

Fatty Acid and Triacylglycerol Metabolism 1

Mobilization of stored fats and
oxidation of fatty acids

Lippincott's Chapter 16

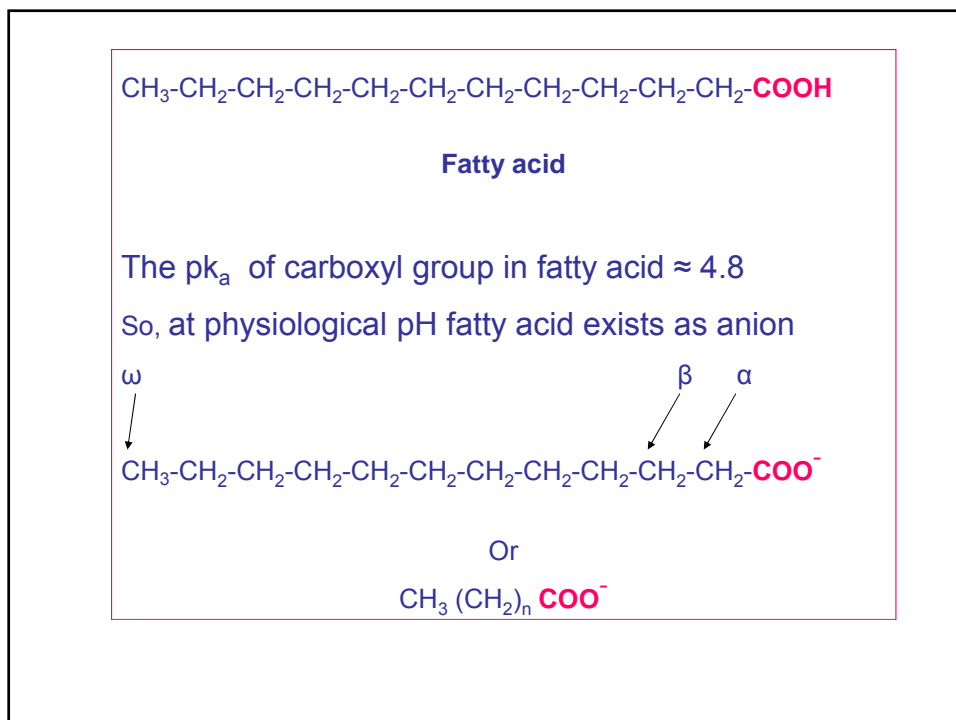
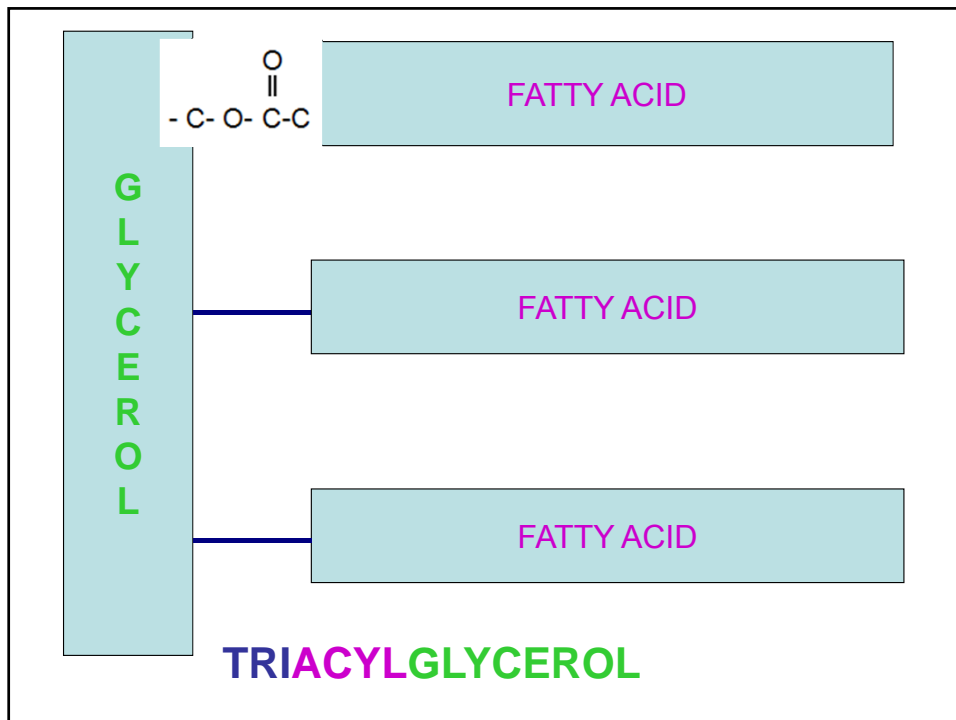
What is the first lecture about

- What is triacylglycerol
- Fatty acids structure
- The most common fatty acids
- TAG as the major energy source and reserve
- Mobilization of TAG in response to hormonal signal
- Reactions of β oxidation
 - Activation
 - Transport across inner mitochondrial membrane
 - Sequence of reactions

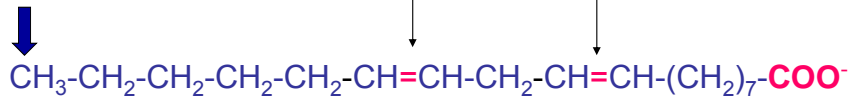
181-182

189-192

193-197



The hydrocarbon chain can be saturated or it may contain one or more double bonds



Unsaturated Fatty Acid

18:2 Δ ^{9,12} or 18:(9,12)

Linoleic Acid

ω 6

Some Carboxylic acids of physiological importance

COMMON NAME	STRUCTURE
Formic acid	1
Acetic acid	2:0
Propionic acid	3:0
Butyric acid	4:0
Capric acid	10:0
Palmitic acid	16:0
Palmitoleic acid	16:1(9)
Stearic acid	18:0
Oleic acid	18:1(9)
Linoleic acid	18:2(9,12)
Linolenic acid	18:3(9,12,15)
Arachidonic acid	20:4(5, 8, 11, 14)
Lignoceric acid	24:0
Nervonic acid	24:1(15)

Triacylglycerol (TAG) or FAT is the major energy reserve in the body

It is more efficient to store energy in the form of TAG

Why FAT not Carbohydrates?

- * More reduced:
9 kcal per gram compared with
4 kcal per gram of carbohydrates
- * Hydrophobic:
can be stored without H₂O
carbohydrates are hydrophilic
1 gram carbohydrates: 2 grams H₂O

Why FAT not Carbohydrates? (Continued)

Average adult has 10 Kg of Fat

How many calories?

90,000 kcal

What is the mass of carbohydrates that produces 90,000 kcal ?

$90,000 / 4 = 22.5 \text{ Kg}$

How much water with it?

FATTY ACID as FUELS

- Fatty Acids are the major fuel used by tissues but Glucose is the major Fuel in extracellular fluids

<u>Fuel type</u>	<u>Amount in Fluids</u> <u>gram</u>	<u>Amount used</u> <u>/12 hours gram</u>
FA	0.5	60 (540 Kcal)
Glucose	20	70 (280 Kcal)