Anatomy and Physiology

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Contents

Lecture 1: Introduction to Anatomy and Physiology

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Definition 1 (Anatomy)**.** The study of the **structure** and **relationships** between **body parts**.

Definition 2 (Physiology)**.** The science **of how those parts come together to function**, and keep that body alive.

Together, these two create the **Science of Us**.

History of Anatomy

The history of anatomy is a very long and somewhat of a secretive road. In many societies, it was considered a taboo of performing human dissections. The 2nd century Greek physician Galen extracted what he could about the human form by performing dissections on pigs. Leonardo Da Vinci poked around the human bodies, documenting them all in his beautifully sketched drawings, until the pope made him stop. Here are some of his drawings.

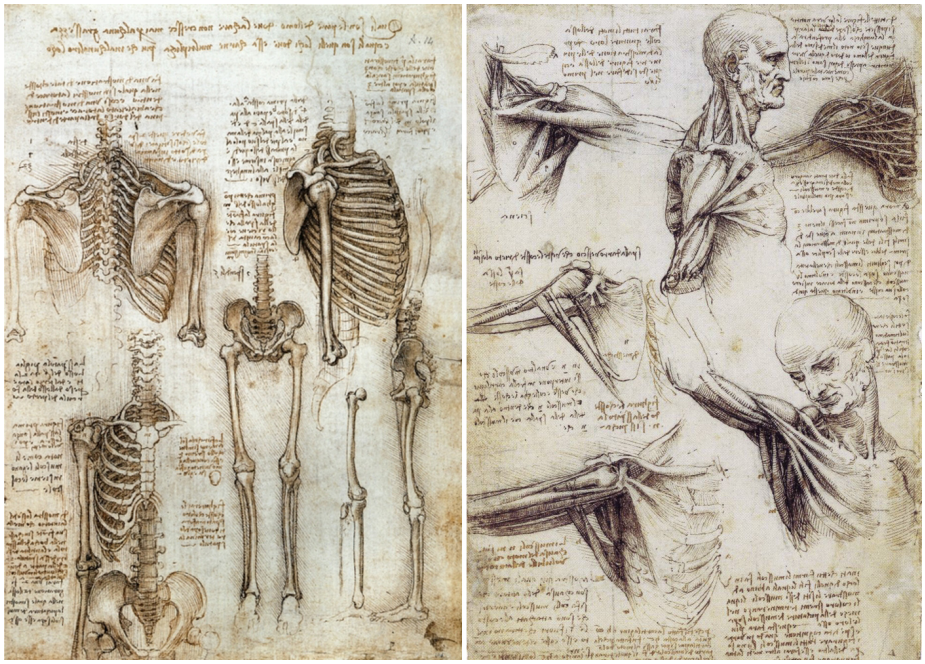

Figure 1: Da-Vinci Human Sketches and Diagrams

Finally, in the 17th and 18th centuries, certified anatomists were allowed to perform tightly regulated human dissections. They were extremely popular. So

popular that you needed an admissions fee to view the dissection, and the likes of Michelangelo and Rembrandt used to watch.

Eventually, the craze for human anatomy become such a craze that in Europe, grave robbers started becoming an actual job, until 1832, when Britain passed the **Anatomy Act**, which provided students with plenty of corpses, in the form of executed murderers.

Still though, today students of anatomy and physiology use educational cadavers to learn, in person and hands-on, what's inside a human body by dissecting them.

Definition 3 (Cadaver)**.** A **cadaver** is a volunteer who donates his/her body after their death to science.

How parts functions

The function of a cell or an organ or a whole organism always reflects its form. Blood flows in one direction through your heart because its valves prevent it from flowing the other way. In the same way, your bones are strong and hard, which allows them to protect and support all your soft parts.

Definition 4 (Complementarity of Structure and Function)**.** The **complementarity of structure and function** is an idea that a what structure can do depends on its form.

This holds true for all levels of your body's organization. From cell to tissue.

Hierarchy of Organization

It all begins with the smallest of the small. **Atoms**. The next level up from chemistry of atoms and molecules include the smallest unit of living things – cells. All cells have some basic functions in common, but they also vary widely in size and shape, depending on their purpose.

Example. The **red blood cell** measures about 5 micrometers across, which, when compared to the **single motor neuron** that runs from the end of your big toe to the bottom of your spine, which measures about a meter.

Typically, cells group with other cells to form the next level of organization; **tissues**. When two or more tissues combine, they form **organs** that performs specific functions that keep your body running. Organs work together and combine to get things done, forming **organ systems**. And finally, all those previous levels combine to make the final organization level; **the body**.

Definition 5 (Homeostasis)**.** This allows your body to maintain **stable,**

internal conditions not matter what **changes** are occurring **outside the body**.

Everyone's ultimate cause of death is the extreme and irreversible loss of homeostasis. Organ failure, suffocation, starvation, dehydration; they all lead to the same end, by throwing off the internal balances that allow your body to keep processing energy.

Directional Terms

With so many connected parts needed to make your life possible, there's a need for a hyper-precise language to identify the parts of your body and communicate what happening to them.

Definition 6 (Verbal Map)**.** A **verbal map** is a detailed description of what's.

When you go to get a surgery, the doctor tells the surgeon a **verbal map**.

Definition 7 (Directional Terms)**.** The **directional terms** is a standardized set of directional terms that describe where one body part is in relation to another.

Definition 8 (Anatomical Position)**.** The **anatomical position** is when the body is erect and facing forward, with arms at the sides and palms forward.

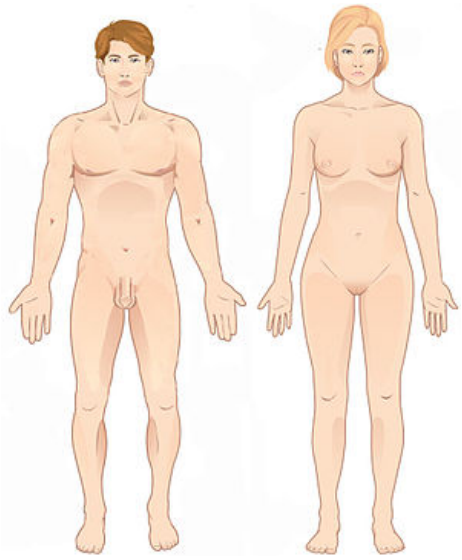

Figure 2: The Classic Anatomical Position

Directional Terms

Anterior	At or near the front of the body (front view)
Posterior	At or near the back of the body (back view)
Midline	An imaginary vertical line that divides the body equally
Lateral	Farther from midline (side view)
Medial	Nearer to midline (side view)
Superior	Toward the head/upper part of a structure (looking down)
Inferior	Away from the head/lower part of a structure (bottom view)
Superficial	Close to the surface of the body
Deep	Away from the surface of the body
Proximal	Nearer to the origination of a structure
Distal	Farther from the origination of structure

Table 1: All Directional Terms