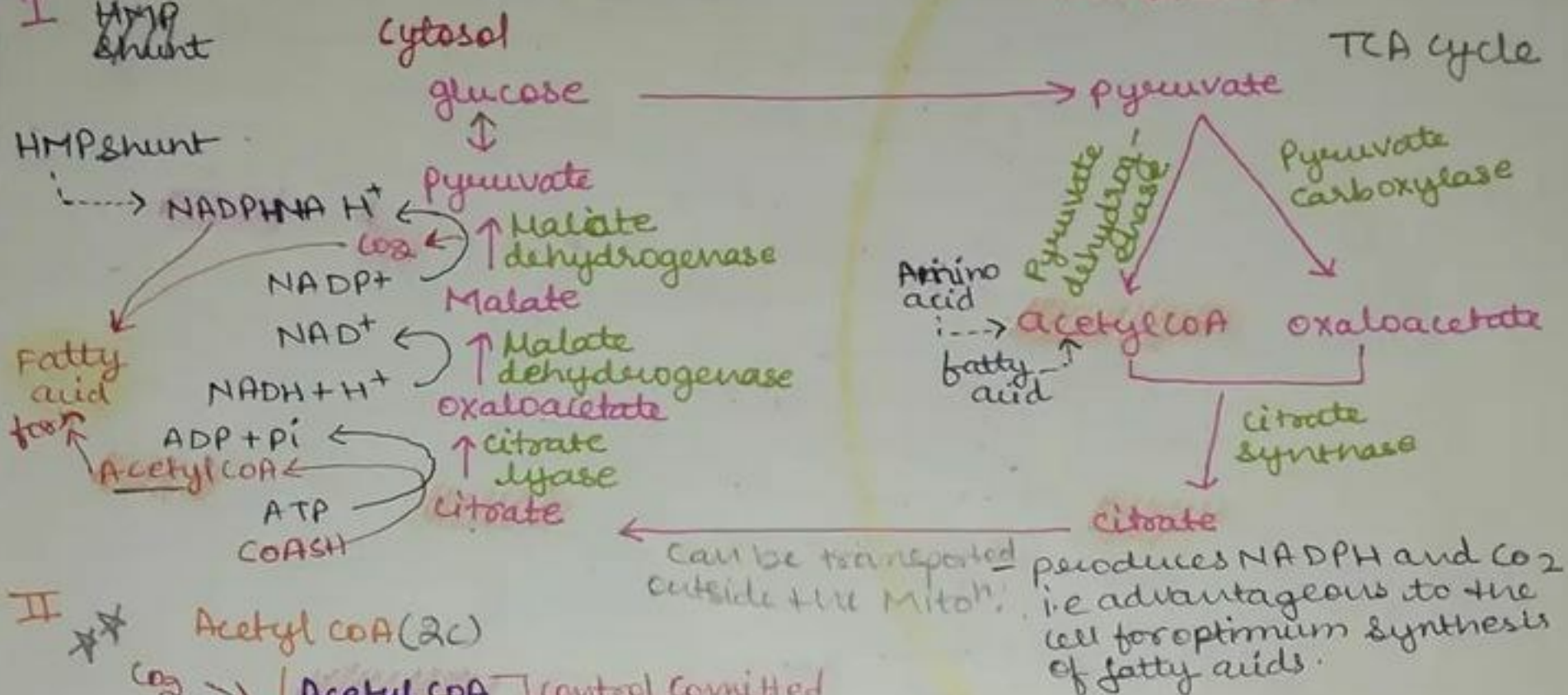


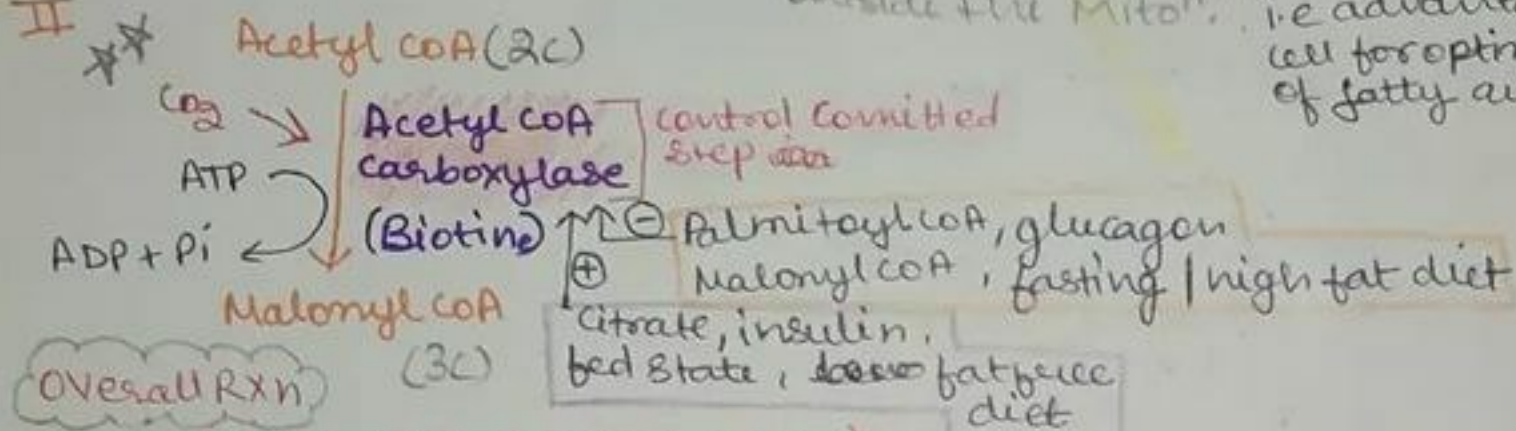
BIOSYNTHESIS OF FATTY ACIDS → liver, kidney, adipose tissues, lactating mammary glands.

- Stages** TCA cycle, oxidation enzymes → cytosomal fraction
- i) production of acetyl CoA and NADPH [requirement]
 - ii) conversion of acetyl CoA to Malonyl CoA [imp. step]
 - iii) Rxn of fatty acid Synthase complex. [main step]
- (FAS) complex

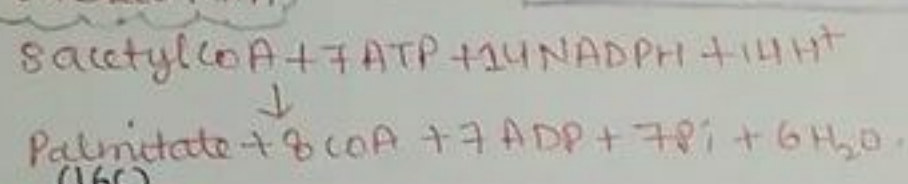
I HMP shunt



II



OVERALL RXN



REGULATION

Hormone



Dietary

- high carbs, fat free diet
↓
↑ acetyl CoA carboxylase, fatty acid synthase
↓
fatty acid formation

NADPH for reducing equivalent fatty acid synthesis provided by NADPH
- 50-60% come from HMP shunt.

III

Fatty acid
Synthase

Acetyl CoA

- Catalysed by Multifunctional enzyme
fatty acid synthase (FAS) complex.
- antiparallel enzyme
- Dimer unit.

① Acetyl CoA -
CoASH $\xrightarrow{\text{Acetyl CoA - ACP transacylase}}$

Acetyl S-enzyme

Malonyl CoA

② Malonyl CoA -
CoASH $\xrightarrow{\text{Malonyl CoA - ACP transacylase}}$

Acylmalonyl enzyme

③ $\text{Co}_2 \xrightarrow{\beta\text{-ketoacyl - ACP synthase}}$

β -ketoacyl ACP

NADPH + H⁺

④ $\text{NADP}^+ \xrightarrow{\beta\text{-ketoacyl ACP reductase}}$

β -hydroxyacyl ACP

⑤ $\text{Co}_2 \xrightarrow{\beta\text{-hydroxyacyl ACP dehydratase}}$

Trans Δ^2 -enoyl ACP

⑥ $\text{NADPH} + \text{H}^+ \xrightarrow{\text{enoyl ACP reductase}}$
 NADP^+

Acyl ACP (butyryl ACP)

⑦ $\xrightarrow{\text{Transfer of carbon chain from ACP to CoA}}$

Acyl-S-enzyme

$\downarrow$ Rxn 2-6
 $\downarrow$ repeated 6 more
 $\downarrow$ times.

$\text{H}_2\text{O} \xrightarrow{\text{Palmitoyl thioesterase}}$

Acetyl CoA (2C) give

Malonyl CoA (14C) give

Palmitate (16C)

Saturated fat

- excess carbs converted
into fatty acid for
as a source of energy
for later use.

- store in form of
Triglycerol

fatty acid + glycerol.

Enzymes

1. Acetyl/Malonyl
transacylase

2. β -ketoacyl synthase

3. β -ketoacyl reductase

4. β -hydroxyacyl dehydratase

5. enoyl reductase

6. thioesterase.

Reduction