

Bronchial Challenge Lung Function Test: Methacholine or Other Agents

A bronchial challenge study is a lung function test that measures what happens when challenged by something that in some people may cause airway tightening (bronchospasm). In the US, the most common inhaled challenge agent is methacholine. Other inhaled agents used include histamine, mannitol and cold air. A challenge study is most often done to see if a person may have asthma. The bronchial challenge test may be called a methacholine challenge test (MCT), methacholine inhalation test, or bronchoprovocation test. This fact sheet will focus mainly on the methacholine challenge test (MCT).



Why am I being asked to do a challenge test?

A challenge study may be done in a person who has unclear or nonspecific symptoms to try to confirm or exclude a diagnosis of asthma. A person who has known asthma will be asked to do the test to see how sensitive the airways are or how well asthma medicines are working to make the airways less sensitive. Ask your healthcare provider what you will learn by doing this test.

Are there any reasons I should not, or might not be able to perform the test?

A bronchial challenge test should not be done if you have had:

- Unstable heart pains (angina)
- Poorly controlled high blood pressure (hypertension)
- Recent blood clots (in your lungs or elsewhere in your body)
- Certain types of blood vessels problems (e.g. aortic or cerebral aneurysm)

Check with your healthcare provider before doing the challenge study if you are pregnant or breast-feeding. There may be other reasons the test is not done and your healthcare provider will decide if you are stable to do the test. If you are in doubt about whether or not you should have this test, discuss your concerns with your healthcare provider.

If your O₂ sat is low at rest off oxygen (less than or equal 85%) you may not be tested or may only be tested with

the use of extra oxygen.

If your lung function is too low at the beginning of the test, you will not be able to do the challenge. That is why you will do baseline spirometry before starting the challenge study.

What are possible risks with a challenge test?

The challenge study may cause an asthma reaction with bronchospasm. You may cough or wheeze. You may feel chest tightness or shortness of breath. You may have no symptoms at all. You should feel better after you are given an inhaled bronchodilator.

The test is usually done in a pulmonary function lab with trained staff who know how to help you if you have problems during the test. A healthcare provider is always available during the study.

How do I prepare for a Challenge test?

You may need to stop certain medicines before a challenge test. Different medicines have to be stopped at different times based on how long they last in the body. Review your medicine list with your healthcare provider to get directions on which medicines to stop and for how long before your test. For example, you should not take albuterol or levalbuterol for at least 8 hours before testing. Also make a list of any over-the-counter medications you are taking for your breathing or for sinus congestion or allergies. Check with your healthcare provider or testing center to see if you should hold them in case they could affect the test results.

You should avoid eating or drinking any caffeine containing products such as coffee, tea, cola drinks, energy drinks, and chocolate the day of the test. The caffeine can lead to inaccurate test results.

You should not exercise 6 hours before the test. You should not smoke at least 6 hours before the test.

Tell your health care provider if you have had a cold or upper respiratory infection in the 4 weeks before the test. These can also affect the test results.

What should I expect during a challenge test?

During a challenge study, a person will inhale methacholine or histamine in varying amounts. The airways in asthma will react to exposure to the chemical at a certain amount. The more sensitive the airways are, the lower the amount that is needed to cause a reaction. The muscles in the airway constrict (called bronchospasm) which causes a blockage (obstruction) making it harder for you to blow air out. At any time, if your lungs show a positive reaction (a drop in function of 20% or more), you will be given an inhaled bronchodilator to reverse it.

How is a Methacholine challenge study done?

You must be able to do a spirometry lung function test correctly in order to do a challenge study. (See ATS Patient Information Series on Lung function testing).

Here are the basic steps for a MCT:

1. You will do spirometry to see what your baseline lung function is. If your function is high enough, you will move to the next step of the challenge test.
2. You may or may not be asked to inhale saline (a salt water solution) and recheck your lung function.
3. If your lung function is stable, you will be asked to inhale a very low amount of methacholine.
4. You will do spirometry right after inhaling the methacholine and again in a few minutes.
5. As long as you do not react to the methacholine, you will continue the test inhaling doses of the methacholine (usually between 5-10 doses total). After each dose, you will perform spirometry for safety and to measure your lungs' response to the methacholine.
6. If your lung function drops, you will be given an inhaled medicine called a bronchodilator (like albuterol or levalbuterol) to help open your airways.
7. You will repeat spirometry to make sure you improve back to your baseline.
8. You will not leave the test area until you have recovered back at your baseline. You may therefore be asked to wait for an hour or more, before being allowed to go home.

When will I get the results of the test?

Your healthcare provider will review the results of your O₂ sat levels before, during, and after exercise. You may know the results right away but you will want to review them with your healthcare provider.

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Rx Action Steps

- ✓ If you have a cold, increased coughing, or are feeling ill the day of the test, check with your healthcare provider to postpone your test.
- ✓ Check with your healthcare provider to see if you need to hold any medicine before your challenge test and for how long.
- ✓ Ask your healthcare provider to explain the results of your challenge test..

Healthcare Provider's Contact Number:

Resources:

American Thoracic Society

- www.thoracic.org/patients/
 - Lung function testing
 - What is Asthma?

ATS/ERS Task Force: Standardization of Lung Function Testing. Get full reference or ATS Standards?

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ERS standards

- <https://erj.ersjournals.com/content/49/5/1601526>

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