SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES
Coimbatore -641035

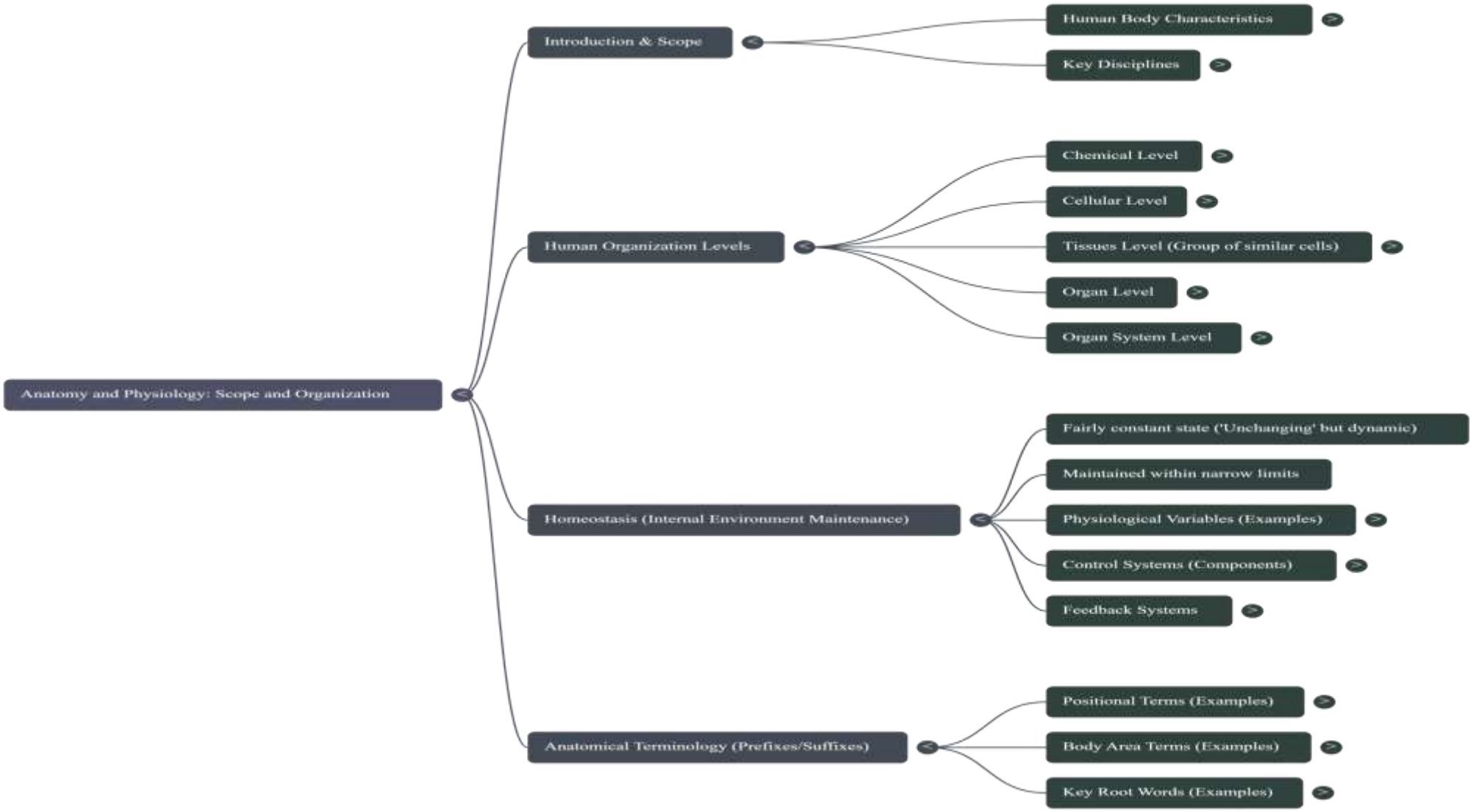
COURSE NAME : Human Anatomy & Physiology

I Year D-Pharm

TOPIC 1 : Scope of Anatomy & Physiology.

SUB TOPIC : Definition of Various terminologies

MIND MAP


Anatomy and Physiology: Scope and Organization
Introduction & Scope
Human Body Characteristics
Key Disciplines
Human Organization Levels
Chemical Level
Cellular Level
Tissues Level (Group of similar cells)
Organ Level
Organ System Level
Homeostasis (Internal Environment Maintenance)
Fairly constant state ('Unchanging' but dynamic)
Maintained within narrow limits
Physiological Variables (Examples)
Control Systems (Components)
Feedback Systems
Anatomical Terminology (Prefixes/Suffixes)
Positional Terms (Examples)
Body Area Terms (Examples)
Key Root Words (Examples)

INTRODUCTION

•The human body is complex, like a highly technical and sophisticated machine.

•It operates as a single entity, but is made up of a number of operational parts that work interdependently.

•If any one part should be fail, the consequences are likely to extend to other parts, and may reduce the ability of the body to function normally.

•The human body is therefore complex in both its structure and function, and the aim of study is to explain the fundamental structures and processes involved.

Anatomy is the study of the structure of the body and the physical relationships involved between body parts.

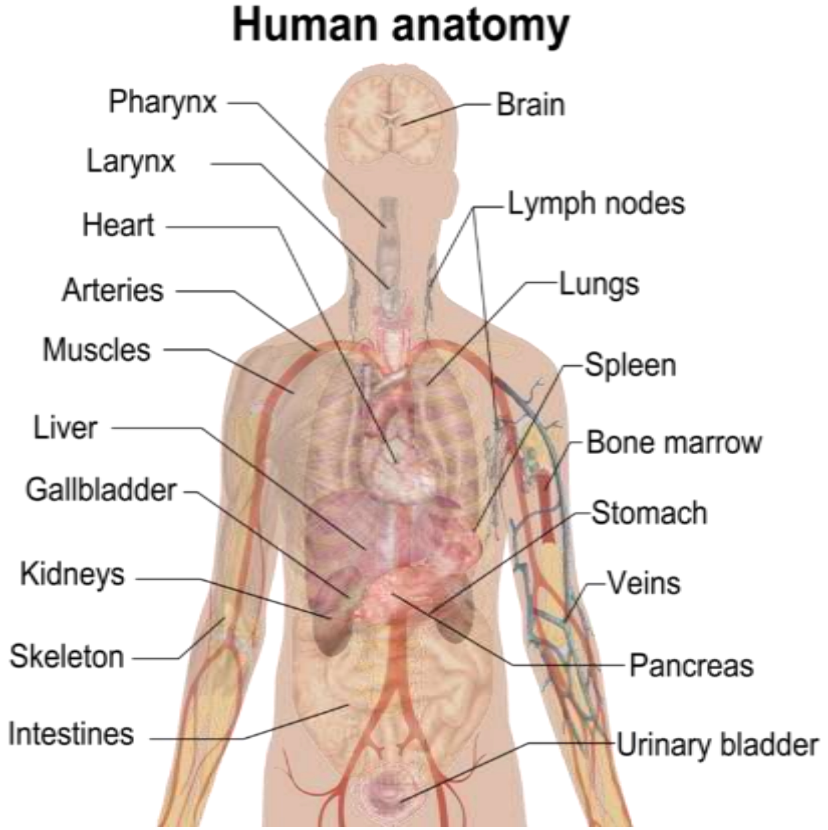
Anatomy further divide into 2 groups:

1. Gross Anatomy
2. Histology

Physiology is the study of how the parts of the body work, and the ways in which they cooperate together to maintain life and health of the individual.

Pathology is the study of abnormalities and how they affect body functions, often causing illness.

Building on the normal anatomy and physiology, relevant illnesses are considered.

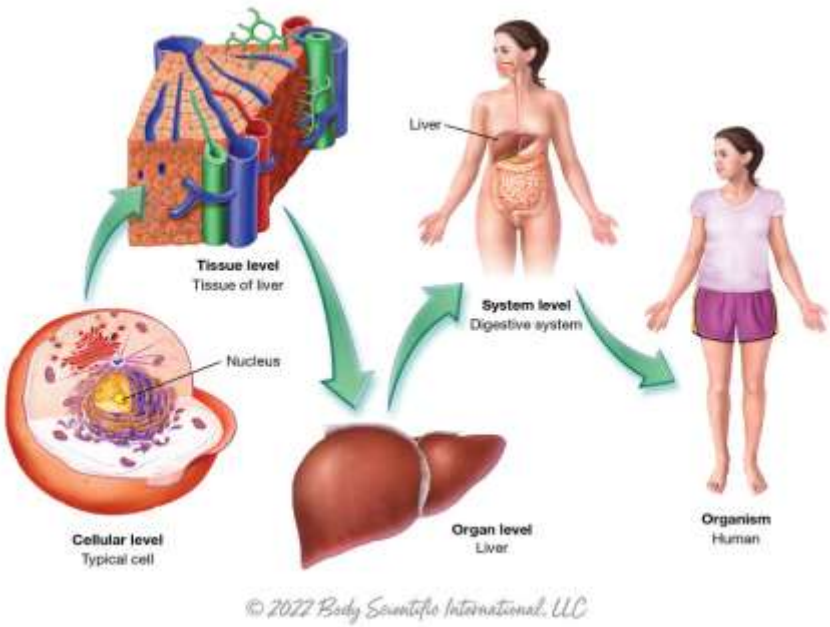


HUMAN ORGANIZATION

• The human body is organized into structural and functional levels of increasing complexity.

• Each higher level incorporates the structures and functions of the previous level, as you will see.

❑ **Chemical Level**: The chemicals that make up the body may be divided into two major categories: inorganic and organic. **Inorganic chemicals** are usually simple molecules made of one or two elements other than carbon (with a few exceptions). **Organic chemicals** are often very complex and always contain the elements carbon and hydrogen.



Human Organization

- **Cellular Level:** The smallest living units of structure and function are **cells**. There are many different types of human cells, though they all have certain similarities.
  - Each type of cell is made of chemicals and carries out specific chemical reactions.
  - **Tissues Level:** A **tissue** is a group of cells with similar structure and function. There are four groups of tissues:
    1. **Epithelial Tissues:-** cover or line body surfaces
    2. **Connective Tissues:-** connect and support parts of the body
    3. **Muscular Tissues:-** brings about movement
    4. **Nervous Tissues:-** regulate body functions.

❖**Organ Level :** An **organ** is a group of tissues precisely arranged so as to accomplish specific functions. For Example: The kidneys contain several kinds of
epithelial, or surface tissues, for their work of absorption.

❖ **Organ System Level:** An **organ system** is a group of organs that all contribute to a particular function.

For example: the urinary system, which consists of the kidneys, ureters, urinary bladder, and urethra. These organs all contribute to the formation and elimination of urine.

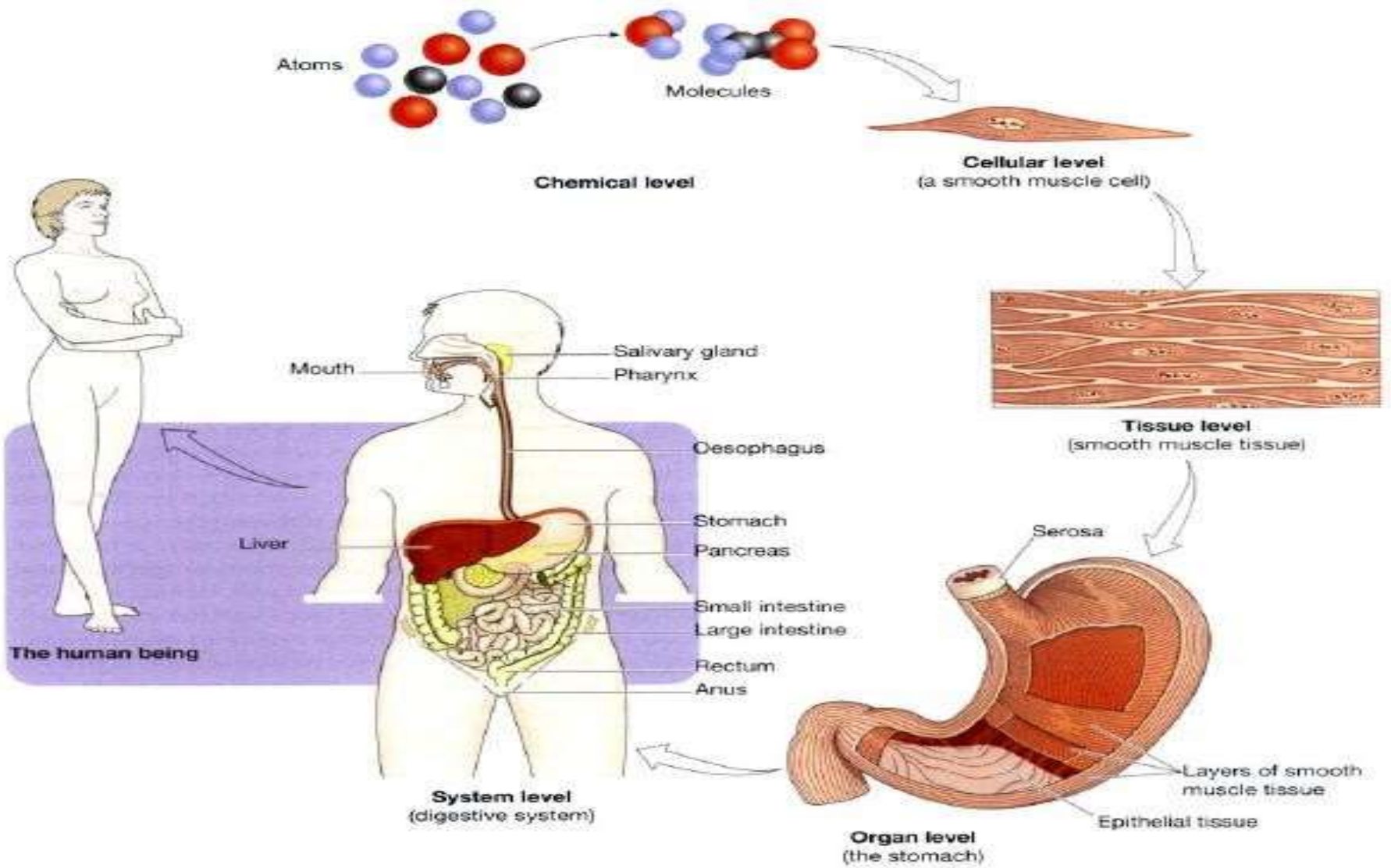


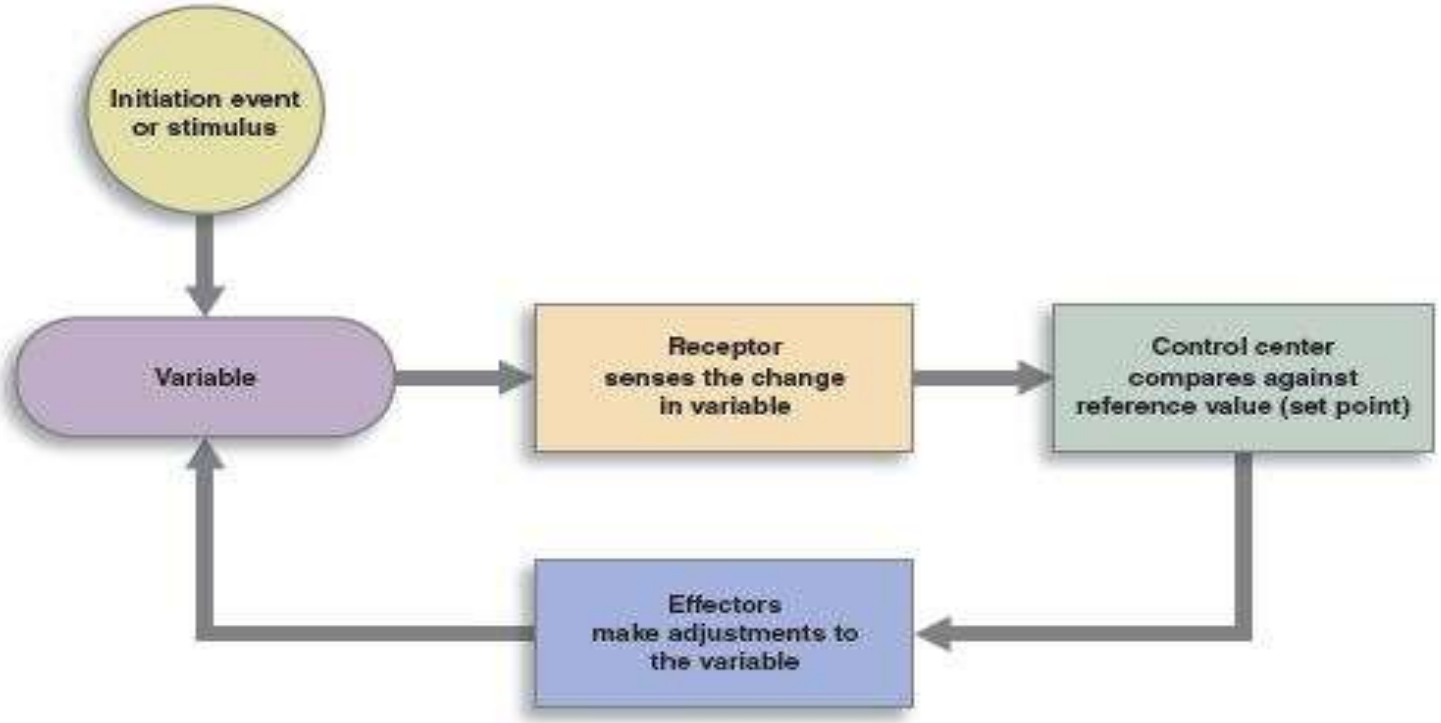
Figure 1.1 The levels of structural complexity.

HOMEOSTASIS

- The composition of the internal environment is maintained within narrow limits, and this fairly constant state is called ***homeostasis***.
- This term means 'unchanging', but in practice it describes a dynamic, ever-changing situation kept within narrow limits. When this balance is threatened or lost, there is a serious risk to the well- being of the individual.
- **Examples of physiological variables:**
  - Temperature
  - Water and electrolyte concentrations
  - pH of body fluids
  - Blood glucose levels
  - Blood and tissue O_2 and CO_2 levels
  - Blood pressure

Homeostasis is maintained by control systems which detect and respond to changes in the internal environment.

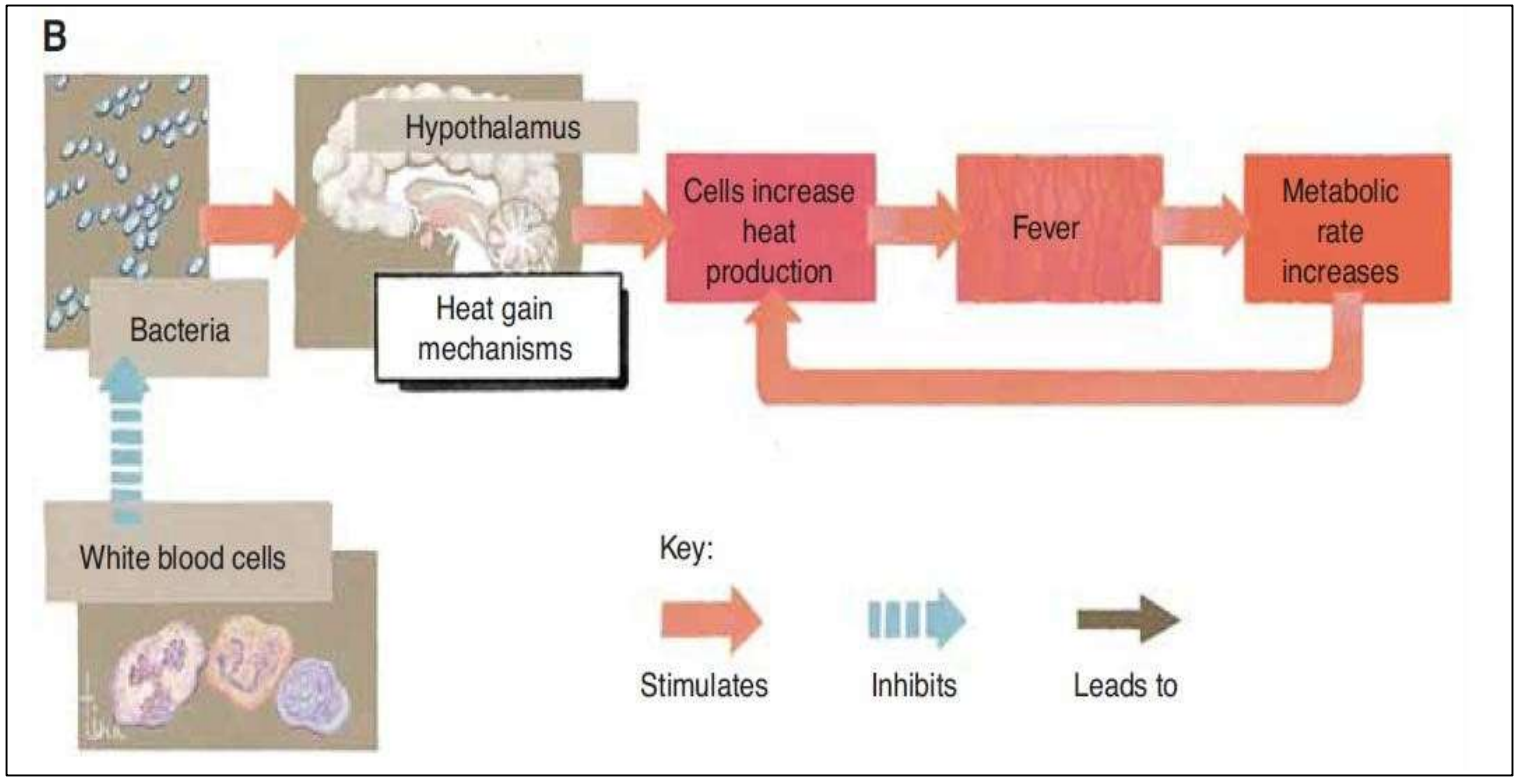
- A control system has three basic components: Detector, Control centre and Effector.
- The ***control centre*** determines the limits within which the variable factor should be maintained.
- It receives an input from the ***detector or sensor***, and integrates the incoming information.
- When the incoming signal indicates that an adjustment is needed the *control centre* responds and its output to the ***effector*** is changed.
- This is a dynamic process that maintains homeostasis.



Homeostasis and feedback loops

POSITIVE FEEDBACK SYSTEMS

- A **positive feedback system** tends to *strengthen* or *reinforce* a change in one of the body's controlled conditions.
- A positive feedback system operates similarly to a negative feedback system, except for the way the response affects the controlled condition.
- The control center still provides commands to an effector, but this time the effector produces a physiological response that adds to or *reinforces* the initial change in the controlled condition. The action of a positive feedback system continues until it is interrupted by some mechanism.



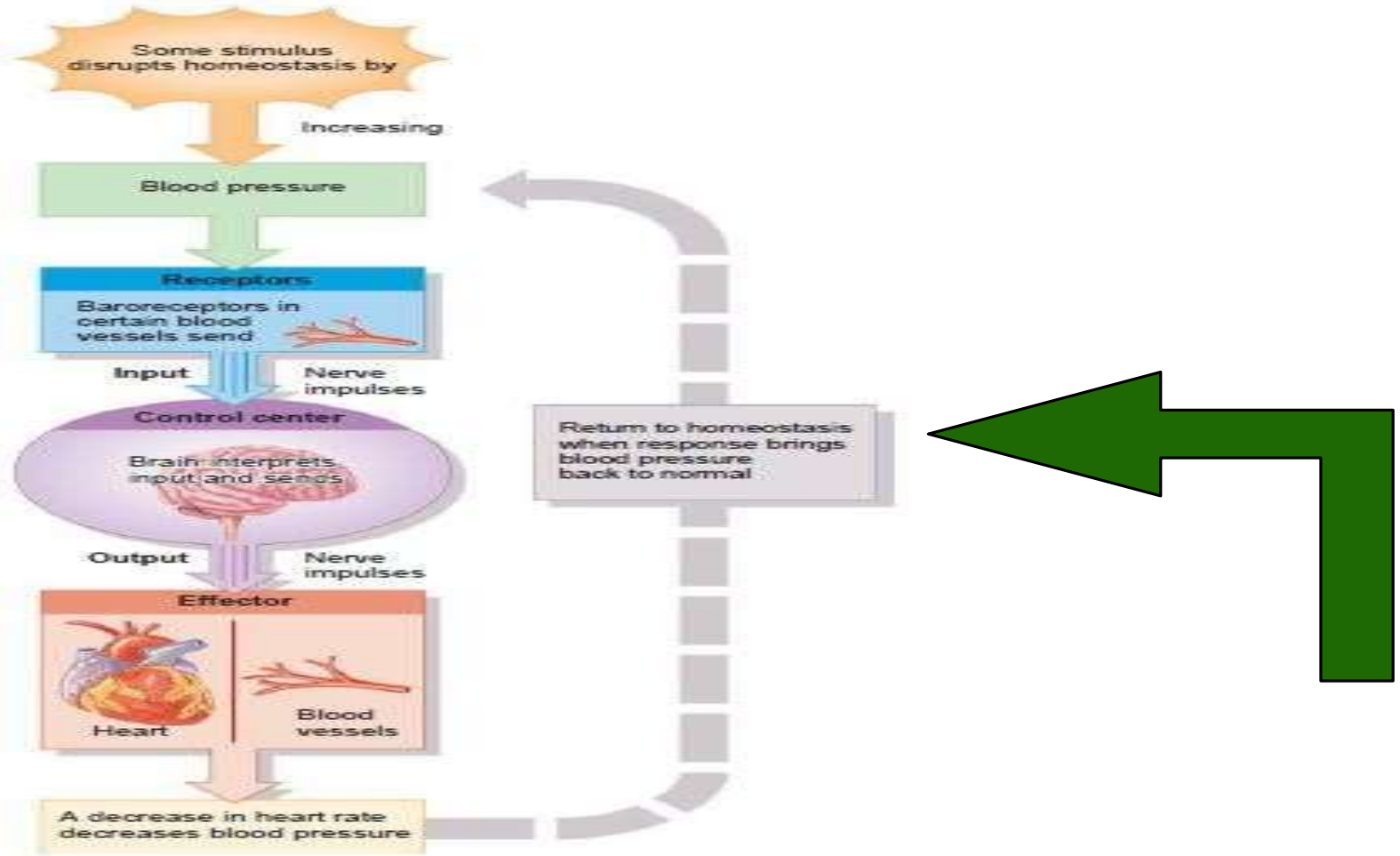
POSITIVE FEED BACK MECHANISM

NEGATIVE FEEDBACK SYSTEM

- A negative feedback system *reverses* a change in a controlled condition.
- Consider the regulation of blood pressure. Blood pressure (BP) is the force exerted by blood as it presses against the walls of blood vessels. When the heart beats faster or harder, BP increases. If some internal or external stimulus causes blood pressure (controlled condition) to rise, the following sequence of events occurs. *Baroreceptors* (the receptors), pressure-sensitive nerve cells located in the walls of certain blood vessels, detect the higher pressure

The baroreceptors send nerve impulses (input) to the brain (control center), which interprets the impulses and responds by sending nerve impulses (output) to the heart and blood vessels (the effectors). Heart rate decreases and blood vessels dilate (widen), which cause BP to decrease (response).

- This sequence of events quickly returns the controlled condition— blood pressure—to normal, and homeostasis is restored.
- Notice that the activity of the effector causes BP to drop, a result that negates the original stimulus (an increase in BP). This is why it is called a negative feedback system.



Negative feedback System

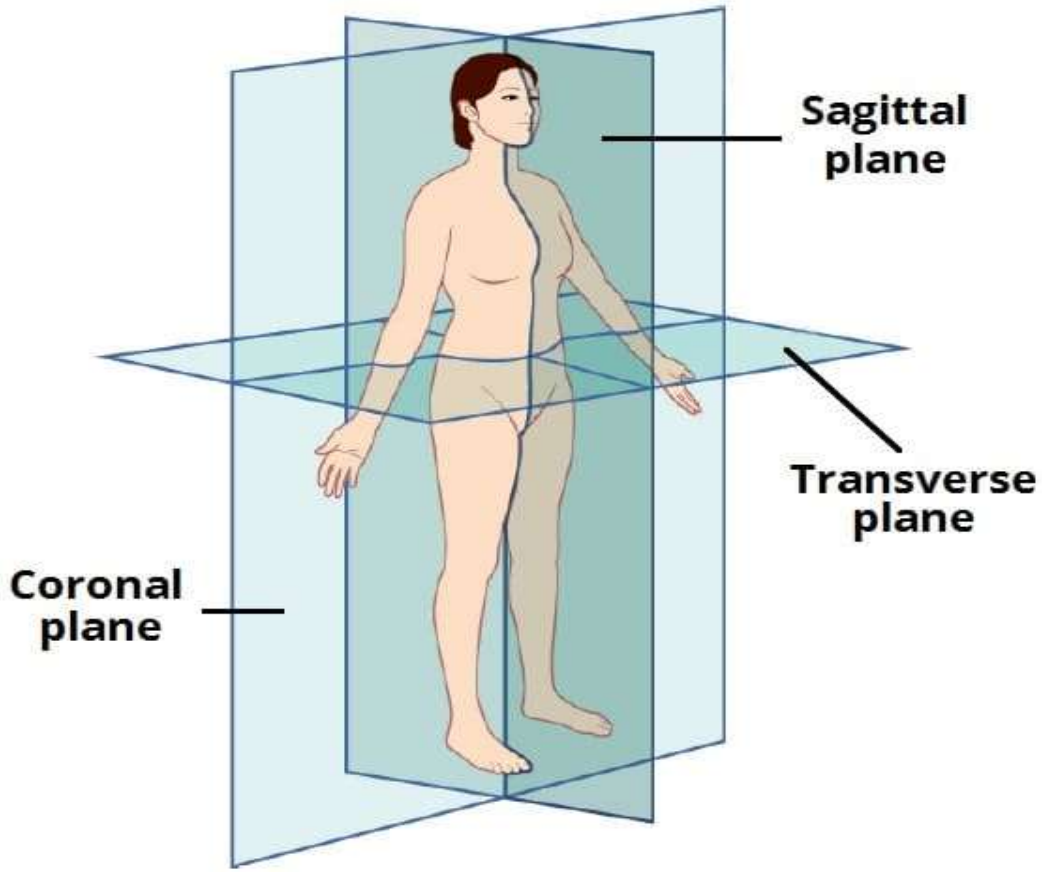
Definition of Various terminologies

Before we get into the following learning units, which will provide more detailed discussion of topics on different human body systems, it is necessary to learn some useful terms for describing body structure. Knowing these terms will make it much easier for us to understand the content of the following learning units. Three groups of terms are introduced here:

- Directional Terms
- Planes of the Body
- Body Cavities

•Posterior or dorsal - back (example, the shoulder blades are located on the posterior side of the body).
•Medial - toward the midline of the body (example, the middle toe is located at the medial side of the foot).
•Lateral - away from the midline of the body (example, the little toe is located at the lateral side of the foot).
•Proximal - toward or nearest the trunk or the point of origin of a part (example, the proximal end of the femur joins with the pelvic bone).
•Distal - away from or farthest from the trunk or the point or origin of a part (example, the hand is located at the distal end of the forearm)

PLANES OF THE BODY



Planes of body

•Coronal Plane (Frontal Plane) - A vertical plane running from side to side; divides the body or any of its parts into anterior and posterior portions.
•Sagittal Plane (Lateral Plane) - A vertical plane running from front to back; divides the body or any of its parts into right and left sides.
•Axial Plane (Transverse Plane) - A horizontal plane; divides the body or any of its parts into upper and lower parts.
•Median plane - Sagittal plane through the midline of the body; divides the body or any of its parts into right and left halves.

ASSESSMENT

1. Which of the following best defines anatomy?

A. Study of chemical reactions in the body
B. Study of the functions of organs and systems
C. Study of the structure and organization of body parts
D. Study of diseases and their treatment

2. What is the main focus of physiology?

A. Structure of internal organs
B. Functions and processes of body systems
C. Names of body parts
D. Development of body parts before birth

3. The relationship between anatomy and physiology can be described as:

A. Completely independent

B. Anatomy explains how body systems work

C. Structure (anatomy) determines function (physiology)

D. Physiology only applies to muscles

4. Microscopic anatomy includes the study of:

A. Organs visible to the naked eye

B. Organ systems as a whole

C. Structures seen with a microscope like cells and tissues

D. Body movements and reflexes

5. Which branch of anatomy deals with the study of body parts as they relate to the overlying skin surface?

A. Systemic anatomy
B. Regional anatomy
C. Surface anatomy
D. Developmental anatomy

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