

PALPITATIONS

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NEMOURS PEDIATRIC CARDIOLOGY

PALPITATIONS

- Definitions
 - “noticeable heartbeat that may be concerning to the patient (eg, too fast, irregular, or too strong”
 - “unpleasant awareness of the forceful, rapid, or irregular beating of the heart”

FUN HEART FACTS

- Heart is by far one of the coolest organ in the body
 - Technically it is the liver
- Heart beats 100,000 a day
- Your heart pumps about 2,000 gallons of blood every day.
- Does not get enough credit
- Not uncommon sometimes you feel your ticker tick



WHY DOES IT BEAT?

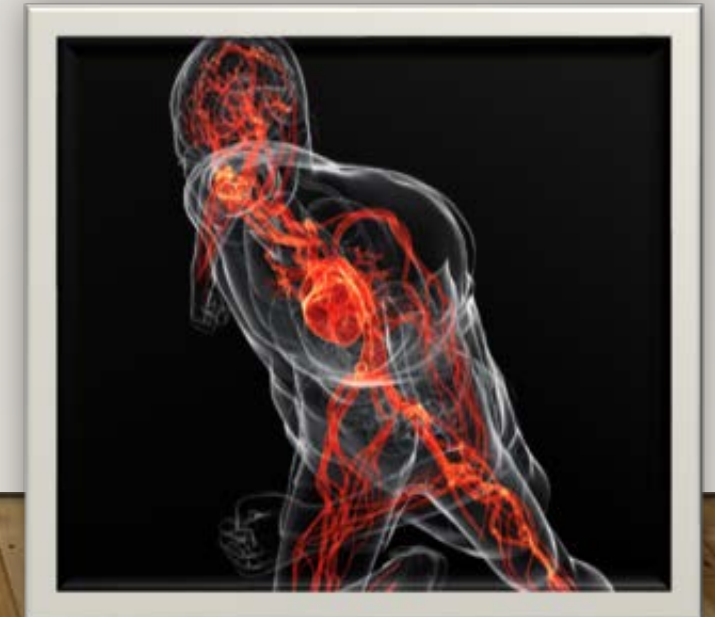


Who decides the rates?

Why do we breath so much?

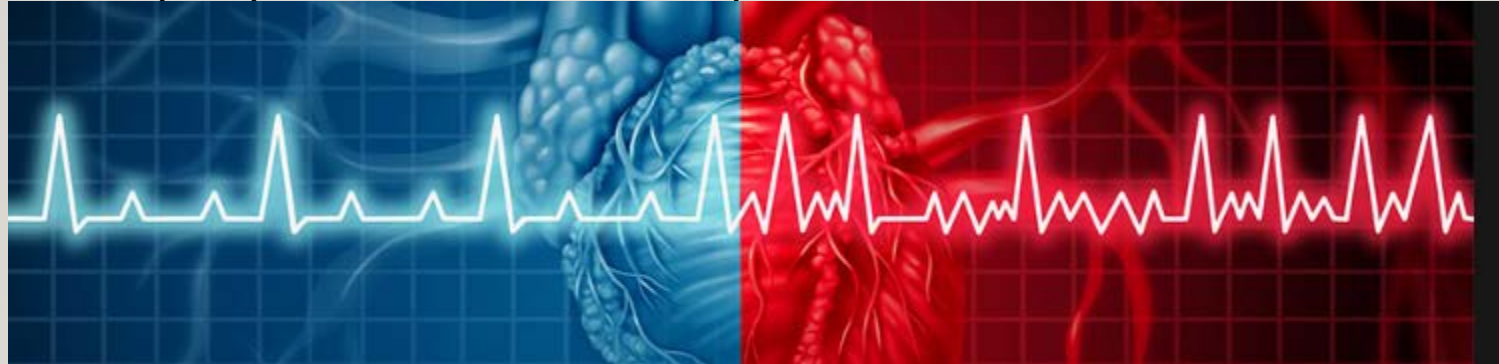
Delivery of oxygen = oxygen demand

- Min HR – 40-80 (vagal tone/SV)
- “Current” speed – oxygen demand
- Max HR – 220 - age



PALPITATIONS TO CARDIOLOGIST

- Is palpitations
 - A. Sinus rhythm (electric energy moving **normally** through top to bottom of the heart)
 - B. Tachyarrhythmia = **chaotic** electricity



WHERE TO START WITH PALPITATIONS

History:

- When did it start and end?
 - How often? How long? Have you counted the HR?
- PMHx
- Meds
- ROS (thyroid, joints, weight changes)
- Sports history:
 - How long playing? How long is practice? Do you have symptoms?
 - Mileage times? Past years?

Physical Exam:

- Vitals
- Rhythm and Rate
 - - breathing variation
- Murmurs

3 ANALOGIES

- 1. Body deliveries oxygen like Amazon



- 2. Heart is like a car engine



- 3. Electricity should move from top to bottom chamber
 - Queen to the King



PRACTITIONERS – THOUGHT PROCESS

?IS THE CAR ENGINE WORKING HARDER?

- Anemia
 - Work up anemia as indicated
- Thyroid dysfunction
- Infections/Fever
- Inflammatory/Fever
 - IBD, SLE, JRA
- Medications
 - Caffeine/Nicotine
 - ADHD/Behavior medications
 - Albuterol
 - Supplements (Ma Huang)
 - OTC
- Pregnancy



CARDIOLOGIST – RHYTHM/ELECTRICAL

?IS THE CAR ELECTRICAL ABNL?

- Atrial arrhythmias
 - Premature atrial contractions
 - Supra-ventricular tachycardia (AVRT,AVNRT)
 - A.Fib/A.Flutter
- Ventricular arrhythmias
 - Premature ventricular contractions
 - Ventricular tachycardia
 - Ventricular fibrillation
- At risk for arrhythmias
 - genotype positive Long QT channelopathy
 - Wolf Parkinson White
 - Brugada pattern/syndrome



CARDIOLOGIST – STRUCTURAL DISEASE

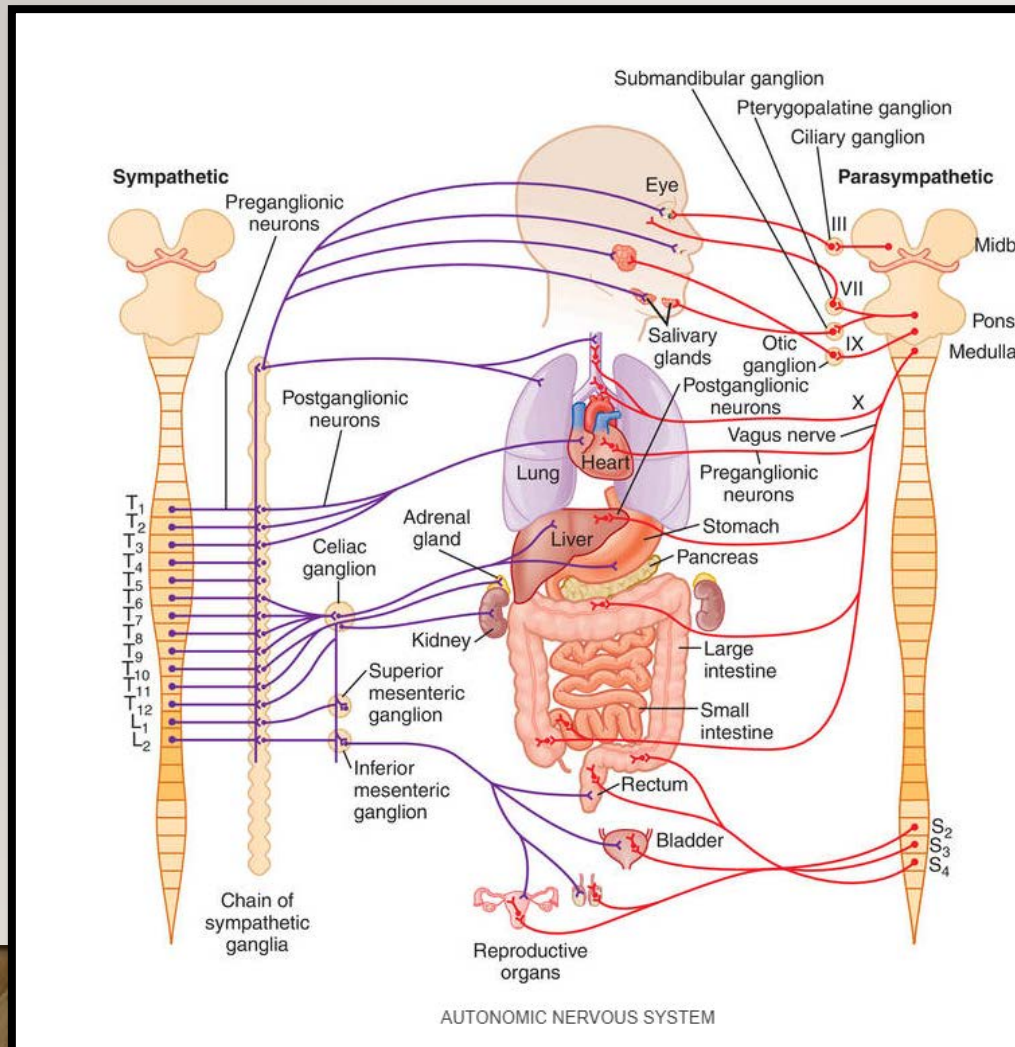


- Pump Disease
 - Cardiomyopathy (primary vs acquired)
 - HCM vs myocarditis/chemo-induced
- Valve disease
 - AS/PS/MR
- Pulmonary hypertension
 - Downs, prematurity
- Extra Hole/vessel disease
 - VSD/ASD/PDA

PRACTITIONERS

- Common things are common, but sometimes you have to work them up
 - CBC
 - BMP
 - TSH
 - Urine toxicology
 - Pregnancy test

INTEGRATION

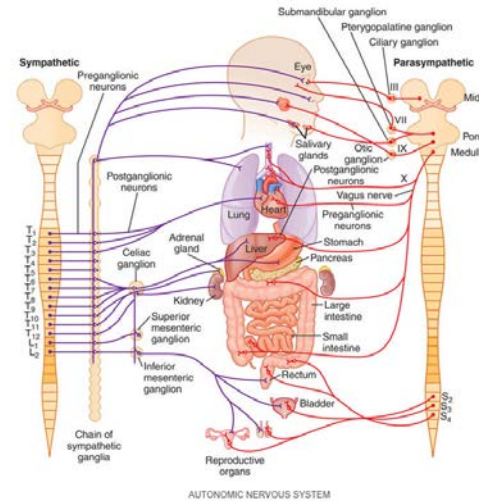


MIRROR ORGANS WHO CONTROLS?

- Mirror organs
 - - brain
 - - heart
 - - GI system

Well innervated - ANS

- NMO
 - - Hair
 - - elbows
 - - kidneys
 - - pancreas



DYSAUTONOMIA

- Syncope is common
 - > female to male ratio
- Fluid changes
- Hormones
- Anemia
- Low salt intake (father has hypertension)



COVID AND DYSAUTONOMIA

Dysautonomia and Implications for Anosmia in Long COVID-19 Disease

Alexandre Vallée ¹

Affiliations + expand

PMID: 34884216 PMCID: PMC8658706 DOI: 10.3390/jcm10235514

[Free PMC article](#)

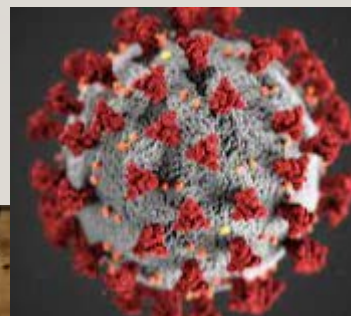
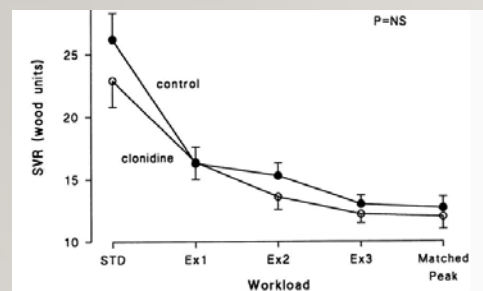
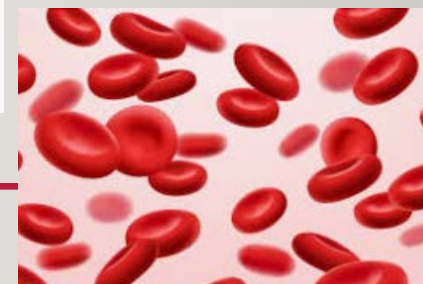
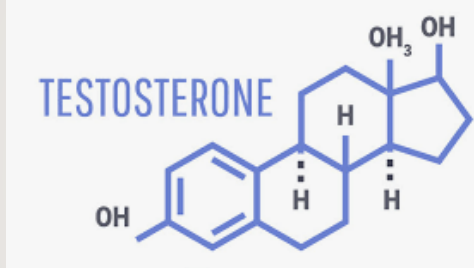
COVID-19-Associated Dysautonomia

Krithika Suresh ¹, Md Didar Ul Alam ¹, Emily Satkovich ¹

Affiliations + expand

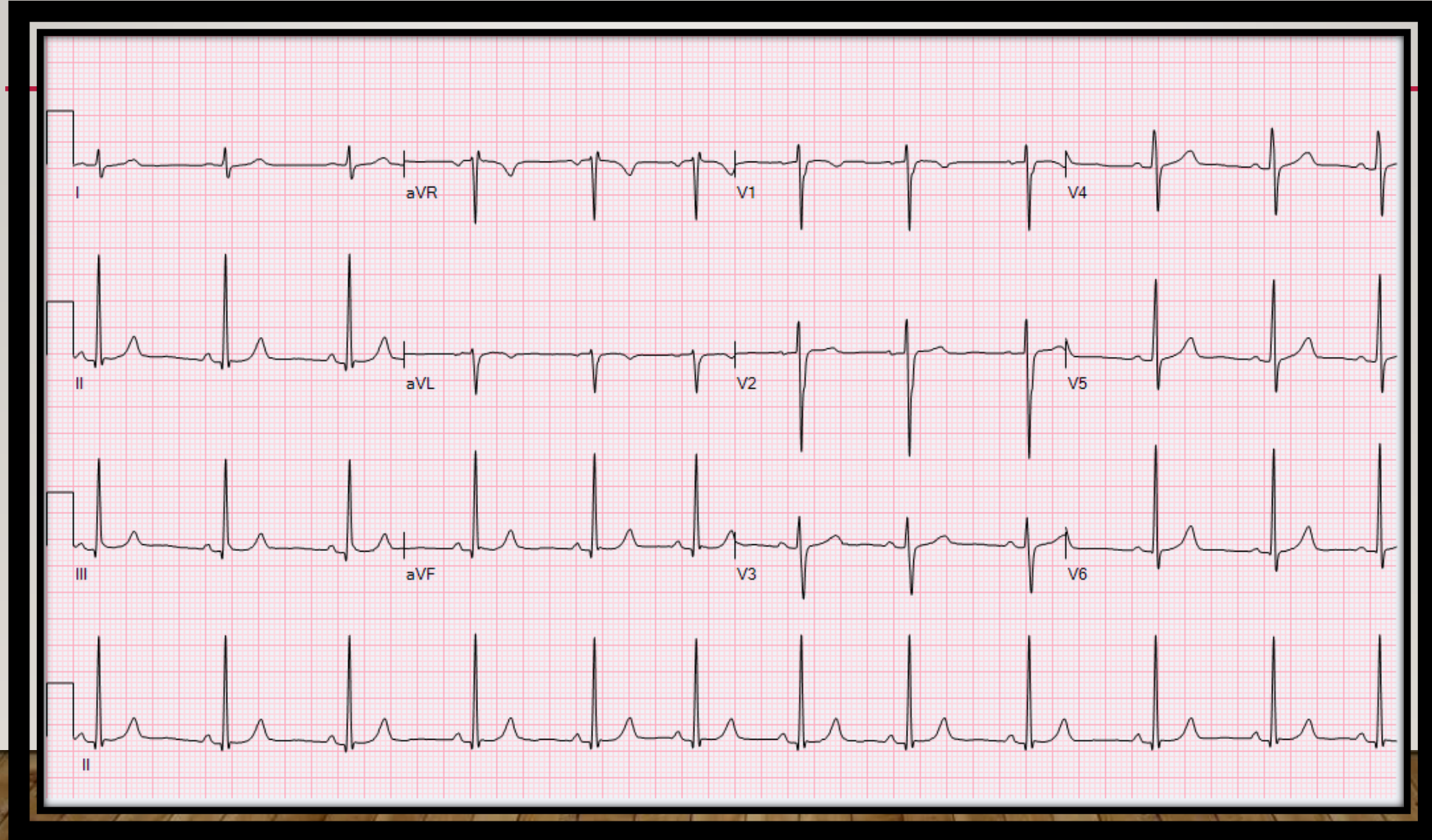
PMID: 34532186 PMCID: PMC8435208 DOI: 10.7759/cureus.17156

Postural orthostatic tachycardia syndrome (POTS) and other autonomic disorders after COVID-19 infection: a case series of 20 patients

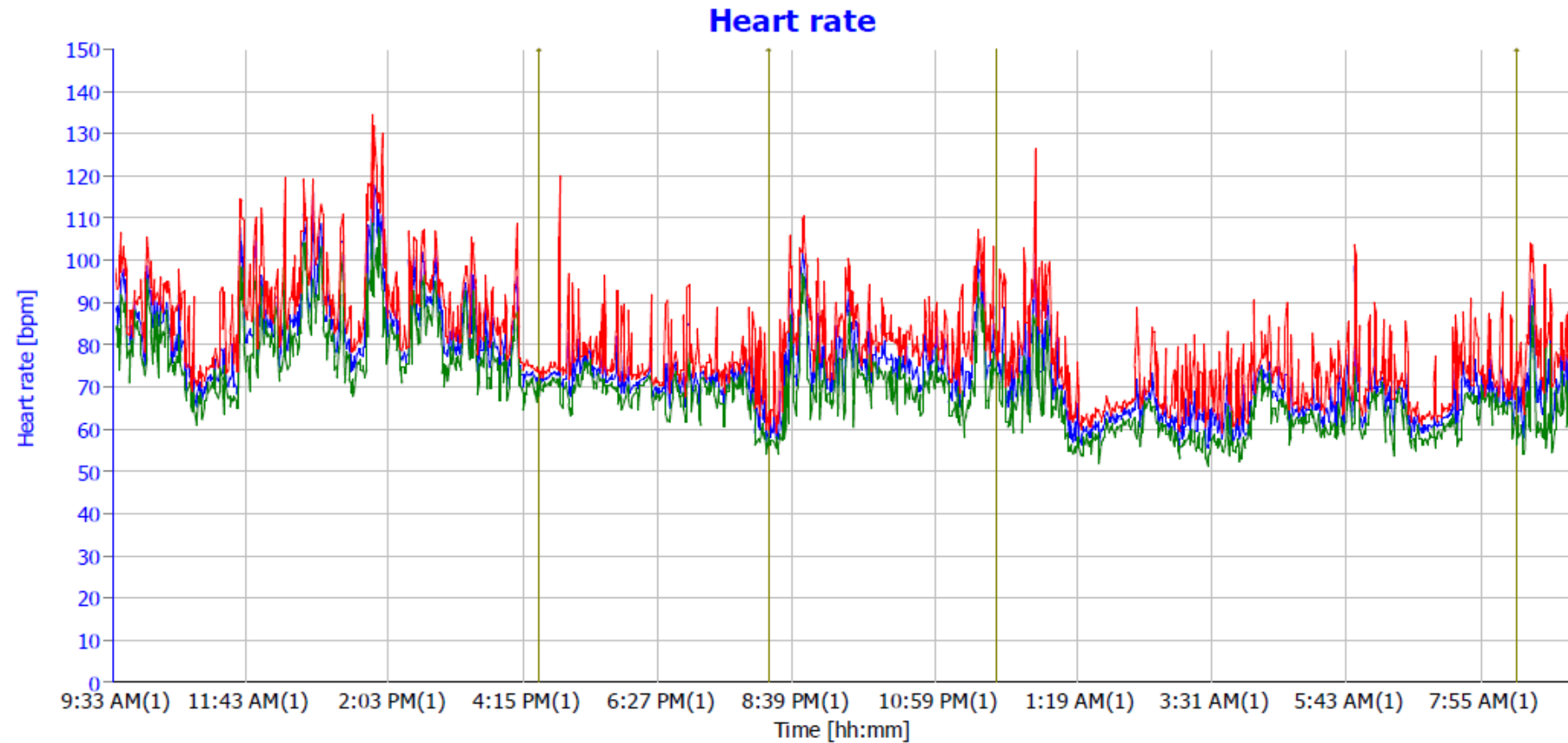


THE ELECTROCARDIOGRAM

“10 SECOND OF GOLD”



HOLTER



Heart rate, recording		Supraventricular arrhythmias		Ventricular arrhythmias	
Mean	: 76 bpm	SVEs total	: 0	(PVC+other V.) total:	0
Minimum/min	: 3:27 AM(1) (56 bpm)	SVEs/h max	: 0 (10:00 AM(1))	(PVC+other V.)/h max:	0 (10:00 AM(1))
Maximum/min	: 1:47 PM(1) (119 bpm)	SVTach total	: 0	VE bigeminy total:	0
Minimum/short	: 3:27 AM(1) (51 bpm)			VE couplets total:	0
Maximum/short	: 1:47 PM(1) (135 bpm)			VE triplets total:	0
Total duration	: 24.00 h			Runs total	: 0
Total beats	: 106346			VE tachy. total	: 0
Artifact share	: 3%			R on T total	: 0

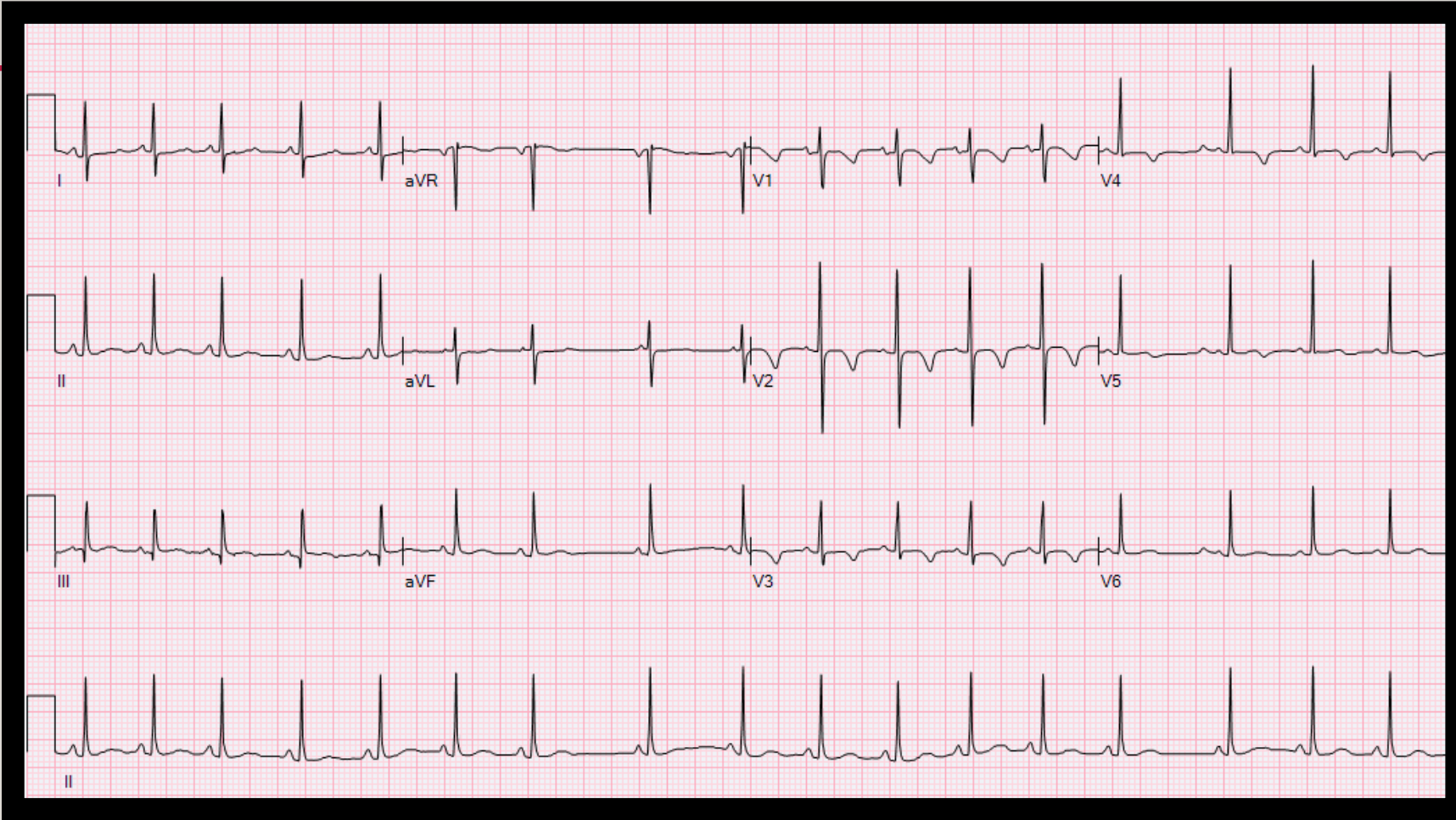
STUDIES ON HOLTERS AND PALPITATIONS

- 1319 Pediatric patients
 - evaluated for palpitations. 8.8% revealed abnormalities. 6.5% had management changes.
- Hegazy RA, Lotfy WN. The value of Holter monitoring in the assessment of Pediatric patients. *Indian Pacing Electrophysiol J* 2007;7:204–214
- 336 Holters pediatric patients for palpitations. 12/336 had ventricular extra beats. 8/336 had supra-ventricular beats.
- [Using a Cardiac Event Recorder in Children with Potentially Arrhythmia-Related Symptoms](#). Saygi M, Ergul Y, Ozyilmaz I, Sengul FS, Guvenc O, Aslan E, Guzeltas A, Akdeniz C, Tuzcu V. *Ann Noninvasive Electrocardiol*. 2016 Sep;21(5):500-7. doi: 10.1111/anec.12339. Epub 2016 Jan 21.

ABNORMAL EKG

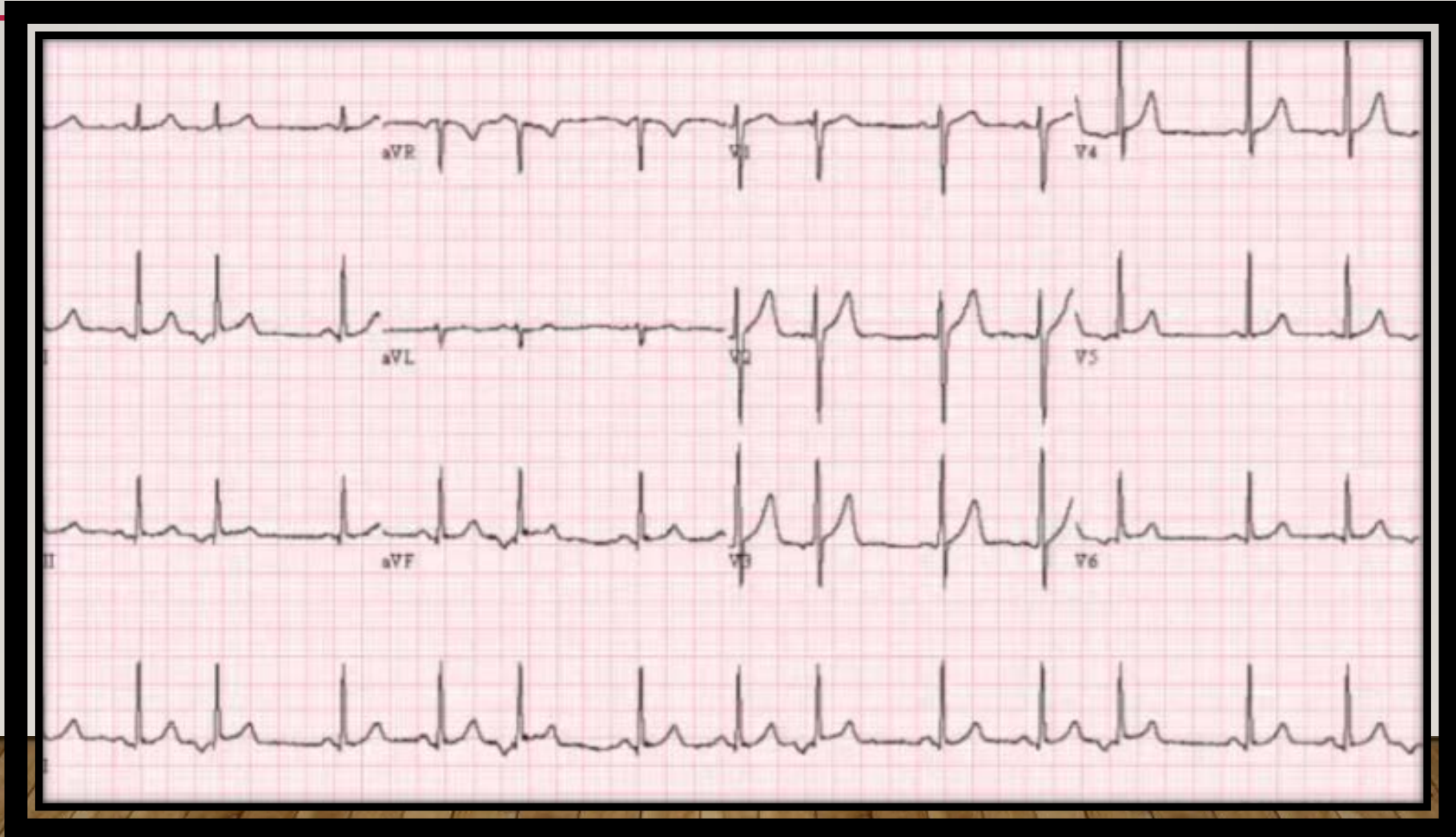
- Premature atrial contractions (PAC's)
 - Premature ventricular contractions (PVC's)
 - Simple vs complex
 - Wolff Parkinson White (WPW)
 - SVT (atrial ectopy, flutter, etc)
 - Long QTc interval/syndrome
-
- Vs Sinus rhythm/sinus arrhythmia/sinus tachycardia

SINUS ARRHYTHMIA

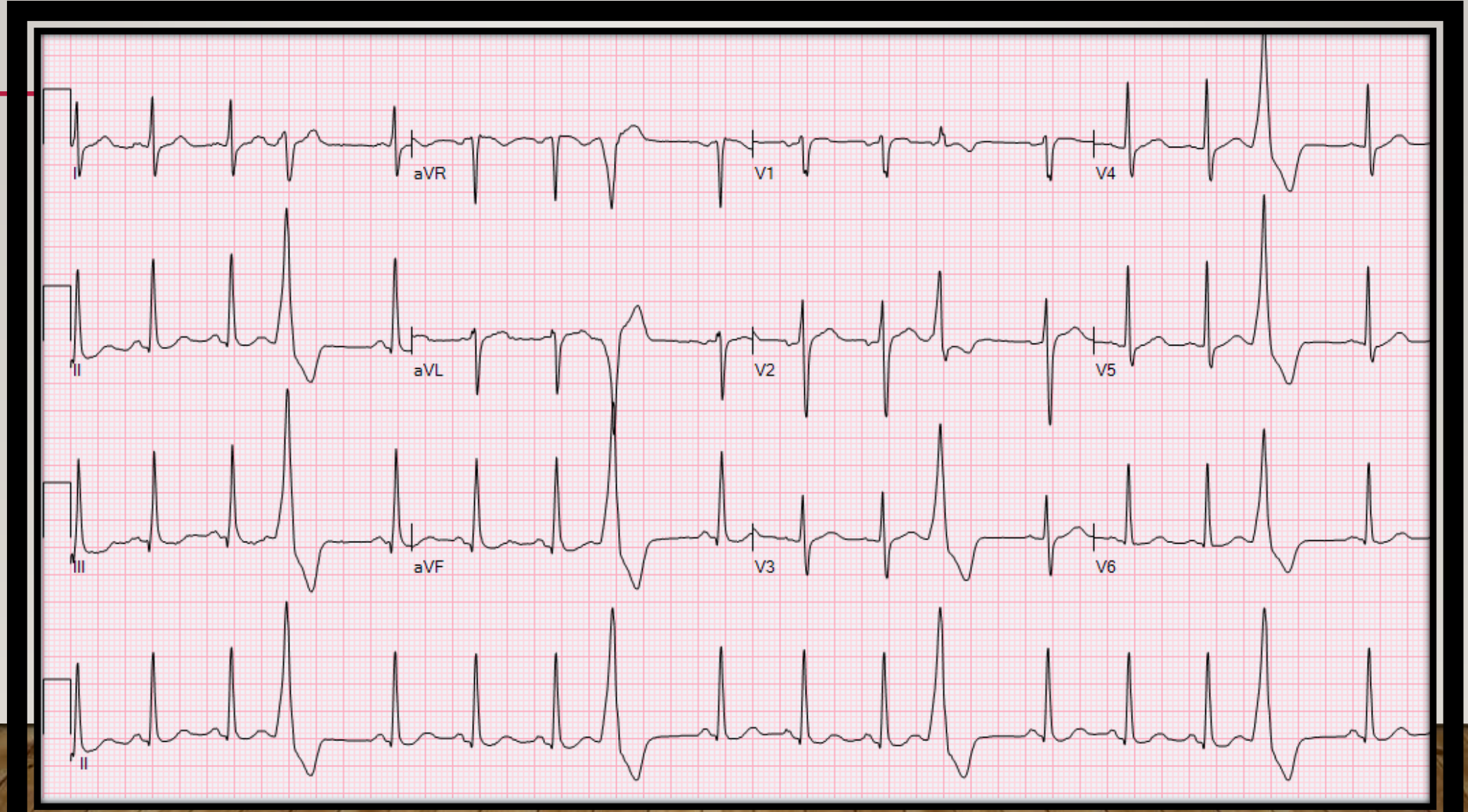


Sinus arrhythmia (a dramatic change in the heart rate but still coming from the **correct place**).

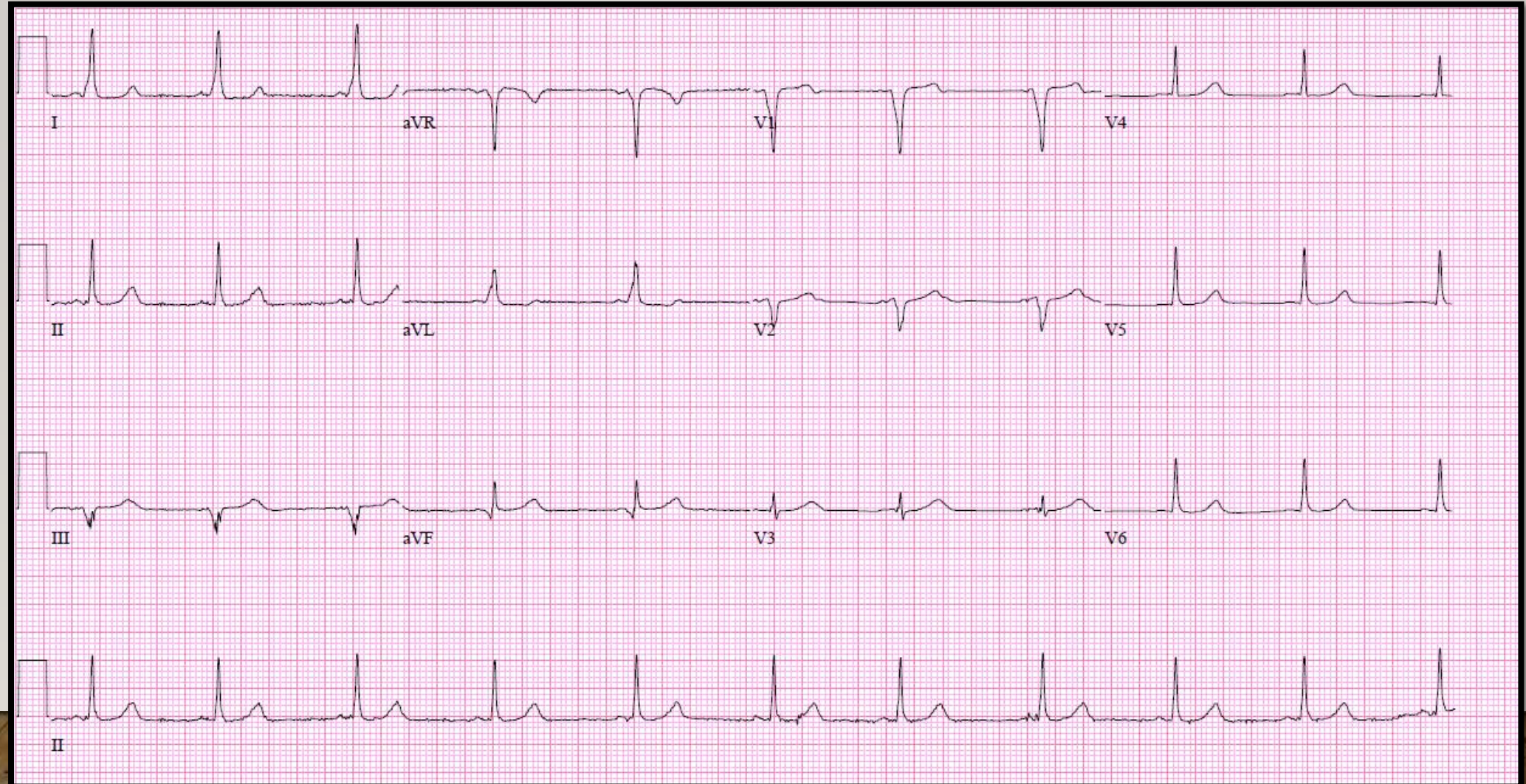
PAC'S



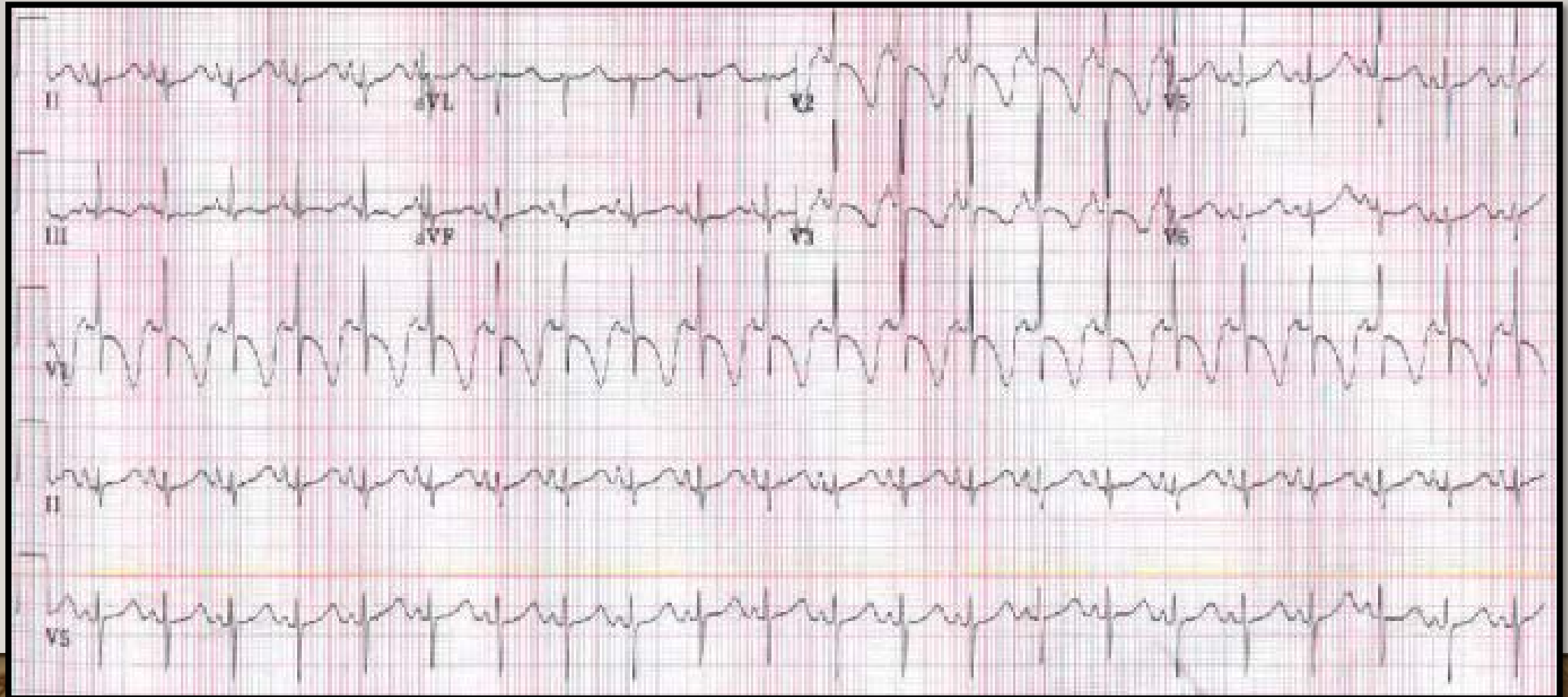
PVC'S



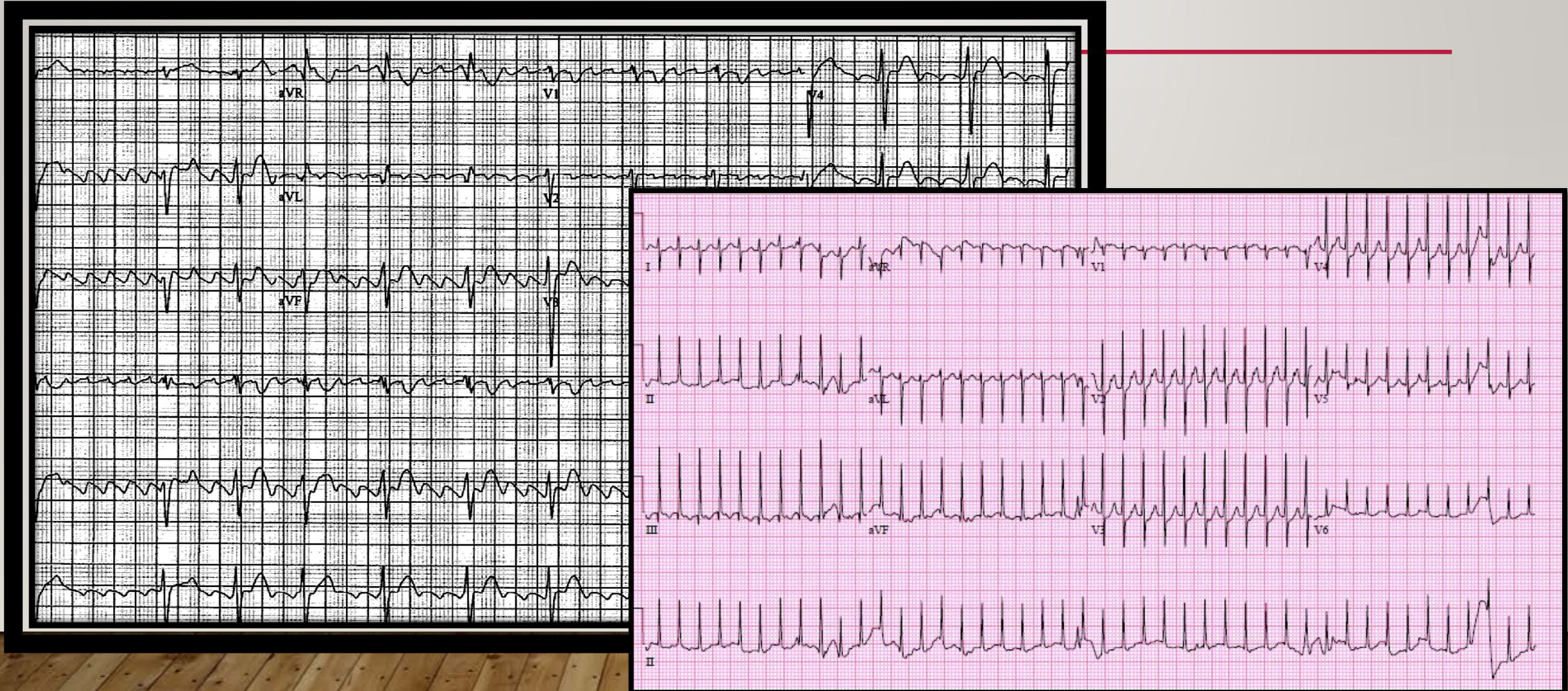
WPW



LONG QT SYNDROME



SVT

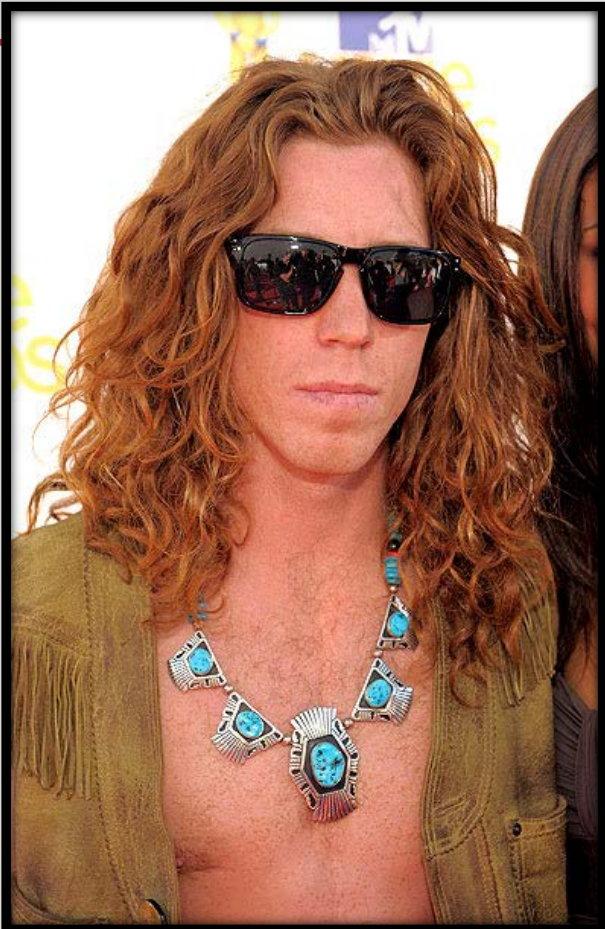


WHEN SHOULD CARDIOLOGIST TREAT WITH BETA BLOCKERS

- Complex PVC's or VT
 - - fast triplets
 - - multiple morphologies
 - - underlying cardiac or systemic disease (CA/pulm)
- SVT or at risk (i.e. WPW)
 - Structural disease
- At risk for arrhythmia (i.e. Long QTc syndrome)
- Genotype positive for arrhythmogenic disease
- Palpitations with no proven arrhythmias (Normal echo/ekg)
 - What is the cause
 - - likely mirror



CHD AND PALPITATIONS



WHEN SHOULD THEY NOT TREAT?

- Palpitations with no proven cardiac disease (genetics/arrhythmias/structural)
- Why not?
 - Because you are not treating the root cause.
 - Anxiety
 - Anemia
 - Should have their own work up
 - Low salt intake
 - Physiologic changes

STRESSFUL SEDENTARY WORLD



VS

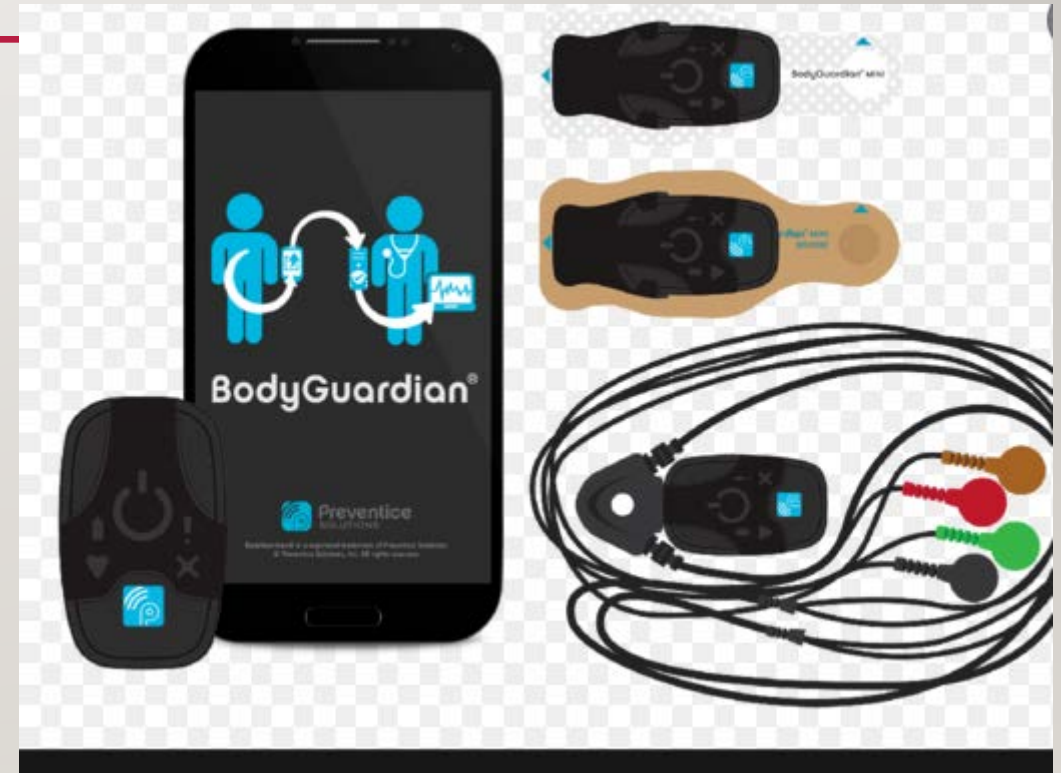
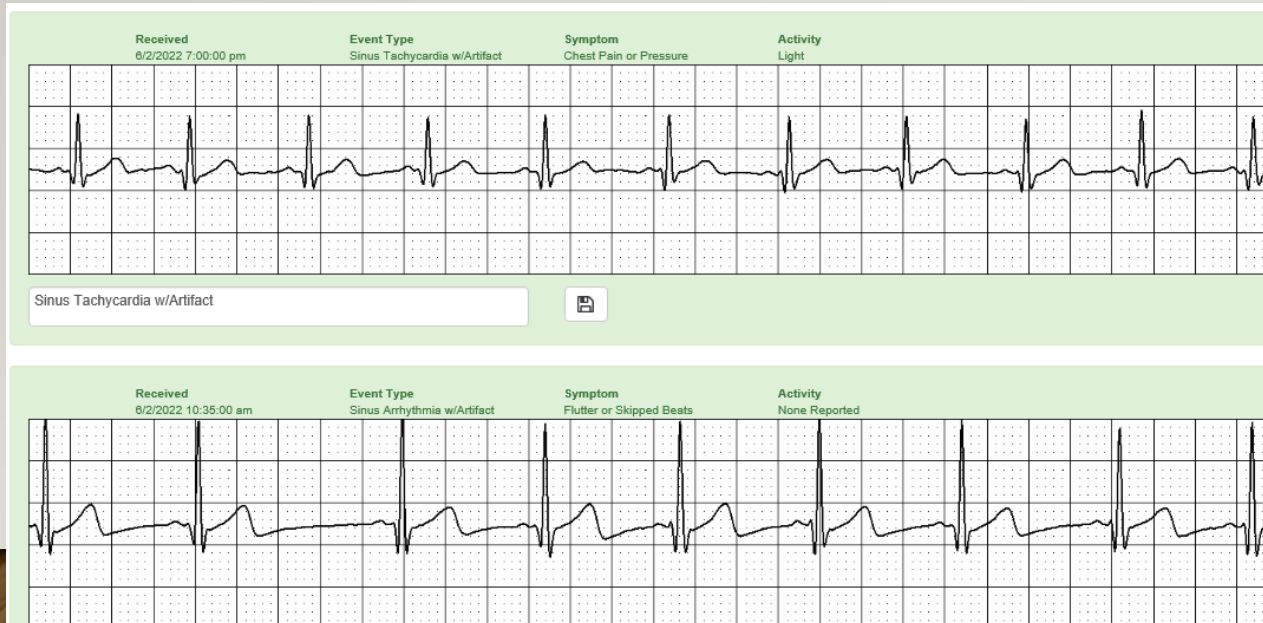


BUT I STILL HAVE PALPITATIONS?

- Ok.
 - Accept the feeling/emotion vs denying.
 - It still does not have to be cardiac in origin
 - Remember the heart has lots of innervation (“mirror organ”) so it could be reflecting.
- Treatment should focus on stressors

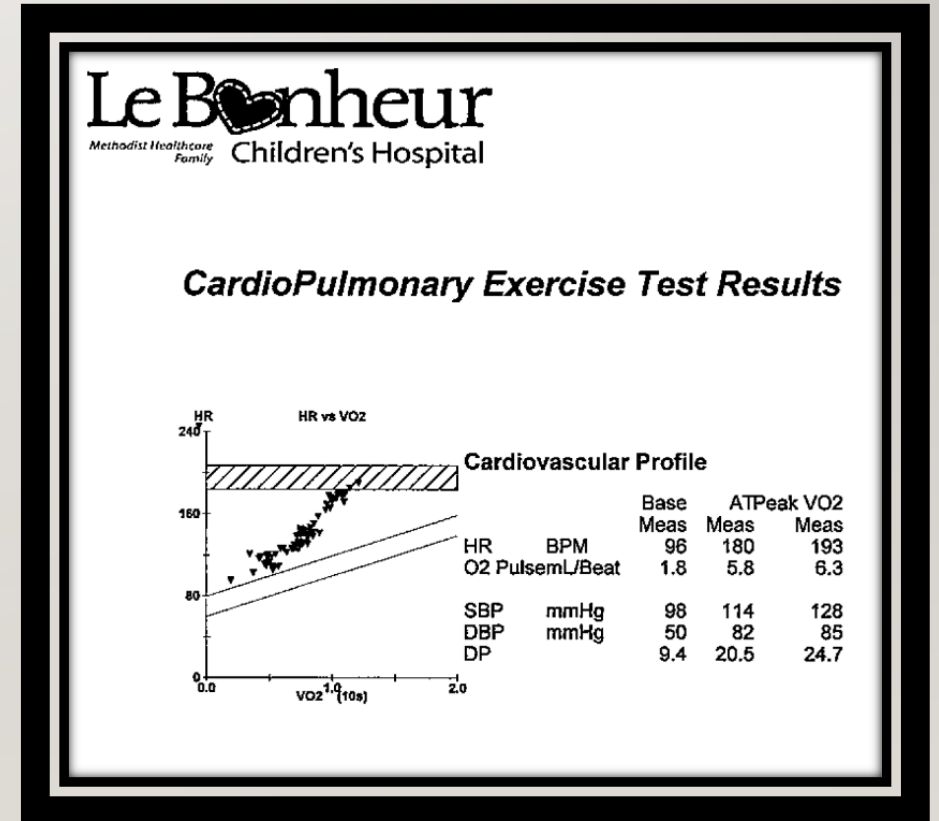
EVENT RECORDERS

- 30 day event monitors
 - 1 minute vs continuous monitors
 - Patch vs lead monitors

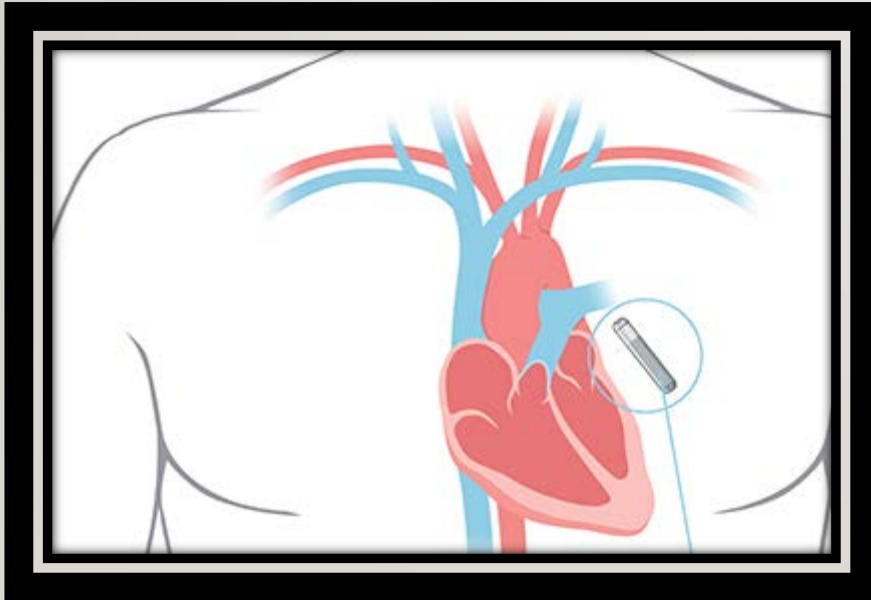




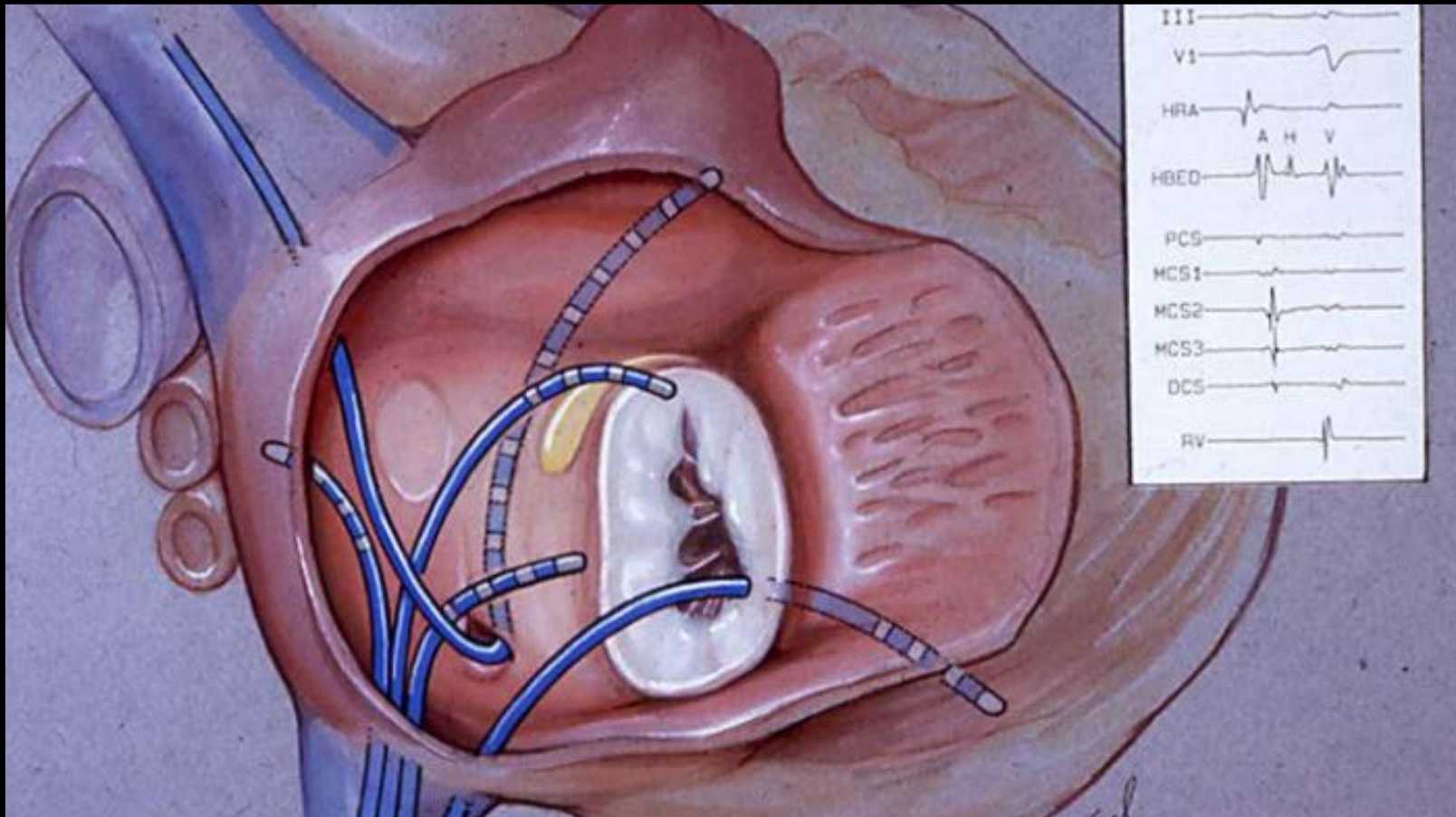
STRESS TESTING



IMPLANTABLE LOOP RECORDER



EP STUDY



CONCLUSION

- 1. The heart is a dynamic hard-working organ
- 2. Palpitations
 - Common.
 - Know how to work them up (non cardiac and cardiac causes)
 - Know the role of the cardiologist on treatment)
- 3. Role of cardiac testing (EKG, Holter, Event monitor, Stress test, implantable recorders)
- 4. Sometimes reassurance is the best medicine