Additions:

- Hexokinase/Glucokinase reaction that phosphorylate Glucose to Glucose-6-P commit Glucose for further metabolism, while PFK I commit to glycolysis

- Glycolytic enzymes deficiency are generally rare, **95% of cases are Pyruvate kinase** deficiency and **4% are phosphoglucose Isomerase** deficiency

- In Glucokinase control: Glucose and Fructose-6-P **Indirectly** affect the function of GK

- complex 1 and 2 are called **flavoprotein dehydrogenases** because they contain FMN and FAD respectively as tightly bound prosthetic groups

- muscles do not share glucose with other tissues because they lack glucose-6-phosphatase Skeletal muscles like **joey**, do not share food.

- Lipid storage diseases, is accumulation of sphingolipids **(particularly Cerebrosides & Gangliosides) are linked to neural disorders**
  - GM1 is degraded to GM2 then GM2 is degrade to GM3
  - ***GM1 gangliosidosis*** is accumulation of **GM1** due to genetic deficiency of the enzyme that degrade GM1 to GM2
  - ***Tay Sach's diseases*** is accumulation of **GM2** due to genetic deficiency of the enzyme that degrade GM1 to GM2

- Lipids and fat are more efficient than carbohydrate or proteins in storing energy because they contain more hydrogen associated with carbon (**more reduced**) so more oxidation steps can be done → more NADH and $FADH_2$ → more ATP

- If the fatty acids are not bound to albumin, they are very dangerous to stay in blood because they amphipathic molecules and act are **detergents**, they will start to ***solubilize our proteins*** (membrane bound proteins) in the blood

- β-oxidation of **very long chain fatty acids** (VLCFA; more than 22C atoms) occurs in ***peroxisomes*** until they become medium or short then they transported to mitochondria to complete their oxidation

- vitamin B12 (Cobalamin) is **cobalt-containing** porphyrin

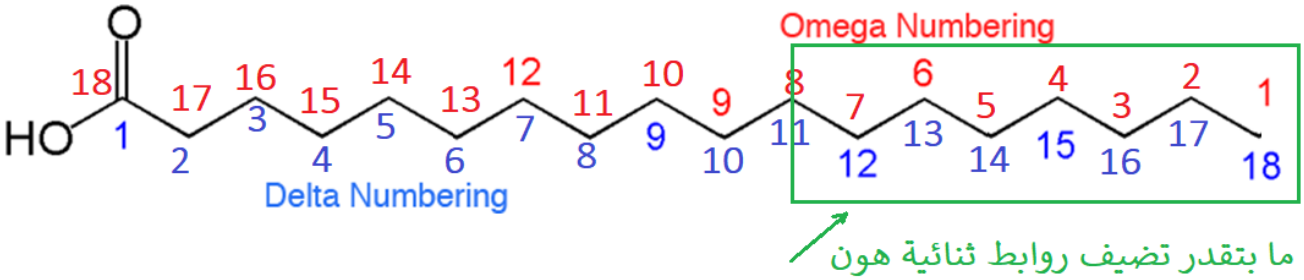
- in fatty acid synthesis, the first cycle release 2 CoA one from Acetyl-CoA (primer) and one from Malonyl-CoA the next cycles release only one CoA per cycle from malonyl-CoA

- during fatty acid synthesis the Acyl group is shuffled between 2SH groups (SH of ACP and SH od 3-Ketoacyl synthases)

- there are 2 methods to number fatty acid's carbon atoms
  - ***Delta numbering*** where we start from the carboxyl head COO^- is C1
  - ***Omega numbering*** where we start from the omega carbon CH_3 is C1

We said that human cannot add double bonds past Delta C9

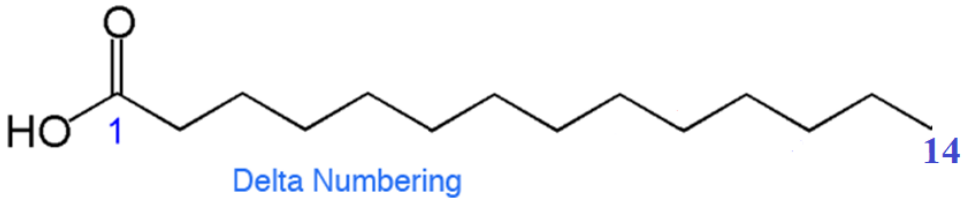
You should know also we cannot add double bonds **within 7 carbons of the methyl terminus (omega carbon)**



حضرتك ما بتقدر تضيف روابط ثنائية هون

يعني بارقام الدلتا: احنا البشر بنقدر نضيف روابط ثنائية على اول 9 كربونات لكن بشرط ما تكون ضمن اخر سبع كربونات

مثلا



السؤال هل ممكن اضيف رابطة ثنائية على الكربونة دلتا 9؟
الجواب لأ, لانة هون الكربونة دلتا 9 من ضمن اخر سبع كربونات
السؤال الك؟ ايش هو رقم ابعد كربونة عن الراس ممكن اضيف عليها رابطة ثنائية هون؟؟؟

- **How catecholamines are synthesized from Tyrosine?**

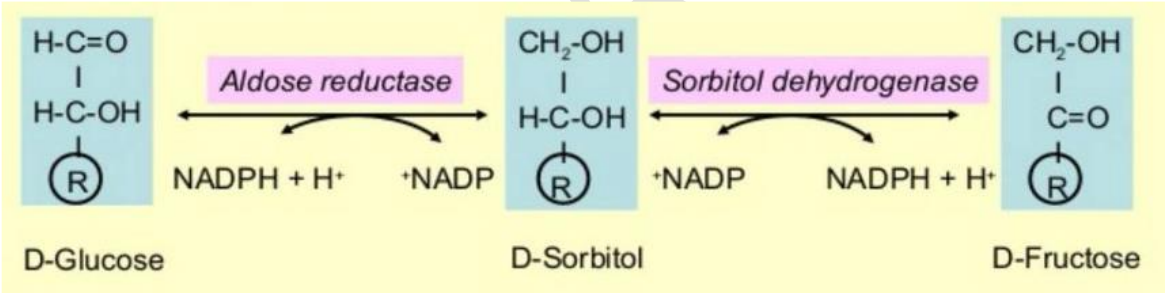
- **How Melanin is synthesized from Tyrosine?**
  Tyrosine is oxidized then polymerization of the oxidized Tyrosine

Glycolysis	cytosol	All cells
TCA cycle	Mitochondria	All cells except those lacking mitochondria (RBCs)
ETC	Inner mitochondrial mem	All cells exept those lacking mitochondria (RBCs)
Gluconeogenesis	1st step in mitochondria Last step in the ER The rest in cytosol	Liver Kidney Some in small intestine
Glycogen synthesis (**Glycogenesis**) Glycogen degradation (**Glycogenolysis**)	cytosol	All cells but mainly in liver and skeletal muscles
Pentose phosphate pathway (PPP) also called Hexose monophosphate shunt (HMS)	cytosol	Most tissues specifically that need high amount of NADPH or actively dividing cells
FAT synthesis (**Lipogenesis**)	cytosol	Liver mainly
FAT hydrolysis (**Lipolysis**)	cytosol	Cytosol of Adipocytes, plasma (lipoproteins), intestinal lumen
Cholesterol synthesis	cytosol	Liver mainly

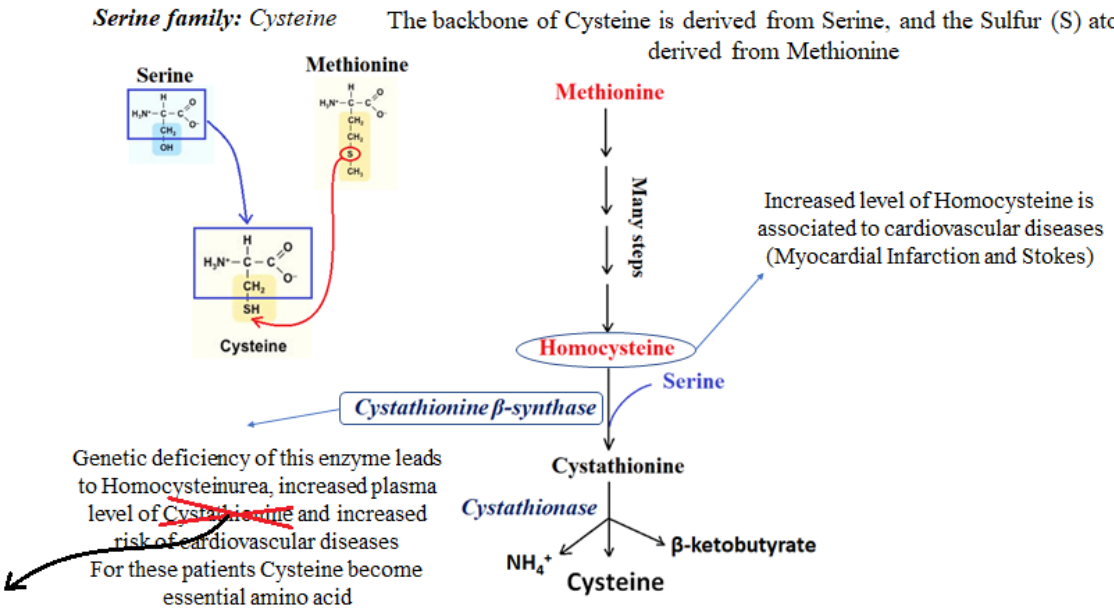
Fatty acid oxidation	mitochondria	All cells except brain and RBCs
Fatty acid synthesis	cytosol	Liver mainly
Ketone body synthesis (**Ketogenesis**)	Mitochondria	Liver
Ketone body degradation (**Ketolysis**)	mitochondria	All cells except liver and RBCs
Urea cycle	cytosol + mitochondria	Liver, some in kidney and Brain

Correction

- in the Dr.Nabil's slides; sorbitol dehydrogenase oxidize sorbitol to Fructose **(NADP+ is reduced to NADPH in this step)**



Lecture 12 slide 21



Homocysteine