SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Approved by Pharmacy Council of India, New Delhi. Coimbatore -641035

COURSE NAME : MEDICINAL BIOCHEMISTRY
YEAR : PHARM D /I YEAR
TOPIC : Factors affecting enzyme activity

Design Thinking in ATP

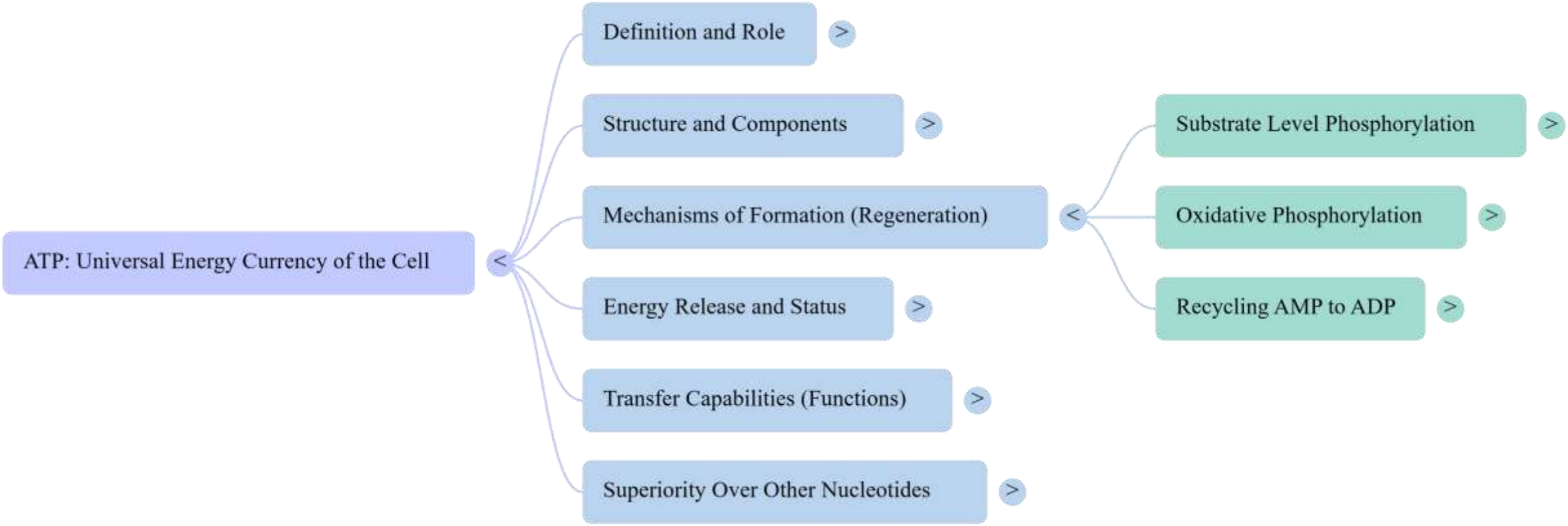
1.Empathize: Deeply understand the student's or learner's challenges, needs, and experiences. This involves engaging with students, educators, and biologists to uncover pain points, preferences, and unmet needs in understanding microscopic cell processes.

2.Define: Reframe the problem based on insights from the empathize phase and establish clear context. This involves synthesizing data to pinpoint the core issue, such as defining the need for clearer explanations of cellular mechanisms.

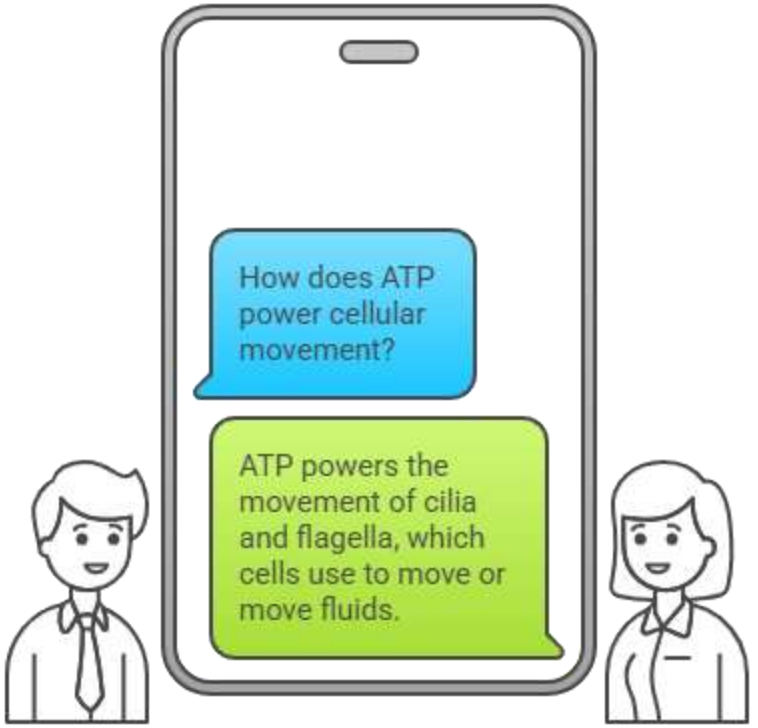
3.Ideate: Brainstorm and explore a wide range of ideas and potential explanations, including innovative diagrams or models.

4.Prototype: Simulate and build educational tools or visuals to enhance comprehension.

MINDMAP


ATP: Universal Energy Currency of the Cell
Definition and Role
Structure and Components
Mechanisms of Formation (Regeneration)
Substrate Level Phosphorylation
Oxidative Phosphorylation
Recycling AMP to ADP
Energy Release and Status
Transfer Capabilities (Functions)
Superiority Over Other Nucleotides

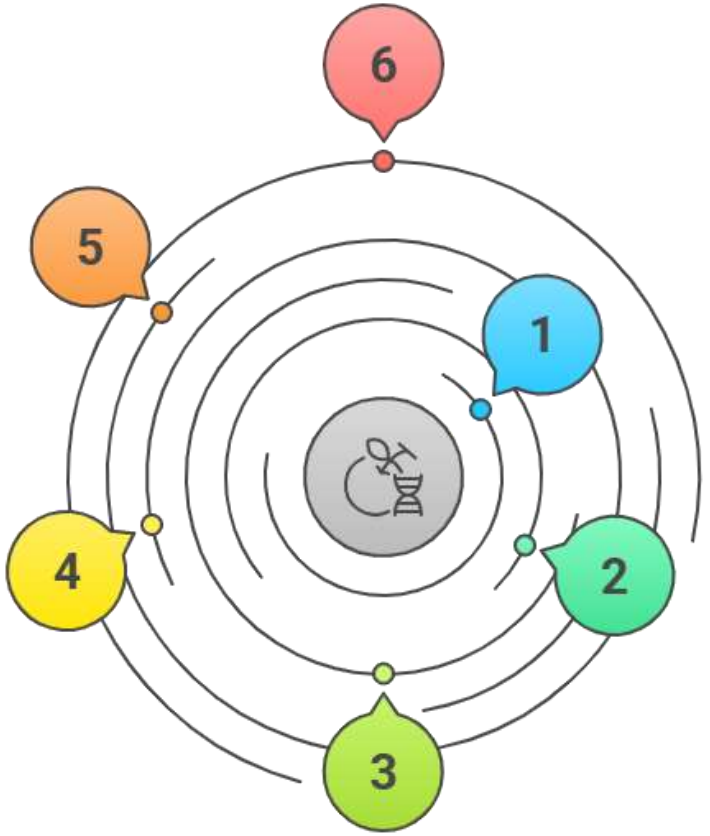
ATP and Cellular Movement



The Vital Role of ATP in Cellular Energy

Biological Systems

Crucial for understanding life's complexities



Structure

Unique molecular design for energy storage

Synthesis

Process of creating ATP

Hydrolysis

Breakdown of ATP to release energy

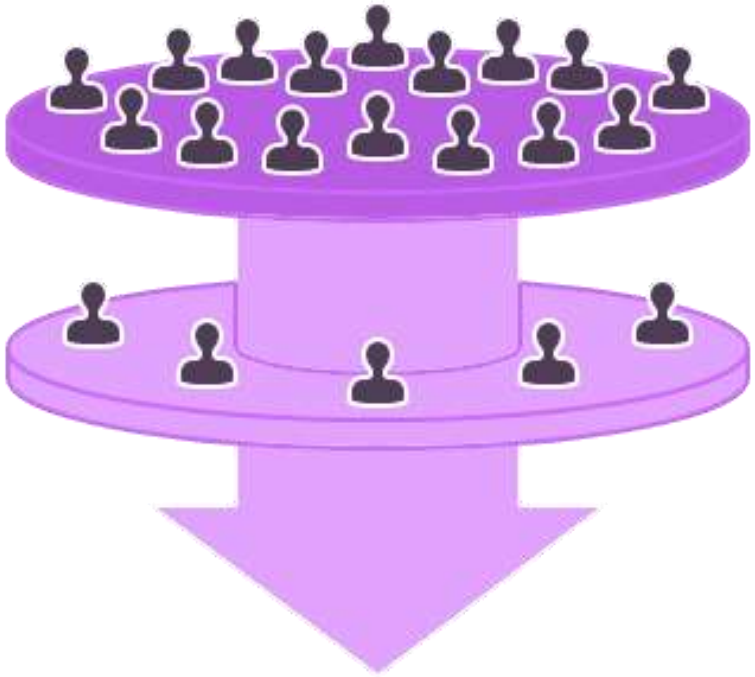
Regeneration

Continuous cycle of ATP production

Cellular Processes

Essential for powering various cellular activities

Enzyme Regulation in ATP Production



Allosteric Regulation

Covalent Modification

Made with Napkin

Factors Affecting ATP Production

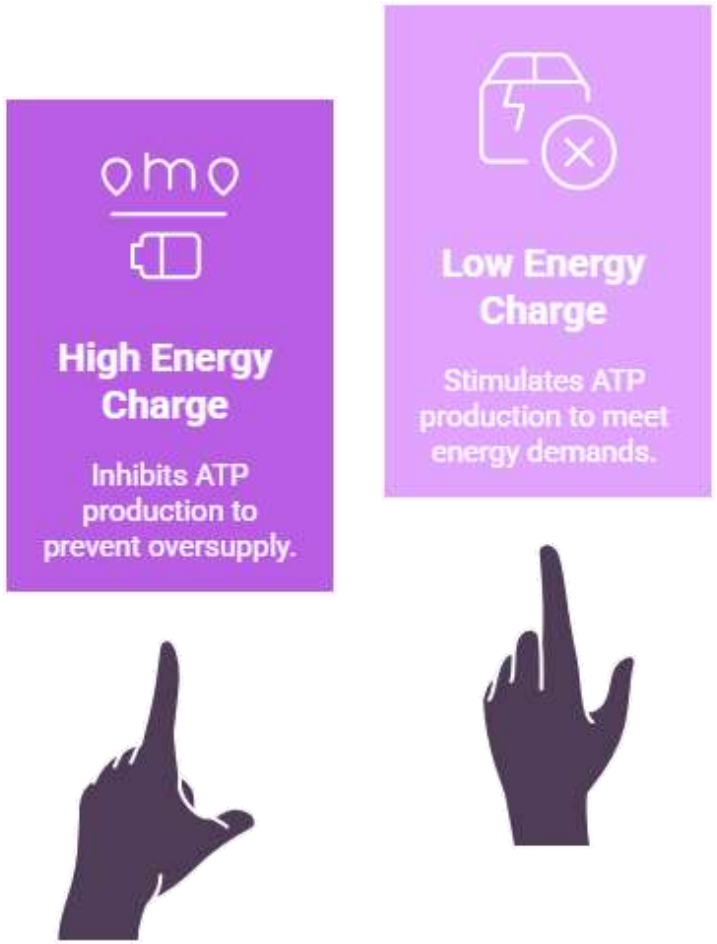
Glucose Availability

The presence of glucose is essential for ATP synthesis

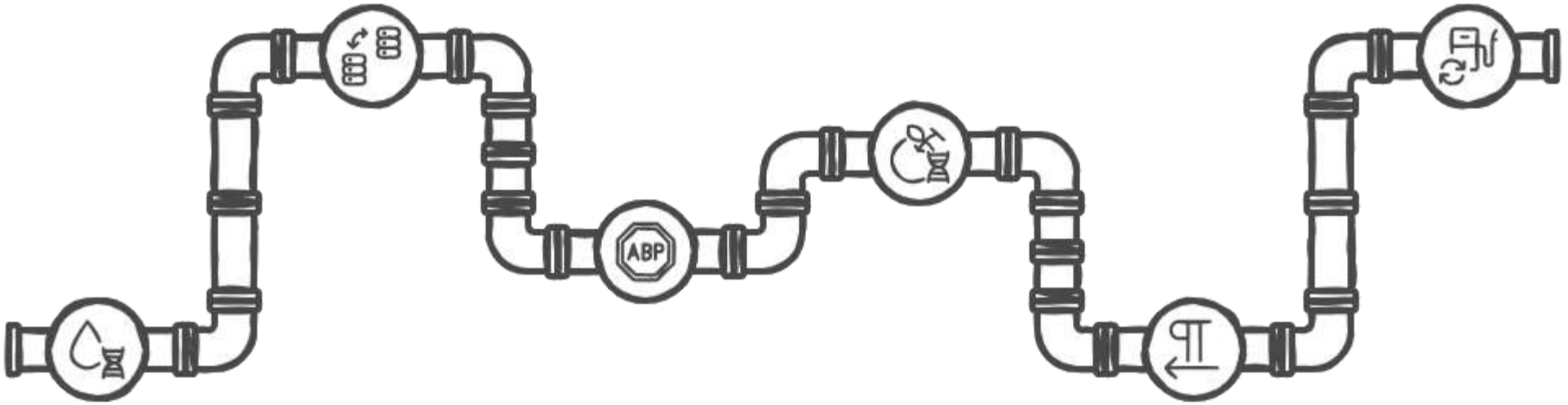
Oxygen Availability

Oxygen is required for efficient ATP production through aerobic respiration

How to adjust ATP production based on energy charge?



ATP Regeneration Cycle



01

ATP Hydrolysis

ATP is broken down into ADP and Pi

02

Energy Release

Energy is released for cellular functions

03

ADP and Pi Formation

ADP and Pi are formed as byproducts

04

Metabolic Pathways

Cellular respiration and photosynthesis regenerate ATP

05

ATP Regeneration

ATP is synthesized from ADP and Pi

06

Energy Storage

ATP stores energy for future use

ATP's Role in Nerve Impulse Propagation

Resting Membrane Potential Maintenance

ATP ensures the neuron's resting state

Ion Gradient Restoration

ATP restores ion balance after an action potential

Signal Transmission

ATP enables effective signal transmission

Nucleic Acid Synthesis

ATP provides energy for DNA and RNA formation

Protein Synthesis

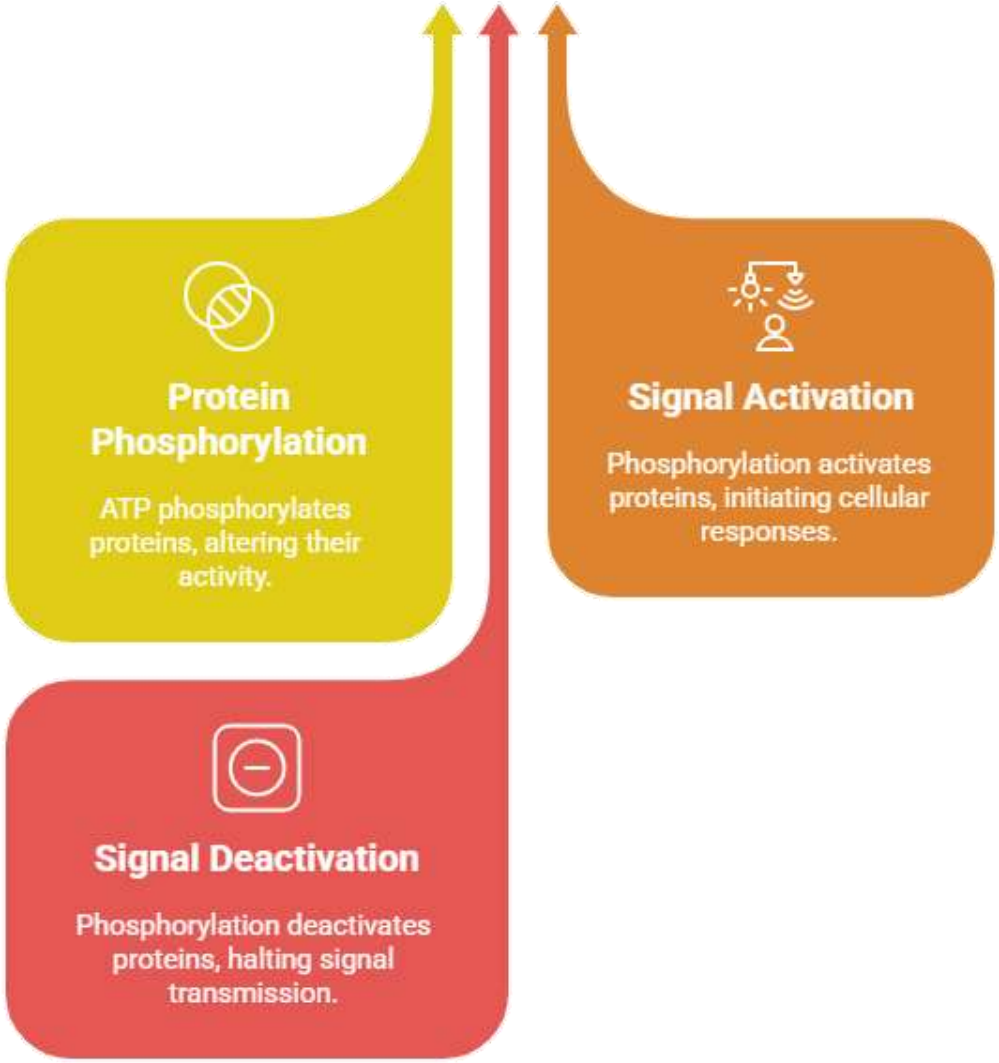
ATP attaches amino acids to tRNA molecules

Polysaccharide Synthesis

ATP fuels the creation of complex carbohydrates

ATP's Role in Biomolecule Synthesis

ATP's Role in Cellular Signaling



How does ATP facilitate molecular movement across cell membranes?

Active Transport

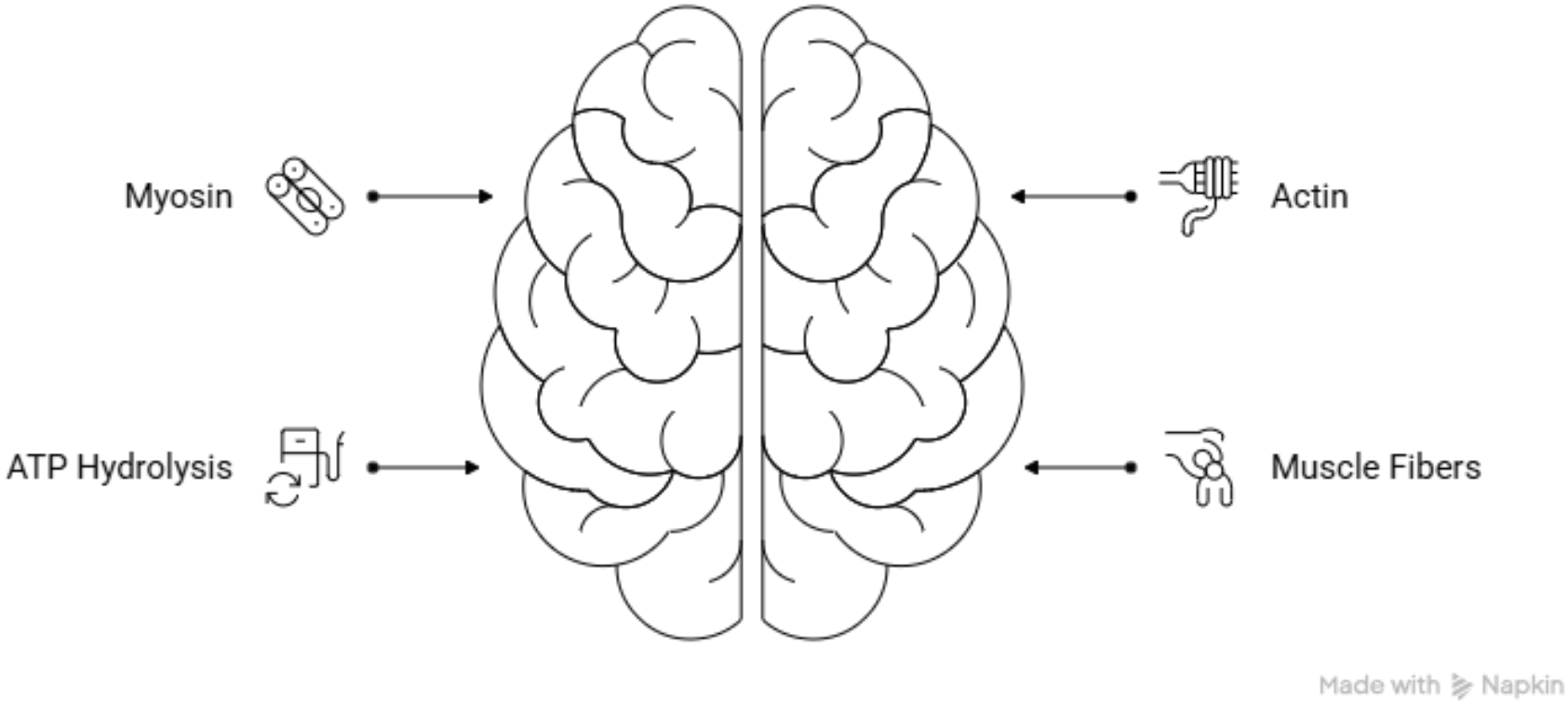
Moves molecules against concentration gradients

VS

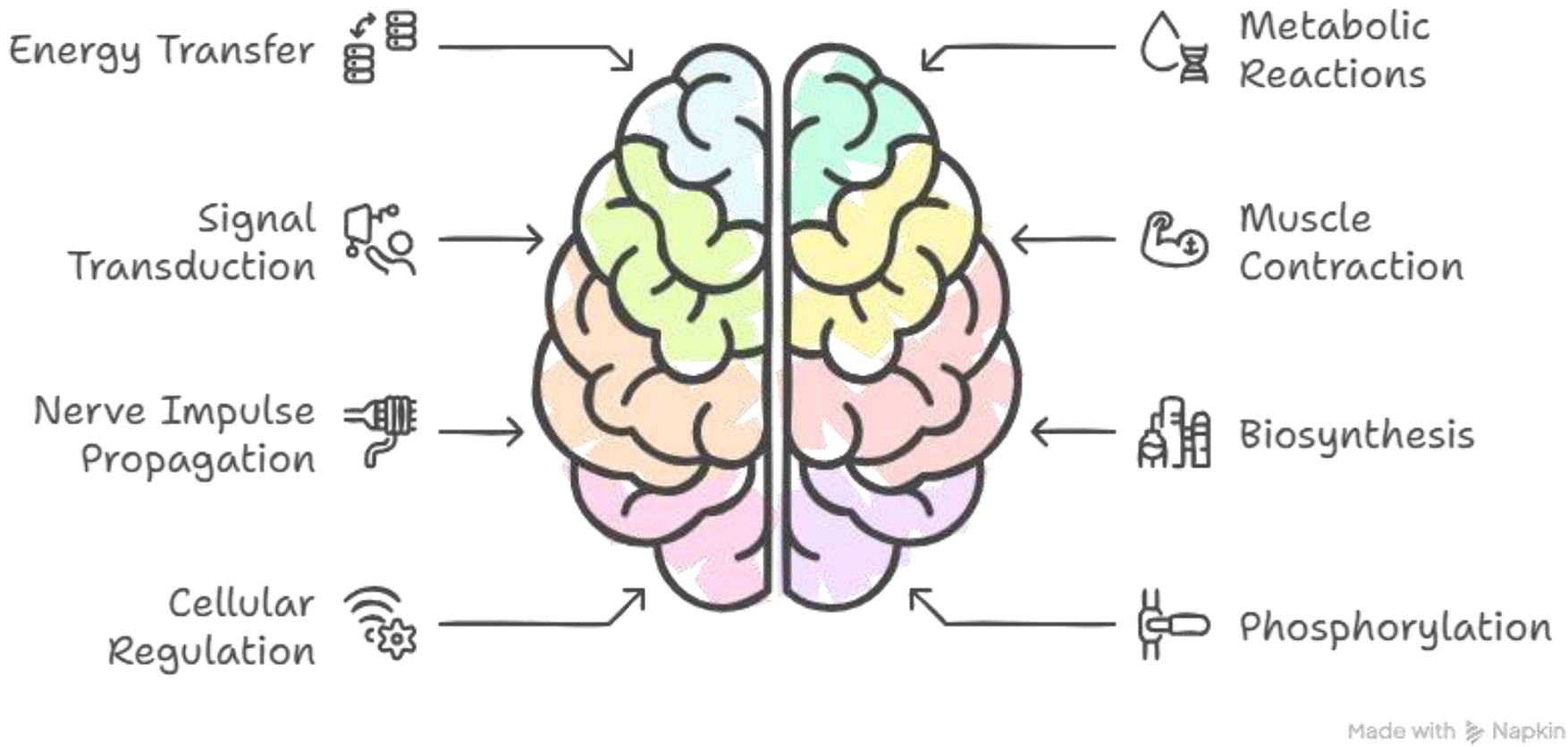
Sodium-Potassium Pump

Uses ATP to maintain ion balance

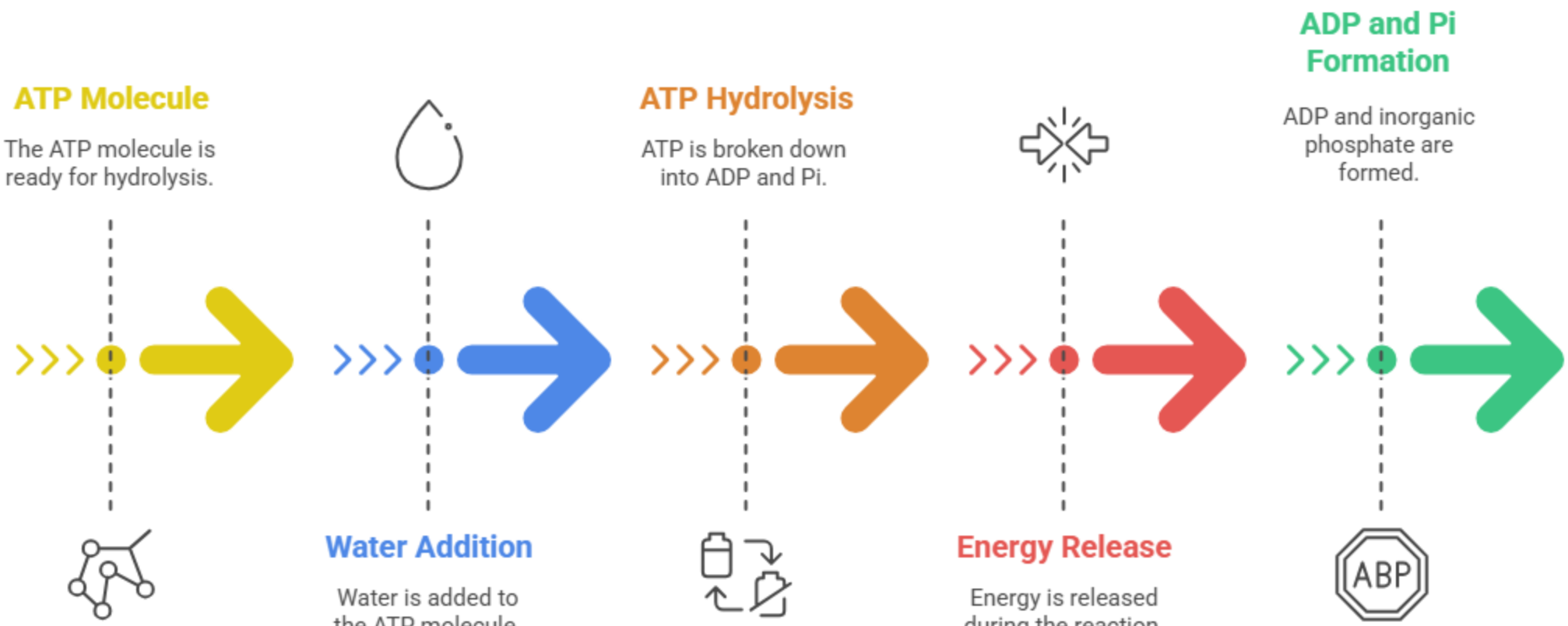
ATP's Role in Muscle Contraction



The Multifaceted Role of ATP

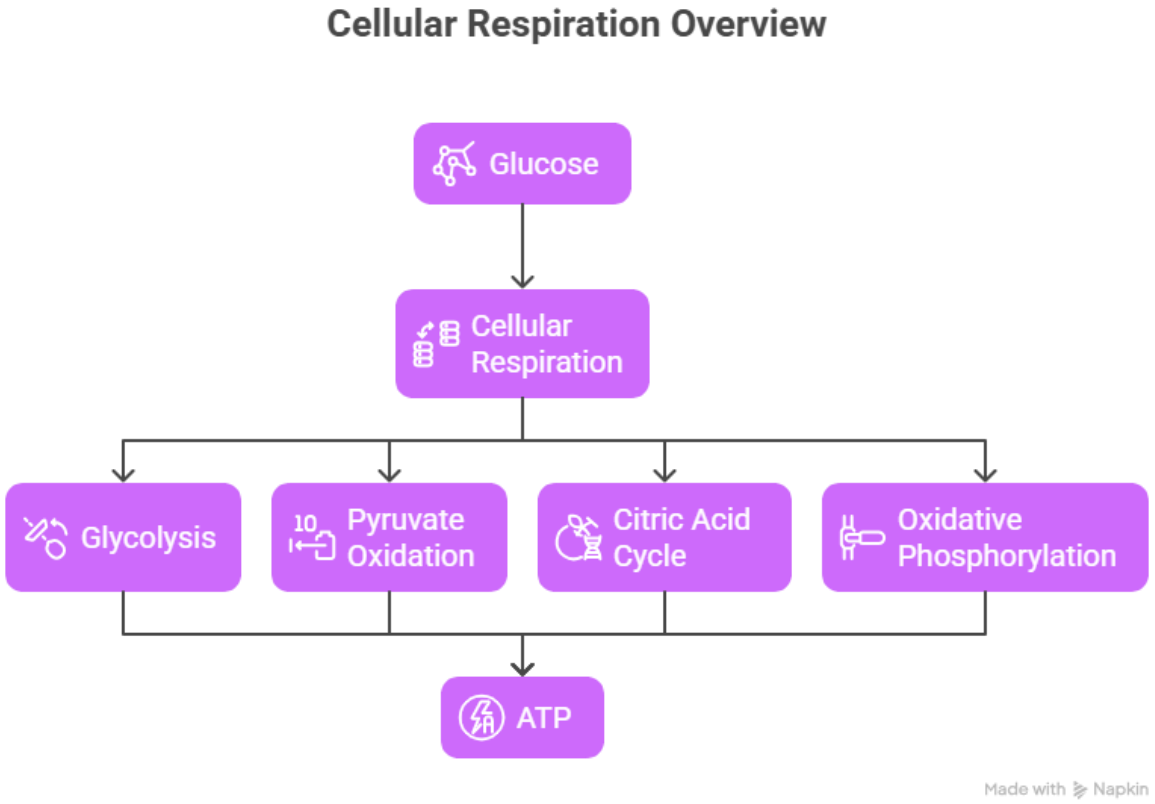


ATP Hydrolysis Process

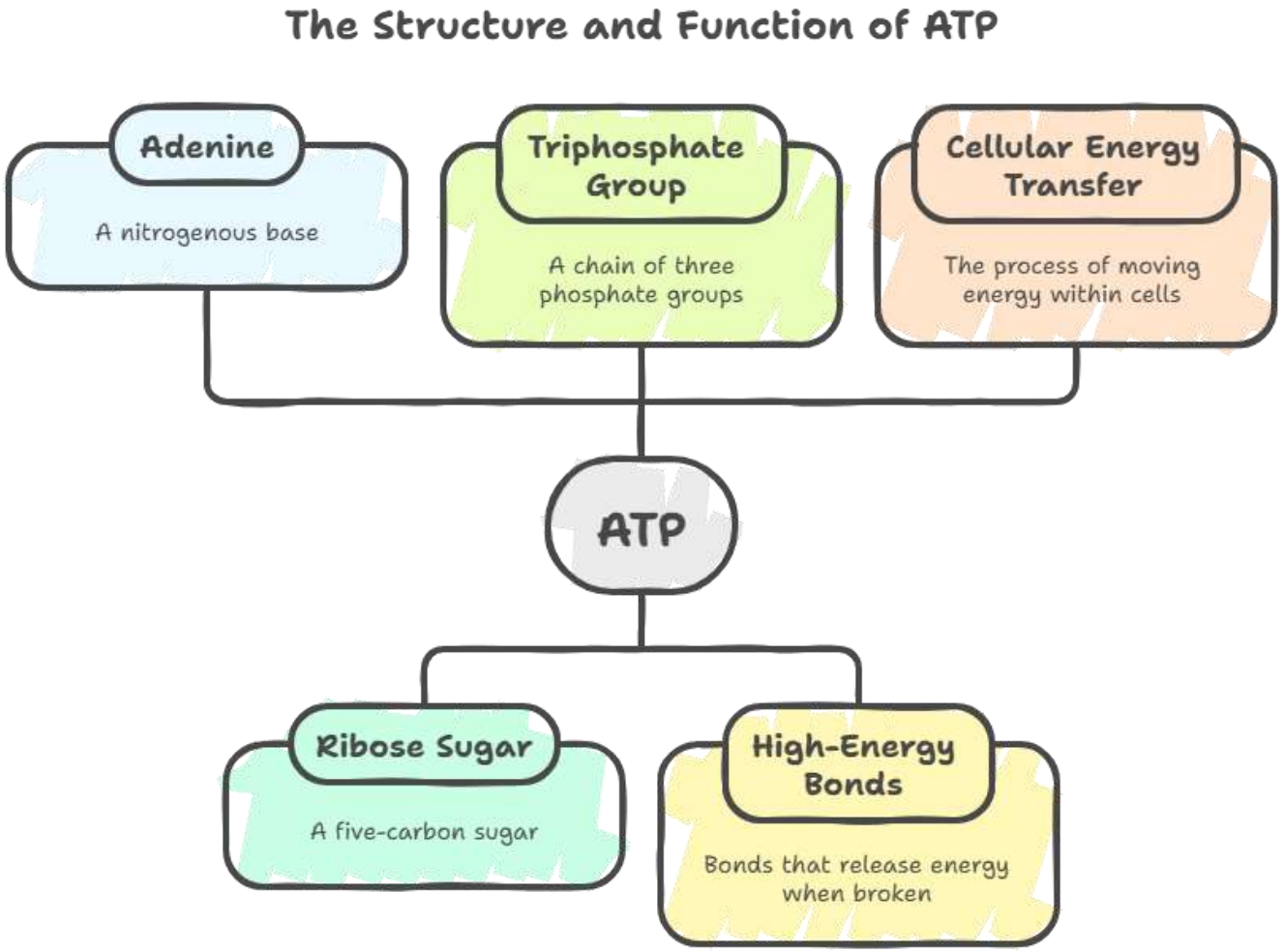


CLASS ASSESSMENTS

DRAW THE STRUCTURE OF ATP?



SUMMARY



REFERENCES

- ✓ Herpes review of biochemistry-Martin
- ✓ Text book of biochemistry- D. Satyanarayana
- ✓ Text book of clinical chemistry-Alex Kaplan & Laverve L szabo
- ✓ Principles of biochemistry-Lehninger
- ✓ Text book of biochemistry-Ramarao


thank you