

WATER SOLUBLE VITAMIN.

1. THIAMINE [VITAMIN B₁]

- Aneurine or Antiberiberi factor.

- Source - The aleurone layer of cereals are rich in thiamine. [food grains]

Yeast is also very good source.

→ Thiamine partially destroyed by heat.

- Structure -

Substitute Pyrimidine Ring - Methylene Bridge - Substitute Thiazole Ring

Thiamine

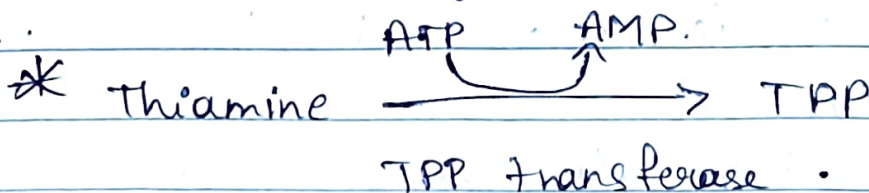
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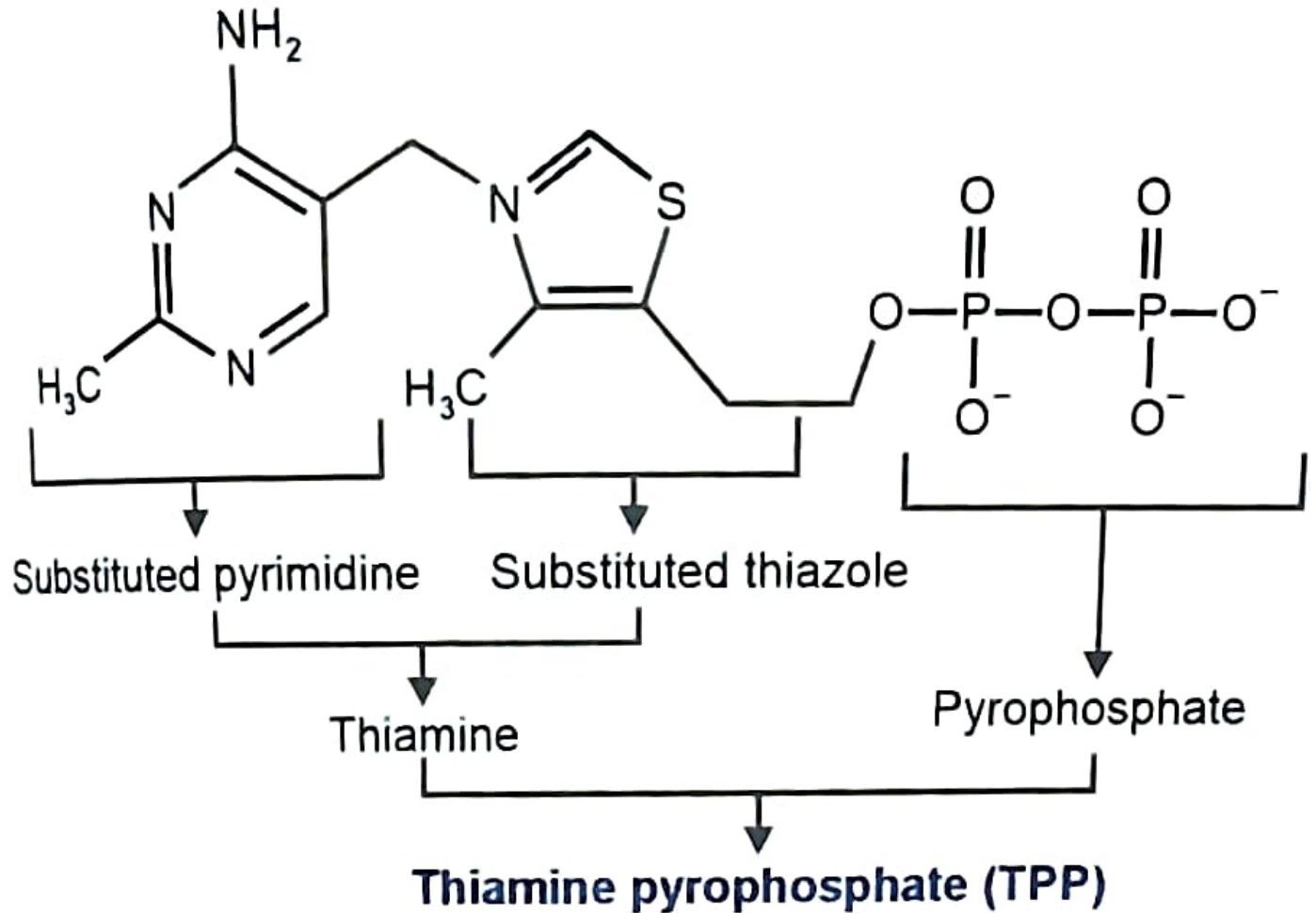
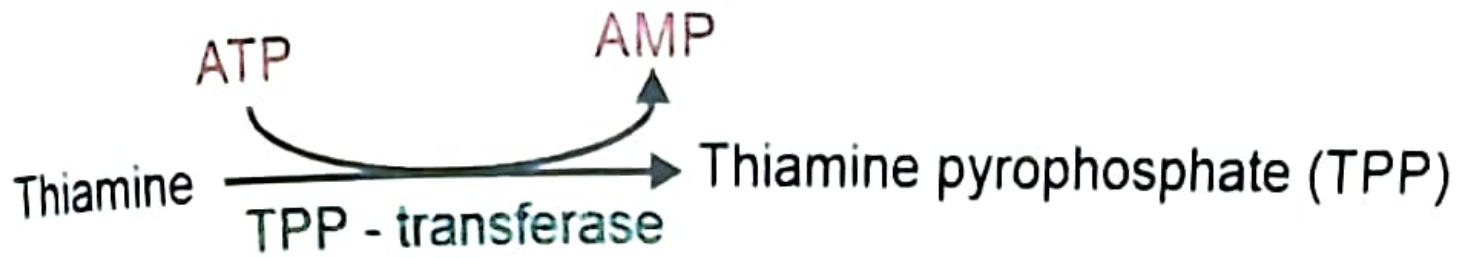
2 Phosphate groups

↓

Thiamine Pyrophosphate [TPP]

[Active Coenzyme form of Thiamine]





→ ROLE OF THIAMINE :-

1. Pyruvate Dehydrogenase Complex

- TPP is a coenzyme.

2. α Ketodehydrogenase in TCA cycle

- TPP is a coenzyme.

3. Transketolase in HMP shunt Pathway.

- Requirement of thiamine ↑ with high intake of carbohydrate.

> DEFICIENCY :-

1. BeriBeri -

Symptoms (early) - Anorexia, dyspepsia, heaviness, weakness, exhaustion.

Types of BeriBeri :-

(i) Wet beriBeri - CVS manifest prominent with edema, palpation, breathlessness, distend neck vein. Death due to heart failure.

(ii) Dry beriBeri - CNS manifest with walking difficult. Peripheral neuritis.

(iii) Infantile beriBeri - Infants born to thiamine deficient mother. Restlessness and Breathlessness.

(iv) Wernicke-Korsakoff Syndrome i.e Cerebral beriBeri
Encephalopathy & psychosis.

2. Polyneuritis.

- Common in chronic alcoholic.
- Alcohol inhibits absorption of thiamine \rightarrow accumulation of pyruvate, lactate leads to lactic acidosis.
- Impaired conversion of pyruvate \rightarrow Acetyl CoA.

\rightarrow Thiamine Deficiency manifest
 \downarrow
 Horizontal ridges in nail.

High Performance
 liquid chroma-
 tography

* Biochemical Findings:-

Blood thiamine \downarrow (low) \rightarrow by HPLC method

Pyruvate, α ketoglutarate, lactate \uparrow (high).

* RDA (Recommended Daily Allowance).

\Rightarrow 1-1.5 mg/day

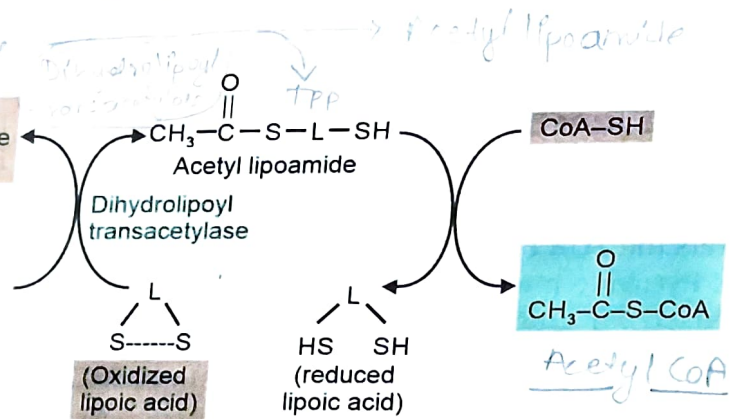
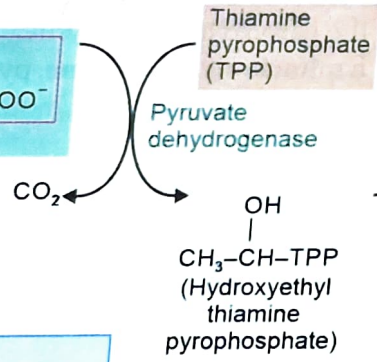
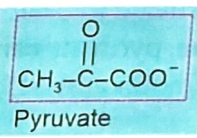
- * Thiamine supplements given in chronic alcoholism, i.e. alcoholic polyneuritis, beriberi, neuritis of pregnancy and old age.

(Fig. 8.19): A similar enzyme complex brings about

the synthesis of

TP = Pyruvate

PPH



Summary:

Pyruvate $\xrightarrow{\text{Pyruvate dehydrogenase}}$ Acetyl-CoA

CoA-SH CO₂ NAD⁺ NADH+H⁺

Fig. 8.19: Details of pyruvate dehydrogenase reaction. See the summary in the inset.

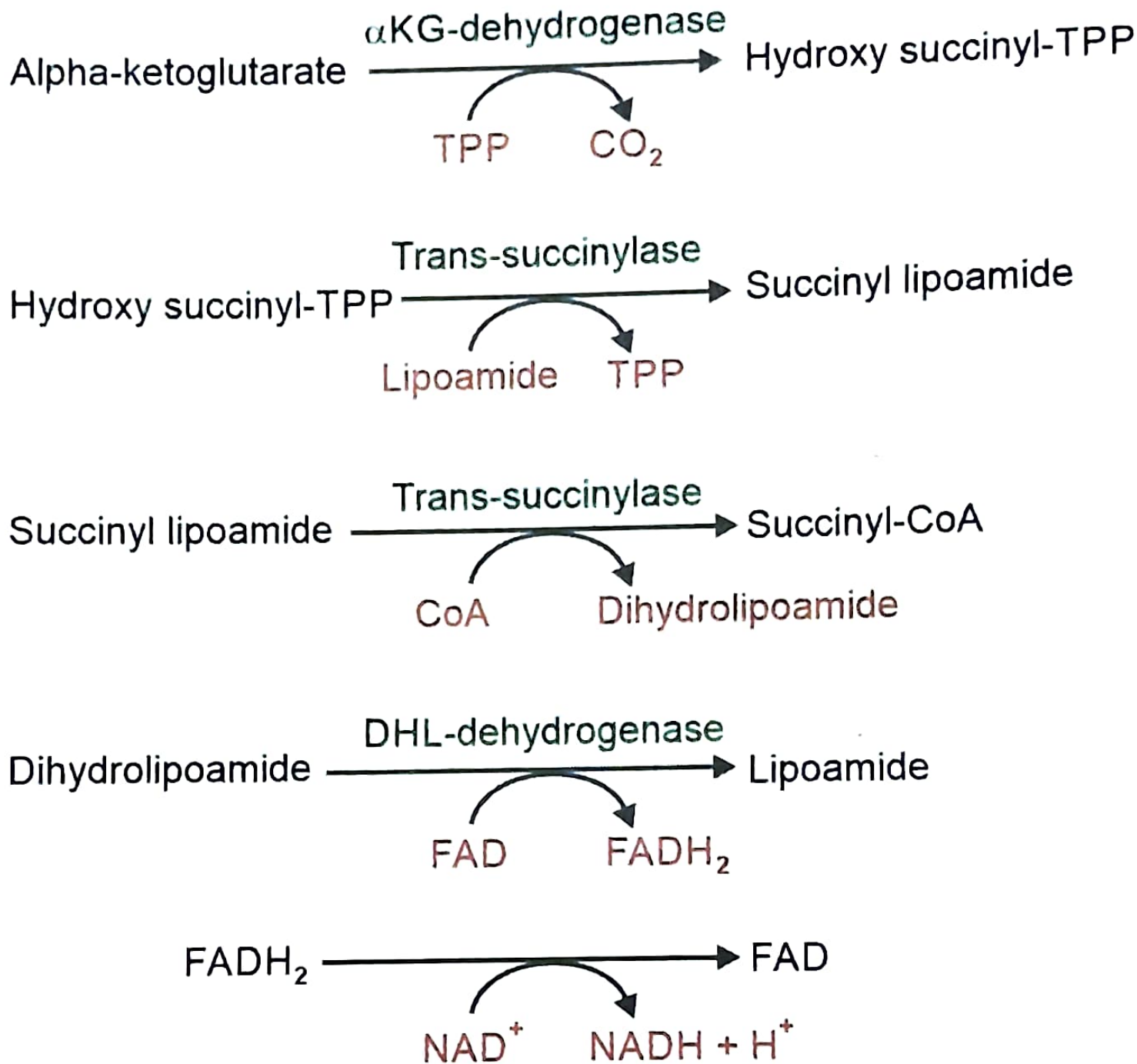
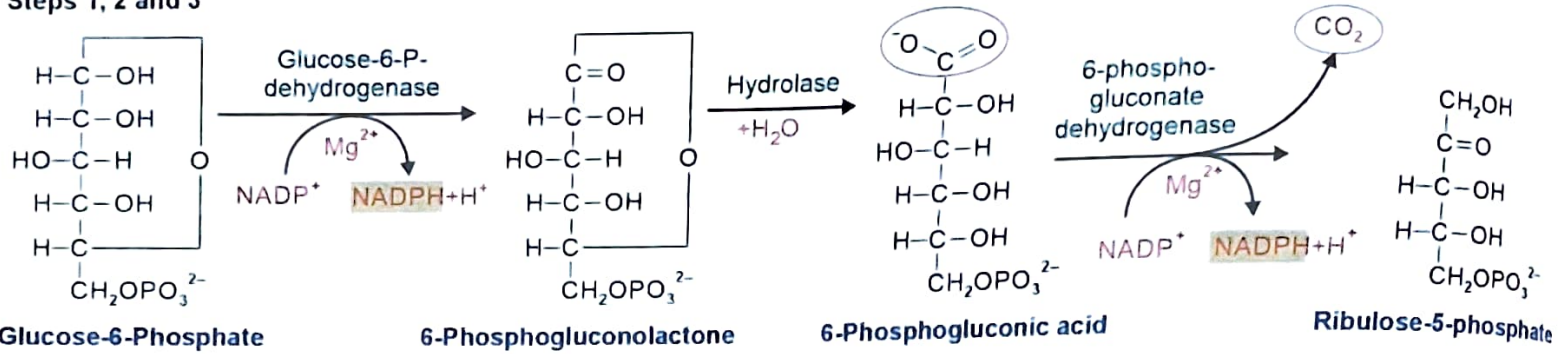
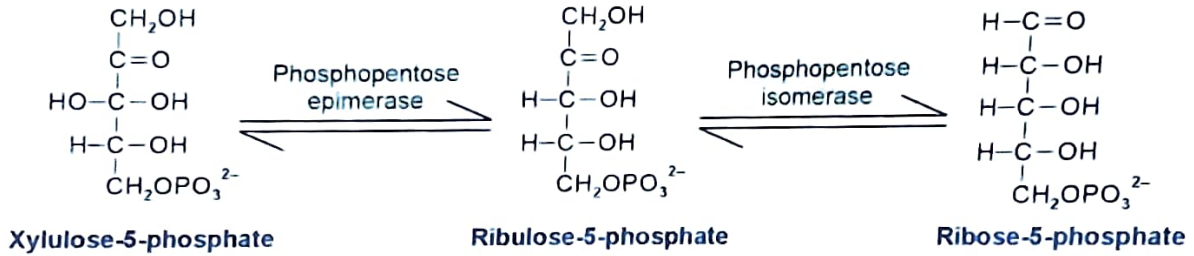


Fig. 7.7: Alpha-ketoglutarate dehydrogenase reaction; compare it with **Fig. 8.19**.

**Oxidative phase:
Steps 1, 2 and 3**



**Nonoxidative phase:
Step 4**



Step 5: First transketolase reaction

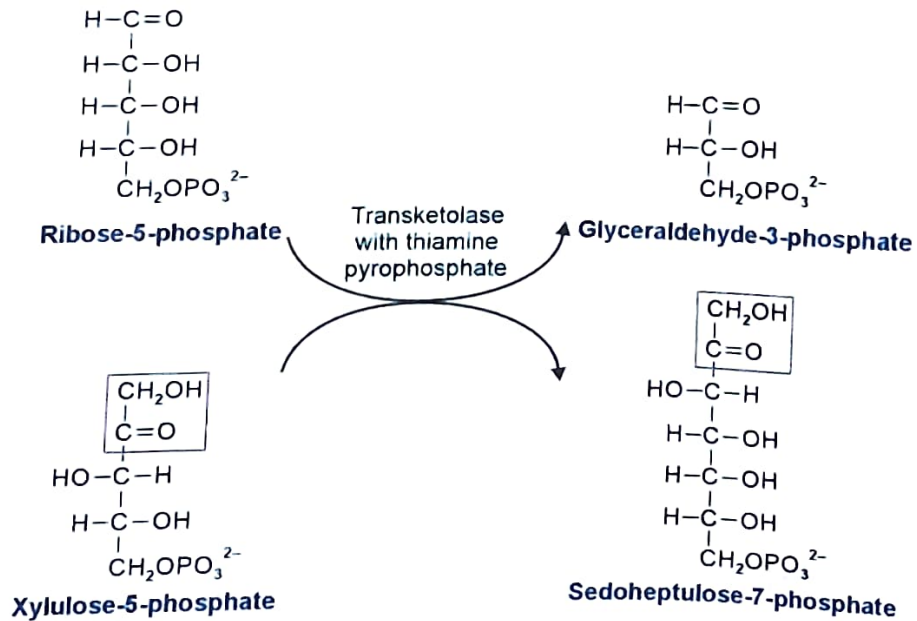


Fig. 8.38: HMP shunt pathway. Steps 1, 2 and 3 are the oxidative phase. NADPH is generated in steps 1 and 3. Step 4 shows epimerase and isomerase reactions. Step 5 is the first transketolase reaction.