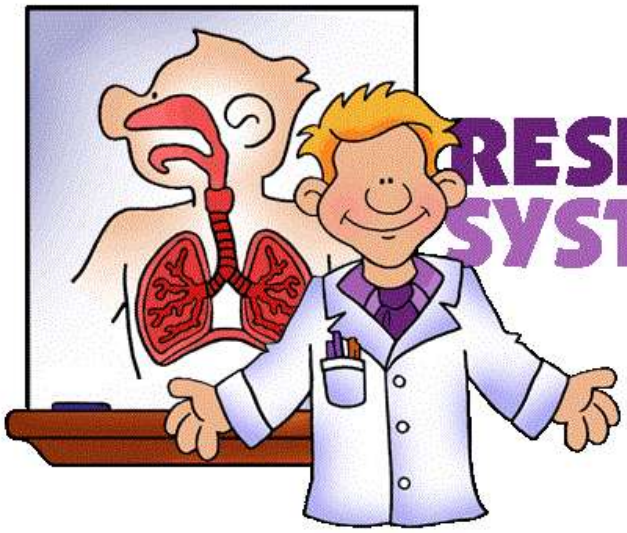
Physiology Team 432



4th Lecture

Lung Function in Health and Disease
" Spirometry "

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SPIROMETRY:

- Spirometry is a **widely used**, effort depended basic lung function test.
- Assess the **lung performance**.
- Assess 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 illness.

Obstructive lung disease: a disease in which the airways in the lungs are obstructed
Restrictive lung disease: a disease in which lung expansion is restricted

Physiology conditions:

The values are not fixed figures, they are changeable according to:

- Age. Children < Adults "optimal values" > Old age.
- Gender.
- Height. The taller the better because of chest area.
- Weight.
- Ethnic group. العرقية المجموعات.
- Pregnancy.

INDICATIONS OF SPIROMETRY

Based on clinical features / abnormal lab tests:

*** Symptoms:**

Dyspnea, cough, sputum production, chest pain.

*** Signs:**

Cyanosis "ازرقاق", clubbing "changes in nails", chest deformity, diminished chest expansion, hyperinflation, diminished breath sounds, Prolongation of expiratory phase & crackles.

*** Arterial blood gas analysis:**

Hypoxemia "low oxygen", hypercapnia "too much carbon dioxide"

*** Abnormal chest X Ray.**

Describe the course of diseases affecting PFTs

PFTs = "Pulmonary Function Tests"

- Some diseases affect the respiratory system:

Neuromuscular diseases: Gillian Barre Syndrome, Myasthenia gravis.
Pulmonary diseases: Obstructive airway diseases, Interstitial lung diseases.

- The side effects of drugs:

Adverse reactions: Drugs with known pulmonary toxicity [Pulmonary fibrosis].

Spirometry is not only for diagnosis!

- **Monitoring indications:**

To assess the therapeutic interventions:
Assess the effect of a treatment "follow up"
- Bronchodilator therapy.
- Steroid treatment for asthma.
- Chronic obstructive lung disease.
- Interstitial lung disease.

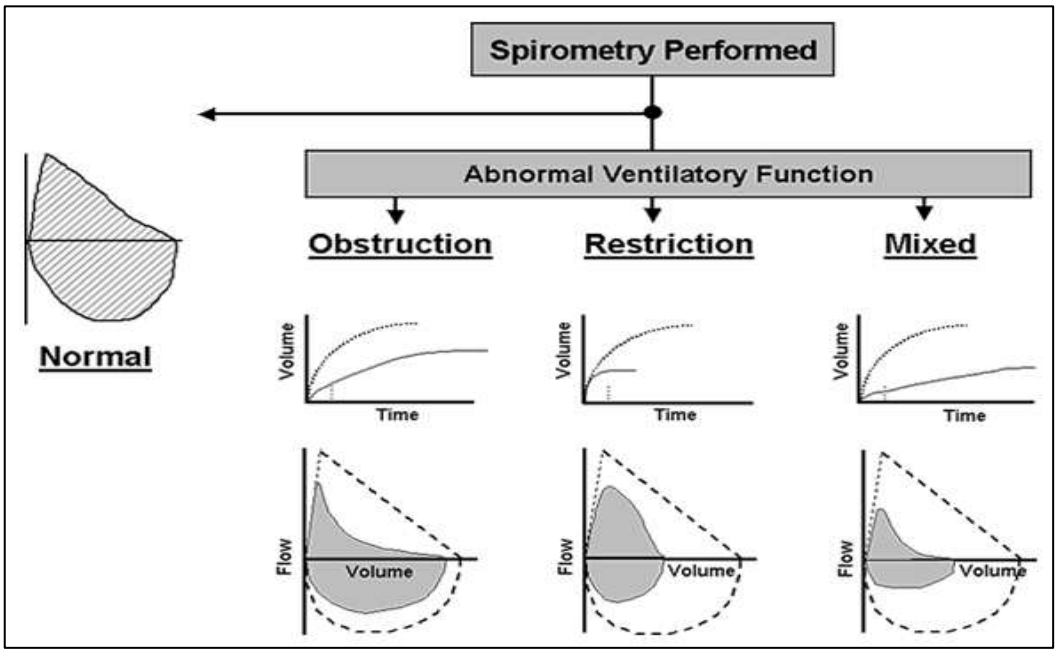
- **PRE Operative indications:**

- To determine the suitability for and management during and after **anesthesia**.
- To assess the **risk for surgical procedures** known to affect lung function.

- **Occupational settings:**

Monitor workers exposed to toxic substances (cement, asbestos, coal, oil…)

SPIROMETRY IN RESPIRATORY DISEASES



DIAGNOSIS OF COPD:

The most important indication of Spirometry is diagnosis of Chronic Obstructive Pulmonary Disease

SYMPTOMS:
Cough
Sputum
Dyspnea

EXPOSURE TO RISK FACTORS:
tobacco
occupation
indoor/outdoor pollution

SMOKERS AND SPIROMETRY:

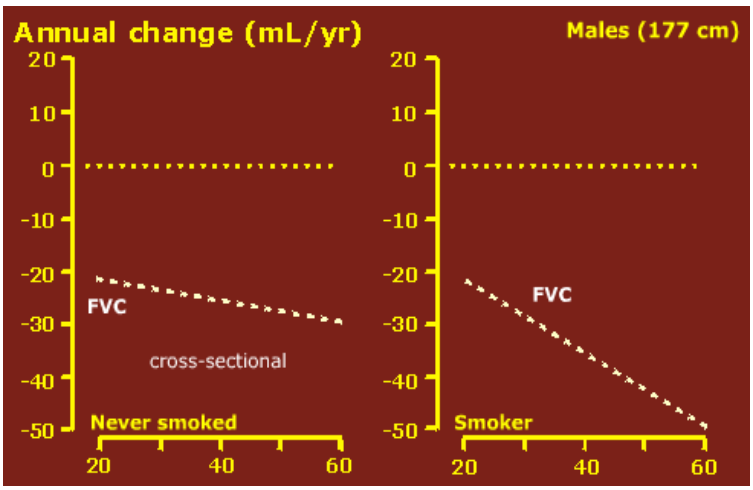
Smoker & Non Smoker:

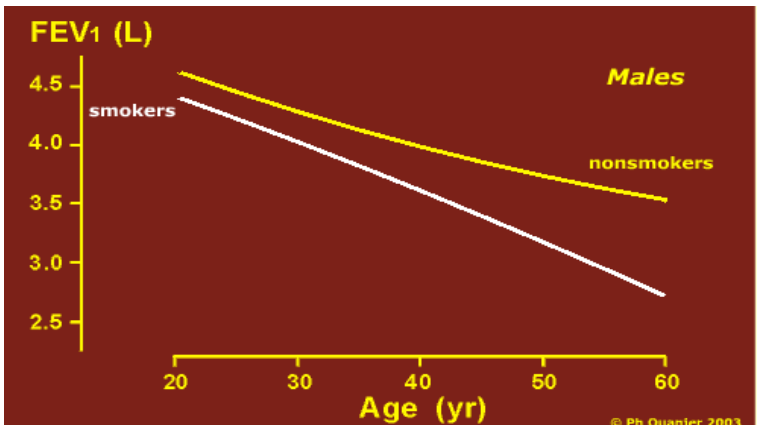
Non-Smoker:

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**





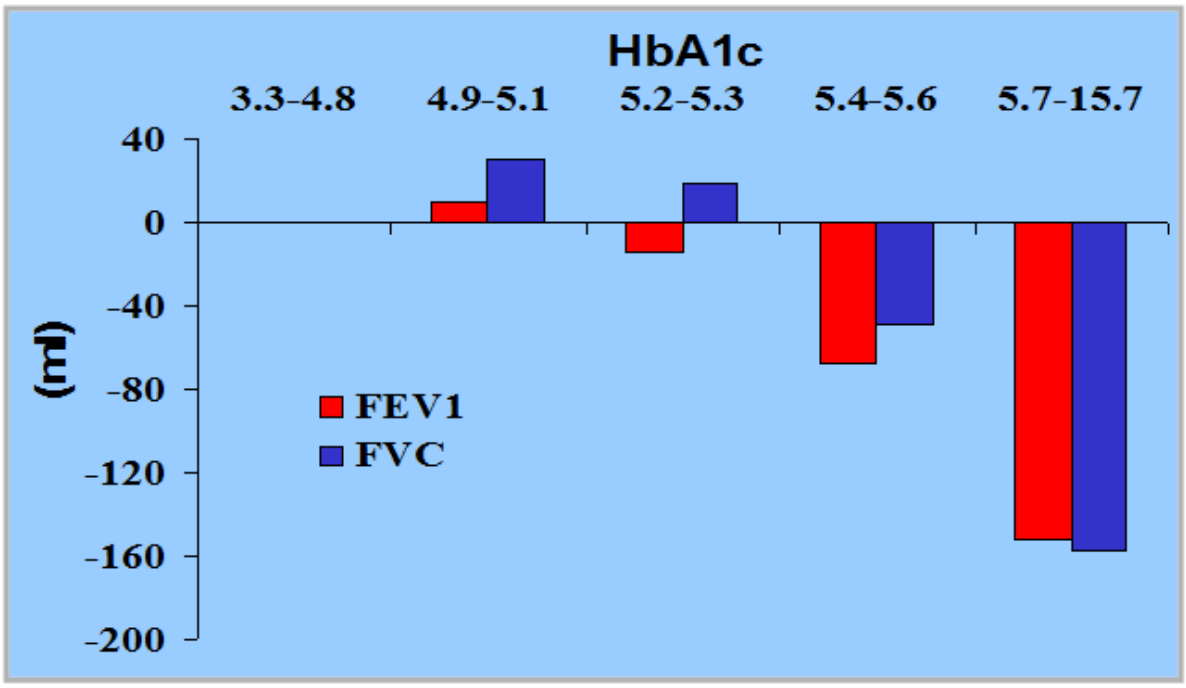
We can see a **gradual** decrease of FEV1 in non-smokers

But a **sharp** decrease in smokers!

FEV1 - *Forced Expiratory Volume in One Second*

- This is the volume of air, which can be forcibly exhaled from the lungs in the first second of a forced expiratory. It is expressed as liters.

This PFT value is critically important in the diagnosis of obstructive and restrictive diseases.



Increase in mean HbA1c is associated with decrease in lung function parameters FVC & FEV1

Note:

Lung function parameters FVC, FEV1, FEF & PEF were significantly decreased in those working with: cement, welding & oil