

Not Just for Grownups Anymore: Managing Pediatric Hyperlipidemia

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Objectives

1. Describe pediatric hyperlipidemia
2. Recognize abnormal pediatric lipid levels
3. Outline the treatment for pediatric hyperlipidemia



1. Describe Pediatric Hyperlipidemia

- Lipid is a non soluble material in liquid
 - Includes:
 - Cholesterol
 - Triglyceride
 - Phospholipids
- Lipids form cell membranes, produce bile acids, and are used in hormone synthesis
- Exogenous – taken in with food
- Endogenous – synthesized within the body

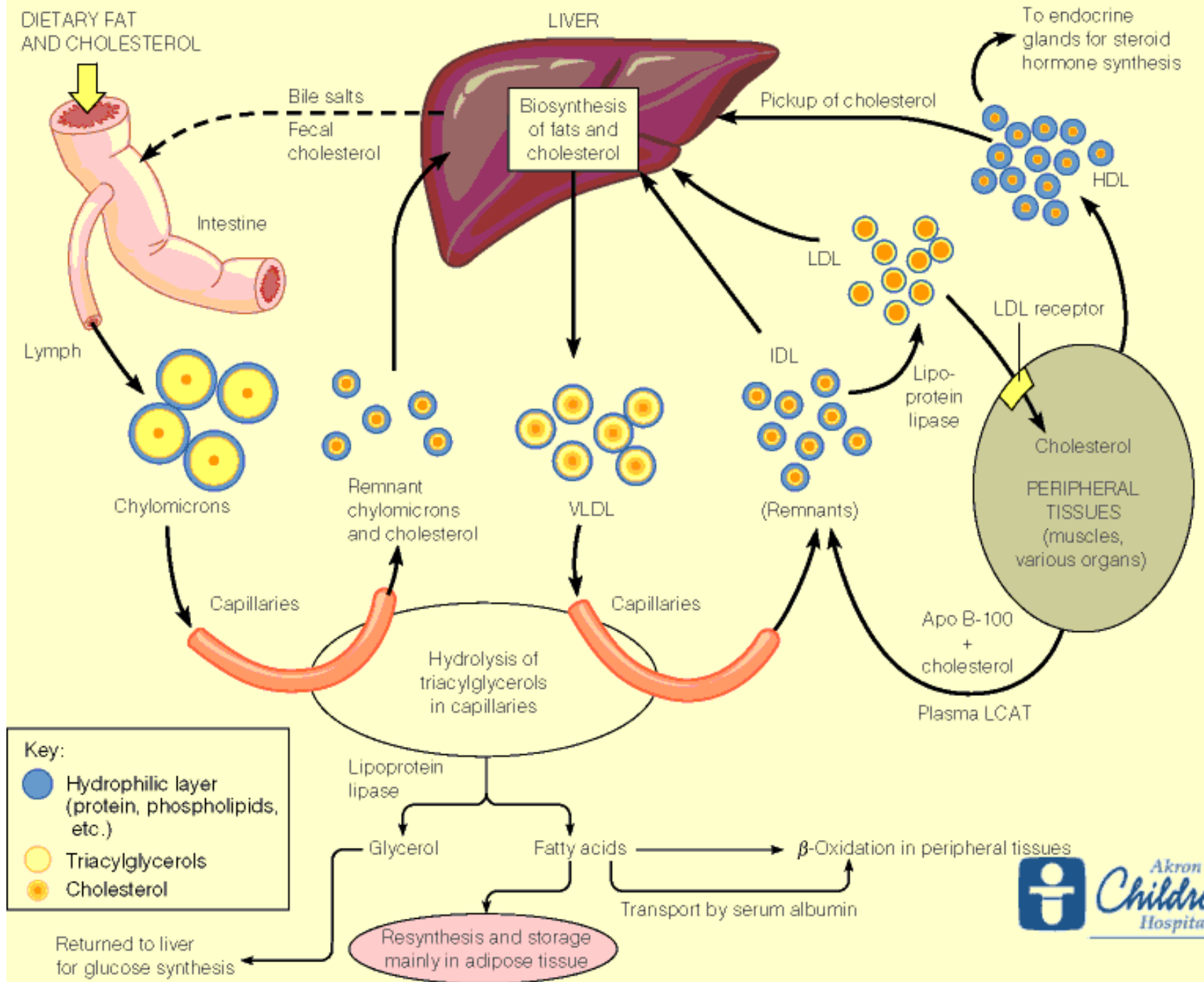


1. Describe Pediatric Hyperlipidemia

- Exogenous – Intestinal absorption of dietary cholesterol and fatty acids
 - Saturated fats (Meats, dairy especially whole milk products, coconut oil, palm oil, cocoa butter)
 - Trans fats (Historically crackers, baked goods, french fries, donuts)
 - Cholesterol (Egg yolks, organ meats)
- Endogenous – Synthesis of very low density lipoprotein (VLDL) in the liver

1. Describe Pediatric Hyperlipidemia

- Lipids are carried in the blood stream by complexes called lipoproteins
- Lipoproteins Classes:
 - Chylomicrons – from the intestines
 - Very low density lipoprotein
 - Intermediate density lipoprotein
 - Low density lipoprotein – serum
 - High density lipoprotein – reverse transport



1. Describe Pediatric Hyperlipidemia

- Normal pediatric lipid levels
 - Total cholesterol <170
 - LDL cholesterol <110
 - HDL cholesterol >45
 - Triglycerides <90
 - Non-HDL cholesterol: <145
- Pediatric hyperlipidemia is an increase in triglycerides and/or LDL cholesterol

1. Describe Pediatric Hyperlipidemia

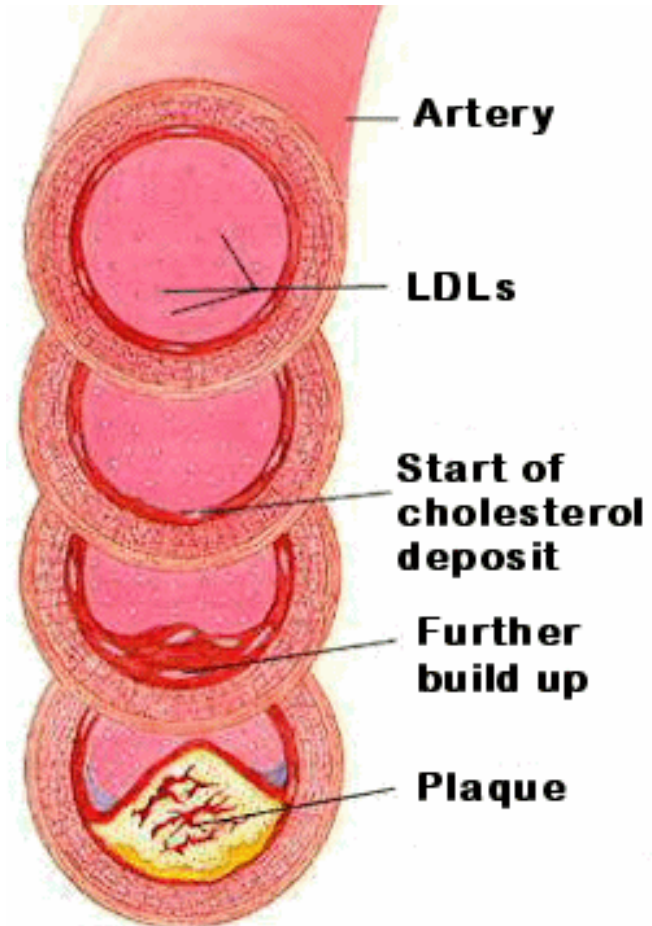
- Abnormal pediatric lipid levels
 - Total cholesterol >200
 - LDL cholesterol >130
 - HDL cholesterol <40
 - Triglycerides >130

1. Describe Pediatric Hyperlipidemia

- Primary dyslipidemia
 - Familial hypercholesterolemia
 - American diet
- Secondary dyslipidemia
 - Diabetes mellitus/Metabolic syndrome
 - Biliary atresia/cholestasis/Hepatitis
 - Nephrotic syndrome/renal failure
 - Hypothyroidism
 - Kawasaki disease/rheumatoid arthritis/SLE
 - Medications (Steroids, OCP's)

1. Describe Pediatric Hyperlipidemia

- Heterozygous familial hypercholesterolemia
 - 1 in 250 are affected
- Homozygous familial hypercholesterolemia
 - 1 in 1 million are affected



1. Describe Pediatric Hyperlipidemia

- As weight increases, so does the likelihood of an abnormal cholesterol panel
 - Normal weight: 14% with lipid panel abnormality
 - Overweight: 22% lipid panel abnormality
 - Obese patients: 42% lipid panel abnormality

2. Recognize Pediatric Hyperlipidemia

- Serum lipid panel
 - Total Cholesterol= LDL + VLDL +HDL
 - LDL is calculated (Valid only if TG<400)
 - Often underestimates IDL component
 - VLDL = TG/5
 - Triglycerides
 - LDL
 - Lipoprotein(a)
 - Lipoprotein X
 - HDL
 - Non HDL cholesterol= TC – HDL

2. Recognize Pediatric Hyperlipidemia

- Previous recommendations
 - Check Total cholesterol or fasting lipid profile on any patient after the age of 2 if:
 - Parental total cholesterol >240
 - Family history of PCAD in parents or grandparents(<55 in males or <65 in females)
 - Unknown family history
 - Patient with obesity, hypertension, or diabetes

2. Recognize Pediatric Hyperlipidemia

- CARDIAC program trialed universal screening of 20,266 fifth grade students in West Virginia
 - 71.4% of patients that would have met the AAP screening criteria:
 - 8.3% had LDL >130mg/dL
 - 1.2% had LDL >160
 - 28.6% of pts wouldn't have been screened
 - 9.5% had LDL >130mg/dL
 - 1.7% had LDL >160

2. Recognize Pediatric Hyperlipidemia

- In 2011, the National Lipid Association recommended universal screening for all children between the ages of 9-11 years
 - Fasting lipid panel
 - Or non-fasting non-HDL cholesterol
- Earlier lipid screening can still be performed starting after age 2 for high risk patients

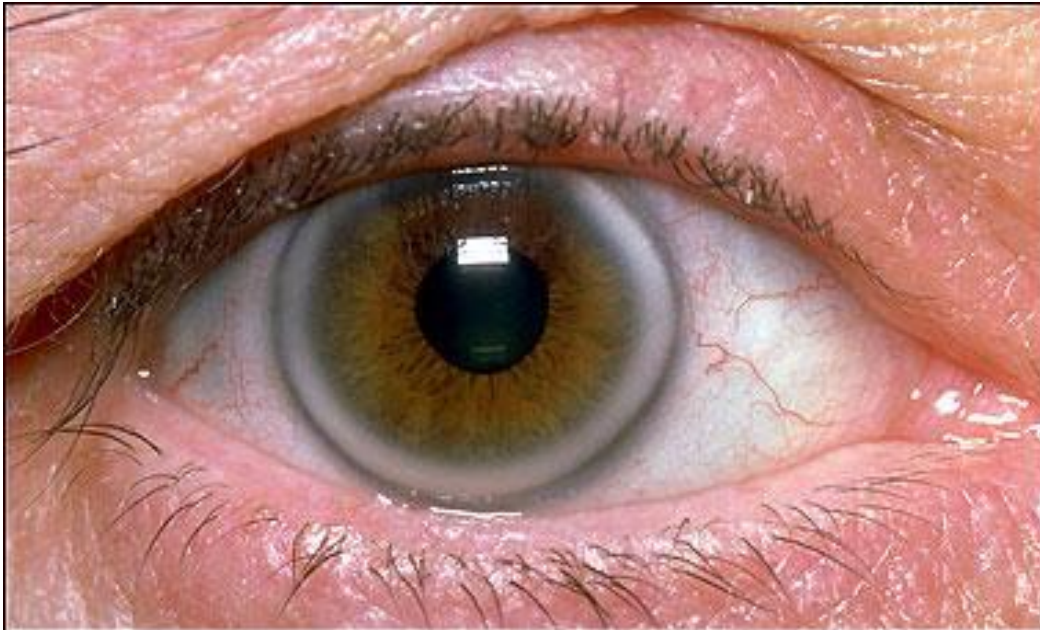
2. Recognize Pediatric Hyperlipidemia

- Physical examination
 - Tendon Xanthoma
 - Accumulation of lipids in cutaneous foam cells
 - Associated with marked elevation of cholesterol



2. Recognize Pediatric Hyperlipidemia

- Corneal Arcus - a lipid-rich corneal deposit that does not affect the patient's vision. It begins at the top and bottom of the cornea and spreads to form a complete ring



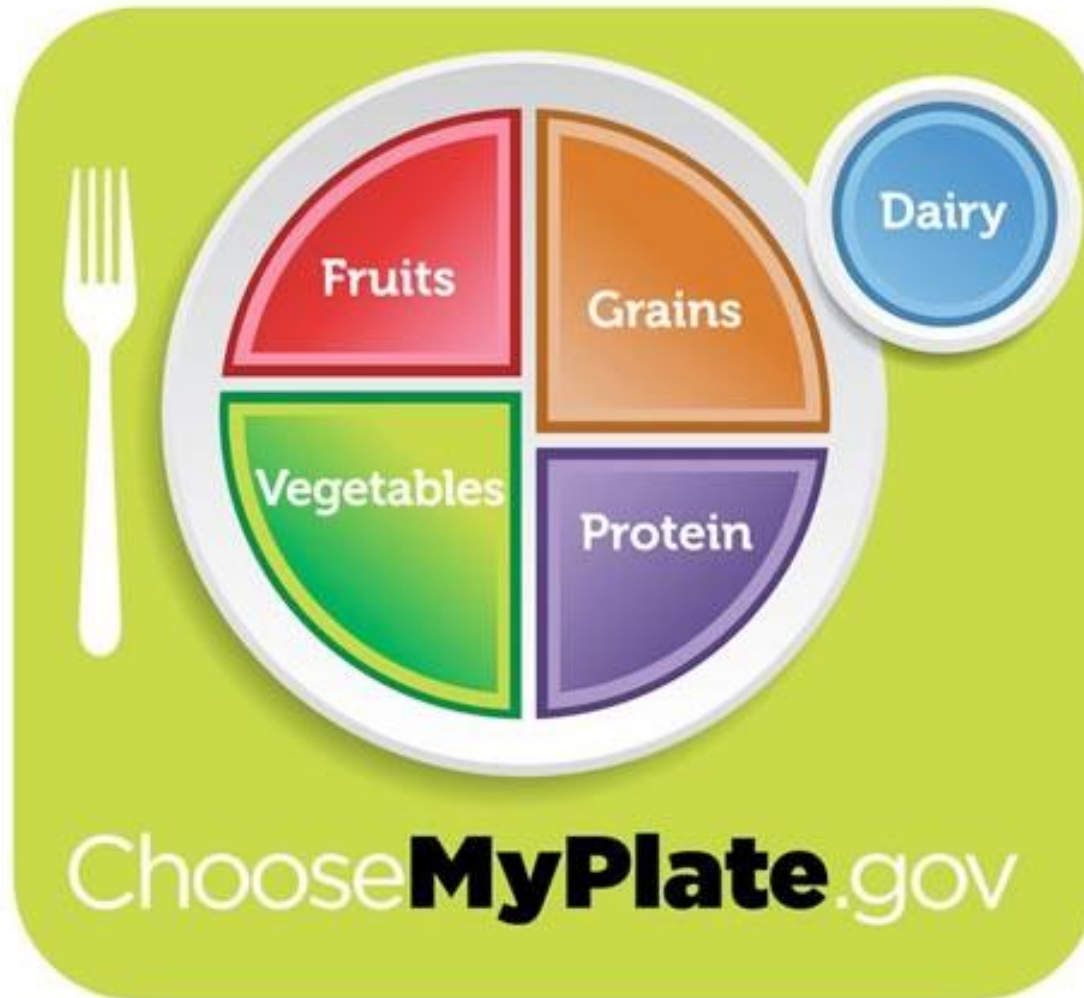
3. Treatment of Pediatric Hyperlipidemia

- First line therapy
 - Diet
 - Can decrease triglycerides and LDL cholesterol
 - Exercise
 - Daily exercise is the best way to increase low HDL levels

3. Treatment of Pediatric Hyperlipidemia

- Diet
 - Reduce saturated fats (red meat, dairy products) and trans fats (baked goods, desserts, crackers)
 - Goal saturated fat <10% of daily caloric intake
 - Limit daily cholesterol intake <200mg
 - Use only nonfat dairy products
 - Increase daily grams of fiber to (age + 5), up to 25 grams maximum

3. Treatment of Pediatric Hyperlipidemia

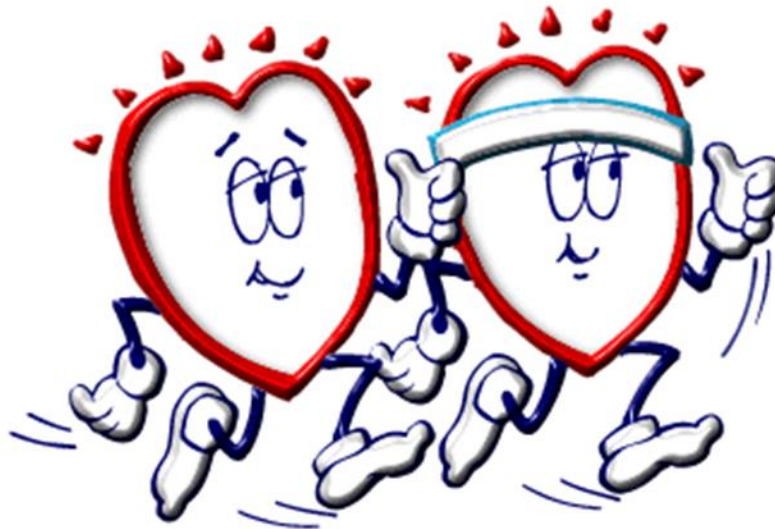


3. Treatment of Pediatric Hyperlipidemia

- 5-2-1-0 Obesity prevention plan
 - 5 Fruits/Vegetables daily
 - 2 Or less hours of screen time daily
 - 1 Hour of moderate physical activity daily
 - 0 Soda, juice, sport drinks daily

3. Treatment of Pediatric Hyperlipidemia

- Exercise
 - AAP recommendations are for all pediatric patients to get a minimum of 60 minutes of sweat producing exercise every single day!



3. Treatment of Pediatric Hyperlipidemia

- Second Line Therapy
 - Plant Stanols/Sterols
 - Omega 3 fatty acids
 - Prescription pharmacotherapy

3. Treatment of Pediatric Hyperlipidemia

- Plant Stanols/Sterols
 - Decrease absorption of cholesterol in GI tract
 - Often recommended as 2 - 4 grams per day
 - Shown to lower LDL cholesterol by 5-10%
 - Can be found in certain grocery store products:
 - Added to margarine
 - Added to orange juice

3. Treatment of Pediatric Hyperlipidemia

- Omega 3 fatty acids
 - Essential unsaturated fatty acids
 - Found in fish oils as well as flaxseed oil
 - Usual dose 2-4 grams daily
 - Often works best to reduce elevated triglycerides

3. Treatment of Pediatric Hyperlipidemia

- Prescription pharmacotherapy (statins, bile acid resins, fibrates)
 - If LDL cholesterol >190 with no other risk factors
 - If LDL >160 with FHx PCAD, or 1 high risk factor or two moderate risk factors
 - If LDL >130 with 2 high risk factors or 1 high risk and two moderate risk factors

3. Treatment of Pediatric Hyperlipidemia

High-level risk factors:

Hypertension that requires drug therapy (BP \geq 99th percentile + 5 mmHg)

Current cigarette smoker

Obesity with BMI \geq 97th percentile

- Presence of a high risk condition: Diabetes (type 1 or type 2)
- Chronic kidney disease/end-stage renal disease/post-renal transplant
- Post-orthotopic heart transplant
- Kawasaki disease with current aneurysms

Moderate-level risk factors:

Hypertension (defined as systolic and/or diastolic BP \geq 95th percentile measured on three or more separate occasions) that does not require drug therapy

- Obesity: For children age 2 to 11 years: BMI \geq 95th to <97th percentile
- For adolescents \geq 12 years: BMI \geq 85th to <97th percentile

HDL cholesterol <40 mg/dL

- Presence of a moderate risk condition: Kawasaki disease with regressed coronary aneurysms
- Chronic inflammatory disease (eg, systemic lupus erythematosus, juvenile idiopathic arthritis)
- HIV infection
- Nephrotic syndrome
- Adolescent depressive and bipolar disorders[¶]

3. Treatment of Pediatric Hyperlipidemia

- Statins
 - 3-Hydroxy-3-methyl-glutaryl Coenzyme A reductase inhibitors
 - Upregulate LDL receptors which clear LDL from the circulation
 - 20-50% reduction in LDL cholesterol
 - SE: Can elevate liver enzymes, cause rhabdomyolysis
Teratogenic to fetus



3. Treatment of Pediatric Hyperlipidemia

- Bile acid binding resins
 - Bind the cholesterol containing bile acids in the GI tract and prevent reuptake in the enterohepatic circulation
 - Can lower cholesterol 10-20%
 - SE: GI symptoms



3. Treatment of Pediatric Hyperlipidemia

- Fibrates

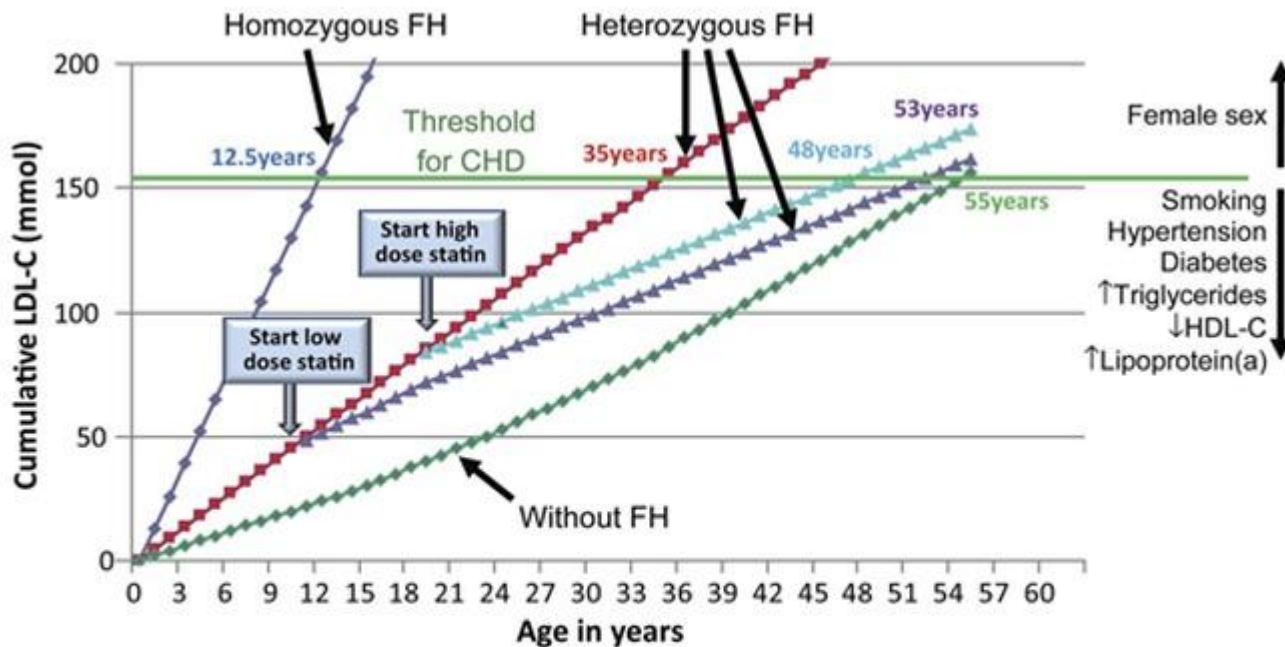
- Inhibit synthesis of VLDL apolipoprotein B
- Decreased hepatic extraction of free fatty acids, thus decreasing hepatic triglyceride production
- SE: rhabdomyolysis, especially when used in combination with a statin



3. Treatment of Pediatric Hyperlipidemia

- Children ages 8-18 started on statin therapy had less carotid intimal media thickness than those not treated at reevaluation at 4.5 years
- Teenagers started on statins had no cardiovascular events by age 30, when their affected parent had 7% CHD event rate by age 30
- Adults taking lipid lowering drugs for 13 years had protection against progression of carotid intima media thickness

3. Treatment of Pediatric Hyperlipidemia



LDL = low-density lipoprotein
LDL-C = LDL cholesterol
HDL-C = high-density lipoprotein cholesterol
CHD = coronary heart disease
FH = familial hypercholesterolaemia

Summary

- Pediatric hyperlipidemia is a common disorder
- Patients are asymptomatic and the only way to diagnose is with lipid screening
- Recommendations are to screen every child
 - Typically best age is 9-11 years old
 - Can screen after age 2 for high risk patients

Thank You!

