LABORATORY AND RISK FACTORS OF ATHEROSCLEROSIS

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RISK FACTORS FOR CHD

- Clinical Risk Factors
- Laboratory Risk Factors

MAJOR CLINICAL RISK FACTORS

- Cigarette Smoking
- Hypertension *(Blood Pressure ≥140/90 mm Hg or on Hypertensive medication*
- Family History of Premature CHD *(CHD in Male First-degree Relative < 55 years; CHD in Female First-degree Relative < 65 years)*
- Age *(men ≥ 45 years; Women ≥ 55 years)*

LABORATORY RISK FACTORS

- Common Lipid Markers Including TC, HDL-C, LDL-C & TG
- Uncommon Lipid Markers Including Lp(a), beta-VLDL, Apo A-I & Apo B-100
- Nonlipid Markers Including Homocysteine & hsCRP

ATP III *(Adult Treatment Panel III)* CLASSIFICATION IN ADULTS

LDL Cholesterol

- *<100 Optimal*
- *100-129 Near Optimal*
- *130-159 Borderline high*
- *160-189 High*
- *≥190 Very high*

HDL Cholesterol

- **<40 Low**
- **≥60 High**

Total Cholesterol

- *<200 Desirable*
- *200-239 Borderline high*
- *≥240 High*

Triglycerides

- *<150 Normal*
- *150-199 Borderline high*
- *200-499 High*
- *≥500 Very high*

NCEP *(National Cholesterol Education Program)* CLASSIFICATION IN CHILDREN AND ADOLESCENTS

LDL Cholesterol	
<110	*Desirable*
110-120	*Borderline*
≥130	*High*

Total Cholesterol	
<170	*Desirable*
170-199	*Borderline*
≥200	*High*

High Triglyceride with Normal Cholesterol

- Familial Hypertriglyceridemia
- Familial Hyperchylomicronemia
- Hyperlipoproteinemia Type V
- Apo C-II Deficiency
- Apo C-III excess
- Diabetes/insuline resistance
- Chronic renal failure and nephrotic syndrome
- Esterogens, Corticosteroides, Beta-blockers
- Obesity
- High carbohydrate diets
- Physical inactivity
- Cigarette smoking
- Excess alcohol intake

Familial Hyperchylomicronemia (Type I)

- Is Rare (1 in 1 000 000)
- LPL Deficiency → Chylomicron ↑
- Exogenous Hypertriglyceridemia
- Very High TG
- Lipemic Serum with Creamy Layer
- Thick Band at Origin
- Pancreatitis

Familial Hypertriglyceridemia (Type IV)

- Is Relativel Common (1 in 300 to 1 in 50))
- Apo B-100 synthesis is normal, but production of VLDL is high
- Familial Hypertriglyceridemia
- Endogenous Hypertriglyceridemia
- Increased VLDL
- High TG
- Thick pre-β Band
- Triad of Obesity, Hyperinsulinemia, Hyperglycemia,

HYPERLIPOPROTEINEMIA TYPE V

- Increased Chylomicron & VLDL
- Thick Origin & pre-β Bands

High Cholesterol with High LDL-C

- Polygenic (Nonfamilial) Hypercholestrolemia
- Familial Hypercholestrolemia
- Familial defective ApoB
- Hyperapobetalipoproteinemia
- Sitosterolemia
- Hypothroidism
- Nephrotic syndrome
- Chronic obstructive liver disease
- Obesity
- Excess Dietary cholesterol and/or saturated fat

Polygenic (Nonfamilial) Hypercholeterolemia

- Includes About 85% of Hypercholestrolemia
- Is likely multifactorial
- Is used to describe patients who develop age-related increases in cholesterol that do not respond to lifestyle modification

Familial Hypercholeterolemia

- Results from mutation in LDL (B/E) receptor gene
- Homozygous occurs 1 in 1 000 000
- Heterozygous occures 1 in 500

Apo B100 Deficiency

- Results from mutation apo B-100 gene
- Estimated frequency is 1 in 750

Hyperapobetalipoproteinemia

- Is characterized by increased apo B-100 concentration
- May be due to increase synthesis of VLDL or apo B-100, which leads to formation of atherogenic small dense LDL
- LDL-C is normal or moderately increased
- The ratio of LDL cholesterol to apo B-100 is reduced

High Triglyceride with High Cholesterol

- Familial Combined Hypelipidemia (Type 2B)
- Familial Dysbetalipoproteinemia (Type 3)
- Severe hypothyroidism
- Diabetes/insuline resistance
- Nephrotic syndrome
- High-dose steroides
- Obesity

Familial Combined Hyperlipidemia

- Is a relative common disorder (Estimated frequency is 1 in 100)
- May be seen as

simple hypercholestrolmiaResults (Type IIa)

simple Hypertriglyceridemia (Type IV)

Mixed (Type IIb)

- It seems to be due to increase in Apo-B100 and VLDL
- Appears to be multifactorial

Dysbetalipoprotenemia (Type III)

- Patients are E2/E2
- This geotype is relativel commom (1 in 100), but expression of type III phenotype is only 1 in 10 000
- Increase in Remnants
- Presence of beta-VLDL with high cholesterol/triglyceride ratio

Isolated Low HDL-C

- Familial Hypobetalipoproteinemia
- Apo A-I deficiency and Apo C-III deficiency
- Apo A-I variants
- Tangier Disease
- LCAT deficiency
- Anabolic steroides, beta-blockers
- Physical inactivity
- Obesity
- High-carbohydrate, low-fat diets

Familial Hypoalphalipoproeinmia

- Is common (1 in 400)
- Decrease synthesis or increase catabolism of HDL or Apo A-I
- Low HDL (<30 mg/dL in men and <40 mg/dL in women)
- Diagnostic criteria include

1) Low HDL-C in presence of normal VLDL-C and LDL-C
2) Absence diseases or factors that lead to secondary effects of hypoalphalipoproteinemia
3) Presence of a similar lipoprotein pattern in a first-degree relative

Aalphalipoproteinemia (Tangier Disease)

- Is a rare disorder
- Results from mutations in ABCA1 gene
- In hemozygous, there in no HDL and Total Cholesterol is low
- There is reduced LDL and abnormal remnants

Isolated High HDL-C

- CETP defects
- Esterogens
- Alcohol intake

Isolated Low Total Cholesterol

- Abetalipoproteinemia
- Hypobetalipoproteinemia
- Chylomicron retention disease