

# Diagnosing Respiratory Diseases

## Biomedical Engineering - URJC

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# Spirometry

## Spirometry

It is the most useful pulmonary function test, measures the volume of air exhaled at specific time points during a forceful and complete exhalation after a maximal inhalation.

- 1 The total exhaled volume = forced vital capacity (**FVC**)
- 2 The volume exhaled in the first second, = forced expiratory volume in one second (**FEV1**)
- 3 Ratio FEV1/FVC or **Tiffeneau Index**.

# Spirometry

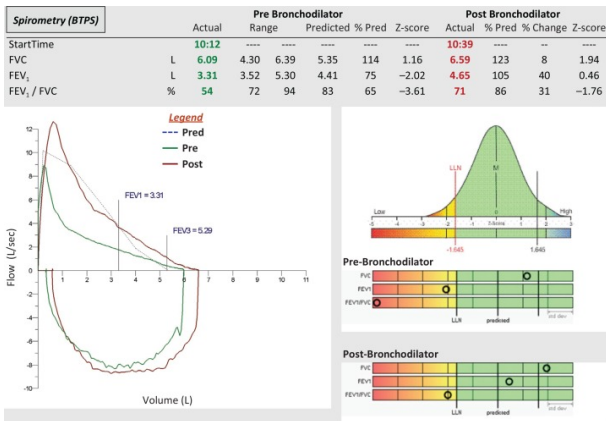
 **Bluetooth®**



# Spirometry



# Spirometry



# Spirometry

## Spirometry

It is the key diagnostic test for **asthma** and **chronic obstructive pulmonary disease** (COPD) when performed before and after bronchodilator administration.

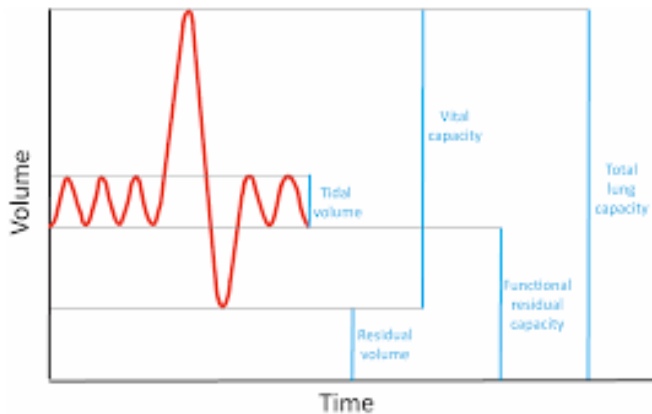
## Bronchodilator test

The spirometry is performed before and after a bronchodilator is administered to determine the degree of bronchodilator responsiveness

# Plethysmography

- Measurement of **lung volumes** is important when spirometry shows a decreased forced vital capacity.
- Body plethysmography is the gold standard for measurement of lung volumes, particularly in the setting of airflow obstruction

# Plethysmography





# Other tests

## DLCO

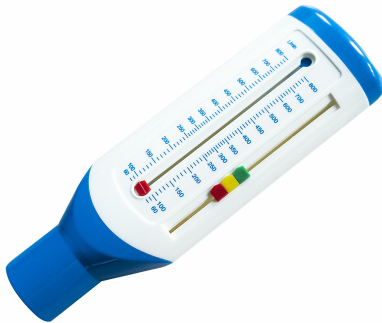
Measurement of the single-breath **diffusing capacity for carbon monoxide (DLCO)** is quick, safe, and useful in the evaluation of restrictive and obstructive lung disease, as well as pulmonary vascular disease.

# Other tests

## Peak flow

- The peak expiratory flow (PEF, also known as a peak flow or peak flow rate) is the maximal rate that a person can exhale during a short maximal expiratory effort after a full inspiration.
- In patients with asthma, the PEF percent predicted correlates reasonably well with the percent predicted value for the forced expiratory volume in one second (FEV1) and provides an objective measure of airflow limitation when spirometry is not available

# Other tests



# Other tests

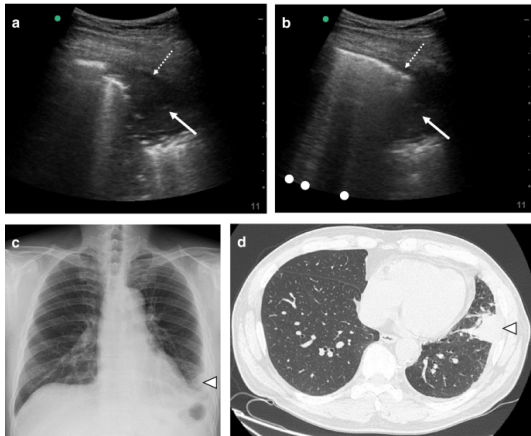
## Pulse Oximetry

- Assessment of oxygen saturation can be used to identify a gas transfer defect and to titrate the amount of oxygen needed to maintain adequate oxygenation.
- At sea level, SpO<sub>2</sub> less than 95 % are considered **abnormal**. A value of SpO<sub>2</sub> less than 88-90 % is generally an indication for supplemental oxygen.

# Pulse Oximetry



# Imaging test



# Bronchoscopy

