Dyslipidemia

summary of 2019 ESC/EAS guidelines and clinical implications in primary care

Dr. Yasmeen Yahya Ahmad

MINISTRY OF HEALTH
KHALID AL-GHUNAIM CLINIC
BIOCHEMISTRY DEPARTMENT

DATE 02/03/21
ID 20017981
PAT NAME : [redacted]
CIVIL ID:
SEX M
DOCTOR:

TEST	RESULT	UNIT	EXPECTED VALUE
ALBUMIN	46	g/L	(40- 50)
ALP	76	U/L	(40- 129)
ALT	22	U/L	(5- 41)
BIL-T	5.9	umol/L	(0- 17.1)
CA	2.34	mmol/L	(2.15- 2.55)
CHOL	4.3	mmol/L	(3.5- 5.2)
CREA	90	umol/L	(44- 106)
GLU	6.1	mmol/L	(3.9- 6.4)
PHOS	1.31	mmol/L	(0.87- 1.45)
TG	0.86	mmol/L	(0.30- 2.30)
URIC ACID	208	umol/L	(143- 417)
UREA	5.6	mmol/L	(1.5- 11.9)
TP	73	g/L	(66- 87)
HDL	1.87 H	Ommol/L ID LAB	(0.95- 1.68)
Na	139	mmol/L	(135- 145)
K	4.16	mmol/L	(3.5- 5.1)
Corrected Ca	2.22	mmol/L	(2.15- 2.55)
LDL-C	2	mmol/L	(-99999- 999999)
non-HDL-Chol	2	mmol/L	(-99999- 999999)

BIOCHEMISTRY

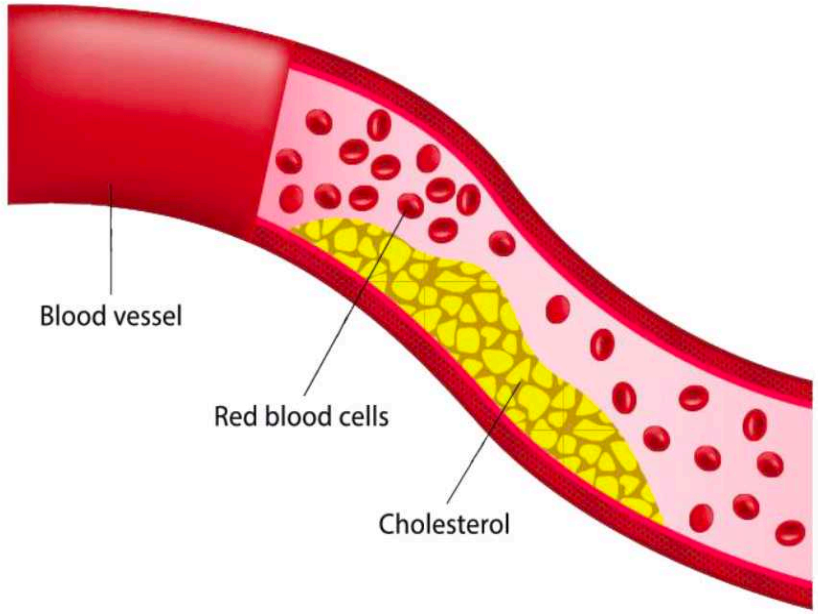
Test Done	Observed Value	Units	Reference Range
Full Profile			
Albumin	43.00	g/l	40-50
Alanine Aminotransferase (ALT/GPT)	29	IU/L	5.0-41.0
Total Bilirubin	13.40	umol/l	0-17.1
Calcium	2.32	mmol/l	2.15-2.55
Cholesterol	4.60	mmol/l	3.5-5.2
Creatinine-S	84.00	µmol/L	44-106
PHOSPHORUS	1.19	mmol/L	0.87-1.45
Triglycerides	1.58	mmol/l	0.30-2.30
UREA	4.60	mmol/L	1.5-11.9
Total Protein	70.00	g/l	66-87
HDL Cholesterol	1.14	mmol/l	0.95-1.68
Sodium	143.00	mmol/L	135-145
Potassium	4.16	mmol/L	3.5 - 5.10
LDL Cholesterol	3.00	mmol/l	
corrected ca	2.26	mmol/L	2.15-2.55
Glucose – Fasting (FBS)	5.10	mmol/l	3.9-6.4
EGfr	87		

Comments : ALP & UA TEST NOT AVAILABLE

Analyzer Name

CHRONIC DISEASES IN PRIMARY HEALTH CARE CLINICAL PRACTICE GUIDELINES

برنامج التصدي للأمراض المزمنة غير المعدية
في الرعاية الصحية الأولية
NCD program in PHC



Dyslipidemia Quick Guide

Adapted from 2019 ESC/EAS Guidelines

APRIL 1, 2021

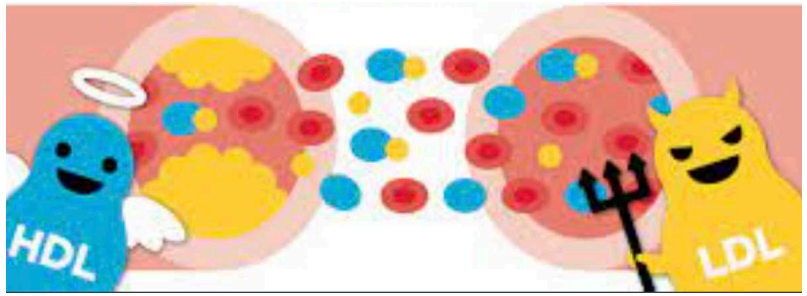
Outline

- Introduction
- ESC/EAS Risk categories and LDL goals
- Risk calculation
- Approach to patient with dyslipidemia
- Treatment of dyslipidemia
- Hypertriglyceridemia
- Comparison with AHA/ACC guidelines

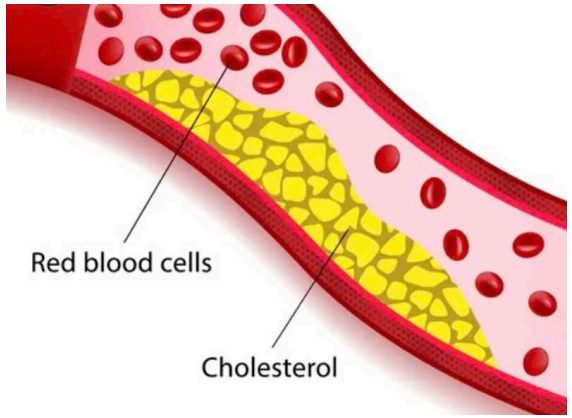
Introduction

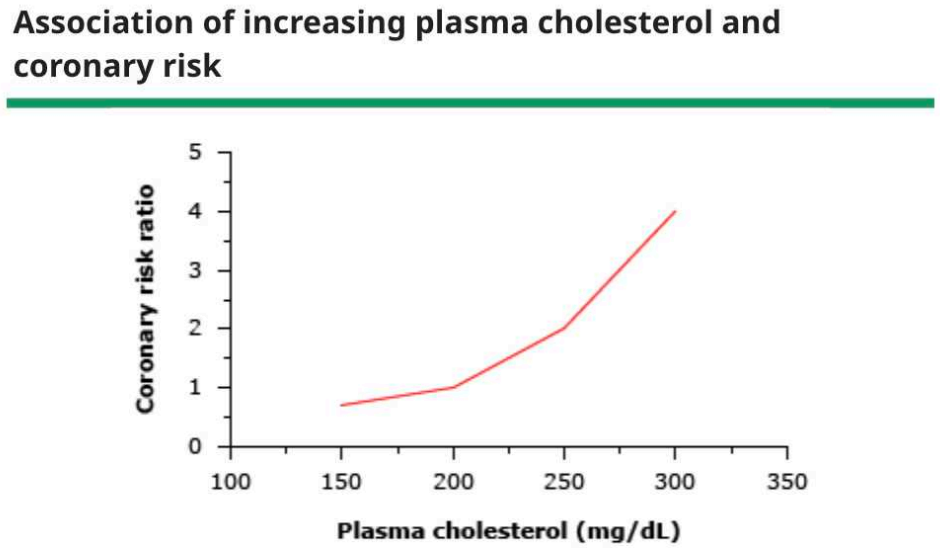
- Dyslipidemias are disorders of lipoprotein metabolism that result in at least one of the following abnormalities:

  - High total cholesterol (TC)
  - High low-density lipoprotein cholesterol (LDL-C)
  - Low high-density lipoprotein cholesterol (HDL-C)
  - High triglycerides (TG)



- Dyslipidemia is a major risk factor for development of atherosclrotic cardiovascular disease.





- According to Kuwait mortality statistics, 48% of deaths in 2019 were due to cardiovascular diseases, which is the highest cause of death.

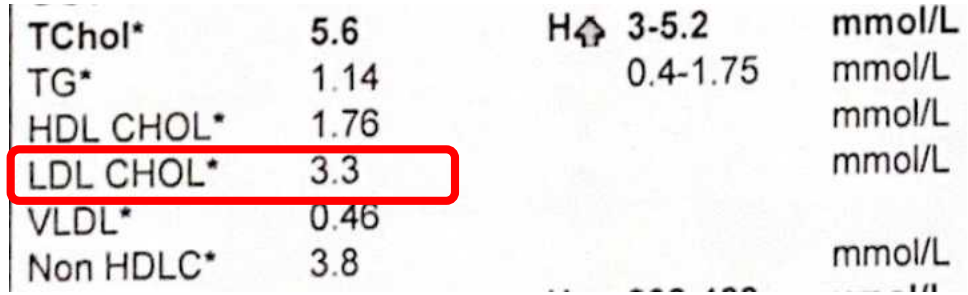
Rationale for targeting LDL-C

- New evidence has confirmed that the key initiating event in atherogenesis is the retention of low-density lipoprotein (LDL) cholesterol (LDL-C) and other cholesterol-rich apolipoprotein (Apo) B containing lipoproteins within the arterial wall and hence atherosclerotic plaque formation
- There is a continuous, positive, graded relationship between LDL-C concentration and CVD events and mortality.
- Clinical trials have clearly indicated that the lower the achieved LDL-C values, the lower the risk of future cardiovascular (CV) events, in patients with and without CVD

Recommendations for lipid analyses for cardiovascular disease risk estimation (1)

EAS ESC European Society of Cardiology

Recommendations	Class	Level
TC is to be used for the estimation of total CV risk by means of the SCORE system.	I	C
HDL-C analysis is recommended to further refine risk estimation using the online SCORE system.	I	C
LDL-C analysis is recommended as the primary lipid analysis for screening, diagnosis and management.	I	C
TG analysis is recommended as a part of the routine lipid analysis.	I	C



TChol*	5.6	H↑ 3-5.2	mmol/L
TG*	1.14	0.4-1.75	mmol/L
HDL CHOL*	1.76		mmol/L
LDL CHOL*	3.3		mmol/L
VLDL*	0.46		
Non HDLC*	3.8		mmol/L

Classes of recommendations

Classes of recommendations	Definition	Wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended or is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/ efficacy of the given treatment or procedure.	
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended

Levels of evidence

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

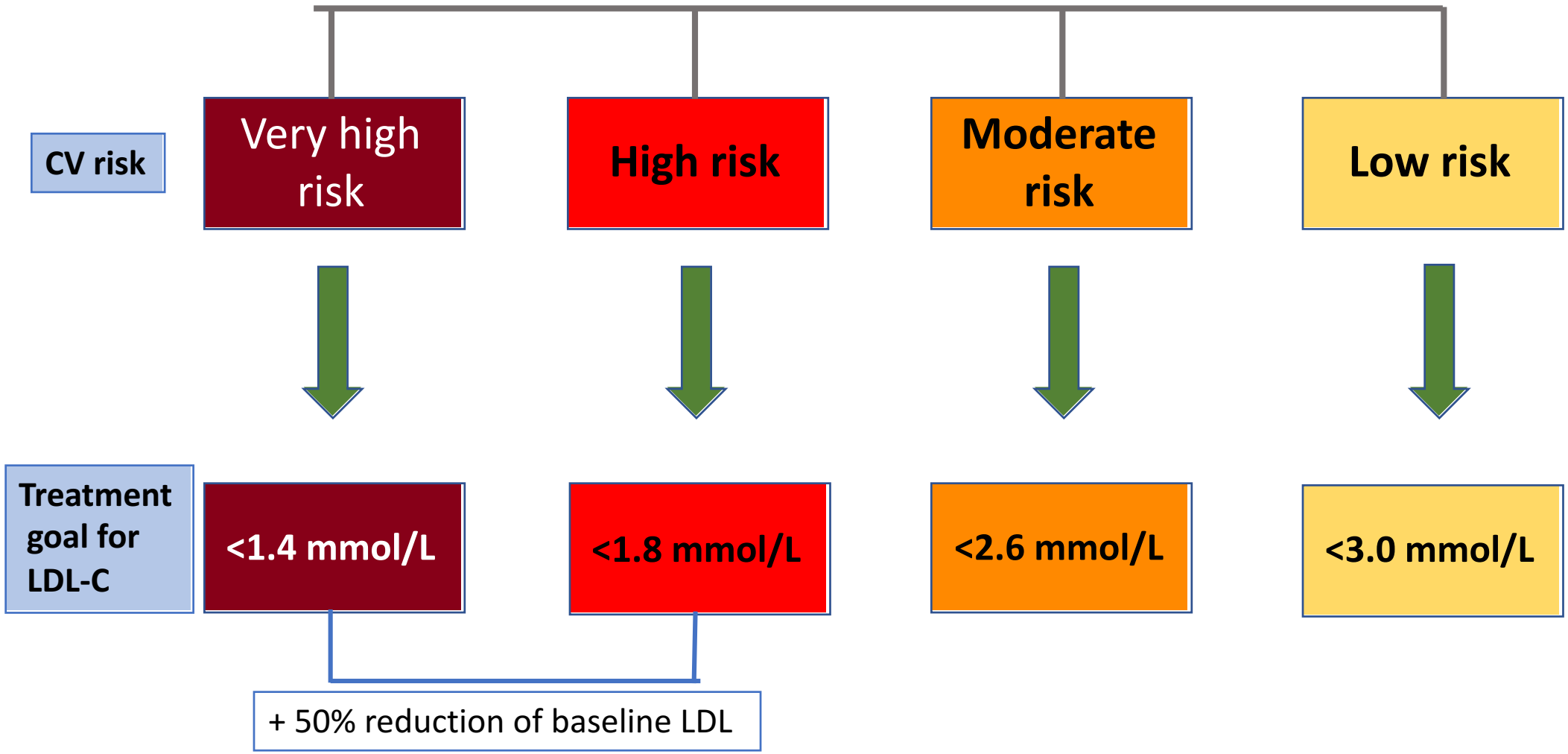
Dyslipidemia causes

PRIMARY

- Familial hypercholesterolemia
- Familial combined hyperlipidemia
- Dysbetalipoproteinemia
- Lipoprotien lipase deficiency

SECONDARY

- **Disease:**
  - Hypothyroidism
  - Diabetes
  - Cushing's syndrome
  - Nephrotic syndrome
- **Diet**
  - High saturated fat
  - Alcohol
- **Drugs**
  - Anabolic steroids
  - Beta blockers
  - Estrogens
  - Corticosteroids


CV risk
Very high risk
High risk
Moderate risk
Low risk
Treatment goal for LDL-C
<1.4 mmol/L
<1.8 mmol/L
<2.6 mmol/L
<3.0 mmol/L
+ 50% reduction of baseline LDL

VERY HIGH RISK

LDL-C goal:
<1.4 mmol/L
+
50% reduction of baseline LDL-C

- **Documented ASCVD**
  - CHD (MI, unstable angina, stable angina, coronary revascularization)
  - Stroke or TIA
  - Peripheral artery disease
  - Unequivocal ASCVD on imaging (significant plaque on coronary angiogram or CT scan or carotid ultrasound)
- **DM with target organ damage**
- **DM with at least 3 major risk factors** (obesity- family history of premature CHD-smoking- HTN)
- **Type 1 DM of long duration > 20 years**
- **Severe CKD (eGFR < 30 mL/min/1.73m$^{2)}$**
- **Familial Hypercholesterolemia with major risk factor**
- **A calculated SCORE $\geq$ 10% for 10-year risk of fatal CVD**

Practical cases:

- A 59-year-old patient, who is known to have HTN develops a transient ischemic attack. His baseline LDL-C = 2.2 mmol/L

  What is the target of his LDL level?

  1.1 mmol/L

- A 55-year-old patient with CKD and eGFR= 25 mL/min/1.73m^2. His baseline LDL-C = 3.9 mmol/L

  What is the target of his LDL level?

  1.4 mmol/L

HIGH RISK

LDL-C goal:
<1.8 mmol/L
+
50% reduction of baseline LDL-C

- **Markedly elevated single risk factor**
  - Total cholesterol > 8.0 mmol/L
  - LDL-C > 4.9 mmol/L
  - BP ≥ 180/110 mmol/L
- **DM without target organ damage + duration ≥ 10 years or another additional risk factor**
- **Moderate CKD (eGFR 30- 59 mL/min/1.73m^2)**
- **Familial Hypercholesterolemia without major risk factor**
- **A calculated SCORE ≥ 5% and < 10% for 10-year risk of fatal CVD**

Practical cases:

- A 45-year-old patient has a baseline LDL = 5.2 mmol/L

  What is the target of his LDL level?

  1.8 mmol/L

- A 55-year-old patient has an eGFR= 55 mL/min/1.73m^2. His baseline LDL-C = 3.0 mmol/L

  What is the target of his LDL level?

  1.5 mmol/L

MODERATE RISK

LDL-C goal:
<2.6 mmol/L

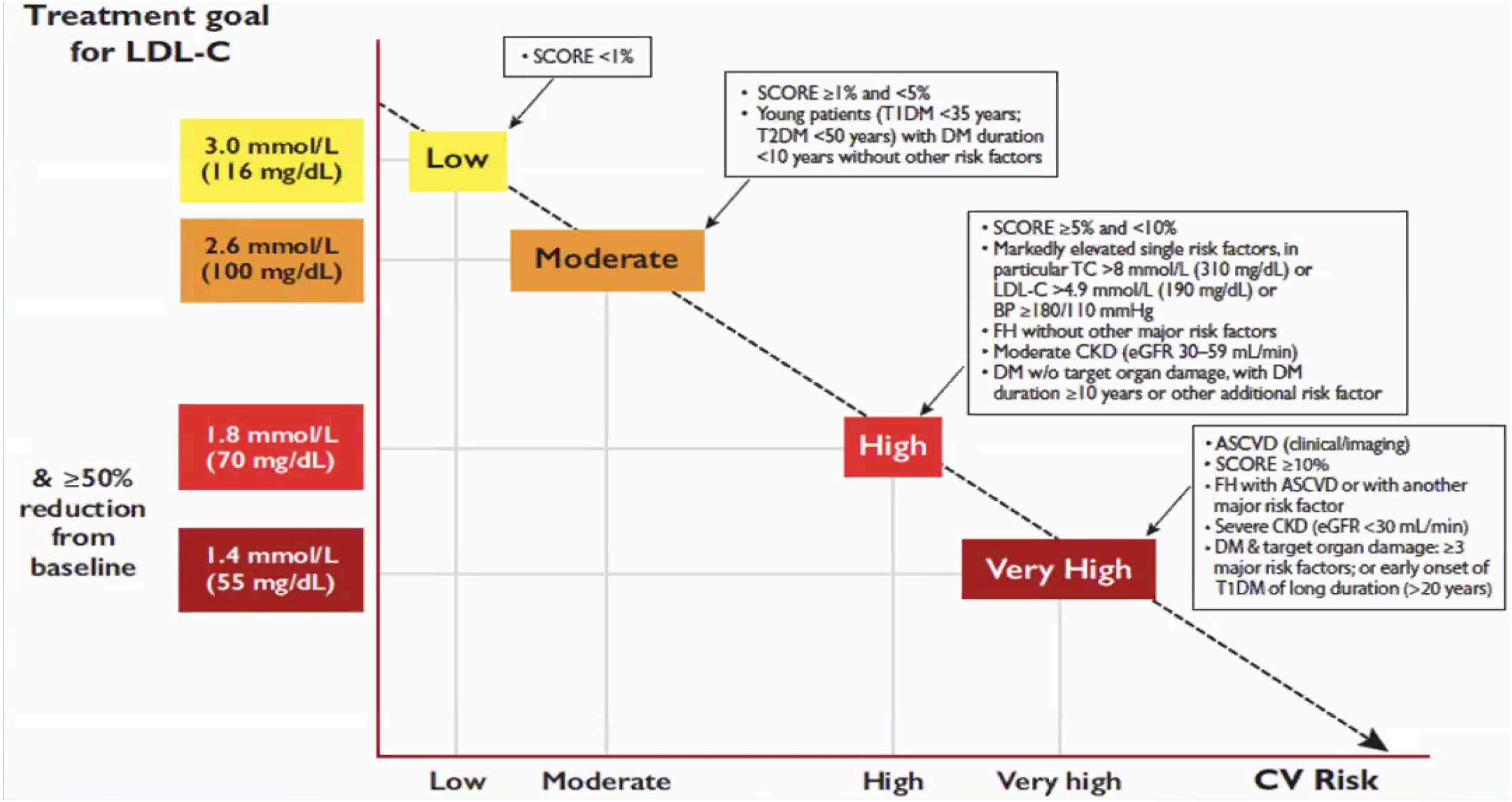
- **Type 1 DM < 35 yrs old, type DM<50 yrs old+ DM duration < 10 years + without additional risk factor**
- **A calculated SCORE ≥ 1% and < 5 % for 10-year risk of fatal CVD**

LOW RISK

LDL-C goal:
<3.0 mmol/L

- **A calculated SCORE < 1% for 10-year risk of fatal CVD**

Very-high- risk	**People with any of the following:** • Documented ASCVD, either clinical or unequivocal on imaging. Documented ASCVD includes previous ACS (MI or unstable angina), stable angina, coronary revascularization (PCI, CABG, and other arterial revascularization procedures), stroke and TIA, and peripheral arterial disease. Unequivocally documented ASCVD on imaging includes those findings that are known to be predictive of clinical events, such as significant plaque on coronary angiography or CT scan (multivessel coronary disease with two major epicardial arteries having >50% stenosis), or on carotid ultrasound. • DM with target organ damage, [a] or at least three major risk factors, or early onset of T1DM of long duration (>20 years). • Severe CKD (eGFR <30 mL/min/1.73 m^2). • A calculated SCORE ≥10% for 10-year risk of fatal CVD. • FH with ASCVD or with another major risk factor.
High-risk	**People with:** • Markedly elevated single risk factors, in particular TC >8 mmol/L (>310 mg/dL), LDL-C >4.9 mmol/L (>190 mg/dL), or BP ≥ 180/110 mmHg. • Patients with FH without other major risk factors. • Patients with DM without target organ damage, with DM duration ≥ 10 years or another additional risk factor. • Moderate CKD (eGFR 30–59 mL/min/1.73 m). • A calculated SCORE ≤ 5% and <10% for 10-year risk of fatal CVD.
Moderate-risk	• Young patients (T1DM <35 years; T2DM <50 years) with DM duration <10 years, without other risk fac- tors. Calculated SCORE ≥1 % and <5% for 10-year risk of fatal CVD.
Low-risk	• Calculated SCORE <1% for 10-year risk of fatal CVD.

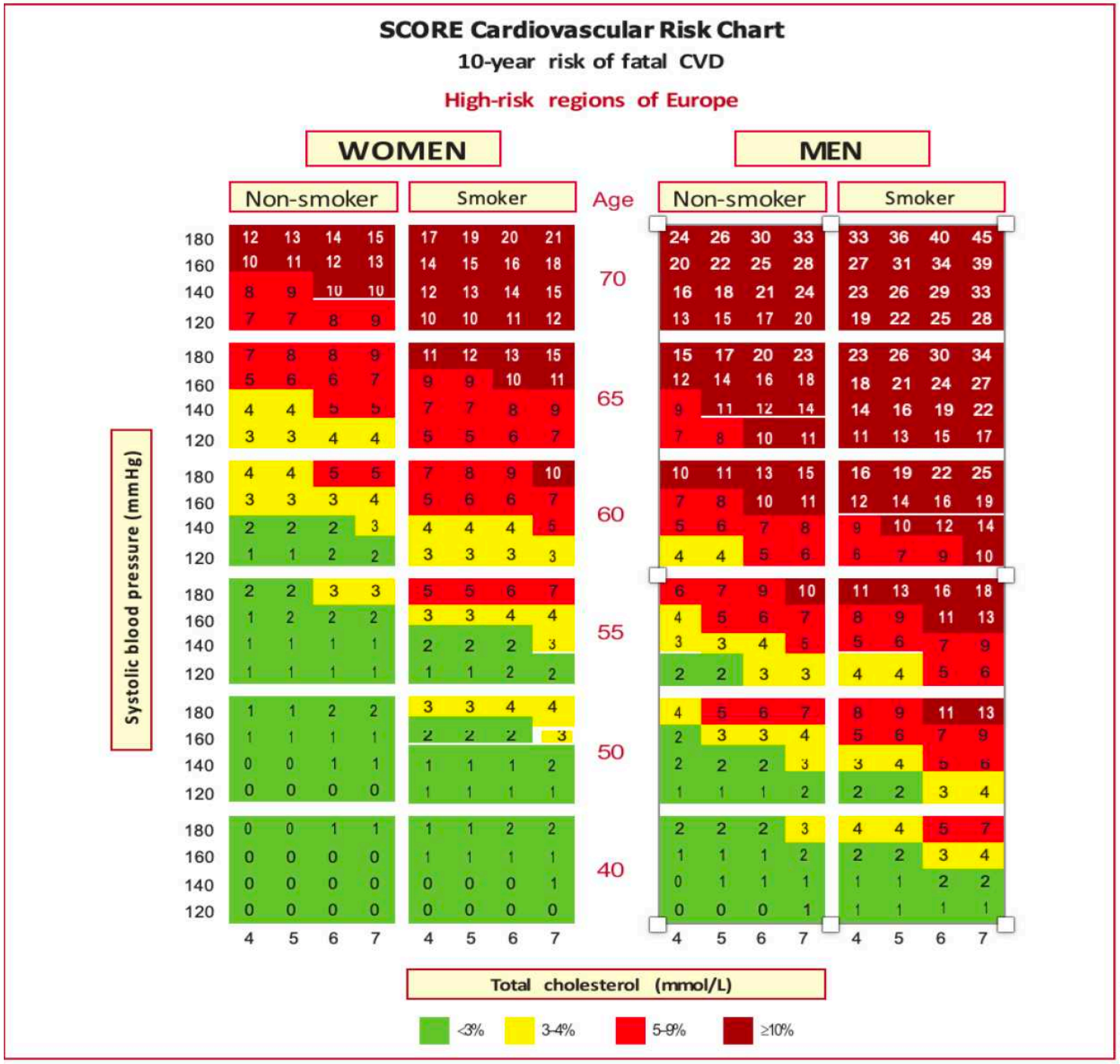

Treatment goal for LDL-C
3.0 mmol/L (116 mg/dL)
2.6 mmol/L (100 mg/dL)
1.8 mmol/L (70 mg/dL)
1.4 mmol/L (55 mg/dL)
& ≥50% reduction from baseline
• SCORE <1%
Low
• SCORE ≥1% and <5%
• Young patients (T1DM <35 years; T2DM <50 years) with DM duration <10 years without other risk factors
Moderate
• SCORE ≥5% and <10%
• Markedly elevated single risk factors, in particular TC >8 mmol/L (310 mg/dL) or LDL-C >4.9 mmol/L (190 mg/dL) or BP ≥180/110 mmHg
• FH without other major risk factors
• Moderate CKD (eGFR 30–59 mL/min)
• DM w/o target organ damage, with DM duration ≥10 years or other additional risk factor
High
• ASCVD (clinical/imaging)
• SCORE ≥10%
• FH with ASCVD or with another major risk factor
• Severe CKD (eGFR <30 mL/min)
• DM & target organ damage: ≥3 major risk factors; or early onset of T1DM of long duration (>20 years)
Very High
Low
Moderate
High
Very high
CV Risk

Patients whose risk is already categorized and risk calculation is not needed

- **Secondary prevention**: ASCVD
- **Primary prevention:**
  - DM
  - CKD
  - Familial hypercholestrolemia
  - LDL > 4.9 mmol/l
  - Total cholesterol > 8.0 mmol/L
  - BP ≥ 180/110

SCORE: Systematic Coronory Risk Estimation

Example:
A 55-year-old male who is not a smoker and not known to have previous medical diseases.
His BP= 140/80
Total chol= 5.0 mmol/L
LDL chol= 2.9 mmol/L



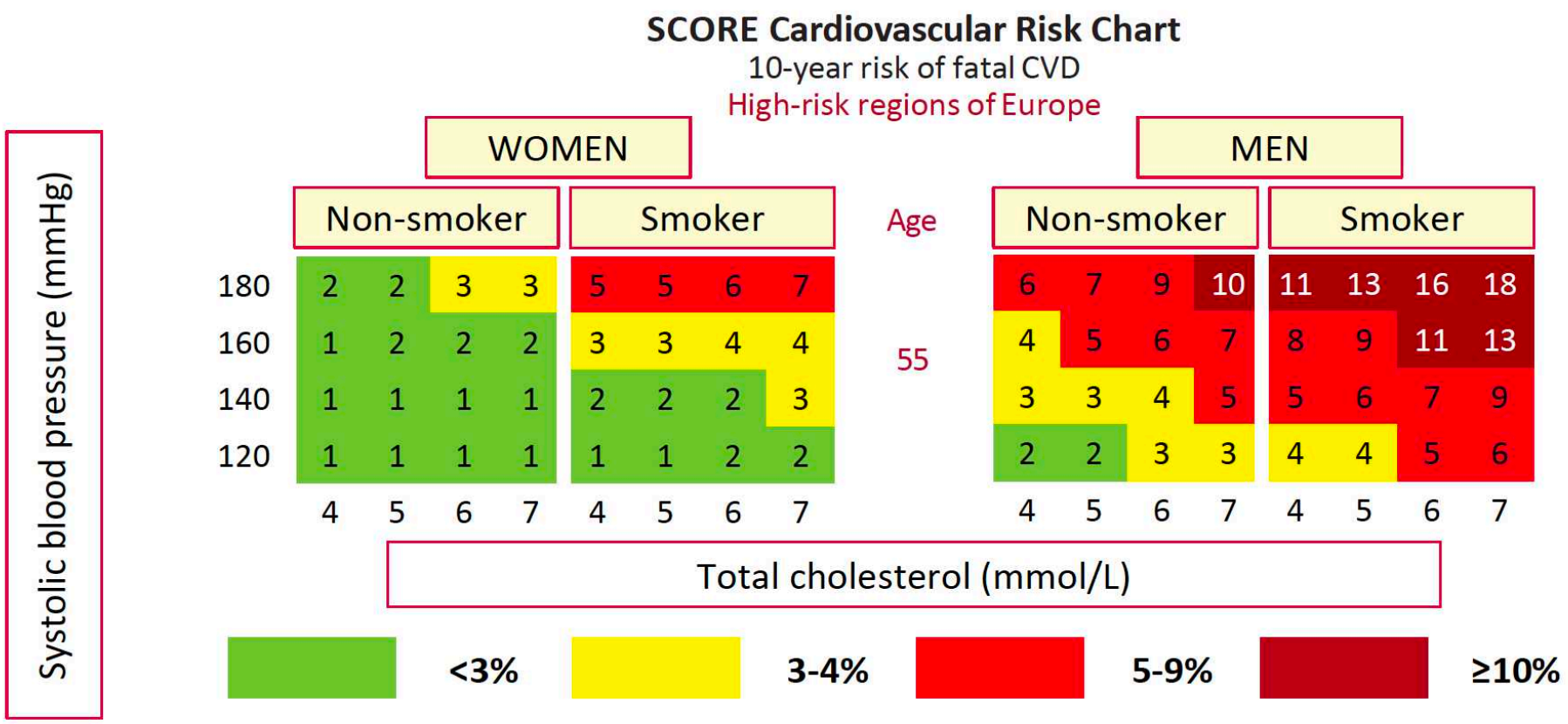
A 55-year-old male who is not a smoker and not known to have previous medical diseases.

BP= 140/80

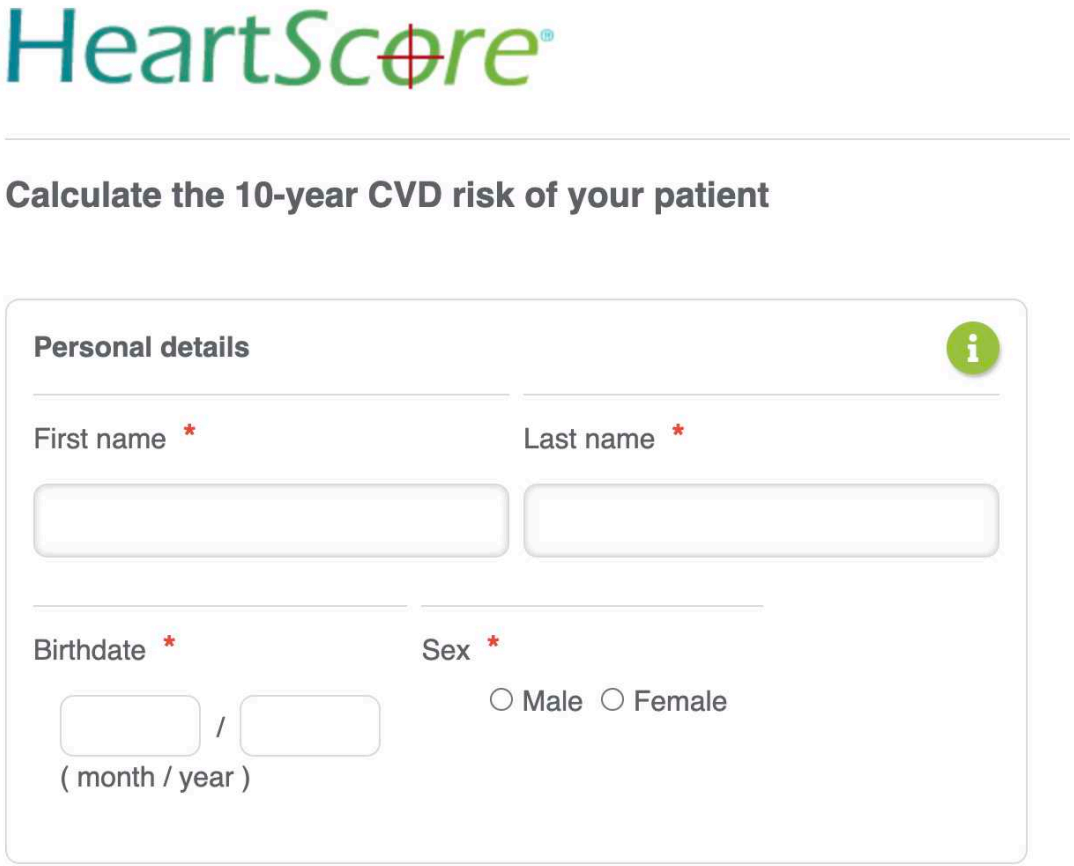
Total chol= 5.0 mmol/L

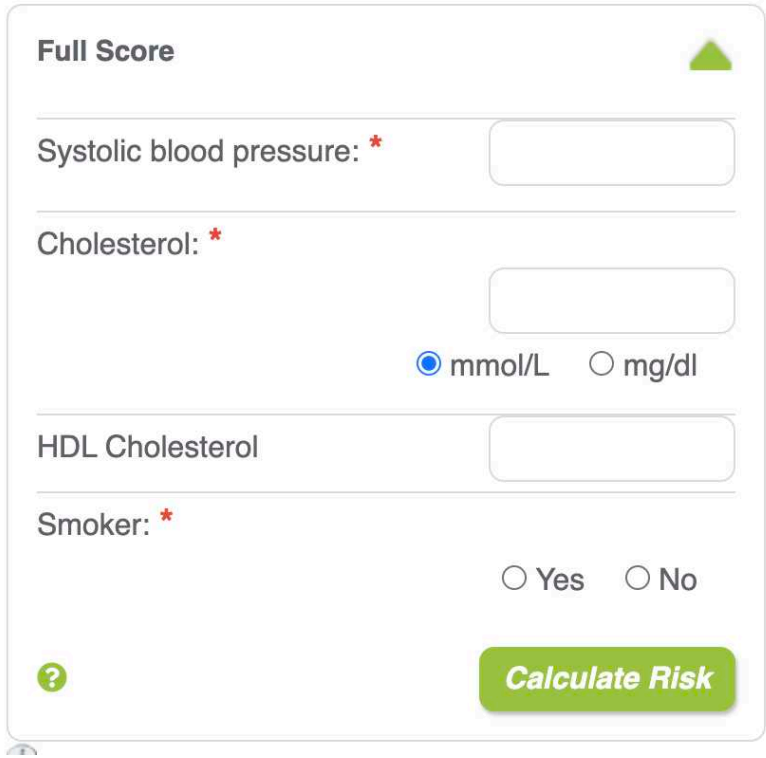
LDL chol= 2.9 mmol/L

- **What is the calculated risk?**
  3%
- **What is the LDL goal for this patient?**
  2.6 mmol/L

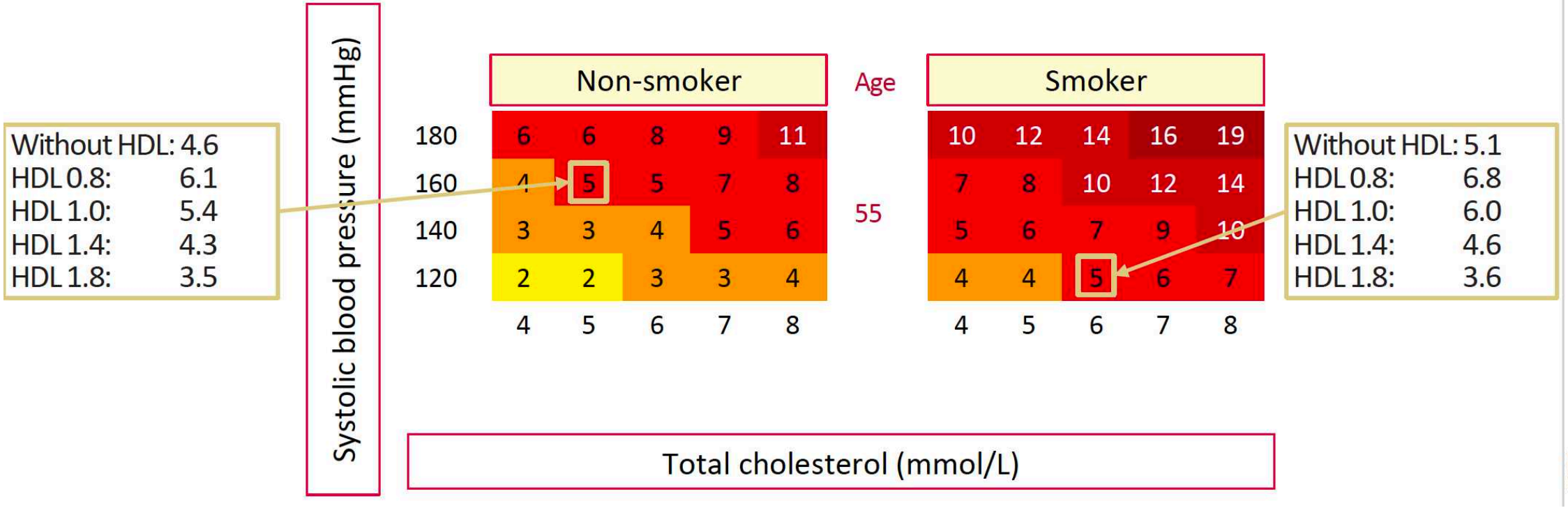


- HDL-C can be used to increase the accuracy of risk evaluation. The electronic version of SCORE, HeartScore has been modified to include HDL-C. *https://heartscore.escardio.org/2016/quickcalculator.aspx?model=EuropeHigh*



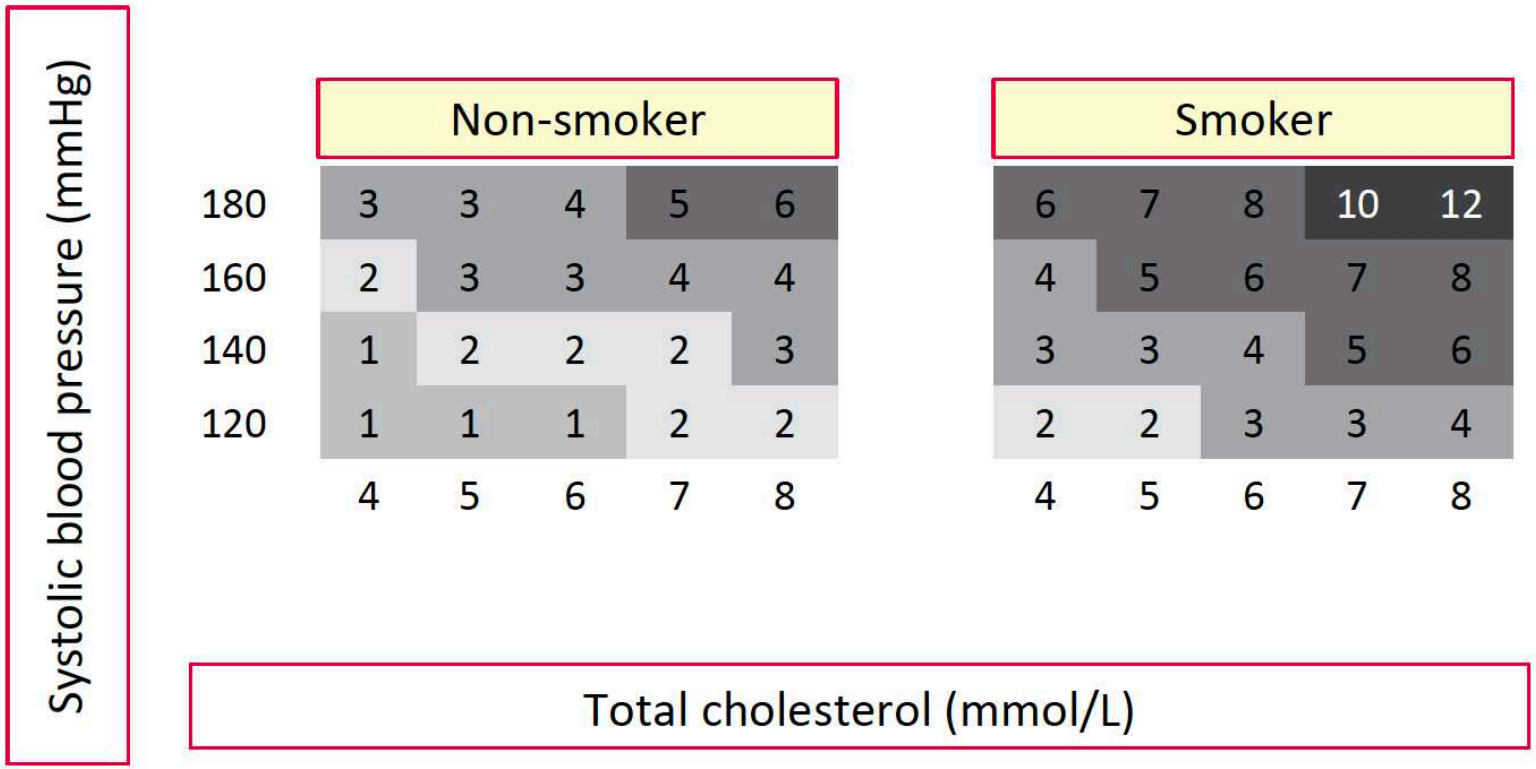


Risk function with high-density lipoprotein (HDL) cholesterol for men in populations at high cardiovascular disease risk (3)



The charts maybe used to give some indication of the effects of reducing risk factors.

Chart for estimating the relative risk for 10-year cardiovascular mortality in young people



Factors modifying SCORE risks

Social deprivation – the origin of many of the causes of CVD.	Major psychiatric disorders.
Obesity and central obesity as measured by the body mass index and waist circumference, respectively.	Treatment for human immunodeficiency virus (HIV) infection.
Physical inactivity.	Atrial fibrillation.
Psychosocial stress including vital exhaustion.	Left ventricular hypertrophy.
Family history of premature CVD (men: <55 years; women: <60 years).	Chronic kidney disease.
Chronic immune-mediated inflammatory disorder.	Obstructive sleep apnoea syndrome.
	Non-alcoholic fatty liver disease.

ClinRisk

Welcome to the QRISK®3-2018 risk calculator https://qrisk.org/three

This calculator is only valid if you do not already have a diagnosis of coronary heart disease (including angina or heart attack) or stroke/transient ischaemic attack.

About you

Age (25-84): 64

Sex: (•) Male ( ) Female

Ethnicity: White or not stated

UK postcode: leave blank if unknown

Postcode:

Clinical information

Smoking status: non-smoker

Diabetes status: none

Angina or heart attack in a 1st degree relative < 60? ☐

Chronic kidney disease (stage 3, 4 or 5)? ☐

Atrial fibrillation? ☐

On blood pressure treatment? ☐

Do you have migraines? ☐

Rheumatoid arthritis? ☐

Systemic lupus erythematosus (SLE)? ☐

Severe mental illness? ☐
(this includes schizophrenia, bipolar disorder and moderate/severe depression)

On atypical antipsychotic medication? ☐

Are you on regular steroid tablets? ☐

A diagnosis of or treatment for erectile disfunction? ☐

Leave blank if unknown

Cholesterol/HDL ratio:

Systolic blood pressure (mmHg):

Standard deviation of at least two most recent systolic blood pressure readings (mmHg):

Body mass index

Height (cm):

Weight (kg):

Calculate risk

Gender

Male | **Female**

Age

20-79

Race

- **White**
- **African American**
- **Other**

HDL - Cholesterol
(mg/dL)

20-100

Total Cholesterol
(mg/dL)

130-320

Systolic Blood Pressure

90-200

Diabetes

Yes | **No**

Treatment for Hypertension

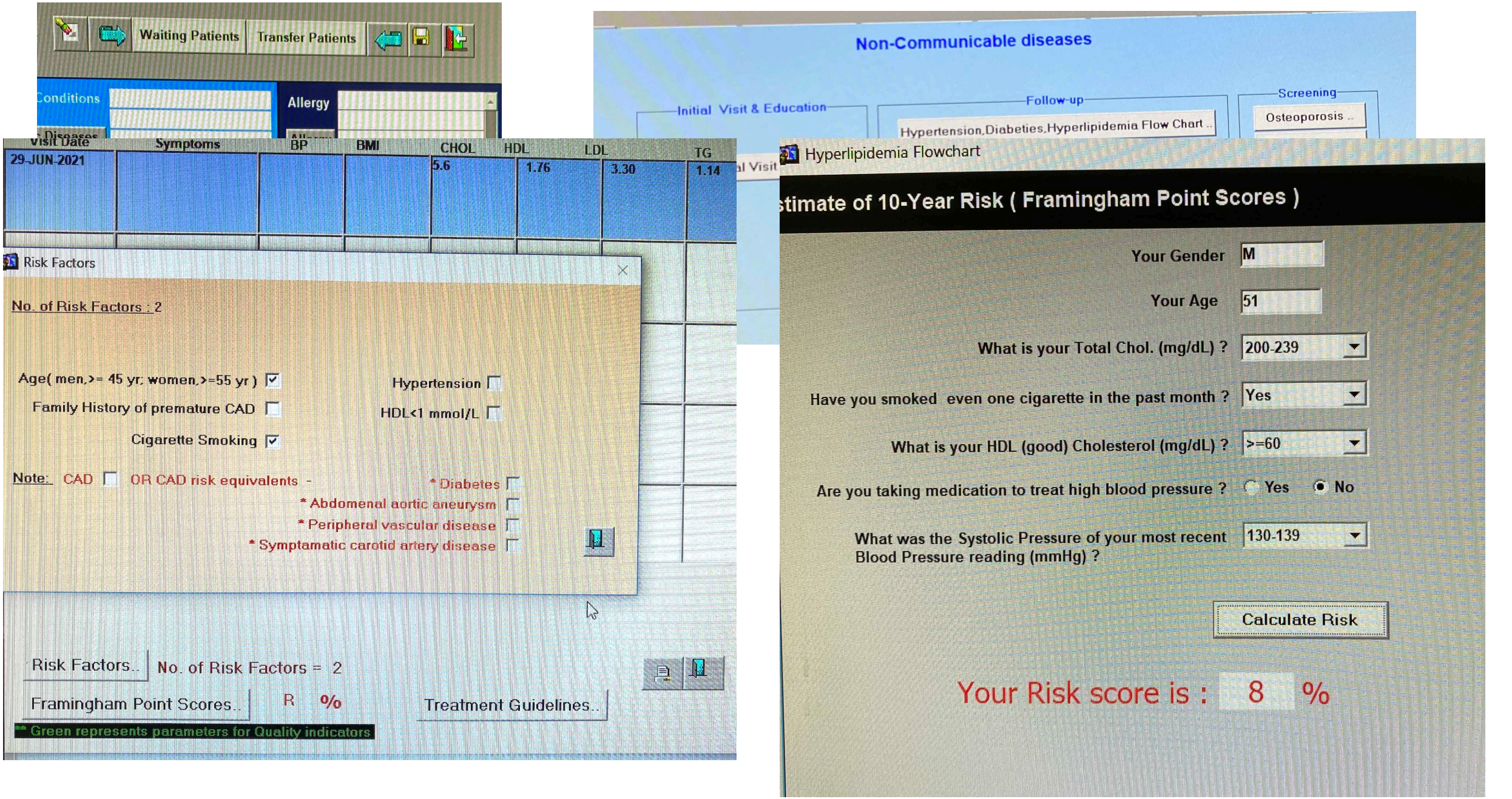
Yes | **No**

Smoker

Yes | **No**

**Intended for use if there is not ASCVD and the LDL-cholesterol is <190 mg/dL*

***Optimal risk factors include: Total cholesterol of 170 mg/dL, HDL-cholesterol of 50 mg/dL, Systolic BP of 110 mm Hg, Not taking medications for hypertension, Not a diabetic, Not a smoker*


Waiting Patients
Transfer Patients
Conditions
Allergy
Non-Communicable diseases
Initial Visit & Education
Follow-up
Hypertension,Diabeties,Hyperlipidemia Flow Chart ..
Screening
Osteoporosis ..
Visit Date
Symptoms
BP
BMI
CHOL
HDL
LDL
TG
29-JUN-2021
5.6
1.76
3.30
1.14
Risk Factors
No. of Risk Factors : 2
Age(men,>= 45 yr; women,>=55 yr)
Family History of premature CAD
Cigarette Smoking
Hypertension
HDL<1 mmol/L
Note: CAD OR CAD risk equivalents -
* Diabetes
* Abdomenal aortic aneurysm
* Peripheral vascular disease
* Symptamatic carotid artery disease
Risk Factors..
No. of Risk Factors = 2
Framingham Point Scores..
R %
Treatment Guidelines..
* Green represents parameters for Quality indicators
Hyperlipidemia Flowchart
stimate of 10-Year Risk (Framingham Point Scores)
Your Gender
M
Your Age
51
What is your Total Chol. (mg/dL) ?
200-239
Have you smoked even one cigarette in the past month ?
Yes
What is your HDL (good) Cholesterol (mg/dL) ?
>=60
Are you taking medication to treat high blood pressure ?
Yes
No
What was the Systolic Pressure of your most recent Blood Pressure reading (mmHg) ?
130-139
Calculate Risk
Your Risk score is : 8 %

Dutch Lipid Clinic Network diagnostic criteria for familial hypercholesterolemia:

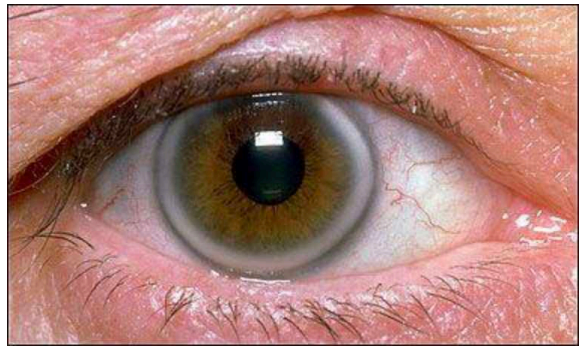
Criteria	Points
1) Family history	
First-degree relative with known premature (men aged <55 years; women <60 years) coronary or vascular disease, or first-degree relative with known LDL-C above the 95th percentil	1
First-degree relative with tendinous xanthomata and/or arcus corneal is, or children aged <18 years with LDL-C above the 95th percentile	2
2) Clinical history	
Patient with premature (men aged <55 years; women <60 years) CAD	2
Patient with premature (men aged <55 years; women <60 years) cerebral or peripheral vascular disease	1
3) Physical examination [a]	
Tendinous xanthomata	6
Arcus corneal is before age 45 years	4
4) LDL-C levels (without treatment)	
LDL-C ≥8.5 mmol/L (≥325 mg/dL	8
LDL-C 6.5–8.4 mmol/L (251–325 mg/dL)	5
LDL-C 5.0–6.4 mmol/L (191–250 mg/dL)	3
LDL-C 4.0–4.9 mmol/L (155–190 mg/dL)	1
5) DNA analysis	
Functional mutation in the *LDLR*, *apoB*, or *PCSK9* genes	8
Choose only one score per group, the highest applicable; diagnosis is based on the total number of points obtained	
A 'definite' FH diagnosis requires >8 points	
A 'probable' FH diagnosis requires 6–8 points	
A 'possible' FH diagnosis requires 3–5 points	

Approach to patients with dyslipidemia: History

- Known to have evidence of existing ASCVD? (CHD, stroke , PAD, unequivocal imaging)
- Known to have DM? CKD? HTN?
- Physical activity, diet
- Drug history
- Smoking, alcohol
- Family history (hypercholesterolemia, premature CVD, Tendinous xanthomata or arcus corneal)
- Known to have OSA, chronic inflammatory disorder
- Exclude possible secondary causes of dylipidemia (such as excess alcohol, uncontrolled diabetes, hypothyroidism, liver disease and nephrotic syndrome)
- Psychosocial history

Approach to patients with dyslipidemia: Physical examination

- Tendinous xanthomata
- Arcus corneal
- BP
- BMI, Waist circumference
- If diabetic: fundus exam and neurological examination



Intervention strategies
as a function of total cardiovascular risk and untreated LDL-C levels

	Total CV risk (SCORE) %	Untreated LDL-C levels					
		<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Primary prevention	<1, low-risk	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A	IIa/A
	≥1 to <5, or moderate risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	IIa/A	IIa/A
	≥5 to <10, or high-risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	IIa/A	IIa/A	I/A	I/A	I/A
	≥10, or at very-high risk due to a risk condition (see *Table 4*)	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/B	IIa/A	I/A	I/A	I/A	I/A
Secondary prevention	Very-high-risk	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	I/A	I/A	I/A	I/A	I/A

Total CV risk (SCORE)%	Untreated LDL-C levels					
	<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Primary Prevention						
< 1 Low-risk	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A	IIa/A
≥1 to <5, or moderate risk (see Table 1)	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	IIa/A	IIa/A

Total CV risk (SCORE)%	Untreated LDL-C levels					
	<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
≥5 to <10, or high- risk (see Table 1)	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention	Lifestyle Intervention and concomitant drug intervention	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	IIa/A	IIa/A	IIa/A	I/A	I/A	I/A
≥10, or at very-high-risk due to a risk condition (see Table 1)	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention	Lifestyle Intervention and concomitant drug intervention	Lifestyle Intervention and concomitant drug intervention	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	IIa/B	IIa/A	I/A	I/A	I/A	I/A

2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce

EAS ESC European Society of Cardiology

Total CV risk (SCORE)%	Untreated LDL-C levels					
	<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Secondary Prevention						
Very-high-risk	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
Class[a]/Level[b]	IIa/A	I/A	I/A	I/A	I/A	I/A

2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk (European Heart Journal 2019 -doi: 10.1093/eurheartj/ehz455)

A 55-year-old male who is not a smoker and not known to have previous medical diseases.

His BP= 140/80

Total chol= 5.0 mmol/L

LDL chol= 2.9 mmol/L

Calculated SCORE = 3%

What is the most appropriate first line intervention for this patient?

A) Lifestyle advices

B) Lifestyle interventions

C) Lifestyle interventions + drug intervention

Total CV risk (SCORE)%	Untreated LDL-C levels					
	<1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Primary Prevention						
< 1 Low-risk	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A	IIa/A
≥1 to <5, or moderate risk (see Table 1)	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle Intervention and concomitant drug intervention
Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	IIa/A	IIa/A

Therapeutic Lifestyle changes: First line therapy in dyslipidemia mangement

Healthy diet

Low in saturated fat with focus on whole grain products, vegetables, fruits and fish

Physical activity

30-60 minute of moderately vigorus physical activity in most days of the week

Weight reduction

BMI 20-25 kg/m^2

WC < 94 cm in men

WC < 80 cm in women

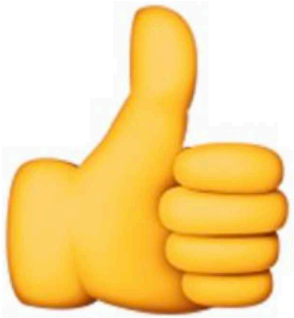
To be preferred		To be used in moderation	To be chosen occasionally in limited amounts
Cereals	Wholegrains	Refined bread, rice, and pasta biscuits, corn flakes	Pastries, muffins, pies, croissants
Vegetables	Raw and cooked vegetables	Potatoes	Vegetables prepared in butter or cream
Legumes	Lentils, beans, fava beans, peas, chickpeas, soybean		
Fruit	Fresh or frozen fruit	Dried fruit, jelly, jam, canned fruit, sorbets, ice-lollies/popsicles, fruit juice	
Sweets and sweeteners	Non-caloric sweeteners	Sucrose, honey, chocolate, sweets/ candies	Cakes, ice creams, fructose, soft drinks
Meat and fish	Lean and oily fish, poultry without skin	Lean cuts of beef, lamb, pork, and veal, seafood, shellfish	Sausages, salami, bacon, spare ribs, hot dogs, organ meats
Dairy food and eggs	Skimmed milk and yoghurt	Low-fat milk, low-fat cheese and other milk products, eggs	Regular cheese, cream, whole milk and yoghurt
Cooking fat and dressings	Vinegar, mustard, fat-free dressings	Olive oil, non-tropical vegetable oils, soft margarines, salad dressing, mayonnaise, ketchup	Trans fats and hard margarines (better to avoid them), palm and coconut oils, butter, lard, bacon fat
Nuts/seeds		All, unsalted (except coconut)	Coconut
Cooking procedures	Grilling, boiling, steaming	Stir-frying, roasting	Frying

الأغذية الممنوعة في المدارس

جديد التربية

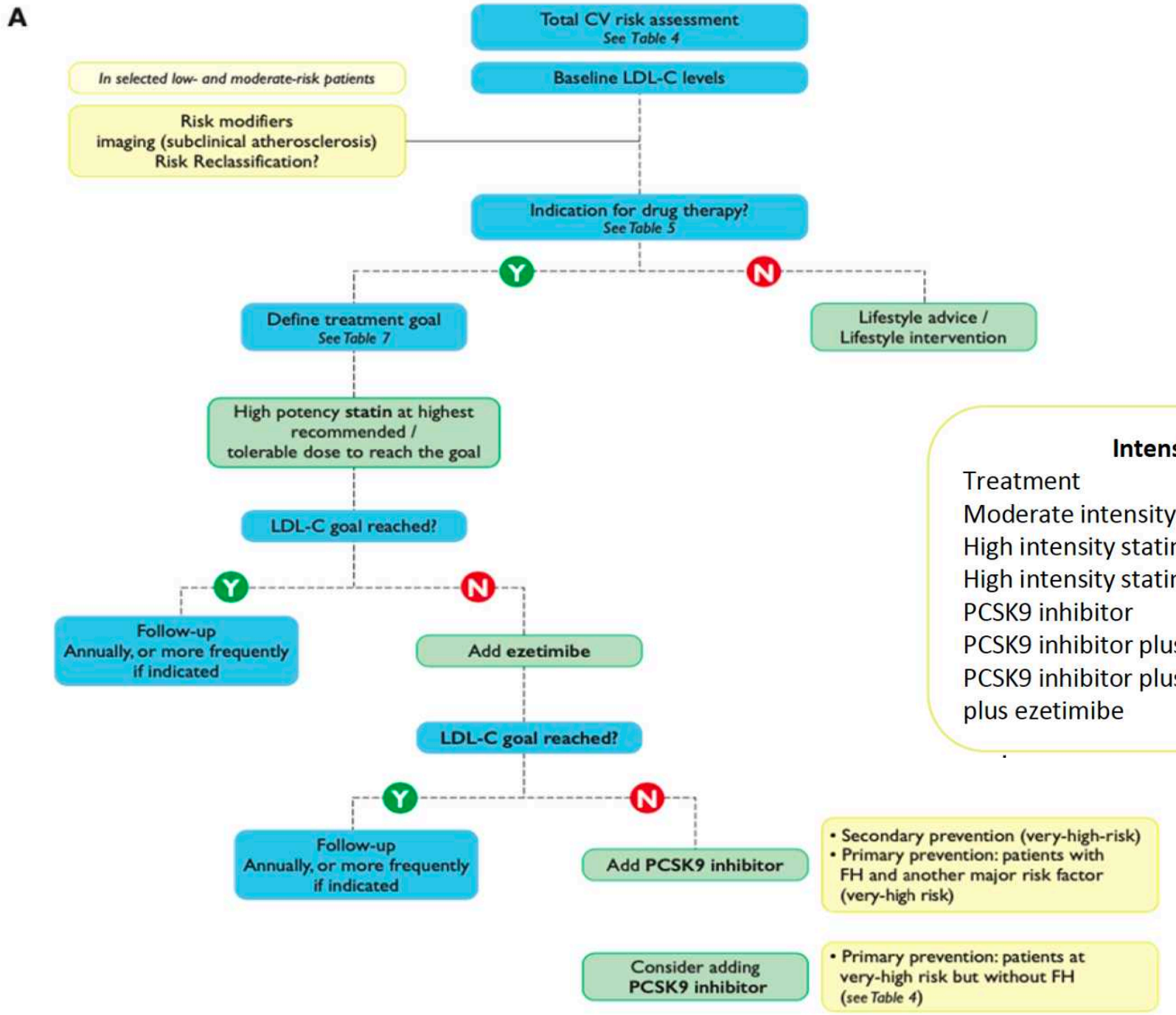
حددت وزارة التربية قائمة بالأغذية الممنوع بيعها في المقصف المدرسي أو إحضارها من قبل الطالب : مشروبات الطاقة ، الشاي المثلج ،المشروبات التي تحتوي على كافيين ، مشروبات الألبان كاملة الدسم فقط

، فشار ونفيش وذرة، ورق عنب، غزل البنات (شعر بنات)، بيتزا والمياه المنكهة، المشروبات الرياضية، والماء المحلى، شراب الفاكهة بأنواعها، جميع أنواع العلك (اللبان) والمصاص والبفك، الحلوى المكونة من السكر والملونات، الشوكولاتة الخالصة، الآيس كريم والجلي، المواد الغذائية التي أضيف إليها مركب جلوتامات الصوديوم، الكعك والدونات والكرواسون، جميع انواع الأغذية المقلية، المواد التي تحتوي على الدهون المهدرجة، المواد الحارة مثل الشطة السائلة والمجففة، المواد الغذائية التي تحتوي على أي مواد حافظة أو ألوان أو نكهات مصنعة من مواد كيماوية، المواد التي تحتوي على مشتقات لحم الخنزير او مضاف لها الكحول (الإيثانول) أو احد منتجاته، اللحوم المصنعة (كالنقانق، السجق، المرتديلا، السوسج وغيرها)، المواد الغذائية التي تحتوي او تحضر من حليب جوز الهند والزبدة والسمن والشحم وكريم جوز الهند والمشروبات الغازية بأنواعها.



Pharmacological Therapy

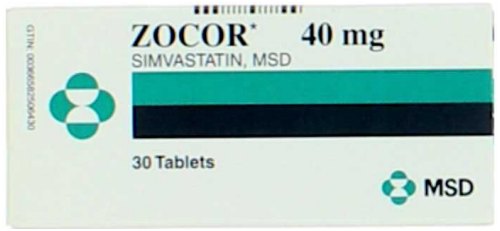
Recommendations	Class[a]	Level[b]
It is recommended that a high-intensity statin is prescribed up to the highest tolerated dose to reach the goals set for the specific level of risk.	I	A
If the goals[c] are not achieved with the maximum tolerated dose of a statin, combination with ezetimibe is recommended.	I	B
For primary prevention patients at very-high risk, but without FH, if the LDL-C goal is not achieved on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor may be considered.	IIb	C
For secondary prevention, patients at very-high risk not achieving their goal[c] on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended.	I	A
For very-high-risk FH patients (that is, with ASCVD or with another major risk factor) who do not achieve their goal[c] on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended.	I	C



Intensity of lipid lowering treatment

Treatment	Average LDL-C reduction
Moderate intensity statin	≈ 30%
High intensity statin	≈ 50%
High intensity statin plus ezetimibe	≈ 65%
PCSK9 inhibitor	≈ 60%
PCSK9 inhibitor plus high intensity statin	≈ 75%
PCSK9 inhibitor plus high intensity statin plus ezetimibe	≈ 85%

High intensity	Moderate intensity	Low intensity
≥ 50 % LDL reduction	30 – 49 % LDL reduction	< 30% LDL reduction



Statins prescription

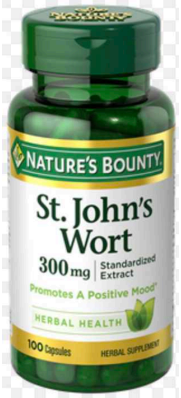
- **Contraindications:**
  - People with active liver disease, or unexplained persistent elevations of transaminases ≥ 3 ULN
  - Women who are pregnant or breastfeeding.
  - Women of child-bearing potential not using appropriate contraception

- **Prescribe atorvastatin with caution to people:**
  - With a history of haemorrhagic stroke
  - With pre-disposing factors for rhabdomyolysis

Statins common side effects

- **Musculoskeletal and connective tissue** — myalgia, arthralgia, pain in extremity, muscle spasms, joint swelling, and back pain
  - **Rarely**: myopathy and rhabdomyolysis
- **Gastrointestinal** — constipation, flatulence, dyspepsia, nausea, and diarrhoea.
- **Metabolism and nutrition** — hyperglycaemia
- **Psychiatric** — insomnia
- **Nervous system** — headache (common), dizziness, paraesthesia
- **Respiratory** — pharyngolaryngeal pain, epistaxis, nasopharyngitis
- **Hepatic effects** — increased serum transaminases and hepatotoxicity

Commonly used drugs that may increase statin level and risk of rhabdomolysis



Statin dose adjustment in CKD

Statin	Usual dose range (mg/d)	Clearance route	Dose range for CKD stages1-3	Dose range for CKD stages4-5
Atorvastatin	10-80	Liver	10-80	10-80
Fluvastatin	20-80	Liver	20-80	20-40
Lovastatin	10-80	Liver	10-80	10-20
Pitavastatin	1-4	Liver/Kidney	1-2	1-2
Pravastatin	10-80	Liver/Kidney	10-80	10-20
Rosuvastatin	10-40	Liver/Kidney	5-40	5-10
Simvastatin	5-40	Liver	5-40	5-40

Statin monitoring

- **Before initiating atorvastatin, measure:**
  - HbA1C
  - Liver function.
  - Full lipid profile
  - Creatine kinase (CK) level (if has unexplained muscle pain)
  - TSH
  - Renal function.
- **After initiating atorvastatin:**
  - Repeat liver function tests (LFTs) within 3 months of starting treatment, and again at 12 months, and at any other time if signs or symptoms suggest hepatotoxicity.
  - Check CK if unexplained muscle symptoms (such as pain, tenderness, or weakness) develop.
  - HbA1C or fasting blood-glucose concentration — repeat after 3 months in people at high risk of diabetes mellitus.

Statin monitoring

Testing lipids

How often should lipids be tested?

- Before starting lipid-lowering drug treatment, at least two measurements should be made, with an interval of 1–12 weeks, with the exception of conditions where concomitant drug treatment is suggested, such as acute coronary syndromes (ACS) and very-high-risk patients.

How often should a patient's lipids be tested after starting lipid-lowering treatment?

- 8 (±4) weeks after starting treatment.
- 8 (±4) weeks after adjustment of treatment until the goal is achieved.

How often should lipids be tested once a patient has achieved the target or optimal lipid level?

- Annually (unless there are adherence problems or other specific reasons for more frequent reviews).

Ezetimibe

- Cholesterol absorption inhibitor
- Dose: 10 mg daily
- C/I: hepatic impairement, hypersensitivity
- Increase risk of Elevated hepatic transaminases and myopathy when combine with statin
- S/E: Fatigue, arthralgia, diarrhea, URTI

Recommendations for the treatment of dyslipidaemias in older people (aged >65 years)

EAS ESC European Society of Cardiology

Recommendations	Class	Level
Treatment with statins is recommended for older people with ASCVD in the same way as for younger patients.	I	A
Treatment with statins is recommended for primary prevention, according to level of risk, in older people aged ≤ 75.	I	A
Initiation of statin treatment for primary prevention in older people aged > 75 may be considered, if at high risk or above.	IIb	B
It is recommended that the statin is started at a low dose if there is significant renal impairment and/or the potential for drug interactions, and then titrated upwards to achieve LDL-C treatment goals.	I	C

2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk (European Heart Journal 2019 -doi: 10.1093/eurheartj/ehz455)

Non-HDL as a secondary target of therapy

- Non-HDL cholesterol:

  Total cholesterol – HDL

- Recommended as a secondary target of therapy especially in people with high TG, DM, obesity, very low LDL
- LDL cholesterol is typically calculated using the Friedewald equation (not valid if TG> 4.5)

  LDL cholesterol = total cholesterol – HDL cholesterol – triglycerides x 0.2

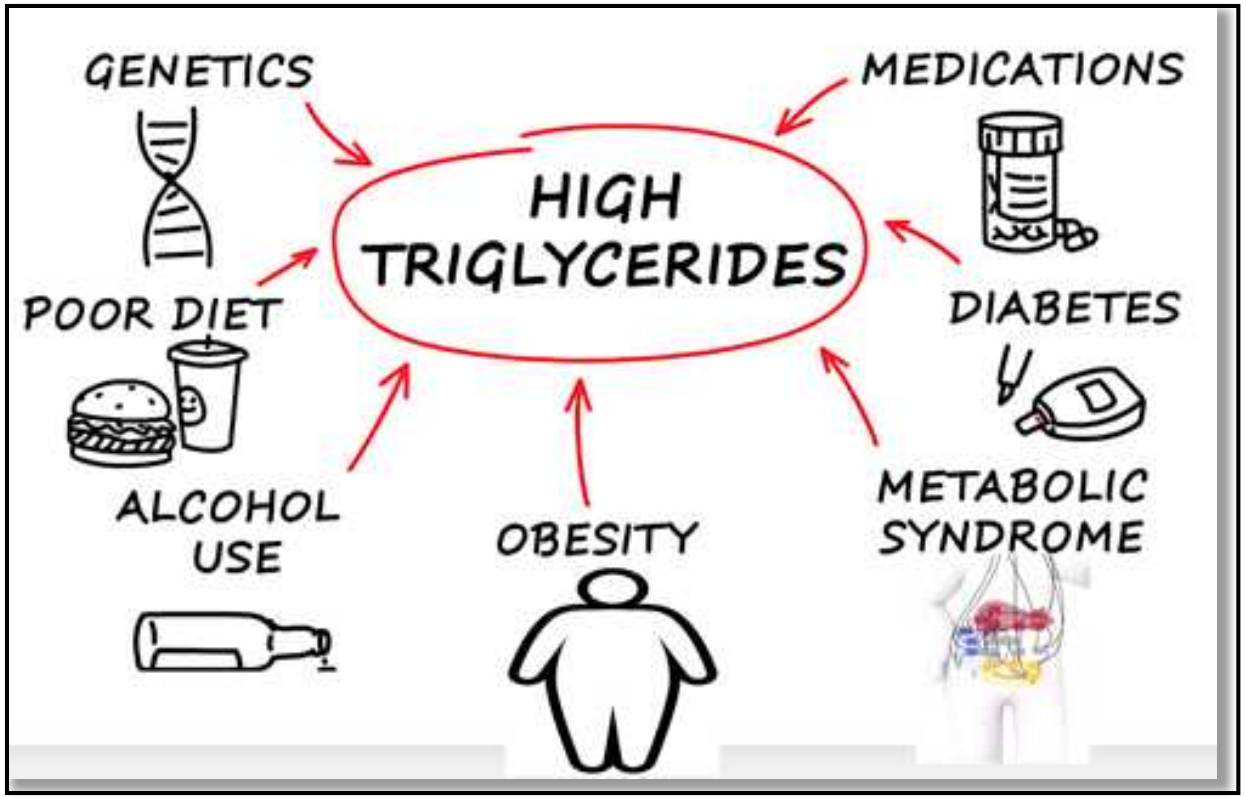
- Goal of non-HDL in different risk groups is 0.8 mmol higher than the LDL goal for that group

	Very high risk	High risk	Moderate risk	Low risk
LDL goal	< 1.4	< 1.8	< 2.6	< 3.0
Non-HDL goal	< 2.2	< 2.6	< 3.4	< 3.8

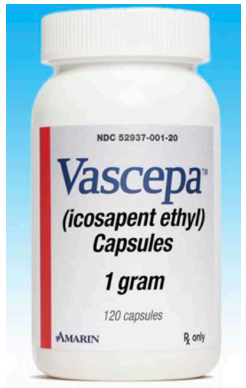
Recommendations	Class	Level
Non-HDL-C evaluation is recommended for risk assessment, particularly in people with high TG, diabetes, obesity or very low LDL-C.	I	C
ApoB analysis is recommended for risk assessment, particularly in people with high TG, diabetes, obesity or metabolic syndrome, or very low LDL-C. It can be used as an alternative to LDL-C, if available, as the primary measurement for screening, diagnosis and management, and may be preferred over non-HDL-C in people with high TG, diabetes, obesity or very low LDL-C.	I	C

Hypertriglyceridemia

Normal	**< 1.7 mmol/L**
Moderate hypertriglyceridemia	**1.7 to 10 mmol/L**
Severe hypertriglyceridemia	**> 10 mmol/L**

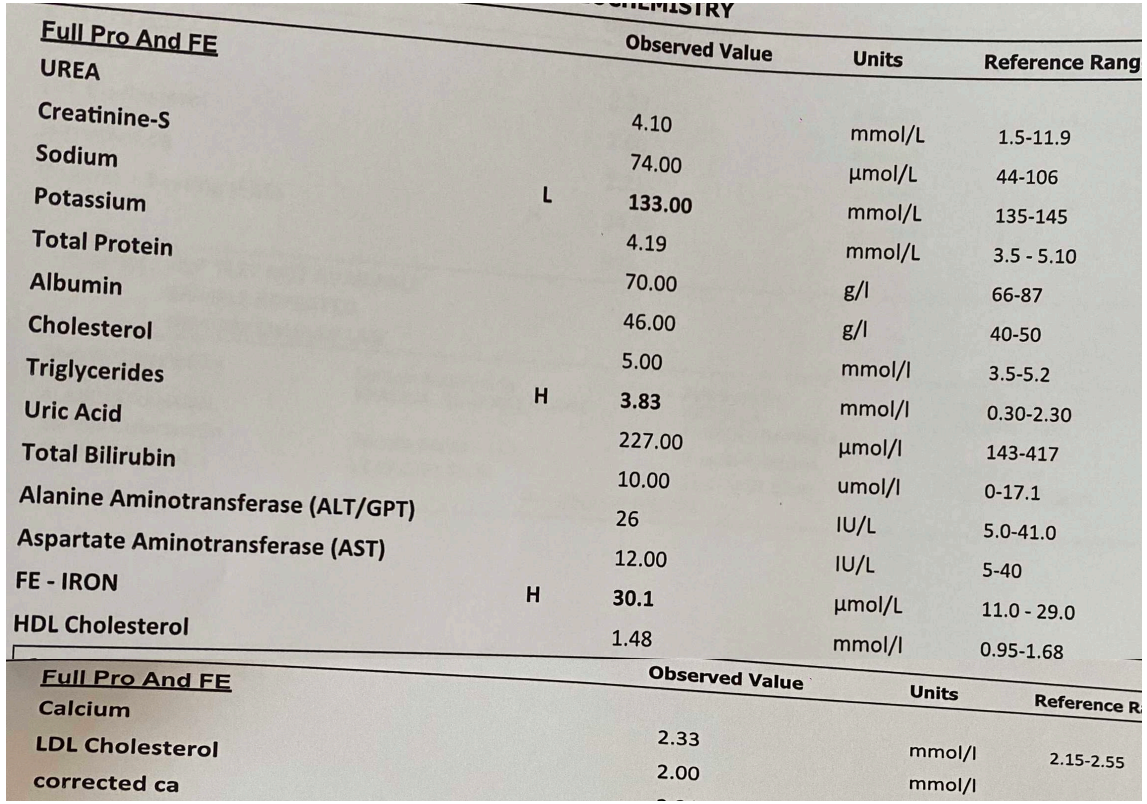


Summary of treatment hypertriglyceridemia

Moderate hypertriglyceridemia	Severe hypertriglyceridemia
Lifestyle + treat secondary causes	Lifestyle + treat secondary causes
Maximum statin therapy ± ezetimibe to reach LDL-goal (accoding to the risk category) In high risk and v high risk patients, IF LDL goal is reached and TG is still high: Add icosapent ethyl 	Start with fibrate to reduce the risk of pancreatitis + optimal statin therapy if indicated

Recommendations	Class	Level
Statin treatment is recommended as the first drug of choice for reducing CVD risk in high-risk individuals with hypertriglyceridaemia (TG >2.3 mmol/L (>200 mg/dL)).	I	B
In high-risk (or above) patients with TG between 1.5 and 5.6 mmol/L (135–499 mg/dL) despite statin treatment, n-3 PUFAs (icosapent ethyl 2 x 2 g/day) should be considered in combination with statin.	IIa	B

Recommendations	Class	Level
In primary prevention patients who are at LDL-C goal with TG >2.3 mmol/L (>200 mg/dL), fenofibrate or bezafibrate may be considered in combination with statins.	IIb	B
In high-risk patients who are at LDL-C goal with TG >2.3 mmol/L (>200 mg/dL), fenofibrate or bezafibrate may be considered in combination with statins.	IIb	C



CHEMISTRY

Full Pro And FE		Observed Value	Units	Reference Rang
UREA		4.10	mmol/L	1.5-11.9
Creatinine-S		74.00	µmol/L	44-106
Sodium	L	133.00	mmol/L	135-145
Potassium		4.19	mmol/L	3.5 - 5.10
Total Protein		70.00	g/l	66-87
Albumin		46.00	g/l	40-50
Cholesterol		5.00	mmol/l	3.5-5.2
Triglycerides	H	3.83	mmol/l	0.30-2.30
Uric Acid		227.00	µmol/l	143-417
Total Bilirubin		10.00	umol/l	0-17.1
Alanine Aminotransferase (ALT/GPT)		26	IU/L	5.0-41.0
Aspartate Aminotransferase (AST)		12.00	IU/L	5-40
FE - IRON	H	30.1	µmol/L	11.0 - 29.0
HDL Cholesterol		1.48	mmol/l	0.95-1.68

Full Pro And FE		Observed Value	Units	Reference R
Calcium		2.33	mmol/l	2.15-2.55
LDL Cholesterol		2.00	mmol/l	
corrected ca				

51 years old male
Known to have diabetes mellitus
On lipitor 20 mg
According to his risk

LDL goal is 1.8
Non- HDL goal is 2.6

LDL= 2.0
Non-HDL = 3.5

Sample No:2104132006

Glu*	5.6		4.1-5.9	mmol/L
BUN*	3.6		2.8-7.2	mmol/L
Creat*	**109**	**H⇧**	**64-104**	**umol/L**
Na*	137		134-144	mmol/L
K*	**5.14**	**H⇧**	**3.6-5.1**	**mmol/L**
CO2*	29.4		21-31	mmol/L
CL*	102		94-115	mmol/L
Ca*	2.38		2.2-2.65	mmol/L
Phos*	0.99		0.78-1.53	mmol/L
T. Protein*	70		66-83	g/L
Albumin*	42		35-52	g/L
T.Bil*	9.4		5-21	umol/L
ALT*	40		3-50	U/L
AST*	34		3-50	U/L
Alk.Phos*	76		30-120	U/L
GGT*	43		5-55	U/L
TChol*	4.9		3-5.2	mmol/L
TG*	**6.41**	**H⇧**	**0.4-1.75**	**mmol/L**
HDL CHOL*	0.92			mmol/L
VLDL*	2.56			
Non HDLC*	4			mmol/L
Urate*	**509**	**H⇧**	**208-428**	**umol/L**
Cal.Osmolality*	**273**	**L⇩**	**275-295**	**mmol/k**
AnionGap*	10.7		10-20	mmol/L
Corrected.Ca*	2.34			mmol/L

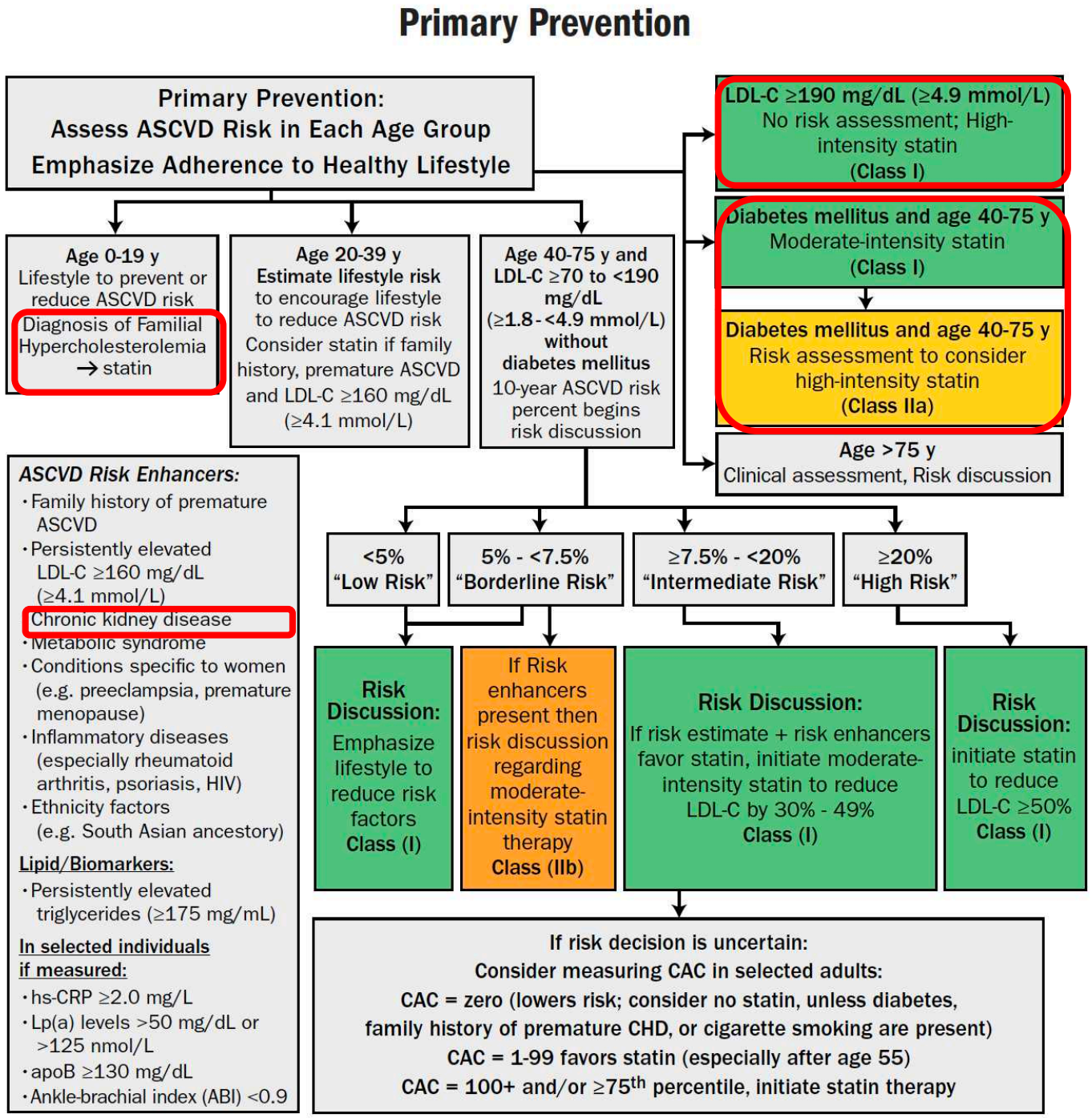
Report Note: 2104132006 CREAT,K, assay was repeated and confirmed. TG is > 4.5 mmol/L, LDL-C cannot be calculated. * Sample is lipemic.

51 year-old, known to have hypertension .
He is a moderate risk.
LDL-goal = 2.6
Non-HDL goal= 3.4

Caculated Non-HDL= 4

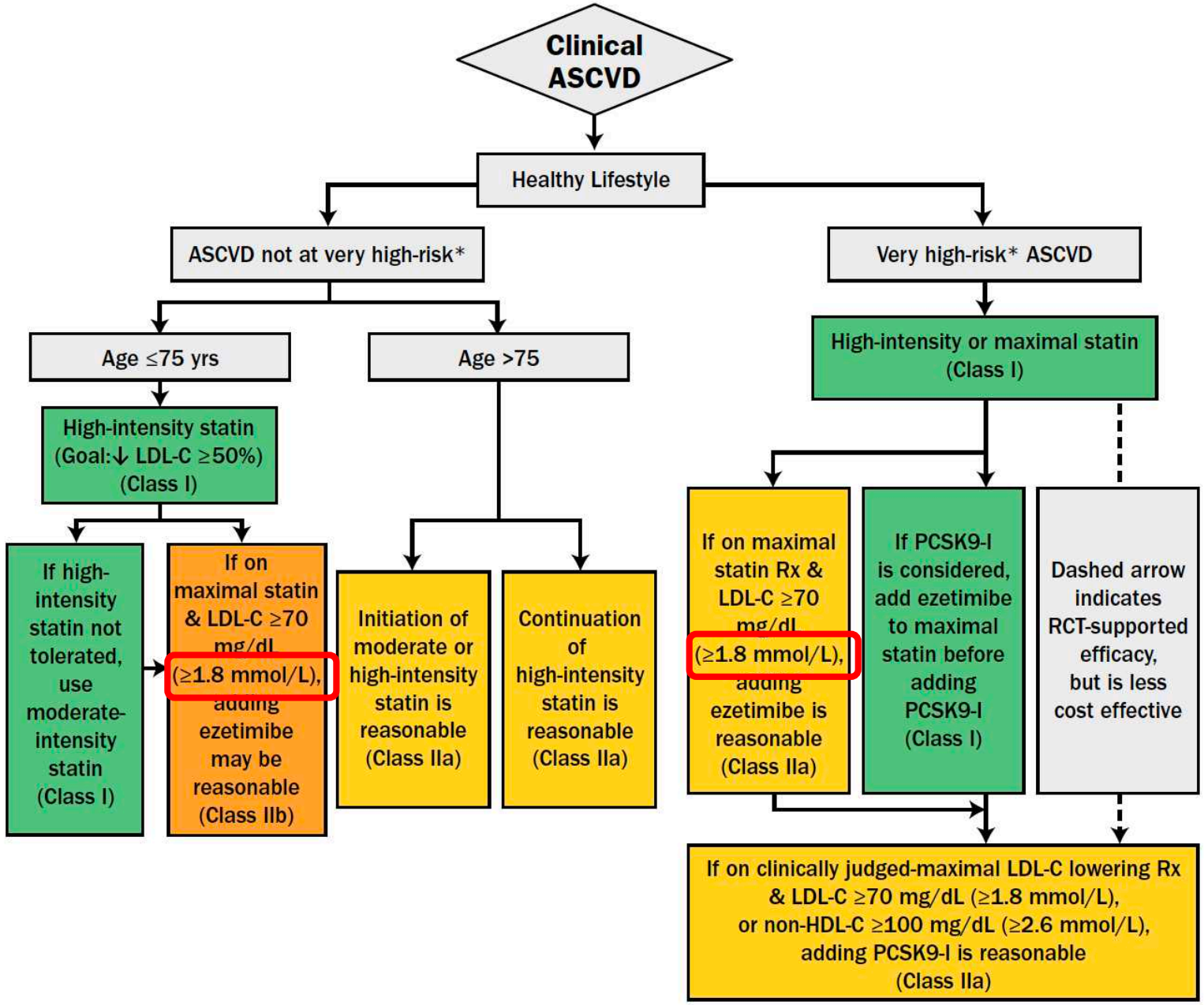
2018 AHA/ACC cholesterol guidelines

Major differences:
- CKD is a risk enhancer and not a risk category
- No absolute LDL levels, only % of reduction



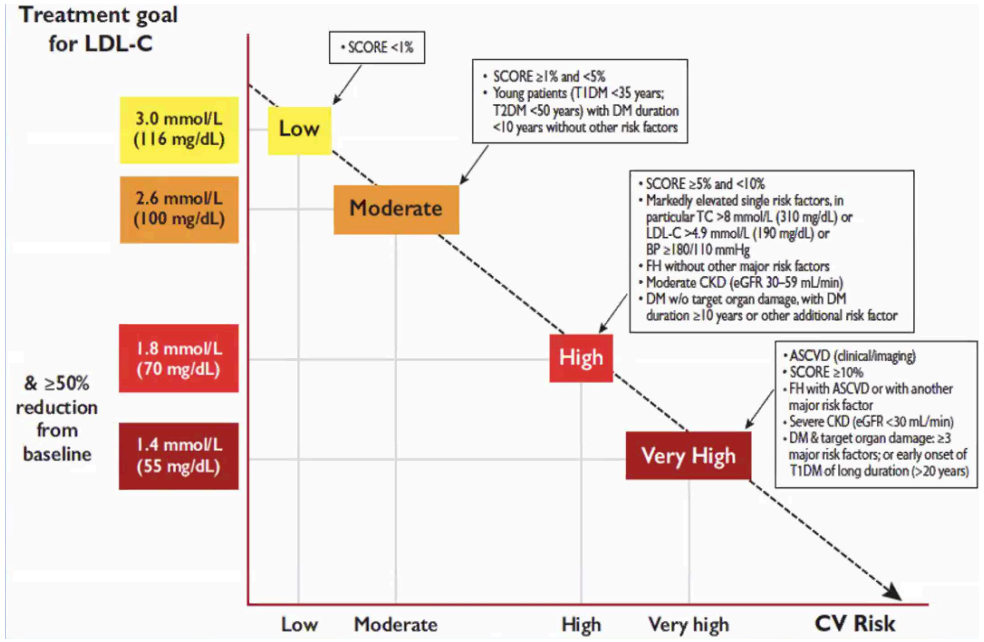
LDL goal is 1.8

Secondary Prevention in Patients with Clinical ASCVD

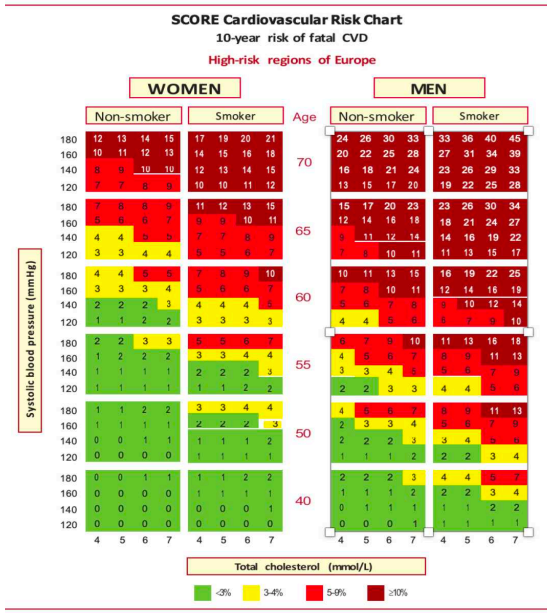


Take Home Message

The 3 slides that you need



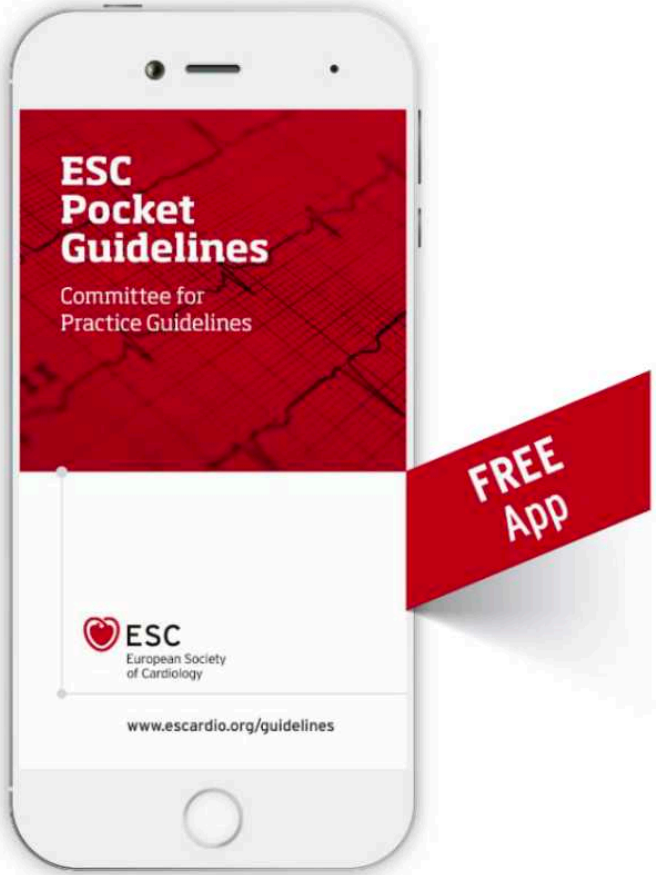
	Total CV risk (SCORE) %	Untreated LDL-C levels <1.4 mmol/L (55 mg/dL)	1.4 to <1.8 mmol/L (55 to <70 mg/dL)	1.8 to <2.6 mmol/L (70 to <100 mg/dL)	2.6 to <3.0 mmol/L (100 to <116 mg/dL)	3.0 to <4.9 mmol/L (116 to <190 mg/dL)	≥4.9 mmol/L (≥190 mg/dL)
Primary prevention	<1, low-risk	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	I/C	I/C	IIa/A	IIa/A
	≥1 to <5, or moderate risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	I/C	I/C	IIa/A	IIa/A	IIa/A	IIa/A
	≥5 to <10, or high-risk (see *Table 4*)	Lifestyle advice	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	IIa/A	IIa/A	I/A	I/A	I/A
	≥10, or at very-high risk due to a risk condition (see *Table 4*)	Lifestyle advice	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/B	IIa/A	I/A	I/A	I/A	I/A
Secondary prevention	Very-high-risk	Lifestyle intervention, consider adding drug if uncontrolled	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention	Lifestyle intervention and concomitant drug intervention
	Class[a]/Level[b]	IIa/A	I/A	I/A	I/A	I/A	I/A



ESC Pocket Guidelines App

Anytime - Anywhere

EAS ESC European Society of Cardiology



- **All ESC Pocket Guidelines**
- **Over 150 interactive tools**
  - **Algorithms**
  - **Calculators**
  - **Charts & Scores**
- **Summary Cards & Essential Messages**
- **Online & Offline**

Learn more in the Guidelines area


Thank you!