NUTRITION: THE DIGESTIVE AND RESPIRATORY SYSTEMS

Biology
Nutrition: The digestive and respiratory systems

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Digestive, respiratory, excretory and circulatory system all play a role in nutrition.
THE DIGESTIVE SYSTEM
An inner cell layer called a mucous membrane makes up the gastrointestinal tract. It’s internally protected by a lubricant substance called mucus and it’s surrounded by muscular layers. When these layers contract they push food down the digestive tract.

The mucosa in the stomach and intestine contain glands that secrete a protective mucous and others that secrete digestive juices.
THE DIGESTIVE PROCESS IN THE MOUTH
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Salivation
- parotid
- submandibular
- sublingual

Chewing
- incisors
- premolars
- canines
- molars

Swallowing
- nasal passages
- bolus
- tongue
- soft palate
- epiglottis
- larynx
- pharynx
- esophagus
THE DIGESTIVE PROCESS IN THE STOMACH
Gastric juices contain **pepsin**, an enzyme that starts protein digestion, and **hydrochloric acid**, which has two functions. It activates pepsin enzymes and supports them by helping the disintegration of food fibres, and destroys bacteria that may be present in food.

The inner layer is covered in mucus that protects it from the effects of hydrochloric acid and enzymes.

The stomach is formed by three muscular layers, which perform massaging motions to mix the chyme.
THE DIGESTIVE SYSTEM IN THE SMALL INTESTINE
The small intestine releases **digestive secretions** with enzymes that break down different molecules.
LIVER AND PANCREAS
The liver produces bile, which is stored in the gall bladder. Bile intervenes in the emulsification of fats: fats are transformed into very small drops, helping enzymes found in digestive juices break down fats.

The pancreas secretes pancreatic juice through the ampulla of Vater, which contains enzymes capable of digesting the different types of molecules present in foods.
FROM FOOD TO NUTRIENTS
Nutrition: The digestive and respiratory systems

Foods
- Starch
- Sucrose
- Fats
- Proteins

Enzymes
- Amylase (s, i, p)
- Maltase (i)
- Sacarasa (i)
- Lipase (i, p)
- Pepsin (g)
- Tripsin (p)
- Erepsin (i)

Nutrients
- Glucose molecules
- Fructose and glucose molecules
- Glycerine molecules and fatty acids
- Amino acids
FOOD ABSORPTION
Food absorption refers to the passage of nutrients to our blood. This allows those nutrients to be distributed across the whole organism. It takes place mainly in the small intestine. In order to increase the surface area for the absorption of nutrients, the inner layer is full of villi and intestinal folds, and the plasma membrane that forms villi has extra creases known as microvilli.
THE DIGESTIVE PROCESS IN THE LARGE INTESTINE
Colon. This part of the large intestine is where *symbiotic* bacteria of the intestinal flora develop and certain vitamins, such as $\text{B}_{12}$ and K, are produced.

Absorption of most water and minerals takes place in the large intestine; *faeces* compact to form stools.

Cecum. This is the first section, it’s shaped like a bag and has a narrow extension, the appendix.

Rectum. This is the final section that ends in the anus.
THE RESPIRATORY SYSTEM
The respiratory system obtains oxygen from the air and provides it to the blood in the circulatory system. Blood carries the oxygen into the cells and takes away carbon dioxide so it can be released.
Nutrition: The digestive and respiratory systems

GAS EXCHANGE
Nutrition: The digestive and respiratory systems

Oxygen is exchanged between air and blood by the process of diffusion: oxygen travels from the area where its concentration is greater to the area where it is lower.

Oxygen concentration is higher in our alveoli than in our blood. Carbon dioxide concentration is lower in our alveoli than in our blood.

The oxygen found in air goes into the blood, after passing through the alveolar wall and the wall of the capillary, to be transported to the body's cells.

El dióxido de carbono de la sangre pasa a los alvéolos, donde se mezcla con el aire que contienen y es expulsado en la espiración.
PULMONARY VENTILATION
Inspiration

Air enters
Ribcage increases its volume

The diaphragm contracts, flattens and lowers itself

Expiration

Air exits
Ribcage decreases its volume

The diaphragm relaxes, curves and rises
HEALTH AND ILLNESSES OF THE DIGESTIVE SYSTEM
Recommendations to look after the organs of the digestive system:

• Chew food slowly, making sure that all food is crushed properly.
• Brush your teeth after each meal in order to eliminate any small pieces of food.
• Visit the dentist at least once a year.
• Do not eat or drink foods that are very hot.
• Wash your hands before eating or preparing food.
• Do not eat out of meal times so that the digestive system doesn’t function non-stop.
• Ensure foods you eat are in perfect condition in order to prevent food poisoning.
• Eat foods that have fibre as they help intestinal movements.
• Do not consume alcohol.

The illnesses of the digestive system can affect the 
**mouth**, like cavities or gingivitis; the **stomach**, like gastritis or ulcers; the **liver**, like hepatitis or cirrhosis, and the **intestine**, like gastroenteritis, appendicitis, constipation or colon cancer.
HEALTH AND ILLNESSES OF THE RESPIRATORY SYSTEM
Recommendations to look after the respiratory organs:

- Do not smoke.
- Try to avoid sudden changes of temperature as such changes increase the risk of contracting respiratory illnesses.
- Do physical exercise regularly.
- Try to avoid being in contact with dust and atmospheric contaminants.
- Try to breathe through your nose.

Illnesses related to the respiratory system are caused by infections (infectious), like nasal catarrh, bronchitis or flu, or by an inflammation of the mucosa (non-infectious), like aphonia, asthma, emphysema or lung cancer.