

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 dyslipidemia**
- **Discuss therapeutic life style changes (TLC)**
- **List down prevention strategies**
- **Pharmacological indications for Dyslipidemia**

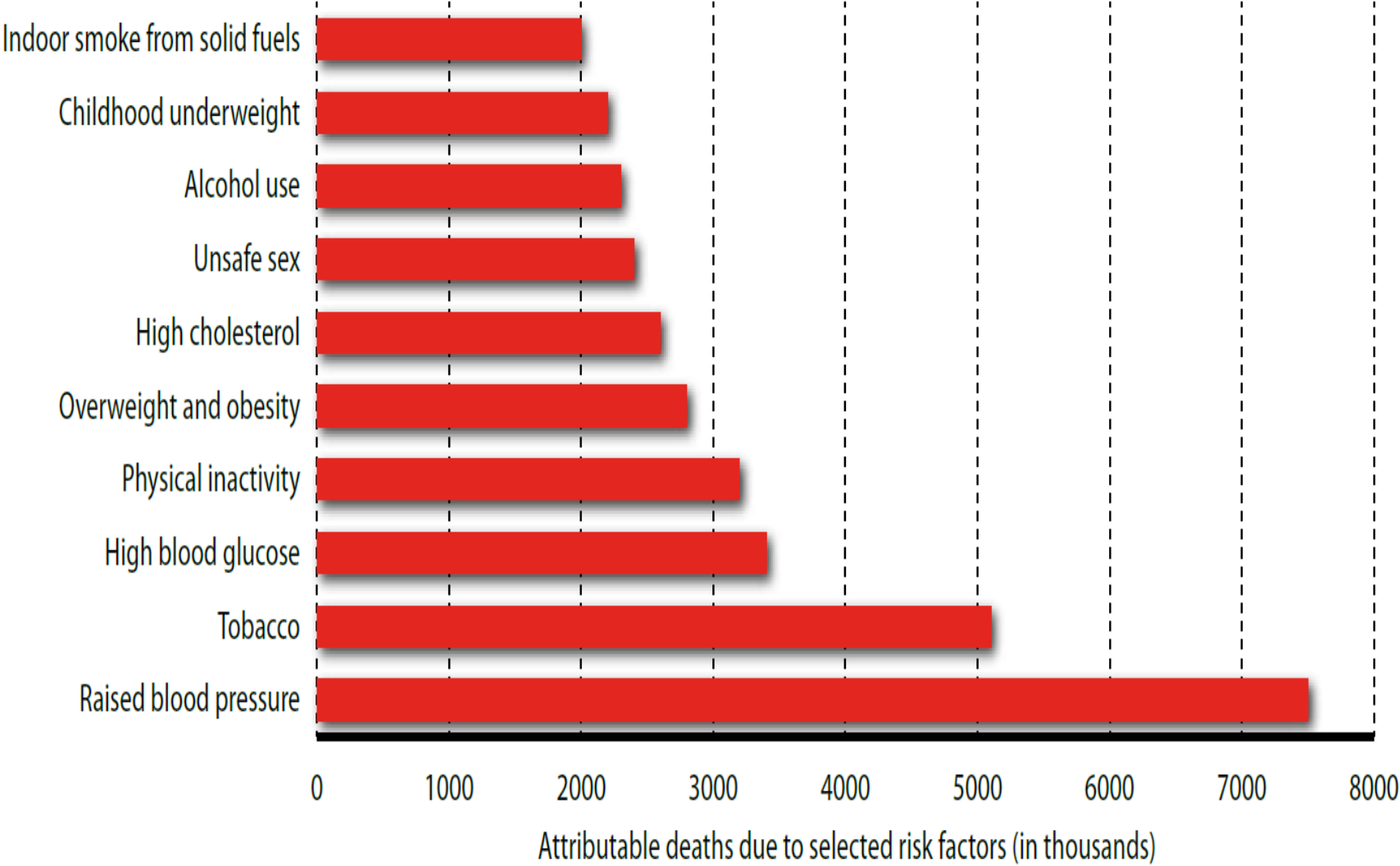
Introduction

- **Dyslipidemia** is a significant risk factor for cardiovascular diseases (CVD), increases the risks of heart disease and stroke. Globally, about **third** of ischemic heart disease is attributed to dyslipidemia.
- **Dyslipidemia** is clinically important because it is a major **modifiable** risk factors for cardiovascular disease

Definition

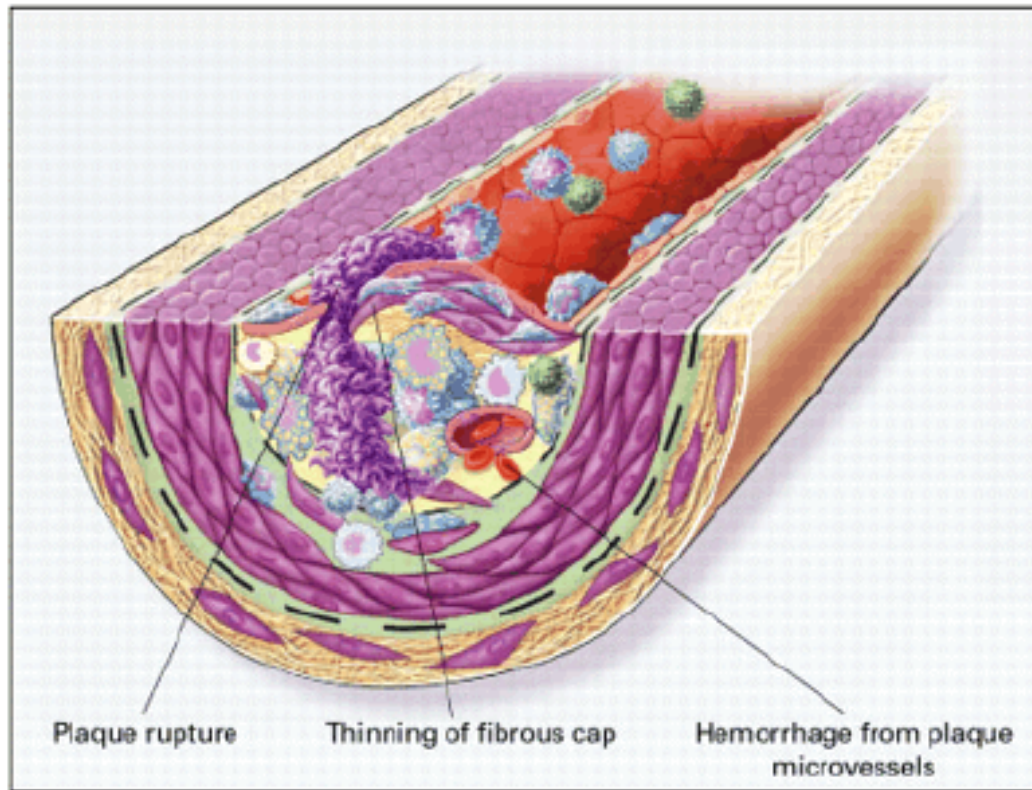
- Dyslipidemias are abnormalities of lipoprotein metabolism and include elevations of total cholesterol, LDL cholesterol, or triglycerides; or deficiencies of HDL cholesterol.

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



- Dyslipidemia is 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

- According to the World Health Organization (WHO), **39%** of the world adult population has been affected by elevated blood cholesterol
- (**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 genders)
- 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.
- **Less than half** of adults with high LDL cholesterol get treatment.
- Only **1 out of every 3** adults with high LDL cholesterol has the condition under control.

Why it is an important public health problem ???

- Dyslipidemia is a **major cause of disease burden** in both the developed and developing world as a risk factor for **Ischemic heart disease and stroke**.
- It was reported that **4.32** million fatalities in **2017** were caused by raised low-density lipoprotein (LDL) cholesterol, accounting for **7.7%** of deaths worldwide that year.

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 **5 %** 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**

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 cholesterol 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

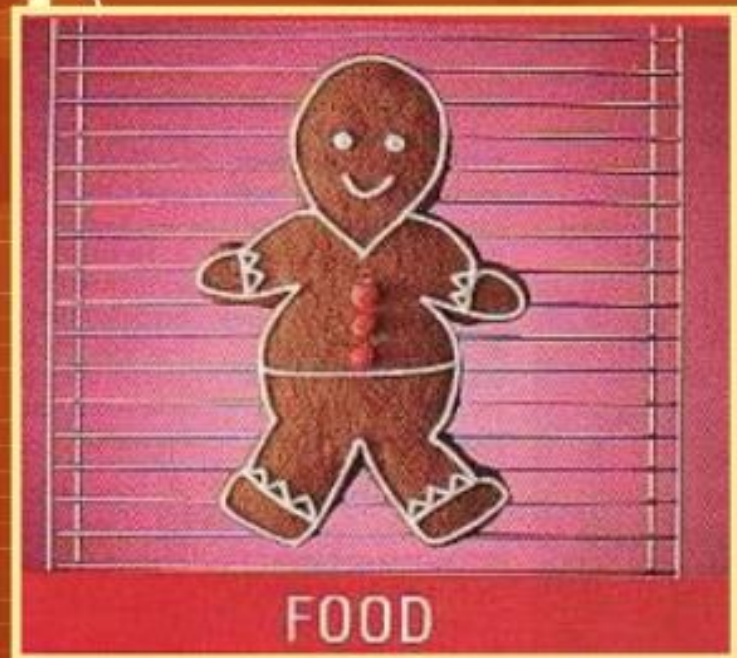
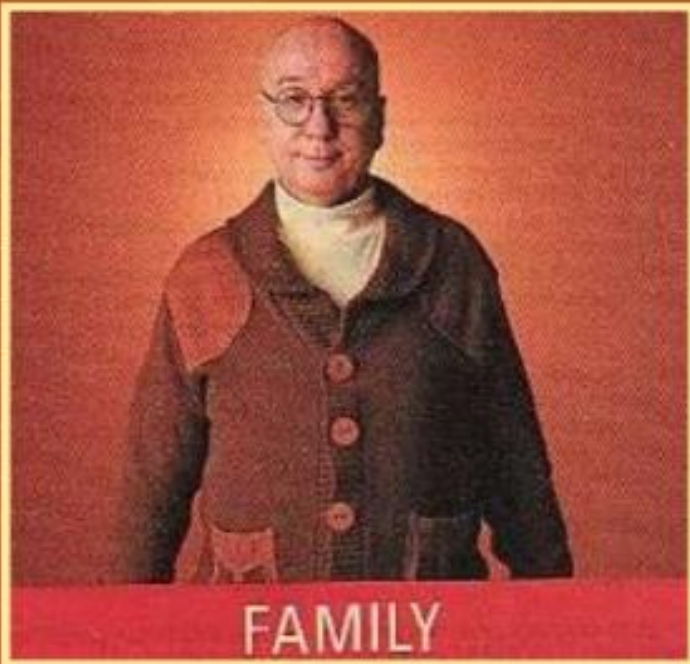
-
- **Familial combined hyperlipidemia** is an autosomal dominant disorder characterized by **patients and their first-degree relatives** who may have either isolated triglyceride or low-density lipoprotein (LDL) cholesterol elevations or both.

-
- **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

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

Risk Factors



Risk Factors for Dyslipidemia

- **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 fat.**

Risk Factors for Dyslipidemia

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

Dyslipidemia signs & symptoms

- Dyslipidemia doesn't have symptoms at all, but it can cause other symptomatic vascular disease, like coronary artery disease.
- Eye lid xanthelasma, **tendinous xanthomas** at the elbow, knee and Achilles tendons and **arcus cornea** are caused by high levels of LDL.
- Acute pancreatitis is caused by high levels of TGs.

Dyslipidemia 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.

Signs of Dyslipidemia

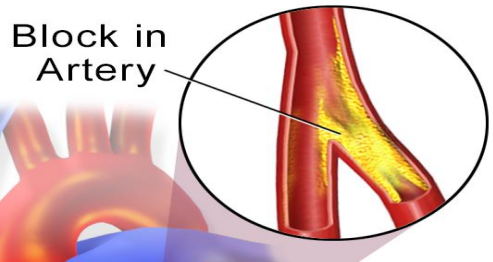


xanthelasma



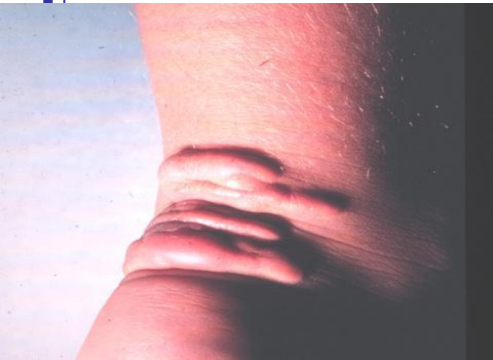
Not significant if in elderly

Corneal arcus



Block in Artery

A major risk of CVD, including myocardial infarction and stroke, as well as total mortality



Predominant hypercholesterolaemia



Xanthelasma* ▲



Corneal arcus* ▲

Aortic stenosis



Extensor digitorum xanthomas ▲

Pre-patellar xanthomas



Achilles tendon xanthomas ▲





Diagnosis

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

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

The adult ranges for LDL cholesterol:

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

Determination of risk category:

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

Primary Prevention

Prevention of new onset.

Goal is to reduce risk factors:

- HT
- DM
- Smoking
- Obesity
- Physical inactivity

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: are reduction in the following:

- Total mortality
- Coronary mortality
- Major coronary events
- Coronary procedures
- Stroke

Dyslipidemia management:

Non-Pharmacologic Treatment

Therapeutic Lifestyle Change-TLC:

an intensive lifestyle intervention that is focused on appropriate weight, diet, physical activity, and other controllable risk factors to reduce cholesterol levels and to prevent other complications of heart disease.

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

Therapeutic Lifestyle Change-TLC

Dietary Modification-TLC diet

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

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 cholesterol level.

Dietary recommendations:

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

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

Box 19-2**American Heart Association
Dietary Guidelines****WEIGHT AND PHYSICAL ACTIVITY**

- Burn at least as many calories as consumed.
- Aim for at least 30 minutes of physical activity on most, if not all, days. To lose weight, do enough activity to burn more calories than eaten every day.

FOODS TO FOCUS ON

- Eat a variety of nutritious foods from all food groups.
- Choose foods like vegetables, fruits, whole-grain products, nuts, and fat-free or low-fat dairy products most often.
- Choose lean meats such as poultry and prepare them without added saturated and trans fats.
- Eat fish at least twice a week.

FOODS TO LIMIT OR CONSUME IN MODERATION

- Limit the amount of saturated fat to 5% to 6% of total calories.
- Avoid trans fat.
- Limit sodium to a maximum of 2400 mg/day (<1500 mg/day reduces blood pressure even more).
- Limit red meat.
- Eat less of the nutrient-poor foods, such as beverages and foods with added sugars.
- Drink alcohol in moderation, if at all. That means one drink per day for women and two drinks per day for men.

GENERAL RECOMMENDATIONS

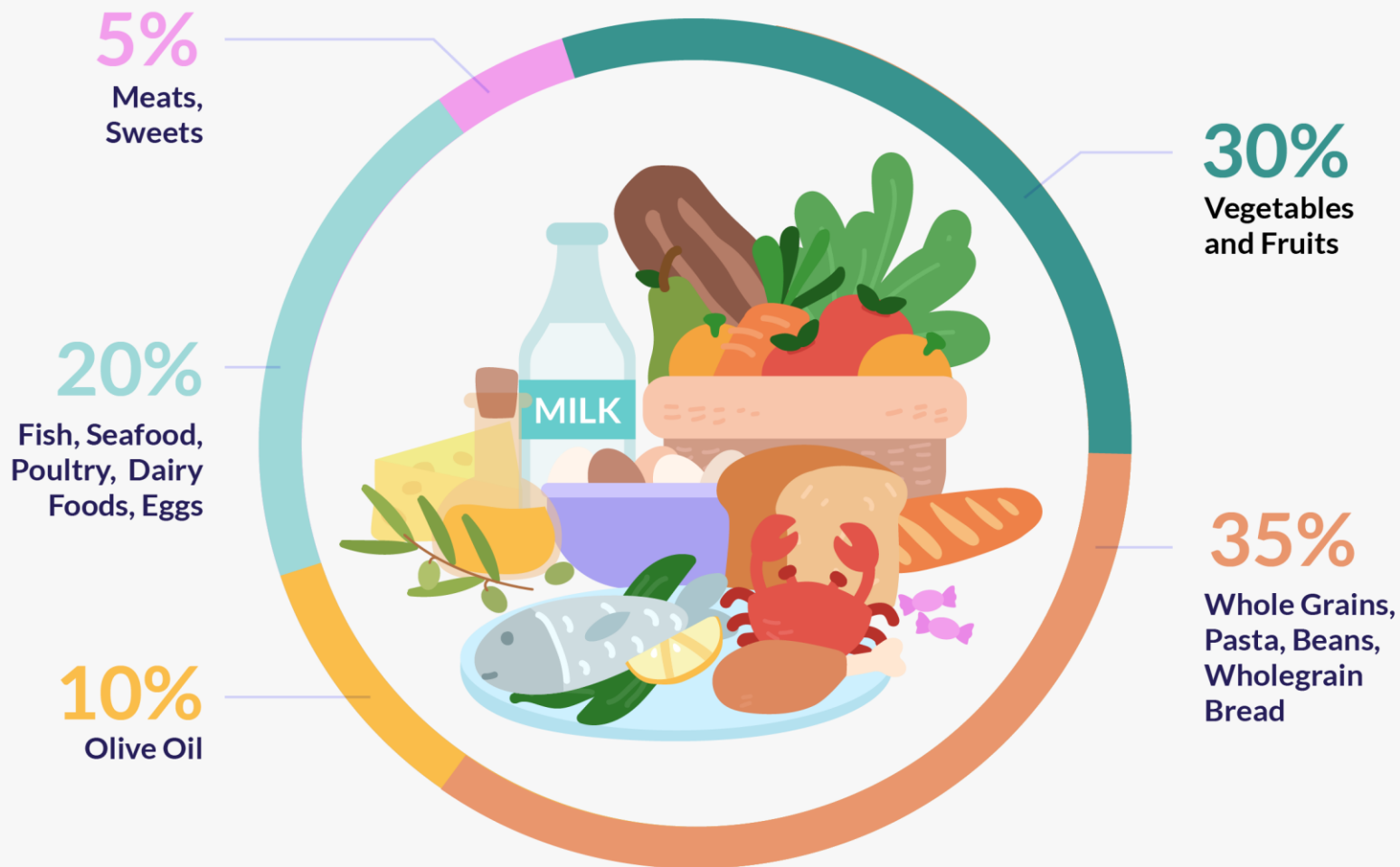
- Follow the American Heart Association recommendations when eating out, and keep an eye on portion sizes.
- Do not smoke tobacco, and stay away from tobacco smoke.

Mediterranean diet:

- Mediterranean diet is a **way of eating that's based on the traditional cuisines of Greece, Italy and other countries that border the Mediterranean Sea.**
- It is a heart-healthy, **well-balanced** way of eating that prioritizes vegetables, fruits, whole grains, legumes, lean proteins (particularly from fish), and healthy fats like extra virgin olive oil and nuts.



Mediterranean Diet



Mediterranean Diet Pyramid

Red meats & sweets
Enjoy Sparingly



Poultry, eggs & dairy
Enjoy 1-2x/wk



Fish, seafood &
omega-3 rich foods
Enjoy >3x/wk



Whole grains, legumes,
fruit, vegetables, healthy
fats, herbs & spices
Enjoy Daily



Physical activity, meal
& family time
Practice Daily



Food and additives

- Certain foods and dietary additives are associated with modest reductions in plasma cholesterol levels.



- Plant **stanol and sterol esters**, also known as **Phytosterols**, are **cholesterol-like compounds** that are found naturally in a range of plant-based foods including vegetable oils, grain products such as breads and cereals, seeds, nuts, legumes, and fruits and vegetables.
- Plant **stanol and sterol esters** interfere with **cholesterol absorption** and reduce plasma LDL-C levels by 10% when taken regularly.

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 cardiopulmonary functions and to stabilize their blood pressure.
- Exercise **increases metabolic kinetics** within the liver, skeletal muscle, and adipose tissue, all of which are **cardio protective and favor HDL production.**

- 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. **150 min /Wk (30 min 5 times /Wk)**
- 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 (>190 mg/dl)

■ Then TLC is applied **concurrently** with Pharmacological treatment.

PHARMACOLOGICAL INDICATION FOR DYSLIPIDEMIA

Indications:

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!