Pyruvate Dehydrogenase Complex

Pyruvate Dehydrogenase (PDH)

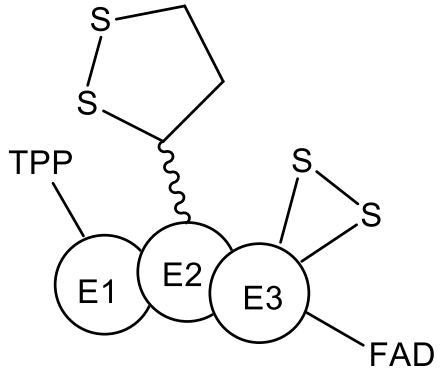
Overall Reaction:

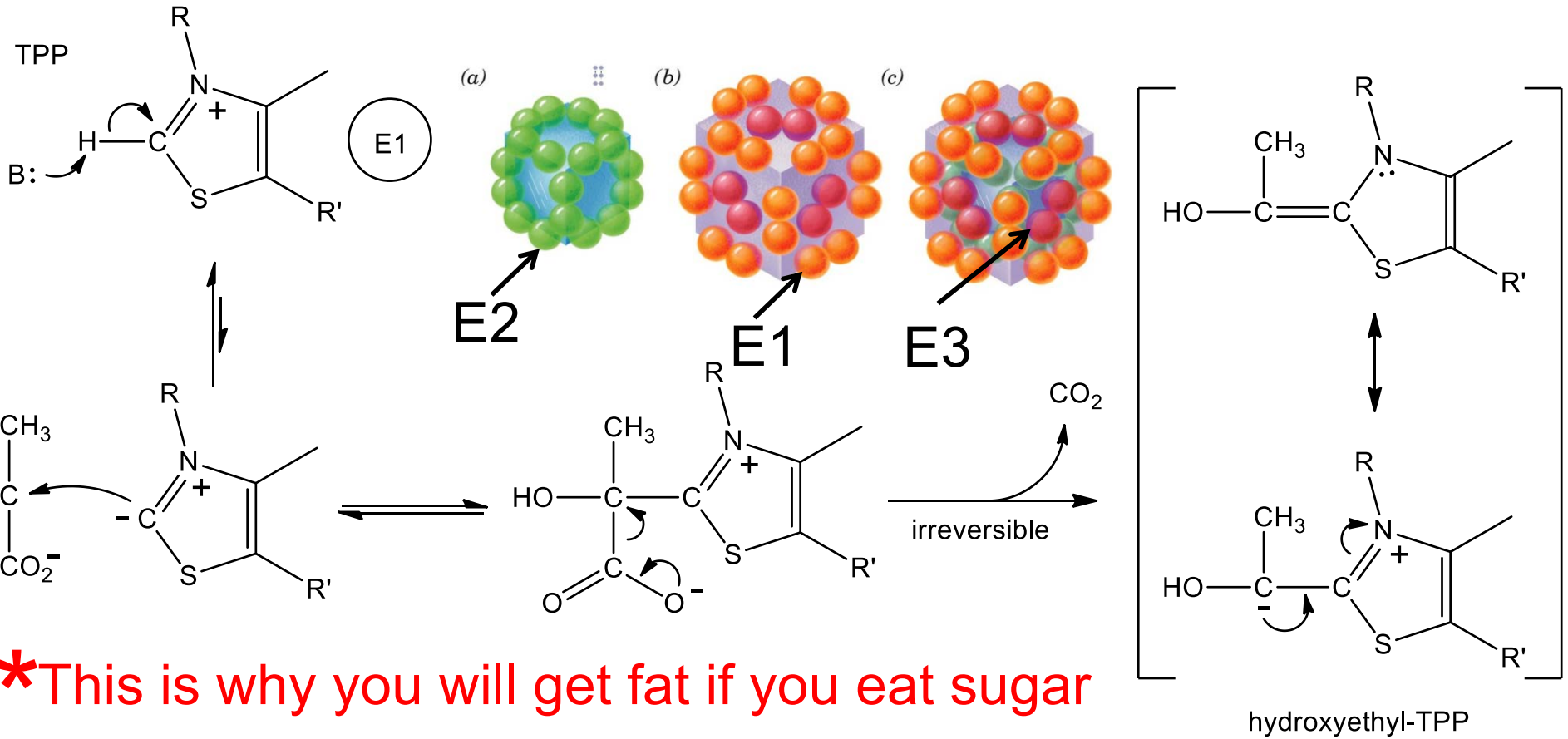
$\Delta G^{o'} = -33.5$ kJ/mol

Pyruvate + NAD^+ + HS-CoA $\xrightarrow{\text{irreversible}}$ Acetyl-CoA + NADH + CO_2

Acetyl-CoA → TCA cycle

Acetyl-CoA → Fatty Acid Biosynthesis *





*This is why you will get fat if you eat sugar

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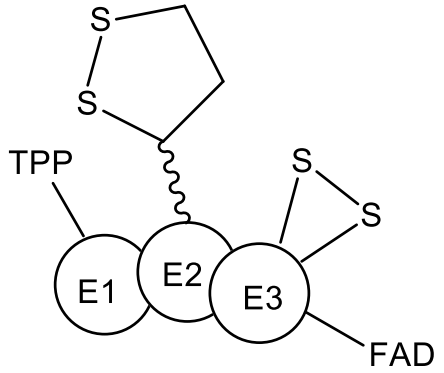
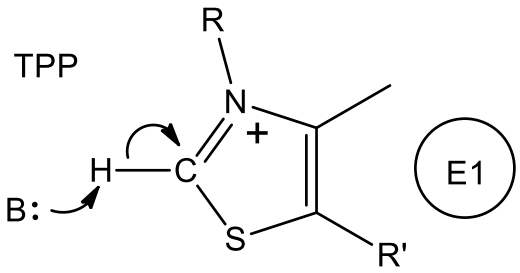
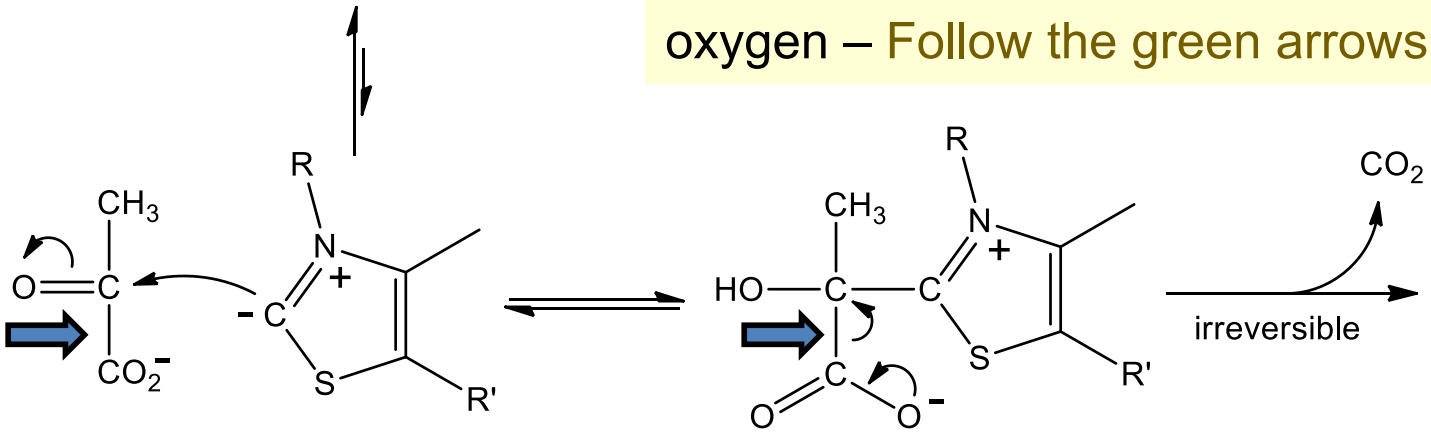
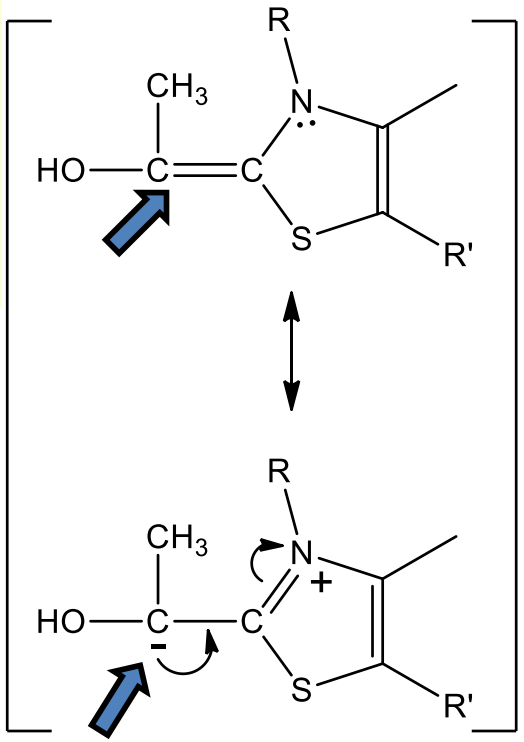




Note that the electrons in this bond came from glucose … you should be able to find them and track them to NADH and then to oxygen – Follow the green arrows





hydroxyethyl-TPP

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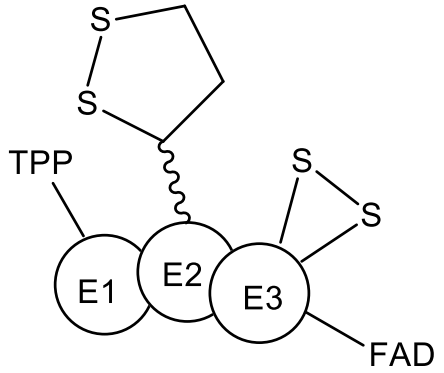
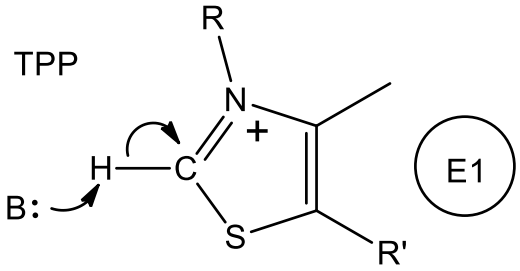
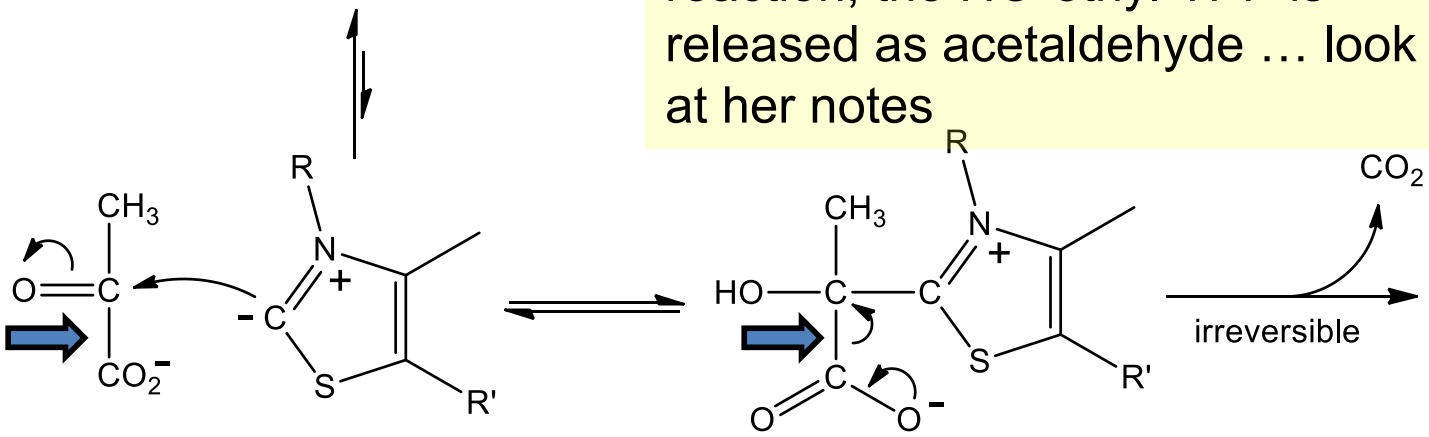
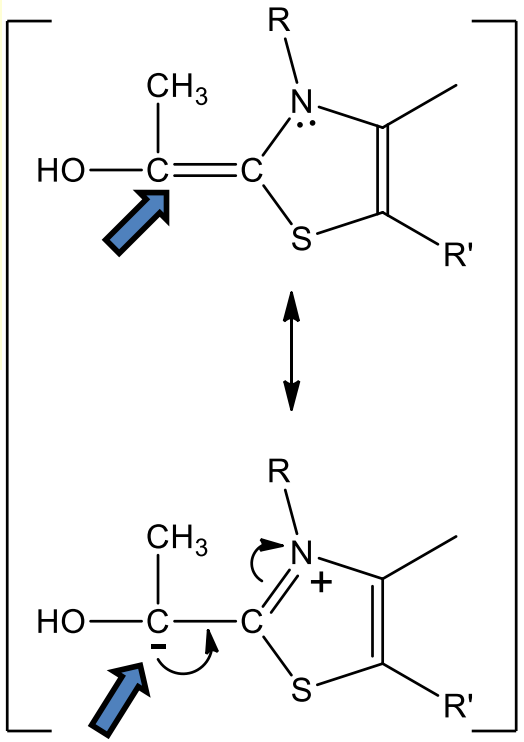




Also …. Note similarity to the Pyruvate Decarboxylase (PDC) reaction JoAnne taught … in that reaction, the HO-ethyl-TPP is released as acetaldehyde … look at her notes



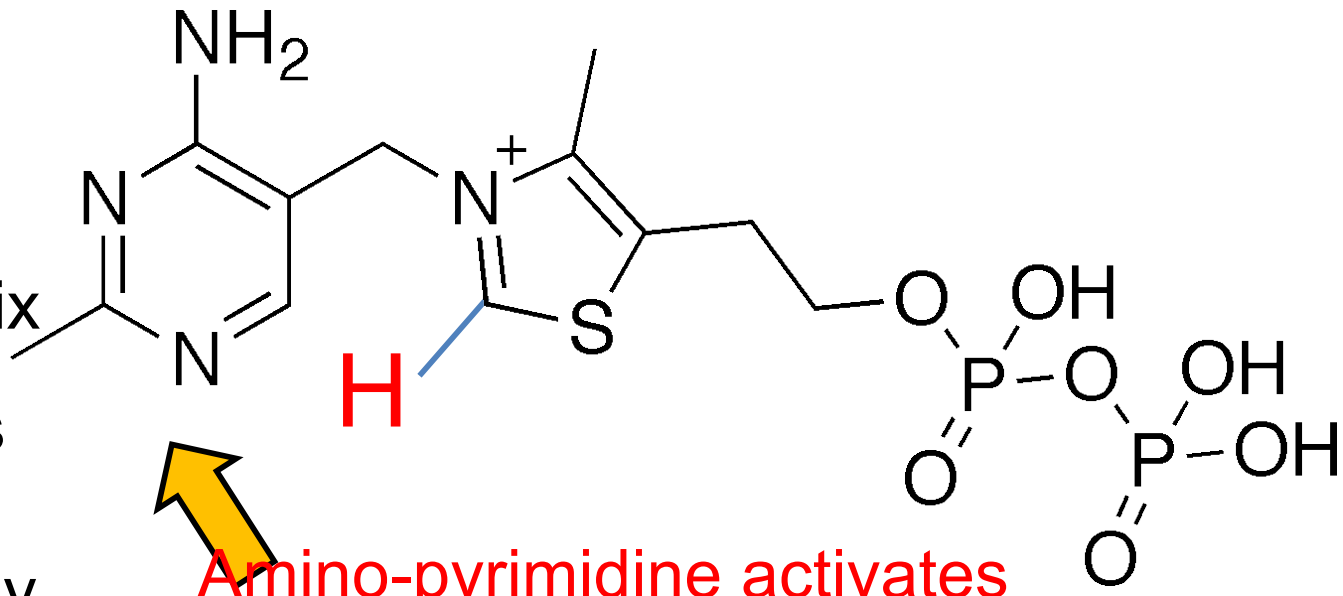


Pyruvate Dehydrogenase
I need you to think about
The electron flow (as well as
The carbon flow)

Vitamin B1 (Thiamine)

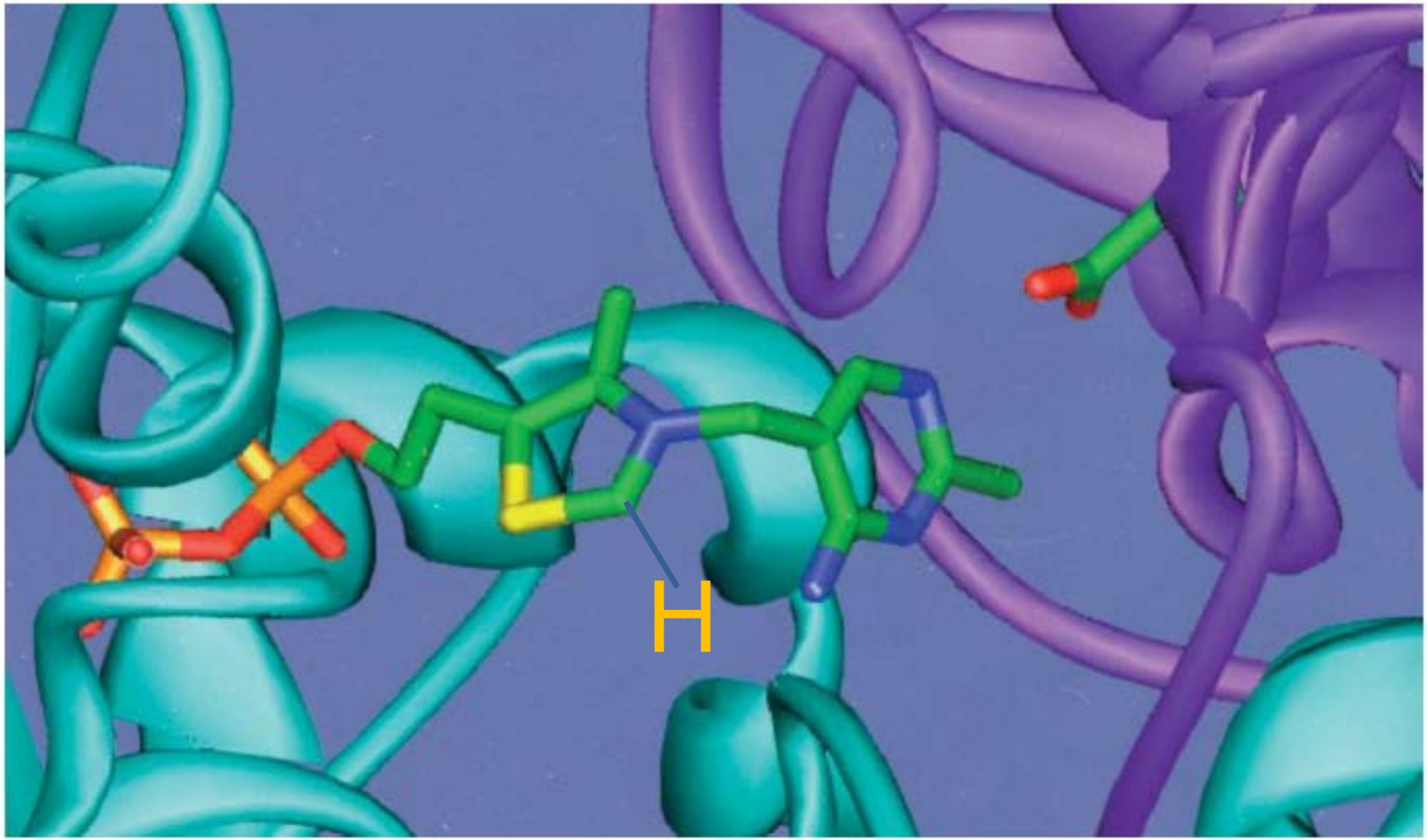
Note: Pyruvate moves from the cytoplasm to the mitochondrial matrix

In prokaryotes, this occurs in the cytoplasm, probably near the plasma membrane

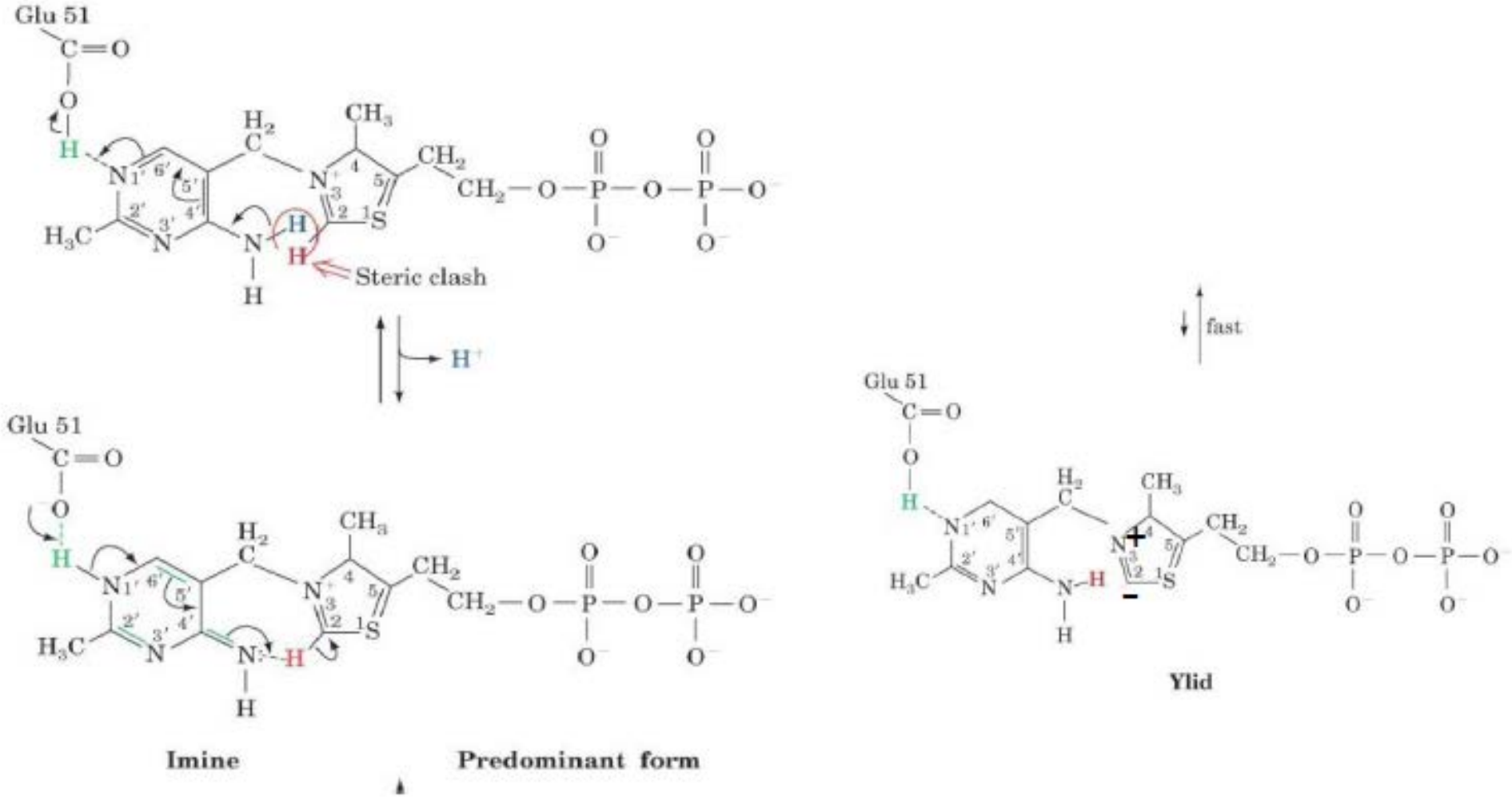


Amino-pyrimidine activates red hydrogen … lowers pKa of thiazole proton … to about 18

Role of pyrimidine base in ylid formation: no GBC from protein in the vicinity of the thiazolium proton



From JoAnne's Notes



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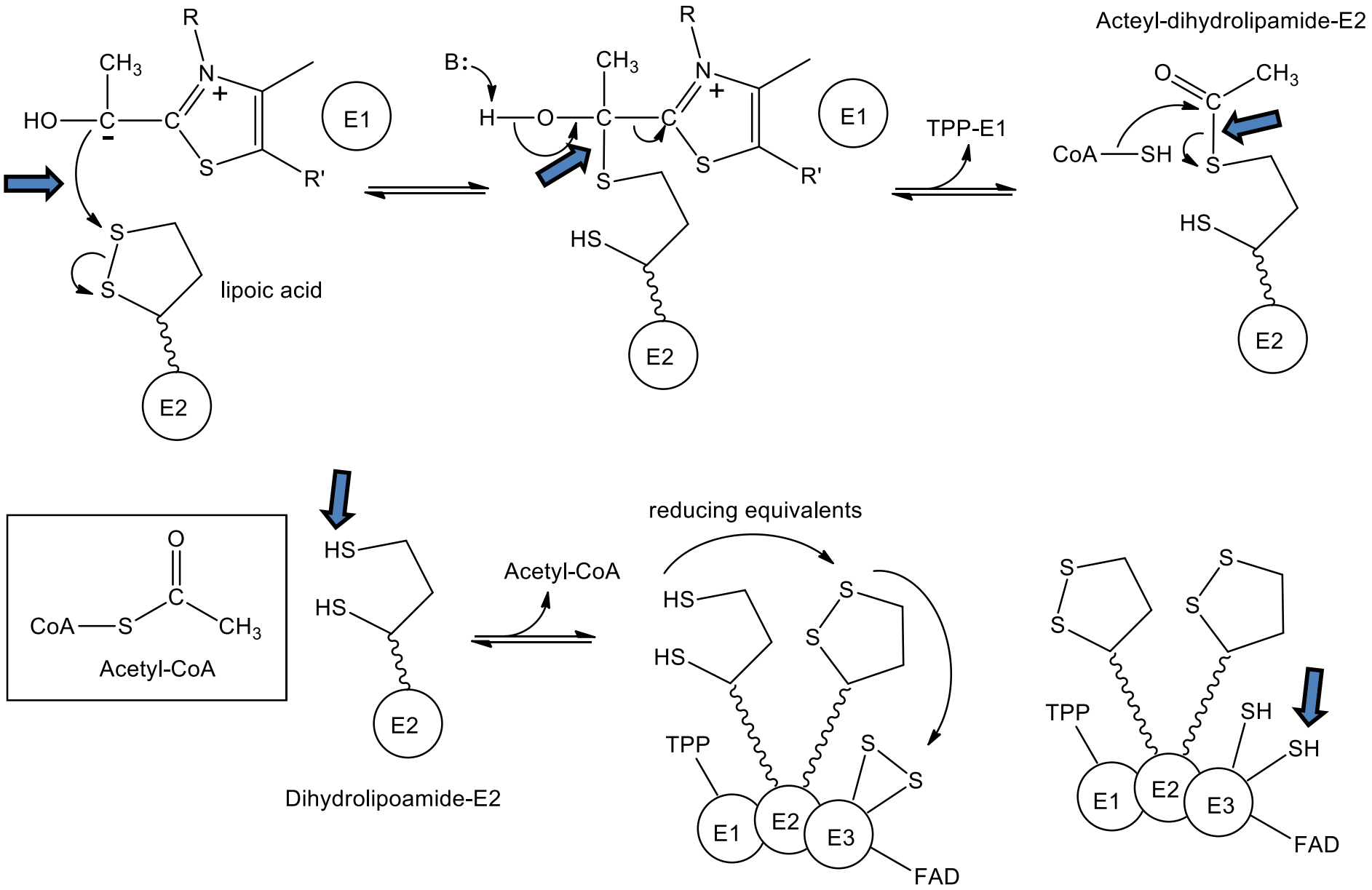

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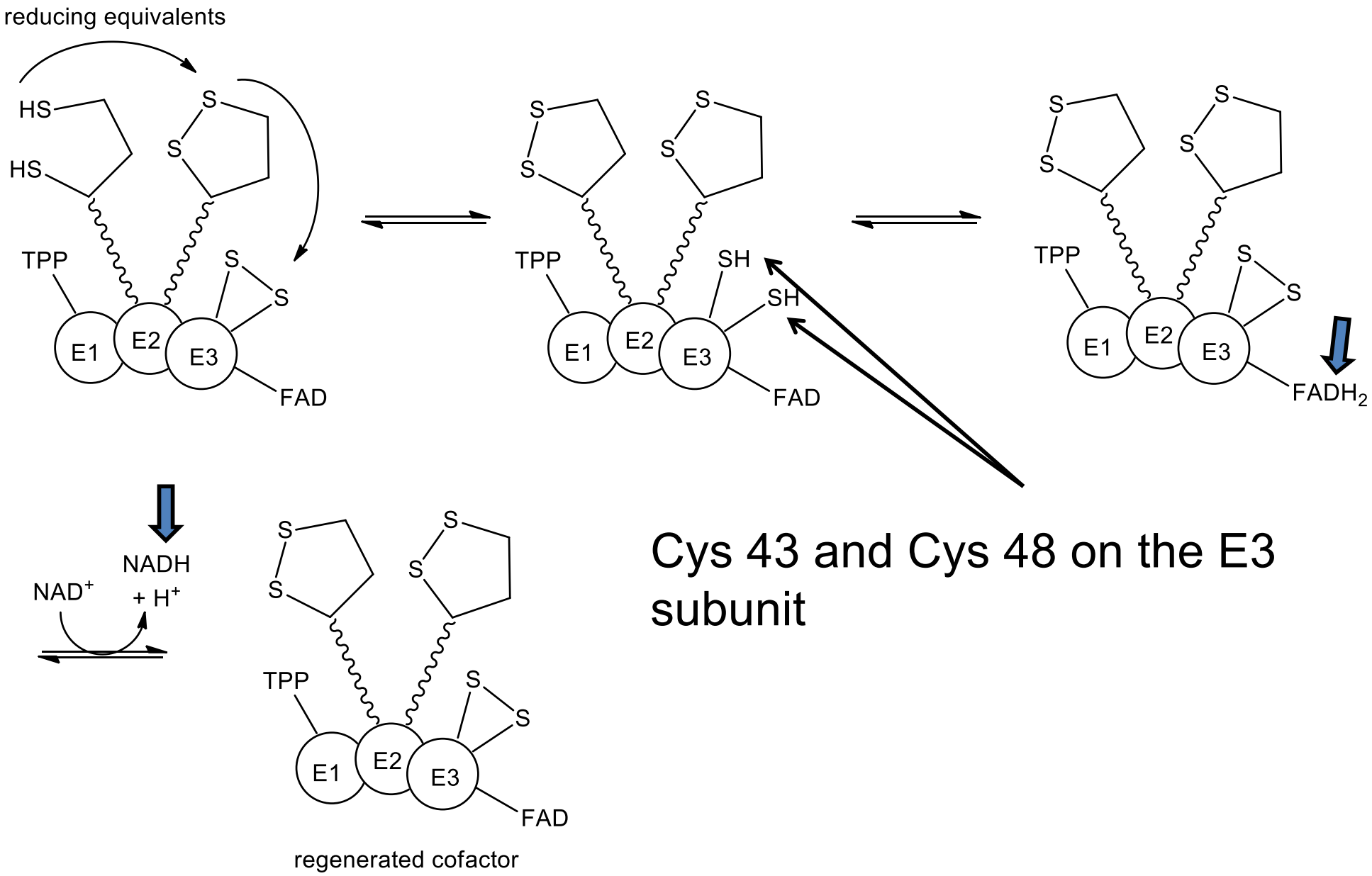

Cys 43 and Cys 48 on the E3 subunit

5.07SC Biological Chemistry I
Fall 2013