

PHYSIOLOGY

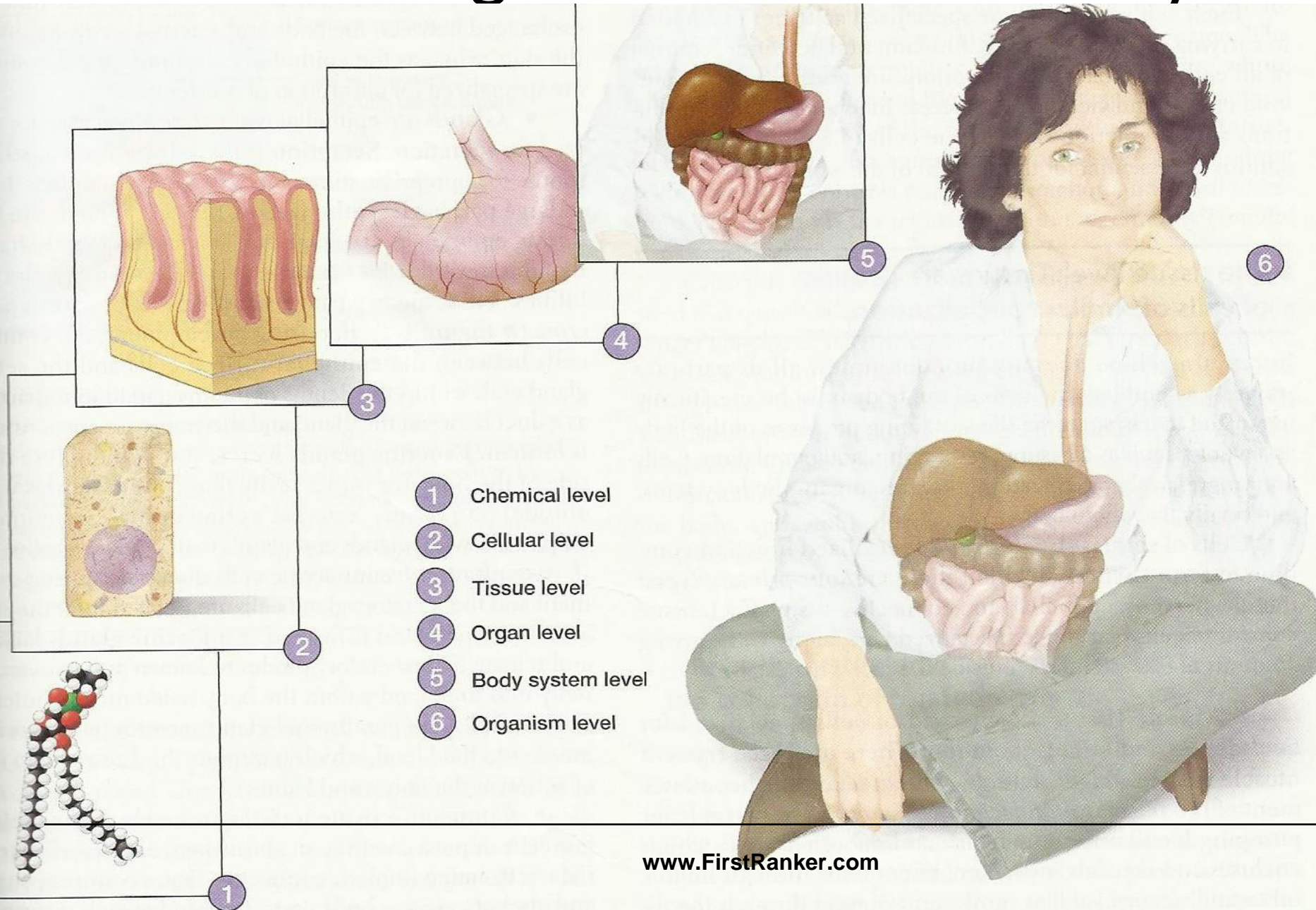
Greek word

Physis-----nature

Logos-----study

It is the study of biological functions of how the body works from cell to tissues, tissues to organs, organs to systems, from systems to organism and how the organism as a whole accomplishes particular tasks essential for life.

Levels of organization in the body

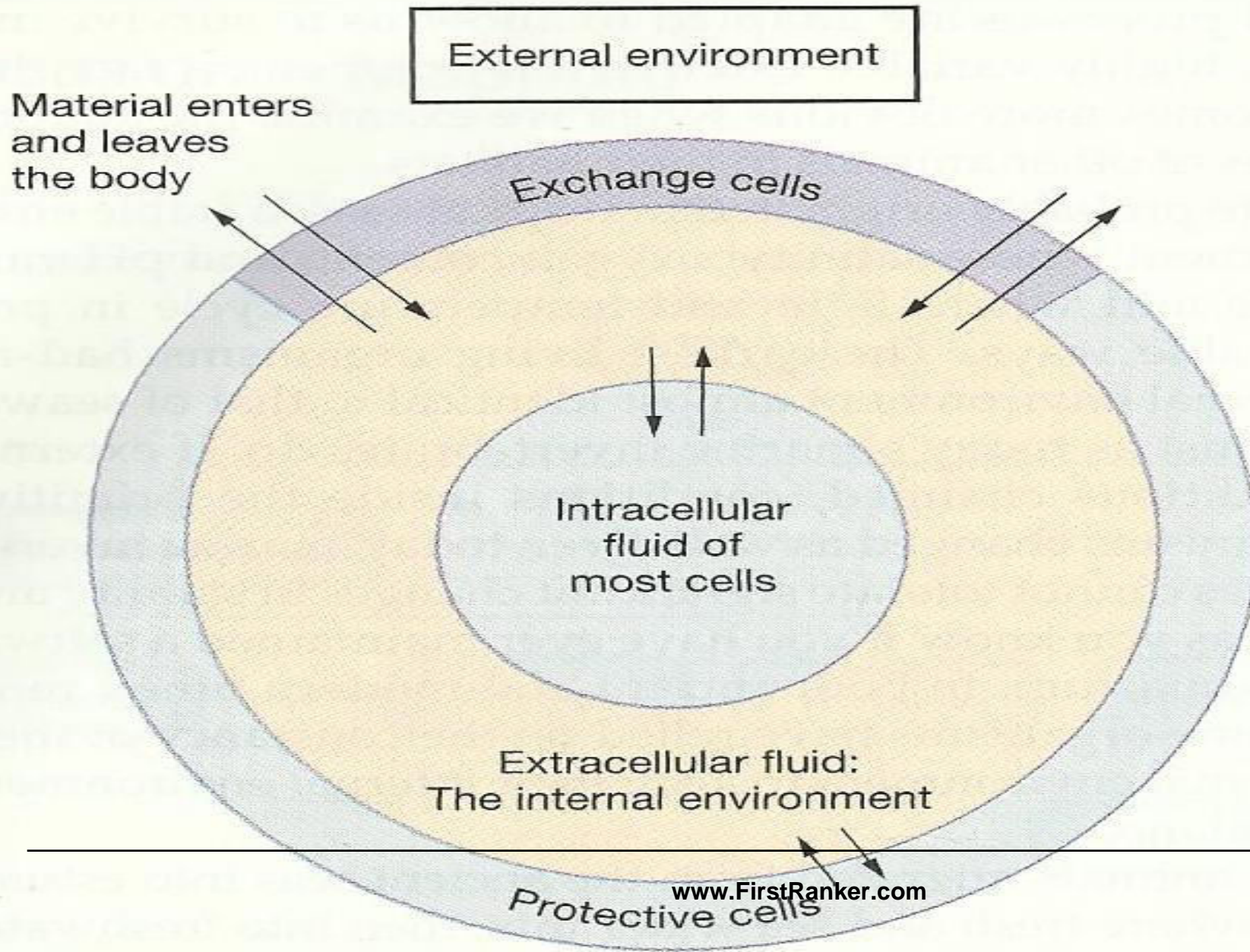


- The cell is the basic unit of both structure and function in a living being and is the smallest unit capable of carrying out the processes associated with life
- The tissues are group of cells of similar specialization
- An organ is unit made up of several tissue types
- A body system is a collection of related organs
- The body systems are packaged together into a functional whole body(Organism)
- Organisms are independent living entities

Concept of Extracellular and Intracellular fluid

- Intracellular fluid—fluid contained within all of the cells of the body
- Extracellular fluid—fluid outside the cells of the body and is the internal environment in which the cells live . It is composed of plasma and interstitial fluid

Intracellular and extracellular fluid



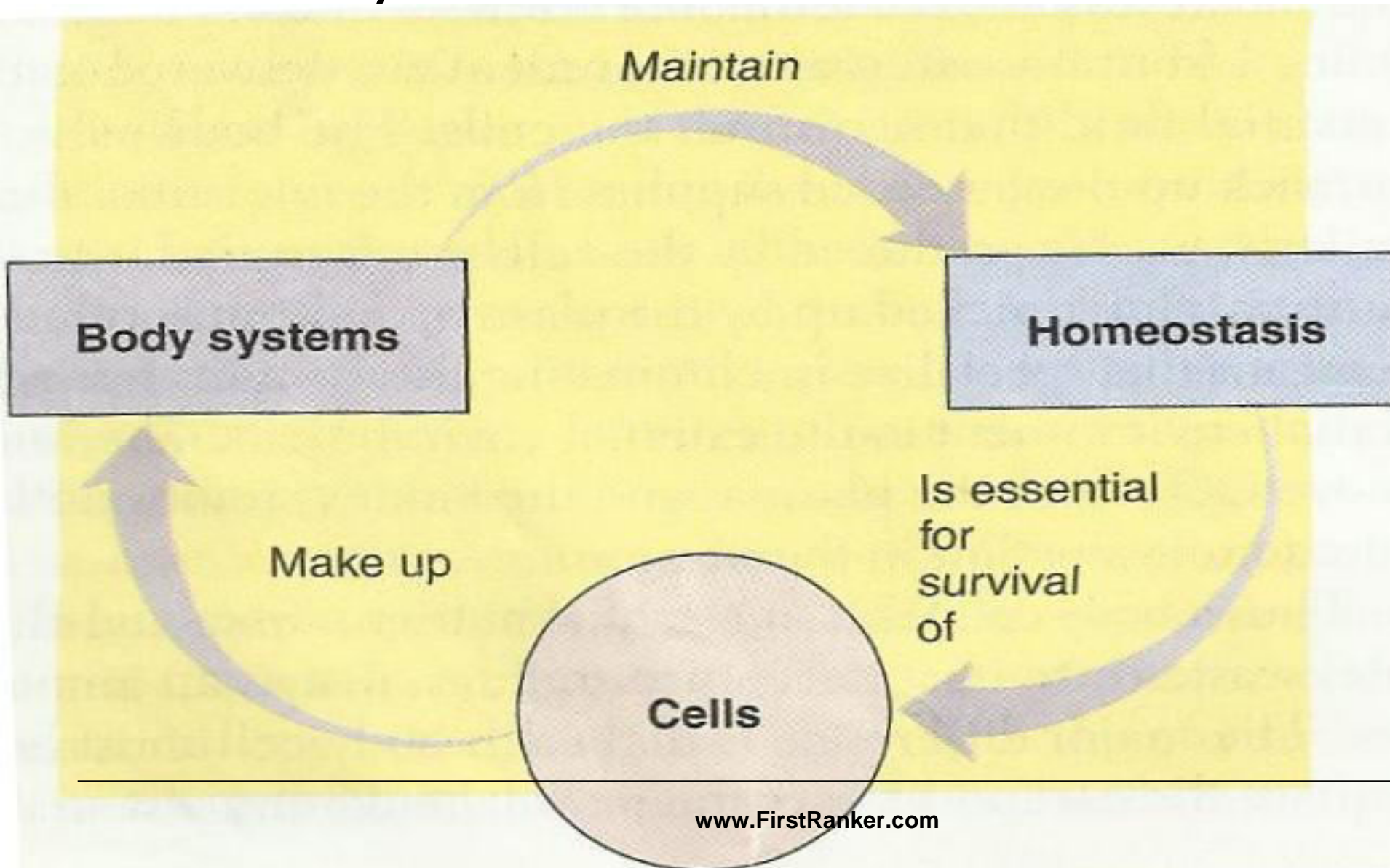
Homeostasis

Homeo means “same”

Stasis means to “stand or stay”

Maintenance of a relatively stable internal environment or body's coordinated response in order to maintain internal stability

Interdependent relationship of cells, systems and homeostasis



Factors homeostatically regulated

1. Concentration of nutrient molecules
2. Concentration of CO₂ and O₂
3. Concentration of waste products
4. pH
5. Concentration of water , salt and other electrolytes
6. Temperature
7. Volume and pressure

Contribution of body systems to Homeostasis

- The Circulatory System
- The Digestive System
- The Respiratory System
- The Urinary System
- The Skeletal System
- The Muscular System
- The Integumentary System
- The Immune System
- The Nervous System
- The Endocrine System
- Reproductive system is not essential for homeostasis and therefore not essential for survival.

Homeostatic Control System

Is a functionally interconnected network of body components that operate to maintain a given physical or chemical factor in the internal environment relatively constant around an optimal level.

Can be classified as:

- Intrinsic (local controls) are inherent compensatory responses of an organ to a change
- Extrinsic controls are responses of an organ that are triggered by factors external to the organ , namely, by the nervous and endocrine systems

Both intrinsic and extrinsic control systems generally operate on the principle of

Negative feedback mechanism

In addition

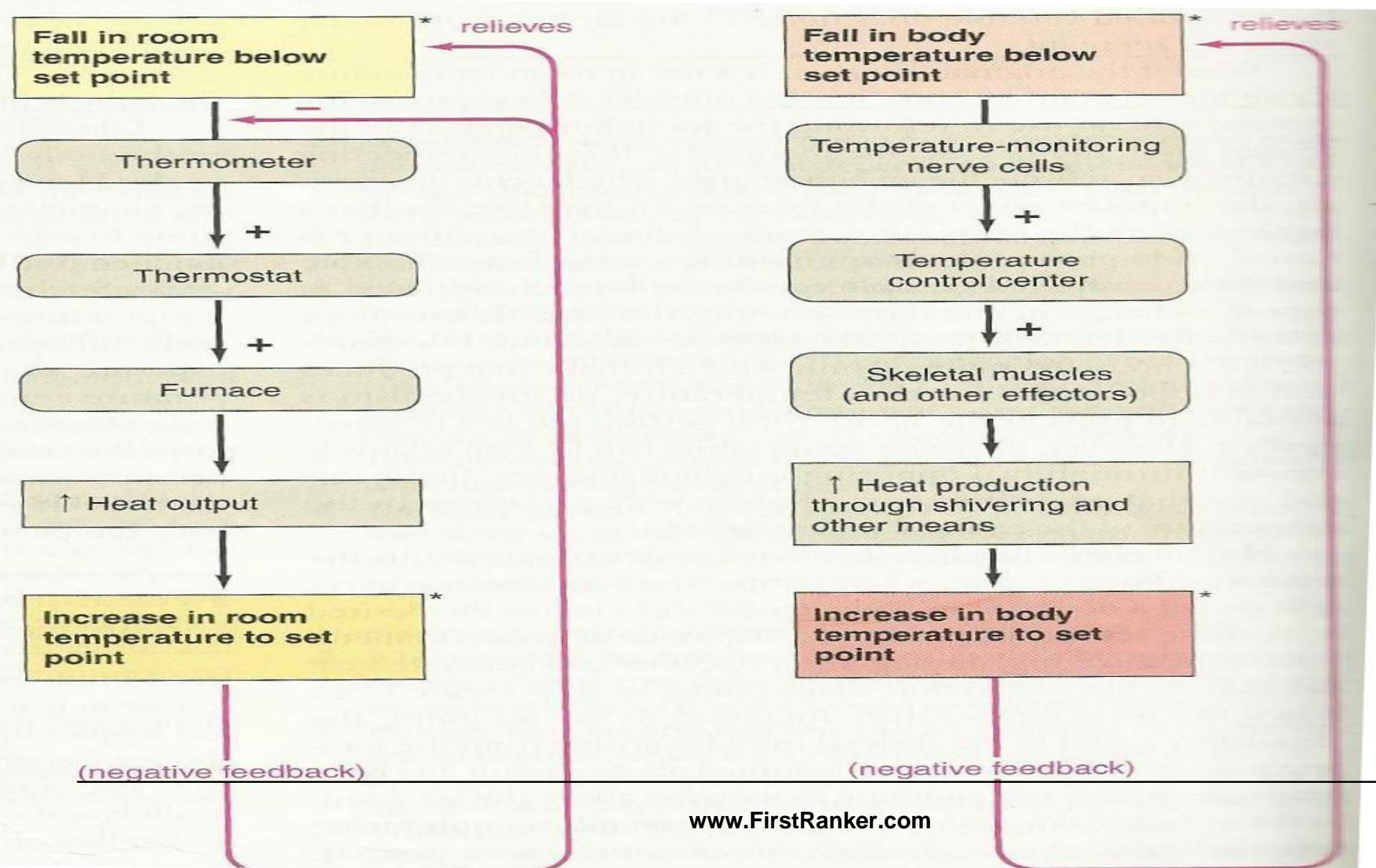
Positive feedback mechanism

Feedforward mechanism

Negative feedback mechanism

Change in a homeostatically control factor triggers a response that seeks to restore the factor to normal by moving the factor in the opposite direction of its initial change or it is a pathway where the response opposes or removes the signal.

Negative Feedback



Negative Feedback

Increased arterial pressure



Baroreceptors(sensor)



Inhibit vasomotor center in medulla



Decreased impulses to heart & blood vessels



Decreased pumping activity of heart and V.D



Decreased blood pressure

Negative Feedback

Increased CO₂ in tissue fluid



Excites respiratory center



Increased rate of breathing



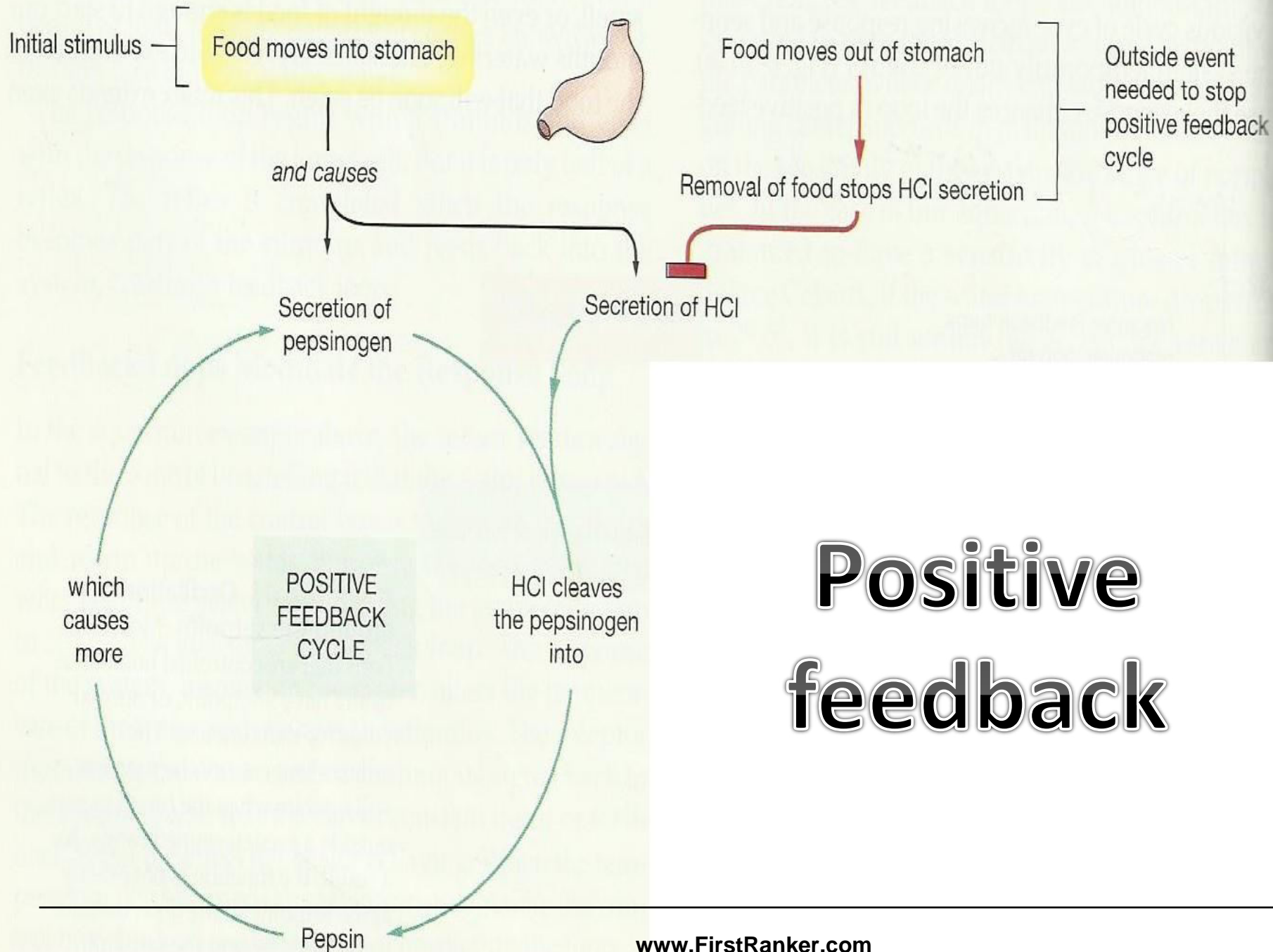
More CO₂ is expired



Decreased CO₂ in tissue fluid

Positive Feedback

The output is continually enhanced or amplified so that the controlled variable continues to be moved in the direction of the initial change or a pathway in which the response reinforces the stimulus.



Positive Feedback

Blood vessel ruptured



Clotting factors activated in clot itself



Activated clotting factors activate inactivated
clotting factors as an enzyme



Clot formed and bleeding stopped

Positive Feedback

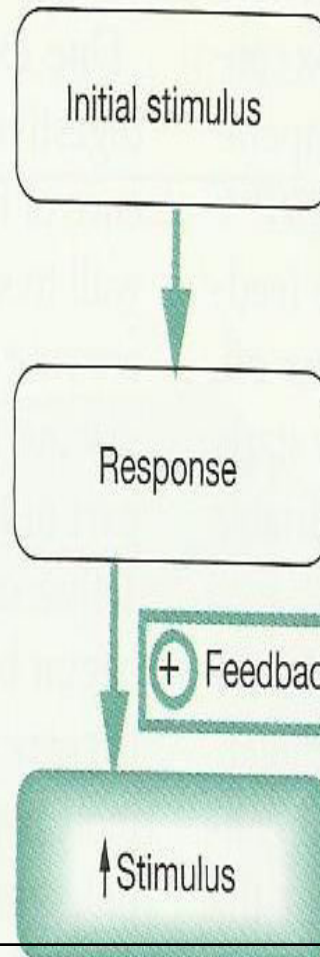
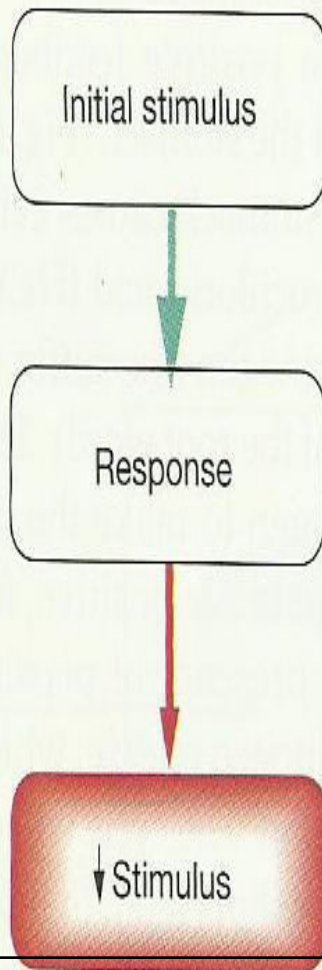


Negative and Positive Feedback

(a) Negative feedback

(b) Positive feedback

Response loop
shuts off



Outside factor required
to shut off + feedback
cycle

Feedforward Mechanism

It brings about a compensatory response in anticipation of a change in a regulated variable.