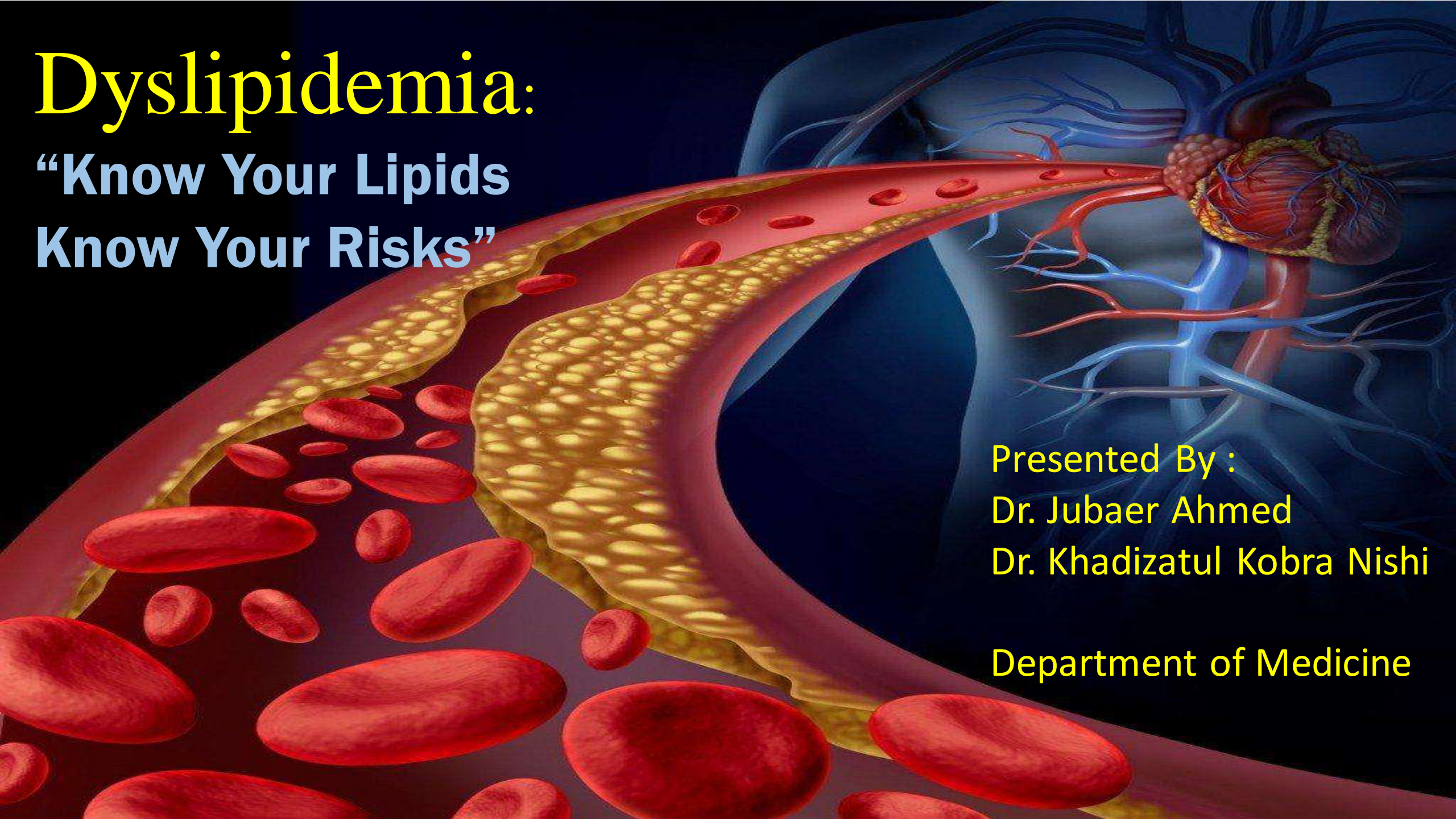


# Dyslipidemia:

**“Know Your Lipids  
Know Your Risks”**

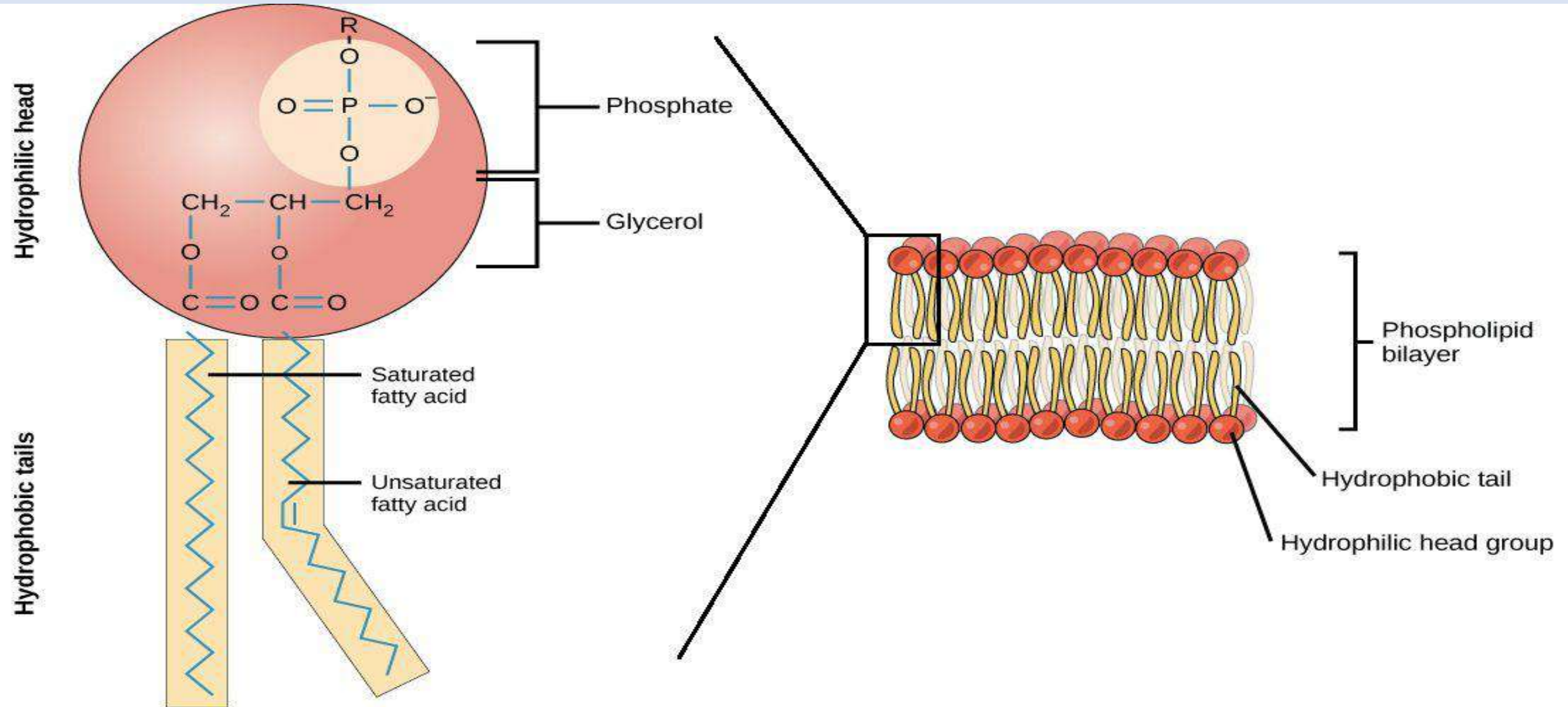


Presented By :  
Dr. Jubaer Ahmed  
Dr. Khadizatul Kobra Nishi  
Department of Medicine

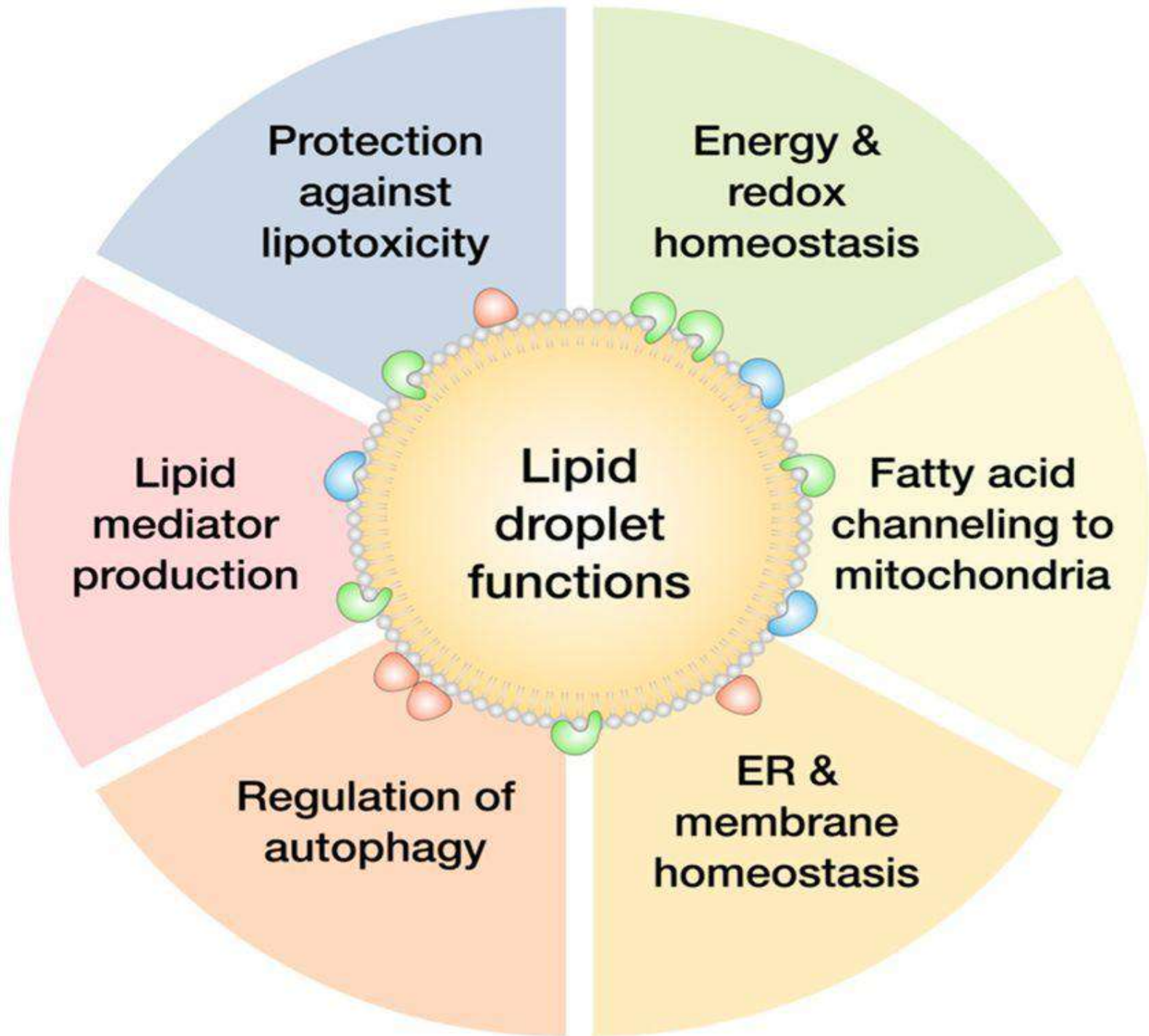
# What is Lipid?

- Heterogeneous group of compounds
- Relatively insoluble in water
- Soluble in organic solvents (ether, chloroform, acetone etc.)
- Actually or potentially related to fatty acids
- Utilized by the living cells

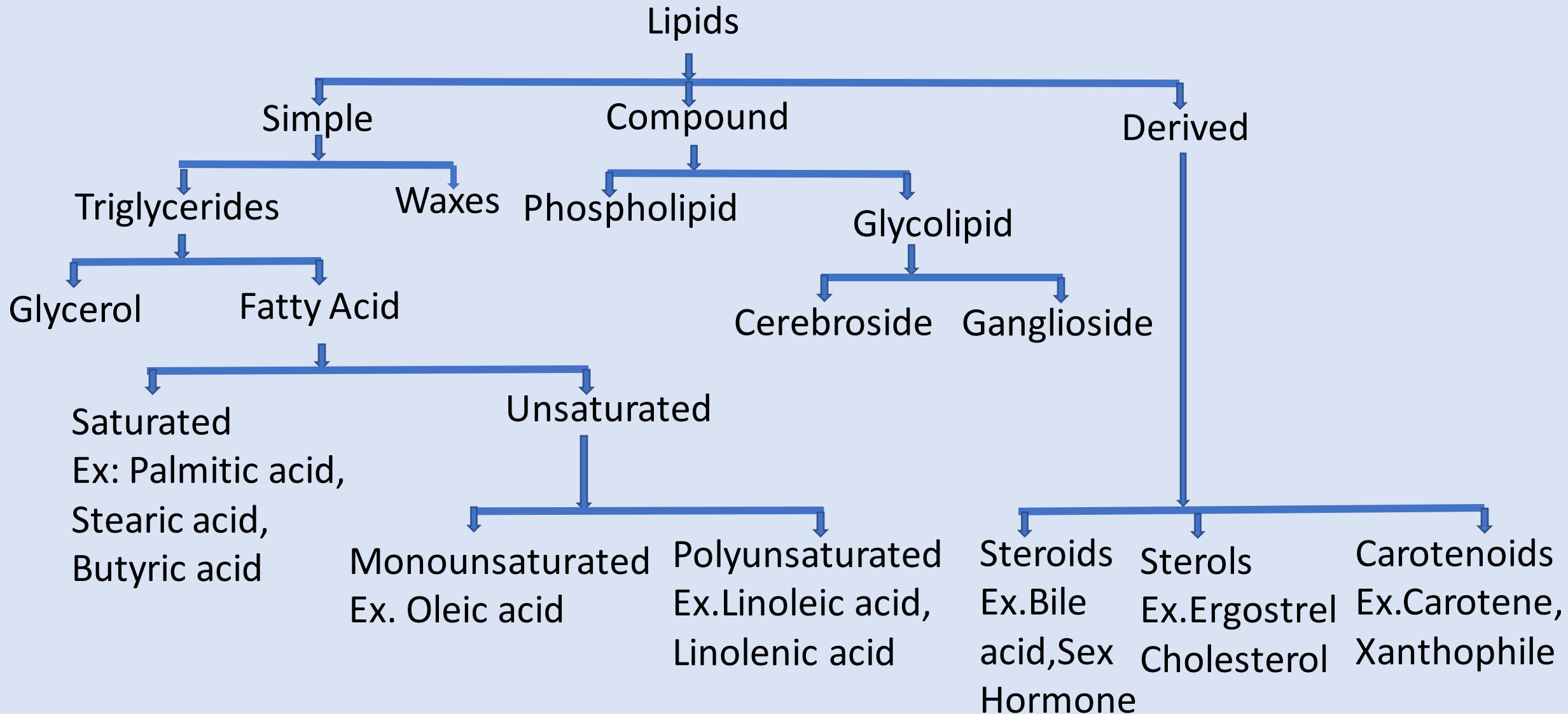
# Structure Of Lipid



# Functions of Lipid



# Classification of Lipid



# Main types and functions

Type of Lipid	Structure / Example	Main Function	Found In
<b>Triglycerides</b>	Glycerol + 3 fatty acids (e.g., fats, oils)	Long-term energy storage and insulation	Butter, oils, body fat
<b>Phospholipids</b>	Glycerol + 2 fatty acids + phosphate group	Major component of cell membranes	Cell membranes (all cells)
<b>Steroids</b>	4 fused carbon rings (e.g., cholesterol, hormones)	Signaling molecules, membrane structure	Hormones (estrogen, testosterone, cortisol, aldosterone)
<b>Waxes</b>	Long-chain fatty acids + alcohols	Waterproofing and protection	



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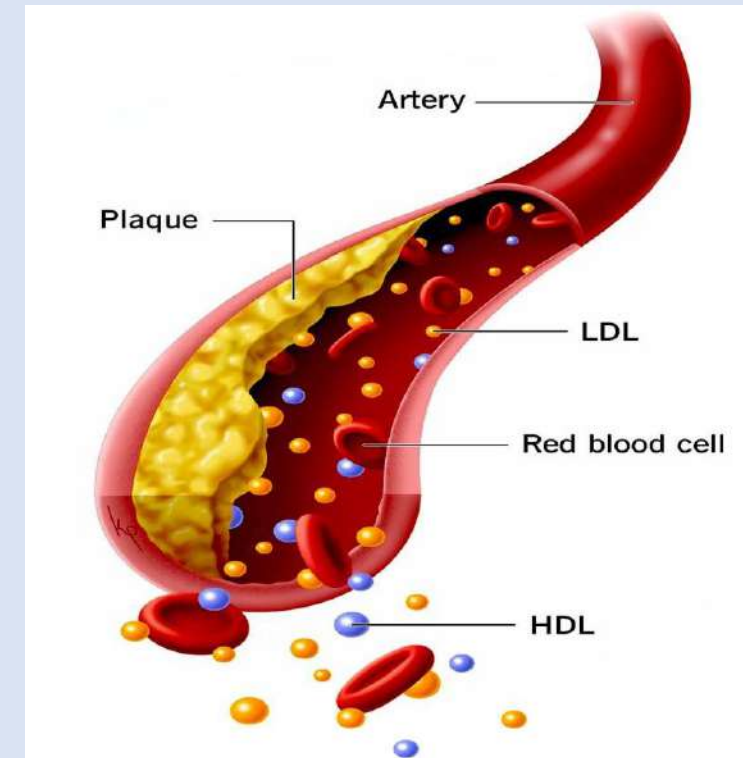
# Fasting Lipid profile

Component	Normal/ Desirable Level	Borderline/ Moderate Risk	High Risk /Undesirable
<b>Total Cholesterol</b>	<200 mg/dl	200-239 mg/dl	> 240 mg/dl
<b>LDL Cholesterol</b>	<130 mg/dl	130-159 mg/dl	> 160 mg/dl
<b>HDL Cholesterol</b>	>60 mg/dl	40-59 mg/dl	< 40 mg/dL(men) < 50 mg/dL (women)
<b>Triglycerides</b>	<150mg/dL	150-199 mg/dl	> 200 mg/dl

(Ref: Katzung – 15<sup>th</sup>)

# What is Dyslipidemia?

Dyslipidemia is a medical condition where the levels of lipids (fats) in the blood are abnormal



# Case Scenario

A 45-years-old diabetic man comes for a routine health check up. His diabetes is well controlled. He has no other comorbid condition. He has a family history of coronary artery disease.

In routine health check up, his fasting lipid profile shows:

### Lipid Profile (Fasting)

S. Cholesterol (Total)	278 mg/dL	<200
S. HDL Cholesterol	29 mg/dL	>40
S. LDL Cholesterol	85 mg/dL	<100
S. Triglyceride	1204 mg/dL	<150
Non-HDL-Cholesterol	249 mg/dL	<130
T.Cholesterol-HDL Ratio	9.59	Low risk:<4.0 High risk:>6.0

# Causes of Dyslipidemia



# Causes of Dyslipidemia

## ❖ Primary (genetic) causes

- Familial hypercholesterolemia
- Familial combined hyperlipidemia
- Familial hypertriglyceridemia
- Familial Dysbetalipoproteinemia

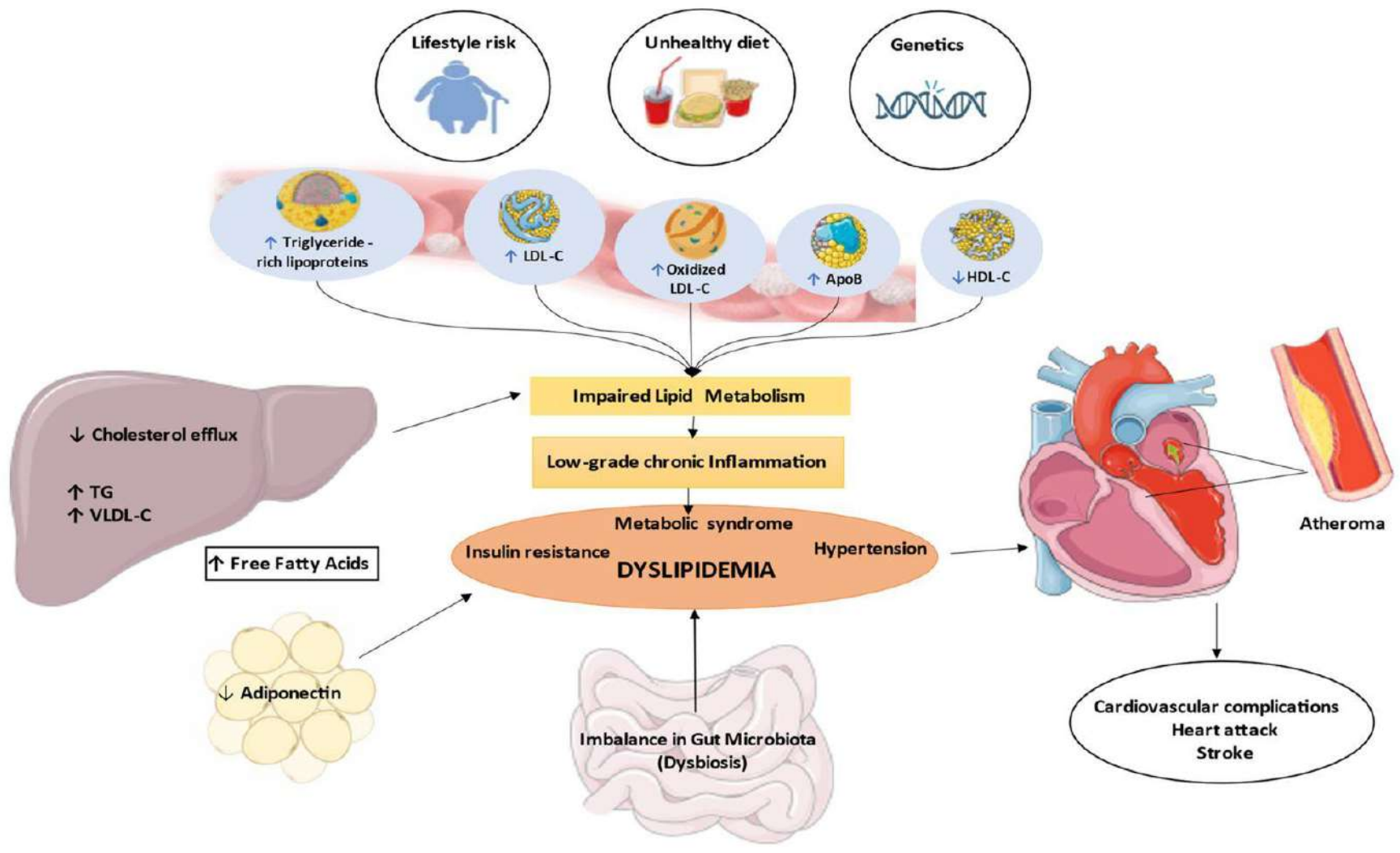
# Secondary (acquired) Causes

- Poor dietary habit
  - High saturated/trans fats
  - Low fiber
  - High calorie intake
- Obesity
- Diabetes mellitus
- Hypothyroidism
- Chronic kidney disease
- Nephrotic Syndrome
- Certain medications (Thiazide, OCP, Cyclosporine etc.)



# Complications of Dyslipidemia





# Dyslipidemia Management

**(2025 Focused Update of the 2019 ESC/EAS Guidelines for  
the Management of Dyslipidemias)**

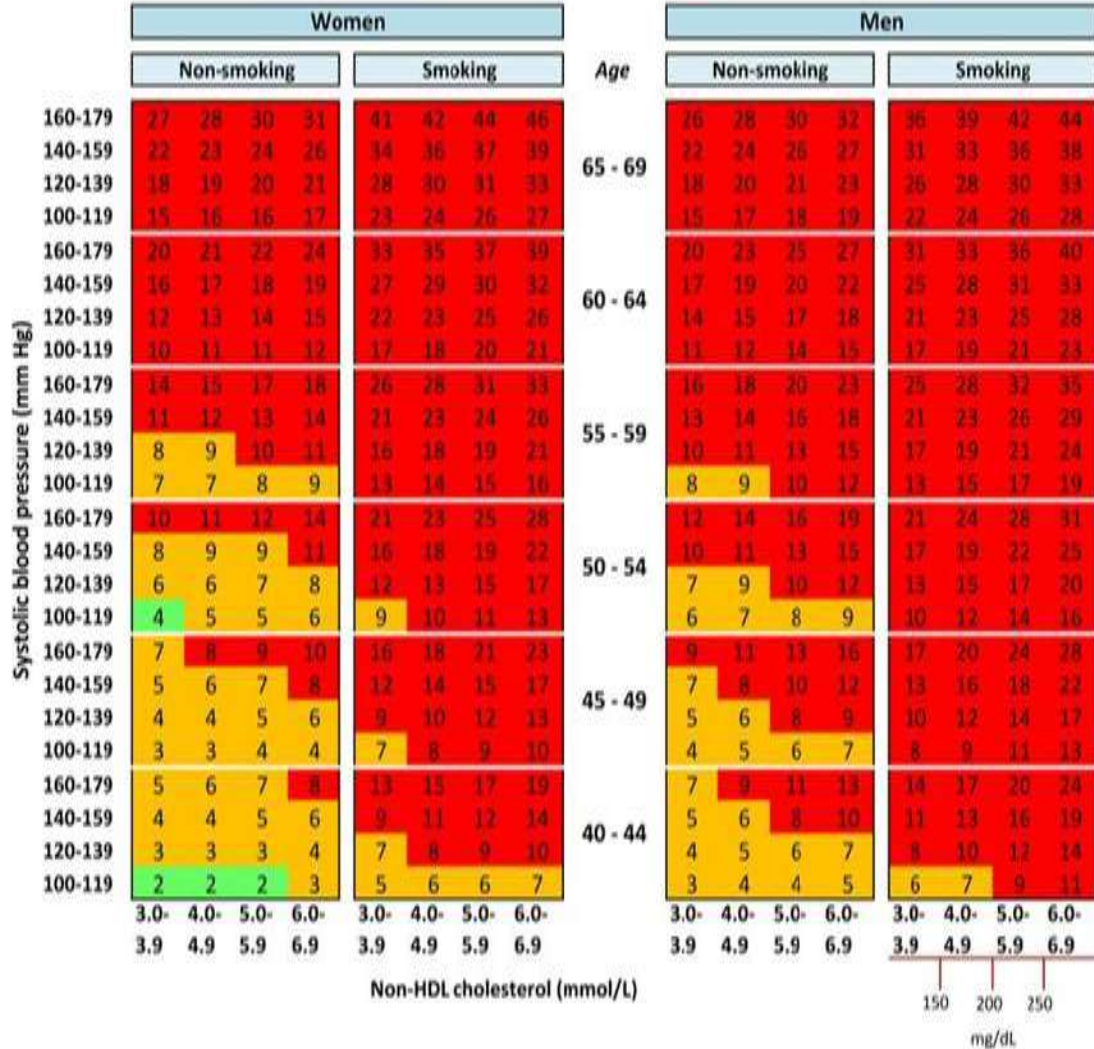
# Risk Category for CVD

<b>Risk Category</b>	<b>Key Features/Criteria</b>	<b>Score 2</b>
Very High Risk	Documented ASCVD, DM with organ damage, severe CKD, FH+ ASCVD, SCORE2 > 20 %	> 20 %
High Risk	Markedly elevated single risk factors, FH without other risk factor, DM > 10 year, moderate CKD	10 - 19 %
Moderate Risk	Young DM patients (<35/<50year) with < 10 year duration, no other risk factor	2 - 9 %
Low Risk	Low calculated risk	< 2 %

D

SCORE2

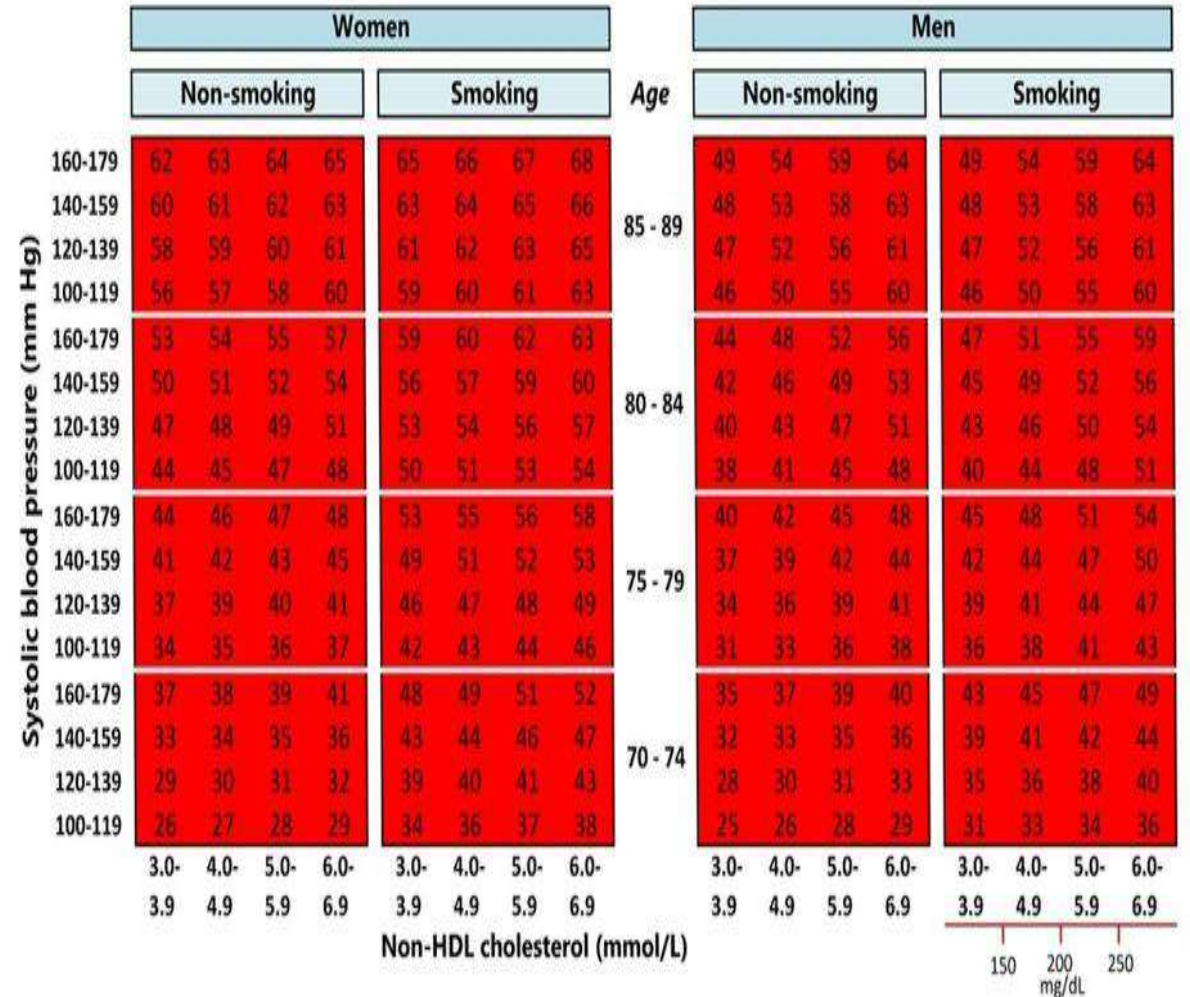
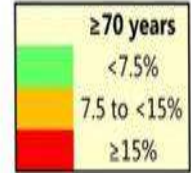
10-year risk of (fatal and non-fatal)  
CV events in populations at  
*very high* CVD risk



D

SCORE2-OP

10-year risk of CV events in older persons in  
populations at very high CVD risk



# Very high cardiovascular risk

- **Patients in this category include**
  - . Acute Coronary Syndrome (ACS: MI or unstable angina)
  - . Chronic coronary syndromes
  - . Stroke or TIA
  - . Peripheral arterial disease

- **Revascularization procedures**

- . PCI (stents)
- . CABG (bypass surgery)
- . Other arterial revascularizations

- **Unequivocal imaging evidence**

- . Significant plaque on coronary angiography or CT
- . Carotid/femoral plaque on ultrasound
- . High coronary artery calcium (CAC) score

- **Diabetes Mellitus (DM) with high-risk features**

- Target organ damage (kidney, retina, heart, etc.)
- $\geq 3$  major cardiovascular risk factors
- Early-onset type 1 diabetes with long duration ( $>20$  years)

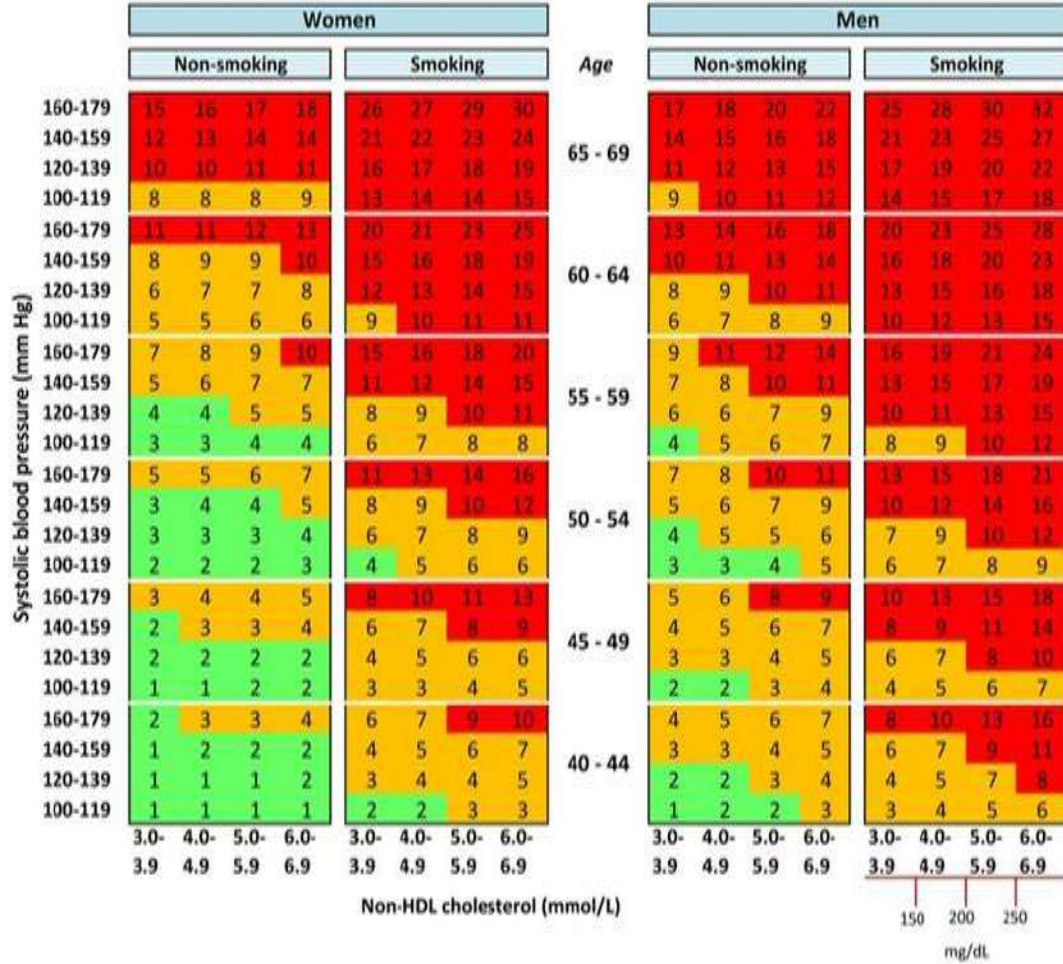
- **Severe Chronic Kidney Disease (CKD)**

- $\text{eGFR} < 30 \text{ mL/min/1.73 m}^2$

C

SCORE2

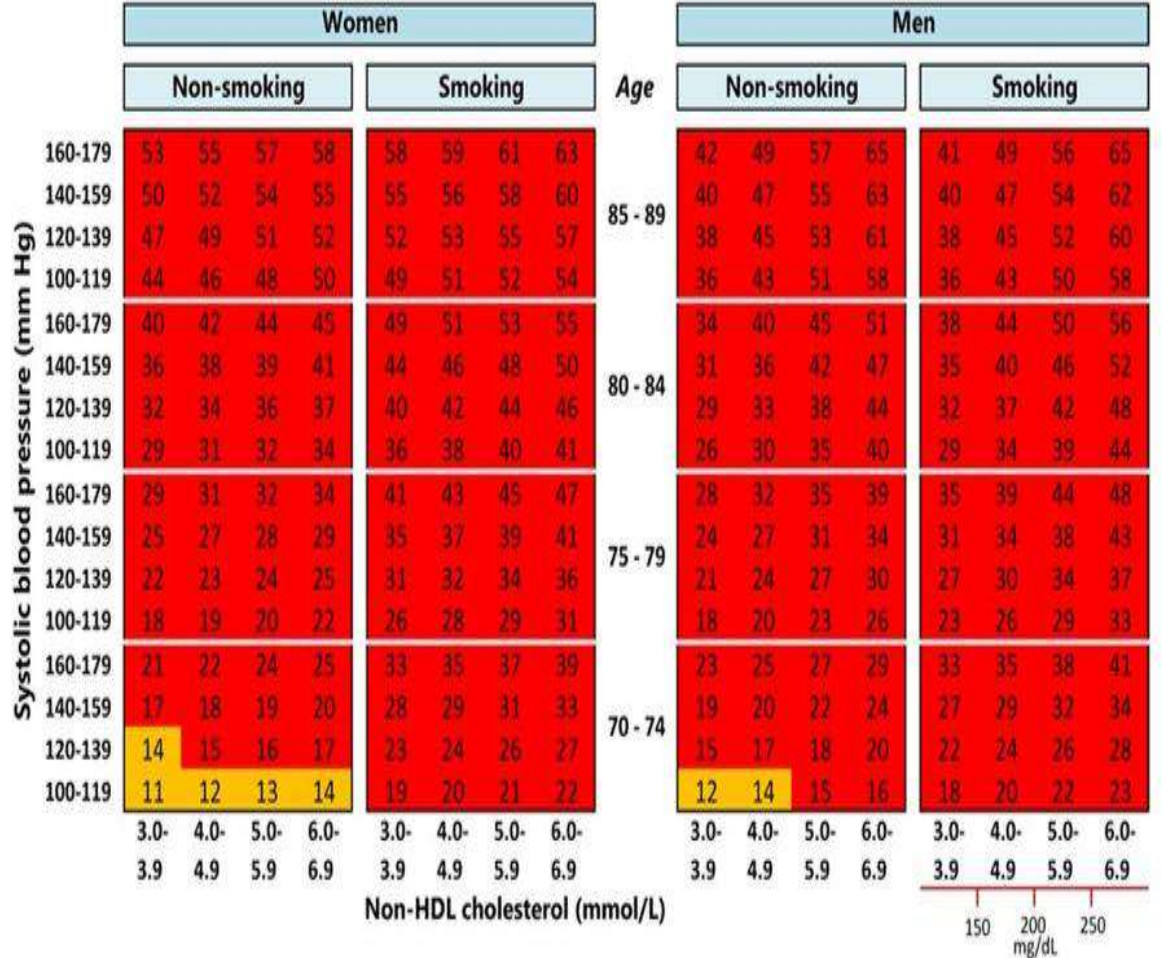
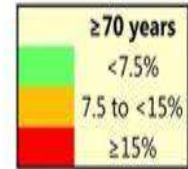
10-year risk of (fatal and non-fatal) CV events in populations at high CVD risk



C

SCORE2-OP

10-year risk of CV events in older persons in populations at high CVD risk



# High Risk / Markedly elevated single risk factors

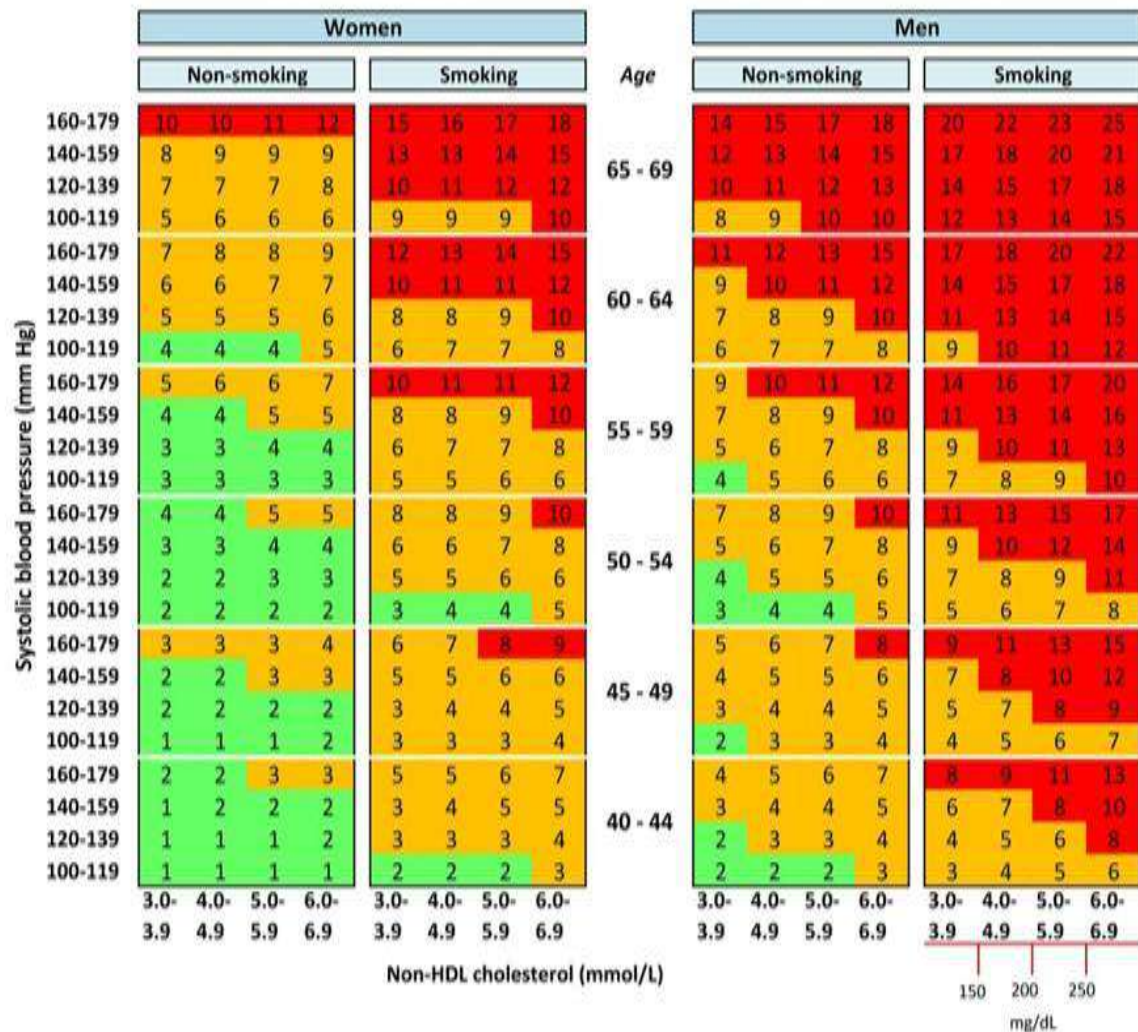
- **Patients in this category include:**

- Total cholesterol (TC) > 8 mmol/L (>310 mg/dL)
- LDL-C > 4.9 mmol/L (>190 mg/dL)
- Blood pressure  $\geq$ 180/110 mmHg

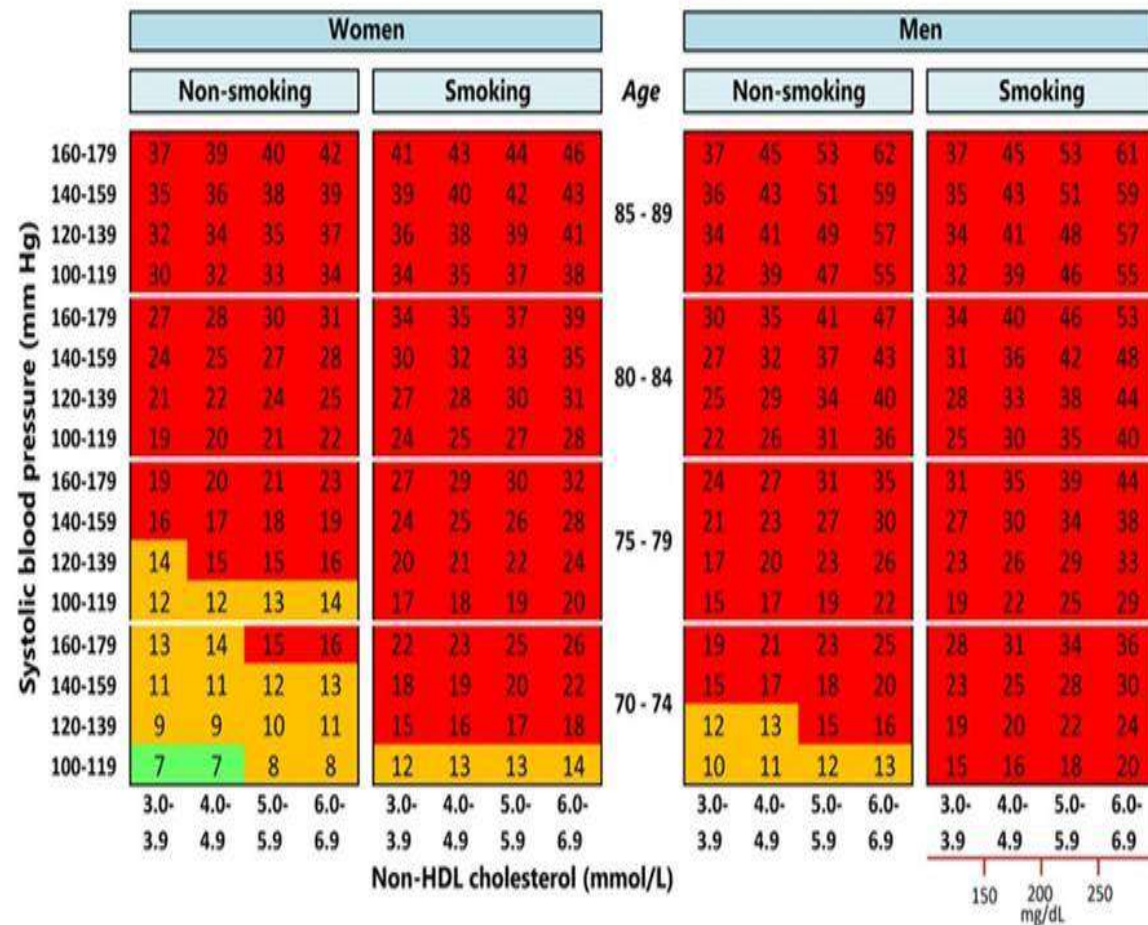
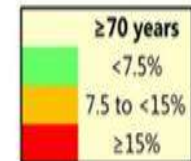
- **Familial hypercholesterolemia (FH)** without other major risk factors
- **Diabetes mellitus** without target organ damage, with duration  $\geq 10$  years **or** another risk factor
- **Moderate CKD:** eGFR 30–59 mL/min/1.73 m<sup>2</sup>

**B****SCORE2**

10-year risk of (fatal and non-fatal)  
CV events in populations at  
*moderate* CVD risk

**B****SCORE2-OP**

10-year risk of CV events in older persons in  
populations at moderate CVD risk



# Moderate Risk

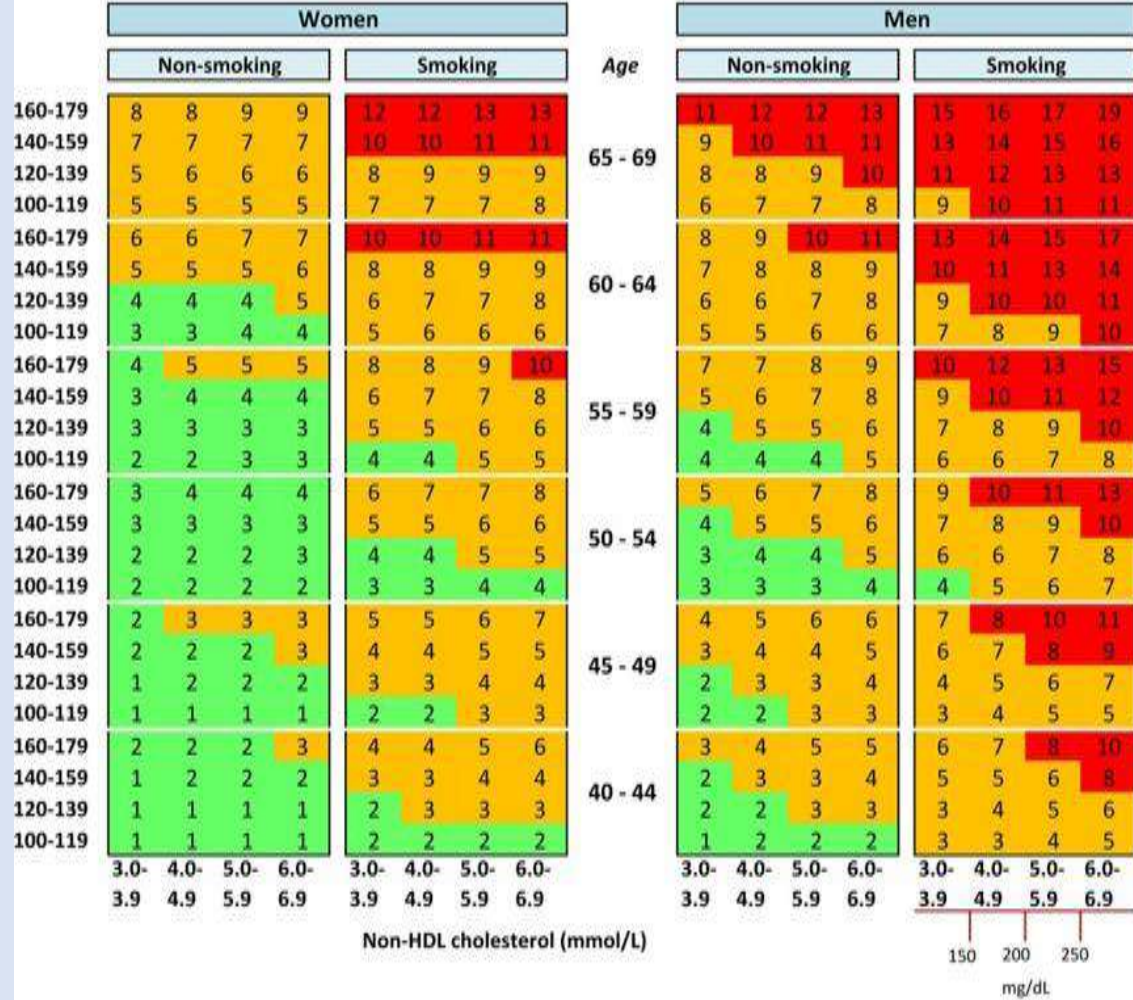
- **Patients in this category include:**

- **Young Patients with Diabetes :**

- Type 1 DM <35 years old
- Type 2 DM <50 years old
- DM duration <10 years, **without other risk factors**

## SCORE2

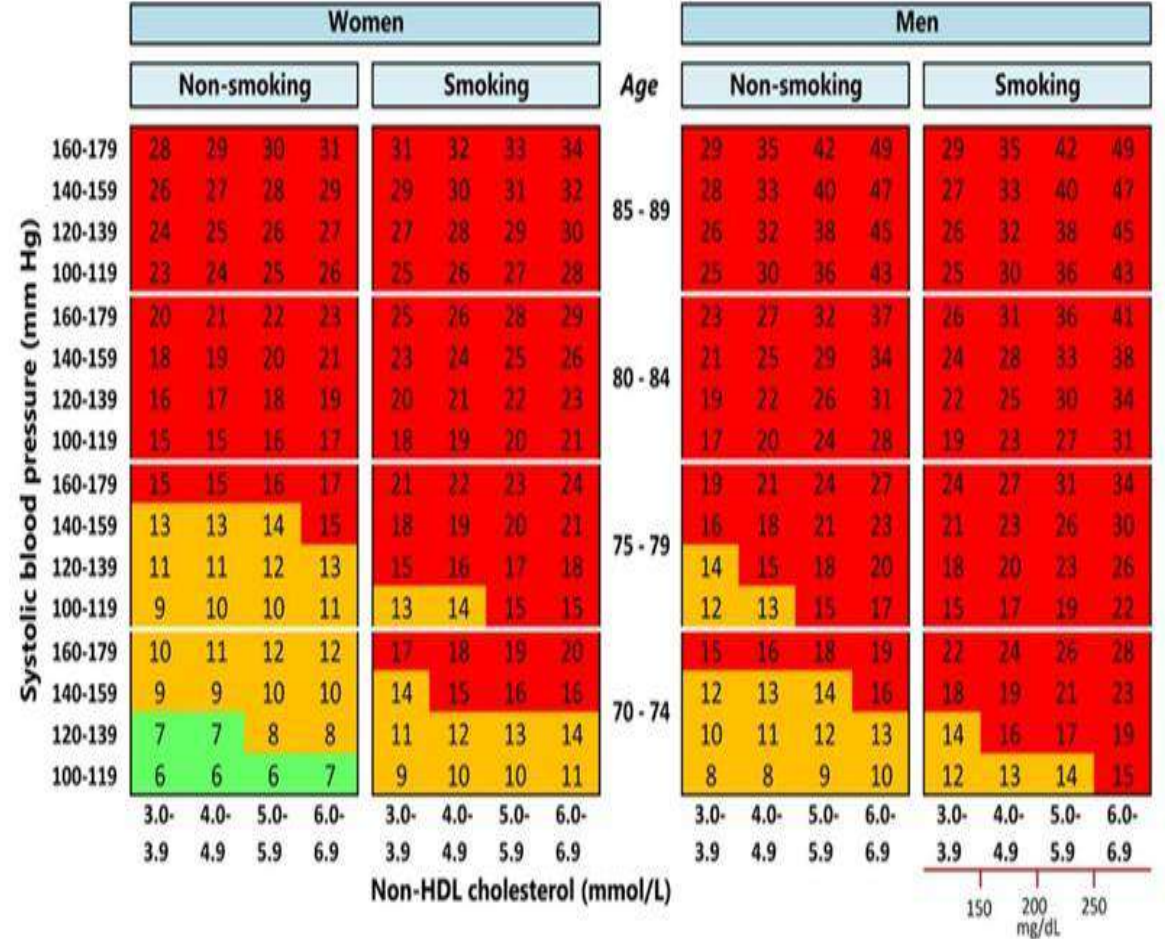
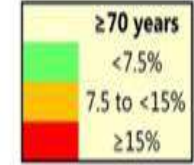
10-year risk of (fatal and non-fatal)  
CV events in populations at  
*low* CVD risk



## A

## SCORE2-OP

10-year risk of CV events in older persons in  
populations at low CVD risk



# Low Risk

- **Patients in this category include:**
  - **Calculated SCORE2/SCORE2-OP: <2% 10-year risk of fatal or non-fatal CVD**

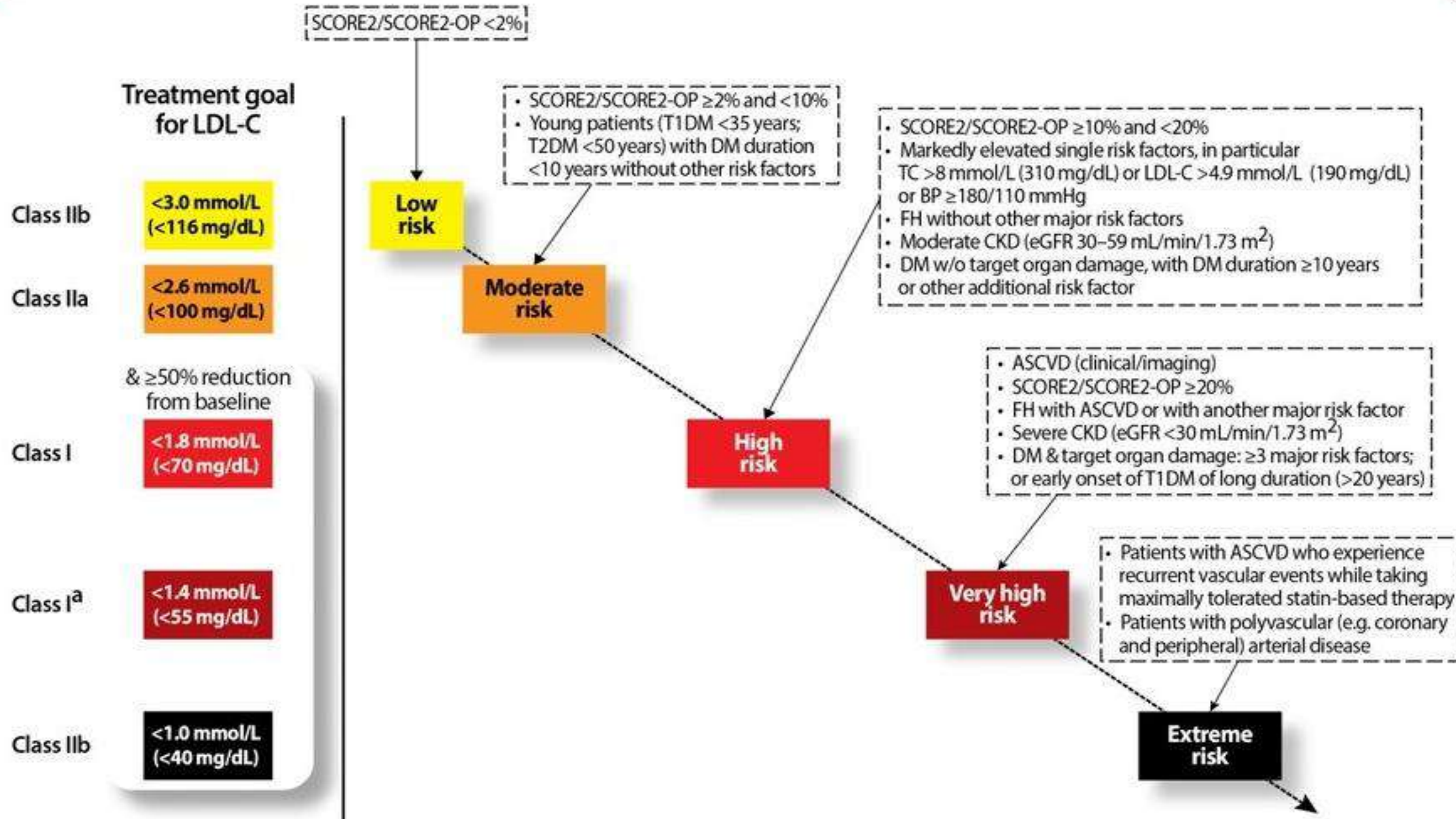
# Risk modifiers for consideration beyond the risk estimation based on the SCORE2 and SCORE2-OP algorithms

## Demographic/Clinical conditions

- Family history of premature CVD (men: <55 years; women: <60 years)
- High-risk (e.g. southern Asian) ethnicity
- Stress symptoms and psychosocial stressors
- Social deprivation
- Obesity
- Physical Inactivity
- Chronic immune mediated /inflammatory disorders
- Major psychiatric disorders
- History of premature menopause

## **Biomarkers:**

- Persistently elevated CRP (>2mg/L)
- Elevated LP(a) [>50mg/dL(>150nmol/L)]



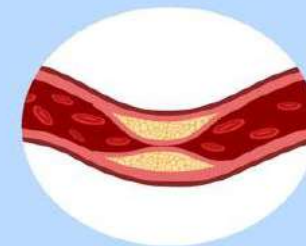




# Non-Pharmacological Approach:

- Increase dietary fiber
- Reduce excessive body weight
- Increase habitual physical activity (swimming, cycling, running, walking at least 30 min/day)
- Avoid dietary trans fat
- Reduce dietary saturated fat

## TIPS TO CONTROL DYSLIPIDEMIA



CONTROL WEIGHT



EXERCISE



INCREASE WHOLEGRAIN AND VEGETABLES



EAT GOOD FAT AND OILS



LIMIT ALCOHOL AND AVOID SMOKING

- Use functional foods enriched with phytosterols
- Reduce intake mono & disaccharides(simple sugars)
- Reduce total dietary carbohydrate intake
- Reduce dietary cholesterol
- Reduce alcohol intake

# Pharmacological Approach

## A. STATINS (HMG-CoA Reductase Inhibitors)

- ❖ Statins are lipid-lowering drugs that inhibit HMG-CoA reductase, the rate-limiting enzyme in hepatic cholesterol synthesis
- ❖ Statins is the First line for Dyslipidemia (especially high LDL)



# Types of Statin According to solubility

## Statin

```
graph TD; A[Statin] --> B["(Fat-soluble) Statins"]; A --> C["(Water-soluble) Statins"]; B --> D["▪ Atorvastatin"]; B --> E["▪ Simvastatin"]; B --> F["▪ Lovastatin"]; B --> G["▪ Fluvastatin"]; B --> H["▪ Pitavastatin"]; C --> I["▪ Rosuvastatin"]; C --> J["▪ Pravastatin"];
```

(Fat-soluble) Statins

- Atorvastatin
- Simvastatin
- Lovastatin
- Fluvastatin
- Pitavastatin

(Water-soluble) Statins

- Rosuvastatin
- Pravastatin

<b>Statin</b>	<b>Usual Daily Dose</b>
Rosuvastatin	5 – 40 mg
Atorvastatin	10 – 80 mg
Simvastatin	10 – 40 mg
Pravastatin	10 – 40 mg
Lovastatin	10 – 80 mg

# Drug Interactions with Statins

## **Anti-Infective Agents:**

- **Antifungals:** Itraconazole, Ketoconazole, Posaconazole
- **Antibiotic:** Erythromycin, Clarithromycin, Telithromycin

## **Calcium channel blocker:**

- Verapamil
- Diltiazem
- Amlodipine

## **Other Drugs:**

- Ciclosporin
- Danazol
- Amiodarone
- Ranolazine
- Nefazodone
- Gemfibrozil
- Grapefruit juice

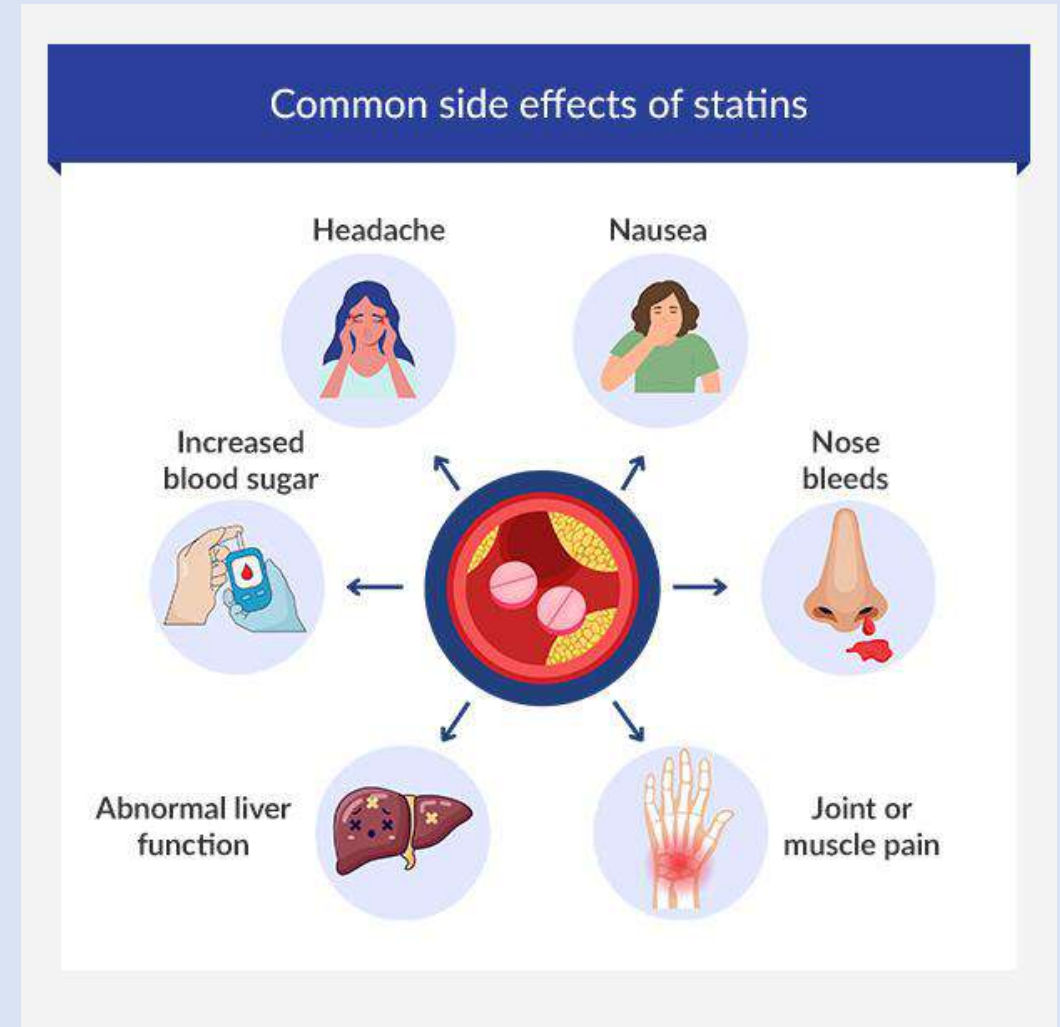
# Clinical Indications of Statins

- ✓ High LDL cholesterol / Dyslipidemia
- ✓ Familial hypercholesterolemia
- ✓ Primary prevention of cardiovascular disease in high-risk patients
- ✓ Secondary prevention in patients with MI, stroke, angina, or post-stent/CABG
- ✓ Diabetes patients  $\geq 40$  years, regardless of LDL level



# Side Effects of Statins (HMG-CoA reductase inhibitors)

- ✓ LFT Abnormality
- ✓ Myalgia, Myopathy, Muscle weakness
- ✓ Myositis
- ✓ Rhabdomyolysis
- ✓ Asymptomatic rise in CK
- ✓ Rash
- ✓ Headache, Nausea
- ✓ Dyspepsia



(Ref: Lippincott's/5<sup>th</sup>/270; Katzung/14<sup>th</sup>/634;)

## B. Non-Statin Therapies:

Non-Statin therapies with proven cardiovascular benefit, taken alone or in combination, are recommended for patients unable to take statin therapy to lower LDL-C levels and reduce CV risk

# □ Drugs :

1. Bile-binding resins :

a. Cholestyramine

b. Colestipol

c. Colesevelam

2. Ezetimibe

3. Fibrates:

a. Fenofibrate

b. Clofibrate

4. PCSK9 inhibitors (proprotein convertase subtilisin/kexin type 9)

5. Niacin

According to **2025 Focused Update of the 2019 ESC/EAS Guidelines for the Management of Dyslipidemias** there are Two latest drugs added in the Pharmacological Approach

They are –

1. Bempedoic Acid
2. Evinacumab

# 1. Bempedoic Acid

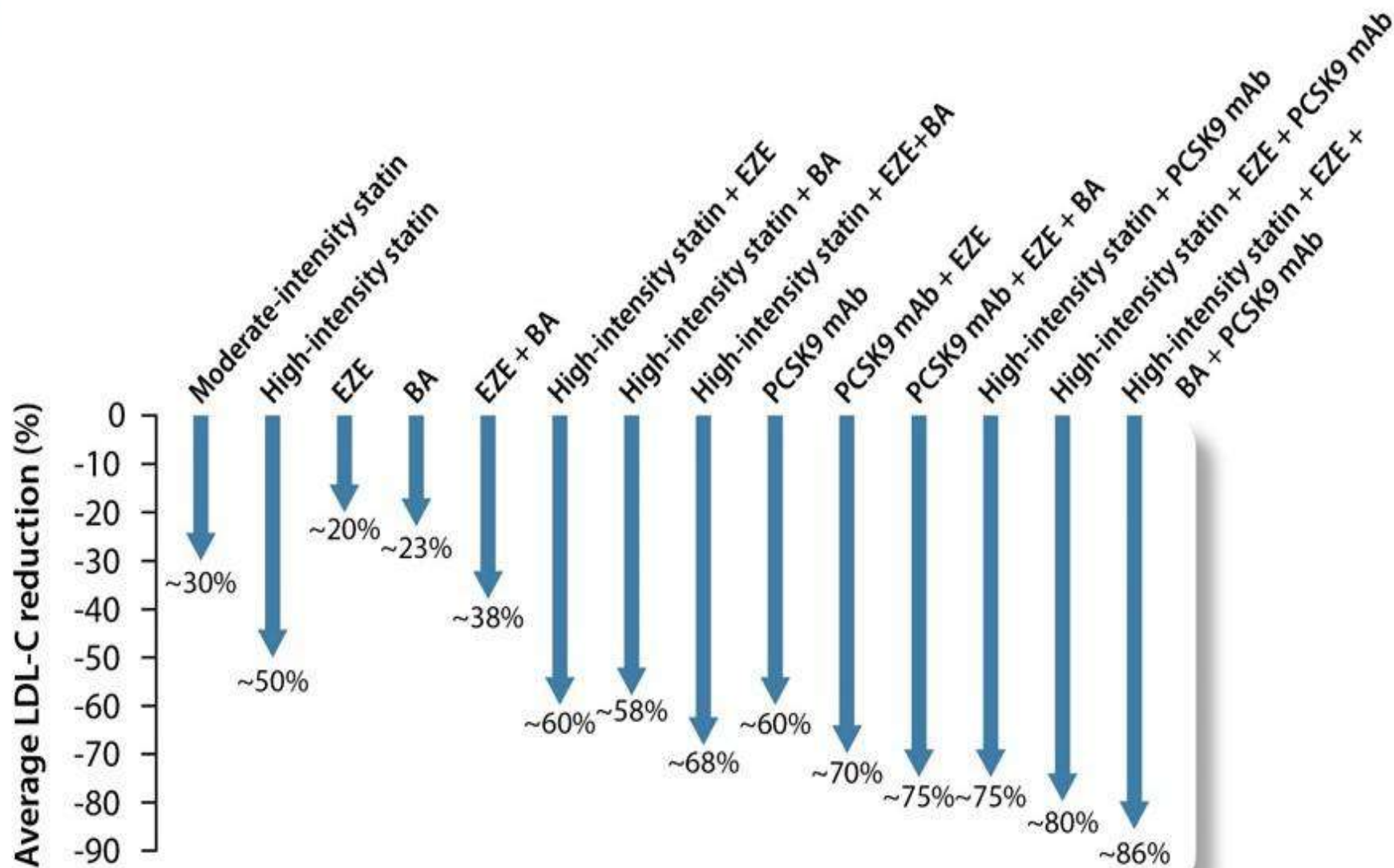
- Recommended for patients unable to take statin therapy to achieve LDL-C goal
- Addition of bempedoic acid to the maximally tolerated dose of statin with or without ezetimibe should be considered in high or very high risk patients to achieve LDL-C goal

## 2. Evinacumab

- Should be considered in patients with homozygous familial hypercholesterolaemia (aged  $\geq 5$  years) not at LDL-C goal despite maximal lipid-lowering therapy

## Figure 2

Average reduction in low-density lipoprotein cholesterol levels with different pharmacological therapies with proven cardiovascular benefit.



# Drug Treatment of Patients with Hypertriglyceridaemia

## 1. High-Dose Icosapent Ethyl

- **Dose:**  $2 \times 2$  g/day
- **Indication:** High-risk or very high-risk patients with **elevated triglycerides** (fasting TG 135–499 mg/dL or 1.52–5.63 mmol/L)

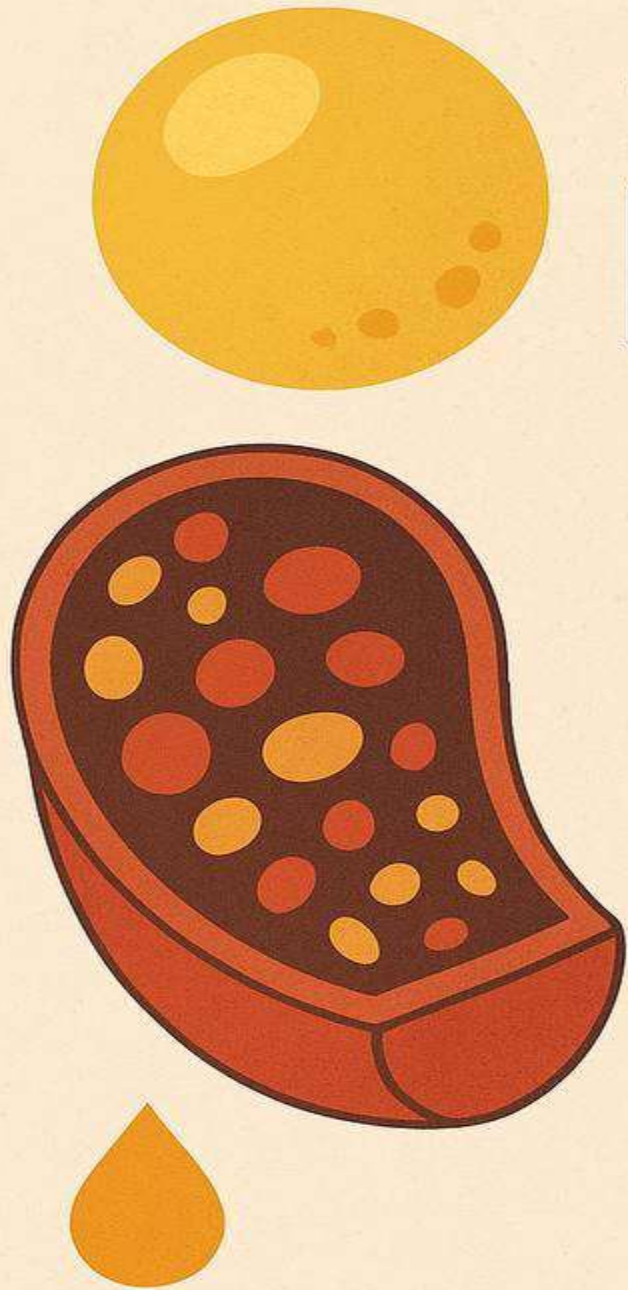


## 2. Volanesorsen

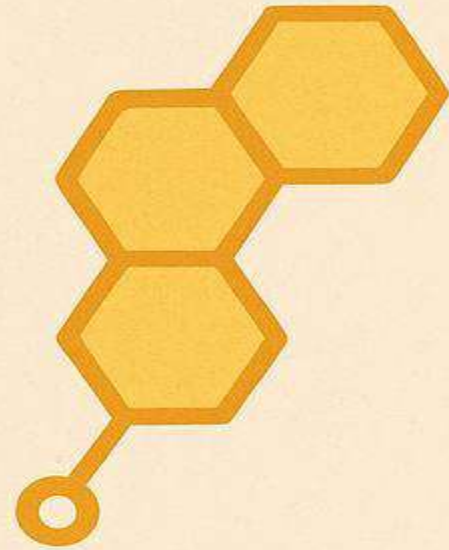
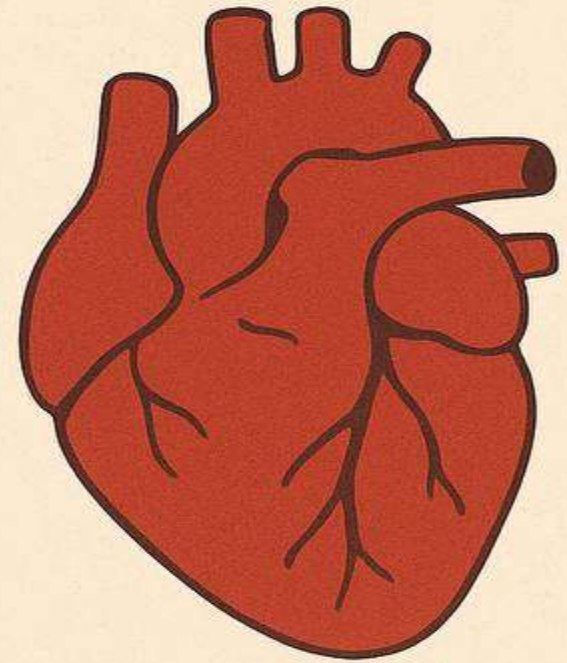
- **Dose:** 300 mg/week
- **Indication:** Severe hypertriglyceridaemia (>750 mg/dL or >8.5 mmol/L) due to **familial chylomicronaemia syndrome**

# Dietary Supplements and ASCVD Risk

- Dietary supplements or vitamins without documented safety and significant LDL-C–lowering efficacy are not recommended to lower the risk of atherosclerotic cardiovascular disease (ASCVD)



**KNOW  
YOUR  
LIPIIDS  
KNOW  
YOUR  
RISKS**




Dyslipidemia is called **Silent Killer** as it has no noticeable symptoms but it causes severe life threatening complications

So, we need to know about our lipids by regular screening. Target LDL goal varies from person to person depending on their risk category. There is no universal goal. After proper assessment of the risk factors one should take measures accordingly

As we all know “**Prevention is Better than Cure**”. So, Lifestyle modification is the preferable approach for the management of Dyslipidemia. If the risk is higher, then additional drugs need to added

So, we should be conscious about this silent killer to achieve Good health for a Good Life



Good Health

↓  
Good Life



**Thank You**

Questions?