

Introductory Knowledge of Different Organ System of Body

Introduction to the human body

The human body: systems, organs and main functions

The **human body** is composed of several different subsystems ranging from microscopic scales to macroscopic level. All the functions are controlled by one or more organ systems. One specific organ might be involved in different organ systems (e.g pancreas, kidney...) depending on its functions.



Figure 1: Human body

The external layer, the integumentary organ system

The **integument** forms the external cover of the organism and is composed of skin, hair, subcutaneous tissue, nails and of course associated glands: the sudoriparous and the sebaceous glands.

Its main role is to protect the organism against any external damages and infections. Therefore, it is considered as the first barrier between the body and the environment. It also controls the temperature and water loss. It has an important role in the synthesis of Vitamin D because it takes place in the integument. The integument system includes a variety of receptors such as pain, pressure or burning sensors, responsible for its preventive role.

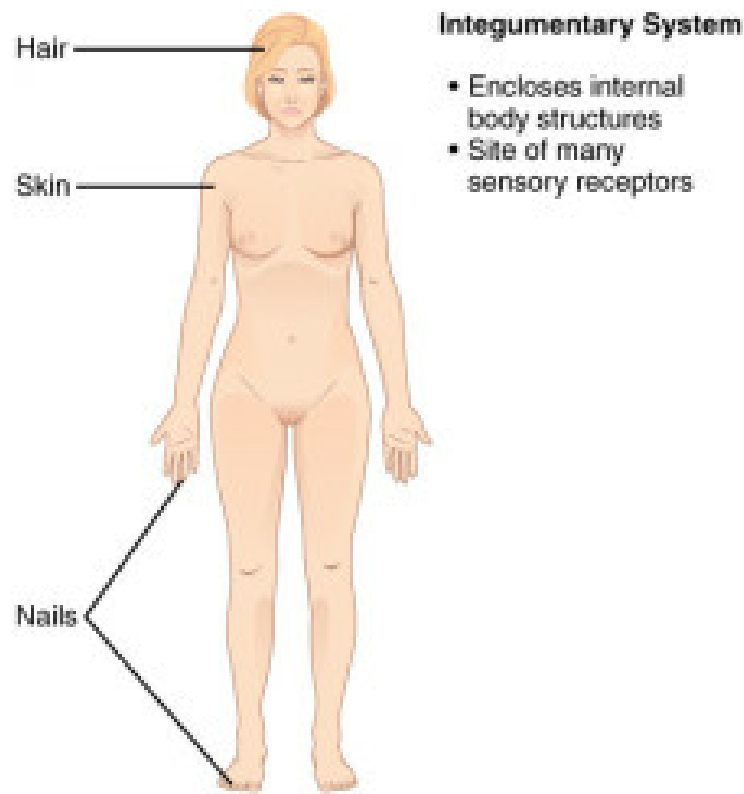


Figure 2: Scheme of the Integumentary organ system of the human body (1)

The skeletal system, the internal scaffold

The skeletal system is the system that contains all the bones. Each bone is a very complex tissue made up of cells, protein fibers and minerals. The bone acts as a scaffold giving structural support and protection for the soft tissues and other organs. It also provides attachment points for different muscles and tendons. Blood globules synthesis in the bone marrow occurs within this skeletal system. Moreover, it stores minerals which are crucial for the physiology (ionic homeostasis).

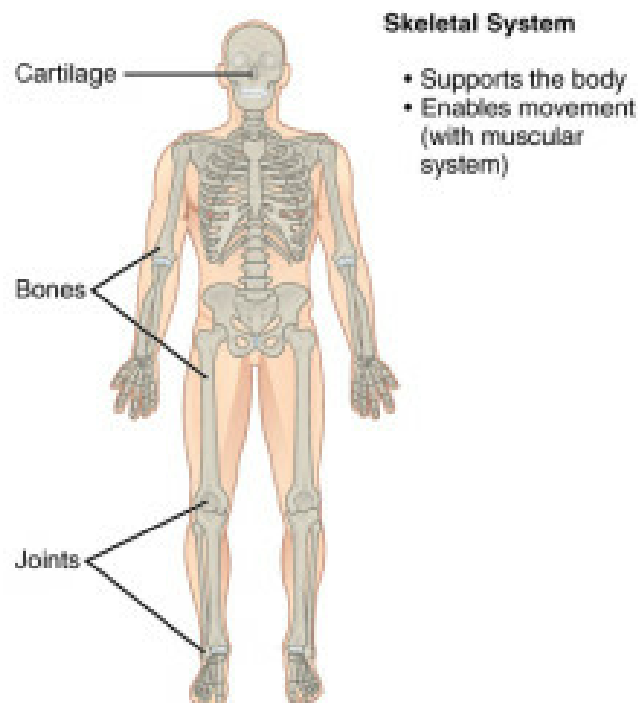


Figure 3: Scheme of the Skeleton body system of the human body

The muscular system

This organ system acts as a junction within the **skeletal system**. Bones are the static support part of the body while the **muscles** provide the dynamic movement by moving the bones. **The muscles** are responsible for the locomotion or its facial expression. This **muscular system** is the one



that keeps the body in a straight position and allows the human to walk using only two points of support.

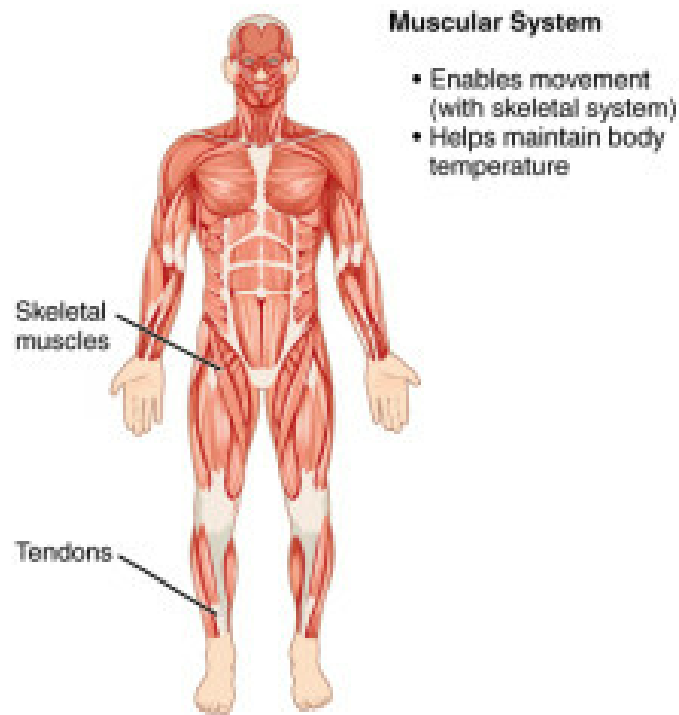


Figure 4: Image of a part of the muscular system in junction with the skeletal system

The nervous system, monitors and control the organism

The nervous system regulates the entire human organism. It reacts instantaneously to all possible changes in the human body and its environment (both internal and external) [8]. By having all the information centralized, it can then activate all the glands, organs and muscles required for the body to answer to a signal. It is considered as the core because it monitors and controls everything that happens to the organism. It is formed by the **central nervous system**: brain and spinal cord, and the **peripheral nervous system**: nerves and sensorial receptor.

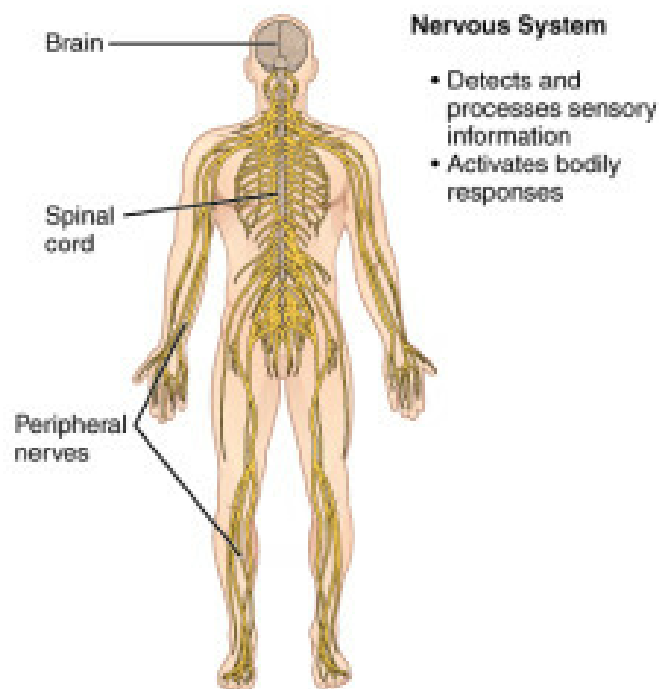


Figure 5: Image of the components of the nervous system of the human body

The organism regulator: the endocrine system

The main organs inside this system are the glands which secrete all the hormones needed to regulate most of the chemical reactions of the



organism. The hormones role is to regulate the metabolism, behavior, and homeostasis of the body. **The endocrine system** also provides the cells with nutrients and it must be mentioned that disruptions of this system lead to major global dysfunctions.

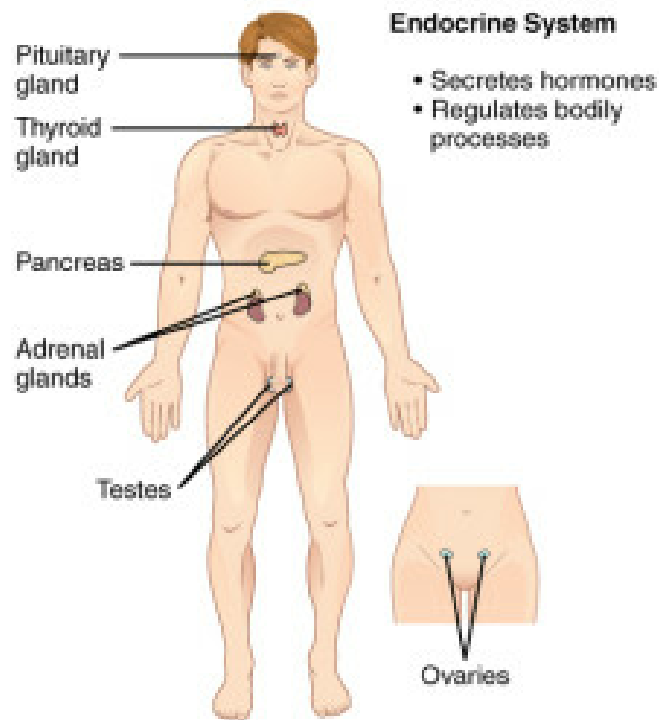


Figure 6: Image of the different organs that compose the endocrine system in the male and female human body

The cardiovascular system: the engine of the human organism

The role of the **cardiovascular system** is to transport blood to each tissue and cell of the body. Depending on the blood system (arterial or venous) it will contain oxygen, nutrients or it will eliminate CO₂ and waste products. This system has the heart as the main organ and the blood vessels as connective tubing's to transport the blood all around the body. The heart acts as a very powerful pump through a succession of chambers (atria and ventricles).

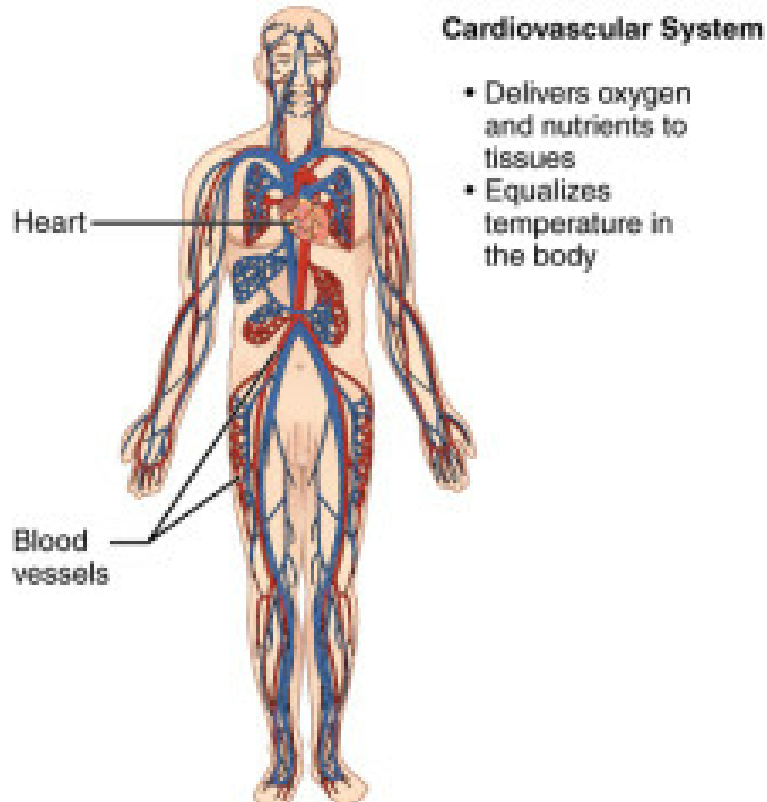


Figure 7: Image of the main organs of the cardiovascular system



The lymphatic and immune systems: the human organism defense

The **lymphatic system** works together with the circulatory and the cardiovascular systems. It contains lymphocytes and other white blood cells. **Immune system** uses the white blood cells to attack all the external organism that enters the body .

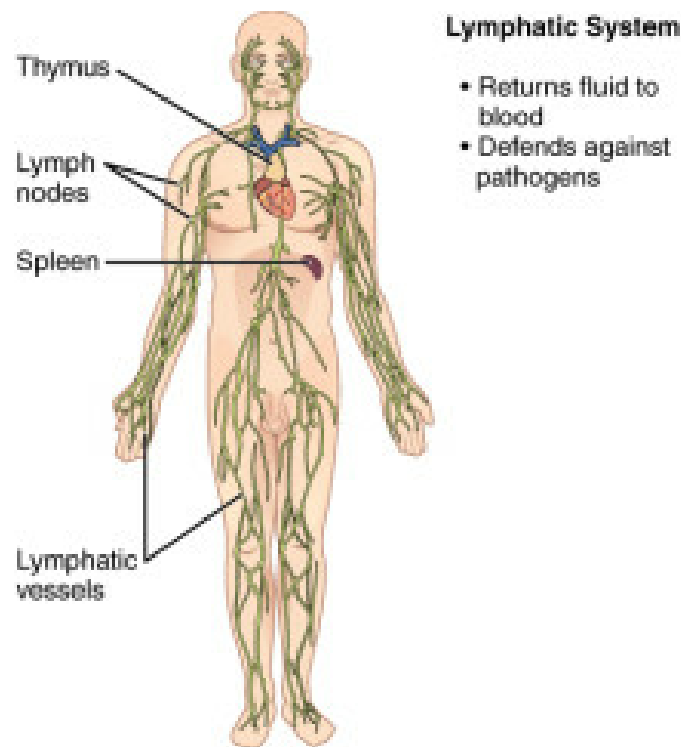


Figure 8: Image of the organs that composed the lymphatic and immune systems

The respiratory system

This organs system provides the oxygen that the human organism requires and removes the CO₂ generated by the human body. It is composed by the nasal cavity, the pharynx, the larynx, the trachea, the lungs and all its subunits that ends with the alveolus. It works together with the cardiovascular system in the oxygen and CO₂ switch that occurs at the alveolus level.

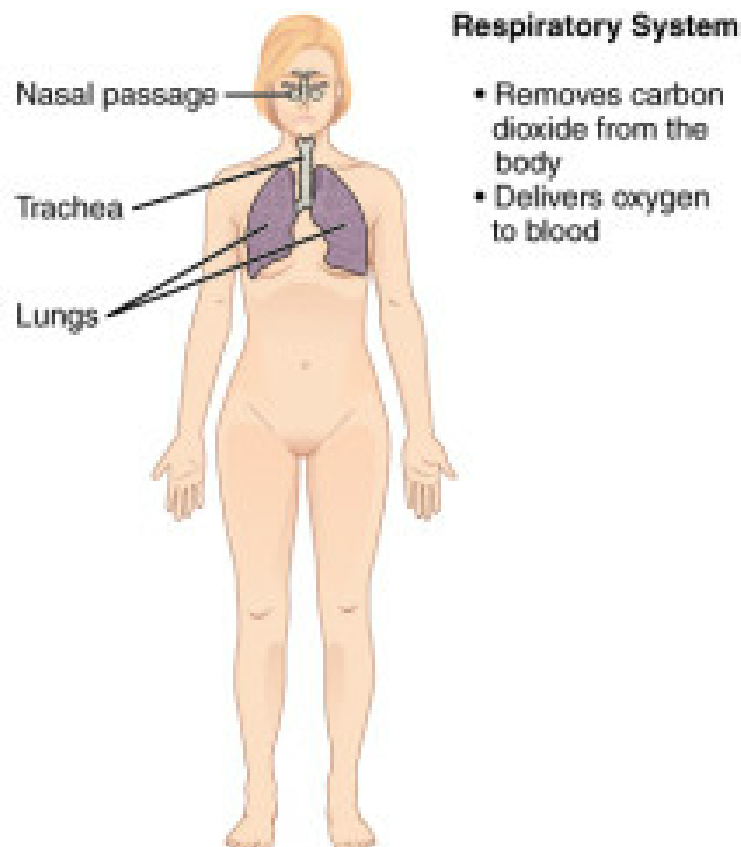


Figure 9: Image with the components of the respiratory system of the human body

The digestive system: the feeding system of the human organism

The aim of this organ system is to decompose the aliments into nutrients that will later be absorbed and distributed to reach all the cells of the human organism. It is also in charge of defecation of the waste products from the intestine via the rectum. **The digestive system** is considered as of the most complex systems because it is highly involved in the metabolism. Furthermore, **the digestive system** is often considered as the "second brain" as it contains millions of neurons that communicate with the brain. The main organs are the oral cavity, the esophagus, the liver, the stomach, the small and gross intestines, and finally rectum and anus.

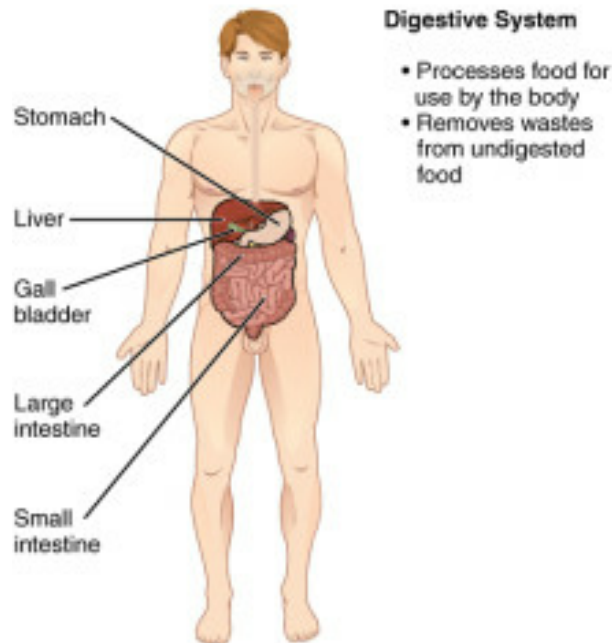


Figure 10: Image showing the organs involved in the digestive system of the human body

The urinary system

The main work performed by kidneys, urethra, ureters and bladder, which hare organs of the **urinary system**, is to eliminate waste products which cannot be removed by the digestive system. It also filters the blood to remove any kind of waste product. **The urinary organs** also have a function in the regulation of the blood volume and pressure. **The urinary system** controls the level of metabolites and electrolytes inside the human organism and so have a strong role in homeostasis. As an example, it is involved in the blood pH regulation.

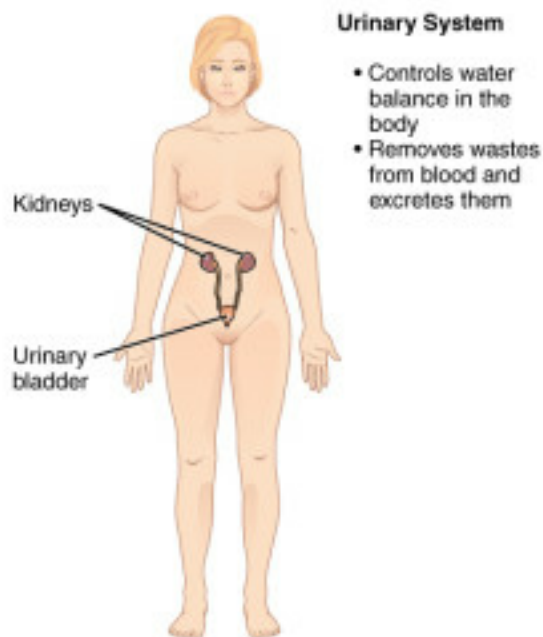


Figure 11: Image of the urinary system organs from the human body

Importance of understanding the complexity of the human body



Now Cherry Biotech is immersed in the **Human-on-a-chip** races, meaning that has to be considered as a complex interconnected entity and not as different independent parts.

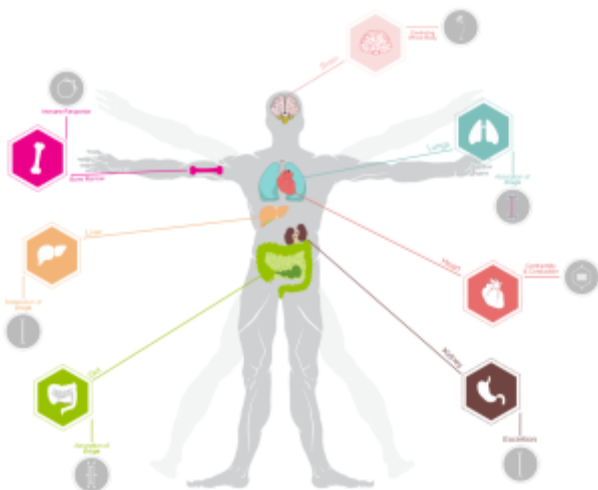


Figure 12: Scheme of the possibilities of the Organ-on-chip program