

ESC Special session in General Cardiology

Clinical Case for Practitioners

Exploring the risk profile of a patient with hypertension

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DECLARATION OF INTEREST

- Research contracts

How to apply ESC 2013 Guidelines on Hypertension in clinical practice



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ESH AND ESC GUIDELINES

2013 ESH/ESC Guidelines for the management of arterial hypertension

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

Authors/Task Force Members: Giuseppe Mancia (Chairperson) (Italy)*, Robert Fagard (Chairperson) (Belgium)*, Krzysztof Narkiewicz (Section co-ordinator) (Poland), Josep Redon (Section co-ordinator) (Spain), Alberto Zanchetti (Section co-ordinator) (Italy), Michael Böhm (Germany), Thierry Christiaens (Belgium), Renata Cifkova (Czech Republic), Guy De Backer (Belgium), Anna Dominiczak (UK), Maurizio Galderisi (Italy), Diederick E. Grobbee (Netherlands), Tiny Jaarsma (Sweden), Paulus Kirchhof (Germany/UK), Sverre E. Kjeldsen (Norway), Stéphane Laurent (France), Athanasios J. Manolis (Greece), Peter M. Nilsson (Sweden), Luis Miguel Ruilope (Spain), Roland E. Schmieder (Germany), Per Anton Sirnes (Norway), Peter Sleight (UK), Margus Viigimaa (Estonia), Bernard Waeber (Switzerland), Faiez Zannad (France)

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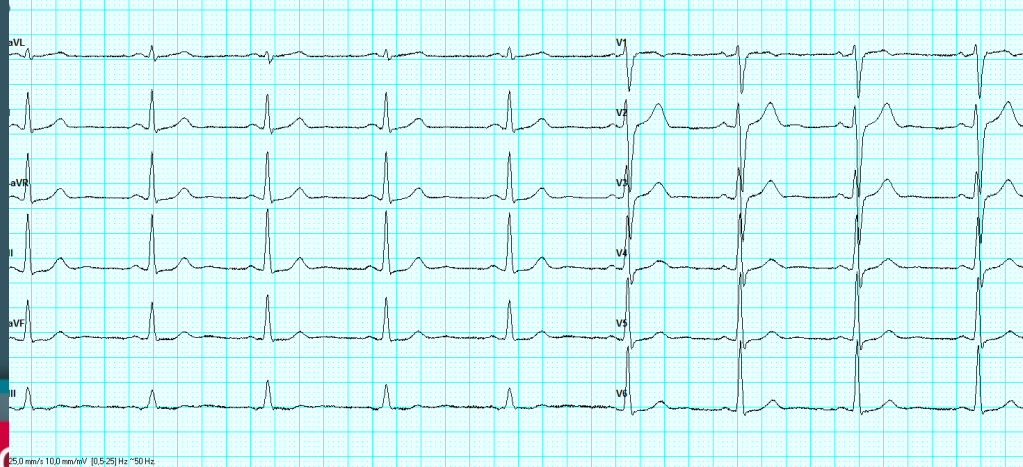
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Case of TSJ - 70

- 42 year old man referred from his GP for evaluation of cardiac risk
- Treated for HT since 2005, initially with metoprolol (discontinued due to ED and drowsiness), now candesartan 16mg od
- Non smoker, no regular exercise
- His uncle died suddenly of AMI at the age of 43, his father died of cancer at the age of 62, his mother underwent PCI at the age 60 and an AMI at the age of 63 and both his mother's parents had AMI in their 50 and 60ies
- He had told his GP of episodes of short stabbing pain unrelated to physical activity and was sent by his GP to a calcium score done in a private X-ray institute: *"There are some possible small calcifications along the stem of the right coronary artery, but a bit uncertain because of motion artefact. No calcifications along the left main coronary and its side branches"*
- The GP was uncertain how to interpret this and referred the patient

Case of TSJ - 70

- 189cm 112 kg BMI 31.3 Waist 114cm
- BP 155/98, standing: 136/94
- lipids (mmol/l) Total cholesterol 5,1 HDL 1,2
LDL 3,4 TG 1,1 (considered OK by his GP)
- CRP 1.0 g/l Glucose 4.5 mmol/l
- ECG: sinus rhythm 61 QRS 104ms





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Table 3 Definitions and classification of office blood pressure levels (mmHg)^a

Category	Systolic		Diastolic
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

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

SCORE = 1%

Your results

Examination date 26 August 2013

Patient name TSJ TSJ

Age 43 (4/1970)

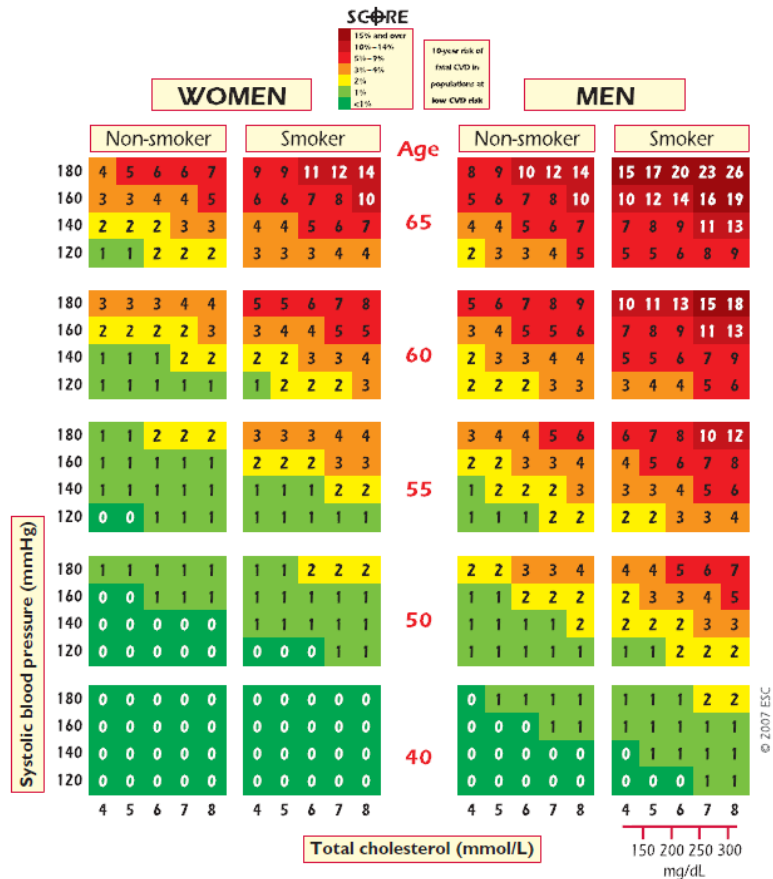
Sex Male

Risk factors	Your results
Systolic blood pressure	154
Cholesterol	5.1 mmol/L
HDL Cholesterol	1.2 mmol/L
Smoker	No
Your total CVD risk*	1%

* Total CVD risk refers to the 10-year risk mortality

3. Moderate risk

Subjects are considered to be at moderate risk when their SCORE is ≥ 1 and $< 5\%$ at 10 years. Many middle-aged subjects belong to this category. This risk is further modulated by factors mentioned above.



Low CVD countries are Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, The Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

How to improve the risk assessment?

Table 4 Factors—other than office BP—influencing prognosis; used for stratification of total CV risk in Figure 1

Risk factors
Male sex
Age (men ≥ 55 years; women ≥ 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 ≥ 30 kg/m ² (height ²)]
Abdominal obesity (waist circumference: men ≥ 102 cm; women ≥ 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) ≥ 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 ² ; women > 95 g/m ² (BSA)] ^a
Carotid wall thickening (IMT > 0.9 mm) or plaque
Carotid–femoral PWV > 10 m/s
Ankle-brachial index < 0.9
CKD with eGFR 30–60 mL/min/1.73 m ² (BSA)
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 ≥ 7.0 mmol/L (126 mg/dL) on two repeated measurements, and/or
HbA _{1c} $> 7\%$ (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 ² (BSA); proteinuria (> 300 mg/24 h).
Advanced retinopathy: haemorrhages or exudates, papilloedema



Additional tests will often prove fruitful

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

- Haemoglobin A_{1c} (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 ambulatory BP monitoring.
- Echocardiogram.
- Holter monitoring in case of arrhythmias.
- Carotid ultrasound.
- Peripheral artery/abdominal ultrasound.
- Pulse wave velocity.
- Ankle-brachial index.
- Fundoscopy.

Total cardiovascular risk assessment

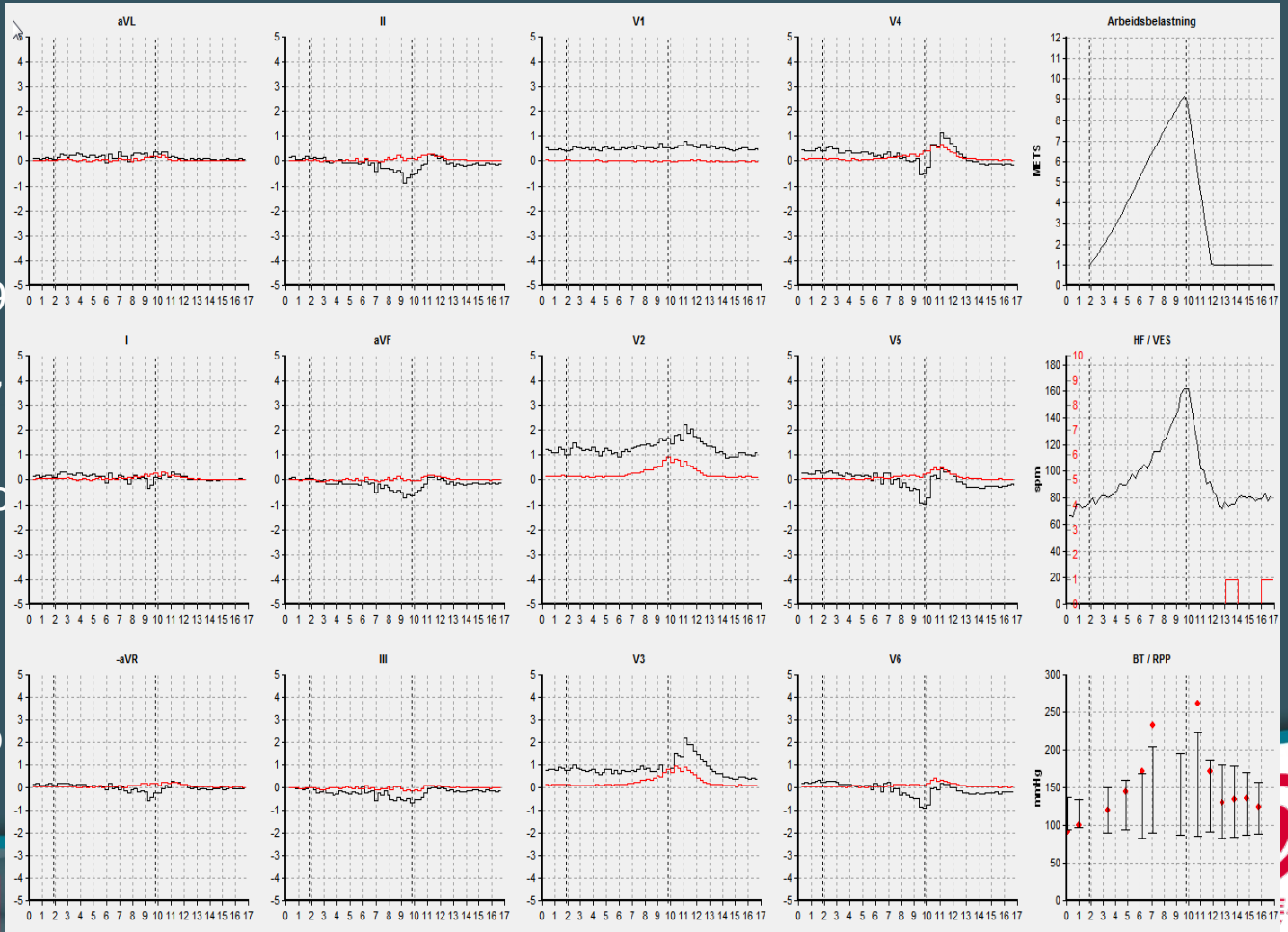
Recommendations	Class ^a	Level ^b	Ref. ^c
In asymptomatic subjects with hypertension but free of CVD, CKD, and diabetes, total CV risk stratification using the SCORE model is recommended as a minimal requirement.	I	B	43
As there is evidence that OD predicts CV death independently of SCORE, a search for OD should be considered, particularly in individuals at moderate risk.	IIa	B	51, 53
It is recommended that decisions on treatment strategies depend on the initial level of total CV risk.	I	B	41, 42, 50

CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease; OD = organ damage; SCORE = Systematic COronary Risk Evaluation

^aClass of recommendation.

Exercise test treadmill

- 5,7 km/h in 15% inclination, estim 9 METS
- Heart rate from 67 to 162
- BP from 136/94 to 222/86.
- no chest pain or arrhythmias.
- no significant ST segment depression



What do the 2013 ESC Hypertension GL recommend for additional test to detect TOD?

Search for asymptomatic organ damage, cardiovascular disease, and chronic kidney disease

Recommendations	Class ^a	Level ^b
Heart		
An ECG is recommended in all hypertensive patients to detect LVH, left atrial dilatation, arrhythmias, or concomitant heart disease.	I	B
In all patients with a history or physical examination suggestive of major arrhythmias, long-term ECG monitoring, and, in case of suspected exercise-induced arrhythmias, a stress ECG test should be considered.	IIa	C
An echocardiogram should be considered to refine CV risk, and confirm ECG diagnosis of LVH, left atrial dilatation or suspected concomitant heart disease, when these are suspected.	IIa	B
Whenever history suggests myocardial ischaemia, a stress ECG test is recommended, and, if positive or ambiguous, an imaging stress test (stress echocardiography, stress cardiac magnetic resonance or nuclear scintigraphy) is recommended.	I	C
Arteries		
Ultrasound scanning of carotid arteries should be considered to detect vascular hypertrophy or asymptomatic atherosclerosis, particularly in the elderly.	IIa	B
Carotid–femoral PWV should be considered to detect large artery stiffening.	IIa	B
Ankle–brachial index should be considered to detect PAD.	IIa	B

Kidney

Echo 1

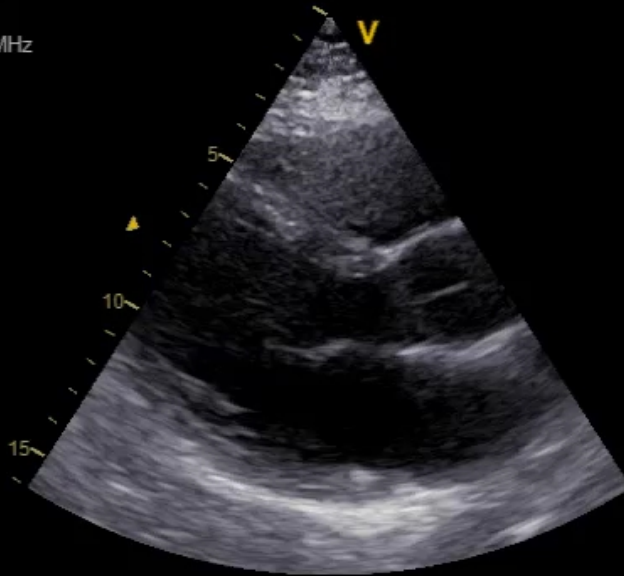


LVEF 60 %

LVEDV (MOD BP) 147 ml

Echo 2

11/07/2013 10:06:14
Octave
Frek.: 1.7 MHz/3.3 MHz



1/07/2013 10:09:33
Octave
rek.: 1.7 MHz/3.3 MHz

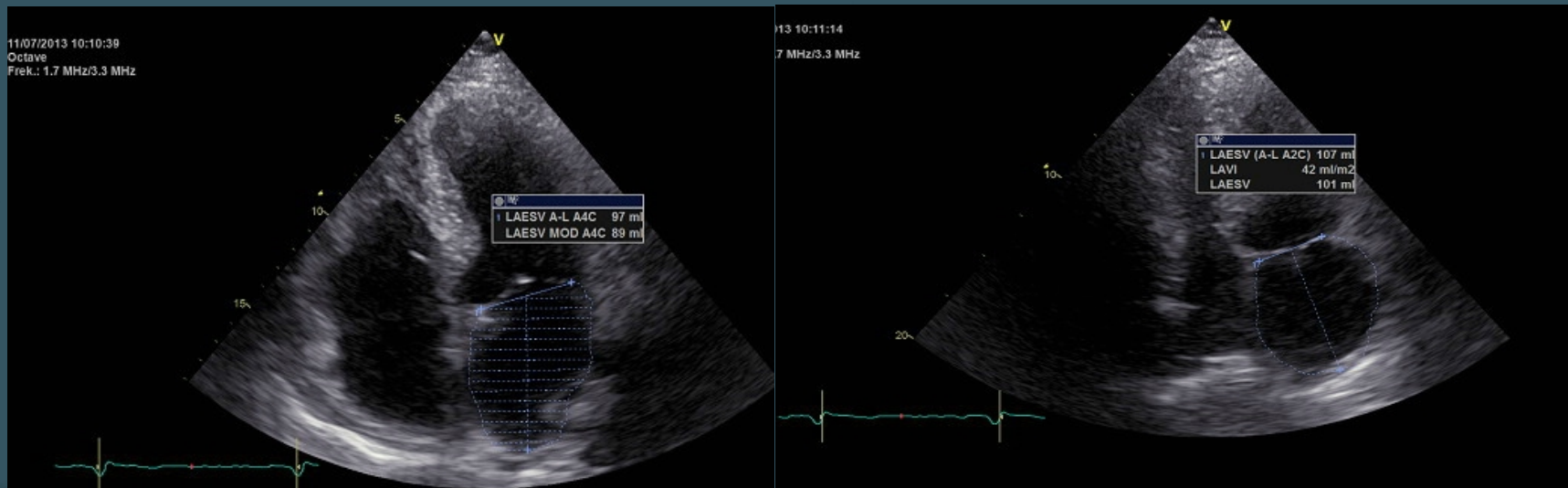


HE	
IVSd	1.4 cm
LVIDd	5.4 cm
LVPWd	1.3 cm
IVSs	1.5 cm
LVIDs	3.6 cm
LVPWs	1.3 cm
%FS	32.37 %
LVd Masse	372.61 g
LVd Masse (ASE)	309.57 g
LVd Masse Ind (ASE)	130 g/m ²
RWT	0.49
LVd MassIndex	0 gm/m ²

Left Atrial Volume Indexed

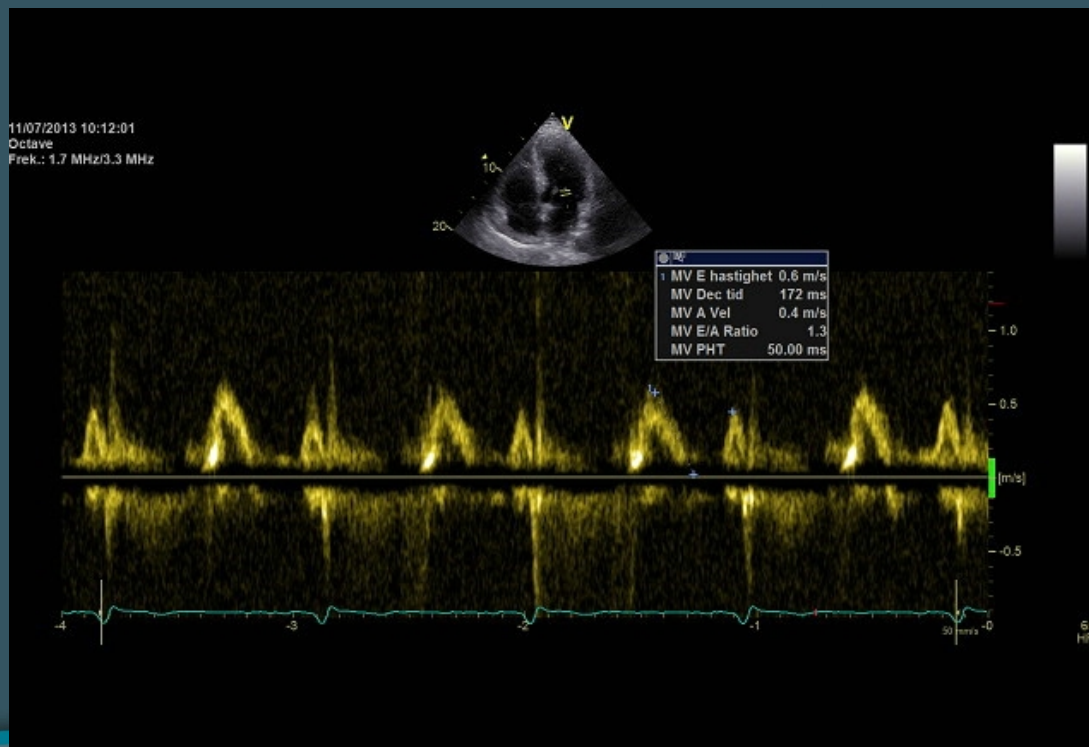
LAVI = 42ml/m²

LAVI is the HbA1c of diastolic function and is easily obtained in all



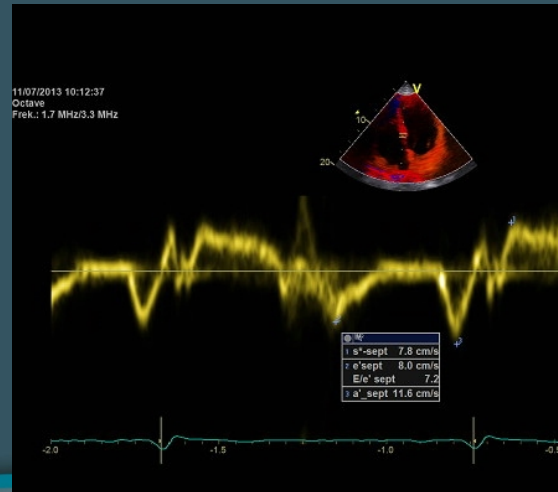
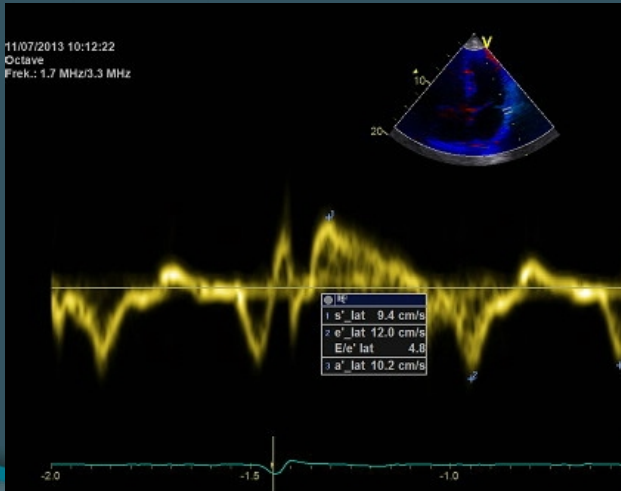
Mitral flow

E/A 1,3
EDT 172ms
Mild MR



Tissue Doppler mitral ring

$e' \text{ lat } 12,0 \text{ cm/s}$ $E/e' \text{ lat} = 4,8$
 $E' \text{ sept } 8,0 \text{ cm/s}$ $E/e' \text{ sept} = 7,2$



Reduced septal e' is one of the earliest sign of hypertensive heart disease

Table 11 Cut-off values for parameters used in the assessment of LV remodelling and diastolic function in patients with hypertension. Based on Lang *et al.*¹⁵⁸ and Nagueh *et al.*¹⁶⁸

Parameter	Abnormal if
LV mass index (g/m ²)	>95 (women) >115 (men)
Relative wall thickness (RWT)	>0.42
Diastolic function: Septal e' velocity (cm/sec)	<8
Lateral e' velocity (cm/sec)	<10
LA volume index (mL/m ²)	≥34
LV Filling pressures : E / e' (averaged) ratio	≥13

LA = left atrium; LV = left ventricle; RWT = relative wall thickness.



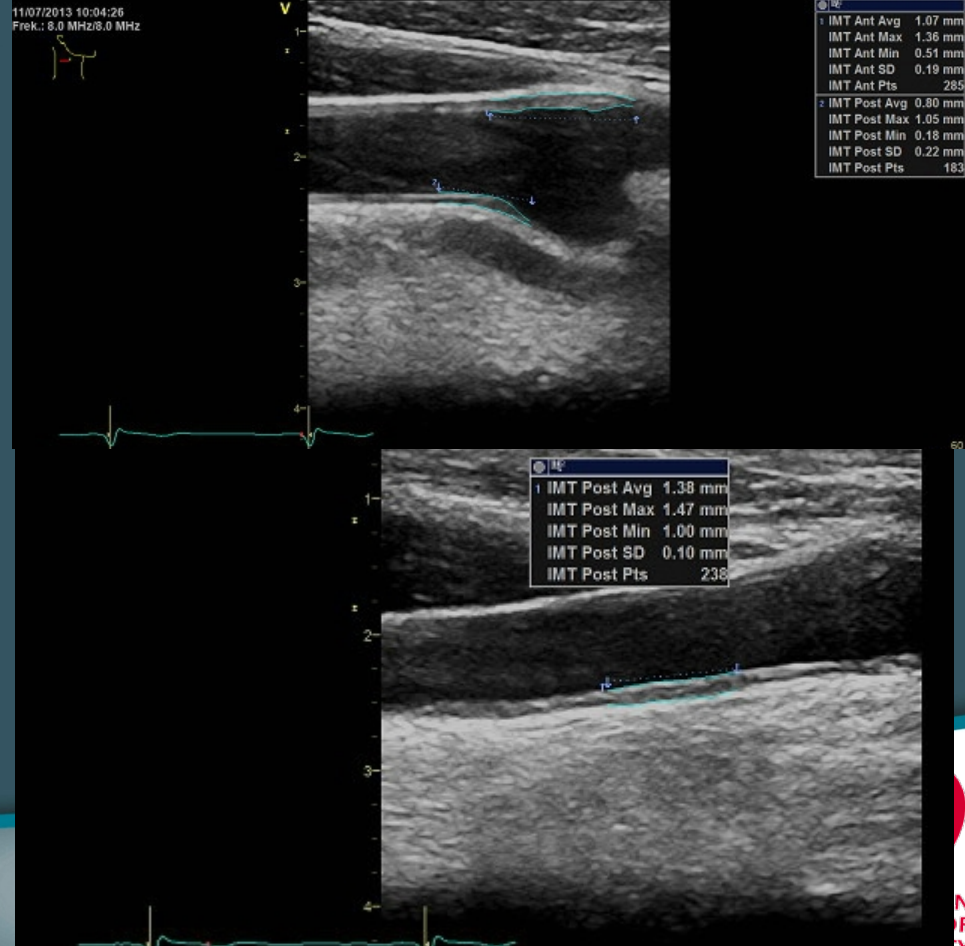
ESC Prev GL: recom for imaging methods for further risk characterization

Recommendations regarding imaging methods

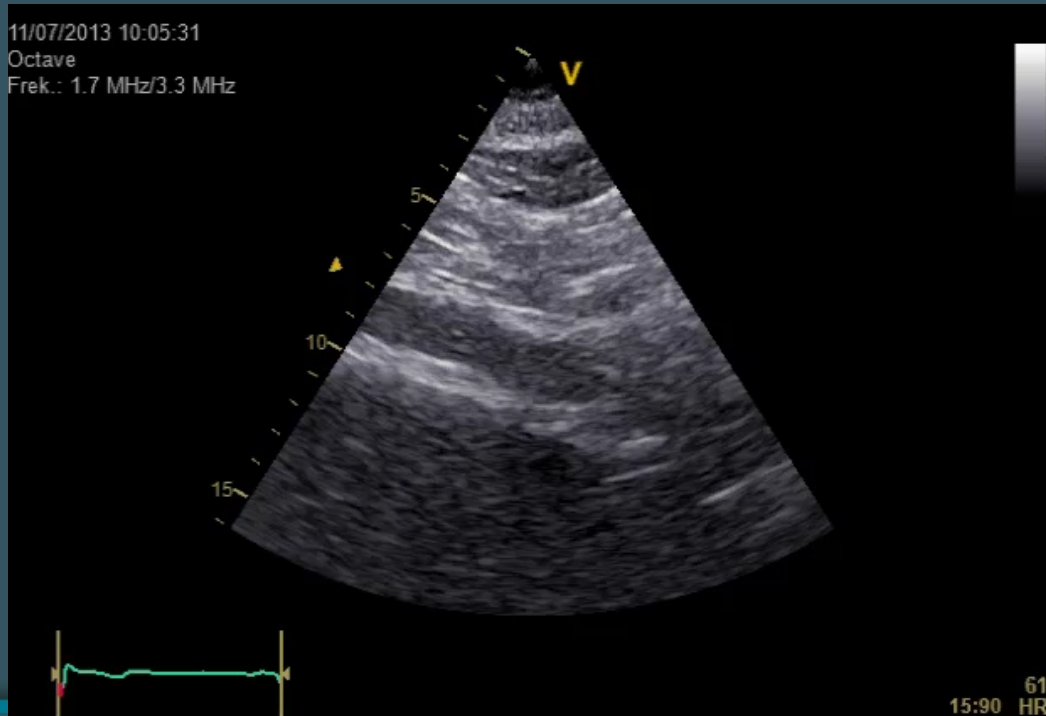
Recommendations	Class ^a	Level ^b	GRADE	Ref ^c
Measurement of carotid intima-media thickness and/or screening for atherosclerotic plaques by carotid artery scanning should be considered for cardiovascular risk assessment in asymptomatic adults at moderate risk.	IIa	B	Strong	130–132
Measurement of ankle-brachial index should be considered for cardiovascular risk assessment in asymptomatic adults at moderate risk.	IIa	B	Strong	133–135
Computed tomography for coronary calcium should be considered for cardiovascular risk assessment in asymptomatic adults at moderate risk.	IIa	B	Weak	136–138
Exercise electrocardiography may be considered for cardiovascular risk assessment in moderate-risk asymptomatic adults (including sedentary adults considering starting a vigorous exercise programme), particularly when attention is paid to non-electrocardiogram markers such as exercise capacity.	IIb	B	Strong	46, 139, 140



Carotid Ultrasound IMT (bulb) up to 1,47mm



Abdominal aorta 1,8cm



- Easily assessed by the standard cardiac probe in 30 sec

ABI and Urine microalb

- Right brachial 158, Left brachial: 155
- Right Ankle: 165, Left Ankle: 168
 - ABI above 0,9 OK

- Spot urine A/C ratio: 2,9 mg/mmol
 - (optimal <2,5 in men, <3 in women)

Factors influencing prognosis in hypertension (from ESC Prev GL

Risk factor	Target organ damage	Diabetes mellitus	Established CVD or renal disease
SBP and DBP	Electrocardiographic LVH (Sokolow-Lyons >38 mm or Cornell >2440 mm/ms); or Novacode LVMI >130 g/m ² (M), >115 g/m ² (F).	Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dL) or post-load plasma glucose >11.0 mmol/L (198 mg/dL).	Cerebrovascular disease: ischaemic stroke, cerebral haemorrhage, transient ischaemic attack.
Pulse pressure (in the elderly)	Echocardiographic LVH* [LVMI ≥ 125 g/m ² (M), ≥ 110 g/m ² (F)]		Heart disease: myocardial infarction, angina, coronary revascularization, heart failure.
Age (M >55 years, F >65 years)	Carotid wall thickening (IMT >0.9 mm) or plaque		Renal disease: diabetic nephropathy, renal impairment [serum creatinine >133 μ mol/L (1.5 mg/dL) (M), >124 μ mol/L (1.4 mg/dL) (F)], proteinuria (>300 mg/24 h).
Smoking	Carotid-femoral PWV >12 m/s		PAD
Dyslipidaemia: TC >5.0 mmol/L (190 mg/dL); or LDL cholesterol >3.0 mmol/L (115 mg/dL); or HDL cholesterol <1.0 mmol/L (40 mg/dL) (M), <1.2 mmol/L (46 mg/dL) (F); or TG >1.7 mmol/L (150 mg/dL)	ABI <0.9		Advanced retinopathy: haemorrhages or exudates, papilloedema.
Fasting plasma glucose 5.5–6.9 mmol/L (100–125 mg/dL)	Slight increase in plasma creatinine: 115–133 μ mol/L (1.3–1.5 mg/dL) (M), 107–124 μ mol/L (1.2–1.4 mg/dL) (F)		
Abnormal glucose tolerance test	Low eGFR ^b (<60 mL/min/1.73 m ²) or creatinine clearance ^c (<60 mL/min)		
Abdominal obesity: waist circumference >102 cm (M), >88 cm (F)	Microalbuminuria 30–300 mg/24 h or albumin/creatinine ratio: ≥ 22 mg/g (≥ 2.5 mg/mmol) (M), ≥ 31 mg/g (≥ 3.5 mg/mmol) (F)		
Family history of premature CVD: age <55 years (M), <65 years (F).			



Therapeutic options

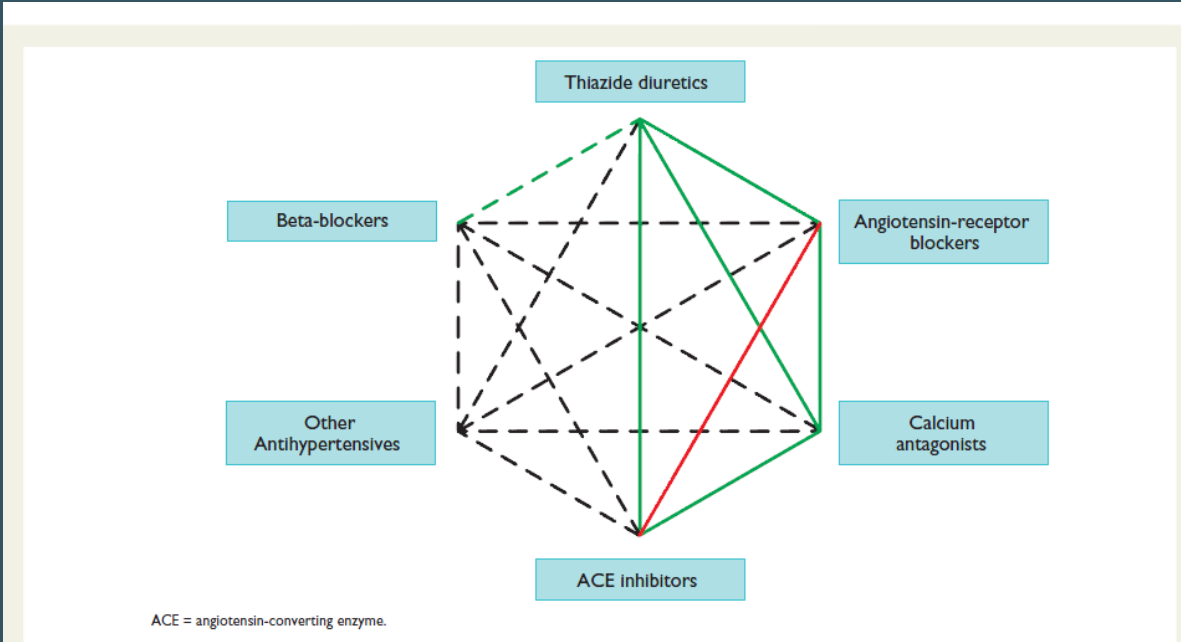


Figure 4 Possible combinations of classes of antihypertensive drugs. Green continuous lines: preferred combinations; green dashed line: useful combination (with some limitations); black dashed lines: possible but less well-tested combinations; red continuous line: not recommended combination. Although verapamil and diltiazem are sometimes used with a beta-blocker to improve ventricular rate control in permanent atrial fibrillation, only dihydropyridine calcium antagonists should normally be combined with beta-blockers.

6.12.4 Summary of recommendations on therapeutic strategies in hypertensive patients with atherosclerosis, arteriosclerosis, and peripheral artery disease

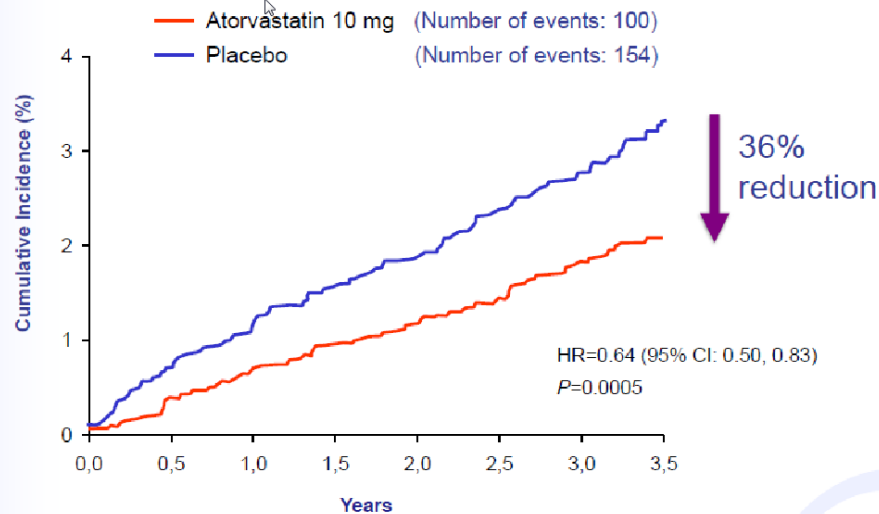
Therapeutic strategies in hypertensive patients with atherosclerosis, arteriosclerosis, and peripheral artery disease

Recommendations	Class ^a	Level ^b	Ref. ^c
In the presence of carotid atherosclerosis, prescription of calcium antagonists and ACE inhibitors should be considered as these agents have shown a greater efficacy in delaying atherosclerosis progression than diuretics and beta-blockers.	IIa	B	186, 581

10mg of atorvastatin had dramatic effect in the ASCOT study

ASCOT-LLA trial

ASCOT-LLA Primary End Point: Nonfatal MI and Fatal CHD



Summing up

- BP control: not satisfactory
 - aim: 140/80
 - Cardiac TOD detected
- Lifestyle control: not satisfactory
 - Aim to reduce waist and BW and increase exercise
- Lipid management: not satisfactory
 - Early atherosclerosis detected
 - LDL should be lowered below 2.5

- HT grade I
- Additional Risk factors
 - Early atherosclerosis
 - Cardiac TOD
 - Slight early kidney affection
 - Dyslipidemia

Other risk factors, asymptomatic organ damage or disease	Blood Pressure (mmHg)			
	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF		Low risk	Moderate risk	High risk
1–2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥3 RF	Low to Moderate risk	Moderate to high risk	High Risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/RF	Very high risk	Very high risk	Very high risk	Very high risk

OD = organ damage; RF = risk factor; SBP = systolic blood pressure; CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease; DBP = diastolic blood pressure; HT = hypertension.

Figure 1 Stratification of total CV risk in categories of low, moderate, high and very high risk according to SBP and DBP and prevalence of RFs, asymptomatic OD, diabetes, CKD stage or symptomatic CVD. Subjects with a high normal office but a raised out-of-office BP (masked hypertension) have a CV risk in the hypertension range. Subjects with a high office BP but normal out-of-office BP (white-coat hypertension), particularly if there is no diabetes, OD, CVD or CKD, have lower risk than sustained hypertension for the same office BP.

Therapeutic consequence of additional tests by cardiologist:

- Detection of low grade atherosclerosis
 - Rx 10mg atorvastatin
- Detection of hypertensive heart changes
 - Increased regimen; Rx: 20mg slow release nifedipine
- Propably reduced risk of future cardiac event and hypertensive complications