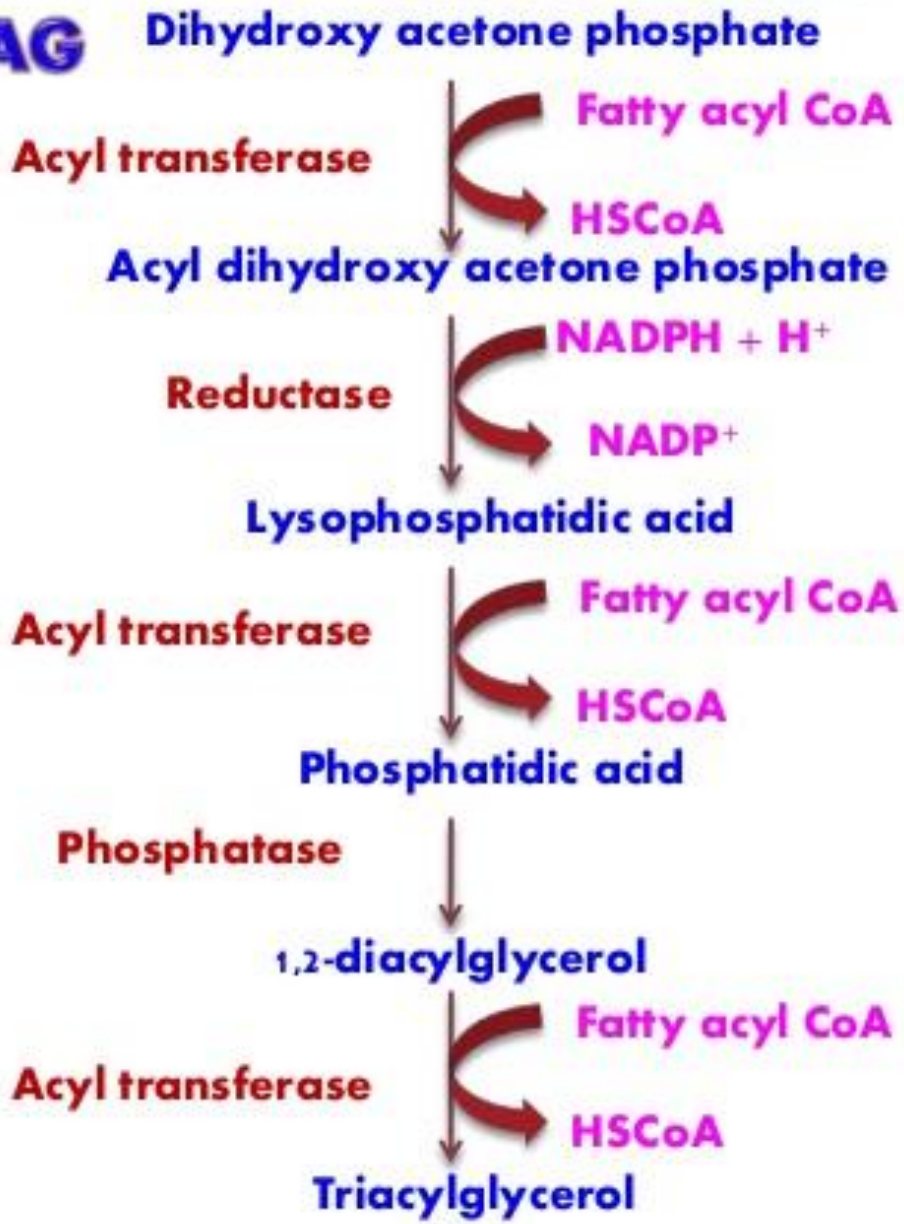
Biosynthesis of Triacylglycerols

Introduction

- Animals can synthesize and store large quantities of triacylglycerols, to be used later as fuel
- In humans only a few hundred grams of glycogen can be stored in the liver and muscles, barely enough to supply the body's energy needs for 12 hours.
- Whenever carbohydrate is ingested in excess of the capacity to store glycogen, it is converted into triacylglycerols and stored in adipose tissue.
- Plants also manufacture triacylglycerols as an energy-rich fuel, stored especially in fruits, nuts, and seeds.

Synthesis of TAG



- TriacylGlycerol Storage form of lipid which mostly occur in fat cells of Adipose tissues.
- Importance

❑ Store of energy - released rapidly on demand

❑ Reserve of Essential Fatty acids

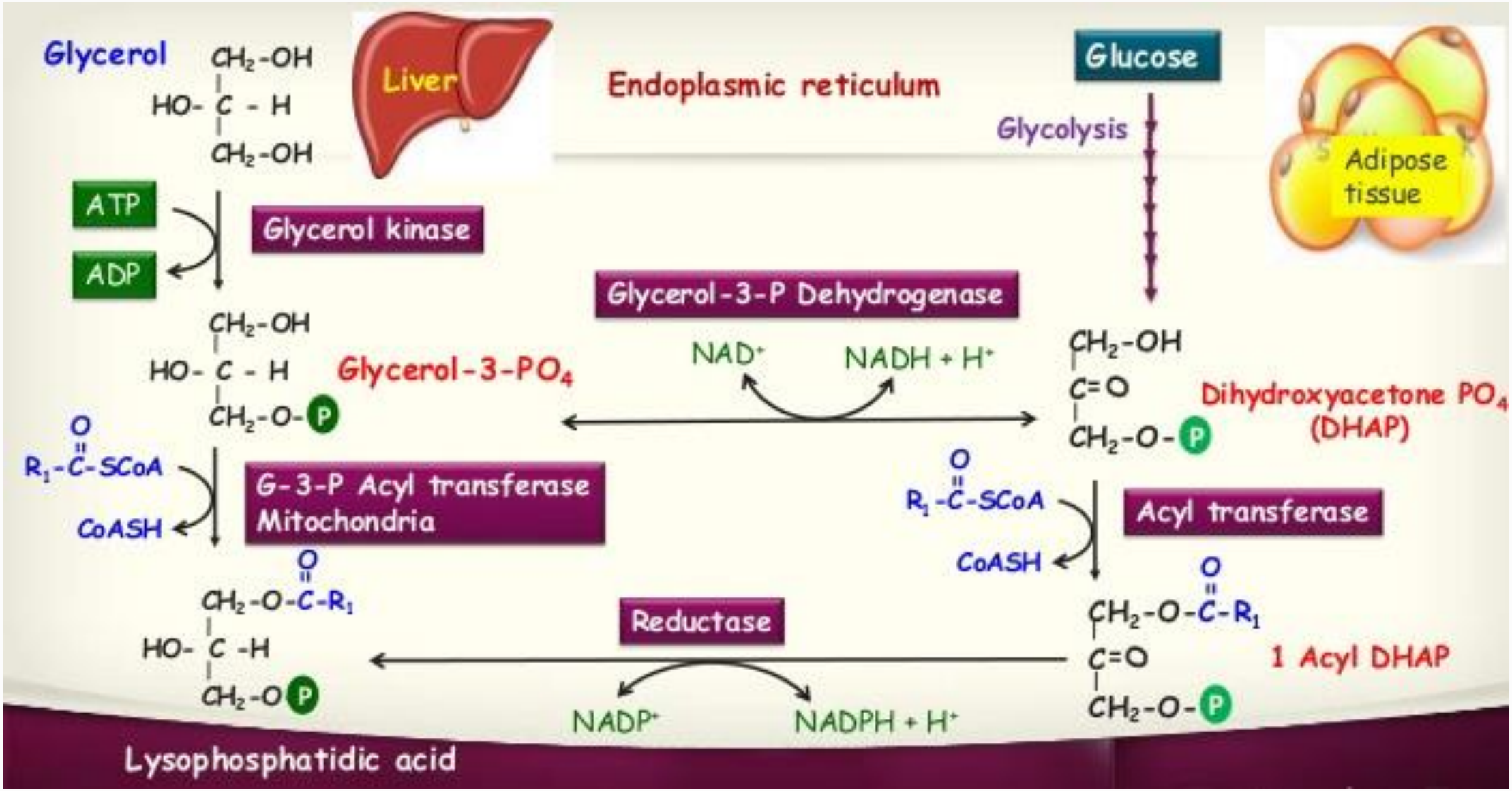
❑ Precursors for Eicosanoids

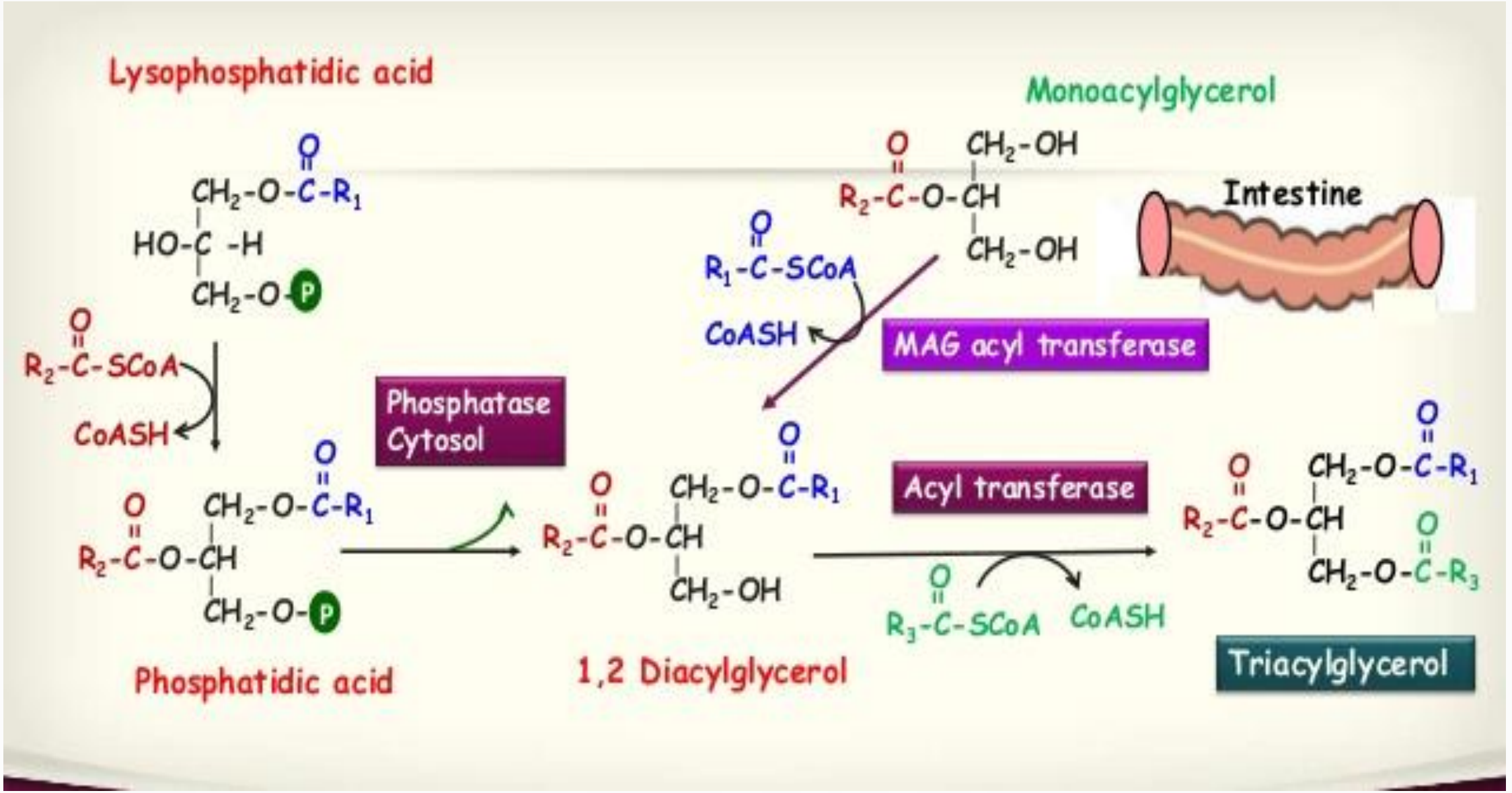
❑ Removes excess potentially harmful lipids such as FFA, DAG, Cholesterol, retinol ester, CoA ester.

- Synthesis of TAG : Occurs in All tissues
- Predominantly - Adipose tissue, Liver Substrates- Fatty acid, Glycerol – activated prior to synthesis
- Two biosynthetic pathway :
- Glycerol-3-phosphate pathway –operates in LIVER,ADIPOSE TISSUES Only difference – source of Gly-3-P
- Monoacyl glycerol pathway – operates in INTESTINE

Live vaccines are used to protect against:

- Measles, mumps, rubella (MMR combined vaccine)
- Rotavirus
- Smallpox
- Chickenpox
- Yellow fever


Glycerol
CH2-OH
HO- C - H
CH2-OH
Liver
Endoplasmic reticulum
Glucose
Glycolysis
Adipose tissue
ATP
ADP
Glycerol kinase
Glycerol-3-Dehydrogenase
NAD+
NADH + H+
Glycerol-3-PO4
CH2-O-P
C=O
Dihydroxyacetone PO4 (DHAP)
O
R1-C-SCoA
CoASH
G-3-P Acyl transferase Mitochondria
Acyl transferase
CH2-O-C-R1
Reductase
1 Acyl DHAP
NADP+
NADPH + H+
Lysophosphatidic acid


Lysophosphatidic acid
Monoacylglycerol
Intestine
MAG acyl transferase
Phosphatase
Cytosol
Acyl transferase
CoASH
Phosphatidic acid
1,2 Diacylglycerol
Triacylglycerol

References

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