

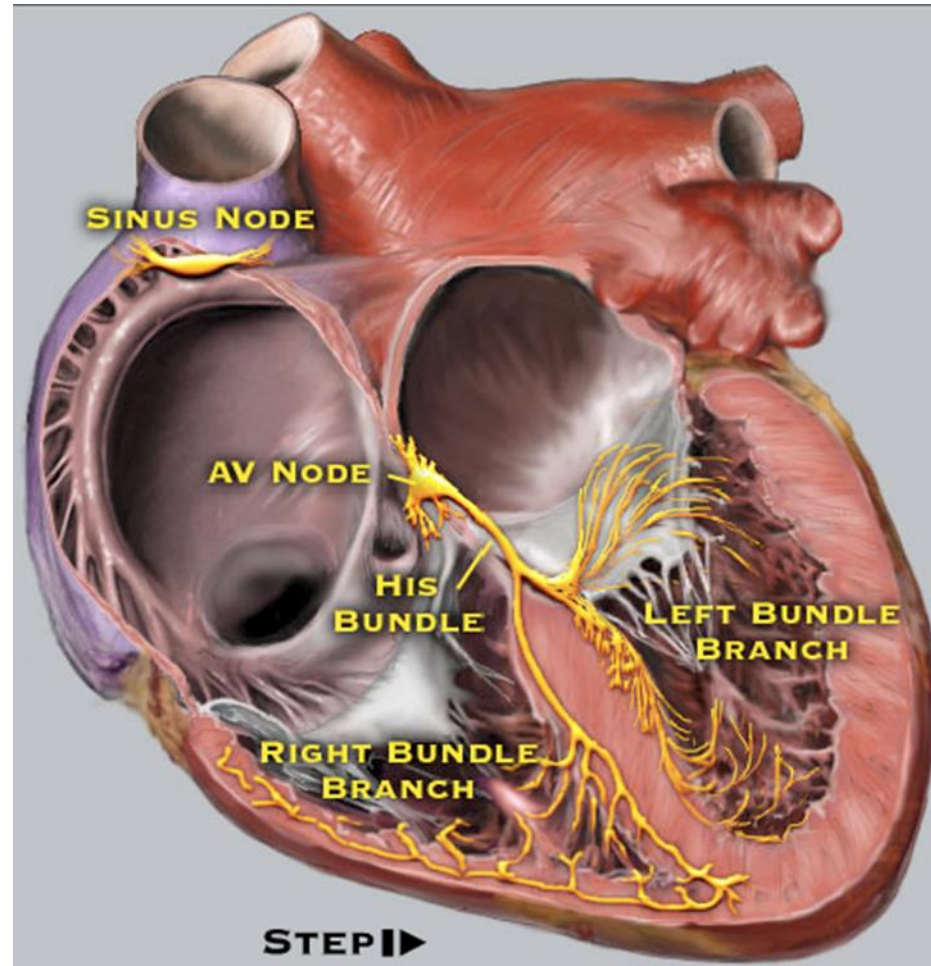
# Management of arrhythmias: A primary care perspective

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Too SLOW =  
bradycardia



Too FAST =  
tachycardia

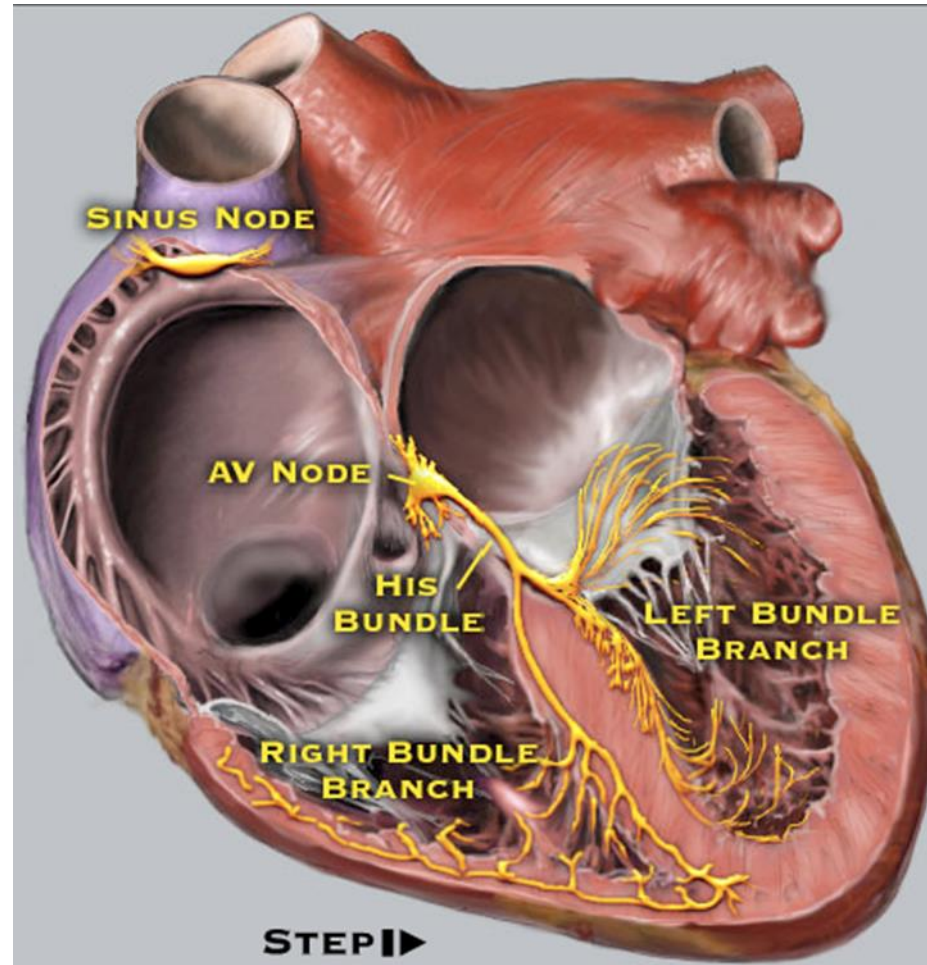
## PHYSIOLOGICAL

Too SLOW =  
bradycardia

Being very “fit”

Vagal state –  
“nocturnal  
pauses”

Reflex response



Too FAST =  
tachycardia  
STRESS

“running from  
a sabre tooth  
tiger”

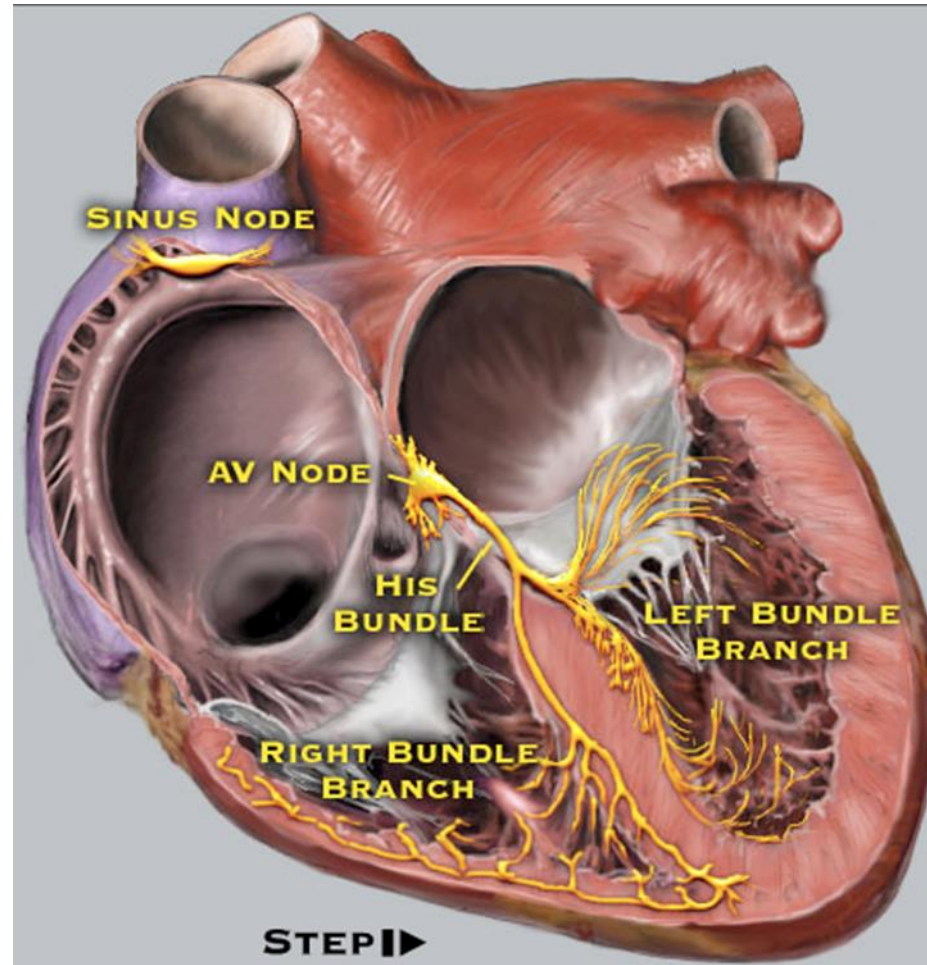
“being late for  
mother in-  
law’s Xmas  
dinner”

Anxiety

## PATHOLOGICAL

Too SLOW =  
bradycardia

Progressive  
“fibrosis/scar” in  
the electrical  
system in the  
heart



Too FAST =  
tachycardia

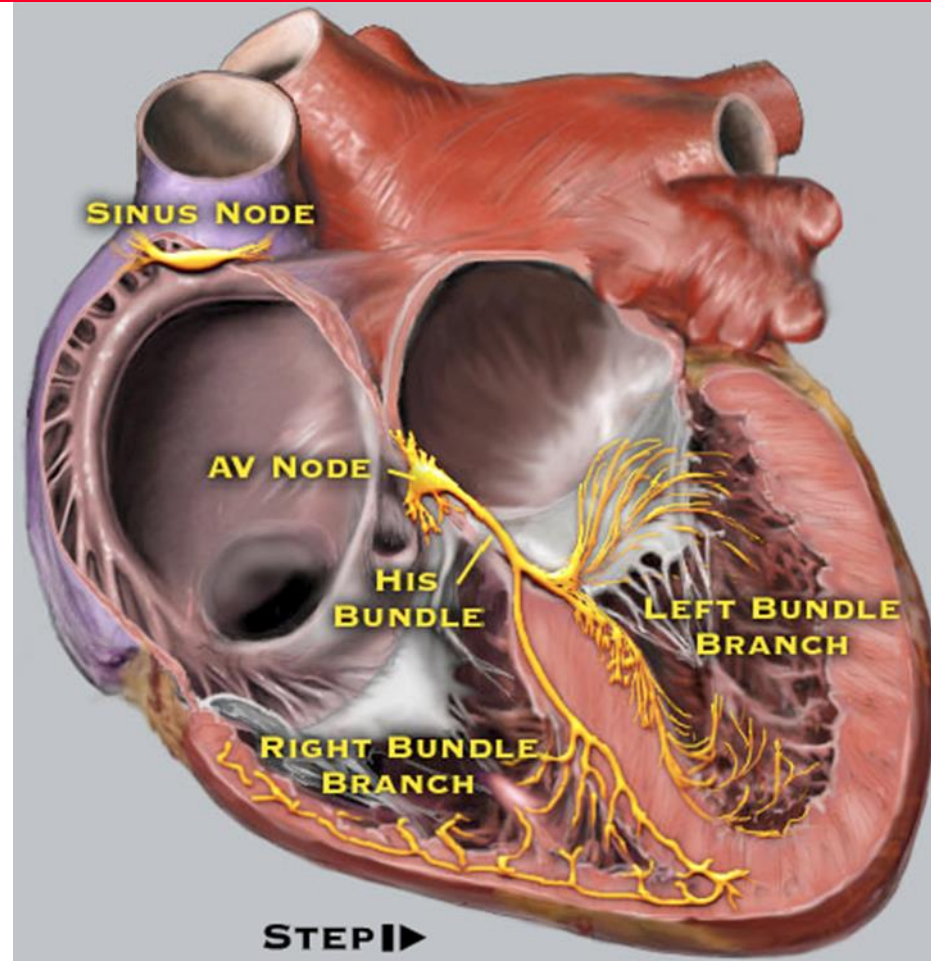
Abnormal “circuits”  
: SVT, VT

Abnormal  
automaticity:  
Excessive ectopic  
beats

Irregularity: AF/VF

## So where do ectopic beats / palpitations fit in ?

Too SLOW =  
bradycardia

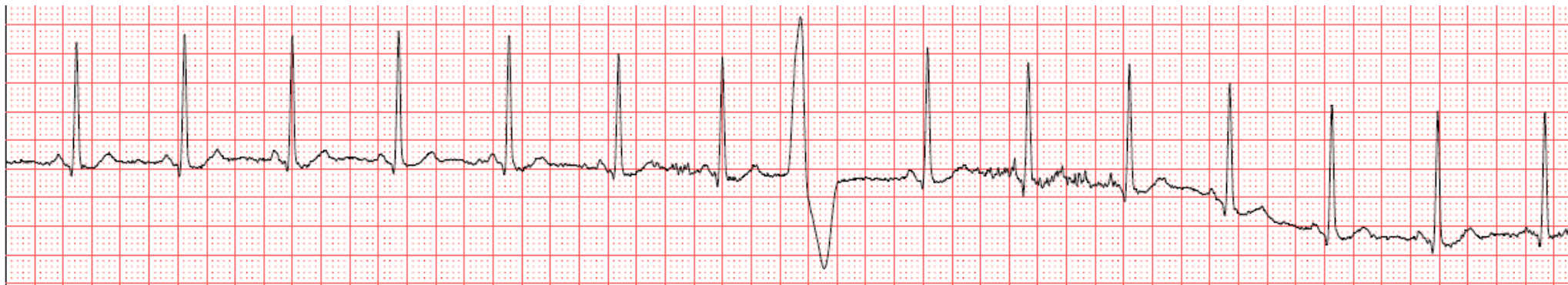
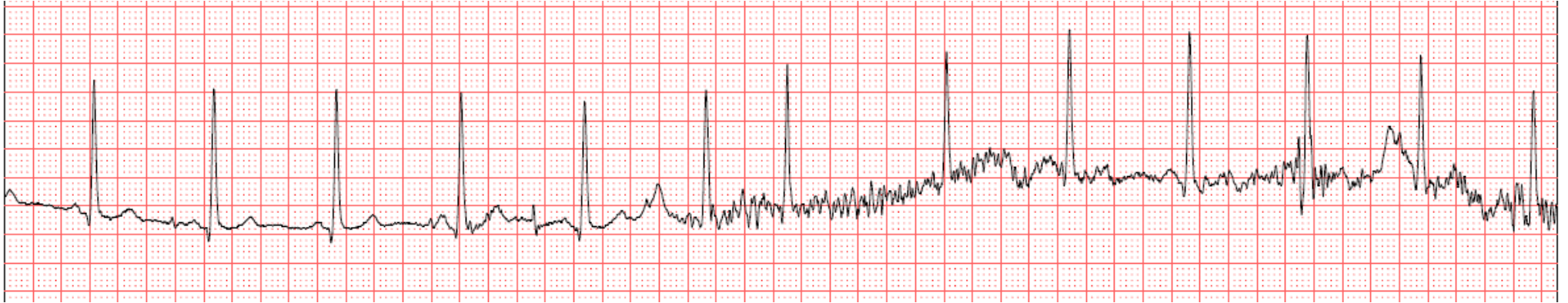


Too FAST =  
tachycardia

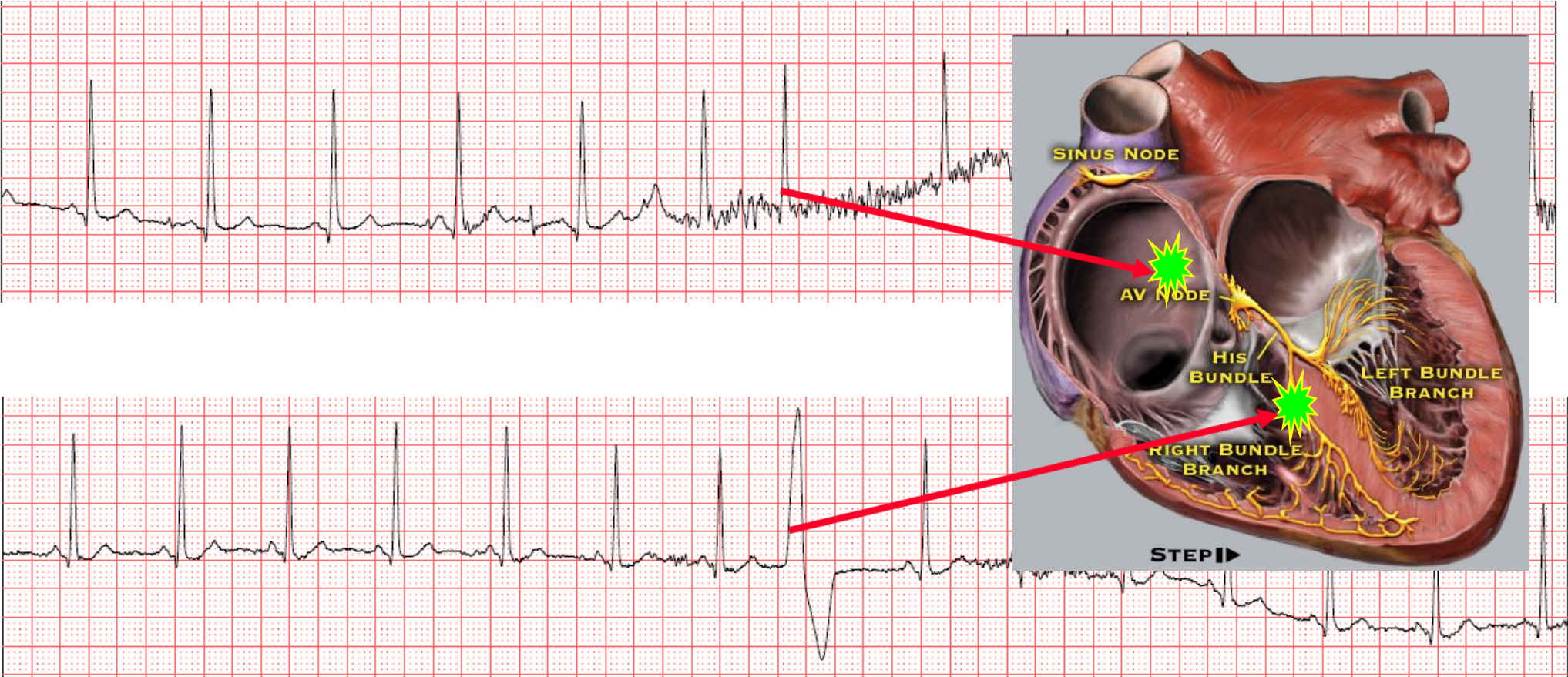
## Normal heart function

- The natural “pacemaker” is the sinus node.
- The sinus node works relentlessly 24/7
- Approx 100,000 heart beats per day
- Diurnal variation (ie slower at night, faster when needs to be)
- All hearts are created with “backup” pacemaker cells

## Some examples of ...



# Are these palpitations?





## Ectopic beats vs palpitations

- ECTOPIC BEATS
  - Are description of extra beats which may arise from the atria of ventricles
  - May or may not be associated with symptoms!
- PALPITATIONS
  - Are a **patient's** description of symptoms
  - May or may not be associated with ectopic beats!

# What tools can be used to investigate palpitations?

- ECG
- 24 Hour Holter monitor
- 7 day event recorder
- Implantable Loop Recorder
  
- Self monitoring smart devices: Alive Cor.

# Mobile ECG

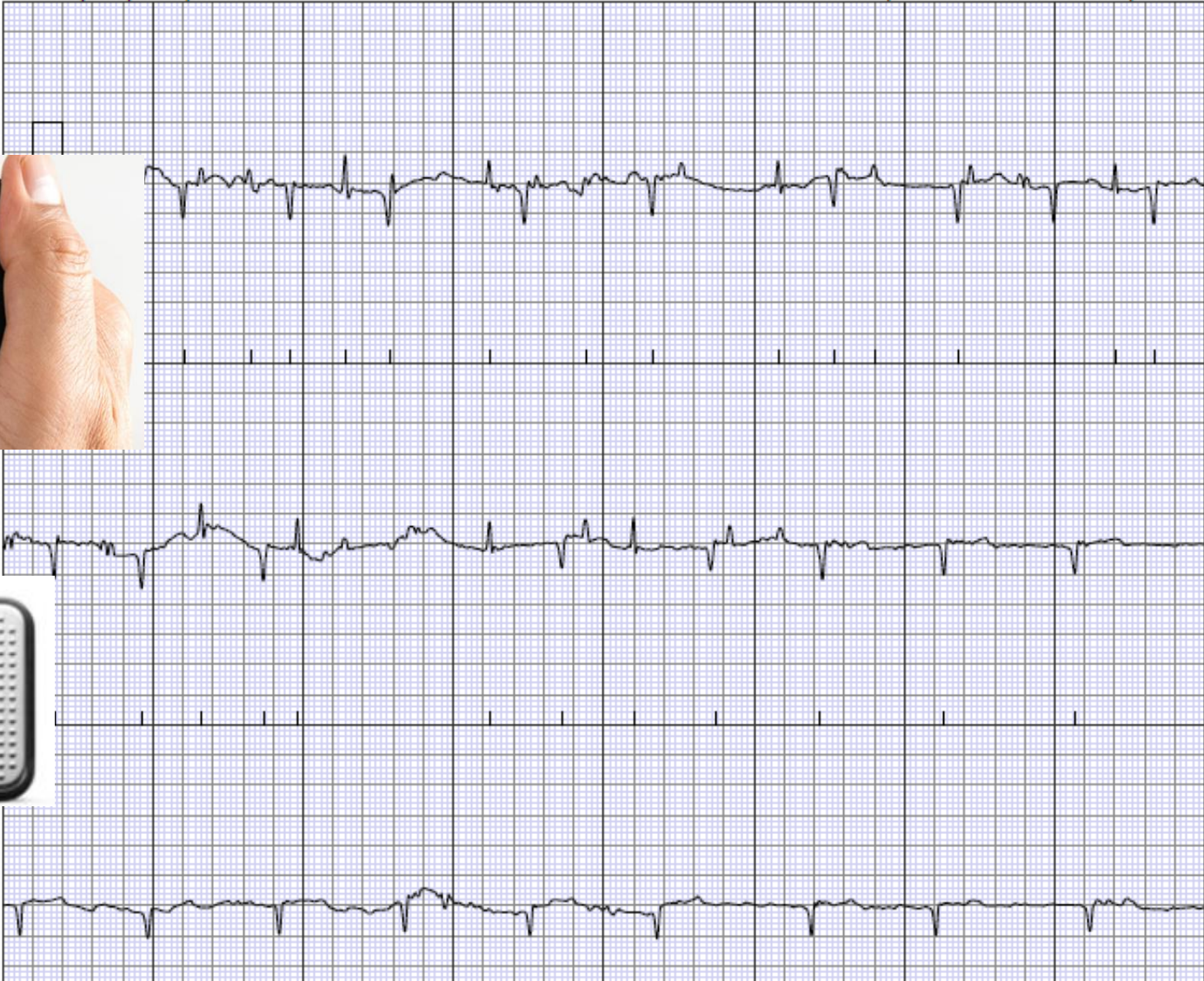
Patient: S A  
Recorded: Thursday, September 15, 2016 at 10:48:30 AM  
Heart Rate: 83 bpm

Finding by AliveCor: Possible atrial fibrillation

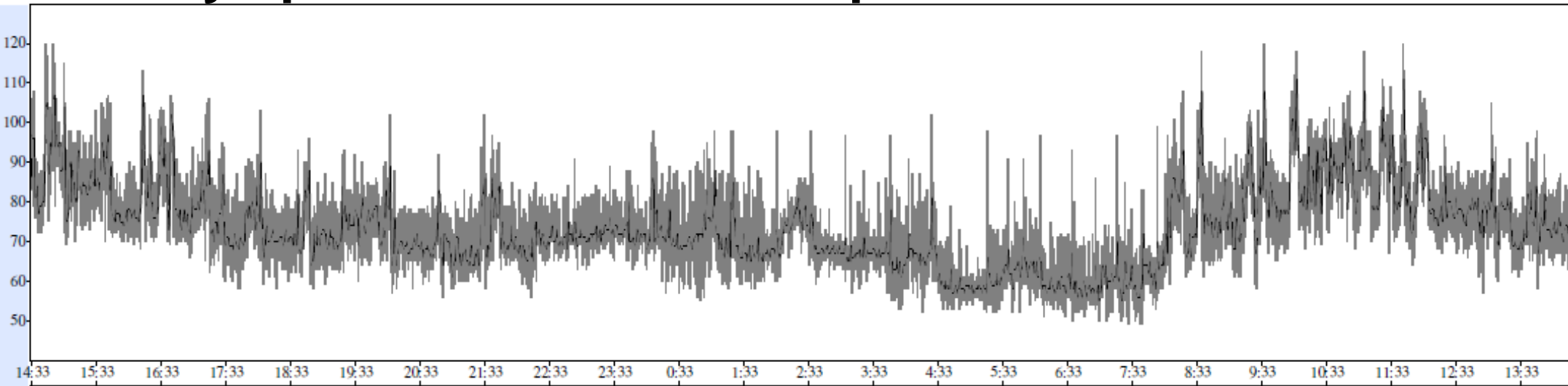
AliveCor

Recorded by: Dr Vipin Patel, Chestnut Practice

Enhanced filter, Mains Filter: 50Hz Scale: 25mm/s, 10mm/mV



# Symptom correlation is important! Case 1



24h ECG report:

Sinus Rhythm throughout the recording,

76 VEs seen in isolation.

2 SVEs seen in isolation.

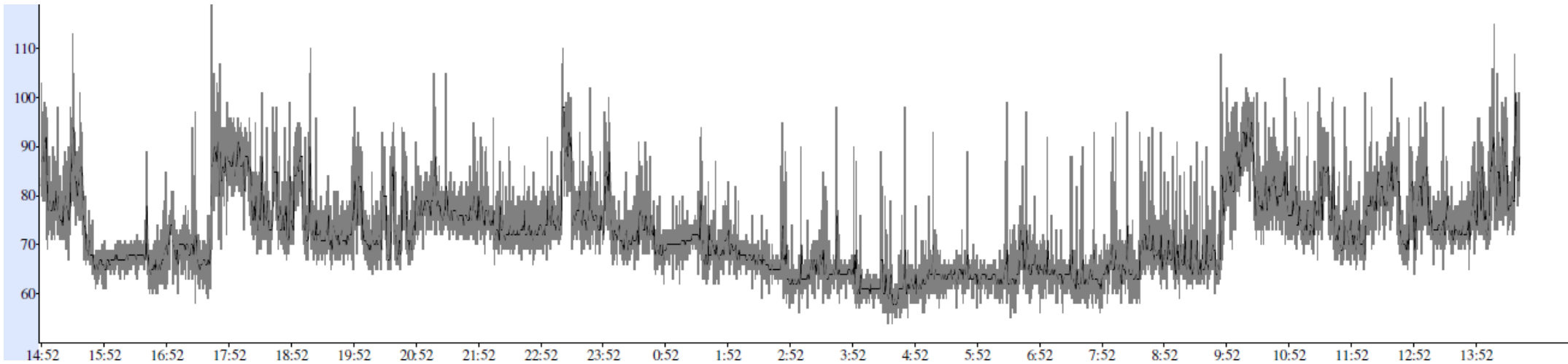
Min HR: 49bpm.

Mean HR: 73bpm.

Max HR: 120bpm.

The patient reported "palpitations" at 23:10 corresponding to Sinus Rhythm with Ventricular Ectopics seen in isolation.

# Symptom correlation is important! Case 2



24h ECG report:

Sinus Rhythm throughout the recording.

43 VEs seen in isolation.

1 SVE seen in isolation.

Min HR: 54bpm.

Mean HR: 72bpm.

Max HR: 119bpm.

The patient reported "palpitations" and "feel heavy" during the monitoring corresponding to Sinus Rhythm.

**SUMMARY**

Date of report 19/12/2011 15:46:19

Hook-up date :	16/12/2011 18:25:00	Min Sinus HR (*/D) :	62 (66/62) at 4:27:20
Duration :	24:00	Mean Sinus HR (*/D) :	86 (90/78)
Recorder n° :	VIP10000894	Max Sinus HR (*/D) :	129 (129/122) at 12:09:53
Duration analysed :	23:39:42	SDNN :	90 ms
Number of QRS :	119242	PNN50 :	0.60 %

Bradycardias :	0
Pauses :	0 ; RR max 1.35 seconds (5:58:52)
Relative pauses :	0
AF :	0
AF burden :	
ST :	0

Ventricular events		Supraventricular events	
VPB :	390 (0%)	Templates :	1
Couplets :	1	Triplets :	0
bigeminy :	0		
VT :	2 ; longest 44 QRS at 179 min-1 (1:29:58)	SVPB :	19 (0%)
IVR/AIVR :	0	Couplets :	1
		Triplets :	0
		SVPT :	2 ; longest 5 QRS at 134 min-1 (21:21:18)

Criteria for analysis : Min VT HR120 min<sup>-1</sup>, SVPB 25%, Pause 2.50s, Brady HR 40 min<sup>-1</sup>, Tachy HR 120 min<sup>-1</sup>, Getting up time 07:00, Bedtime 23:00,  
The values in *italics* in the tables have been modified manually

**CONCLUSION**

Technical report: 72HR monitor day 2

Sinus rhythm with two episodes of VT runs

VT run of 13beats @ 135bpm at 05:56:46  
Longest and fastest VT run of 44beats @217bpm at 01:30:00

VE singles 331  
SVE runs x 2  
SVE couplets x 2  
SVE singles x 6

Max R-R: 1.35sec at 05:58:52

Max HR: 217bpm (VT) @ 1:30:11  
Max HR: 129bpm at 12:09:53  
Min HR: 62bpm at 04:27:20

No diary returned

Holter  
shows VT –

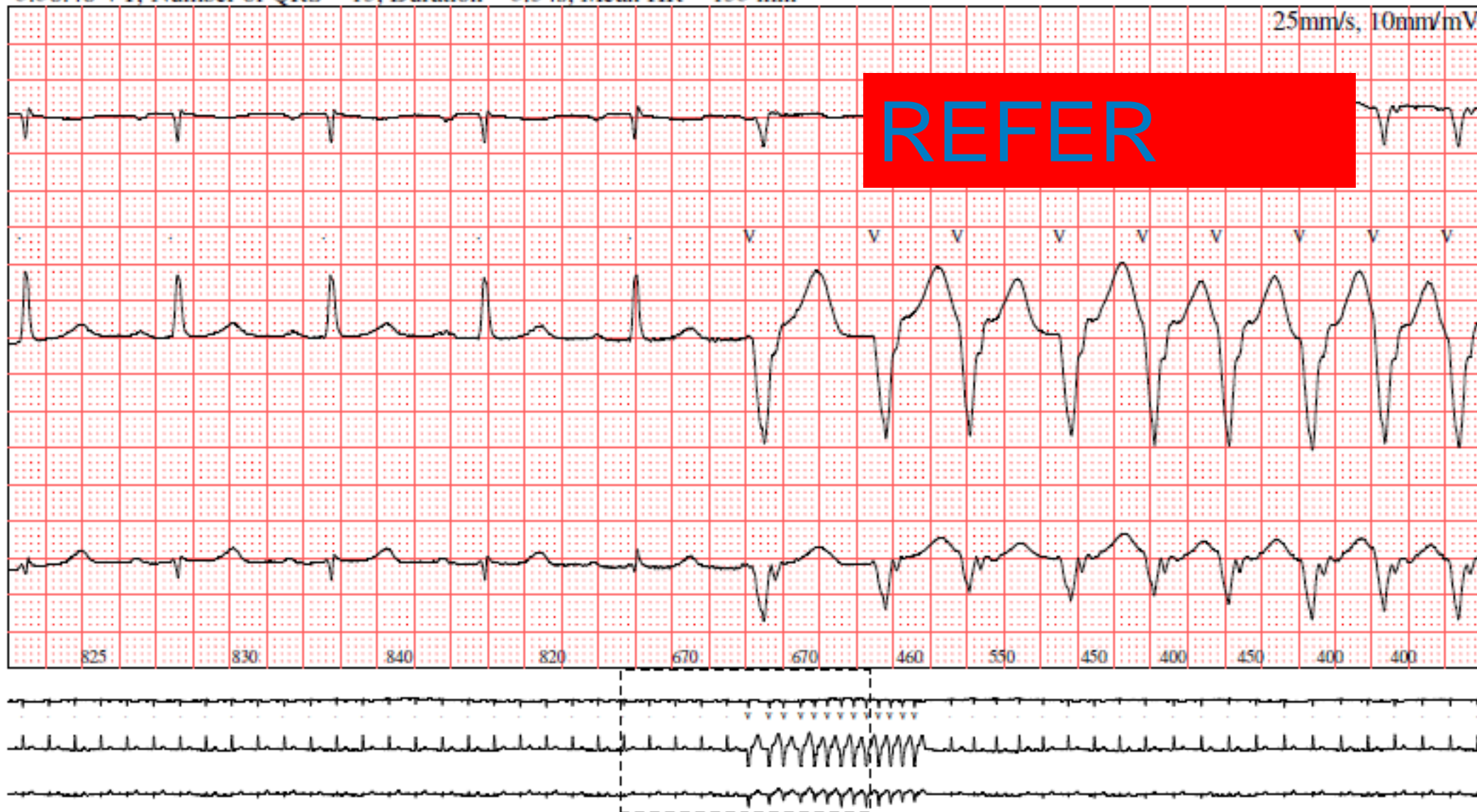
Case of 56  
yo woman  
with HTN  
and obesity  
only

Do you  
refer?

5:56:46 VT; Number of QRS = 13; Duration = 5.34s; Mean HR = 135 min<sup>-1</sup>

25mm/s, 10mm/mV

**REFER**



# Management of non-sustained BCT

- **Refer** if uncertain
- If VT + syncope → will need consideration for ICD
- Fhx sudden death is relevant.
- IHD = high likelihood that this is ischaemic VT (commonest)
- If no IHD, Will need work up for Arrhythmogenic right ventricular cardiomyopathy, Brugada, Hypertrophic cardiomyopathy, Long QT syndrome, Early repolarisation syndromes
- At tertiary centre : thorough Hx, CMRI, ajmaline and adrenaline challenge, VT stimulation study, Reveal device



Case of 30  
yo woman  
with palps,  
but no  
syncope.  
Normal  
echo

Should  
she be  
referred?

Hook-up date :	03/05/2012 14:41:00	Min Sinus HR (* / Ⓜ) :	55 (56/55) at 6:49:18
Duration :	24:00	Mean Sinus HR (* / Ⓜ) :	82 (83/80)
Recorder n <sup>o</sup> :	VIP10000899	Max Sinus HR (* / Ⓜ) :	127 (127/111) at 8:13:03
Duration analysed :	23:07:38	SDNN :	98 ms
Number of QRS :	113109	PNN50 :	18.90 %
Bradycardias : 0 Pauses : 0 ; RR max 1.36 seconds (23:43:31) Relative pauses : 0 AF : 0 AF burden : ST 0			
VPB : 12027 (10%) Couplets : 0 bigeminy : 31 ; longest 11.24 seconds (10:49:22) VT : 0 IVR/AIVR : 0		Ventricular events Templates : 1 Triplets : 0	
		Supraventricular events SVPB : 98 (0%) Couplets : 2 Triplets : 1 SVPT : 0	

Criteria for analysis : Min VT HR120 min<sup>-1</sup>, SVPB 25%, Pause 2.50s, Brady HR 40 min<sup>-1</sup>, Tachy HR 120 min<sup>-1</sup>, Getting up time 07:00, Bedtime 23:00,  
The values in italics in the tables have been modified manually

### CONCLUSION

Technical Report:

Sinus Rhythm with frequent VE's

VE singles x 12027

Occasional VE trigeminy and bigeminy cycles

SVE triplets x 1

SVE couplets x 2

SVE singles x 98

Max R-R: 1.36sec at 23:43:31

Max HR: 127bpm at 08:13:03

Min HR: 55bpm at 06:49:18

No diary returned

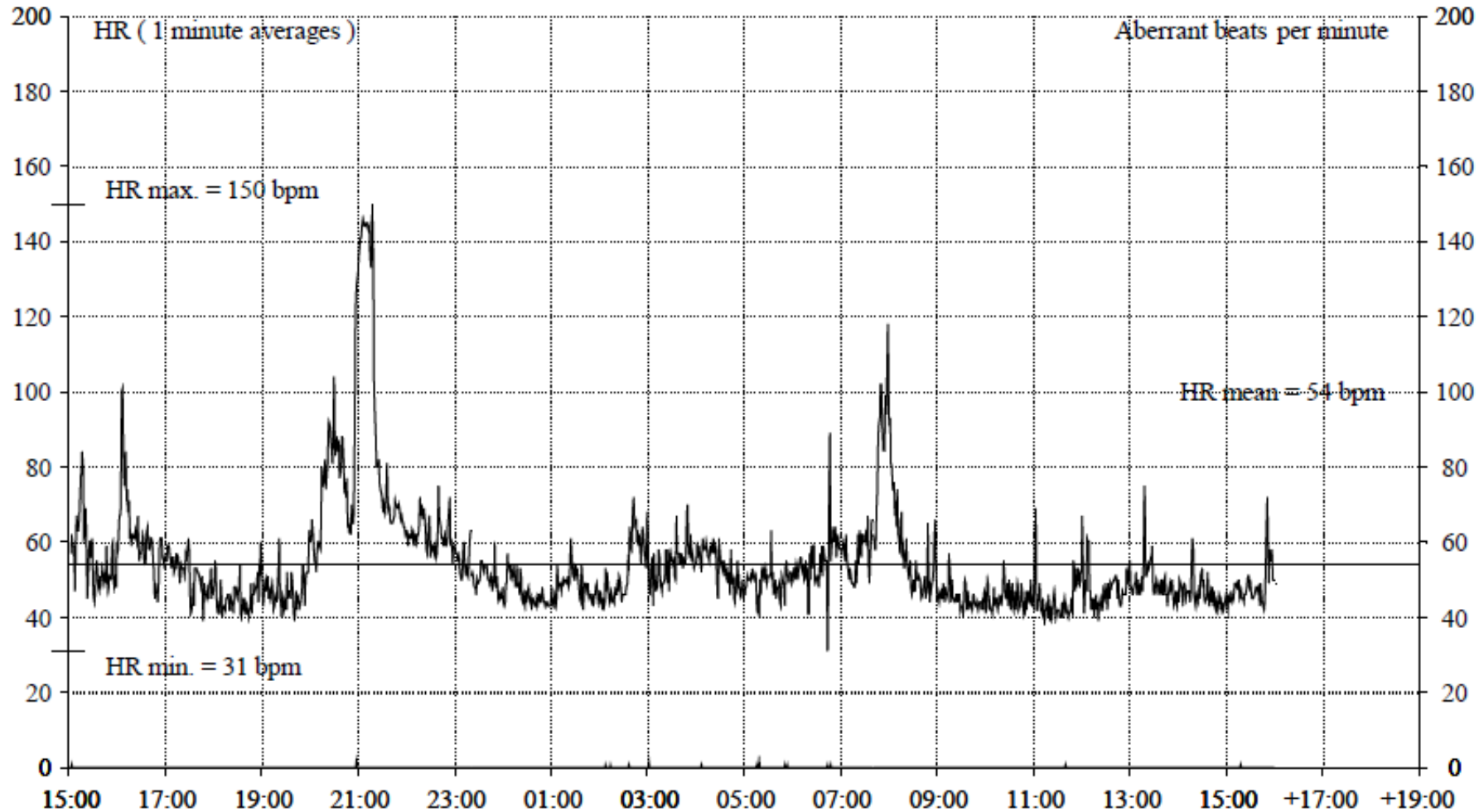
## Other clinical cases – the HOLTHER report, what does it mean?

- Echo – Normal
- VE > 10,000, but no sustained VT

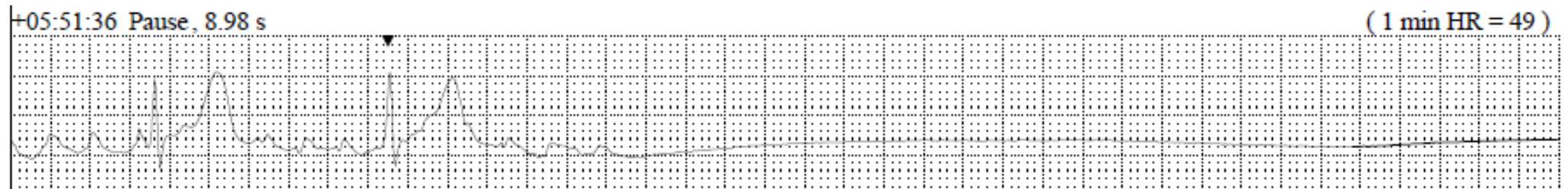
### Challenging / Unanswered questions

- what is natural progression of disease?
- What burden of ectopy is considered “high” enough to warrant therapy?
- At what stage do you start therapy?
- Drugs or ablation ?

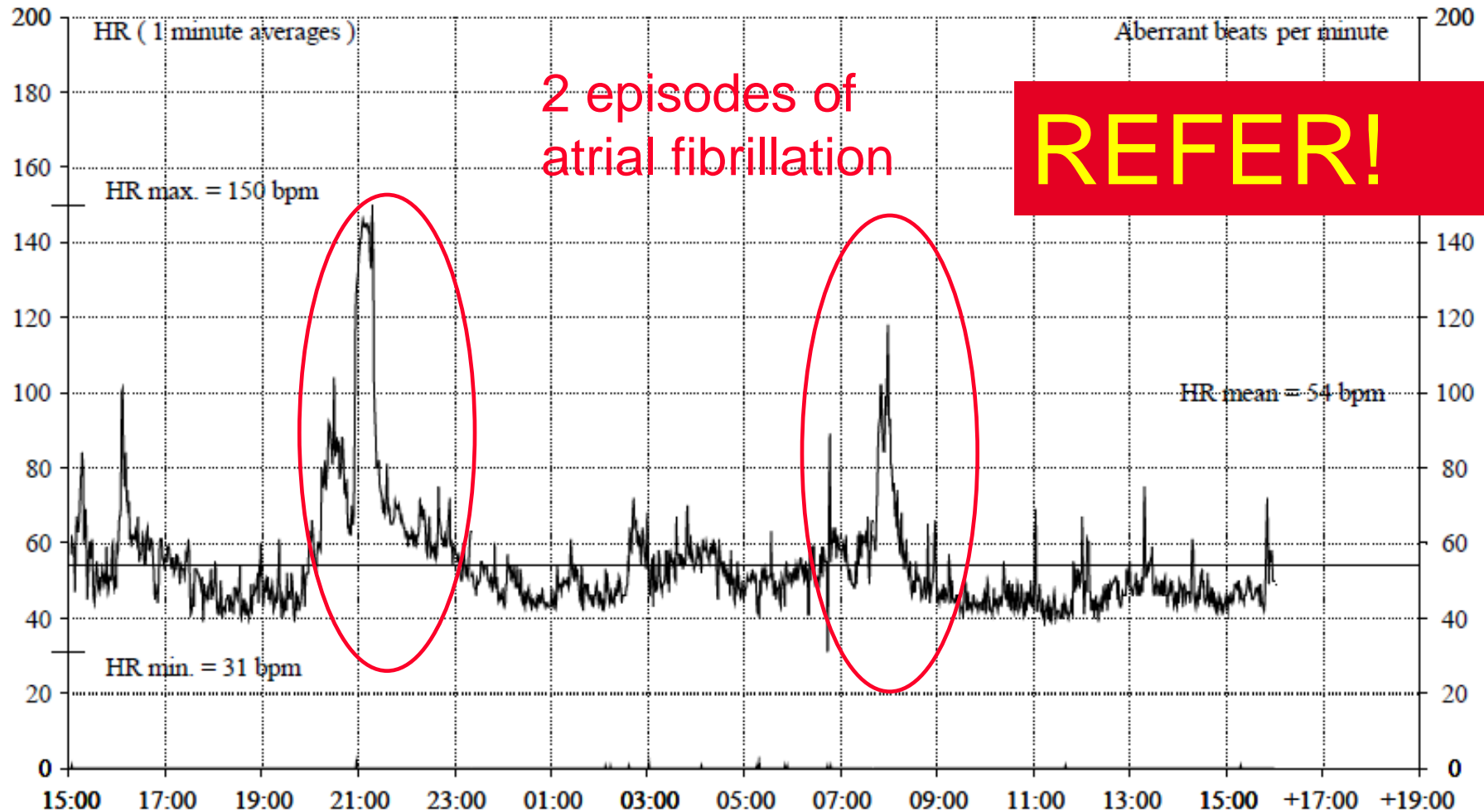
# 55yo patient with syncope: What is this?



# Patient c/o palpitations, then fainting



# AF with offset pauses



# Definitions

## **2012 HRS/EHRA/ECAS expert consensus statement on catheter and surgical ablation of atrial fibrillation: recommendations for patient selection, procedural techniques, patient management and follow-up, definitions, endpoints, and research trial design**

March 2012, Europace, Heart Rhythm, J Interv Cardiac Electrophysiol

Paroxysmal	:	recurrent (>2 episodes) with spontaneous termination <7 days
Persistent	:	AF > 7 days, or needs cardioversion
Longstanding Persistent	:	AF > 1 year
Permanent	:	“State of mind” of physician/patient - acceptance of long term AF
Caveat, Post “early” DCCV	:	within 48h (Paroxysmal)
	:	> 48 hours (Persistent)

# Case scenario 1

- 76 year old lady with HTN, DM, with persistent AF for 5 years and NYHA 2. Echo shows mildly impaired LV and LA size of 4.9cm. What is optimal management?

# Management questions

Questions:

1. Rate vs Rhythm?
2. Anticoagulate or not? = STROKE PREVENTION



# Rate vs rhythm

- **Decision based on**

1. Symptoms, despite best drug therapy
2. Likelihood of achieving sinus rhythm
  - » LA size < 5cm
  - » Duration of AF < 4 years
  - » Younger age
  - » Less atrial fibrosis (i.e. CMR imaging)

- **Options for treatment are**

- » Anti arrhythmics: amiodarone, flecainide, propafenone, Sotalol
- » AV nodal blocking: Digoxin, beta blockers, calcium antagonists
- » DCCV – even if only to assess symptoms
- » Ablation (earlier – and evolving indications)

# Rate control – how to do it ?

Drugs of choice

1. Beta blocker
2. Calcium blocker
3. Both
4. Digoxin

# Rhythm control – how to do it ?

Drugs of choice

Normal heart = flecainide

Structural heart disease = amiodarone

Heart failure = amiodarone

Ischaemic Heart Disease = sotalol/amiodarone

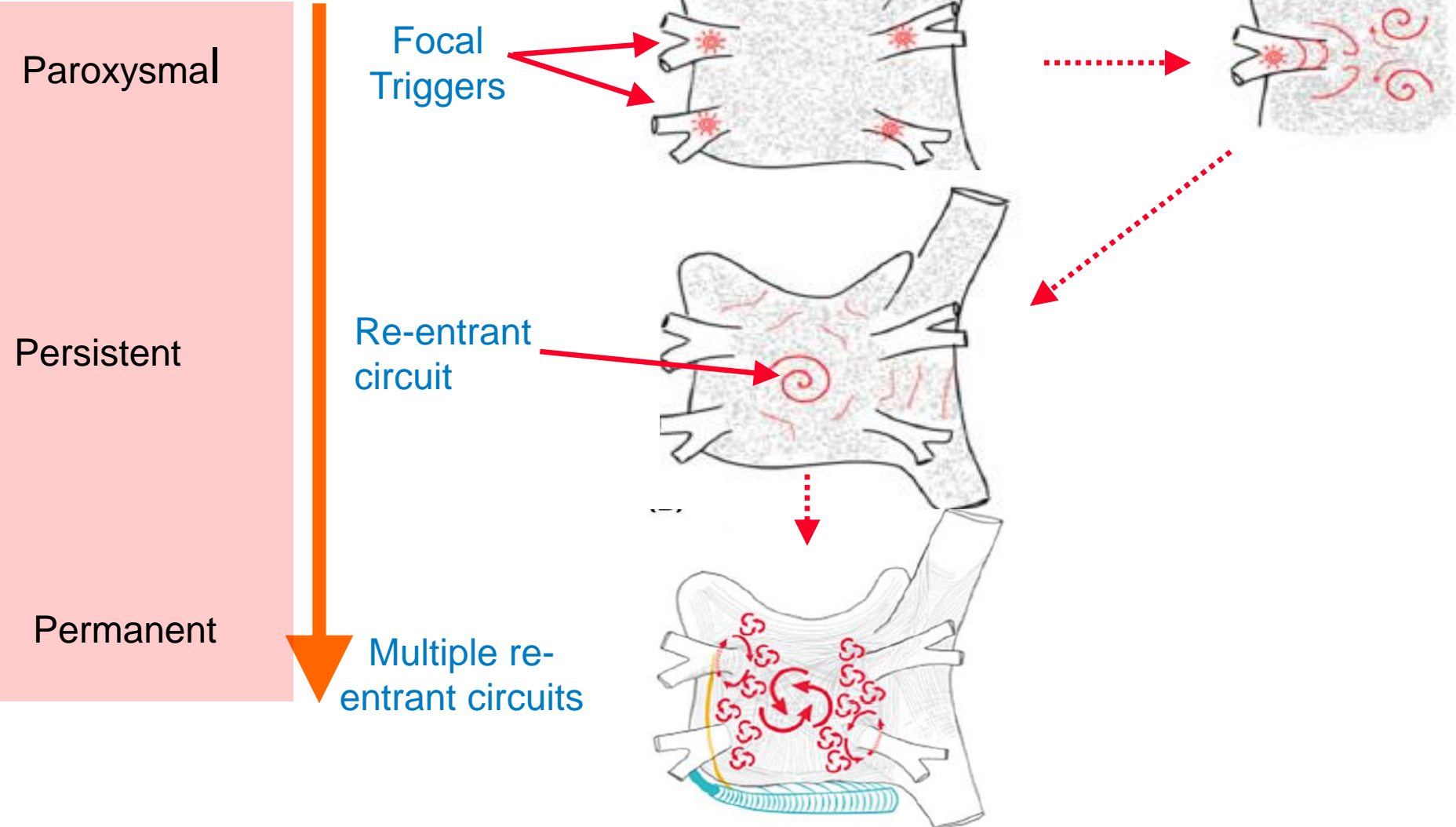
# DCCV

Reasonable to consider initially  
But high recurrence rate

At 1 year, 75% failure without anti arrhythmics  
40% failure with best drug (amio)

# Catheter ablation : rationale

# Mechanisms of AF

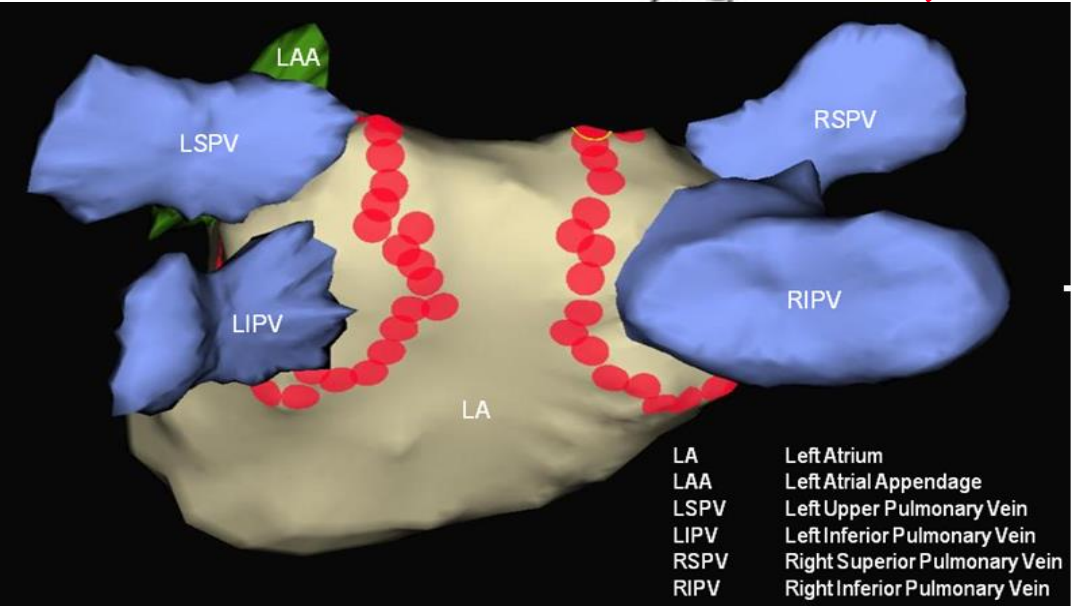


# Rational for AF ablation – elimination of triggers

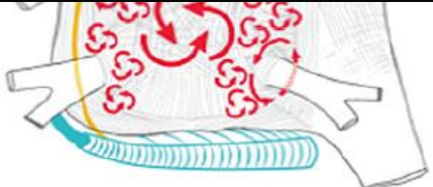
Paroxysmal  
Persistent  
Permanent



Re-entrant circuits



Multi-entrant circuits

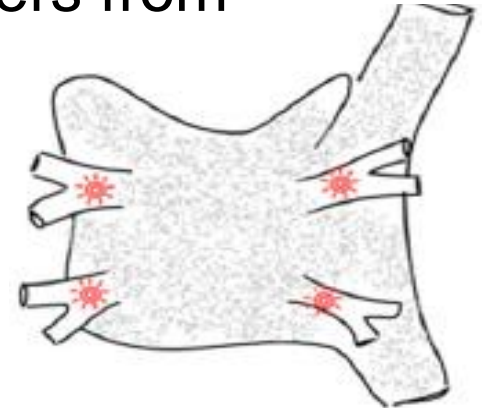


# Catheter ablation for paroxysmal AF

- Good mechanistic understanding of focal triggers from pulmonary veins

Success rates 70% for 1 procedure

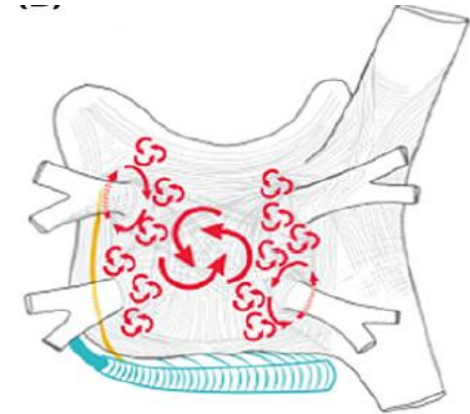
Increased to 85% with more than 1 procedure





# Catheter ablation for persistent AF

- Mechanistic understanding unclear – multiple sources/drivers



- Translates into poorer outcomes
- 40% 1<sup>st</sup> time success
- Likely to need more than 1 procedure – final success 50-70% (dependent on many factors)

# Anti-coagulation

- Assessment of stroke risk, independent of arrhythmia
- Paroxysmal AF CVA risk = Persistent AF risk
- Use CHADS2VASc score validated.
- Options for treatment
  1. Warfarin
  2. Newer agents (dabigatran, rivaroxaban ,apixaban)
  3. Left atrial appendage closure devices.
  4. NOT ASPIRIN (unless unable to tolerate other anticoagulant or other reasons for this)

# CHADS2VASc

CHA2DS2-VASc Risk	Score	CHA2DS2-VASc Score	Adjusted stroke rate (% / year)
		0	0
CHF or LVEF <40%	1	1	1.3
Hypertension	1	2	2.2
Age > 75	2	3	3.2
Diabetes	1	4	4
Stroke / TIA / Thromboembolism	2	5	6.7
Vascular Disease	1	6	9.8
Age 65-74	1	7	9.6
Female	1	8	6.7
		9	15.2

*CHF = congestive heart failure; TIA - transient ischemic attack;  
 LVEF = left ventricular ejection fraction.*

# NOACs vs warfarin

	Dabigatran (150mg)		Rivaroxaban		Apixaban	
%	w	d	w	r	w	a
CVA/ embolism	1.69	1.11*	2.4	2.1	1.6	1.27*
Bleed	3.36	3.11	3.4	3.6	3.09	2.13
MI	0.53	0.74*	1.1	0.9	0.61	0.53
Death	4.13	3.64*	2.2	1.9	3.94	3.52*

# Anticoagulation

- Key points
  1. Decision to anti-coagulate made on CHADSVASC alone, not on rate/rhythm strategy
  2. Anticoagulation : Probably if CHADSVASC = 1, definitely if >1
  3. Do not use aspirin.
  4. Other options to consider if unable to tolerate anticoagulation (LAA closure)

# Case scenario 1

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# Case scenario 1

- 76 year old lady with HTN, DM, with persistent AF for 5 years and NYHA 2. Echo shows mildly impaired LV and LA size of 4.9cm. What is optimal management?
- Rate/Rhythm : unlikely to maintain SR (duration > 5 y, LA size almost 5.0cm, HTN) whatever the strategy. Likely therefore to assign “permanent AF” state. For rate control (including ? AV nodal ablation + pace)
- CVA risk: CHADSVASC = 5 (i.e 6.7% annual CVA risk), therefore for anticoagulation.
- Heart failure management : ACE, Beta blockers, frusemide, etc.

## Case scenario 2

- 45 year old man with palpitations weekly, lasting up to 3 hours – unable to work during this time as highly symptomatic. Normal LV and LA 3.6cm. No underlying heart disease. ? Management?



## Case scenario 2

- 45 year old man with palpitations weekly, lasting up to 3 hours – unable to work during this time as highly symptomatic. Normal LV and LA 3.6cm. No underlying heart disease. ? Management?
- Rate/Rhythm : likely to maintain SR (PAF, duration unspecified, LA size normal). For rhythm control.
  - Drugs vs ablation?
    - » 8 prospective randomised trials now comparing success rates
      - AAD (9-40%) vs Ablation (66-89%)
    - » Improved QOL in ablation arms in all trials
- CVA risk: CHADSVasc2 = 0 (low annual CVA risk), not for anticoagulation

## Case scenario 3

- 66 yo man with persistent AF for 12 months, LA size 4.6, Normal LV. Hypertensive. Fatigued but thinks it's "old age" catching up with him. ? Management

## Case scenario 3

- 66 yo man with persistent AF for 12 months, LA size 4.6, Normal LV. Hypertensive. Fatigued but thinks it's "old age" catching up with him. ? Management
- Rate/Rhythm : ? likely to maintain SR (duration 12 months, LA size 4.6, large but not too large for ablation, ? symptomatic).
  - Start on AAD
  - Consider DCCV with full anticoagulation to assess symptoms
    - » If symptomatic with AF, and failed AAD therapy, can have AF ablation.
- CVA risk: CHADSVasc = 2 (age + HTN): for Anticoagulation
- CHADSVasc score evolve with time: Old patients get older! / HTN / DM / HF