What is Human Physiology?

the study of biological function of humans

Levels of Structural Organization in the Human Body

- Chemicals
- Cells
- Tissues
- Organs
- Organ Systems

The Chemical Level

- Human body is composed of *atoms* organized into *molecules*
- Atoms and molecules undergo *chemical reactions*
  - Physiology involves control of chemical reactions within the body

Cells

- Basic living units
- Smallest subdivision able to carry out all life processes
- Contain *organelles*
  - Structures that have specific functions
- Specialized for specific physiological roles

Tissues

- Groups of cells of similar structure
- Interaction among cells leads to functions single cells cannot effectively do alone

Types of Tissues

- Epithelial tissues
  - Form body surfaces
    - Barriers
    - Secretion
    - Absorption
    - Some movement (cilia)

Types of Tissues

- Connective Tissues
  - Very diverse
  - *Extracellular matrix*
    - Incorporate large amounts of extracellular material in tissue structure and function
  - Connection, Structure, and Protection

Types of Tissues

- Muscle Tissue
  - Contraction
  - Generates Tension, Movement and Heat

Types of Tissues

- Nerve tissue
  - High speed communication
  - Control/Integration

Organs

- structures consisting of at least two tissue types
- performs a specific function related to the whole body

Organ Systems

- groups of organs performing related functions
- Enable basic functions needed to maintain overall homeostasis

Major Organ Systems

- Nervous System
  - Communication and control
- Endocrine System
  - Communication and control
- Integumentary System
  - Barrier between interior of body and exterior, thermoregulation
- Respiratory System
  - Gas exchange, pH balance
- Urinary System
  - Waste removal, water and ion balance

Major Organ Systems

- Digestive System
  - Obtain raw materials from exterior
- Immune System
  - Protect body from foreign substances, other organisms and cancer cells
- Musculoskeletal System
  - Movement, structure, support, protection, heat generation
- Circulatory System
  - Transportation of most materials throughout body
- Reproductive System
  - Perpetuation of the species

The Internal Environment

- The interior of body, the environment of cells inside the body
- Mostly water (~67%)
  - Liquid
  - High heat capacity
    - does not change temperature easily
  - Polar solvent
    - dissolves some substances, not others

Attributes of the Internal Environment

- amt. nutrients
- amt. wastes
- amt. O_2 & CO_2
- amt. salts
- Temperature (37ºC)
- pH (7.4)
- Fluid volume

Various physiological systems maintain different attributes of the internal environment within narrow normal ranges

Homeostasis

= state of constancy of conditions within the body

How does the body maintain homeostasis?

Through Regulatory Mechanisms

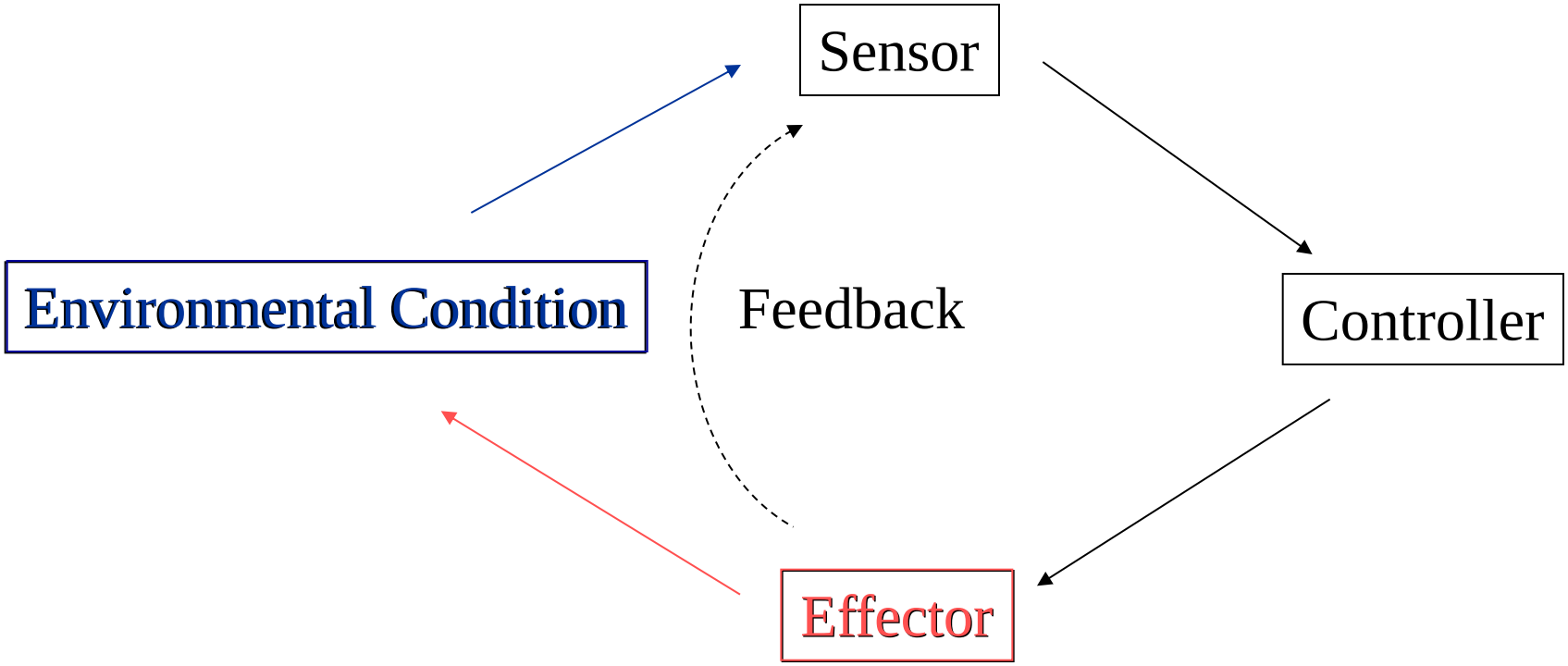
Regulatory Mechanism Components

- *sensor*
  - monitors internal conditions, detects changes
- *integrating center (controller)*
  - receives & integrates information
- *effector*
  - responds to changes
  - activity of effectors results in return of condition to normal levels.

Regulatory Mechanisms Work by Feedback

- *Feedback* = return of output to the input part of a system
- The response of the effector influences subsequent output by the effector

Feedback


Sensor
Environmental Condition
Feedback
Controller
Effector

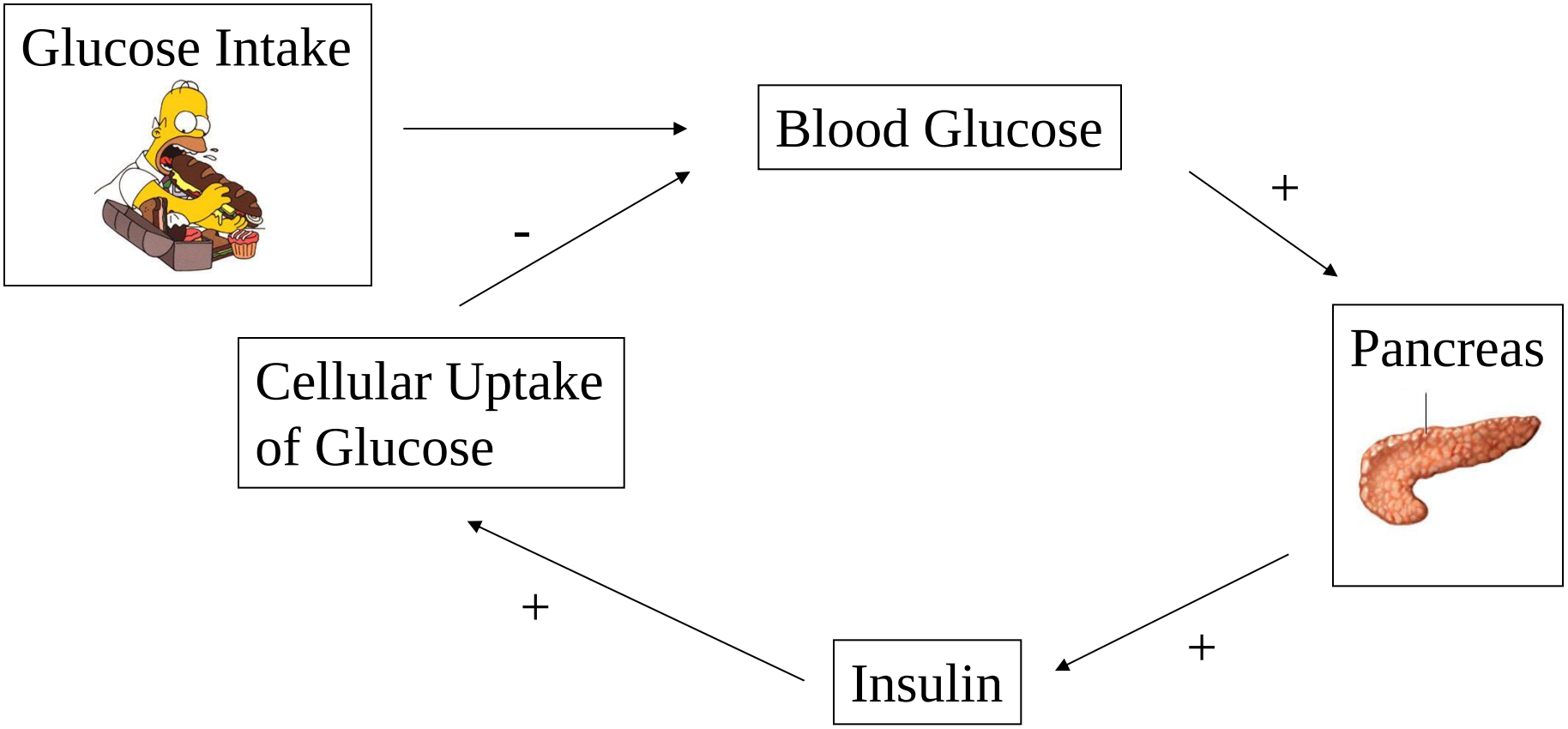
Types of Homeostatic Responses

- ***Negative Feedback***
  - change in a condition leads to a response from the effector which *counteracts* that change

↑ Change → ↑ Response → ↓ Change → ↓ Response

  - most common type of response

Negative Feedback Example: Insulin in Blood Glucose Regulation

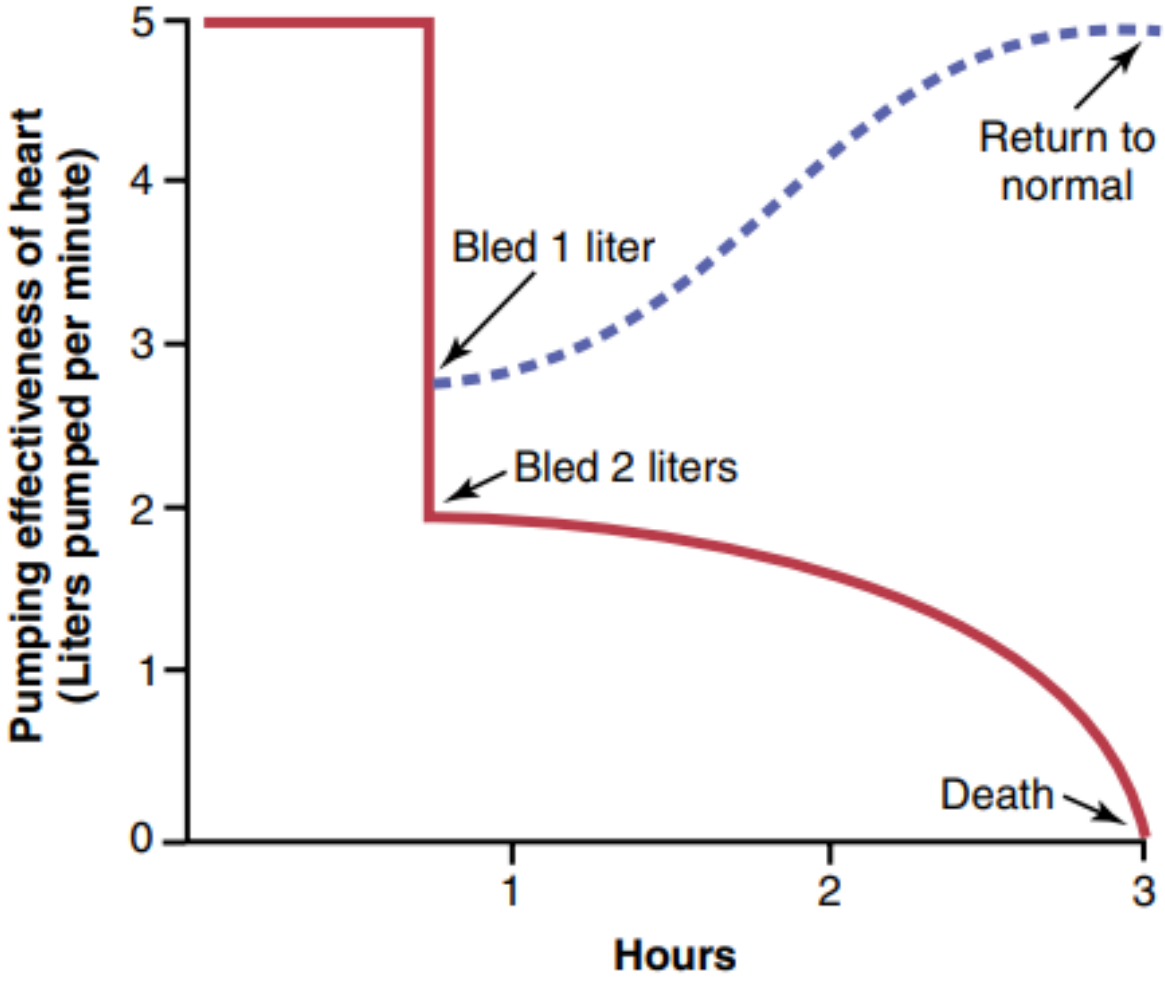


Types of Homeostatic Responses

- **Positive Feedback**
  - change in a condition leads to a response from the effector which *amplifies* that change

↑ Change → ↑ Response → ↑↑ Change → ↑↑ Response

  - less common, and part of a larger negative feedback loop


Pumping effectiveness of heart
(Liters pumped per minute)
5
4
3
2
1
0
1
2
3
Hours
Bled 1 liter
Bled 2 liters
Return to
normal
Death

Applied Physiology is the study of biological systems and steps into practice.

It involves the application of the knowledge of **physiological** properties to restore core stability and joint stability. It differs from **clinical practice**.

Examples

- Space physiology
- Deep sea physiology
- High altitude physiology
- Advanced exercise physiology

Means slightly different physiology mechanisms but still normal

Clinical practice

- Treatment of diseased people
- And abnormal

Back to normal stage = balance

Teaching Methods:

- Lectures,
- Problem solving,
- Small group discussions,
- Case based education.

Take home message

So…..

Please know what is normal first at Earth level….then

Apply it to different environments like space level or submarine level

Then……

Come to clinical aspects disorders and treatment

- MBS 210 – physiology ++++ RS, CVS, GIT, REP
- MBS 310 - physiology

- MBM 320 – physiology ++++
- MBM 220 - physiology

- MBP/MBE 260- Anat & Physiology +++

Human physiology credits

Contact hours:

- Lectures - 6 hours per week,
- Practicals - 3 hours every 2 weeks
- Tutorial - 1 hour per week
- Seminars - 3 hours every 2 weeks

Mean = 10 hrs a week

Total = 400 contact hrs/subject

Medical Attributes

- Self directed
- Tenacity
- Autodidactic
- Professionalism
- Dignity
- No Bias/ Non judging = objectivity
- Eclectic


In mbchb...
TikTok
@katek_balpal
degree

Prescribed books

Ganong's Review of **Medical Physiology** (Review Questions). by Kim E Barrett; Susan M Barman; Jason X -J Yuan; Heddwen Brooks;. 26 edition **eBook**. English. **2022**

2. Walter F.B., Boupaep E.L., (2009) Medical Physiology. Publishers Saunders/Elsevier. ISBN 978-1-4160-3115-4

Recommended book

Purchase **Guyton** and Hall **Textbook** of **Medical Physiology** 2022- 14th Edition. Print **Book**& E-**Book**. ISBN 9781455770052, 9780323389587.

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Thank
you