CARDIOMETABOLIC ASPECTS OF PATIENT CARE

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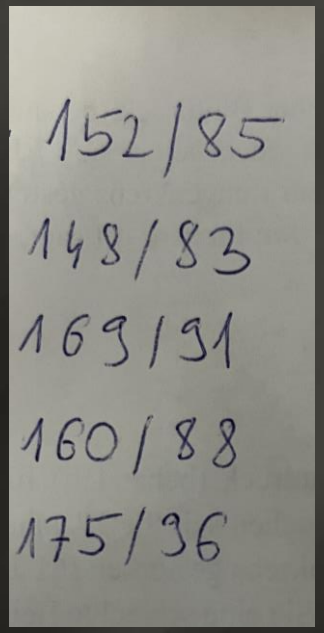
Overview

- Cardiometabolic syndrome
- DM
- Dislipidamia
- Hypertension
- Other risk factors

1. case: What is the 10 year risk for a major CV disease risk?

- Lives in Hungary
- Gender: male
- Age: 71 years
- Body weight: 104 kg
- Body hight: 175 cm
- Smoker
- Abdominal circumference: 113 cm
- Medication: bilastin
- Blood pressure average: 160/89 Hgmm
- Total-cholesterol: 6,2, HDL: 0,7, LDL: 4,8

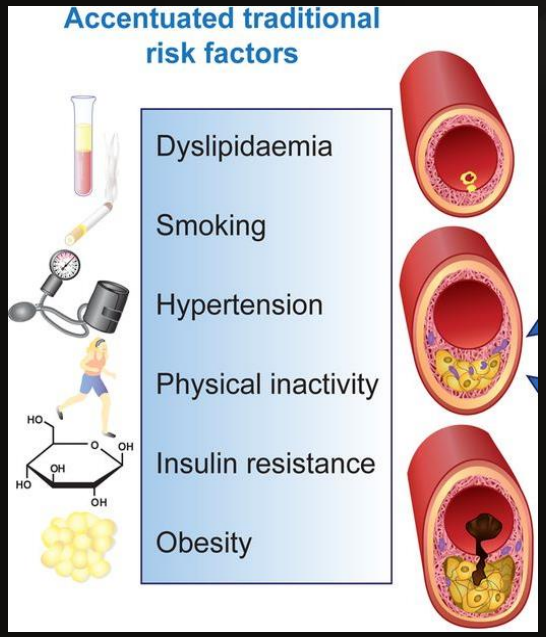


Cardiometabolic syndrome (International Diabetes Federation, 2006)

- **Abdominal obesity**. Waist circumference:
  - ≥94 cm – men
  - ≥80 cm - women
- Plus any **two** of the following four factors:
  - **Raised triglycerides**:
    >1,7 mmol/l or treated
  - **reduced HDL-cholesterol**:
    ♂<1,03 mmol/l or ♀<1,29 mmol/l, or treated
  - **Raised blood pressure**:
    sys ≥140 Hgmm, or diastolic ≥90 Hgmm, or treated
  - **Raised fasting plasma glucose**:
    ≥5,6 mmol/l or previously diagnosed type 2 diabetes

Metabolic syndrome

- **Central obesity with hypertension and complex metabolic disease (lipids, carbohydrates)**
- **Based on insulin resistence and/or hyperinsulinaemia**
- A sum of the risk factors of **arteriosclerosis** and **T2DM**, causing organ failures and increasing the risk of cardiovascular and cerebrovascular diseases



Classic course of the disease

- The end result of long lasting, complex processes:
- **Abdominal type obesity** →
- **Hypertension** (first 1st grade, intermittent) →
- Dislipidaemia **(TG↑, HDL↓)** →
- **Impaired glucose tolerance** then type 2 DM

Diabetes Mellitus

DM

- **In Hungary it should be managed by the GP, with the help of the specialists**

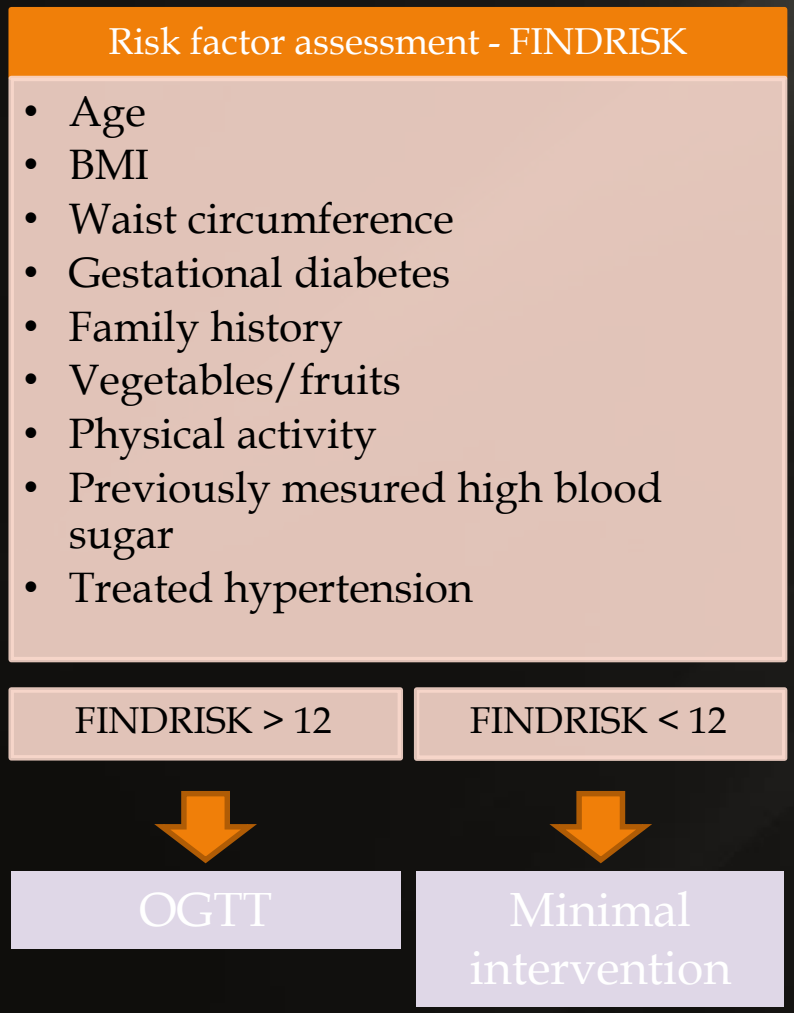
I. Recognition of the target groups

- Who, when and how should be screened?

I. Recognition of the target groups

Symptom-free patients with risk factors	Patients with symptoms	Patients with diagnosis	Sympom and risk factor free patients
Evaluation of risk factors: ADA	Classic symptoms	Prediabetes	
Evaluation of risk factors: FINDRISK	Complaintfree patients	Diabetes	
Pregnant			

I/A. Symptom-free patients with risk factors



II. Chronic management plan– Symptom-free patients with risk factors

- **Status (every 3 years)**

Lab

  - HbA1c and/or OGTT
  - lipids

Physical examination

  - Blood pressure, body weight, vessels, neuropathy

- **Therapy**

Reduction of risk factors

  - Smoking
  - Eating habits
  - Physical activity
  - Other conditions
    - Dislipidaemia
    - Obesity
    - Hypertension
    - CV diseases

I/B. Patients with symptoms

Classic symptoms	Complaint-free symptoms	
• Polyuria and polydipsia • Weight loss • pruritus vulvae, balanitis • Consciousness disturbane, coma because of DKA or HHC	Symptoms (accidental finding, associated diseases) • Retinopathy • Nephropathy • Neuropathy • „diabetic foot" • …	Abnormal findings • Blood sugar • HbA_{1C} • Triglicerid • Glucosuria • …

Blood sugar measurement (in the office) + Urine aceton (stix)

HbA_{1C} + fasting and pp blood sugar

HbA_{1C} + fasting and pp blood sugar

ER

I/C. Patients with diagnosis

(also newly diagnosed patients)

Prediabetes

Impaired fasting glucose (IFG):	
Fasting glucose	6,1-6,9 mmol/l
OGTT 2h	<7,8 mmol/l
Impaired glucose tolerance (IGT):	
Fasting glucose	<7,0 mmol/l
OGTT 2h	7,8-11,0 mmoll
HbA1C	5,7 – 6,4%

Prediabetes management by GP

Type 2 diabetes mellitus

2x fasting glucose	≥ 7,0 mmol/l
OGTT 2h	≥ 11,1 mmol/l
HbA1C	≥ 6,5%
2x Random glucose	> 11,1 mmol/l

Medical hystory
If suspect of:
- LADA
- Other diabetes

Specialist

Diabetes management by GP

II. Chronic management plan– Prediabetes

- **Status (every years)**

Lab

- HbA1c and/or OGTT
- Lipids
- Kreatinin, eGFR
- Urine blood/aceton/sediment
- Urine culture if needed

Physical examination

- Blood pressure, body weight, vessels, neuropathy
- Ophthalmology
- Diabetic foot

- **Therapy**

Non-pharmacological therapy:

- Eating habits + physical ecercise
- Aim: 7% loss of weight
- Cessation of smoking

Pharmacological therapy:

- Metformin if:
  - < 60 years of age
  - BMI > 30 kg/m2
  - Diabetes in first degree family member
  - Elevated TG
  - Reduced HDL
  - Hypertension
  - HgA1c > 6,0%
  - Gestatinal diabetes

II. Chronic management plan– Diabetes

- **Status (every years)**

Lab

- HbA1c and/or OGTT
- Lipids
- Kreatinin, eGFR
- Urine blood/aceton/sediment
- Urine culture if needed

Physical examination

- Blood pressure, body weight, vessels, neuropathy
- Ophthalmology
- Diabetic foot

- **Therapy**

Non-pharmacological therapy:

- Eating habits + physical ecercise
- Aim: 7% loss of weight
- Cessation of smoking

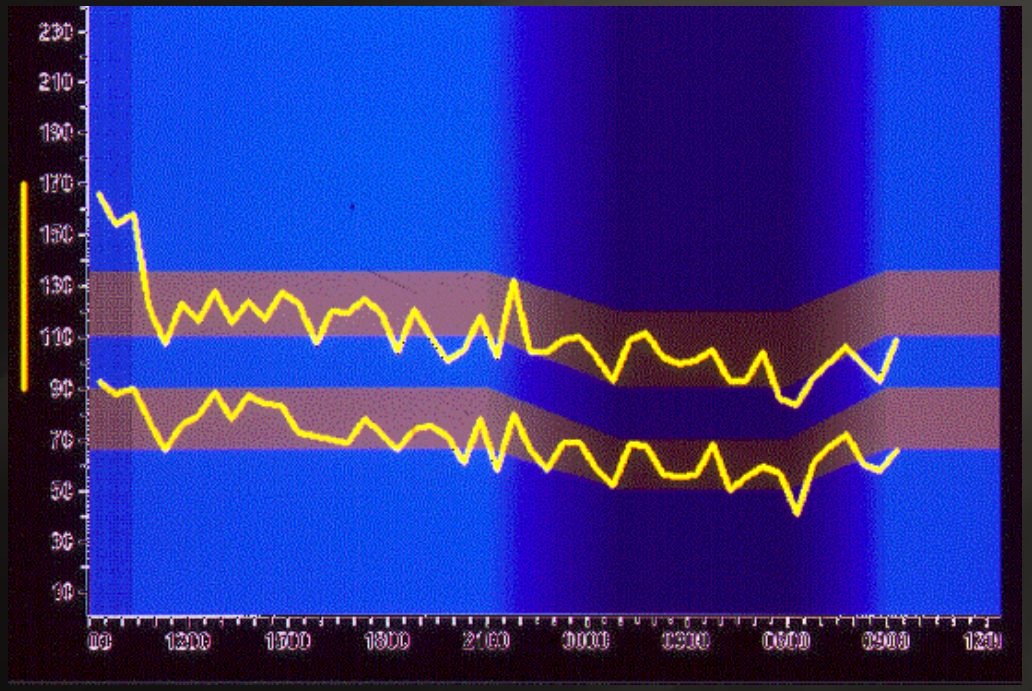
Pharmacological therapy:

- Metformin + ???

Dislipidaemia

2. case: What is the LDL target value?

- Lives in Hungary
- Gender: male
- Age: 71 years
- BW: 104 kg
- BH: 175 cm
- Non-smoker
- Abd. circ.: 113 cm
- Medication: none
- Total-cholesterol: 3,8, HDL: 1,4, LDL: 1,9



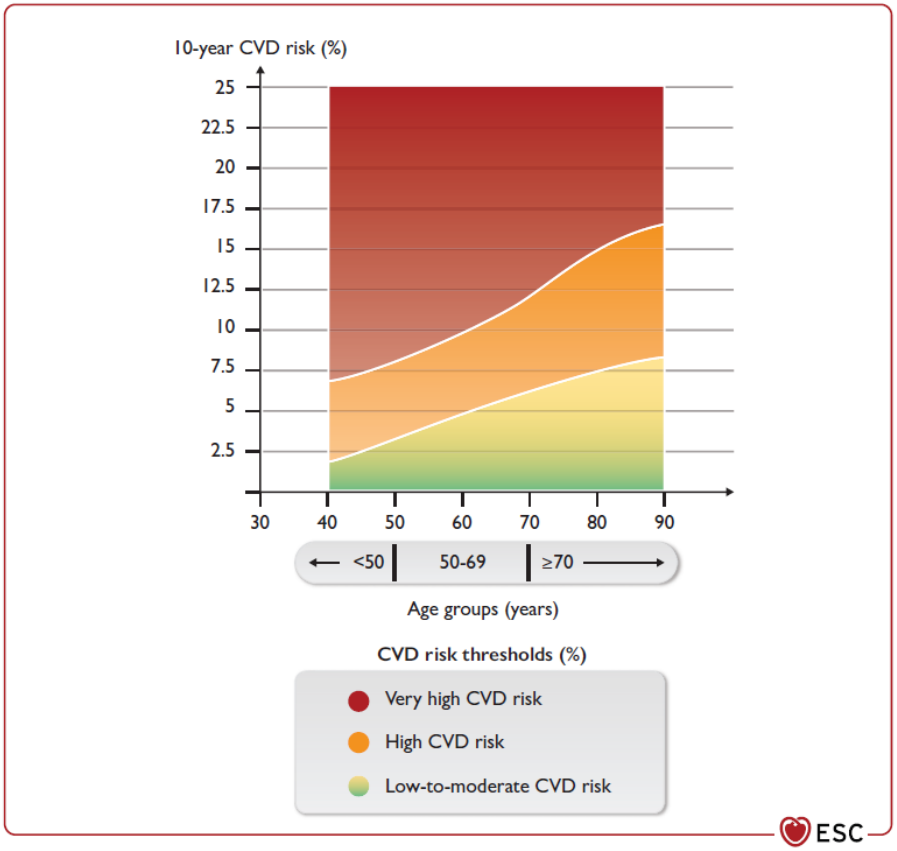
How to apply SCORE values?

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

CVD = cardiovascular disease.

[a]In apparently healthy people ≥70 years old, the treatment recommendation for lipid-lowering drugs is Class IIb ('may be considered').

The division of the population into three distinct age groups (<50, 50–69, and ≥70 years) results in a discontinuous increase in risk thresholds for low-to-moderate, high, and very high risk. In reality, age is obviously continuous, and a sensible application of the thresholds in clinical practice would require some flexibility in handling these risk thresholds as patients move towards the next age group, or recently passed the age cut-off. *Figure 5* illustrates how a continuous increase in age relates to increasing risk thresholds, and may be used as a guide for daily practice.



Dislipidaemia

Definition:

- **Raised triglycerid**:
  >1,7 mmol/l or treated
- **Low HDL-cholesterol**:
  ♂<1,03 mmol/l or ♀<1,29 mmol/l or treated
- **Raised LDL-cholesterol**

LDL target values:

- Low CVD risk (SCORE<1%): < 3,4 mmol/l
- Moderate CVD risk: < 2,6 mmol/l
- High CVD risk: > 50% reduction + < 1,8 mmol/l
- Very high risk: > 50% reduction + < 1,4 mmol/l
- Recurrent CV disease by max. therapy: < 1,0 mmol/l

How associated diseases modify the CVD risk?

- **Very high risk:**
  - **Post AMI/stroke/acut limb ischaemia**
  - **Proven coronary atherosclerosis, cerebral/peripheral arteriosclerosis**
  - **DM with organ damage**
  - **CKD**
  - **Familial hypercholesterolaemia**
- **High risk:**
  - **Blood pressure > 180 Hgmm or total-chol > 8 mmol/l**
  - **DM > 10 years without organ failure**
  - **CKD**
  - **Left ventricular hypertrpophy**
  - **Ankle-brachial index < 0,9**
- **Moderate risk:**
  - **DM < 10 years**

Hypertonia

3rd case study

- 45-year-old obese female patient (180 cm, 105 kg, BMI: 32.41). No known illnesses.
- At Christmas she visited her daughter, who was worried about her health and measured her blood pressure:
  - 165/90 Hgmm, pulse: 89/min
- Blood pressure at the GP office:
  - Left arm: 135/85 Hgmm, pulse: 85/min
  - Right arm: 130/80 Hgmm, pulse: 86/min
- She can't measure her blood pressure at home, she visits the GP office several times, blood pressure always in normal range.
- Whenever she visits her daughter they measure higher blood pressures.

3rd case study - What could be the reason for the difference? What should you ask as a GP?

Brainstorming – 1-2 min

- Psychological reasons?
- Cuff size?
- Measurement through clothing?
- Arm/wrist/other equipment?
- Coffeine, tea, alcohol?
- Talking during the measurement?
- Diurnal rhythm?
- Doughter lives on the 4th floor?

3rd case – What else to do?

Findrisc!!

- 45 years of age
- BH: 180 cm, BW: 105 kg, abd. circ.: 106 cm
- Blood pressure: left: 135/85 Hgmm, pulse: 85/min
- Spinning once a week for 1.5 hours
- Eats every day banana, apple or orang
- No previously measured high glucose level
- Mother had type 2 DM

Accurate blood pressure measurement I.

„The accurate measurement of BP is the sine qua non for successful management."

The equipment— whether aneroid, mercury, or electronic—should be regularly inspected and validated.

The operator should be trained and regularly retrained in the standardized technique, and the patient must be properly prepared and positioned.

The auscultatory method of BP measurement should be used.

Persons should be seated quietly for at least 5 minutes in a chair (rather than on an exam table), with feet on the floor, and arm supported at heart level.

Caffeine, exercise, and smoking should be avoided for at least 30 minutes prior to measurement.

Measurement of BP in the standing position is indicated periodically, especially in those at risk for postural hypotension, prior to necessary drug dose or adding a drug, and in those who report symptoms consistent with reduced BP upon standing.

Accurate blood pressure measurement II.

An appropriately sized cuff (cuff bladder encircling at least 80 % of the arm) should be used to ensure accuracy.

At least two measurements should be made and the average recorded.

For manual determinations, palpated radial pulse obliteration pressure should be used to estimate SBP—the cuff should then be inflated 20–30 mmHg above this level for the auscultatory determinations; the cuff deflation rate for auscultatory readings should be 2 mmHg per second.

SBP is the point at which the first Korotkoff sounds is heard (onset of phase 1), and the disappearance of Korotkoff sound (onset of phase 5) is used to define DBP.

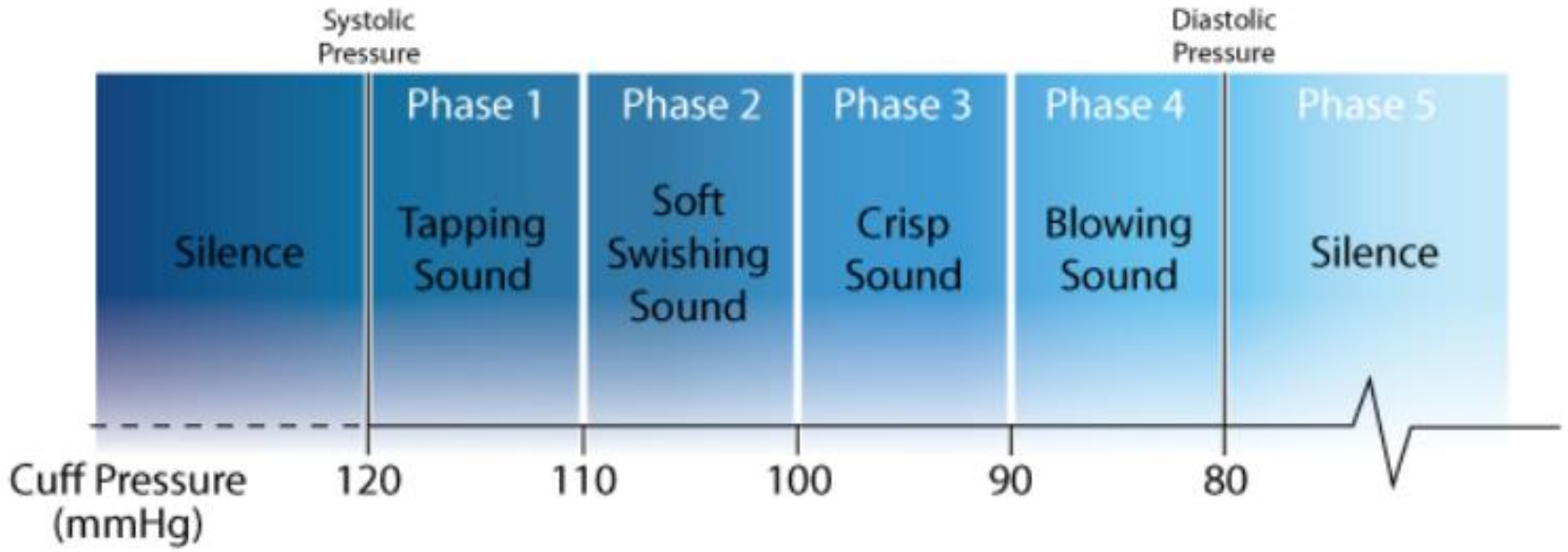
Clinicians should provide to patients, verbally and in writing, their specific BP numbers and the BP goal of their treatment.

Blood pressure monitors

White coat syndrome

- Own experiences
  - ER
  - The examiner

Korotkov-sounds



Hypertension values
Video: 6:08

Category	SBP (mmHg)		DBP (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[b]	≥140	and	<90

Hypertension target values

csoportok / Age	Nem komplikált HT	HT + DM	HT + CAD	HT + stroke / TIA[1]	HT + PAD	HT + CKD + AU[2]	HT + CKD[3]	
18-65 év	120-129	120-129	120-129	120-129	120-129	120-129	130-139	70-79
> 65 év	130-139	130-139	130-139	130-139	130-139	130-139	130-139	70-79

4th case

- 11:37

Hypertension examination

- Brainstorming – 3-4 min
  - Relevant questions of medical history
  - Relevant elements of the physical examination
  - Relevant laboratory examinations
  - Relevant instrumental examinations to do, relevant further examinations to ask for

Medical history

- For how long? Had earlier high blood pressure?
- Risk factors:
  - Smoking
  - Diet
  - Sport
  - Personality traits
  - Own and family history:
    - CV diseases/hypertension
    - Dislipidaemia
    - DM
- Symptoms of demages to the most affected organs: kidney, heart, brain, retina, periferal vessels
- Signs of sec. hypertonia: nephropathy, haematuria, recurring urinary tract infections, phaeochromocytoma, muscle weakness
- Medication, drugs, energy drinks, performance drugs
- Environmental factors
- OSAS

Physical examination

- Somatometric data: body height, body weight, BMI, abdominal circumference
- Peripheral arteries
  - A. carotis communis - auscultation
- Heart percussion
- Heart sounds – valvular diseases, coarctatio aortae
- Lung auscultation – pulmonary congestion, pulm. diseases
- Abdomen
  - Liver – ethyl
  - A. renalis auscultation
- Retina examination – Ophthalmologist
- Lower limb oedema

Laboratory

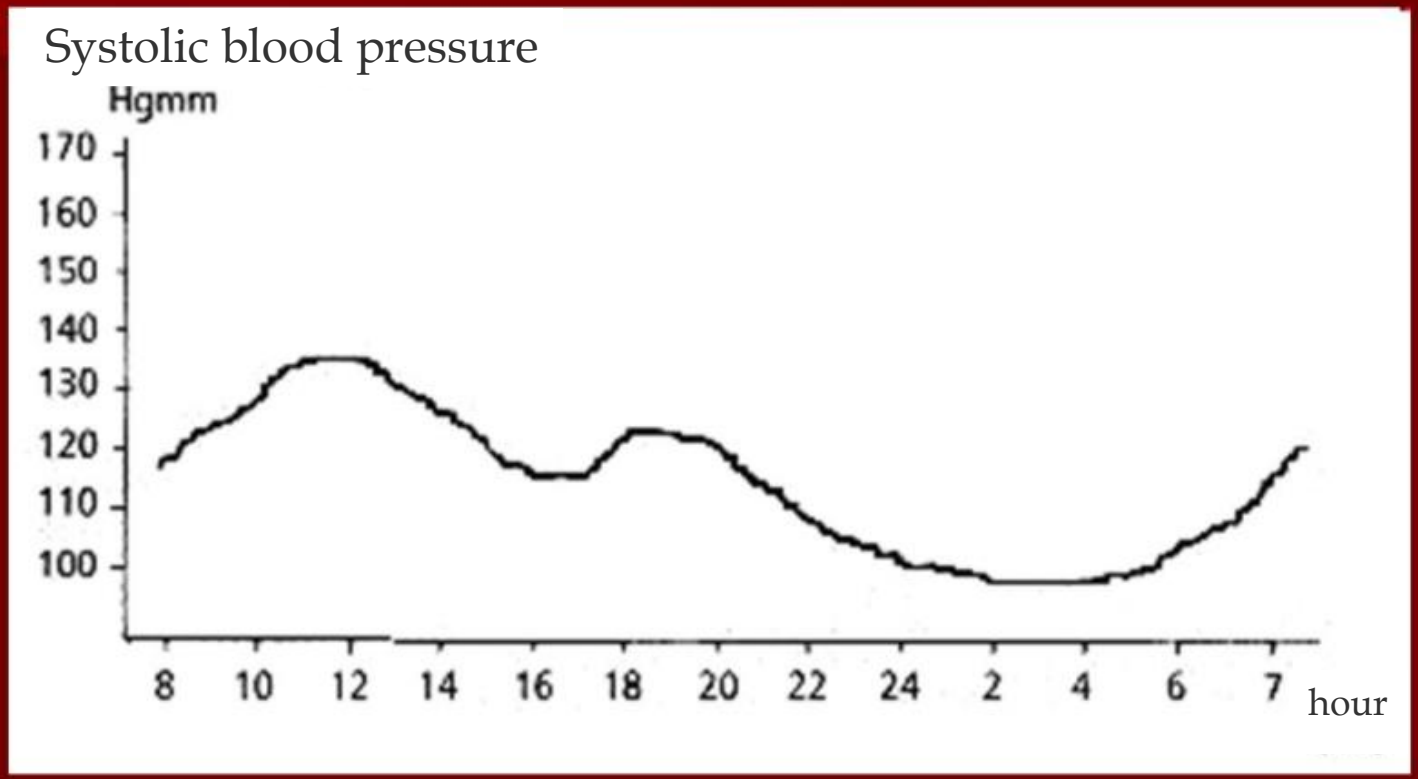
- Ions
- Blood sugar (II. DM – 70% also hypertension)
- Lipids
- Inflammation
- Uric acid
- Liver function
- Thyroid gland
- Kidney function
  - Kreatinin, karbamid
  - Urine:
    - (mikro)albuminurea - „angina of the kidney”

Instrumental examinations

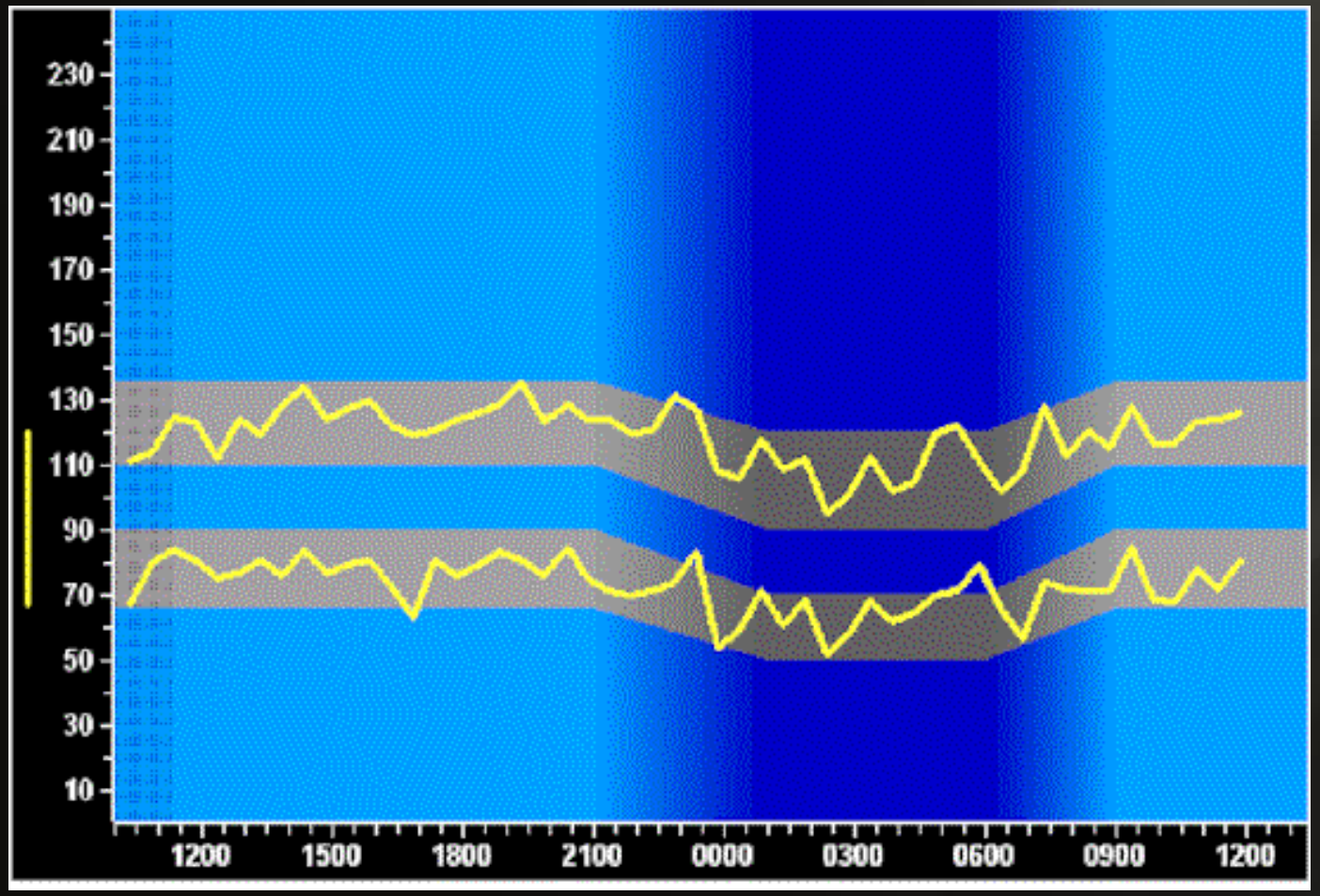
- ECG
- Abdominal US
  - Kidney: kidney cirrhosis/swelling, polycystic kidney, extreme a. renalis stenosis
  - Adrenal gland: adenoma
- Ophthalmology
- ABPM or BP diary

- Doppler US, Ankle-brachial index
- Thorax X-ray
- Echocardiography
- Carotis IMT

ABPM
Diurnal rhytm



ABPM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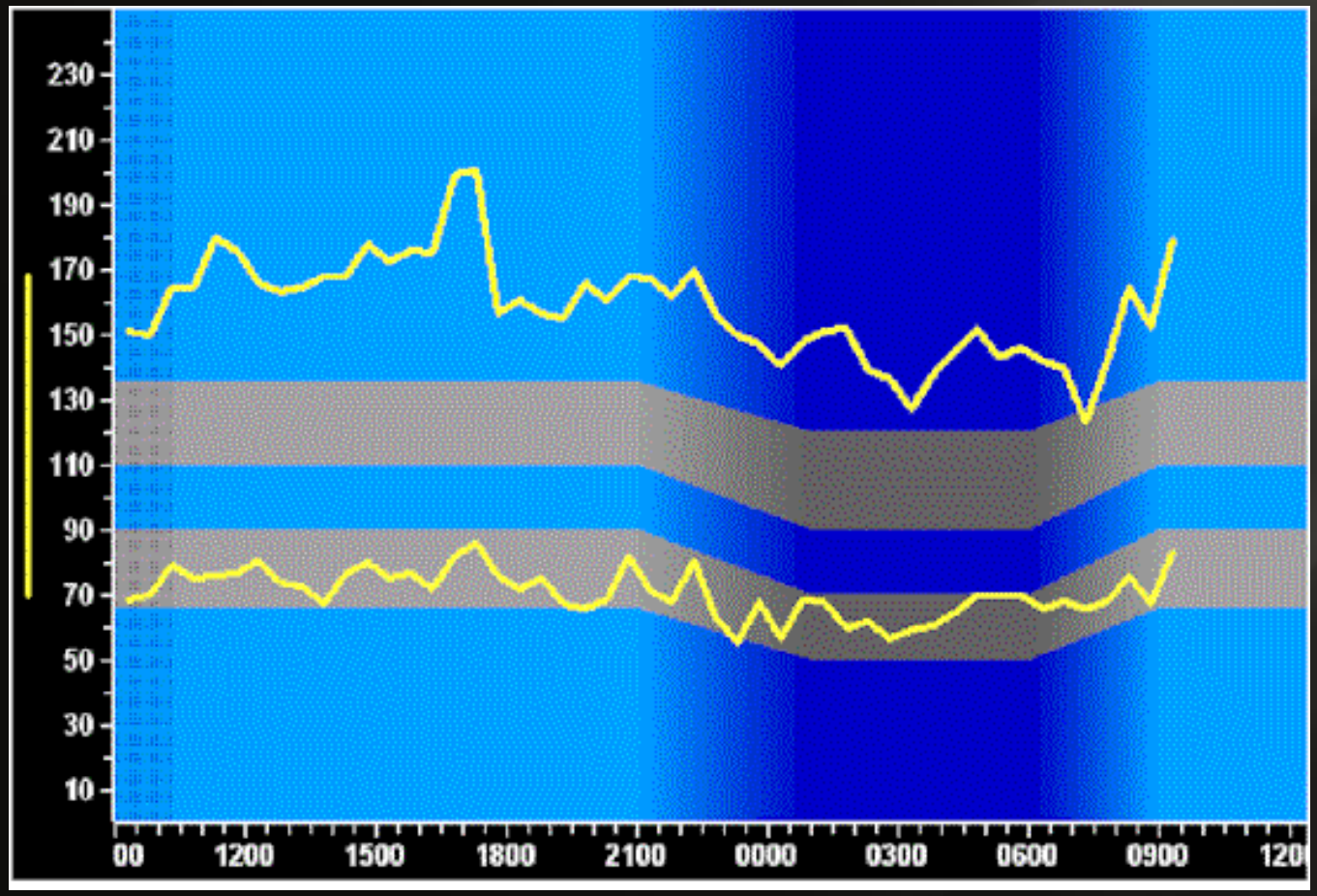
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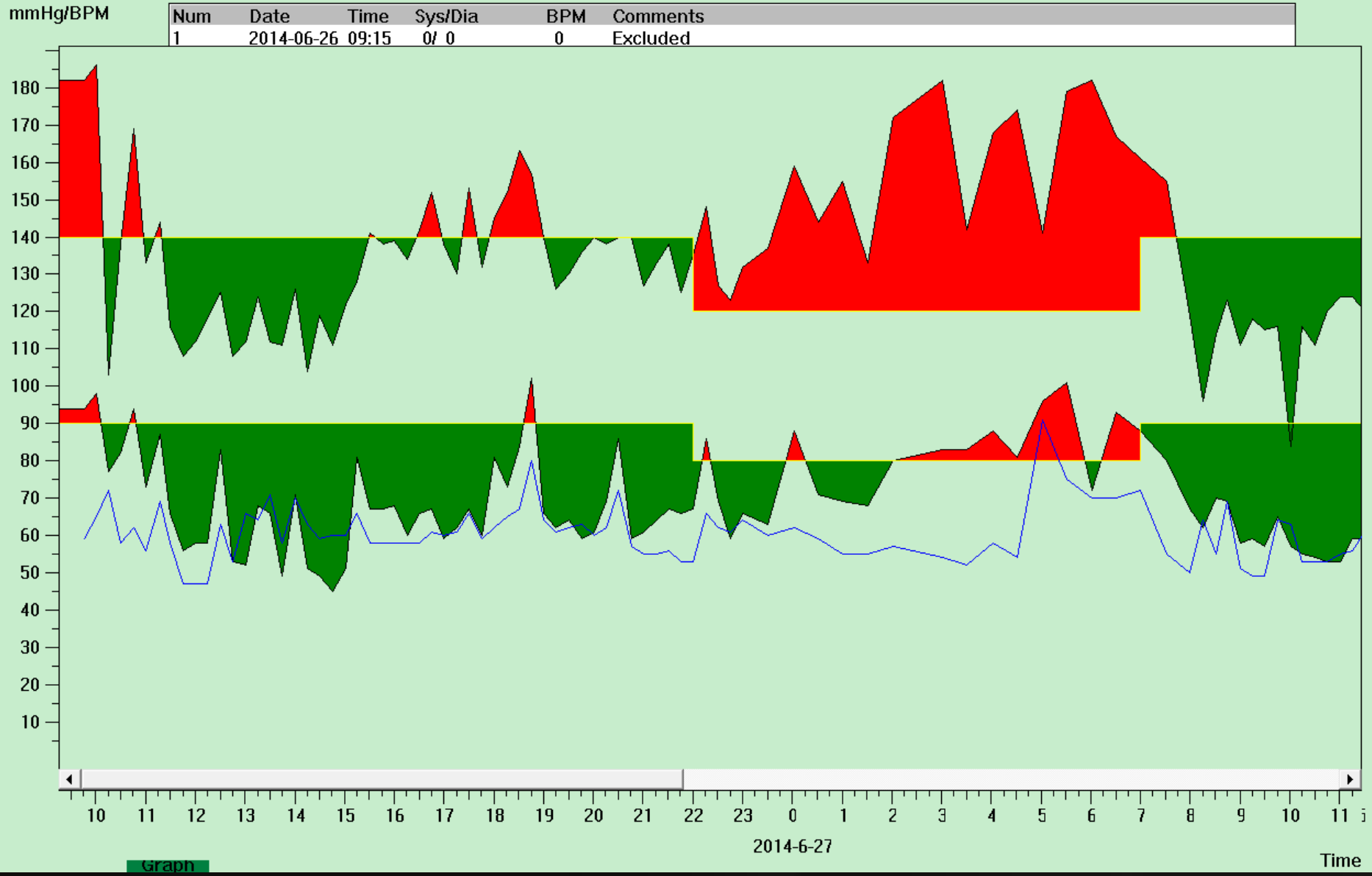
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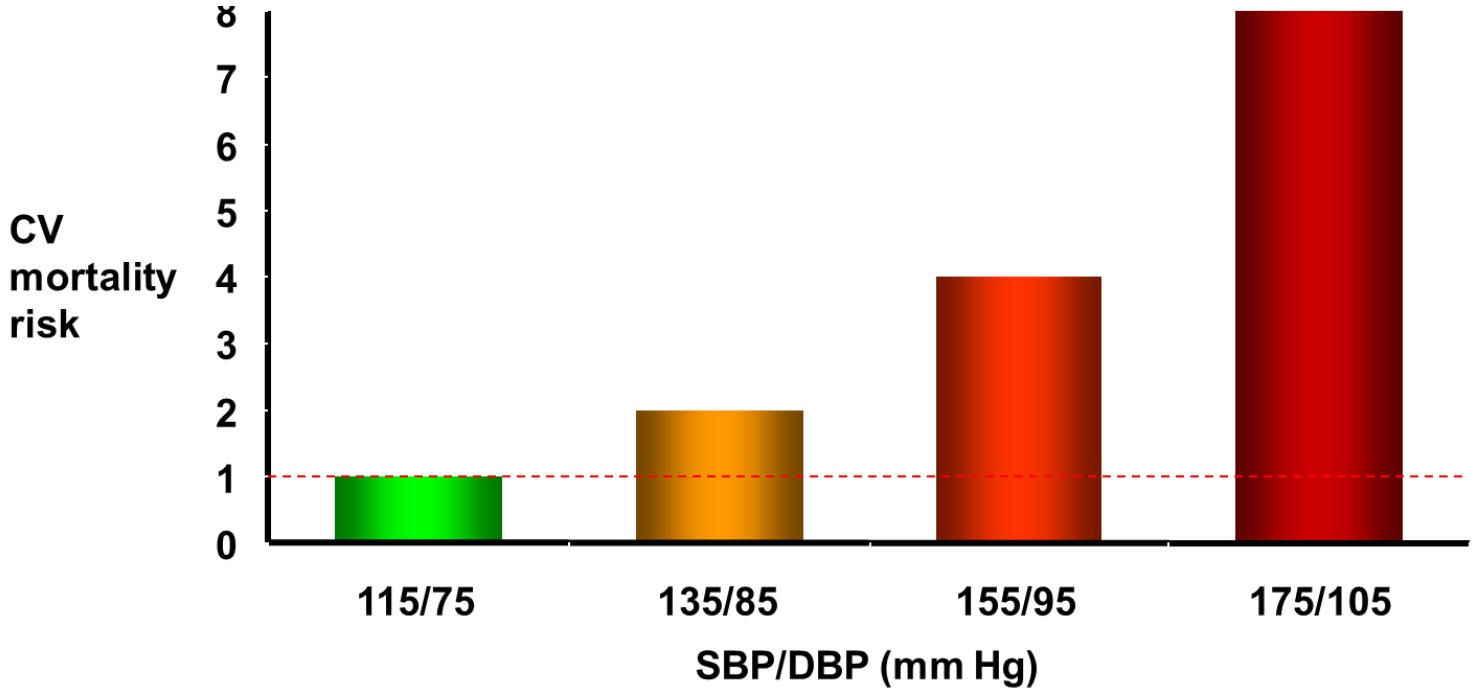
2014-6-27
Time
Graph

Aims of the examinations

- Risk assessment:
  - Low risk: change of lifestyle
  - High risk: change of lifestyle + medication

- Diff. diagnosis of secunder hypertension (5-10%)

Every 20/10 Hgmm elevation doubles the CV mortality!



*Individuals aged 40-70 years, starting at BP 115/75 mm Hg.
CV, cardiovascular; SBP, systolic blood pressure; DBP, diastolic blood pressure
Lewington S, et al. *Lancet*. 2002; 60:1903-1913.
JNC 7. *JAMA.* 2003;289:2560-2572.

Lifestyle modification

Lifestyle modification[a]	SBP reduction range (mm Hg)[b,c]
Nutrition (DASH eating plan)	8–14
Nutrition (dietary sodium restriction)	2–8
Physical activity	4–9
Weight loss	5–20[d]
Moderation of alcohol consumption	2–4

Abbreviations used: DASH, Dietary Approaches to Stop Hypertension; SBP, systolic blood pressure.

[a]Smoking cessation should also be included in an overall lifestyle modification wellness plan.

[b]Individual patients may experience varying responses to lifestyle modifications because they are dose- and time-dependent.

[c]Implementing multiple lifestyle modification interventions will enhance the SBP-lowering effect.

[d]SBP reduction per 10 kg weight loss.

Patient without any symptoms visits the GP office. We measure 160/95 Hgmm blood pressure. What is the next step?

- Medical history, physical examination
- Blood pressure diary or ABPM
- Tensiomin (captopril). Short half-life!
  - >180 Hgmm 1x1
  - 160-180 Hgmm 1x1/2

Blood pressure diary shows constantly elevated values (Sys: btw 160-180 Hgmm). What is the next step?

- Laboratory examination
- Abdominal US: kidney parenchyma, renal artery, adrenal gland, aorta calcification (generalized angiopathy?)
- Ophthalmology

- Therapy

Blood pressure control guidelines

- The lowest effective dosis
- Instead of elevation of the dose => small-dose combinations
  - Fix combinations → better compliance
- One dosage per day, if possible (24 h effect)
- Gradual decrease of blood pressure
  - Especially in elderly and/or angiopathy patients
- The medication must not worsen/it should improve other co-morbidity
- Personalized therapy: https://www.uptodate.com/contents/image?imageKey=NEPH%2F63628

Which medication?

No co-morbidity:

- 1. step:
  - ACEi or ARB + CCB or diuretics
- 2. step:
  - ACEi or ARB + CCB + diuretics
- 3. step (resisting HT):
  - MRA or
  - Other diuretics or
  - alfa-blocker or
  - beta-blocker

Which medication?

IHD, AMI:

- Beta-blocker, ACEi (ARB)

Old, isolated systolic HT:

- Diuretikum

PAD:

- CCB (amlodipin, lerkanidipin)
- Alfa-1 blockers (doxazosin)

BPH:

- Alfa-1 blockers (doxazosin)

Pregnant:

- Alfa-2 agonists (metildopa)

Which medication?

Elevated sympathic activity (manager):

- I1-agonists: rilmenidin (Tenaxum)
- Beta-blockers

MS, dislipidaemia, obesity:

- CCB, BB, ACEi (ARB), I1-agonist

Arrhytmia:

- Beta-blocker

Which medication NO?

Gout:

- Diuretics

ED:

- Diuretics, ACEi

Pregnant:

- ACEi

COPD, asthma:

- Beta-blocker

AV-blokk:

- Beta-blockers

Which medication is NOT to be given?

Orthostatic hypotonia:

- Alfa-1 blockers (doxazosin)

Psoriasis:

- Beta-blockers

Other ASCVD risk factors

- Smoke
- CKD, AF, HFrEF, tumor, COPD, inflammatory diseases (RA, IBD…), infections, migraine, OSAS, mental illnessis, NAFLD, pregnancy, ED
- Gender
- Psychosocial factors
- Ethnicity
- Imaging: coronary CT, carotis-US, ankle-brachial index, artery wall stiffness, echocardiographia
- Family history

CKD

	CKD stages risk heat map				In validation datasets	SCORE2 population (age 40-69, no diabetes	SCORE2-OP population (age 70+, no diabetes)
	ACR					Risk ratio of CKD Add-on (eGFR+ACR) to SCORE2	Risk ratio of CKD Add-on (eGFR+ACR) to SCORE2-OP
eGFR	<30	30-299	300+		CKD Stages		
90+					Risk ratio, Median (IQI)		
60-89					No CKD	0.98 (0.97, 1.00)	0.97 (0.93, 0.99)
45-59					CKD at moderate risk	1.29 (1.24, 1.30)	1.15 (1.11, 1.17)
30-44					CKD at high risk	1.70 (1.63, 1.74)	1.29 (1.23, 1.34)
<30					CKD at very high risk	2.78 (2.59, 3.05)	1.60 (1.38, 1.65)
					Overall	1.03 (1.00, 1.07)	1.04 (0.99, 1.07)

Uric acid

- CV risk factor on its own
- Limit: 400/370 umol/l
- Target value: < 350 umol/l

Therapy:

- Allopurinol
- Losartan

Thrombocyta aggregation inhibition

- Estabilished ASCVD: a must
- Apperantly healthy people:
  - DM + high/very higy CVD risk: IIb

Thank you for your attention!

- Feedback:
  - Potecho.pte.hu
- Based on the lectures of:

  Dr. Princz János
  Dr. Papp Renáta
  Dr. Rinfel József
  Dr. Czopf László
  Dr. Kis Andrea
- Literature:

  Dr. Sirák András: Sürgősségi betegellátás
  ESC CV prevention guideline, 2021

Videó:
https://www.youtube.com/watch?v=UfCr_wUepxo&t=682s