

# WHAT SPIROMETRY TELLS YOU

## SPIROMETRY MEASUREMENTS

Spirometry measures the volume of air exhaled or inhaled over a set period of time. Spirometry can help the clinician determine whether an individual has a disease in the lungs and help determine whether the disease is obstructive or restrictive.

Testing may include these measures and others not shown in the illustrations on the poster:

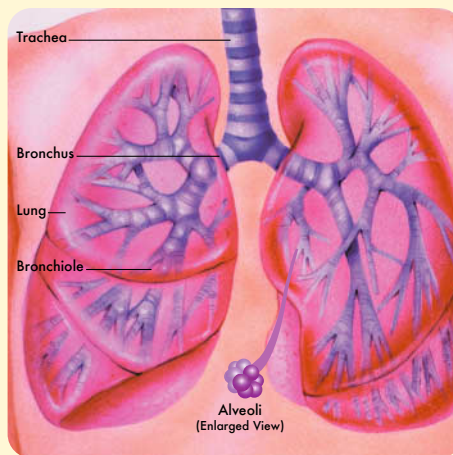
- FEV<sub>1</sub> Forced expiratory volume in the first second
- FVC Forced vital capacity
- FEV<sub>6</sub> Forced expiratory volume after 6 seconds
- PEF Peak expiratory flow
- VC Vital capacity

Lung diseases are often classified as either obstructive or restrictive.

In individuals with obstructive lung disease, the lungs may be able to take in the same amount of air that healthy lungs can take in. However, the air cannot leave the lungs as quickly as it can in individuals with healthy lungs. The air is obstructed from leaving the lungs.

### Some Obstructive Lung Diseases

- Chronic Obstructive Pulmonary Disease
- Pleural effusion • Pneumothorax • Sarcoidosis



In individuals with restrictive disease, the lungs are not able to take in the same amount of air that healthy lungs can take in. The air is restricted from entering the lungs.

### Some Restrictive Lung Diseases

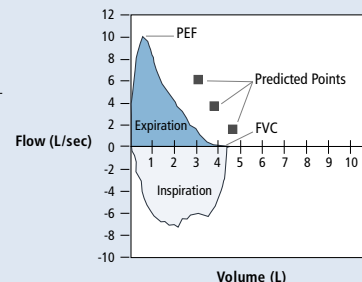
- Asthma • Bronchiectasis • Chronic bronchitis
- Ascites • Kyphoscoliosis • Cystic fibrosis

## Sample Spirometry Graphs

Spirometric graphs show measurement of flow and volume (Figure 1) and measurement of volume and time (Figure 2). Both graphs can be helpful in determining severity of obstruction.

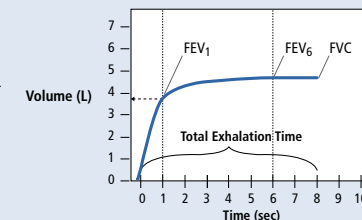
### Flow Volume Graph

Figure 1



### Volume Time Graph

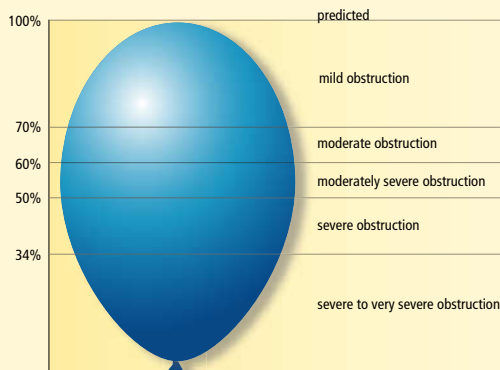
Figure 2



Adapted from American Thoracic Society. Lung function testing: selection of reference values, interpretive strategies. *Am Rev Respir Dis.* 1991;144:1202-1218.

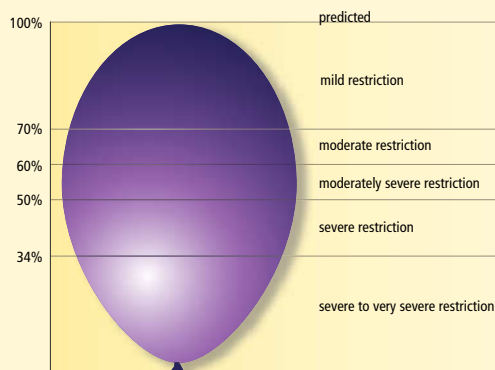
## OBSTRUCTION

### FEV<sub>1</sub>



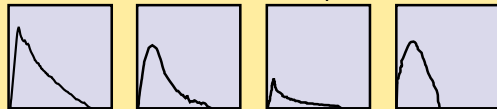
## RESTRICTION

### VC



## SPIROGRAM INTERPRETATION GUIDE

### Flow Volume Graph



### Volume Time Graph



## TIPS TO HELP ENSURE ACCURATE SPIROMETRY RESULTS

- No bronchodilators 6 to 8 hours before testing, if possible.
- Test performed with subject seated, unless very obese.
- Maximal inhalation and pause.
- Very forceful exhalation for at least 6 seconds, with mouth and teeth closed tightly on mouthpiece.
- Duration of exhalation at least 15 seconds.
- Three acceptable and reproducible results.
- If unacceptable results, perform bronchodilator therapy and repeat testing in 15 minutes.
- Use of nose clips, if available and tolerated.

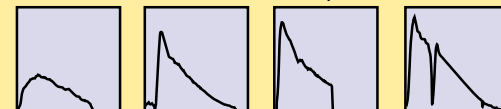
## REASONS FOR POOR TEST RESULTS

Refer to diagrams below.

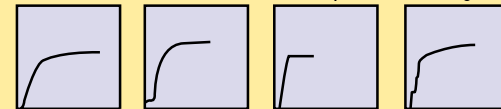
- Poor/variable effort
  - Exhalation not forceful enough
  - Results differ by more than 5% from previous best maneuver
- Hesitation at the start
  - Proper inhalation but slow exhalation
- Abrupt stop/early termination
  - Air in lungs not completely exhaled
- Uneven exhalation
  - Coughing or pausing during testing

## EXAMPLES OF UNACCEPTABLE TESTS

### Flow Volume Graph



### Volume Time Graph



Renaissance® II Spirometry System

Simplicity® Spirometer

Sources: ATS. *Am Rev Respir Dis.* 1991;144:1202-1218. AARC. *Respir Care.* 1991; 36 (12): 1414-1417. Evans SE, Scanlon PD. *Mayo Clin Proc.* 2003;78:758-763. Halprin D M G. *YDA: COPD.* Churchill Livingstone; 2003. NHLBI *Workshop Report.* Publication Number 95-3659. Ruppel G. *Manual of Pulmonary Function Testing.* 8<sup>th</sup> ed. Mosby; 2003.

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