a variety of powerful drugs that have been shown to be life-saving.

Treatment usually includes corticosteroid medicines, such as prednisone, and other drugs that also suppress immune function. These include cyclophosphamide, methotrexate, azathioprine and mycophenolate mofetil. Such drugs usually make the disease go into remission (the complete absence of all signs of the disease), but do not cure the disease. Recent studies also have shown that a biologic agent called rituximab is as effective as cyclophosphamide for GPA and does not have some of the toxic effects of that drug. In severe cases, treatment may include a technique of cleansing the blood (plasmapheresis).

When the disease is in remission, the dosage of prednisone is reduced or often completely stopped. Some patients do require a low dose of prednisone to sustain remission. The ideal duration of treatment with the other immunosuppressive medications is uncertain. However, it is well established that vasculitis with pulmonary involvement is associated with relapse that may be as high as 60 percent in the first year and 80 percent by the end of the second year after stopping treatment.

Exposure-related ILD

ILD also may be caused by exposure to toxins in your environment at work or at home. The most common ILDs caused by occupational exposures are:

ASBESTOSIS
An ILD that occurs when tiny asbestos fibers are inhaled and become lodged in the air tubes in the lungs (bronchi), where they cause scarring.

Asbestos is the name given to a group of natural mineral fibers that are known for their strength and for their fire and chemical-resistant properties. Because of these qualities, asbestos has been used as a strengthening agent in cement and
plastics, as well as a material for insulation, fireproofing and sound absorption in numerous manufacturing, building and construction industries.

The inhalation of asbestos fibers also can cause the membrane encasing the lungs (pleura) to thicken, or tumors to develop in the pleura (mesothelioma) or in the sac lining the abdomen. Smokers with asbestosis have a markedly higher risk of developing lung cancer.

**What are the symptoms of asbestosis?** – Over time, the scars from asbestosis cause the lungs to become stiff, making breathing increasingly difficult. Up to 15 percent of people with asbestosis eventually die of respiratory failure.

**How is asbestosis treated?** – There is no cure for asbestosis. However, shortness of breath can be relieved with oxygen therapy. In some cases, lung transplantation may be offered. People with asbestosis who smoke are encouraged to quit in order to reduce the likelihood of developing lung cancer.

**SILICOSIS**

An ILD caused by chronic exposure to inhaled silica particles. Crystalline silica is a natural substance you can be exposed to in mining, tunneling, sandblasting and foundry work. Inhaling silica dust causes inflammation and scar tissue in the lungs, limiting the body’s oxygen supply.

**What are the symptoms of chronic silicosis?** – Even after years of exposure, symptoms may not appear right away. When they do appear, the initial symptom is shortness of breath, cough and the production of excess mucus in the lungs. As the disease progresses, other symptoms include fatigue, extreme shortness of breath, chest pain or respiratory failure.

**How is chronic silicosis treated?** – There is no cure for silicosis. Inhaled bronchodilators and corticosteroids might help relieve some symptoms. Flare ups can be frequent and are treated with antibiotics and systemic corticosteroids.

It is important for those with chronic silicosis to be closely monitored as they are at increased risk for lung cancer and active tuberculosis, especially when they are also exposed to tobacco smoke, diesel exhaust or radon gas.

**COAL WORKER’S PNEUMOCONIOSIS (CWP)**

A form of ILD that develops due to chronic inhalation of coal dust. The coal dust settles in the lungs and blackens them, which is why CWP is often also known as “black lung disease.” This dust can cause small nodules (tissue masses) to develop in the lungs.

The disease can vary depending on the type of coal, the actual jobs done by the exposed individual, how much dust the individual inhaled, and whether there also was smoking. Long wall operators and roof bolters are at higher risk for CWP.

**What are the symptoms of CWP?** – Often, there are no symptoms. However, if the disease progresses to progressive massive fibrosis (PMF), or a type of CWP that causes severe lung scarring and destroys lung structure, cough, wheezing and shortness of breath may develop.

**How is CWP treated?** – There is no cure for CWP, but inhaled bronchodilators and inhaled corticosteroids may provide some symptom relief. Flare ups may occur and are sometimes treated with antibiotics and systemic (pill) corticosteroids. However, the usefulness of systemic corticosteroids is questionable.

It is important for those with CWP to be closely monitored as they are at increased risk for emphysema, chronic bronchitis and chronic obstructive pulmonary disease.
**CHRONIC BERYLLIUM DISEASE**

Formerly known as berylliosis, chronic beryllium disease (CBD) is an ILD that is caused by exposure to beryllium dust, usually at work. It may be misdiagnosed as sarcoidosis unless the exposure is known since both diseases look similar on X-ray and biopsy. Beryllium is a metal used in many industries, most notably the aerospace industry.

**What are the symptoms of CBD?** – Symptoms usually develop slowly, often years after contact with beryllium has stopped. Those affected may develop increasing shortness of breath, dry cough, fatigue, weight loss and chest pain.

**How is CBD treated?** – There is no cure for CBD, but corticosteroids are generally thought to suppress the body’s reaction to beryllium, often leading to improved breathing and lung function. Unlike sarcoidosis, treatment for CBD usually must be indefinite, as it tends to relapse after the medications are stopped. In more advanced cases, oxygen therapy or lung transplantation may be necessary.

**HYPERSENSITIVITY PNEUMONITIS (HP)**

This is an inflammatory reaction of the lung caused by inhalation of particles. It may lead to scarring. Some individuals develop obvious symptoms after a large exposure (acute hypersensitivity pneumonitis). More commonly, the exposures are low-level and not recognized to be bothersome by the affected individual.

The most common exposures that may lead to HP:

- **Birds** – Exposure to the feathers and bird droppings of birds such as parakeets, chickens and pigeons. Feather pillows and comforters also can be a source.
- **Farmer’s lung** – Dust inhaled from wet hay or other moldy dust
- **Domestic HP** – Inhalation of molds may lead to HP in susceptible individuals.
- **Hot tubs** – Exposure to the germ nontuberculous mycobacteria in some hot tubs has been linked with an HP-like illness.

**What are the symptoms of HP?** – In some situations, the exposure and the symptoms are easily linked. For example, a farmer turning over moldy hay may notice cough, fever, shortness of breath and achiness several hours after exposure. Re-exposure to an environment that caused HP after a period of absence may cause noticeable symptoms. More commonly, the development of symptoms is very gradual. This is typical of bird-related HP. Usually, the first symptom is shortness of breath while exercising or climbing stairs. Eventually, this shortness of breath may worsen and occur with little exertion or while resting. Other symptoms may include a cough or fatigue.

**How is HP treated?** – The first step is to identify, if possible, the exposure leading to HP, and to minimize it as much as possible. Sometimes, it is not possible to identify a definite exposure. Besides avoidance, HP is often treated with corticosteroid pills when it is affecting the lung function or is bothersome. Other immunosuppressive medications, such as azathioprine, leflunomide, mycophenolate and cyclophosphamide, may be useful. Hot tub lung often can be treated with simply draining the hot tub. Oxygen therapy and/or lung transplantation may be needed for types of ILD causing severe lung damage.
What can I expect during my diagnosis and treatment?

While everyone’s care is tailored just for them, here is a general look at what you can expect from your initial contact through your first visit to Cleveland Clinic:

Step 1 - Call our ILD hotline to make an appointment. You can reach ILD Coordinator Howard Christie at 216.444.8994.

Step 2 - Howard will walk you through an on-phone assessment of your needs, goals and any medical records that may need to be transferred prior to your visit.

Step 3 - Howard will work with our scheduling office. He will then contact with you with the best time and date for your schedule. Our Medical Concierge also can help out-of-state patients arrange transportation, accommodations and other details. (http://my.clevelandclinic.org/heart/medicalconcierge.aspx)

Step 4 – During your visit to Cleveland Clinic, we will try to accommodate any changes in your personalized care plan. Your visit could be as brief as a few days or up to five days, depending on your needs. A typical visit may include:

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**MONDAY MORNING**
- Your evaluation with an ILD physician
- Breathing tests, if needed
- Rheumatology appointment with Soumya Chatterjee, MD, if needed

**MONDAY AFTERNOON**
- Chest imaging, if needed
- Thoracic surgery appointment with David Mason, MD, if needed
- Preop clinic, if needed
- Cardiac stress test, if needed

**TUESDAY**
- Surgical lung biopsy or bronchoscopy, if needed

**WEDNESDAY**
- Other appointments, if needed
- Genetics evaluation with Rebecca Cook, MS, if desired

**THURSDAY MORNING**
- ILD conference – You may choose to attend a discussion of your case with our multidisciplinary team of pulmonologists, radiologists and pathologists who will help determine the best treatment plan recommended for you, if desired.
- Wrap-up visit with respiratory physician after the ILD conference
- OR, if needed/desired, meeting with research coordinators about participating in clinical trials or our lung transplant team about a lung transplant

**SATURDAY**
- Patients who have had a surgical lung biopsy may return home.
Why should I choose Cleveland Clinic?

Our Respiratory Institute’s Interstitial Lung Disease Program has experts who understand the variability, range and types of ILD, and work together to tailor a plan of care that’s best for you.

Our treatment team includes pulmonologists, rheumatologists, thoracic radiologists, thoracic surgeons, pulmonary pathologists, and genetics and transplant experts. Together, they meet weekly to review cases and make treatment decisions – meaning everyone treated at Cleveland Clinic receives the input of the entire team throughout their diagnosis, disease management and follow-up care.

For diagnosis, our bronchoscopy team and thoracic surgeons perform both standard and advanced procedures in cases where biopsy is necessary. However, thanks to our extensive experience, invasive diagnostic procedures often are unnecessary. We frequently use steroid-minimizing or steroid-free treatment regimens, whenever possible.

You’ll also have easy access to any ancillary services you may need, such as oxygen therapy and pulmonary rehabilitation. Moreover, we also offer access to clinical trials, not widely available, for those who qualify.

Being part of Cleveland Clinic also means you have easy access to any of our other specialists to manage any related conditions, such as pulmonary hypertension. Our respiratory services are ranked #3 in the nation U.S. News & World Report.

Making an appointment

Call 216.444.8994 to make an appointment with any of our experts in Cleveland Clinic’s ILD Program. For sarcoidosis, call our Sarcoidosis Center of Excellence at 216.444.3613.

Need a second opinion but cannot travel to Cleveland?

Our MyConsult service offers secure online second opinions for patients who cannot travel to Cleveland. Through this service, patients enter detailed health information and mail pertinent test results to us. Then, Cleveland Clinic experts render an opinion that includes treatment options or alternative recommendations regarding future therapeutic considerations. To learn more about MyConsult, please visit clevelandclinic.org/myconsult.
Every life deserves world class care.

9500 Euclid Avenue, Cleveland, OH 44195

At the Respiratory Institute, specialists in pulmonology, allergy and immunology, and critical care medicine work in close collaboration with thoracic surgery, thoracic radiology and pulmonary pathology experts. Together, they diagnose and manage the full spectrum of respiratory and allergic disorders, serving more than 90,000 patients annually. The Respiratory Institute is one of 26 institutes at Cleveland Clinic, a not-for-profit academic medical center ranked among the nation’s top hospitals (U.S. News & World Report), where nearly 3,000 physicians in 120 specialties collaborate to give every patient the best outcome and experience.

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