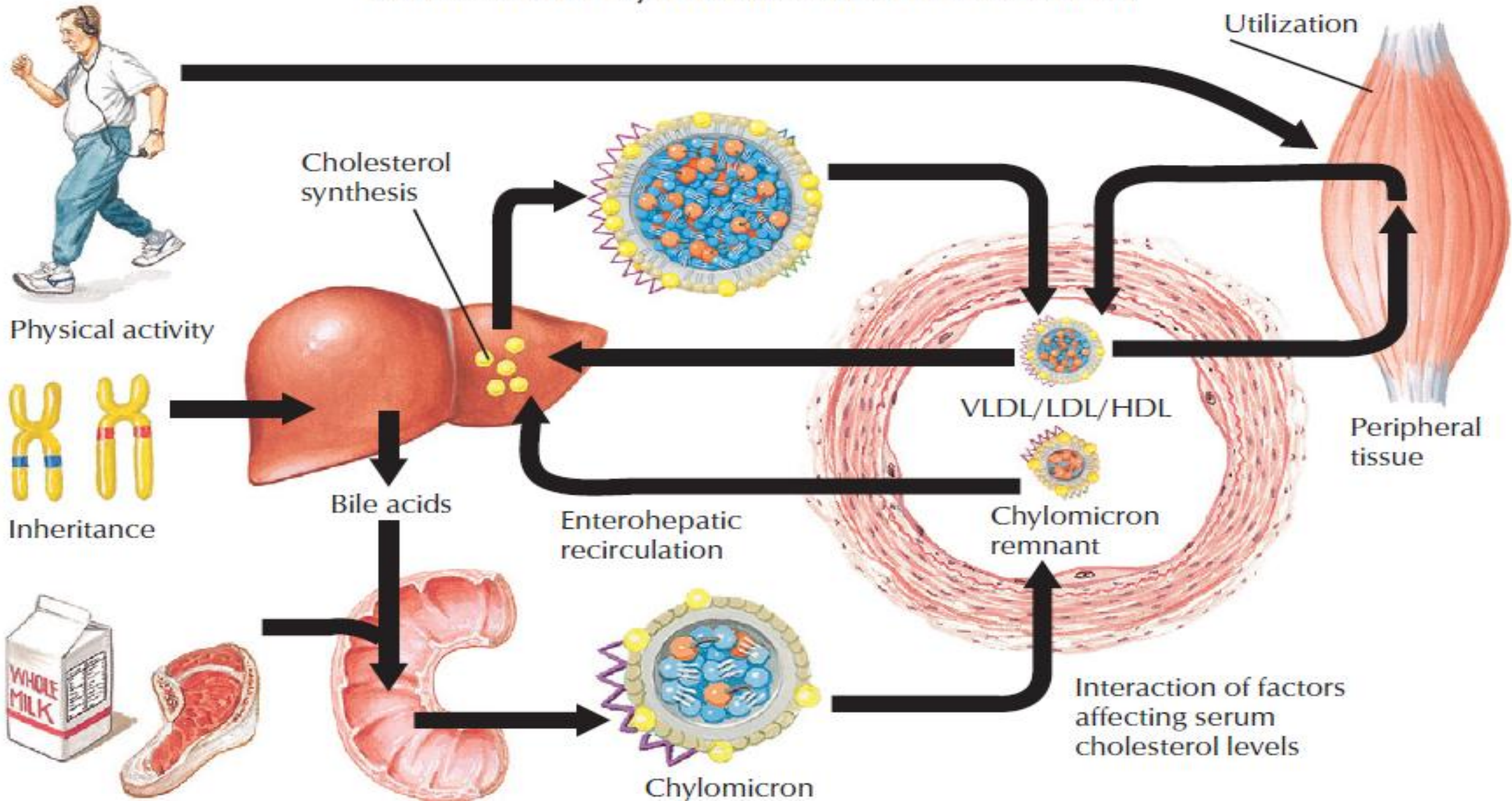
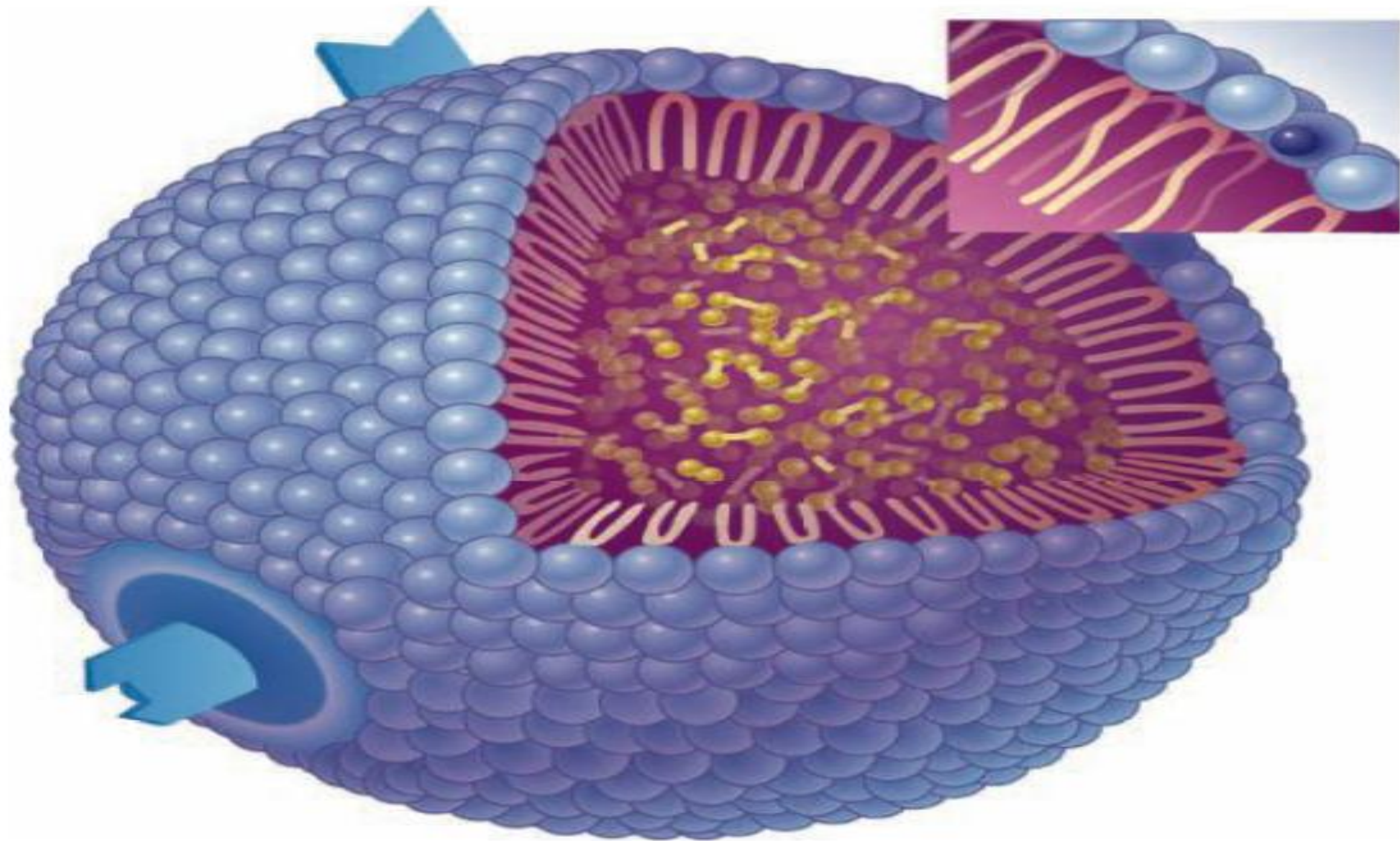




Hypercholesterolemia

Cholesterol Synthesis and Metabolism





cholesterol

Lipoprotein Structure

Polar shell
Free cholesterol
Phospholipid

Nonpolar core
Cholesterol ester
Triglyceride

APO-C
(C-I, II, III)

APO-E

APO-B-48

APO-A
(A-I, II, III)

Chylomicron

APO-B-100

APO-C
(C-I, II, III)

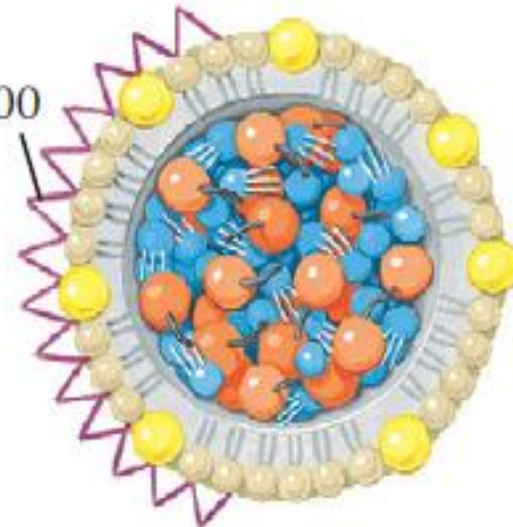
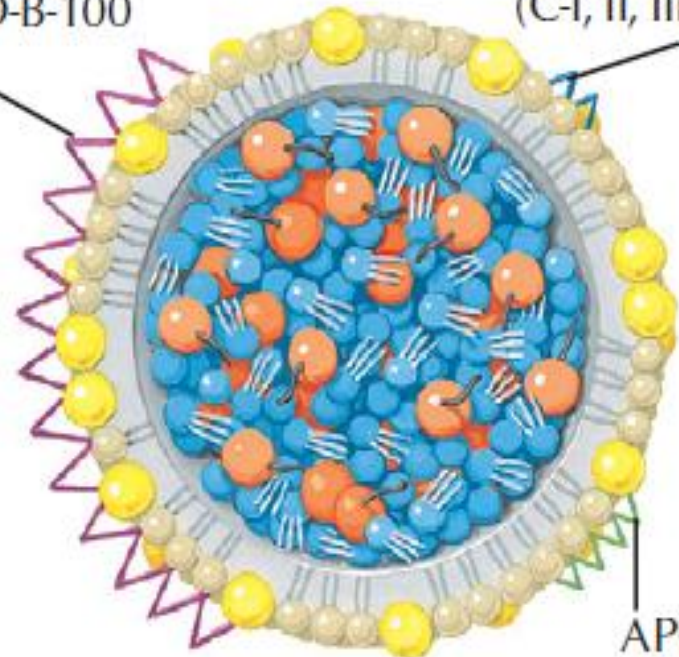
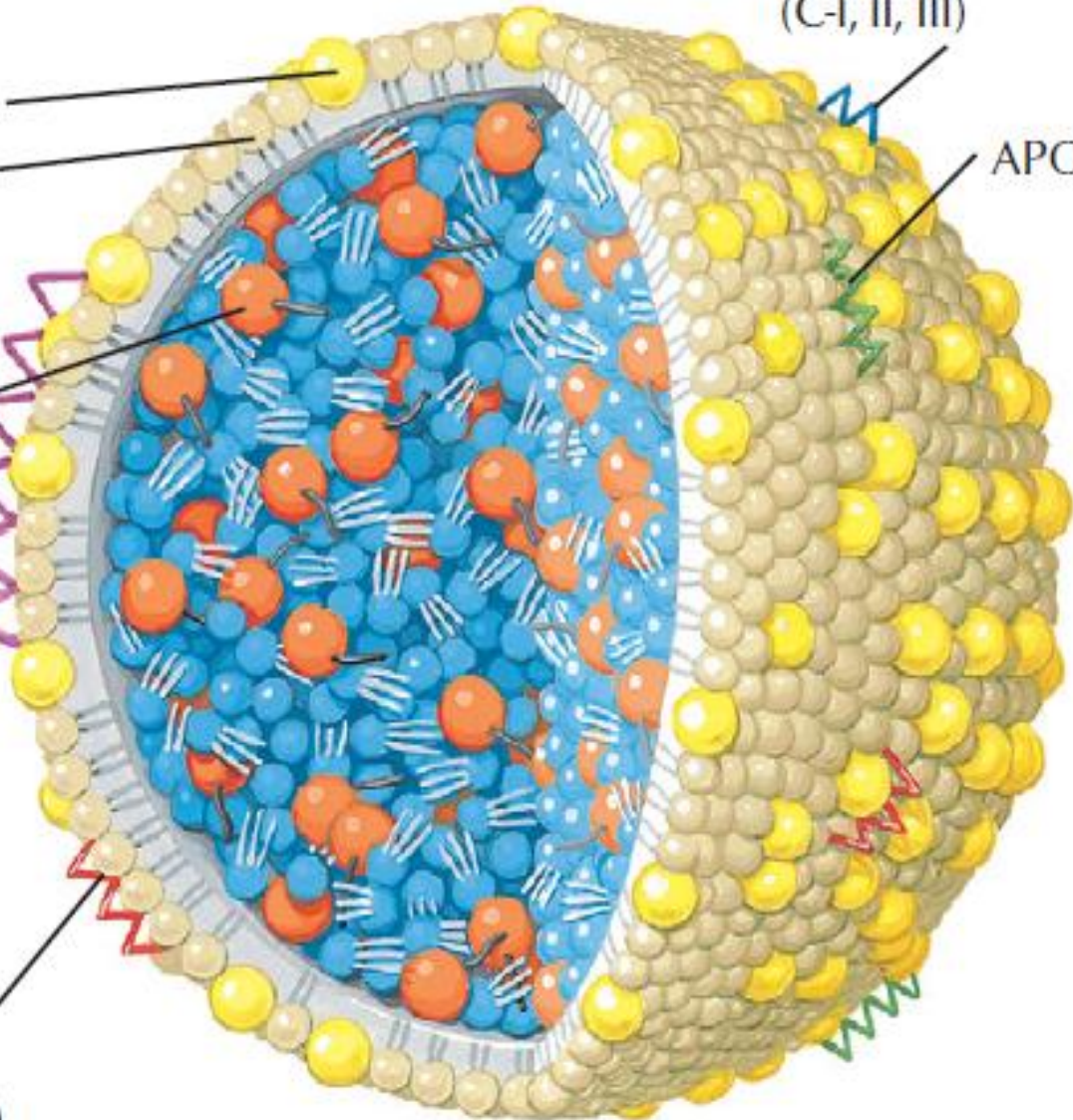
APO-E

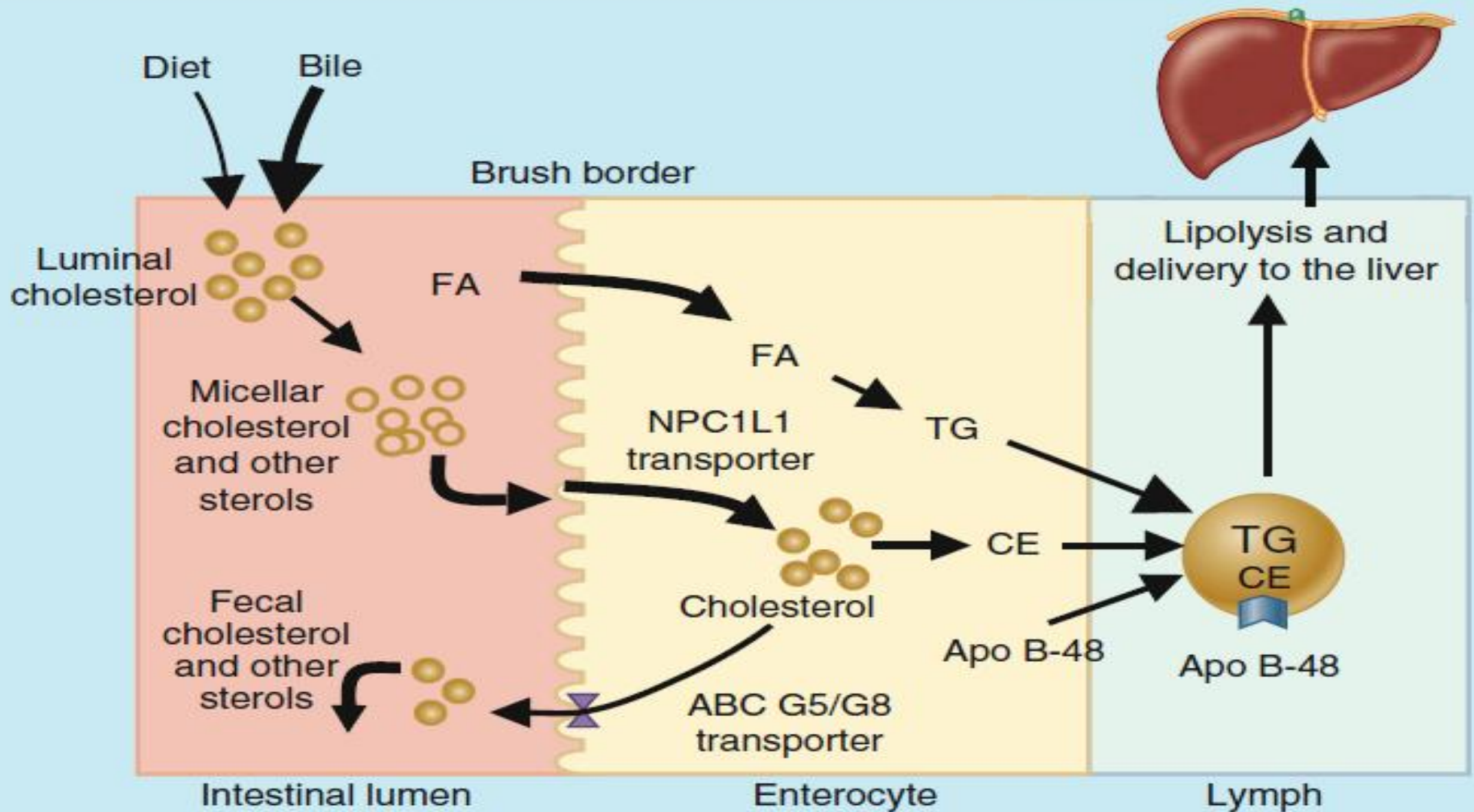
Very low-density lipoprotein (VLDL)

APO B-100

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CMC





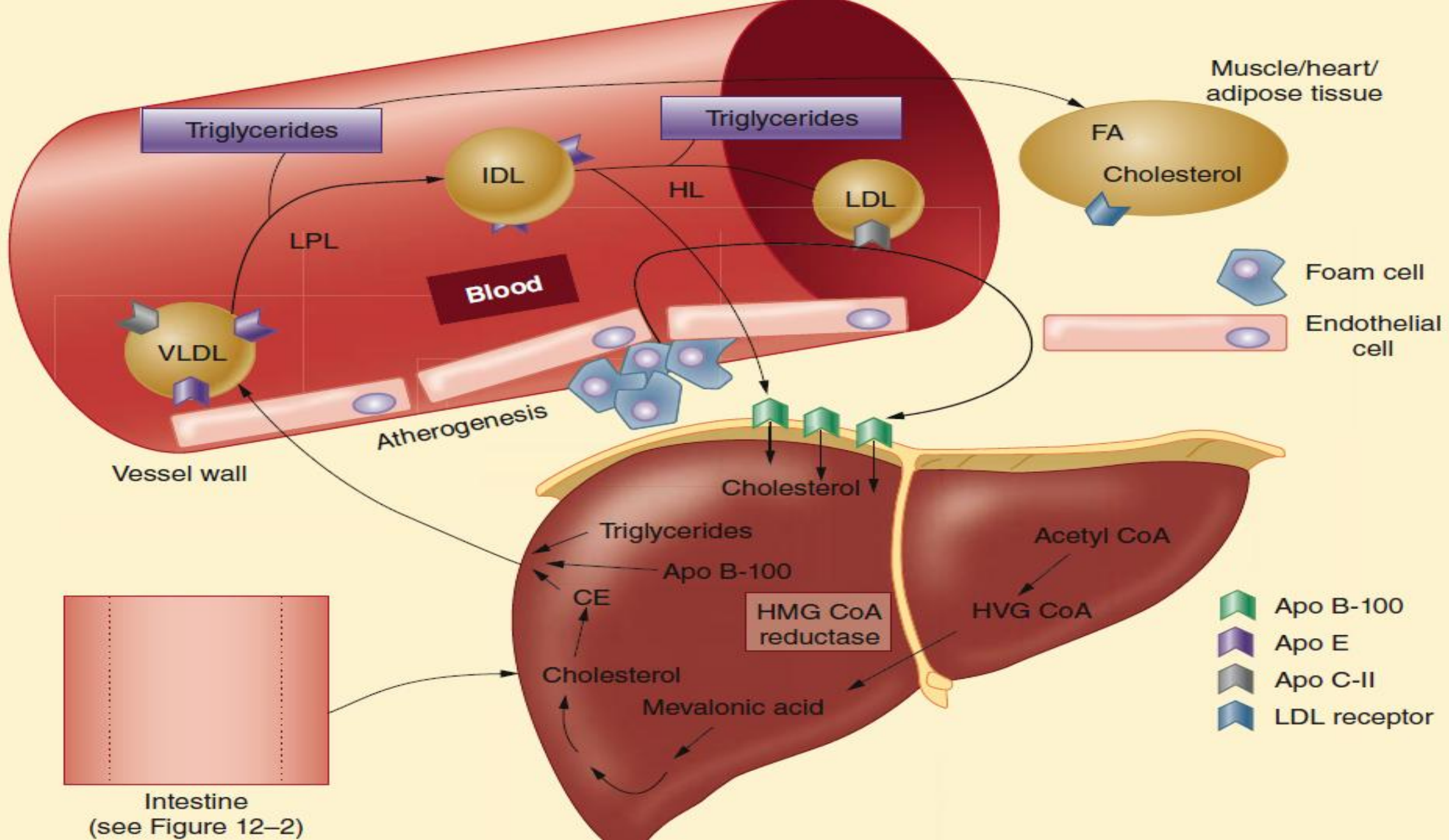


Table 12–5**National Lipid Association Classifications of Cholesterol and Triglyceride Levels in mg/dL (mmol/L)****Lipids****Non-HDL Cholesterol^a**

< 130 (3.36)	Desirable
130–159 (3.36–4.11)	Above desirable
160–189 (4.14–4.89)	Borderline high
190–219 (4.91–5.66)	High
≥ 220 (5.69)	Very high

LDL Cholesterol

< 100 (2.59)	Desirable
100–129 (2.59–3.34)	Above desirable
130–159 (3.36–4.11)	Borderline high
160–189 (4.14–4.89)	High
≥ 190 (4.91)	Very high

HDL Cholesterol

< 40 (1.03)(men)	Low
< 50 (1.29)(women)	Low

Triglycerides

< 150 (1.70)	Normal
150–199 (1.70–2.25)	Borderline
200–499 (2.26–5.64)	High
≥ 500 (5.65)	Very high ^b

Clinical Presentation and Diagnosis

Lipid Panel

- Non-HDL cholesterol exceeding 130 mg/dL (3.36 mmol/L) or LDL cholesterol exceeding 100 mg/dL (2.59 mmol/L) should be evaluated for high cholesterol in conjunction with assessment of ASCVD risk.
- Serum triglycerides exceeding 150 mg/dL (1.70 mmol/L) and serum HDL cholesterol less than 40 mg/dL (1.03 mmol/L) in men and less than 50 mg/dL (1.29 mmol/L) in women may suggest metabolic syndrome and should be evaluated.

Physical Findings

- Corneal arcus of the eye and xanthomas may be seen in patients with genetic disorders that cause a marked increase in serum LDL cholesterol (greater than 250 mg/dL [6.47 mmol/L]).
- Those with extremely elevated serum triglycerides (greater than 1000 mg/dL [11.3 mmol/L]) can develop pancreatitis and tuberoeruptive xanthomas.

Indications for Lipid Panel

- All adults more than 20 years of age should be screened at least every 5 years using a fasting blood sample to obtain a lipid profile (total cholesterol, non-HDL cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides). A fasting lipid profile is preferred so an accurate assessment of LDL cholesterol can be performed.
- Children between 2 and 20 years old should be screened for high cholesterol if their parents have premature CHD or if one of their parents has a total cholesterol greater than 240 mg/dL (6.21 mmol/L). Early screening will help identify children at highest risk of developing CHD in whom early education and dietary intervention is warranted.

Indications for Other Tests

- Conditions that may produce lipid abnormalities (such as those listed in Table 12–2) should be screened for using appropriate tests. If present, these conditions should be properly addressed.

Hypercholesterolemia

General Management Measures

Dietary Management



Weight control



Reduce consumption of foods high in cholesterol, saturated fat and *trans* fatty acids, and salt. Decrease total caloric intake.



Increase consumption of food low in saturated fat and high in fiber.



Increased exercise



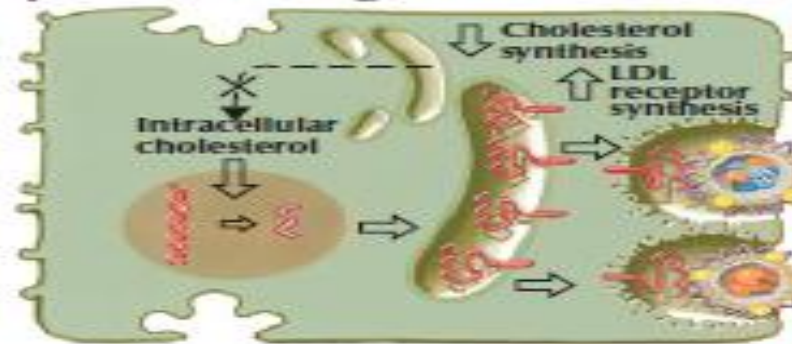
Fish oil supplements

Appropriate diet and exercise are cornerstones of cholesterol management. Dietary counseling and reinforcement and a planned program of physical activity are recommended.

Actions of Lipid-Lowering Medications

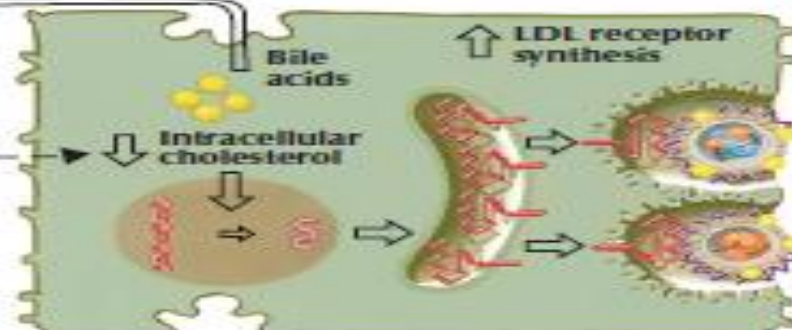
Statins

Statins (HMG-CoA reductase inhibitors) inhibit cholesterol synthesis and increase LDL receptor uptake of LDL.



Bile Acid Sequestrants

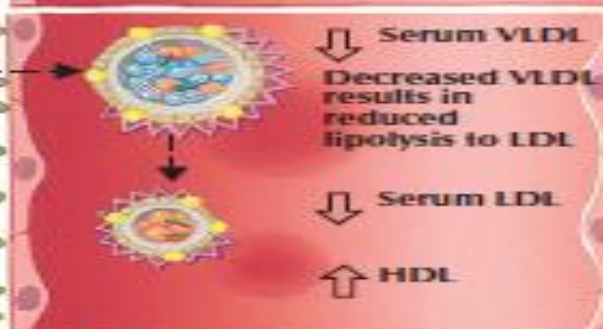
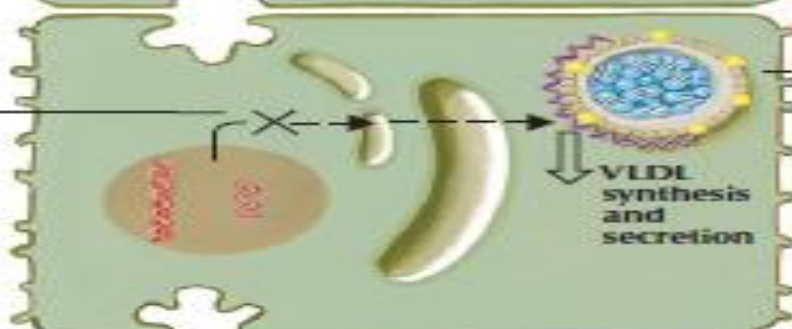
Sequestrants prevent bile acid reabsorption and increase uptake by hepatic LDL receptors.



Nicotinic Acid

Drugs reduce tissue lipase activity and impair synthesis of VLDL.

Nicotinic acid



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 C. Machado, M.D.

Fibric Acid Derivatives

Act via stimulation of lipase to increase lipolysis by lipoprotein lipase (LPL) thereby decreasing VLDL.

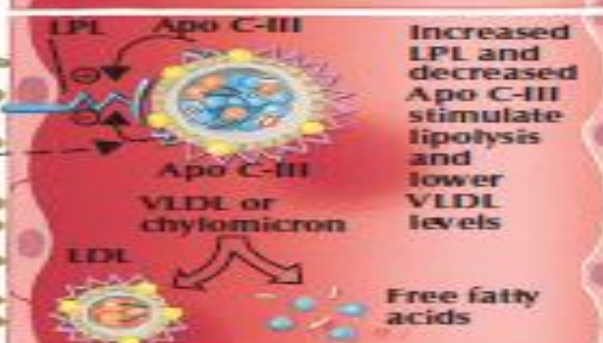
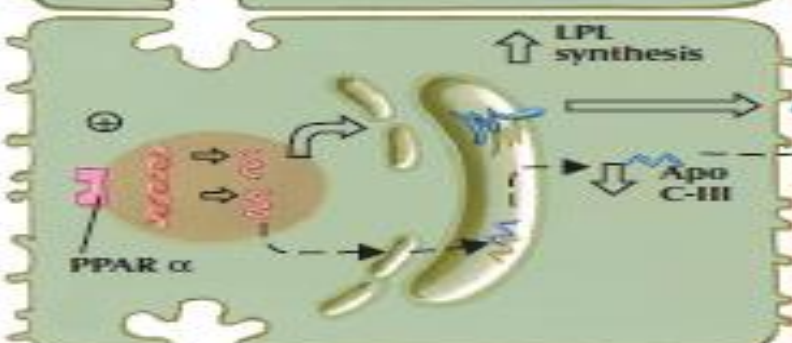


Table 12-10

Effects of Lipid-Lowering Drugs on Serum Lipids at FDA-Approved Doses

Lipid-Lowering Drug	LDL Cholesterol	HDL Cholesterol	Triglycerides	Total Cholesterol
Statins				
Atorvastatin	-26% to -60%	+5% to +13%	-17% to -53%	-25% to -45%
Fluvastatin	-22% to -36%	+3% to +11%	-12% to -25%	-16% to -27%
Fluvastatin ER	-33% to -35%	+7% to +11%	-19% to -25%	-25%
Lovastatin	-21% to -42%	+2% to +10%	-6% to -27%	-16% to -34%
Lovastatin ER	-24% to -41%	+9% to +13%	-10% to -25%	-18% to -29%
Pitavastatin	-31% to -45%	+1% to +8%	-13% to -22%	-23% to -31%
Pravastatin	-22% to -34%	+2% to +12%	-15% to -24%	-16% to -25%
Rosuvastatin	-45% to -63%	+8% to +14%	-10% to -35%	-33% to -46%
Simvastatin	-26% to -47%	+8% to +16%	-12% to -34%	-19% to -36%
Bile Acid Sequestrants				
Cholestyramine	-15% to -30%	+3% to +5%	May increase in patients with elevated triglycerides	-10% to -25%
Colesevelam	-15% to -18%	+3% to +5%		-70% to -10%
Colestipol	-15% to -30%	+3% to +5%		-10% to 25%
Cholesterol Absorption Inhibitor				
Ezetimibe	-18%	+1% to +2%	-7% to -9%	-12% to -13%
Nicotinic Acid				
Niacin ER	-5% to -17%	+14% to +26%	-11% to -38%	-3% to -12%
Niacin IR	-5% to -25%	+15% to +39%	-20% to -60%	-3% to -25%
Fibric Acid Derivatives				
Fenofibrate	-31% to +45%	+9% to +23%	-23% to -54%	-9% to -22%
Gemfibrozil	-30% to +30%	+10% to +30%	-20% to -60%	-2% to -16%
Combination Products				
Niacin ER and lovastatin	-30% to -42%	+20% to +30%	-32% to -44%	Not stated
Niacin ER and simvastatin ^a	-12% to -14%	+21% to +29%	-27% to -38%	-9% to -11%
Simvastatin and ezetimibe	-46% to -59%	+8% to +12%	-25% to -26%	-34% to -43%
Omega-3-Fatty Acids				
Lovaza	+45%	+9%	-45%	-10%
Vascepa	-5%	-4%	-27%	-7%
Epanova	+26%	+5%	-31%	-6%
OMTRYG	+20% to +45%	0% to +9%	-25% to -45%	-8% to -10%
Micosomal Transfer Protein Inhibitors				
Lomitapide	-40%	-7%	-45%	-36%
Antisense Oligonucleotide				
Mipomersen	-25%	+15%	-18%	-21%