INTRODUCTION TO HOMEOSTASIS

Text References: Chapter 1 and parts of 18, as indicated.

I. Homeostasis Defined:
   A. The condition in which the body’s internal environment remains relatively constant.

   1. Internal environment
      a. Extracellular fluid (ECF)
         • Interstitial fluid (tissue fluid)
         • Plasma
         Note: Would these be considered intercellular or intracellular fluids?
      b. Intracellular fluid (ICF)
         • Cytoplasm (cytosol) of cell

   2. Means maintaining physiological limits
      a. Internal environment contains exactly optimum concentrations of
         • gases—eg:
         • nutrients—eg:
         • ions—eg:
         • water
      b. Internal environment has exactly an optimum
         • temperature—what is it in humans?
         • pressures
           *hydrostatic (blood pressure)
           *osmotic

      NOTE: these are examples of “controlled conditions”—conditions that must be controlled in order to maintain homeostasis. What 2 systems control these conditions?

         a. Nervous System via ________________________________.
         b. Endocrine System via ________________________________.

   B. Life of the cells depends on maintaining this constancy of its internal fluid environment that bathes them and regulates the fluid balance inside the cell.
      1. Tissues depend on cells.
      2. Organs depend on having healthy tissues.
      4. The organism (YOU) depend on proper functioning of your systems.

II. Controlled conditions, stress and homeostasis
   A. Stress defined: Any condition that disrupts homeostasis
   B. Your body is constantly working to maintain homeostasis—constantly adjusting itself when a stressor disrupts the required conditions.
   C. These conditions must be maintained within very narrow margins—within very narrow limits and must be regulated.
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D. Both the nervous system and the endocrine system are important for regulating/controlling homeostasis through either (A) or (B) systems/mechanisms.
   A. _____________________________ feedback system/mechanism
   B. _____________________________ feedback system/mechanism

III. Feedback Systems: Mechanisms for maintaining homeostasis
   A. Describe a feedback system in general:
      Explain: It is a circular system in which information is ‘fed back’ into the system.

   B. Components of a feedback system—describe and define
      1. Stimulus/stressor
      2. Receptor (five examples)
      3. Control center
      4. Effector

   C. Negative feedback mechanism
      1. Describe and diagram a general example
      2. What does this mean? As the product of the reaction (response) increases (accumulates) the reaction decreases. Explain.
      3. Regulation of room temperature (thermostat, furnace, etc) as an example. When could this become a problem situation (a runaway, disease, positive feedback system?) Refer to lecture.
      4. Diagram the following as examples of negative feedback mechanisms.
         a. Regulation of body temperature (refer to lecture and text)
         b. Regulation of blood pressure (text—on your own)

   D. Positive feedback mechanisms
      1. Not common in a healthy body—may be described as a “runaway” or indication of a disease process
      2. Describe and diagram a general example
      3. What does this mean: “As a result of the reaction, the reaction increases”.
      4. How does this compare with a negative feedback reaction?
      5. Diagram a “normal” positive feedback mechanism: Oxytocin and its effect on labor contractions and childbirth. Go a little further with the effects of oxytocin (what is its role in the milk “letdown reflex”? How does it help get the uterus “back in shape” after childbirth? (Refer to lecture and Chapter 1 or use your text index for more detail—hint: see chapter 18)

IV. See Lecture Syllabus and complete the 2 Assignments listed under Introduction to the Human Body. These are for your information—they give you an opportunity to process what you have learned and they will help you confirm what you know (or don’t know). You will not turn these in to me.