

Air Pollution and Lung Function

Children exposed to higher levels of air pollution show reduced lung growth and function that may affect them decades later, according to a recent study conducted in Mexico. The early lung deficits may increase the risk of developing chronic obstructive lung disease later in life, as well as cardiovascular morbidity and general mortality.

The three-year study measured lung function growth in 3,170 8-year-old children at 39 schools in Mexico City and analyzed the data with respect to exposure to common urban pollutants: ozone, nitrogen dioxide and particulate matter. The researchers also conducted personal exposure assessments on 60 randomly selected children in the study to ensure that the air monitoring station data was an accurate representation of individual exposure.

The findings, published in the American Journal of Respiratory and Critical Care Medicine, found that higher exposure to ozone, nitrogen dioxide and particulate matter was significantly associated with lung growth deficits.

The researchers couldn't identify specific sources of the pollutants but it is likely due to vehicular exhaust, the study said. The results of another study published in the New England Journal of Medicine indicate that current levels of air pollution have chronic, adverse effects on lung development in children from the age of 10 to 18 years, leading to clinically significant deficits in attained FEV1 (assessed from lung function testing) as children reach adulthood.

In view of these recent findings, it is advisable for anyone exposed to significant amounts of air pollution for a long period of time to undergo lung function testing. Pulmonary (lung) function tests are used to detect lung diseases or to monitor the progression of a particular disease, such as COPD. Regular testing can detect lung disease in its early stages and allow for timely treatment. Lung function tests are conducted non-invasively and are simple to perform.

One of the most basic tests of pulmonary (lung) function is called Spirometry. Basically, this involves forcefully breathing out into a device called a Spirometer [see photo]. Spirometry testing is quick, non-invasive and painless.



Spirometry is performed under various conditions with the patient breathing into a tube attached to the machine, which calculates the amount of air the lungs can hold and the rate that air can be inhaled

and exhaled. The results of the test are compared with those of healthy individuals of similar height and age, and of the same sex and race. Abnormal results may be a sign of lung disease (e.g COPD, asthma). If you have already been diagnosed with a lung disease before the test, the result will help your doctor determine how severe the disease is and/or the effectiveness of the treatment.

Preparation for a Pulmonary Function Test

Up to 24 hours before the schedule test:

Follow your doctor's orders to stop taking some or all of your medication

Get a good night's sleep as tiredness can affect the accuracy of the test

Up to eight hours before the schedule test:

Do not smoke or eat a heavy meal

Up to four hours before the test:

Do not carry out strenuous activity

Wear loose, non-restrictive clothes that keep your chest area as free as possible when u come for the test.

During the test:

The test is painless. Remain calm because fear or anxiety can make the test results less reliable.

How is a spirometry conducted ?

Basic information about yourself (height, weight, age and sex) will be recorded.

You will have to breathe into a Spirometer - a machine that measures how much air you are able to breathe in and out. . Several breathing tasks may be required, such as : - Taking in a deep breath, holding the breath and breathing out as forcefully as possible. - Breathing rapidly into the tube. . Follow instructions carefully. You may have to repeat the same task a few times to ensure consistent results. . You will be given time to rest in between tasks.

The entire test takes approximately 20 to 45 minutes. You may feel light-headed because of the deep breathing you have been doing. You should remain seated until the feeling passes.

Occasionally, the doctor may request for an inhalation challenge test, which requires breathing in a solution to be conducted with the above tests.

What happens after the Test

The doctor will have a report of your test results. He/she will review these results with you. A number of different terms will arise during the discussion:

Predicted values are the normal results that your doctor would expect for people with the same height, weight, age and sex as you.

Measured values are your results in comparison with normal or predicted values. For example, if you only blow out half the amount of air that would normally be predicted, the measured value of your vital capacity (VC) would be 50 percent. If your total lung capacity (TLC) is exactly what would be predicted, the measured value is 100 percent.

A common spirometry measurement is FEV1 (Forced Expiratory Volume in One Second), the volume of air exhaled in the first second after a deep inhalation. For COPD patients, FEV1 is used to determine the severity of obstruction, with less than 80% considered mild and less than 50% severe.

More detailed tests of lung function involve the measurement of lung volumes and the diffusing capacity (DLCO). The DLCO is a sensitive measurement of lung function and even mild abnormalities of the lungs can be detected with this test.