

Evaluation of Palpitations in an Outpatient Setting

22 January 2024

Leon M Ptaszek, MD, PhD, FACC, FHRS



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL



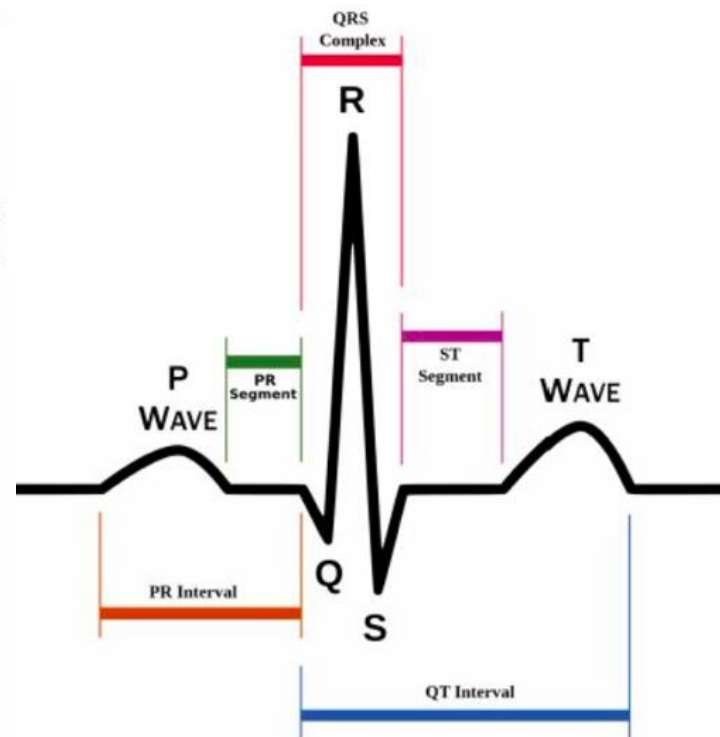
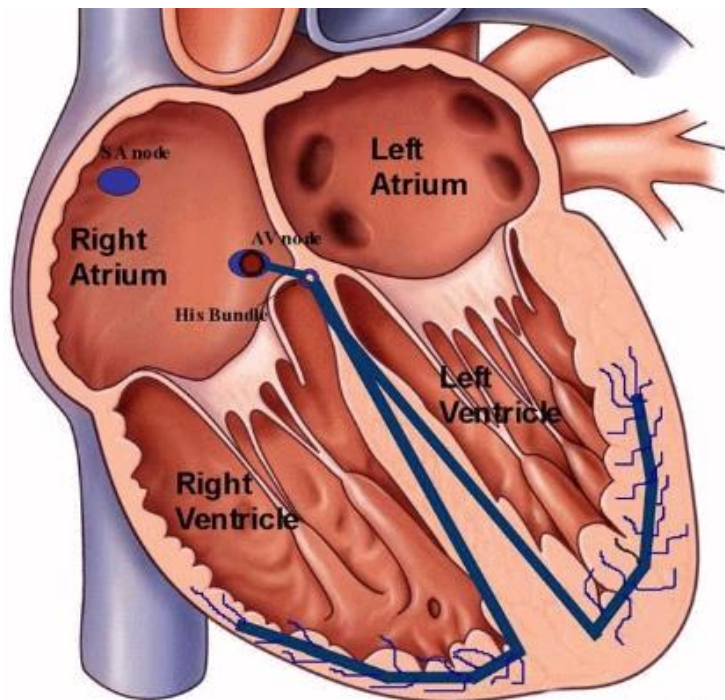
MASSACHUSETTS
GENERAL HOSPITAL

CORRIGAN MINEHAN
HEART CENTER

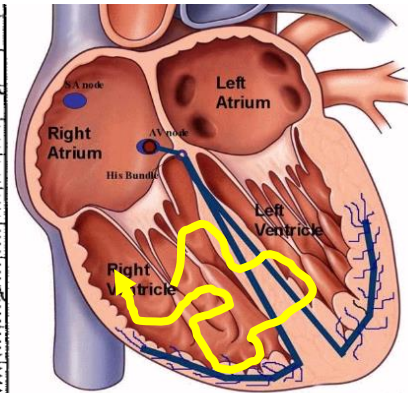
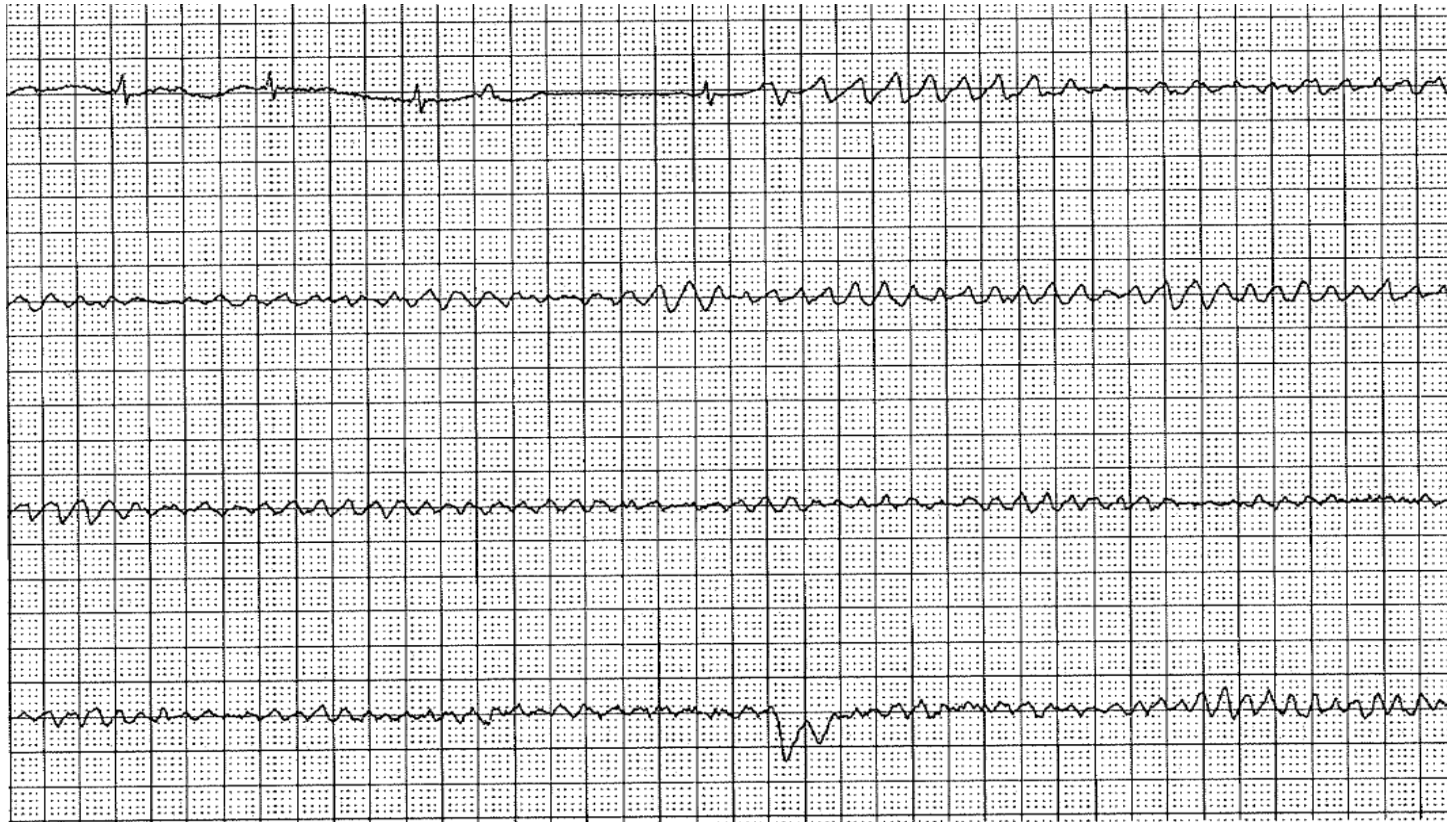
1. *Select appropriate diagnostic testing for evaluation of palpitations.*
2. *Identify critical components in the outpatient evaluation and management of new-onset atrial fibrillation.*
3. *Learn bradycardia evaluation and indication for pacemaker implant.*
4. *Learn when to refer a patient to a cardiologist.*

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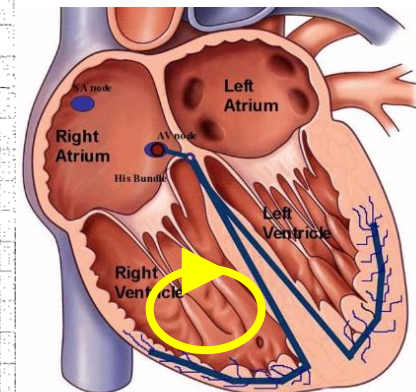
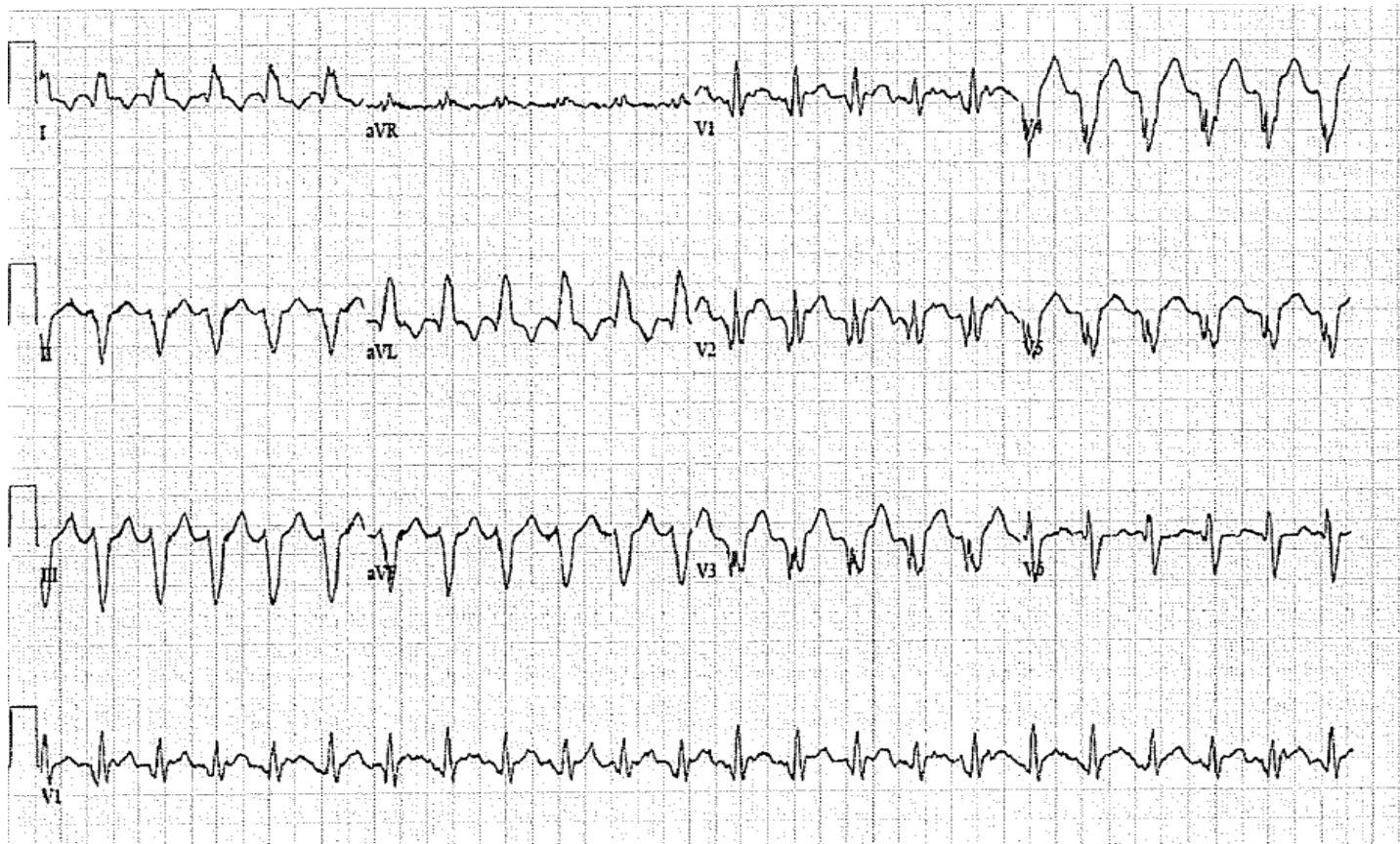
Function of the Cardiac Conduction System



Ventricular Fibrillation



Ventricular Tachycardia



Question:

Which of the following is associated with VT?

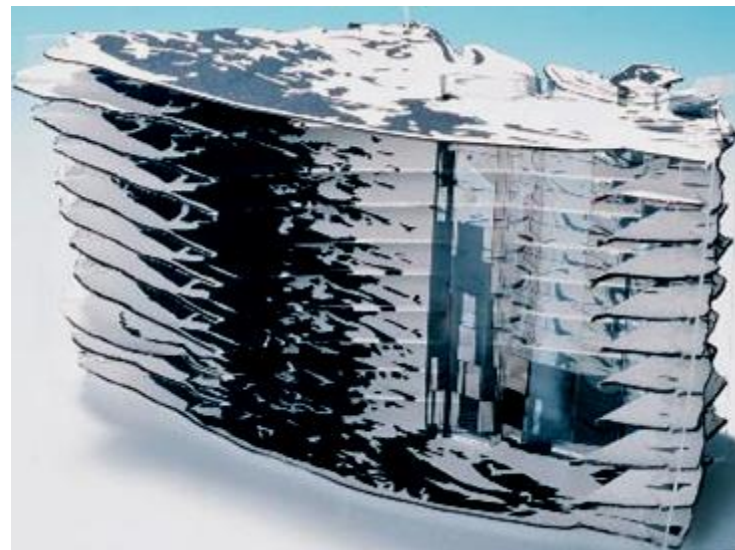
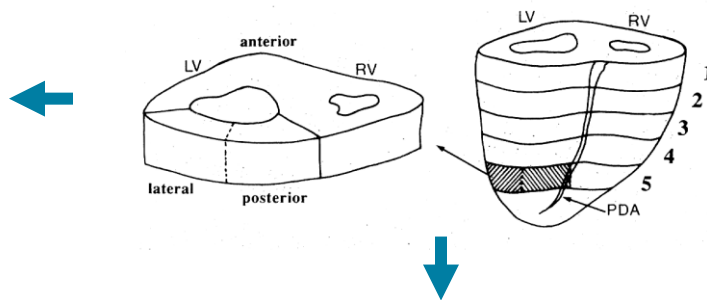
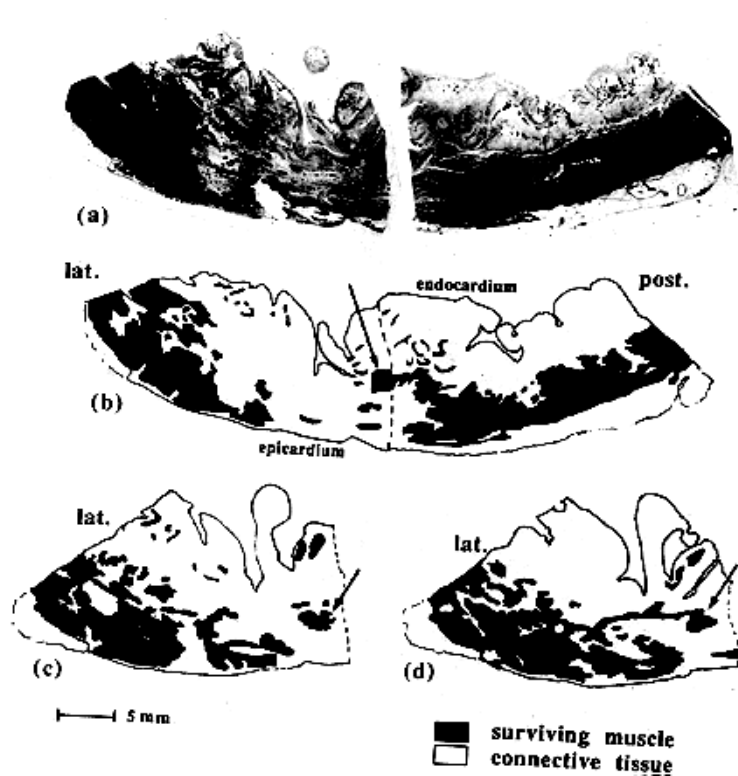
1. Ischemic cardiomyopathy
2. Non-ischemic cardiomyopathy
3. Infiltrative cardiomyopathy
4. All of the above

Question:

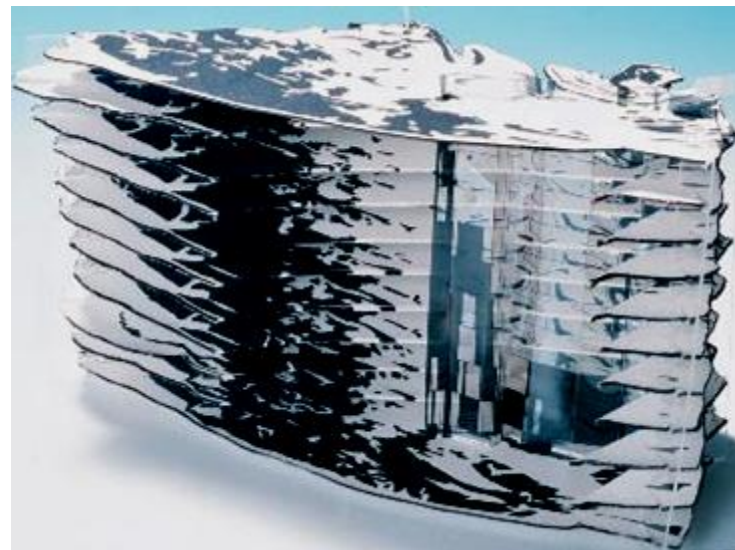
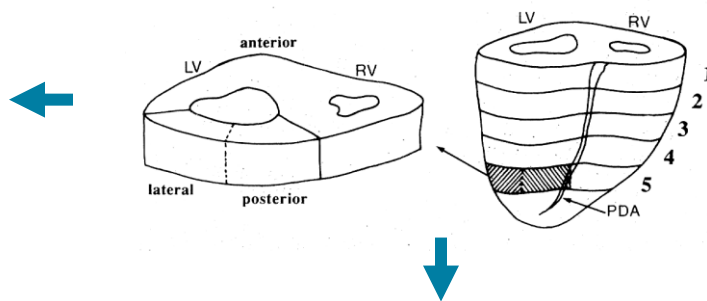
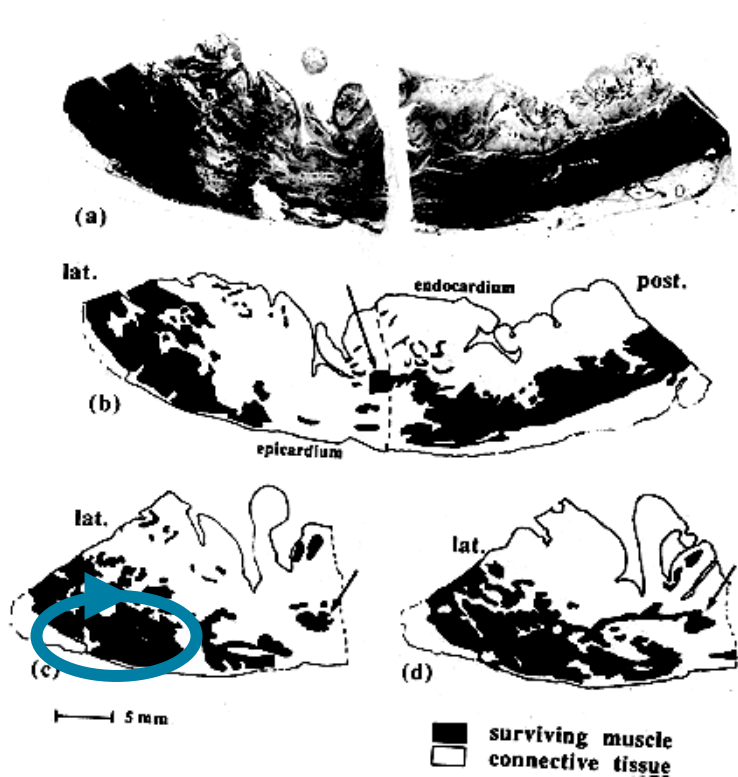
Which of the following is associated with VT?

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4. **All of the above**

Substrate for Ventricular Arrhythmias



Substrate for Ventricular Arrhythmias



Supraventricular Arrhythmias

AF/AFL

AVNRT

WPW

AT

PSVT



Question

Which of the following supraventricular arrhythmias is associated with a risk of stroke:

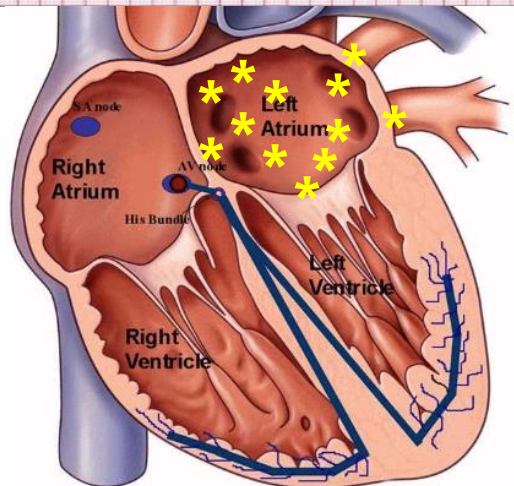
1. AVRT
2. AF
3. AT
4. AFL
5. Both 2 and 4

Question

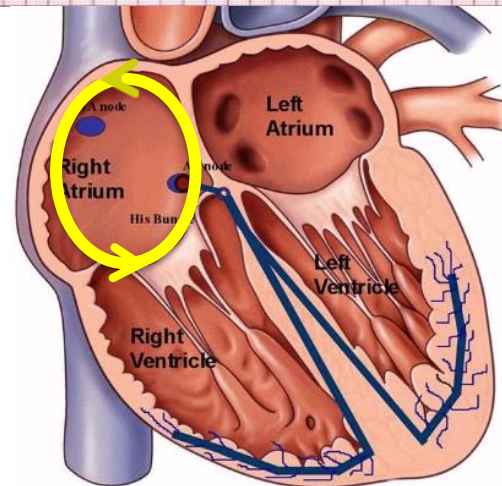
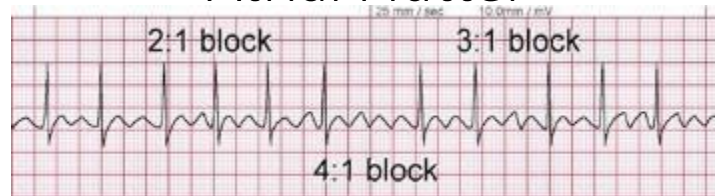
Which of the following supraventricular arrhythmias is associated with a risk of stroke:

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3. AT
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Atrial Fibrillation



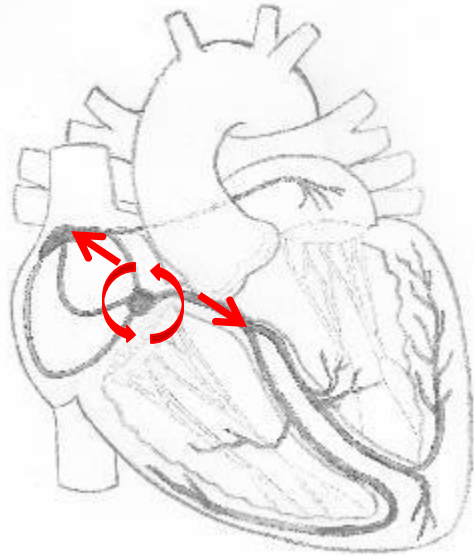
Atrial Flutter



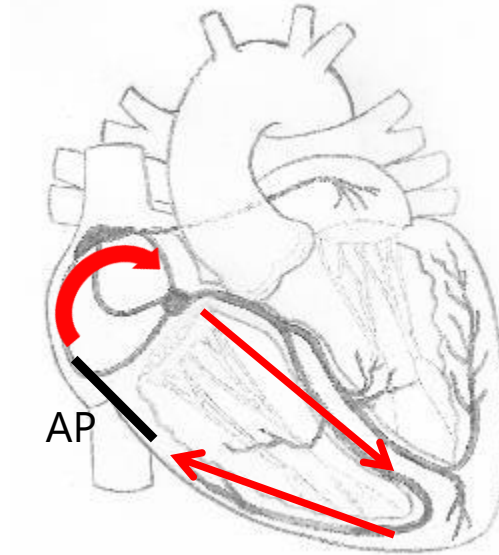
Typical = isthmus dependent
Atypical = non-isthmus dependent

Types of PSVT

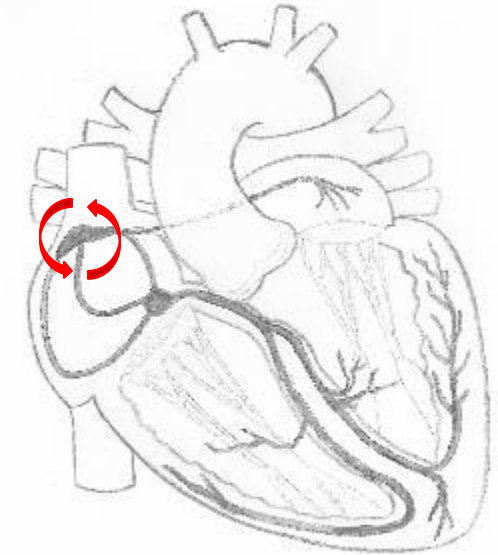
AVNRT: 60%



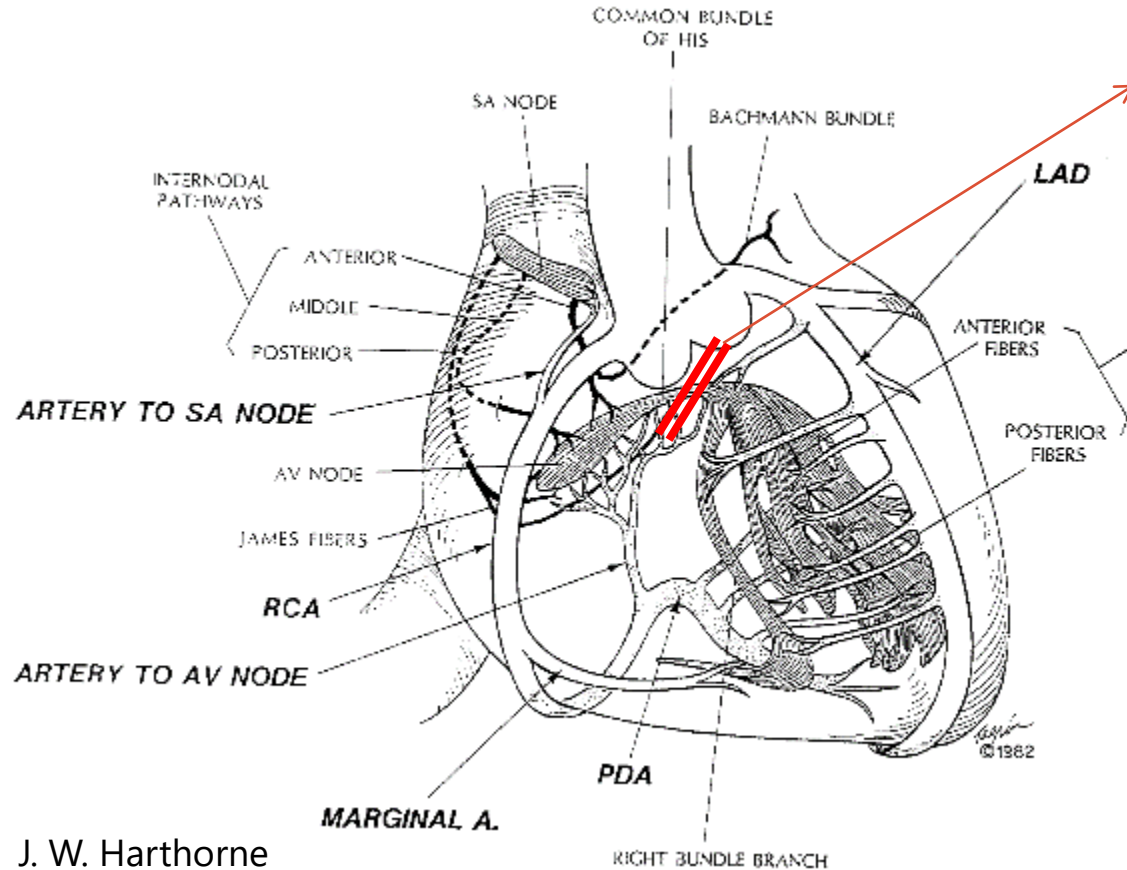
WPW: 30%



AT: 10%



Disease of the Cardiac Conduction System



Slowed/blocked conduction

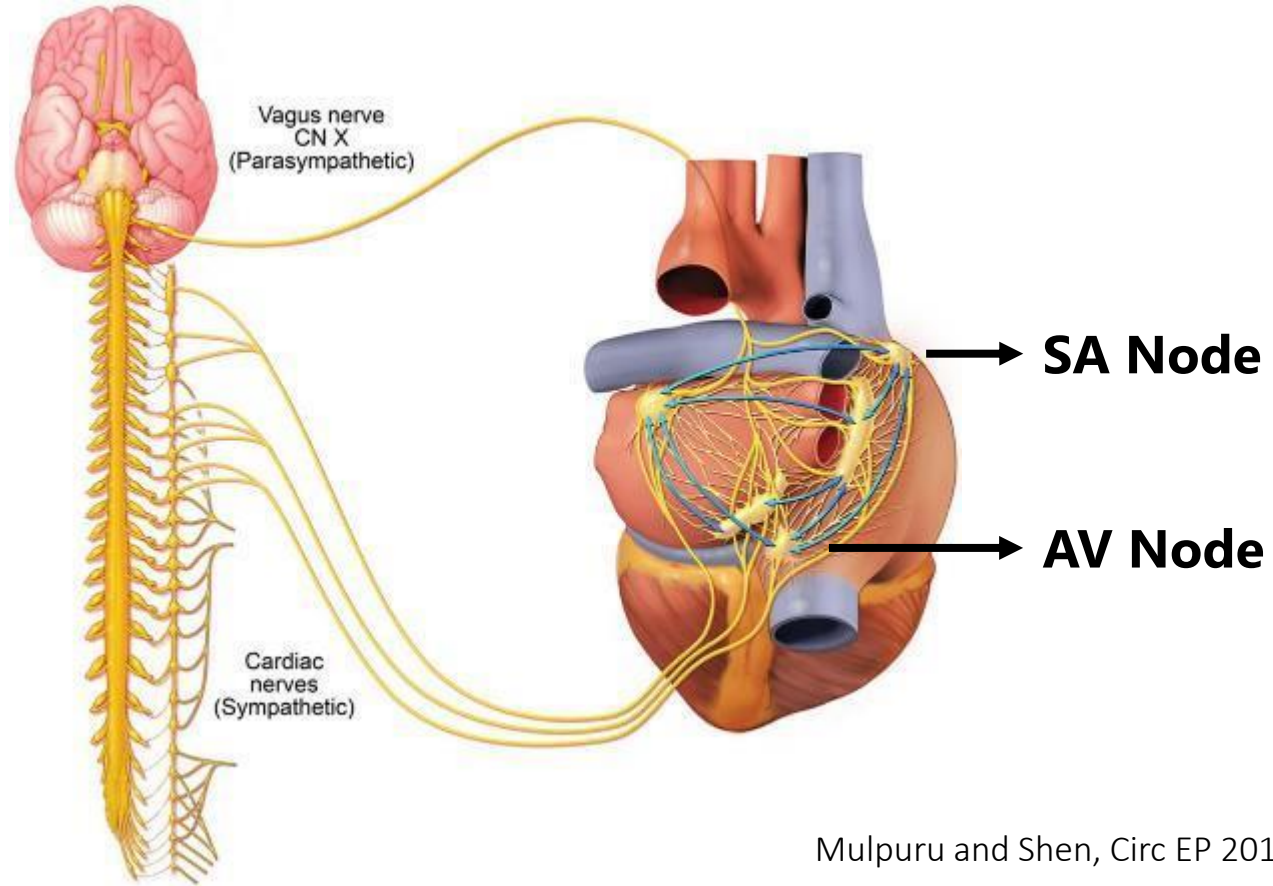
Irreversible Causes

- Idiopathic (age related)
- Ischemic
- Infiltrative (amyloid, sarcoid)
- Structural heart disease
- Surgery

Reversible Causes

- Medications
- Inflammation (SCD, Lyme)
- Metabolic

Autonomic Nervous System: Impact on Heart Rhythm



Evaluation of Palpitations

- Patient Description of Symptoms
- Pertinent Medical History
- Physical Exam
- Testing

Evaluation of Palpitations

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Differentiate life-threatening
from non-life-threatening

Patient Description of Symptoms

- **Loss of consciousness?**
- **Episodes:**
 - Frequency/duration
 - Triggers
 - Rapid vs. slow
 - Regular vs. irregular
- **General cardiac symptoms:**
 - Exertional dyspnea/chest discomfort
 - LE edema/orthopnea

- **Cardiac History**
 - CAD/MI
 - CHF
 - Valve disease
 - Congenital heart disease
- **Non-Cardiac History**
 - Thyroid disease
 - Mental health
- **Social History**
 - Tobacco / EtOH / Stimulants
 - Non-prescribed medications
 - Barriers to care
- **Family History**
 - Sudden cardiac death
 - Cardiomyopathy
- **Medications**

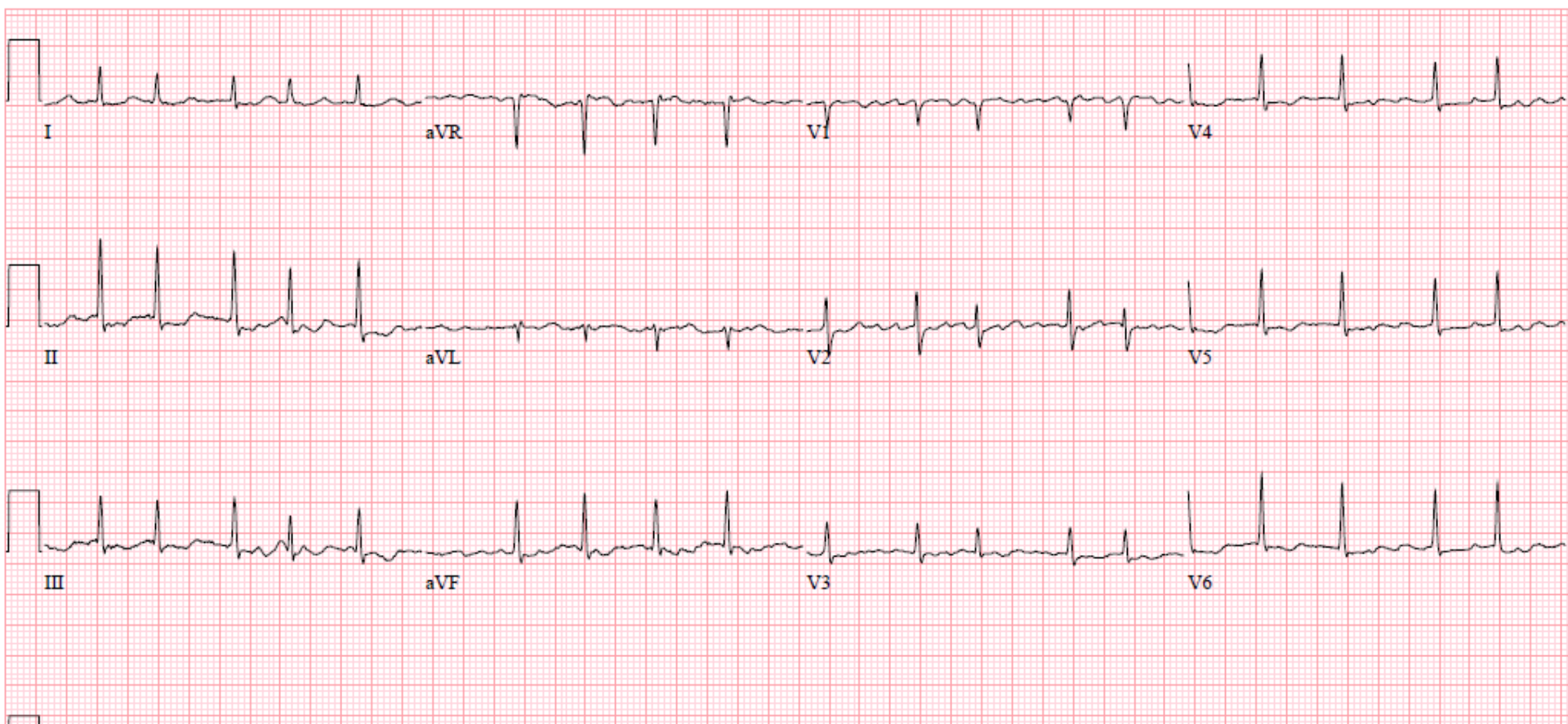
Physical Exam

- Vital signs
- Orthostasis
- Cardiac auscultation
- Non-cardiac findings

- 12-lead ECG
- Laboratory studies (CBC, BMP, TSH, ?NT-proBNP, ?hs-TnT)
- Trans-thoracic echocardiogram (TTE)
- Exercise stress testing
- Ambulatory arrhythmia monitoring

1. *Select appropriate diagnostic testing for evaluation of palpitations.*
2. *Identify critical components in the outpatient evaluation and management of new-onset atrial fibrillation/atrial flutter.*
3. *Learn bradycardia evaluation and indication for pacemaker implant.*
4. *Learn when to refer a patient to a cardiologist.*

Atrial Fibrillation



Question

Which of the following factors is primarily responsible for the increased risk of morbidity/mortality in patients with AF?

1. Heart Failure
2. Stroke
3. Cardiac Arrest
4. Syncope / Falls

Question

Which of the following factors is primarily responsible for the increased risk of morbidity/mortality in patients with AF?

1. Heart Failure
2. **Stroke**
3. Cardiac Arrest
4. Syncope / Falls

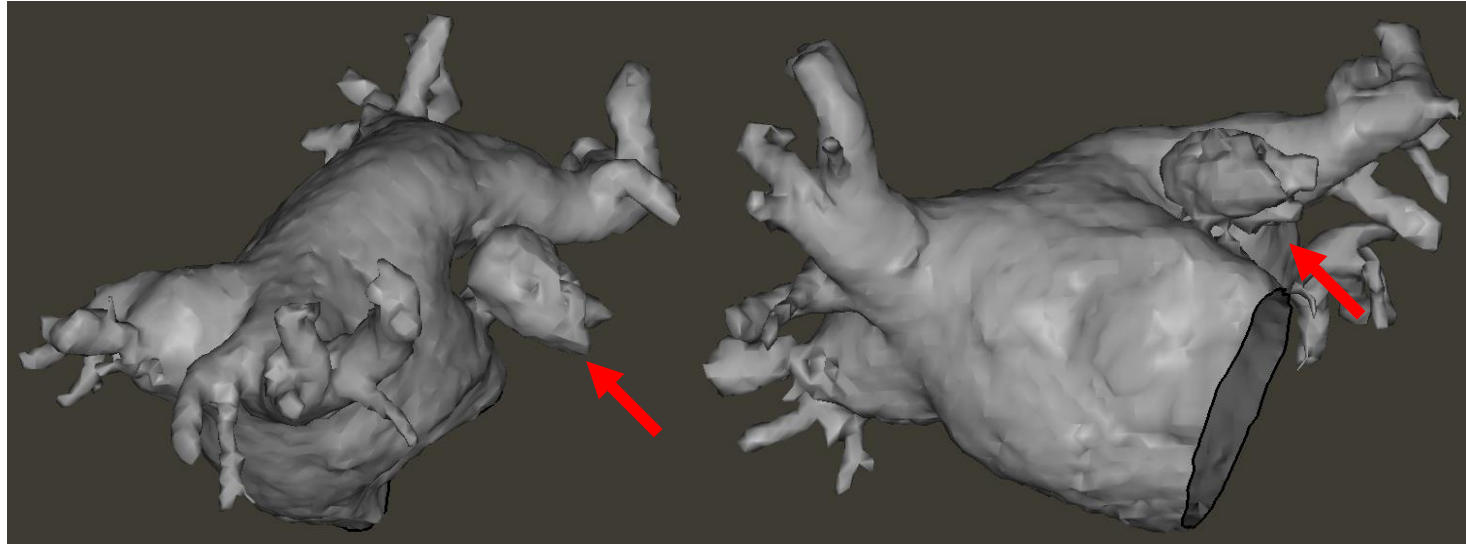
- **Stroke prevention**
 - OAC for qualifying patients

- **Palliation of symptoms associated with AF**
 - Rate or rhythm control
 - For rhythm control, consider anti-arrhythmic drugs (AADs) vs. ablation

Pathophysiology of AF-Related Stroke

Superior

RAO



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

Calculating Risk of NAVF-Related Stroke

CHADS-VASC score

Congestive heart failure +1

HTN +1

→ **Score = 1:** 0.6% CVA/year

Age ≥ 65 +1

Age ≥ 75 +1

→ **Score ≥ 2:** ≥ 2.2% CVA/year

Diabetes +1

Stroke/TIA/thromboembolism +2

Sex (female) +1






Vascular disease (peripheral or CAD) +1

- **Warfarin (Coumadin)**
 - Reduce stroke risk by 65%
- **DOACs**
 - Superior stroke prevention than coumadin
 - Lower bleeding risk than coumadin
- **Anti-platelets**
 - Effectiveness debated
 - 19% stroke risk reduction (8 trials, >4,000 patients)

Reasons for withholding anticoagulant

Bleeding risk associated with OAC use: HAS-BLED score

HTN (+1)

Abnormal liver fxn (+1)		Score 1: 1% bleed/yr
Abnormal renal fxn (+1)		Score 2: 1.9% bleed/yr
Stroke/TIA (+1)		Score 3: 3.7% bleed/yr
Bleeding predisposition (+1)		Score 4: 8.7% bleed/yr
Elderly: Age \geq 65 (+1)		Score 5: >10% bleed/yr
Drugs (anti-platelet) (+1)		
Drugs (alcohol) (+1)		

Stroke Risk and Bleeding Risk Rise Together

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)

Bleeding predisposition (+1)

Elderly: Age \geq 65 (+1)

Drugs (anti-platelet) (+1)

Drugs (alcohol) (+1)



Objectives

1. *Select appropriate diagnostic testing for evaluation of palpitations.*
2. *Identify critical components in the outpatient evaluation and management of new-onset atrial fibrillation.*
3. *Learn bradycardia evaluation and indication for pacemaker implant.*
4. *Learn when to refer a patient to a cardiologist.*

Which of the following is an indication for pacemaker implantation?

1. Sick sinus syndrome with symptomatic bradycardia.
2. Complete heart block with stable blood pressure and no associated symptoms.
3. Persistent second-degree AV block with symptomatic bradycardia.
4. All of the above.

Which of the following is an indication for pacemaker implantation?

1. Sick sinus syndrome with symptomatic bradycardia.
2. Complete heart block with stable blood pressure and no associated symptoms.
3. Persistent second-degree AV block with symptomatic bradycardia.
4. **All of the above.**

Disease of the Cardiac Conduction System

SAN Disease

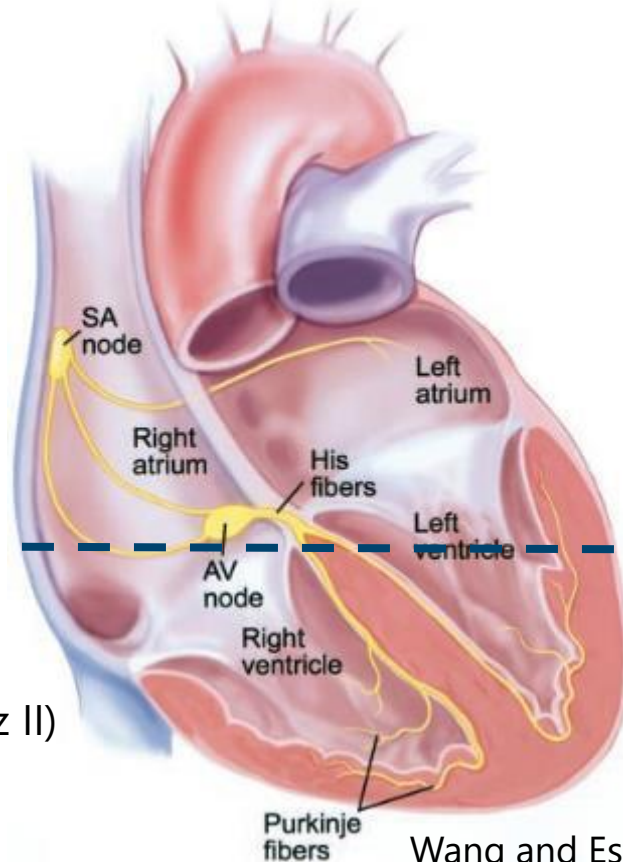
- Sick sinus syndrome

AV Nodal Block

- 1st degree AV block
- 2nd degree AV block (Wenckebach)

Infranodal Block

- 2nd degree AV block (Mobitz II)
- Complete heart block

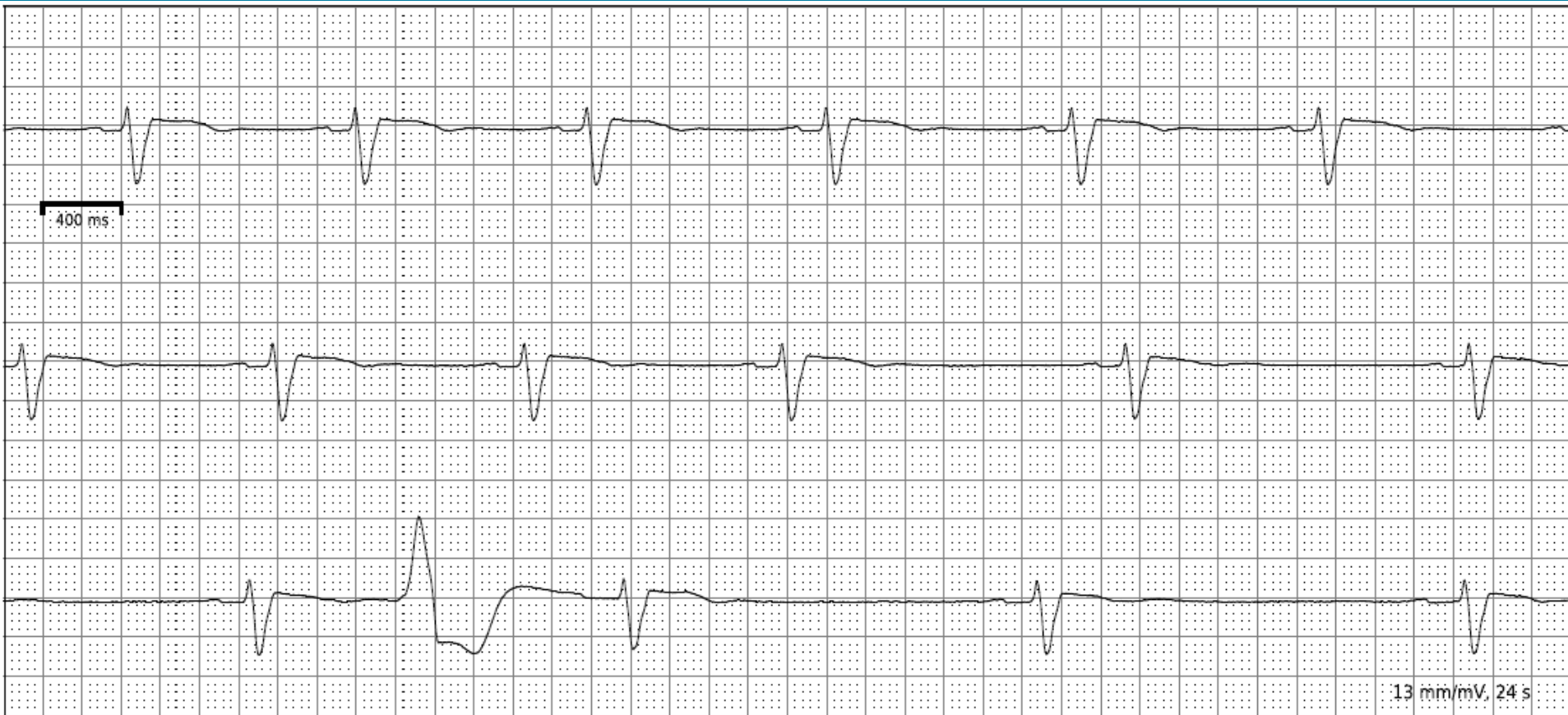


Less ominous

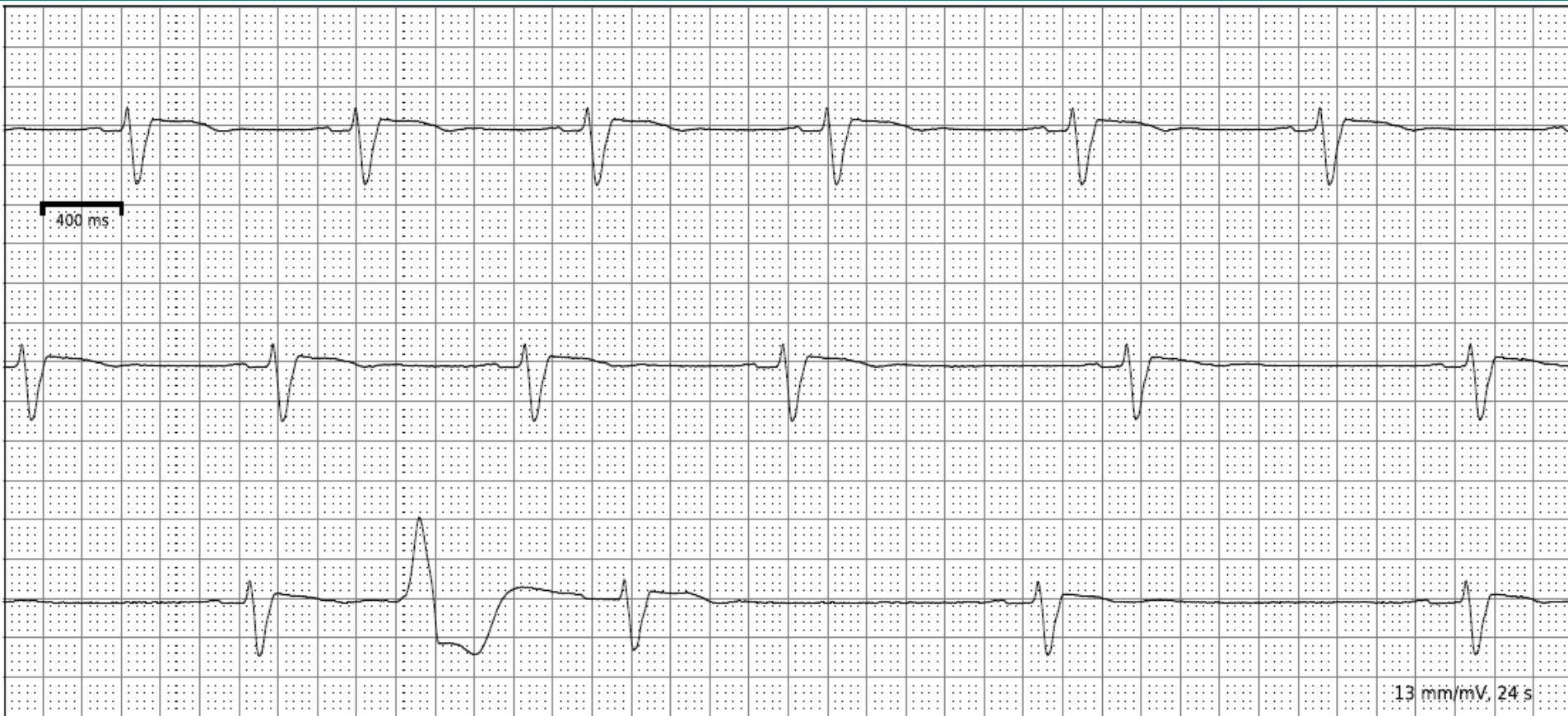
More ominous

Wang and Estes, Circulation 2002

Single-lead, continuous tracing

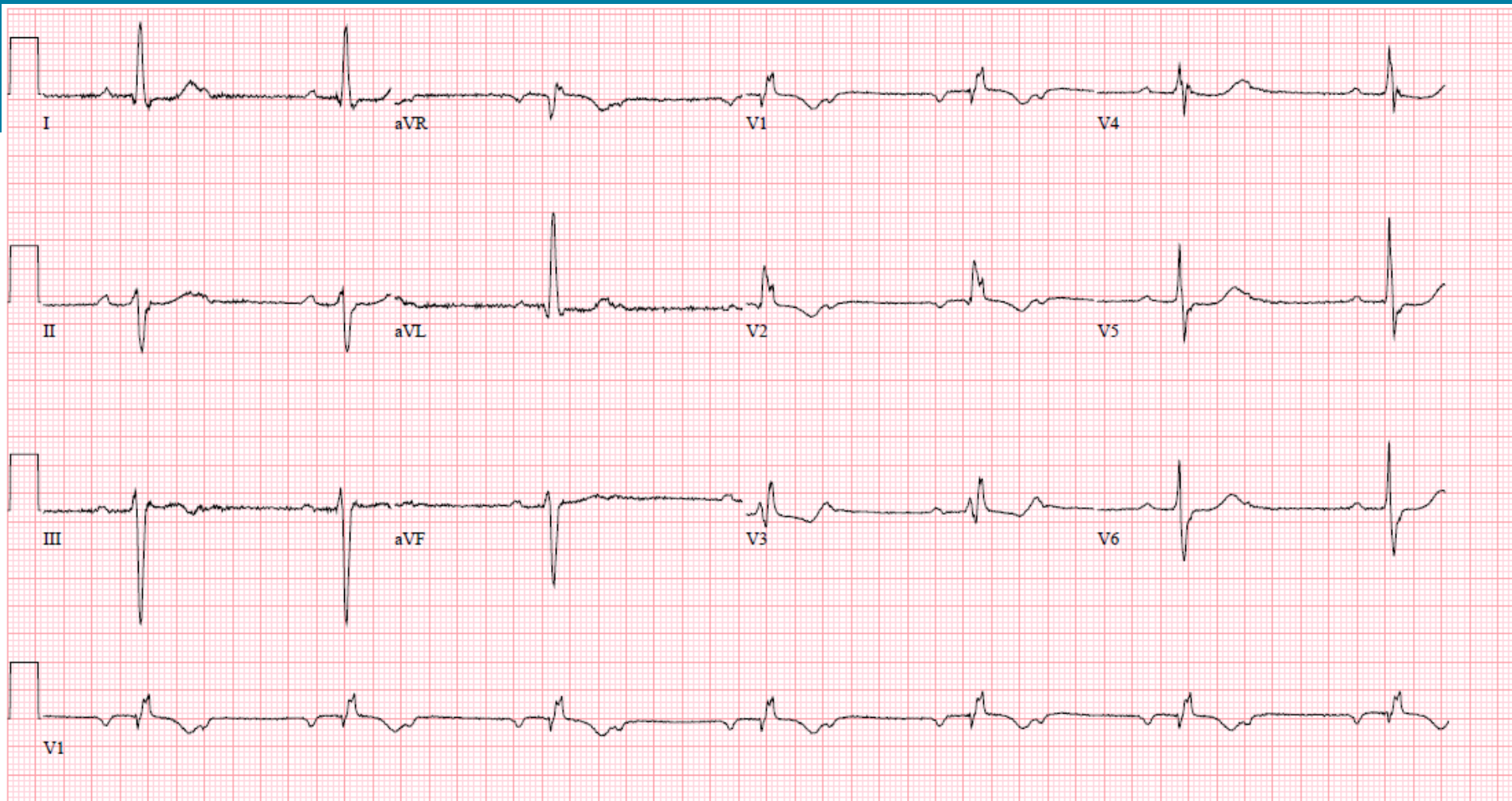


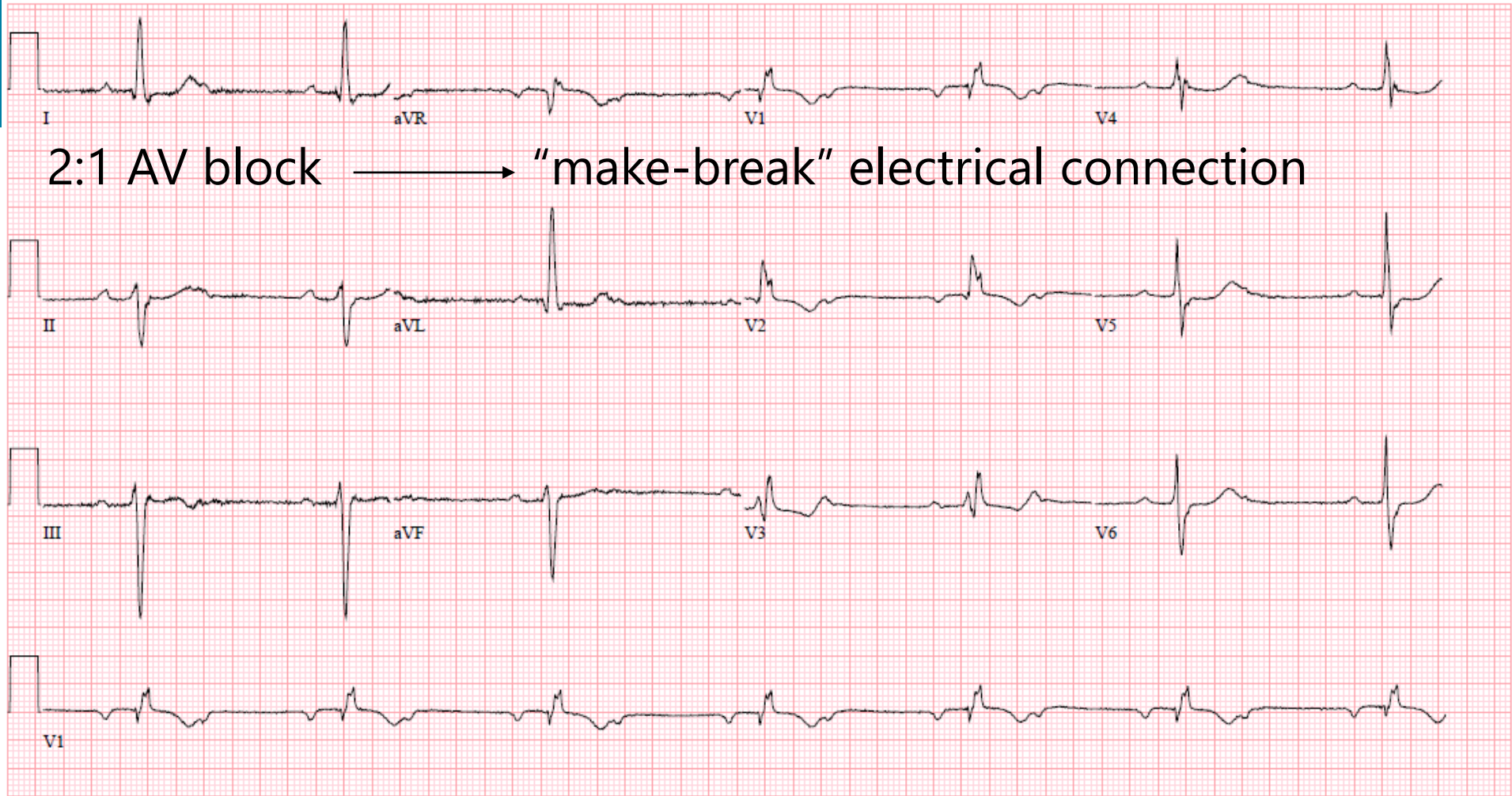
Sinus bradycardia with Sinus Arrhythmia



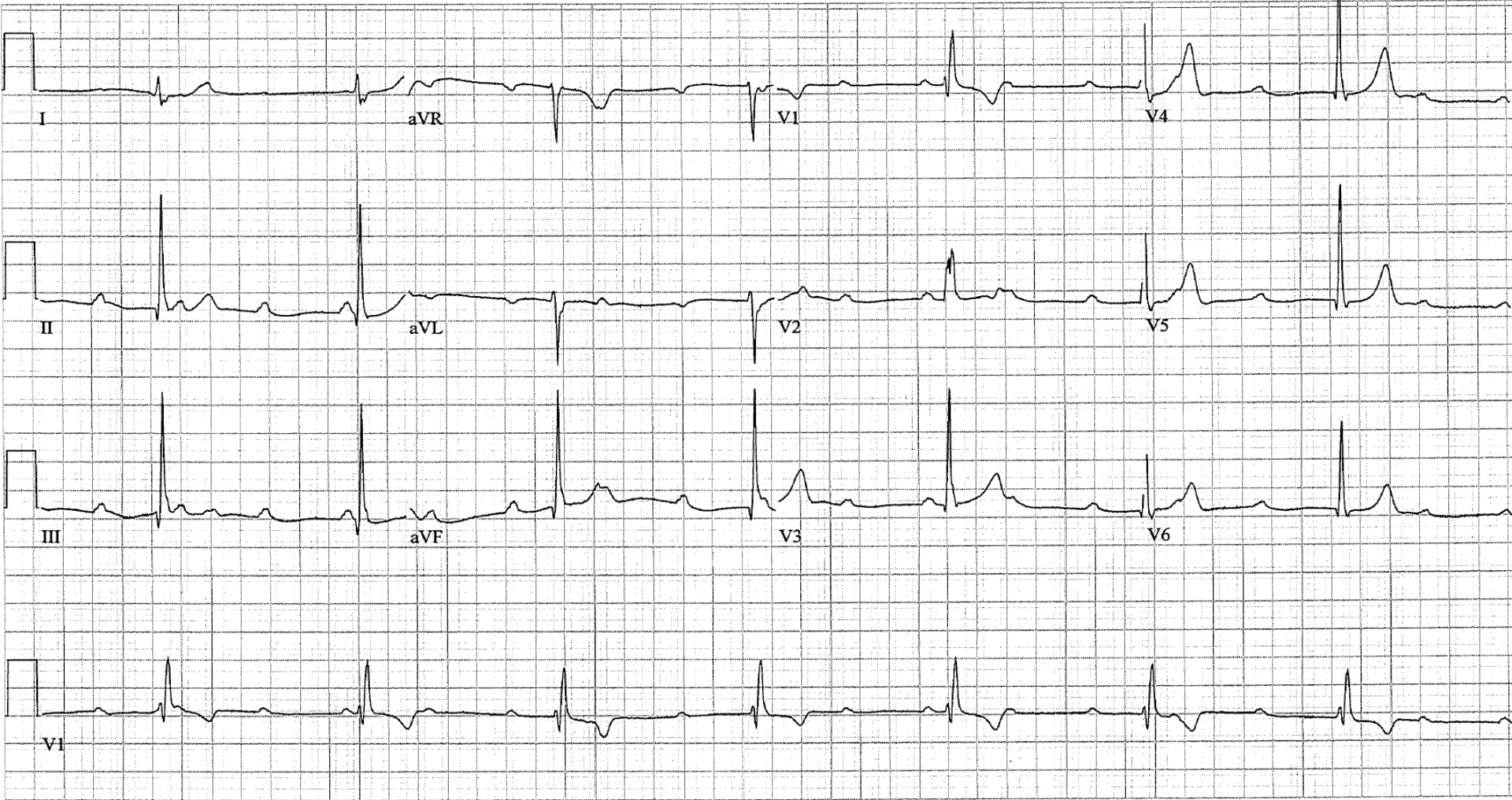
Asymptomatic patient



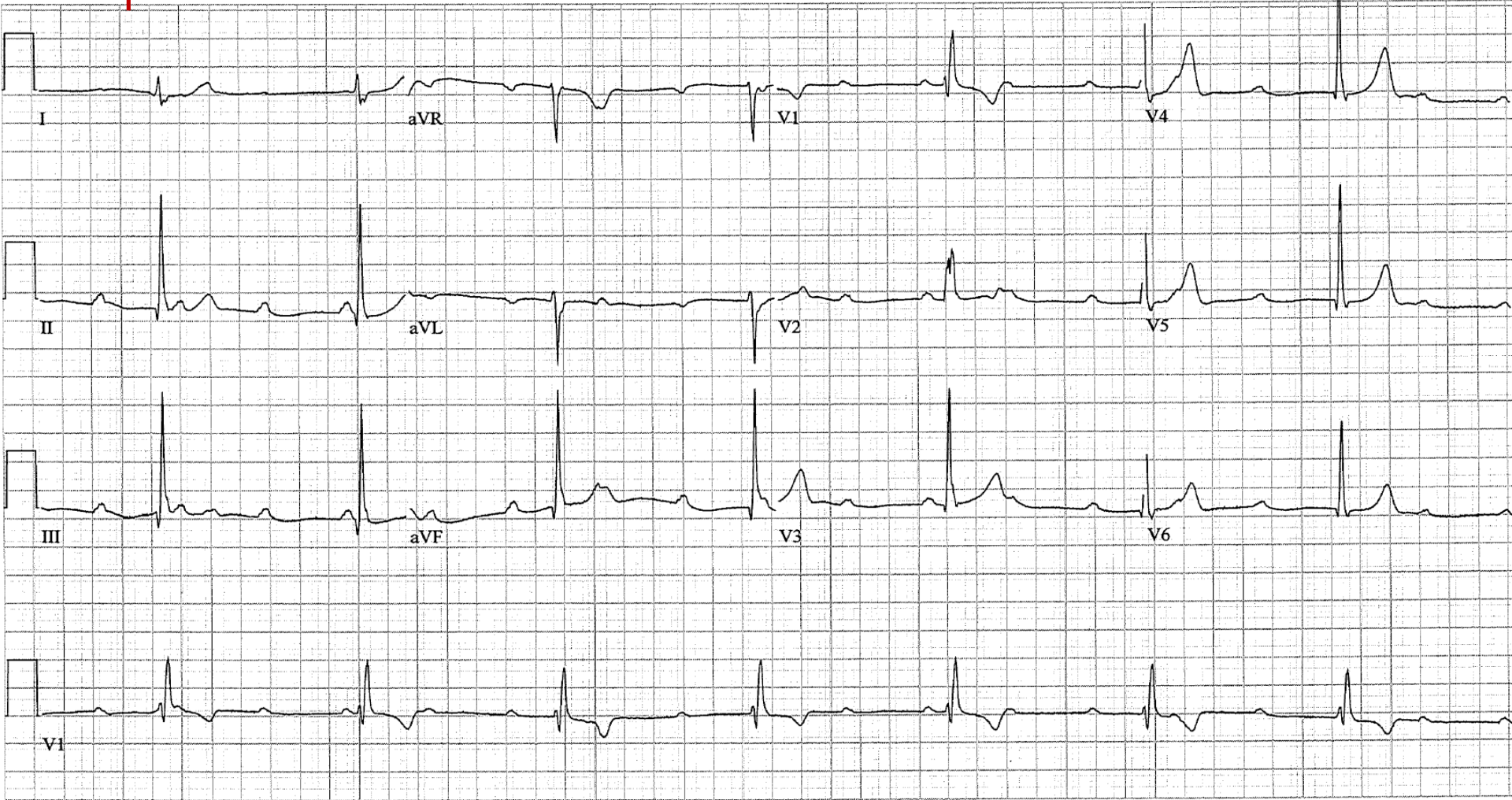




2:1 AV block → "make-break" electrical connection



Complete heart block



Components of the Permanent Pacemaker

The Pulse Generator

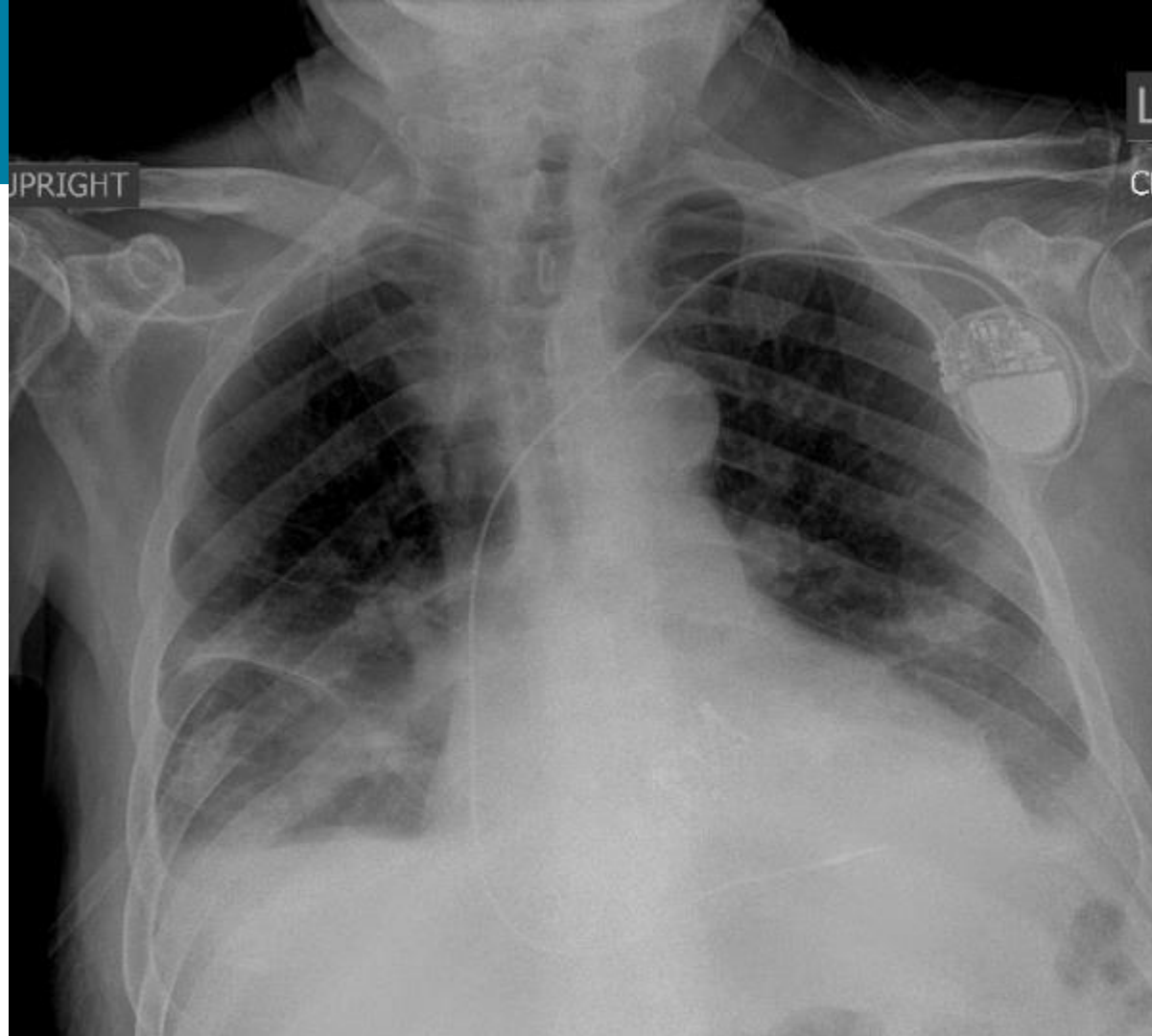
The Leads

The Patient Care System
(Programmer, Support Equipment)

The Patient



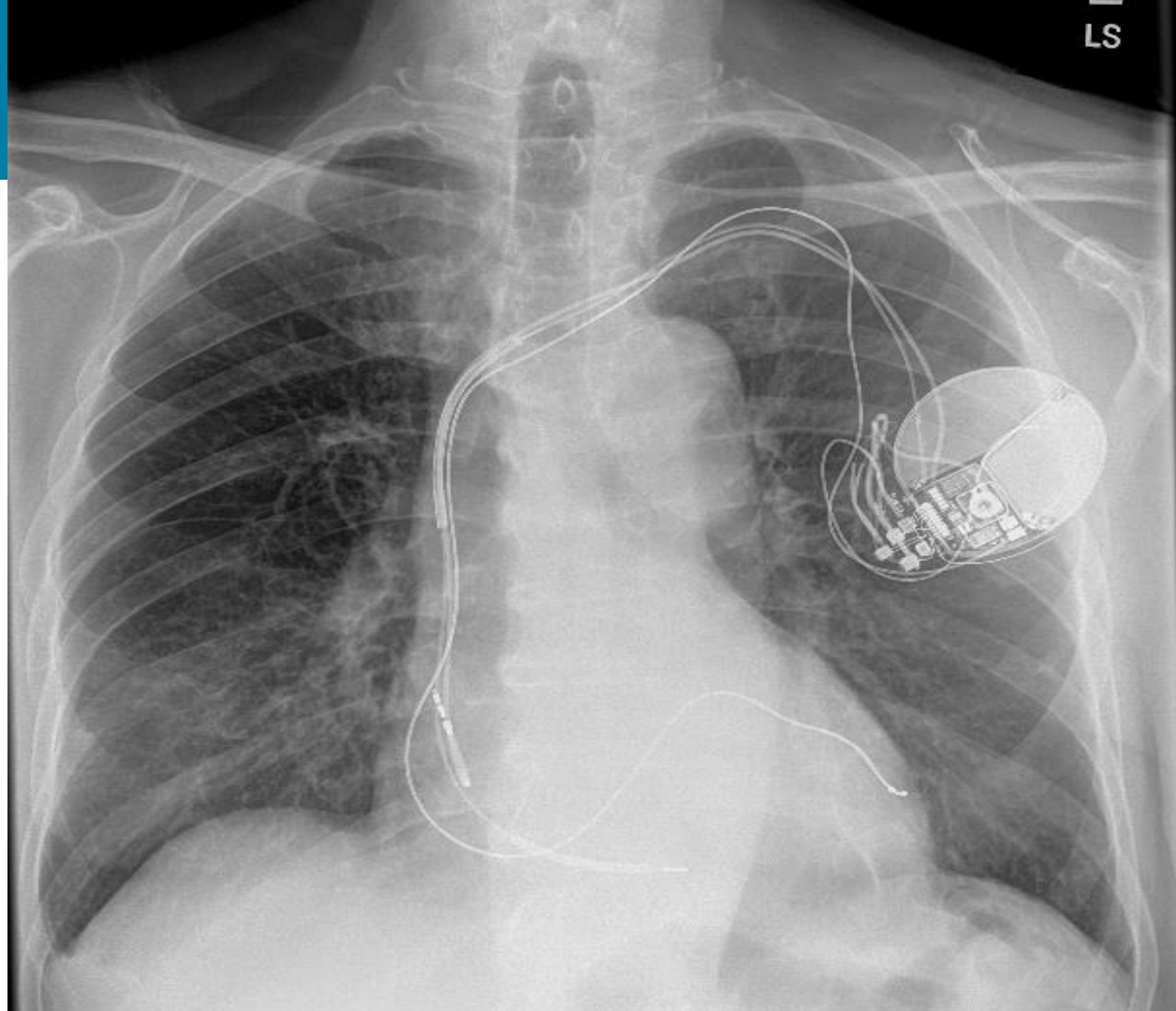
Single-chamber PPM



Dual-chamber PPM



Biventricular ICD (CRT-D)



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3. *Learn bradycardia evaluation and indication for pacemaker implant.*
4. *Learn when to refer a patient to a cardiologist.*

- **History**

- Syncope or near-syncope
- High burden of symptoms
- History of heart disease

- **Findings**

- Abnormal study results (ECG, TTE, stress test)
- Concerns that PPM is indicated
- Arrhythmia requiring advanced therapies (AADs, ablation)



Thank you



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