

# **TEMA 25**

**Metabolismo del piruvato.**

**Fermentaciones.**

**Descarboxilación oxidativa:**

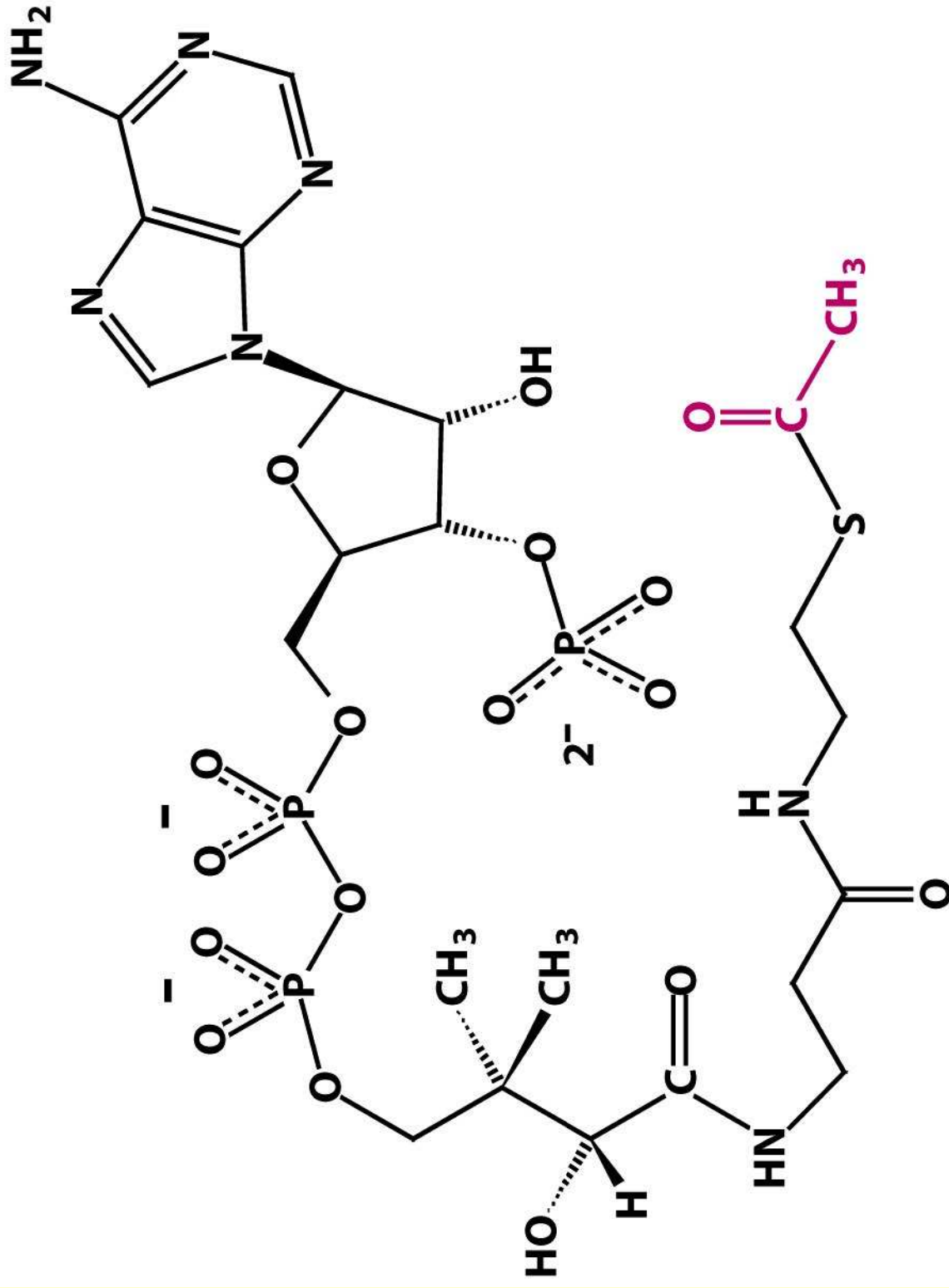
**Piruvato deshidrogenasa.**

# TEMA 24

**Las Figuras recogidas en este tema proceden de los siguientes textos:**

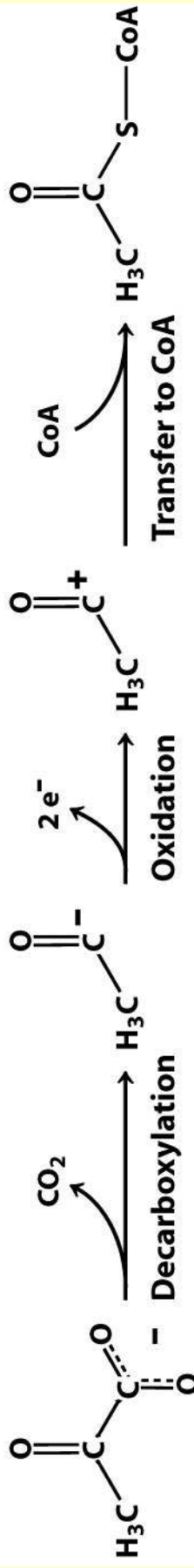
**- Berg • Tymoczko • Stryer. Biochemistry. Sixth Edition. 2007. W. H. Freeman and Company.**

**- Donald Voet • Judith G. Voet • Charlotte W. Pratt. Fundamentals of Biochemistry. Second Edition. 2006 by John Wiley & Sons, Inc.**



## Acetyl coenzyme A (Acetyl CoA)

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**Pyruvate**

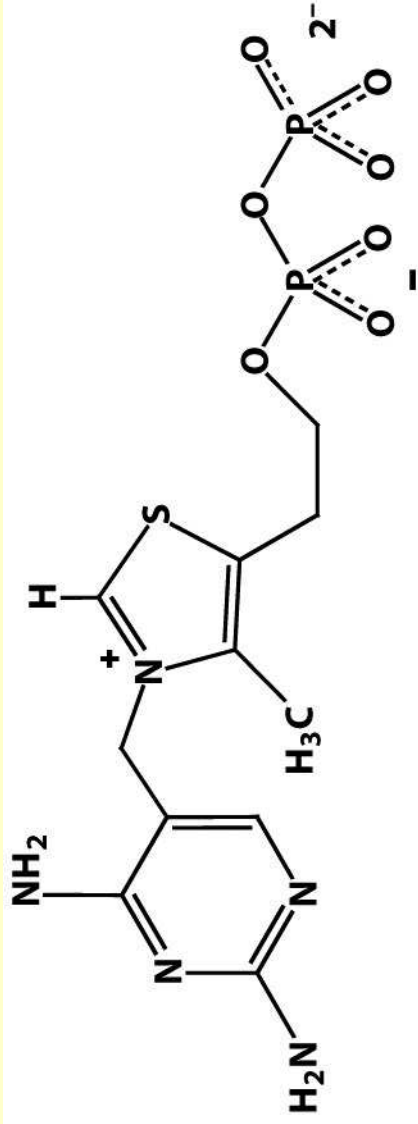
**Acetyl CoA**

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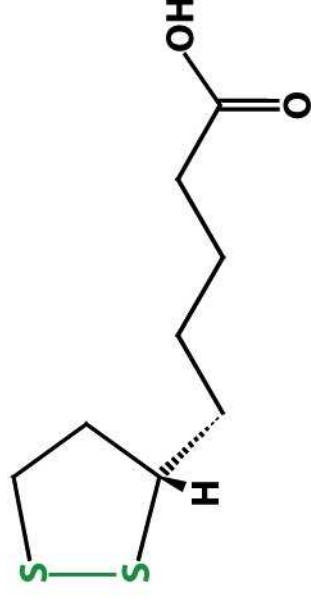
**TABLE 17.1 Pyruvate dehydrogenase complex of *E. coli***

<b>Enzyme</b>	<b>Abbreviation</b>	<b>Number of chains</b>	<b>Prosthetic group</b>	<b>Reaction catalyzed</b>
<b>Pyruvate dehydrogenase component</b>	<b>E<sub>1</sub></b>	<b>24</b>	<b>TPP</b>	<b>Oxidative decarboxylation of pyruvate</b>
<b>Dihydrolipoyl transacetylase</b>	<b>E<sub>2</sub></b>	<b>24</b>	<b>Lipoamide</b>	<b>Transfer of acetyl group to CoA</b>
<b>Dihydrolipoyl dehydrogenase</b>	<b>E<sub>3</sub></b>	<b>12</b>	<b>FAD</b>	<b>Regeneration of the oxidized form of lipoamide</b>

Table 17-1  
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**Thiamine pyrophosphate (TPP)**



**Lipoic acid**

**Table 16-1 The Coenzymes and Prosthetic Groups of Pyruvate Dehydrogenase**

Cofactor	Location	Function
Thiamine pyrophosphate (TPP)	Bound to E <sub>1</sub>	Decarboxylates pyruvate yielding a hydroxyethyl-TPP carbanion
Lipoic acid	Covalently linked to a Lys on E <sub>2</sub> (lipoamide)	Accepts the hydroxyethyl carbanion from TPP as an acetyl group
Coenzyme A (CoA)	Substrate for E <sub>2</sub>	Accepts the acetyl group from lipoamide
Flavin adenine dinucleotide (FAD)	Bound to E <sub>3</sub>	Reduced by lipoamide
Nicotinamide adenine dinucleotide (NAD <sup>+</sup> )	Substrate for E <sub>3</sub>	Reduced by FADH <sub>2</sub>

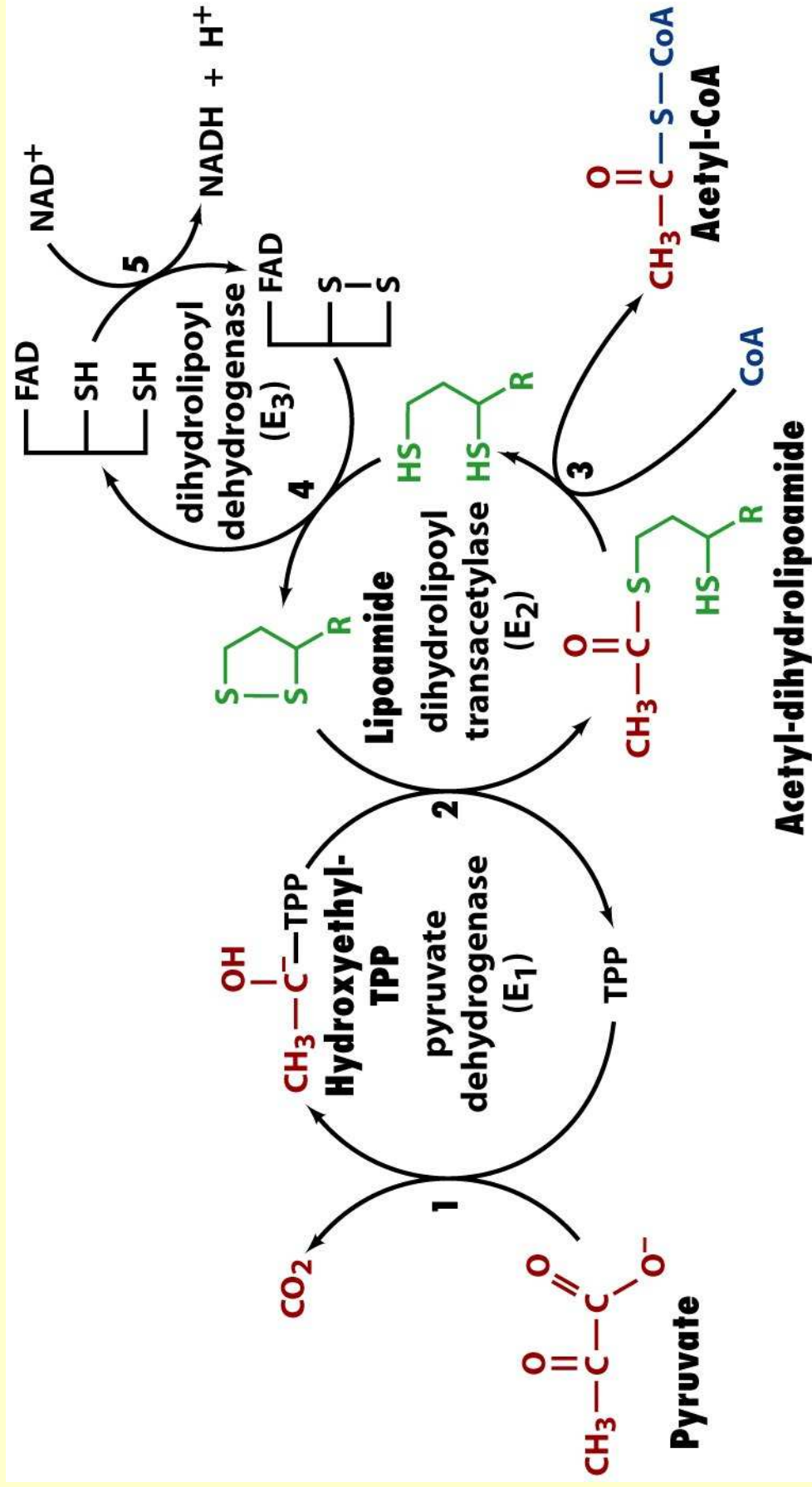
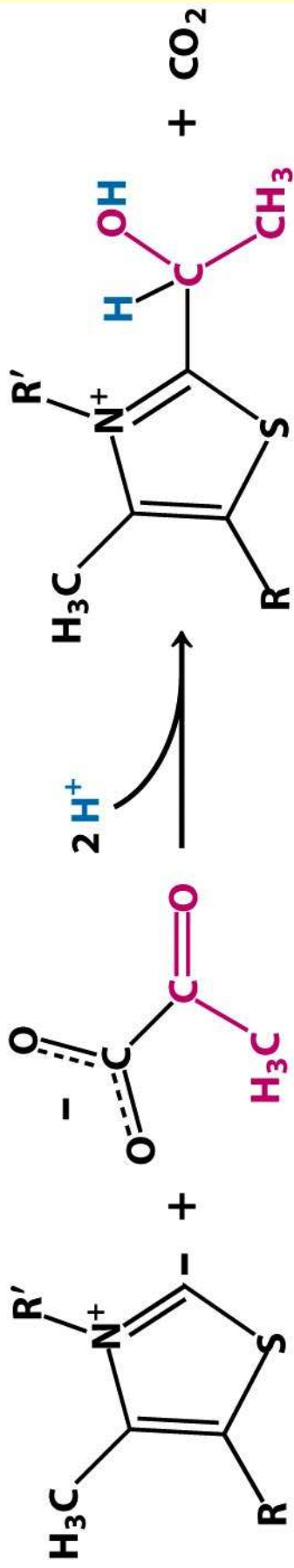


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**Carbanion  
of TPP**

**Pyruvate**

**Hydroxyethyl-TPP**

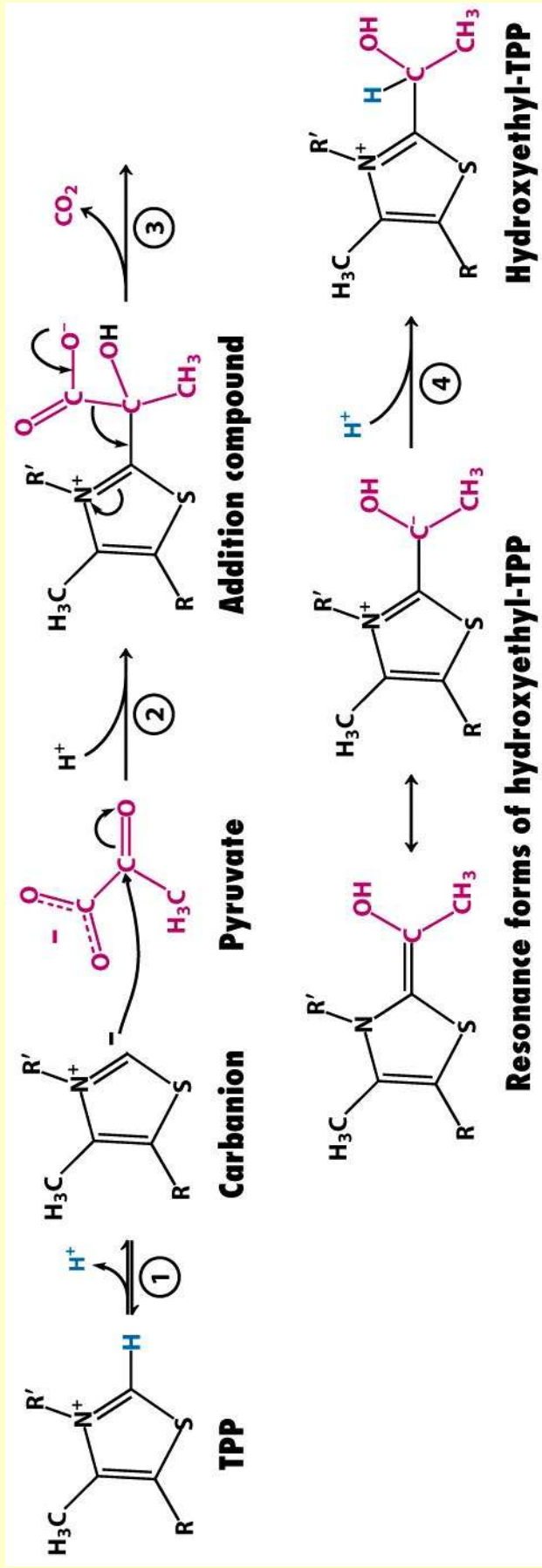


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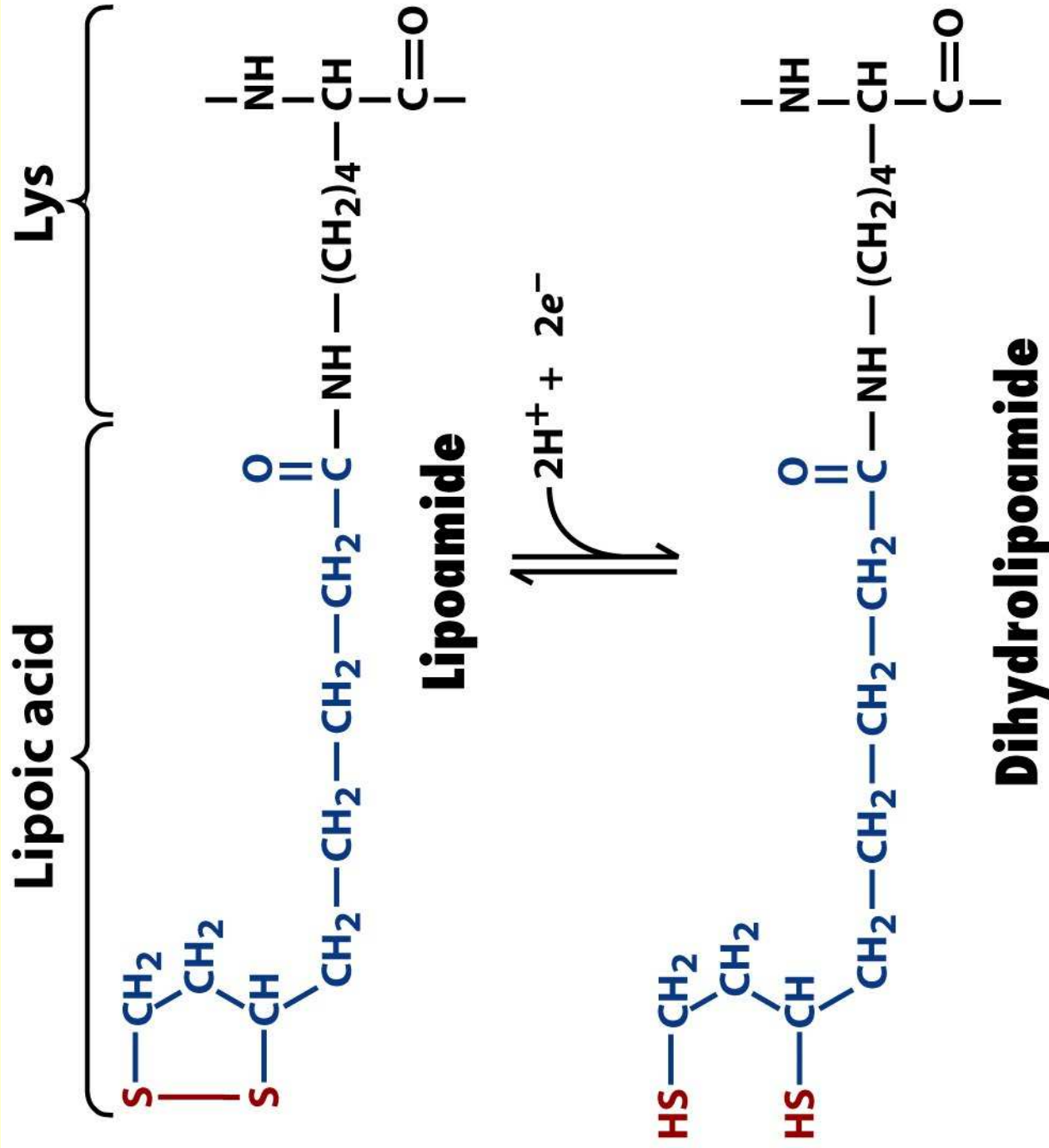
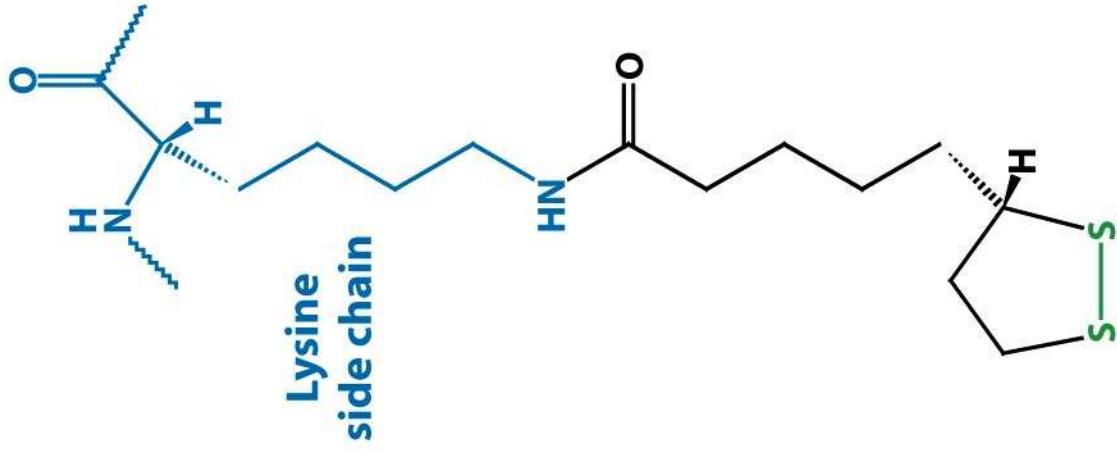


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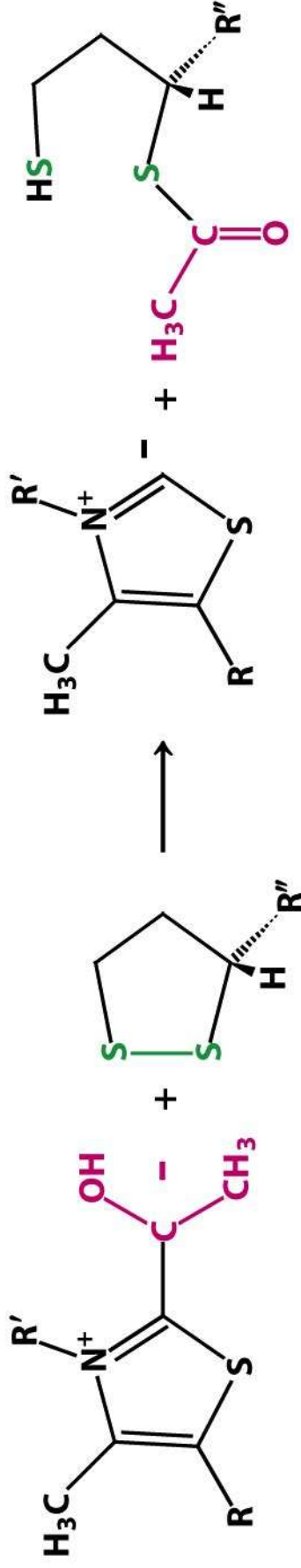


Lysine  
side chain

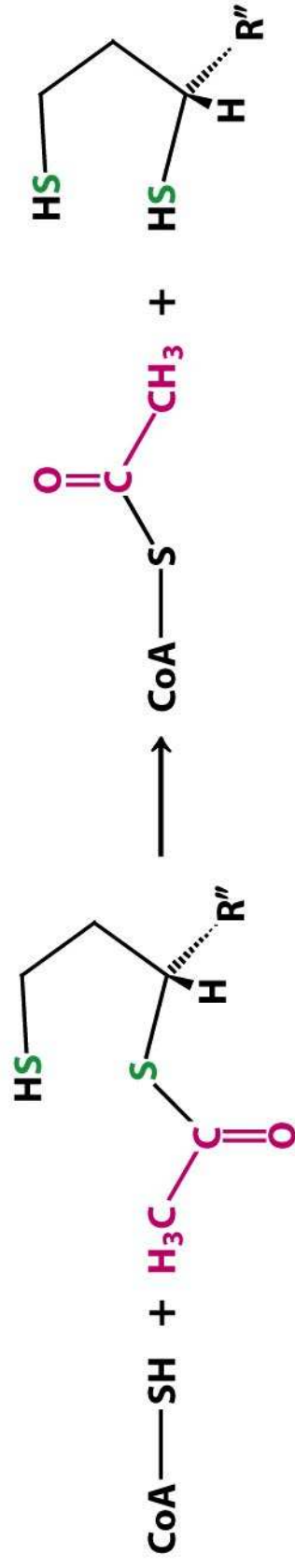
Reactive disulfide bond

## Lipoamide

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**Hydroxyethyl-TPP (ionized form)**      **Lipoamide**      **Carbanion of TPP**      **Acetyl-lipoamide**



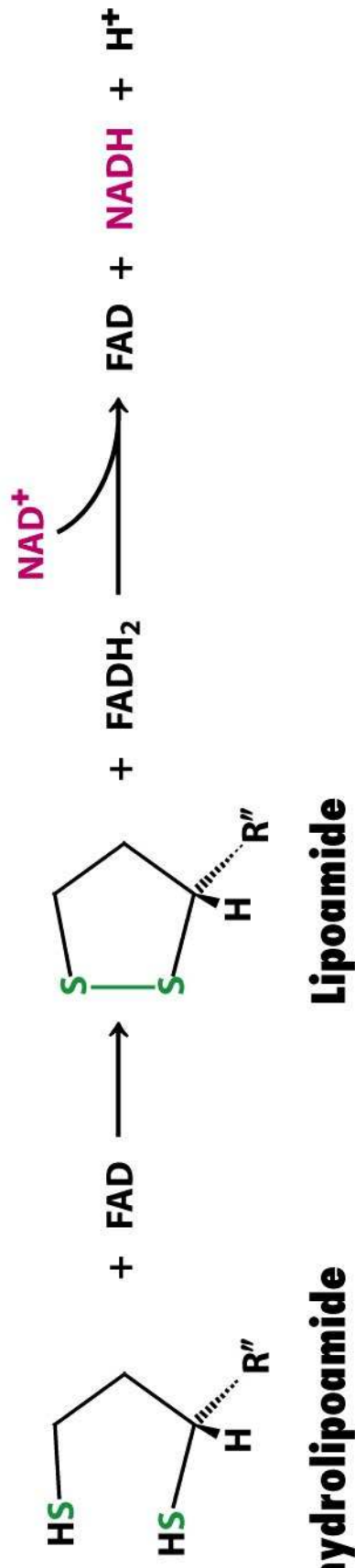
**Coenzyme A    Acetylipoamide**

**Acetyl CoA**

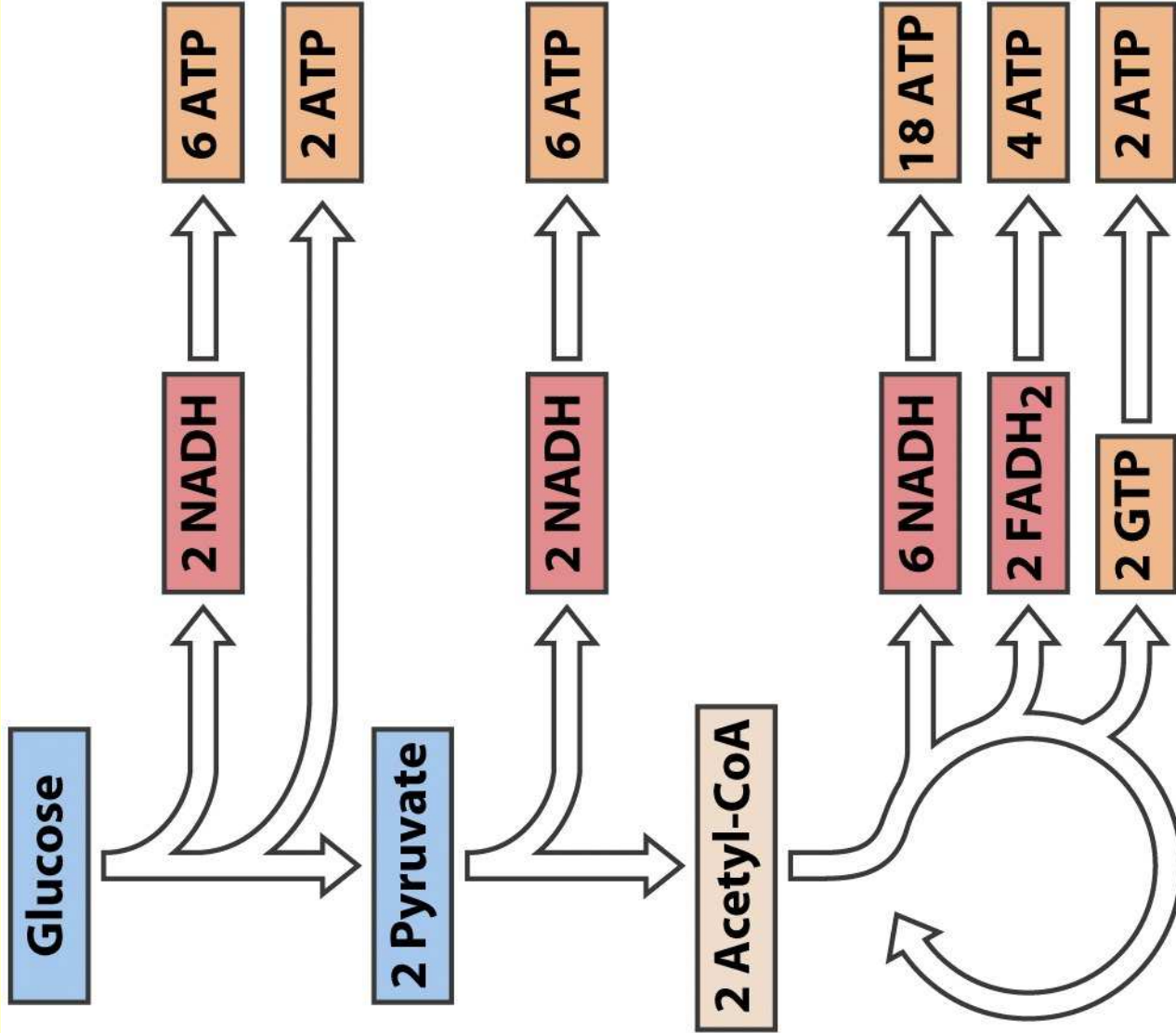
**Dihydrolipoamide**

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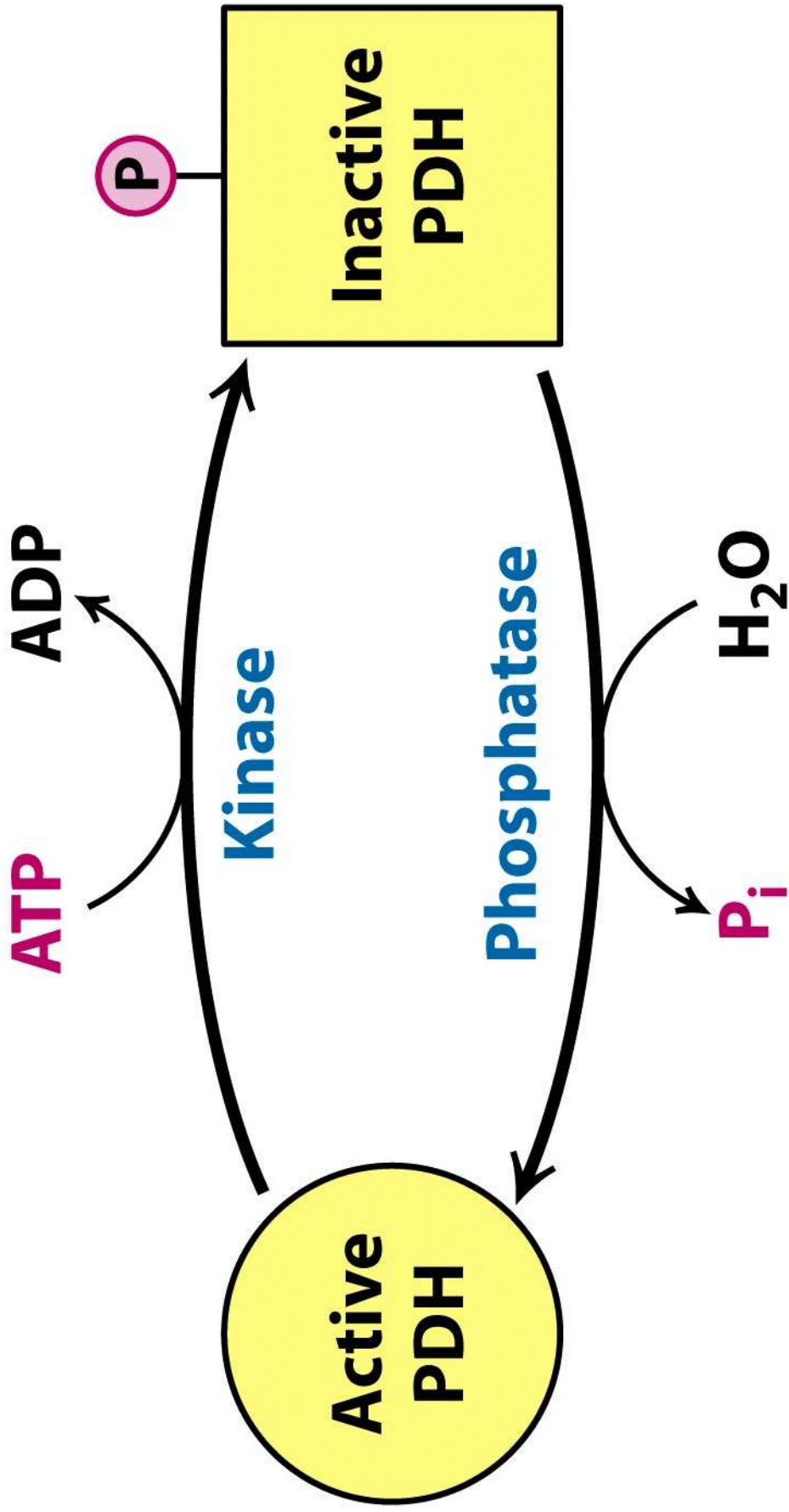
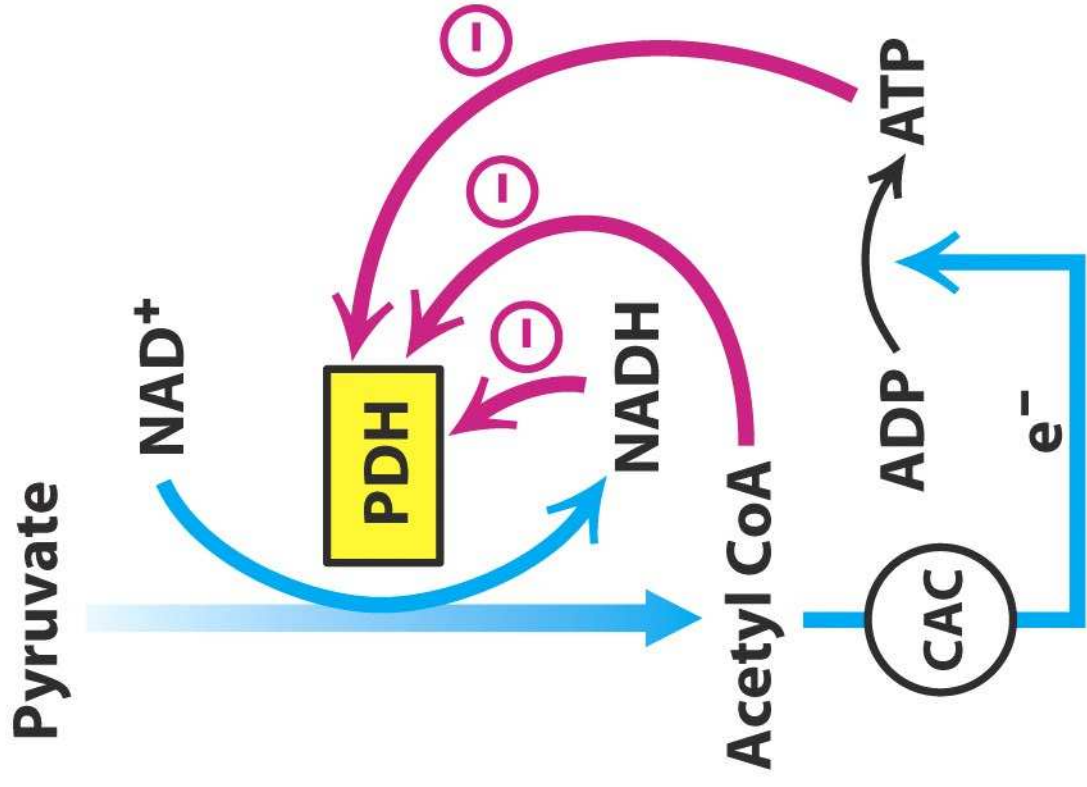


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### (A) HIGH ENERGY CHARGE



### (B) LOW ENERGY CHARGE

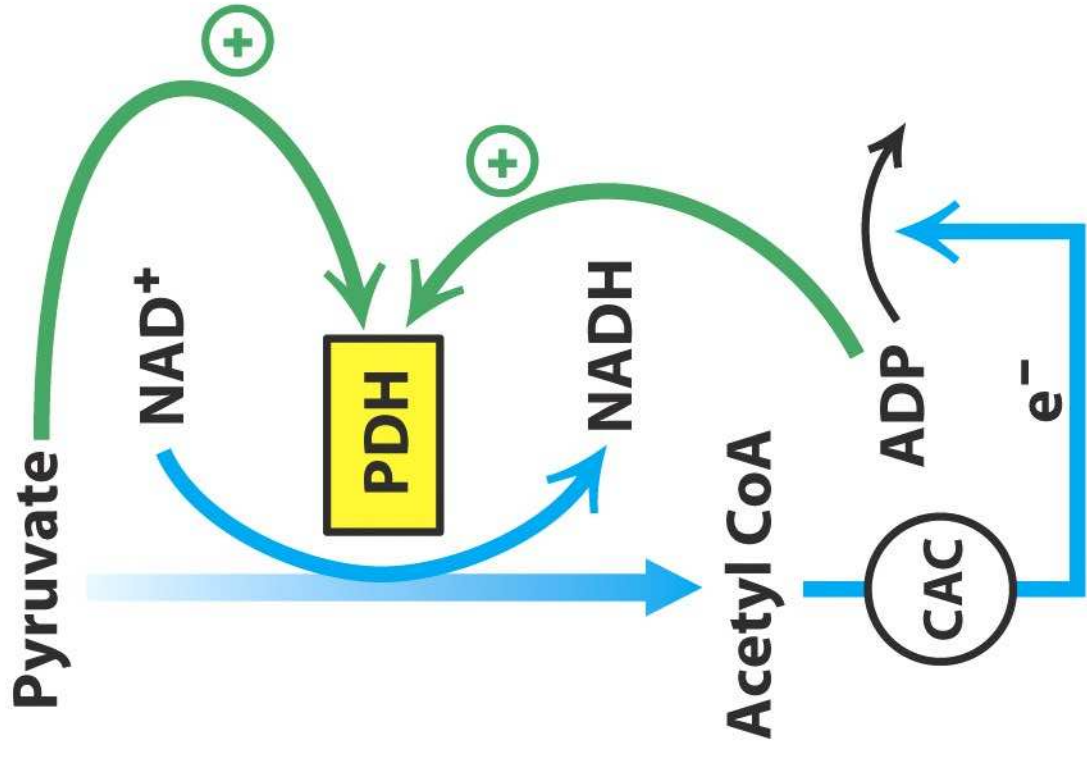


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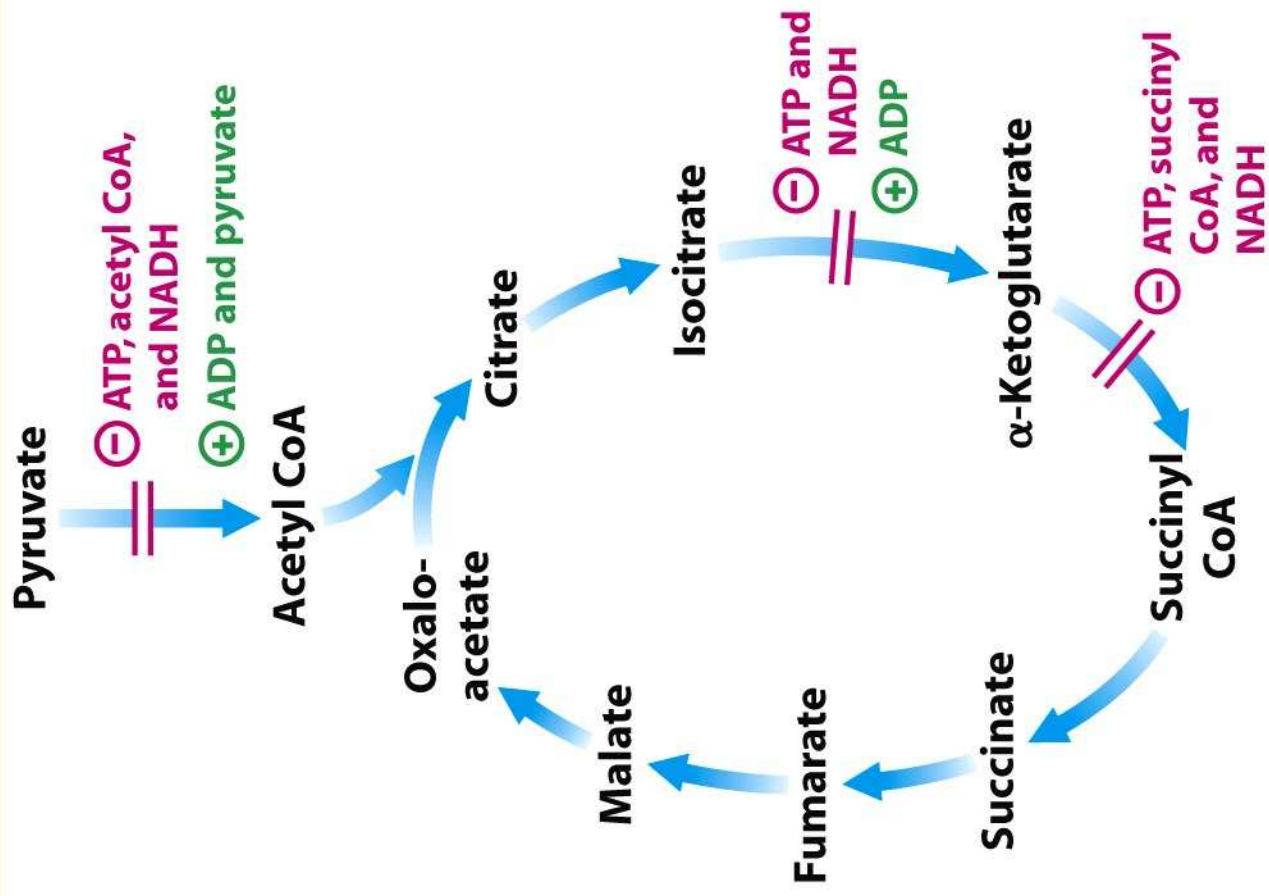


Figure 17-19  
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