

Epidemiology of Dyslipidemia

By:Dr.Yossra K.Al-Robaiaay
Assistant professor
FICMS (FM)

Learning Objectives of the lecture :

- **Defining dyslipidemia**
- **Explain why it is an important public health problem**
- **Global burden of dyslipidemia**
- **Identify the risk factors of hyperlipidemia**
- **Discuss therapeutic life style changes (TLC)**
- **List down prevention strategies**

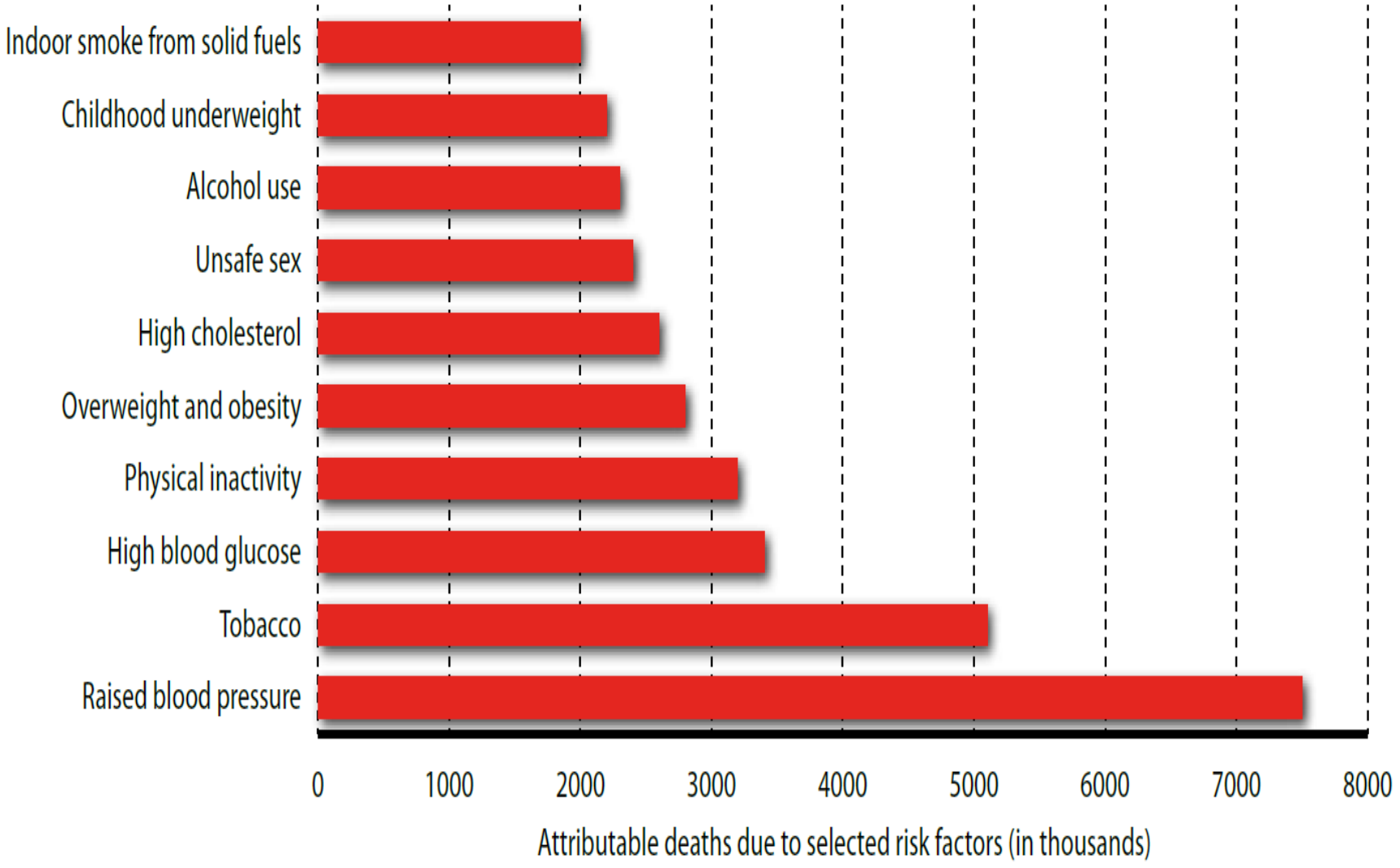
Definition

- Dyslipidemias are abnormalities of lipoprotein metabolism and include elevations of total cholesterol, LDL cholesterol, or triglycerides; or deficiencies of HDL cholesterol.

Introduction

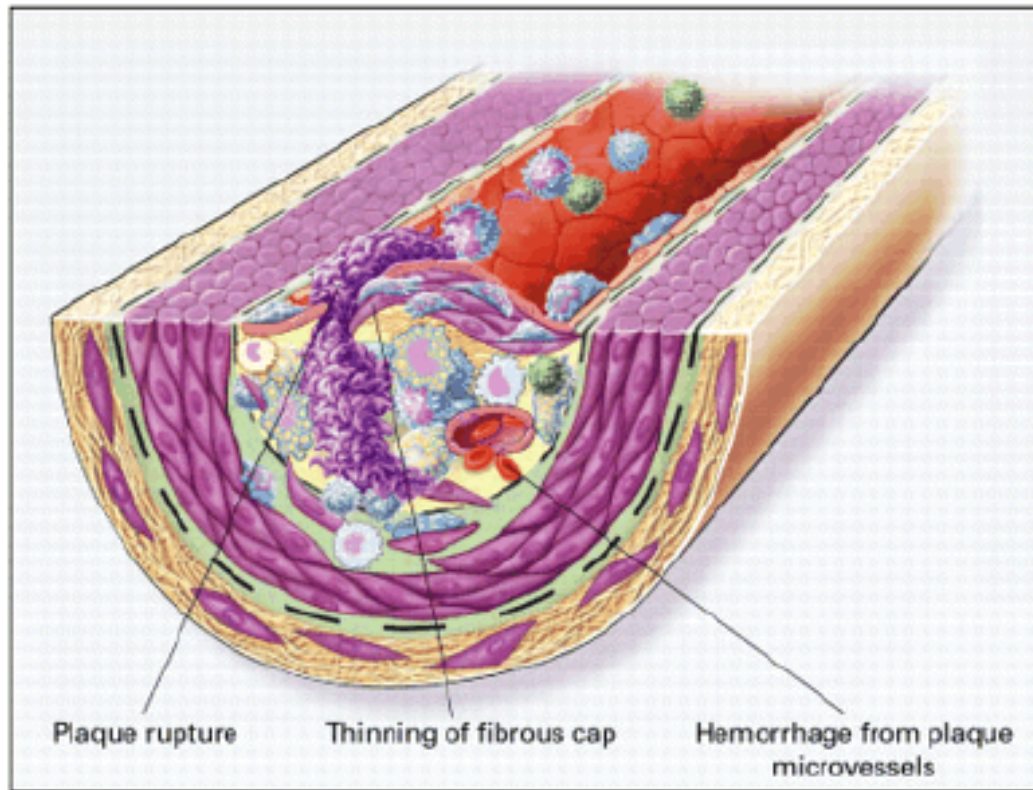
- **Dyslipidemia** increases the risks of heart disease and stroke. Globally, about third of ischemic heart disease is attributable to high cholesterol.
- **Dyslipidemia is** clinically important because it is a major modifiable risk factors for **cardiovascular disease**

Figure 29 Ranking of 10 selected risk factors of cause of death (2).



- A complex disorder caused by the interplay of **genetic, dietary** and **physiological** factors
- Studies found a graded relationship between the total **cholesterol concentration** and **coronary risk**.

Atherosclerosis



EPIDEMIOLOGY

- Global prevalence of raised total cholesterol among adults was **39%**
- (**37%** for males and **40%** for females).

EPIDEMIOLOGY

- The prevalence of elevated total cholesterol was highest in the WHO Region of **Europe** (**54%** for both sexes)
- The WHO **African** Region and the WHO **South East Asian** Region showed the lowest percentages (**22.6%** and **29.0%** respectively).

EPIDEMIOLOGY

- **71 million American adults (33.5%)** have high low-density lipoprotein (LDL), or “bad,” cholesterol.
- Only **1 out of every 3** adults with high LDL cholesterol has the condition under control.
- **Less than half** of adults with high LDL cholesterol get treatment.

Why it is an important public health problem ???

- Hyperlipidemia is a **major cause of disease burden** in both the developed and developing world as a risk factor for **Ischemic heart disease and stroke**.
- Overall, raised cholesterol is estimated to cause **2.6 million deaths** (4.5% of total).

Why it is an important to control hyperlipidemia???

- A **10%** reduction in serum cholesterol in men aged 40 has been reported to result in a **50%** reduction in heart disease within 5 years.
- The same serum cholesterol reduction for men aged 70 years can result in an average **20%** reduction in heart disease occurrence in the next 5 years.

Why it is an important to control hyperlipidemia???

- In Ireland, a **30%** reduction in the heart disease death rate has been attributed to **4.6%** reduction of the population mean for total cholesterol.
- In Finland, **50%** of the **decline in IHD mortality** has been explained by the reduction of population blood cholesterol level.

Types of dyslipidemia

- 1. Hypertriglyceridemia**
- 2. Hypercholesterolemia**
- 3. Combined hyperlipidemia**
- 4. lipoprotein disorders**

LIPID PROFILE

	DESIRABLE	BORDERLINE	HIGH RISK
Cholesterol	<200 mg/dl	200-239 mg/dl	240 mg/dl
Triglycerides	<150 mg/dl	150-199 mg/dl	200-499 mg/dl
HDL cholesterol	60 mg/dl	35-45 mg/dl	<35 mg/dl
LDL cholesterol	60-130 mg/dl	130-159 mg/dl	160-189 mg/dl
Cholesterol/ HDL ratio	4.0	5.0	6.0

■ **These are the adult ranges for LDL cholesterol:**

- Optimal: Less than **100 mg/dL** (This is the goal for people with **diabetes or heart disease.**)
- Near optimal: **100 to 129 mg/dL**
- Borderline high: **130 to 159 mg/dL**
- High: **160 to 189 mg/dL**
- Very high: **190 mg/dL and higher**
-

Diagnosis

- By using fasting lipoprotein profiles and measuring plasma levels (total cholesterol, TGs, Lipoproteins)

Classification of Hyperlipidemia

- This classification tackles more on the reason why the condition has happened.
- The reasons may include **(primary)** **hereditary** or **secondary** to another conditions.

Hyperlipidemia Causes

Primary Causes. (Hereditary)

- Over production and defective clearance of the cholesterols TG and LDL which is the result of the mutations of single or multiple genes.

Hereditary Causes of Hyperlipidemia

- **Familial Hypercholesterolemia**
- **Familial Combined Hyperlipidemia:**
- **Dysbetalipoproteinemia**

-
- **Familial combined hyperlipidemia** is an autosomal dominant disorder characterized by patients and their first-degree relatives who may have either isolated triglyceride or low-density lipoprotein (LDL) cholesterol elevations or both.

-
- **Dysbetalipoproteinemia** is a rare familial dyslipidemia characterized by approximately equally elevated serum cholesterol and triglyceride levels.
 - It is associated with an increased risk for premature cardiovascular disease.

Causes of Secondary Hyperlipidemia

- Diabetes
- Hypothyroidism
- Obstructive liver disease
- Chronic renal failure
- Drugs that raise LDL cholesterol and lower HDL cholesterol
- Alcohol raises triglycerides

Risk Factors for Hyperlipidemia

- Alcohol overuse
- Cigarette smoking
- Diabetes mellitus
- Hypertension
- Liver disease
- Drugs like thiazides, retinoids, anabolic steroids and glucocorticoids .

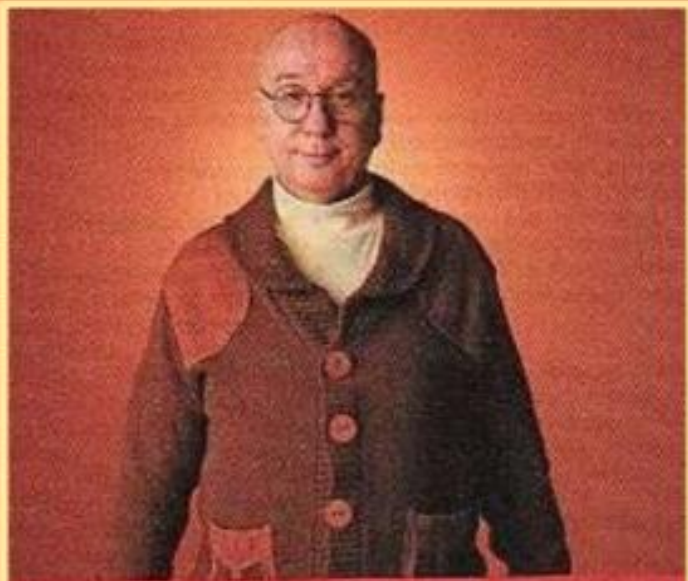
Risk Factors for Hyperlipidemia

- Age and Gender (Men >45y, Women >55y)
- Family history
- Obesity—BMI > 30 Obesity increases LDL by decreasing LDL receptor activity, also lowers HDL
- Physical inactivity
- Atherogenic diet—high saturated fats & trans fatty acids

Hyperlipidemia signs & symptoms

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

Risk Factors



FAMILY



FOOD

Hyperlipidemia signs & symptoms

- Patients with familial hypercholesterolemia can have the above findings with **planar xanthomas**.
- Patients that have elevation of TGs in severe condition expect to have eruptive xanthomas over their elbow, back, trunks, knees, buttocks, feet and hands.

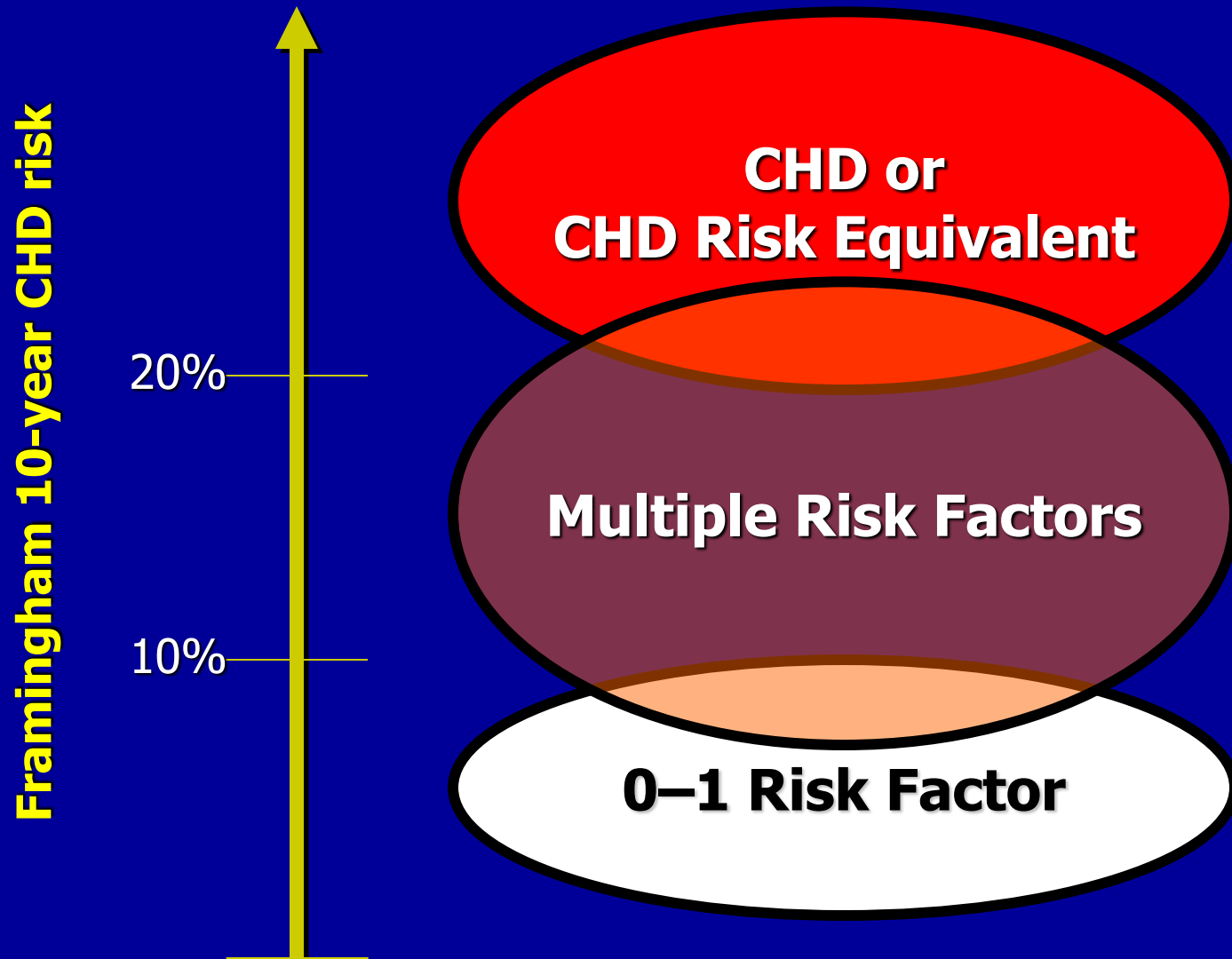
Dyslipidemia signs & symptoms

- Retinal arteries and veins can have a **creamy white appearance** due to the severe hypertriglyceridemia.
- Symptoms like paresthesias, confusion and dyspnea may occur in case of high lipid levels.

Determination of risk category:

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

Risk Assessment of Populations



Primary Prevention

Prevention of new onset.

Goal is to reduce risk factors:

- HT
- DM
- Smoking

Primary prevention measures include:

- Reduce fat and cholesterol intake
- Increase physical activity
- Weight control

Secondary Prevention

By LDL-Lowering Therapy either by

1. Therapeutic Lifestyle Change-TLC ..or

2. Pharmacological therapy

Benefits:

- Reduction in total mortality,
- Coronary mortality,
- Major coronary events,
- Coronary procedures,
- Stroke

Hyperlipidemia Treatment

Non-Pharmacologic Treatment

Therapeutic Lifestyle Change-TLC

- **Smoking Cessation**
- **Physical Activity**
- **Weight Loss**
- **Dietary Modification**

Therapeutic Lifestyle Change-TLC

Dietary Modification-TLC diet

- Reduce saturated and “trans” fats <7% of calories
- cholesterol <200 mg/day
- Increase Fiber (25g/day) and complex carbohydrates

Therapeutic Lifestyle Change-TLC

Dietary Modification-TLC diet

- **Simple carbohydrates discouraged** because insulin drives TG production in the liver
- **Alcohol** eliminate their intake.
- **Dairy** products and **red meat** are taken in moderation. In order to lower their cholesterol level.

Dietary recommendations:

It is recommended that patients should eat fish, vegetables, nuts and fruits.

- eat in smaller portions
- 3 months trial for all patients

Food and additives

Certain foods and dietary additives are associated with modest reductions in plasma cholesterol levels. Plant **stanol and sterol esters** interfere with **cholesterol absorption** and reduce plasma LDL-C levels by 10% when taken three times per day.



Dietary sources of Cholesterol

Type of Fat	Main Source	Effect on Cholesterol levels
Monounsaturated	Olives, olive oil, canola oil, peanut oil, cashews, almonds, peanuts and most other nuts; avocados	Lowers LDL, Raises HDL
Polyunsaturated	Corn, soybean, safflower and cottonseed oil; fish	Lowers LDL, Raises HDL
Saturated	Whole milk, butter, cheese, and ice cream; red meat; chocolate; coconuts, coconut milk, coconut oil , egg yolks, chicken skin	Raises both LDL and HDL
Trans	Most margarines; vegetable shortening; partially hydrogenated vegetable oil; deep-fried chips; many fast foods; most commercial baked goods	Raises LDL

Regular Exercise-

- Regular exercises help the patients in losing weight, improve the functions of their lungs and heart and to stabilize their blood pressure. Exercise routines are adjusted to fit in the patient's ability level.
- Exercise to increase HDL

Cardioprotective affect

-
- 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.

- ~~* If TLC are not effective or pts. are at high CV risk or extremely elevated LDL (>200mg/dl)~~
- Then TLC is applied concurrently with Pharmacological treatment.

PHARMACOLOGICAL INDICATION FOR HYPERCHOLESTEROLEMIA

Indication

1. patients **with CHD** or **risk factors** even they have "average" LDL-C levels.
2. To reduce LDL-C to <100 mg/dL in patients with **established CHD**
3. all patients with **markedly elevated** plasma levels of **LDL-C levels** (>190 mg/dL)
4. plasma LDL-C levels between **130 and 190 mg/dL** with The presence of **other risk factors** such as a low plasma **level of HDL-C** (<40 mg/dL)



thank you!