

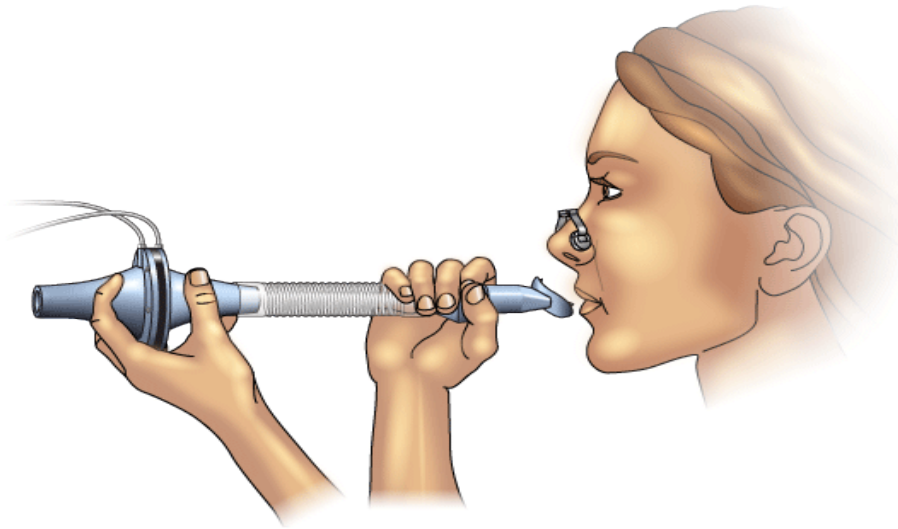
Practical class 3

Spirometry

Theory

The Spirometer and attached flow head together function as a pneumotachometer, with an output signal proportional to the airflow rate during breathing. Expired or inspired air has to pass through a very fine wire mesh in the flow head. This creates a pressure differential between the two sides of the mesh proportional to the flow rate of the air passing through the flow head. Volume x respiratory rate gives the person's Minute Ventilation and integration of expiratory flow gives the volume.

Flow head and pneumotachometer



Instructions

Aim

The aim of the practice is to understand $p\text{CO}_2$ and minute ventilation dependence.

Channel description

- expiratory flow (l/s) – channel 1
- volume (l) - channel 2
- minute ventilation (l/min) – channel 3

Procedure

1. You are fitted with a nose-clip, and breathe slowly into a mouthpiece with capnometer, which is connected by a tube to a measuring device. During the measurement, you are requested to breathe quickly and heavily, or slowly and deeply. You are interested in end tidal CO₂ (on capnometer) and minute ventilation (on monitor).

2. You will measure your minute ventilation and end tidal CO₂ during light and slow or hard and fast cycling on bike.

Table for output values

	Slow breath	Deep breath	Slow ride on bike	Fast ride on bike
Flow (l/s)				
Volume (l)				
Minute ventilation (l/min)				
ETCO ₂ (mmHg)				

Questions

1. Explain why during hyperventilation CO₂ at the end of expiration decreases?
2. Explain the differences between changes of CO₂ in hyperventilation and in increased minute ventilation as a result of physical exercise.
3. How does CO₂ output change during the test?