

# **Alcohol Metabolism**

## **&**

# **It's**

# **Biochemical effect**

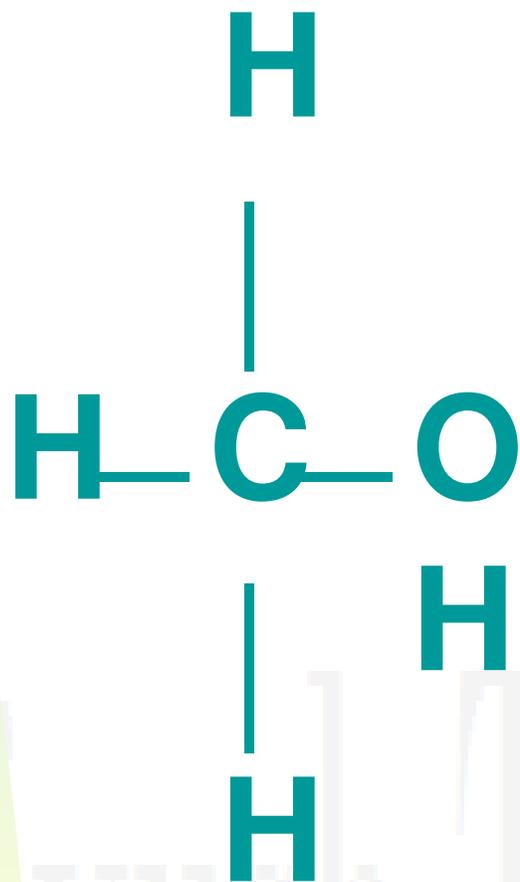
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# Ethanol



# Ethyl Alcohol

# Methanol



**Methyl Alcohol**

# Alcohol Metabolism

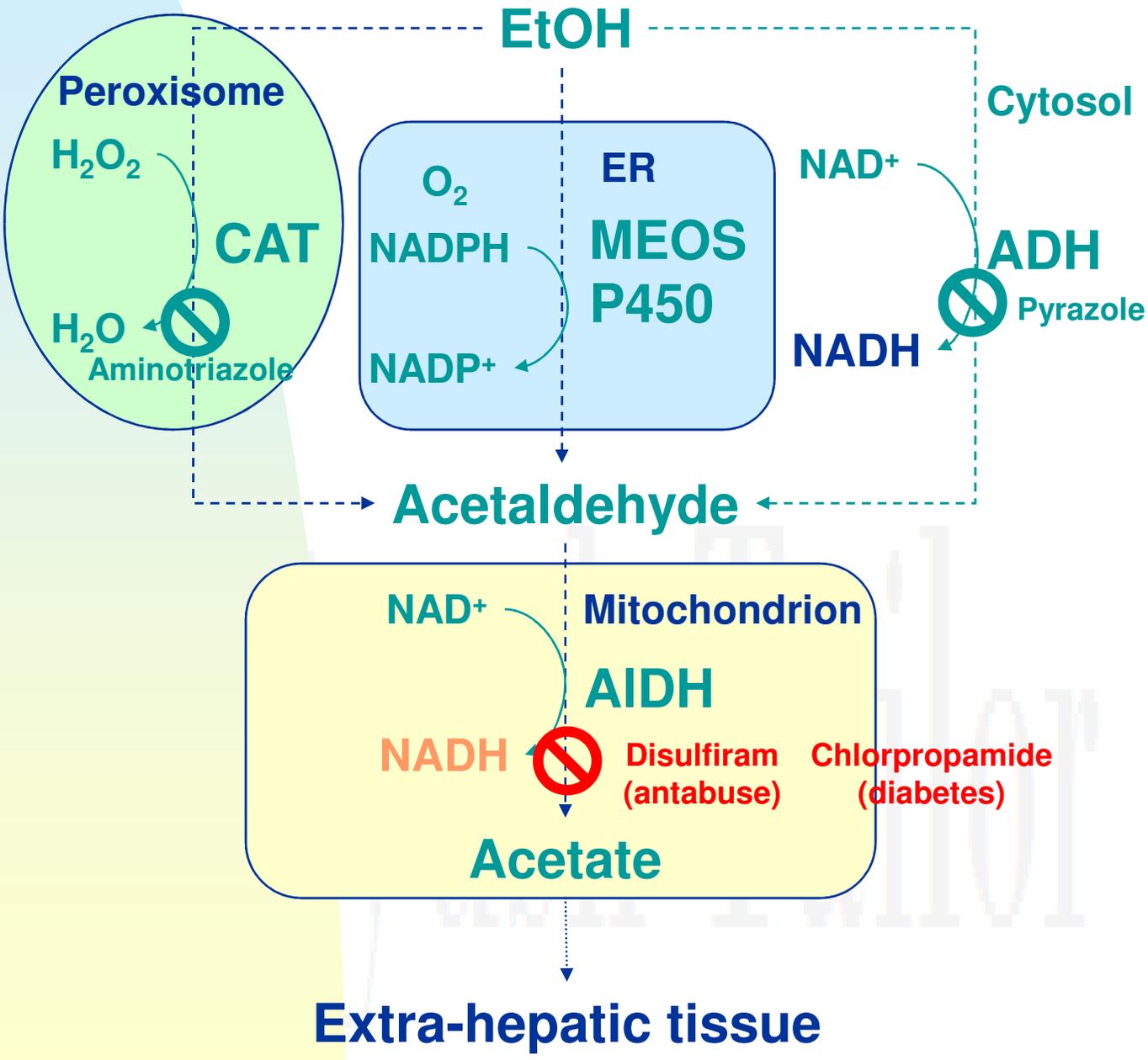
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- Cellular processing
- Pathway perturbations
- Malate-aspartate shuttle
- Glycerol-3-phosphate shuttle

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Oh my!  
Now what?

# Cellular Processing



# Alcohol Dehydrogenase

- NAD<sup>+</sup> dependent cytoplasmic enzyme
- Dimer
- 6 iso-enzymes
- $\alpha_2$  ,  $\beta_2$  ,  $\gamma_2$  ,  $\alpha\beta$  ,  $\alpha\gamma$  ,  $\beta\gamma$
- If  $\beta$  chain is mutated, even small quantity of alcohol may produce intoxication.

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# Microsomal Ethanol Oxidising System (MEOS)

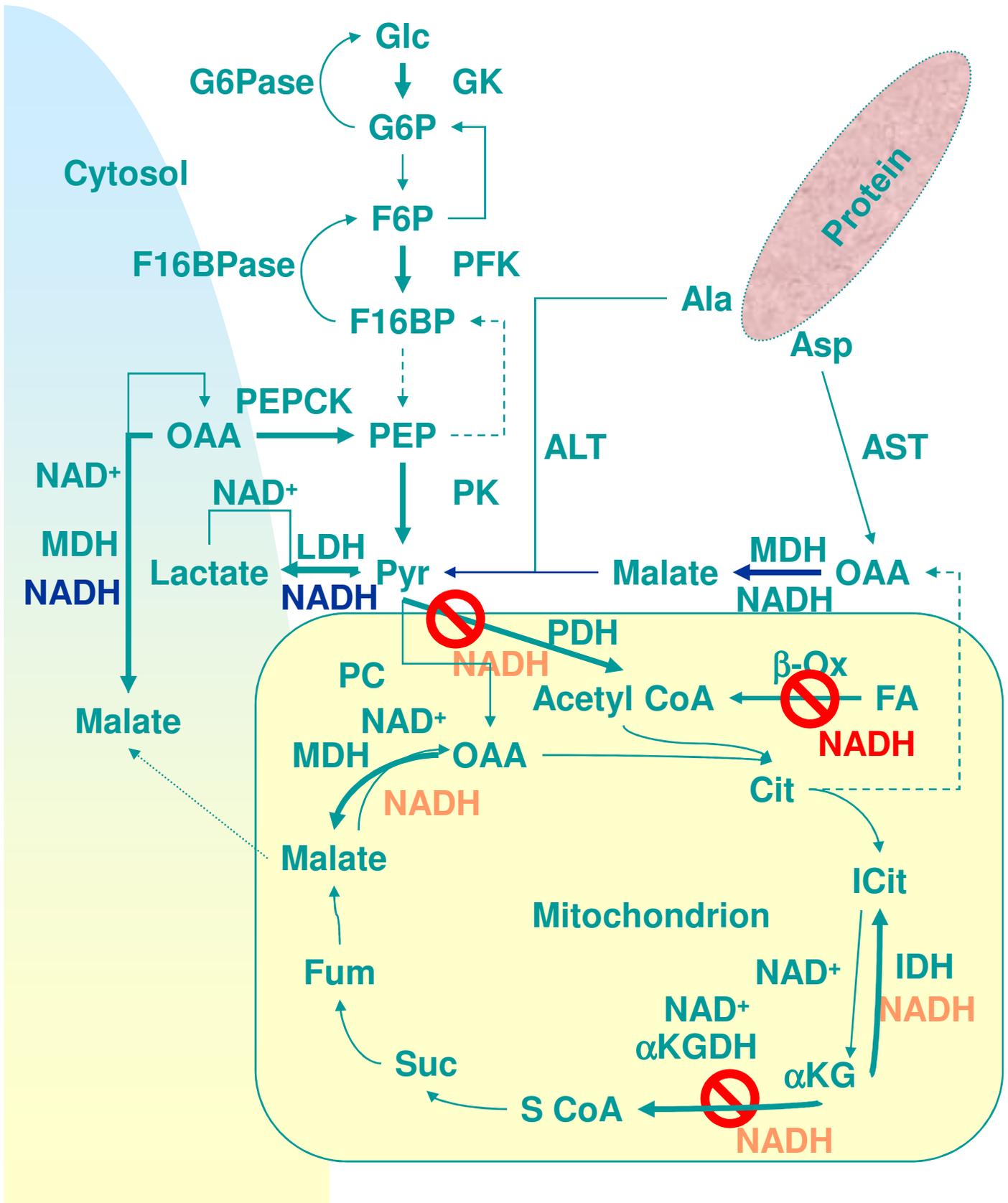
- Microsomal Enzyme
- Use NADPH & Oxygen
- Cytochrome P – 450 is also involve in this reaction.

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# Aldehyde Dehydrogenase

- Mitochondrial NAD<sup>+</sup> dependent enzyme
- Convert Acetaldehyde to Acetic acid
- Than Acetic acid is converted to Acetyl CoA.
- Activity of ADH > ALDH
- Also, Activity of ALDH is in Indians < Europeans.
- Accumulation of Acetaldehyde in liver.
- Which is toxic, may lead to death.

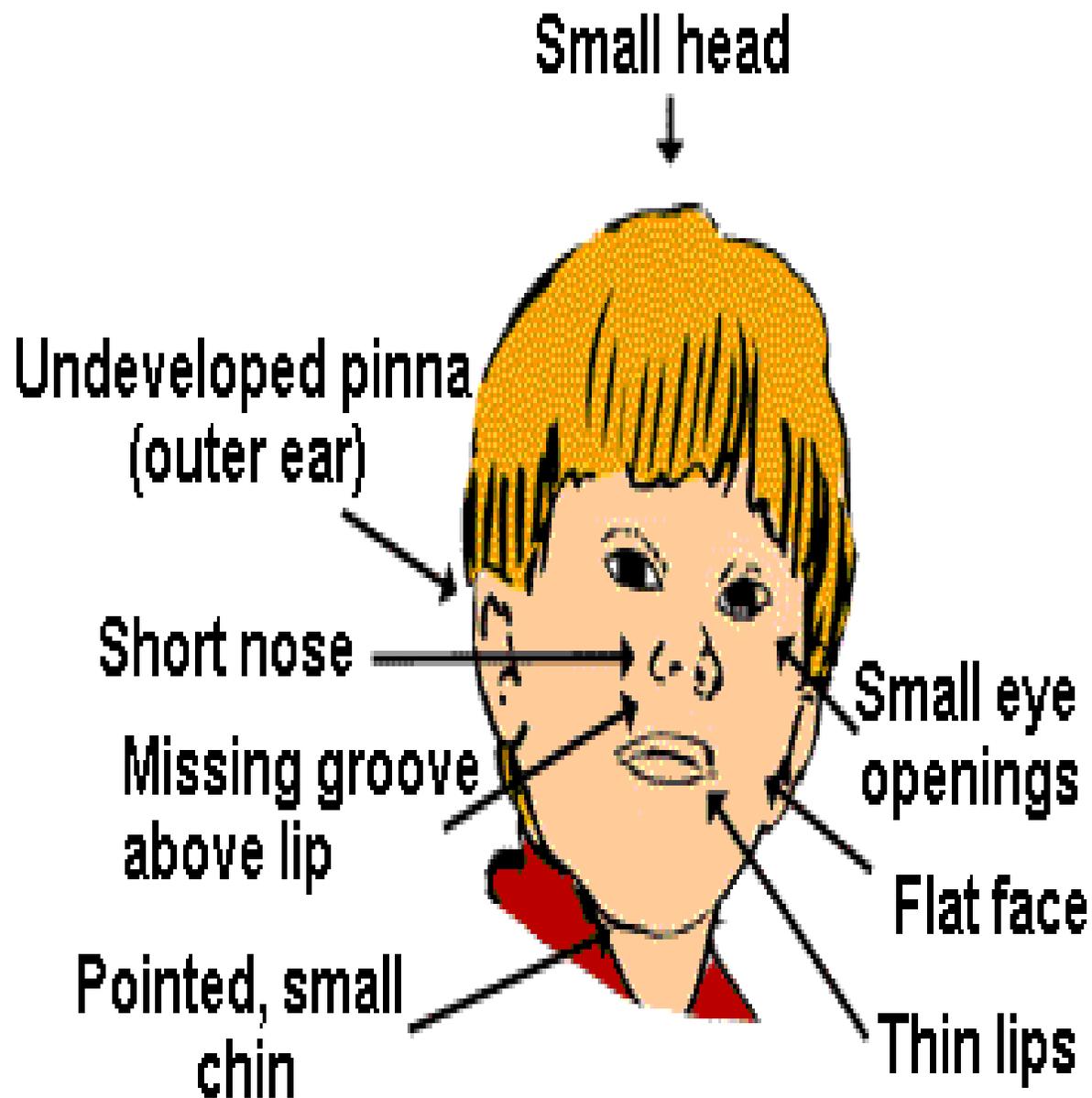
# Effect on Pathway



# Biochemical Alteration in Alcoholism

- Lactic acidosis
- Inhibit gluconeogenesis, so Hypoglycemia.
- Ketogenesis
- Fatty Liver
- Cirrhosis of liver due to accumulated toxic effect of acetaldehyde
- Gout
- CNS depression
- Alcohol induce MEOS, which inactivate drugs like barbiturate & tranquilisers. So Chronic alcoholic require higher dose of drugs.
- Neuronal degeneration, Neuritis – due to deficiency of Thiamin & Pyridoxal phosphate. ( Wernick's disease )
- Pancreatitis
- Cardiac effect = Cardiomyopathy, Arrhythmia
- In Pregnancy = Fetal Alcohol Syndrome

# Effects of Prenatal Alcohol



THE PREVENTABLE TRAGEDY

# FETAL ALCOHOL SYNDROME

Text and photographs by GEORGE STEINMETZ



# Laboratory Finding in Alcoholism

- *Serum Gamma Glutamyl Transferase (GGT) & Alanine Transaminase (ALT)*  
increase in Chronic alcoholic
- Serum Amylase & Serum Lipase increase in Acute alcoholism
- Estimation of alcohol in blood
- Decrease Aldehyde dehydrogenase
- Increase Fatty acid ethyl ester
- Desialylated transferrin level is a highly sensitive marker for chronic alcoholic abuse.

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1 To find a woman you need Time and Money therefore:

$$\text{Woman} = \text{Time} \times \text{Money}$$

2 "Time is money" so

$$\text{Time} = \text{Money}$$

3 Therefore

$$\text{Woman} = \text{Money} \times \text{Money}$$

$$\text{Woman} = (\text{Money})^2$$

4 "Money is the root of all problems"

$$\text{Money} = \sqrt{\text{Problems}}$$

5 Therefore

$$\text{Woman} = (\sqrt{\text{Problems}})^2$$

$$\text{Woman} = \text{Problems}$$

A+