Management of lipid disorders

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Journal of the Ceylon College of Physicians, 2005, **38**, 59-63

Who should be tested for lipids?

- CHD (Coronary Heart Disease) patients or patients with cerebro-vascular or peripheral artery disease.
- Diabetic patients.
- Individuals with a family history or clinical evidence of familial hyperlipidaemia.
- Individuals with other risk factors for CHD.
- It is also reasonable to test individuals who are undergoing a general health screening. Ideally all adults >20 yrs should be tested at least once every 5 years if facilities are available.

Determine lipoprotein levels

A lipid profile consisting of TC, LDL-C, HDL-C and TG should be obtained after 9 to 12 hour fast.

Classification of LDL, Total, and HDL Cholesterol (mg/dL)

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LDL Cholesterol – Primary target of Therapy

<100	Optimal
100-129	Near optimal / above normal
130-159	Borderline high
60-189	High
>190	Very high

Total Cholesterol

<200	Desirable
200-239	Borderline high
>240	High
HDL	Cholesterol
<40	Low
>60	High

Classification of Serum Triglycerides (mg/dL)

Classification of Serum Triglyceride (mg/dl)	
<150	Normal
150-199	Borderline high
200-499	High
>500	Very high

Any person with elevated LDL cholesterol or other form of hyperlipidaemia should undergo clinical or laboratory assessment to rule out secondary dyslipidaemia

- **Diabetes**
- **Hypothyroidism**
- **Obstructive liver disease**
- **Chronic renal failure**
- **Drugs that increase LDL cholesterol and decrease HDL cholesterol (progestins, anabolic steroids, and corticosteroids).**

What are the precautions to be taken?

- 9 - 12 hours of fasting is necessary for the estimation of TG.
- Individuals should be seated for at least five minutes prior to phlebotomy to avoid hemoconcentration.
- Blood should be collected in tubes without anticoagulant for serum or with EDTA for plasma.
- The measurement of any lipid is preferably performed with the person in a baseline stable condition, that is, in the absence of acute illnesses including stroke, trauma, surgery, acute infection, weight loss, pregnancy, or recent change in usual diet.
- Defer tests for at least 2 weeks after a febrile illness. For patients suffering from acute myocardial infarction, the cholesterol level may be depressed between 24 hours to about 3 months after the infarction.
- Since cholesterol and TG levels show biological variability, it is advisable to obtain at least 2 consecutive estimations (1-8 weeks apart) before deciding on any therapeutic intervention.

Determine risk category:

1. Established CHD and CHD risk equivalents – >20, 10 year risk
2. Multiple (2+) risk factors – 10-20%, 10 year risk
3. 0-1 risk factor – <10%, 10 year risk

Identify presence of clinical atherosclerotic disease that confers high risk (>20%) for coronary heart disease (CHD) events (CHD risk equivalent):

- Clinical CHD
- Symptomatic carotid artery disease
- Peripheral arterial disease
- Abdominal aortic aneurysm
- Diabetes

Determine presence of major risk factors (other than LDL):
Major Risk Factors (Exclusive of LDL Cholesterol) That Modify LDL Goals

- Cigarette smoking
- Hypertension (BP ≥ 140/90 mmHg or on antihypertensive medication)
- Low HDL cholesterol (<40 mg/dL for men and <50mg/dL for women)*
- 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)

* HDL cholesterol ≥ 60 mg/dL counts as a "negative" risk factor; its presence removes one risk factor from the total count.

Treatment: 2 step approach

- Attain the goal for LDL cholesterol
- Manage metabolic syndrome and other lipid risk factors

Step 1

Attain goal for LDL cholesterol

- Establish LDL goal of therapy
- Determine need for therapeutic lifestyle changes (TLC)
- Determine level for drug consideration

LDL Cholesterol Goals and Cut-points for Therapeutic Lifestyle Changes (TLC) and Drug Therapy in Different Risk Categories

Risk Category	LDL goal	LDL level at which to initiate Therapeutic Lifestyle Changes (TLC)	LDL level at which to consider Drug therapy
CHD or CHD risk equivalents (10 year risk >20%)	<100 mg/dl (optional goal:<70mg/dl for very high risk*)	≥130 mg/dl	≥100 mg/dl (<100mg/dl : drugs optional)
2 + risk factors (10 year risk 10-20%)	<130 mg/dl	≥130 mg/dl	≥130 mg/dl (100-129 mg/dl : drugs optional)
0 -1 risk factors (10 year risk <10%)	<160 mg/dl	≥160 mg/dl	≥190 mg/dl (160-189 mg/dl : drugs optional)

*Very high risk: established CVD plus
(1) multiple major risk factors (especially diabetes),
(2) severe and poorly controlled risk factors (especially continued cigarette smoking),
(3) multiple risk factors of the metabolic syndrome (especially high triglycerides >200 mg/dL plus non-HDL-C >130 mg/dL with low HDL-C [<40 mg/dL])
(4) patients with acute coronary syndromes.

Initiate therapeutic lifestyle changes (TLC) if LDL is above goal.

TLC Features

- **TLC Diet:**
  1. Saturated fat <7% of calories, cholesterol <200 mg/day
  2. Consider increased viscous (soluble) fiber (10-25 g/day) and plant stanols / sterols (2g/day) as therapeutic options to enhance LDL lowering
- **Weight management**
- **Increased physical activity**

Component	Recommendations	Component	Recommendations
LDL raising nutrients	Less than 7% of Total calories	Polyunsaturated fat	Upto 10% of total calories
Saturated fats*	Less than 200mg /day	Monounsaturated fat	Upto 20% of total calories
Dietary Cholesterol		Total fat	20-25% of calories*
Therapeutic options for LDL lowering		Carbohydrate †	50-60% of total calories*
		Dietary fibre	20-30g per day
Plant Stanolsterols	2g per day	Protein	Appproximately 15%of total calories
Increased viscous (soluble) fibre	10-20g per day		
Total calories (energy)	Adjust total caloric intake to maintain desirable body weight & prevent weight gain		
Physical activity	Include enough moderate exercise to expend at least 200kcal per day		

* Trans fatty acids are another LDL-raising fat that should be kept at a low intake.

† Carbohydrate should be derived predominantly from foods rich in complex carbohydrates including grains, especially whole grains, fruits, and vegetables.

‡ Daily energy expenditure should include at least moderate physical activity (contributing approximately 200 Kcal per day).

Consider adding drug therapy if LDL exceeds levels shown in the table:

- Consider drug simultaneously with TLC for CHD and CHD equivalents
- Consider adding drug to TLC after 3 months for other risk categories.

Step 2

Identify metabolic syndrome and treat, if present, after 3 months of TLC

Clinical Identification of the Metabolic Syndrome – Any 3 of the Following:

Risk factor	Defining level
Abdominal obesity	Waist circumference
Men	> 102 cm (>40 in)
Women	>88 cm (> 35 in)
Triglycerides	> 150 mg/dl
HDL cholesterol	
Men	< 40 mg/dl
Women	< 50 mg/dl
Blood pressure	>130/85 mmHg
Fasting glucose	> 110 mg/dl

Treatment of the metabolic syndrome

Treat underlying causes (overweight/obesity and physical inactivity):

- Intensify weight management
- Increase physical activity

Treat lipid and non-lipid risk factors if they persist despite these lifestyle therapies:

Treat underlying causes (overweight/obesity and physical inactivity):

- Treat hypertension
- Use aspirin for CHD patients to reduce prothrombotic state
- Treat elevated triglycerides and /or low HDL

Treat elevated triglycerides

Treatment of elevated triglycerides (> 150 mg/dL)

- Primary aim of therapy is to reach LDL goal
- Intensify weight management
- Increase physical activity
- If triglycerides are > 200 mg/dL after LDL goal is reached, set secondary goal for non-HDL cholesterol (total - HDL) 30 mg/dL higher than LDL goal

If triglycerides 200 – 499 mg/dL after LDL goal is reached, consider adding drug if needed to reach non-HDL goal:

- Intensify therapy with LDL-lowering drug, or
- Add nicotinic acid or fibrate to further lower VLDL

If triglycerides > 500 mg/dL, first lower triglycerides to prevent pancreatitis:

- Very low-fat diet (<15% of calories from fat)
- Weight management and physical activity
- Fibrate or nicotinic acid
- When triglycerides < 500 mg/dL, turn to LDL-lowering therapy

Treatment of low HDL cholesterol (<40 mg/dL)

- First reach LDL goal, then:
- Intensify weight management and increase physical activity
- If triglycerides <200 mg/dL (isolated low HDL) in CHD or CHD equivalent consider nicotinic acid or fibrate.

Drugs Affecting Lipoprotein Metabolism

Drug class	Agents and Daily doses	Lipid / Lipoprotein effects	Side effects	Contraindications
HMG CoA reductase inhibitors (Statins)	Lovastatin (2080mg) Simvastatin (20-80mg) Atorvastatin (10-80mg)	LDL ↓ 18.55% HDL ↑ 5.15% TG ↓ 7.30%	Myopathy Increased Liver enzymes	Absolute: Active or chronic liver disease Relative: Concomitant use of certain drugs
Bile acid sequestrants	Cholestyramine (4-14g) Colestipol (5-20g)	LDL ↓ 15.30% HDL ↑ 3.5% TG No change or increase	Gastrointestinal distress, Constipation Decreased absorption of other drugs	Absolute: Dysbetalipo-Protienaemia TG > 400mg/dl Relative: TG > 200mg/dl
Nicotinic acid	Immediate release (crystalline) Nicotinic acid (1.53g) Sustained release nicotinic acid (1.2g)	LDL ↓ 5.25% HDL ↑ 15.35% TG ↓ 20.50%	Flushing, Hyperglycaemia Hyperuricaemia (or Gout) Upper GI distress Hepatotoxicity	Absolute: Chronic liver disease Severe gout Relative: Diabetes Hyperuricaemia Peptic ulcer disease
Fibric acid	Gemfibrozil (600mg BD) Fenofibrate (200mg)	LDL ↓ 5.20% (may be increased in patients with high TG) HDL ↑ 10.20% TG ↓ 20.50%	Dyspepsia Gallstones Myopathy	Absolute: Severe renal disease Severe hepatic disease