

# A walk through the new SCORE **SCORE 2 – SCORE 2 OP**

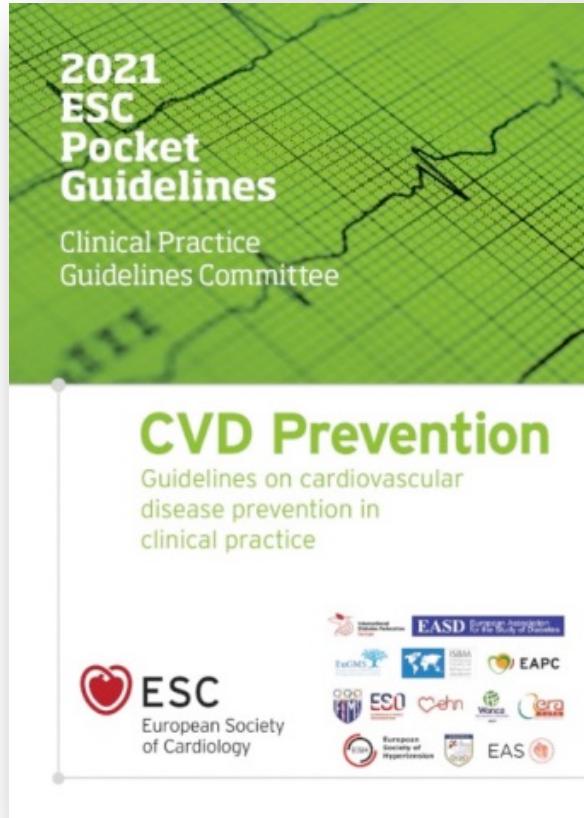
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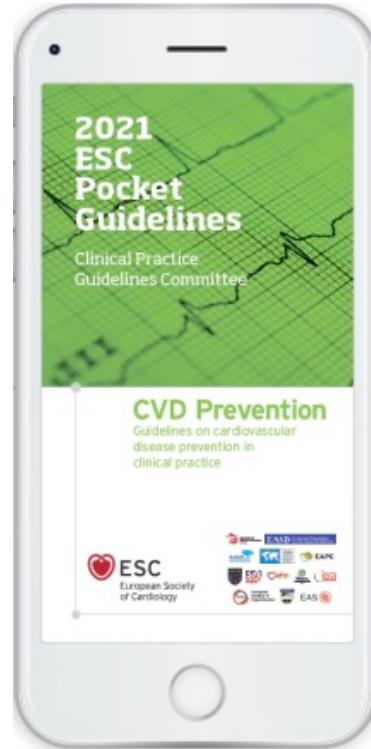
Belgian Hypertension Committee



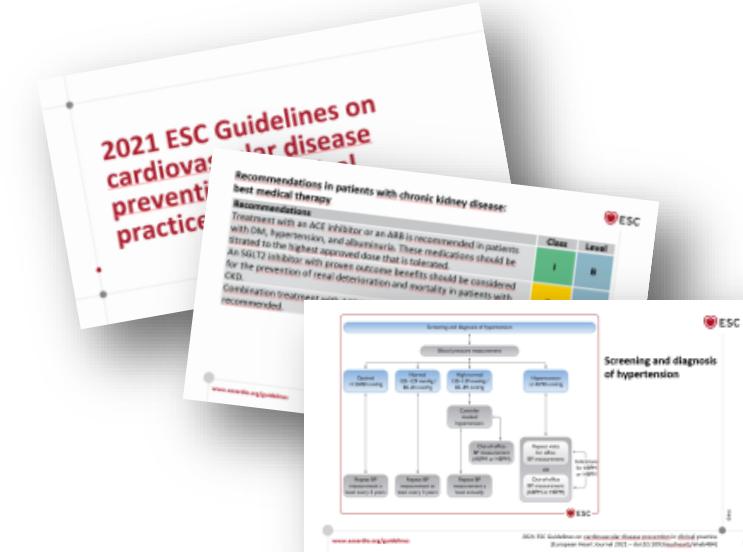
## ESC Pocket Guidelines



## ESC Pocket Guidelines App



## ESC Guidelines Official Slide-set



## Evaluation of cardiovascular risk

- Definitions very high - high - moderate-low risk patients
- SCORE SCORE2 en SCORE2-OP

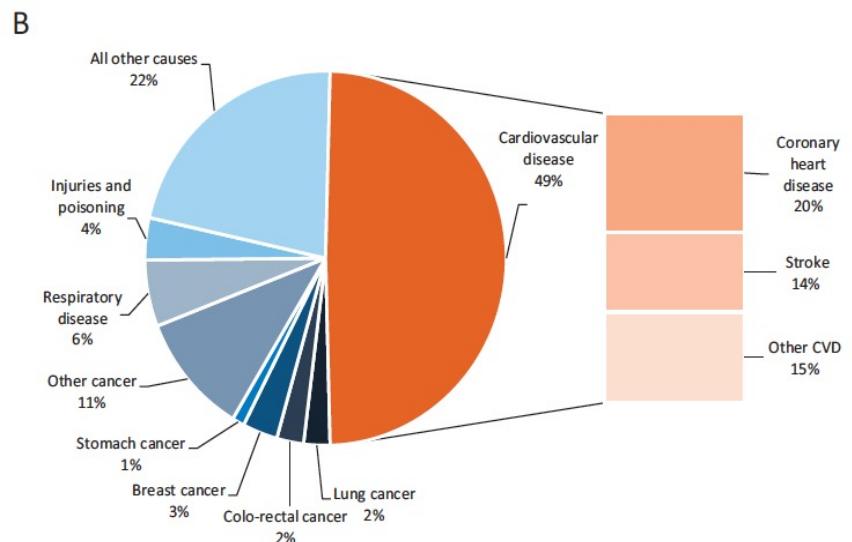
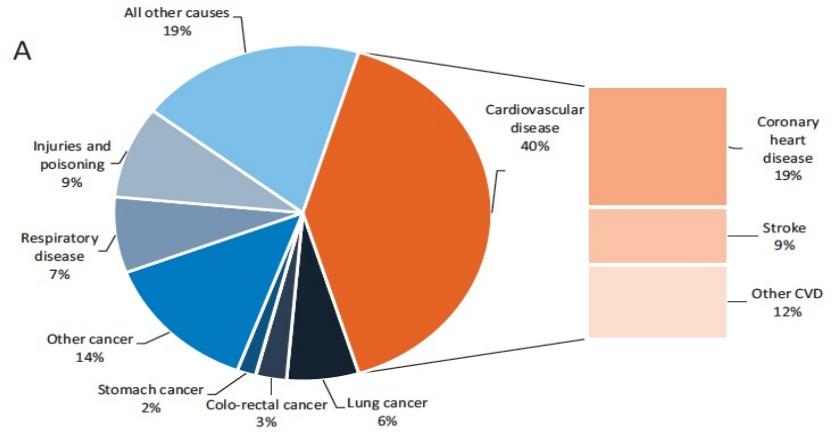


## Epidemiology

Cardiovascular Diseases major cause of death in men and women in all European countries. (~ 40%)

Coronary heart disease major cause of death

- In men >45 y
- In women >65 y



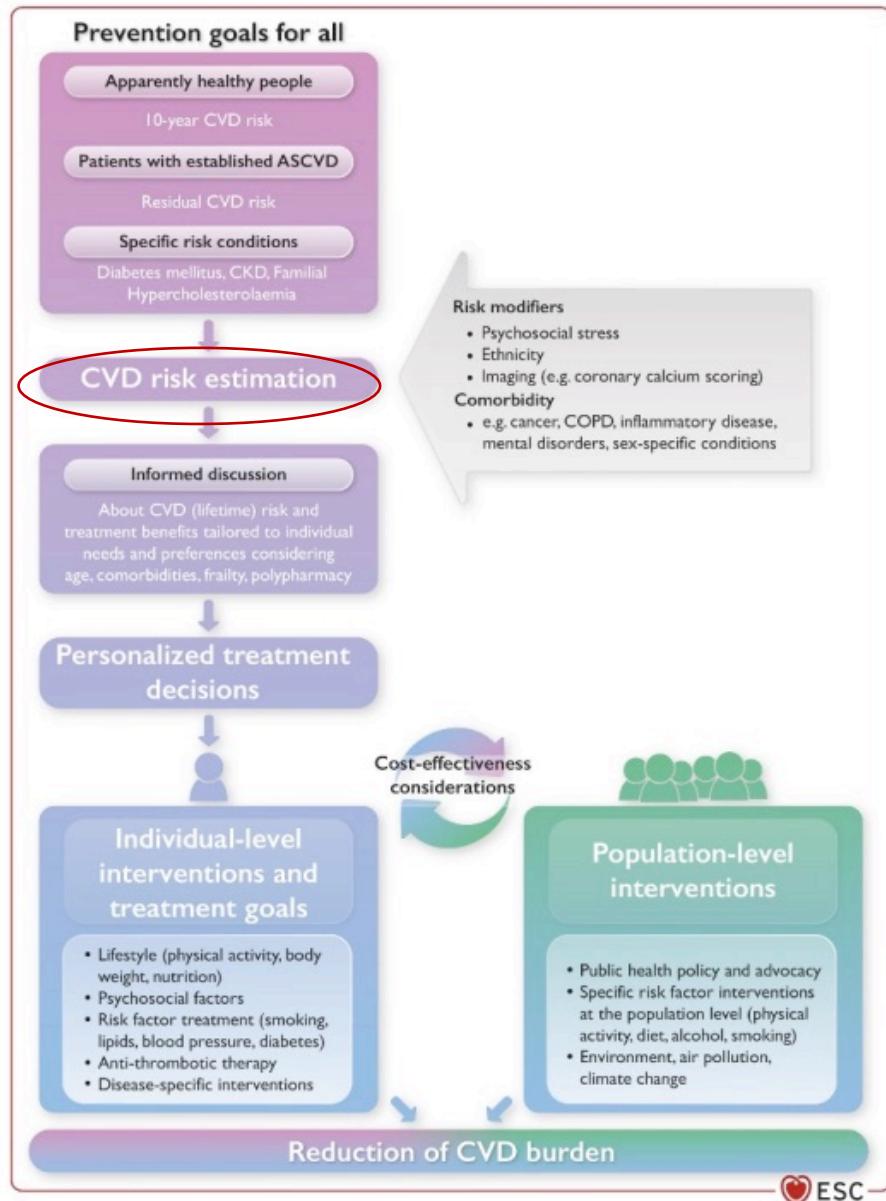
Townsend et al., EHJ 2016



# Top 3 doodsoorzaken in België

## Statbel 2019

	Allen	Mannen	Vrouwen
Tumoren	25,5%	28,6%	22,6%
<b>Hart- en vaatziekten</b>	25,1%	23,4%	26,7%
Respiratoire Aandoeningen	11,2%	11%	11%



## Prevention of CVD

# **SCORE**

## **(Systematic COronary Risk Evaluation)**

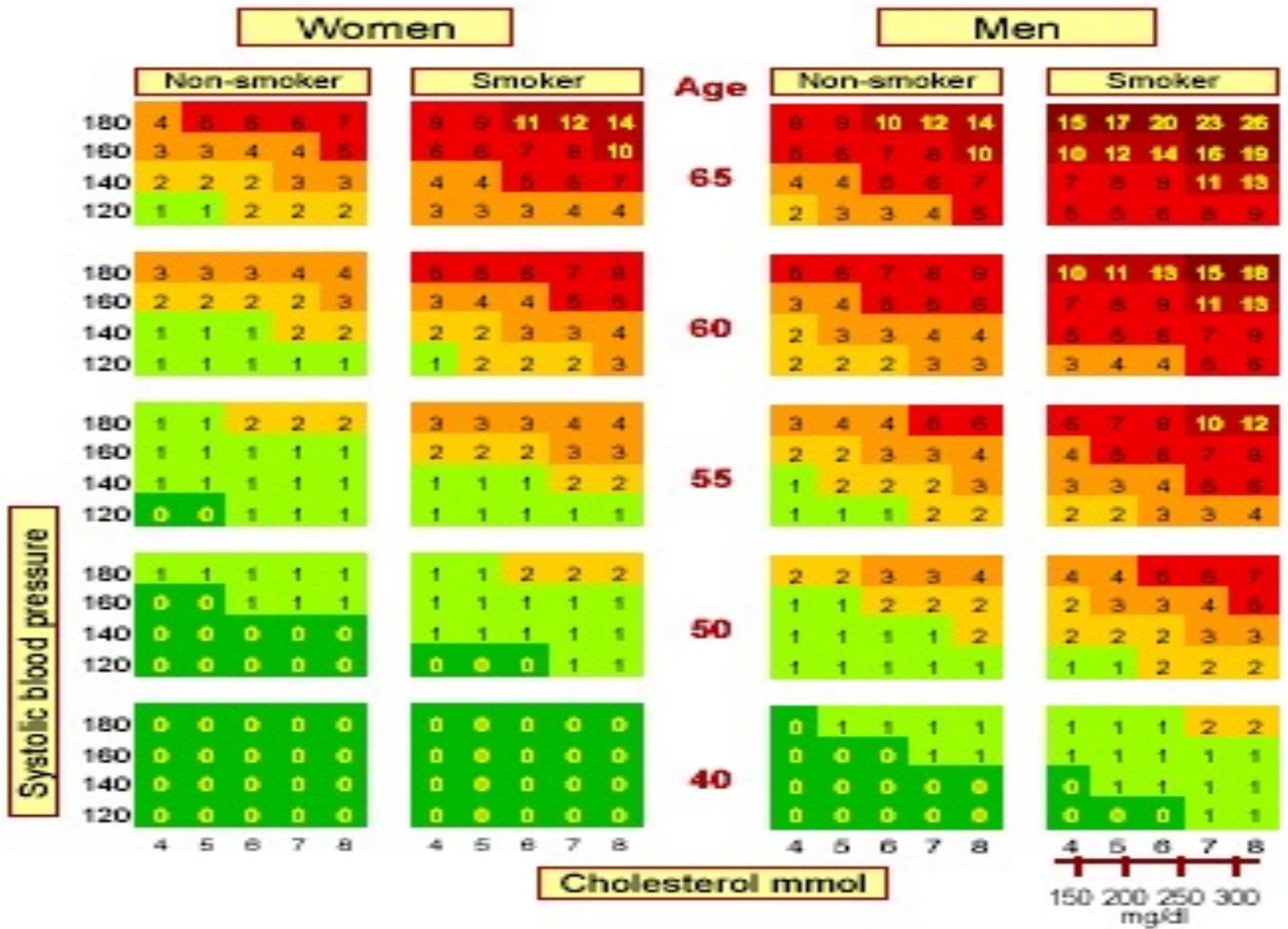
**Develop an optimal model in Europa to  
estimate total cardiovascular risk to  
prevent cardiovascular disease**

To decrease risk

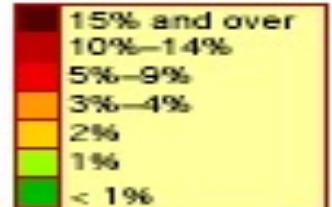
To prevent *premature cv morbidity & death*



# SCORE



**SCOR**E



10-year risk of fatal CVD in populations at low CVD risk

© 2003

# Recommendations for cardiovascular disease risk estimation (1)

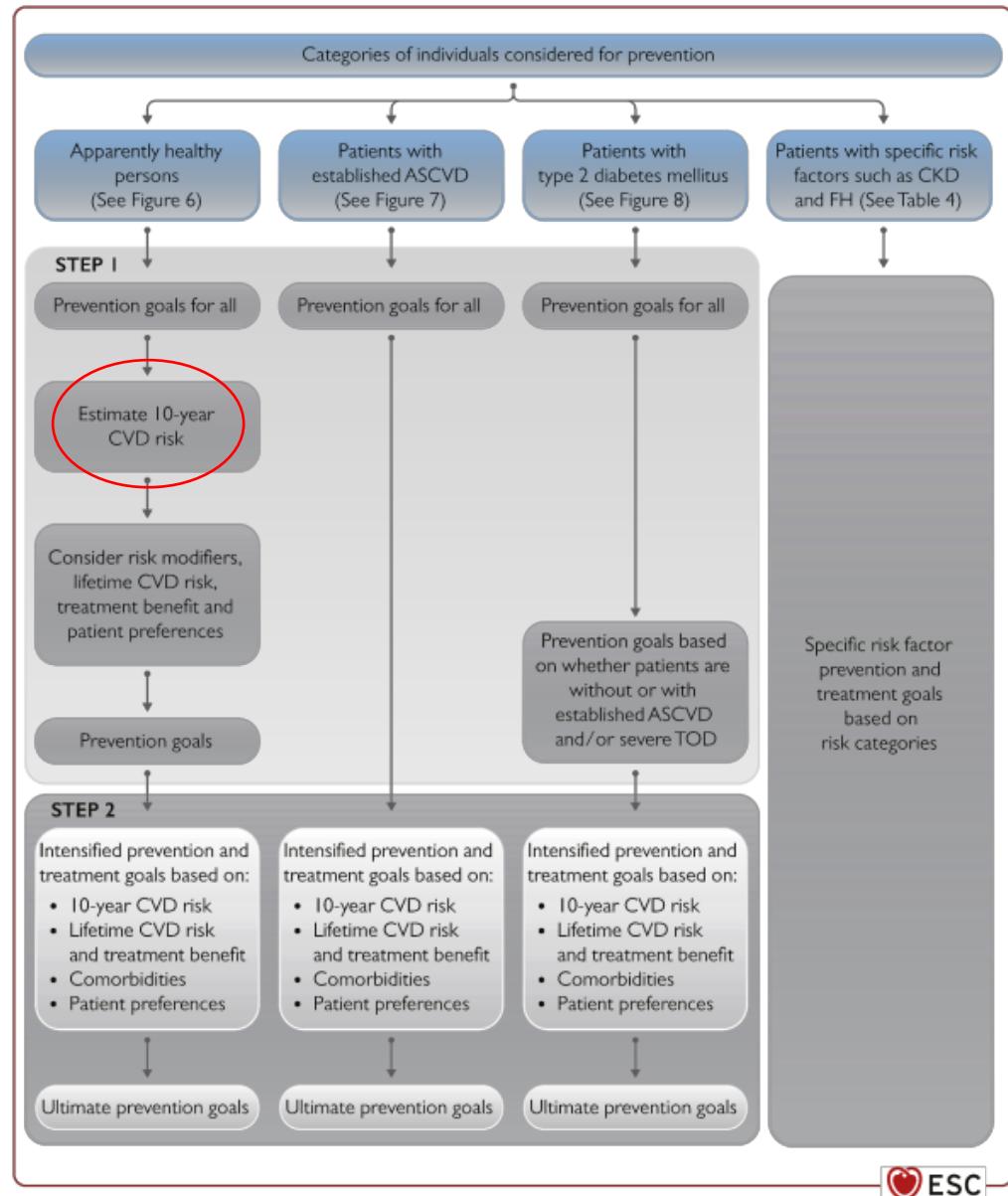
Recommendations	Class	Level
In apparently healthy people <70 years without established ASCVD, DM, CKD, genetic/rarer lipid or BP disorders, estimation of 10-year fatal and non-fatal CVD risk with SCORE2 is recommended.	I	B
In apparently healthy people ≥70 years without established ASCVD, DM, CKD, genetic/rarer lipid or BP disorders, estimation of 10-year fatal and non-fatal CVD risk with SCORE2-OP is recommended.	I	B
In apparently healthy people, after estimation of 10-year fatal and non-fatal CVD risk, lifetime risk and treatment benefit, risk modifiers, frailty, polypharmacy, and patient preferences should be considered.	IIa	C
Patients with established CVD and/or DM and/or moderate-to-severe renal disease and/or genetic/rarer lipid or BP disorders are to be considered at high or very high CVD risk.	I	A

## Recommendations for cardiovascular disease risk estimation (2)



Recommendations	Class	Level
A stepwise treatment-intensification approach aiming at intensive risk factor treatment is recommended for apparently healthy people at high or very high CVD risk, as well as patients with established ASCVD and/or DM, with consideration of CVD risk, treatment benefit of risk factors, risk modifiers, comorbidities, and patient preferences.	I	B
Treatment of ASCVD risk factors is recommended in apparently healthy people without DM, CKD, genetic/rarer lipid, or BP disorders who are at <b>very high risk</b> (SCORE2 $\geq 7.5\%$ for age under 50; SCORE2 $\geq 10\%$ for age 50–69; SCORE2-OP $\geq 15\%$ for age $\geq 70$ years).	I	C
Treatment of ASCVD risk factors should be considered in apparently healthy people without DM, CKD, genetic/rarer lipid, or BP disorders who are at <b>high risk</b> (SCORE2 2.5 to $< 7.5\%$ for age under 50; SCORE2 5 to $< 10\%$ for age 50–69; SCORE2-OP 7.5 to $< 15\%$ for age $\geq 70$ years), taking CVD risk modifiers, lifetime risk and treatment benefit, and patient preferences into account.	IIa	C

©ESC



## Examples of a stepwise approach to risk stratification and treatment options



## SCORE versus SCORE2 / SCORE2-OP

SCORE risk = 10 year risk of CV  
**death**

Age: 40-70 years

SCORE2 risk = 10 year risk of  
**fatal and non-fatal CV event**

Age:

- SCORE2 : 40-69 years
- SCORE2-OP : 70-90 years



## SCORE 2 Ages 40-69 years

Derived from 45 prospective cohorts from 13 European countries (680.000 individuals, 30.000 cardiovascular events)

Incorporates traditional risk factors: age, smoking status, systolic blood pressure, total and HDL cholesterol

Model recalibrated tot 4 risk regions in Europe (low, moderate, high, very high risk) using CVD incidence rates

External validation in 25 prospective cohorts from 15 European countries with moderate to good discrimination (C-index 0,67 to 0,81)



## SCORE 2-OP    Ages 70-90 years

Derived from 1 prospective study: Cohort of Norway (CONOR), 28500 participants without history of ASCVD

Incorporates traditional risk factors: age, smoking status, systolic blood pressure, total and HDL cholesterol

Model recalibrated to 4 risk regions in Europe (low, moderate, high, very high risk) using CVD incidence rates

External validation from large, randomized clinical trials (340.000 participants) with moderate discrimination (C-index 0,63 to 0,67)



## SCORE versus SCORE2 / SCORE2-OP

SCORE risk = 10 year risk of CV death

Age: 40-70 years

### Parameters

- Age, gender, smoking status
- Blood pressure
- *Total* cholesterol

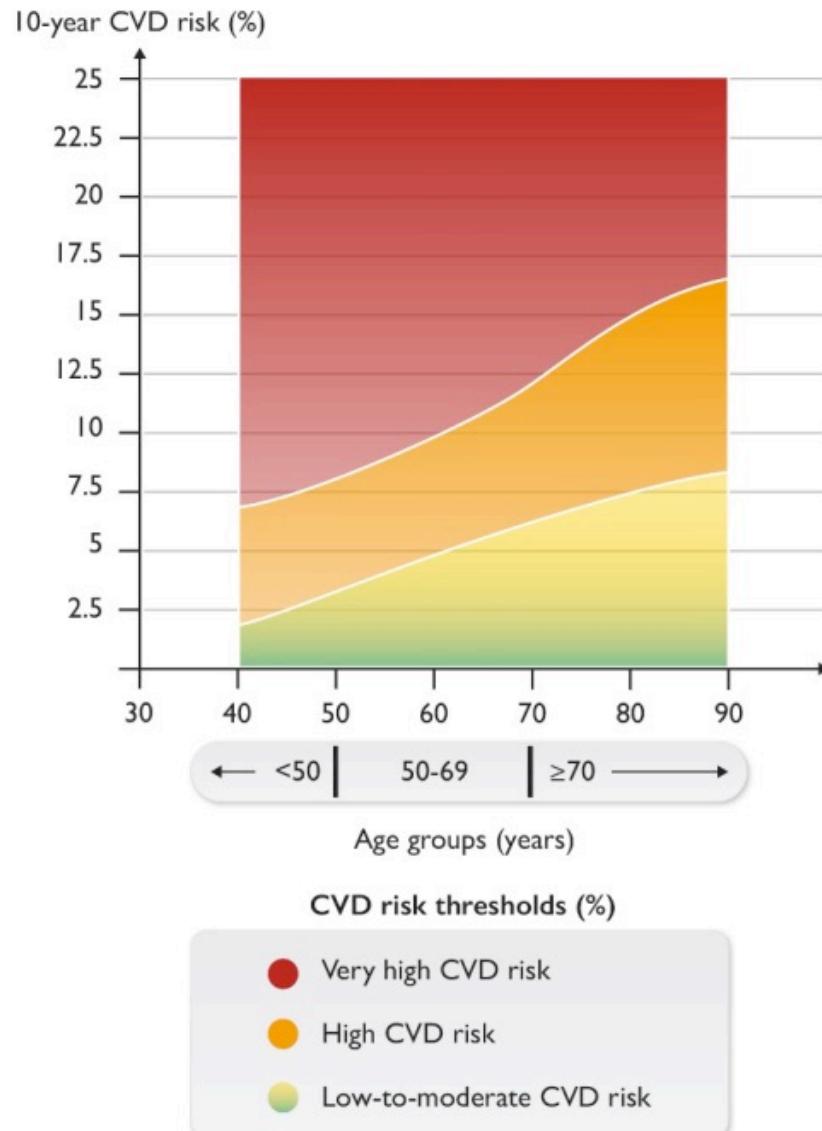
SCORE2 risk = 10 year risk of fatal and non-fatal CV event

### Age

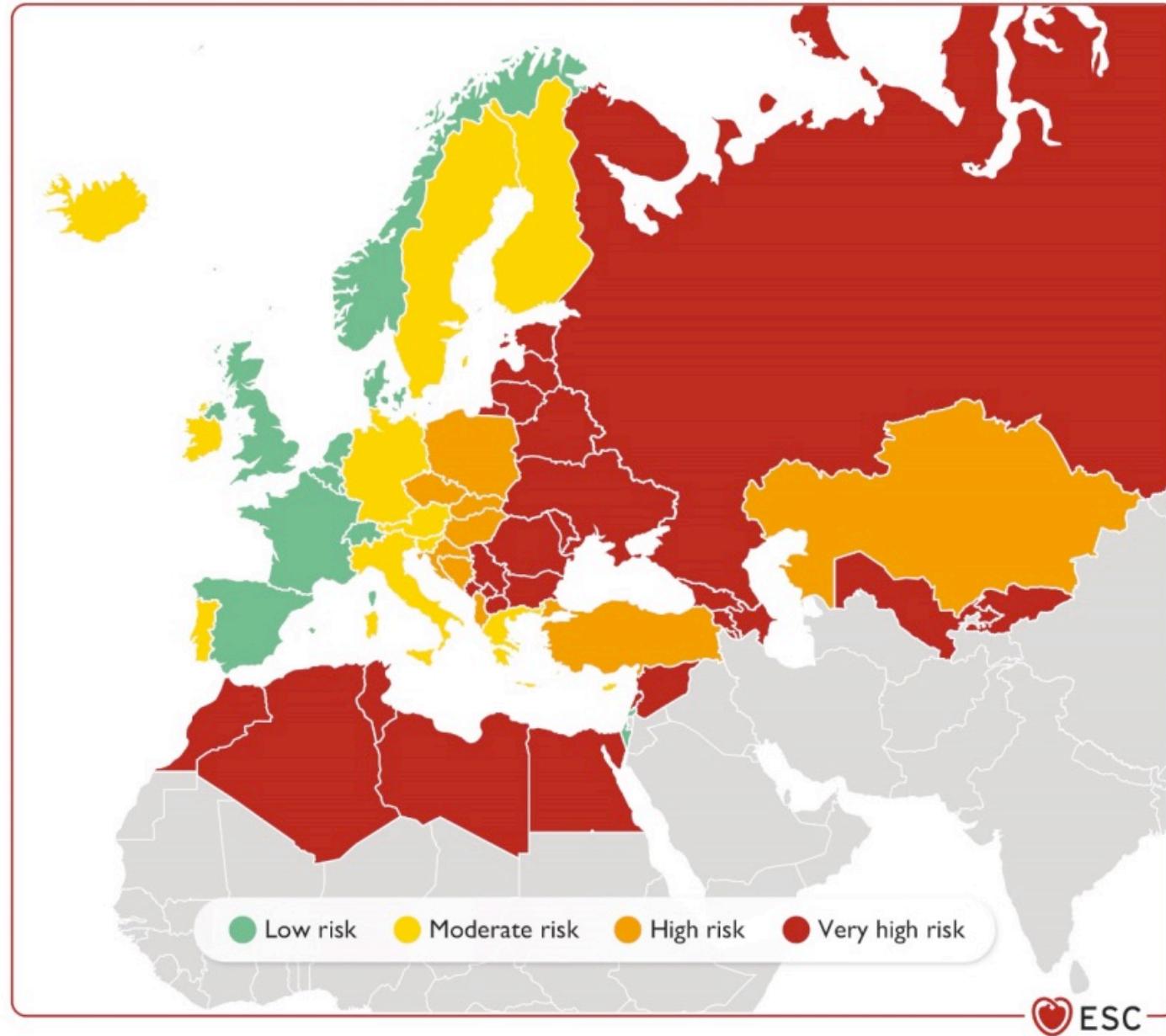
- SCORE2: 40-69 years
- SCORE2-OP: 70-90 years

### Parameters

- Age, gender, smoking status
- Blood pressure
- *Non-HDL* cholesterol



## Schematic representation of increasing 10-year CVD risk thresholds across age groups



Risk regions based on  
World Health Organization  
cardiovascular mortality  
rates

**SCORE2 & SCORE2-OP**  
10-year risk of (fatal and non-fatal) CV events in populations at low CVD risk

<50 years	50-69 years	≥70 years
<2.5%	<5%	<7.5%
2.5 to <7.5%	5 to <10%	7.5 to <15%
≥7.5%	≥10%	≥15%

Women

Men

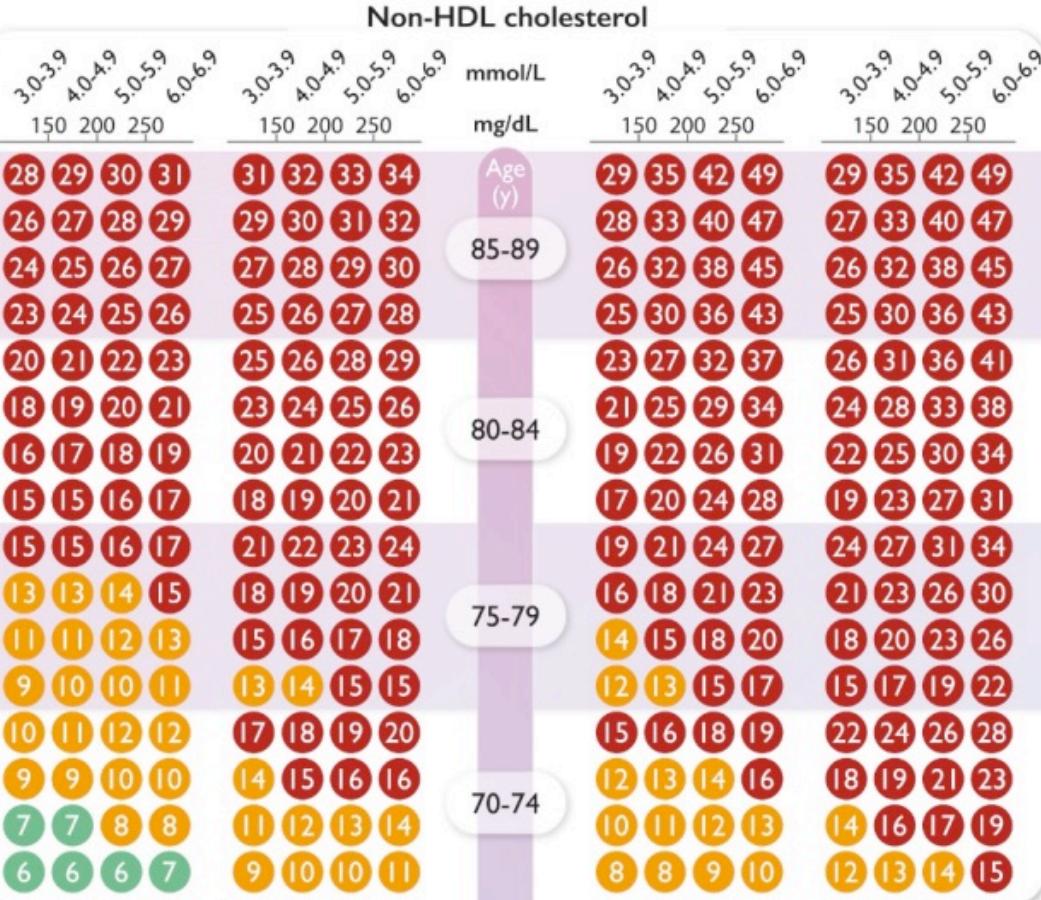
Non-smoking

Smoking

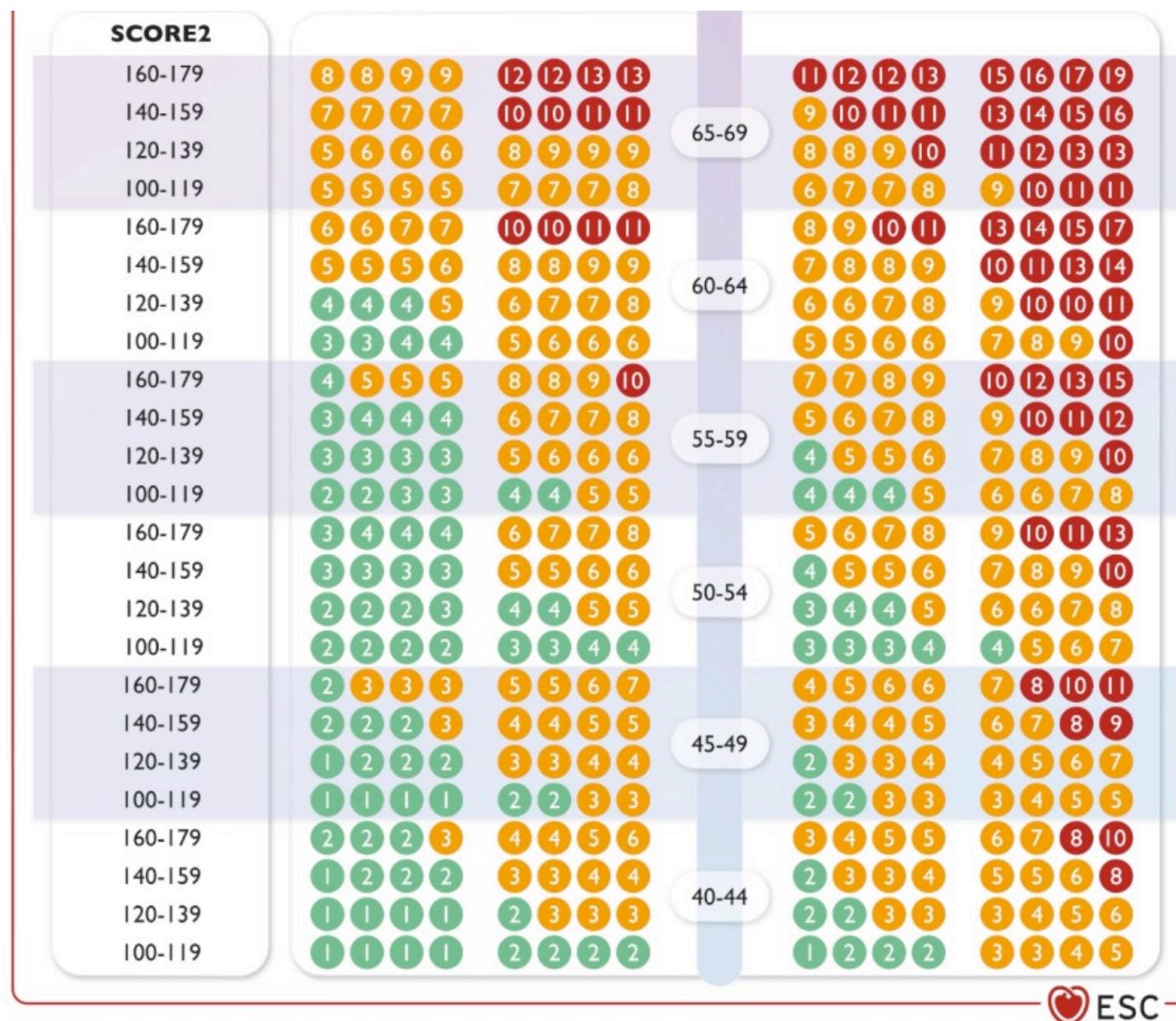
Non-smoking

Smoking

Systolic blood pressure (mmHg)  
**SCORE2-OP**



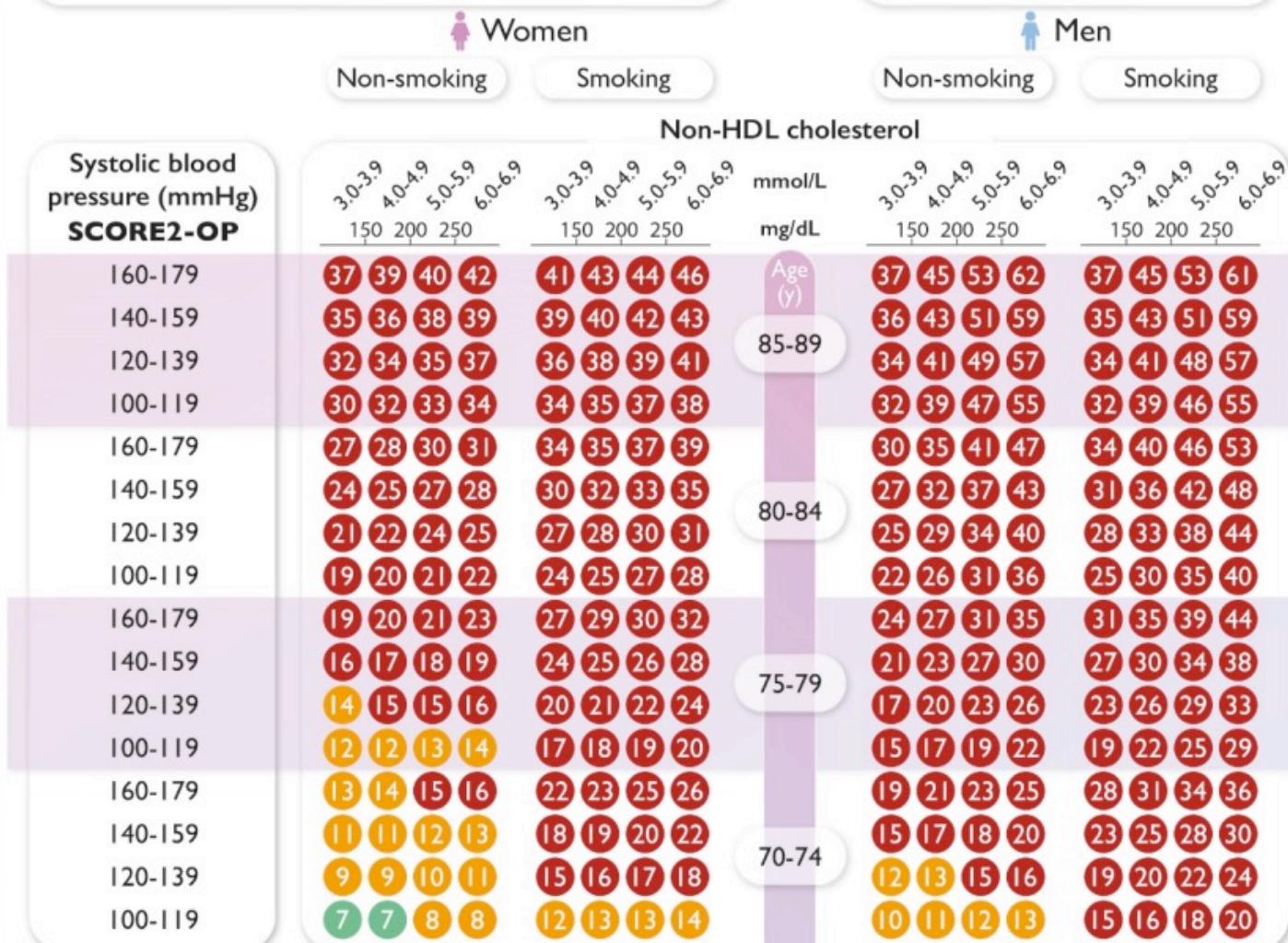
## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD Low CVD Risk (1)



## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD Low CVD Risk (2)

**SCORE2 & SCORE2-OP**  
10-year risk of (fatal and non-fatal) CV  
events in populations at moderate CVD risk

<50 years	50-69 years	≥70 years
<2.5%	<5%	<7.5%
2.5 to <7.5%	5 to <10%	7.5 to <15%
≥7.5%	≥10%	≥15%



## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD Moderate CVD Risk (1)

**SCORE2**

160-179



140-159



120-139



100-119



160-179



140-159



120-139



100-119



160-179



140-159



120-139



100-119



160-179



140-159



120-139



100-119



160-179



140-159



120-139



100-119



160-179



140-159



120-139



100-119



65-69

60-64

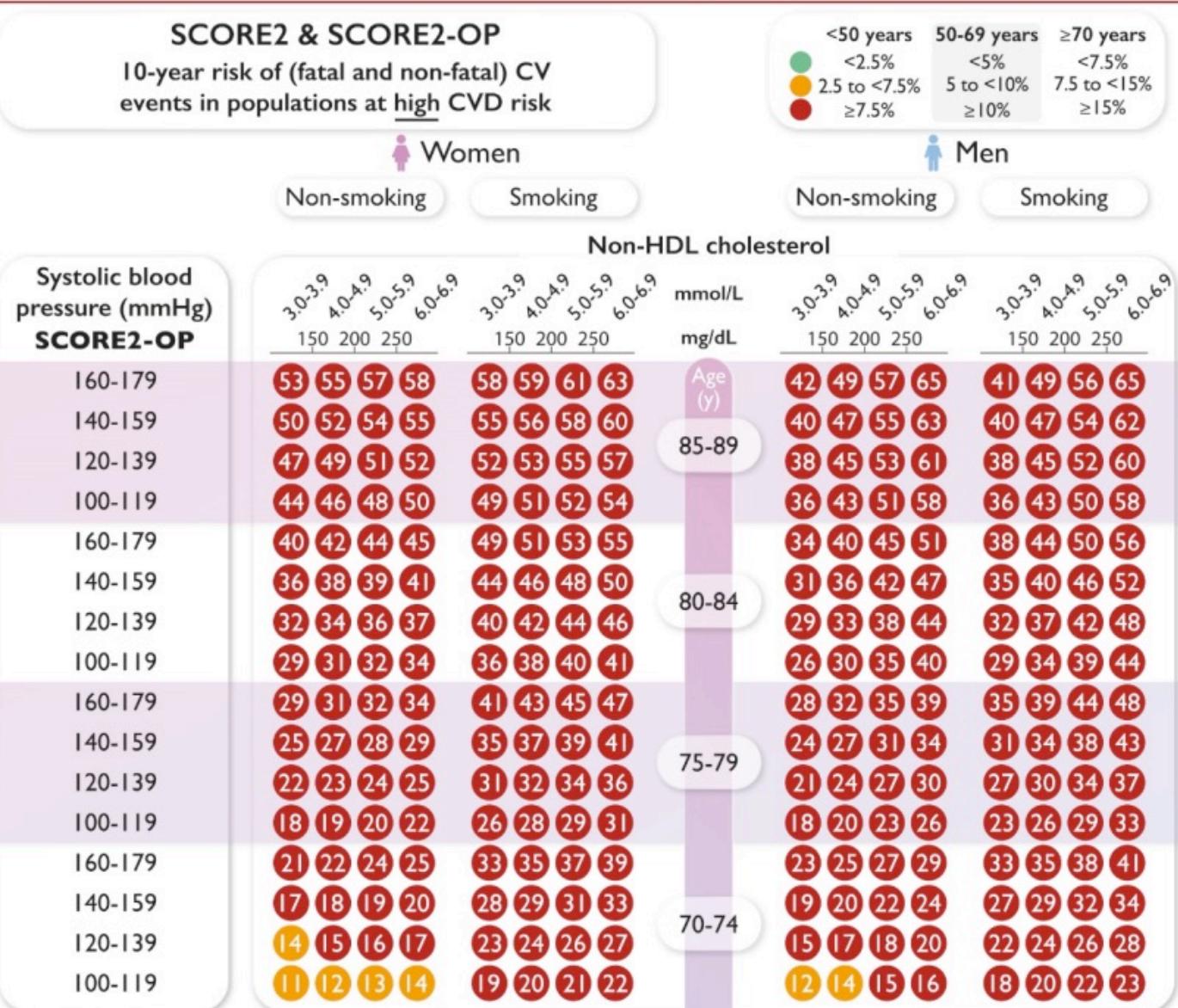
55-59

50-54

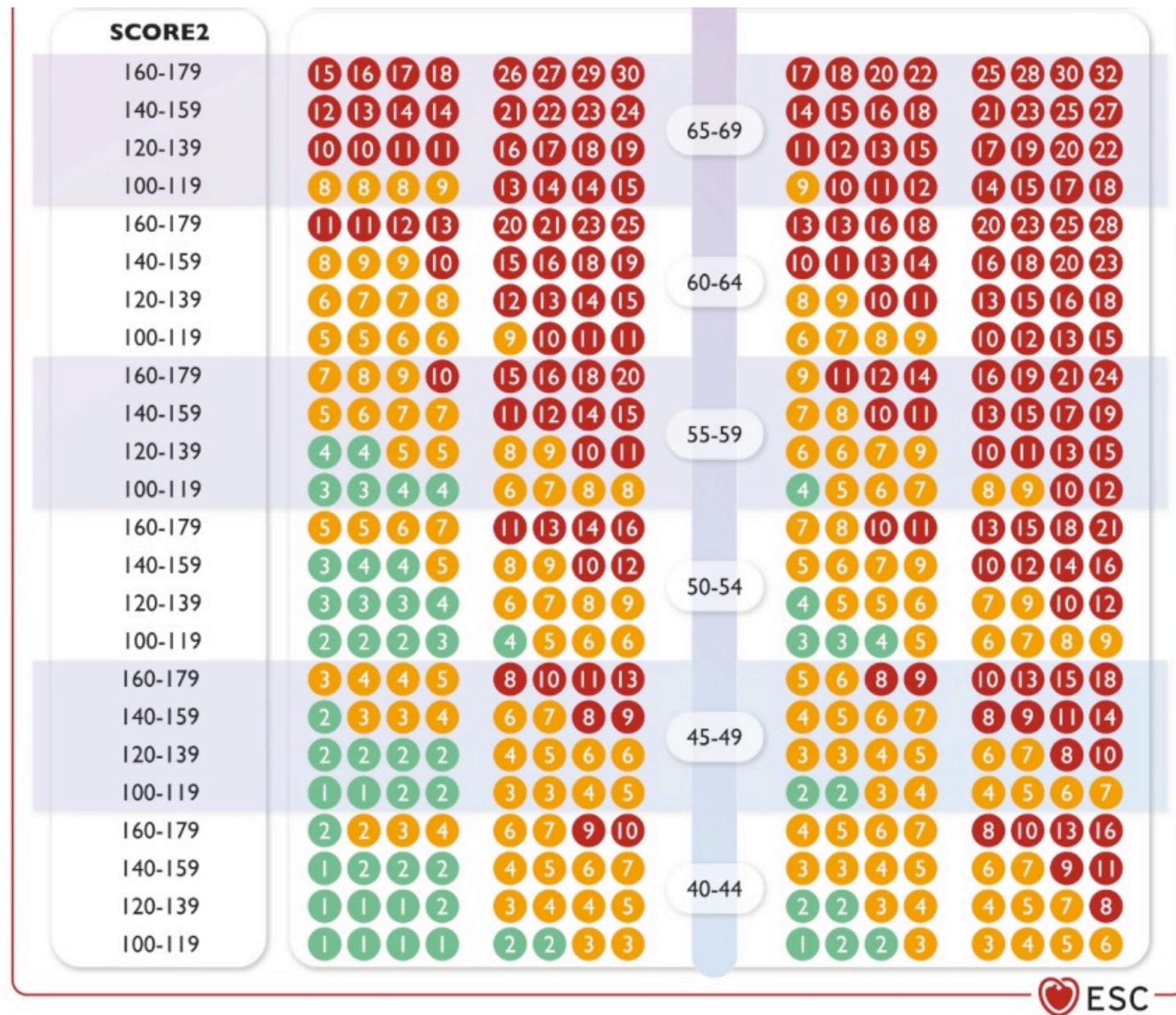
45-49

40-44

## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD Moderate CVD Risk (2)



## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD High CVD Risk (1)



## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

### High CVD Risk (2)

**SCORE2 & SCORE2-OP**  
10-year risk of (fatal and non-fatal) CV events in populations at very high CVD risk

<50 years	50-69 years	≥70 years
<2.5%	<5%	<7.5%
2.5 to <7.5%	5 to <10%	7.5 to <15%
≥7.5%	≥10%	≥15%

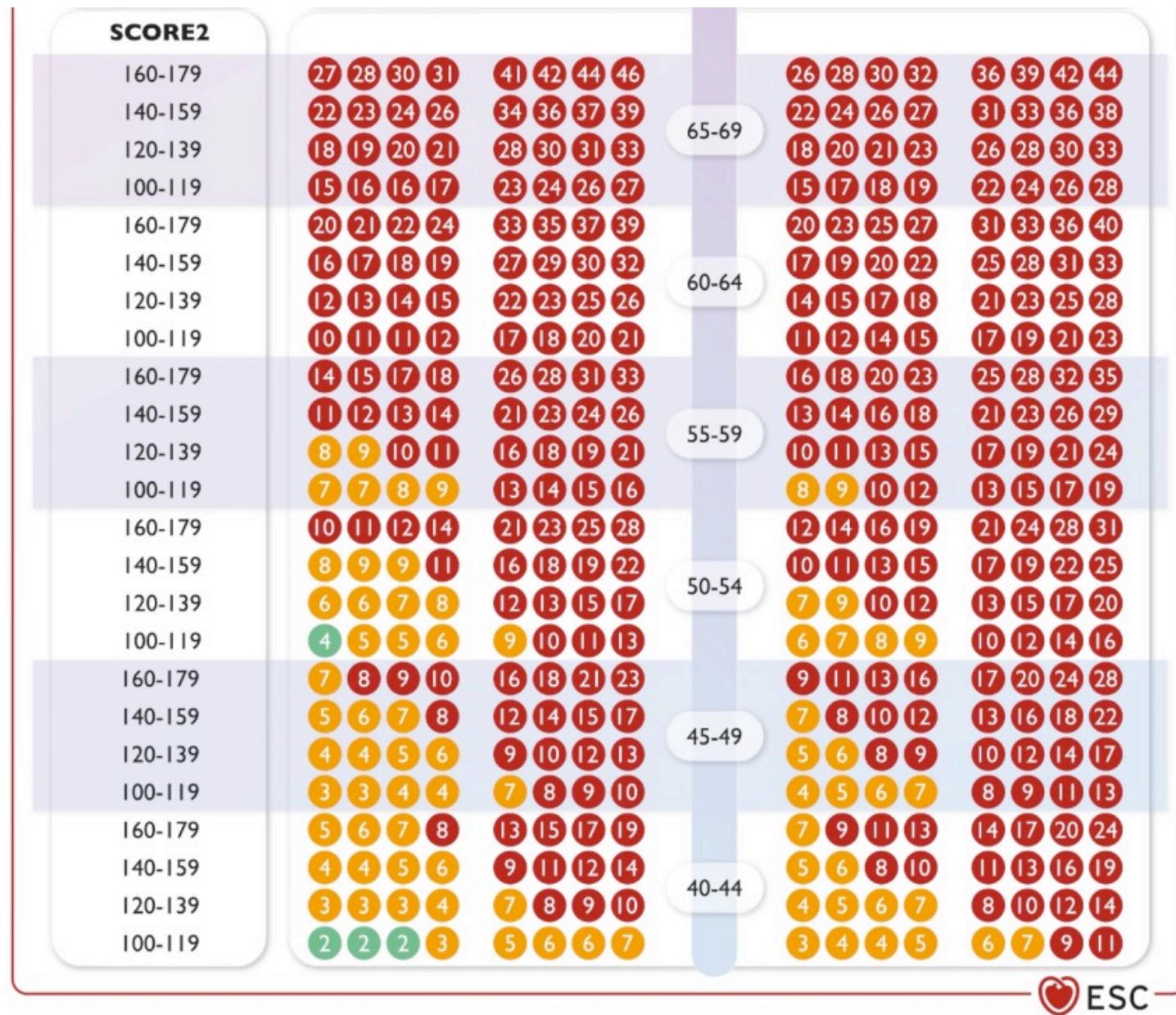


## SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

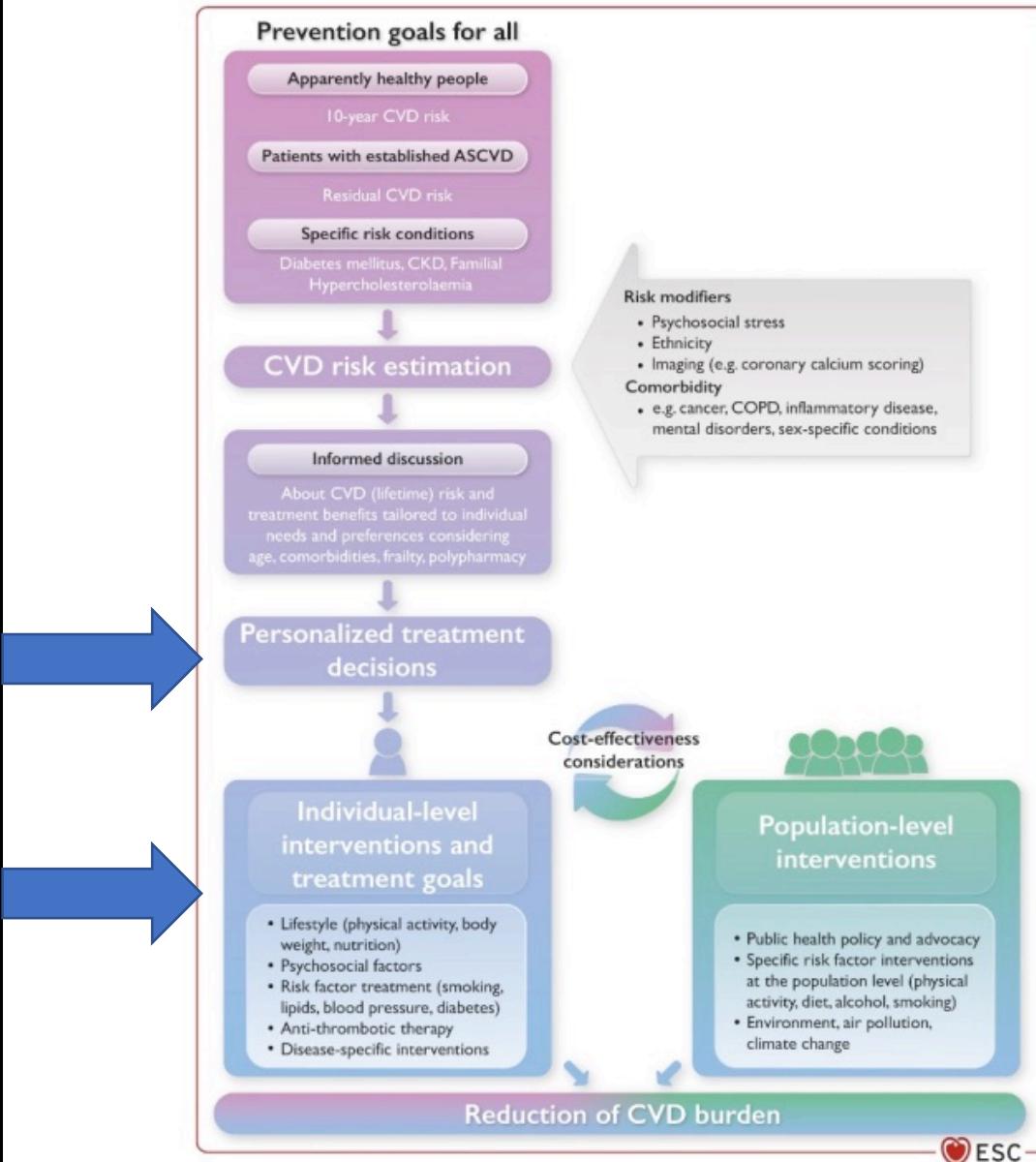
### Very high CVD Risk (1)



# **SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD Very high CVD Risk (2)**



# Prevention of CVD

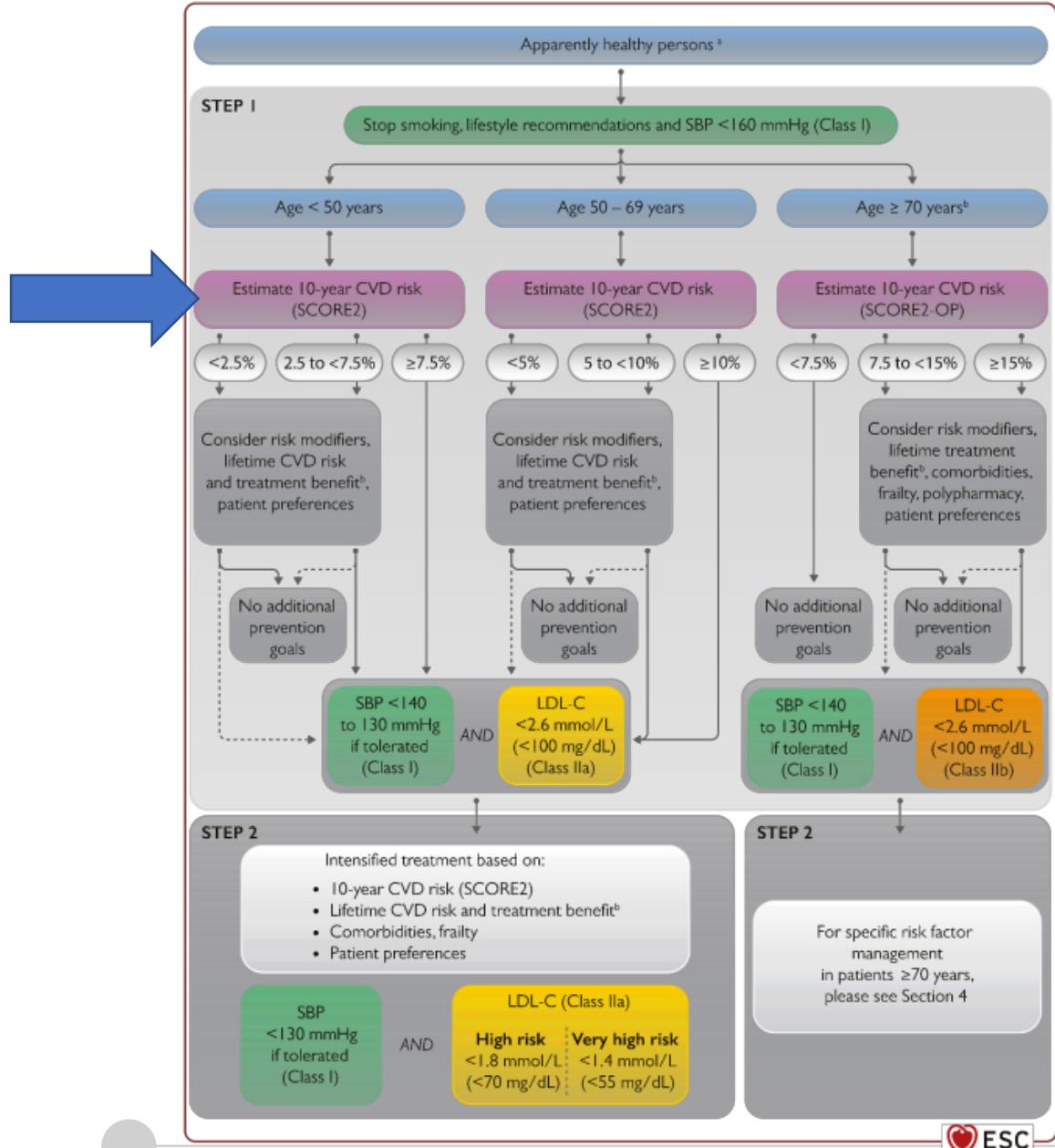


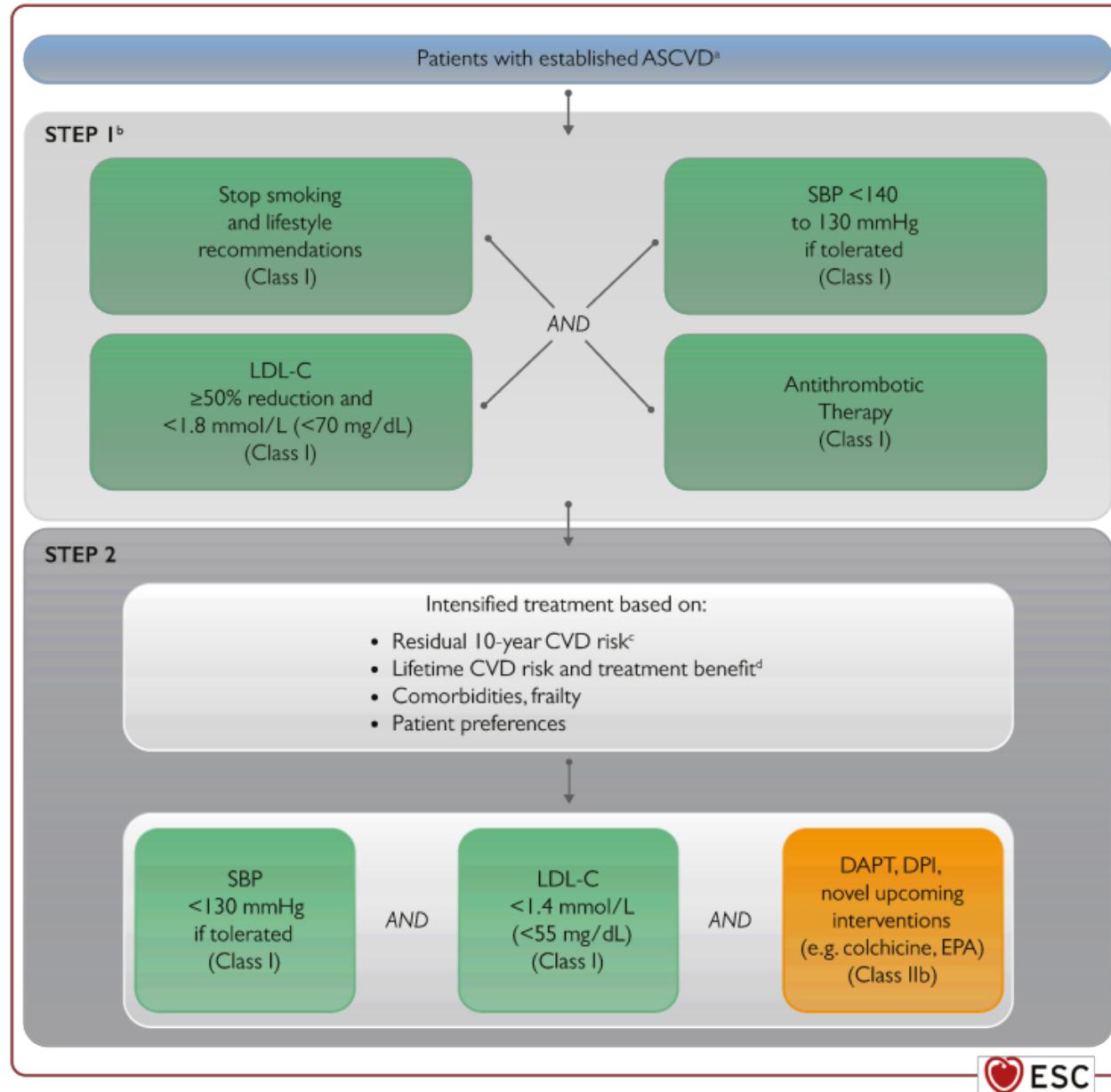
# Cardiovascular disease risk categories based on SCORE2 and SCORE2-OP in apparently healthy people according to age



	<50 years	50-69 years	≥70 years <sup>a</sup>
<b>Low-to-moderate CVD risk:</b> risk factor treatment generally not recommended	<2.5%	<5%	<7.5%
<b>High CVD risk:</b> risk factor treatment should be considered	2.5 to <7.5%	5 to <10%	7.5 to <15%
<b>Very high CVD risk:</b> risk factor treatment generally recommended <sup>a</sup>	≥7.5%	≥10%	≥15%

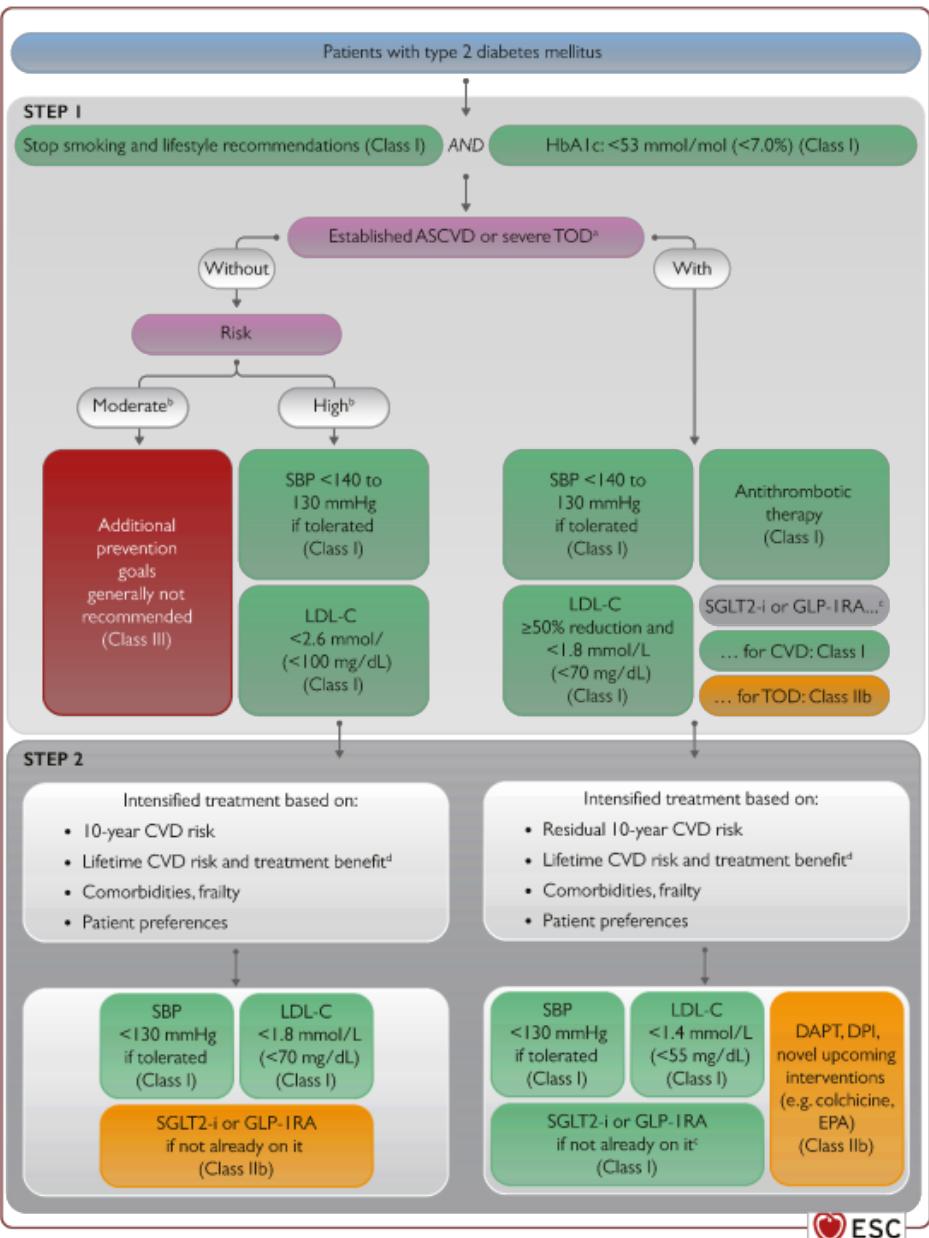
## Cardiovascular risk and risk factor treatment in apparently healthy persons





## Cardiovascular risk and risk factor treatment in patients with established cardiovascular disease

## Cardiovascular risk and risk factor treatment in patients with type 2 diabetes mellitus



# Treatment goals for different patient categories (1)



Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals <sup>a</sup> (STEP 2)
Apparently healthy persons	For BP and lipids: initiation of drug treatment based on CVD risk assessment or SBP >160 mmHg	
<50 years	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated <sup>b</sup> LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction in high-risk patients LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction in very-high-risk patients
50–69 years	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated <sup>b</sup> LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction in high-risk patients LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction in very-high-risk patients
≥70 years	Stop smoking and lifestyle optimization SBP <140 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL)	For specific risk factor management in patients ≥70 years old, please see relevant sections in section 4.
Patients with CKD	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL) and ≥50% LDL-C reduction Otherwise according to ASCVD and DM history	LDL-C <1.8 mmol/L (70 mg/dL) in high-risk patients and <1.4 mmol/L (55 mg/dL) in very-high-risk patients (see Table 4)
Patients with FH	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL) and ≥50% LDL-C reduction Otherwise according to ASCVD and DM history	LDL-C <1.8 mmol/L (70 mg/dL) in high-risk patients and <1.4 mmol/L (55 mg/dL) in very-high-risk patients (see Table 4)

# Treatment goals for different patient categories (2)



Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals <sup>a</sup> (STEP 2)
<b>People with type 2 DM</b>		
Well-controlled short-standing DM e.g. <10 years), no evidence of TOD and no additional ASCVD risk factors	Stop smoking and lifestyle optimization	
Without established ASCVD or severe TOD (see Table 4 for definitions)	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <2.6 mmol/L (100 mg/dL) HbA1c <53 mmol/mol (7.0%)	SBP <130 mmHg if tolerated <sup>b</sup> LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction SGLT2 inhibitor or GLP-1RA
With established ASCVD and/or severe TOD (see Table 4 for definitions)	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> LDL-C <1.8 mmol/L (70 mg/dL) HbA1c <64 mmol/mol (8.0%) SGLT2 inhibitor or GLP-1RA CVD: antiplatelet therapy	SBP <130 mmHg if tolerated <sup>b</sup> LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction SGLT2 inhibitor or GLP-1RA if not already on <i>May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.</i>
<b>Patients with established ASCVD</b>	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated <sup>b</sup> Intensive oral lipid-lowering therapy aiming at LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction Antiplatelet therapy	SBP <130 mmHg if tolerated <sup>b</sup> LDL-C <1.4 mmol/L and ≥50% reduction (55 mg/dL) <i>May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.</i>

# Patient categories and associated cardiovascular disease risk (1)

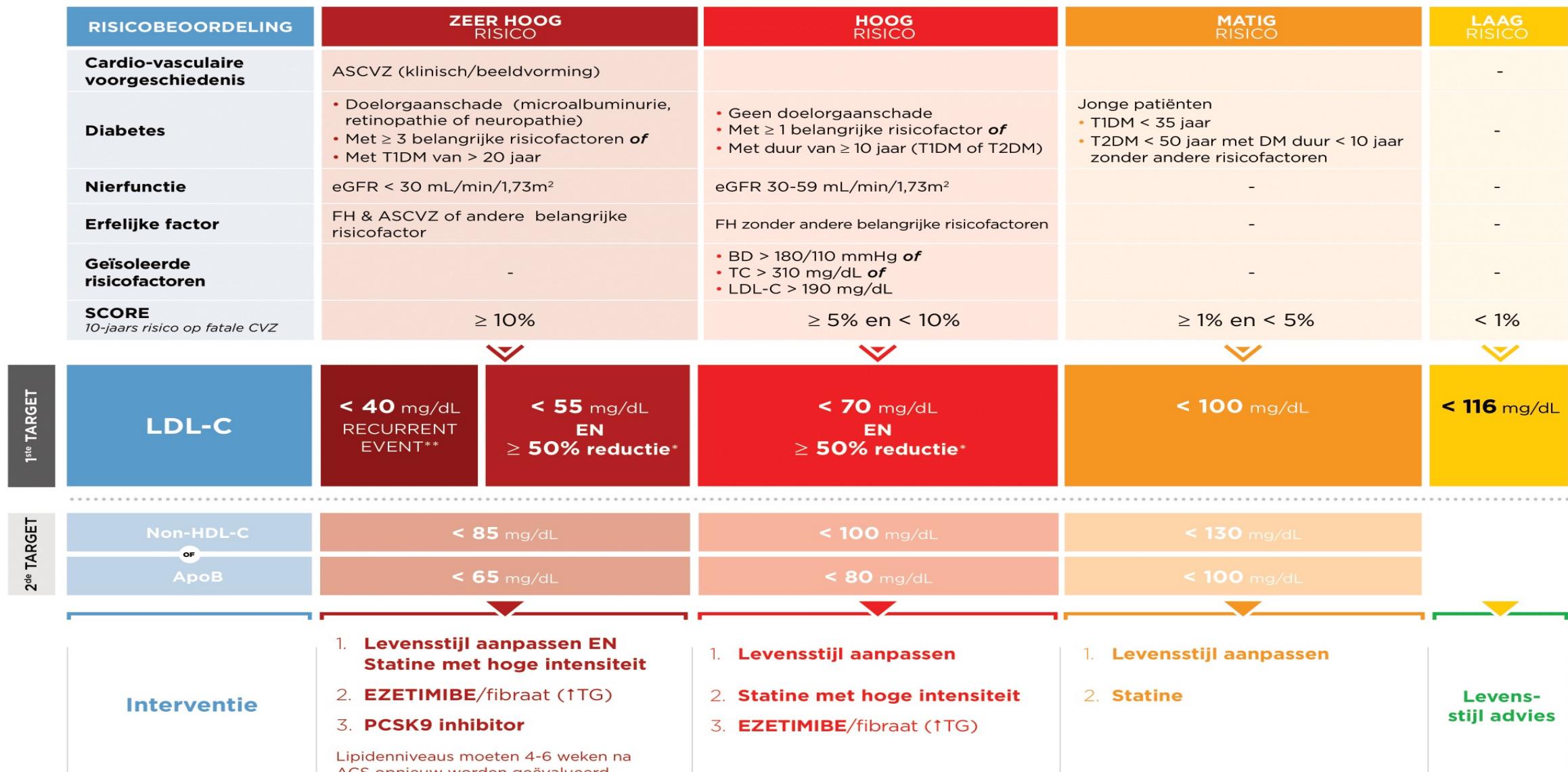
Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
<b>Apparently healthy persons</b>			
Persons without established ASCVD, diabetes mellitus, CKD, Familial Hypercholesterolemia	<50 years	Low- to high-risk	10-year CVD risk estimation (SCORE2). Lifetime risk and benefit estimation of risk factor treatment (e.g. with the LIFE-CVD lifetime model) to facilitate the communication of CVD risk and treatment benefits.
	50-69 years	Low- to very high-risk	10-year CVD risk estimation (SCORE2). Lifetime benefit estimation of risk factor treatment (e.g. with the LIFE-CVD lifetime model) to facilitate the communication of treatment benefits.
	≥70 years	Low- to very high-risk	10-year CVD risk estimation (SCORE2-OP). Lifetime benefit estimation of risk factor treatment (e.g. with the LIFE-CVD lifetime model) to facilitate the communication of treatment benefits.
<b>Patients with CKD</b>			
CKD without diabetes or ASCVD	Moderate CKD (eGFR 30–44 mL/min/1.73 m <sup>2</sup> and ACR <30 mg/g <b>or</b> eGFR 45–59 mL/min/1.73 m <sup>2</sup> and ACR 30 mg/g –300 mg/g <b>or</b> eGFR ≥60 mL/min/1.73 m <sup>2</sup> and ACR >300 mg/g)	High-risk	N/A
	Severe CKD (eGFR <30 mL/min/1.73 m <sup>2</sup> <b>or</b> eGFR 30–44 mL/min/1.73 m <sup>2</sup> and ACR >30 mg/g)	Very high-risk	N/A
<b>Familial Hypercholesterolemia</b>			
Associated with markedly elevated cholesterol levels	N/A	High-risk	N/A
<b>Patients with type 2 diabetes mellitus</b>			
Patients with type 1 DM above 40 years of age may also be classified according to these criteria	Patients with well controlled short-standing DM (e.g. <10 years), no evidence of TOD and no additional ASCVD risk factors	Moderate-risk	N/A
	Patients with DM without ASCVD and/or severe TOD, and not fulfilling the moderate risk criteria.	High-risk	Residual 10-year CVD risk estimation after general prevention goals (e.g. with the ADVANCE risk score or DIAL model). Consider lifetime CVD risk and benefit estimation of risk factor treatment (e.g. DIAL model).

# Patient categories and associated cardiovascular disease risk (2)



Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
<b>Patients with type 2 diabetes mellitus (continued)</b>			
	Patients with DM with established ASCVD and/or severe TOD: <ul style="list-style-type: none"><li>• eGFR &lt;45 mL/min/1.73 m<sup>2</sup> irrespective of albuminuria</li><li>• eGFR 45-59 mL/min/1.73 m<sup>2</sup> and microalbuminuria (ACR 30 mg/g – 300 mg/g)</li><li>• Proteinuria (ACR &gt;300 mg/g)</li><li>• Presence of microvascular disease in at least 3 different sites (e.g. microalbuminuria plus retinopathy plus neuropathy)</li></ul>	Very high-risk	Residual 10-year CVD risk estimation after general prevention goals (e.g. with the SMART risk score for established CVD or with the ADVANCE risk score or with the DIAL model). Consider lifetime CVD risk and benefit estimation of risk factor treatment (e.g. DIAL model).
<b>Patients with established ASCVD</b>			
Documented ASCVD, clinical or unequivocal on imaging. Documented clinical ASCVD includes previous AMI, ACS, coronary revascularization and other arterial revascularization procedures, stroke and TIA, aortic aneurysm and PAD. Unequivocally documented ASCVD on imaging includes plaque on coronary angiography or carotid ultrasound or on CTA. It does NOT include some increase in continuous imaging parameters such as intima-media thickness of the carotid artery.	N/A	Very high-risk	Residual CVD risk estimation after general prevention goals (e.g. 10-year risk with the SMART risk score for patients with established CVD or 1- or 2-year risk with EUROASPIRE risk score for patients with CHD). Consider lifetime CVD risk and benefit estimation of risk factor treatment (e.g. SMART-REACH model; or DIAL model if diabetes).

## SAMENVATTING VAN DE 2019 ESC/EAS RICHTLIJNEN VOOR DE BEHANDELING VAN DYSLIPIDEMIE



SABE-ZEN-20.01.0025

\*Vanaf onbehandelde waarde. / \*\*ASCVZ met 2de vasculair event < 2 jaar.  
ASCVZ: Atherosclerotische Cardiovasculaire ziekte.

# RISK evaluation



RISICOBEoordeling	ZEER HOOG RISICO	HOOG RISICO	MATIG RISICO	LAAG RISICO
<b>Cardio-vasculaire voorgeschiedenis</b>	Atherosclerotische CV ziekte (klinisch/beeldvorming)			-
<b>Diabetes</b> Type 2 of Type 1 ouder dan 40 jaar	ASCVD of ernstige doelorgaanschade -eGFR<45 -eGFR 45-59 en ACR 30-300 mg/g -Proteinurie (ACR > 300 mg/g) -Microvasculair lijden in ≥ 3 gebieden*	Geen ASCVD Geen ernstige doelorgaanschade Geen matig risicoprofiel	Korte duur diabetes (< 10 jaar) Geen doelorgaanschade Geen andere ASCVZ risicofactoren	-
<b>Nierfunctie</b>	eGFR <30 eGFR 30-44 en ACR > 30	eGFR 30-44 en ACR<30 mg/g eGFR 45-59 en ACR 30-300 mg/g eGFR ≥ 60 en ACR > 300mg/g	-	-
<b>Erfelijke factor</b>	FH & ASCVZ of andere belangrijke risicofactor	FH zonder andere belangrijke risicofactoren	-	-
<b>Geïsoleerde risicofactoren</b>	-	• BD > 180/110 mmHg <i>of</i> • TC > 310 mg/dL <i>of</i> • LDL-C > 190 mg/dL	-	-

ACR = albumine/creatinine ratio;

\*microvasculair lijden in 3 gebieden: bv microalbuminurie + retinopathie + neuropathie



## bv LDL streefwaarde ifv het CV risico/SCORE 2

				Primaire preventie doelen	Intensere preventiedoelen
SCORE 2		SCORE 2-OP	CV risico	LDL – streefwaarden (mg/dl)	
< 50 jaar	50-69 jaar	≥ 70 jaar		< 100 mg/dl	
<2,5%	<5%	<7,5%	Laag tot gemiddeld	< 100 mg/dl	< 100 mg/dl
2,5 tot <7,5%	5 tot <10%	7,5 tot <15%			< 70 mg/dl en ≥ 50% reductie
≥ 7,5%	≥ 10%	≥ 15%			< 55 mg/dl en ≥ 50% reductie

# Risk modifiers



Psychosocial factors (stress, anxiety, depression)

Ethnicity (e.g. South Asia immigrants)

Family history of premature CVD

Pregnancy complications

Early menopause

Frailty

Socioeconomic determinants

Environmental exposure (e.g. air pollution)

Calcium scoring on CT, Carotid Ultrasound

No routine use for risk stratification:

- Blood or urinary Biomarkers (e.g. hsCRP, apoB,...)
- Genetic risk scores
- Vascular tests or Imaging (ABI, scans (exc. cac)....)

## Recommendations for CVD risk modifiers

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Stress symptoms and psychosocial stressors modify CVD risk. Assessment of these stressors should be considered. <sup>100–102</sup>	IIa	B
CAC scoring may be considered to improve risk classification around treatment decision thresholds. Plaque detection by carotid ultrasound is an alternative when CAC scoring is unavailable or not feasible. <sup>103,104</sup>	IIb	B
Multiplication of calculated risk by RR for specific ethnic subgroups should be considered. <sup>105</sup>	IIa	B
The routine collection of other potential modifiers, such as genetic risk scores, circulating or urinary biomarkers, or vascular tests or imaging methods (other than CAC scoring or carotid ultrasound for plaque determination), is not recommended.	III	B

CVD = cardiovascular disease; CAC = coronary artery calcium; RR = relative risk.

<sup>a</sup>Class of recommendation.

<sup>b</sup>Level of evidence.

# Conditions associated with increased risk



Chronic kidney disease

Atrial fibrillation

Cancer

COPD

Heart failure

Inflammatory conditions (eg rheumatoid arthritis, psoriasis)

Infections (eg HIV)

Migraine with aura

Sleep disorders

Mental disorders

Non-alcoholic fatty liver disease

Sex specific conditions (eg pregnancy induced hypertension, premature menopause, erectile dysfunction)

# Take home messages

Total risk calculation has its place  
in directing a

“Overall Standard” approach → “Patient Specific Tailored” approach

Who will benefit (the most) from preventive pharmacotherapy?

Blood Pressure, Diabetes Mellitus, Lipids, Obesity, Smoking



Ethnicity, Environment, Family history, Frailty, Genetics, Psychosocial & Socioeconomic factors, Biomarkers(?), HMOD, Co-morbidities...

# Take home messages

Total risk calculation has its place

in directing a

“Overall Standard” approach → “Patient Specific Tailored” approach

In apparently healthy people estimate 10 y fatal and non-fatal CV risk with

SCORE 2 in < 70 y

SCORE 2 OP >70 y

Treat ASCVD risk factors if

SCORE 2 > 7,5%      < 50 y

SCORE 2 > 10%      50-69 y

SCORE 2 OP > 15% >70 y

# Take home messages



## We treat people, not risk factors

**Risk factors- Risk qualifiers co-house in a certain person**

Blood Pressure, Diabetes Mellitus, Lipids, Obesity, Smoking

Ethnicity, Environment, Family history, Frailty, Genetics, Psychosocial & Socioeconomic factors, Biomarkers(?),...

An informed discussion about CVD risk and treatment benefits tailored to the needs of the patient

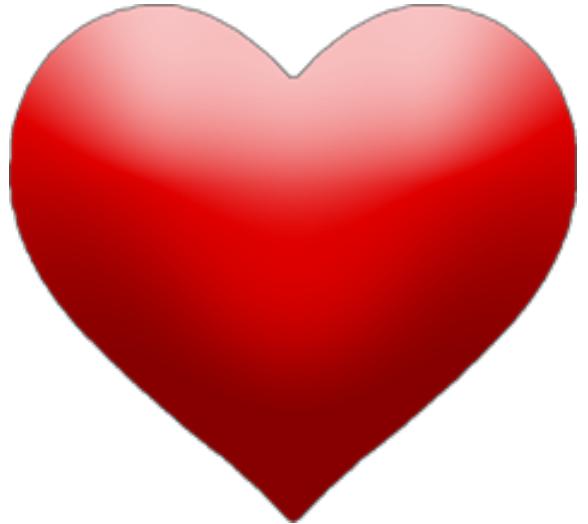
CARDIO  
SCOPIE

**THANK YOU for  
your attention**





**Thank you for your attention**



# Cardiovascular Risk Calculation

- **Standard:** absolute risk of a CVD event in the next 10 years

<http://www.heartscore.org>

<http://www.u-prevent.com>

- **Specific populations or conditions.**

- **Young** people: **lifetime risk:** identify high-risk individuals both in the short and long term.

LIFE-CVD model <http://www.u-prevent.com>

JBS-3 risk calculator <http://www.jbs3risk.com>

ASCVD risk estimator plus <http://tools.acc.org/ASCVD-Risk-Estimator-Plus>

- **Older** persons: often important non-CVD risk which has to be taken into account

- Older Person SCORE

- LIFE-CVD score

- **Relative risk.** How does the risk compare to persons of equal age and sex with better or worse risk profiles.