

# Ευρωπαϊκές Εξετάσεις Καρδιολογίας European Exam on General Cardiology (EEGC)



## Δομή Εξετάσεων και παραδείγματα θεμάτων

**Κατερίνα Κ. Νάκα MD, PhD(UK), FESC**



Αναπλ. Καθηγήτρια Καρδιολογίας  
Πανεπιστήμιο Ιωαννίνων, Σχολή  
Επιστημών Υγείας, Τμήμα Ιατρικής



2<sup>η</sup> Καρδιολογική Κλινική, ΠΓΝ Ιωαννίνων

# DISCLOSURES

**SPEAKER: KATERINA K. NAKA MD, PhD, FESC**

*RCTs/Registries - Amgen, Actelion, BMS, Boehringer, CSL Behring, Lexikon, Bayer*

*Advisory Boards – Glaxo, Boehringer*

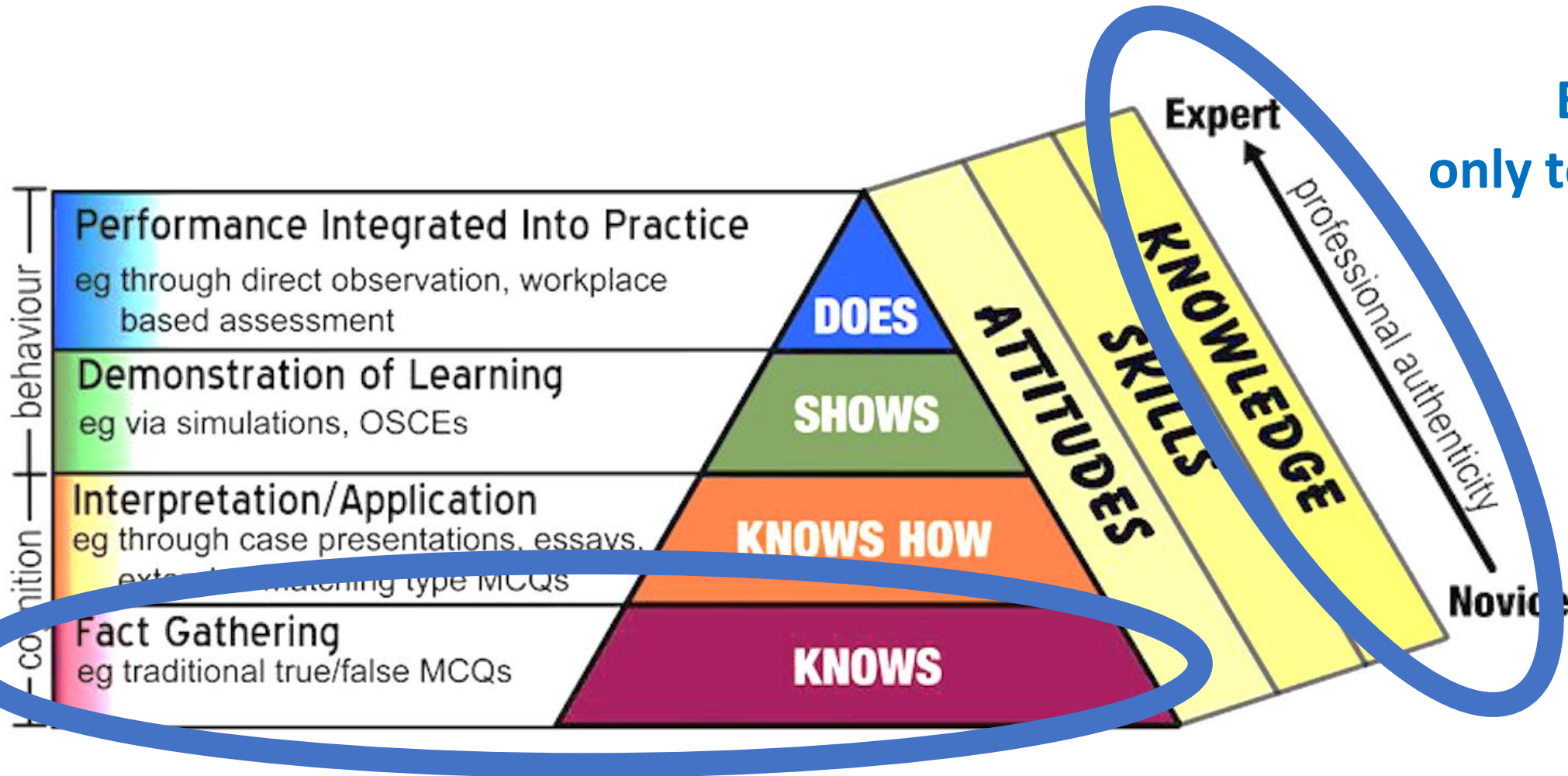
*Horizon2020 funding – KardiaTool, Insilc projects*

None of the above are related to this presentation apart from

- ***MCQ writer since 2013***
- ***MCQ selector for the EEGC since 2015***
- ***Deputy Chair of the Selection Committee since 2018***



## MILLER'S PRISM OF CLINICAL COMPETENCE (aka Miller's Pyramid)



EEGC  
only tests 1 of 3



# The European Examination in General Cardiology (EEGC)

- General principles / Structure
- Example MCQs
- How to prepare

## Contribution: Chris Plummer

- EEGC Board Chair
- UEMS Cardiac Section vice-president for training

# EEGC basic principles (I)



- Taken towards the end of training but always BEFORE the end of training
- **Every mid June**
- In some countries
  - required for Certificate of Completion of Training (CCT); UK, Ireland
  - may replace their theoretical exam; Switzerland, Netherlands

# EEGC basic principles (II)



- **Multiple Choice Questions (MCQs) examination**
  - 120 MCQs
  - 3 hours (1.5 min / MCQ)
  - Computer terminals in PearsonVUE centres (2019; 112 centers in 16 countries)
- **Pass / Fail only**
- **Mapped to the ESC curriculum - Based on current best evidence**
  - Guidelines (mostly-exclusively ESC guidelines)
  - ESC textbook and other sources for core knowledge mainly (ECG, arrhythmia recognition, non-invasive imaging)

# EEGC structure – MCQs (I)



- **short clinical scenario:**

*A 56-year-old man was admitted to the emergency department with chest pain.  
His 12-lead ECG is shown (see Image).*

- **images as required:**

- 70% (84) text only
- 20% (24) still image
- 10% (12) video

- **a short question:           NO NEGATIVE QUESTIONS**

*What is the most appropriate treatment?*

- **1 best answer of 5 options:**

- A to E                               **!!! combinations e.g. 'A & C', 'all the above' are not allowed**
- Alphabetical always
- As similar length as possible

- **as short and clear as possible, simple English**

# EEGC structure – Topics (II)



- **Section 1 - Valvular and Myocardial Disease**

- 2.10 Myocardial Diseases
- 2.15 Valvular heart disease
- 2.16 Infective endocarditis
- 2.17 Heart Failure

- **Section 2 - Ischaemic Heart Disease**

- 2.4 Invasive cardiac imaging
- 2.7 Cardiovascular Disease Protection - risk factors and hypertension
- 2.8 Acute Coronary Syndromes
- 2.9 Chronic Coronary Syndromes
- 2.19 Physical activity in sport and primary and secondary prevention

- **Section 3 - Rhythm Disorders**

- 2.2 The electrocardiogram – standard ECG, ambulatory ECG, exercise ECG, CPX
- 2.20 Arrhythmias
- 2.21 Atrial fibrillation and flutter
- 2.22 Syncope
- 2.23 Sudden Cardiac Death and Resuscitation

- **Section 4 - Adult Congenital Heart Disease and Non-invasive Investigation**

- 2.3 Non-invasive imaging  
(50% echo, 25% CT/nuclear and 25% CMR)
- 2.13 Adult congenital heart disease
- 2.14 Heart disease in pregnancy

- **Section 5 – General Cardiology**

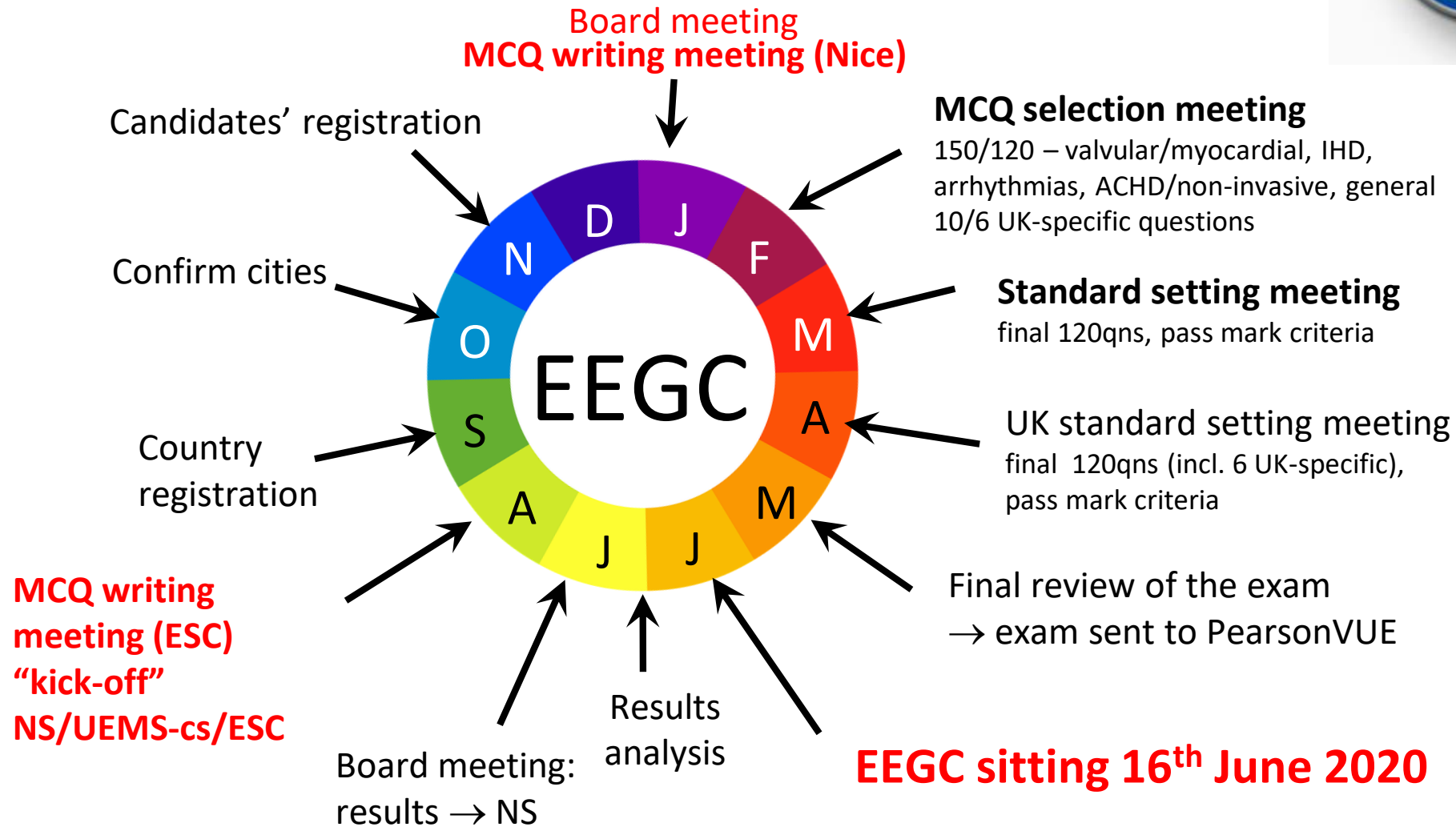
- 2.1 History taking and clinical examination
- 2.5 Genetics
- 2.6 Clinical Pharmacology
- 2.11 Pericardial diseases
- 2.12 Oncology and the heart
- 2.18 Pulmonary arterial hypertension
- 2.24 Diseases of the Aorta and Trauma
- 2.25 Peripheral Artery Disease
- 2.26 Venous thrombo-embolism
- 2.27 Acute Cardiac Care
- 2.28 The Cardiac Consult (non-cardiac disease and the heart)

## Re-use of Questions

- ≈ 50% of questions will be new
- ≈ 50% will have been previously used and performed well in previous EEGC



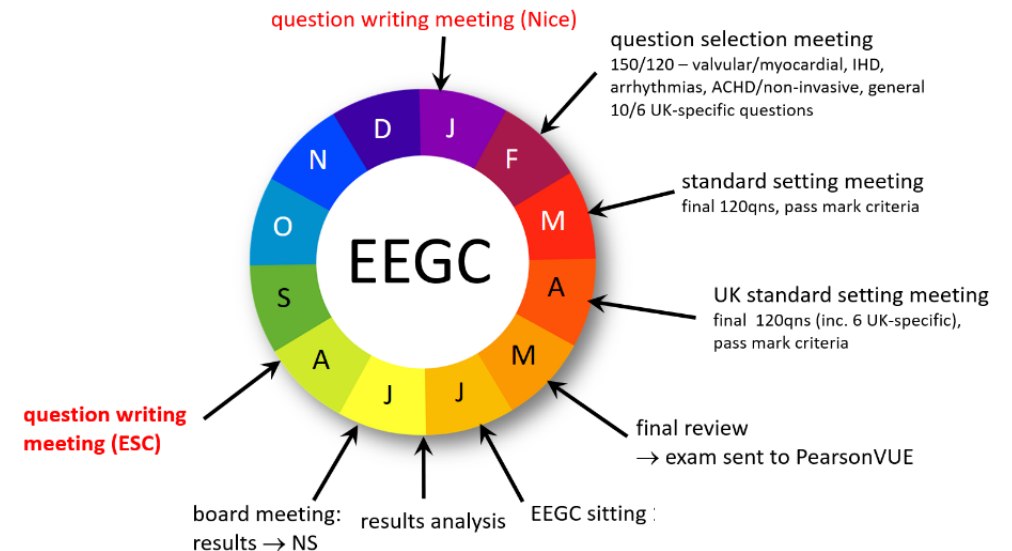
# EEGC annual cycle



# 2 Question Review Meetings



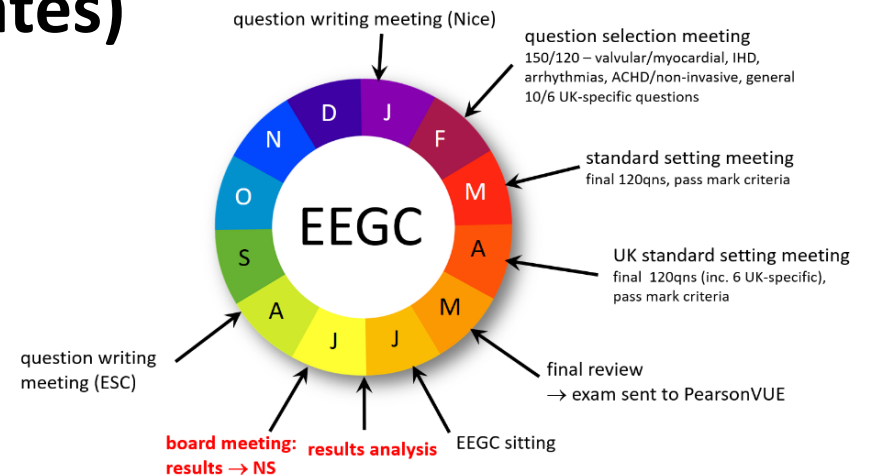
- question writers from all participating countries meet in Heart House in Nice or at ESC
- all new questions reviewed extensively
  - presented by the author
  - discussed by a group of ≈6 cardiologists
  - evidence reviewed
  - edited
  - accepted, rejected or sent back for re-writing
- previously used questions are also reviewed
  - evidence reviewed
  - edited
  - accepted, rejected or sent back for re-writing



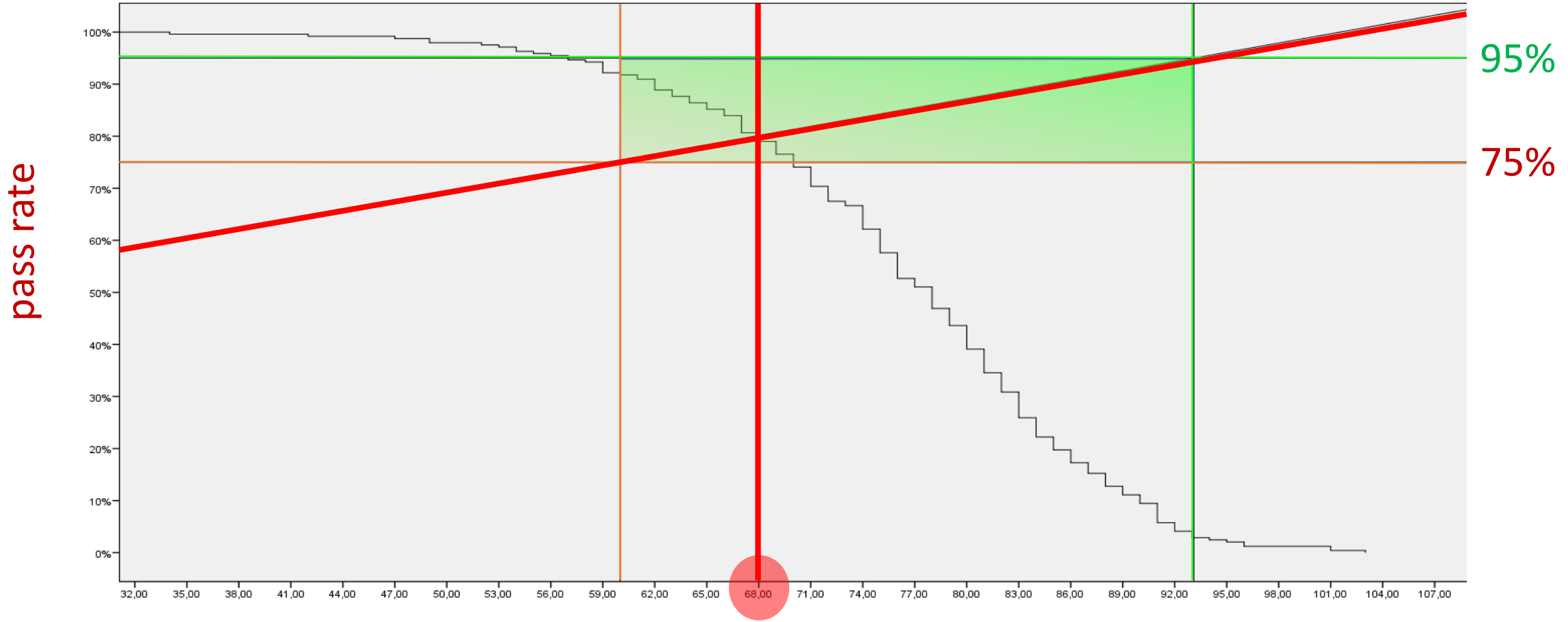
# Question Performance Review



- EEGC board meeting
- **review all questions that <30% candidates answered correctly**
  - 8 questions in 2018
  - 12 questions in 2019
- **review all questions with negative correlation (questions that were failed by well performing candidates)**
  - 2018: 2 questions → no questions excluded
  - 2019: 6 questions → 4 questions excluded



# EEGC pass mark: complex process



**pass mark = usually 65-68 correct answers (56-58%)**



EUROPEAN SOCIETY OF CARDIOLOGY



# 16 countries



- CSANZ *observer* 
- Austria *pilot* 
- Cyprus *enrolled* 
- Finland *enrolled* 
- Germany *enrolled* 
- Greece *enrolled* 
- Ireland *enrolled* 
- Latvia *pilot* 

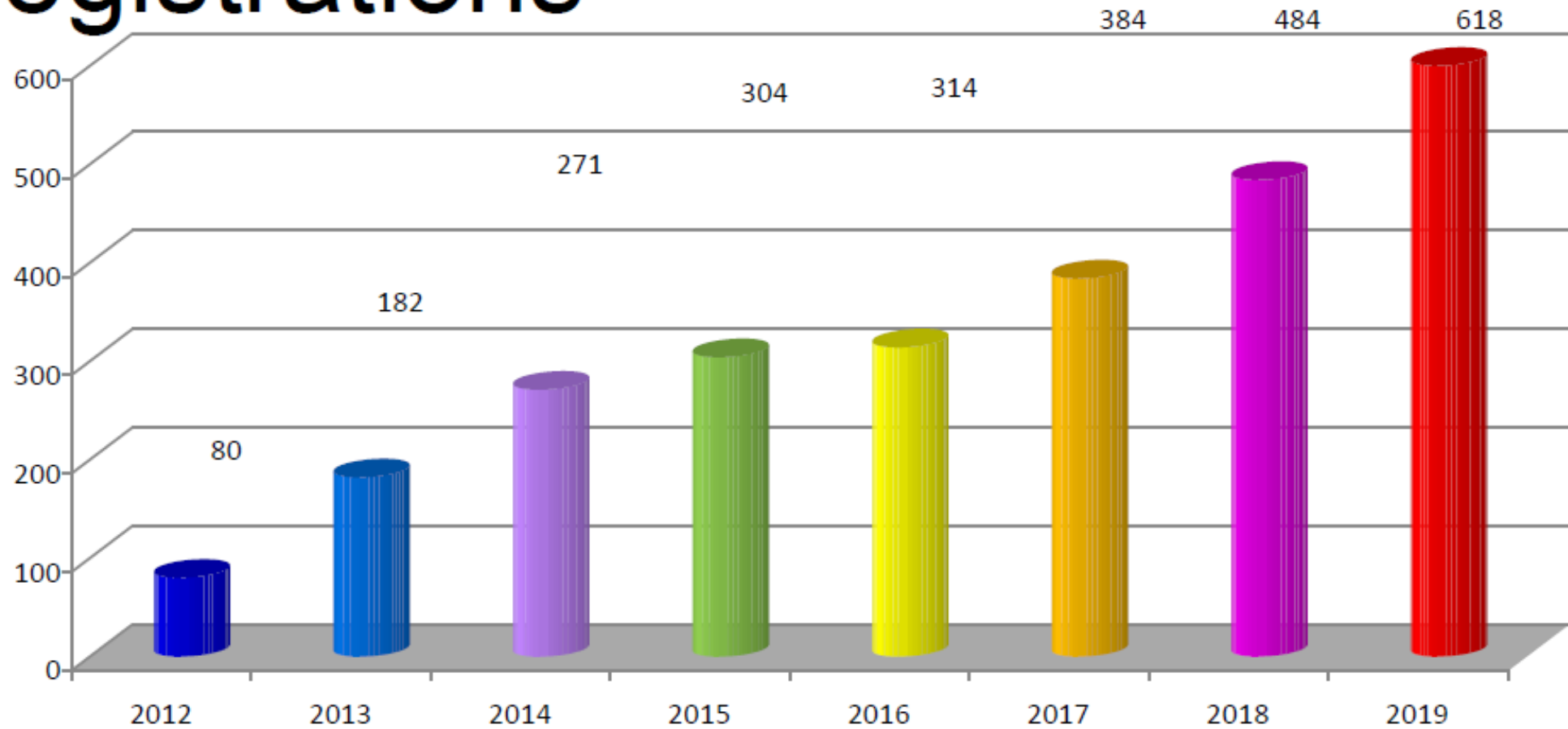
- Lithuania *observer* 
- Malta *enrolled* 
- Netherlands *enrolled* 
- Portugal *enrolled* 
- Spain *enrolled* 
- Sweden *enrolled* 
- Switzerland *enrolled* 
- UK *enrolled* 

- Bulgaria 
- Egypt 
- France 
- Israel 
- Poland 
- Tunisia 
- Turkey 
- Asian Pacific Society of Cardiology 

ESC Congress Paris 2019 Together with World Congress of Cardiology

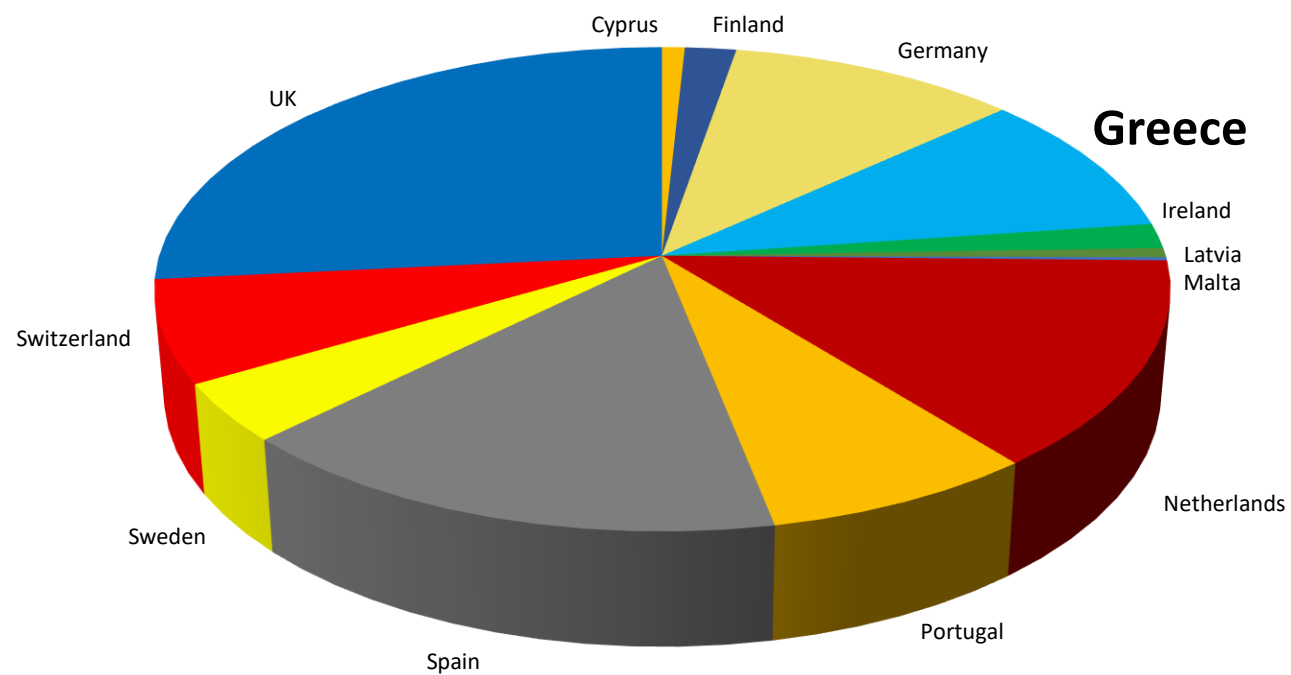
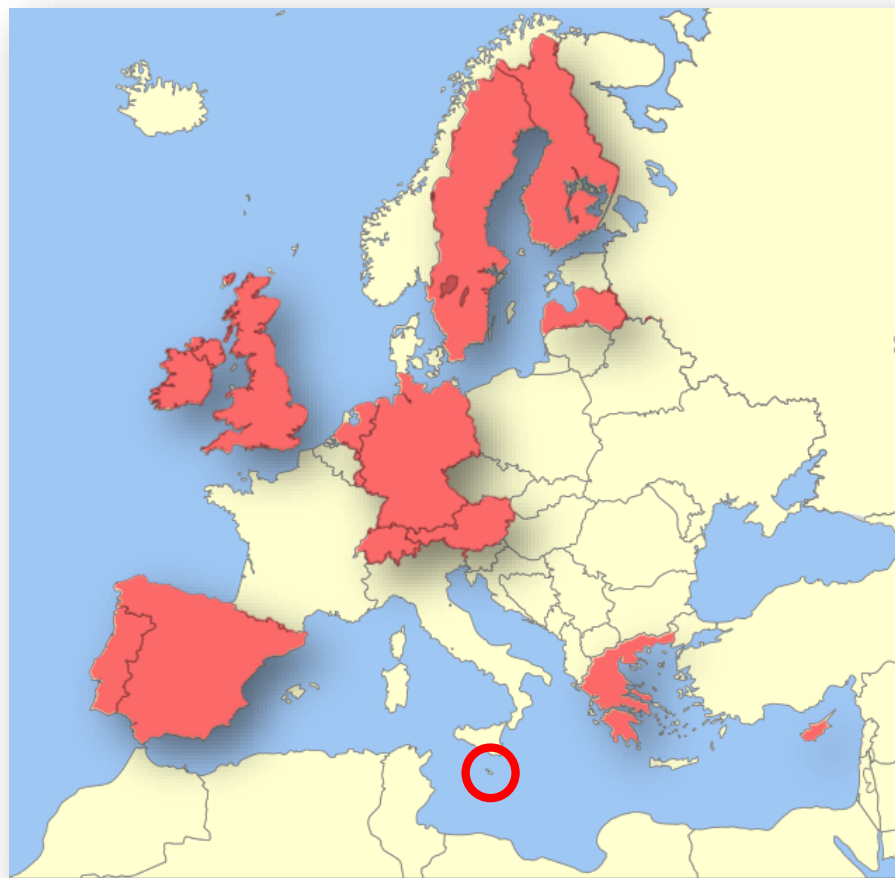


# registrations



Together with  
**ESC Congress Paris 2019** World Congress of Cardiology

# EEGC registrations

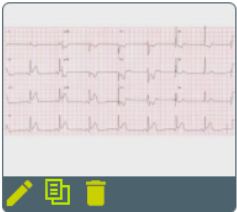


# EEGC format

## Clinical Context

A 56-year-old man was admitted with chest pain. His ECG is shown.

## Associated media



Add [+]

## Question

What is the most appropriate treatment?

## Answers

▼ Reorder answers in alphabetical order

Add [+]

- |          |                     |                                  |  |
|----------|---------------------|----------------------------------|--|
| <b>A</b> | aspirin             | <input type="radio"/>            |  |
| <b>B</b> | clopidogrel         | <input type="radio"/>            |  |
| <b>C</b> | intravenous heparin | <input type="radio"/>            |  |
| <b>D</b> | primary PCI         | <input checked="" type="radio"/> |  |
| <b>E</b> | thrombolysis        | <input type="radio"/>            |  |

Save

Save and preview

Ref.: 21287

## Status

Last Update 2018-08-25 12:50:37 by Plummer (Draft)

## Tags

### Topic \*

8. Acute Coronary Syndromes (ACS) ▼

### Difficulty level

Select a difficulty level ▼

### Clinical context length

Select a clinical context length ▼

### Keywords

Add [+]

### References

Add [+]

### Demo

This question can be used for a demo.

### Country specific questions

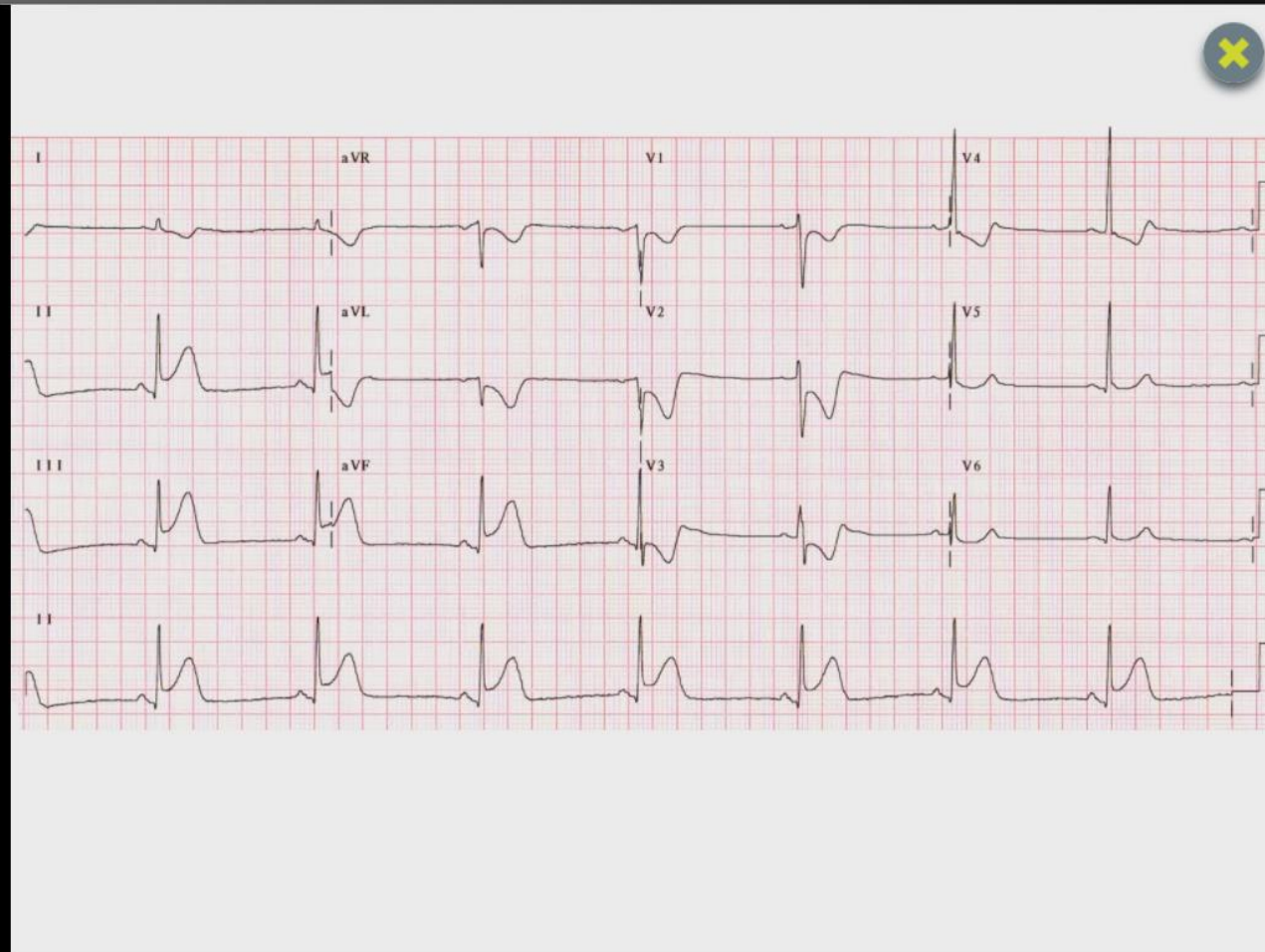
UK specific

## Comments

Add [+]



# EEGC format



## Details

Ref.: **21287**

Topic: **8. Acute Coronary Syndromes (ACS)**

Clinical context length:

Difficulty level:

Keywords:

References:

Demo:

Country specific questions:

Used:

**There is no statistical information!**

Creation: **2018-08-25 12:48:26** by Plummer

Last Update 2018-08-25 13:11:39 by Plummer (Draft)

Comments

Add [+]

## Statistical information

## Selection

Draft

Submitted

# EEGC format



A 56-year-old man was admitted with chest pain. His ECG is shown.

What is the most appropriate treatment?

A aspirin

A

D primary PCI

D

B clopidogrel

B

E thrombolysis

E

C intravenous heparin

C

## Details

Ref.: **21287**

Topic: **8. Acute Coronary Syndromes (ACS)**

Clinical context length:

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References:

Demo:

Country specific questions:

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Comments

Add [+]

## Statistical information

### Selection

Draft

Submitted



**Take the Challenge!**

**European Exam on General  
Cardiology (EEGC)**

**Example MCQs**

A 75-year-old woman was seen in the clinic with a murmur. She had a history of hypertension and dyslipidaemia treated with amlodipine and simvastatin and was a non-smoker. She denied any symptoms during her daily activities. Physical examination revealed signs of severe aortic stenosis. A transthoracic echocardiogram showed a normal sized left ventricle with an ejection fraction of 55%, a tricuspid, calcified aortic valve with a maximal velocity of 4.2 m/s, peak/mean pressure gradient of 70/45mmHg with no regurgitation and an ascending aorta of 37mm.

What is the most appropriate investigation ?

**A** brain natriuretic peptide

**D** exercise testing

**B** coronary angiogram

**E** transoesophageal echocardiogram

**C** CT calcium score

A 75-year-old woman was seen in the clinic with a murmur. She had a history of hypertension and dyslipidaemia treated with amlodipine and simvastatin and was a non-smoker. She denied any symptoms during her daily activities. Physical examination revealed signs of severe aortic stenosis. A transthoracic echocardiogram showed a normal sized left ventricle with an ejection fraction of 55%, a tricuspid, calcified aortic valve with a maximal velocity of 4.2 m/s, peak/mean pressure gradient of 70/45mmHg with no regurgitation and an ascending aorta of 37mm.

What is the most appropriate investigation?

A brain natriuretic peptide

A

D exercise testing

D

B coronary angiogram

B

E transoesophageal echocardiogram

E

C CT calcium score

C

# Discussion 1a

## Why is this question valuable?

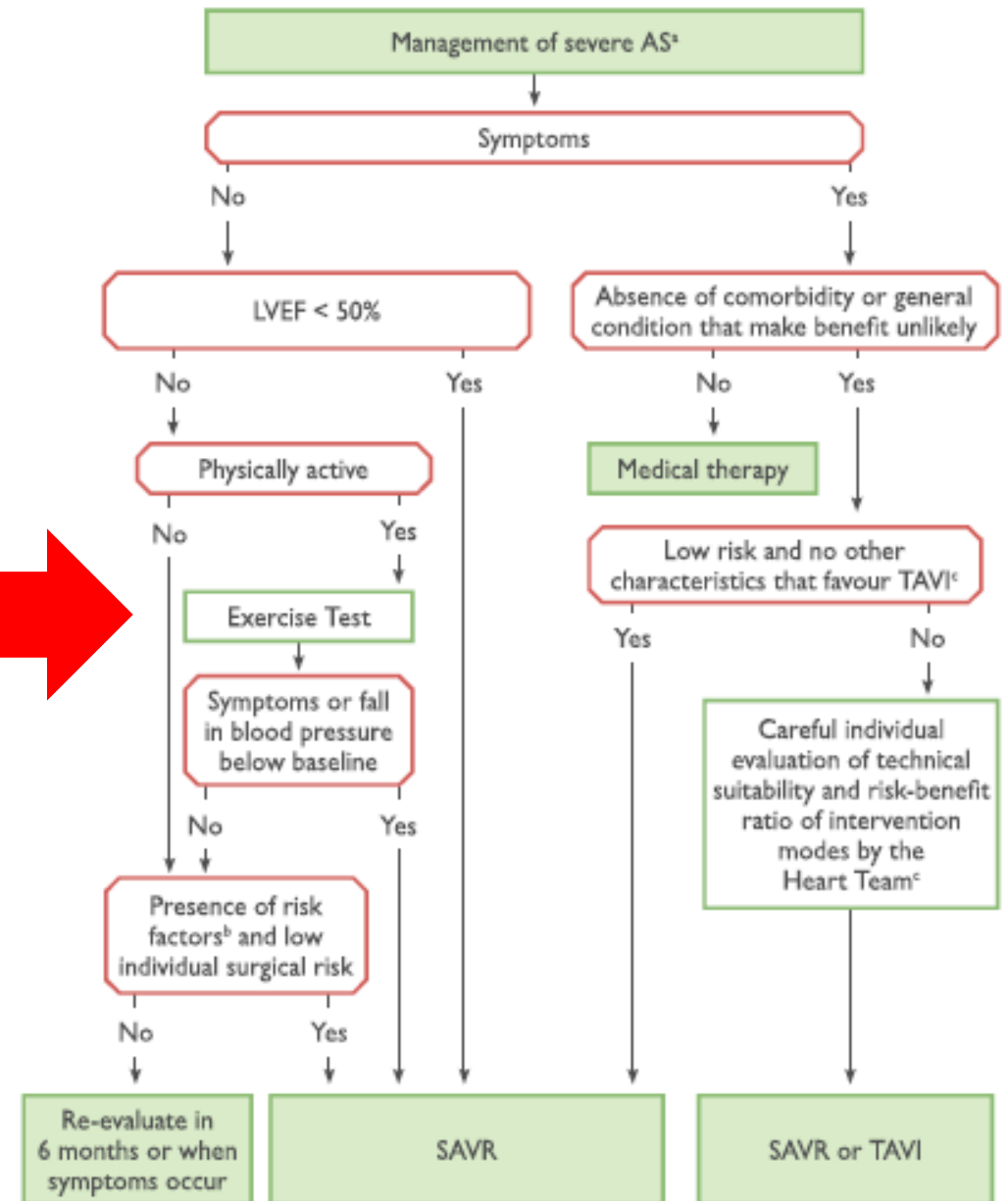
- Assess knowledge in a common clinical problem:  
**asymptomatic severe AS**
- Assess knowledge of **echocardiographic criteria for severity of aortic valve disease**
- Examine knowledge of **criteria for intervention in aortic valvular disease**

# Discussion 1b

## Explanation of the answer

- In severe AS if
  - symptoms are absent
  - LVEF is normal
  - patient is physically active
- **exercise testing is the next criterion for surgical intervention** (to look for symptoms or fall in BP)

*ESC guidelines on VHD 2018*



A 74-year-old man was admitted with acute pulmonary edema that completely resolved after 2 days of diuresis. He had been experiencing progressively worsening shortness of breath over the last 5-6 months. He had no history of hypertension or diabetes, was a non-smoker and received no medications. On examination, pulse was regular 80 bpm, BP was 105/70 mmHg, there was a 2/6 ejection systolic murmur with a soft second heart sound, carotid volume was weak, chest was clear, and there was no peripheral edema.

Transthoracic echocardiogram revealed a mildly dilated left ventricle with an ejection fraction of 35% and diffuse hypokinesis, a tricuspid and moderately calcified aortic valve with a maximal velocity of 3.5 m/s, peak/mean pressure gradient of 49/27mmHg with no regurgitation. The aortic valve area calculated using the continuity equation was 0.8 cm<sup>2</sup>.

What is the most appropriate next investigation ?

**A** CT calcium score

**D** perfusion cardiac MRI

**B** exercise ECG testing

**E** transoesophageal echocardiogram

**C** low-dose dobutamine echocardiogram



A 74-year-old man was admitted with acute pulmonary edema that completely resolved after 2 days of diuresis. He had been experiencing progressively worsening shortness of breath over the last 5-6 months. He had no history of hypertension or diabetes, was a non-smoker and received no medications. On examination, pulse was regular 80 bpm, BP was 105/70 mmHg, there was a 2/6 ejection systolic murmur with a soft second heart sound, carotid volume was weak, chest was clear, and there was no peripheral edema.

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What is the most appropriate next investigation?

A CT calcium score

A

D perfusion cardiac MRI

D

B exercise ECG

B

E transoesophageal echocardiogram

E

C low-dose dobutamine echocardiogram

C

# Discussion 2a

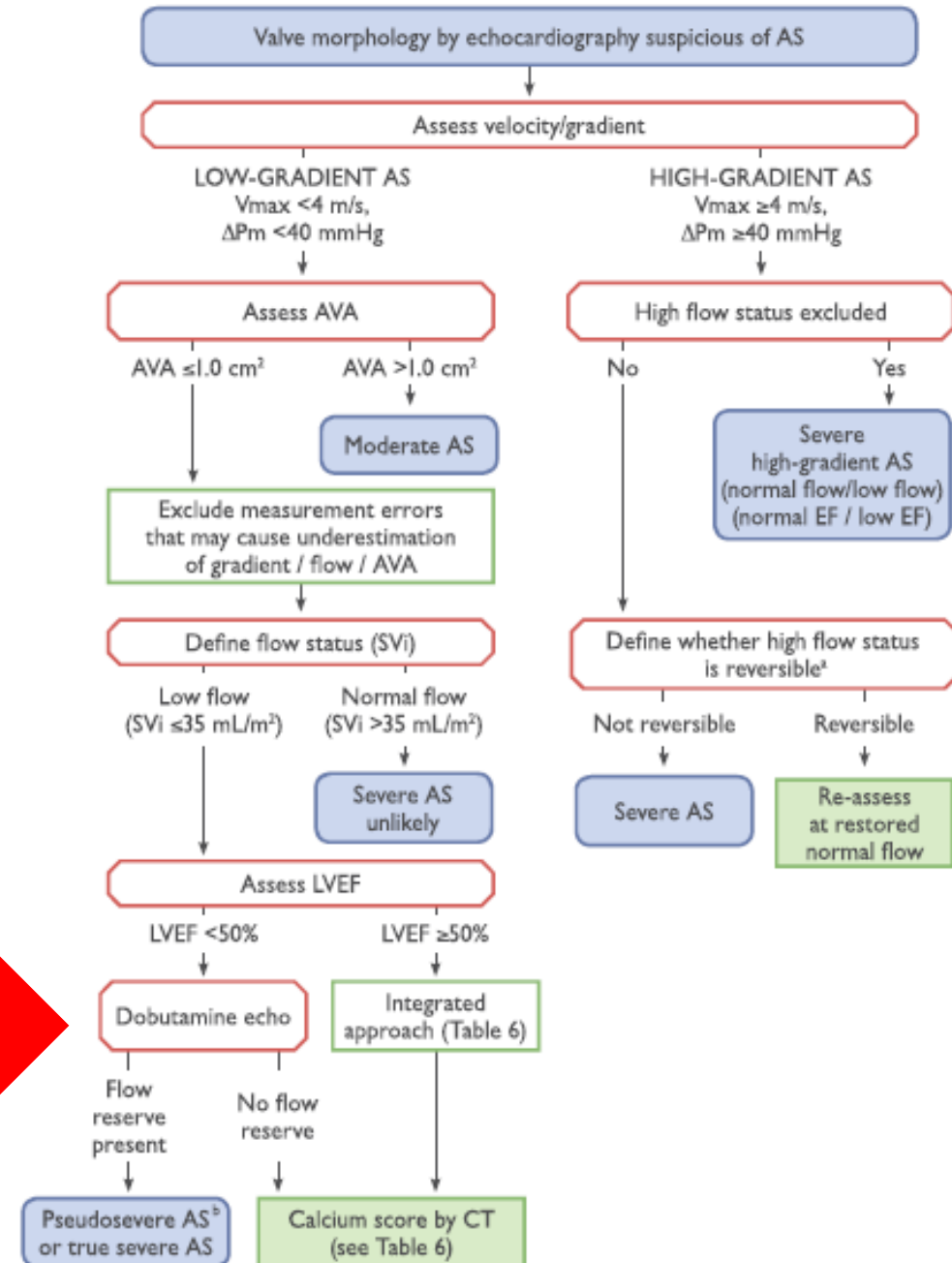
## Why is this question valuable?

- Assess knowledge in an important clinical problem:  
**low-flow, low-gradient AS**
- Examine knowledge of the **limitations of physical examination**
- Examine knowledge of the **AS classification in the most recent guidelines**
- Assess knowledge of **differential diagnosis in this difficult setting**

# Discussion 2b

## Explanation of the answer

- This is a typical example of mismatch between a small AVA and a low mean PG
- In this clinical setting of acute HF with a LVEF < 35%, one needs to discriminate between pseudosevere or true severe AS; a DSE is thus recommended



*ESC guidelines on VHD 2018*

A 78-year-old man was admitted with acute pulmonary oedema that responded partially to high doses of intravenous diuretics. He had a long-standing history of mitral regurgitation due to posterior mitral valve prolapse, atrial fibrillation and severe chronic obstructive airway disease on home nebulisers. Over the last years he experienced progressively worsening dyspnoea on exertion (functional class NYHA II-III) and was receiving increasing doses of furosemide, sacubutril/valsartan, carvedilol, spironolactone and apixaban. After initial clinical improvement, pulse was irregular 90/min, BP was 110/80mmHg, there was a gallop rhythm, a loud systolic murmur at the apex, mildly distended jugular veins and no leg oedema.

ECG showed atrial fibrillation with RBBB and QRS of 130ms.

Transthoracic echocardiogram revealed severe mitral regurgitation with flail posterior mitral leaflet, moderately dilated left ventricle with an ejection fraction of 30%, severely dilated left atrium (60ml/m<sup>2</sup>) and systolic pulmonary artery pressure of 65mmHg.

What is the most appropriate long-term management?

**A** cardiac resynchronization therapy

**D** surgical valve replacement

**B** percutaneous mitral valve repair

**E** ventricular assist device

**C** pulmonary vein isolation

A 78-year-old man was admitted with acute pulmonary oedema that responded partially to high doses of intravenous diuretics. He had a long-standing history of mitral regurgitation due to posterior mitral valve prolapse, atrial fibrillation and severe chronic obstructive airway disease on home nebulisers. Over the last years he experienced progressively worsening dyspnoea on exertion (functional class NYHA II-III) and was receiving increasing doses of furosemide, sacubutril/valsartan, carvedilol, spironolactone and apixaban. After initial clinical improvement, pulse was irregular 90/min, BP was 110/80mmHg, there was a gallop rhythm, a loud systolic murmur at the apex, mildly distended jugular veins and no leg oedema.

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Transthoracic echocardiogram revealed severe mitral regurgitation with flail posterior mitral leaflet, moderately dilated left ventricle with an ejection fraction of 30%, severely dilated left atrium (60ml/m<sup>2</sup>) and systolic pulmonary artery pressure of 65mmHg.

What is the most appropriate long-term management?

A cardiac resynchronization therapy

D surgical valve replacement

B percutaneous mitral valve repair

E ventricular assist device

C pulmonary vein isolation

# Discussion 3a

## Why is this question valuable?

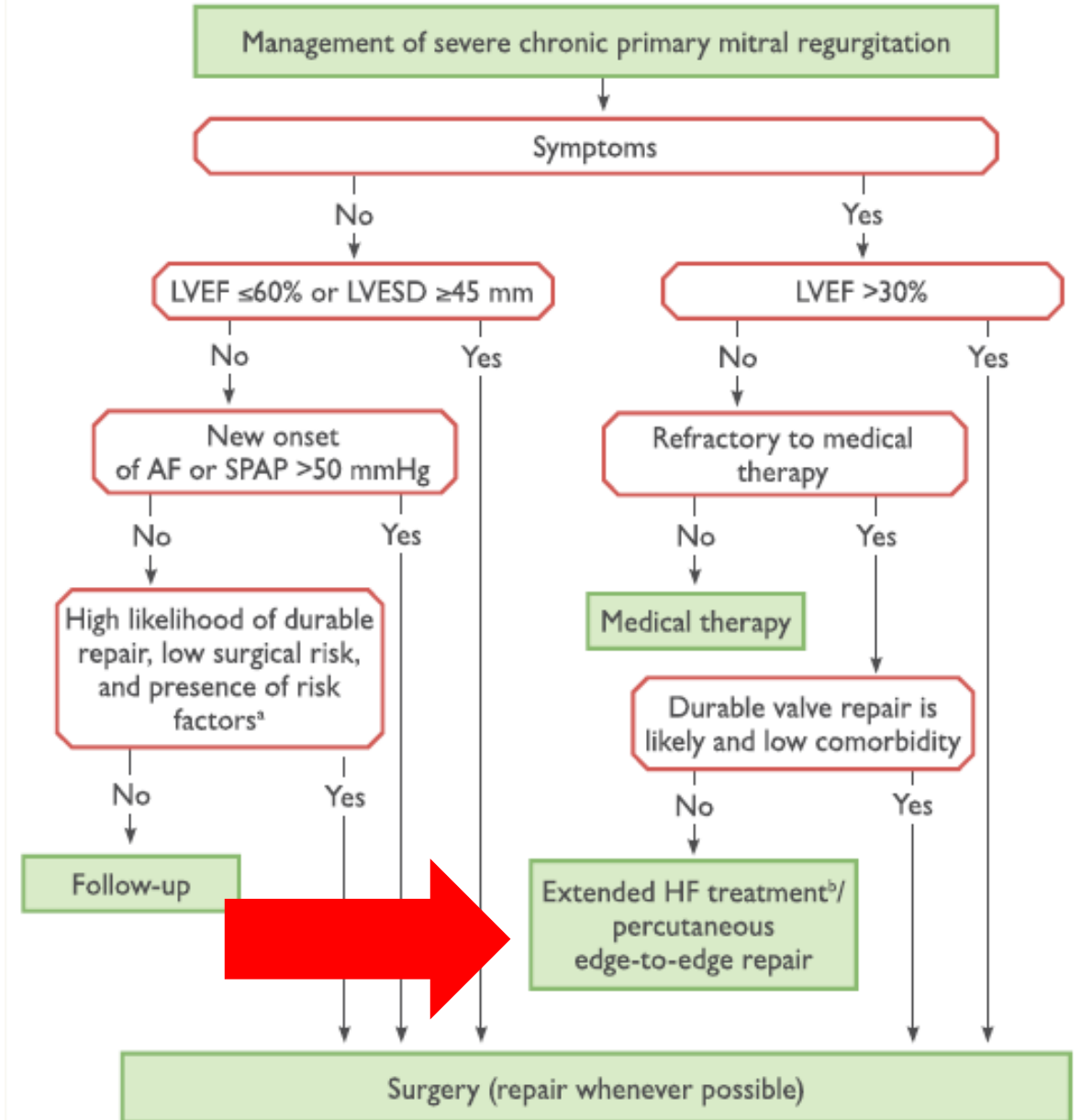
- Assess knowledge in a complex clinical setting: **structural MR with refractory HF**
- Assess knowledge of **structural vs functional MR**
- Assess knowledge on **assessment of surgical risk**
- Examine knowledge of **the most recent developments**; some of these have also been **introduced in the latest guidelines**
- **Assess clinical judgement** when several management options are available in MV disease and HF

# Discussion 3b

## Explanation of the answer

- Chronic primary MR that has led to refractory HF
- CRT is not an option (AF, QRS)
- AF ablation has not been extensively studied so far
- Age is prohibitive for VAD
- Criteria for surgery present but surgical risk is very high (comorbidity, old age)
- Percutaneous MV repair could be an option

*ESC guidelines on VHD 2018*





A 65-year-old man with a history of intermittent second degree atrioventricular block and implantation of a DDD-pacemaker was brought to the emergency department. He complained of sudden tachycardia episodes lasting 30-60 seconds. An ECG recorded during the tachycardia is shown (see image).

What is the most likely diagnosis?

A atrial flutter

A

D sinus tachycardia

D

B atrioventricular nodal reentry tachycardia

B

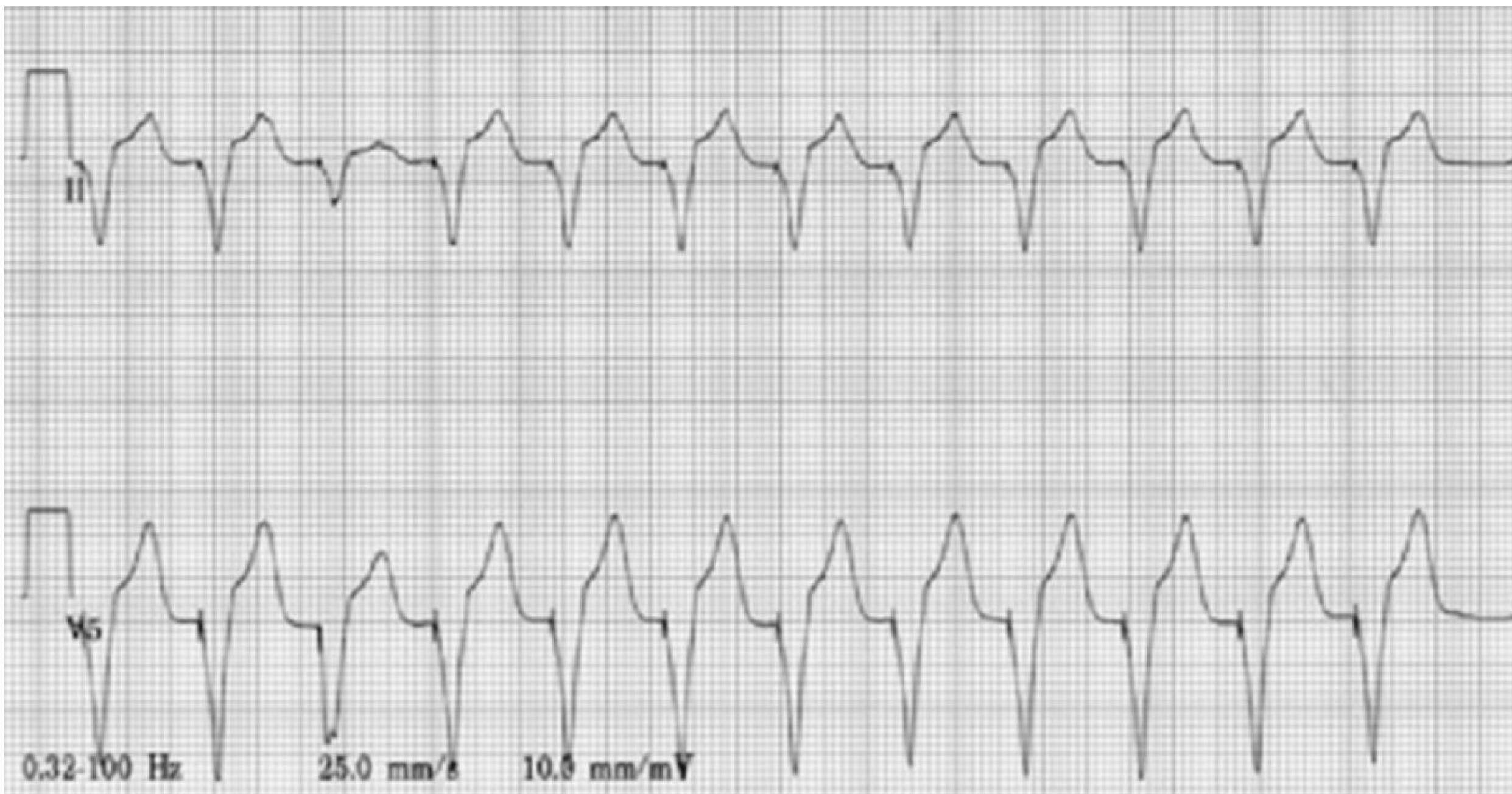
E ventricular tachycardia

E

C pacemaker mediated tachycardia

C







A 65-year-old man with a history of intermittent second degree atrioventricular block and implantation of a DDD-pacemaker was brought to the emergency department. He complained of sudden tachycardia episodes lasting 30-60 seconds. An ECG recorded during the tachycardia is shown (see image).

What is the most likely diagnosis?

A

atrial flutter

D

sinus tachycardia

B

atrioventricular nodal reentry tachycardia

E

ventricular tachycardia

C

pacemaker mediated tachycardia

# Discussion 4a

## Why is this question valuable?

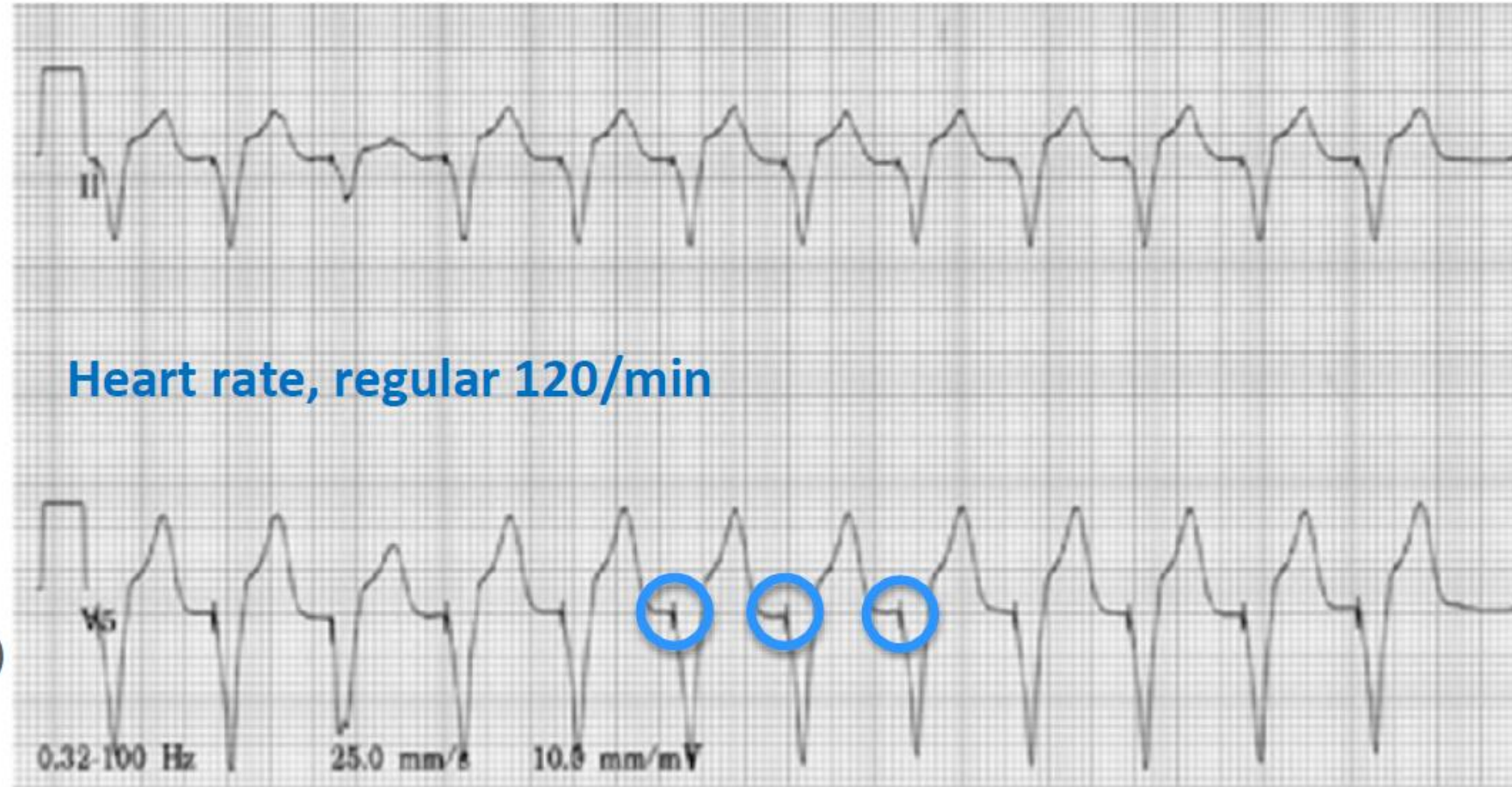
- Exam knowledge of typical pacemaker scenarios
- Pacemaker Mediated Tachycardia (PMT)
  - Well know (frequent) complication of DDD pacemaker
- Can/must be diagnosed and treated
  - Magnet over the pulse generator (acute therapy)
  - Programming of the pacemaker (chronic therapy)

# Discussion 4b

## Explanation of the answer

A	atrial flutter
B	atrioventricular nodal reentry tachycardia
C	pacemaker mediated tachycardia
D	sinus tachycardia
E	ventricular tachycardia

- Sudden onset (not sinustachycardia)
- Ventricular paced rhythm (not VT)
- AVNRT (too old, too slow)
- Atrial flutter (no F-waves)





A 70-year-old woman was admitted to emergency department due to recent onset tachycardia lasting 12 hours. She had hypertension and type 2 diabetes. She was being treated with losartan 100 once daily and metformin 500mg twice daily. Her ECG recorded at 50mm/s is shown.

What is the most appropriate antithrombotic therapy?

A aspirin 100mg daily

A

D rivaroxaban 20mg daily

D

B none

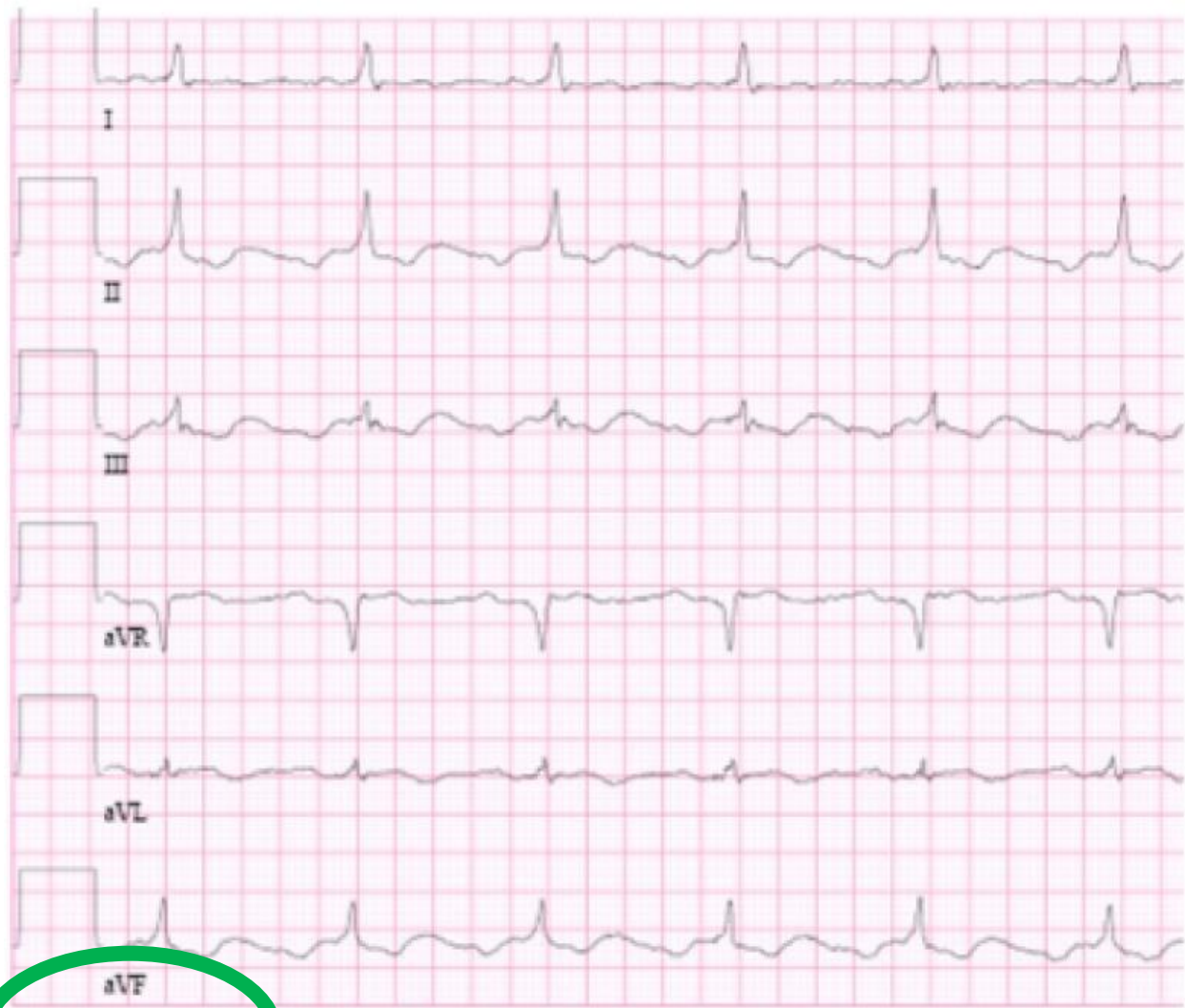
B

E ticagrelor 90mg twice daily

E

C rivaroxaban 2.5mg twice daily

C



50mm/s 10mm/mV 50Hz 005E 12SL 235 CID: 1



A 70-year-old woman was admitted to emergency department due to recent onset tachycardia lasting 12 hours. She had hypertension and type 2 diabetes. She was being treated with losartan 100 once daily and metformin 500mg twice daily. Her ECG recorded at 50mm/s is shown.

What is the most appropriate antithrombotic therapy?

A

aspirin 100mg daily

D

rivaroxaban 20mg daily



B

none

E

ticagrelor 90mg twice daily



C

rivaroxaban 2.5mg twice daily

# Discussion 5a

## Why is this question valuable?

- Exam ECG diagnosis of common arrhythmias
- Exam treatment of common arrhythmias
- Exam risk assessment of patients with arrhythmias
- Exam stroke prevention associated with arrhythmias



# Discussion 5b

## Explanation of the answer

### Recommendations for the therapy of macro-re-entrant atrial arrhythmias

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Anticoagulation, as in AF, is recommended for patients with atrial flutter and concomitant AF. <sup>4</sup>	I	B
Patients with atrial flutter without AF should be considered for anticoagulation, but the threshold for initiation has not been established. <sup>241–247</sup>	IIa	C

A 70-year-old man was admitted with an acute anterior ST-elevation myocardial infarction treated with primary PCI. At discharge, his left ventricular ejection fraction was 32% and he was prescribed bisoprolol 5mg once daily, enalapril 20 mg once daily, furosemide 40mg once daily, aspirin 100mg once daily and ticagrelor 90mg twice daily, atorvastatin 40mg once daily

What is the most appropriate next step in management?

A continue current therapy

A

D start eplerenone

D

B CRT implantation

B

E start sacubitril-valsartan

E

C ICD implantation

C

# Discussion 6a

## Why is this question valuable?

- Exam knowledge about guideline based risk stratification and management of patients with MI

# Discussion 6b

## Explanation of the answer

Routine therapies in the acute, subacute, and long-term phases: beta-blockers, angiotensin-converting inhibitors, angiotensin II receptor blockers, mineralocorticoid receptor antagonists, and lipid-lowering therapy after ST-elevation myocardial infarction



Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
<b>Beta-blockers</b>		
Oral treatment with beta-blockers is indicated in patients with heart failure and/or LVEF $\leq 40\%$ unless contraindicated. <sup>327-341</sup>	I	A
Intravenous beta-blockers should be considered at the time of presentation in patients undergoing primary PCI without contraindications, with no signs of acute heart failure, and with an SBP $> 120$ mm Hg. <sup>346-348,350,403</sup>	IIa	A
Routine oral treatment with beta-blockers should be considered during hospital stay and continued thereafter in all patients without contraindications. <sup>344,354-356,404,405</sup>	IIa	B

What is the most appropriate next step in management?

A continue current therapy

B CRT implantation

C ICD implantation

D start eplerenone

E start sacubitril-valsartan

No QRS width mentioned

If NYHA II HF symptoms persist despite all 3 major HF meds

### MRA

MRA are recommended in patients with an LVEF  $\leq 40\%$  and heart failure or diabetes, who are already receiving an ACE inhibitor and a beta-blocker, provided there is no renal failure or hyperkalaemia.<sup>397</sup>

I	B
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ESC guidelines on management of STEMI 2017

It is recommended to obtain a lipid profile in all STEMI patients as soon as possible after presentation. <sup>349,406</sup>	I	C
In patients with LDL-C $\geq 1.8$ mmol/L ( $\geq 70$ mg/dL) despite a maximally tolerated statin dose who remain at high risk, further therapy to reduce LDL-C should be considered. <sup>376,382</sup>	IIa	A
<b>ACE inhibitors/ARBs</b>		
ACE inhibitors are recommended, starting within the first 24 h of STEMI in patients with evidence of heart failure, LV systolic dysfunction, diabetes, or an anterior infarct. <sup>383</sup>	I	A
An ARB, preferably valsartan, is an alternative to ACE inhibitors in patients with heart failure and/or LV systolic dysfunction, particularly those who are intolerant of ACE inhibitors. <sup>376,407</sup>	I	B
ACE inhibitors should be considered in all patients in the absence of contraindications. <sup>394,395</sup>	IIa	A
<b>MRA</b>		
MRA are recommended in patients with an LVEF $\leq 40\%$ and heart failure or diabetes, who are already receiving an ACE inhibitor and a beta-blocker, provided there is no renal failure or hyperkalaemia. <sup>387</sup>	I	B

### After discharge

In patients with pre-discharge LVEF  $\leq 40\%$ , repeat echocardiography 6–12 weeks after MI, and after complete revascularization and optimal medical therapy, is recommended to assess the potential need for primary prevention ICD implantation.<sup>3,296</sup>

I	C
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A 64-year-old asymptomatic and otherwise healthy male was referred for coronary angiography after a routine health check-up treadmill test had shown 2.5mm ST-depression in the lateral leads. Echocardiography was normal. Coronary angiography revealed a non-calcified, proximal 80% LAD stenosis, fractional flow reserve (FFR) was 0.75. He was started on beta-blocker, aspirin and statin.

What is the most appropriate recommendation regarding management?

**A** CABG and PCI are both appropriate options and should be discussed

**D** functional testing to assess ischaemia (e.g. stress echocardiography)

**B** continue medical management with follow up

**E** PCI with a drug-eluting stent

**C** coronary artery bypass grafting (IMA to LAD)

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What is the most appropriate recommendation regarding management?

A

CABG and PCI are both appropriate options and should be discussed

D

functional testing to assess ischaemia (e.g. stress echocardiography)

<

B

continue medical management with follow up

E

PCI with a drug-eluting stent

>

C

coronary artery bypass grafting (IMA to LAD)

# Discussion 7a

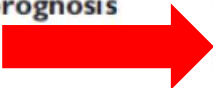
## Why is this question valuable?

- Assess knowledge on the indications for revascularization based on the most recent ESC guidelines
- Assess knowledge on FFR interpretation

# Discussion 7b

## Explanation of the answer

### Indications for revascularization in patients with stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class <sup>a</sup>	Level <sup>b</sup>
<b>For prognosis</b> 	Left main disease with stenosis >50%. <sup>c 68–71</sup>	I	A
	Proximal LAD stenosis >50%. <sup>c 62,68,70,72</sup>	I	A
	Two- or three-vessel disease with stenosis >50% with impaired LV function (LVEF ≤35%). <sup>c 61,62,68,70,73–83</sup>	I	A
	Large area of ischaemia detected by functional testing (>10% LV) or abnormal invasive FFR. <sup>d 24,59,84–90</sup>	I	B
	Single remaining patent coronary artery with stenosis >50%. <sup>c</sup>	I	C
<b>For symptoms</b>	Haemodynamically significant coronary stenosis <sup>c</sup> in the presence of limiting angina or angina equivalent, with insufficient response to optimized medical therapy. <sup>e 24,63,91–97</sup>	I	A

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CAD = coronary artery disease; FFR = fractional flow reserve; iwFR = instantaneous wave-free ratio; LAD = left anterior descending coronary artery; LV = left ventricular; LVEF = left ventricular ejection fraction.

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

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

<sup>c</sup>With documented ischaemia or a haemodynamically relevant lesion defined by FFR ≤0.80 or iwFR ≤0.89 (see section 3.2.1.1), or >90% stenosis in a major coronary vessel.

<sup>d</sup>Based on FFR <0.75 indicating a prognostically relevant lesion (see section 3.2.1.1).

<sup>e</sup>In consideration of patient compliance and wishes in relation to the intensity of anti-anginal therapy.



# Discussion 7b

## Explanation of the answer

Recommendation for the type of revascularization in patients with stable coronary artery disease with suitable coronary anatomy for both procedures and low predicted surgical mortality<sup>d</sup>

Recommendations according to extent of CAD	CABG		PCI	
	Class <sup>a</sup>	Level <sup>b</sup>	Class <sup>a</sup>	Level <sup>b</sup>
<b>One-vessel CAD</b>				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis. <sup>68,101,139–144</sup>	I	A	I	A



**PCI or CABG: discuss Heart Team**

A 78-year-old asymptomatic man with an NSTEMI 7 years previously was referred for a follow-up. Echocardiography revealed normal ejection fraction, office BP was 135/80 mmHg, HR was 88 bpm, LDL-C was 2.1 mmol/L. Medication consisted of aspirin 100 mg once daily, and rosuvastatin 10 mg once daily

What is the most appropriate advice regarding his medication?

A add a bile acid sequestrant

A

D increase the dosage of rosuvastatin

D

B add ezetimibe

B

E replace rosuvastatin with atorvastatin

E

C evaluate the patient for PCSK9 inhibitor therapy

C

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A add a bile acid sequestrant

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B add ezetimibe

B

E replace rosuvastatin with atorvastatin

E

C evaluate the patient for PCSK9 inhibitor therapy

C

# Discussion 8a

## Why is this question valuable?

- Assess knowledge on secondary prevention based on the most recent ESC guidelines
- Assess knowledge on LDL treatment goals in CAD patients and available treatment options

# Discussion 8b

## Explanation of the answer

**Table 4 Risk categories**

Very high-risk	Subjects with any of the following:
	<ul style="list-style-type: none"> <li>• Documented cardiovascular disease (CVD), clinical or unequivocal on imaging. Documented CVD includes previous myocardial infarction (MI), acute coronary syndrome (ACS), coronary revascularisation (percutaneous coronary intervention (PCI), coronary artery bypass graft surgery (CABG)) and other arterial revascularization procedures, stroke and transient ischaemic attack (TIA), and peripheral arterial disease (PAD). Unequivocally documented CVD on imaging is what has been shown to be strongly predisposed to clinical events, such as significant plaque on coronary angiography or carotid ultrasound.</li> <li>• DM with target organ damage such as proteinuria or with a major risk factor such as smoking, hypertension or dyslipidaemia.</li> <li>• Severe CKD (GFR &lt;30 mL/min/1.73 m<sup>2</sup>).</li> <li>• A calculated SCORE ≥10% for 10-year risk of fatal CVD.</li> </ul>

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
In secondary prevention for patients at very-high risk, <sup>c</sup> an LDL-C reduction of ≥50% from baseline <sup>d</sup> and an LDL-C goal of <1.4 mmol/L (<55 mg/dL) are recommended. <sup>33-35,119,120</sup>	I	A

### Recommendations for pharmacological low-density lipoprotein cholesterol lowering

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
It is recommended that a high-intensity statin is prescribed up to the highest tolerated dose to reach the goals set for the specific level of risk. <sup>32,34,38</sup>	I	A
If the goals <sup>c</sup> are not achieved with the maximum tolerated dose of a statin, combination with ezetimibe is recommended. <sup>33</sup>	I	B
For primary prevention patients at very-high risk, but without FH, if the LDL-C goal is not achieved on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor may be considered.	IIb	C
For secondary prevention, patients at very-high risk not achieving their goal <sup>c</sup> on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended. <sup>119,120</sup>	I	A
For very-high-risk FH patients (that is, with ASCVD or with another major risk factor) who do not achieve their goal <sup>c</sup> on a maximum tolerated dose of a statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended.	I	C
If a statin-based regimen is not tolerated at any dosage (even after rechallenge), ezetimibe should be considered. <sup>197,265,353</sup>	IIa	C
If a statin-based regimen is not tolerated at any dosage (even after rechallenge), a PCSK9 inhibitor added to ezetimibe may also be considered. <sup>197,265,353</sup>	IIb	C
If the goal <sup>c</sup> is not achieved, statin combination with a bile acid sequestrant may be considered.	IIb	C

*ESC guidelines on dyslipidaemia 2019*

# How to prepare for the EEGC



- support from trainers
- start revision early
- study leave before the exam
- revise mainly (ESC) guidelines and ESC textbook
- read widely
- talk to colleagues who have passed the exam
- keep notes
- **find more info on the exam**

# More information on the EEGC (I)



Cardiology in focus

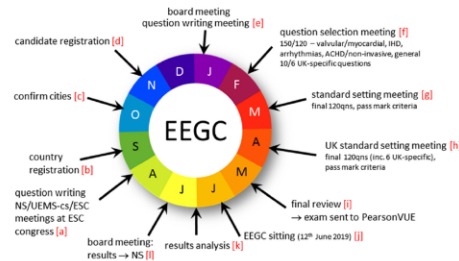
## Behind the scenes of the European Examination in General Cardiology

doi:10.1136/heartjnl-2018-314495

Chris Plummer,<sup>1</sup> Sarah Bowater,<sup>2</sup> Jim Hall,<sup>3</sup> Clive Lawson,<sup>4</sup> Georgina Ooues,<sup>2</sup> Susanna Price,<sup>5</sup> Russell Smith,<sup>2</sup> Ian Wilson,<sup>6</sup> Rob Wright<sup>3</sup>

The European Examination in General Cardiology (EEGC) is a joint venture between the European Union of Medical Specialists, the European Society of Cardiology (ESC) and the participating National Cardiac Societies, including the British Cardiovascular Society (BCS). It provides a high-quality test of knowledge for cardiology trainees from 14 countries where it is used to support training. In the UK, the EEGC is taken in specialty training (ST)5, and can be retaken in ST6 and ST7 if necessary, and is approved by the GMC as a requirement for CCT.

Development of the exam (figure 1) starts at the ESC Congress in August with a question writing meeting (a). Each question has a clinical scenario, a single question and five possible answers shown in alphabetical order. The questions are written and edited by groups of cardiologists from a range of countries and subspecialties. The knowledge tested is mapped to the curriculum in line with current guidelines and published clinical studies. Countries register in September (b) and confirm the cities where the exam will be sat in October (c). UK candidates contact the BCS education team (Education@bcs.com) from November of their ST5 year to arrange registration (d). The EEGC Board meets in January, prior to the second question writing meeting of the year (e). In February, five cardiologists select 24 questions from each of the sections: general cardiology, valvular or myocardial disease, ischaemic heart disease, arrhythmias, adult congenital heart disease or non-invasive cardiology. Seventy per cent are text only, 20% contain still images and 10% include

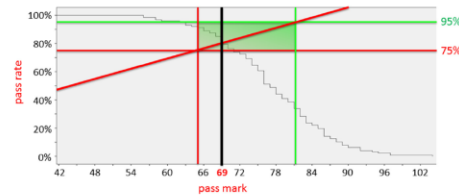


**Figure 1** Development of the EEGC. ACHD, Adult Congenital Heart Disease; EEGC, European Examination in General Cardiology; ESC, European Society of Cardiology; IHD, Ischaemic Heart Disease; NS, National Cardiac Societies; qns, questions; UEMS-cs, Union of European Medical Specialists Cardiology Section.

video clips (f). The standard setting group review each question using a modified Angoff method to estimate its difficulty, and their collated scores inform the final pass mark (g). This process is repeated in the UK because of the UK-specific questions (h). In May, the final exam of 120 questions is reviewed by the EEGC Board chair and chair of the standard setting group (i) to ensure that there are no errors before the exam is sat on computers at local test centres over 3 hours in June (j). Six of the 120 questions that UK candidates

sit are clearly identified as specific to UK guidance or laws.

The performance of each question in the exam is reviewed, and any questions where <30% or >90% of candidates answered correctly, as well as questions where there was a negative correlation with candidates' performance in the overall exam, are reviewed by representatives of participating national societies to ensure that the answer key was correct, that the question was not misleading and that it tested an important point of



**Figure 2** Hofstee method for the calculation of the UK pass mark 2018.

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<sup>2</sup>Department of Cardiology, Queen Elizabeth Hospital Birmingham, Birmingham, UK  
<sup>3</sup>Department of Cardiology, James Cook University Hospital, Middlesbrough, UK  
<sup>4</sup>Department of Cardiology, Maidstone and Tunbridge Wells NHS Trust, Maidstone, Kent, UK  
<sup>5</sup>Adult Intensive Care Unit, Royal Brompton Hospital, London, UK  
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Cardiology in focus

## How to succeed in the EEGC: a guide for trainees and their trainers

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Georgina Ooues,<sup>1</sup> Chris Plummer,<sup>2</sup> Jim Hall,<sup>3</sup> Clive Lawson,<sup>4</sup> Susanna Price,<sup>5</sup> Russell Smith,<sup>1</sup> Ian Wilson,<sup>6</sup> Rob Wright,<sup>3</sup> Sarah Bowater<sup>1</sup>

All doctors are highly experienced at passing exams during medical school and in postgraduate training. However, for a number of trainees, notably those who have had a period out of programme to undertake research or for parental leave, the European Examination in General Cardiology (EEGC) is the first exam they will have sat in more than 4 years. In addition, the challenging and busy nature of cardiology training, annual review of competence progression and advanced modular training allocation process can allow little time or energy for revision. Finally, personal circumstances and responsibilities change as we get older, and this can pose additional difficulties, and at times conflict, when preparing for the exam.

### UNDERSTANDING THE EXAM AND TOPICS COVERED

The British Cardiovascular Society (BCS) emails all cardiology trainees about the EEGC in November of their fifth Specialty Training year (ST5)—if you are in ST5 and don't receive this email, you should contact the BCS and inform your training programme director. It is important that trainees understand the structure of the exam and the topics covered. This information is covered in detail in Behind the Scenes of the European Exam in General Cardiology, Heart 2019 and on the BCS, ESC and UEMS websites.

### Preparing the knowledge required to pass the exam

Adult learners should be independent and self-directed, possessing an internal drive

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### Box 1 How trainers can support the trainees for the exam preparation

#### What should the trainer do?

- ▶ Provide a suitable learning environment *throughout training*:
  - Ward rounds.
  - Cardiac catheterisation, electrophysiology and imaging facilities.
  - Clinics.
- ▶ Facilitate appropriate study leave.
- ▶ Facilitate on-call swaps for revision activity or exam-oriented CPD.
- ▶ Acknowledge that trainees may be stressed and/or distracted in the period before the exam.

for learning,<sup>1</sup> but trainees need support from their trainers and peers during revision for the EEGC.

Trainers can support learning by providing experiences that will allow trainees to 'construct' knowledge based on what they already know. These experiences should be relevant and applicable to real-life situations to optimise learning. Other ways trainers can help are outlined in box 1.

A recent survey of trainees in the West Midlands showed that 84% received little or no support in their preparation for the EEGC from their educational supervisors. It is clearly important that trainers are more aware of the timing and structure of the exam so that they can support their trainees effectively.

Trainers should encourage their colleagues and supervisors to challenge them on topics covered by the exam, for example, asking about relevant guidelines and evidence, to help strengthen their understanding of the topics.

Trainers are encouraged to read widely. There is a plethora of tips available on

how to pass the EEGC, but the list of recommended resources for exam preparation may appear daunting (box 2). Learning should be a social and collective process. Trainees are encouraged to talk to colleagues who have passed the EEGC and consider joining or creating a study group of trainees preparing for the exam.<sup>2</sup>

We recommend starting revision early to allow time to use as many resources as possible. Keeping notes from study materials is advised in order to be able to revise key points from a wide variety of sources. Obtaining study leave to attend courses that provide focused teaching on updated guidelines and general cardiology topics can be extremely useful for revision. Finally, maintaining a healthy study-life balance is crucial to avoid becoming tired and unproductive (figure 1).

### Taking the EEGC

The exam is taken on computers in Pearson VUE centres (<https://home.pearsonvue.com/esc>). To ensure fairness, they

### Box 2 Recommended resources for exam preparation

#### Recommended study materials for the European Examination in General Cardiology (EEGC)

- ▶ Textbooks: for example, *The ESC Textbook of Cardiovascular Medicine*.
- ▶ Guidelines: ESC, NICE/DVLA (for UK-specific questions).
- ▶ MCQ revision books: for example, Oxford Higher Specialty Training, Mayo Clinic Scientific Press – published questions do not necessarily reflect the content or style of the EEGC.
- ▶ Courses: for example British Cardiovascular Society (BCS) courses, BCS and Mayo Clinical Cardiology Review Course, BJCA Cardiology to the Core.
- ▶ Online educational reviews: for example, Education in Heart, ESC webinars and ESC conference presentations.

# More information on the EEGC (II)



## Presentations and further examples on the ESC website ([esc365.escardio.org](https://esc365.escardio.org))

<https://esc365.escardio.org/Congress/ESC-CONGRESS-2017/Test-your-clinical-knowledge-with-the-European-Exam-in-General-Cardiology/21300-test-your-clinical-knowledge-with-the-european-exam-in-general-cardiology>

<https://esc365.escardio.org/Congress/ESC-Congress-2018/Take-the-Challenge-The-European-Exam-on-General-Cardiology-EEGC/24165-take-the-challenge-the-european-exam-on-general-cardiology-eegc>

<https://esc365.escardio.org/Congress/ESC-Congress-2018/The-changing-environment-of-Cardiology-Education-and-Training-ESC-and-UEMS/180159-put-it-all-together-from-the-esc-core-curriculum-to-the-european-exam-general-cardiology-and-beyond-what-is-the-exam-how-it-works-what-impact-it-has>

<https://esc365.escardio.org/Congress/ESC-CONGRESS-2019/The-European-Exam-on-General-Cardiology-what-it-is-and-how-to-prepare-for-i/201029-arrhythmias> etc...



# More information on the EEGC (III)

<http://www.uems-cardio.eu/index.php/initiatives/eegc>



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## Preparation for the EEGC



The EEGC is designed to test a wide range of general cardiology knowledge aligned with the ESC core curriculum. There is no single source from which all questions are developed and candidates are encouraged to read widely, including ESC guidelines, the ESC textbook and practice-changing clinical trials.

Information about the construction of the EEGC is published in *Behind the Scenes of the European Exam in General Cardiology, Heart 2019*.

Example questions are available in presentations made at the ESC congress available through ESC365:

Test your clinical knowledge with the EEGC - ESC 2017:

<https://esc365.escardio.org/Congress/ESC-CONGRESS-2017/Test-your-clinical-knowledge-with-the-European-Exam-in-General-Cardiology/21300-test-your-clinical-knowledge-with-the-european-exam-in-general-cardiology>

Take the challenge - ESC 2018:

<https://esc365.escardio.org/Congress/ESC-Congress-2018/Take-the-Challenge-The-European-Exam-on-General-Cardiology-EEGC/24165-take-the-challenge-the-european-exam-on-general-cardiology-eegc>



# More information on the EEGC (IV) for the registered candidates only



EEGC module in the ESC website

[http://learn.escardio.org/lp/eegc\\_programme/knowledge](http://learn.escardio.org/lp/eegc_programme/knowledge)

- access to the programme **restricted to the candidates registered to the exam**
- all those registered by the Hellenic Cardiac Society have recently received communication from the ESC with instructions on how to access the modules

# EEGC: conclusions



## High-quality general cardiology exam

- Robust structure and governance: supported by UEMS, ESC, national societies, independent University
- Tests knowledge and drives learning
- Delivered on computer in secure centres near the candidates
- Has a reasonable cost; **many thanks to Hellenic Cardiac Society**
- Growing in countries and numbers
- Opportunity for excellent CPD for all those involved

***Thank you for the attention  
and good luck to all the candidates !***

<https://bcardio.gr/index.php/el/>

*Thank you for your attention*

*University Campus &  
University Hospital, Ioannina*



A 42-year-old man was seen in the clinic for aortic regurgitation. He was completely asymptomatic, performed aerobic exercise for 30-45 minutes/day and received no medications. On examination, he was of normal build, had a regular pulse of 70 bpm, BP 135/65 mmHg, normal heart sounds with a II/IV diastolic murmur at the aortic area and clear chest.

Transthoracic echocardiogram showed a left ventricular end-diastolic diameter of 61 mm and end-systolic diameter of 45 mm, ejection fraction of 60%, a bicuspid aortic valve with severe regurgitation and an ascending aorta diameter of 45 mm.

What is the most appropriate management?

A

follow-up appointment in 6 months

D

start a calcium channel blocker



B

refer for aortic valve and aorta surgery

E

start an angiotensin receptor blocker



C

refer for aortic valve replacement

# Discussion 9a

## Why is this question valuable?

- *Assess knowledge in an important clinical problem: **asymptomatic severe AR of a bicuspid aortic valve with a dilated aorta***
- *Examine knowledge of the most recent guidelines*
- *Examine knowledge of criteria for intervention in aortic regurgitation with disease of the aorta*

# Discussion 9b

## Explanation of the answer

- Typical example of bicuspid AV with dilated aorta, severe AR without any symptoms
- Criteria for surgical intervention are:
  - aortic dilatation (>50mm in BAV)
  - severe AR with symptoms
  - severe AR with LV dilatation (EDD/ESD: 70/50mm)
- In the absence of hypertension to mandate medications, a 6-month f-up is recommended

*ESC guidelines on VHD 2018*

