Effect of Exercise on Breathing Rate

Human Biology (ANE106)

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Lab 4

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Breathing

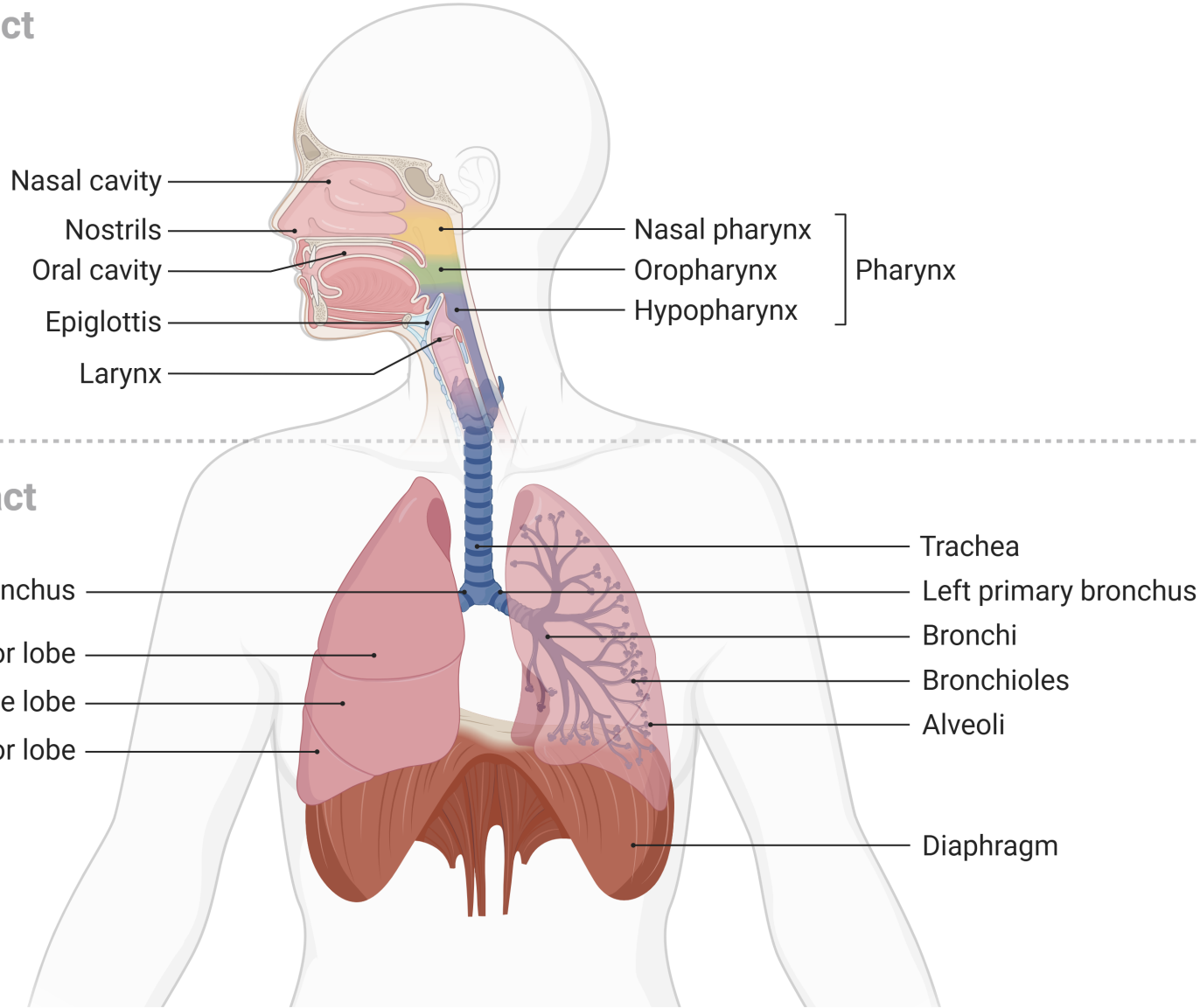
Breathing is the process by which oxygen enters the body and carbon dioxide is removed. During exercise, muscles require more oxygen to produce energy, and more carbon dioxide is produced as a waste product. As a result, the rate and depth of breathing increase to meet the body’s demands.

Respiratory System

The respiratory system is a group of organs and structures responsible for breathing and gas exchange in the body. Its main function is to supply oxygen to the blood and remove carbon dioxide from the body through the process of respiration.

Human Respiratory System

Upper respiratory tract



Lower respiratory tract

Mechanics of Breathing

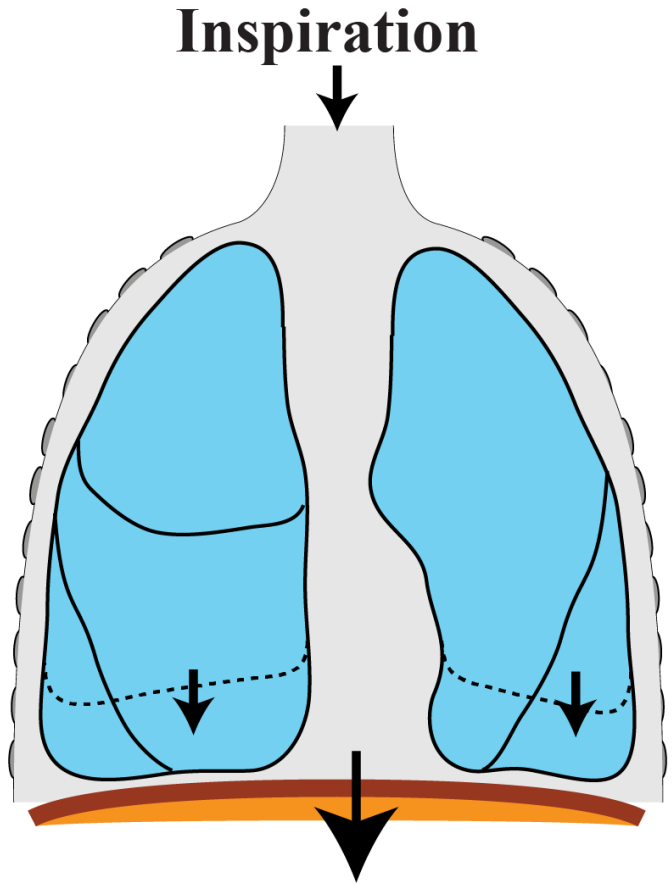
Breathing consists of:

- Inspiration
- Expiration

Inspiration (Inhalation)

During inspiration:

- Diaphragm contracts and moves downward
- External intercostal muscles contract
- Thoracic cavity volume increases
- Lung pressure decreases
- Air enters the lungs



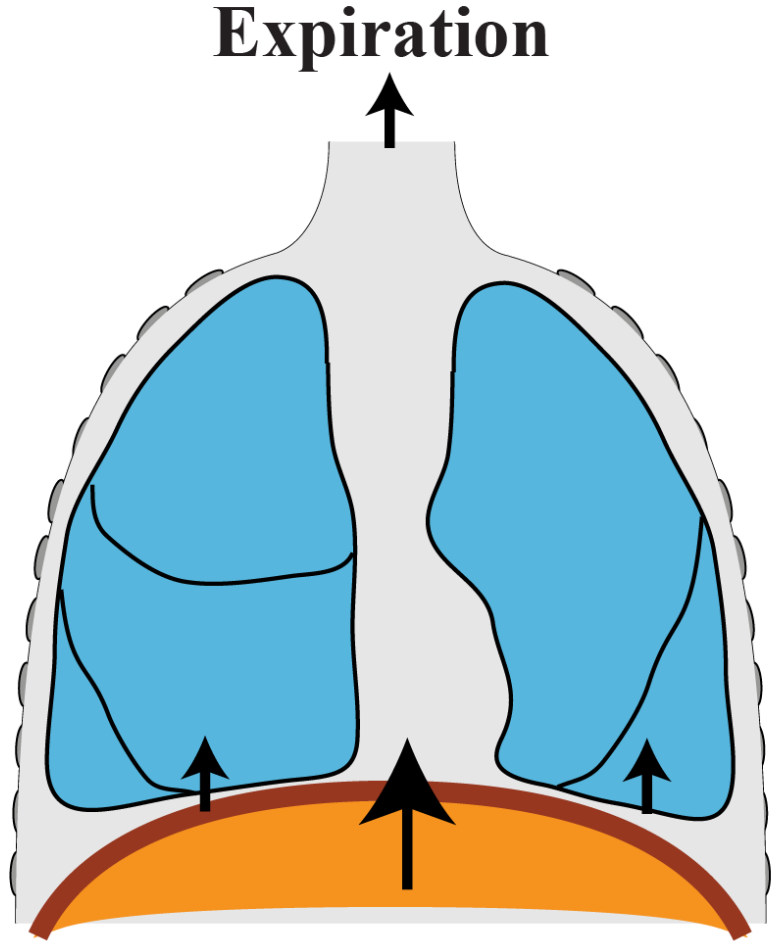
Main Muscle of Inspiration

- The diaphragm is the primary muscle involved in breathing.

Expiration (Exhalation)

During expiration:

- Diaphragm relaxes
- Thoracic volume decreases
- Lung pressure increases
- Air leaves the lungs

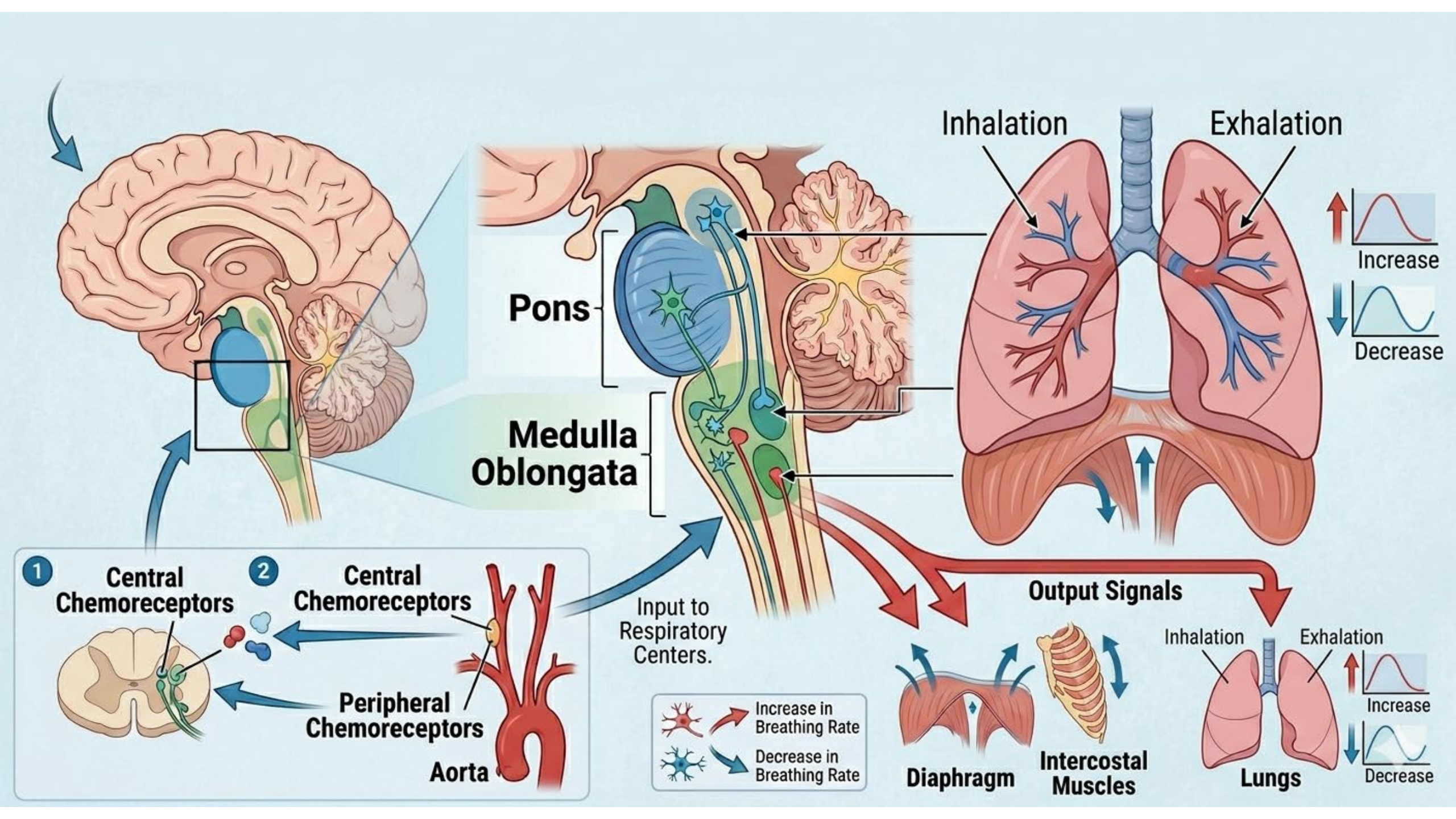


Regulation of Breathing

Breathing is controlled mainly by the respiratory center located in the medulla oblongata and pons of the brainstem. These centers regulate the rate and depth of breathing automatically according to the body's needs.

Main Control Centers

- Medulla oblongata
- Pons


Inhalation
Exhalation
Increase
Decrease
Pons
Medulla Oblongata
1
Central Chemoreceptors
2
Central Chemoreceptors
Peripheral Chemoreceptors
Aorta
Input to Respiratory Centers.
Output Signals
Increase in Breathing Rate
Decrease in Breathing Rate
Diaphragm
Intercostal Muscles
Inhalation
Exhalation
Increase
Decrease
Lungs

Role of Chemoreceptors

Chemoreceptors monitor:

- Carbon dioxide
- Oxygen
- Blood pH

An increase in carbon dioxide stimulates faster breathing.

Practical session:

Effect of Exercise on Breathing Rate

Objectives

- Measure breathing rate before and after exercise.
- Observe changes in respiratory activity during physical activity.

Materials

- Stopwatch or timer
- Notebook and pen
- Volunteer/student participant

Procedure

- Allow the participant to rest for 5 minutes.
- Measure the resting breathing rate by counting the number of breaths per minute.
- Ask the participant to perform exercise such as running in place or for 2–3 minutes.
- Immediately after exercise, measure the breathing rate again.
- Record the breathing rate after 1 minute and 5 minutes of rest.

Condition	Breathing Rate (breaths/min)
At Rest	
Immediately After Exercise	
After 1 Minute Rest	
After 5 Minutes Rest	

Expected Result

Breathing rate increases during and immediately after exercise due to increased oxygen demand and carbon dioxide production. The rate gradually returns to normal during recovery.