

# Cardiovascular Diseases in Family Medicine

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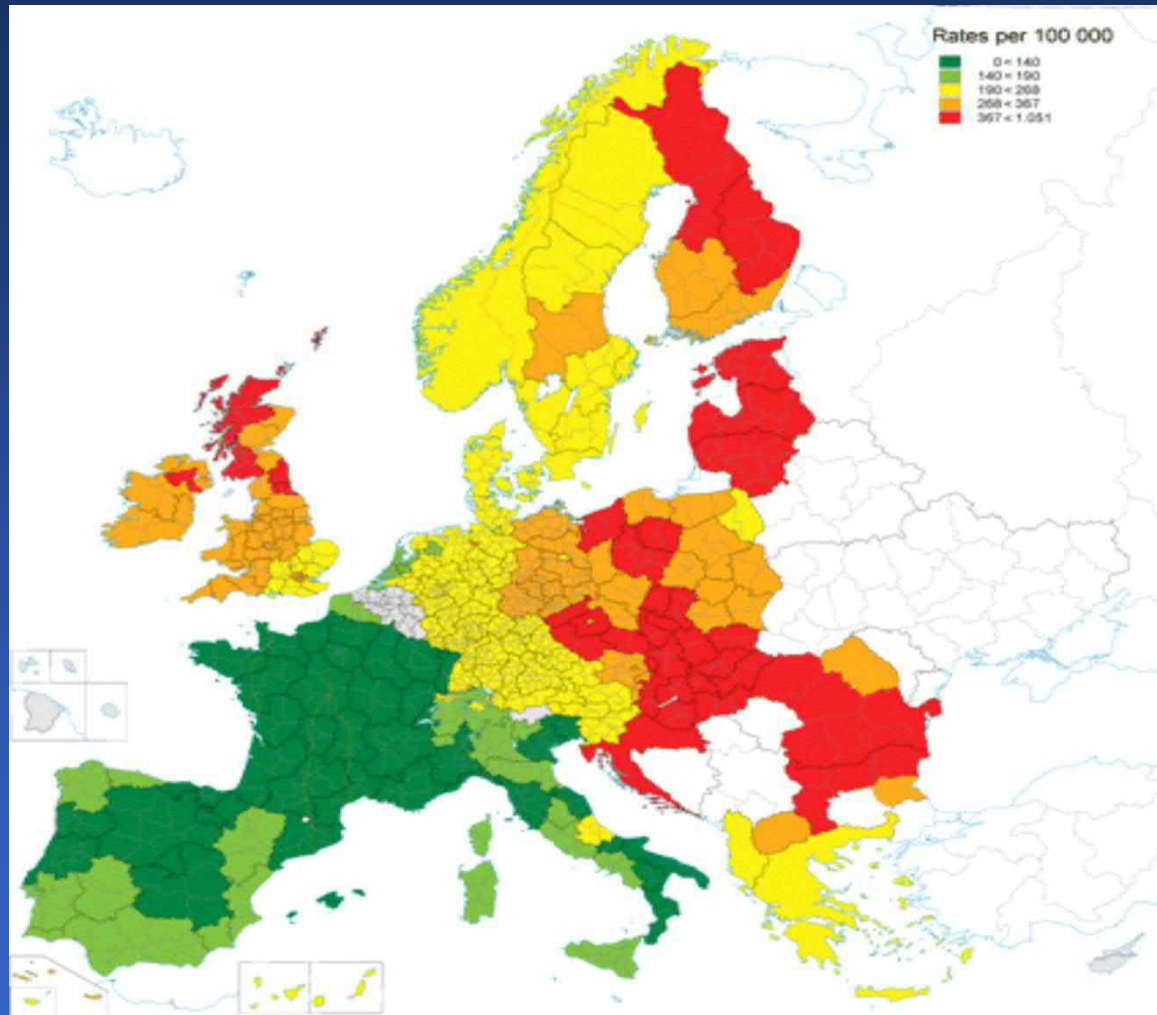
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# Why the prevention of CV diseases is necessary?

- **Atherosclerotic CVD, especially CHD, remains the leading cause of premature death worldwide.**
- **CVD affects both men and women; of all deaths that occur before the age of 75 years in Europe, 42% are due to CVD in women and 38% in men.**
- **CVD mortality is changing, with declining age-standardized rates in most European countries, which remain high in Eastern Europe.**
- **Prevention works: 50% of the reductions seen in CHD mortality is related to changes in risk factors, and 40% to improved treatments.**

# Regional variation in cardiovascular mortality within Europe



Age-standardized mortality from ischaemic heart disease in European regions (men; age group 45–74 years; year 2000)

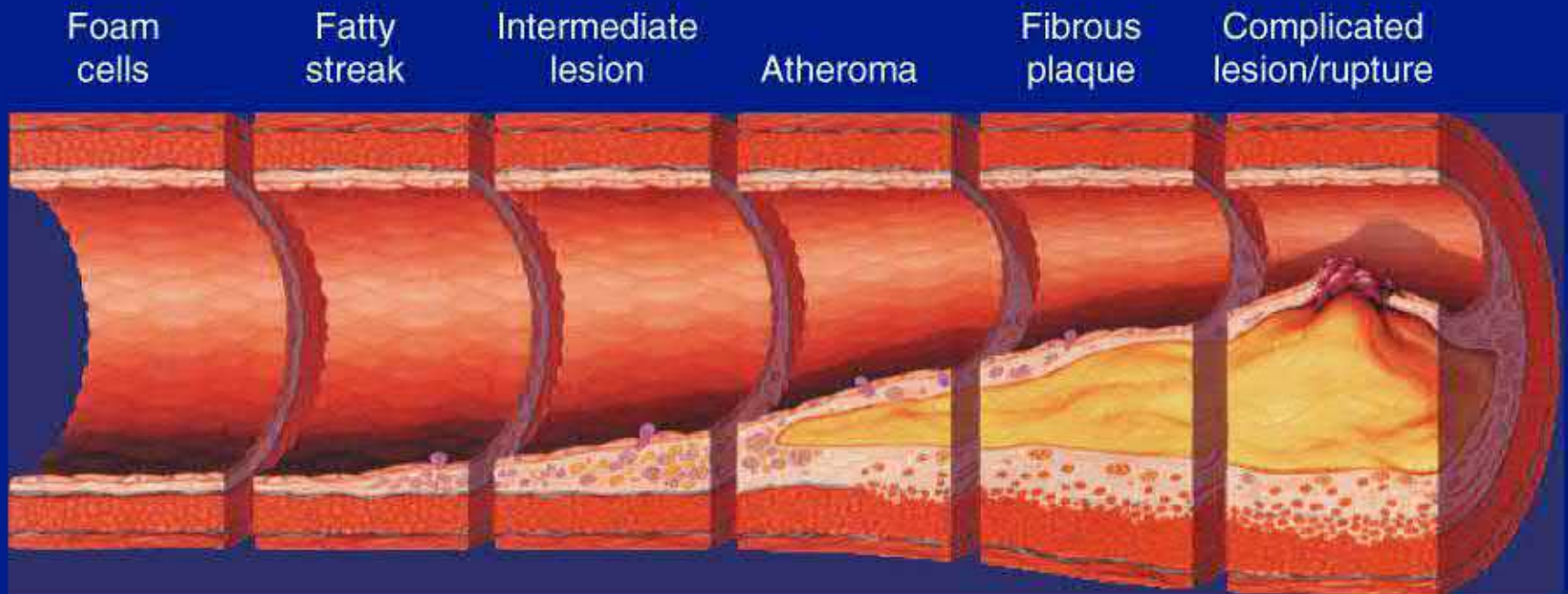
Eur Heart J. 2008;29(10):1316-1326. doi:10.1093/eurheartj/ehm604

# Mortality: Cardiovascular diseases and diabetes, deaths per 100,000

<http://apps.who.int/gho/data/?vid=2510>

	male	female
Hungary	416	241
USA	190	122
Spain	140	86
France	128	69
Russia	772	414
Mali	419	393

# Atherosclerosis timeline



Endothelial dysfunction

From first decade

From third decade

From fourth decade

Growth mainly by lipid accumulation

Smooth muscle  
and collagen

Thrombosis,  
hematoma

# Risk Factors for Cardiovascular Disease

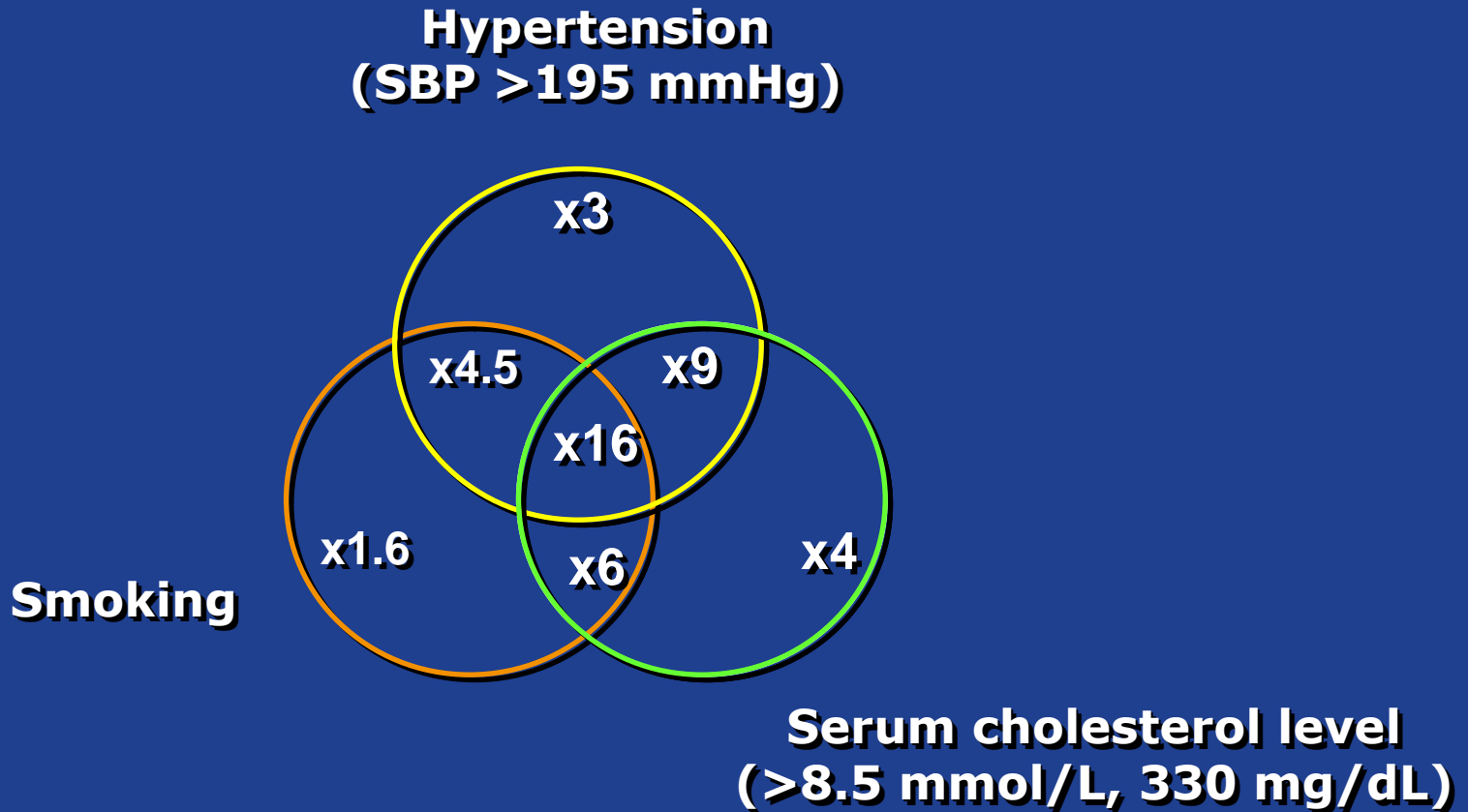
## ● Modifiable

- Smoking
- Dyslipidaemia
  - raised LDL-C
  - low HDL-C
  - raised triglycerides
- Raised blood pressure
- Diabetes mellitus
- Obesity
- Dietary factors
- Thrombogenic factors
- Lack of exercise
- Excess alcohol consumption

## ● Non-modifiable

- Personal history of CHD
- Family history of CHD
- Age
- Gender

# Levels of Risk Associated with Smoking, Hypertension and Hypercholesterolaemia



# Preventive medicine

## 2016 European Guidelines on cardiovascular disease prevention in clinical practice

Eur Heart J. **2016**;37:2315-2381.



own to have a limited effect.<sup>530</sup>  
e policies of workplaces, educational  
ctive.<sup>532</sup>

ary care to prevent alcohol abuse has  
39

ve alcohol intake can be limited by re-  
d opening hours of outlets and by in-  
r sales and servings.<sup>495</sup>

needed with regard to potential con-  
effects of alcohol consumption.

## Environment

the risk of respiratory and CV diseases.<sup>544</sup>

articles in the EU are motorized road traf-  
l and residential heating using oil, coal or

means living in urban areas are exposed to  
y standards. In particular, young and old

high risk of CVD are more prone to the  
ution on the circulation and the heart.

ased a policy package to be implemen-  
measures to reduce harmful emissions

d agriculture. Further efforts to reduce  
raged and taken up by national govern-

most effective multidisciplinary care.

### Recommendation for cardiovascular disease prevention in primary care

Recommendation	Class <sup>a</sup>	Level <sup>b</sup>
It is recommended that GPs, nurses and allied health professionals within primary care deliver CVD prevention for high-risk patients.	I	C

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

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

The physician in general practice is the key person to initiate, coordinate and provide long-term follow-up for CVD prevention. In most countries, GPs deliver >90% of consultations and provide most public health medicine, including preventive care and chronic disease monitoring. In the case of CVD prevention, they have a unique role in identifying individuals at risk of CVD and assessing their eligibility for intervention based on their risk profile.

How to maximize attendance rates and adherence, particularly in those who are at highest risk, remains an issue.

As mentioned in section 2.2, a systematic approach is recommended to risk assessment, giving priority to persons with a priori

# How to stay healthy?

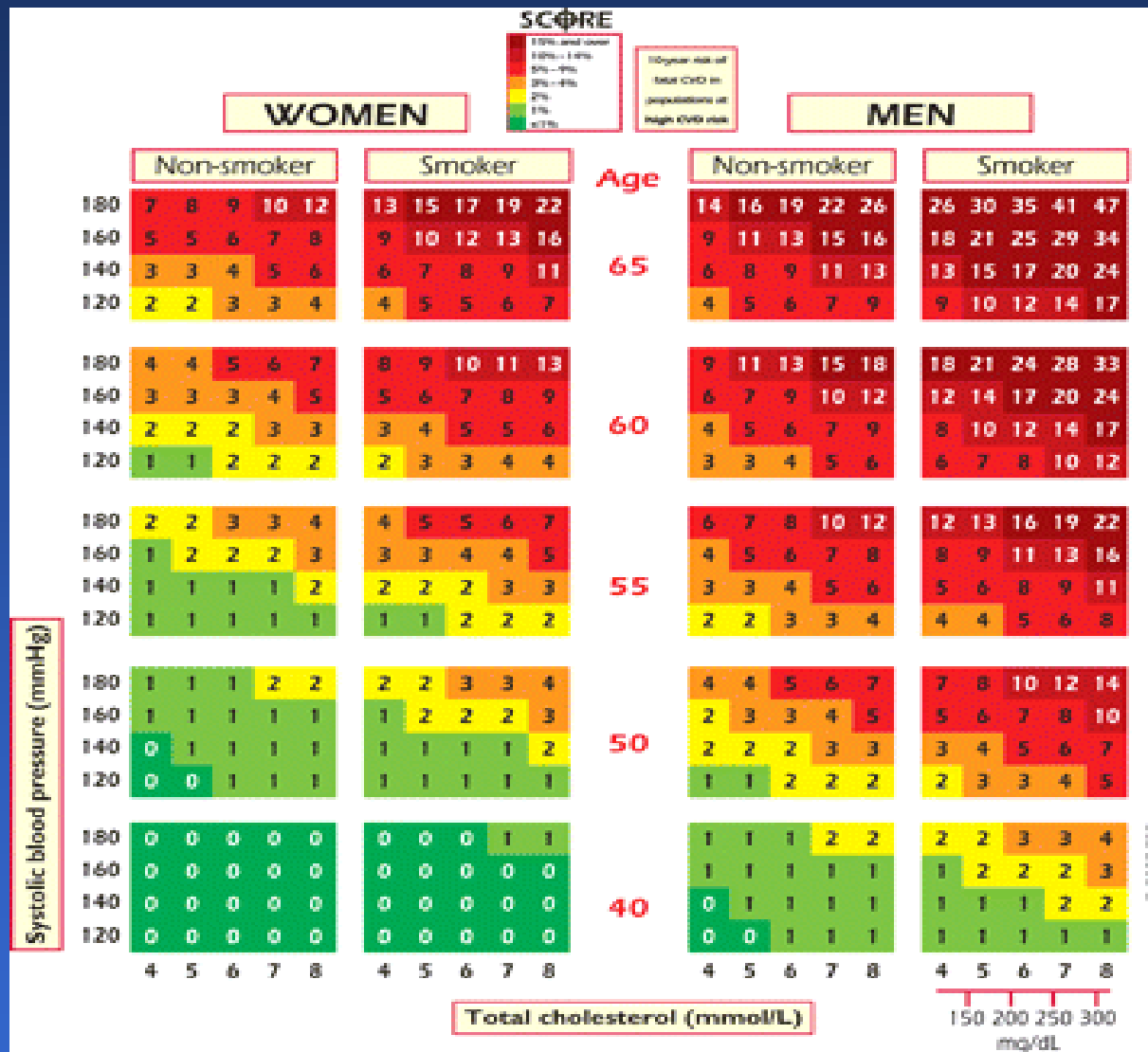
- **No use of tobacco.**
- **Adequate physical activity: at least 30 min five times a week.**
- **Healthy eating habits.**
- **No overweight.**
- **Blood pressure below 140/90 mmHg.**
- **Blood cholesterol below 5 mmol/L (190 mg/dL).**
- **Normal glucose metabolism.**
- **Avoidance of excessive stress.**

# Psychosocial risk factors

Contribute both to the risk of developing CVD and the worsening of clinical course and prognosis of CVD:

- low socio-economic status
- lack of social support
- stress at work and in family life
- depression, anxiety, hostility
- type D personality

# SCORE: 10-year risk of fatal CV disease in high-risk population



High CVR risk countries are all those not listed under the low risk chart (Figure 4). Of these, some are at very high risk, and the high-risk chart may underestimate risk in these. These countries are Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia FYR, Moldova, Russia, Ukraine, and Uzbekistan.

**Calculate score at: [www.hearscore.org](http://www.hearscore.org)**



HOME

 Print

## Calculator

Examination date: 13/09/2016

Patient name: CsZs

Date of birth: 9 / 1966

Sex:  Male  Female

Full Score  BMI Score

Systolic blood pressure: > 180

Cholesterol: 6.5 mmol/L

HDL Cholesterol: 1.3

Smoker:  Yes  No

Calculate Risk

HeartScore is based on the SCORE Risk Charts, which evaluate CVD risk for patients between 40 and 65, with SBP between 100 - 180 mmHg and Cholesterol between 3 - 6 mmol/L (105 - 305 mg/dl). Please note that patients with examination data over these value range are automatically at higher risk.

Patient Advice CVD Prevention Guidelines

 Patient p

## Patient Advice

This page allows you to have graphical displays of your patient's risk evaluation on the date of the examination.

- The **Patient Advice** tab consolidates the advices given to the patient at the date of the examination.
- The **CVD Prevention Guidelines** tab includes recommendations from the European Guidelines on CVD Prevention.

## What is CVD risk?

CVD risk means you risk of dying of a heart attack, stroke or other circulatory problem

[Actual Total CVD Risk Level](#) | [What makes up your risk](#) | [Personalized health advice](#)

## Your results

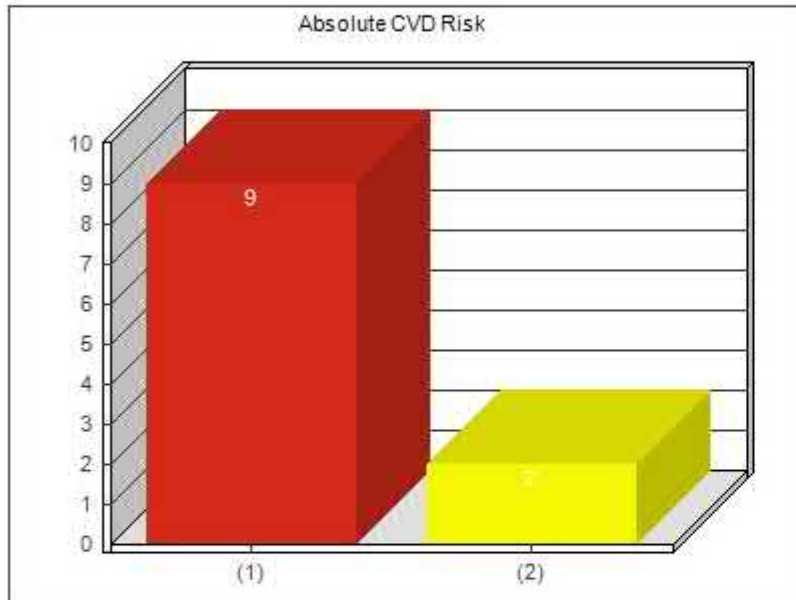
Examination date 13 September 2016  
 Patient name NJ  
 Age 50 (9/1966)  
 Sex Male

Risk factors	Your results	What you should aim for:
Systolic blood pressure	181	140 or less
Cholesterol	6.5 mmol/L	5 mmol/L or less
HDL Cholesterol	1.3 mmol/L	Greater than 1 mmol/L
Smoker	Yes	No

## Actual Total CVD Risk Level

The total cardiovascular disease risk level (left bar below) shows you the percentage risk of having a fatal cardiovascular event, such as a stroke or heart attack. Based on examination results, your total CVD risk is 9%.

However, by becoming aware of your risk factors and taking a few preventive actions, you can reach the treatment goals and reduce your risk to 2% as shown by the treatment goal level (right bar below).



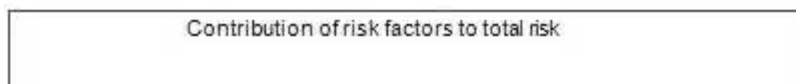
- (1) Your current risk is 9%
- (2) Your risk if you reach your treatment goals will approach 2%

At present, your risk of dying from a heart attack or a stroke within the next ten years is increased. You can reduce this risk further by becoming aware of your risk factors and by changing your lifestyle.

Your Risk Age: because of your risk factors your risk is similar to a 80 year old person with no risk factors, this is called your 'risk age'. You can reduce your risk age by reducing your risk factors.

## What makes up your risk

Cardiovascular disease is generally due to a combination of several risk factors. The more risk factors you have, the greater the chance of having a heart attack or stroke. The pie chart below shows you the distribution of your modifiable risk factors and the impact they have on your total CVD risk level.

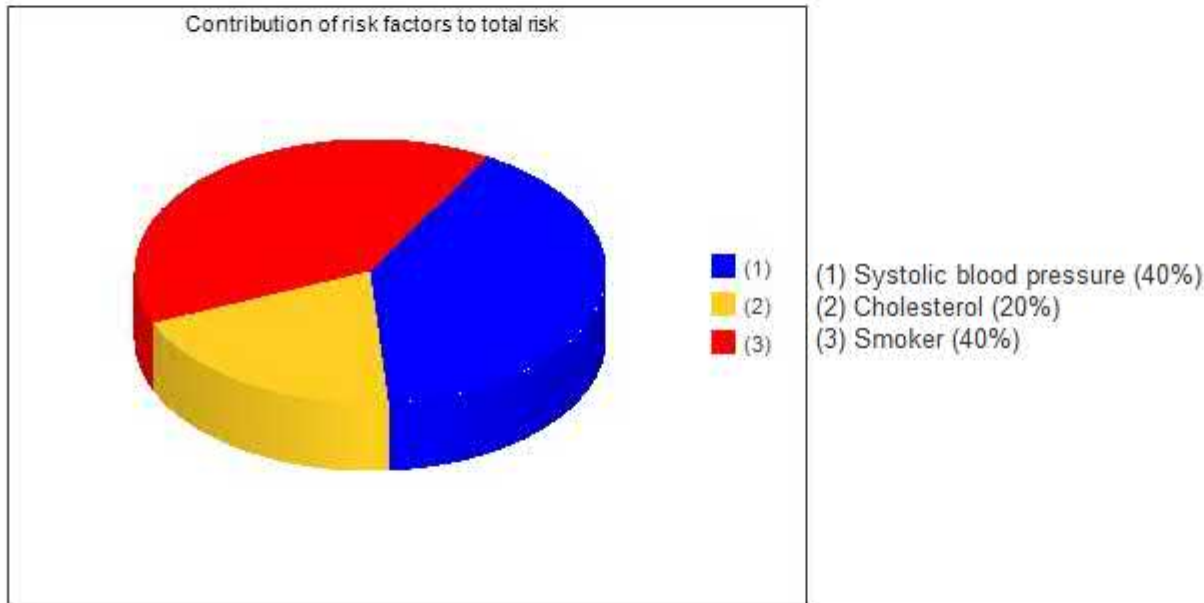


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### Personalized health advice

For most people walking 30 minutes per day and eating plenty of of vegetables, fruit, cereals and fish helps lower risk.

#### Smoker

You are noted to be a smoker. If you can stop smoking this would greatly reduce your risk. Many smokers who want to quit find nicotine chewing gum and patches helpful

Smoking increases your risk of many diseases: it is an extra good reason to quit. If you can manage to stop, you will have halved your risk of a heart attack or stroke: no drug is this good at reducing risk. I will do all that I can to help you.





# HeartScore<sup>®</sup>



HOME



Print

## Calculator

Examination date: 13/09/2016 31

Patient name: CsZs

Date of birth: 9 1966

Sex:  Male  Female

**Full Score** BMI Score

Systolic blood pressure: 120

Cholesterol: 6.5 mmol/L

HDL Cholesterol: 1.2

Smoker:  Yes  No

Calculate Risk

HeartScore is based on the SCORE Risk Charts, which evaluate CVD risk for patients between 40 and 65, with SBP between 100 - 180 mmHg and Cholesterol between 3 - 8 mmol/L (105 - 305

Patient Advice CVD Prevention Guidelines



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[Actual Total CVD Risk Level](#) | [What makes up your risk](#) | [Personalized health advice](#)

## Your results

Examination date 13 September 2016

Patient name CsZs

Age 50 (9/1966)

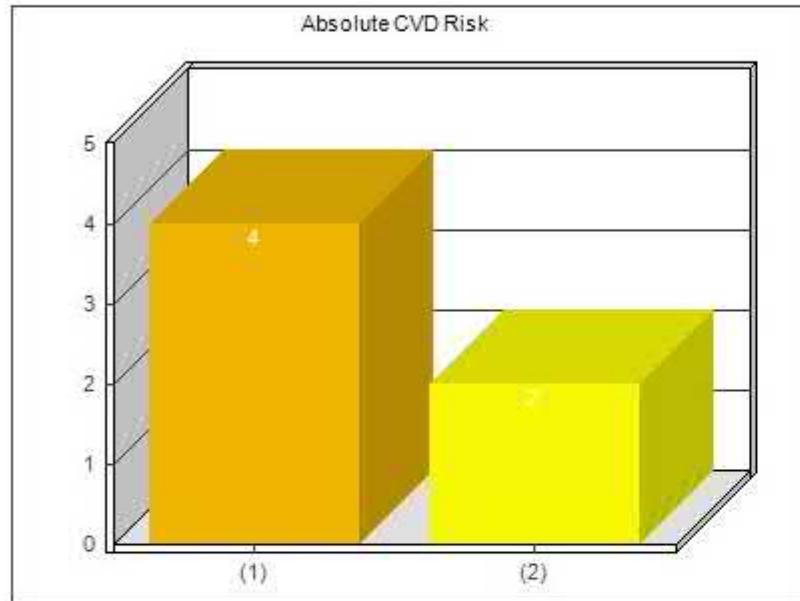
Sex Male

Risk factors	Your results	What you should aim for:
Systolic blood pressure	120	140 or less

## Actual Total CVD Risk Level

The total cardiovascular disease risk level (left bar below) shows you the percentage risk of having a fatal cardiovascular event, such as a stroke or heart attack. Based on examination results, your total CVD risk is 4%.

However, by becoming aware of your risk factors and taking a few preventive actions, you can reach the treatment goals and reduce your risk to 2% as shown by the treatment goal level (right bar below).



- (1) Your current risk is 4%
- (2) Your risk if you reach your treatment goals will approach 2%

At present, your risk of dying from a heart attack or a stroke within the next ten years might seem low, but this risk is 3 times higher than it could be. You can reduce this risk further by becoming aware of your risk factors and by changing your lifestyle.

Your Risk Age: because of your risk factors your risk is similar to a 64 year old person with no risk factors, this is called your 'risk age'. You can reduce your risk age by reducing your risk factors

## What makes up your risk

Cardiovascular disease is generally due to a combination of several risk factors. The more risk factors you have, the greater the chance of having a heart attack or stroke. The pie chart below shows you the distribution of your modifiable risk factors and the impact they have on your total CVD risk level.

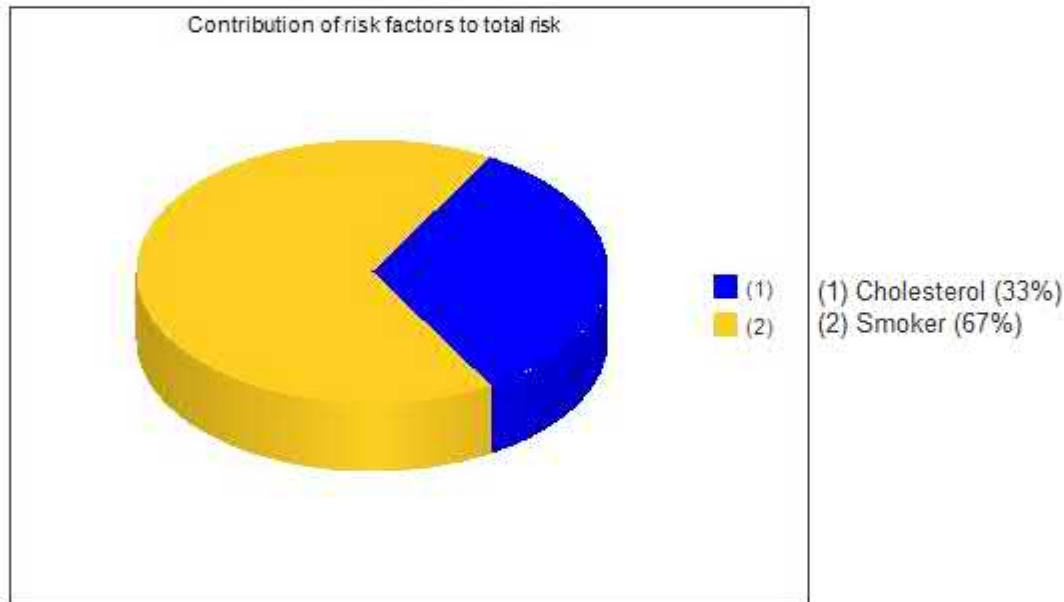
Contribution of risk factors to total risk

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### What makes up your risk

Cardiovascular disease is generally due to a combination of several risk factors. The more risk factors you have, the greater the chance of having a heart attack or stroke. The pie chart below shows you the distribution of your modifiable risk factors and the impact they have on your total CVD risk level.



### Personalized health advice

For most people walking 30 minutes per day and eating plenty of of vegetables, fruit, cereals and fish helps lower risk.

#### Smoker

You are noted to be a smoker. If you can stop smoking this would greatly reduce your risk. Many smokers who want to quit find nicotine chewing gum and patches helpful

#### Systolic blood pressure

Your blood pressure is 120 mmHg, and that is within the normal range.

#### Cholesterol

# The proper treatment of hypertension works...

- Reduction of stroke- 40%
- Reduction of acute coronary events- 20%
- Reduction of acute heart failure- 50%

Mancia G et al, Journal of Hypertension. 2007 Jun;25(6):1105-87.

# **Hypertension Management**

**2013 Practice guidelines for the management of arterial hypertension of the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC)**

Journal of Hypertension 2013, 31:1281–1357

# Blood pressure categories

Category	SBP		DBP
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension	≥140	and	<90

The blood pressure (BP) category is defined by the highest BP level, whether systolic blood pressure (SBP) or diastolic blood pressure (DBP). Isolated systolic hypertension should be graded 1, 2 or 3 according to SBP values in the ranges indicated.

Whelton PK, et al.

2017 High Blood Pressure Clinical Practice Guideline

# 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

A Report of the American College of Cardiology/American Heart Association Task Force on  
Clinical Practice Guidelines

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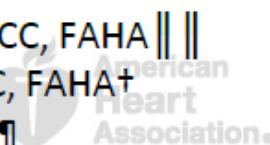
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**Whelton PK, et al.****2017 High Blood Pressure Clinical Practice Guideline****Table 6. Categories of BP in Adults\***

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
<b>Hypertension</b>			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

\*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in Section 4); DBP, diastolic blood pressure; and SBP systolic blood pressure.

**References**

1. Lewington S, Clarke R, Qizilbash N, et al. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet*. 2002;360:1903-13.
2. Rapsomaniki E, Timmis A, George J, et al. Blood pressure and incidence of twelve cardiovascular diseases: lifetime risks, healthy life-years lost, and age-specific associations in 1.25 million people. *Lancet*. 2014;383:1899-911.
3. Etehad D, Emdin CA, Kiran A, et al. Blood pressure lowering for prevention of cardiovascular disease and death: systematic review and meta-analysis. *Lancet*. 2016;387:957-67.
4. Guo X, Zhang X, Guo L, et al. Association between pre-hypertension and cardiovascular outcomes: a systematic



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NOVEMBER 26, 2015

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## A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group\*

### ABSTRACT

#### BACKGROUND

The most appropriate targets for systolic blood pressure to reduce cardiovascular morbidity and mortality among persons without diabetes remain uncertain.

#### METHODS

We randomly assigned 9361 persons with a systolic blood pressure of 130 mm Hg or higher and an increased cardiovascular risk, but without diabetes, to a systolic blood-pressure target of less than 120 mm Hg (intensive treatment) or a target of less than 140 mm Hg (standard treatment). The primary composite outcome was myocardial infarction, other acute coronary syndromes, stroke, heart failure, or death from cardiovascular causes.

#### RESULTS

At 1 year, the mean systolic blood pressure was 121.4 mm Hg in the intensive-treatment group and 136.2 mm Hg in the standard-treatment group. The intervention was stopped early after a median follow-up of 3.26 years owing to a significantly lower rate of the primary composite outcome in the intensive-treatment group than in the standard-treatment group (1.65% per year vs. 2.19% per year; hazard ratio with intensive treatment, 0.75; 95% confidence interval [CI], 0.64 to

The members of the writing committee (Jackson T. Wright, Jr., M.D., Ph.D., Jeff D. Williamson, M.D., M.H.S., Paul K. Whelton, M.D., Joni K. Snyder, R.N., B.S.N., M.A., Kaycee M. Sink, M.D., M.A.S., Michael V. Rocco, M.D., M.S.C.E., David M. Reboussin, Ph.D., Mahboob Rahman, M.D., Suzanne Oparil, M.D., Cora E. Lewis, M.D., M.S.P.H., Paul L. Kimmel, M.D., Karen C. Johnson, M.D., M.P.H., David C. Goff, Jr., M.D., Ph.D., Lawrence J. Fine, M.D., Dr.P.H., Jeffrey A. Cutler, M.D., M.P.H., William C.ushman, M.D., Alfred K. Cheung, M.D., and Walter T. Ambrosius, Ph.D.) assume responsibility for the overall content and integrity of the article. The affiliations of the members of the writing group are listed in the Appendix. Address reprint requests to Dr. Wright at the Division of Nephrology and Hypertension, University Hospitals Case Medical Center, Case Western Reserve University, 1100 Euclid

lar risk was defined by one or more of the following: clinical or subclinical cardiovascular disease other than stroke; chronic kidney disease, excluding polycystic kidney disease, with an estimated glomerular filtration rate (eGFR) of 20 to less than 60 ml per minute per 1.73 m<sup>2</sup> of body-surface area, calculated with the use of the four-variable Modification of Diet in Renal Disease equation; a 10-year risk of cardiovascular disease of 15% or greater on the basis of the Framingham risk score; or an age of 75 years or older. Patients with diabetes mellitus or prior stroke were excluded. Detailed inclusion and exclusion criteria are listed in the Supplementary Appendix. All participants provided written informed consent.

#### **RANDOMIZATION AND INTERVENTIONS**

Eligible participants were assigned to a systolic blood-pressure target of either less than 140 mm Hg (the standard-treatment group) or less than 120 mm Hg (the intensive-treatment group). Randomization was stratified according to clinical site. Participants and study personnel were aware of the study-group assignments, but outcome adjudicators were not.

After the participants underwent randomization, their baseline antihypertensive regimens

pharmaceuticals; neither company had any other role in the study.

Participants were seen monthly for the first 3 months and every 3 months thereafter. Medications for participants in the intensive-treatment group were adjusted on a monthly basis to target a systolic blood pressure of less than 120 mm Hg. For participants in the standard-treatment group, medications were adjusted to target a systolic blood pressure of 135 to 139 mm Hg, and the dose was reduced if systolic blood pressure was less than 130 mm Hg on a single visit or less than 135 mm Hg on two consecutive visits. Dose adjustment was based on a mean of three blood-pressure measurements at an office visit while the patient was seated and after 5 minutes of quiet rest; the measurements were made with the use of an automated measurement system (Model 907, Omron Healthcare). Lifestyle modification was encouraged as part of the management strategy. Retention in the study and adherence to treatment were monitored prospectively and routinely throughout the trial.<sup>26</sup>

#### **STUDY MEASUREMENTS**

Demographic data were collected at baseline. Clinical and laboratory data were obtained at



**ESC**

European Society  
of Cardiology

European Heart Journal (2018) 00, 1–98  
doi:10.1093/eurheartj/ehy339

**ESC/ESH GUIDELINES**

# 2018 ESC/ESH Guidelines for the management of arterial hypertension

**The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH)**

**Authors/Task Force Members: Bryan Williams\*** (ESC Chairperson) (UK), **Giuseppe Mancia\*** (ESH Chairperson) (Italy), **Wilko Spiering** (The Netherlands), **Enrico Agabiti Rosei** (Italy), **Michel Azizi** (France), **Michel Burnier** (Switzerland), **Denis L. Clement** (Belgium), **Antonio Coca** (Spain), **Giovanni de Simone** (Italy), **Anna Dominiczak** (UK), **Thomas Kahan** (Sweden), **Felix Mahfoud** (Germany), **Josep Redon** (Spain), **Luis Ruilope** (Spain), **Alberto Zanchetti<sup>†</sup>** (Italy), **Mary Kerins** (Ireland), **Sverre E. Kjeldsen** (Norway), **Reinhold Kreutz** (Germany), **Stephane Laurent** (France), **Gregory Y. H. Lip** (UK), **Richard McManus** (UK), **Krzysztof Narkiewicz** (Poland), **Frank Ruschitzka** (Switzerland), **Roland E. Schmieder** (Germany), **Evgeny Shlyakhto** (Russia), **Costas Tsioufis** (Greece), **Victor Aboyans** (France), **Ileana Desormais** (France)

**Table 3** Classification of office blood pressure<sup>a</sup> and definitions of hypertension grade<sup>b</sup>

Category	Systolic (mmHg)		Diastolic (mmHg)
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension <sup>b</sup>	≥140	and	<90

BP = blood pressure; SBP = systolic blood pressure.

<sup>a</sup>BP category is defined according to seated clinic BP and by the highest level of BP, whether systolic or diastolic.

<sup>b</sup>Isolated systolic hypertension is graded 1, 2, or 3 according to SBP values in the ranges indicated.

The same classification is used for all ages from 16 years.

# How to measure the blood pressure?

**Allow the patient to sit for 3-5 minutes before beginning BP measurement.**

**Take at least two BP measurements spaced 1-2 min apart, and additional measurements if the first two are quite different.**

**Repeated measurements in atrial fibrillation.**

**Use standard bladder (12-13 cm), but have larger and smaller as well for large and thin arms.**

**Measure at first visit BP 1 and 3 min after assumption of the standing position in elderly participants, diabetic patients and in other conditions in which orthostatic hypertension may be frequent or suspected.**

# BLOOD PRESSURE MEASUREMENT



## PREPARATION BEFORE TAKING BP

The patient should be resting comfortably in a quiet environment for 5 minutes in a chair. The patient should have an empty bladder and not have eaten, ingested caffeine, smoked, or engaged in physical activity at least 30 minutes prior to the measurement. There should be no talking during the procedure by the patient or observer.

Inflatable bladder width should be about 40% of arm circumference and bladder length should be about 80-100% of the individual's arm circumference.

For auscultation, the lower edge of the cuff should be 2-3 cm above the elbow crease and the bladder should be centered over the brachial artery.

## DID YOU KNOW?

Using **too large a cuff** leads to falsely low readings and using **too small a cuff**, falsely high readings. Markings on the cuff clearly indicate the ideal arm circumferences appropriate for the cuff size.

## Ideally, use validated upper-arm electronic devices.

For electronic devices, apply the cuff as recommended by the manufacturer and record the BP exactly as displayed on the automated device.



## Auscultation

If only this method is available, the preparation is as above.

For auscultatory measurements, the cuff should be at heart level. Increase the pressure **rapidly to 30 mmHg** above the level at which the brachial or radial pulse is extinguished, place the stethoscope head over the brachial artery, **deflate** the cuff by approximately **2 mmHg per heartbeat**, and determine systolic (appearance of Korotkoff sounds) and diastolic (disappearance of Korotkoff sounds). If the Korotkoff sounds persist towards zero, use the point of muffling of the sounds to indicate diastolic BP.

Record the BP to the **closest 2 mmHg**. Avoid terminal digit preference (rounding up or down to a zero for the last digit).



No talking during the procedure.

Seated position

Back supported

BP cuff at heart level

Edge 2-3 cm above elbow crease

Arm supported

Empty bladder

Legs uncrossed

## GOOD PRACTICE

On the initial visit, readings should be taken in each arm and the higher arm should be used for subsequent measurements.

Two or more readings should be taken at each visit and the mean calculated.

## Clinical indications for HBPM or ABPM

- Suspicion of white-coat hypertension

  - Grade 1 hypertension in the office

  - High office BP in individuals without asymptomatic organ damage and at low total CV risk

- Suspicion of masked hypertension

  - High normal BP in the office

  - Normal office BP in individuals with asymptomatic organ damage or at high total CV risk

- Identification of white-coat effect in hypertensive patients

- Considerable variability of office BP over the same or different visits

- Autonomic, postural, postprandial, siesta-induced and drug-induced hypotension

- Elevated office BP or suspected preeclampsia in pregnant women

- Identification of true and false resistant hypertension

## Specific indications for ABPM

- Marked discordance between office BP and home BP

- Assessment of dipping status

- Suspicion of nocturnal hypertension or absence of dipping, such as in patients with sleep apnoea, CKD or diabetes

- Assessment of BP variability

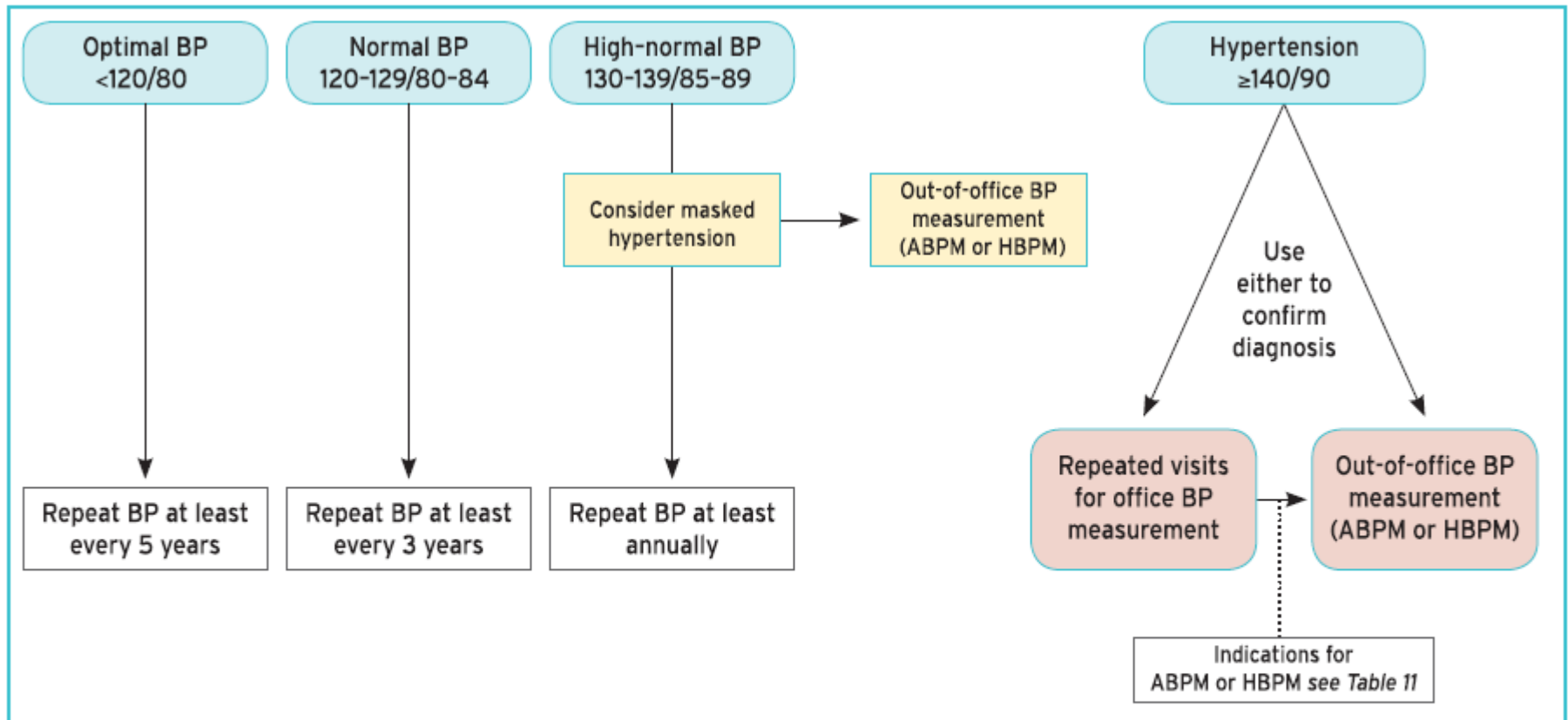
# Normal ranges of blood pressure

Category	SBP (mmHg)		DBP (mmHg)
Office BP	≥140	and/or	≥90
Ambulatory BP			
Daytime (or awake)	≥135	and/or	≥85
Night-time (or asleep)	≥120	and/or	≥70
24-h	≥130	and/or	≥80
Home BP	≥135	and/or	≥85

BP, blood pressure; DBP, diastolic blood pressure; SBP, systolic blood pressure.



# How often should BP be measured?



**Figure 2** Screening and diagnosis of hypertension. ABPM = ambulatory blood pressure monitoring; BP = blood pressure; HBPM = home blood pressure monitoring.

# Personal and family medical history

1. Duration and previous level of high BP, including measurements at home
2. Secondary hypertension
  - (a) Family history of CKD (polycystic kidney)
  - (b) History of renal disease, urinary tract infection, haematuria, analgesic abuse (parenchymal renal disease)
  - (c) Drug/substance intake, for example oral contraceptives, liquorice, carbenoxolone, vasoconstrictive nasal drops, cocaine, amphetamines, glucocorticosteroids and mineralocorticosteroids, NSAIDs, erythropoietin, cyclosporine
  - (d) Repetitive episodes of sweating, headache, anxiety, palpitations (pheochromocytoma)
  - (e) Episodes of muscle weakness and tetany (hyperaldosteronism)
  - (f) Symptoms suggestive of thyroid disease
3. Risk factors
  - (a) Family and personal history of hypertension and CVD
  - (b) Family and personal history of dyslipidaemia
  - (c) Family and personal history of diabetes mellitus (medications, blood glucose levels, polyuria).
  - (d) Smoking habits
  - (e) Dietary habits
  - (f) Recent weight changes; obesity
  - (g) Amount of physical exercise
  - (h) Snoring; sleep apnoea (information also from partner)
  - (i) Low birth weight.
4. History and symptoms of organ damage and CVD
  - (a) Brain and eyes: headache, vertigo, impaired vision, TIA, sensory or motor deficit, stroke, carotid revascularization
  - (b) Heart: chest pain, shortness of breath, swollen ankles, myocardial infarction, revascularization, syncope, history of palpitations, arrhythmias, especially atrial fibrillation
  - (c) Kidney: thirst, polyuria, nocturia, haematuria
  - (d) Peripheral arteries: cold extremities, intermittent claudication, pain-free walking distance, peripheral revascularization
  - (e) History of snoring/chronic lung disease/sleep apnoea
  - (f) Cognitive dysfunction
5. Hypertension management
  - (a) Current antihypertensive medication
  - (b) Past antihypertensive medication
  - (c) Evidence of adherence or lack of adherence to therapy
  - (d) Efficacy and adverse effects of drugs

# Signs suggesting secondary hypertension

features of Cushing syndrome

skin stigmata of neurofibromatosis (pheochromocytoma)

palpation of enlarged kidneys (polycystic kidney)

auscultation of abdominal murmurs (renovascular hypertension)

auscultation of precordial chest murmurs (aortic coarctation,  
aortic disease: upper extremity artery disease)

left-right arm blood pressure difference (aortic coarctation,  
subclavian artery stenosis)

# Laboratory, other investigations

## Routine tests

- Haemoglobin and/or haematocrit
- Fasting plasma glucose
- Serum total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol
- Fasting serum triglycerides
- Serum potassium and sodium
- Serum uric acid
- Serum creatinine (with estimation of GFR),
- Urine analysis: microscopic examination; urinary protein by dipstick test; test for microalbuminuria
- 12-lead ECG.

## Additional tests, based on history, physical examination and findings from routine laboratory tests

- Haemoglobin A<sub>1c</sub> [if fasting plasma glucose is >5.6 mmol/l (102 mg/dl) or previous diagnosis of diabetes]
- Quantitative proteinuria (if dipstick test is positive); urinary potassium and sodium concentration and their ratio
- Home and 24-h ABPM
- Echocardiogram
- Holter monitoring in case of arrhythmias
- Carotid ultrasound
- Peripheral artery/abdominal ultrasound
- Pulse wave velocity
- Ankle-brachial index
- Fundoscopy

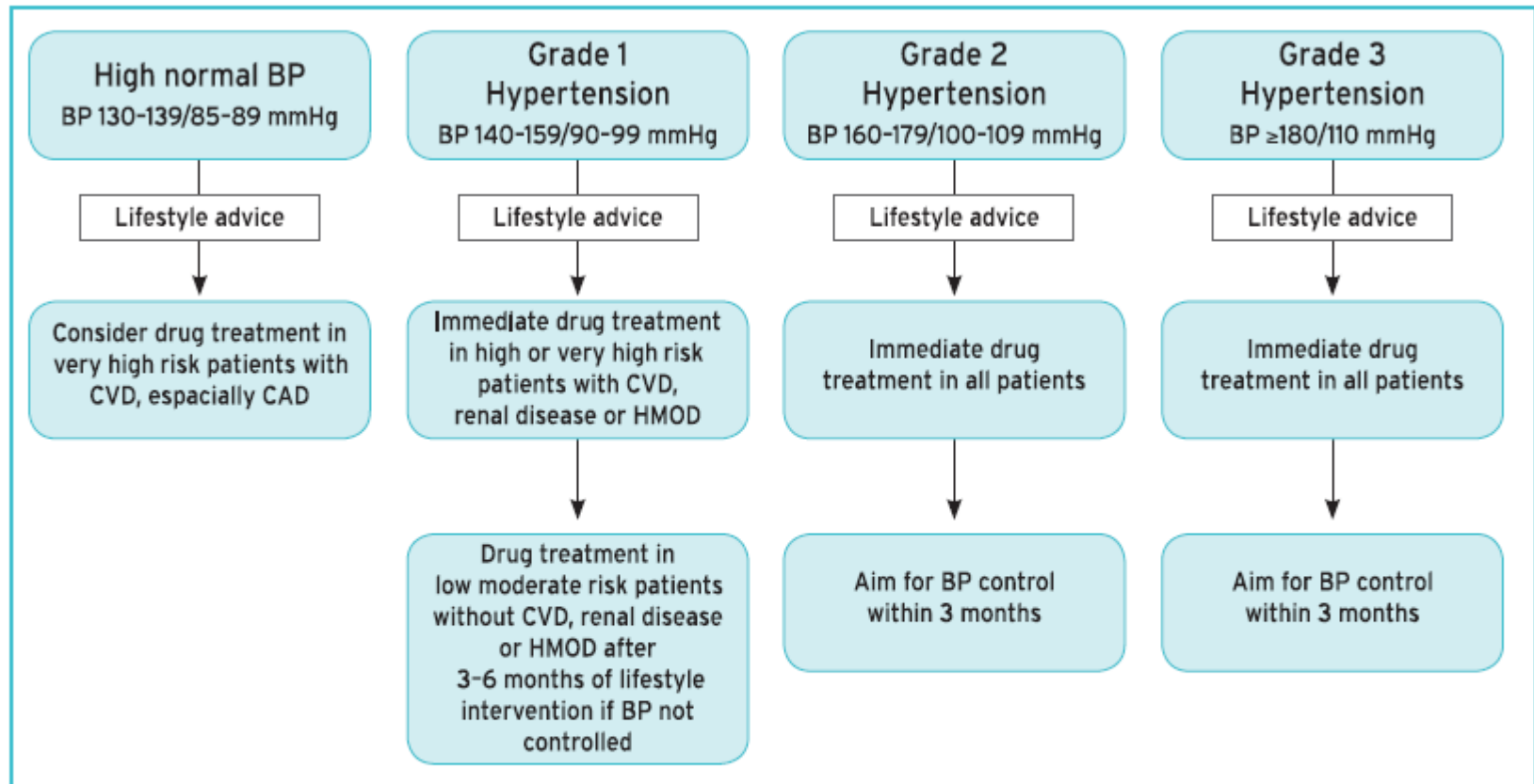
## Extended evaluation (mostly domain of the specialist)

- Further search for cerebral, cardiac, renal and vascular damage, mandatory in resistant and complicated hypertension
- Search for secondary hypertension when suggested by history, physical examination or routine and additional tests

# CV risk and blood pressure

Hypertension disease staging	Other risk factors, HMOD, or disease	BP (mmHg) grading			
		High normal SBP 130-139 DBP 85-89	Grade 1 SBP 140-159 DBP 90-99	Grade 2 SBP 160-179 DBP 100-109	Grade 3 SBP $\geq$ 180 or DBP $\geq$ 110
Stage 1 (uncomplicated)	No other risk factors	Low risk	Low risk	Moderate risk	High risk
	1 or 2 risk factors	Low risk	Moderate risk	Moderate to high risk	High risk
	$\geq$ 3 risk factors	Low to Moderate risk	Moderate to high risk	High Risk	High risk
Stage 2 (asymptomatic disease)	HMOD, CKD grade 3, or diabetes mellitus without organ damage	Moderate to high risk	High risk	High risk	High to very high risk
Stage 3 (established disease)	Established CVD, CKD grade $\geq$ 4, or diabetes mellitus with organ damage	Very high risk	Very high risk	Very high risk	Very high risk

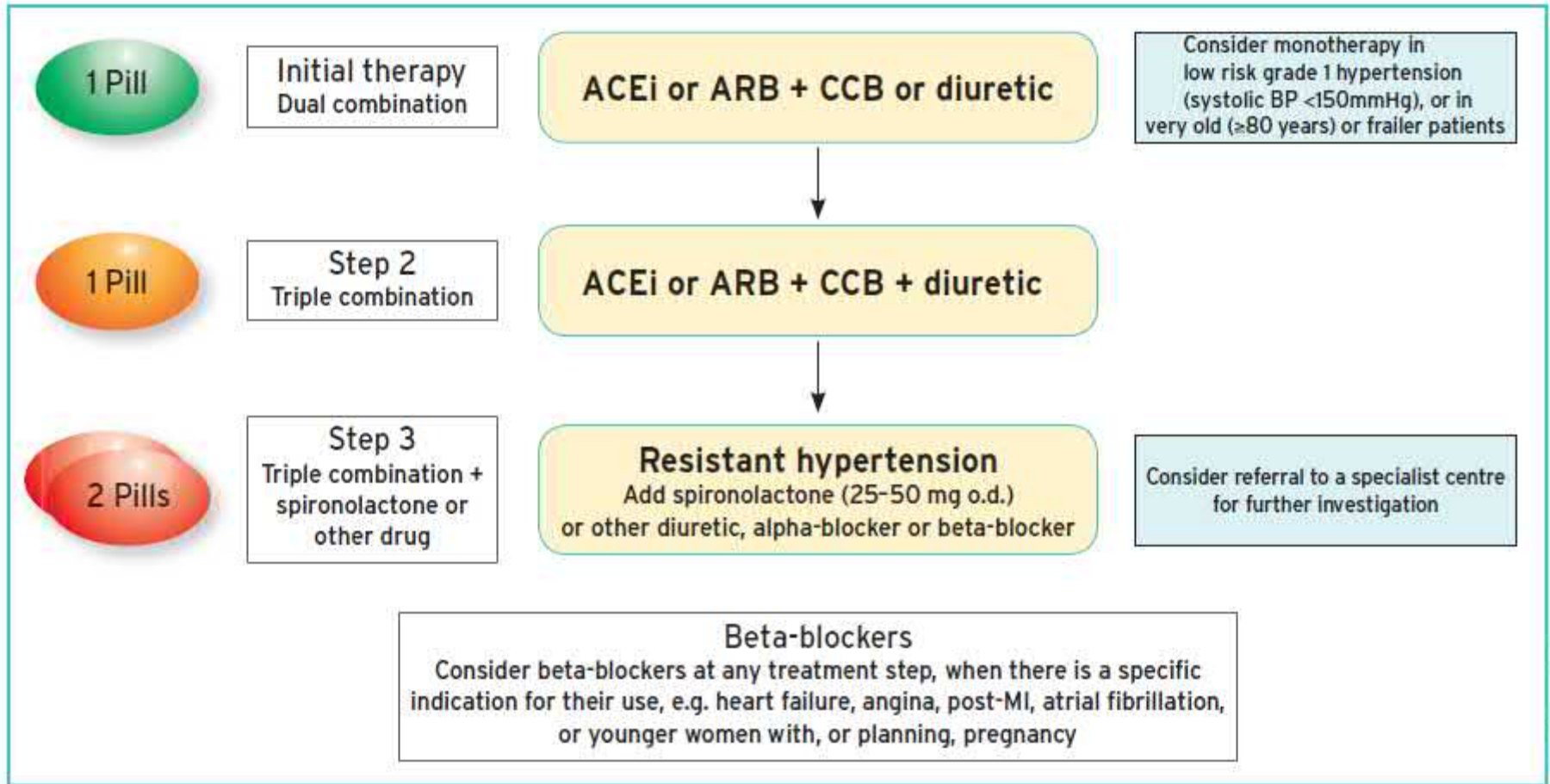
# Initiation of lifestyle changes and antihypertensive drug treatment



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**Figure 3** Initiation of blood pressure-lowering treatment (lifestyle changes and medication) at different initial office blood pressure levels. BP = blood pressure; CAD = coronary artery disease; CVD = cardiovascular disease; HMOD = hypertension-mediated organ damage.

# How to treat hypertension?



**Figure 4 Core drug treatment strategy for uncomplicated hypertension.** The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

# Treatment target ranges

**Table 23** Office blood pressure treatment target range

Age group	Office SBP treatment target ranges (mmHg)					Office DBP treatment target range (mmHg)
	Hypertension	+ Diabetes	+ CKD	+ CAD	+ Stroke <sup>a</sup> /TIA	
18 - 65 years	<b>Target to 130</b> <i>or lower if tolerated</i> Not <120	<b>Target to 130</b> <i>or lower if tolerated</i> Not <120	<b>Target to &lt;140 to 130</b> <i>if tolerated</i>	<b>Target to 130</b> <i>or lower if tolerated</i> Not <120	<b>Target to 130</b> <i>or lower if tolerated</i> Not <120	70–79
65 - 79 years <sup>b</sup>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	70–79
≥80 years <sup>b</sup>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	<b>Target to 130-139</b> <i>if tolerated</i>	70–79
<b>Office DBP treatment target range (mmHg)</b>	70–79	70–79	70–79	70–79	70–79	

CAD = coronary artery disease; CKD = chronic kidney disease (includes diabetic and non-diabetic CKD); DBP = diastolic blood pressure; SBP = systolic blood pressure; TIA = transient ischaemic attack.

<sup>a</sup>Refers to patients with previous stroke and does not refer to blood pressure targets immediately after acute stroke.

<sup>b</sup>Treatment decisions and blood pressure targets may need to be modified in older patients who are frail and independent.



# Lifestyle changes

1. salt restriction to 5–6 g/day;
2. moderation of alcohol consumption to no more than 20–30 g of ethanol per day in men and 10–20 g/day in women;
3. high consumption of vegetables and fruits and low fat dairy products;
4. reduction of weight to a BMI of 25 kg/m<sup>2</sup> and waist circumference to less than 102 cm in men and less than 88 cm in women;
5. at least 30 min of moderate dynamic exercise on 5 to 7 days per week.

# Compelling and possible contraindications to the use of antihypertensive drugs

<b>Drug</b>	<b>Compelling</b>	<b>Possible</b>
Diuretics	Gout	Metabolic syndrome; glucose intolerance; pregnancy; hypercalcaemia; hypokalaemia
b-Blockers	Asthma; A-V block	Metabolic syndrome; glucose intolerance; athletes and physically active patients; chronic obstructive pulmonary disease (except for vasodilator b-blockers)
Calcium antagonists (dihydropyridines)		Tachyarrhythmia; heart failure
Calcium antagonists (verapamil, diltiazem)	A-V block (Grade 2 or 3, trifascicular block); severe left ventricular dysfunction; heart failure	

# Compelling and possible contraindications to the use of antihypertensive drugs

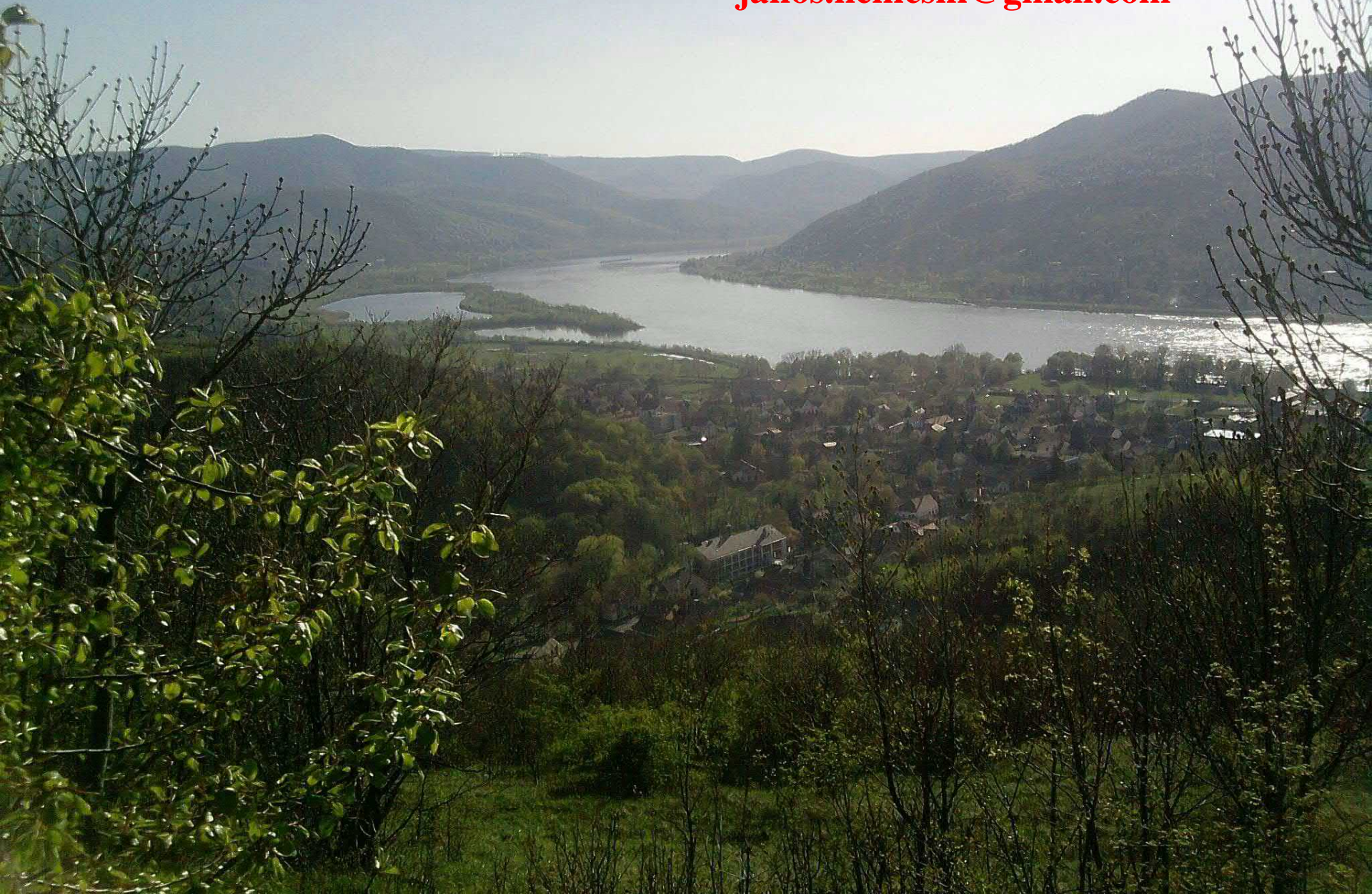
<b>Drug</b>	<b>Compelling</b>	<b>Possible</b>
<b>ACE inhibitors</b>	<b>Pregnancy; angioneurotic oedema; hyperkalaemia; bilateral renal artery stenosis</b>	<b>Women with childbearing potential</b>
<b>ARBs</b>	<b>Pregnancy; hyperkalaemia; bilateral renal artery stenosis</b>	<b>Women with childbearing potential</b>
<b>Mineralocorticoid receptor antagonists</b>	<b>Acute or severe renal failure (eGFR &lt;30 ml/min); hyperkalaemia</b>	

# **Main take-home messages**

- **keep the patients healthy;**
- **screen and treat hypertension, diabetes, dyslipidaemia and additional risk factors (smoking, anxiety, hyperuricaemia, obesity, alcohol...) to avoid cardiovascular events;**
- **be up-to-date**

**Thank you for your attention!**

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## **Risk factors**

**Male sex**

**Age (men  $\geq 55$  years; women  $\geq 65$  years)**

**Smoking**

**Dyslipidaemia**

**Total cholesterol  $>4.9$  mmol/L (190 mg/dL), and/or**

**Low-density lipoprotein cholesterol  $>3.0$  mmol/L (115 mg/dL),  
and/or**

**High-density lipoprotein cholesterol: men  $<1.0$  mmol/L  
(40 mg/dL), women  $<1.2$  mmol/L (46 mg/dL), and/or**

**Triglycerides  $>1.7$  mmol/L (150 mg/dL)**

**Fasting plasma glucose 5.6–6.9 mmol/L (102–125 mg/dL)**

**Abnormal glucose tolerance test**

**Obesity [BMI  $\geq 30$  kg/m<sup>2</sup> ]**

**Abdominal obesity (waist circumference: men  $\geq 102$  cm;  
women  $\geq 88$  cm) (in Caucasians)**

**Family history of premature CVD (men aged  $<55$  years;  
women aged  $<65$  years)**

## **Asymptomatic organ damage**

**Pulse pressure (in the elderly)  $\geq 60$  mmHg**

**Electrocardiographic LVH (Sokolow–Lyon index  $> 3.5$  mV; RaVL  $> 1.1$  mV; Cornell voltage duration product  $> 244$  mV\*ms), or Echocardiographic LVH [LVM index: men  $> 115$  g/m<sup>2</sup>; women  $> 95$  g/m<sup>2</sup> (BSA)]**

**Carotid wall thickening (IMT  $> 0.9$  mm) or plaque**

**Carotid–femoral PWV  $> 10$  m/s**

**Ankle-brachial index  $< 0.9$**

**Microalbuminuria (30–300 mg/24 h), or albumin–creatinine ratio (30–300 mg/g; 3.4–34 mg/mmol) (preferentially on morning spot urine)**

## **Diabetes mellitus**

**Fasting plasma glucose  $\geq 7.0$  mmol/L (126 mg/dL) on two repeated measurements, and/or**

**HbA1c  $> 7\%$  (53 mmol/mol), and/or**

**Post-load plasma glucose  $> 11.0$  mmol/L (198 mg/dL)**

## **Established CV or renal disease**

**Cerebrovascular disease: ischaemic stroke; cerebral haemorrhage; transient ischaemic attack**

**CHD: myocardial infarction; angina; myocardial revascularization with PCI or CABG**

**Heart failure, including heart failure with preserved EF**

**Symptomatic lower extremities peripheral artery disease**

**CKD with eGFR  $<30$  mL/min/1.73m<sup>2</sup>; proteinuria ( $>300$  mg/24 h).**

**Advanced retinopathy: haemorrhages or exudates, papilloedema**