

Lung function in health and disease

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Types of lung function tests include

- Spirometry.
- Gas diffusion.
- Body Plethysmography.
- Inhalation challenge test.
- Exercise stress test.

- **Spirometry:**
 - It is the measurement of the speed and the amount of air that can be exhaled and inhaled.
- **Body Plethysmography test:**
 - The patient is required to sit in an airtight chamber that resembles a small telephone booth. Inside the chamber is an affixed spirometer, which is used to determine the flow properties of the patient.
- **Cardiopulmonary Stress Testing**
 - Used for evaluation of dyspnea that is out of proportion to findings on static pulmonary function tests
- **Diffusing Capacity of Lung for Carbon Monoxide**
 - To evaluate the presence of possible parenchymal lung disease
- **Pulse Oximetry**
 - The principle is measurement of O₂ saturation by spectrophotometry

Spirometer



Plethysmography



Spirometry



- Spirometry is a method to record volume movement of air into and out of the lungs.
- Spirometry is a simple most commonly used test to:
 - Assess the lung performance
 - Measure the physiological parameters:
 - Lung volumes
 - Capacities
 - Flow rate
 - Differentiate between the obstructive and restrictive lung conditions
 - Play a critical role in the diagnosis, differentiation and management of respiratory diseases.

Physiological conditions affecting lung functions

- Age
- Gender
- Height
- Weight
- Ethnic group
- Pregnancy

Indications of Spirometry

- Based on clinical features / abnormal lab tests
- **Symptoms:**
 - Dyspnea
 - Cough
 - Sputum production
 - Chest pain
- **Signs:**
 - Cyanosis,
 - Clubbing
 - Chest deformity
 - Diminished chest expansion
 - Hyperinflation
 - Diminished breath sounds
 - Prolongation of expiratory phase & crackles
- **Arterial blood gas analysis:** Hypoxemia, hypercapnia
- **Abnormal chest X Ray.**

Indications of Spirometry

- To detect respiratory disease in patients presenting with symptoms of breathlessness, and to distinguish respiratory from cardiac disease.
- To diagnose or manage asthma
- To diagnose and differentiate between obstructive and restrictive lung disease.
- To conduct pre-operative risk assessment before anesthesia
- To measure response to treatment of conditions which spirometry detects

Indications of Spirometry

- Describe the course of diseases affecting PFTs
 - **Neuromuscular diseases:** Gillian Barre Syndrome, Myasthenia gravis
 - **Pulmonary diseases:** Obstructive airway diseases, Interstitial lung diseases
 - **Adverse reactions:** Drugs with known pulmonary toxicity [Pulmonary fibrosis]

Indications of Spirometry

- **To assess the therapeutic interventions:**
 - Bronchodilator therapy
 - Steroid treatment for asthma
 - Chronic obstructive lung disease
 - Interstitial lung disease

Indications of Spirometry

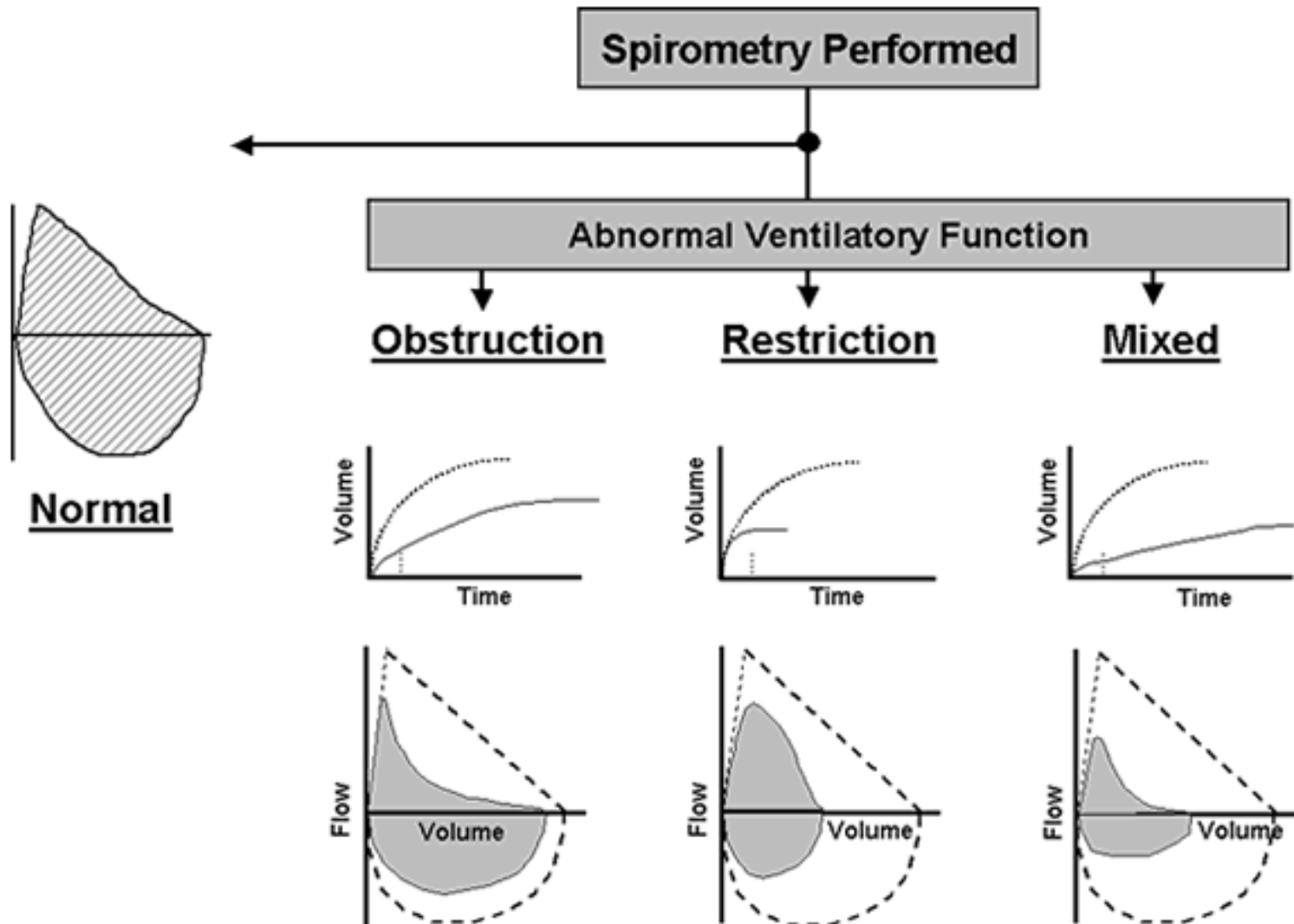
PRE OPERATIVE INDICATIONS

- To determine the suitability of patients for anesthesia
- To assess the risk for surgical procedures known to affect lung function.

Results classification

- Normal
- Obstructive
- Restrictive
- Combined

Assessment of spirometry



Maintaining accuracy

- The most common reason for inaccurate results:
 - Inadequate or incomplete inhalation.
 - Additional breath taken during the test
 - Lips not sealed around the mouth piece.
 - Slow start to forced exhalation
 - Some exhalation through the nose.
 - Coughing.

Smoking and Spirometry

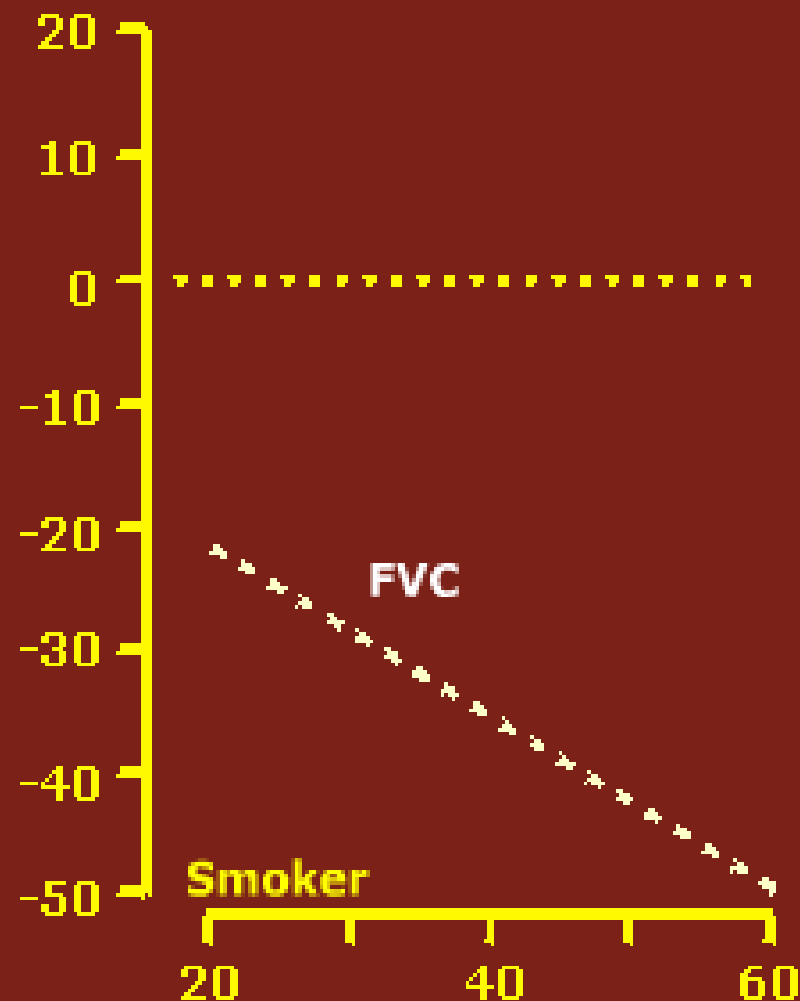
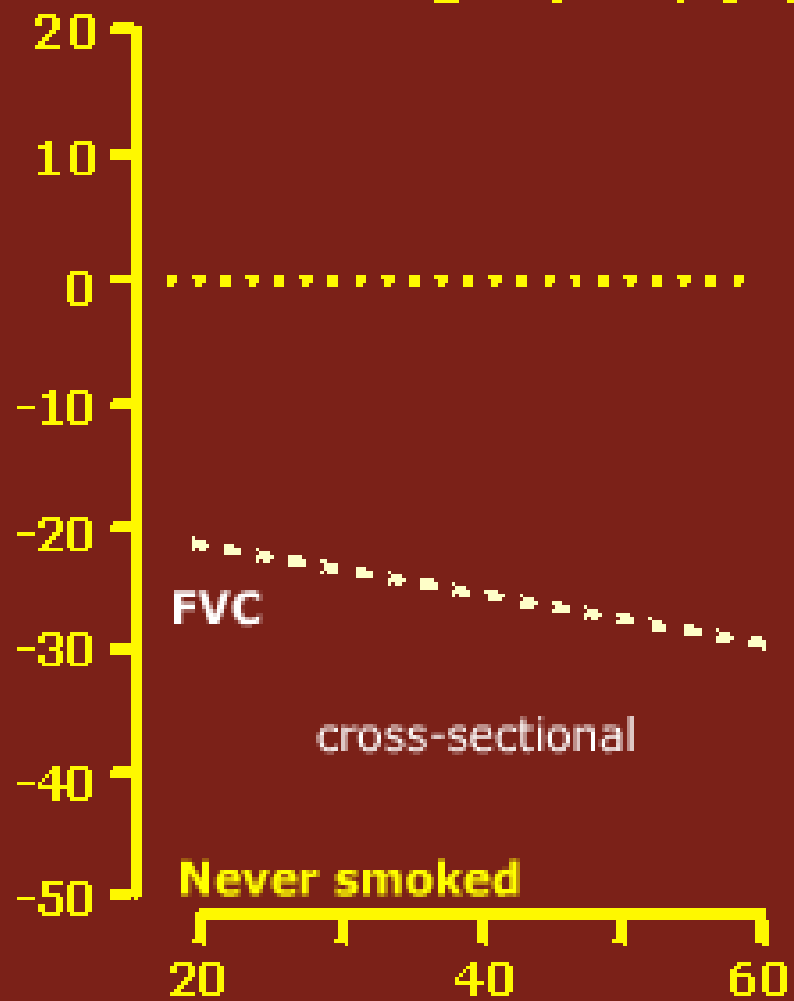
Effect of smoking on lung function:

- **Non Smoker:** In normal healthy non smoker subject after the age of 30 the expected decline in Lung function parameter [FEV1] is 25–30 ml/ year
- **Smoker:** The average rate of decline of lung function in smokers as measured by Forced Expiratory Volume in 1 sec [FEV1] is 60-70 ml / year

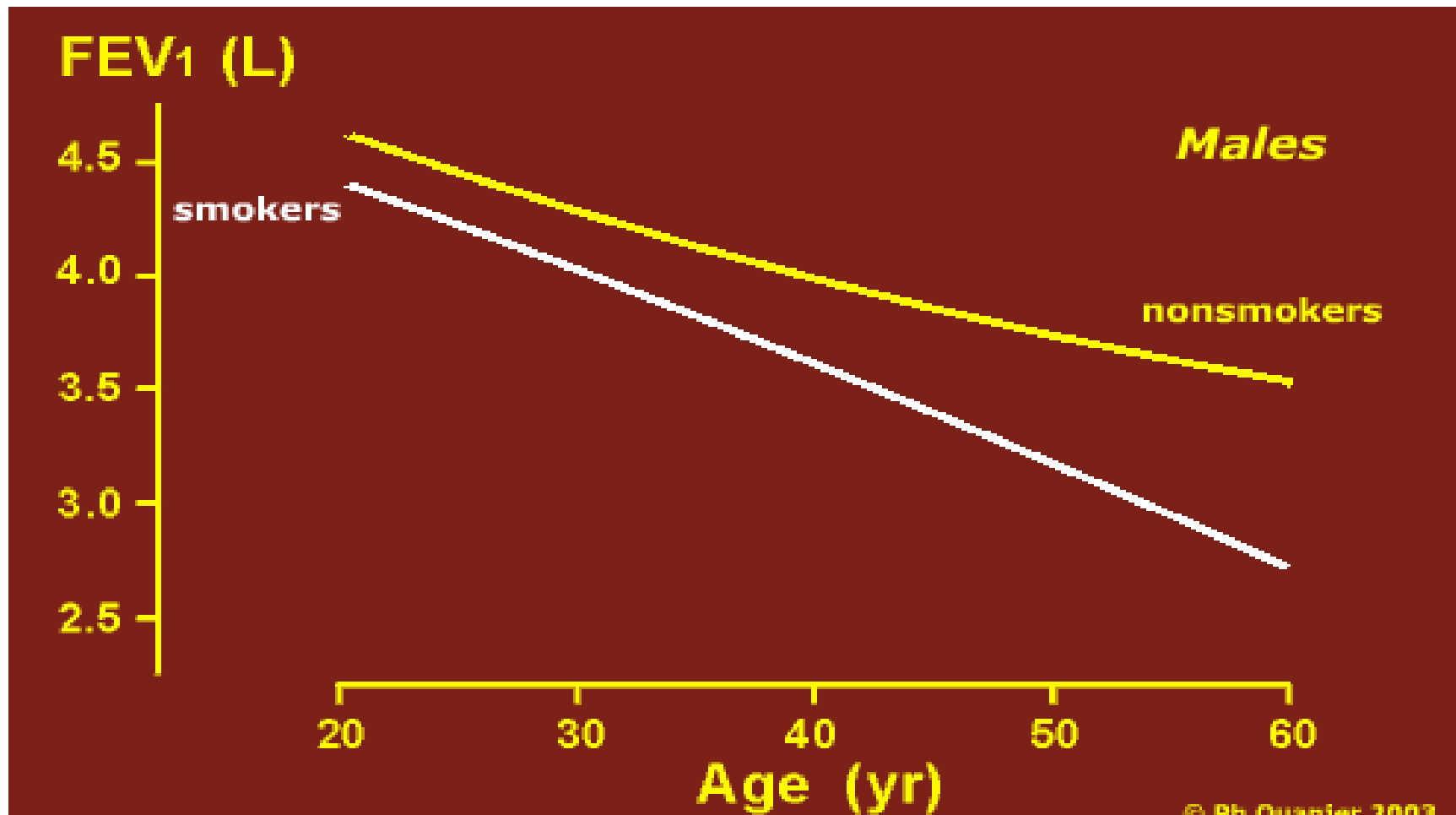
SMOKERS AND SPIROMETRY

Annual change (mL/yr)

Males (177 cm)



SMOKERS AND SPIROMETRY



DIAGNOSIS OF COPD

SYMPTOMS

cough
sputum
dyspnea

EXPOSURE TO RISK FACTORS

tobacco
occupation
indoor/outdoor pollution



SPIROMETRY