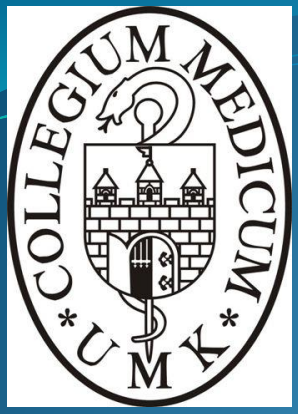


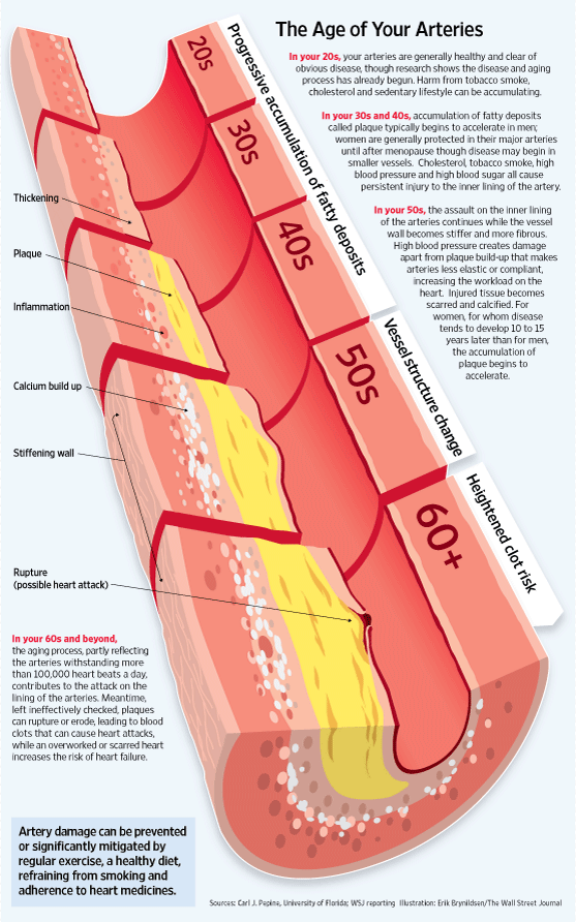
Cardiovascular risk assesment and smoking cessation

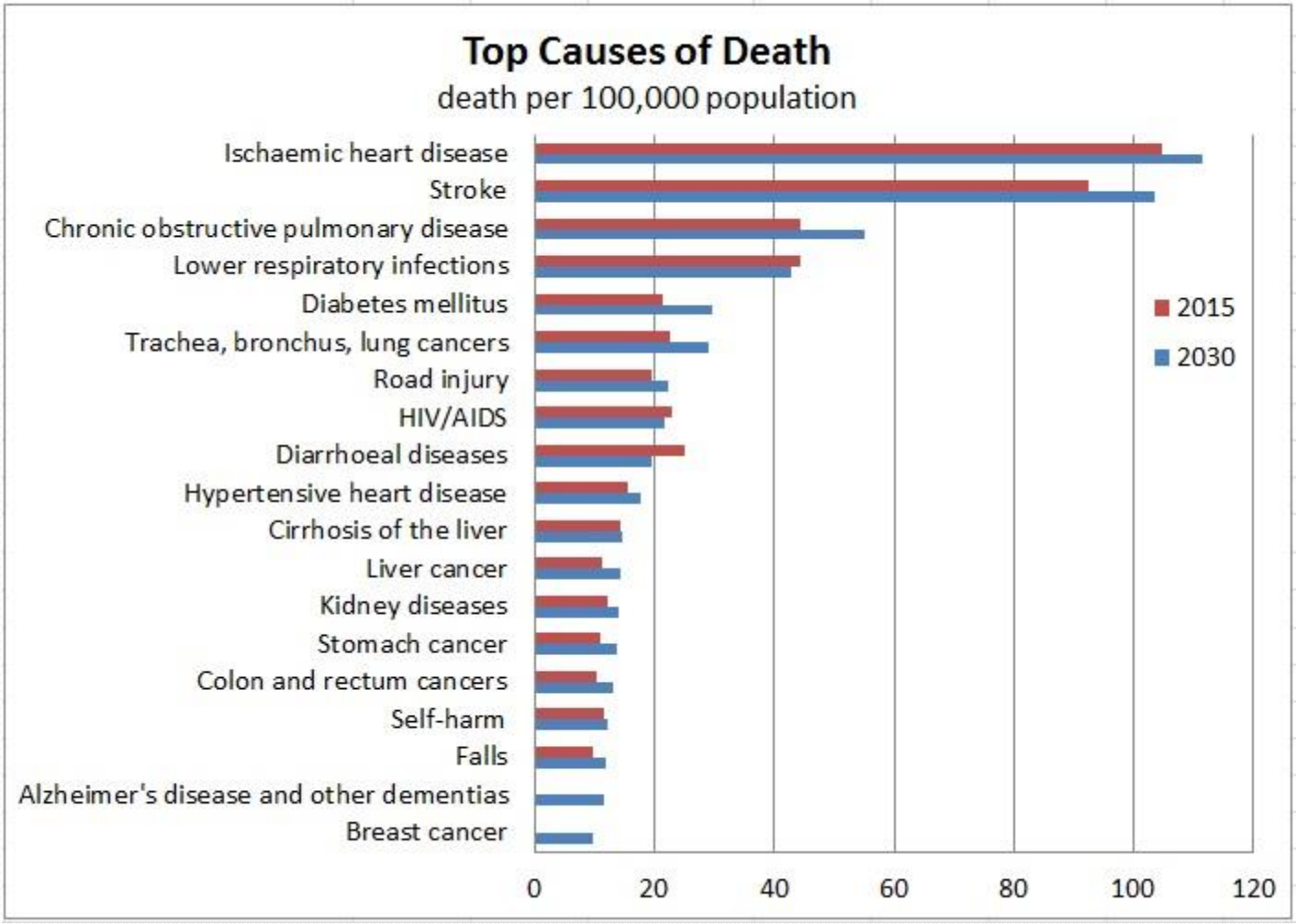
Krzysztof Buczkowski

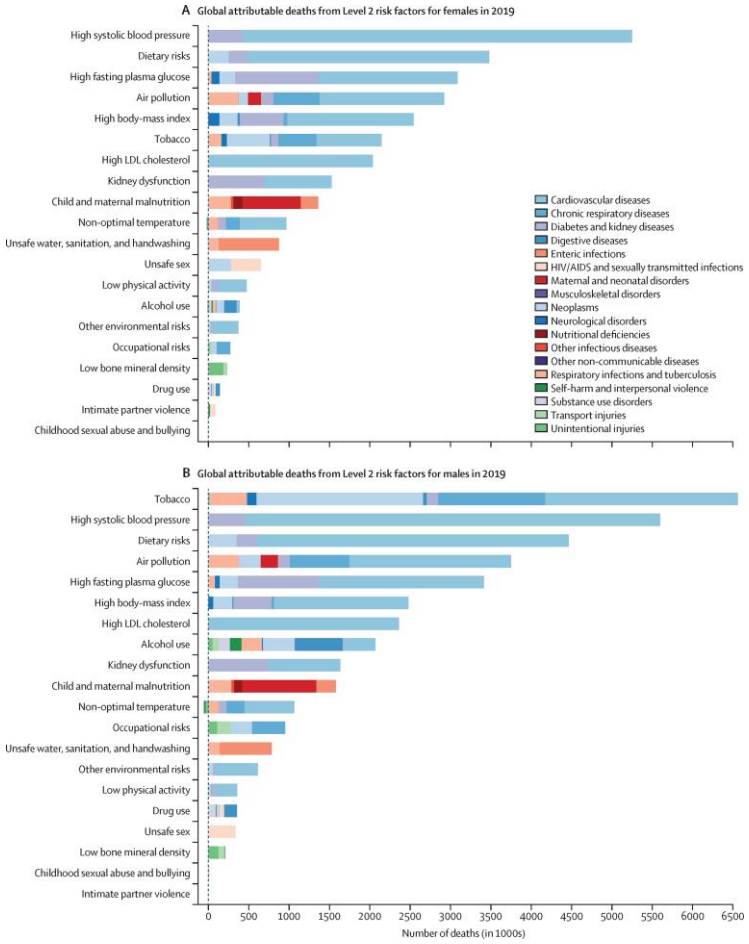
Family Medicine Department

Definition

Cardiovascular risk is defined as the probability of suffering in the future from a cardiovascular event


The Age of Your Arteries
In your 20s, your arteries are generally healthy and clear of obvious disease, though research shows the disease and aging process has already begun. Harm from tobacco smoke, cholesterol and sedentary lifestyle can be accumulating.
In your 30s and 40s, accumulation of fatty deposits called plaque typically begins to accelerate in men; women are generally protected in their major arteries until after menopause though disease may begin in smaller vessels. Cholesterol, tobacco smoke, high blood pressure and high blood sugar all cause persistent injury to the inner lining of the artery.
In your 50s, the assault on the inner lining of the arteries continues while the vessel wall becomes stiffer and more fibrous. High blood pressure creates damage apart from plaque build-up that makes arteries less elastic or compliant, increasing the workload on the heart. Injured tissue becomes scarred and calcified. For women, for whom disease tends to develop 10 to 15 years later than for men, the accumulation of plaque begins to accelerate.
20s
30s
40s
50s
60+
Progressive accumulation of fatty deposits
Vessel structure change
Heightened clot risk
Thickening
Plaque
Inflammation
Calcium build up
Stiffening wall
Rupture (possible heart attack)
In your 60s and beyond, the aging process, partly reflecting the arteries withstanding more than 100,000 heart beats a day, contributes to the attack on the lining of the arteries. Meantime, left ineffectively checked, plaques can rupture or erode, leading to blood clots that can cause heart attacks, while an overworked or scarred heart increases the risk of heart failure.
Artery damage can be prevented or significantly mitigated by regular exercise, a healthy diet, refraining from smoking and adherence to heart medicines.
Sources: Carl J. Pepine, University of Florida; WSJ reporting Illustration: Erik Brynildsen/The Wall Street Journal


Top Causes of Death
death per 100,000 population
Ischaemic heart disease
Stroke
Chronic obstructive pulmonary disease
Lower respiratory infections
Diabetes mellitus
Trachea, bronchus, lung cancers
Road injury
HIV/AIDS
Diarrhoeal diseases
Hypertensive heart disease
Cirrhosis of the liver
Liver cancer
Kidney diseases
Stomach cancer
Colon and rectum cancers
Self-harm
Falls
Alzheimer's disease and other dementias
Breast cancer
0
20
40
60
80
100
120
2015
2030


A Global attributable deaths from Level 2 risk factors for females in 2019
High systolic blood pressure
Dietary risks
High fasting plasma glucose
Air pollution
High body-mass index
Tobacco
High LDL cholesterol
Kidney dysfunction
Child and maternal malnutrition
Non-optimal temperature
Unsafe water, sanitation, and handwashing
Unsafe sex
Low physical activity
Alcohol use
Other environmental risks
Occupational risks
Low bone mineral density
Drug use
Intimate partner violence
Childhood sexual abuse and bullying
Cardiovascular diseases
Chronic respiratory diseases
Diabetes and kidney diseases
Digestive diseases
Enteric infections
HIV/AIDS and sexually transmitted infections
Maternal and neonatal disorders
Musculoskeletal disorders
Neoplasms
Neurological disorders
Nutritional deficiencies
Other infectious diseases
Other non-communicable diseases
Respiratory infections and tuberculosis
Self-harm and interpersonal violence
Substance use disorders
Transport injuries
Unintentional injuries
B Global attributable deaths from Level 2 risk factors for males in 2019
Tobacco
High systolic blood pressure
Dietary risks
Air pollution
High fasting plasma glucose
High body-mass index
High LDL cholesterol
Alcohol use
Kidney dysfunction
Child and maternal malnutrition
Non-optimal temperature
Occupational risks
Unsafe water, sanitation, and handwashing
Other environmental risks
Low physical activity
Drug use
Unsafe sex
Low bone mineral density
Childhood sexual abuse and bullying
Intimate partner violence
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
Number of deaths (in 1000s)

Risk categories

- Low
- Moderate
- High
- Very high

Patient categories

- aparently healthy people
- CKD
- familial hipercholesterolemia
- DM
- Patients with established ASCVD

Patient categories and associated cardiovascular disease risk (1)

Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
Apparently healthy persons			
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.
Patients with CKD			
CKD without diabetes or ASCVD	Moderate CKD (eGFR 30–44 mL/min/1.73 m^2 and ACR <30 mg/g **or** eGFR 45–59 mL/min/1.73 m^2 and ACR 30 mg/g –300 mg/g **or** eGFR ≥60 mL/min/1.73 m^2 and ACR >300 mg/g)	High-risk	N/A
	Severe CKD (eGFR <30 mL/min/1.73 m^2 **or** eGFR 30–44 mL/min/1.73 m^2 and ACR >30 mg/g)	Very high-risk	N/A
Familial Hypercholesterolemia			
Associated with markedly elevated cholesterol levels	N/A	High-risk	N/A
Patients with type 2 diabetes mellitus			
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).

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Patient categories and associated cardiovascular disease risk (2)

Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
Patients with type 2 diabetes mellitus (continued)			
	Patients with DM with established ASCVD and/or severe TOD: • eGFR <45 mL/min/1.73 m² irrespective of albuminuria • eGFR 45-59 mL/min/1.73 m² and microalbuminuria (ACR 30 mg/g – 300 mg/g) • Proteinuria (ACR >300 mg/g) • Presence of microvascular disease in at least 3 different sites (e.g. microalbuminuria plus retinopathy plus neuropathy)	**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).
Patients with established ASCVD			
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).

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Apparently healthy persons

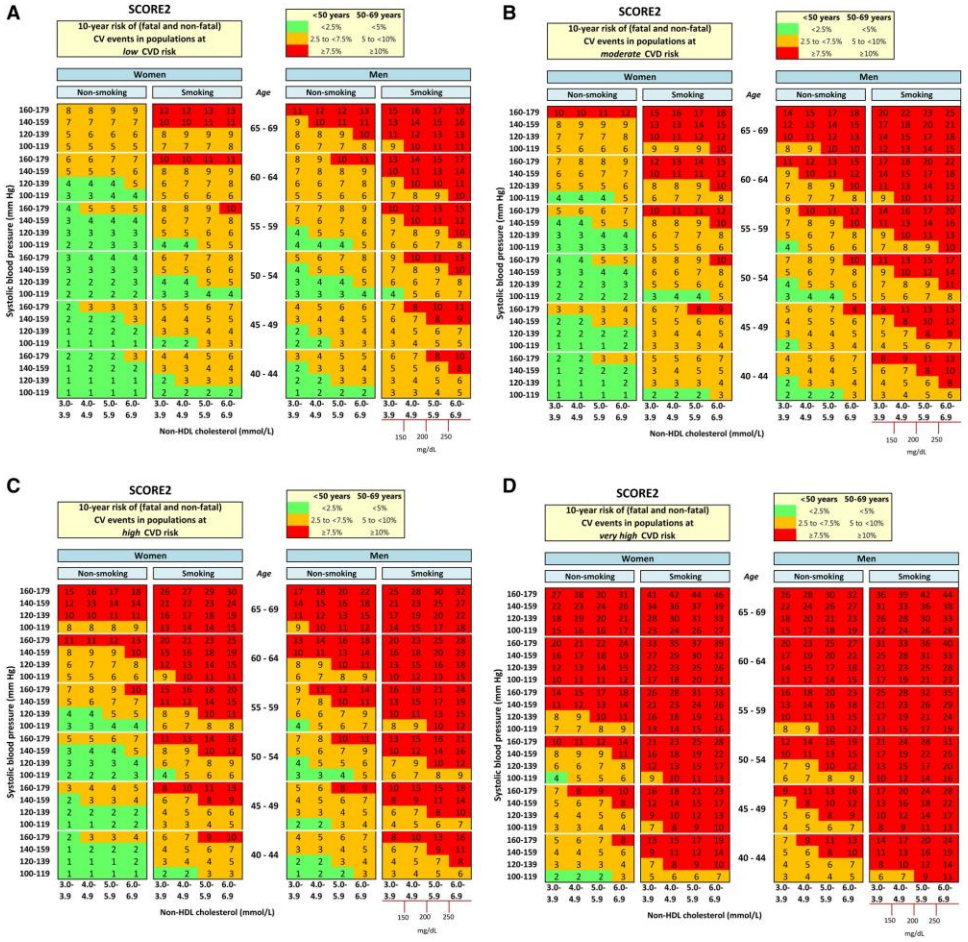
Persons without established ASCVD, diabetes mellitus, CKD, Familial Hypercholesterolemia

- in apparently healthy people aged 40-69 years it is recommended to estimate the 10-year total atherosclerotic cardiovascular disease (ASCVD) risk with the SCORE 2 model
- in those aged ≥70 years with the SCORE 2 O.P. model.

Variables for SCORE2 & SCORE2-OP

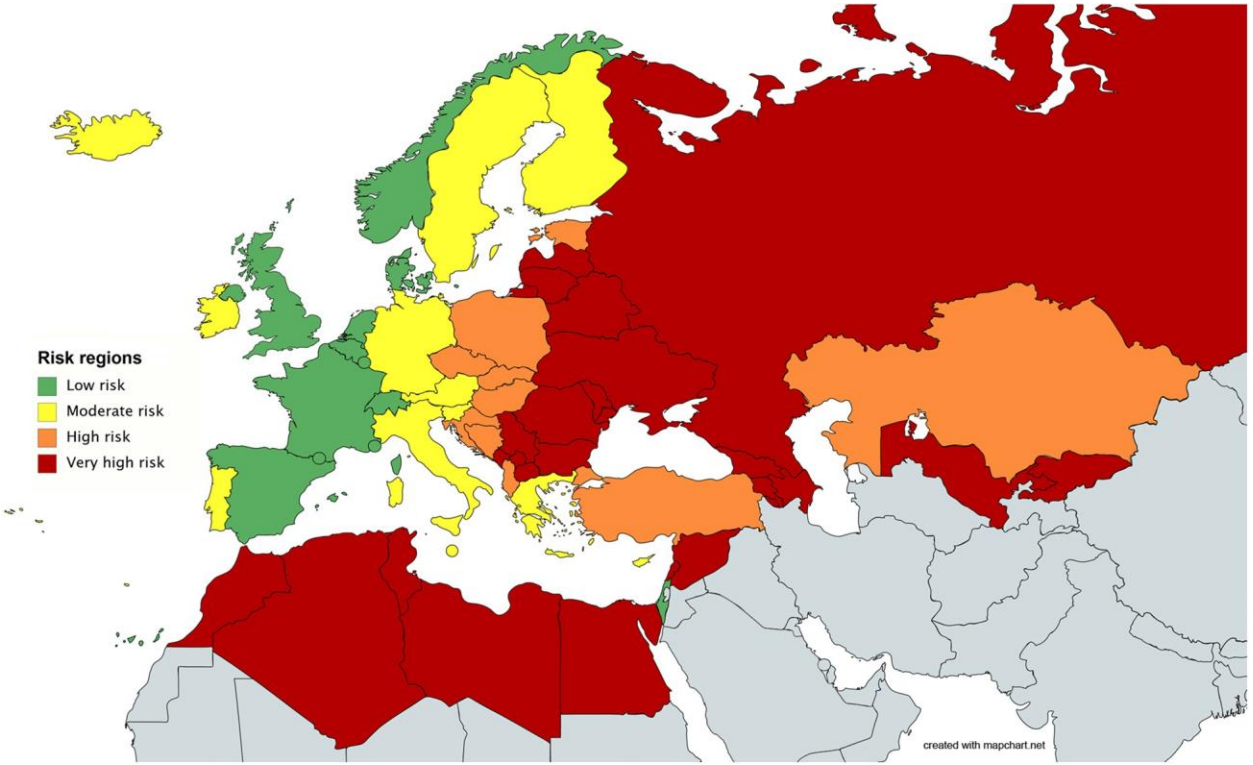
- Age
- Gender
- Smoking status
- Systolic blood pressure
- Non HDL cholesterol

Figure 3 SCORE2 charts for estimation of CVD risk in four European risk regions.



Eur Heart J, Volume 42, Issue 25, 1 July 2021, Pages 2439–2454, https://doi.org/10.1093/eurheartj/ehab309

Figure 2 Risk regions based on standardised cardiovascular disease mortality rates. Countries were grouped into four ...



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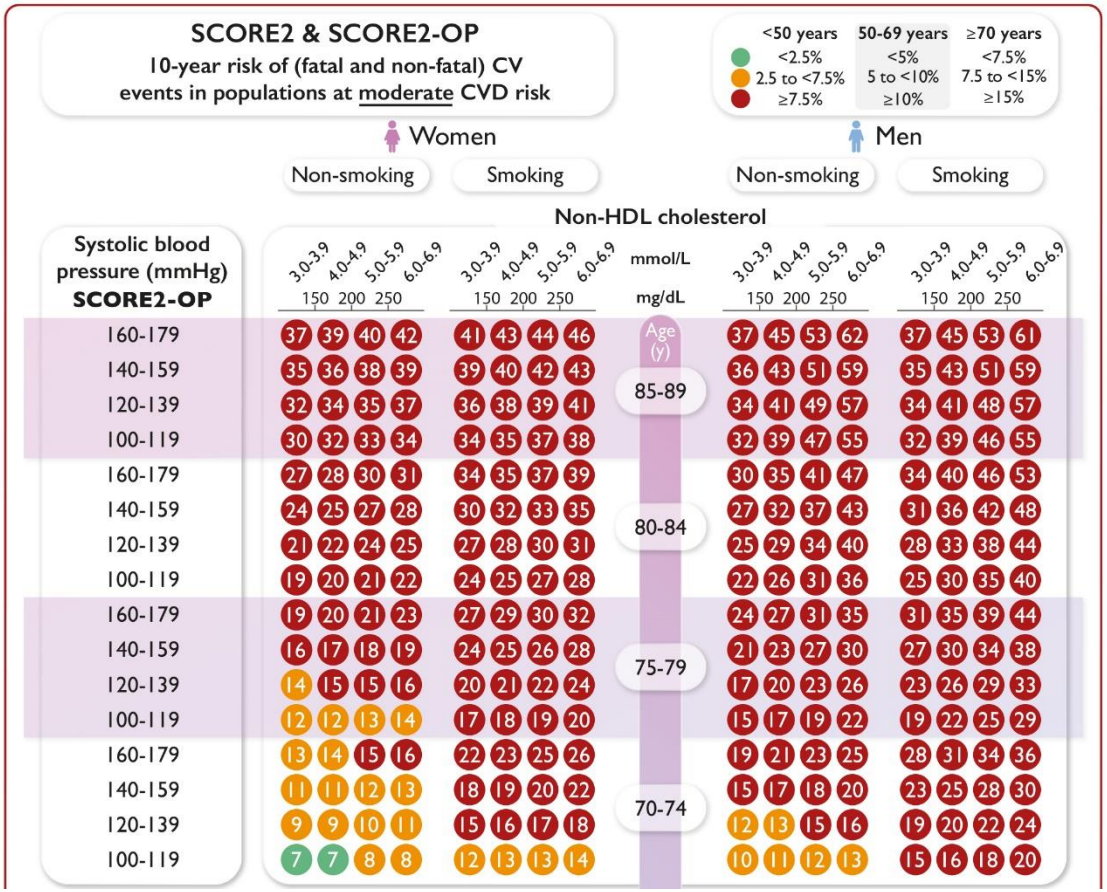

SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

Moderate CVD Risk (1)

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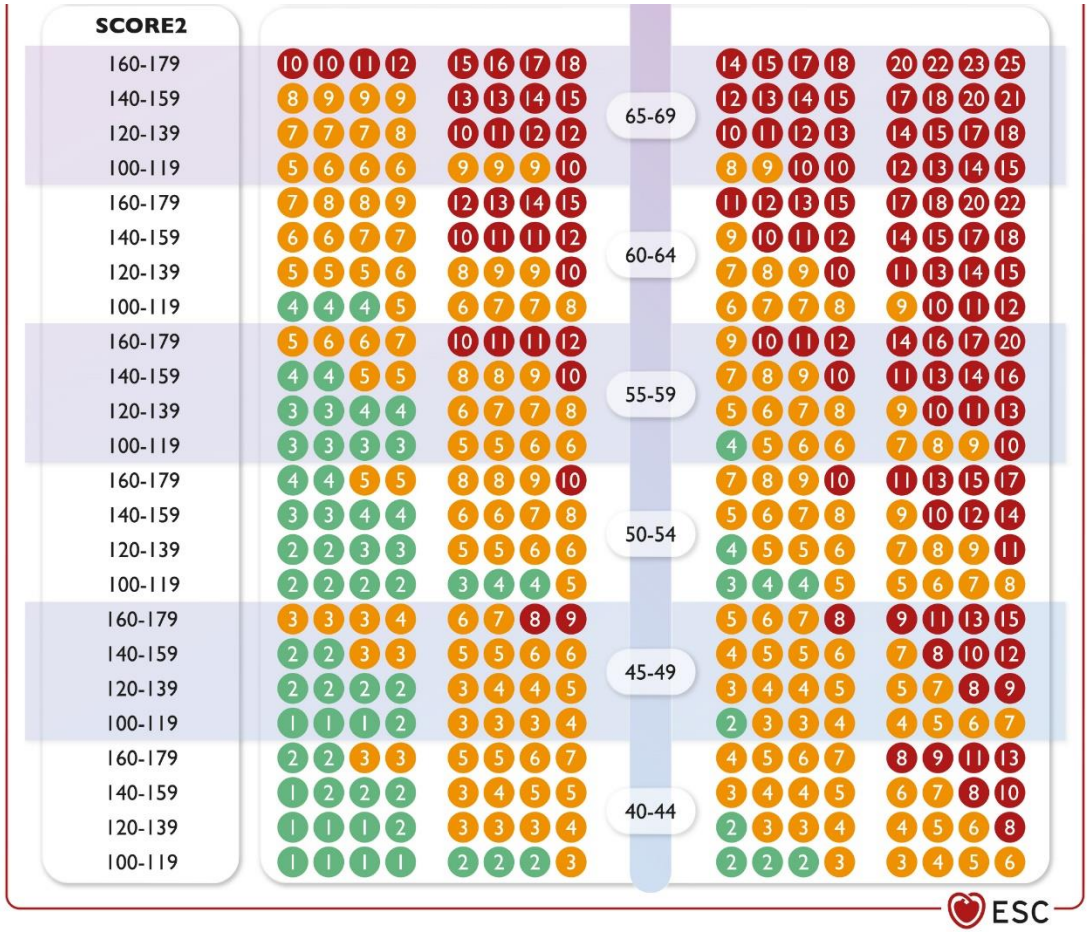

SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

Moderate CVD Risk (2)

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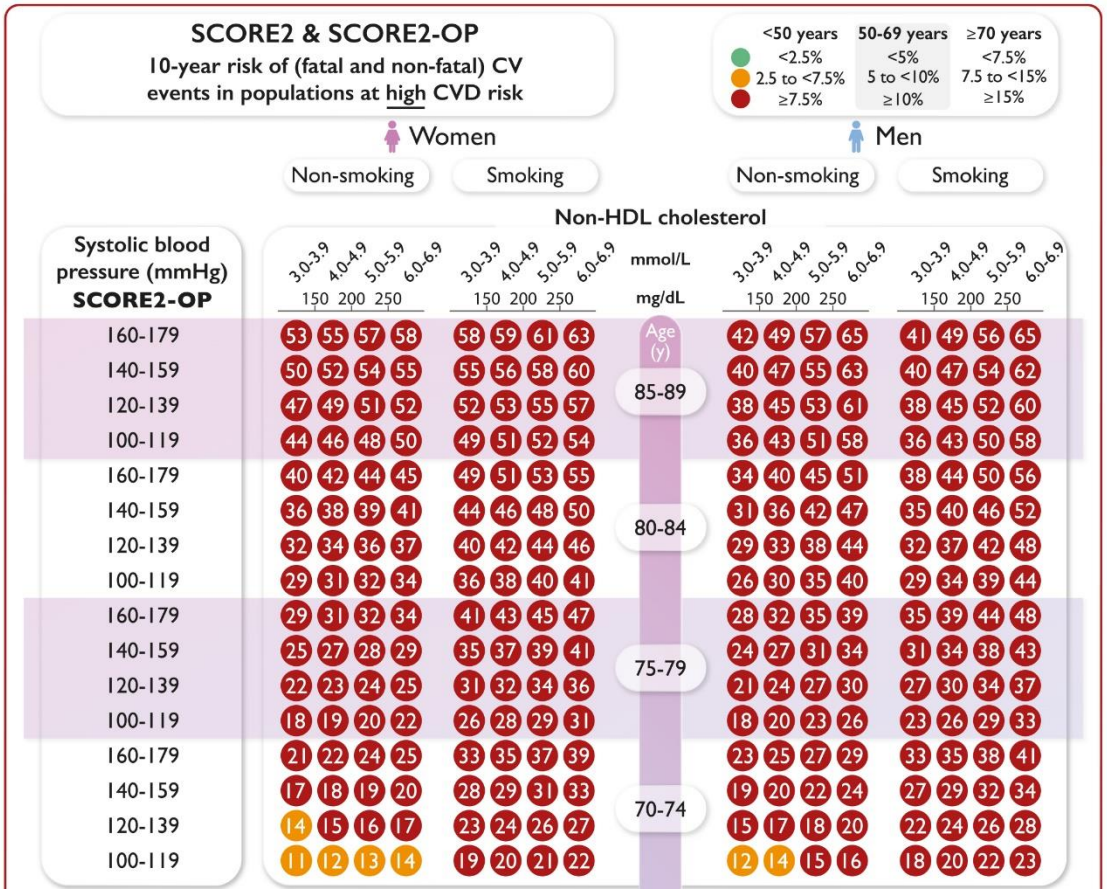

SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

High CVD Risk (1)

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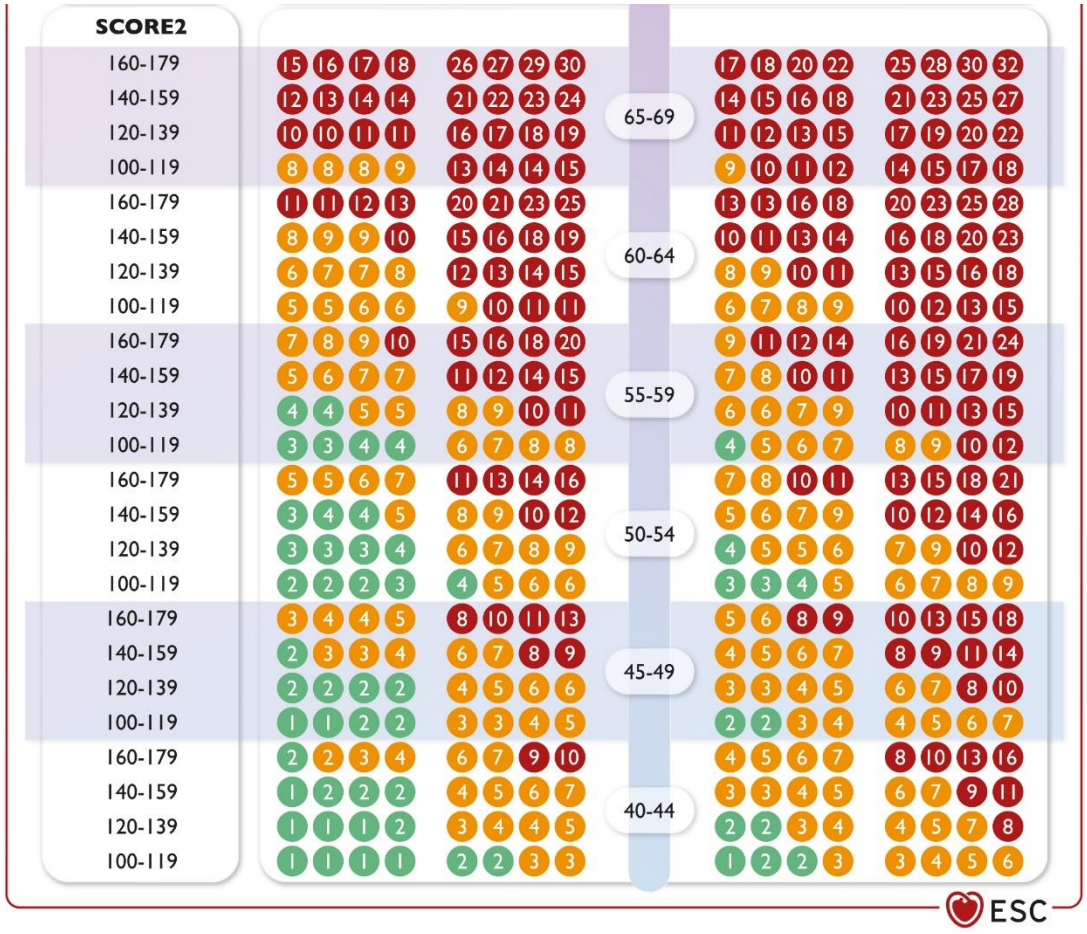

SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD

High CVD Risk (2)

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(European Heart Journal 2021 – doi:10.1093/eurheartj/ehab484)

Patient categories and associated cardiovascular disease risk (1)

Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
Apparently healthy persons			
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.
Patients with CKD			
CKD without diabetes or ASCVD	Moderate CKD (eGFR 30–44 mL/min/1.73 m^2 and ACR <30 mg/g **or** eGFR 45–59 mL/min/1.73 m^2 and ACR 30 mg/g –300 mg/g **or** eGFR ≥60 mL/min/1.73 m^2 and ACR >300 mg/g)	High-risk	N/A
	Severe CKD (eGFR <30 mL/min/1.73 m^2 **or** eGFR 30–44 mL/min/1.73 m^2 and ACR >30 mg/g)	Very high-risk	N/A
Familial Hypercholesterolemia			
Associated with markedly elevated cholesterol levels	N/A	High-risk	N/A
Patients with type 2 diabetes mellitus			
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).

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Patient categories and associated cardiovascular disease risk (2)

Patient category	Subgroups	Risk categories	CVD risk and therapy benefit estimation
Patients with type 2 diabetes mellitus (continued)			
	Patients with DM with established ASCVD and/or severe TOD: • eGFR <45 mL/min/1.73 m² irrespective of albuminuria • eGFR 45-59 mL/min/1.73 m² and microalbuminuria (ACR 30 mg/g – 300 mg/g) • Proteinuria (ACR >300 mg/g) • Presence of microvascular disease in at least 3 different sites (e.g. microalbuminuria plus retinopathy plus neuropathy)	**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).
Patients with established ASCVD			
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).

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Treatment goals for different patient categories (1)

Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals[a] (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[b] LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated[b] 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[b] LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated[b] 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[b] 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[b] 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[b] 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*)

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice
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Treatment goals for different patient categories (2)

Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals[a] (STEP 2)
People with type 2 DM		
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[b] LDL-C <2.6 mmol/L (100 mg/dL) HbA1c <53 mmol/mol (7.0%)	SBP <130 mmHg if tolerated[b] 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[b] 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[b] LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction SGLT2 inhibitor or GLP-1RA if not already on *May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.*
Patients with established ASCVD	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] 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[b] LDL-C <1.4 mmol/L and ≥50% reduction (55 mg/dL) *May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.*

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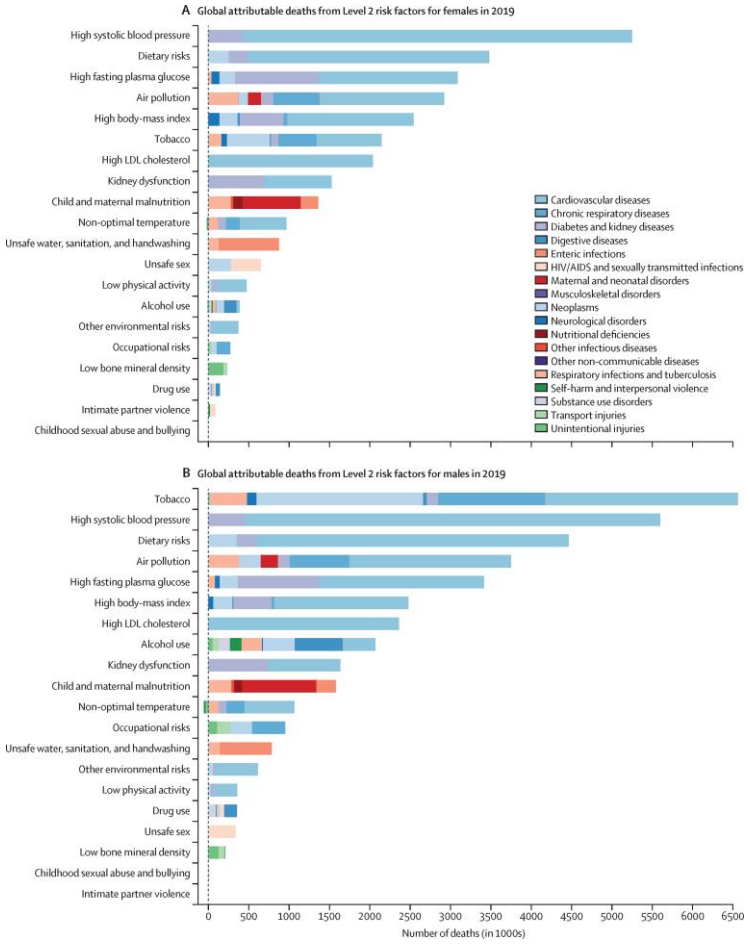
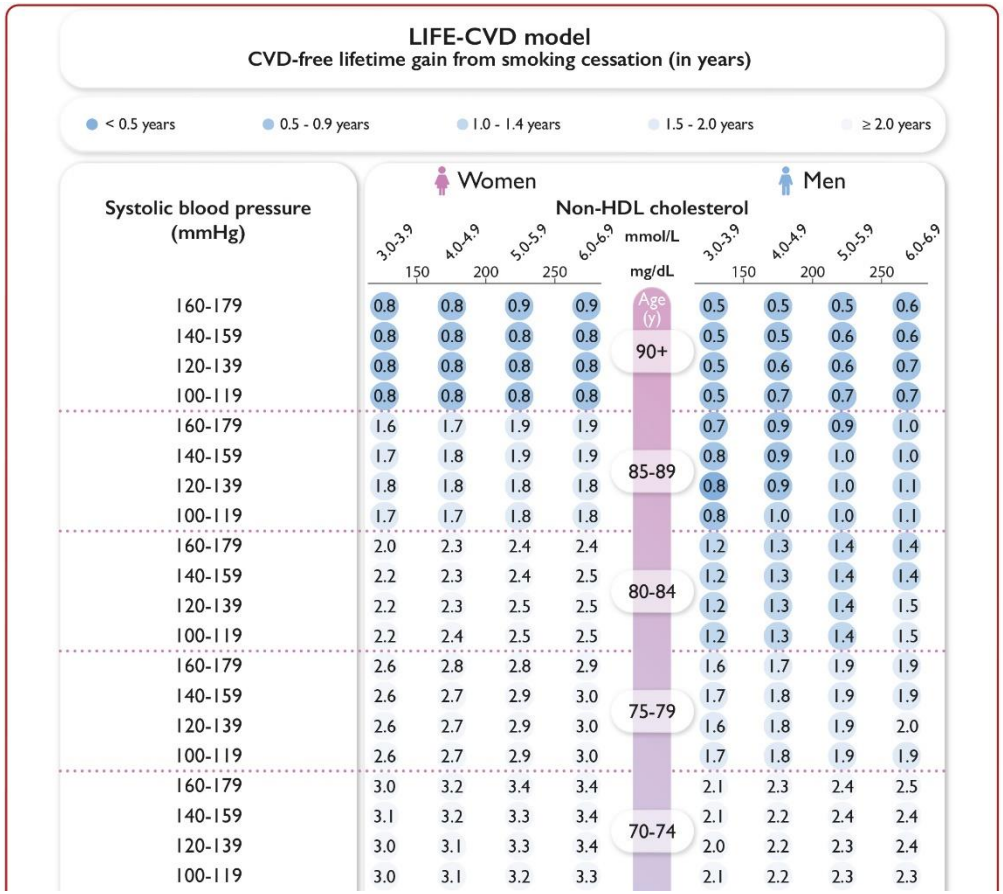

A Global attributable deaths from Level 2 risk factors for females in 2019
High systolic blood pressure
Dietary risks
High fasting plasma glucose
Air pollution
High body-mass index
Tobacco
High LDL cholesterol
Kidney dysfunction
Child and maternal malnutrition
Non-optimal temperature
Unsafe water, sanitation, and handwashing
Unsafe sex
Low physical activity
Alcohol use
Other environmental risks
Occupational risks
Low bone mineral density
Drug use
Intimate partner violence
Childhood sexual abuse and bullying
Cardiovascular diseases
Chronic respiratory diseases
Diabetes and kidney diseases
Digestive diseases
Enteric infections
HIV/AIDS and sexually transmitted infections
Maternal and neonatal disorders
Musculoskeletal disorders
Neoplasms
Neurological disorders
Nutritional deficiencies
Other infectious diseases
Other non-communicable diseases
Respiratory infections and tuberculosis
Self-harm and interpersonal violence
Substance use disorders
Transport injuries
Unintentional injuries
B Global attributable deaths from Level 2 risk factors for males in 2019
Tobacco
High systolic blood pressure
Dietary risks
Air pollution
High fasting plasma glucose
High body-mass index
High LDL cholesterol
Alcohol use
Kidney dysfunction
Child and maternal malnutrition
Non-optimal temperature
Occupational risks
Unsafe water, sanitation, and handwashing
Other environmental risks
Low physical activity
Drug use
Unsafe sex
Low bone mineral density
Childhood sexual abuse and bullying
Intimate partner violence
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
Number of deaths (in 1000s)

Overview

- Tobacco use is the leading cause of death in the world
- Smokers die an average of 13 or 14 years earlier than nonsmokers, and 50% of continuing smokers will die of a tobacco-related disease.
- Smoking is responsible for 40% of all deaths from cancer and 21% of deaths from cardiovascular disease.
- Almost 10% of deaths attributable to smoking occur in nonsmokers exposed to secondhand smoke.
- Toxins from cigarette smoke cause disease in most organs of the body.



LIFE-CVD model
CVD-free lifetime gain from smoking cessation (in years)

< 0.5 years | 0.5 - 0.9 years | 1.0 - 1.4 years | 1.5 - 2.0 years | ≥ 2.0 years

Systolic blood pressure (mmHg)	Women Non-HDL cholesterol mmol/L 3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	mg/dL 150	200	250	Age (y)	Men 3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9
160-179	0.8	0.8	0.9	0.9					0.5	0.5	0.5	0.6
140-159	0.8	0.8	0.8	0.8				90+	0.5	0.5	0.6	0.6
120-139	0.8	0.8	0.8	0.8					0.5	0.6	0.6	0.7
100-119	0.8	0.8	0.8	0.8					0.5	0.7	0.7	0.7
160-179	1.6	1.7	1.9	1.9					0.7	0.9	0.9	1.0
140-159	1.7	1.8	1.9	1.9				85-89	0.8	0.9	1.0	1.0
120-139	1.8	1.8	1.8	1.8					0.8	0.9	1.0	1.1
100-119	1.7	1.7	1.8	1.8					0.8	1.0	1.0	1.1
160-179	2.0	2.3	2.4	2.4					1.2	1.3	1.4	1.4
140-159	2.2	2.3	2.4	2.5				80-84	1.2	1.3	1.4	1.4
120-139	2.2	2.3	2.5	2.5					1.2	1.3	1.4	1.5
100-119	2.2	2.4	2.5	2.5					1.2	1.3	1.4	1.5
160-179	2.6	2.8	2.8	2.9					1.6	1.7	1.9	1.9
140-159	2.6	2.7	2.9	3.0				75-79	1.7	1.8	1.9	1.9
120-139	2.6	2.7	2.9	3.0					1.6	1.8	1.9	2.0
100-119	2.6	2.7	2.9	3.0					1.7	1.8	1.9	1.9
160-179	3.0	3.2	3.4	3.4					2.1	2.3	2.4	2.5
140-159	3.1	3.2	3.3	3.4				70-74	2.1	2.2	2.4	2.4
120-139	3.0	3.1	3.3	3.4					2.0	2.2	2.3	2.4
100-119	3.0	3.1	3.2	3.3					2.1	2.2	2.3	2.3

Lifetime CVD benefit from smoking cessation for apparently healthy persons (1)

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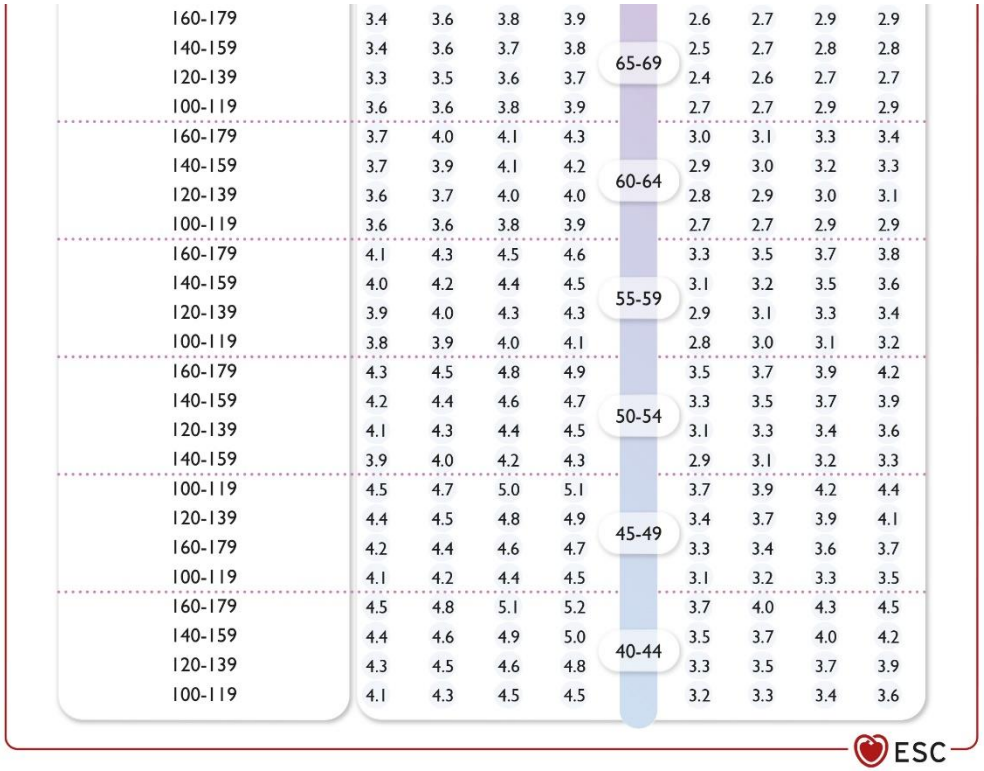


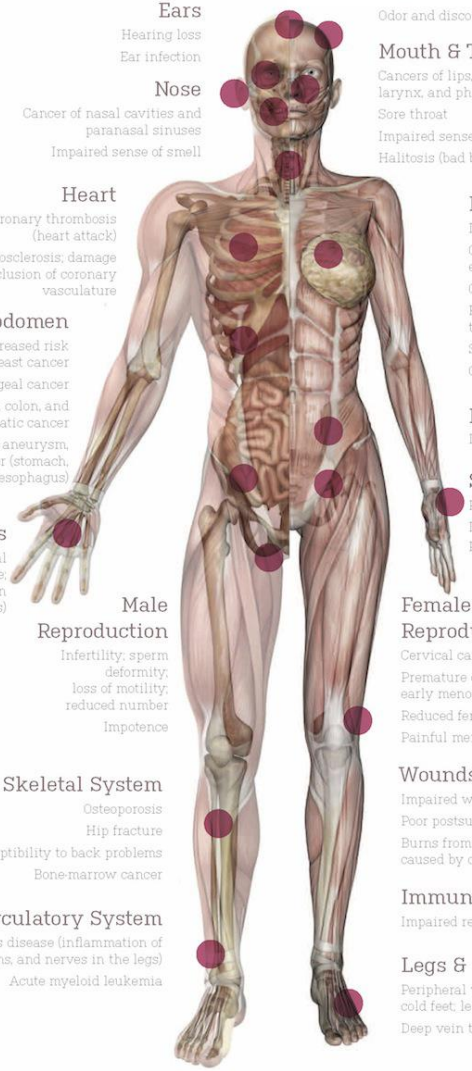
160-179	3.4	3.6	3.8	3.9	65-69	2.6	2.7	2.9	2.9
140-159	3.4	3.6	3.7	3.8		2.5	2.7	2.8	2.8
120-139	3.3	3.5	3.6	3.7		2.4	2.6	2.7	2.7
100-119	3.6	3.6	3.8	3.9		2.7	2.7	2.9	2.9
160-179	3.7	4.0	4.1	4.3	60-64	3.0	3.1	3.3	3.4
140-159	3.7	3.9	4.1	4.2		2.9	3.0	3.2	3.3
120-139	3.6	3.7	4.0	4.0		2.8	2.9	3.0	3.1
100-119	3.6	3.6	3.8	3.9		2.7	2.7	2.9	2.9
160-179	4.1	4.3	4.5	4.6	55-59	3.3	3.5	3.7	3.8
140-159	4.0	4.2	4.4	4.5		3.1	3.2	3.5	3.6
120-139	3.9	4.0	4.3	4.3		2.9	3.1	3.3	3.4
100-119	3.8	3.9	4.0	4.1		2.8	3.0	3.1	3.2
160-179	4.3	4.5	4.8	4.9	50-54	3.5	3.7	3.9	4.2
140-159	4.2	4.4	4.6	4.7		3.3	3.5	3.7	3.9
120-139	4.1	4.3	4.4	4.5		3.1	3.3	3.4	3.6
140-159	3.9	4.0	4.2	4.3		2.9	3.1	3.2	3.3
100-119	4.5	4.7	5.0	5.1	45-49	3.7	3.9	4.2	4.4
120-139	4.4	4.5	4.8	4.9		3.4	3.7	3.9	4.1
160-179	4.2	4.4	4.6	4.7		3.3	3.4	3.6	3.7
100-119	4.1	4.2	4.4	4.5		3.1	3.2	3.3	3.5
160-179	4.5	4.8	5.1	5.2	40-44	3.7	4.0	4.3	4.5
140-159	4.4	4.6	4.9	5.0		3.5	3.7	4.0	4.2
120-139	4.3	4.5	4.6	4.8		3.3	3.5	3.7	3.9
100-119	4.1	4.3	4.5	4.5		3.2	3.3	3.4	3.6

ESC

Lifetime CVD benefit from smoking cessation for apparently healthy persons (2)

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice
(European Heart Journal 2021 – doi:10.1093/eurheartj/ehab484)

How Tobacco Harms You



Eyes
Blindness (macular degeneration)
Cataracts
Stinging, excessive tearing and blinking

Ears
Hearing loss
Ear infection

Nose
Cancer of nasal cavities and paranasal sinuses
Impaired sense of smell

Heart
Coronary thrombosis (heart attack)
Atherosclerosis; damage and occlusion of coronary vasculature

Chest & Abdomen
Possible increased risk of breast cancer
Esophageal cancer
Gastric, colon, and pancreatic cancer
Abdominal aortic aneurysm, peptic ulcer (stomach, duodenum, and esophagus)

Hands
Peripheral vascular disease; poor circulation (cold fingers)

Male Reproduction
Infertility; sperm deformity; loss of motility; reduced number
Impotence

Skeletal System
Osteoporosis
Hip fracture
Susceptibility to back problems
Bone-marrow cancer

Circulatory System
Buerger's disease (inflammation of arteries, veins, and nerves in the legs)
Acute myeloid leukemia

Brain & Psyche
Stroke (cerebrovascular accident)
Addiction/withdrawal
Altered brain chemistry
Anxiety about tobacco's health effects

Hair
Odor and discoloration

Mouth & Throat
Cancers of lips, mouth, throat, larynx, and pharynx
Sore throat
Impaired sense of taste
Halitosis (bad breath)

Teeth
Periodontal (gum) disease; gingivitis; periodontitis
Loose teeth, tooth loss
Root-surface caries, plaque
Discoloration and staining

Lungs
Lung, bronchus, and tracheal cancer
Chronic obstructive pulmonary disease (COPD); emphysema
Chronic bronchitis
Respiratory infection; influenza; pneumonia; tuberculosis
Shortness of breath; asthma
Chronic cough; excessive sputum production

Liver
Liver cancer

Kidneys & Bladder
Kidney and bladder cancer

Skin
Psoriasis
Loss of skin tone; wrinkling; premature aging

Female Reproduction
Cervical cancer
Premature ovarian failure; early menopause
Reduced fertility
Painful menstruation

Wounds & Surgery
Impaired wound healing
Poor postsurgical recovery
Burns from cigarettes and from fires caused by cigarettes

Immune System
Impaired resistance to infection

Legs & Feet
Peripheral vascular disease; cold feet; leg pain; gangrene
Deep vein thrombosis (DVT)

source: Tobacco Atlas, 4th edition; tobaccoatlas.org

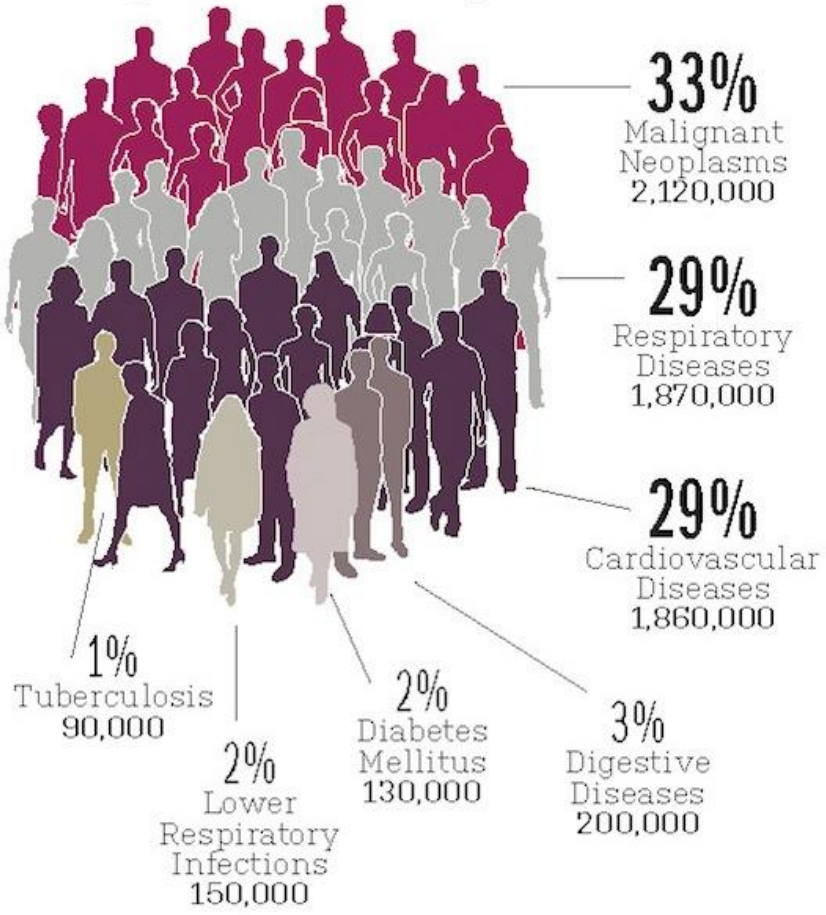
Health Risks Associated with Smoking

- Atherosclerosis- abdominal aortic aneurysm, subclinical atherosclerosis, stroke (cerebrovascular accident), coronary heart disease
- Cancer of the bladder, cervix, esophagus, kidney, larynx, lung, oral cavity, pharynx, pancreas, stomach
- Chronic obstructive pulmonary disease (COPD) acute respiratory infections, including pneumonia

Projected Global Tobacco-Caused Deaths

By cause, 2015 baseline scenario

Totals might not sum due to rounding.



source: Tobacco Atlas, 4th edition; tobaccoatlas.org

Health Risks Associated with Smoking

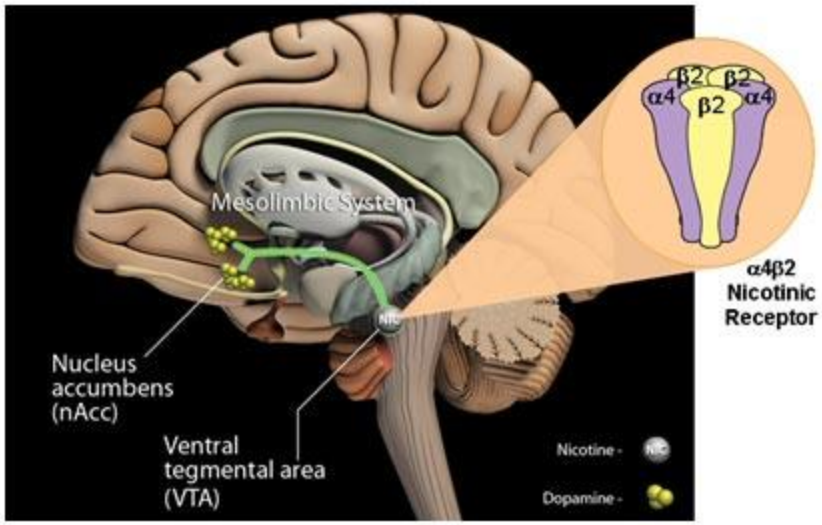
- Fetal growth restriction and low birth weight
- Preterm delivery and shortened gestation
- Sudden infant death syndrome (SIDS)
- Reduced lung function in infants
- Impaired lung growth during childhood and adolescence
- Respiratory symptoms in children and adolescents, including cough, phlegm, wheezing, and dyspnea
- Asthma-related symptoms (e.g., wheezing) in childhood and adolescence

Health Risks Associated with Smoking

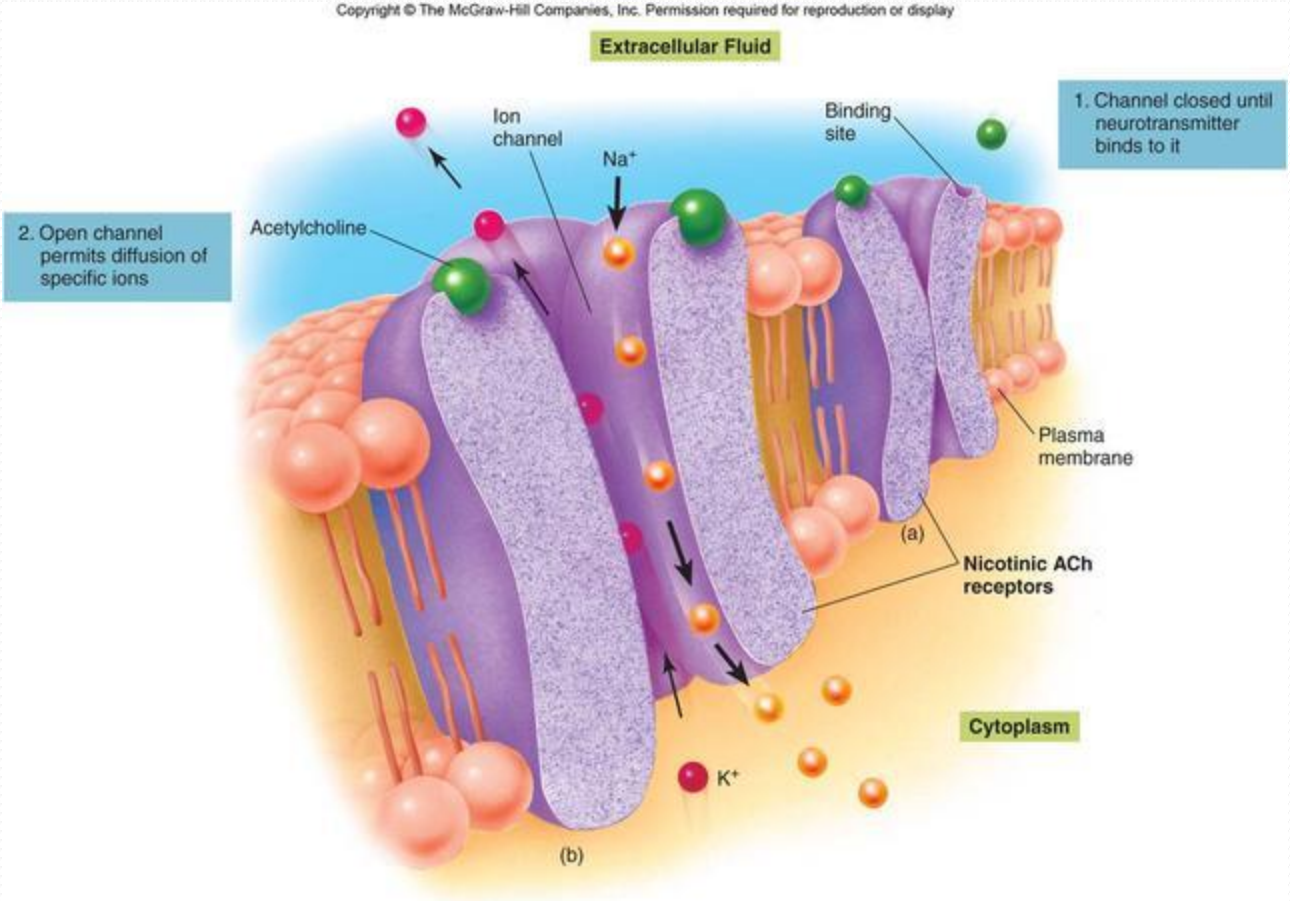
- Low bone density in postmenopausal women
- Hip fractures
- Macular degeneration (AMD)
- Cataracts

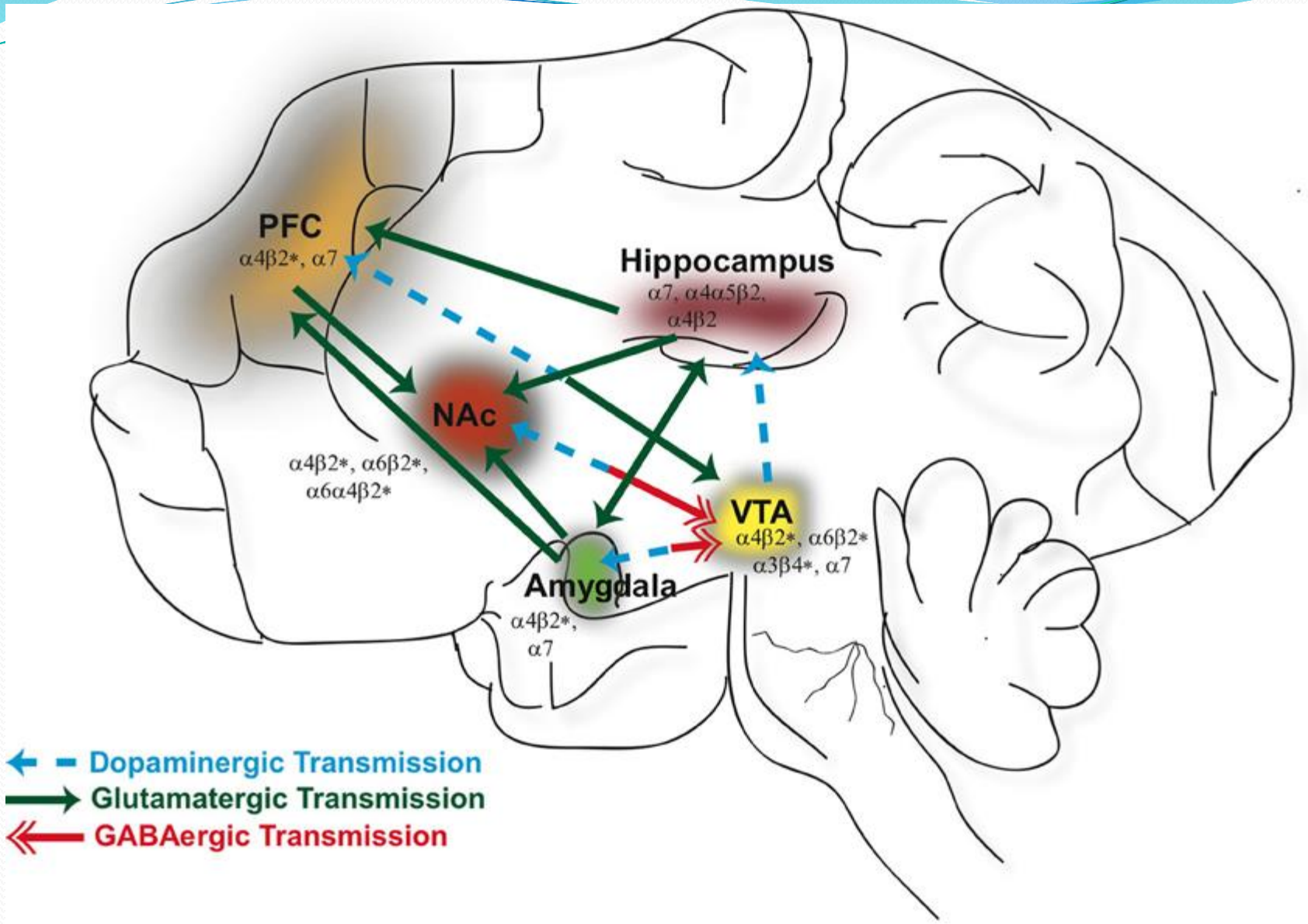
Passive (Involuntary) Smoking

- Secondhand smoke contains 4000 different chemicals, of which more than 60 are carcinogenic.
- About one third of lung cancers occur in nonsmokers who live with a smoker or work in a smoky environment.
- Passive smoking is the third leading preventable cause of death, after alcohol and smoking itself.
- Passive smoking increases the risk of SIDS in infants and otitis media, cancer, and respiratory disease in older children, in direct proportion to smoke exposure.



- Nicotine binds predominantly to nicotinic acetylcholine (nACh) receptors in the CNS; the primary is the α4β2 nicotinic receptor in the Ventral Tegmental Area (VTA)
- After nicotine binds to the α4β2 nicotinic receptor in the VTA, it results in a release of dopamine in the Nucleus Accumbuns (nAcc) which is linked to reward

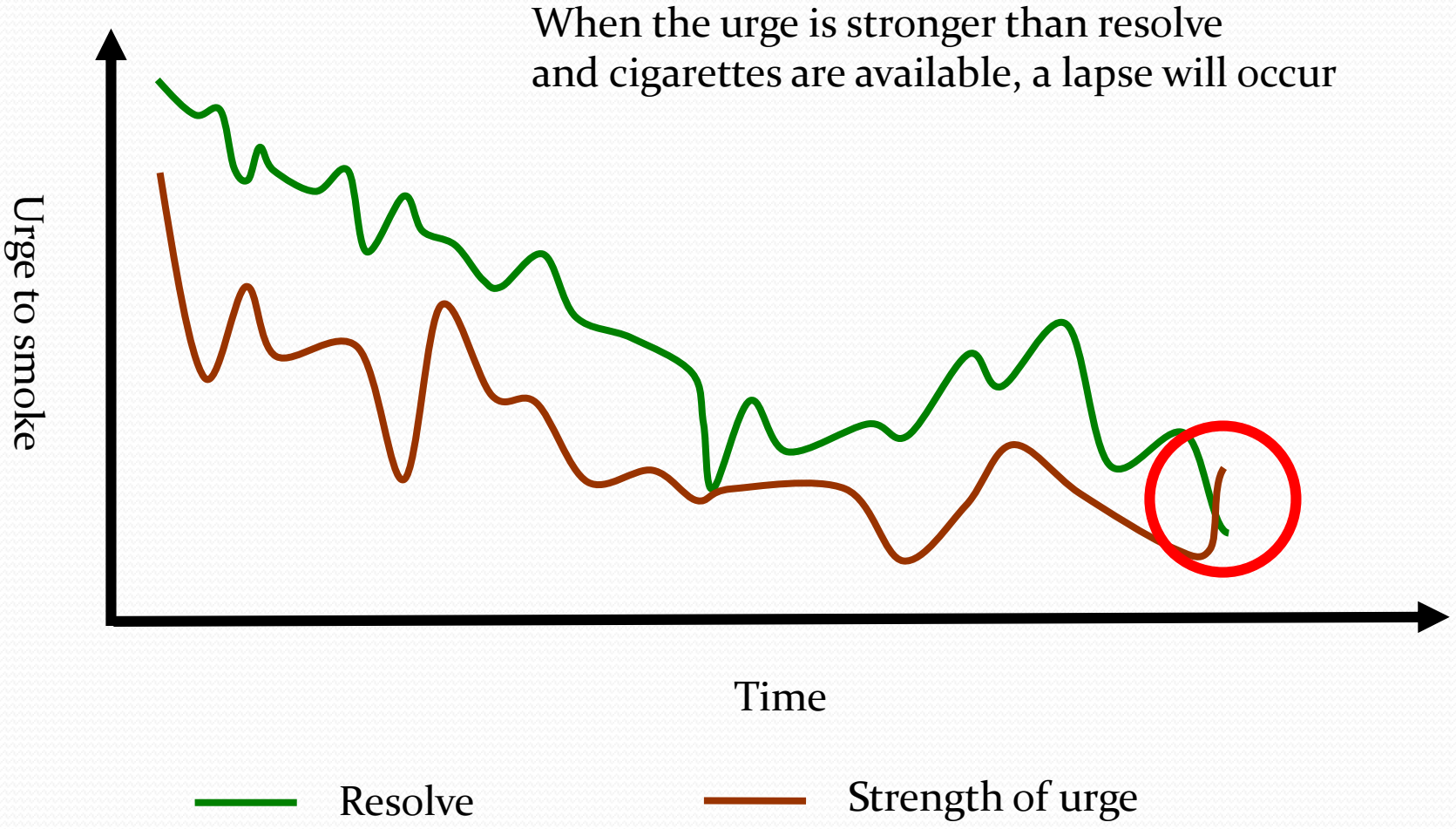



PFC
α4β2*, α7
Hippocampus
α7, α4α5β2,
α4β2
NAc
α4β2*, α6β2*,
α6α4β2*
VTA
α4β2*, α6β2*
α3β4*, α7
Amygdala
α4β2*,
α7
Dopaminergic Transmission
Glutamatergic Transmission
GABAergic Transmission

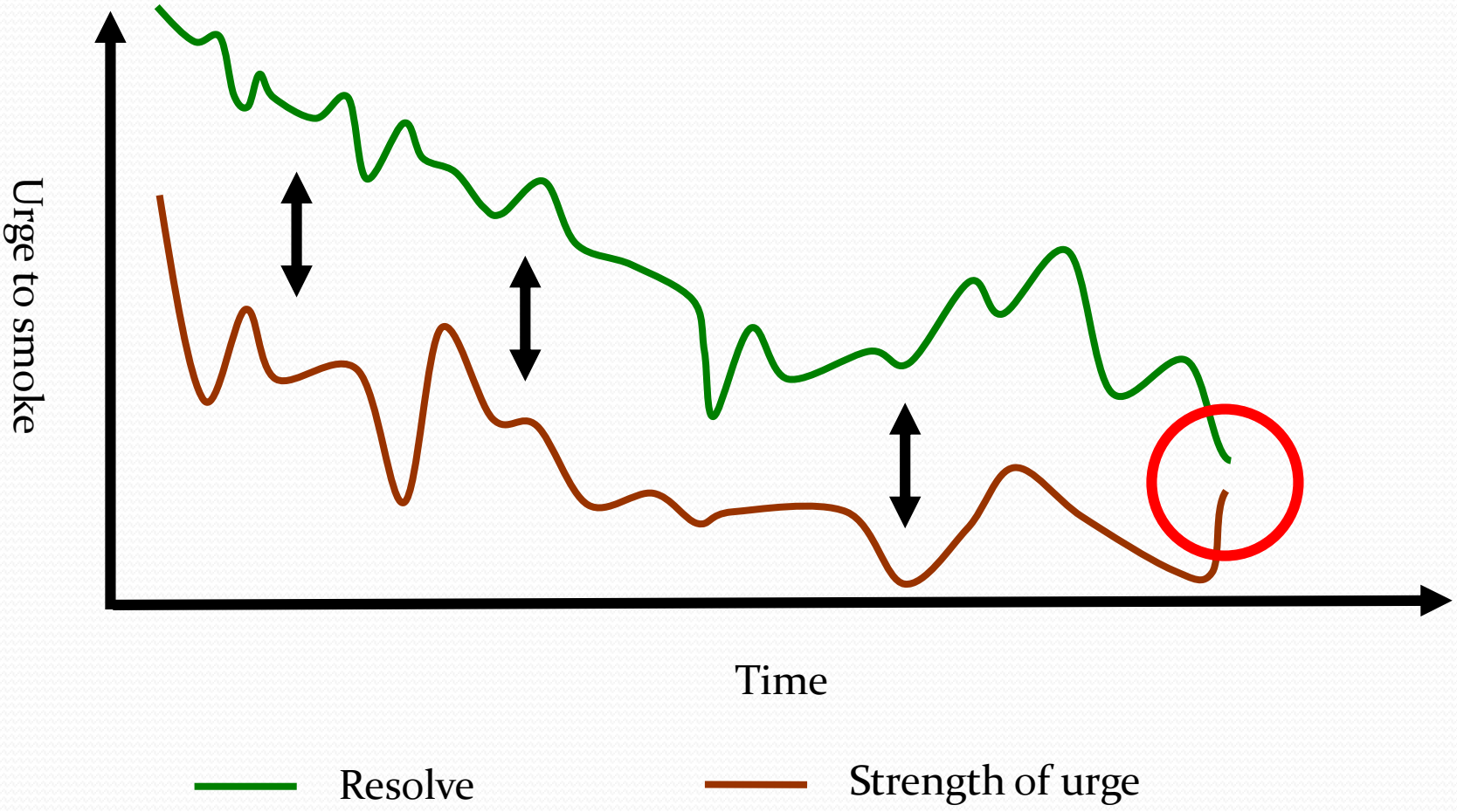
Smoking Cessation

- Patients who smoke should receive advice and encouragement to stop at every visit.
- Take advantage of the teachable moment, when a patient who smokes is being treated for any medical condition.
- Multiple strategies and persistence are usually needed for successful cessation because tobacco dependence is a chronic disease.
- Brief counseling, usually lasting less than 3 minutes, is an effective way to begin intervention.

The battle over time between resolve and urge to smoke



The role of treatment is to keep these lines as far apart as possible



Pharmacotherapy

Nicotine replacement therapies (NRTs) (transdermal patch, gum, nasal spray, lozenges, vapor inhaler)

- can be used for smoking reduction
- use for ≥8 weeks possibly starting before quit date

Bupropion

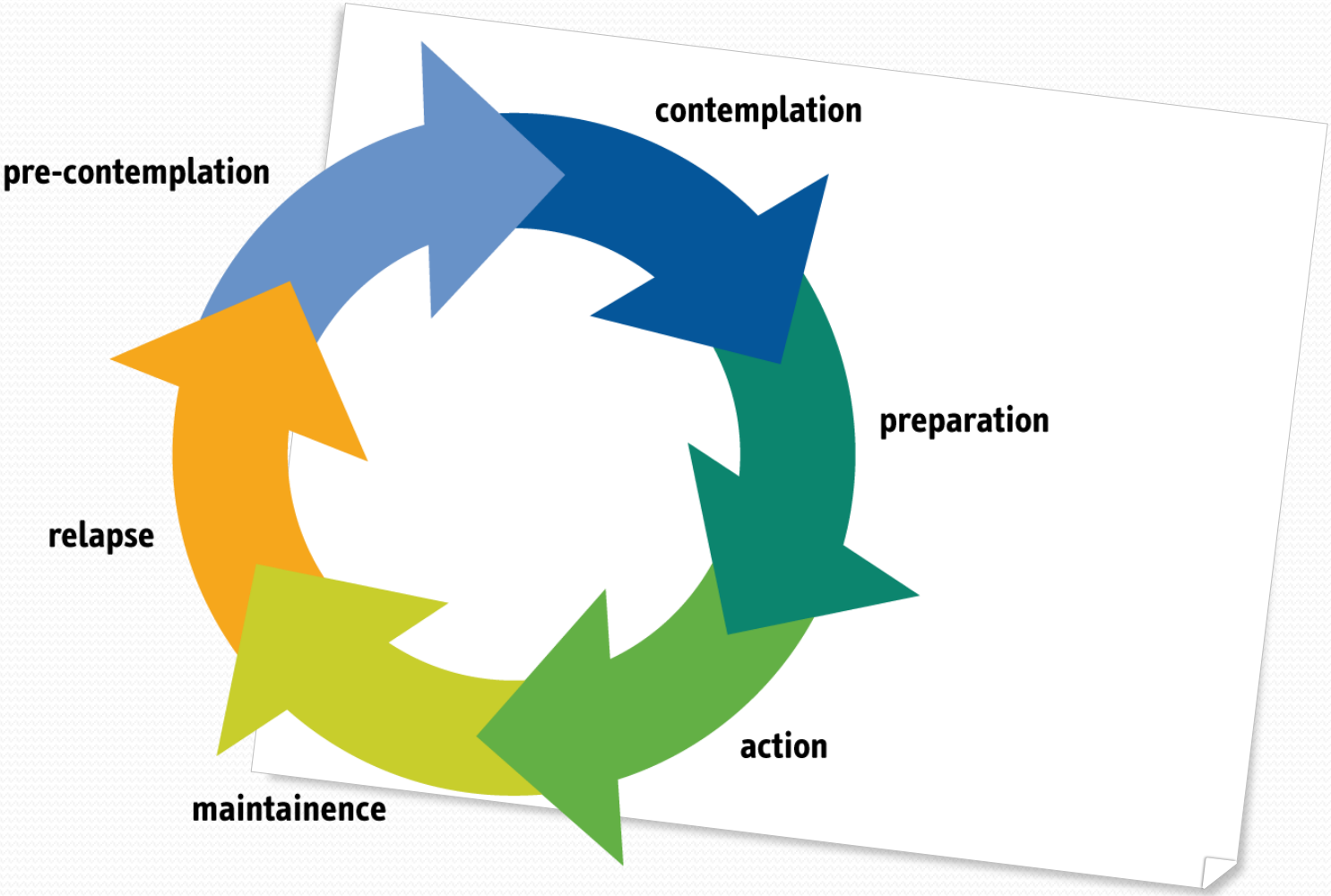
- unknown mechanism of action
- use for 8 weeks starting 1 week before quit date

Varenicline

partial agonist binding with high affinity to $\alpha 4\beta 2$ nAch receptor

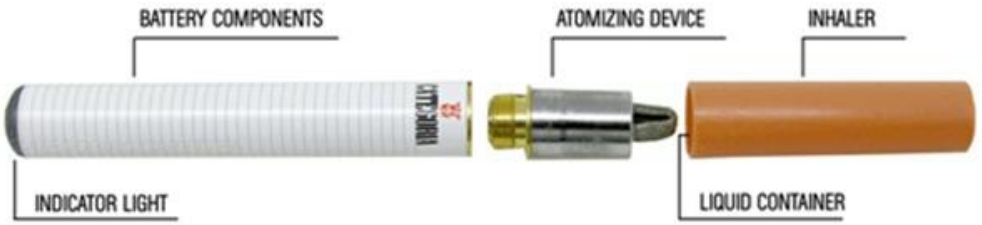
Five As for Tobacco Users Willing to Quit

- ***A***sk about tobacco use at every visit
- ***A***dvise to quit through clear personalized messages
- ***A***ssess willingness to quit
- ***A***ssist efforts to quit
- ***A***rrange follow-up and support



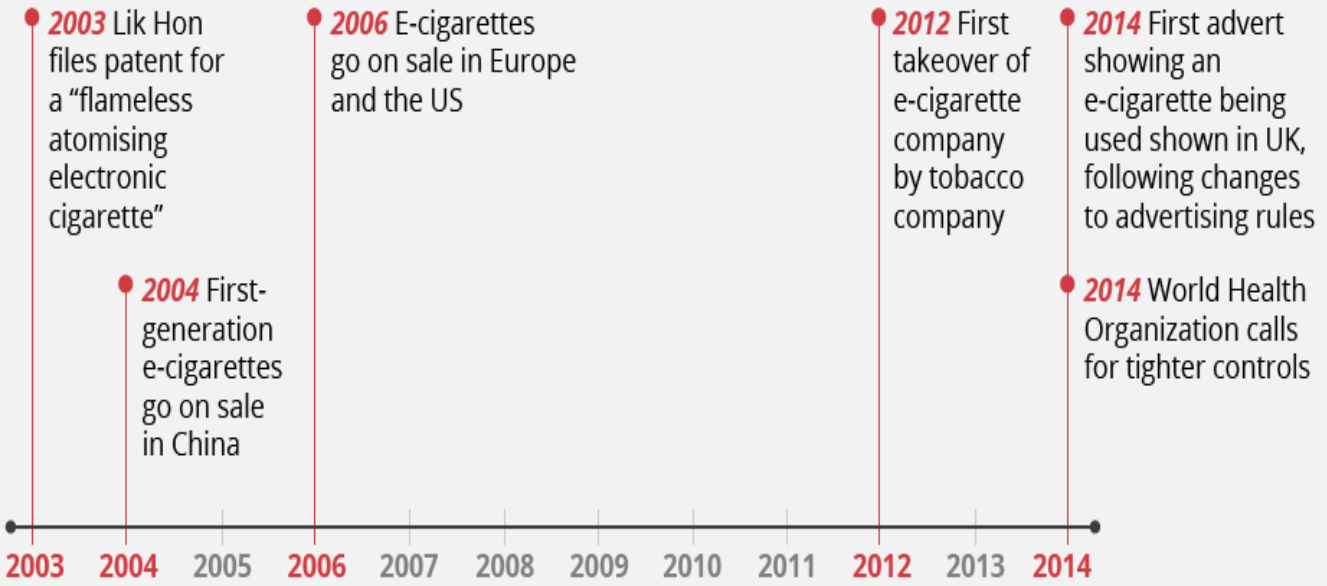
Transtheoretical Model of Change
Prochaska & DiClemente

Figure 2. Image of the product tested in the study.



Caponnetto P, Campagna D, Cibella F, Morjaria JB, et al. (2013) EffiCiency and Safety of an eLectronic cigAreTte (ECLAT) as Tobacco Cigarettes Substitute: A Prospective 12-Month Randomized Control Design Study. PLoS ONE 8(6): e66317. doi:10.1371/journal.pone.0066317
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0066317

Key moments in the growth of the e-cigarette market



Office for National Statistics

Relapse Prevention

- Follow-up in the first few weeks of a cessation attempt
- helping smokers identify and deal with “tempting situations”

THANKS FOR YOUR ATTENTION !!