



HARVARD MEDICAL SCHOOL  
TEACHING HOSPITAL

# Management of Atrial Fibrillation

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# Objectives

- 1. Recognize atrial fibrillation (AF) and its consequences.**
- 2. Identify patients with AF who will benefit from oral anticoagulant therapy.**
- 3. Identify patients with AF who will benefit from rhythm versus rate control therapy.**

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# Question 1

Atrial fibrillation increases the risk of stroke by the following amount:

- A. 2-fold
- B. 3-fold
- C. 4-fold
- D. 5-fold

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# Objective 1: AF and Its Consequences

## ***Case 1: 66-year-old man who presents for a routine visit***

HPI: Left arm has been “clumsy” for 3-4 months

PMH: HTN, Anxiety/depression

Meds: Lisinopril 2.5mg daily

Exam: T 98 BP 110/70 HR 90 RR 12

Neuro: arm, leg strength 3/5 (L) and 5/5 (R)

JVP: normal

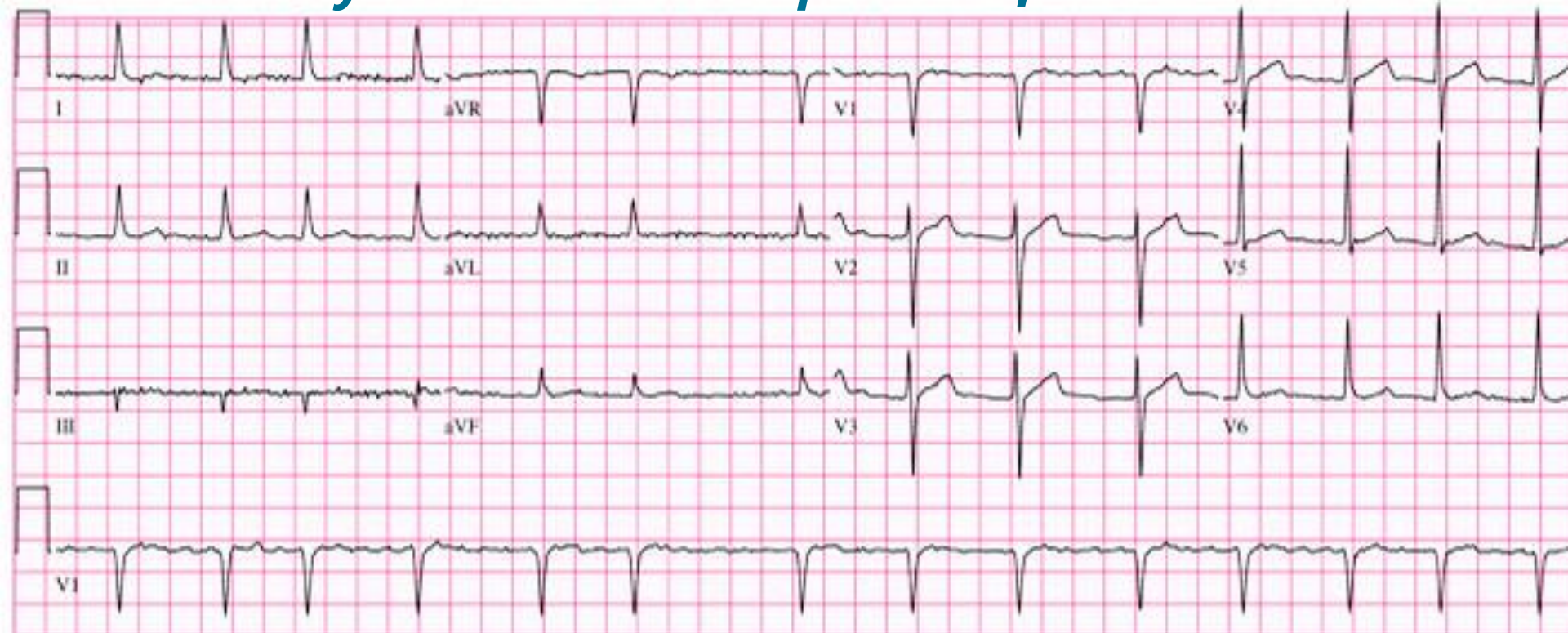
Lungs: clear

Heart sounds: normal

Abdomen: benign

# Objective 1: AF and Its Consequences

## *Case 1: 66-year-old man who presents for a routine visit*

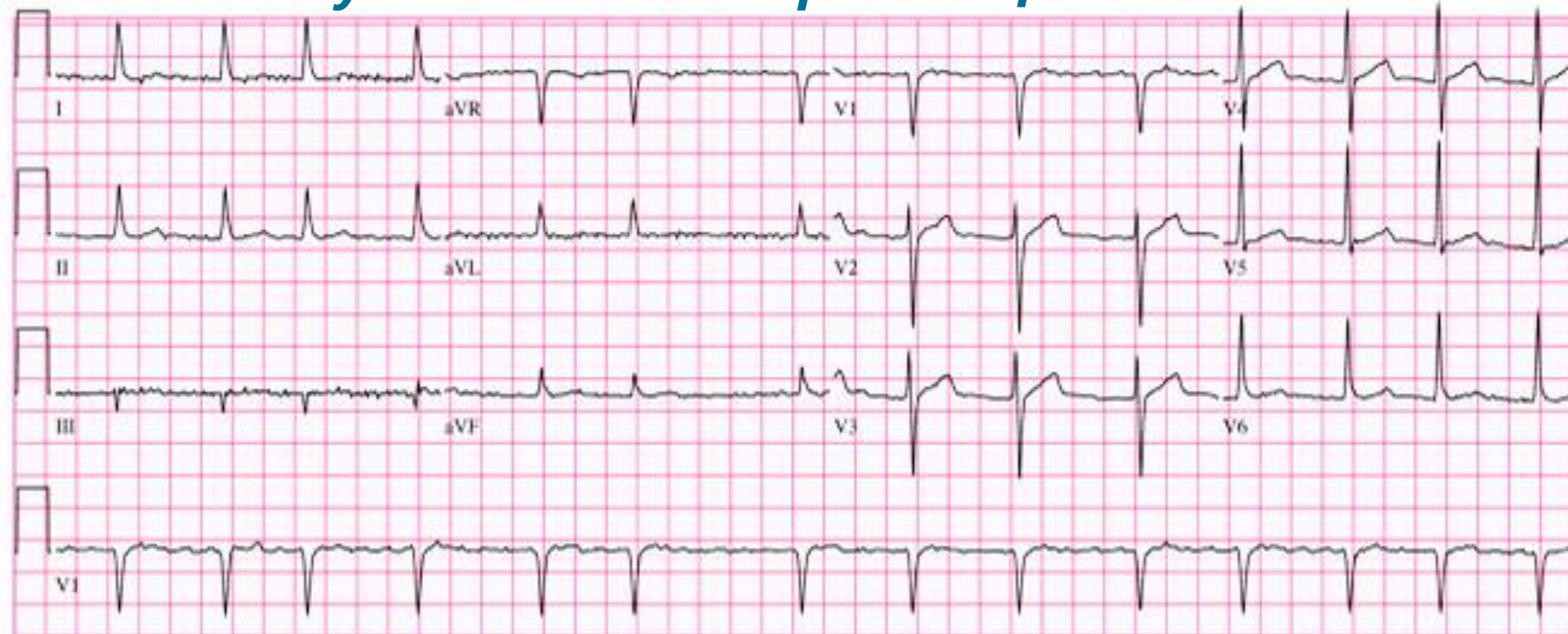


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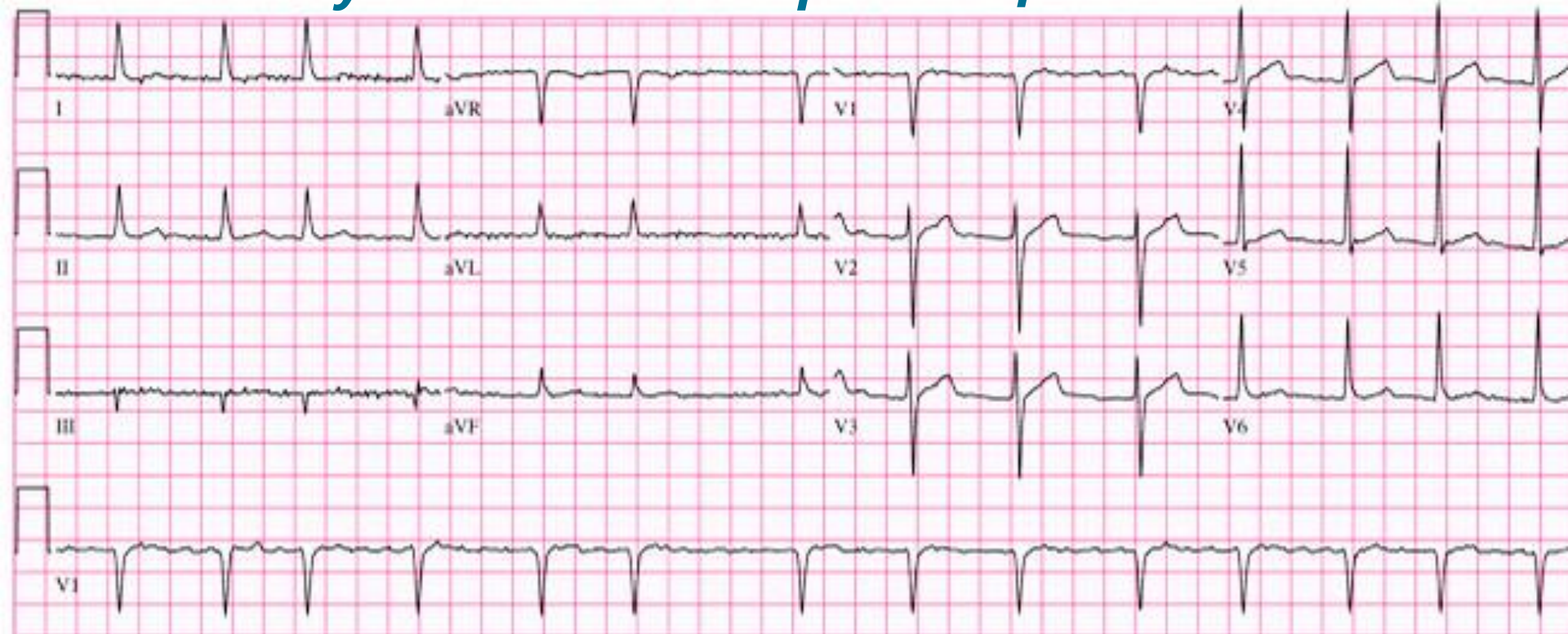


No P wave



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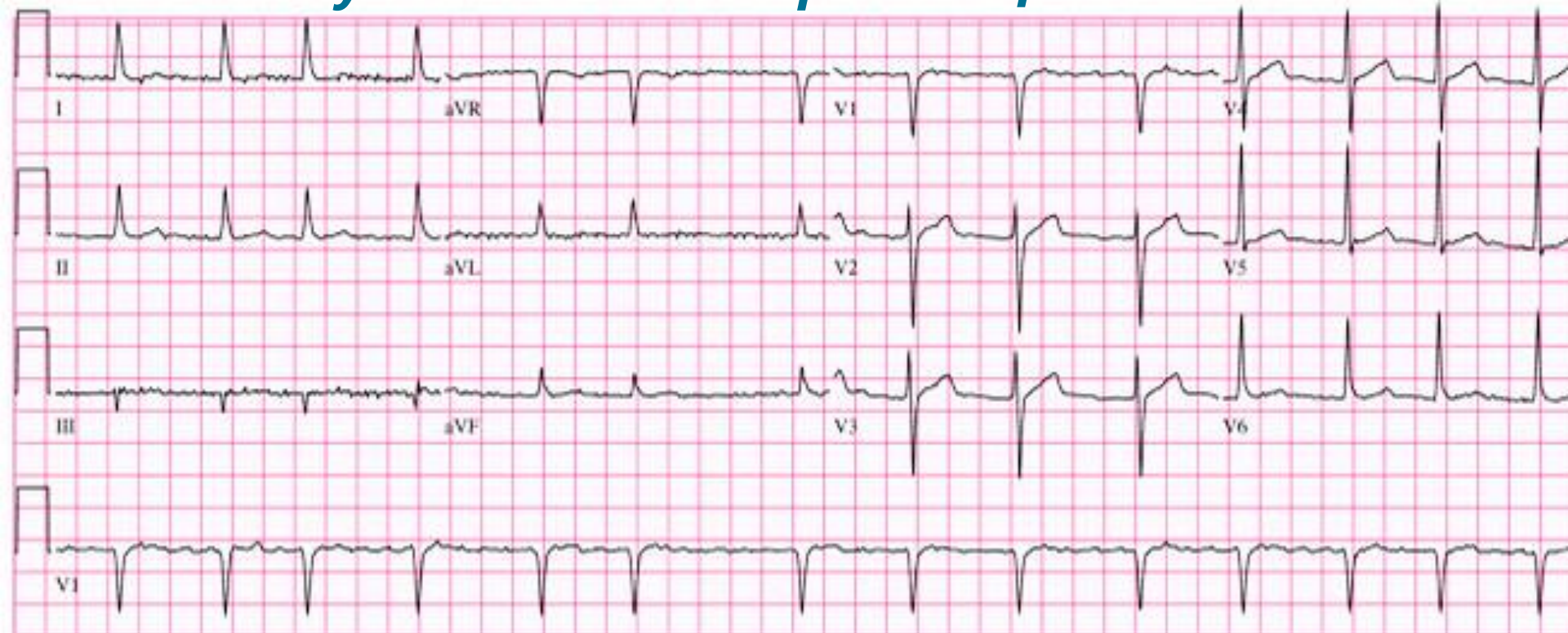


No P wave

Irregularly irregular spacing of R-R intervals

# Objective 1: AF and Its Consequences

*Case 1: 66-year-old man who presents for a routine visit*



**Atrial fibrillation**

# Objective 1: AF and Its Consequences

## *Case 1: 66-year-old man who presents for a routine visit*

### Brain MRI with cerebral angiogram:

- Evidence of old, punctate infarcts in both cerebral hemispheres
- Angiogram reveals no significant stenoses in carotid arteries (internal and external), flow through vertebral arteries is normal

# Objective 1: AF and Its Consequences

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- Almost 20% of all strokes occur in patients with AF.

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**Incidence of AF increases with age.**



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## **AF is a common cause of stroke.**

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## **Incidence of AF increases with age.**

- 9% of population over 65 affected.
- Prevalence increasing, expected to double 2010-2030.

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## **Many patients are asymptomatic.**

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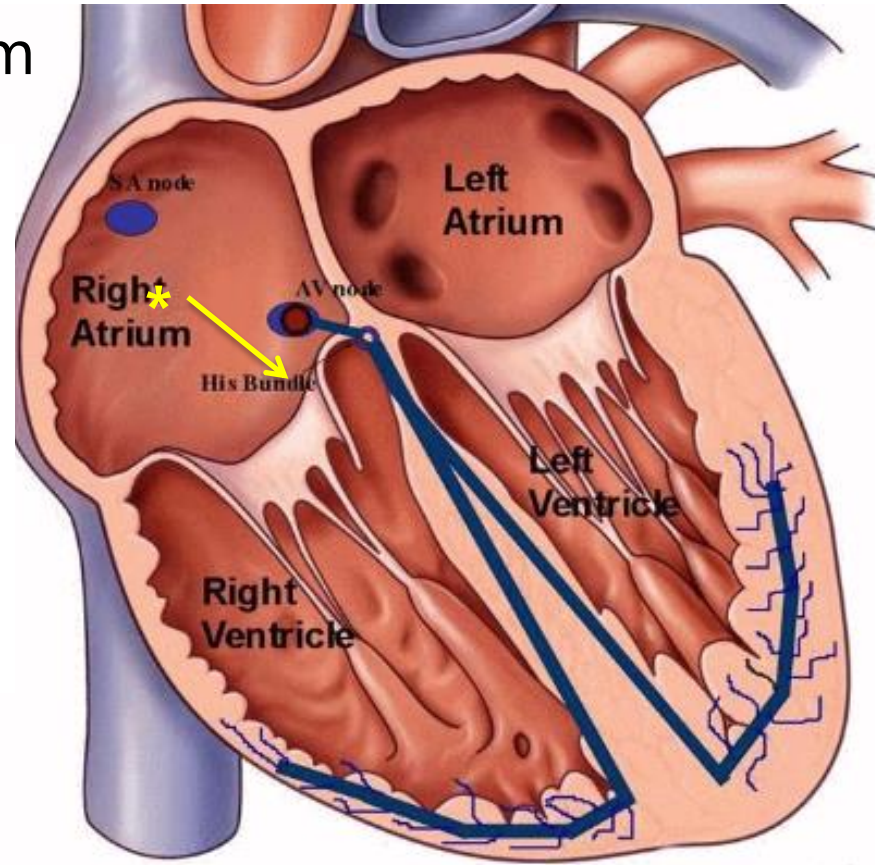
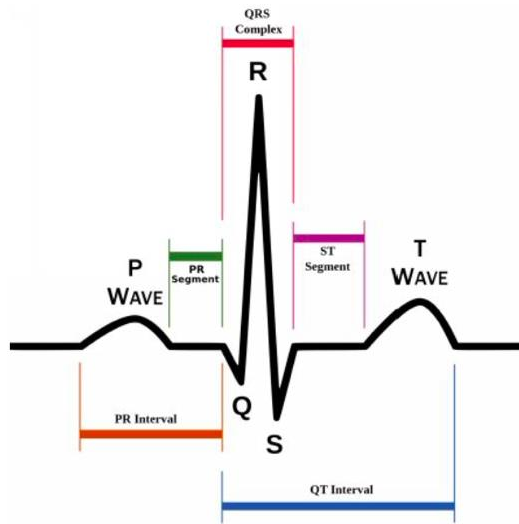
- 9% of population over 65 affected.
- Prevalence increasing, expected to double 2010-2030.

## **Many patients are asymptomatic.**

- Stroke could be the first presenting sign.

# Objective 1: AF and Its Consequences

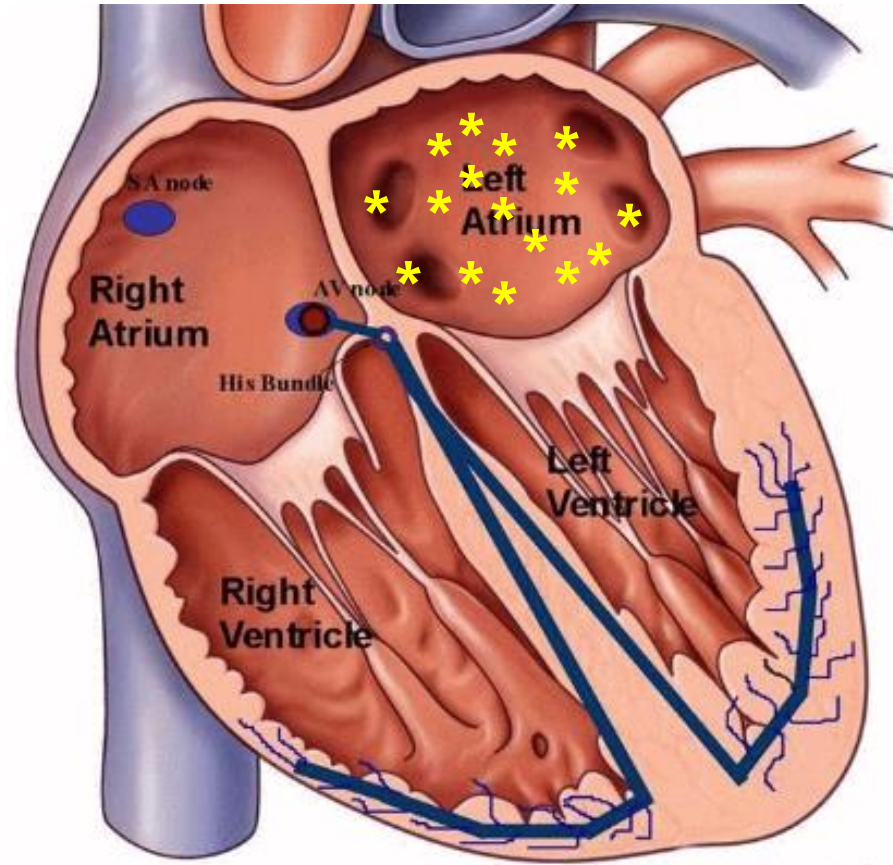
## Normal Sinus Rhythm



# Objective 1: AF and Its Consequences

## Atrial Fibrillation

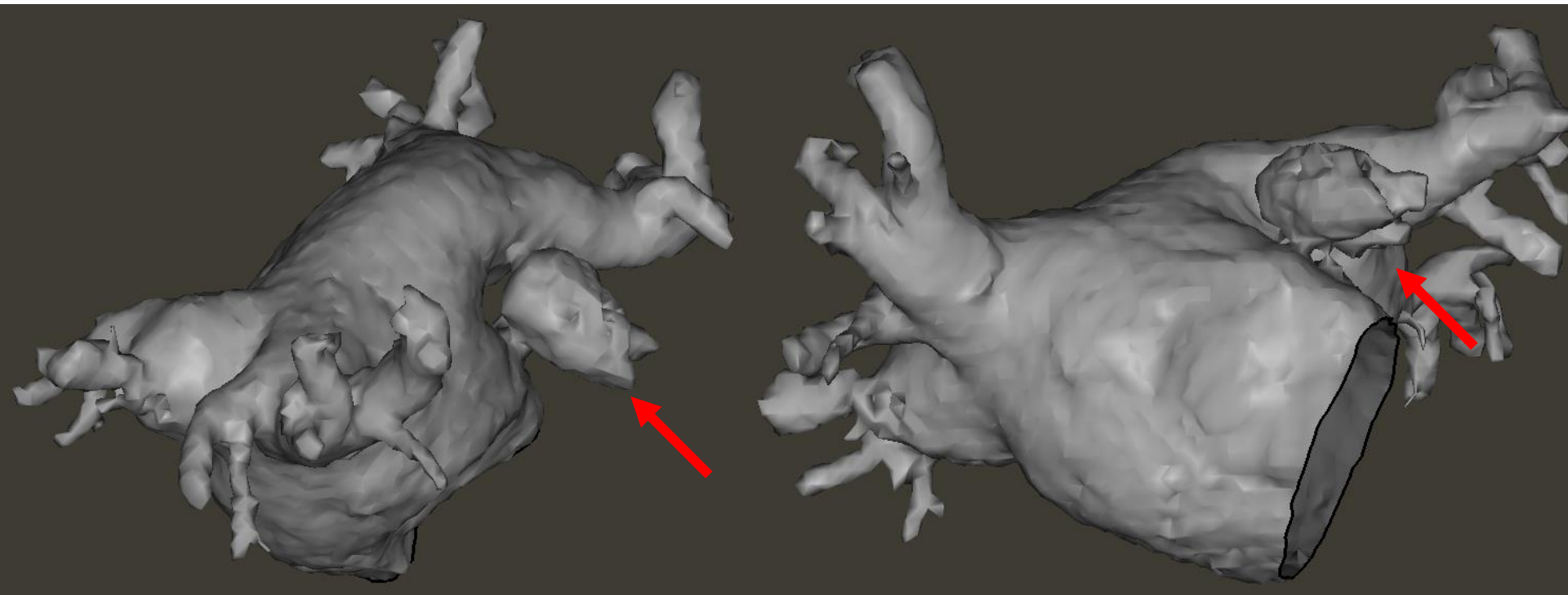
- Chaotic, rapid electrical firing in pulmonary veins
- Left atrium does not contract normally
- Blood stasis with thrombus formation and increased risk of embolic events



# Objective 1: AF and Its Consequences

Superior

RAO



Sluggish blood flow in left atrial appendage leads to thrombus formation and embolization.

Ptaszek LM et al. JICRM 2013;4:1-5

# Objectives

- 1. Recognize atrial fibrillation (AF) and its consequences.**
- 2. Identify patients with AF who will benefit from oral anticoagulant (OAC) therapy.**
- 3. Identify patients with AF who will benefit from rhythm versus rate control therapy.**

## Question 2

Which of the following patients with AF qualifies for oral anticoagulant therapy?

- A. 75-year-old woman with diabetes mellitus
- B. 74-year-old woman with diabetes mellitus
- C. 64-year-old man with diabetes mellitus
- D. 65-year-old man with hyperlipidemia



## Question 2

Which of the following patients with AF qualifies for oral anticoagulant therapy?

- A. 75-year-old woman with diabetes mellitus
- B. 74-year-old woman with diabetes mellitus
- C. 64-year-old man with diabetes mellitus
- D. 65-year-old man with hyperlipidemia

# Objective 2: OAC Therapy for Patients with AF

**Morbidity and mortality are higher for patients with AF than for patients without AF.\***

\* Bode and Ptaszek. Curr Cardiol Rep 2021;23:179.

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**Morbidity and mortality are higher for patients with AF than for patients without AF.\***

**Worse outcomes in AF are driven by the increase in stroke risk.**

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# Objective 2: OAC Therapy for Patients with AF

**Morbidity and mortality are higher for patients with AF than for patients without AF.\***

**Worse outcomes in AF are driven by the increase in stroke risk.**

- AF increases risk of stroke by 500%

\* Bode and Ptaszek. Curr Cardiol Rep 2021;23:179.

# Objective 2: OAC Therapy for Patients with AF

**Oral anticoagulant (OAC) therapy is the cornerstone of stroke risk reduction.<sup>1</sup>**

**Appropriate use of OAC can reduce the risk of AF-related stroke by ~65%.**

**Guidelines support the use of OAC for stroke risk reduction in qualifying patients with NVAf.<sup>2,3</sup>**

- Risk of AF-related stroke described by CHADS-VASC score

1. Alkhouli et al. 2018 JACC 71:2790-2801.

2. Kirchof et al. 2016 Eur Heart J 37:2893-2962.

3. January CT et al. J Am Coll Cardiol. 2019 Jul 9;74(1):104-132.



# Objective 2: OAC Therapy for Patients with AF

## CHADS-VASC score\*

Congestive heart failure +1

HTN +1

Age  $\geq$  65 +1

Age  $\geq$  75 +1

Diabetes +1

Stroke/TIA/thromboembolism +2

Sex (female) +1

Vascular disease (peripheral or CAD) +1



**Score = 1:** 0.6% CVA/year



**Score  $\geq$  2:**  $\geq$  2.2% CVA/year

\* Friberg et al. 2012 Eur Heart J 33:1500-1510.



# Objective 2: OAC Therapy for Patients with AF

## **Vitamin K Antagonists (e.g., warfarin)**

- Reduce stroke risk by 65%

## **DOACs (e.g., apixaban)**

- Superior stroke prevention than coumadin
- Lower bleeding risk than coumadin<sup>1</sup>

## **Anti-platelets (e.g., aspirin, clopidogrel)**

- Effectiveness debated<sup>2</sup>
- 19% stroke risk reduction (8 trials, >4,000 patients)

1. Hsu et al. 2018 Clin Pharmacol Ther 104:301-310.

2. Hsu et al. 2016 JACC 67:2913-2923.

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# Objective 2: OAC Therapy for Patients with AF

## Outcomes for patients with AF receiving OAC are better even if they have a stroke:

Severity and in-hospital mortality is reduced for patients receiving therapeutic coumadin or DOAC.<sup>1</sup>

## Lack of OAC is associated with higher risk of:

Initial stroke (OR 2.95)

Recurrent stroke (OR 2.8)

All-cause death (OR 2.75).<sup>2</sup>

1. Xian et al. 2017 JAMA 317:1057-1067.
2. Mazurek et al. 2017 Stroke 48:2198-2205.

# Question 3

Which of the following regarding oral anticoagulation therapy is correct?

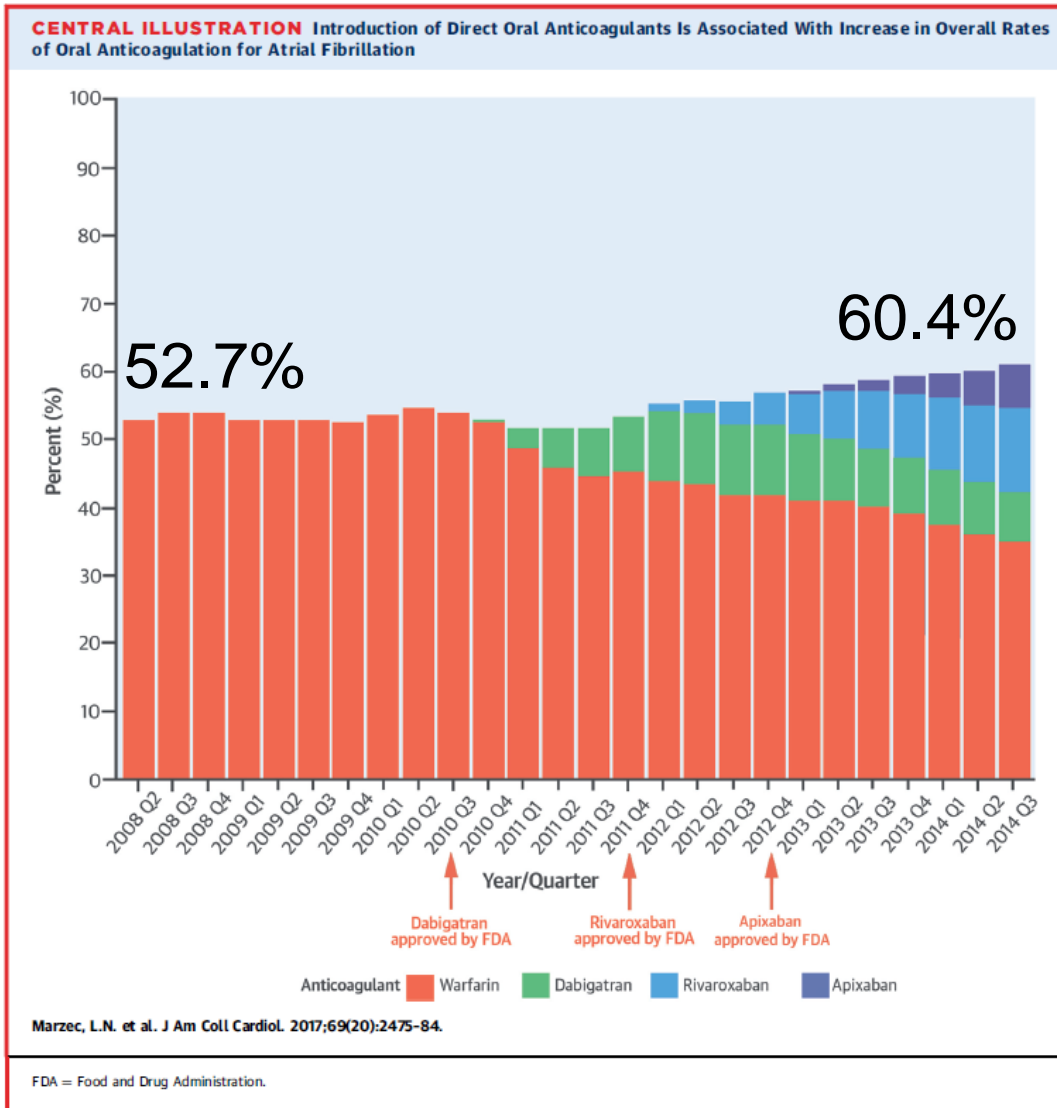
- A. NOACs can reduce the risk of stroke by 65%
- B. NOACs can reduce the risk of stroke by 75%
- C. Aspirin can reduce the risk of stroke by 40%
- D. Clopidogrel can reduce the risk of stroke by 50%

# Question 3

Which of the following regarding oral anticoagulation therapy is correct?

- A. NOACs can reduce the risk of stroke by 65%
- B. NOACs can reduce the risk of stroke by 75%
- C. Aspirin can reduce the risk of stroke by 40%
- D. Clopidogrel can reduce the risk of stroke by 50%

# Objective 2: OAC Therapy for Patients with AF



Marzec et al. 2017 JACC 69:2475-2484.

OAC  
underutilization  
is a persistent  
issue

# Objective 2: OAC Therapy for Patients with AF

## Bleeding risk associated with OAC use: HAS-BLED score

**HTN (+1)**

**Abnormal liver fxn (+1)**

**Abnormal renal fxn (+1)**

**Stroke/TIA (+1)**

**Bleeding predisposition (+1)**

**Elderly: Age  $\geq$  65 (+1)**

**Drugs (anti-platelet) (+1)**

**Drugs (alcohol) (+1)**



**Score 1:** 1% bleed/yr



**Score 2:** 1.9% bleed/yr



**Score 3:** 3.7% bleed/yr



**Score 4:** 8.7% bleed/yr



**Score 5:** >10% bleed/yr



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# Objective 2: OAC Therapy for Patients with AF

## **CHADS-VASC**

**Congestive heart failure (+1)**

**HTN (+1)**

**Age  $\geq$  65 (+1)**

**Age  $\geq$  75 (+1)**

**Diabetes (+1)**

**Stroke/TIA (+2)**

**Sex (female) (+1)**

**Vascular disease (+1)**

## **HAS-BLED**

**HTN (+1)**

**Abnormal liver funct (+1)**

**Abnormal renal funct (+1)**

**Stroke/TIA (+1)**

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**Elderly: Age  $\geq$  65 (+1)**

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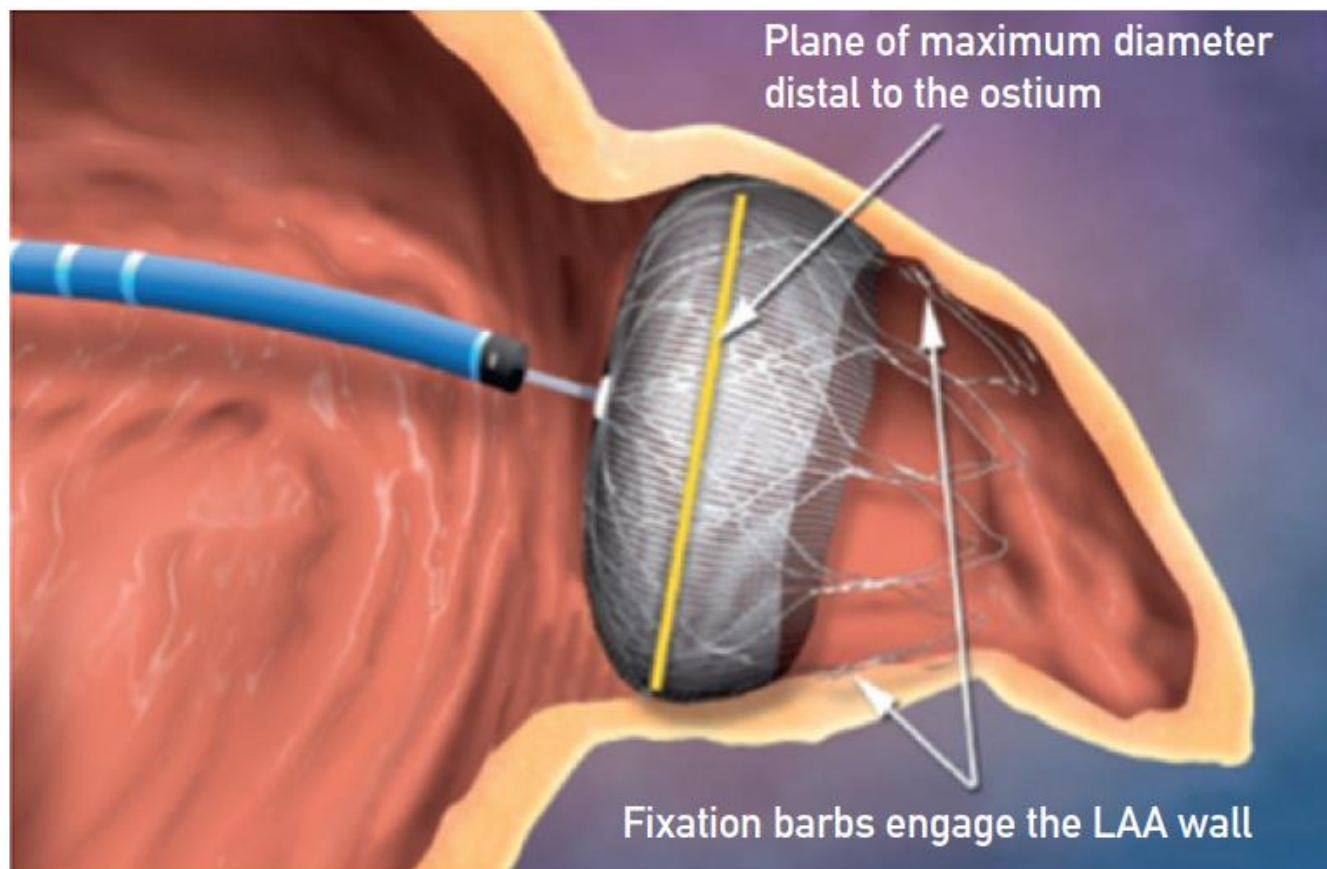
**Drugs (alcohol) (+1)**



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# Objective 2: OAC Therapy for Patients with AF



Adapted from Holmes DR et al. 2019 Mayo Clinic Proc 94:864-874.



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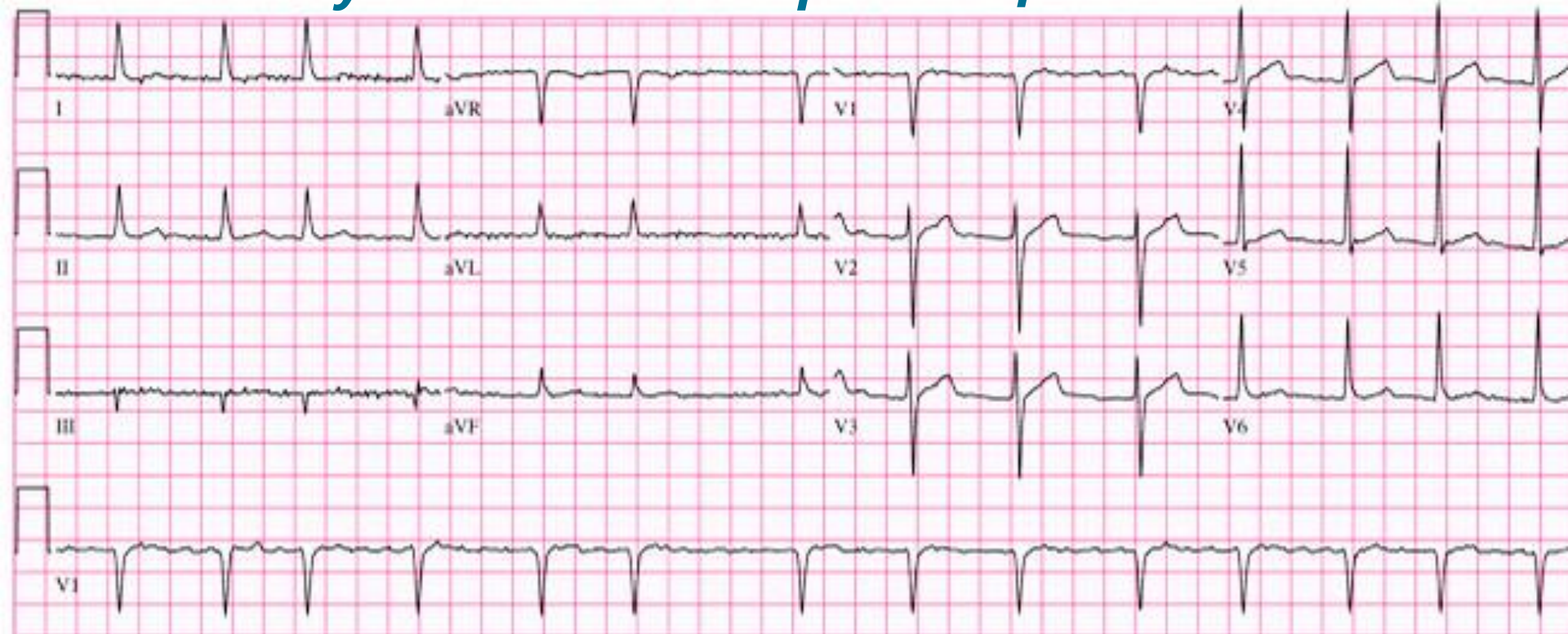
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1. Recognize atrial fibrillation (AF) and its consequences.
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# Objective 3: Rate vs Rhythm Control of AF

*Case 1: 66-year-old man who presents for a routine visit*



**Atrial fibrillation**

# Objective 3: Rate vs Rhythm Control of AF

## ***Case 1: 66-year-old man who presents for a routine visit***

- Patient was asymptomatic in AF, heart rate was <100bpm.

# Objective 3: Rate vs Rhythm Control of AF

## ***Case 1: 66-year-old man who presents for a routine visit***

- Patient was asymptomatic in AF, heart rate was <100bpm.
- What would you do if the patient was having symptoms?

# Objective 3: Rate vs Rhythm Control of AF

## ***Case 1: 66-year-old man who presents for a routine visit***

- Patient was asymptomatic in AF, heart rate was  $<100$ bpm.
- What would you do if the patient was having symptoms?
- What would do if the patient's heart rate was  $>100$ bpm?

# Objective 3: Rate vs Rhythm Control of AF

## ***Rhythm control strategy:***

- Therapies (medications, catheter ablation) whose goal is to restore normal sinus rhythm.

## ***Rate control strategy:***

- Accept AF and maintain HR in acceptable range (110 bpm or less) with medications.

# Question 4

The EASTAF-NET4 trial supports the utilization of a rhythm control strategy in which of the following patients:

- A. 65-year-old man with poorly controlled hypertension and diabetes mellitus
- B. 72-year-old woman with congestive heart failure
- C. 77-year-old woman with poorly controlled hypertension and diabetes mellitus
- D. 65-year-old woman with coronary artery disease and history of stroke

# Question 4

The EASTAF-NET4 trial supports the utilization of a rhythm control strategy in which of the following patients:

- A. 65-year-old man with poorly controlled hypertension and diabetes mellitus
- B. 72-year-old woman with congestive heart failure
- C. 77-year-old woman with poorly controlled hypertension and diabetes mellitus
- D. 65-year-old woman with coronary artery disease and history of stroke

# Objective 3: Rate vs Rhythm Control of AF

## *Rhythm control strategy:*

- Not previously associated with a mortality benefit.<sup>1</sup>
- Previously reserved for patients in whom rate control cannot be achieved or in whom symptoms persist despite adequate rate control.
- More recent data from the EAST-AFNET 4 Trial describes benefits of a rhythm control strategy.<sup>2</sup>

1. Wyse DG et al NEJM 2002;347:1825-1833.
2. Kirchof P et al NEJM 2020;383:1305-1316.



# Objective 3: Rate vs Rhythm Control of AF

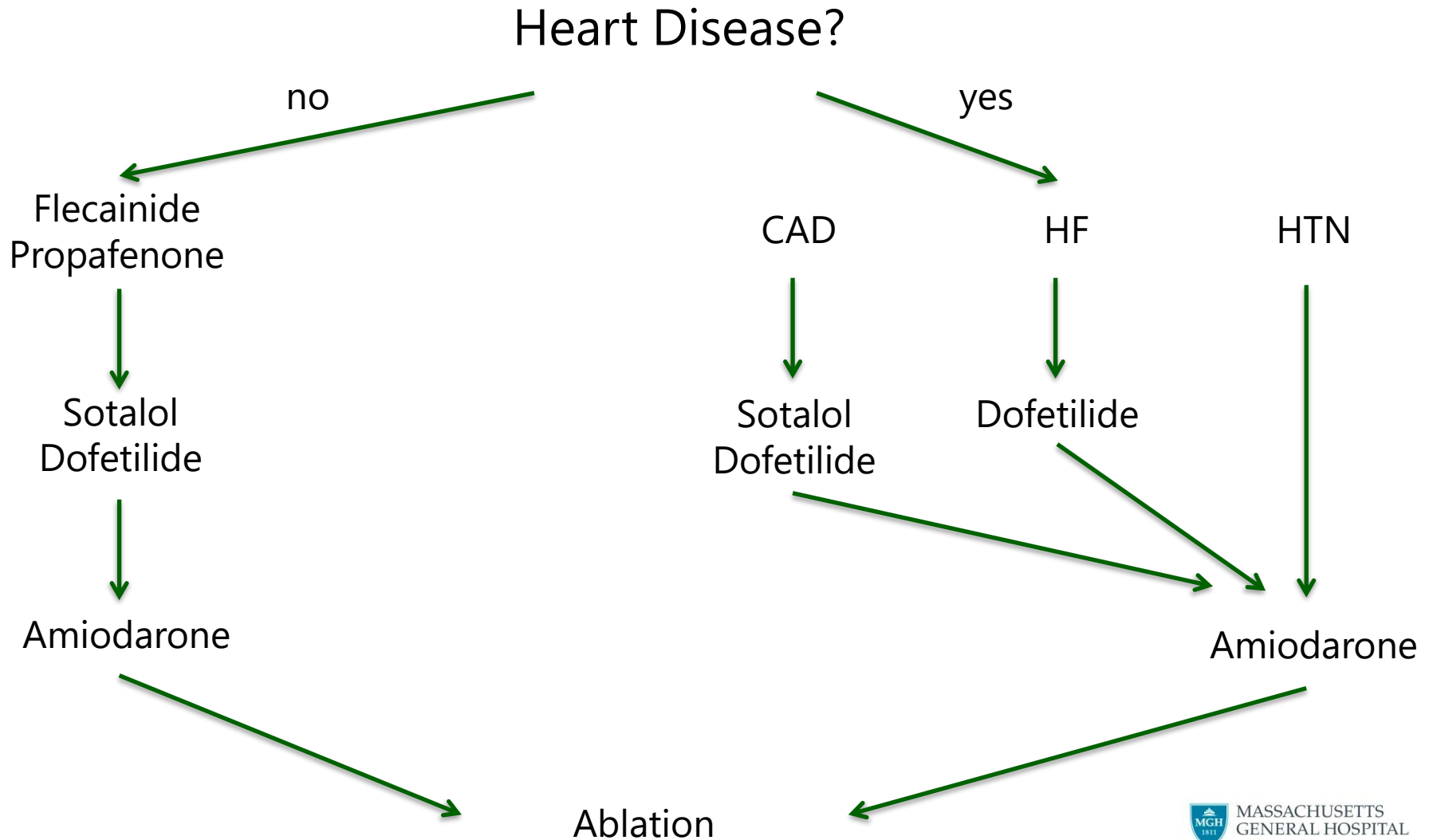
## ***AF Symptoms:***

- Highly variable
- Palpitations/irregular heart beat/racing heart
- Not all patients aware of arrhythmia
- Fatigue/dyspnea/decreased exertional capacity

# Objective 3: Rate vs Rhythm Control of AF

<b>Drug</b>	<b>"Lone" AF</b>	<b>CHF, CAD</b>	<b>CAD nl LVEF</b>	<b>Renal Failure</b>
First Line	Flecainide Propafenone	Dofetilide Amiodarone	Sotalol	Amiodarone Dronedarone
Second Line	Sotalol Procainamide Disopyramide Amiodarone			Propafenone
Avoid		Flecainide Propafenone Dronedarone	Flecainide Propafenone	Sotalol Procainamide Dofetilide

# Objective 3: Rate vs Rhythm Control of AF



# Objective 3: Rate vs Rhythm Control of AF

## ***Case 1: 66-year-old man who presents for a routine visit***

- Patient was asymptomatic in AF, heart rate was  $<100$ bpm.
- What would you do if the patient was having symptoms?
- What would do if the patient's heart rate was  $>100$ bpm?

# Objective 3: Rate vs Rhythm Control of AF

## *Case 1: 66-year-old man who presents for a routine visit*

- Patient was asymptomatic in AF, heart rate was <100bpm.  
**Rate vs rhythm control meds, initiate OAC**
- What would you do if the patient was having symptoms?
- What would do if the patient's heart rate was >100bpm?

# Objective 3: Rate vs Rhythm Control of AF

## *Case 1: 66-year-old man who presents for a routine visit*

- Patient was asymptomatic in AF, heart rate was <100bpm.  
**Rate vs rhythm control meds, initiate OAC**
- What would you do if the patient was having symptoms?  
**Initiate OAC, consider rhythm control**
- What would do if the patient's heart rate was >100bpm?

# Objective 3: Rate vs Rhythm Control of AF

## *Case 1: 66-year-old man who presents for a routine visit*

- Patient was asymptomatic in AF, heart rate was <100bpm.

**Rate vs rhythm control meds, initiate OAC**

- What would you do if the patient was having symptoms?

**Initiate OAC, consider rhythm control**

- What would do if the patient's heart rate was >100bpm?

**Initiate rate control (if BP allows) and OAC**

# Summary

## **Recognize atrial fibrillation (AF) and its consequences.**

- 500% increase in risk of stroke.

## **Identify patients with AF who will benefit from oral anticoagulant therapy.**

- OAC can reduce stroke risk by 65%: appropriate for patients with CHADS-VASC score of 2 or greater without prohibitive bleeding risk.

## **Identify patients with AF who will benefit from rhythm versus rate control therapy.**

- Fast heart rates and/or symptoms (incl. CHF).



Thank you



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