

What you need to know about the

Diffusing Capacity of the Lungs (DLCO)

What is it?

This test is used to estimate the transfer of oxygen from the alveoli in your lungs to your bloodstream. The diffusing capacity (DL) of oxygen is technically very difficult to measure, and the test actually measures the diffusing capacity of carbon monoxide (DLCO) which provides a valid estimate of the oxygen diffusion. The diffusing capacity test is safe and has no lasting effects.

What should you expect?

This test requires complicated equipment and special testing gases. It will always be performed in a pulmonary function lab.

You will be asked to sit upright in a chair. You may be asked to loosen your bra or your belt if these could restrict your breathing. If you are using supplemental oxygen then you will be asked to take your nasal cannula off. You will have your nose clipped so that you will breathe only through your mouth and you will be asked to breathe through a flanged rubber mouthpiece. It is important that you keep your lips snug on the mouthpiece in order to get a tight seal so that air does not leak.

When the diffusing capacity test starts you will be told to breathe quietly for several breaths and then to blow out as much air as you can. When you have emptied your lungs you will be asked to take a quick deep breath in, as deep as you can, and then to hold it for 10 seconds. The inhaled gas contains a very low concentration of carbon monoxide. At the end of the breath-holding period you will be asked to blow the air out quickly. The staff person giving you the test should be coaching you the entire time you are performing the test.

You will probably need to perform the diffusing capacity test at least twice. More attempts may be necessary and this will be based on test quality and reproducibility but there should not be more than four attempts. The staff person who is performing your test should tell you each time whether you did the test correctly, or if not, which part of the test you need to improve.

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You may become very short of breath during the breath-holding period. This is normal. Despite this you need to hold your breath for at least 10 seconds and not come off the mouthpiece until you are told that you can. If you become too tired, short of breath, or uncomfortable please take time to recover between tests. If you are using supplemental oxygen you can use it between tests if this will help you recover. You can drink water if your throat is uncomfortable or dry. Kleenex should be available if you start coughing.

The nose clip and the mouthpiece should both be new and clean at the start of your testing session. The staff person performing your test should be wearing gloves or at a minimum should have performed hand hygiene before your testing session. Kleenex should be available if you start coughing.

What is a normal measurement?

The diffusing capacity test results are compared to normal values for someone that is your height, age, gender and ethnicity. These normal values will come from one of several different population studies and there are two different ways of making this comparison:

Percent predicted: A DLCO result that is at least 80% of the predicted value is considered to be within normal limits.

Lower Limit of Normal (LLN): The lower limit of normal is based on a statistical analysis of the study population. A DLCO result above the LLN is considered to be within normal limits.

What affects test quality?

Your test results will probably be underestimated if you do not empty your lung as much as you can and then take as deep a breath as you can.

Your test results will probably be underestimated if you do not hold your breath for the full ten seconds or if you leak air during the test.

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Your test results will probably be underestimated if you breathe in too slowly at the start of the test or if you breathe out too slowly at the end of the test.

Because hemoglobin is the molecule in your red blood cells that carries oxygen in the bloodstream the test results will be underestimated if your hemoglobin levels are low and overestimated if they are high. The diffusing capacity results can be corrected for your hemoglobin level but the blood test for hemoglobin needs to have been done recently. There are no clear standards for how recent a hemoglobin measurement needs to be in order to correct DLCO test results but anything more than a month old should not be used for this purpose.

Because the diffusing capacity test uses small amounts of carbon monoxide any extra carbon monoxide in your blood will reduce the test results. Smoking cigarettes puts extra carbon monoxide in your blood and for this reason you should not smoke for 24 hours before the diffusing capacity test. It is possible to correct for blood carbon monoxide levels but you will need to have an arterial blood sample taken and measured in a laboratory instrument called a co-oximeter. This blood test should be done no more than an hour from the time the diffusing capacity test is performed.

Your predicted DLCO is directly related to your height so your test results cannot be assessed correctly if your height has not been measured accurately. Your height should be measured regularly and it should be measured with your shoes off with you standing straight while looking directly ahead.