



Methacholine Challenge Test (MCT)



Changi
General Hospital
SingHealth

What is Methacholine Challenge Test (MCT)?

The methacholine challenge test (MCT) is used to measure whether your airways narrow after inhaling a specific provoking agent – methacholine in this instance. The degree of resultant airway narrowing is dependent on each individual's susceptibility and the airway narrowing will be assessed objectively by measuring the changes in lung function before and after inhalation of the methacholine in progressively larger doses. Increased airway hyper-responsiveness is usually a hallmark feature of asthma.

Why do I need this test?

Your doctor may use this test to establish the diagnosis of asthma if initial lung function tests did not show any conclusive results. If you have a history of asthma, your doctor may recommend doing a MCT from time to time to assess how well your asthma medication is working. Please clarify with your doctor if you are unsure why you need to undergo this test.



How do I prepare myself for the test?

How long before the test?	Avoid:
2 hours	Heavy meals
8 hours	Alcohol
Day of test	<ul style="list-style-type: none">• Smoking• Exercise• Wearing tight clothing that will restrict your breathing or movement

The doctor will advise you on the medications to temporarily discontinue before the test as they can affect the test results. Please clarify with your doctor if you are on any other medication for your breathing that is not listed here so that they can advise you accordingly.

Inhaled medication containing only corticosteroids such as Beclomethasone, Budesonide, Fluticasone, Triamcinolone, or Mometasone may be continued. Please confirm with your doctor if there is any need to stop these medications.

How long before the test?	Avoid:	Examples
8 hours	Inhaled beta-agonists – Short acting	Albuterol or Salbutamol (Ventolin)
12 hours	Inhaled anticholinergics – Short acting	Ipratropium bromide (Atrovent)
	Oral Theophylline (Non-SR)	Nuelin
24 hours	Oral Theophylline (SR)	Nuelin SR
48 hours	Inhaled beta-agonists – Long acting	Formoterol (e.g. Symbicort, Flutiform) Salmeterol (e.g. Seretide)
	Inhaled beta-agonists – Ultra-long acting	Indacaterol (Onbrez & Ultibro Breezhaler) Olodaterol (Striverdi & Spiolto Respimat) Vilanterol (Anoro, Relvar & Trelegy Ellipta)
1 week	Inhaled anticholinergics – Long acting	Glycopyrronium (Seebri & Ultibro Breezhaler) Tiotropium (Spiriva & Spiolto Respimat) Umeclidinium (Incruse, Anoro & Trelegy Ellipta) Aclidinium

How is the test done?

Our clinical physiologist will guide you through the three stages of the MCT, estimated to take about 30 to 45 minutes.

1. You will need to undergo a baseline lung function assessment first. You will be asked to use maximal effort to blow out and breathe in through the equipment. This step helps to ensure that your baseline lung function is not too low to proceed with the rest of the test.
2. You will then be asked to inhale progressively larger doses of methacholine, which is tasteless and odourless, from a machine. The lung function assessment will be repeated after each dose to see if there is significant change in your lung function from the baseline readings. If there is no significant change, you will be asked to inhale the next dose of methacholine, for up to 5 doses. If there is a significant change, you will not be asked to inhale the next dose of methacholine.
3. You will be given inhaled bronchodilator medication to re-open your airways if there is significant airway narrowing during the course of the test. Lung function assessments will be repeated thereafter to ensure that your lungs and breathing have returned to normal.



The entire procedure is estimated to take about 30-45mins.

What are the possible risks from this test?

This is generally a safe test.

You may feel breathless or light-headed for a short while (usually lasting only for a few seconds) after the test is performed as the lung function assessments require some exertion during the breathing manoeuvres.

If your airways tighten after inhalation of methacholine, you may experience symptoms similar to an asthmatic attack, such as chest tightness, shortness of breath, wheezing or coughing. These symptoms are usually mild, transient, and you will be given inhaled bronchodilator medication to relieve your symptoms. There will be no symptoms if your airways do not tighten.

Please inform the clinical physiologist if you experience any discomfort during the test. Generally, it would be extremely rare to have persistent symptoms or develop new symptoms after the test. The test is done in our Pulmonary Function Laboratory with trained staff and there will be appropriate medical assistance available whenever necessary.



The risks and complications listed here are not intended to be exhaustive. There may be uncommon risks or those that are specifically applicable to you due to individual risk factors. Please check with your doctor if you have any concerns about this.

What can I expect after the test?

After the test, you can resume the medication(s) that you have stopped for the purpose of the test unless your doctor had given you other prior instructions. You can also go back to your usual diet and activities.

You will be given an appointment to see your doctor who will discuss the test results with you and answer any questions that you may have about your condition.

Are there alternatives to MCT?

Clinical guidelines recommend that asthma should be diagnosed based on presence of typical asthma symptoms and objective evidence of airflow limitation, usually obtained from lung function assessments.

Our doctor may recommend other alternatives to MCT in certain situations (e.g. if you are deemed unsuitable to undergo MCT).

Pre- and Post-Bronchodilator Spirometry

Our doctor may recommend pre-and post-bronchodilator spirometry (which is another form of lung function test) to elicit a significant response to an inhaled bronchodilator medication to confirm diagnosis of asthma. This test may be repeated if needed.

Other forms of airway provocation tests

Other methods such as exercise challenge test can produce similar effects of inducing airway narrowing. However, the effects are dependent on individual susceptibility and may be considered in certain situations (e.g. if your respiratory symptoms are solely exercise-induced).

Is there a chance that I may not be able to have the test?

You may not be able to undergo the test in certain scenarios such as the following:

- ▶ If you are pregnant or nursing
- ▶ If you had a recent heart attack or stroke within the last 3 months
- ▶ If you have a known blood vessel problem
- ▶ If you have uncontrolled high blood pressure
- ▶ If your baseline lung function prior to inhalation of the methacholine is too low
- ▶ If you are allergic to methacholine

Please inform your doctor if you have any of these conditions that may preclude you from undergoing the test, so that alternative plans or tests can be arranged.

Can I take the test if I am not feeling well?

You should not proceed with the test if you have a fever, cold, respiratory tract infection or feeling unwell. Generally, you are advised to take the test one month after recovery for a more accurate test result.

Please call the CGH Appointment Centre at 6850 3333 to reschedule your appointment. Do check with your doctor if you have any concerns.



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PATIENTS. AT THE HEART OF ALL WE DO.®


2 Simei Street 3 Singapore 529889
Tel: 6788 8833 Fax: 6788 0933
Reg No 198904226R

CGH Appointment Centre

For appointments and enquiries,
please call: (65) 6850 3333

Operating hours:
8.30 am to 8.00 pm (Monday to Friday)
8.30 am to 12.30 pm (Saturday & Sunday)
Closed on Public Holiday

For more information, please visit www.cgh.com.sg

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Information is valid as of October 2020 and subject to revision without prior notice.

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