Dyslipidemia

Dyslipidemia is an abnormal amount of lipids (e.g. cholesterol and/or fat) in the blood. In developed countries, most dyslipidemias are hyperlipidemias; that is, an elevation of lipids in the blood. This is often due to diet and lifestyle. Prolonged elevation of insulin levels can also lead to dyslipidemia

Dyslipidemia Causes

Causes are classified into two groups: the Primary and secondary causes

- Primary Causes. Overproduction and defective clearance of the cholesterols TG and LDL is the result of the mutations of single or multiple genes. The primary disorders are the common dyslipidemia causes to the children, although it may not affect in the most cases of adult dyslipidemia.
- Secondary Causes. Adults are the most affected ones when it comes to secondary causes. The causes contribute a lot on how an adult will be affected with dyslipidemia. The sedentary lifestyle is the most essential secondary cause. The lifestyle includes excessive dietary intake of cholesterol, trans fats and saturated fats. Trans fats are the fatty acids that are either polyunsaturated or monounsaturated, in which there are added hydrogen atoms. Trans fats are usually used in a lot of processed foods.

Other secondary causes are:

- Alcohol overuse
- Diabetes mellitus
- Hypothyroidism
- Chronic kidney disease,
- Other cholestatic liver diseases and primary biliary cirrhosis.
- Drugs like thiazides, retinoids, estrogens and glucocorticoids, among others.

The Fredrickson classification scheme organizes these various primary dyslipidemias into a several categories. High triglycerides are a component of each of these dyslipidemias except Fredrickson type IIa (familial hypercholesterolemia). In the United States, the 2 most common dyslipidemias are Fredrickson type IIb (familial combined hyperlipidemia) and type IV (familial hypertriglyceridemia). Together, these 2 dyslipidemias account for 85% of familial dyslipidemias.

Fredrickson Dyslipidemia Classification

Type	Elevated Lipoprotein	Total Cholesterol Level	Triglyceride Level	Relative Frequency
I	CM*	Normal	++	<1%
IIa	LDL	++	Normal	10%
(FHC)				
IIb	LDL/VLDL	++	+	40%
(FCH)				
III	IDL	+	+	<1%
IV	VLDL	Normal to+	++	45%
(FHT)				
V	CM	+	++	5%
	VLDL			

* CM, chylomicron; LDL, low-density lipoprotein; VLDL, very low-

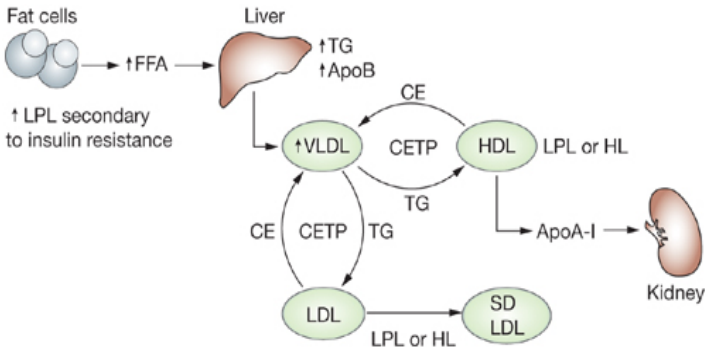
Prevalence Of Dyslipidemia In Type 2 Diabetes

The most common pattern of dyslipidemia in patients with type 2 diabetes patients is elevated triglyceride levels and decreased HDL cholesterol levels. The mean concentration of LDL cholesterol in those with type 2 diabetes is not significantly different from that in those individuals who do not have diabetes. However, qualitative changes in LDL cholesterol may be present. In particular, patients with diabetes tend to have a higher proportion of smaller and denser LDL particles, which are more susceptible to oxidation and may thereby increase the risk of cardiovascular events. Insufficient data are available to make recommendations on the measurement of particle size in clinical practice.

As in those who do not have diabetes, lipid levels may be affected by factors unrelated to glycemia or insulin resistance, such as renal disease, hypothyroidism, and frequent occurrence of genetically determined lipoprotein disorders (e.g., familial combined hyperlipidemia and familial hypertriglyceridemia). These genetic disorders may contribute to the severe hypertriglyceridemia seen in some patients with diabetes. Furthermore, use of alcohol or estrogen may also contribute to hypertriglyceridemia.

The role of insulin resistance in diabetic dyslipidemia.

Insulin resistance initiates the characteristic triad of high triglyceride level, low HDL cholesterol level and high small dense LDL level. If the concentration of VLDL-transported triglyceride is high, CETP promotes the transfer of LDL cholesteryl ester or HDL cholesteryl ester in exchange for triglyceride. Triglyceride-rich HDL cholesterol or LDL cholesterol can undergo hydrolysis by hepatic lipase or lipoprotein lipase.



Abbreviations: ↑, increased level; ApoA-1, apolipoprotein A-1; ApoB, apolipoprotein B; CE, cholesteryl ester; CETP, cholesteryl ester transfer protein; FFA, free fatty acid; HL, hepatic lipase; LPL, lipoprotein lipase; SD LDL, small dense LDL

Dyslipidemia Symptoms:

Dyslipidemia doesn't have symptoms at all, but it can cause other symptomatic vascular disease, like coronary artery disease.

Eyelid xanthelasmas, tendinous xanthomas at the elbow, knee tendons and Achilles and arcus cornea are caused by high levels of LDL. Acute pancreatitis is caused by high levels of TGs.

Patients that have familial hypercholesterolemia in homozygous form can have the above findings with planar xanthomas. Patients that have elevation of TGs in severe condition can expect having eruptive xanthomas over their elbow, back, trunks, knees, buttocks, feet and hands. Those with rare dysbetalipoproteinemia can expect having palmar xanthomas and tuberous xanthomas.

Retinal arteries and veins can have a creamy white appearance due to the severe hypertriglyceridemia. You can also have a milky appearance in your blood plasma when you have high lipid levels. You can expect symptoms like paresthesias, confusion and dypsnea.

Dyslipidemia Treatment

The treatment of dyslipidemia depends on the age, symptoms and overall health of the patient. The probability of the dyslipidemia to progress to heart disease is also considered. The most common treatment is having a well regulated diet and exercise. However, exercise can also be combined with medication and surgery for more serious conditions, just to prevent any complications.

Lifestyle Change

The doctor will explain the whole treatment option to a patient who is first diagnosed to have this condition. In cases like high levels of cholesterol and triglycerides, it is recommended that lifestyle change is needed, rather than a medical intervention. The patient must commit in exercising and dieting, as they are the most essential part of dyslipidemia treatment. A patient with mild dyslipidemia is asked by the doctor to take some exercises and general dietary guidelines. Those with advanced conditions are also asked to meet with a nutritionist to have a well designed meal plans and to have an exercise routine.

The dyslipidemia diet plans include foods that are low in cholesterol and calories and trans-fat free. Foods that are sugary and fried must be avoided. Dairy products and red meat are taken in moderation. In order to lower their cholesterol level, it is recommended that patients should eat fish, vegetables, nuts and fruits. It is also important that doctors and nutritionists explain the essence of eating certain kinds of foods to patient. They also need to help patients eat in smaller portions and avoid their cravings.

Regular Exercise

Having regular exercises help the patients in losing weight, improve the functions of their lungs and heart and to stabilize their blood pressure. Patients should always follow the instructions of their doctors for them to achieve their desired results. Exercise routines are adjusted to fit in the patient's ability level. If the patient is physically able, they are encouraged to take walk regularly and ride bicycles. Other activities like Pilates, Yoga, Workout classes and weightlifting are also suggested.

It is said that diet and exercise are not just the things that you need to do in order to prevent other health complications. Patients can be prescribed with medications to lower down their triglyceride and cholesterol levels. One medication prescribed by doctors is Statins. These are drugs that inhibit the liver enzyme, which synthesizes the lipids and can lead to fatty buildup. Fibrates are other drugs that are combines with Statins to raise the lipoprotein levels. Lipoproteins are good cholesterol that helps in preventing the sticking of fatty deposits to arterial walls.

It is important that patients follow the treatment regimen to avoid surgery and prevent it from progressing to a serious health problem.

Hypertriglyceridemia:

Denotes high blood levels of triglycerides, the most abundant fatty molecule in most organisms. Elevated levels of triglycerides are associated with atherosclerosis, even in the absence of hypercholesterolemia (high cholesterol levels), and predispose to cardiovascular disease. Very high triglyceride levels also increase the risk of acute pancreatitis. Hypertriglyceridemia itself is usually symptomless, although high levels may be associated with skin lesions known as xanthomas.

Weight loss and dietary modification may be effective in hypertriglyceridemia. The decision to treat hypertriglyceridemia with medication depends on the levels and on the presence of other risk factors for cardiovascular disease. Very high levels that would increase the risk of pancreatitis is treated with a drug from the fibrate class.

Most people with elevated triglycerides experience no symptoms. Some forms of primary hypertriglyceridemia can lead to specific symptoms: both familial chylomicronemia and **primary mixed hyperlipidemia** include skin symptoms (eruptive xanthoma), eye abnormalities (lipemia retinalis), **hepatosplenomegaly** (enlargement of the liver and spleen), and neurological symptoms. Some experience attacks of abdominal pain that may be mild episodes of pancreatitis. Eruptive xanthomas are 2–5 mm papules, often with a red ring around them, that occur in clusters on the skin of the trunk, buttocks and extremities. **Familial dysbetalipoproteinemia** causes larger, tuberous xanthomas; these are red or orange and occur on the elbows and knees. Palmar crease xanthomas may also occur.

Acute pancreatitis occurs in people whose triglyceride levels are above 1000 mg/dl (11.3 mmol/l). Hypertriglyceridemia is associated with 1–4% of all cases of pancreatitis. The symptoms are similar to pancreatitis secondary to other causes, although the presence of xanthomas or risk factors for hypertriglyceridemia may offer clues.

Causes

- High carbohydrate diet
- Idiopathic (constitutional)
- Obesity
- Diabetes mellitus and insulin resistance - it is one of the defined components of metabolic syndrome (along with central obesity, hypertension, and hyperglycemia)
- Excess alcohol intake
- Renal failure, Nephrotic syndrome
- Genetic predisposition; some forms of familial hyperlipidemia such as familial combined hyperlipidemia i.e. Type II hyperlipidemia
- Lipoprotein lipase deficiency - Deficiency of this water soluble enzyme, that hydrolyzes triglycerides in lipoproteins, leads to elevated levels of triglycerides in the blood.
- Lysosomal acid lipase deficiency or Cholesteryl ester storage disease
- Certain medications e.g. isotretinoin, estrogen, hydrochlorothiazide diuretics, beta blockers, protease inhibitors
- Hypothyroidism (underactive thyroid)
- Systemic Lupus Erythematosus.
- Glycogen storage disease type 1.

Treatment:

For people with mildly or moderately high levels of triglycerides lifestyle changes are recommended. This may include restriction of carbohydrates and fat in the diet. Medications are recommended in those with high levels of triglycerides, with fibrates being recommended first.