

Laboratory Practical 5

Assessing Respiratory Function

(This is an abridged version from the one undertaken in class)

Asthma is a condition characterised by an increased sensitivity of the airway passages, which manifests itself as a reversible narrowing of the air passage, principally the bronchioles.

This narrowing is produced by a swelling of the mucus membrane lining with copious thick mucus and a constriction of the smooth muscles surrounding the bronchioles.

Diagnosing Asthma

1. History: Symptoms include:

- ✓ Chronic cough, that may be the only feature
- ✓ Wheeze
- ✓ Tightness of the chest
- ✓ Shortness of breath
- ✓ The important features of these symptoms are: variable, intermittent, worse at night and trigger factors including exercise.

2. Testing

Peak Flow and FEV1 are the key variables measured for the diagnosis and monitoring of asthma

- ✓ Peak Flow is defined as the maximum flow rate of air breathed out during forced expiration.
- ✓ FEV1 relates to the forced expiratory volume, per second.

We can also use other information gathered such as:

- ✓ FVC is an abbreviation of Forced Vital Capacity, and indicates the maximum volume of air expired after maximum inspiration
- ✓ FER is an abbreviation for Forced Expiratory Ratio which is the Percentage of FVC expelled in the first second of a forced expiration $[(FEV1 / FVC) \times 100]$
- ✓ PEF is an abbreviation for Peak Expiratory Flow and is a measure of how fast a person can exhale while breathing out as hard and fast as possible. PEF is used to evaluate the condition of the airways in people who have asthma or other conditions that affect the ability to breathe.

Using the Micro Plus Spirometer:-

- ✓ Switch the unit on by moving the switch to the BLOW position. The display will now indicate “BLOW” and 3 zeros
- ✓ Breathe in until your lungs are completely full
- ✓ Seal your lips around the mouthpiece and blow out as hard and as fast as possible until you cannot push any more air out.
- ✓ When you have finish this manoeuvre FEV1 will be indicated on the display.
- ✓ To read the FVC push the switch upwards to the “VIEW” position and the display will indicate FVC. If the switch is left in this position the measurements of FEV1, FVC, FER and PEF will be displayed in rotation until the unit is switched off.

- ✓ Record your results in the table below
- ✓ Use the Micro Medical Lung Function Calculators to find your predicted values for all four variables

Parameters Measured	Your results	Your Predicted
FEV ₁		
FVC		
FER		
PEF		

In asthmatics

- ✓ FEV1 and FVC will be significantly below their predicted values.
- ✓ The FEV1 and FVC are usually measured over 3 days a week for 2 weeks. Variability of 20% or more is highly suggestive of asthma. Variability is calculated using the following equation;

$$[(\text{highest-lowest}) / \text{highest}] \times 100$$

Exercise Testing for Asthma

Practical Task Protocol

- ✓ Take a resting measurement of all 4 variables
- ✓ Calculate the patients HRmax
- ✓ Calculate an exercise intensity of 60% of HRmax
- ✓ Client will cycle at 60% HRmax for 8 minutes
- ✓ Re-measure all 4 variables at 4 minutes and 8 minutes during exercise
- ✓ Re measure all 4 variables at 5 and 10 minutes post exercise

Results

Time	FEV ₁	FVC	FER	PEF
Rest				
4 mins				
8 mins				
5 mins post				
10 mins post				

Interpretation of Results

A positive test for asthma can also be determined by a decrease in FEV₁ of more than 15% at any point during the test.

