

Pulmonary Function Testing in Children

Pulmonary function tests (PFT's) measure how well your child can move air in and out of his or her lungs. PFT's, also called breathing tests, will help your healthcare provider tell if your child has lung disease, how severe it is and what medications may help. Your child may be asked to do PFT's in your healthcare provider's office or in a pulmonary function laboratory (lab).



Specially trained staff will coach you and your child throughout the tests. Often the breathing tests are presented as a blowing game. Sometimes blowing a toy like a party horn can be used to help your child practice what will be done during the breathing tests.

Before doing PFT's, your child's height will be measured because his or her lung size is related to his or her height. Your child's test results can be compared to the results of other children of the same sex, age, and height, like the standard ranges on a growth chart. Two common PFT's done in children are *spirometry* and *airway resistance* tests.

What is spirometry?

Spirometry is the most common lung function test done. It measures how much air is moved in and out of the lungs and how fast the air moves. To get the best results, your child will be asked to follow very specific instructions. Most children can do spirometry by age 6, though some preschoolers are able to perform the test at a younger age.

Your child will be asked to wear a nose clip to keep him or her from breathing through his or her nose during the test. Your child will then be asked to take in a deep breath and to blow the air out into a mouthpiece that is connected to a computer. The computer measures how much and how fast the air is blown out. Your child will repeat the test at least two times to get their best, most consistent result. This test can take up to 30 minutes to complete.

One of the tests measured during spirometry is your child's peak flow. The peak flow requires your child to blow out as hard and as fast as they can. This test gives

a number like you get when you record your child's peak flow reading at home or in your doctor's office. However, spirometry is a more accurate test to measure disease than just a peak flow reading.

Your child may become tired or frustrated during the test and this is common. Sometimes it takes several visits to the office or lab to practice the test before your child can complete the test. Coughing during the test is to be expected. Tell your child that they may rest between blowing into the machine, in order to catch his or her breath.

Sometimes this test is repeated after your child inhales medication. This test is called a *post- bronchodilator* or *bronchodilator response* test.

What is a post bronchodilator or bronchodilator response test?

Your healthcare provider may want to see if your child has an improvement in his or her breathing after inhaling a bronchodilator (a medicine that opens the breathing tubes). Your child will be asked to breathe in a bronchodilator medicine (usually *albuterol* or *levalbuterol*) after completing the first breathing test. About 15 minutes after taking the medicine, your child will repeat the breathing test. The results from the second test will be compared to the first test to find out if the medicine has improved your child's breathing.

Why shouldn't I give my child some of their breathing medications before the test?

Some breathing medicines will block the test from showing whether your child's airways have a good response. Ask the staff which medicines, if any, to stop.

Listed in the table below are bronchodilators by their generic name (in *italics*) and brand name (the name assigned by the pharmaceutical company). Note: the brand name of the medication can be different from country to country.

Short acting bronchodilators such as *albuterol* or *levalbuterol* or the combination inhaler *albuterol/ipratropium* (Combivent®) should not be given for at least 4 hours prior to the test. Also, you may be told to stop giving your child a long acting bronchodilator (*generic name/brand name*) *salmeterol/Serevent*®, or *formoterol/Foradil*® or combination inhalers that include one of these bronchodilators plus a steroid. Examples of these combinations are Advair® and Symbicort®. If your child is taking either of these medications, you may be asked not to give this medication to your child from 12 to 24 hours prior to the test.

	Generic Name	Brand Name
Short-acting bronchodilators (lasts about 4 hours)	<i>albuterol sulfate</i>	ProAir®, Proventil®, Ventolin®
	<i>levalbuterol tartrate</i>	Xopenex®
Long-acting bronchodilators (lasts about 12 hours)	<i>formoterol fumarate</i>	Foradil®, Oxeze®, Oxis®
	<i>salmeterol</i>	Serevent®
COMBINATION DRUGS		
Two short-acting bronchodilators	<i>albuterol sulfate / ipratropium bromide</i>	Combivent RespiMat®, Duoneb
Long-acting bronchodilator plus an inhaled corticosteroid	<i>formoterol fumarate + budesonide</i>	Symbicort®
	<i>formoterol fumarate + mometasone furoate</i>	Dulera®
	<i>salmeterol + fluticasone propionate</i>	Advair®, Seretide®

What is forced oscillometry?

Some young children aren't able to take a deep enough breath and blow out hard and long enough for spirometry. Forced oscillometry is another way to test lung function in young children. This is an easy test to do and takes only a few minutes. Your child will be asked to sit straight and breathe normally through a mouthpiece. He or she wears a nose clip and keeps their lips sealed tightly around the mouthpiece. A technician may hold his or her cheeks. The machine will send little puffs of air through the mouthpiece while the child is breathing regularly. This test measures how easily air flows in the lungs (resistance and compliance).

How can I help to make the breathing test less stressful for my child and me?

1. Be patient with your child during the test.
2. Explain to your child that the test does not hurt.

3. Explain to your child that the breathing test is being done to find out how to make their breathing better.
4. Schedule the test at a time of day that your child is usually not tired or hungry.
5. The staff will explain the test to you and your child. If you or your child does not understand, ask the staff to repeat the instructions.
6. If your child has a cold, sinus infection, or other reason that makes them unable to take the test, let your provider and the office or lab know as soon as possible. They can decide whether the test should be performed or rescheduled.

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Rx Action Steps

- ✓ If you are concerned about your child's breathing, ask your healthcare provider about having your child's lung function tested.
- ✓ Prepare your child for PFT's by explaining the test before arriving at the office or lab.
- ✓ Ask at least 48 hours before the scheduled test if there are any medicines that should not be taken by your child before the test.
- ✓ Plan extra time when your child is doing lung function tests. Several tests and rest periods may be needed to get the best results.

Healthcare Provider's Contact Number:

For More Information

American Thoracic Society

- www.thoracic.org/patients/

Asthma.net

- <https://asthma.net/diagnosis/spirometry/>

AboutKidsHealth (Sick Kids -Canada)

- <https://www.aboutkidshealth.ca/Article?contentid=1268&language=English>

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