

BC AL/336/3/8  
⑥ 23rd Nov - Tuesday

RESPIRATION (PY2/14, PY3)

1. a) Determine vital capacity

Take deep inspiration, hold nose and breathe slowly but completely into the meter. Take care that no air leaks out round the lips. Repeat three times and take average.

b) Determine volume of air in a normal respiration, i.e. tidal air.

Fit the subject with mask and bag, collect expired air over two minutes with the subject at rest. Count the respirations. Measure the volume of the expired air and calculate volume per respiration = tidal air.

c) Determine inspiratory reserve volume

Take normal inspiration and breathe steadily and completely into the meter. Inspiratory reserve volume = vital capacity - the volume measured.

d) Determine expiratory reserve volume

Expiratory reserve volume = vital capacity - (inspiratory reserve volume + tidal volume)

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2. Determine the factors influencing the "Breaking Point".

Determine the time of holding breath under the following conditions:-

After taking: (1) a normal maximal inspiration (average of 3 values)

(2) 12 deep breaths performed very rapidly

(3) 1 deep breath of oxygen

(4) 6 breaths of air + 4% CO<sub>2</sub>.

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3. Effect of exercise on the rate and minute volume of respiration.

With the subject at rest, collect expired air over a period of five minutes. Count the respirations each minute. Measure the volume of expired air and calculate volume per minute and per respiration (the latter is the tidal volume).

Repeat after the subject has taken exercise. Collect the air for two minutes in this case. Calculate as above and compare data.

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4. Effect of breathing air + 4% CO<sub>2</sub>.

Determine the normal minute rate and volume as in the previous experiment. Then connect the subject to a container filled with air + 4% CO<sub>2</sub> and allow the subject to re-breathe for three minutes. Count the total number of respirations and the time taken; measure the volume of expired air and compare your values with those obtained using room air.

5. Stethograph

The respiratory movements are recorded by means of a stethograph consisting of a wide rubber tube, fixed round the chest, connected to a recording tambour.

Pressure changes in the wide tube are caused by movements of the chest and are transmitted to the tambour and records are taken on a smoked drum. An advantage of this method of recording is that there is no interference with normal breathing as often occurs with other methods, where respiration is through a mouthpiece.

A disadvantage of the present method is that the mechanical movement of the chest wall is rarely strictly proportionate to the ventilation of the lungs. Increased movement can, however, be taken to indicate increased ventilation and the respiration rate determined.

To record the respirations: Remove clip from side tube and fasten wide rubber tube around the chest. Inflate tube from side tube so as to give movements of an amplitude of  $\frac{1}{2}$ " to 1". Close the side tube and record on the drum. Make sure that the subject is turned away from the recording drum.

Graphic records of respiration under the following conditions:

- (a) at rest
- (b) while swallowing a small volume of water
- (c) after exercise - count pulse rate every 15 secs during recovery period
- (d) breathing air containing 5% CO<sub>2</sub> - count pulse rate every 15 secs
- (e) after 2 minutes rapid forcible breathing (voluntary hypernoea).