UNDERSTANDING PULMONARY FUNCTION TEST DETAILS:
What You Need to Know and Why
Throughout the history of your experience with chronic lung disease, has your doctor ever handed you your test results and gone over the numbers with you? If not, this certainly does not mean you have a bad doctor. In fact, most physicians will not go over the actual results of tests with patients. However, to fully understand your disease, you should ask to not only see your results but have them explained to you, says Robert J. Rosneck, Exercise Physiologist/Respiratory Therapist for University Hospitals Case Medical Center in Cleveland, Ohio.

Pulmonary function tests can be confusing, but knowing the results of your test is just as important as knowing your cholesterol levels, Rosneck insists. “Test results give you a method of comparison when determining how well you’re responding to treatment,” he says. “They tell you if your disease is improving, staying the same or progressing.”

What is the purpose of a pulmonary function test?

A pulmonary function test is used to assess lung function and determine the cause of breathing problems, according to the National Heart, Lung and Blood Institute.

Your doctor may request a pulmonary function test, Rosneck says, if you are:

- More than 60 years of age
- Known to have pulmonary disease
- Are pathologically obese
- Have a history of smoking, coughing or wheezing

While there are other reasons your doctor may want you to complete a pulmonary function test, it is likely that he or she is assessing the progression of lung disease and the effectiveness of any treatment you are currently trying.
What happens during a pulmonary function test?

During the test, you will be asked to keep your nostrils closed with a clip and breathe out quickly into a tube attached to the spirometer. While you breathe, the machine measures how quickly you can expel air from your lungs and how much air you can exhale after taking a deep breath. “Expect to perform this action at least three times to help get an accurate reading,” Rosneck says. “And don’t be alarmed by raised voices; the nurse should encourage you like a coach would encourage a player on the field.”

What else do I need to know?

Several variables have an impact on the values of a pulmonary function test. The machines used during tests take several things into account before you even begin:

- Age
- Gender
- Body height and size
- Race

Terminology You Need to Know

There are a few terms vital to understanding your pulmonary function test results. The following information can get confusing, so sit down in a comfortable chair and get ready to focus.

- **Forced Vital Capacity (FVC):** During your pulmonary function test, you will be asked to take in the deepest breath you are able. You will then be told to exhale as much breath as possible. “FVC is the volume of air that can be forcibly and maximally exhaled out of the lungs until no more can be expired,” Rosneck explains.

- **Forced Expiratory Volume in One Second (FEV1):** “This is the volume of air that can be forcibly exhaled from the lungs in the first second of a forced exhalation,” Rosneck says. This means the first second of your exhaling breath should be the most forceful.

- **FEV1/FVC (FEV1%):** This figure is the ratio of FEV1 to FVC—or the first second of exhalation to the volume exhaled during the full breath. “This indicates what percentage of the total FVC was expelled from the lungs during the first second of forced exhalation,” Rosneck clarifies.
So what does this all mean?

Obstructive disease causes patients to have difficulty exhaling breath, states the University of Maryland Medical Center. When it comes to obstructive diseases, such as Chronic Obstructive Pulmonary Disease (COPD), the third number (FEV1/FVC) is most important, Rosneck points out. With healthy lungs, the first second of exhalation should be forceful; if the determined ratio — FEV1/FVC — is less than 70 percent, it is concluded you have COPD.

What should I do?

The first step to understanding your pulmonary function test results is asking for them. Be sure you inform your physician you would like to see your results. It is also a good idea to ask a family member or close friend to attend your appointment so details can be kept in order.

What do the results of my pulmonary function test mean?

Imagine you are at a child’s birthday party, and a clown is blowing up balloons. Perhaps one is a little slippery and it gets away from the clown. If the balloon is new and stretchy, air will be expelled very quickly from the balloon as it shoots across the room. However, if that clown were on a budget and using old, used balloons and the same thing happened, that old balloon would not deflate nearly as quickly because it has lost its elasticity.

Now imagine this balloon is your lung. It has a hard time exhaling air because much of the elasticity has been lost, according to the American Lung Association. Rosneck often uses this metaphor to explain COPD.
Obstructive Versus Restrictive Disease  As you can see from the balloon example, obstructive lung disease means you have trouble expelling your breath. These diseases include asthma, chronic bronchitis, emphysema and bronchiectasis.

On the other hand, [WebMD](https://www.webmd.com/) explains how restrictive lung disease keeps lungs from fully filling with air. These diseases include pulmonary fibrosis and sarcoidosis. Other factors such as gross obesity could also be causing lungs to be restricted.

Interpreting Your Results  So how does a pulmonary function test determine if you have an obstructive disease, a restrictive disease or no disease at all? Rosneck offers this systematic way for interpreting your results (you may want to refer back to the terminology section here):

- **Step 1:** Look at the Forced Vital Capacity (FVC) result to see if it is within normal limits (see table below).
- **Step 2:** Look at the Forced Expiratory Volume in One Second (FEV1) to see if it is within normal limits (see table below).
- **Step 3:** Evaluate. If both the FVC and FEV1 are normal, there is no disease. If FVC and/or FEV1 are low, then the presence of disease is highly likely.
- **Step 4:** If Step 3 indicates there is disease, then look at the ratio between the two (FEV1/FVC or FEV1%).
  - Obstructive disease is present if the percent predicted is 69 percent or lower.
  - Restrictive disease is present if both the FVC and FEV1 results are below 85 percent.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>High% of Predicted Values</th>
<th>Low% of Predicted Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>100% or higher</td>
<td>85%</td>
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<tr>
<td>Mild Disease</td>
<td>85%</td>
<td>80%</td>
</tr>
<tr>
<td>Moderate Disease</td>
<td>80%</td>
<td>50%</td>
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<tr>
<td>Severe Disease</td>
<td>50%</td>
<td>30%</td>
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<tr>
<td>Very Severe Disease</td>
<td>30%</td>
<td>0%</td>
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This may be a lot to digest, so ask your physician to go over the information with you until you understand. Don’t hesitate to ask a family member, friend or caregiver to join you at your appointment to make sure you get all the details right.

Once you understand your test levels, you can use them to compare how well you are responding to treatment, insists Rosneck. “Test results,” he says, “tell you if your disease is improving, staying the same or progressing.”

If you have been diagnosed with COPD, talk to your doctor about your oxygen therapy options. Portable oxygen solutions can ensure you remain active and independent. Find the right solution for your lifestyle by clicking here.