Subject:- BIOCHEMISTRY

Title:- VITAMIN "B1" (Thiamine)

Presented by:-
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# Introduction:-

- Vitamin B1 is also called as the **Thiamine**
- It is a water-soluble vitamin
- It play a crucial role in carbohydrate metabolism and **energy Production**
- The active form of **Thiamine Pyrophosphate** (TPP)

  (also called as cocarboxylase)

# Structure of Thiamine

- Composed of:
  Pyrimidine ring
  Thiazole ring
- This are connected by a methylene bridge.

- This structure is essential for its **coenzyme active**

# Active Form (Coenzyme form)

- Thiamine+ATP→Thiamine Pyrophosphate (TPP)
- Thiamine is converted into TPP by the enzyme thiamine pyrophosphokinase.
- TPP is the biologically active form.

# Absorption, Transport & Storage of Thiamine

- **Absorption:-**
  - Occurs mainly in the small intestine (jejunum)
  - Low concentrations: active transport (carrier-mediated)
  - High concentrations: passive diffusion
  - Converted to active form (thiamine pyrophosphate – TPP) in tissues
- **Transport:-**
  - Circulates in blood bound to plasma proteins & RBCs
  - Delivered to tissues via active transport mechanisms
- **Storage:-**
  - Limited storage in the body (~25–30 mg total)
- Mainly stored in:-
  - Liver
  - Heart
  - Kidneys
  - Brain
- Rapid turnover → deficiency can develop quickly

# Source of Vitamin B1

- Whole grains (Brown rice, oats)
- Meat(especially pork)
- Nuts
- Pulses
- Yeast

# Daily Requirement

- Adults:- 1.1-1.2 mg per day
- Increased need for:

  Pregnant women

  Lactating mothers

  People with high carbohydrates diets

# Deficiency of Thiamine

- Causes:

  Poor nutrition

  Chronic Alcoholism

  Malabsorption

- Diseases:

1} Beriberi

- Dry beriberi-peripheral neuropathy
- Wet beriberi-cardiac failure, edema

2} Wernicke-Korsakoff Syndrome

- Common in alcoholics
- Symptoms:-

  Confusion

  Memory loss

# Biochemical Basis of Deficiency

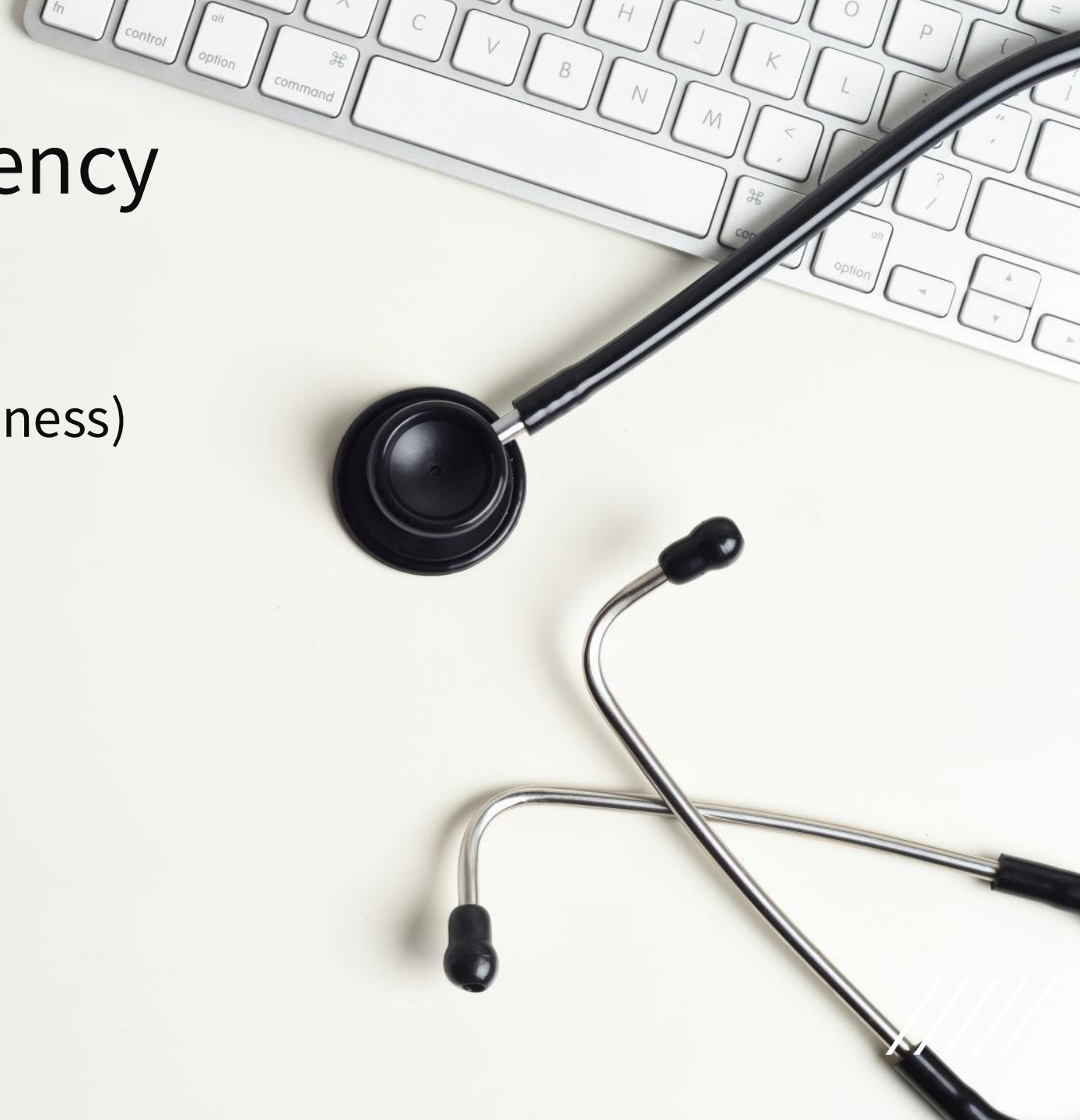
- Impaired ATP production
- Accumulation of:

  Pyruvate

  Lactate → leads to lactic acidosis
- Brain and heart are most affected (high energy demand)

# Symptoms of Deficiency

- Fatigue and weakness
- Nerve damage(tingling, numbness)
- Muscle loss
- Confusion memory issues
- Heart problems

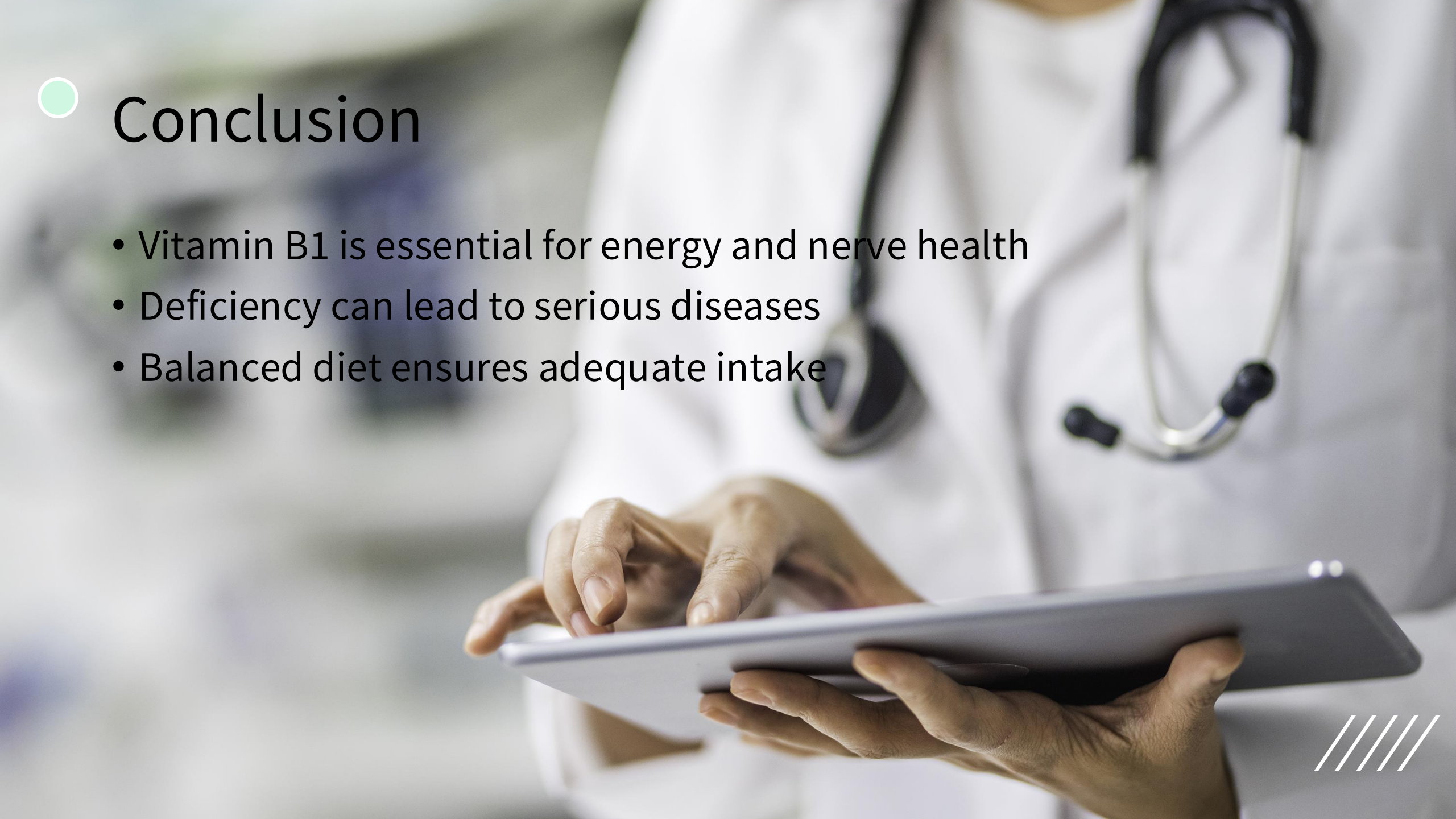


# Biochemical Functions of Thiamine

- Acts as Thiamine Pyrophosphate (TPP) – active coenzyme form
- Essential for carbohydrate metabolism and energy production
- Coenzyme in key enzyme systems:
- Pyruvate dehydrogenase (glycolysis → Krebs cycle)
- α-Ketoglutarate dehydrogenase (Krebs cycle)
- Transketolase (Pentose phosphate pathway)
- Supports ATP generation in cells
- Crucial for normal nerve function (neurotransmitter synthesis & conduction)
- Helps in fat and protein metabolism (indirect role)

# Conclusion

- Vitamin B1 is essential for energy and nerve health
- Deficiency can lead to serious diseases
- Balanced diet ensures adequate intake

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