

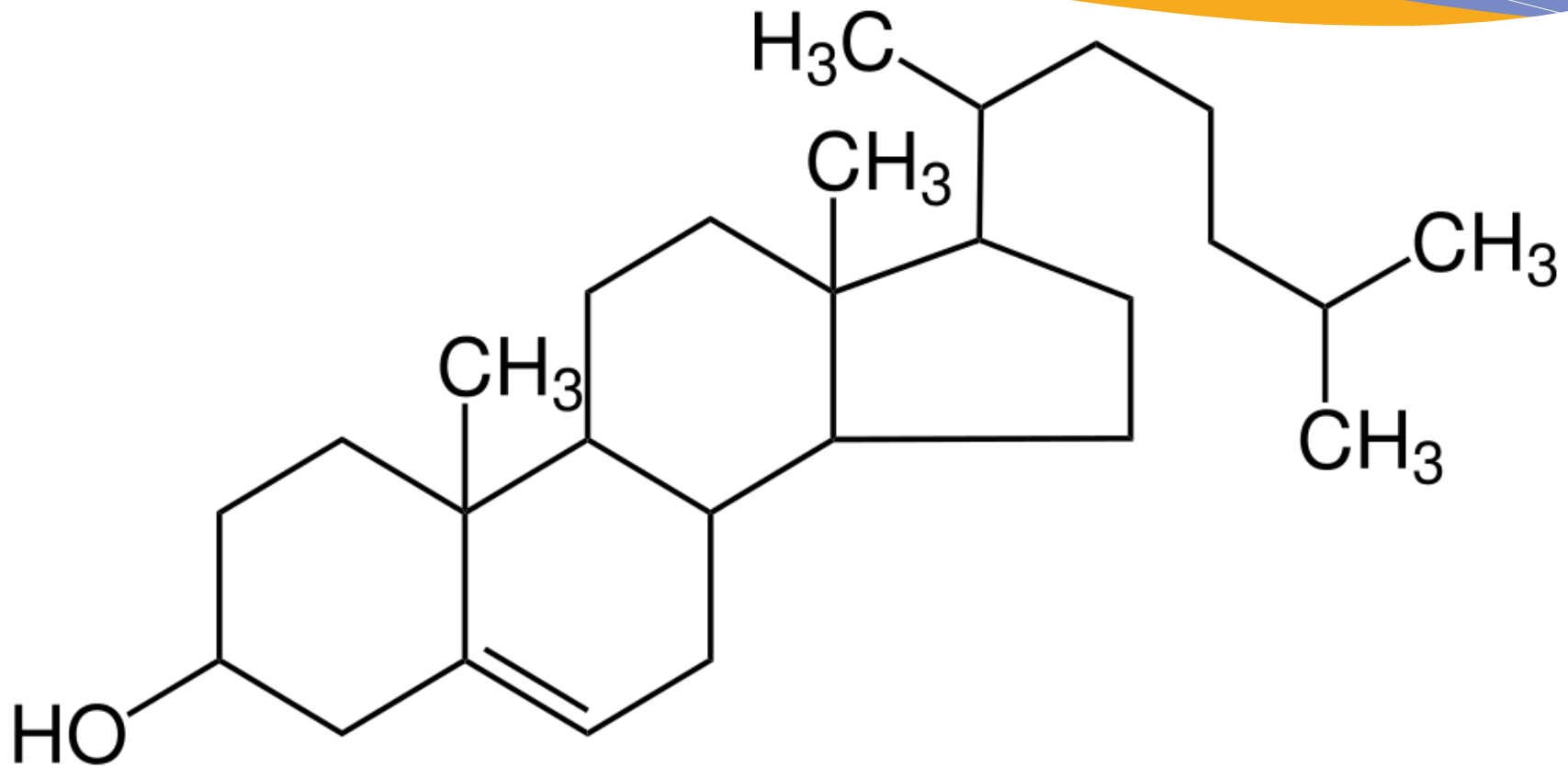
Low Cholesterol

Dr. Erica Peirson



PEIRSON CENTER FOR CHILDREN

Cholesterol



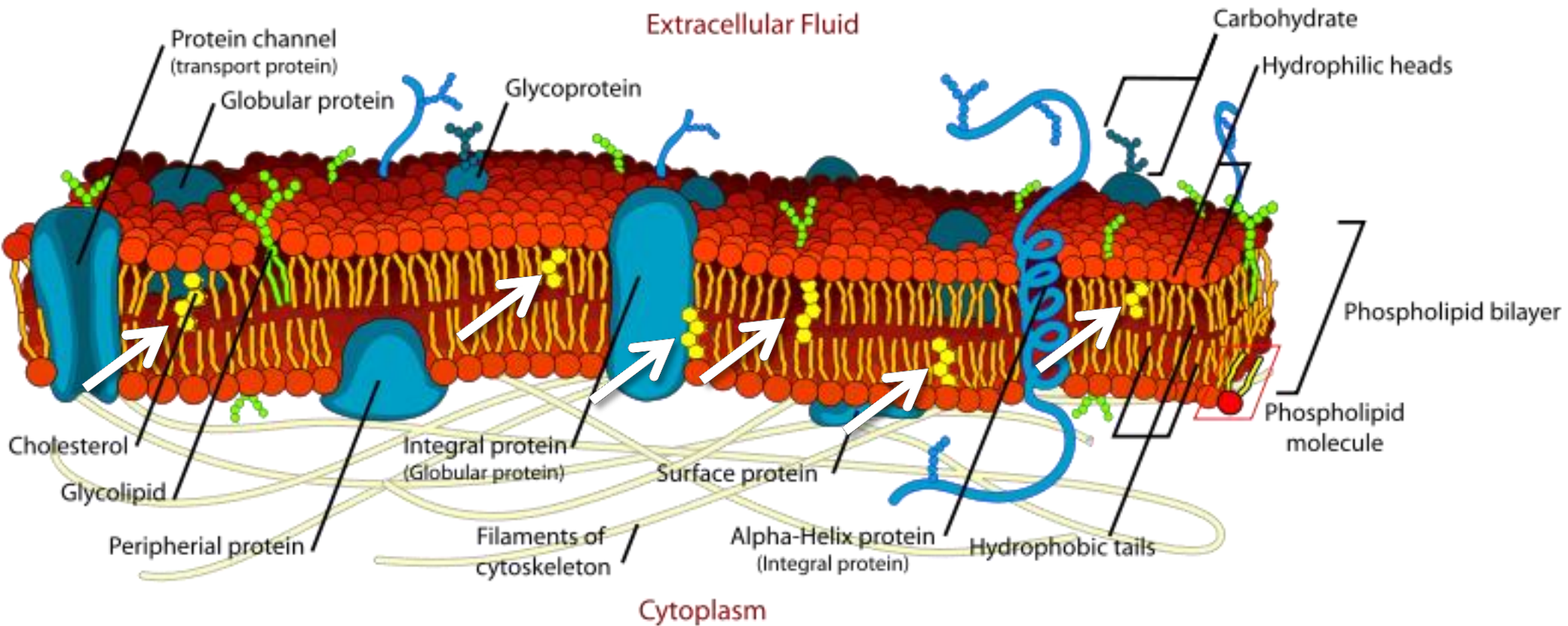
Cholesterol

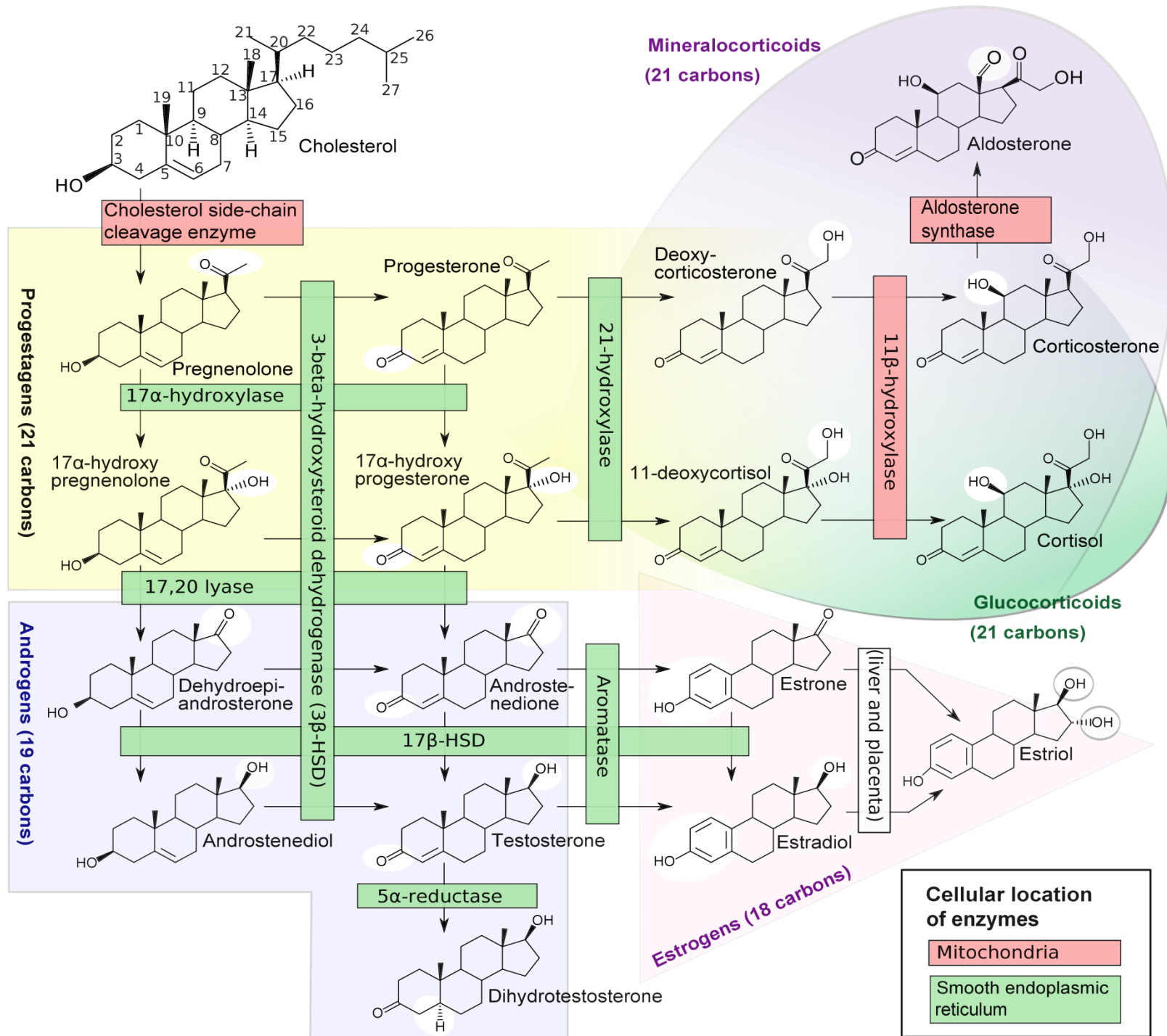
- Diet/absorption
- Synthesis
 - Liver (80%)
 - Adrenals
 - Muscle
 - Skin

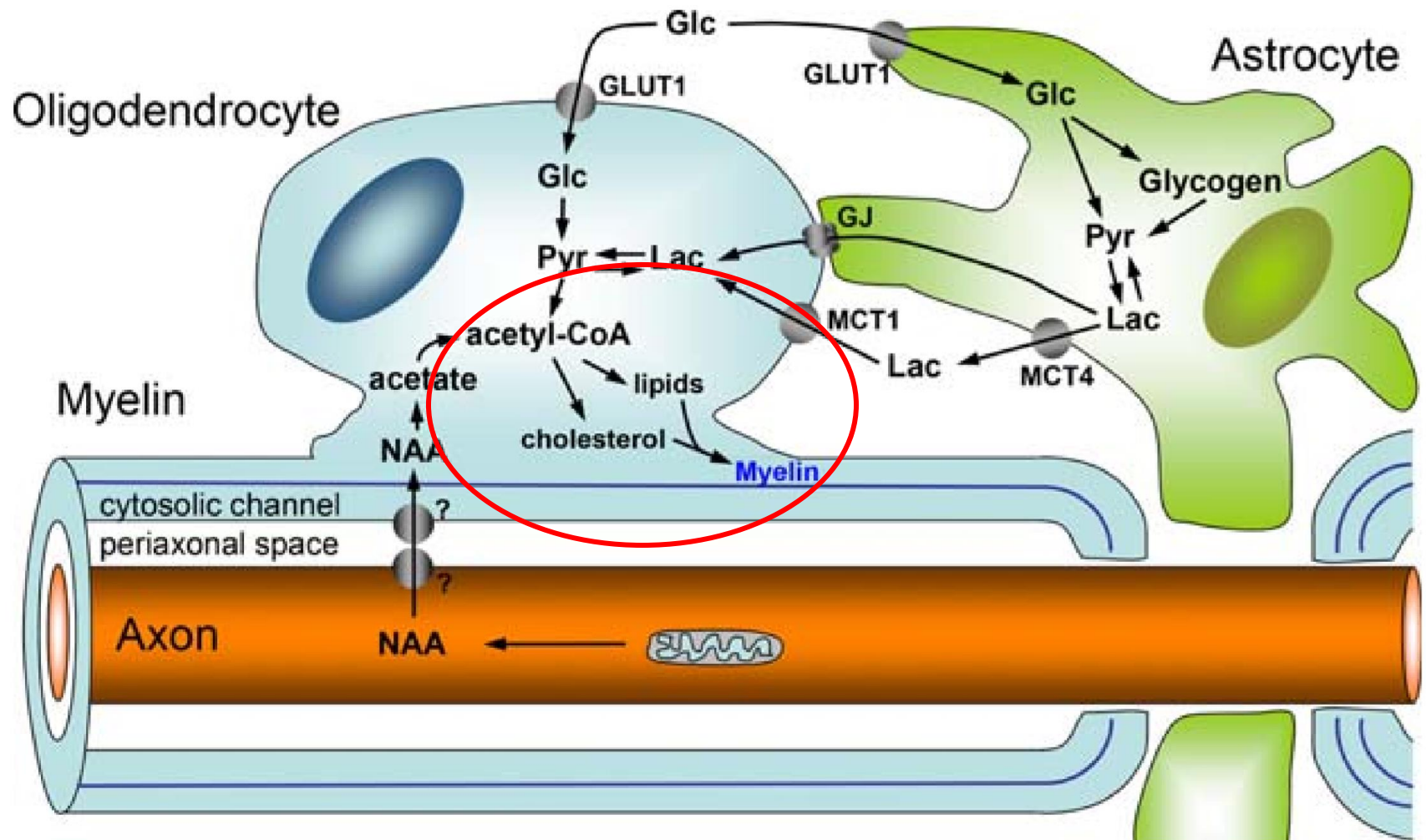
Cholesterol

- Cell membrane integrity
- Vitamin D synthesis
- Hormone synthesis
- Myelin synthesis
- Bile Acid Formation

Cholesterol





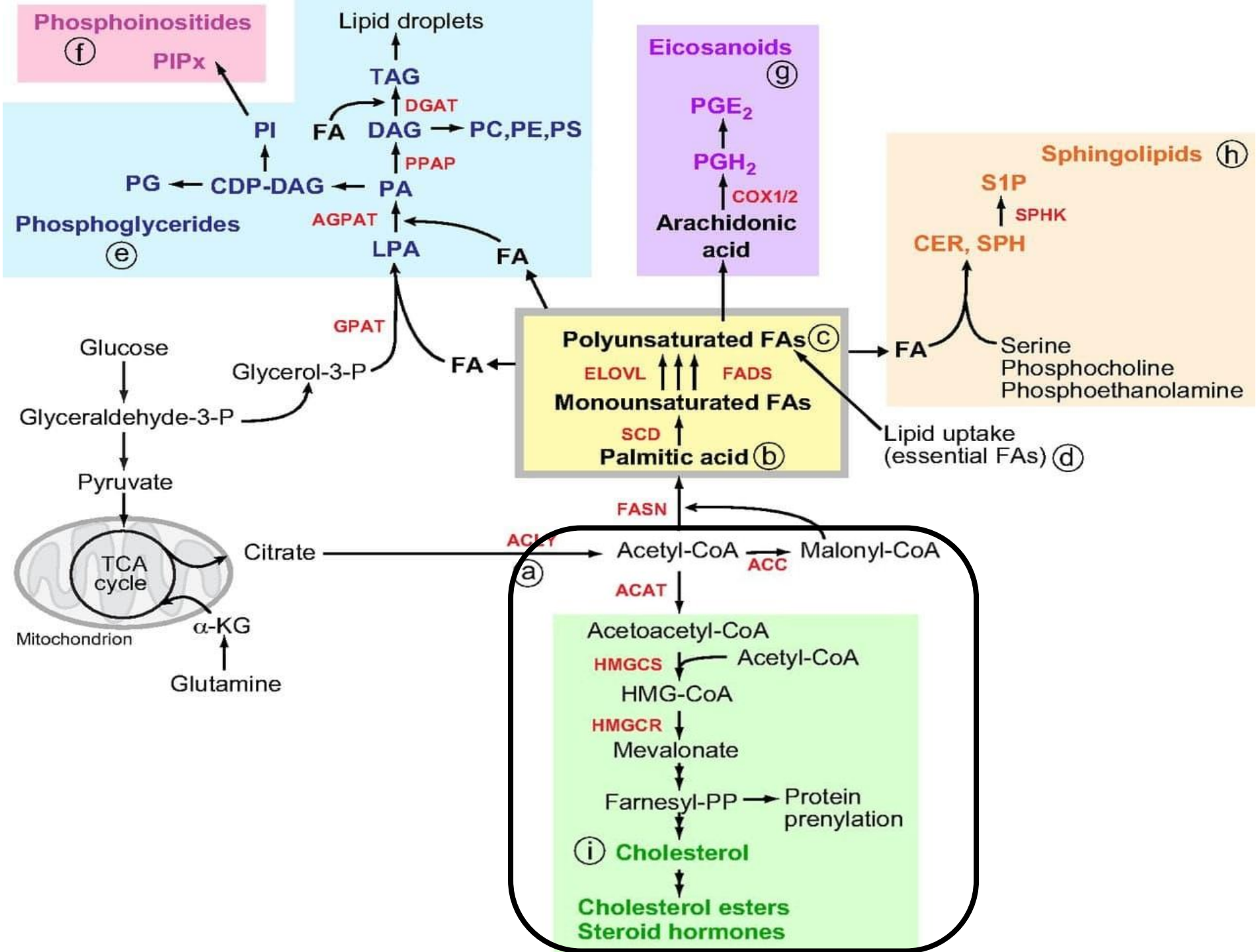


Dietary sources

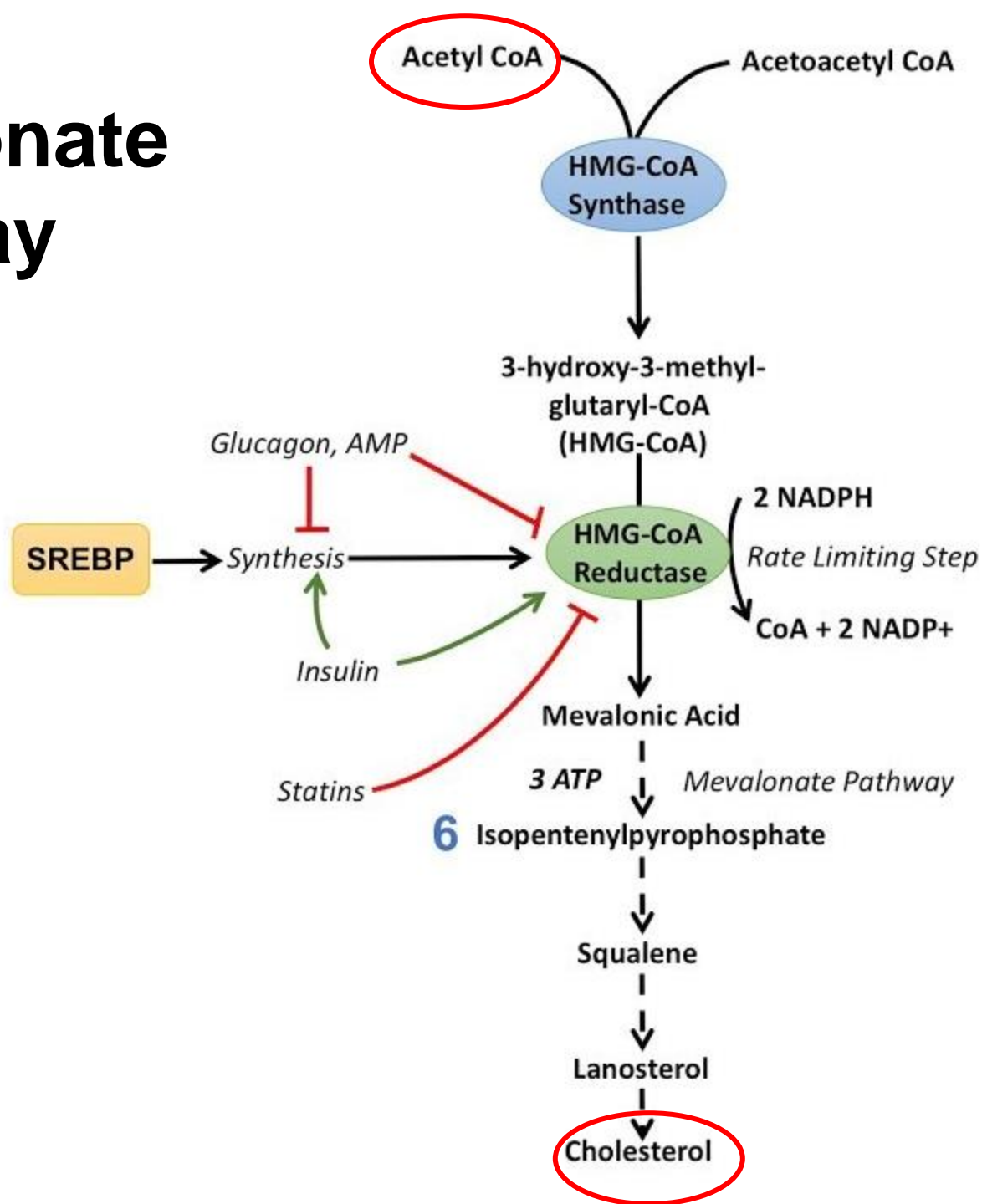
- Cheese
- Egg yolks
- Beef, pork, poultry, fish, shrimp
- Breast milk

Phytosterols

- Block cholesterol absorption
 - Avocado
 - Flax seeds/meal
 - Peanuts
 - Rice bran
 - Corn
 - Wheat Germ



Mevalonate Pathway



Reference Ranges

Definition

The terms hypolipidemia, hypocholesterolemia and hypobetalipoproteinemia are used interchangeably in the literature, and refer to reduced plasma cholesterol. Most authors use the total serum cholesterol (TC) to define this condition. Yet, there is no consensus about the level below which a clinically significant hypocholesterolemia will ensue, and each author used a different cut-off value. Even so, most of the authors use a cut-off value between 120 mg/dl (3.1 mmol/l) and 150mg/dl (3.88mmol/l) [2,3,4,5]. However some authors use higher levels up to 190mg/dl (4.9mmol/l) [6,7] while others use lower values such as 100mg/dl (2.59 mmol/l) [8,9,10].

Reference Ranges

Result	Value	Ref. Range
Cholesterol	96	<170 mg/dL
Triglycerides	54	40-252 mg/dL
HDL Chol	27 (L)	>40 mg/dL
LDL Calc	58	<100 mg/dL
VLDL Calc	11 (L)	12-38 mg/dL

Result	Value	Ref. Range
Cholesterol	110	<170 mg/dL
Triglycerides	51	40-252 mg/dL
HDL Chol	47	>40 mg/dL
LDL Calculated	53	<100 mg/dL
VLDL Calc	10 (L)	12-38 mg/dL

Reference Ranges

Total Cholesterol	90 ^{L ^1 01}	[150-200]	mg/dL
Triglycerides	68 ^{^2 01}	[<=149]	mg/dL
HDL Cholesterol	45.0 ^{^3 01}		mg/dL
Total Chol/HDL Ratio	2 ⁰¹		
Non-HDL Cholesterol	45 ⁰¹	[<=130]	mg/dL
LDL Cholesterol, Calc	37 ^{L 01}	[65-100]	mg/dL
LDL/HDL Ratio	0.7 ⁰¹	[0.0-4.2]	
VLDL Cholesterol, Calc	14 ⁰¹	[1-17]	mg/dL

Lipid Panel

Cholesterol, Total

99

Low

mg/dL

Brain Health

Protein Cell 2015, 6(4):254–264
DOI 10.1007/s13238-014-0131-3

Protein & Cell

REVIEW

Cholesterol metabolism and homeostasis in the brain

Juan Zhang, Qiang Liu✉

Causes of low cholesterol



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Brain Health

- Cholesterol does not pass the blood brain barrier
- It must be synthesized in the brain
- The brain contains 23% of all cholesterol within the body

Causes of low cholesterol



Review Article

www.ljm.org.ly

Hypolipidemia: A Word of Caution

Elmehdawi RR

Department of Internal Medicine, Faculty of Medicine, Garyounis University, Libya

Causes of Low Cholesterol

- Infection
- Malabsorption
- Chronic Liver Disease
- Chronic Inflammation
- Parasites
- Thiamine Deficiency
- Manganese Deficiency
- Anemia (cause or consequence?)
- Hyperthyroidism
- Critical Illness
- Malignancy
- Adrenal Failure/Fatigue

Causes of Low Cholesterol

Lipids in Health and Disease



Review

Open Access

Role of cholesterol in parasitic infections

Devendra Bansal¹, Harinderpal Singh Bhatti¹ and Rakesh Sehgal*^{1,2}

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Causes of Low Cholesterol

Role of Thiamine in Regulation of Fatty Acid and Cholesterol Biosynthesis in Cultured Brain Cells

Nutrition Reviews, Volume 37, Issue 1, 1 January 1979, Pages 24–25,
<https://doi.org/10.1111/j.1753-4887.1979.tb02192.x>

Published: 01 January 1979

Abstract

Thiamine deficiency in cultured glial cells impairs their ability to synthesize fatty acids and cholesterol. The defect is related to reduced formation of key lipogenic enzymes. These changes could be the basis of degenerative changes seen in glial cells in early thiamine deficiency.

Causes of Low Cholesterol

A ROLE FOR THIAMINE IN THE REGULATION OF FATTY ACID AND CHOLESTEROL BIOSYNTHESIS IN CULTURED CELLS OF NEURAL ORIGIN¹

J. J. VOLPE² and J. C. MARASA

Departments of Pediatrics and Neurology and Neurosurgery (Neurology), Washington University
School of Medicine, St. Louis, MO 63110, U.S.A.

(Received 17 June 1977. Accepted 16 September 1977)

Abstract—Cultured glial (C-6) and neuronal (neuroblastoma) cells were utilized to define the role of thiamine in the regulation of fatty acid and cholesterol biosynthesis. Glial cells subjected to thiamine deficiency exhibited rates of fatty acid synthesis that were only 13% of the rates in thiamine-supplemented cells. The decrease in fatty acid synthetic rate was accompanied by a comparable decrease in the activities of fatty acid synthetase and acetyl-CoA carboxylase, the two critical enzymes in the pathway.

When B1, B2 and ALA are not present pyruvate dehydrogenase enzyme does not work, resulting in a buildup of pyruvic acid that leads to elevated lactic acid.



Glucose

Glucose-6-phosphate

Pentose Phosphate Pathway

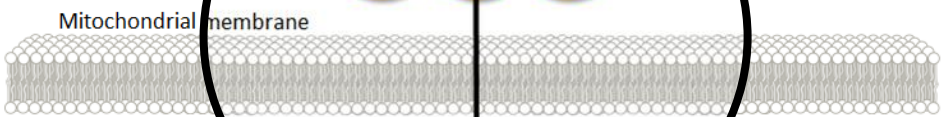
Transketolase
B1

Nucleic acids
and
NADPH

Building block for DNA and RNA

Pyruvate

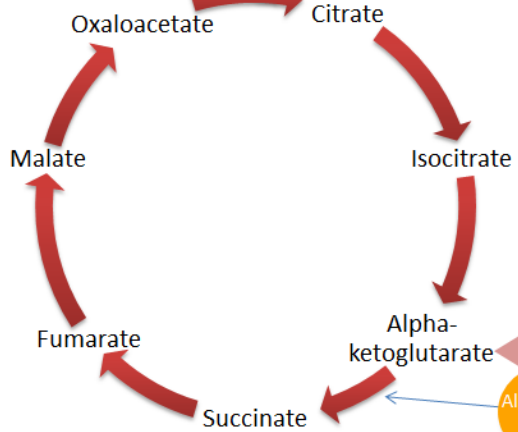
ALA B2 B1
Pyruvate Dehydrogenase
Enzyme Complex



Acetyl-CoA

**Thiamine (B1)
as
Thiamine
Pyrophosphate**

- Needed for
- Glutathione regeneration
 - Detoxification
 - Respiratory burst (immune response)
 - Deiodinase function (T4 to T3 conversion)
 - Lipid synthesis



ALA B2 B1
Alpha-ketoglutarate Dehydrogenase
Enzyme Complex

When B1, B2 and ALA are not present alpha-ketoglutarate dehydrogenase enzyme does not work, resulting in a buildup of alpha-ketoglutarate and mitochondrial dysfunction.

Causes of Low Cholesterol

Surg Neurol Int. 2015; 6: 45.

Published online 2015 Mar 24. doi: 10.4103/2152-7806.153876: 10.4103/2152-7806.153876

PMCID: PMC4392553

PMID: [25883837](#)

Glyphosate, pathways to modern diseases III: Manganese, neurological diseases, and associated pathologies

[Anthony Samsel](#) and [Stephanie Seneff](#)^{1,*}

“Mn stimulates cholesterol synthesis in the liver, presumably because bile acids, derived from cholesterol, are needed to bind to Mn and carry it back to the gut for recycling.”

Treatment

- Find the cause!
- There may be multiple causes at once
- Monitor fasting lipid panel post-intervention every 3-6 months