

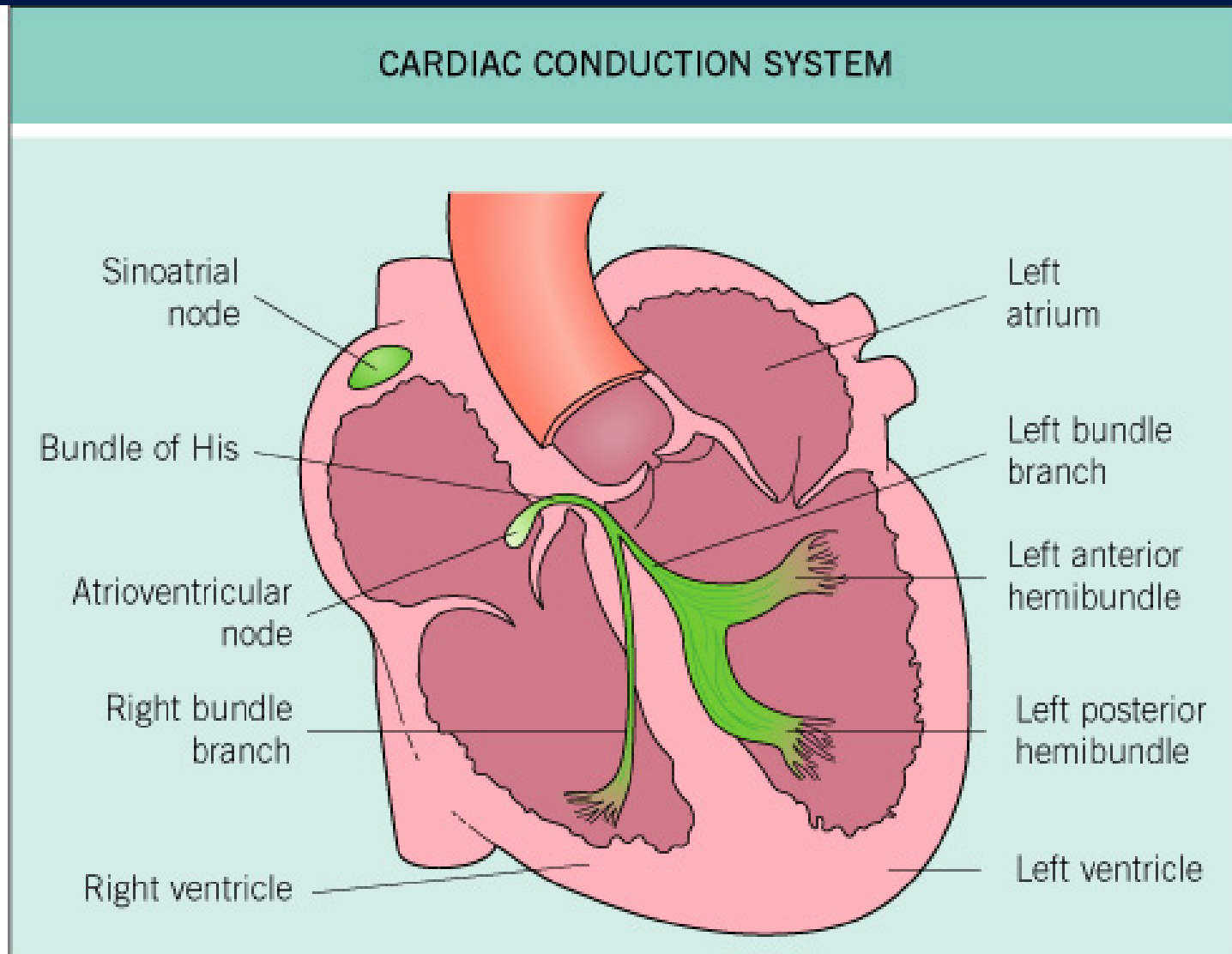
EKG Conference

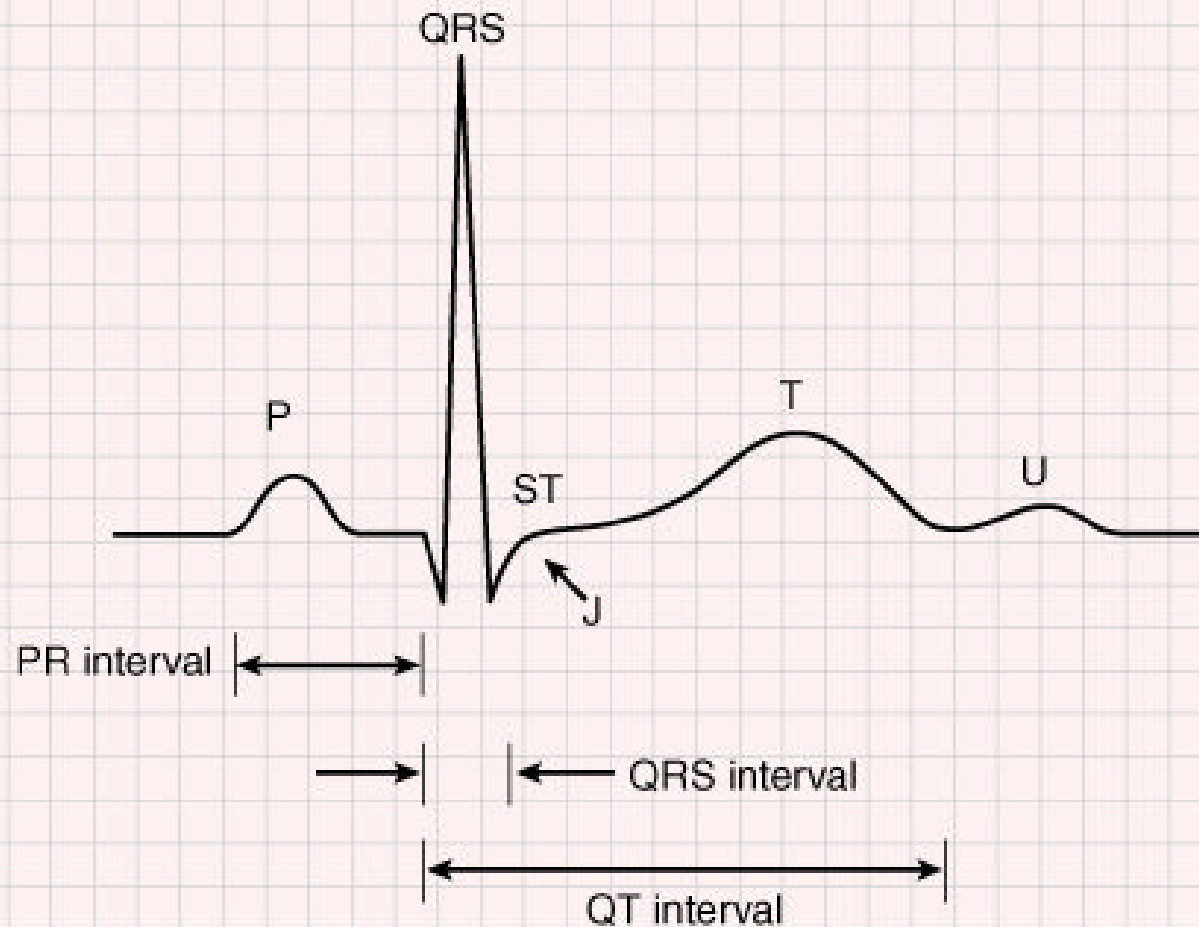
August 30, 2007

David Stultz, MD

Southwest Cardiology, Inc.







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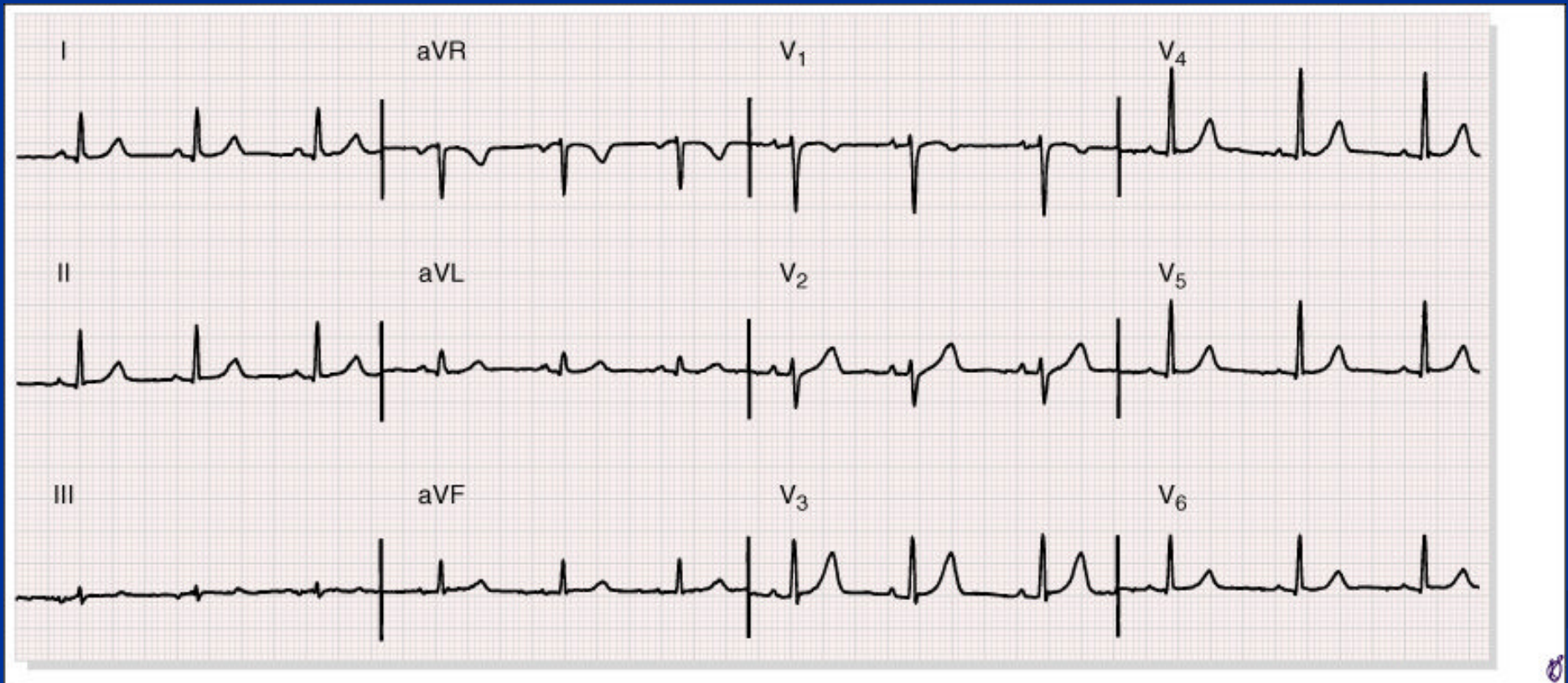
TABLE 9-2 Normal Values for Durations of Electrocardiographic Waves and Intervals in Adults

Wave/Interval	Duration (msec)
P wave duration	<120
PR interval	<120
QRS duration	<110-120*
QT interval (corrected)	≥440-460*

*See text for further discussion.

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Normal EKG



Review from Last Session

■ Heart Rate

- 1 big box = 200ms
- 1 small box = 40ms

Big Boxes Between QRS complexes	1	2	3	4	5	6	7
Heart Rate (300/big boxes)	300	150	100	75	60	50	42

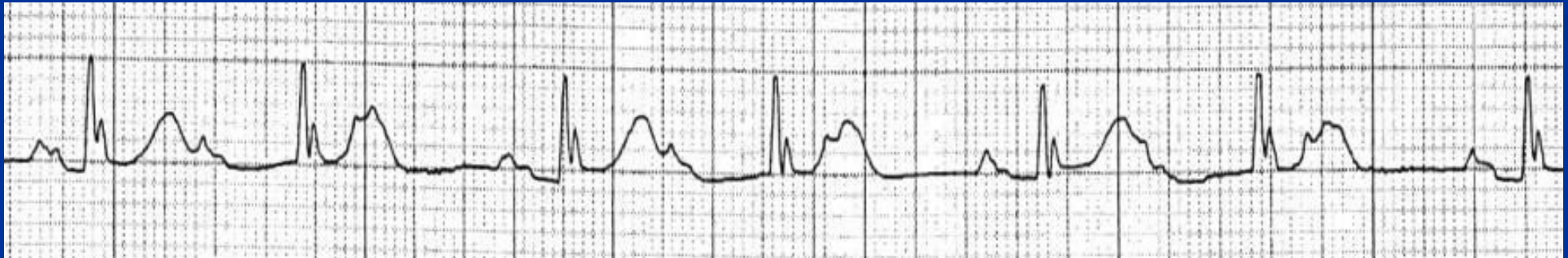
1st Degree AV Block

- >200 ms from onset of P wave to onset of QRS



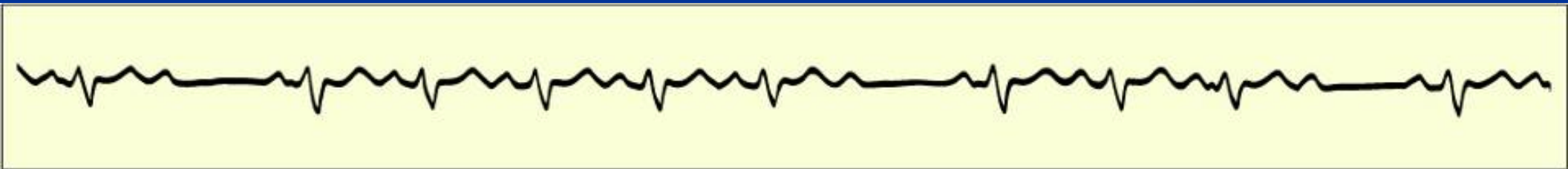
2nd Degree AV Block Type 1 - Wenkebach

- P-R interval prolongs until QRS is dropped



2nd Degree Heart Block Type 2

- PR interval remains constant, QRS drops unexpectedly

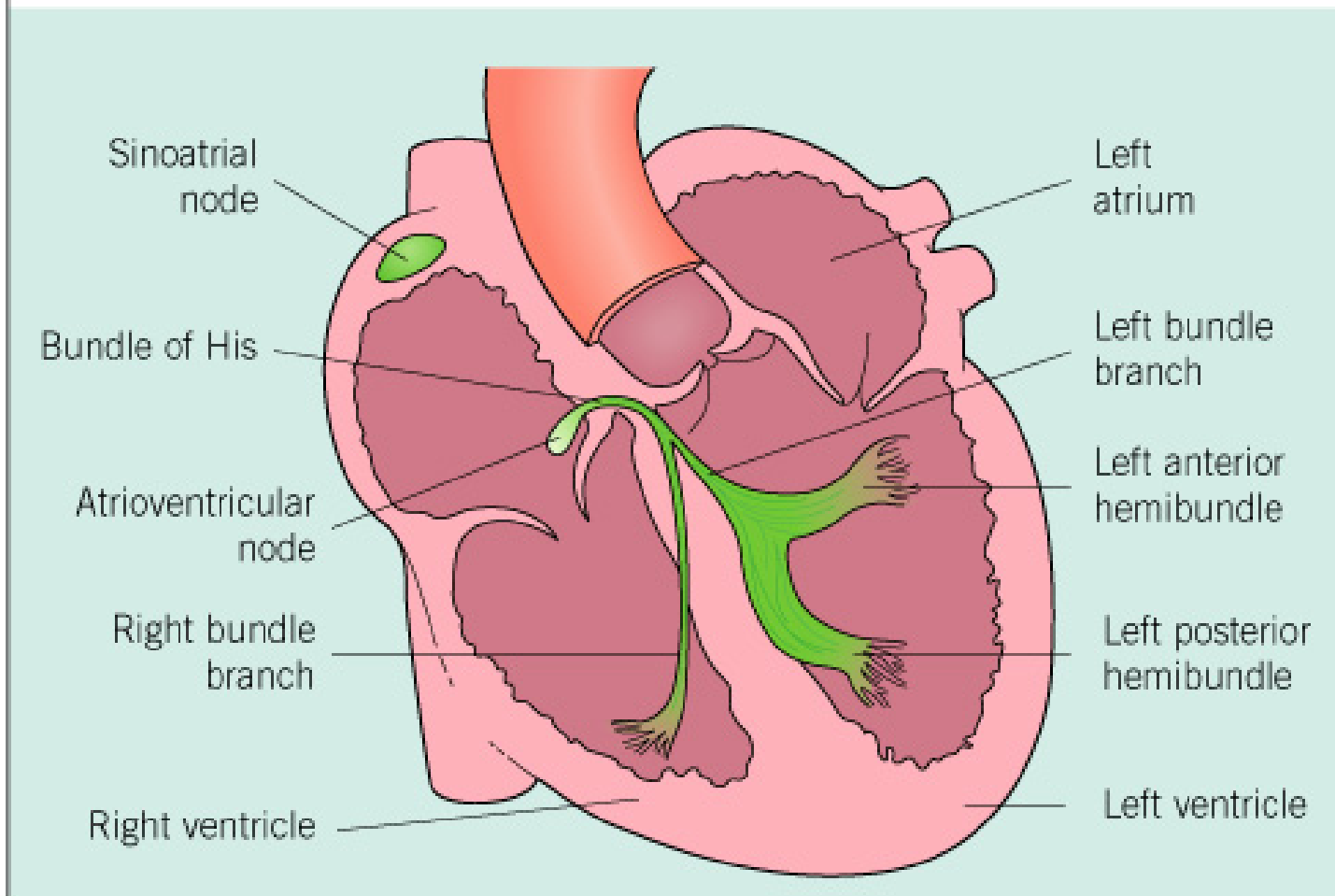


3rd degree Heart Block

- P rate faster than QRS rate
- No correlation between P's and QRS

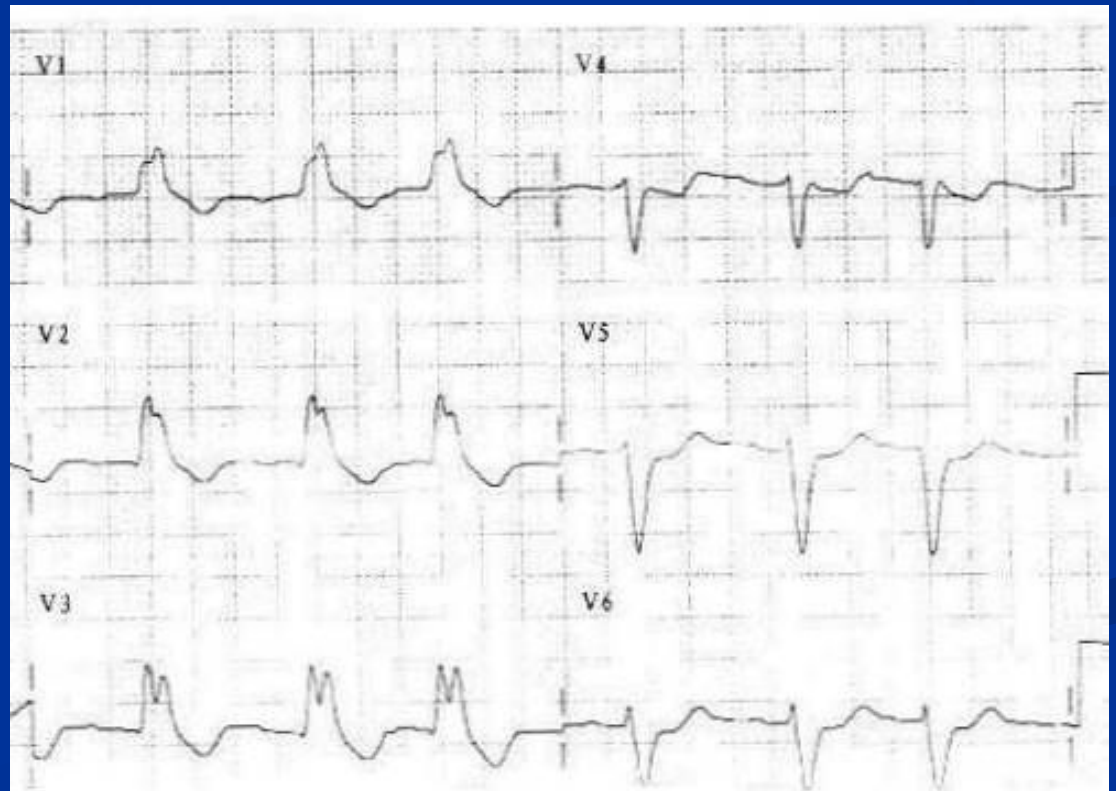


CARDIAC CONDUCTION SYSTEM



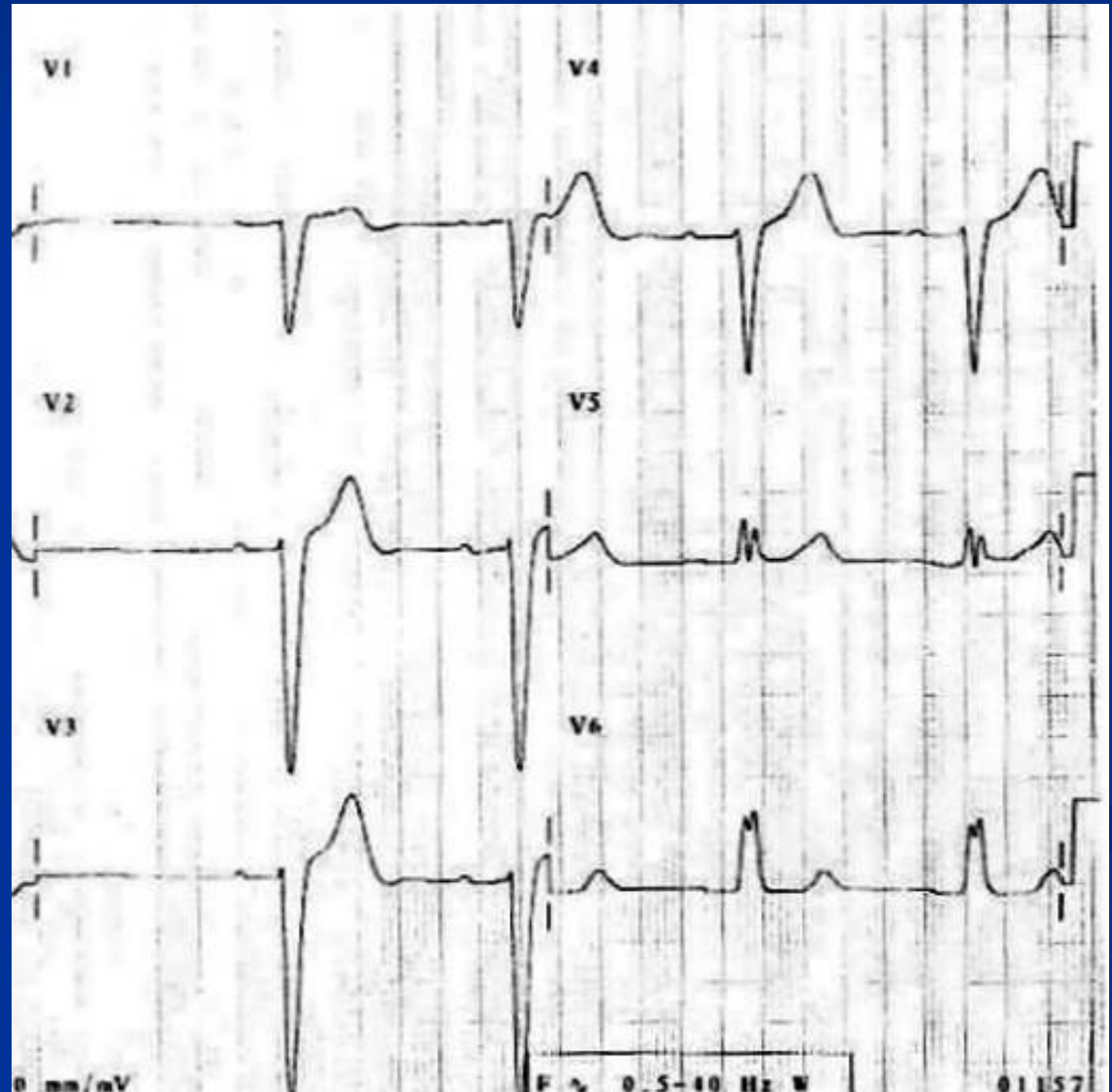
Bundle Branch Blocks

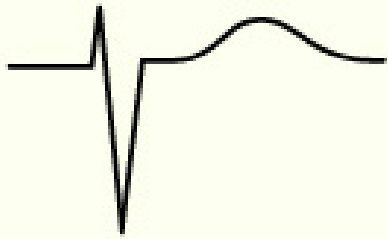
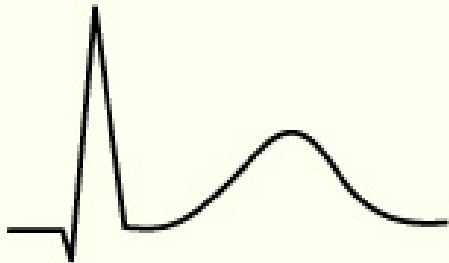
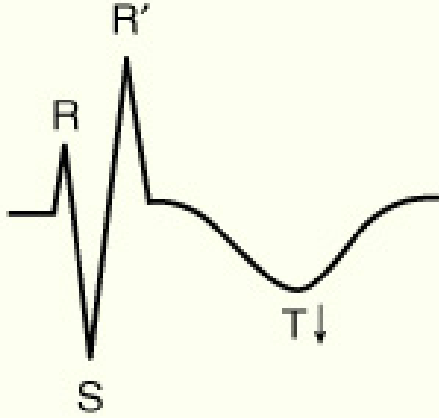
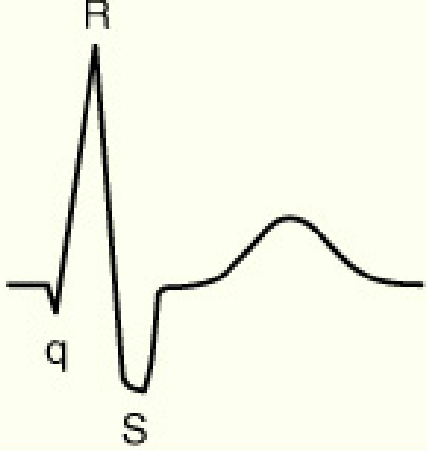
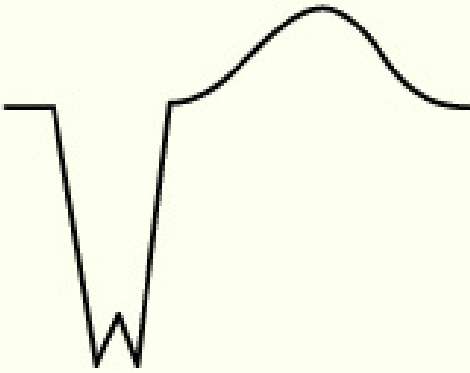
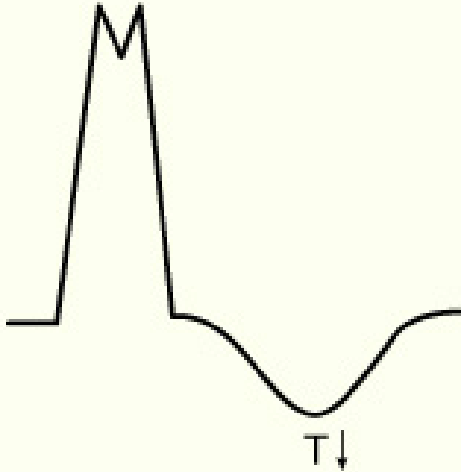
- Right Bundle Branch Block
 - QRS duration $>120\text{ms}$ (3 small boxes)
 - rsR' in V1
 - 'Rabbit Ears'



Bundle Branch Blocks

- Left Bundle Branch Block
 - QRS duration >120ms (3 small boxes)
 - R in V6



	V ₁	V ₆
Normal		
RBBB	 R R' S T↓	 R q S
LBBB		 T↓



Bundle Branch Block Criteria

TABLE 9-7 Common Diagnostic Criteria for Bundle Branch Blocks

Complete left bundle branch block

QRS duration ≥ 120 msec

Broad, notched R waves in lateral precordial leads (V_5 and V_6) and usually leads I and aV_1

Small or absent initial r waves in right precordial leads (V_1 and V_2) followed by deep S waves

Absent septal q waves in left-sided leads

Prolonged intrinsicoid deflection (>60 msec) in V_5 and V_6 *

Complete right bundle branch block

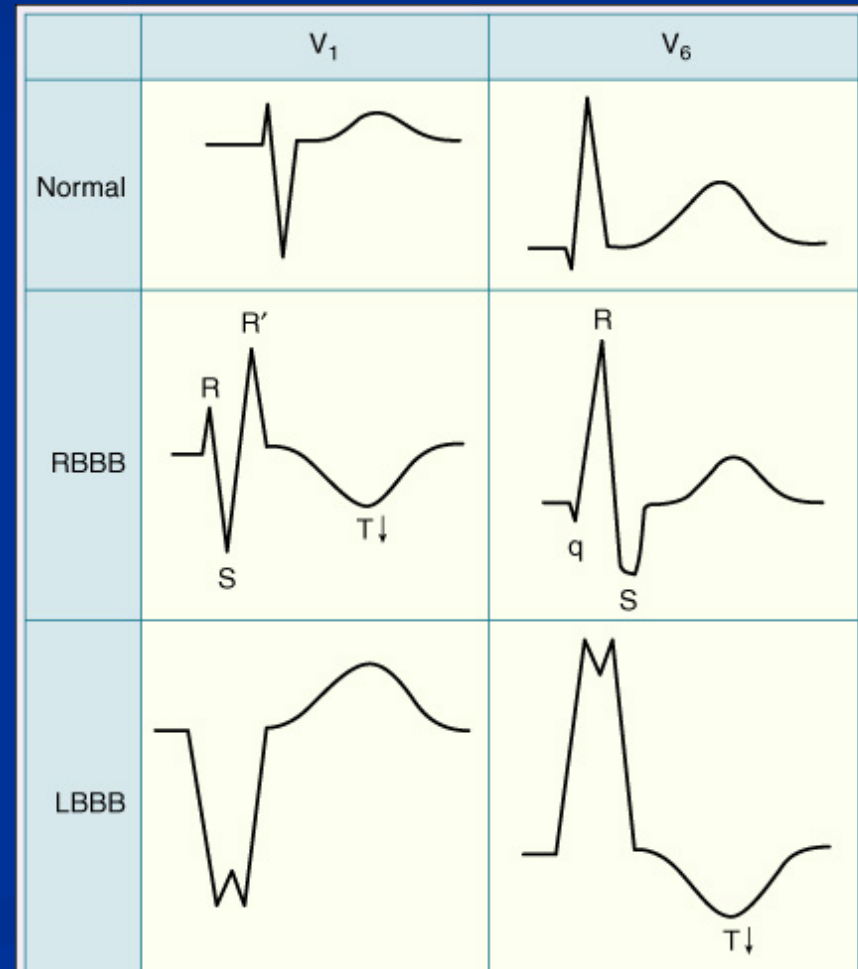
QRS duration ≥ 120 msec

Broad, notched R waves (rsr' , rsR' , or rSR' patterns) in right precordial leads (V_1 and V_2)

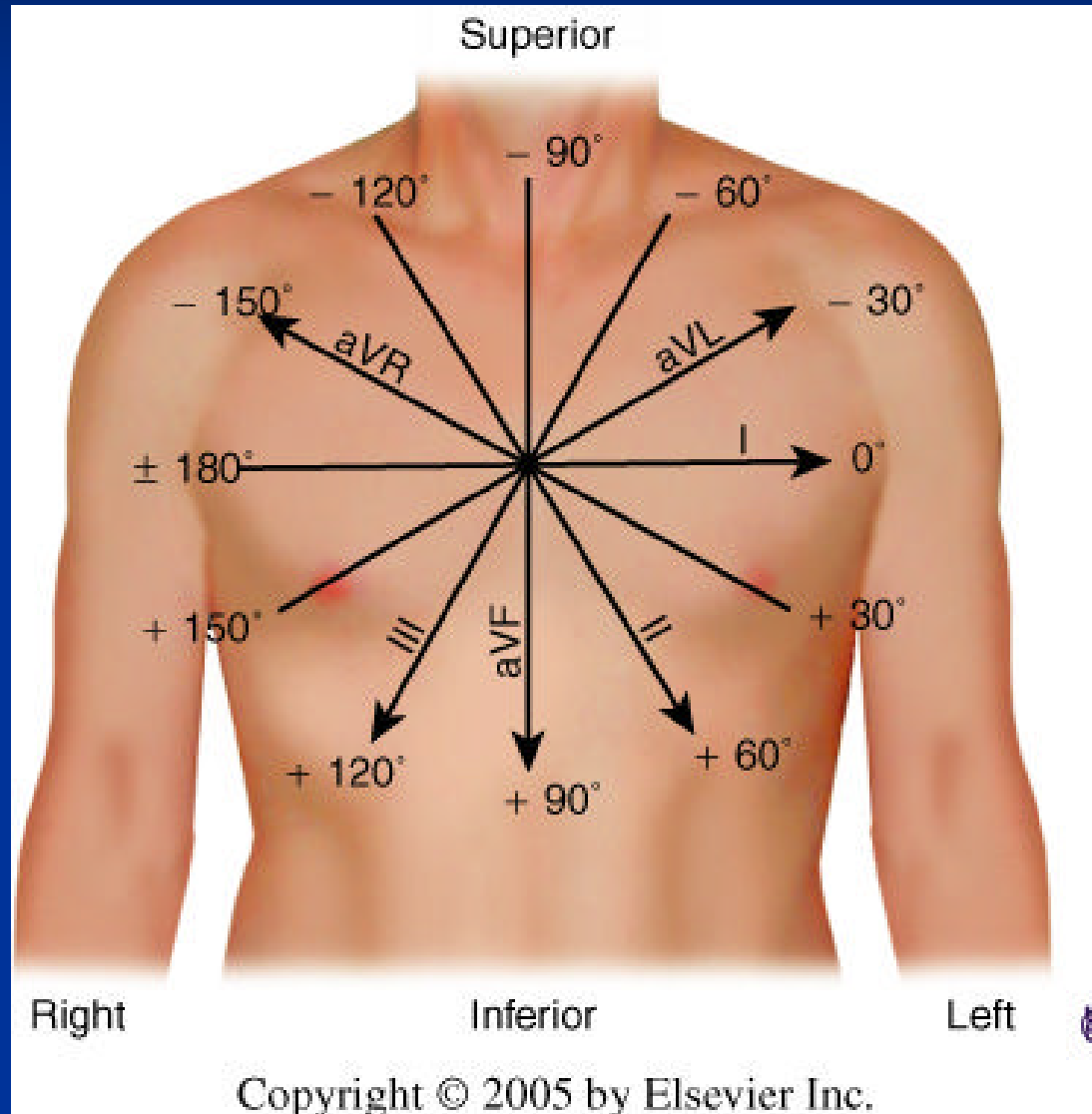
Wide and deep S waves in left precordial leads (V_5 and V_6)

*Criterion required by some authors.

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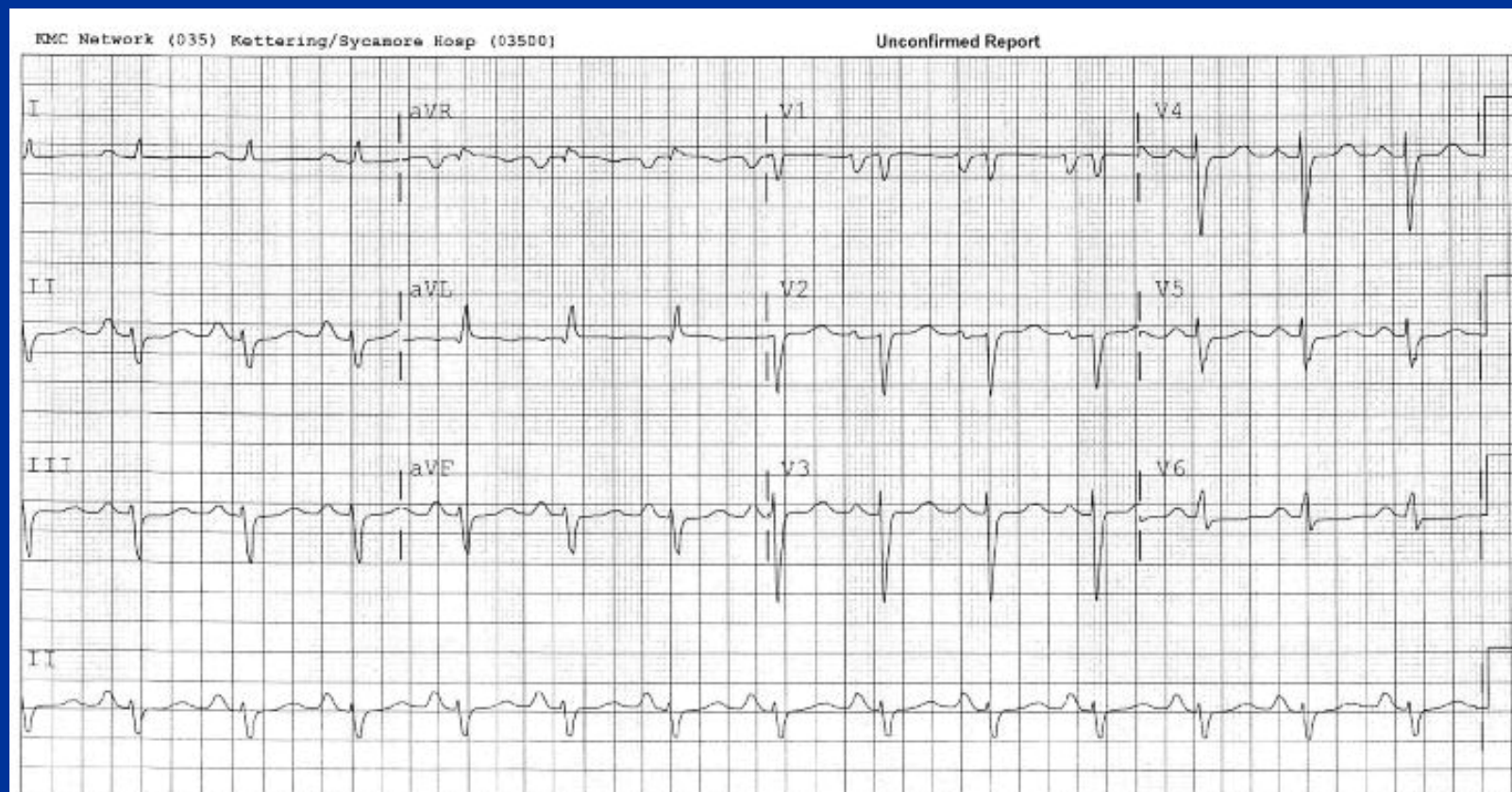


Axis

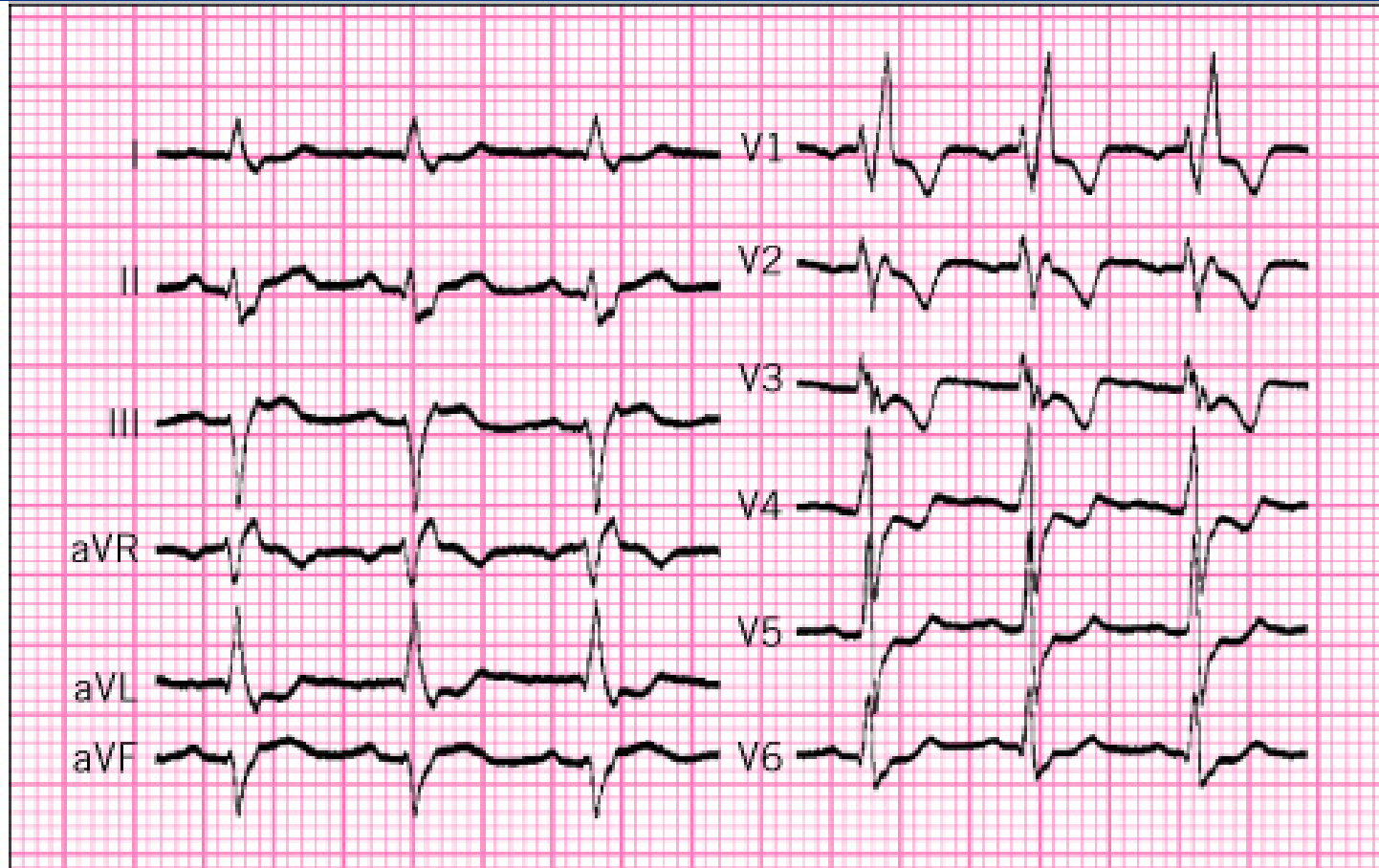


Left Anterior Fascicular Block

- Frontal Axis -45 to -90 degrees
- QRS <120ms
- rS pattern in II, III, aVF (inferior leads)



LAFB + RBBB



Left Posterior Fascicular Block

- Frontal Axis +/-120 degrees (typically right axis deviation)
- QRS <120ms
- RS pattern I, qR pattern in II, II, aVF (inferior leads)



Fascicular Blocks

QRS Duration <120ms

LAHB (LAFB)

Severe LAD without explanation

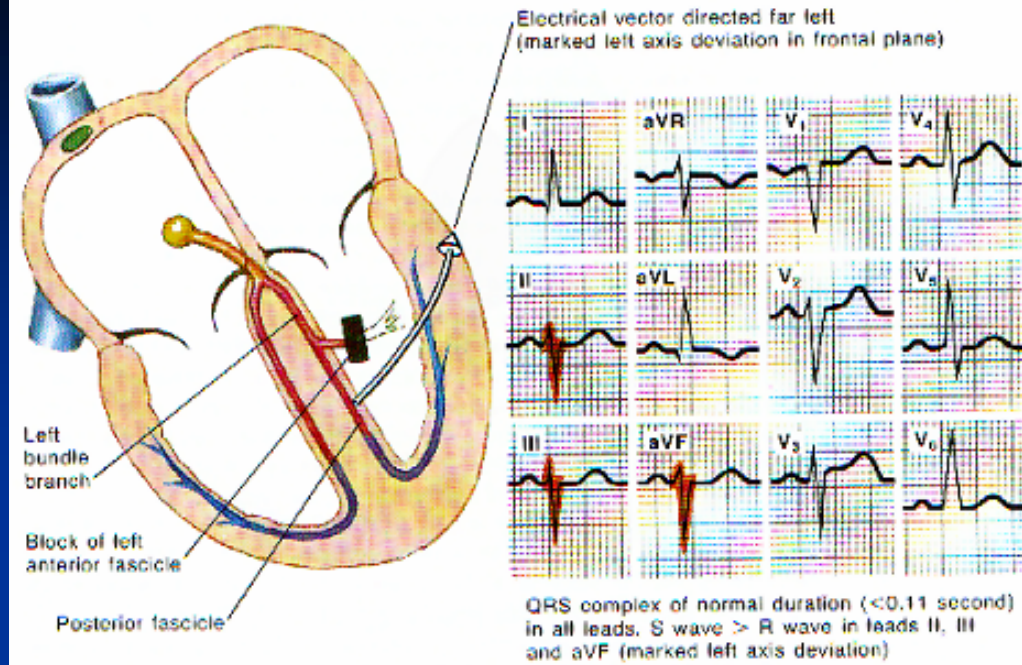
- Deep S waves in II, III, aVF
- Frontal Axis <-45 to -60 degrees
- Positive in I, Negative in aVF
- Not explained by LBBB, LVH, inferior infarct

LPHB (LPFB)

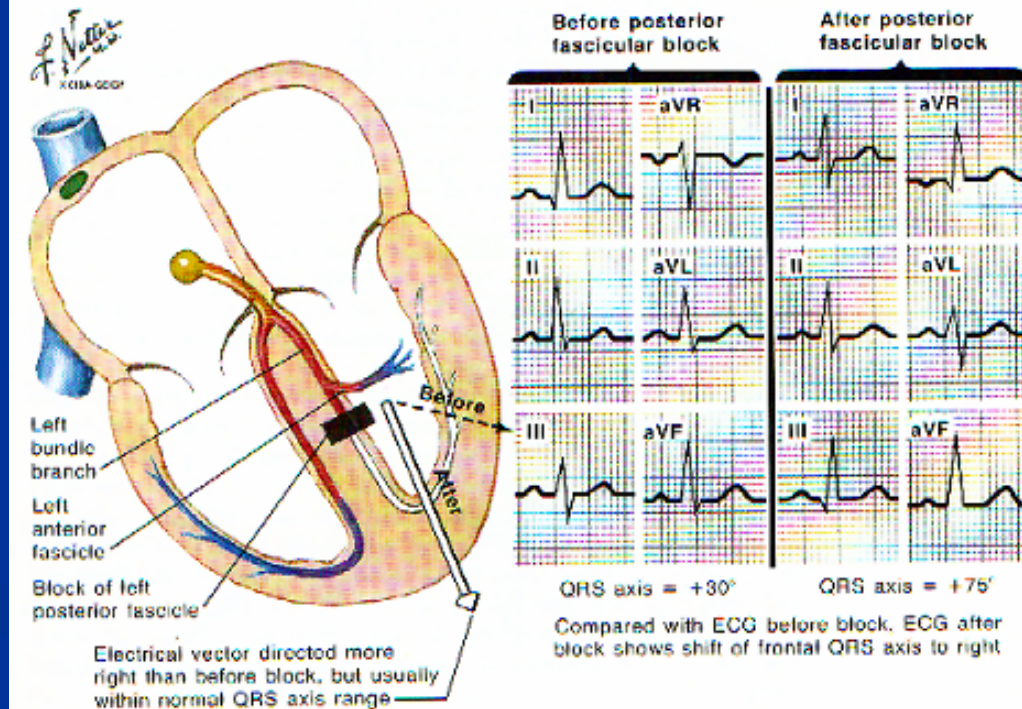
Opposite of LAFB, Rare

- Usually Right Axis deviation
- Negative in I, Positive in aVF
- Positive in II, III, aVF
- Not explained by RVH, anterolateral infarct

Left Anterior Fascicular Block



Left Posterior Fascicular Block



Fascicular Block Criteria

TABLE 9-6 Common Diagnostic Criteria for Unifascicular Blocks

Left anterior fascicular block

Frontal plane mean QRS axis of -45 to -90 degrees with rS patterns in leads II, III, and aV_f and a qR pattern in lead aV_f

QRS duration less than 120 msec

Left posterior fascicular block

Frontal plane mean QRS axis of ± 120 degrees

RS pattern in leads I and aV_f with qR patterns in inferior leads

QRS duration of less than 120 msec

Exclusion of other factors causing right axis deviation (e.g., right ventricular overload patterns, lateral infarction)

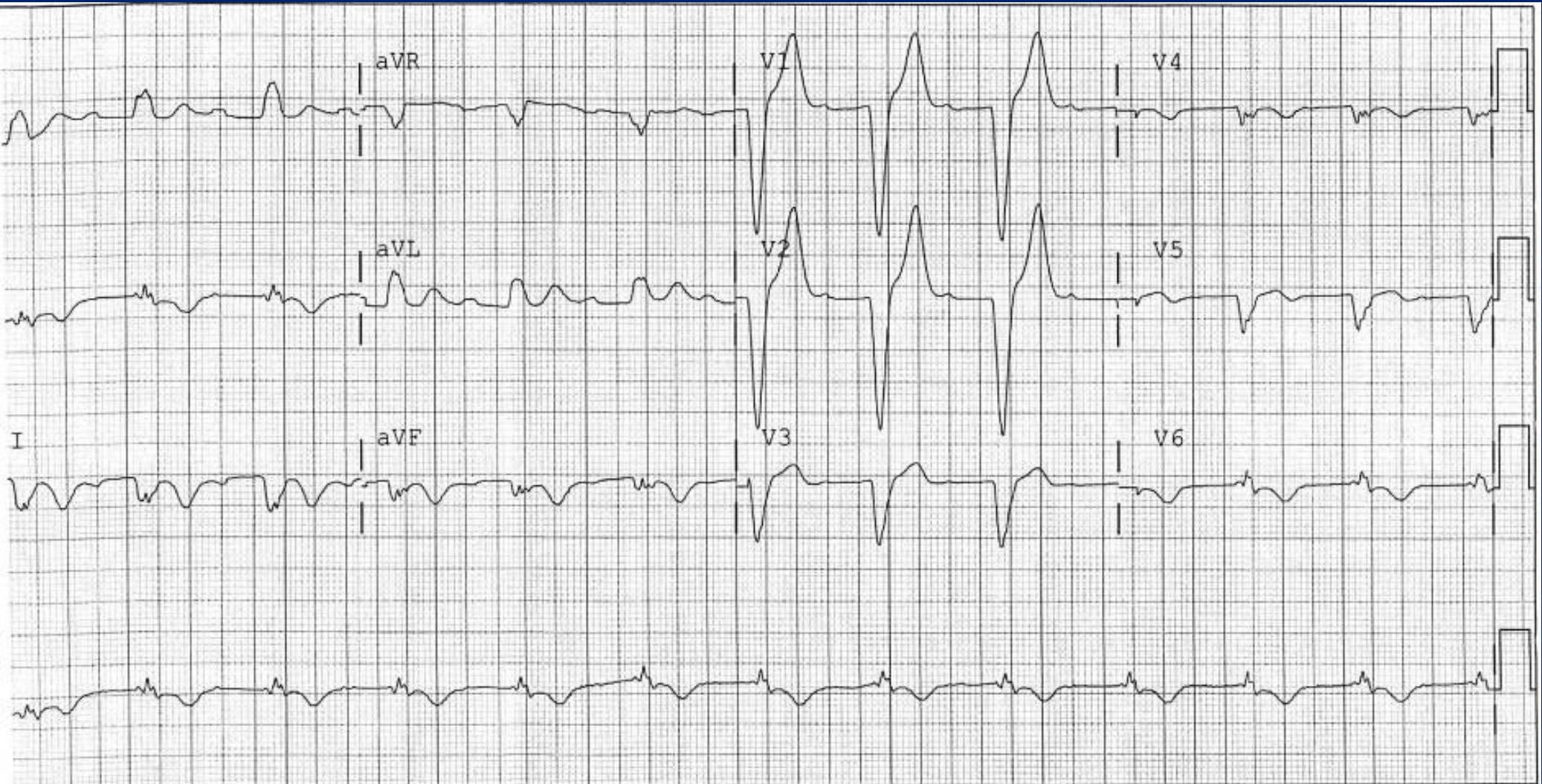
COMMON CAUSES OF ATRIOVENTRICULAR AND INTRAVENTRICULAR CONDUCTION DISTURBANCE

Intrinsic causes	Congenital Sclerodegenerative Ischemia Trauma (surgical) Connective tissue disorders Tumors Sarcoidosis
Extrinsic causes	Drugs Autonomic disorders Hypothyroidism

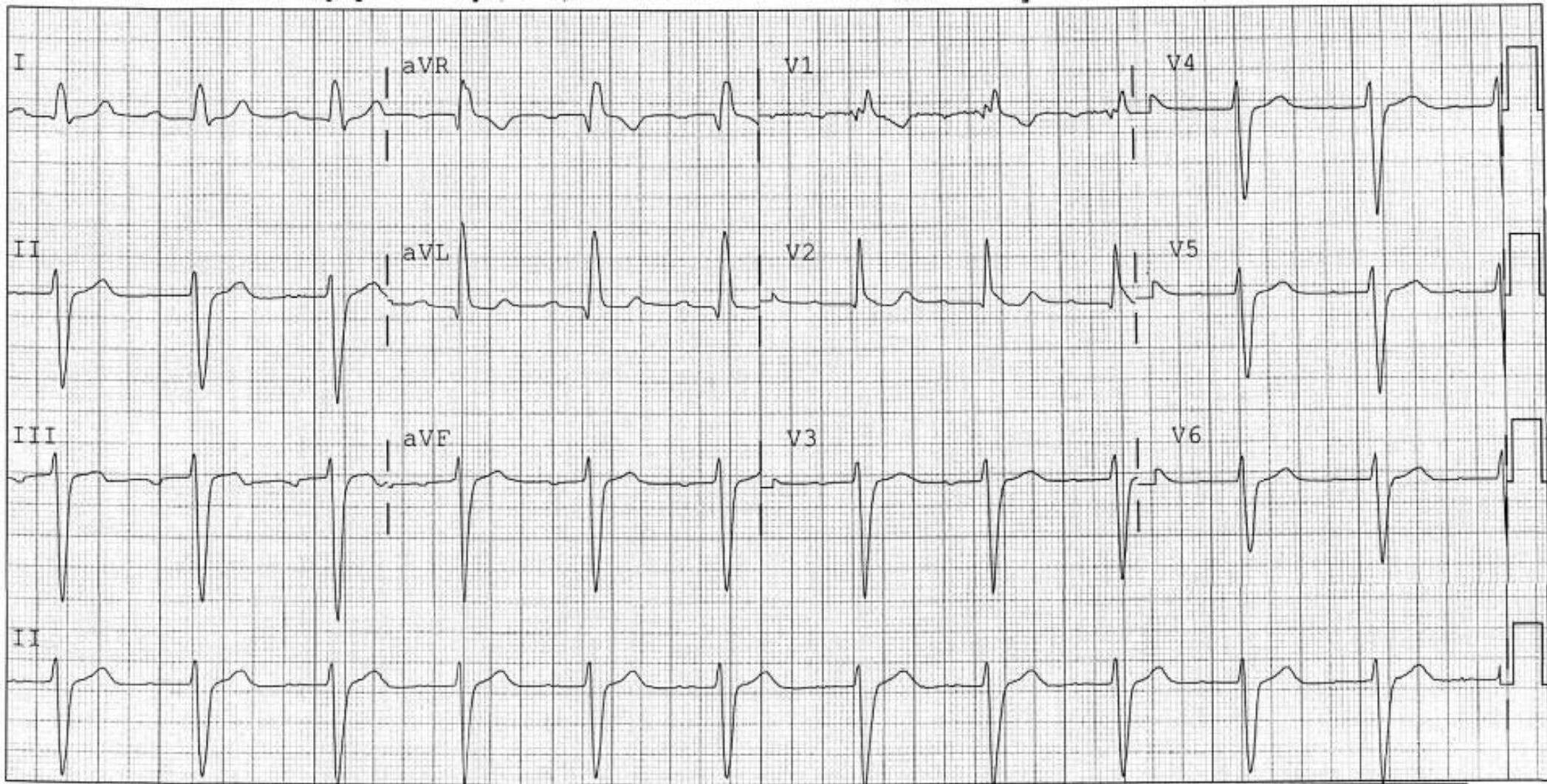
An interesting case

- 58 year old female admitted with syncope
- Seen 2 weeks ago at previous hospital for syncope, had negative workup
- Describes some clonic motions during syncope, having workup for seizures

Initial EKG



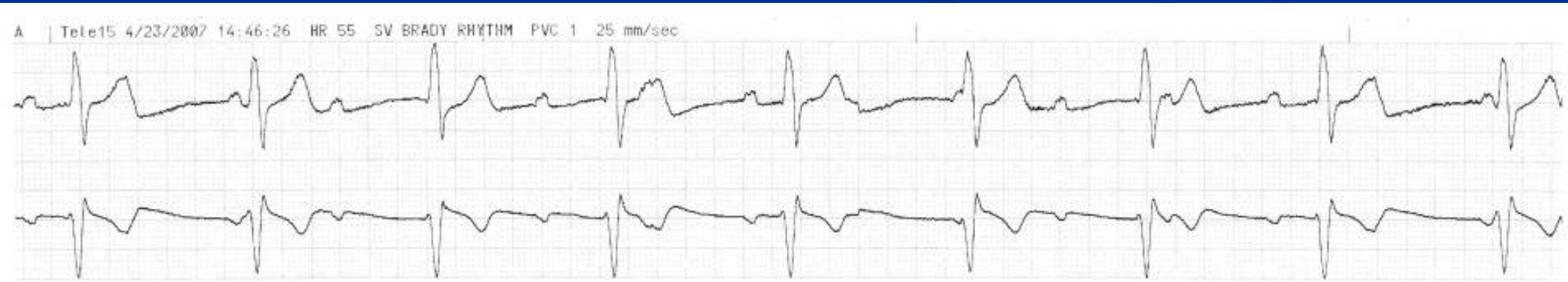
About 2 hours later



Overnight telemetry



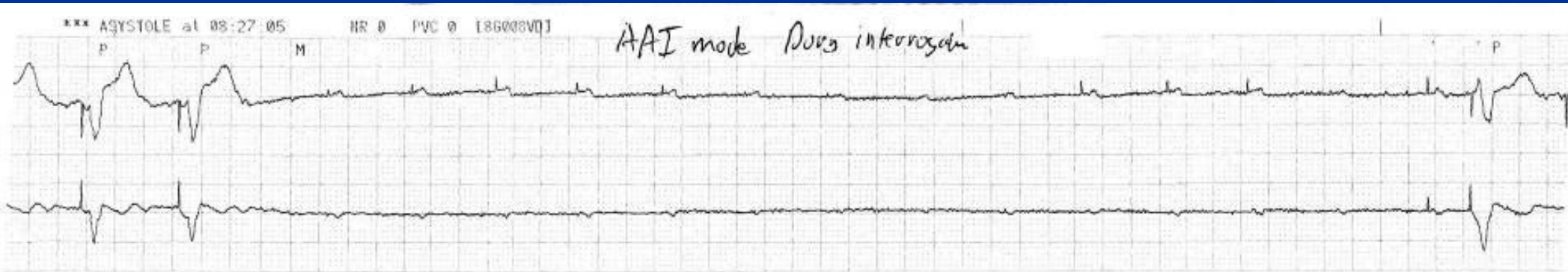
Probably sinus rhythm with 2nd degree type 2 heart block



3rd degree heart block

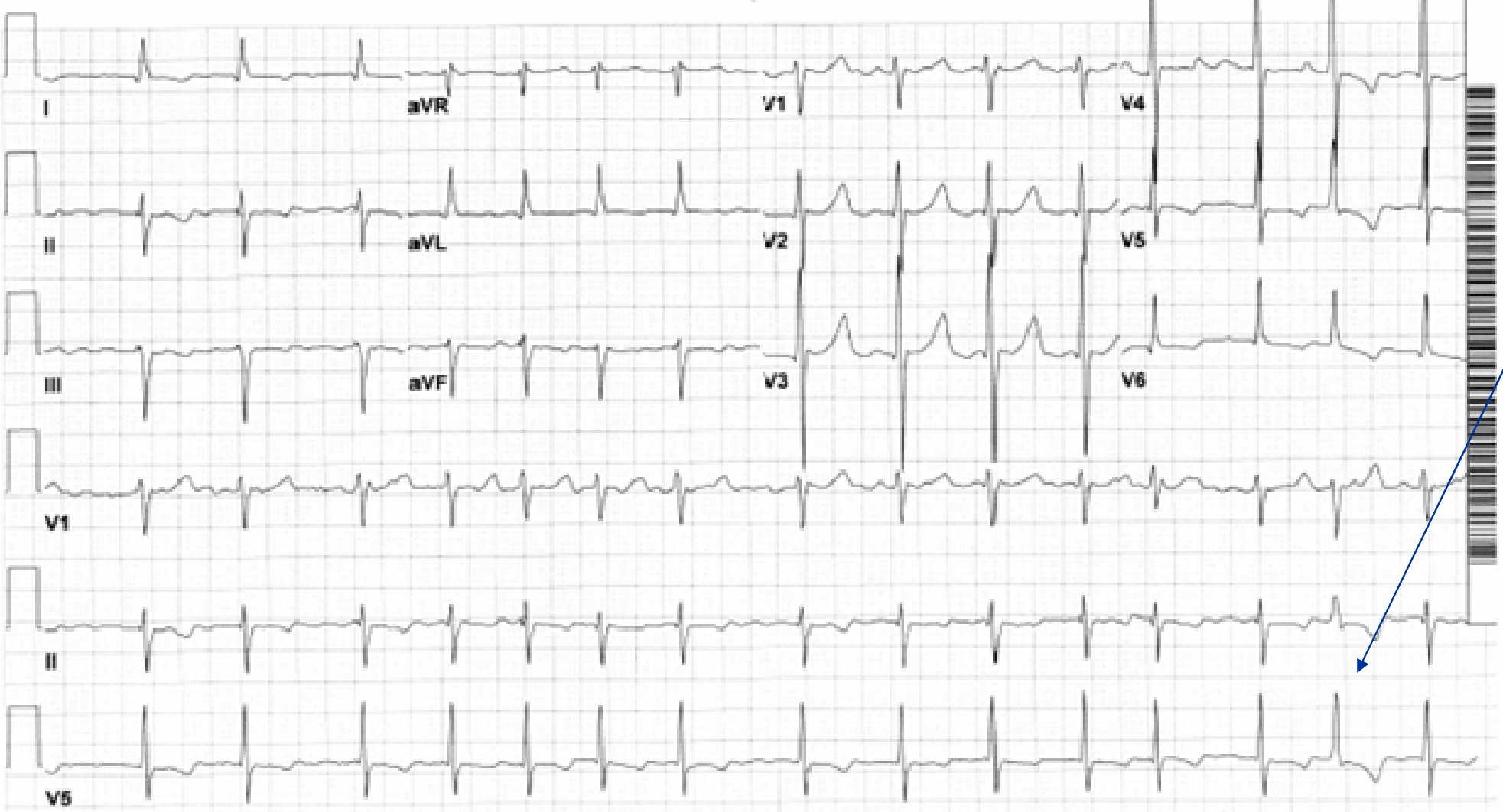
Rapidly progressive heart block

- Dual chamber pacemaker implanted
- During a portion of testing of pacemaker the following day, only the atrial lead was paced



“Fun” EKGs





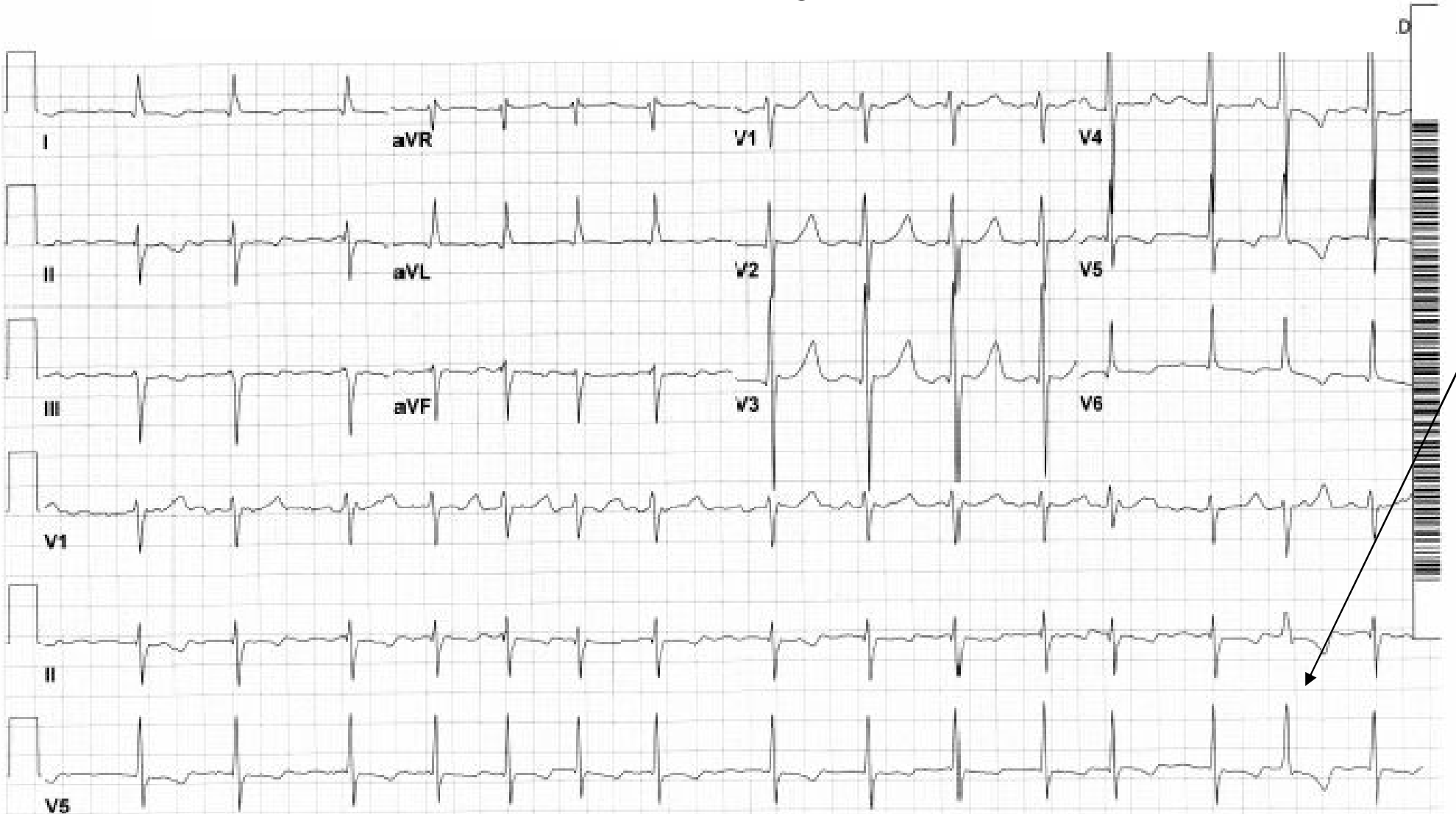
29-NOV-1940 (64 yr)
Male Black

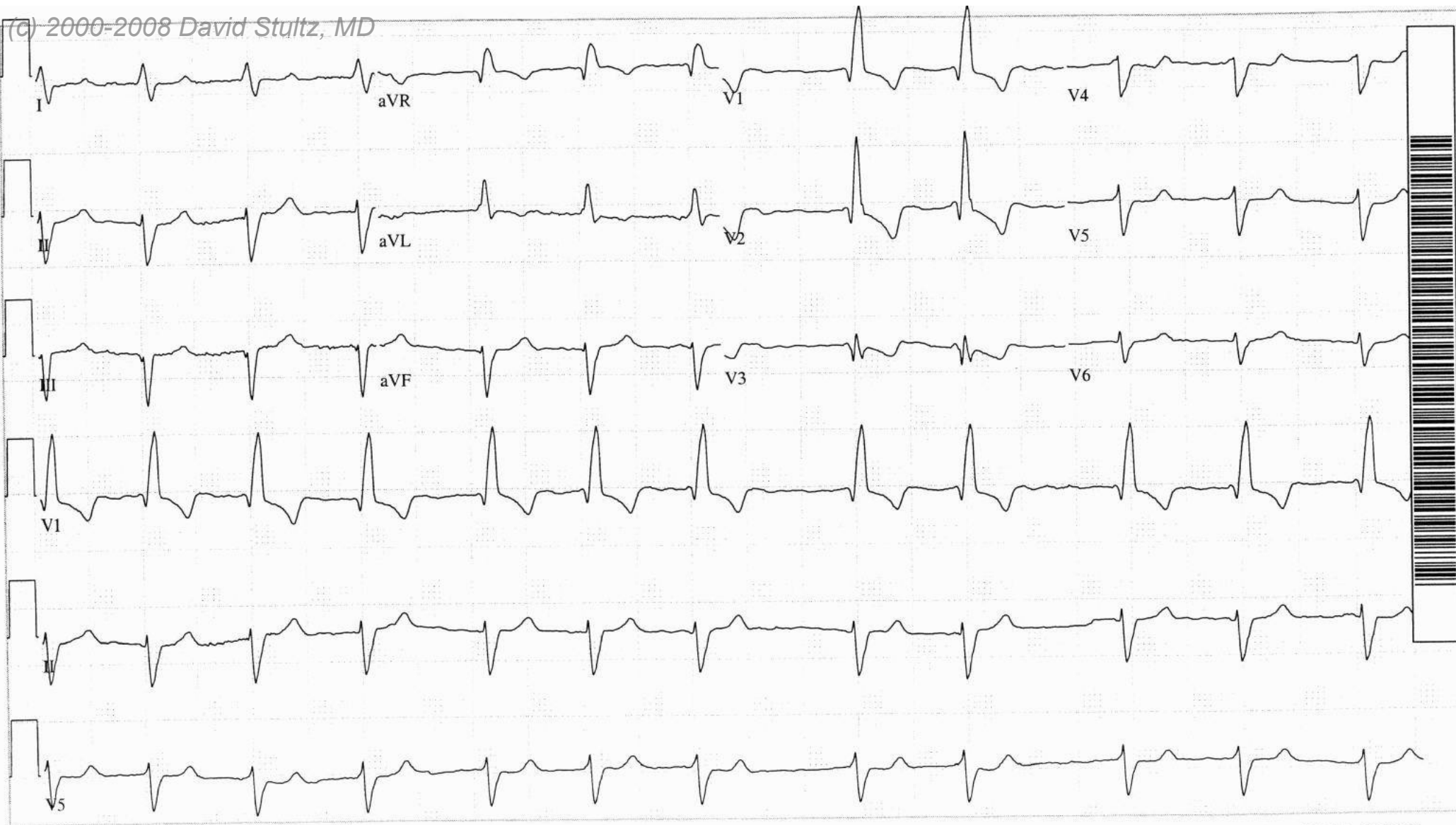
Vent. rate	93	BPM
PR interval	*	ms
QRS duration	104	ms
QT/QTc	418/520	ms
P-R-T axes	-112 -58 -118	

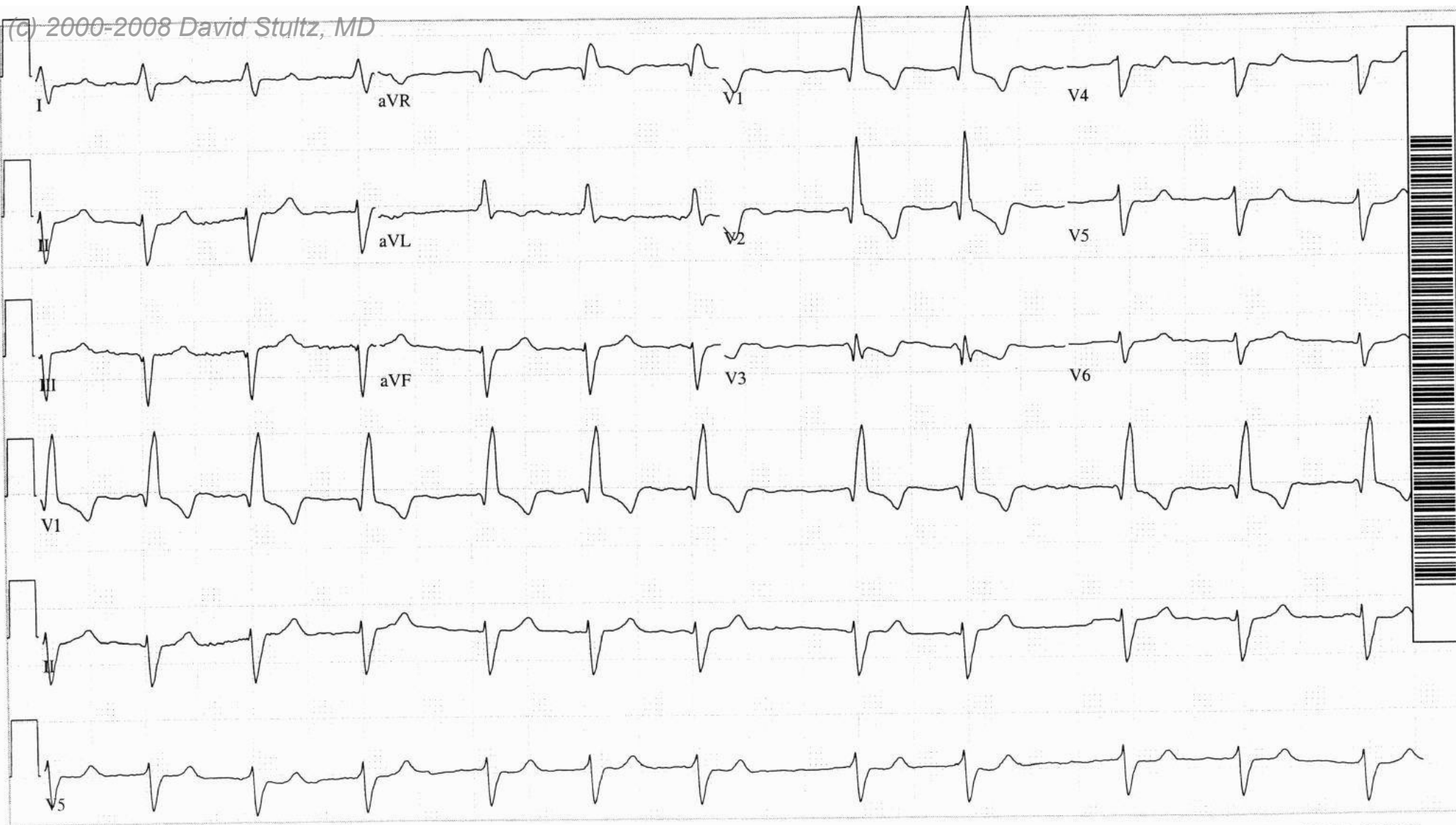
Room: S5
Loc: 3

- Atrial Fibrillation
- LAFB
- Ashman phenomena
- Long QTc

te-ir





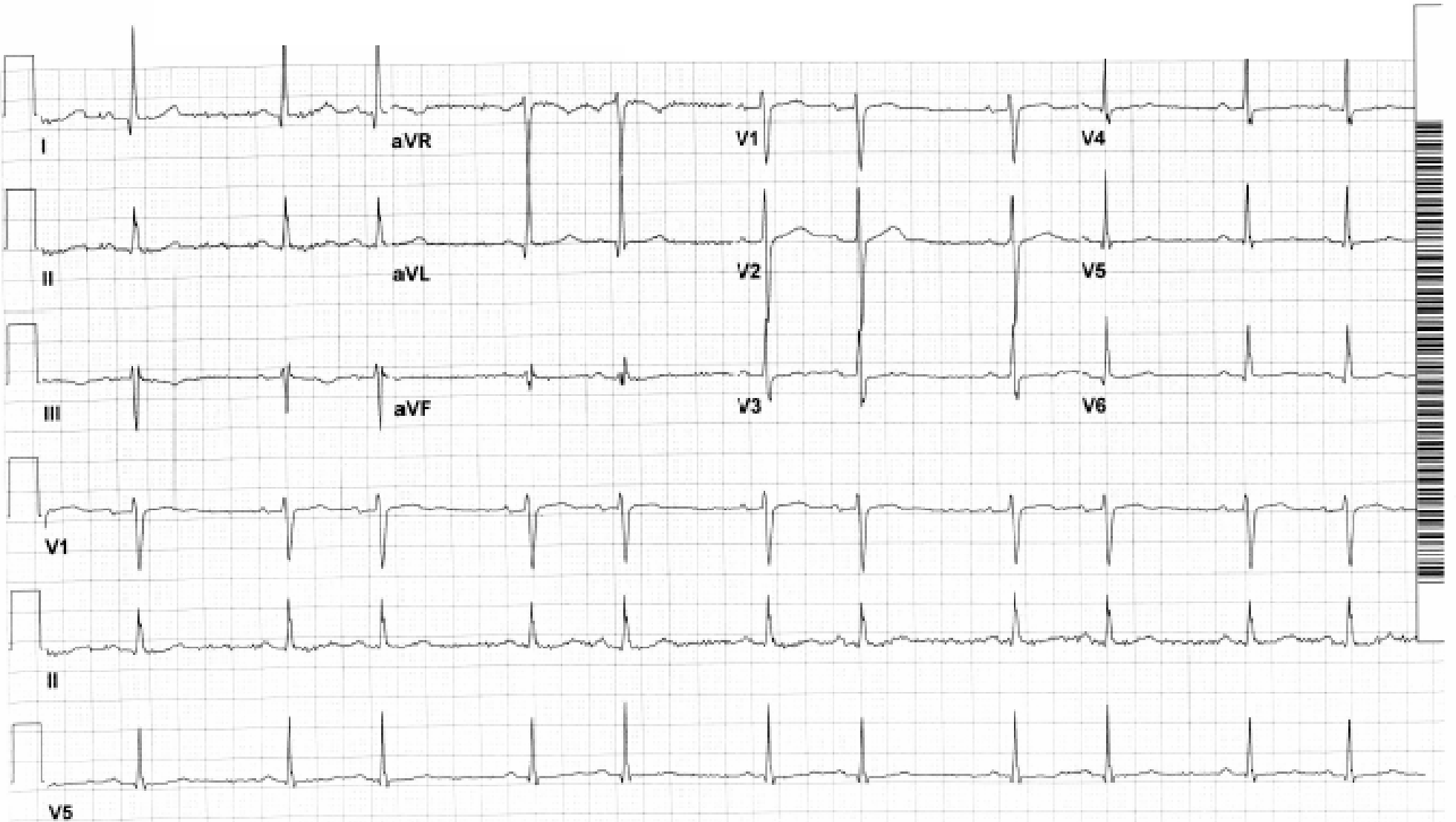


Atrial Fibrillation
LAFB
RBBB

20-JUN-1944 (61 yr)
Male

Vent. rate	68	BPM
PR interval	176	ms
QRS duration	92	ms
QT/QTc	348/370	ms
P-R-T axes	43 2	-8

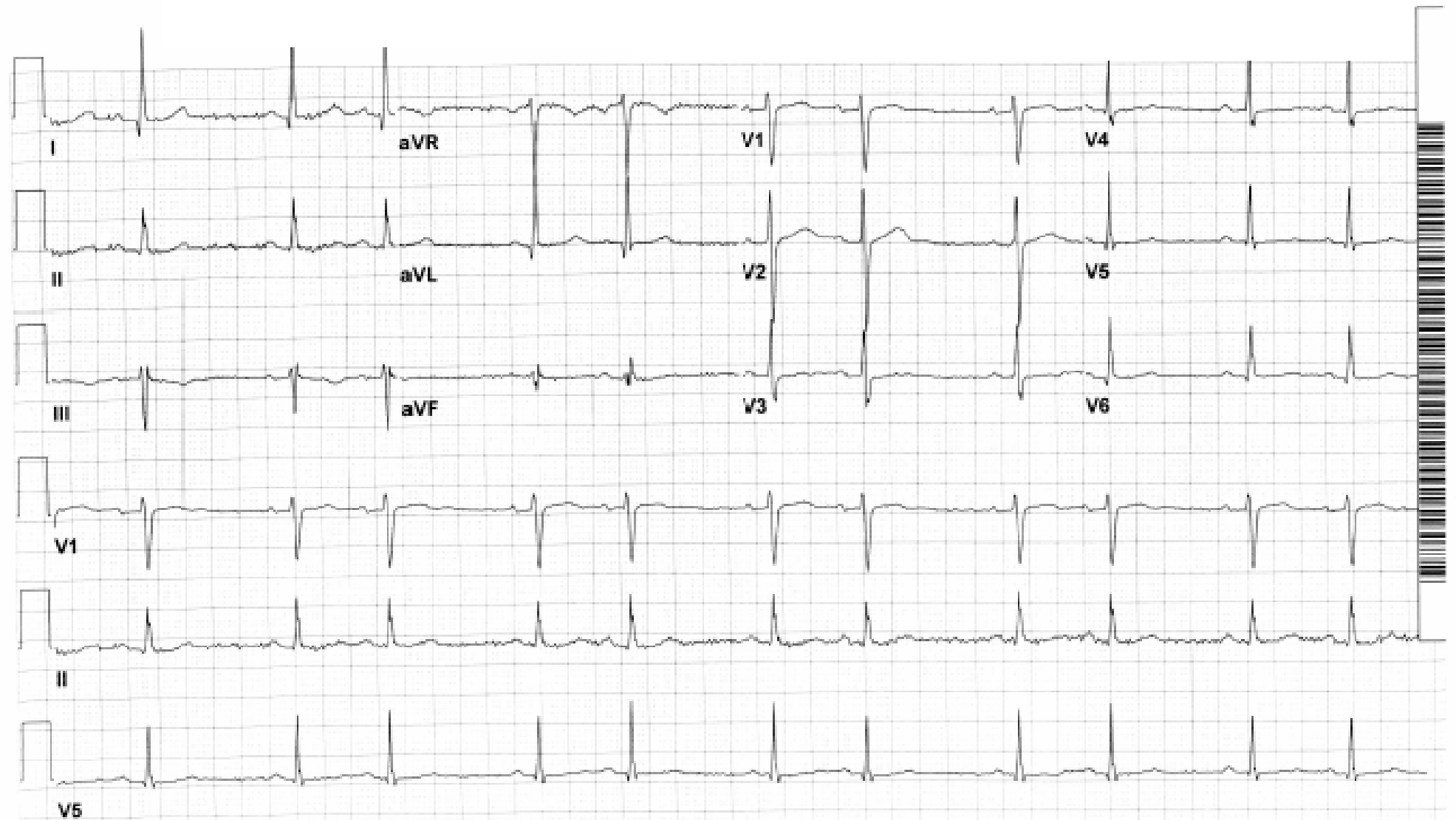
Room: ER
Loc: 2



20-JUN-1944 (61 yr)
Male

Vent. rate	68	BPM
PR interval	176	ms
QRS duration	92	ms
QT/QTc	348/370	ms
P-R-T axes	43 2	-8

- Sinus rhythm
- SA exit block (Wenkebach 3:2)

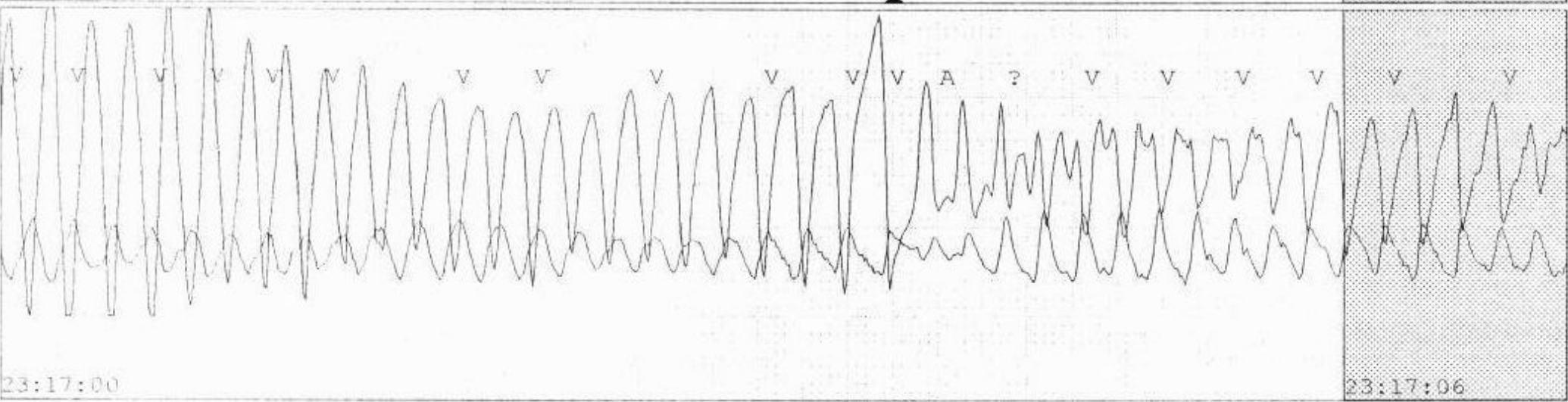
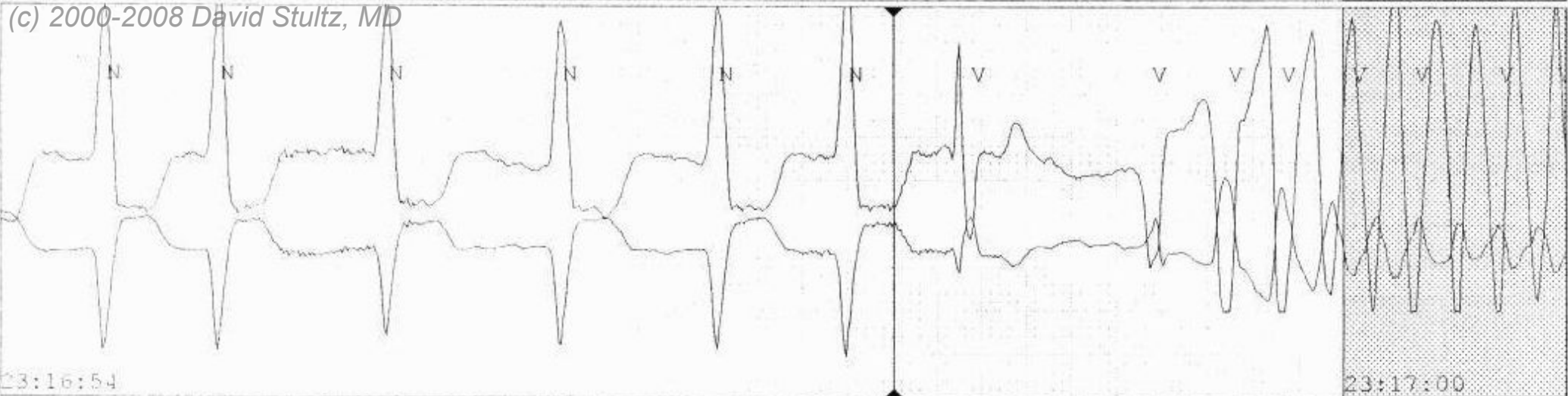




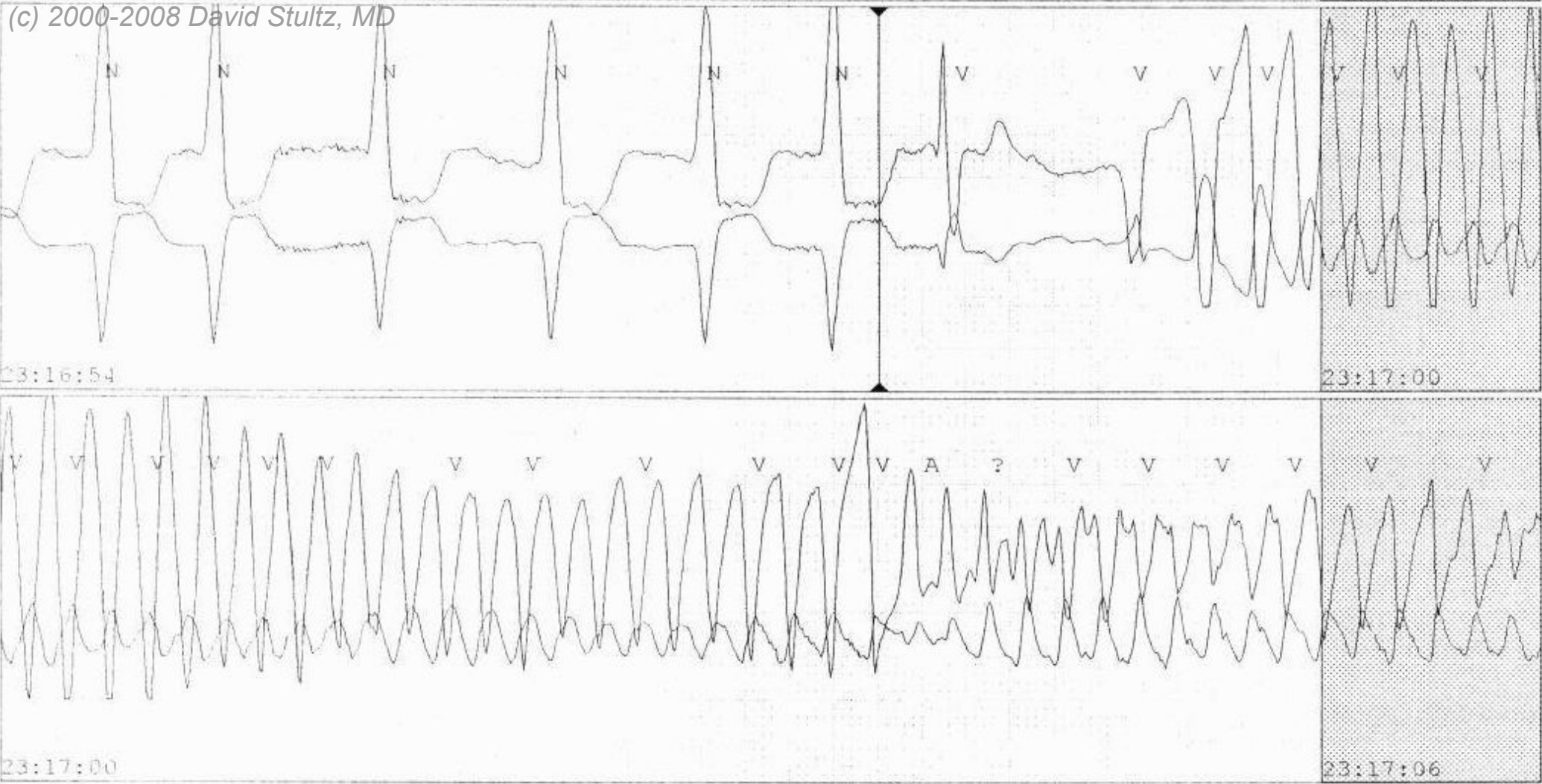


Sinus Arrhythmia
WPW

(c) 2000-2008 David Stultz, MD



(c) 2000-2008 David Stultz, MD



Initiation of polymorphic VT
Long-short-long cycle

(c) 2000-2008 David Stultz, MD

17 years
Male

Vent. rate 211 bpm
PR interval * ms
QRS duration 150 ms
QT/QTc 322/603 ms
P-R-T axes * -52 116

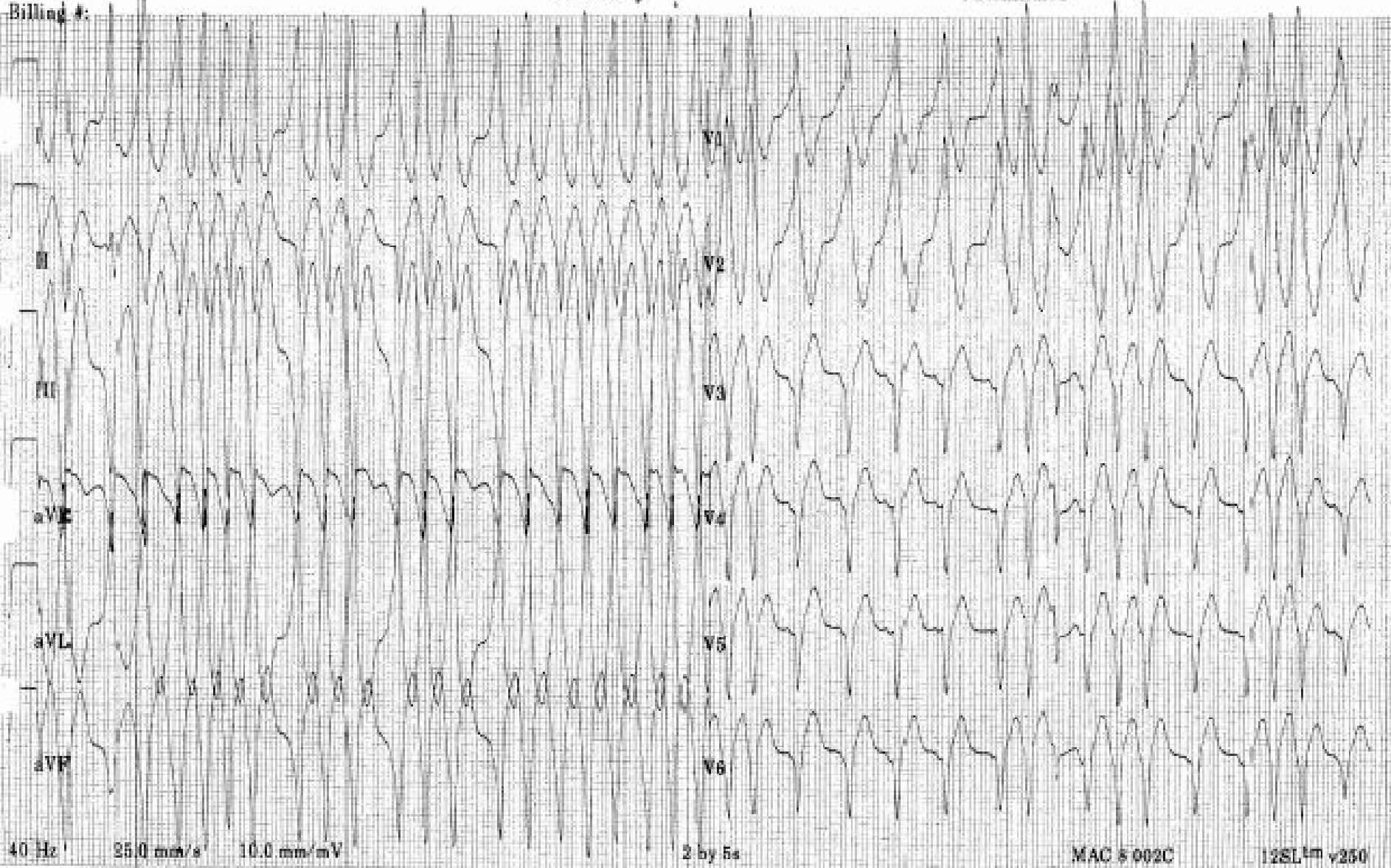
Room:

Technician:

Referred by:

Unconfirmed

Billing #:



40 Hz 25.0 mm/s 10.0 mm/mV

2 by 5s

MAC 5 002C

12SL™ v250

17 years
Male

Vent. rate 211 bpm
PR interval * ms
QRS duration 150 ms
QT/QTc 322/603 ms
P-R-T axes * -52 116

Room:

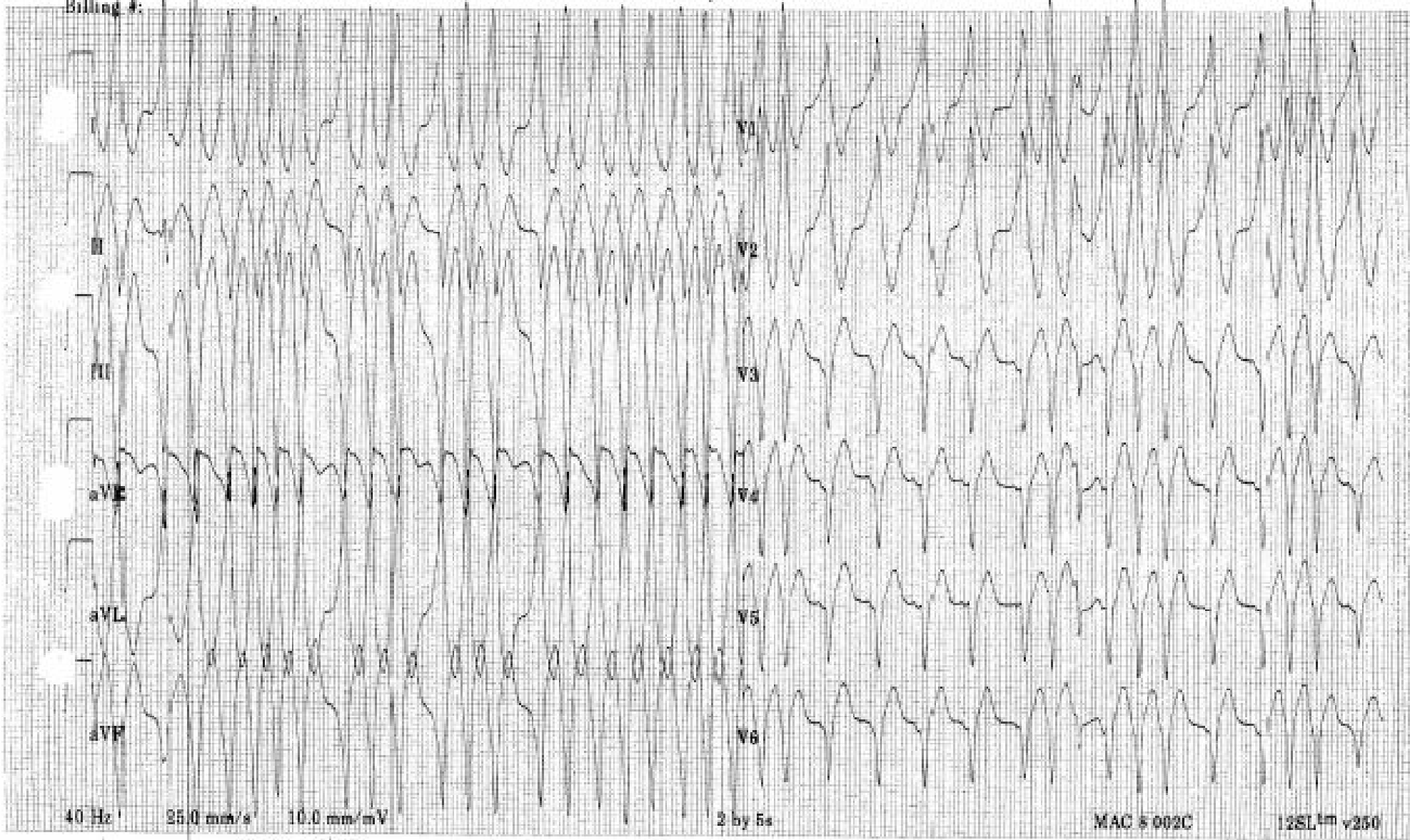
Technician:

•Atrial Fibrillation with WPW

Referred by:

Unconfirmed

Billing #:



40 Hz 25.0 mm/s 10.0 mm/mV

2 by 5s

MAC 5 002C

12SL™ v250