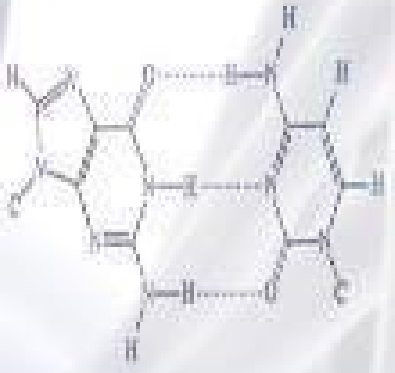
Medical Committee
The University of Jordan

SLIDE SHEET

SLIDE : 14

DR.NAME: Dr. Faisal

Biochemistry



Majida Al-Foqaraa'

Fatty Acid Synthesis

- Requires
  - Carbon Source: Acetyl CoA
  - Reducing Power: NADPH
  - Energy Input: ATP

Why Energy ?

Fatty Acid

↓

↓

↓

↓

Acetyl CoA

ΔG^{o} : -ve

Acetyl CoA

↓

↓

↓

↓

Fatty Acid

ΔG^{o} : +ve

Why Energy ?

Fatty Acid

↓

↓

↓

↓

Acetyl CoA

ΔG^{o} : -ve

Acetyl CoA + n(ATP)

↓

↓

↓

↓

Fatty Acid + n(ADP)

ΔG^{o} : -ve

FA Degradation and Synthesis

Acyl CoA $_{(n)}$

↓ **Oxidation**

↓ **Hydration**

↓ **Oxidation**

↓ **Thyolysis**

Acyl CoA $_{(n-2)}$ + Acetyl CoA

Acyl CoA $_{(n+2)}$

↑ **reduction**

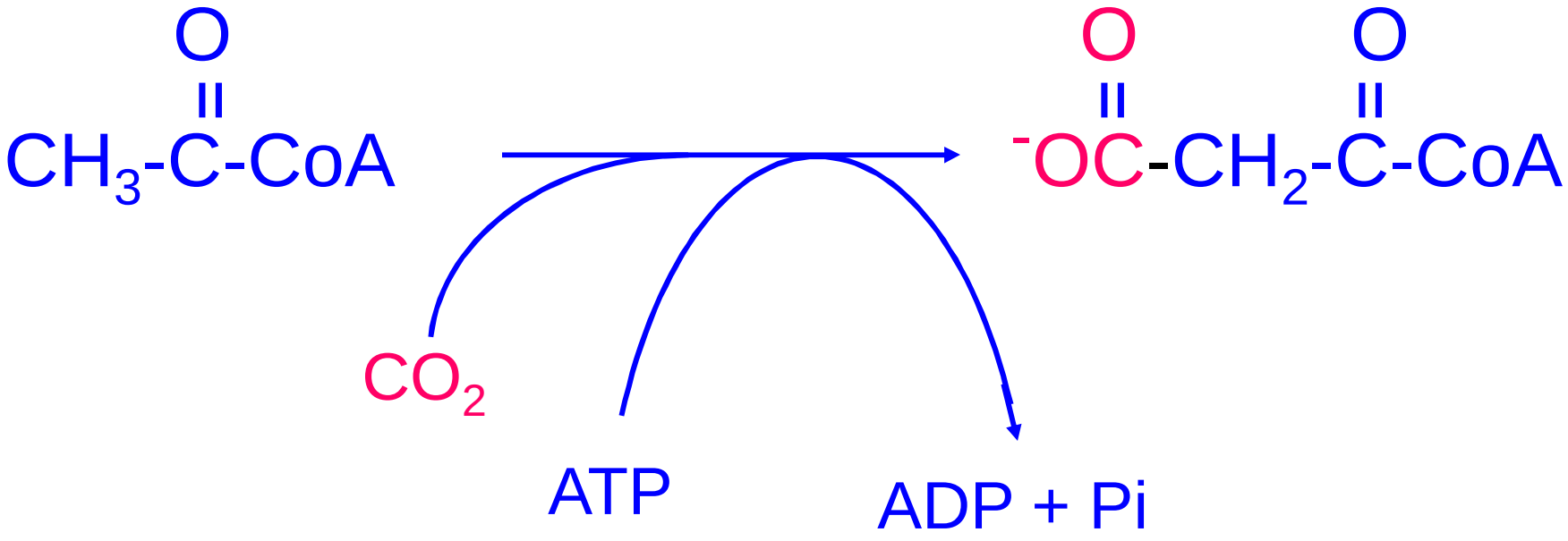
↑ **dehydration**

↑ **reduction**

↑ **condensation**

Acyl CoA$_{(n)}$ + Malonyl CoA

Carboxylation of Acetyl CoA Produces Malonyl CoA

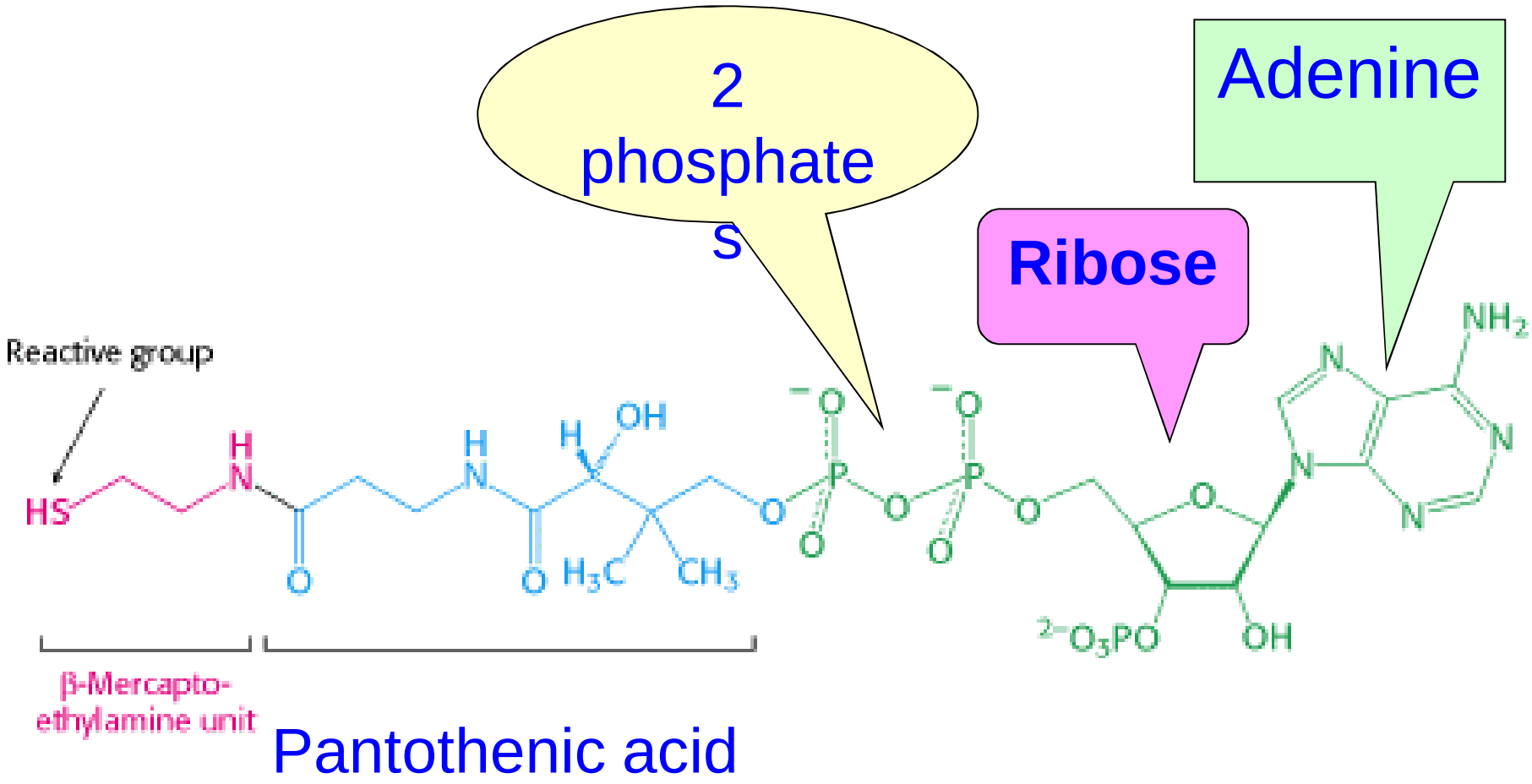


Acetyl CoA Carboxylase

Biotin-Containing Enzyme

Fatty Acid Synthase Catalyzes the remaining steps

- **Multifunctional Enzyme Complex**
- **Dimer of two Identical Chains**
- **Each has Seven Catalytic Activities**
  - One activity is Condensing Enzyme with –SH
- **One Domain is Linked to Phosphopantetheine**
  - With Reactive -SH

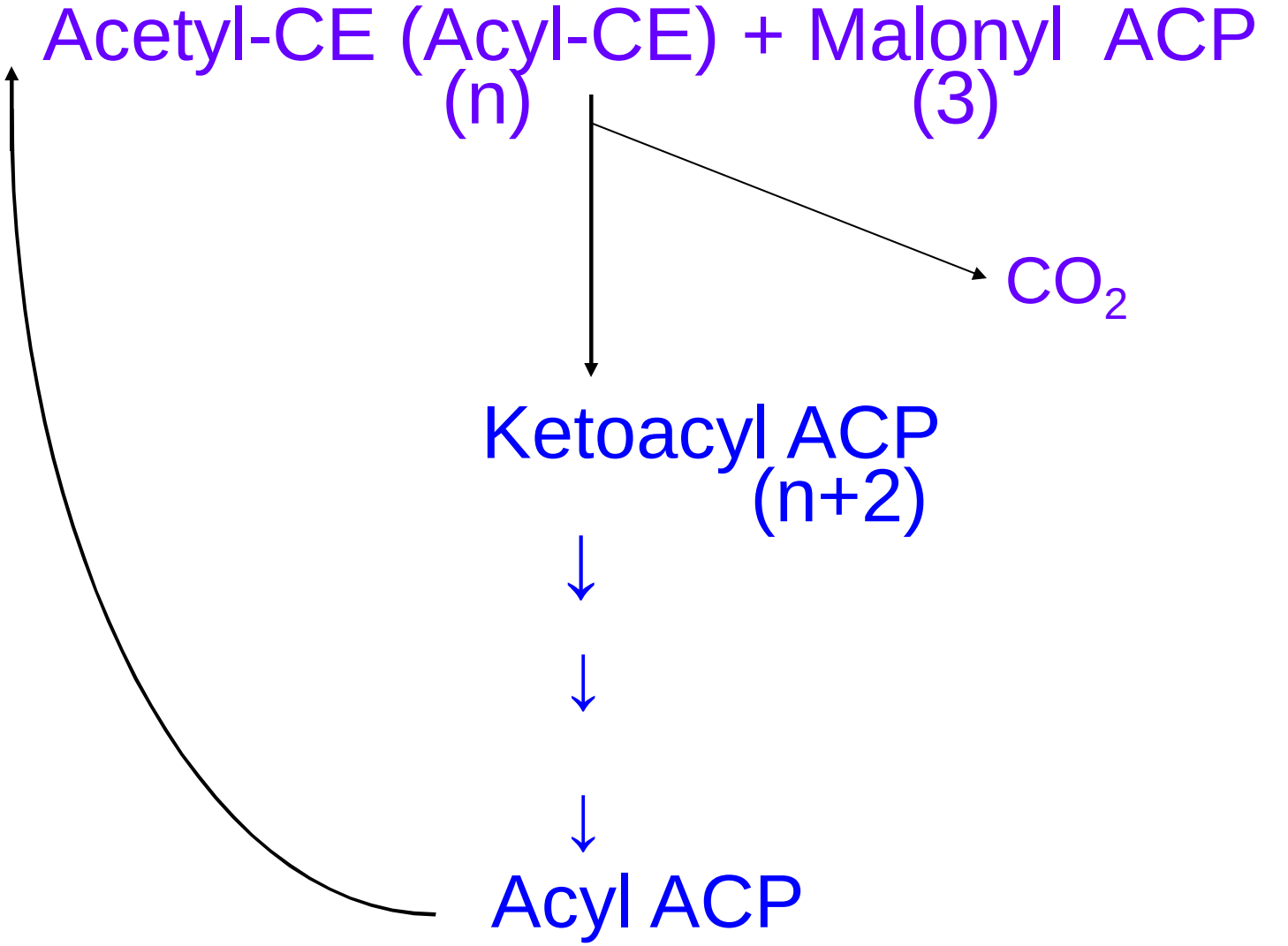


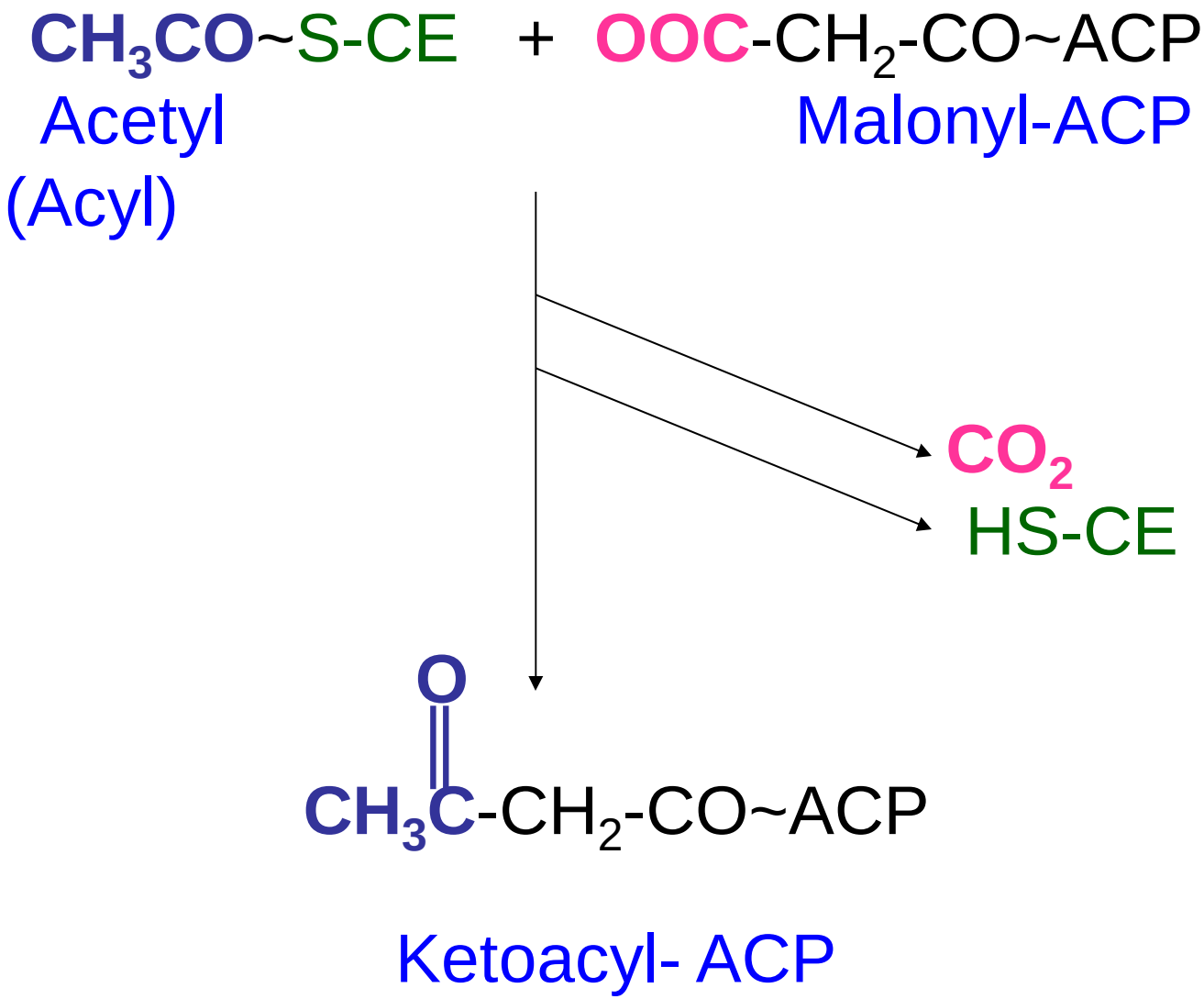
Pantothenic acid

Fatty Acid Synthase Catalyzes the remaining steps

- **Multifunctional Enzyme Complex**
- **Dimer of two Identical Chains**
- **Each has Seven Catalytic Activities**
  - One activity is Condensing Enzyme with –SH
- **One Domain is Linked to Phosphopantetheine**
  - With Reactive -SH
  - Carries Intermediates during Catalysis
  - (Acyl, Acetyl and Malonyl Groups)
  - Known as Acyl Carrier Protein (ACP)

Fatty Acid Synthesis (Overview)




CH3CO~S-CE + OOC-CH2-CO~ACP
Acetyl
(Acyl)
Malonyl-ACP
CO2
HS-CE
O
CH3C-CH2-CO~ACP
Ketoacyl- ACP