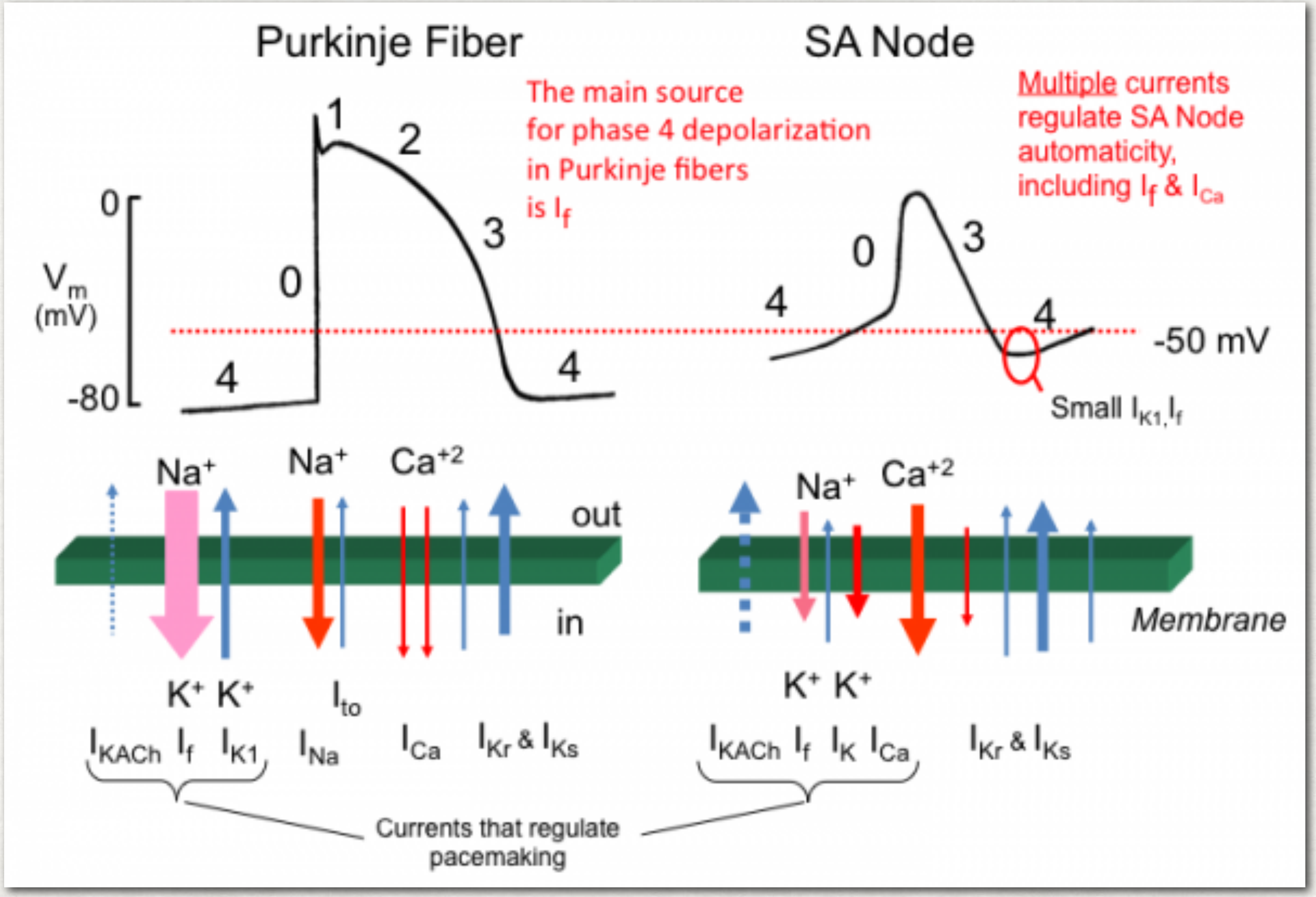
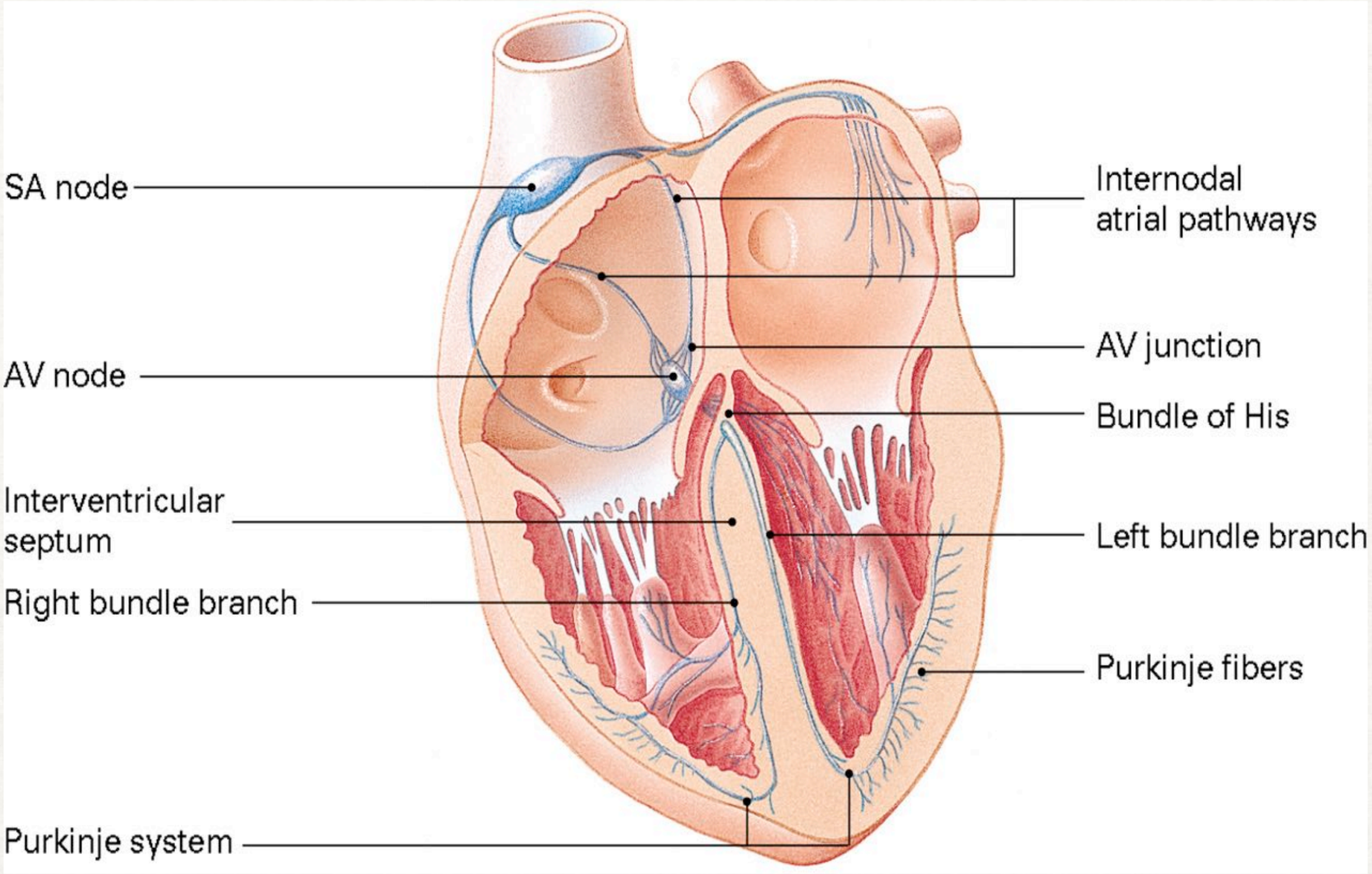
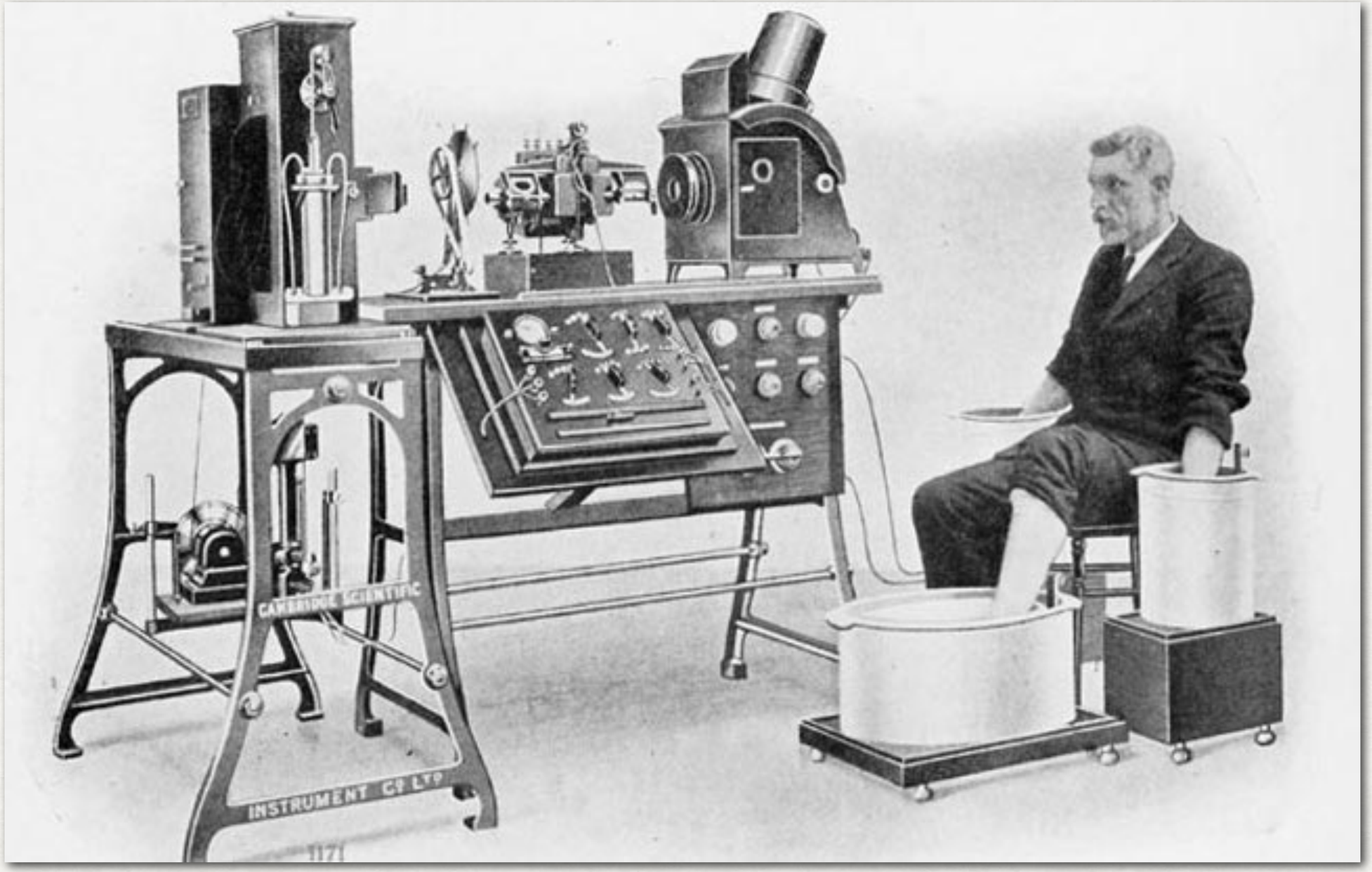
DR. MAHLOW

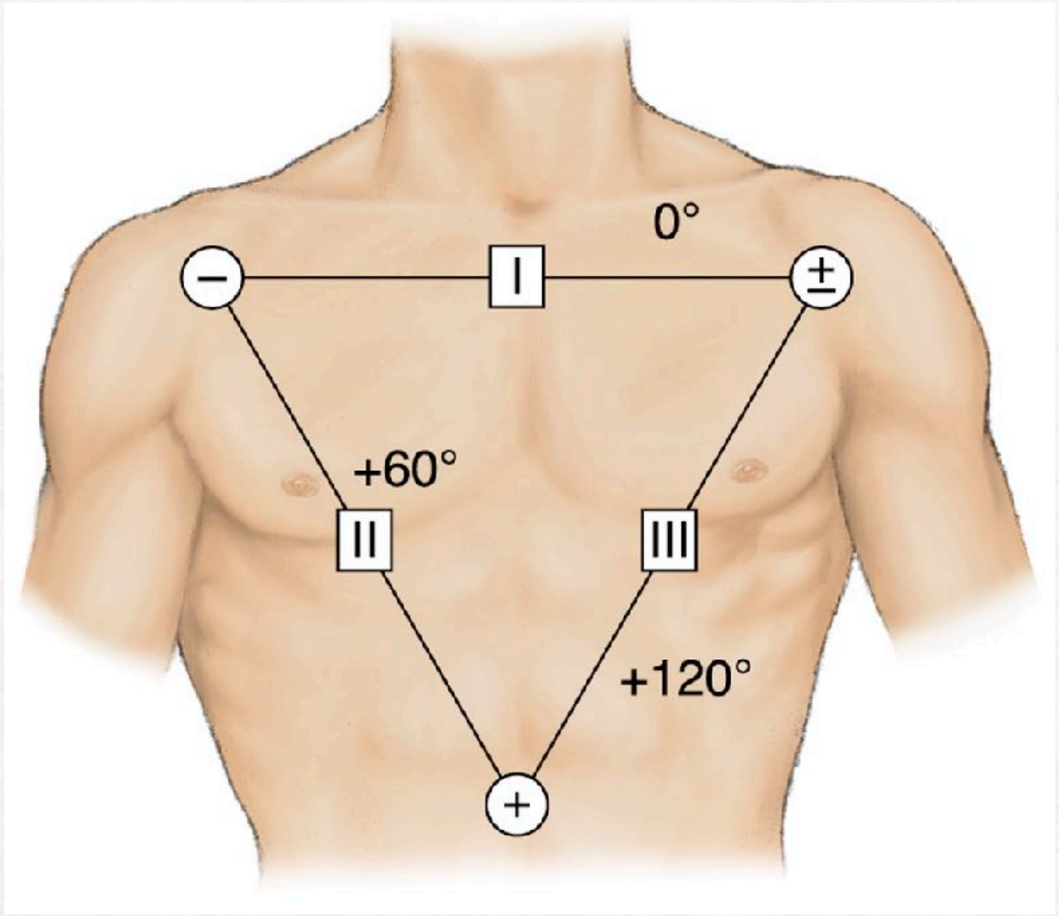
EKG AND EP STUDY

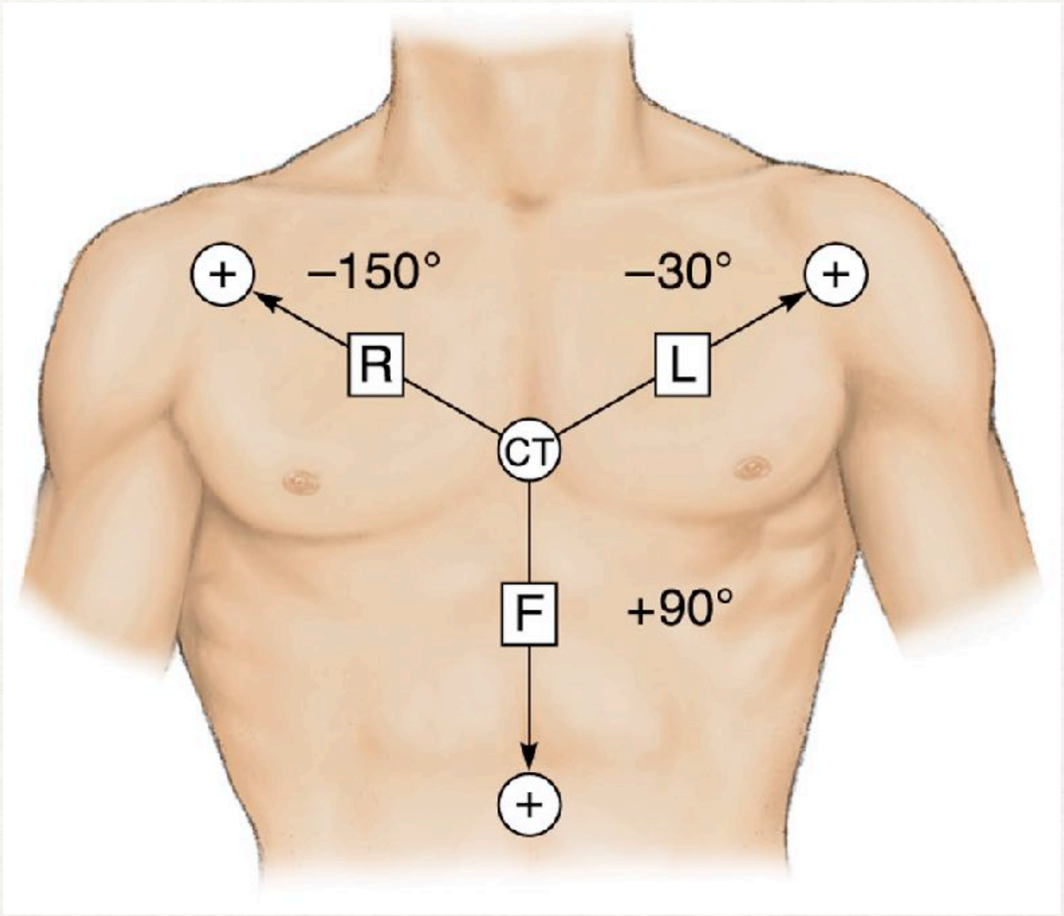

Sheffield
City Council
CAUTION:
BENCHES MAY BE WET
FOLLOWING PERIODS OF RAIN

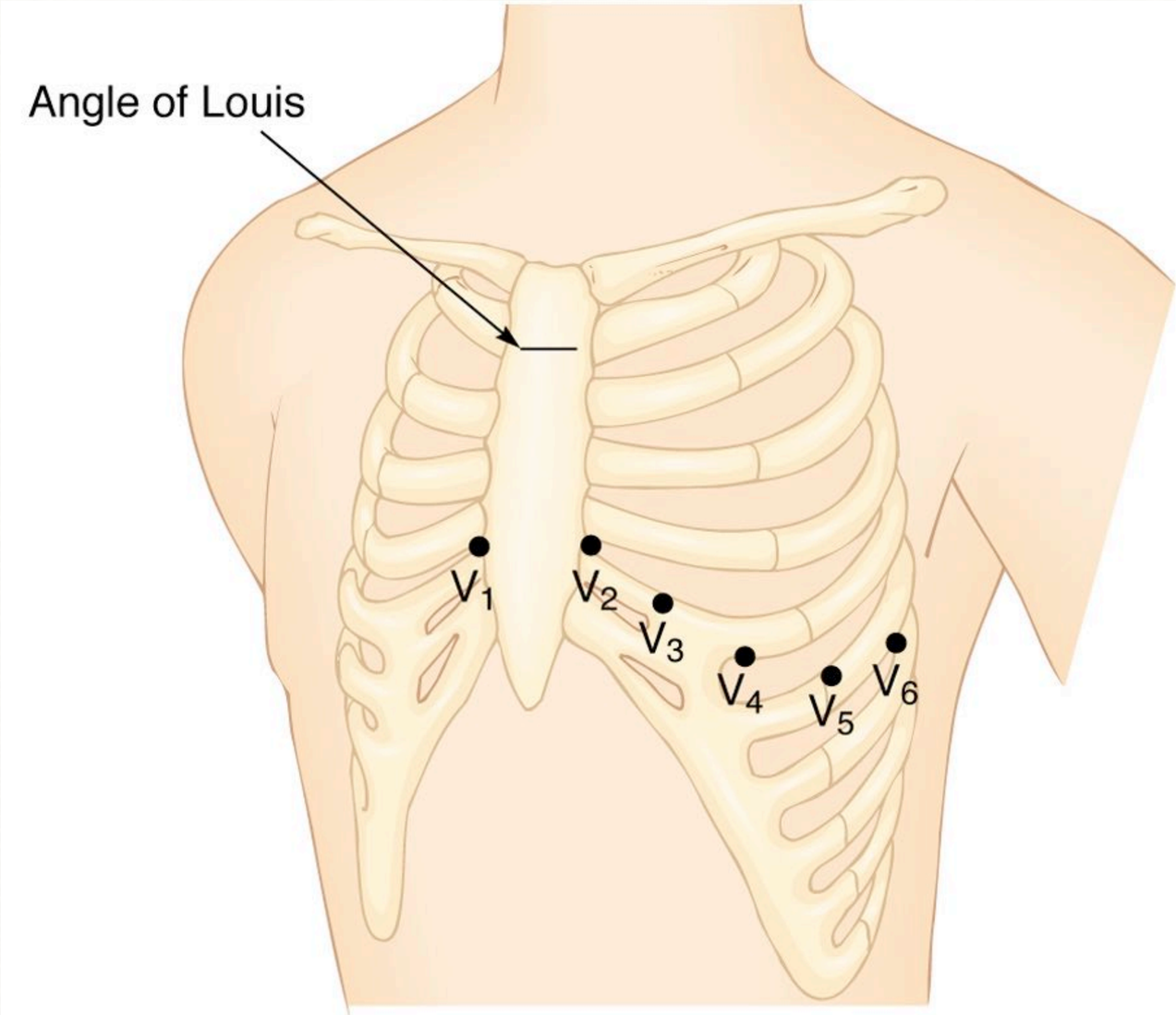

Purkinje Fiber
SA Node
The main source for phase 4 depolarization in Purkinje fibers is I_f
Multiple currents regulate SA Node automaticity, including I_f & I_{Ca}
V_m (mV)
0
-80
1
2
3
0
4
4
0
3
4
4
-50 mV
Small I_{K1}, I_f
Na^+
Na^+
Ca^{+2}
out
in
K^+ K^+
I_{to}
I_{KACh} I_f I_{K1}
I_{Na}
I_{Ca}
I_{Kr} & I_{Ks}
Na^+
Ca^{+2}
Membrane
K^+ K^+
I_{KACh} I_f I_K I_{Ca}
I_{Kr} & I_{Ks}
Currents that regulate pacemaking


SA node
AV node
Interventricular septum
Right bundle branch
Purkinje system
Internodal atrial pathways
AV junction
Bundle of His
Left bundle branch
Purkinje fibers

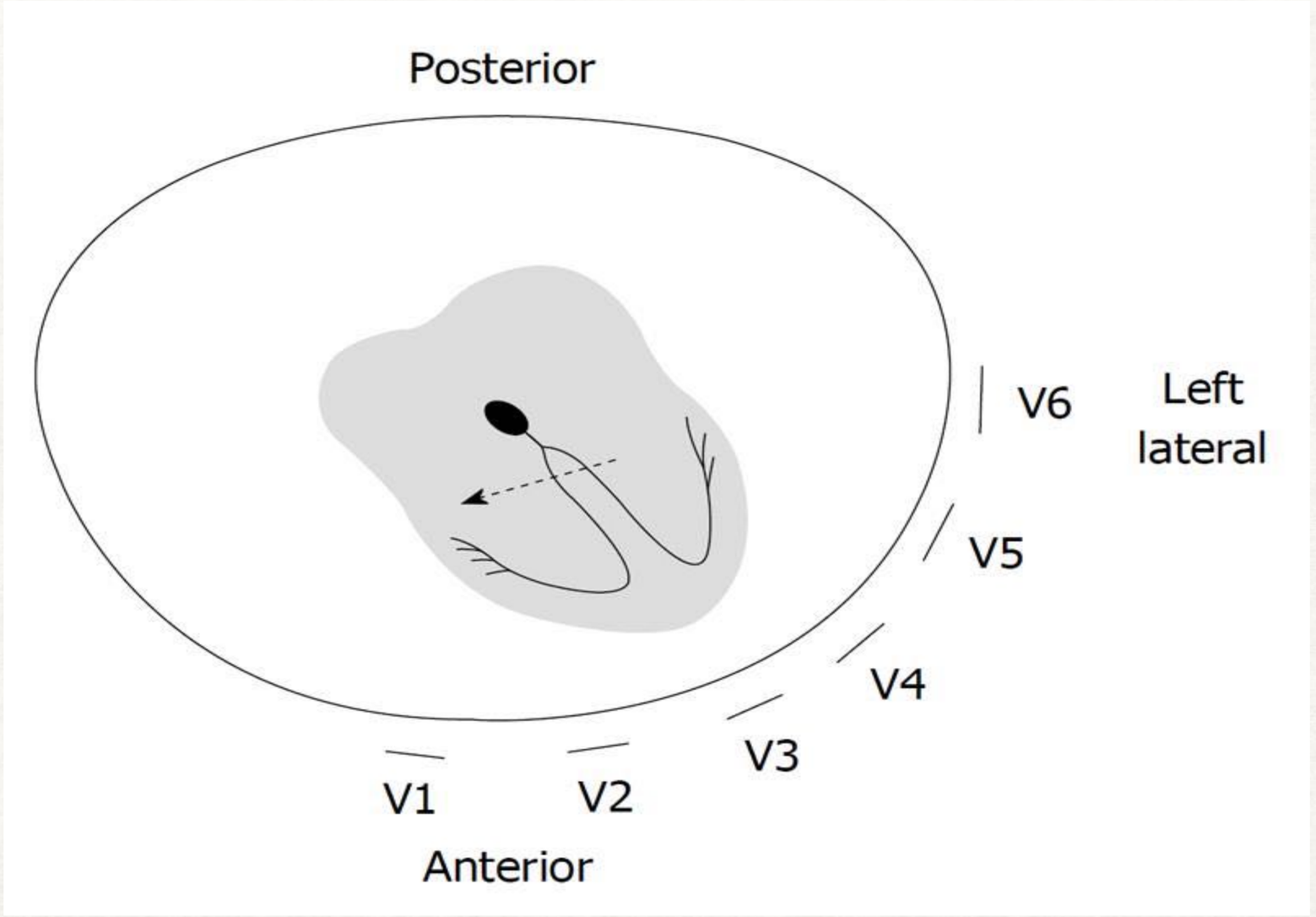

CAMBRIDGE SCIENTIFIC
INSTRUMENT Co LTD

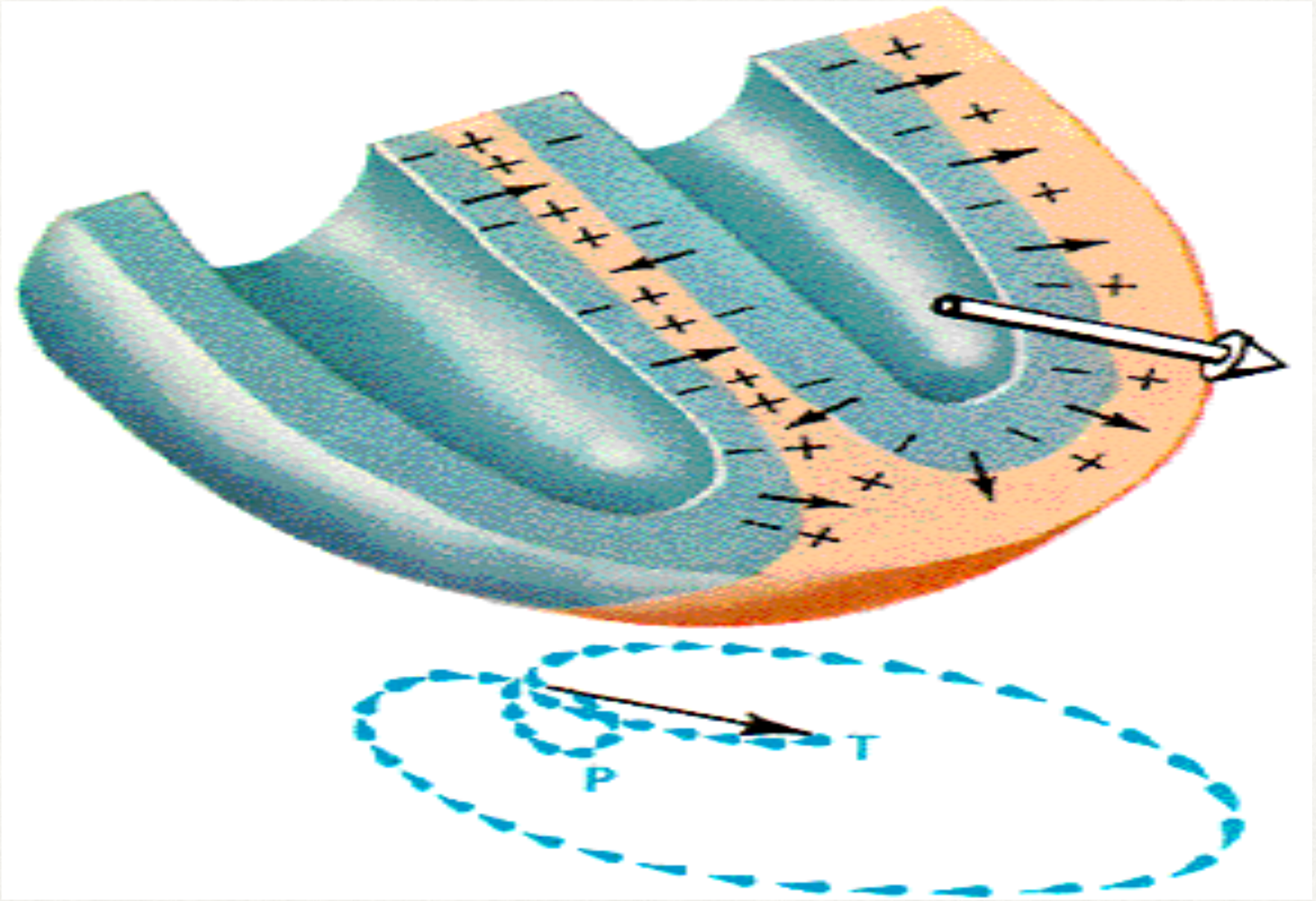

0°
I
−
±
+60°
II
III
+120°
+

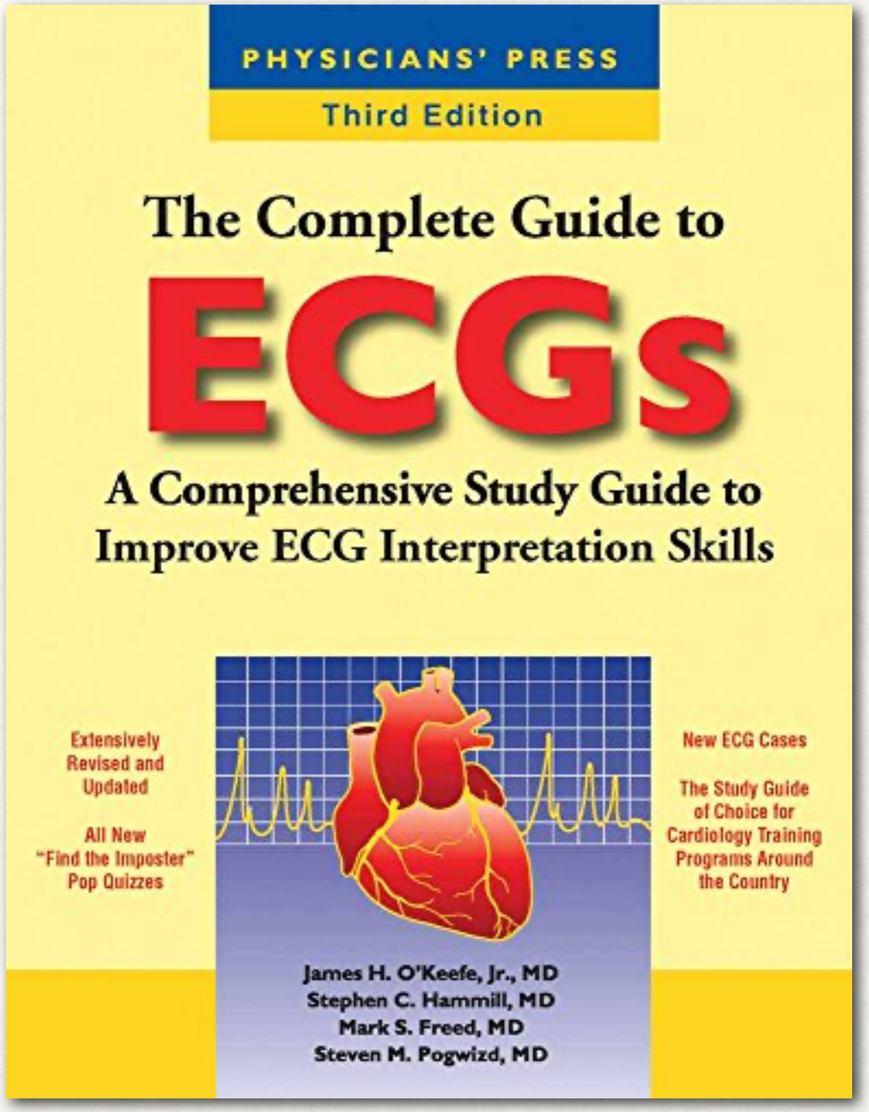

+
−150°
−30°
+
R
L
CT
F
+90°
+



Chest Lead Placement


Posterior
V6
Left
lateral
V5
V4
V3
V2
V1
Anterior


T
P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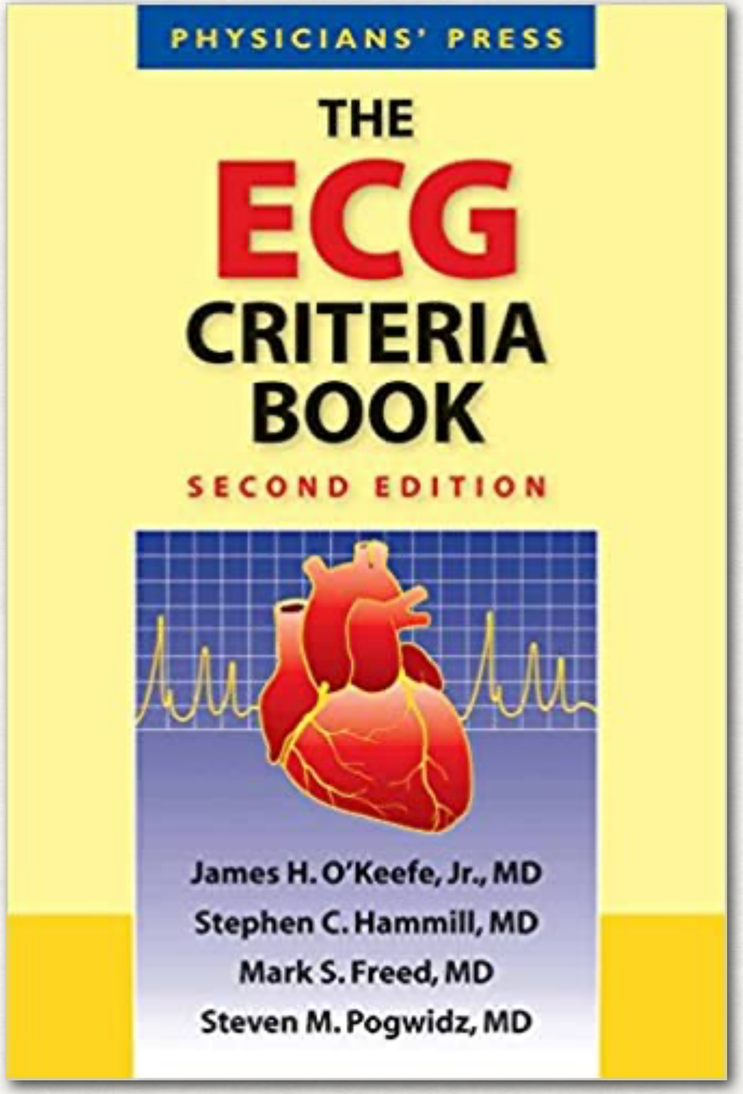
PHYSICIANS' PRESS
THE
ECG
CRITERIA
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https://uconcall.com/ekgcurriculum

HOW TO READ EKGS

- Rate
- Rhythm
- Axis
- Interval
- Waveform

HOW TO READ EKGS

- Rate
  - 300,150,100,75,60,50
- Rhythm
- Axis
- Interval
- Waveform

HOW TO READ EKGS

- Rate
- Rhythm
  - Look at all QRSs. P waves? Fib? Flutter? AV Block?
- Axis
- Interval
- Waveform

HOW TO READ EKGS

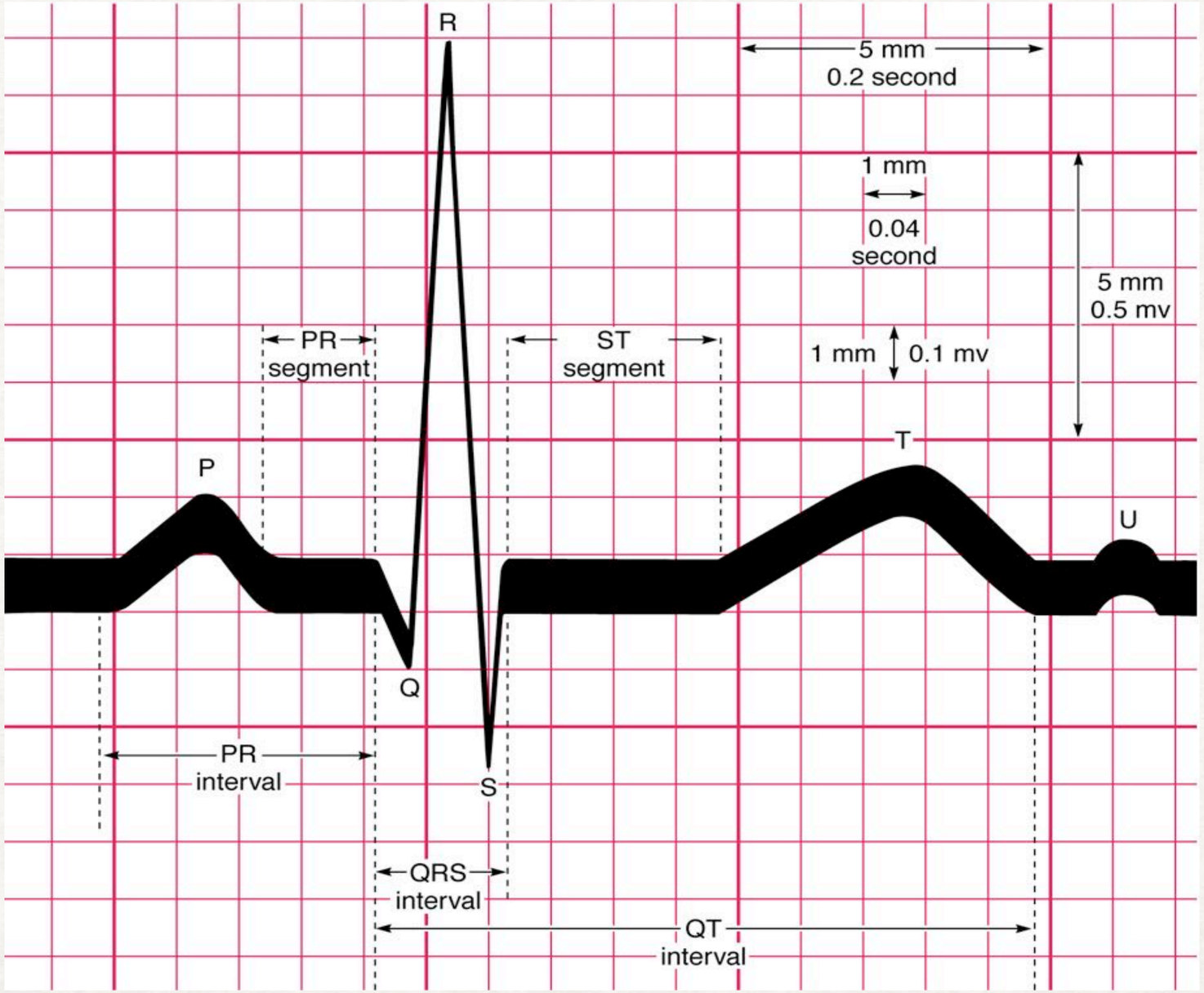
- Rate
- Rhythm
- Axis
  - Up in I, Up in II => normal axis
- Interval
- Waveform

HOW TO READ EKGS

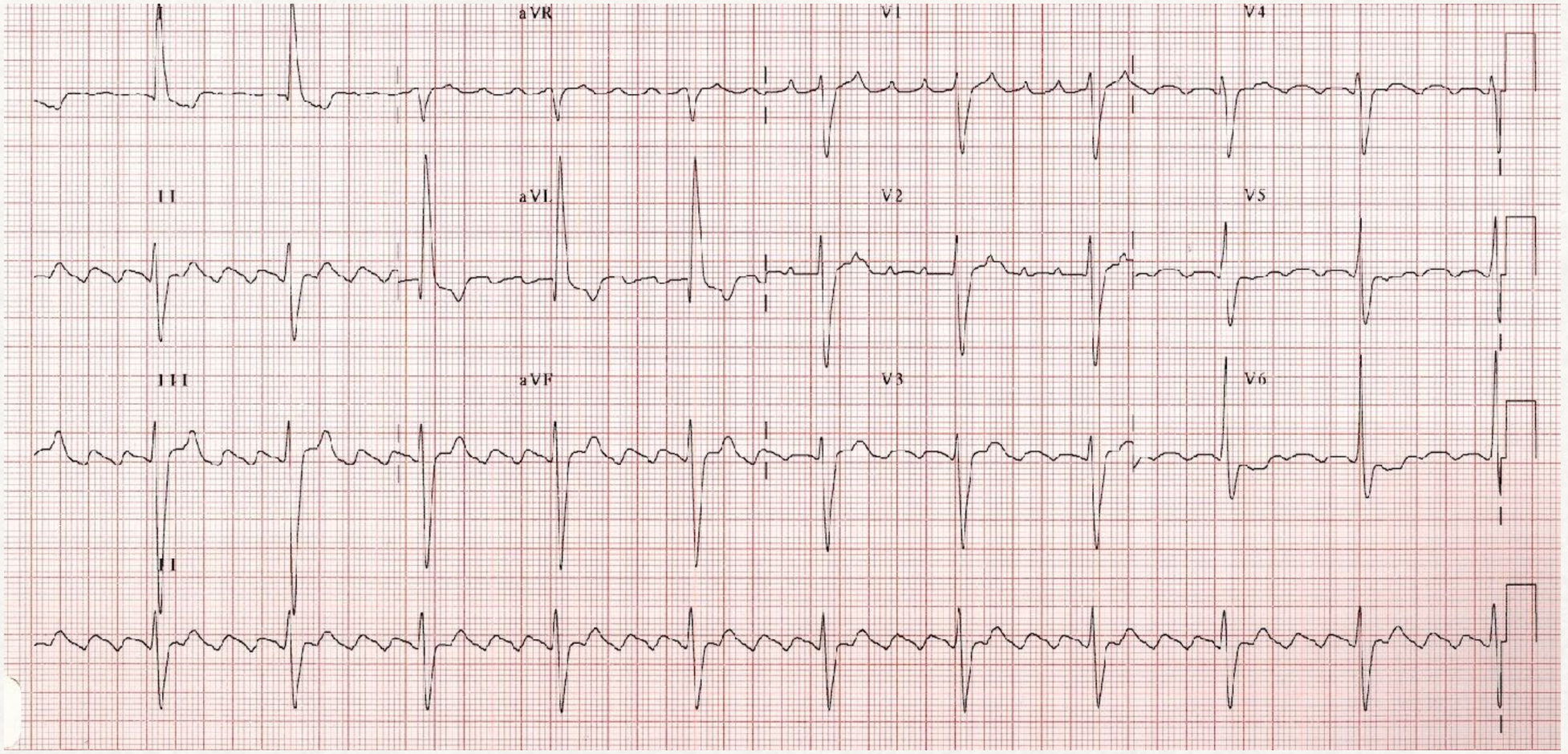
- Rate
- Rhythm
- Axis
- Interval
  - Big box = 200 msec. Little box = 40 msec
  - PR < 1
  - QRS < 3
  - QT < 1/2 RR. QTc < 450 males, 460 females
- Waveform

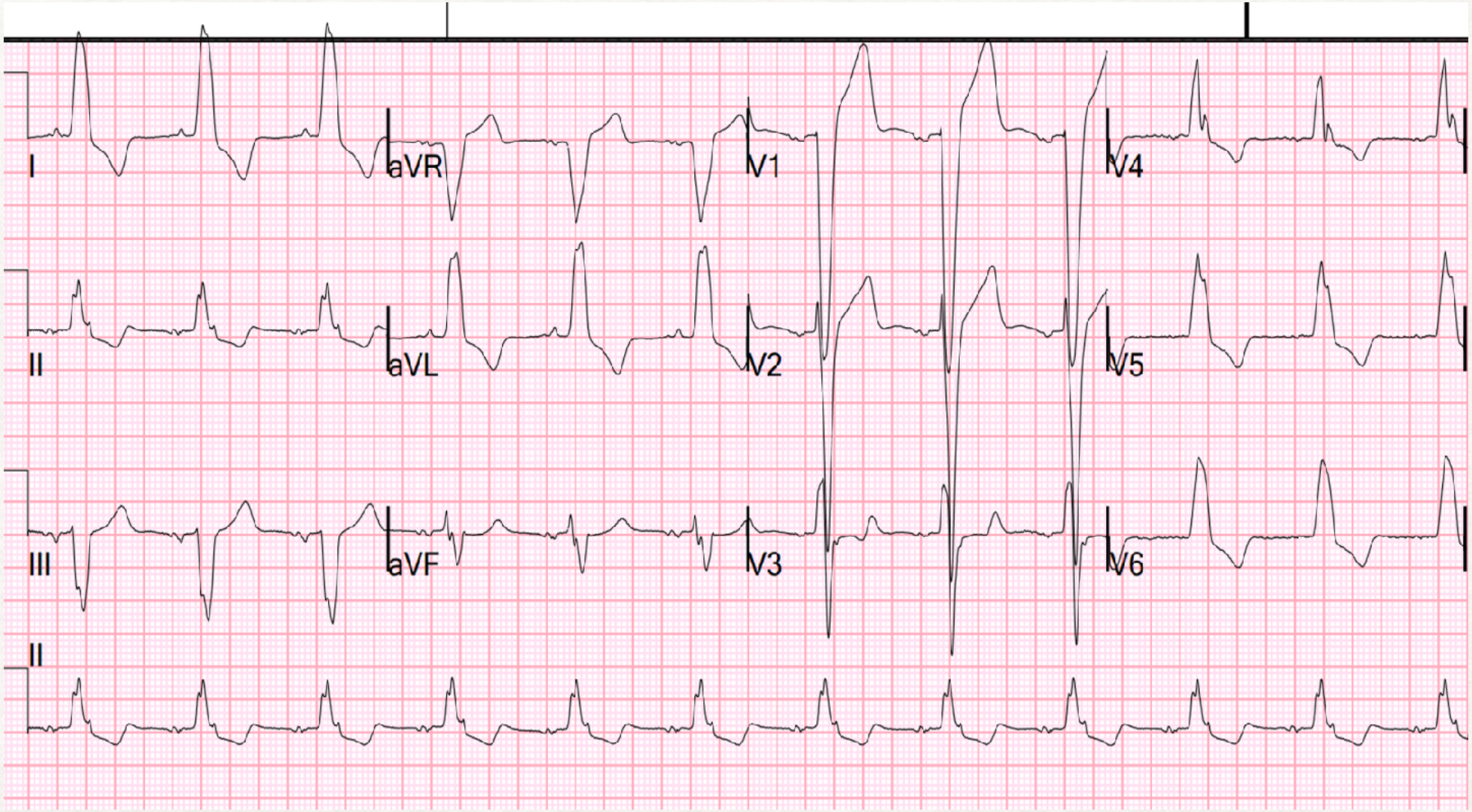
HOW TO READ EKGS

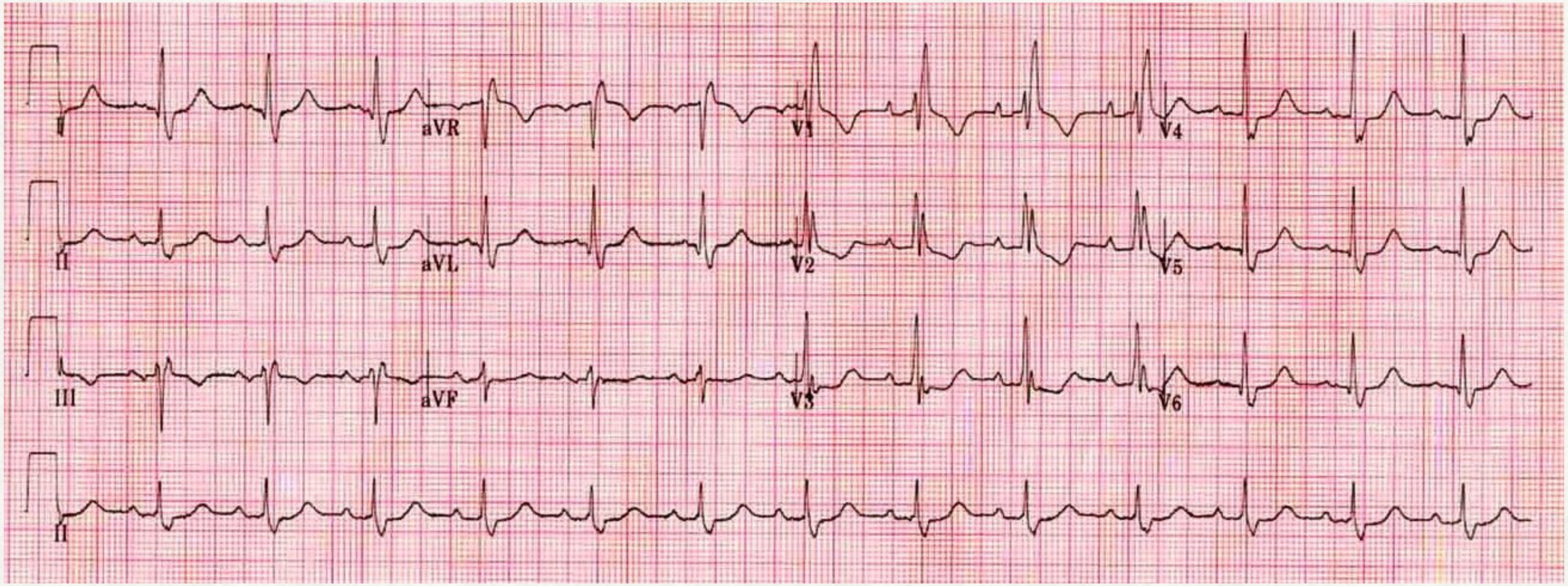
- Rate
- Rhythm
- Axis
- Interval
- Waveform
  - P waves, Q waves, R waves (LVH, precordial progression), ST segments and t waves

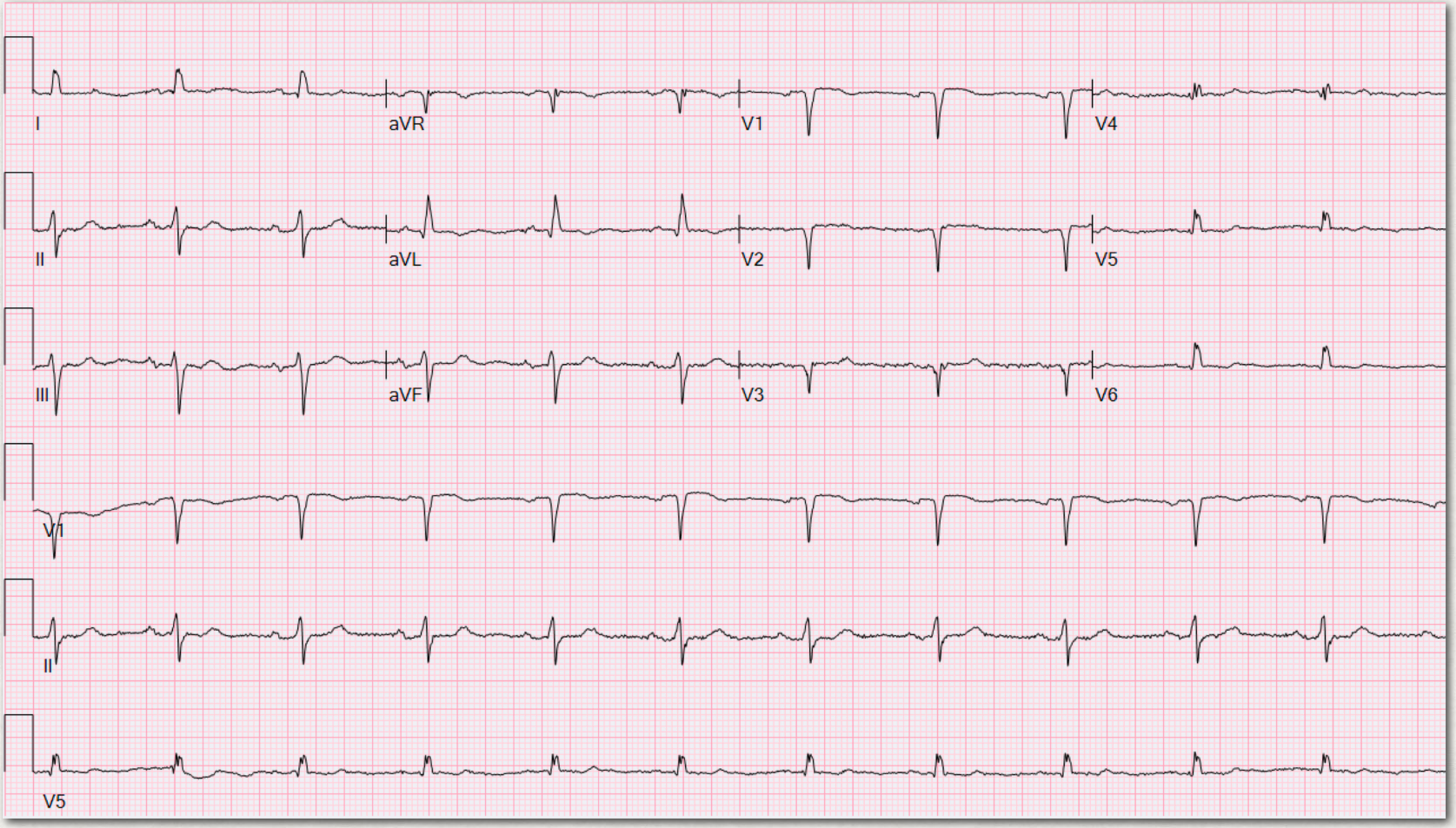

R
5 mm
0.2 second
1 mm
0.04
second
5 mm
0.5 mv
PR
segment
ST
segment
1 mm
0.1 mv
T
P
U
Q
S
PR
interval
QRS
interval
QT
interval

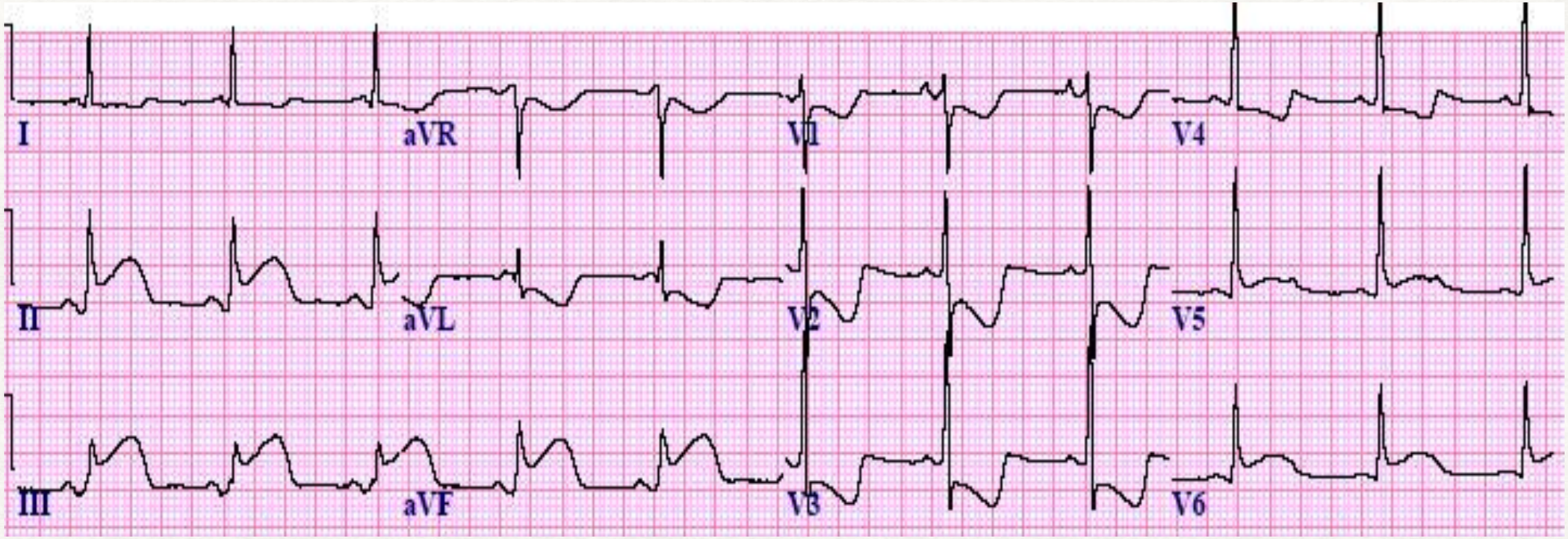
EKG UNKNOWNS

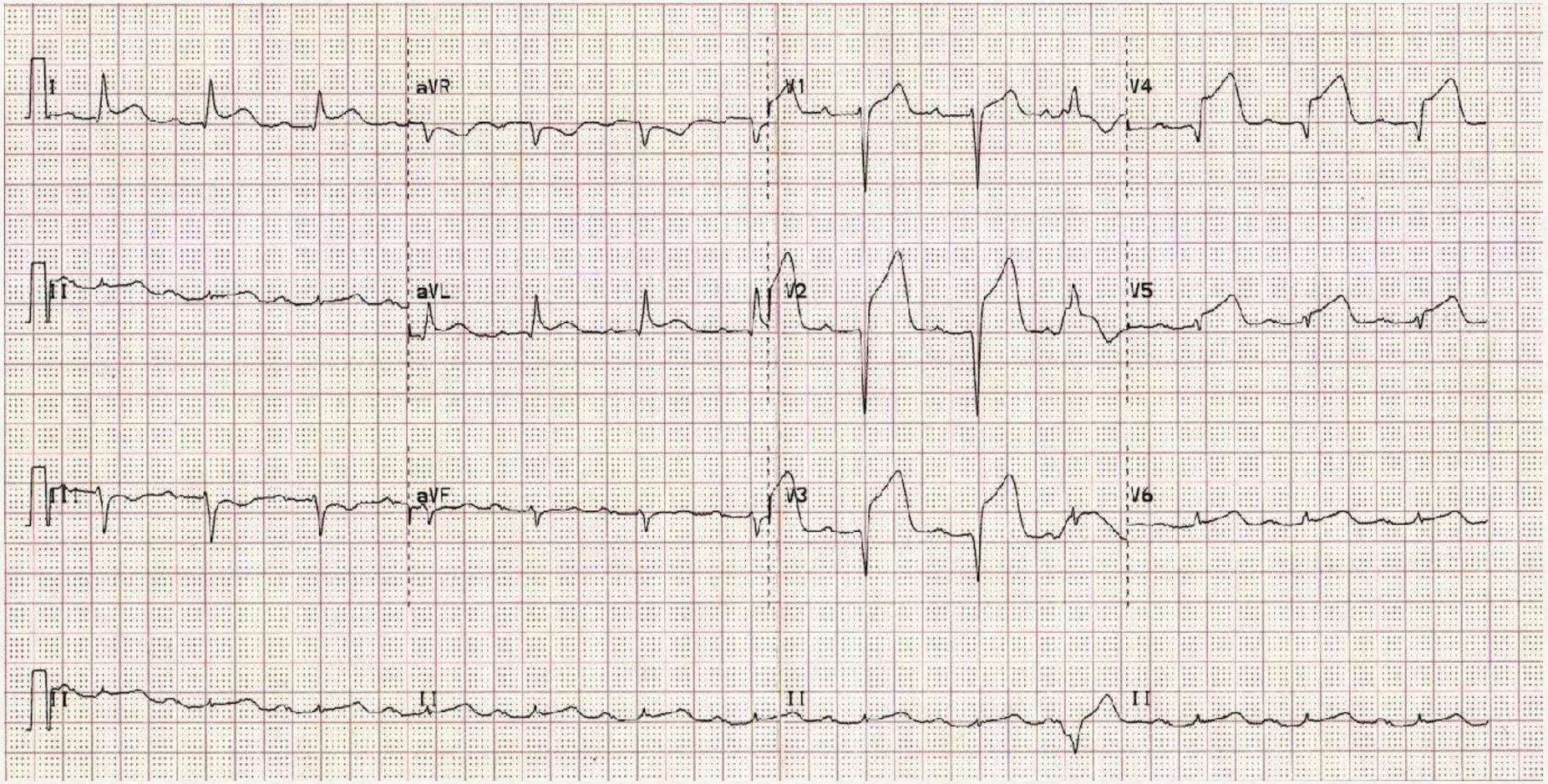

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

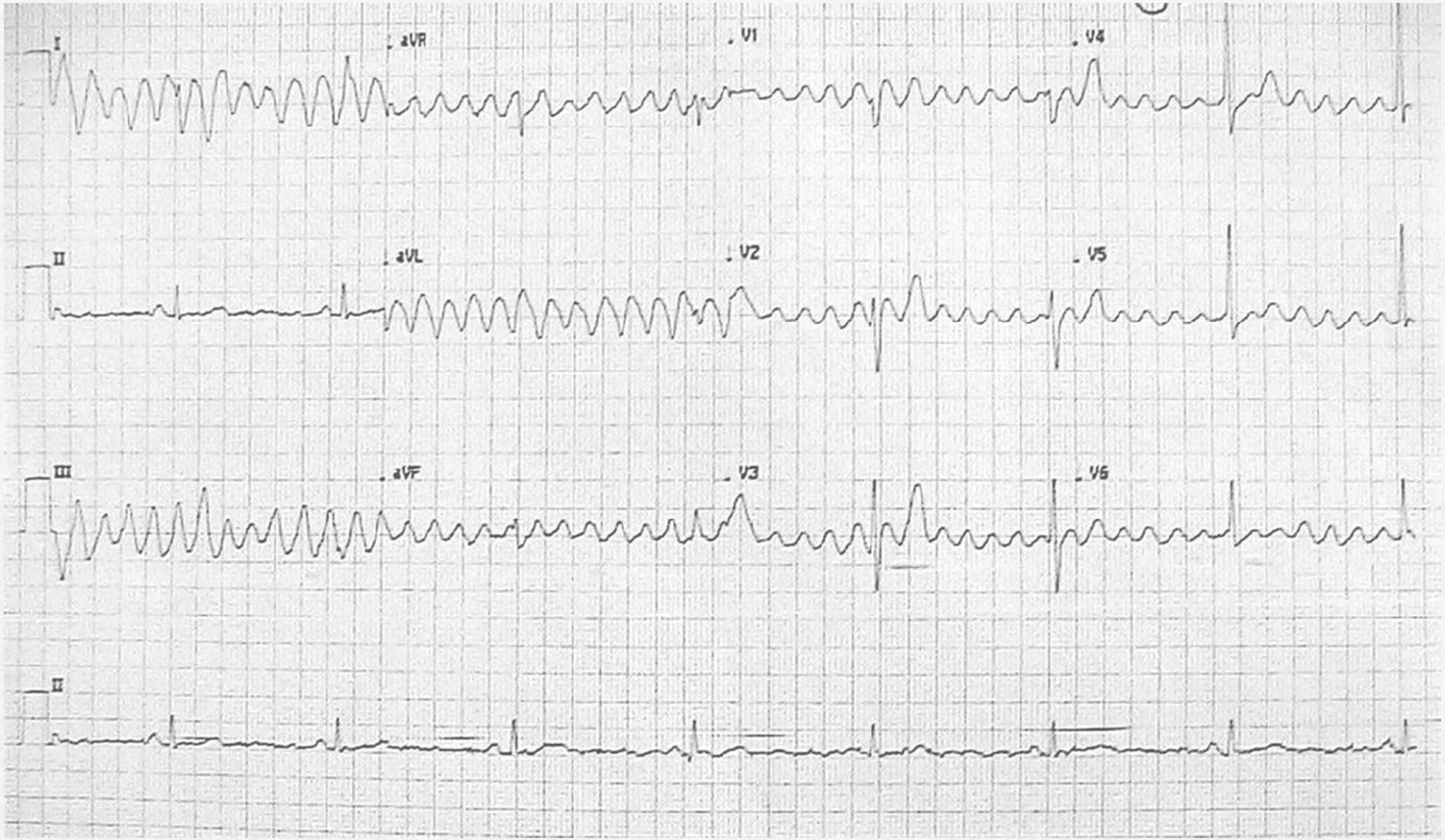

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

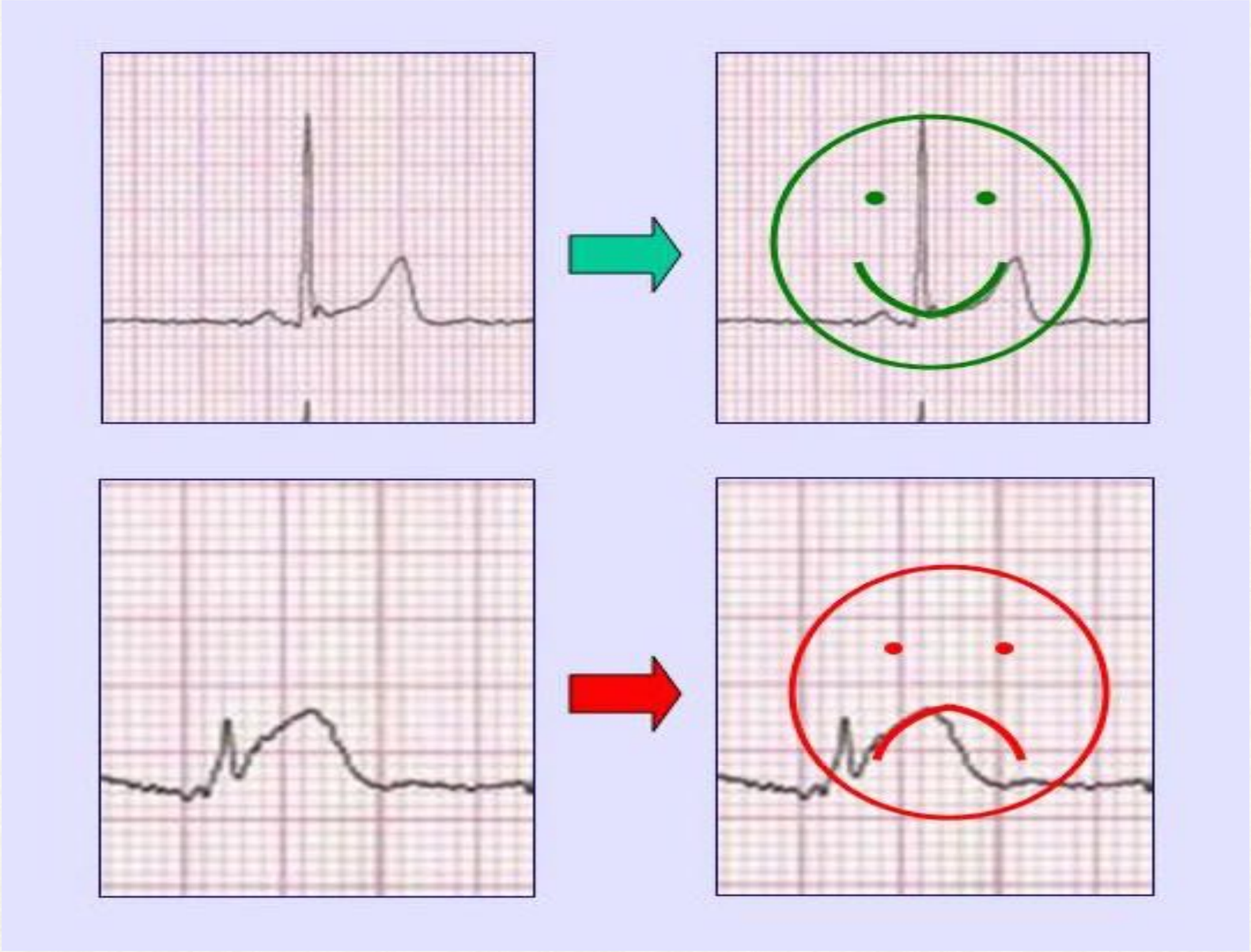

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

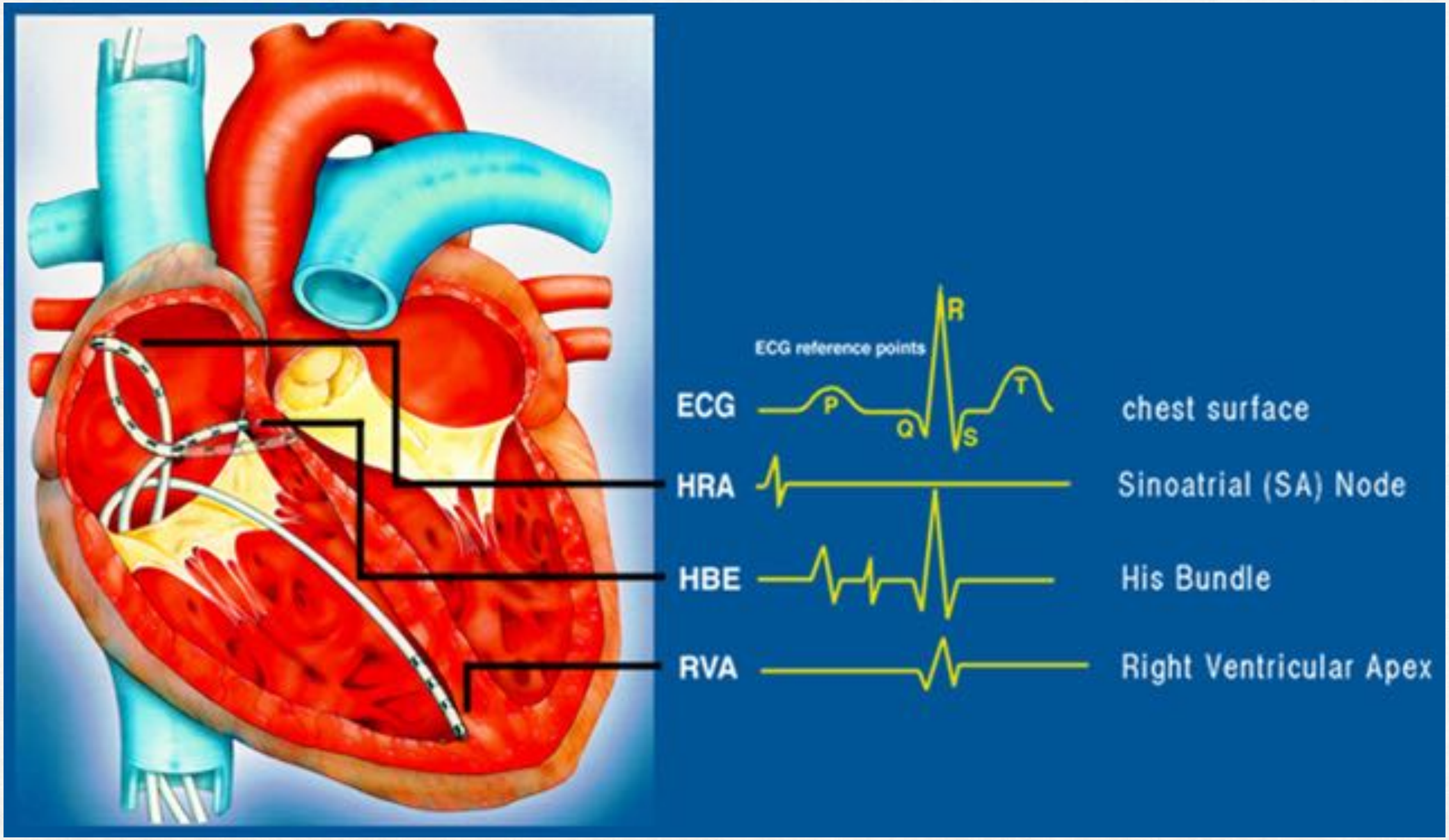

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5

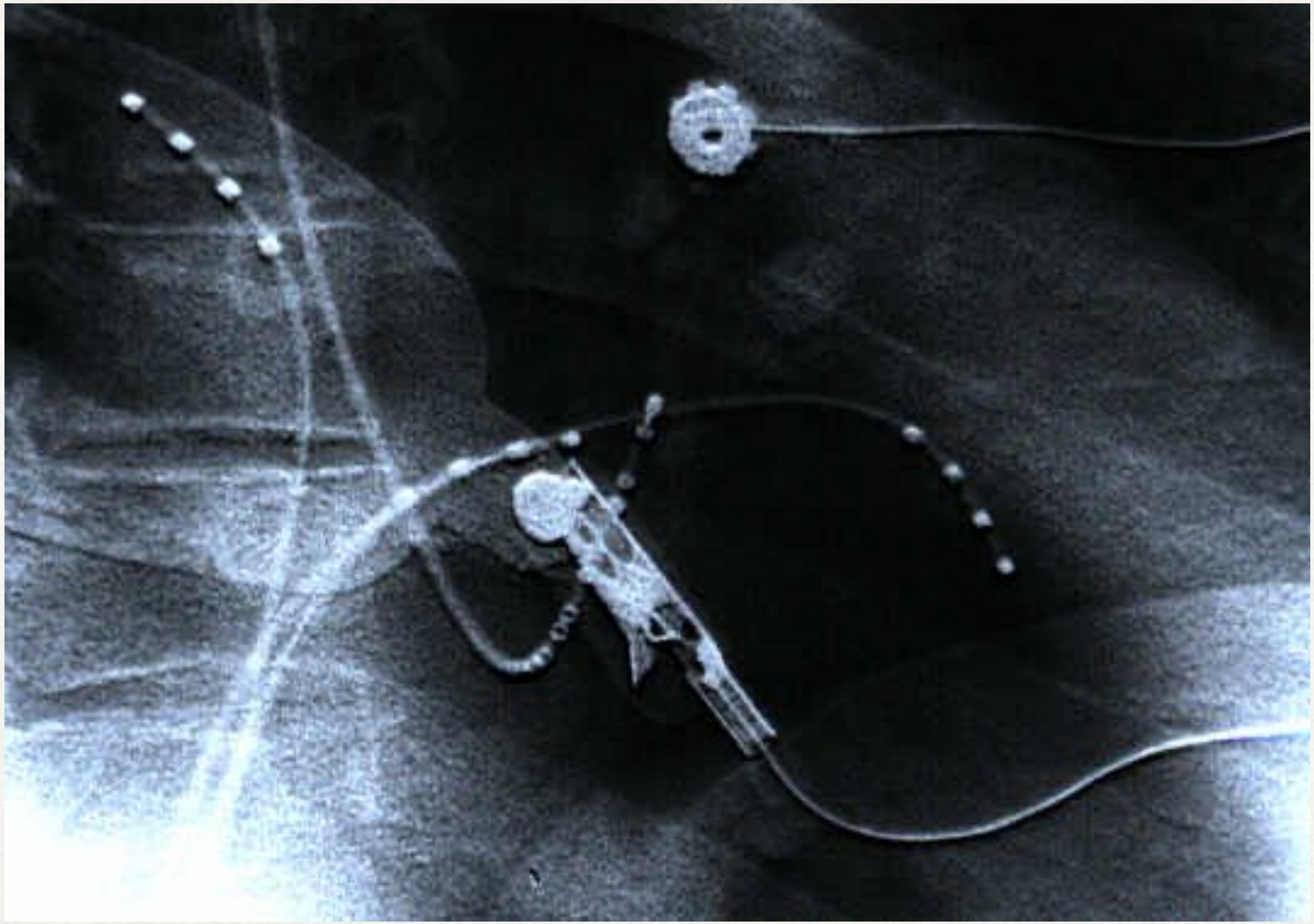

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

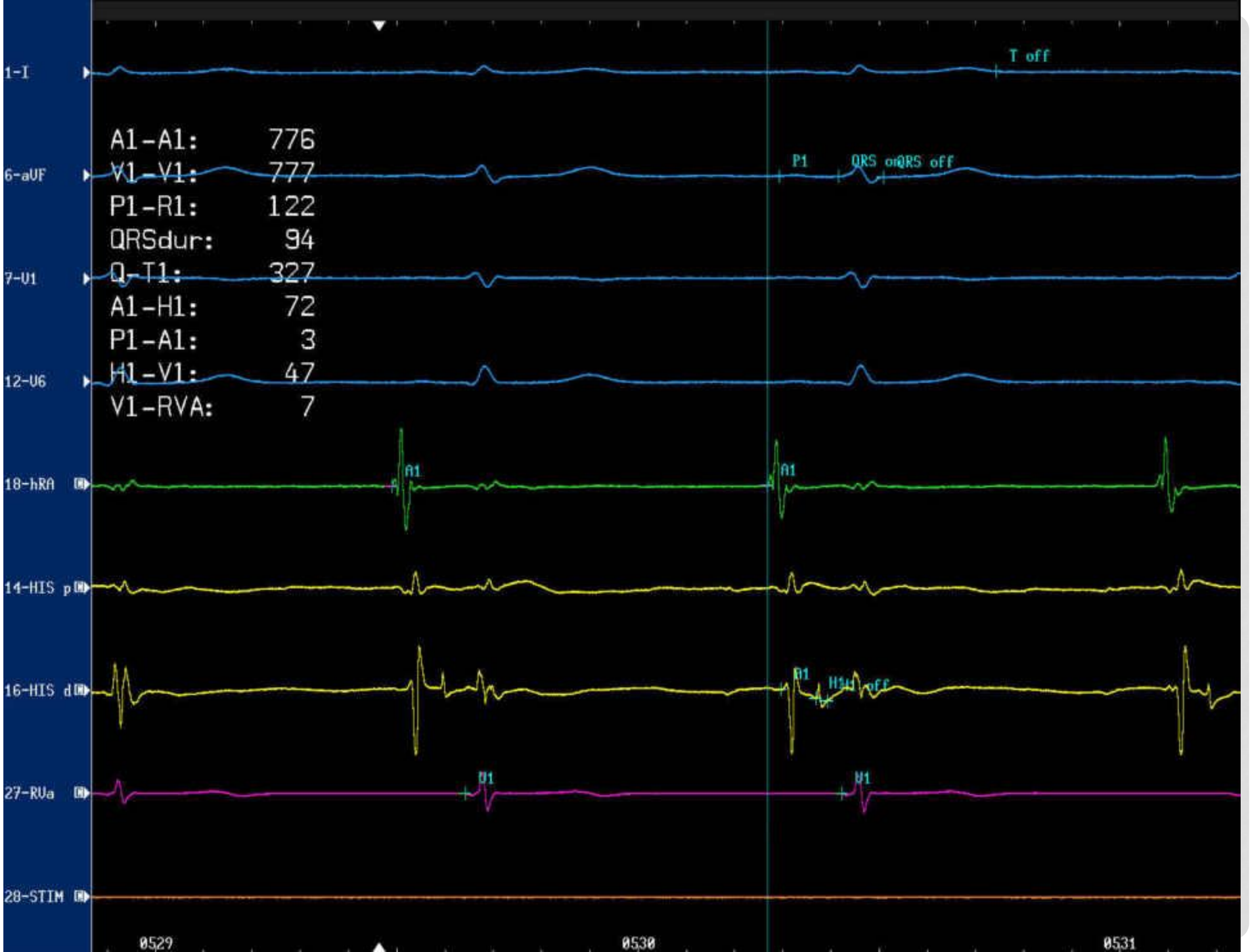

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
II
II

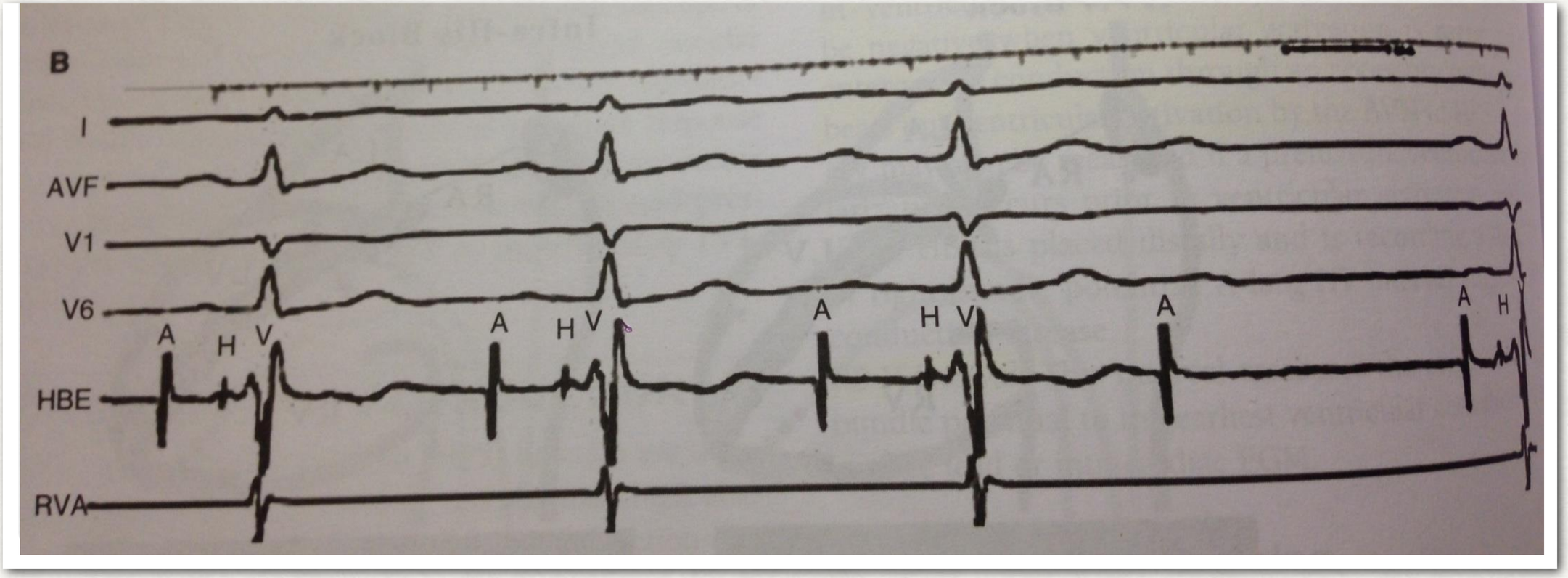

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

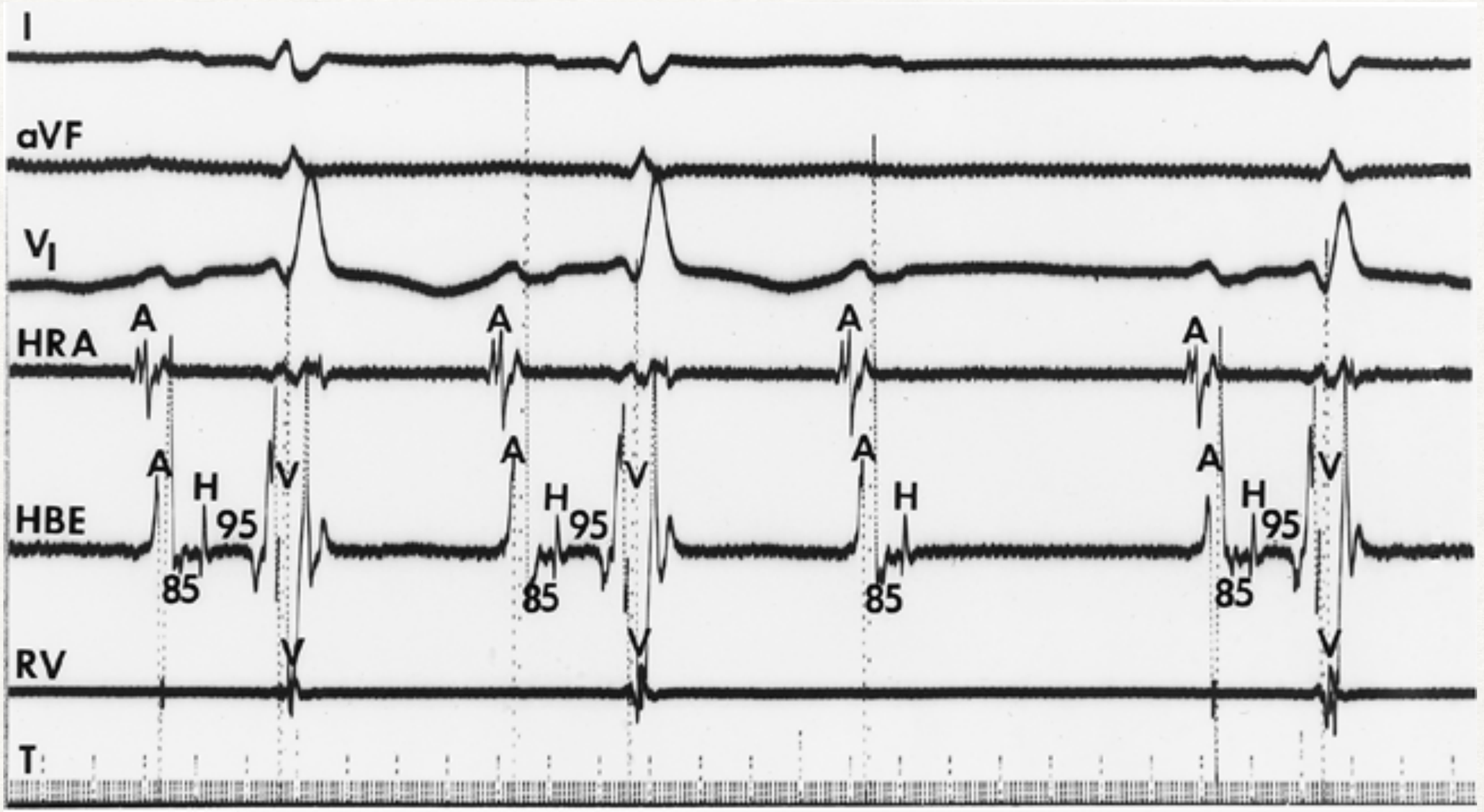


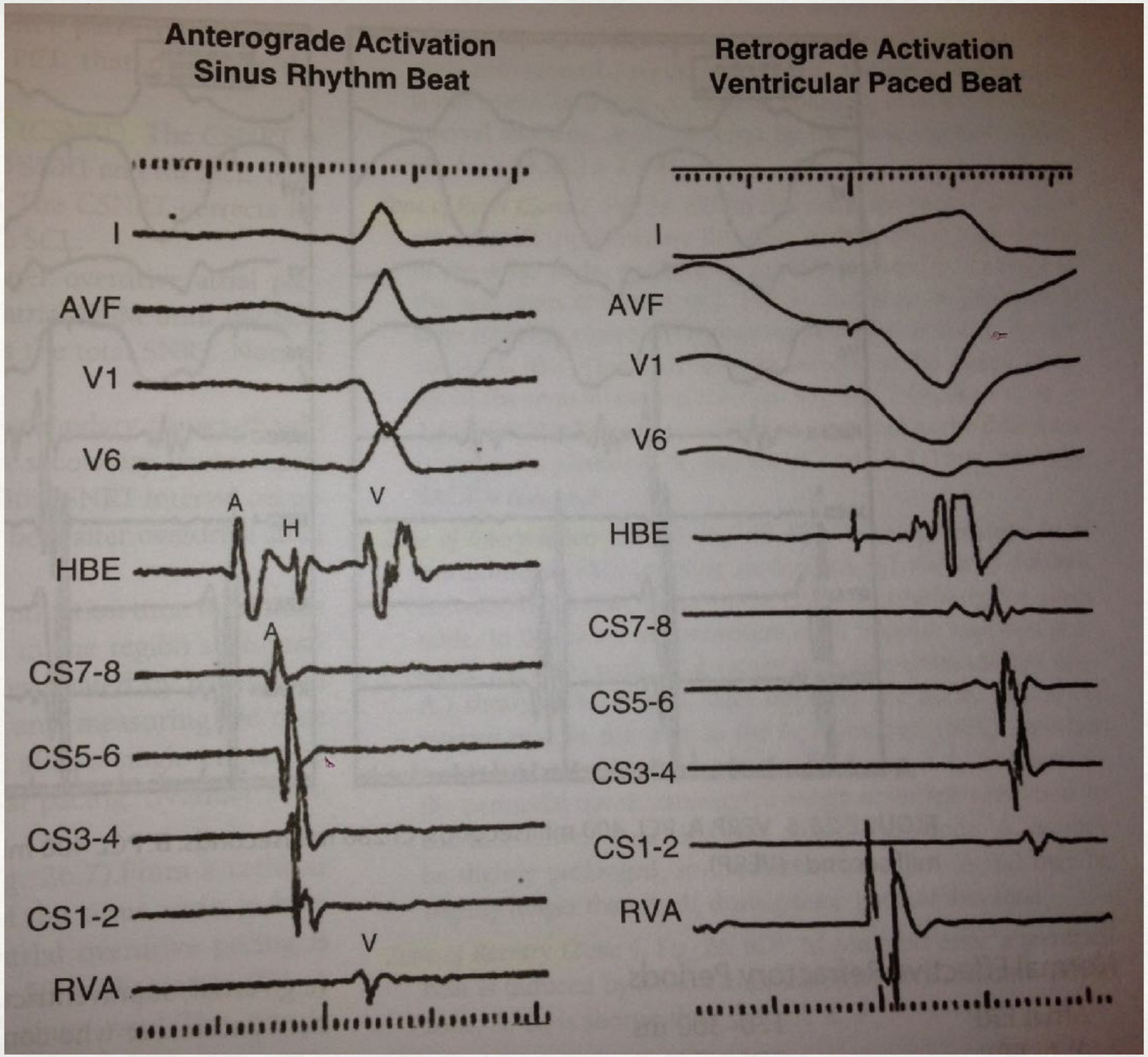

ECG reference points
R
P
Q
S
T
ECG
chest surface
HRA
Sinoatrial (SA) Node
HBE
His Bundle
RVA
Right Ventricular Apex

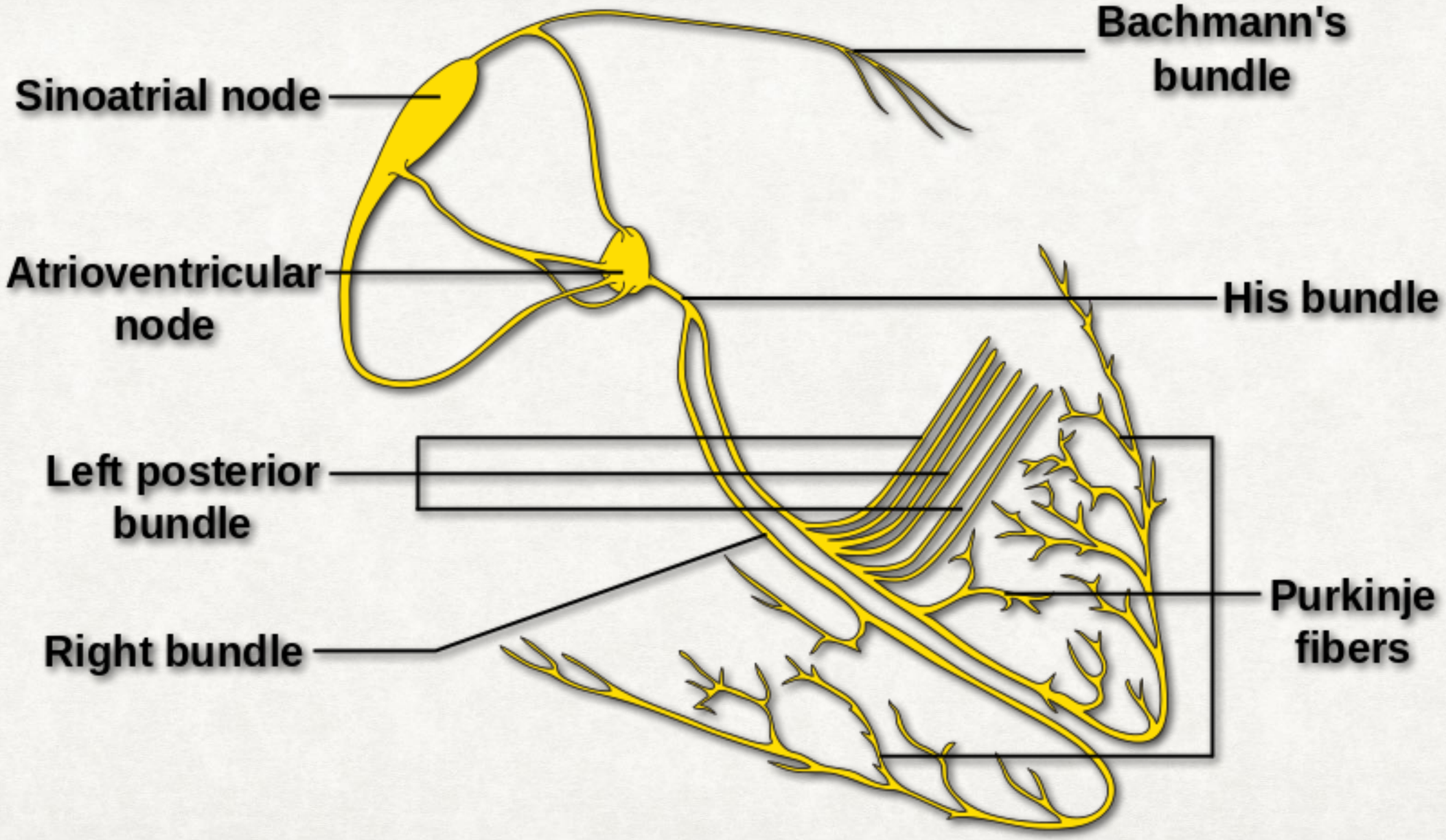


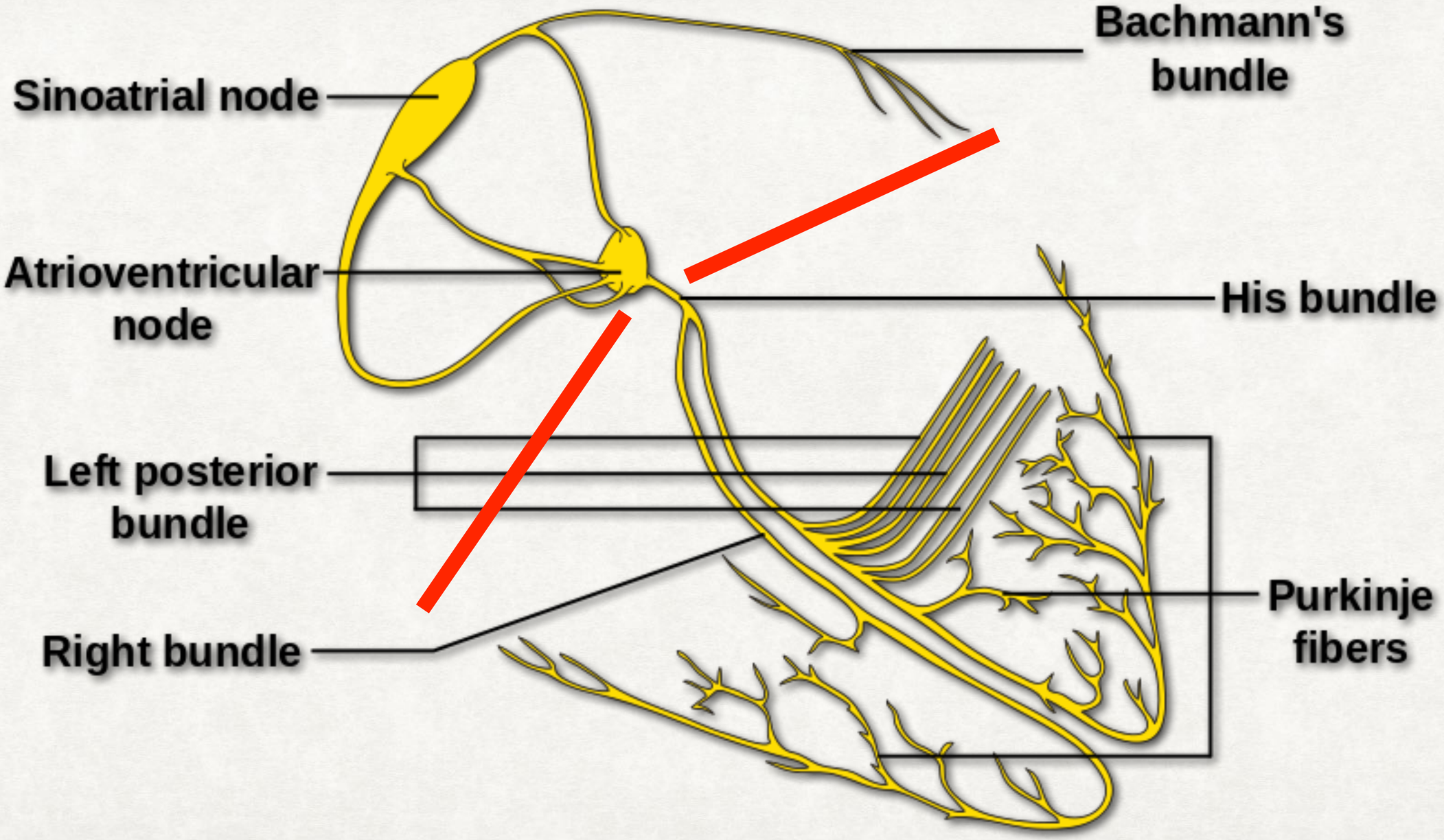

1-I
T off
A1-A1: 776
V1-V1: 777
P1-R1: 122
QRSdur: 94
Q-T1: 327
A1-H1: 72
P1-A1: 3
H1-V1: 47
V1-RVA: 7
6-aVF
P1
QRS on
QRS off
7-V1
12-V6
18-hRA
A1
A1
14-HIS p
16-HIS d
A1
H1
off
27-RVa
V1
V1
28-STIM
0529
0530
0531


B
I
AVF
V1
V6
A
H
V
A
H
V
A
H
V
A
A
H
HBE
RVA


I
aVF
V1
HRA
A
A
A
A
HBE
A
H
V
95
85
A
H
V
95
85
A
H
85
A
H
V
95
85
RV
V
V
V
T


Anterograde Activation
Sinus Rhythm Beat
I
AVF
V1
V6
A
H
V
HBE
A
CS7-8
CS5-6
CS3-4
CS1-2
V
RVA
Retrograde Activation
Ventricular Paced Beat
I
AVF
V1
V6
HBE
CS7-8
CS5-6
CS3-4
CS1-2
RVA


Bachmann's bundle
Sinoatrial node
Atrioventricular node
His bundle
Left posterior bundle
Purkinje fibers
Right bundle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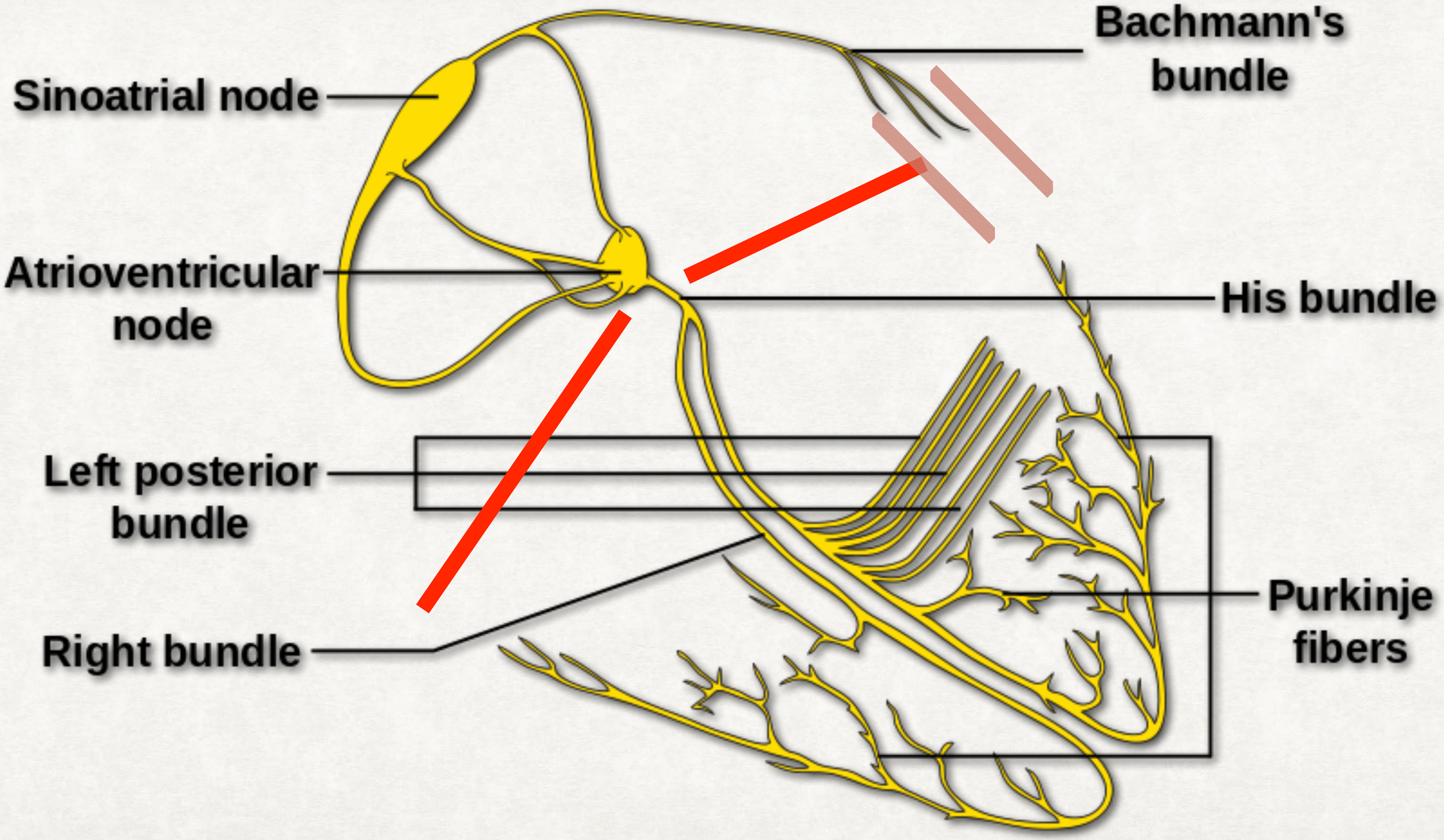
Right bundle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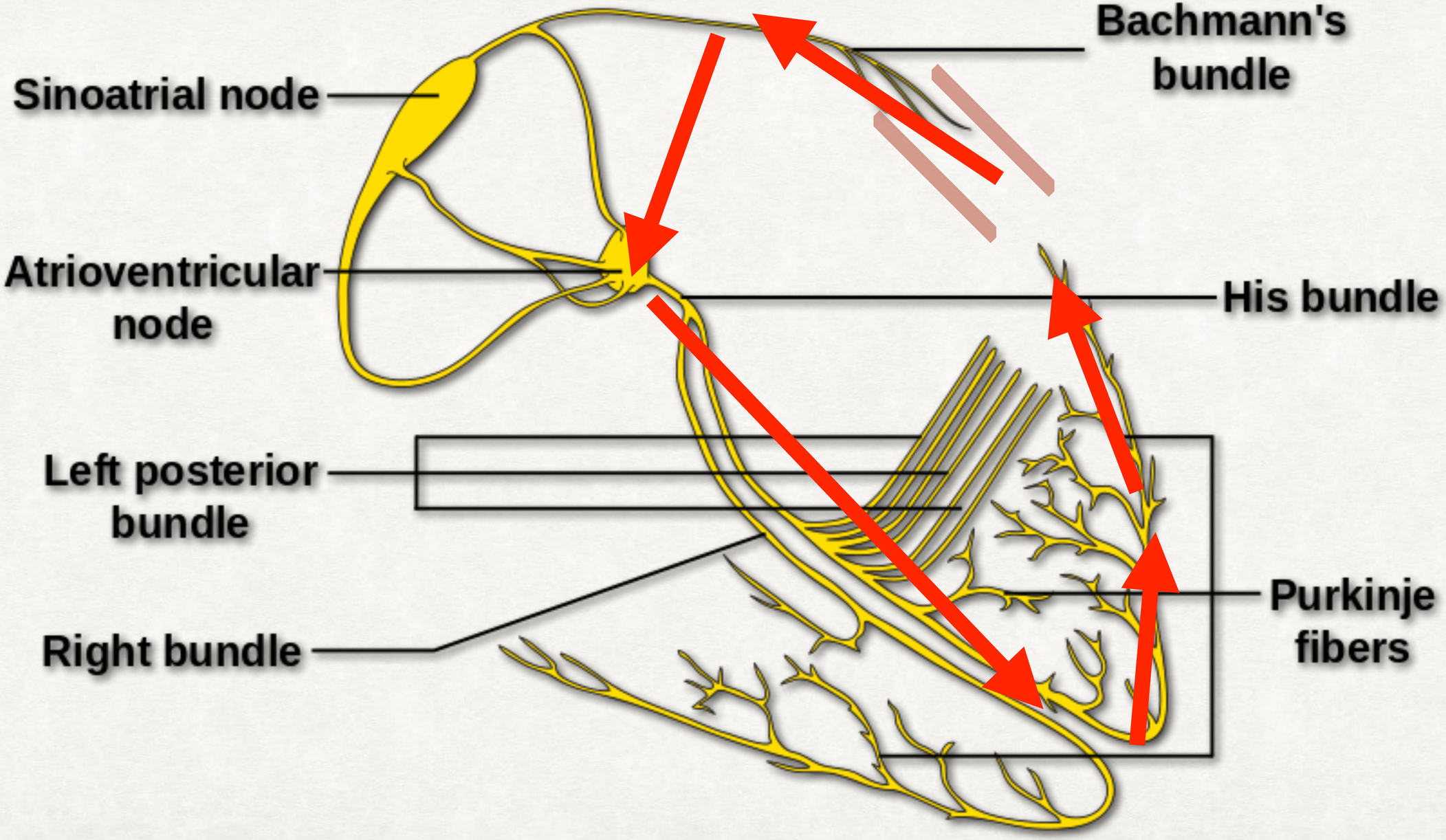
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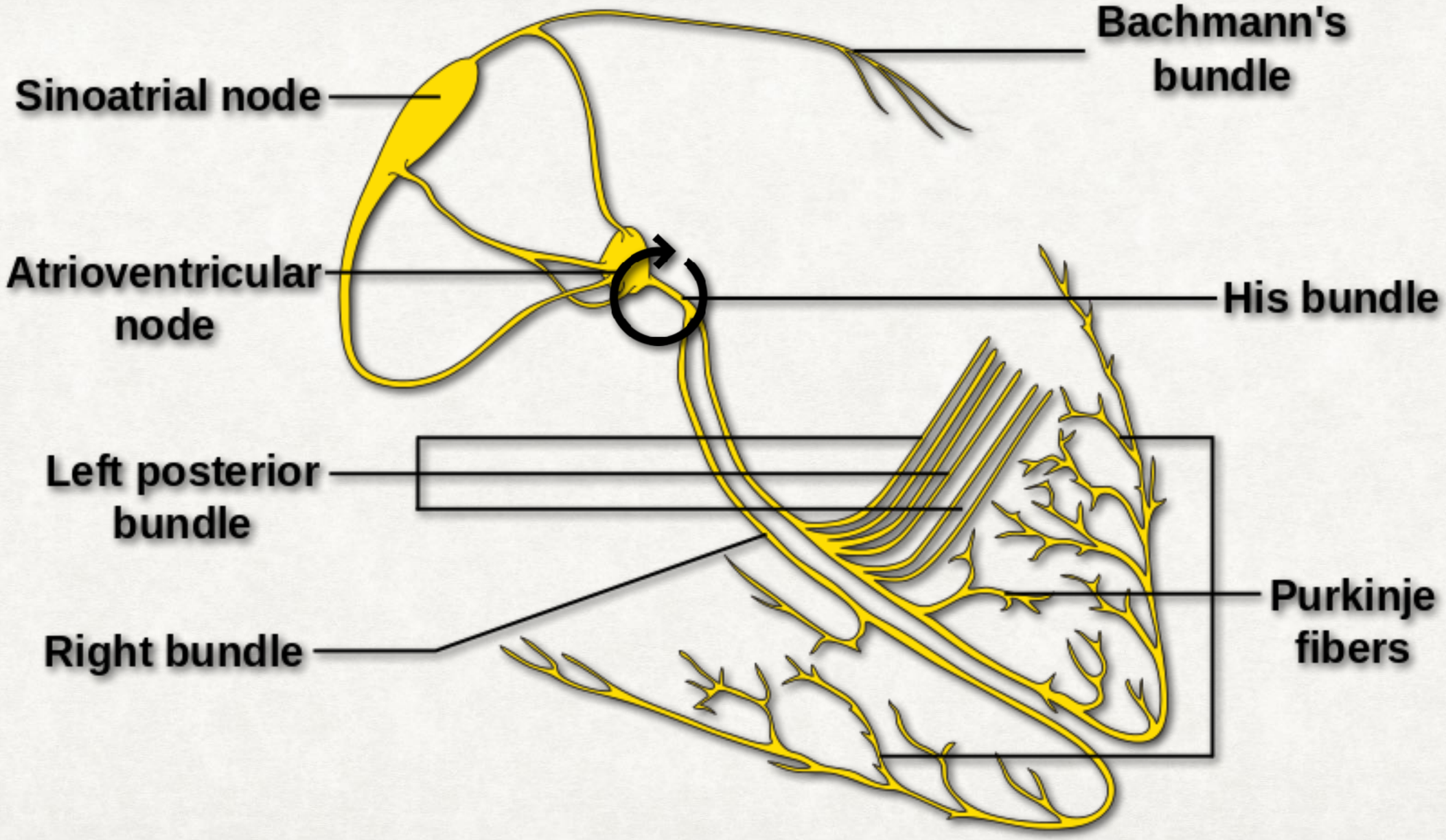
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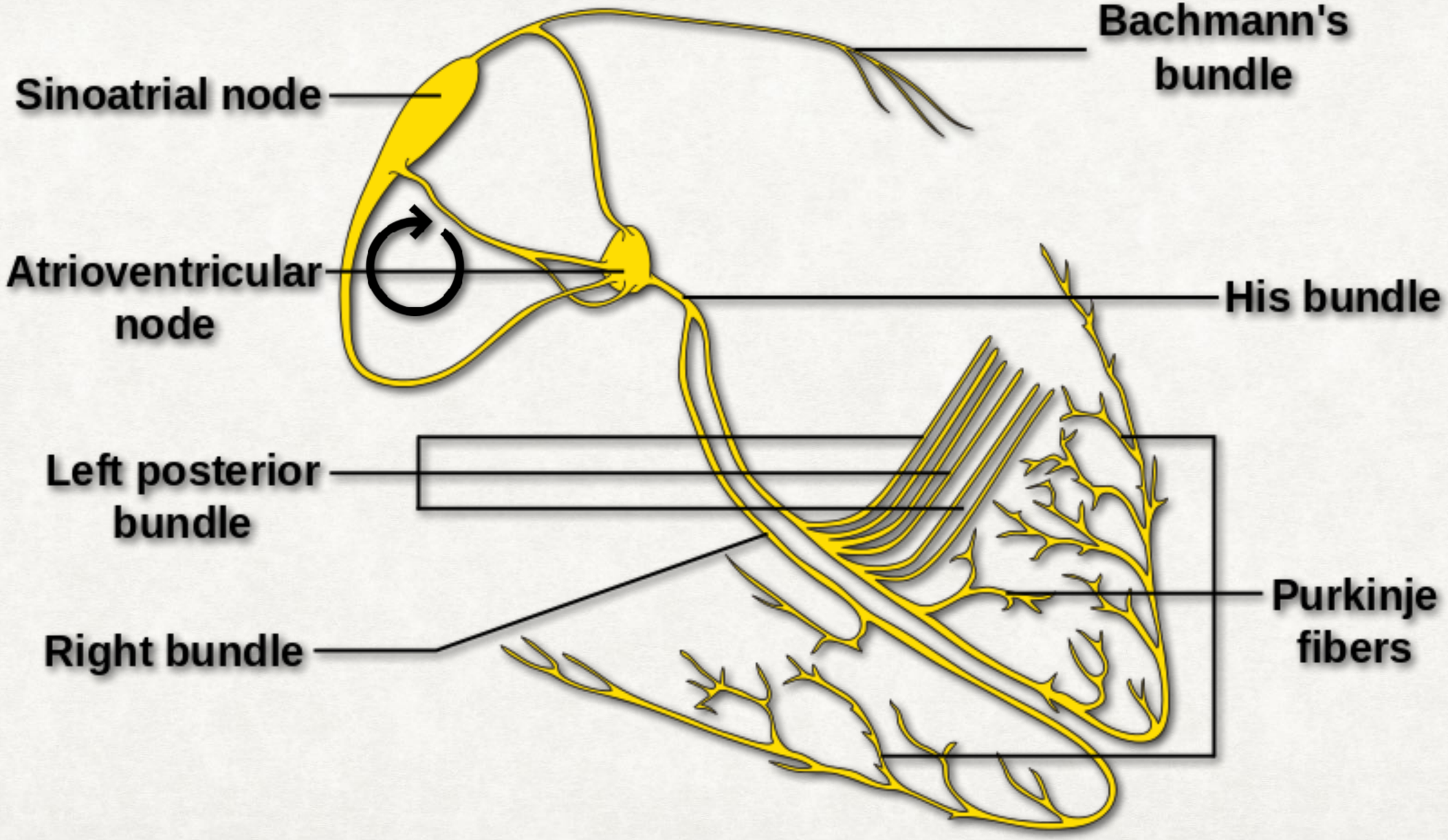
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Atrioventricular node
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Left posterior bundle
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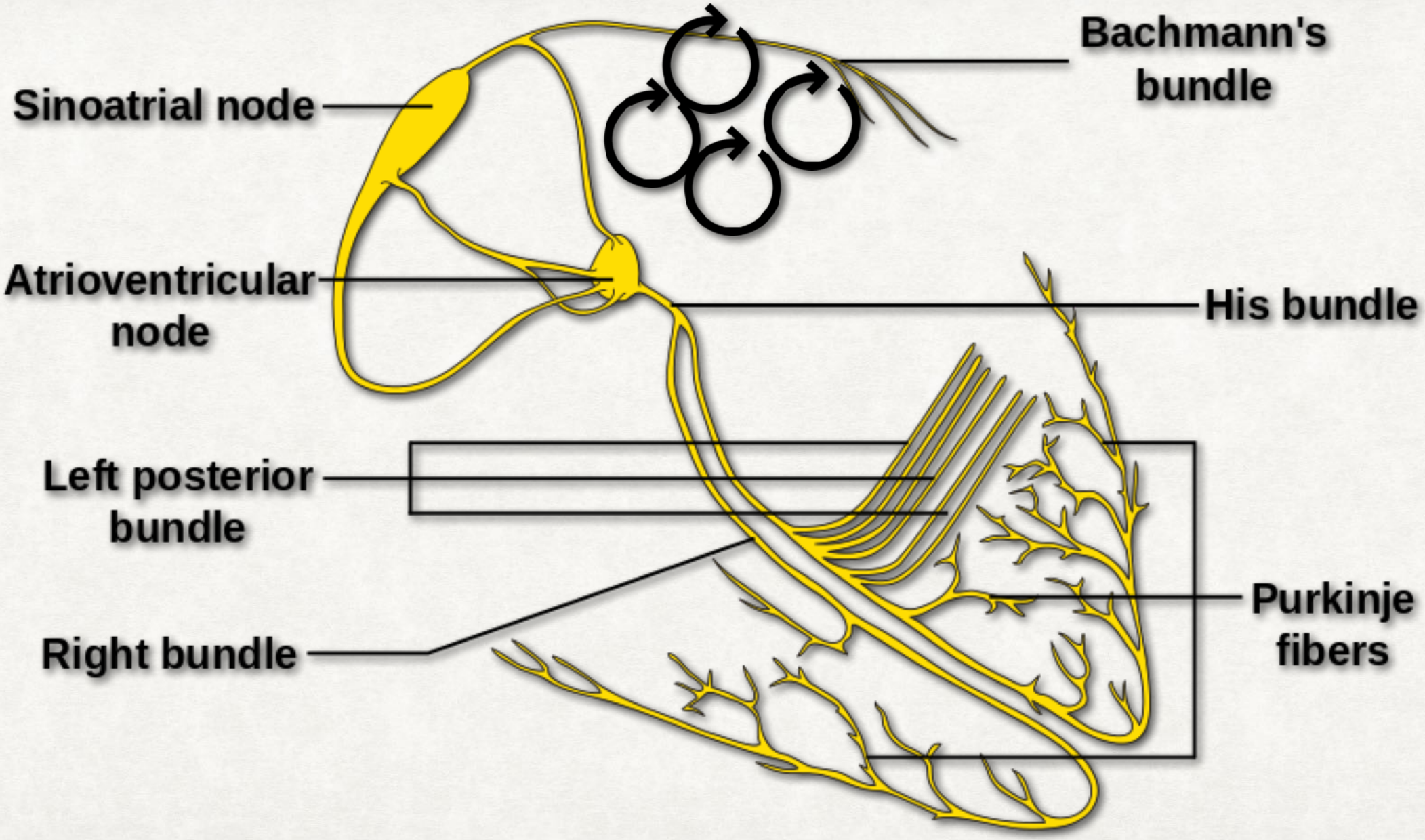
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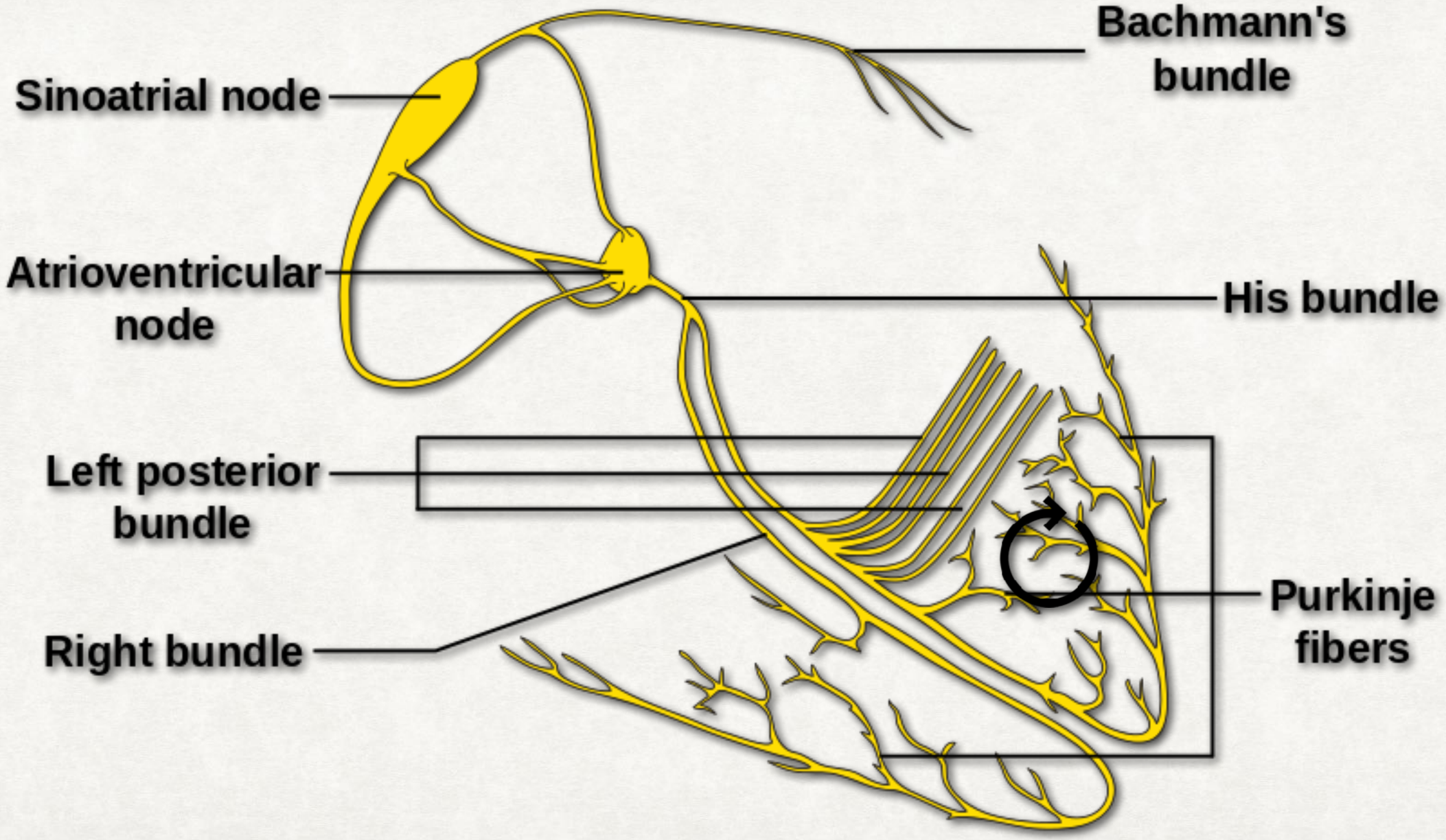
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Purkinje fibers
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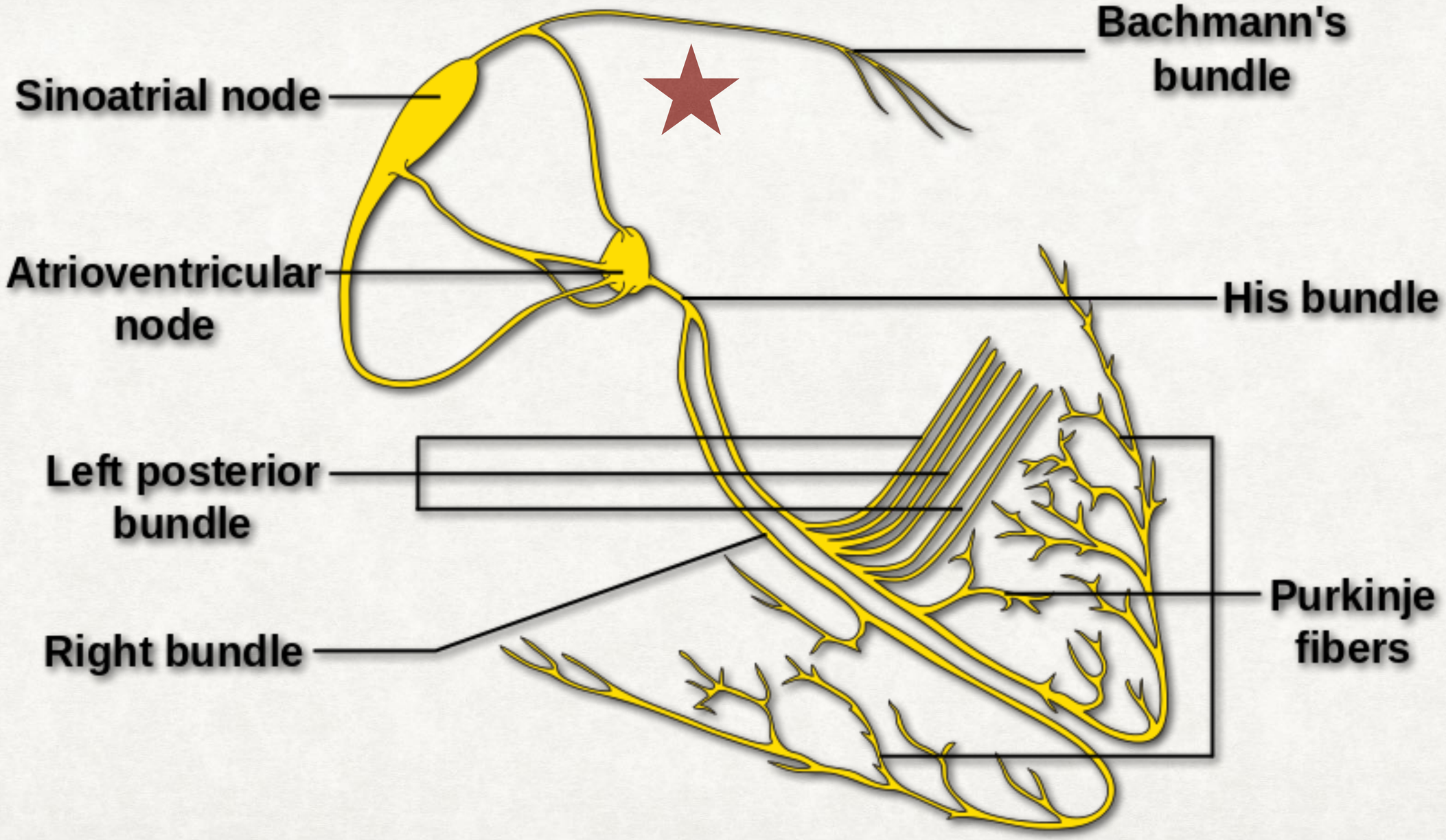
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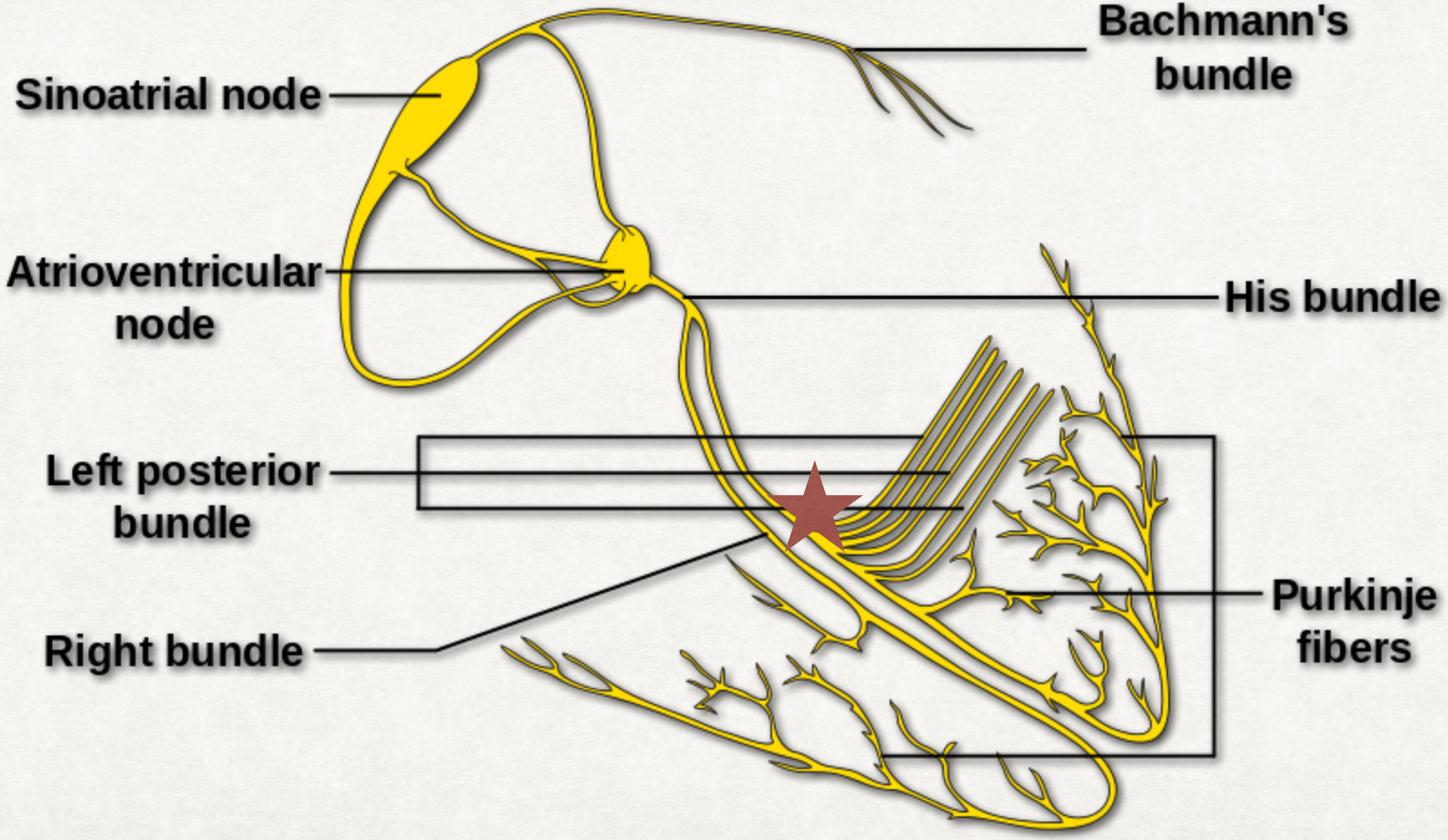
Left posterior bundle
Purkinje fibers
Right bundle

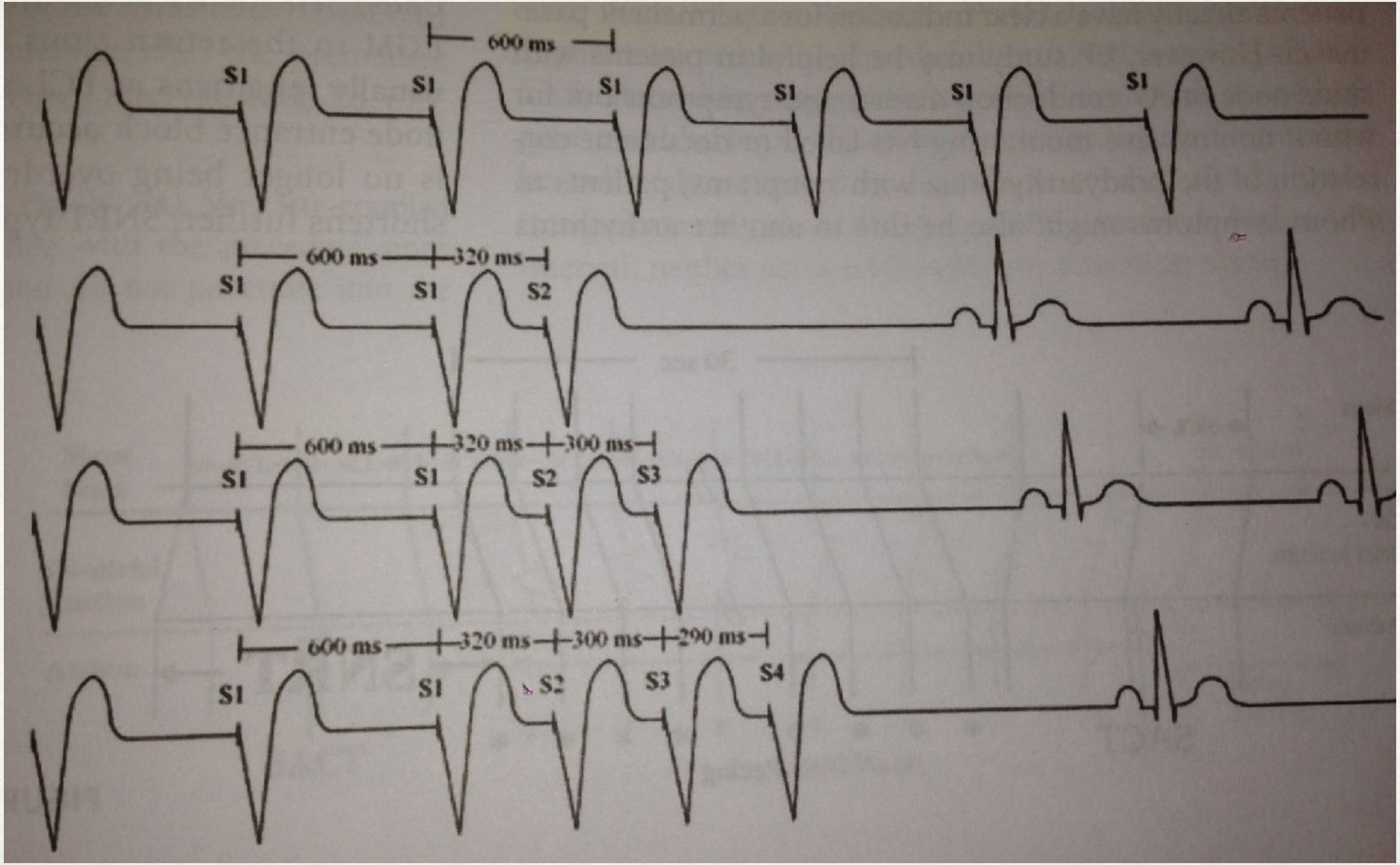

Bachmann's bundle
Sinoatrial node
Atrioventricular node
His bundle
Left posterior bundle
Purkinje fibers
Right bundle

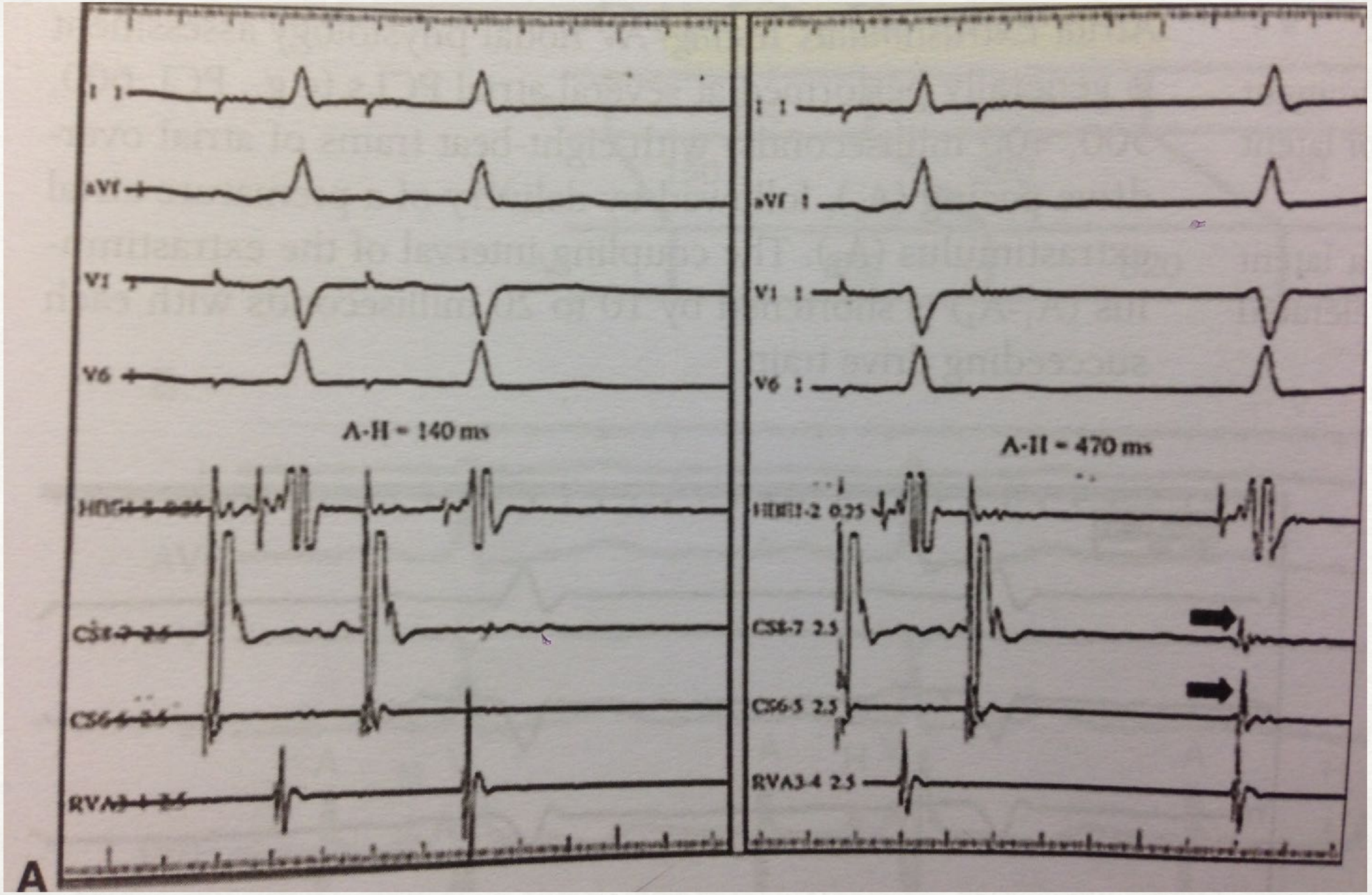
EP STUDY

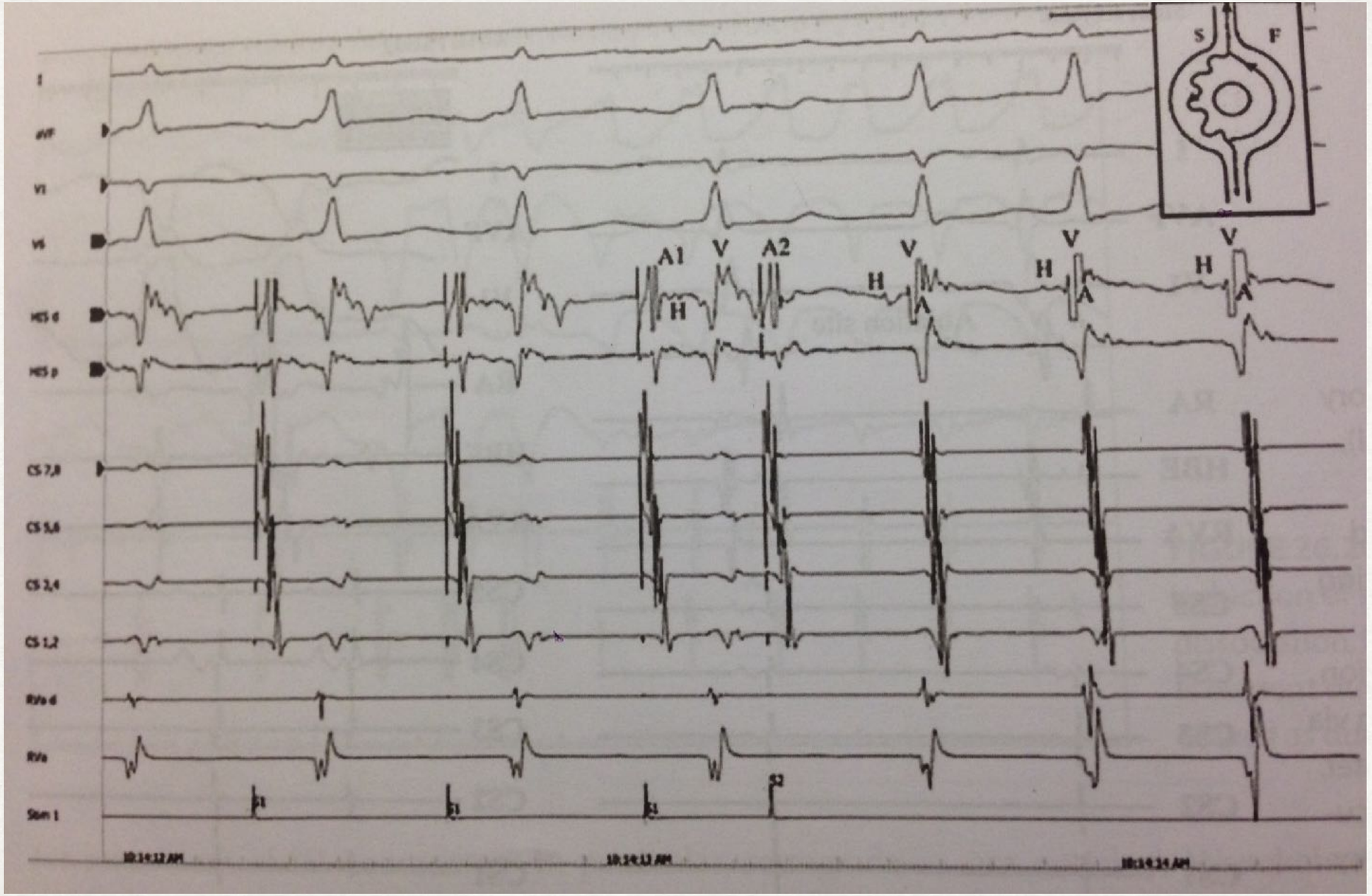
- Baseline measurements: baseline rhythm and rate, AH, HV, QT
- Premature extrastimuli: put in two quick stimuli after a drivetrain
- Incremental pacing: pace faster and faster
- Repeat steps 2 and 3 in the other chamber
- Trigger dysrhythmia, may need isoproterenol
- Ablate
- Done.

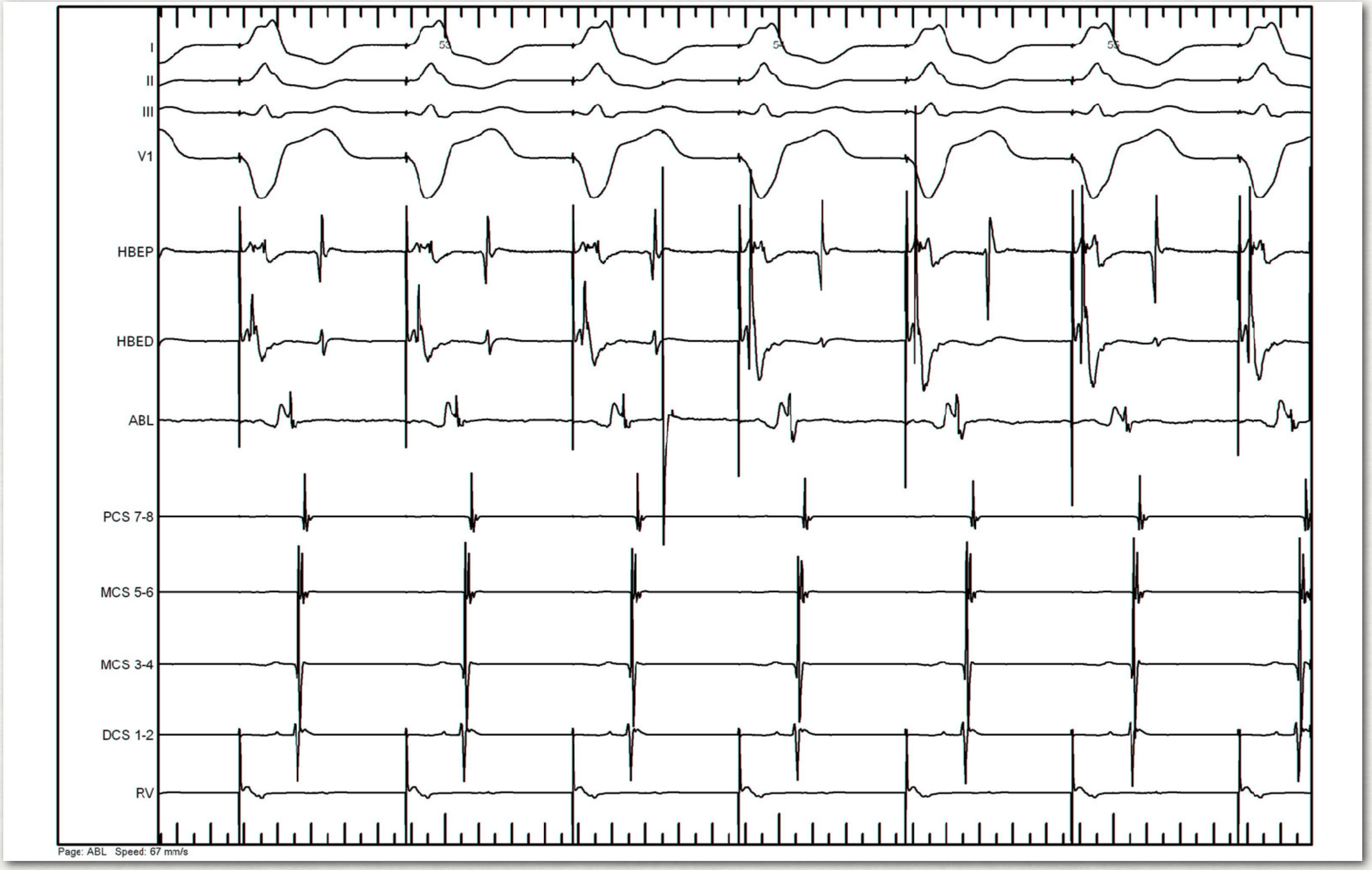
TERMS

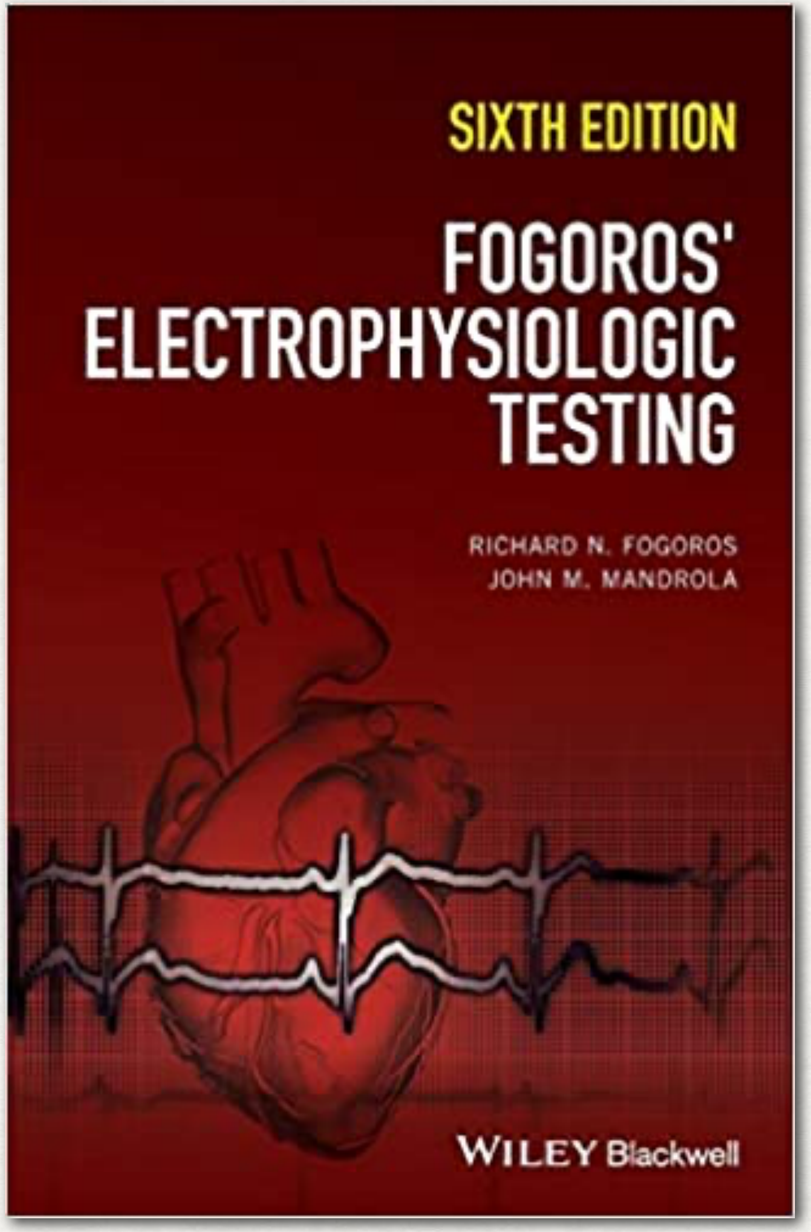
- Cycle Length rather than heart rate: time (msec) from one QRS to the next one
  - 1000 msec = 60 BPM
- ERP: Effective Refractory Period: point at which the pacing device won't capture anymore
- Dual AV Node physiology: 1/2 the AV node remains excitable but conducts very slowly
- Reentry: short circuit


600 ms
S1
S1
S1
S1
S1
S1
600 ms
320 ms
S1
S1
S2
600 ms
320 ms
300 ms
S1
S1
S2
S3
600 ms
320 ms
300 ms
290 ms
S1
S1
S2
S3
S4


I
aVf
V1
V6
A-H = 140 ms
CS8-7 2.5
CS6-5 2.5
RVA3-4 2.5
A-H = 470 ms
A


I
aVF
V1
V6
HIS d
HIS p
CS 7,8
CS 5,6
CS 3,4
CS 1,2
RVa d
RVa
Stim I
A1
V
A2
H
V
H
A
V
H
A
V
H
A
S
F


I
II
III
V1
HBEP
HBED
ABL
PCS 7-8
MCS 5-6
MCS 3-4
DCS 1-2
RV
Page: ABL Speed: 67 mm/s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