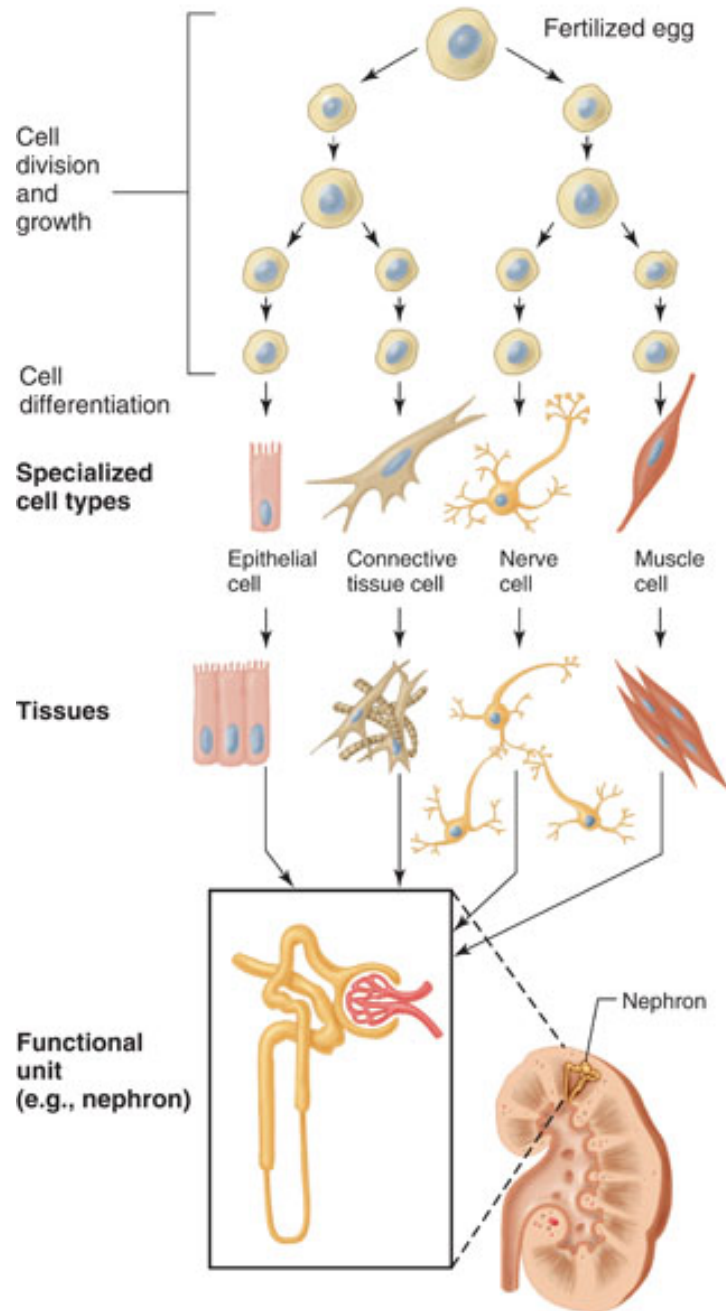


# What is Biomedical Engineering?

- Biomedical Engineering is the application of knowledge from engineering and physics to enhance the understanding of and provide solutions to problems in biology and medicine.
  - EP catalog, 2013-2014

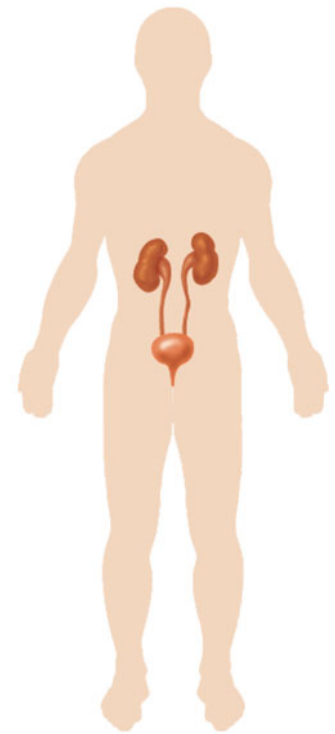
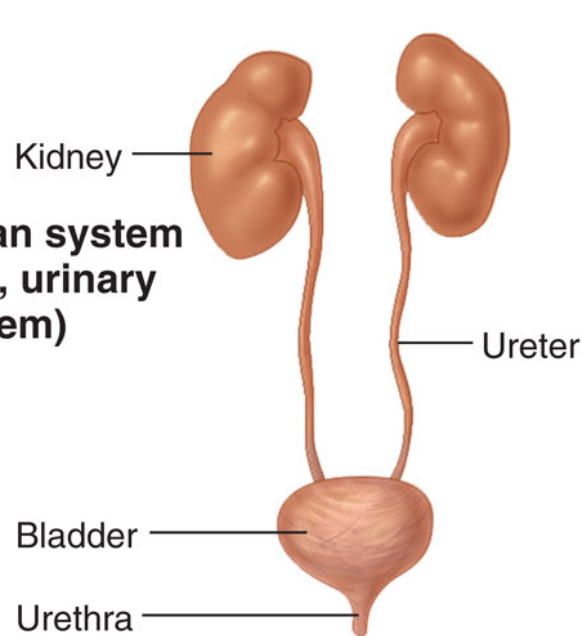
# What is Physiology?

- The science which treats of the functions of the **living organism** and its parts, and of the **physical** and **chemical** factors and processes involved.
  - <http://www.medicaldictionaryweb.com/Physiology-definition/> - taken from Dorland, 27<sup>th</sup> Ed.
- **Human** physiology is the science of mechanical, physical, and biochemical functions of **humans**, their **organs**, and the **cells** of which they are composed.
  - <http://en.wikipedia.org/wiki/Physiology>



## Organ (e.g., kidney)

## Organ system (e.g., urinary system)



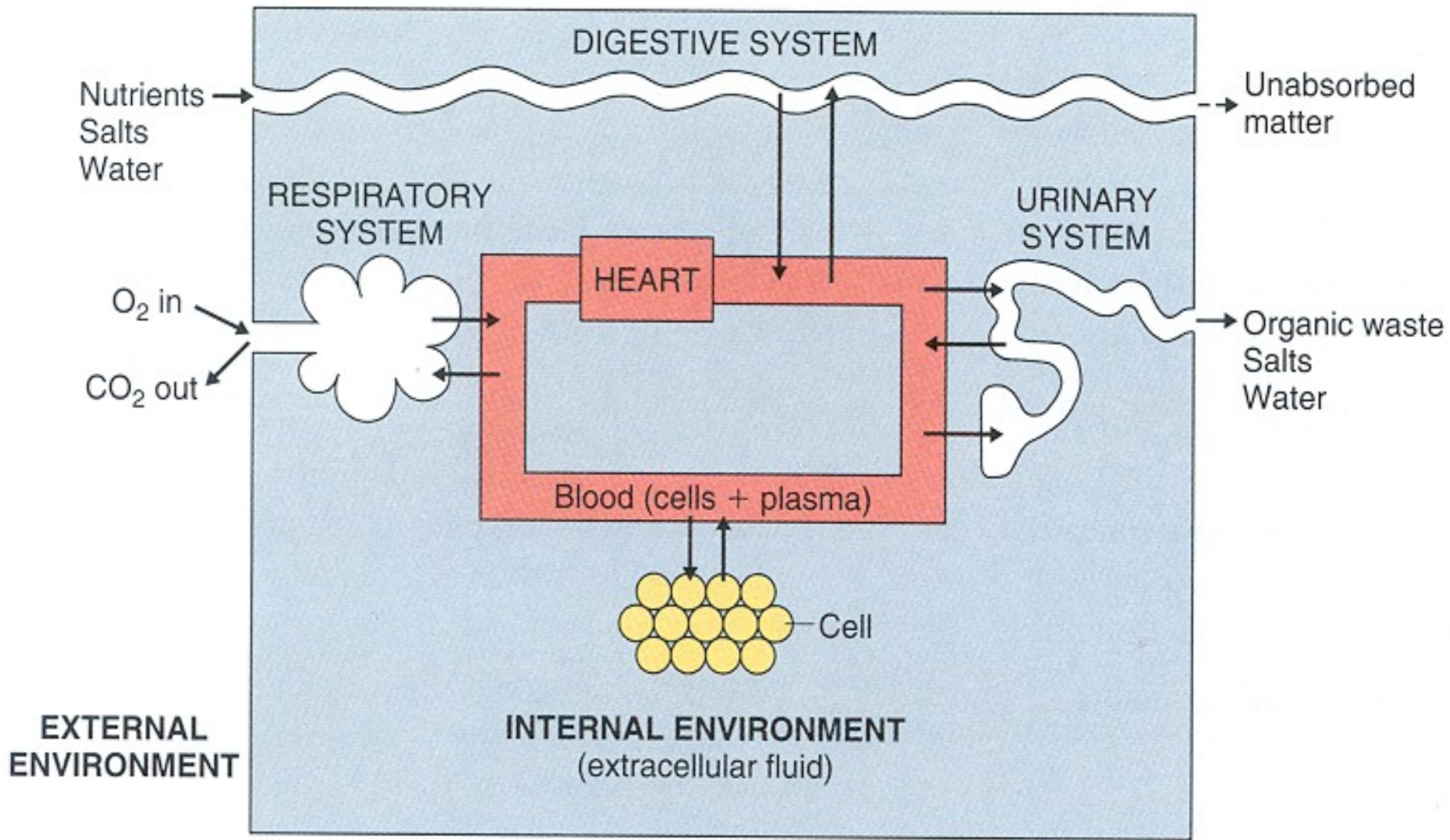
## Total organism (human being)

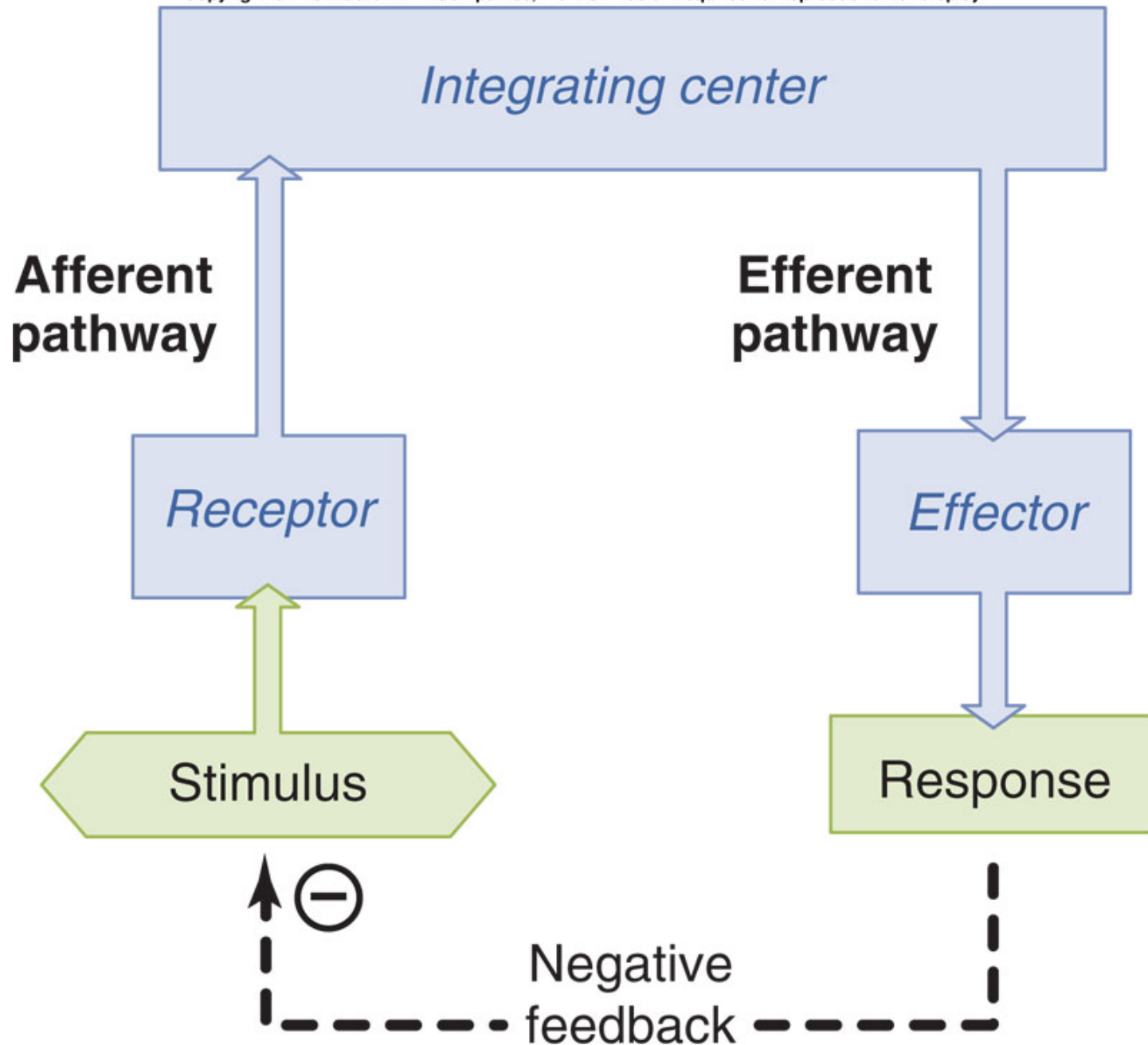
TABLE 1-1

*Organ Systems of the Body*

SYSTEM	MAJOR ORGANS OR TISSUES	PRIMARY FUNCTIONS
<i>Circulatory</i>	Heart, blood vessels, blood (Some classifications also include <b>lymphatic vessels</b> and lymph in this system.)	Transport of blood throughout the body's tissues
<i>Respiratory</i>	Nose, <b>pharynx</b> , larynx, trachea, bronchi, lungs	Exchange of carbon dioxide and oxygen; regulation of hydrogen ion concentration
<i>Digestive</i>	Mouth, <b>pharynx</b> , esophagus, stomach, intestines, salivary glands, pancreas, liver, gallbladder	Digestion and absorption of organic nutrients, salts, and water
<i>Urinary</i>	Kidneys, ureters, bladder, urethra	Regulation of plasma composition through controlled excretion of salts, water, and organic wastes
<i>Musculo-skeletal</i>	Cartilage, bone, ligaments, tendons, joints, skeletal muscle	Support, protection, and movement of the body; production of blood cells
<i>Immune</i>	White blood cells, <b>lymph vessels</b> and nodes, spleen, thymus, and other lymphoid tissues	Defense against foreign invaders; return of extracellular fluid to blood; formation of white blood cells
<i>Nervous</i>	Brain, spinal cord, peripheral nerves and ganglia, special sense organs	Regulation and coordination of many activities in the body; detection of changes in the internal and external environments; states of consciousness; learning; cognition
<i>Endocrine</i>	All glands or organs secreting hormones: Pancreas, testes, ovaries, hypothalamus, <b>kidneys</b> , pituitary, thyroid, parathyroid, adrenal, intestinal, thymus, heart, and pineal, and endocrine cells in other locations	Regulation and coordination of many activities in the body, including growth, metabolism, reproduction, blood pressure, electrolyte balance, and others
<i>Reproductive</i>	Male: Testes, penis, and associated ducts and glands Female: Ovaries, fallopian tubes, uterus, vagina, mammary glands	Production of sperm; transfer of sperm to female Production of eggs; provision of a nutritive environment for the developing embryo and fetus; nutrition of the infant
<i>Integumentary</i>	Skin	Protection against injury and dehydration; defense against foreign invaders; regulation of temperature







## INTEGRATING CENTER

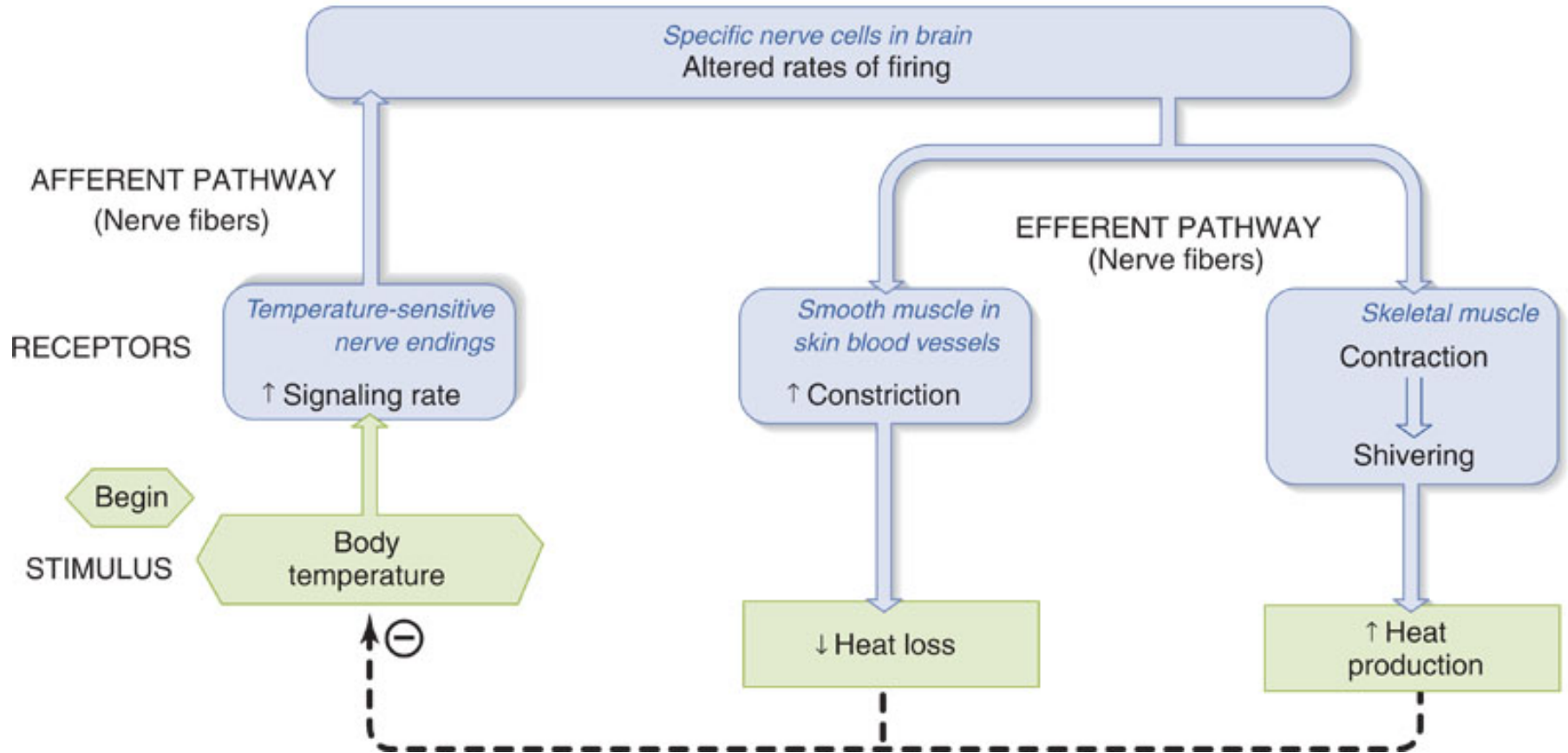


TABLE I-3

*Questions to Be Asked About  
Any Homeostatic Reflex*

1. What is the variable (for example, plasma potassium concentration, body temperature, blood pressure) that is maintained at a relatively constant level in the face of changing conditions?
2. Where are the receptors that detect changes in the state of this variable?
3. Where is the integrating center to which these receptors send information and from which information is sent out to the effectors, and what is the nature of these afferent and efferent pathways?
4. What are the effectors, and how do they alter their activities so as to maintain the regulated variable near the set point of the system?



END

Video 1, Module 1