

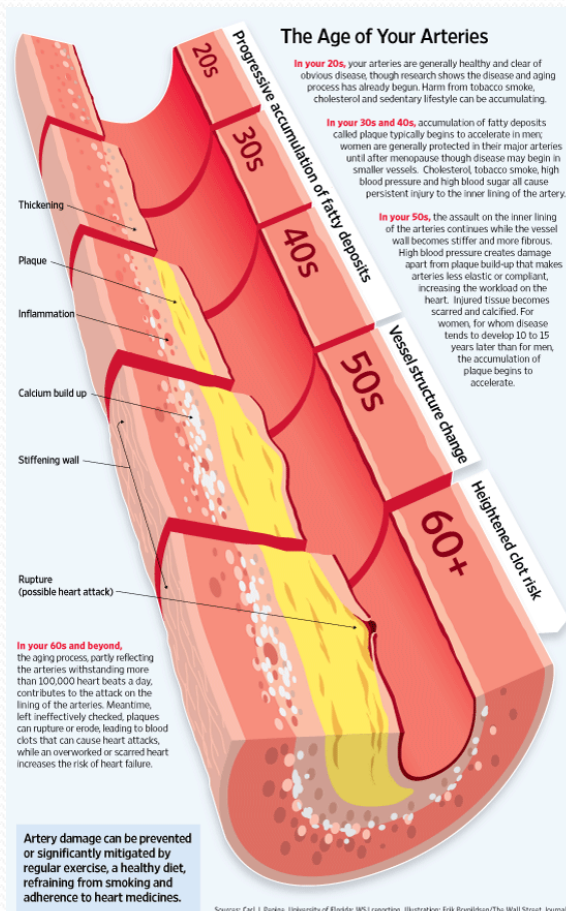
# Cardiovascular risk assessment and smoking cessation

Krzysztof Buczkowski

Family Medicine Department

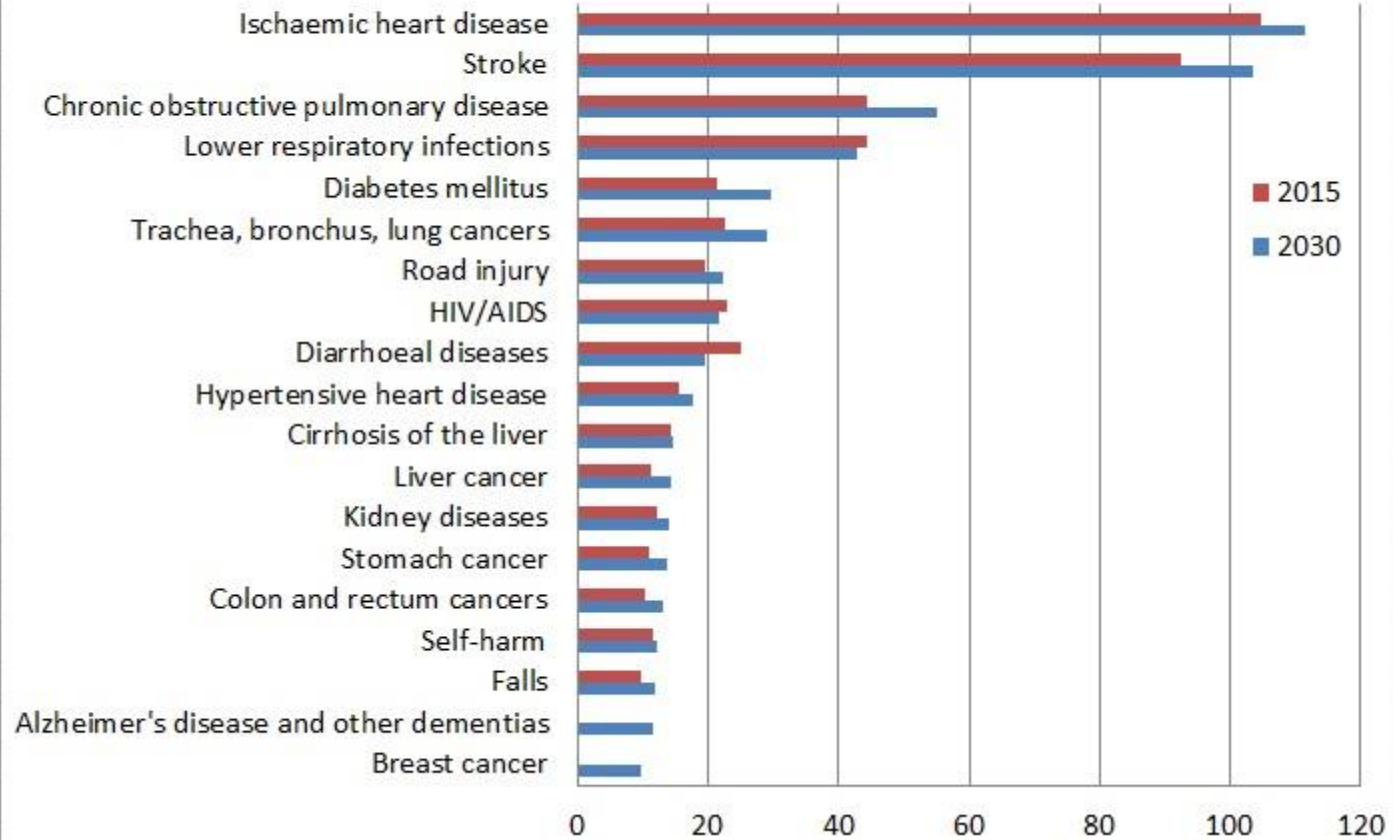
# Definition

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



## Top Causes of Death

death per 100,000 population





# Risk categories

- Low
- Moderate
- High
- Very high

# Patient categories

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

# Patient categories

- CKD
- familial hipercholesterolemia
- DM
- Patients with established ASCVD



# Patient categories- very high risk

- cardiovascular disease (coronary artery disease, stroke, or peripheral artery disease).
- diabetes:
  - accompanied by organ damage (e.g., proteinuria, retinopathy) or
  - plus  $\geq 3$  major cardiovascular risk factors (e.g., smoking, hypertension, dyslipidemia).
- CKD with an eGFR  $< 30$  ml/min/1.73 m<sup>2</sup>.
- LDL-C levels (e.g.,  $\geq 190$  mg/dl) in the context of familial hypercholesterolemia

# Patient categories- high risk

- With moderate CKD (eGFR 30–59 ml/min/1.73 m<sup>2</sup>).
- With diabetes without organ damage but with  $\geq 1$  major risk factor.
- With a 10-year SCORE2 risk of 10–<20%.

# Patient categories- moderate risk

- Those with diabetes but without additional cardiovascular risk factors.
- Those with a 10-year risk score of 5–<10% on the SCORE2 scale.


# Patient categories- low risk

- Individuals without significant cardiovascular risk factors.
- Those with a SCORE2 result of <5%.



## **Apparently healthy persons**

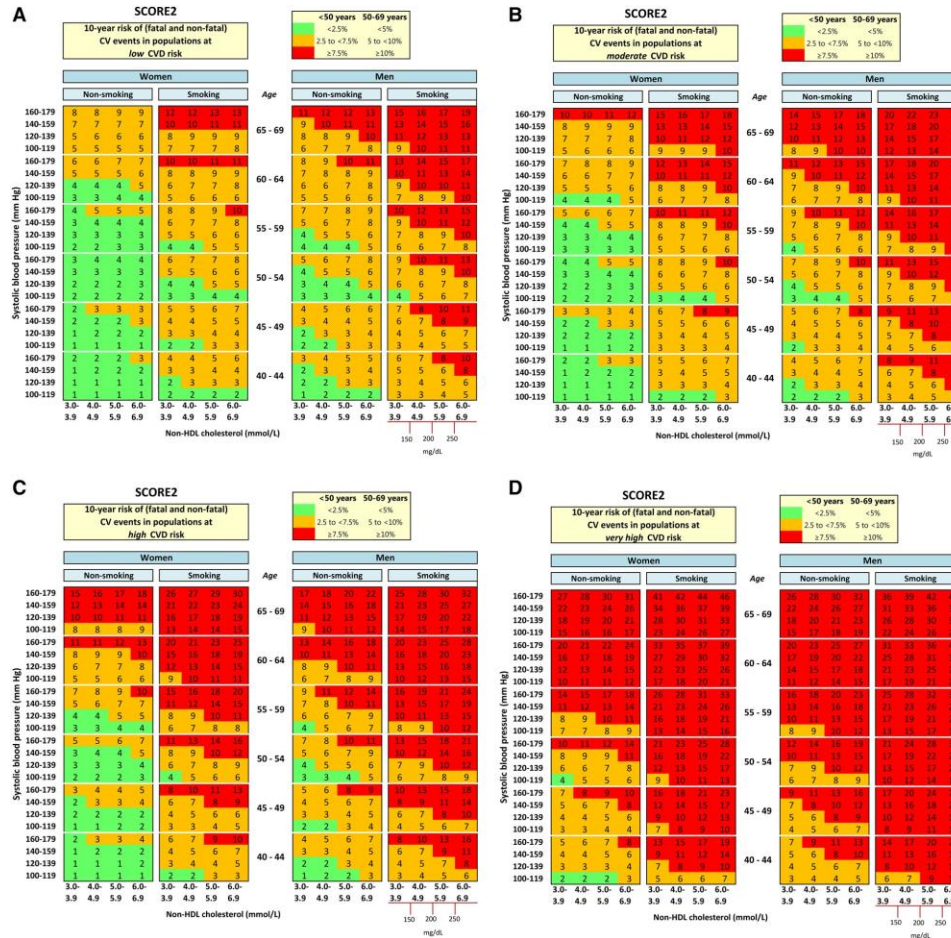
Persons without established ASCVD, diabetes mellitus, CKD, Familial Hypercholesterolemia

- 
- 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  $\geq 70$  years with the SCORE 2 O.P. model.

# Variables for SCORE2 & SCORE2-OP

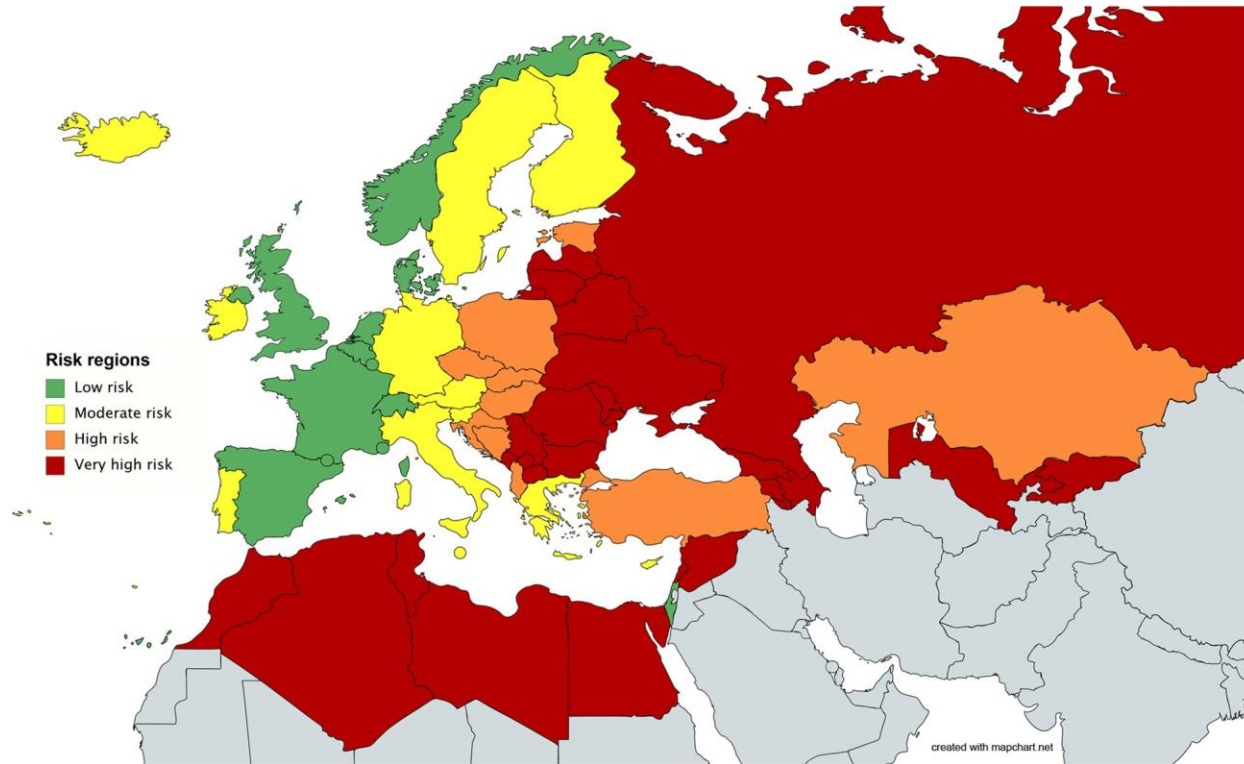
- Age
- Gender
- Smoking status
- Systolic blood pressure
- Non HDL cholesterol

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





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



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

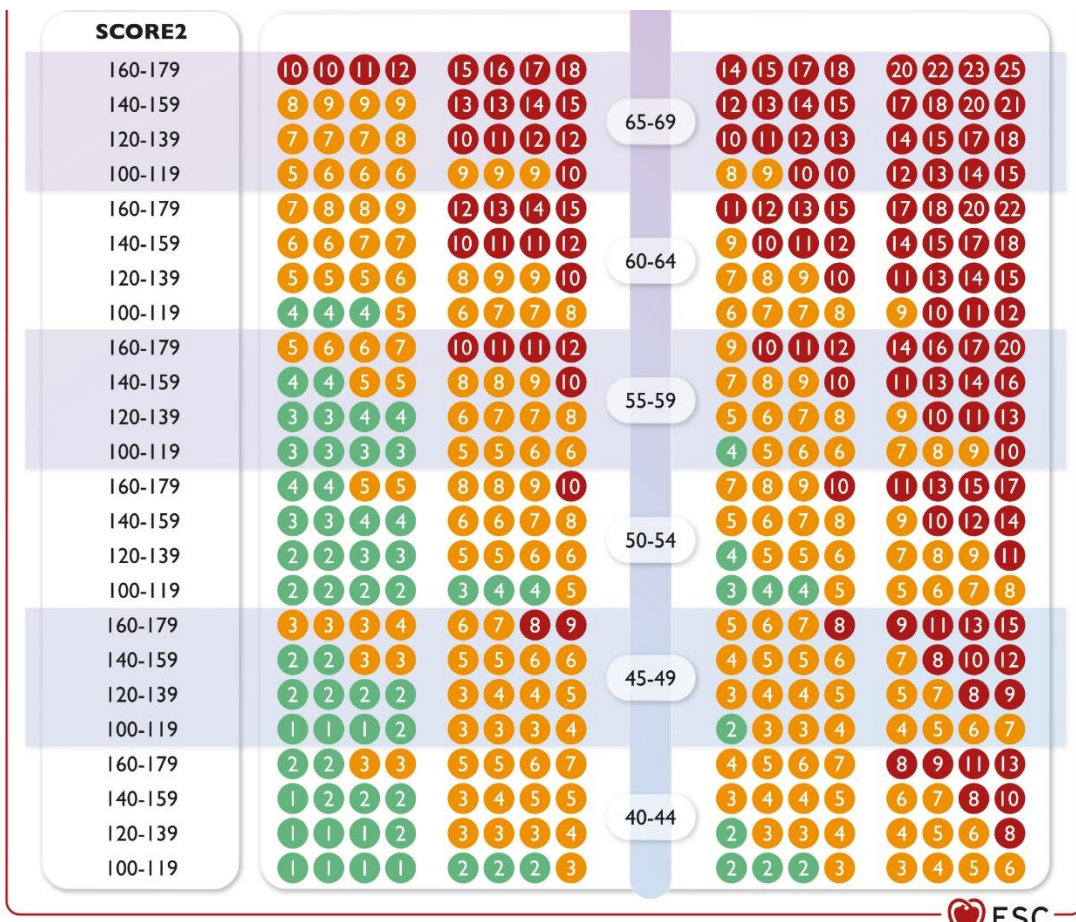
<50 years	50-69 years	≥70 years
● <2.5%	● <5%	● <7.5%
● 2.5 to <7.5%	● 5 to <10%	● 7.5 to <15%
● ≥7.5%	● ≥10%	● ≥15%

Women Men

Non-smoking Smoking Non-smoking Smoking

Systolic blood pressure (mmHg) <b>SCORE2-OP</b>	Non-HDL cholesterol								Age (y)	Non-HDL cholesterol								
	3.0-3.9				4.0-4.9					mmol/L	3.0-3.9				4.0-4.9			
	150	200	250	300	150	200	250	300			150	200	250	300	150	200	250	300
160-179	37	39	40	42	41	43	44	46	85-89	37	45	53	62	37	45	53	61	
140-159	35	36	38	39	39	40	42	43	80-84	36	43	51	59	35	43	51	59	
120-139	32	34	35	37	36	38	39	41	75-79	34	41	49	57	34	41	48	57	
100-119	30	32	33	34	34	35	37	38	70-74	32	39	47	55	32	39	46	55	
160-179	27	28	30	31	34	35	37	39		30	35	41	47	34	40	46	53	
140-159	24	25	27	28	30	32	33	35		27	32	37	43	31	36	42	48	
120-139	21	22	24	25	27	28	30	31		25	29	34	40	28	33	38	44	
100-119	19	20	21	22	24	25	27	28		22	26	31	36	25	30	35	40	
160-179	19	20	21	23	27	29	30	32		24	27	31	35	31	35	39	44	
140-159	16	17	18	19	24	25	26	28		21	23	27	30	27	30	34	38	
120-139	14	15	15	16	20	21	22	24		17	20	23	26	23	26	29	33	
100-119	12	12	13	14	17	18	19	20		15	17	19	22	19	22	25	29	
160-179	13	14	15	16	22	23	25	26		19	21	23	25	28	31	34	36	
140-159	11	11	12	13	18	19	20	22		15	17	18	20	23	25	28	30	
120-139	9	9	10	11	15	16	17	18		12	13	15	16	19	20	22	24	
100-119	7	7	8	8	12	13	13	14		10	11	12	13	15	16	18	20	

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



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

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

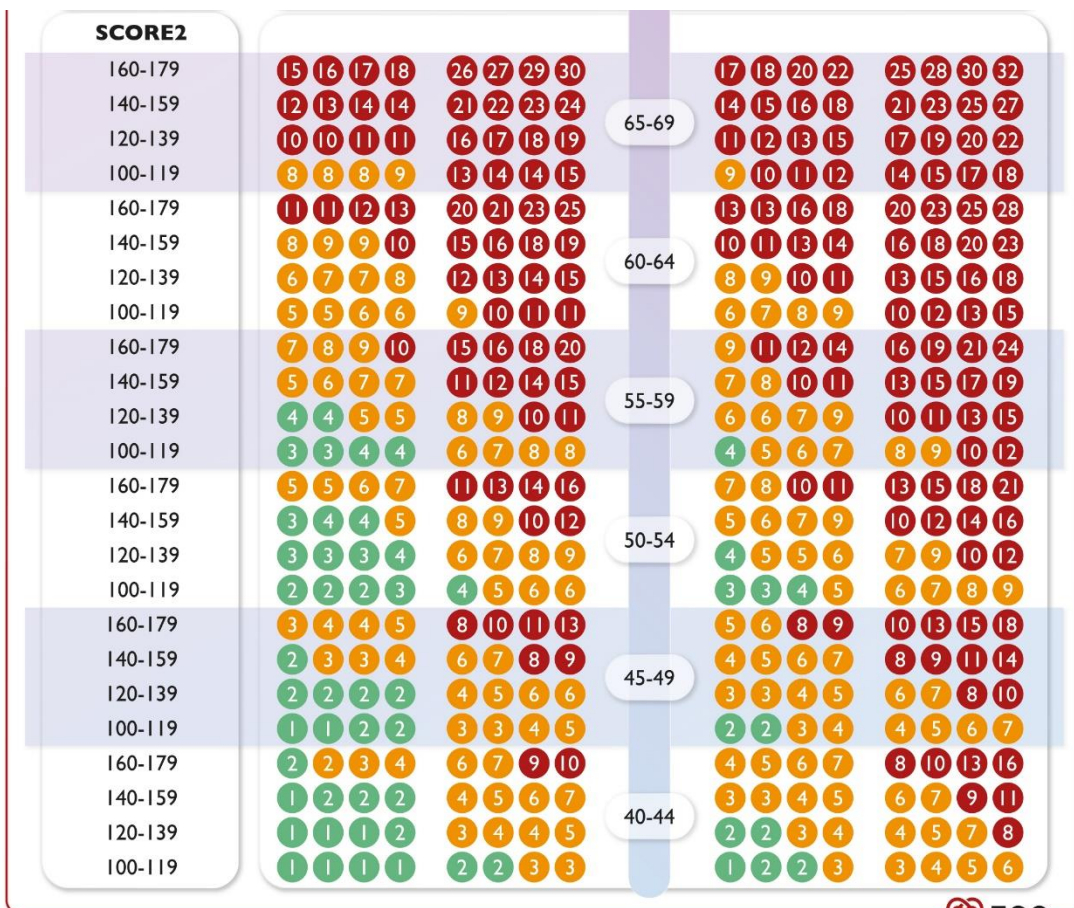
<50 years	50-69 years	≥70 years
● <2.5%	● <5%	● <7.5%
● 2.5 to <7.5%	● 5 to <10%	● 7.5 to <15%
● ≥7.5%	● ≥10%	● ≥15%

Women Men

Non-smoking Smoking Non-smoking Smoking

Systolic blood pressure (mmHg) <b>SCORE2-OP</b>	Non-HDL cholesterol								Age (y)	Non-HDL cholesterol								
	3.0-3.9				4.0-4.9					mmol/L	3.0-3.9				4.0-4.9			
	150	200	250	300	150	200	250	300			mg/dL	150	200	250	300	150	200	250
160-179	53	55	57	58	58	59	61	63	85-89	42	49	57	65	41	49	56	65	
140-159	50	52	54	55	55	56	58	60	80-84	40	47	55	63	40	47	54	62	
120-139	47	49	51	52	52	53	55	57		38	45	53	61	38	45	52	60	
100-119	44	46	48	50	49	51	52	54		36	43	51	58	36	43	50	58	
160-179	40	42	44	45	49	51	53	55	75-79	34	40	45	51	38	44	50	56	
140-159	36	38	39	41	44	46	48	50		31	36	42	47	35	40	46	52	
120-139	32	34	36	37	40	42	44	46		29	33	38	44	32	37	42	48	
100-119	29	31	32	34	36	38	40	41	70-74	26	30	35	40	29	34	39	44	
160-179	29	31	32	34	41	43	45	47		28	32	35	39	35	39	44	48	
140-159	25	27	28	29	35	37	39	41		24	27	31	34	31	34	38	43	
120-139	22	23	24	25	31	32	34	36	70-74	21	24	27	30	27	30	34	37	
100-119	18	19	20	22	26	28	29	31		18	20	23	26	23	26	29	33	
160-179	21	22	24	25	33	35	37	39		23	25	27	29	33	35	38	41	
140-159	17	18	19	20	28	29	31	33	70-74	19	20	22	24	27	29	32	34	
120-139	14	15	16	17	23	24	26	27		15	17	18	20	22	24	26	28	
100-119	11	12	13	14	19	20	21	22		12	14	15	16	18	20	22	23	

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



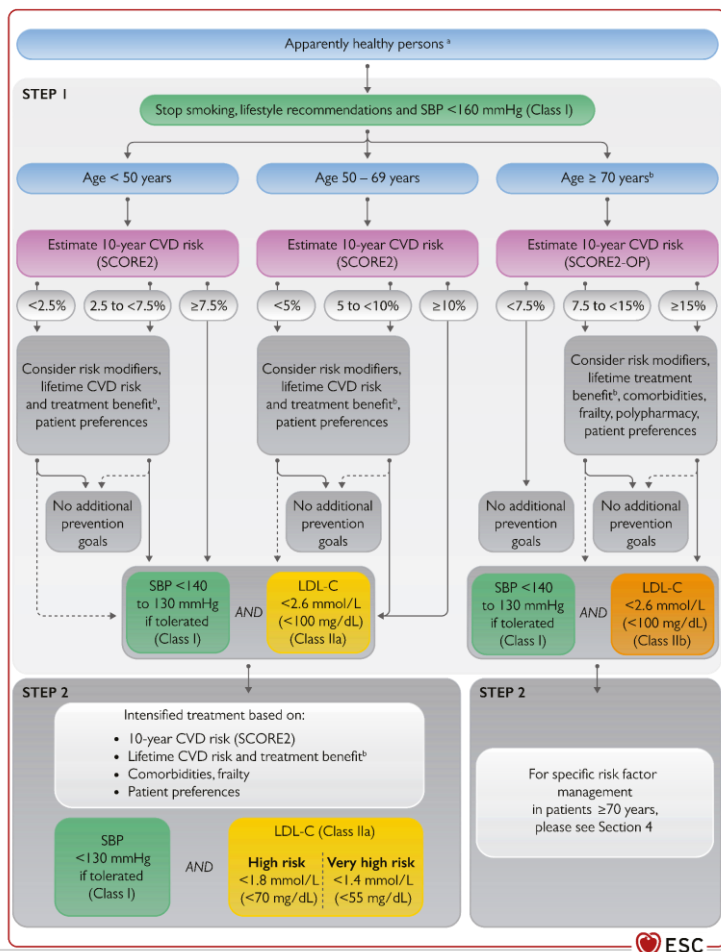
**SCORE2 and SCORE2-OP risk chart for fatal and non-fatal (MI, stroke) ASCVD High CVD Risk (2)**

## 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



## 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)



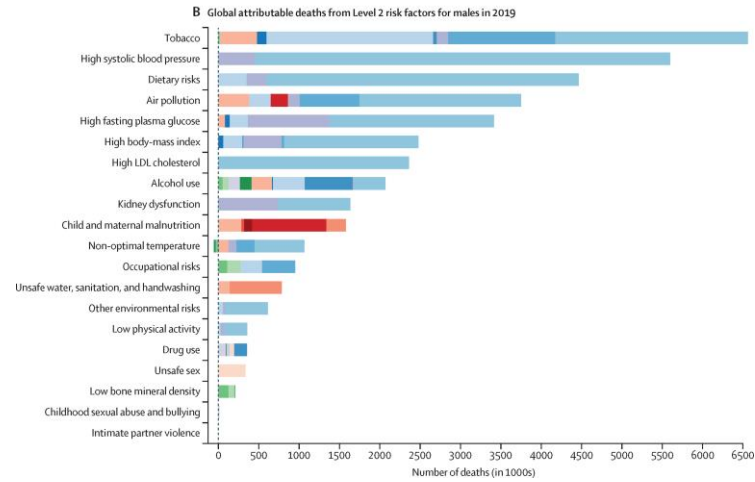
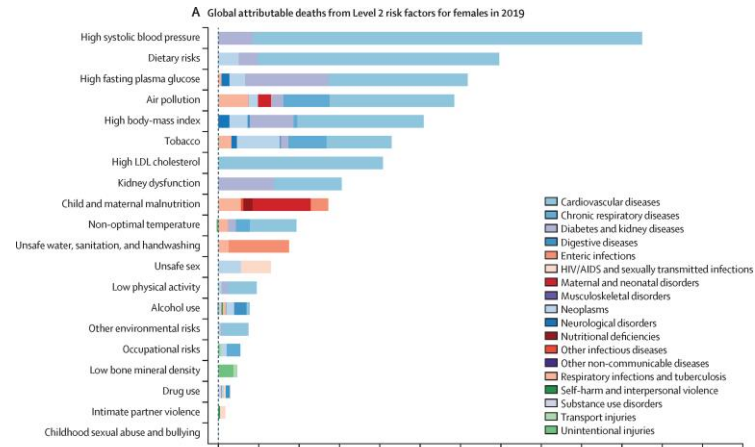
## Treatment goals for different patient categories (2)

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>

## Recommendations for physical activity (1)

Recommendations	Class	Level
It is recommended for adults of all ages to strive for at least 150–300 min a week of moderate-intensity or 75–150 min a week of vigorous-intensity aerobic PA, or an equivalent combination thereof, to reduce all-cause mortality, CV mortality, and morbidity.	I	A
It is recommended that adults who cannot perform 150 min of moderate-intensity PA a week should stay as active as their abilities and health condition allow.	I	B
It is recommended to reduce sedentary time to engage in at least light activity throughout the day to reduce all-cause and CV mortality and morbidity.	I	B





# 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				Age (y)	Men			
	Non-HDL cholesterol					Non-HDL cholesterol			
	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9		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	90+	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	90+	0.5	0.6	0.6	0.7
100-119	0.8	0.8	0.8	0.8	90+	0.5	0.7	0.7	0.7
160-179	1.6	1.7	1.9	1.9	85-89	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	85-89	0.8	0.9	1.0	1.1
100-119	1.7	1.7	1.8	1.8	85-89	0.8	1.0	1.0	1.1
160-179	2.0	2.3	2.4	2.4	80-84	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	80-84	1.2	1.3	1.4	1.5
100-119	2.2	2.4	2.5	2.5	80-84	1.2	1.3	1.4	1.5
160-179	2.6	2.8	2.8	2.9	75-79	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	75-79	1.6	1.8	1.9	2.0
100-119	2.6	2.7	2.9	3.0	75-79	1.7	1.8	1.9	1.9
160-179	3.0	3.2	3.4	3.4	70-74	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	70-74	2.0	2.2	2.3	2.4
100-119	3.0	3.1	3.2	3.3	70-74	2.1	2.2	2.3	2.3

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

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

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

# 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

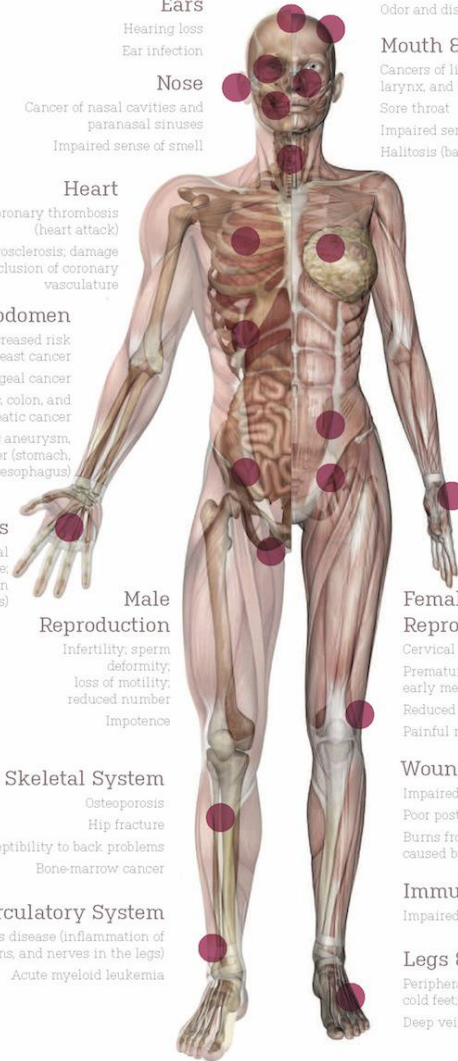
Impaired wound healing  
Poor postsurgical recovery  
Burns from cigarettes and from fires caused by cigarettes

## Immune System

Impaired resistance to infection

## Legs & Feet

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

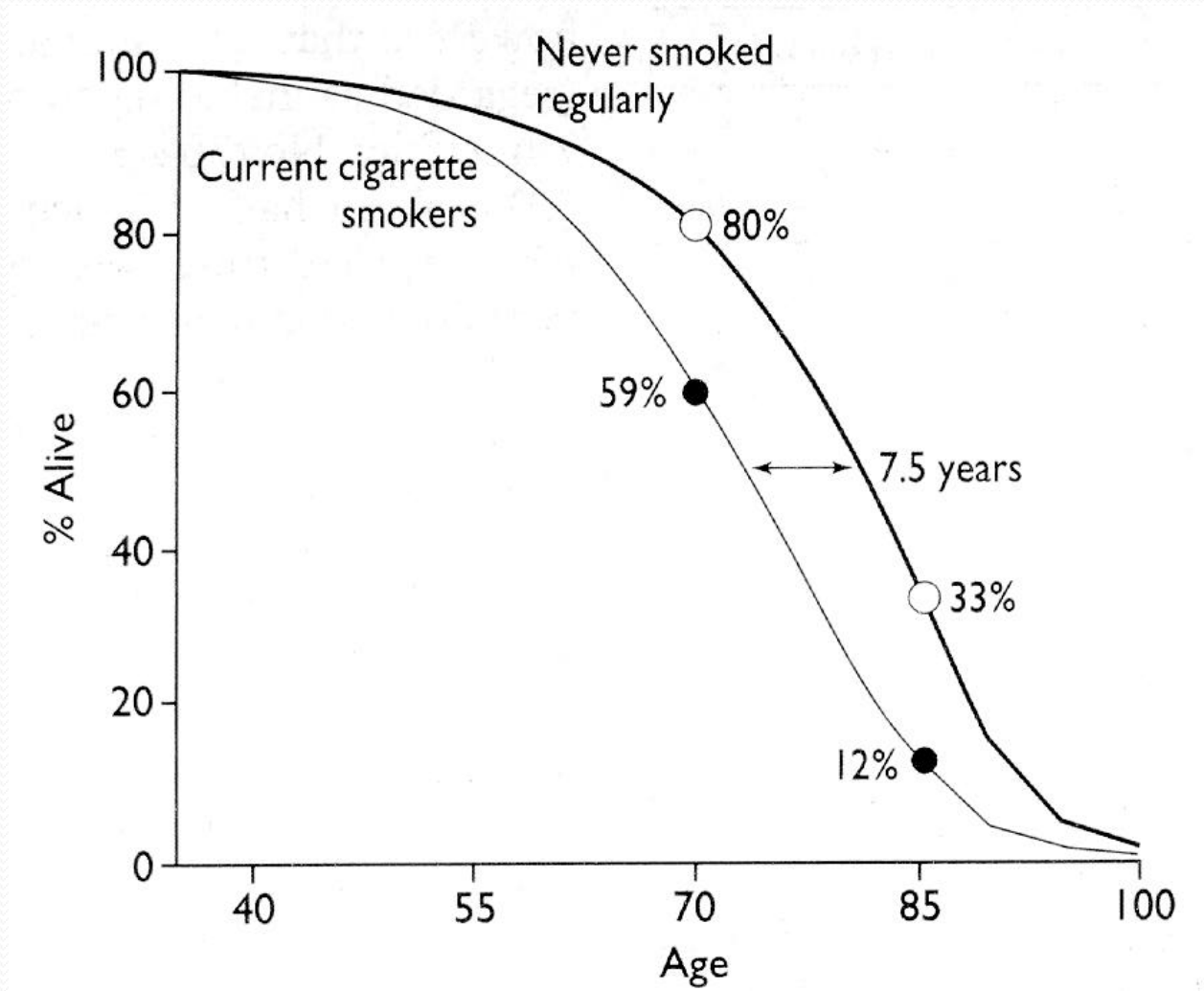




# Consequences of smoking

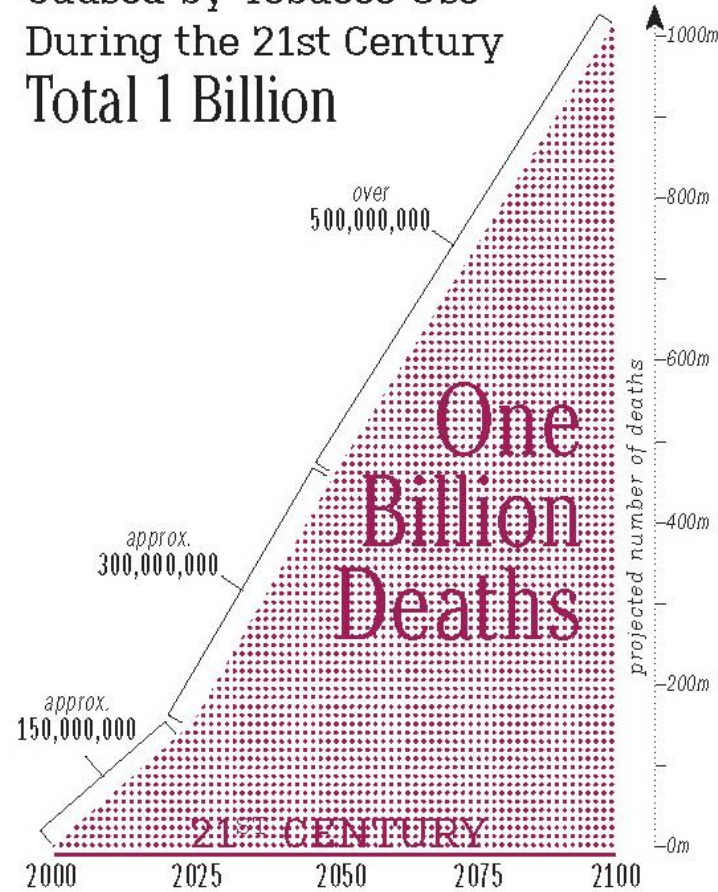


**FIG 1 - Overall survival after age 35 among cigarette smokers and non- smokers: life table estimates, based on age specific death rates for the entire 40 year period. (Note that, at 1990 British death rates, 97% of male infants would survive from birth to 35 years of age)**



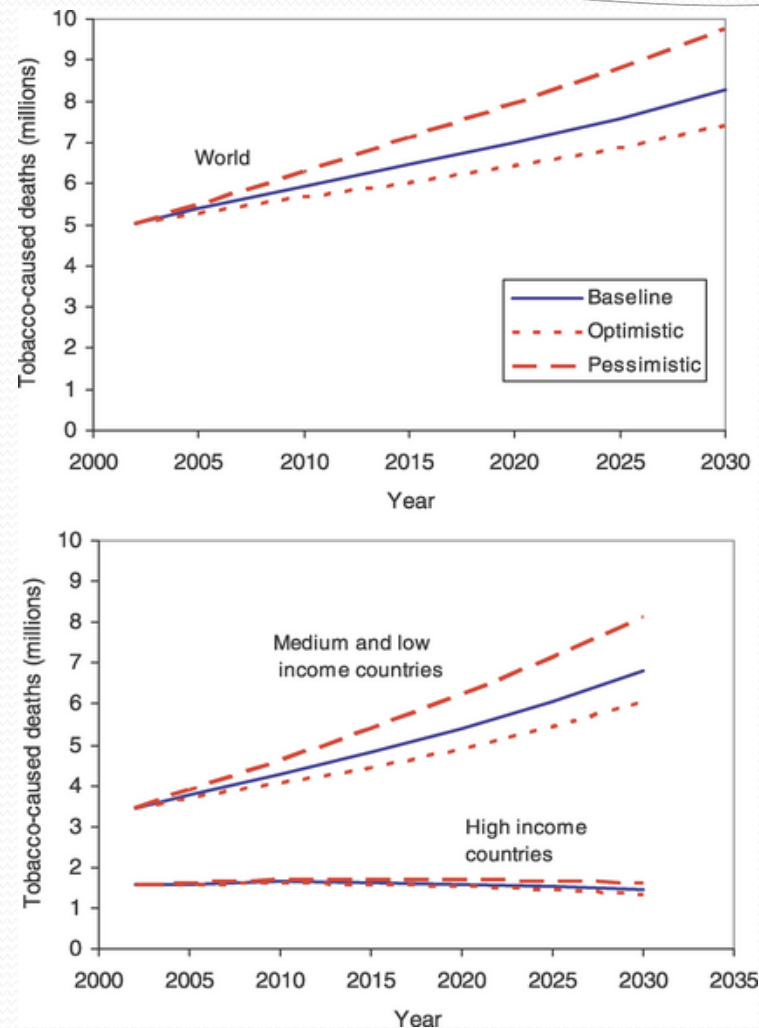
Doll, R et al. BMJ 1994;309:901-911

# Projected Deaths Caused by Tobacco Use During the 21st Century Total 1 Billion



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

# Projected Numbers of Tobacco-Caused Deaths for the World and for High-Income and Middle- plus Low-Income Countries, Three Scenarios, 2002-2030



Mathers CD, Loncar D (2006) Projections of Global Mortality and Burden of Disease from 2002 to 2030. PLoS Med 3(11): e442. doi:10.1371/journal.pmed.0030442  
<http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0030442>

# Health Risks Associated with Smoking

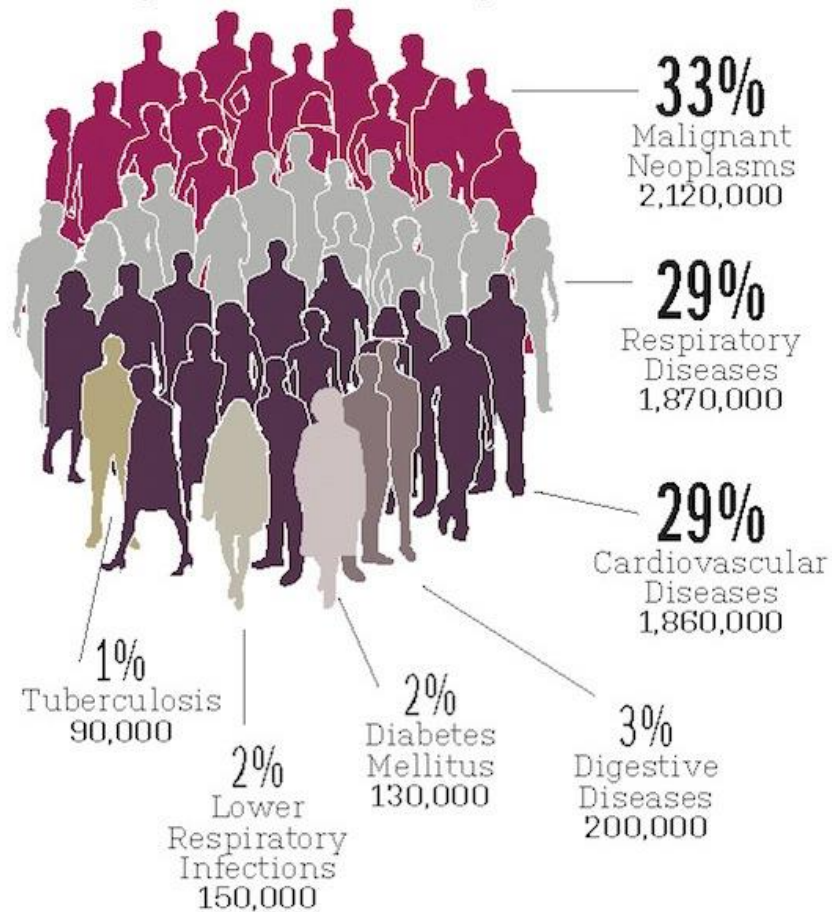


- Atherosclerosis- abdominal aortic aneurysm, subclinical atherosclerosis, stroke (cerebrovascular accident), coronary heart disease
- Cancer of the bladder, cervix, esophagus, kidney, larynx, lung, oral cavity, pharynx, pancreas, stomach
- Chronic obstructive pulmonary disease (COPD) acute respiratory 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](http://tobaccoatlas.org)

Cause	Tobacco-Caused Deaths	
	Number (Millions)	Percent of Total
<b>All causes</b>	6.43	100
Tuberculosis	0.09	1
Lower respiratory infections	0.15	2
<b>Malignant neoplasms</b>	2.12	33
Trachea, bronchus, lung cancers	1.18	18
Mouth and oropharynx cancers	0.18	3
Oesophagus cancer	0.17	3
Stomach cancer	0.12	2
Liver cancer	0.10	2
Other malignant neoplasms	0.34	5
<b>Diabetes mellitus</b>	0.13	2
<b>Cardiovascular diseases</b>	1.86	29
Ischaemic heart disease	0.93	14
Cerebrovascular disease	0.52	8
Other cardiovascular diseases	0.24	4
<b>Respiratory diseases</b>	1.87	29
COPD	1.76	27
<b>Digestive diseases</b>	0.20	3

DOI: 10.1371/journal.pmed.0030442.t004

Mathers CD, Loncar D (2006) Projections of Global Mortality and Burden of Disease from 2002 to 2030. PLoS Med 3(11): e442. doi:10.1371/journal.pmed.0030442

# 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



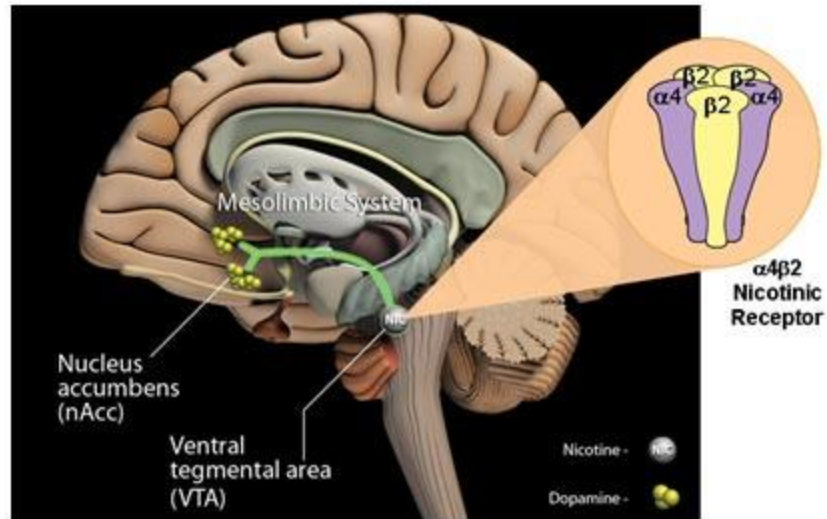
# Health Risks Associated with Smoking

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

# Passive (Involuntary) Smoking

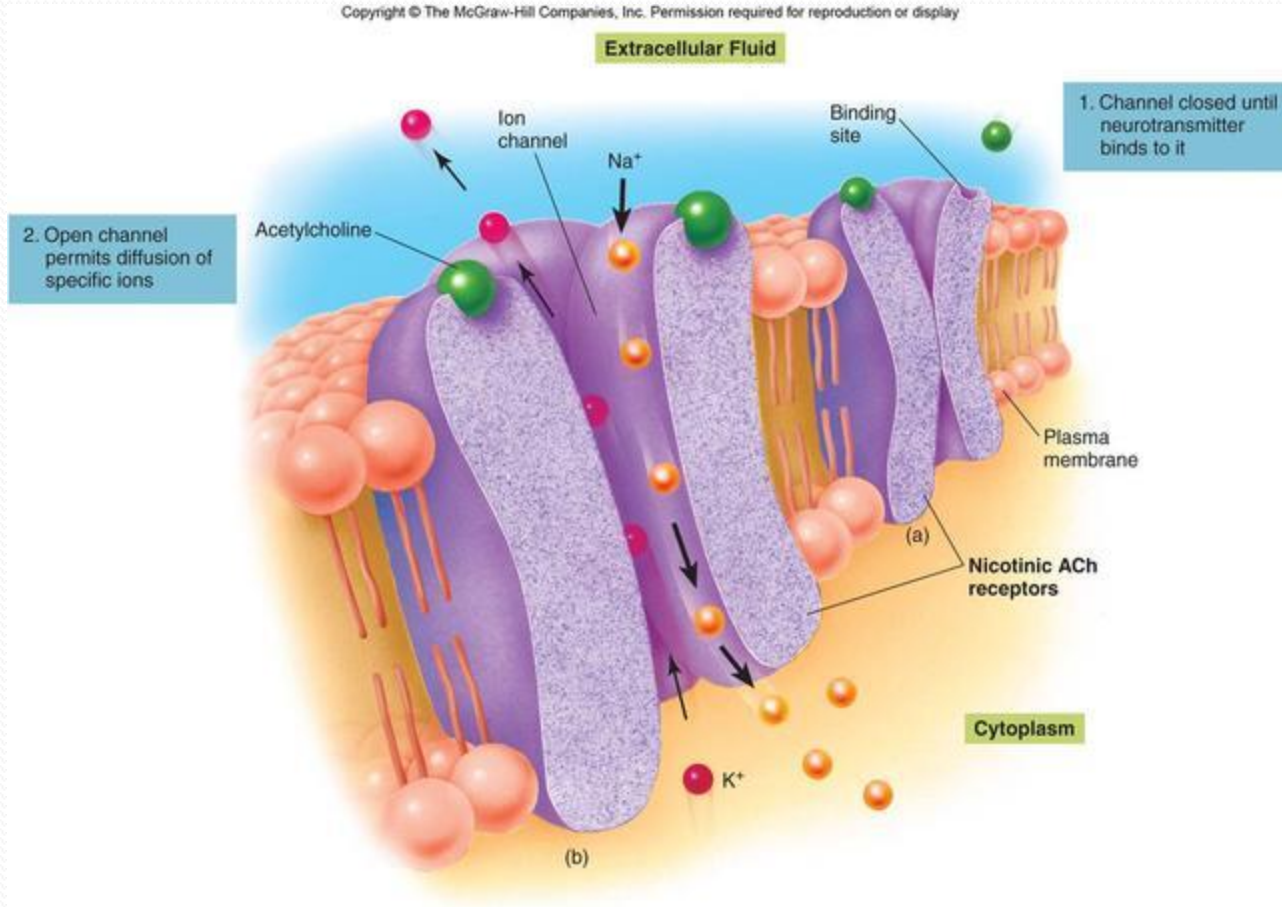
- Secondhand smoke contains 4000 different chemicals, of which more than 60 are carcinogenic.
- About one third of lung cancers occur in nonsmokers who live with a smoker or work in a smoky environment.
- Passive smoking is the third leading preventable cause of death, after alcohol and smoking itself.
- 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.

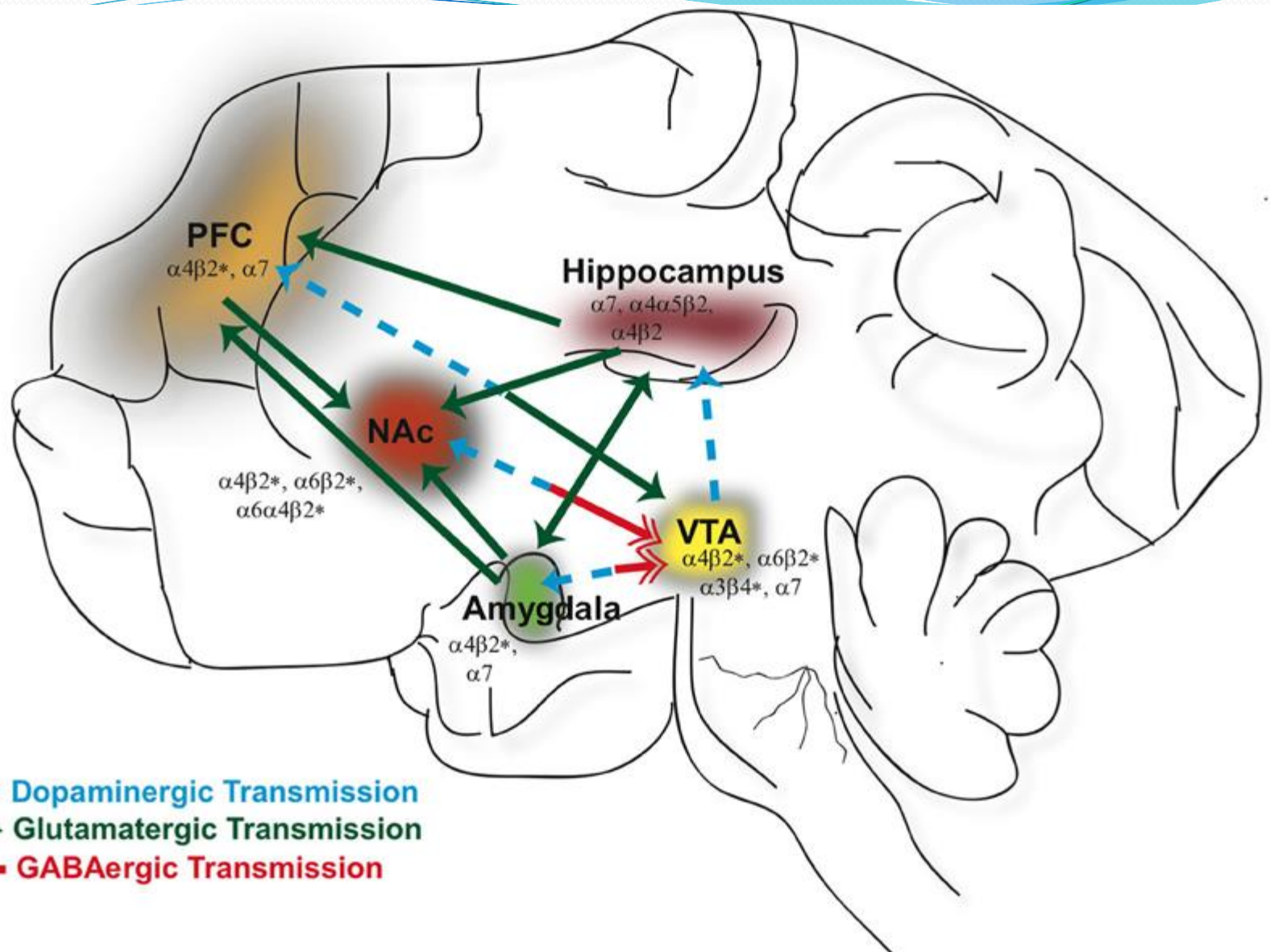


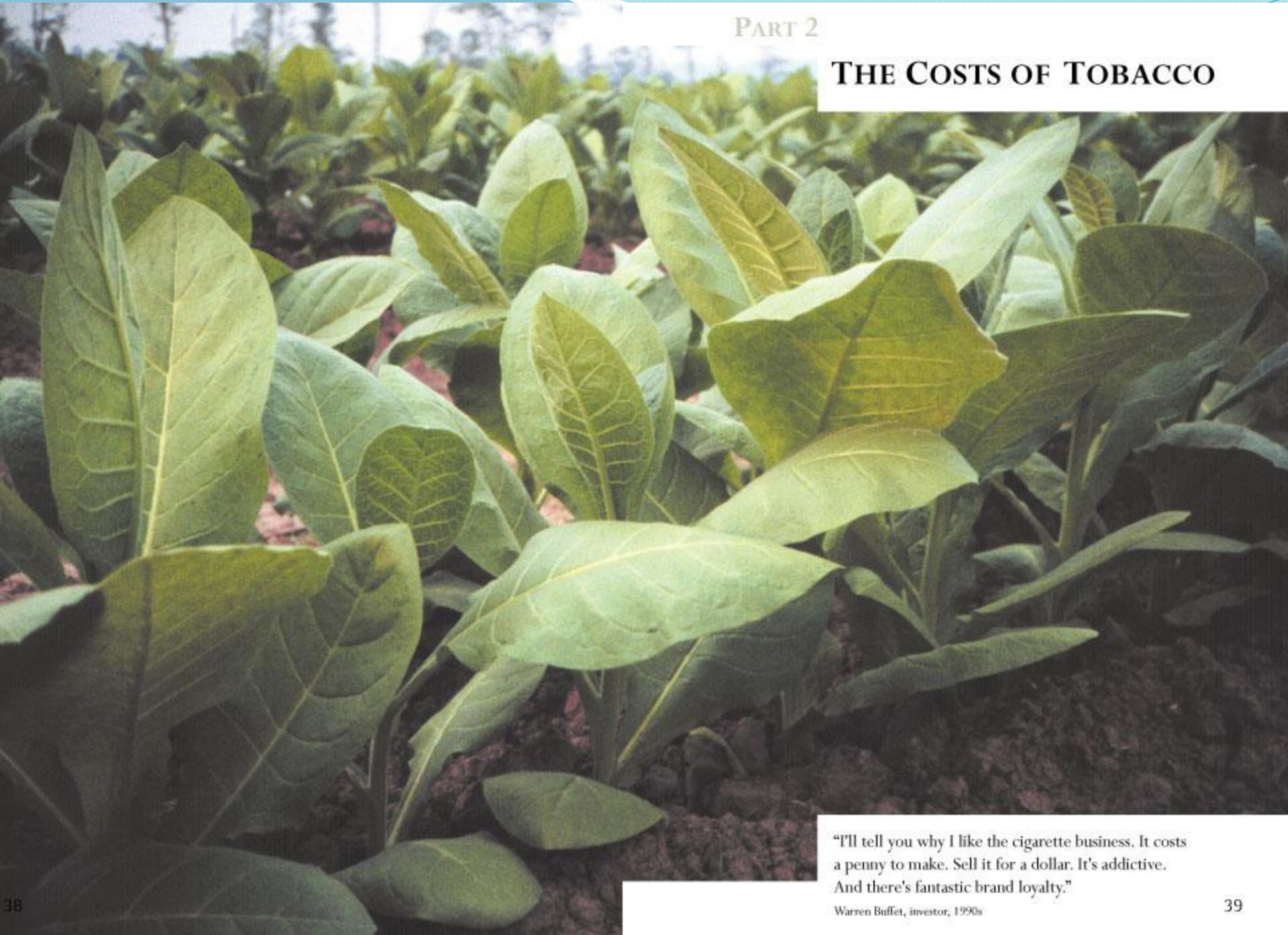


- Nicotine binds predominantly to nicotinic acetylcholine (nACh) receptors in the CNS; the primary is the  $\alpha 4 \beta 2$  nicotinic receptor in the Ventral Tegmental Area (VTA)
- After nicotine binds to the  $\alpha 4 \beta 2$  nicotinic receptor in the VTA, it results in a release of dopamine in the Nucleus Accumbens (nAcc) which is linked to reward

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display



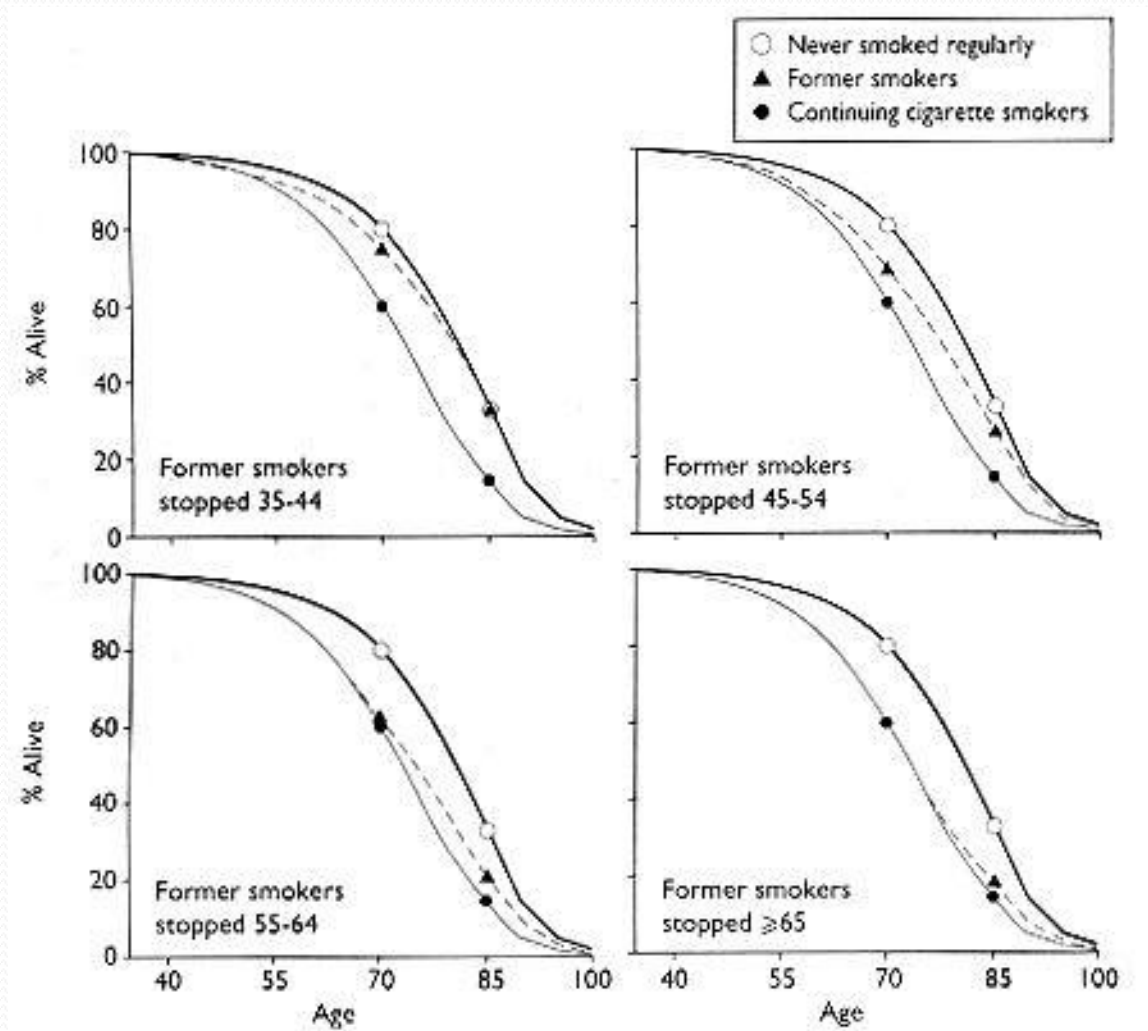




"I'll tell you why I like the cigarette business. It costs a penny to make. Sell it for a dollar. It's addictive. And there's fantastic brand loyalty."

Warren Buffet, investor, 1990s

# Effects on survival after ages 45, 55, 65, and 75 of stopping smoking in previous decade: life table estimates (as in fig 1)



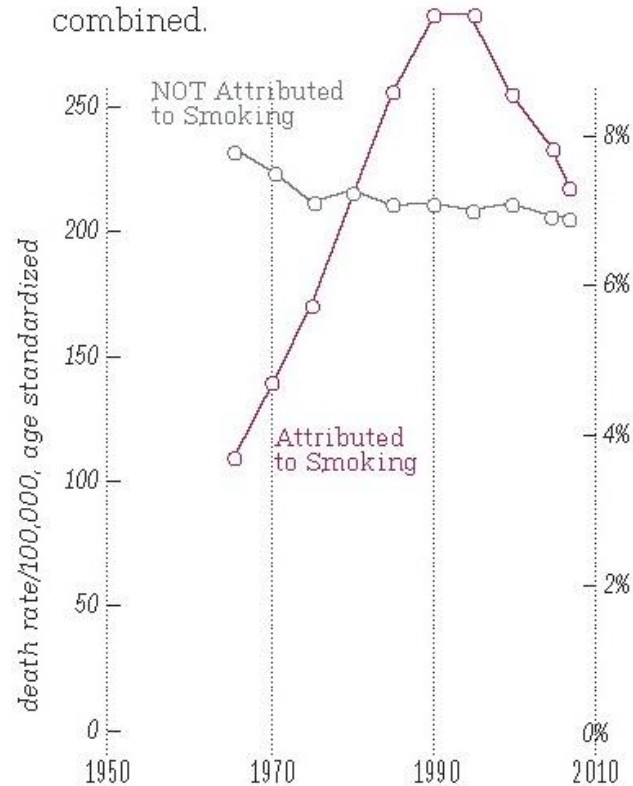
Doll, R et al. BMJ 1994;309:901-911



# Male Cancer Mortality

Poland, ages 35–69, 1965–2010

In Poland, cancers caused by smoking were responsible for more deaths in middle-aged men than all other cancers combined.



source: Tobacco Atlas 4th edition; tobaccoatlas.org

# Smoking Cessation



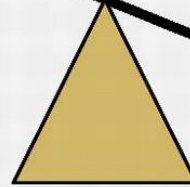
- Patients who smoke should receive advice and encouragement to stop at every visit.
  - Take advantage of the teachable moment, when a patient who smokes is being treated for any medical condition.
    - Multiple strategies and persistence are usually needed for successful cessation because tobacco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

A smoker may feel a desire to stop, which varies from moment to moment depending on:

- Worry about health
- Dislike of financial cost of smoking
- Guilt or shame at smoking
- Disgust with smoking
- Hope for success at stopping

The desire or need to stop conflicts with urges to smoke and desire to smoke arising from:

- Anticipated enjoyment of cigarette
- Need for the forthcoming cigarette
- Concern about loss of self esteem if the quit attempt fails
- Concern about unpleasant short term effects of stopping
- Wanting or needing to hold on to the perceived benefits of smoking



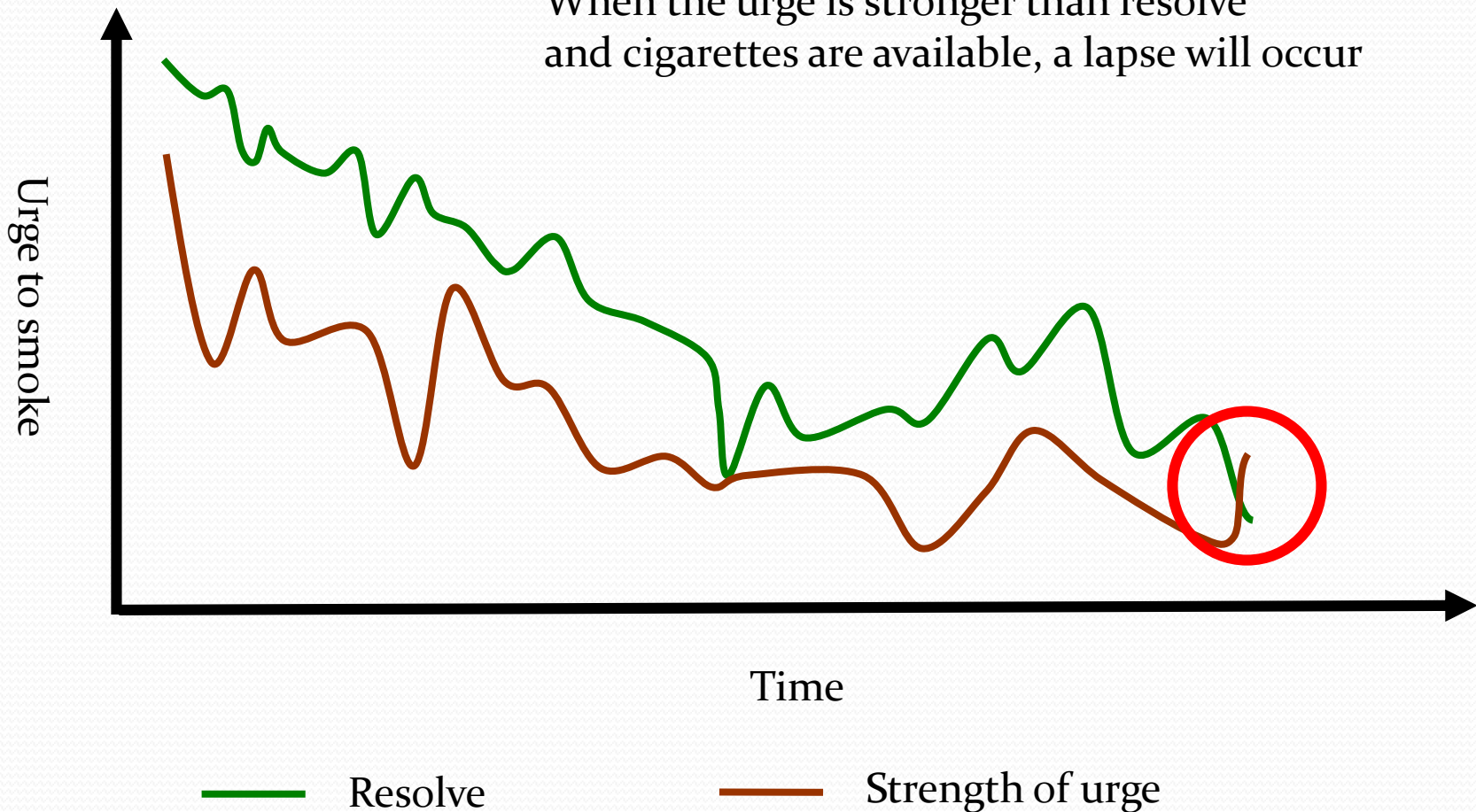
Depending on the strength of the competing desires and needs, the conflict may result in:

- Putting the idea of stopping out of his or her mind
- Forming an intention to stop at some vaguely conceived future time point
- Forming a definite plan to stop at some future time point
- Deciding to stop immediately

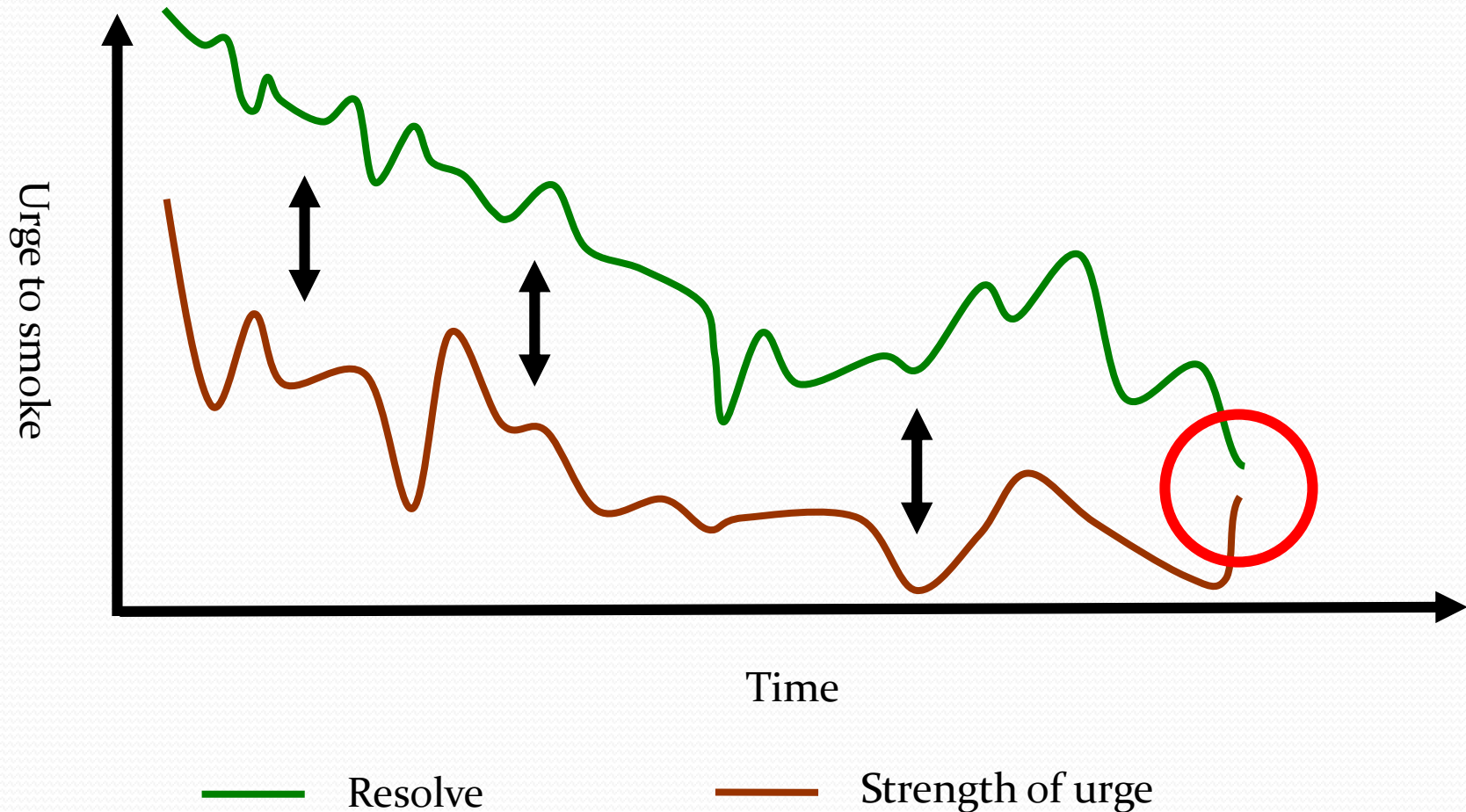
Offering treatment can change this balance - small things can have a big effect on actions

# The battle over time between resolve and urge to smoke

When the urge is stronger than resolve and cigarettes are available, a lapse will occur



# 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)

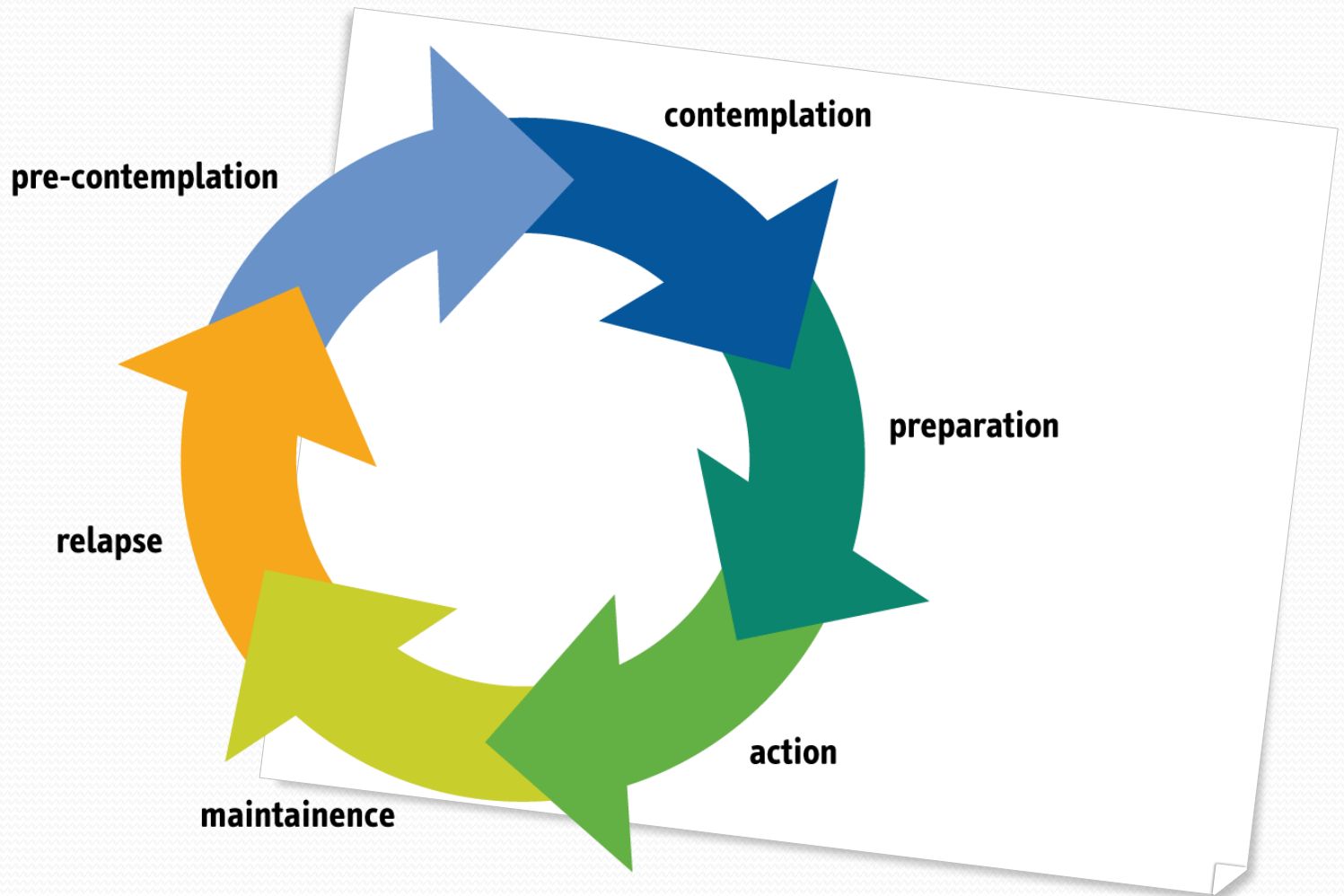
- can be used for smoking reduction
- use for  $\geq 8$  weeks possibly starting before quit date

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



**Transtheoretical Model of Change**  
Prochaska & DiClemente

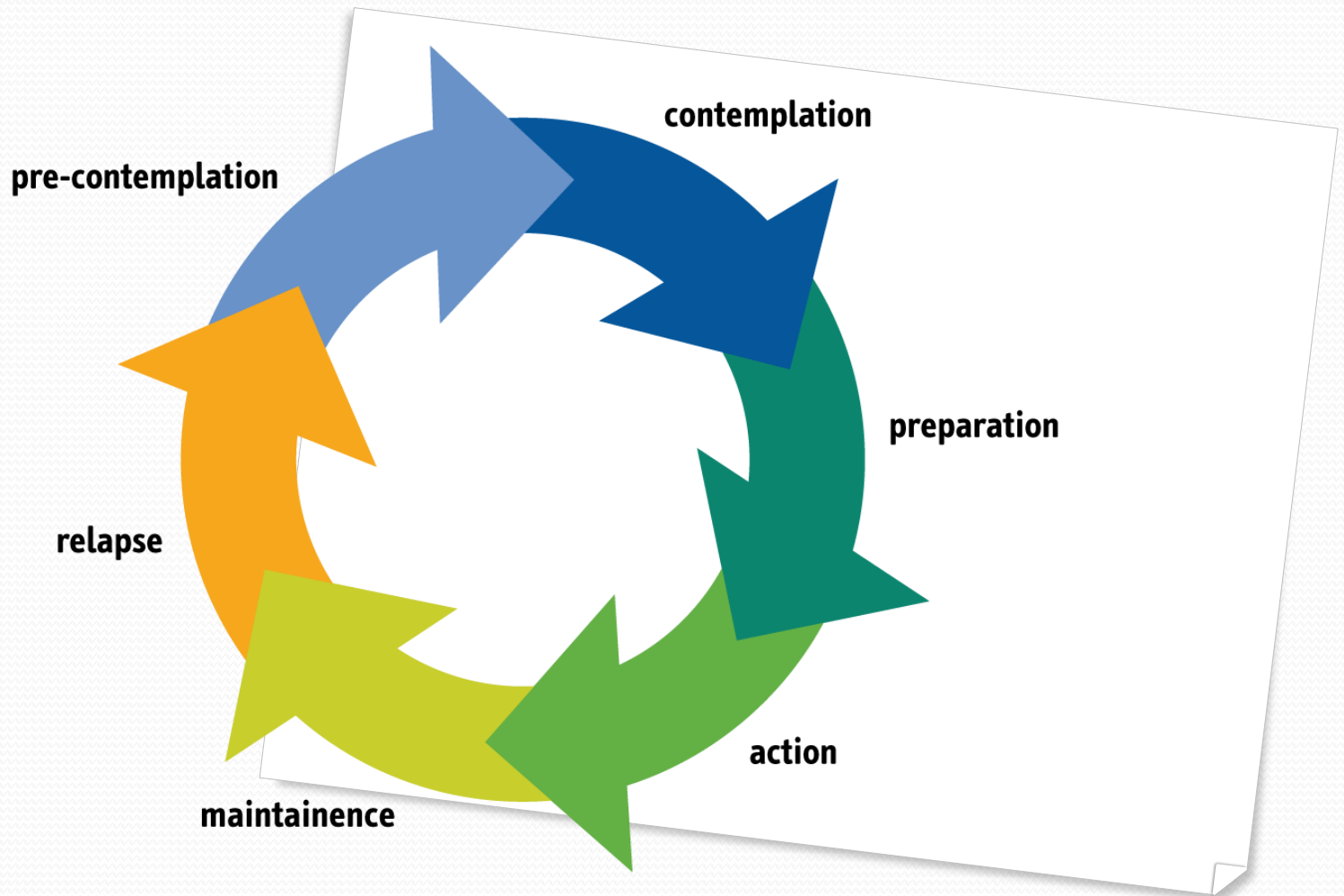
# Stages of Change

- *Precontemplation*: Patient is not interested in quitting smoking in the near future (within 6 months).
- *Contemplation*: Patient is thinking about quitting within the next few months, but has taken no action.
- *Preparation*: Patient is planning to quit in the next 30 days.
- *Action*: Patient is in the process of quitting, or has quit during the last 6 months.
- *Maintenance*: Patient has abstained for more than 3 months.



# Five As for Tobacco Users Willing to Quit

- Ask about tobacco use at every visit
- Advise to quit through clear personalized messages
- Assess willingness to quit
- Assist efforts to quit
- Arrange follow-up and support



**Transtheoretical Model of Change**  
Prochaska & DiClemente

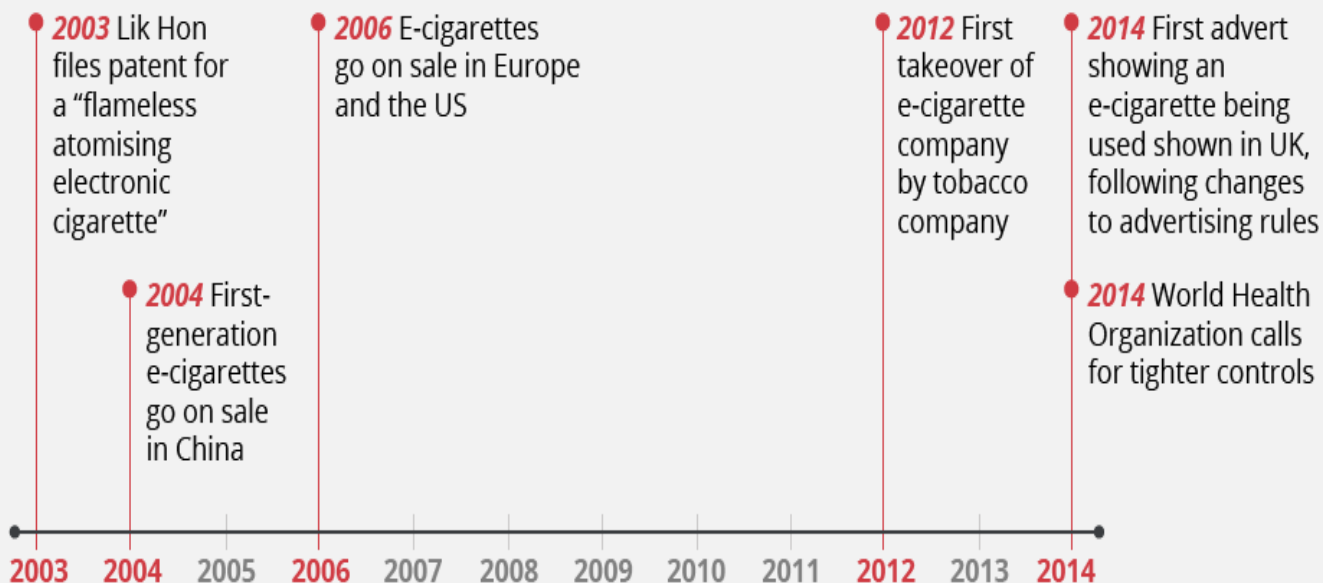


Figure 2. Image of the product tested in the study.



Caponnetto P, Campagna D, Cibella F, Morjaria JB, et al. (2013) Efficiency and Safety of an eElectronic 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



# 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 !!

