

# EKG Rhythm Lecture

“If you are not going to be better tomorrow than you were today, then what need do you have for tomorrow?”  
Rabbi Nachkann of Bratslav

# 1. Rate

## 2. Rhythm? QRS Wide or Narrow?

### Reg

P-QRS relationship?  
PR interval constant?  
P waves upright II/III/F?

### Irreg-Irreg

P- waves seen?  
Are P waves same or different?

### Patterned

What is the pattern?  
Eval P waves & QRS  
What is the origin or the pattern?  
What is the underlying rhythm and what interrupts?

## 3. Morphology (next EKG lecture)

*Axis*

*Pwave / PR*

*QRS (tall? / wide?)*

*QT Interval*

*ST- T – Q waves (Inf, Ant, Lat)*

V.D.

20 DEC 1992

5:15:16PM

03481652

22 yrs

Female

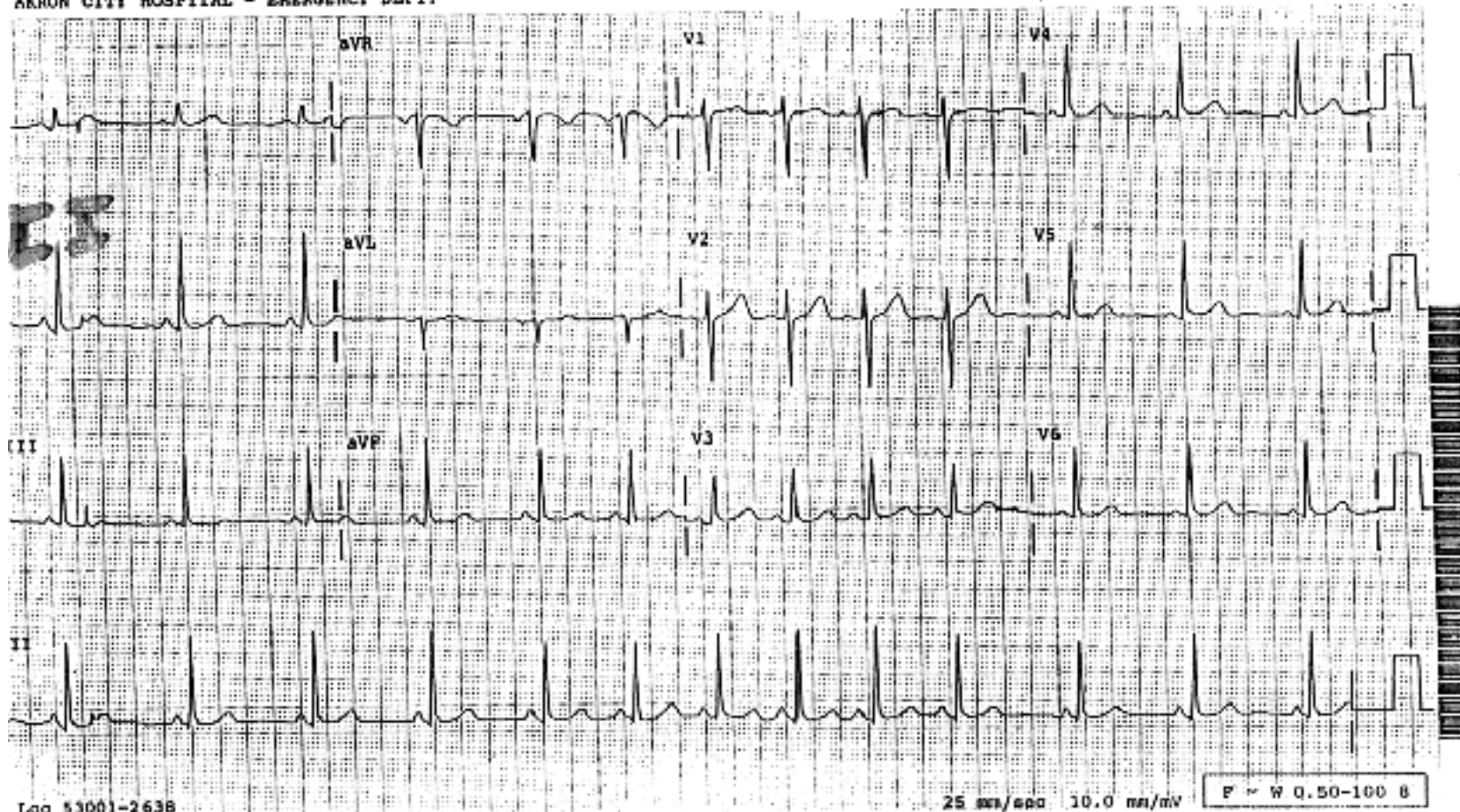
**EKG #1**

PR 140  
QRSD 66  
QT 354  
QTc 411

--AXES--  
P 64  
QRS 72  
T 36

AKRON CITY HOSPITAL - EMERGENCY DEPT.

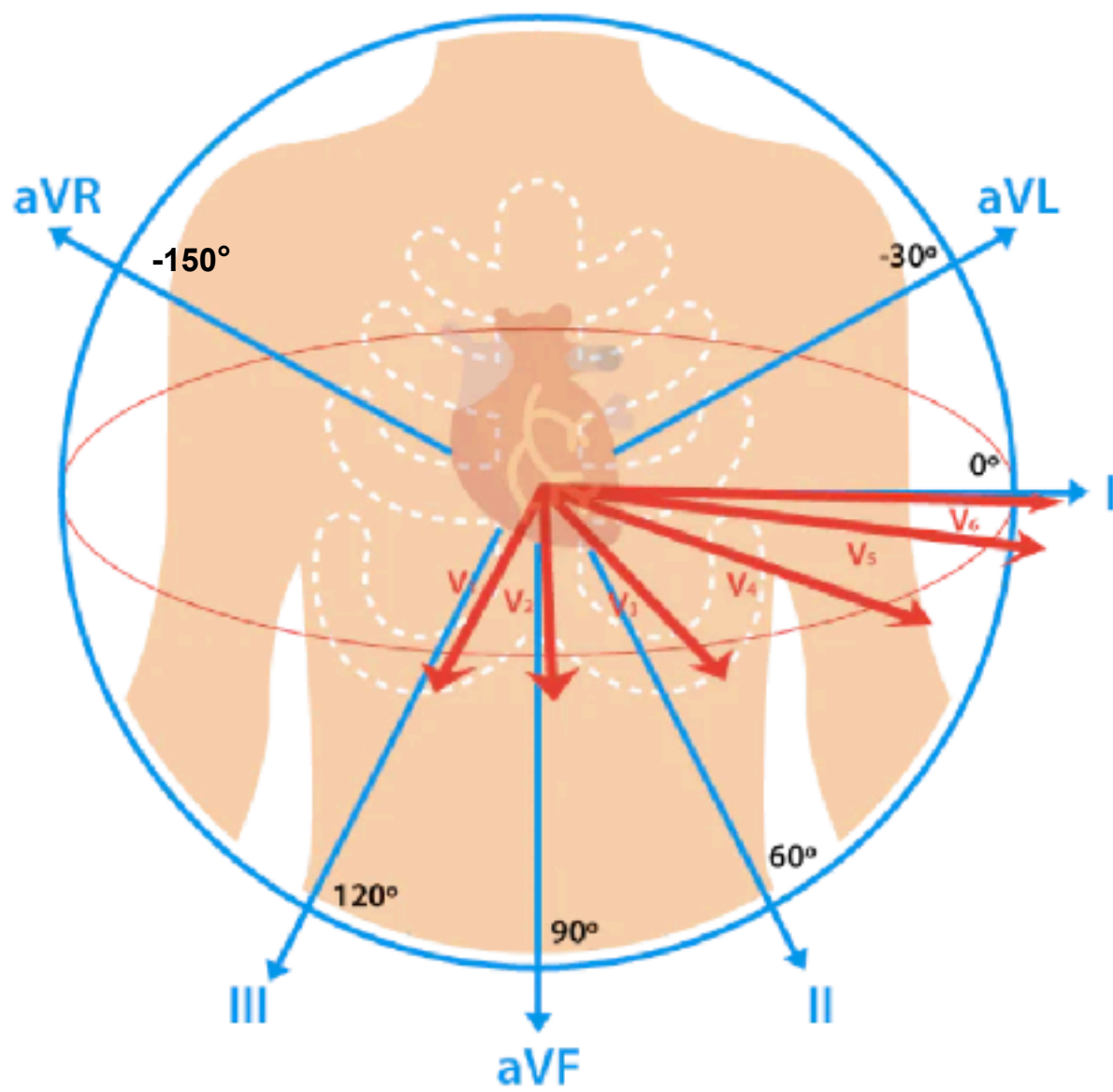
R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



Loe 53001-2638

25 mm/sec 10.0 mV

P ~ W Q.50-100 8



V.D.

20 DEC 1992

5:15:16PM

03481652

22 yrs

Female

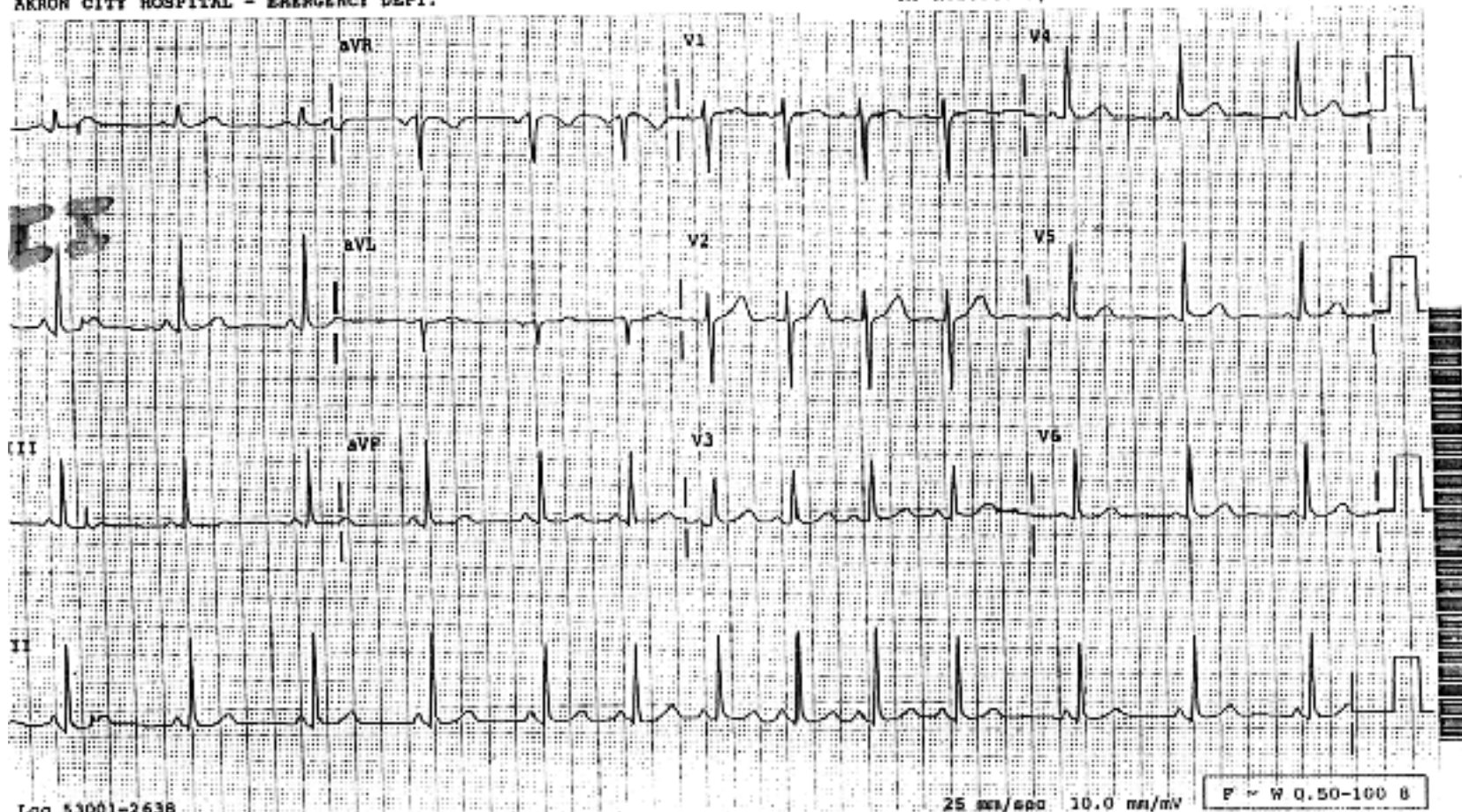
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AKRON CITY HOSPITAL - EMERGENCY DEPT.

R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



Loe 53001-2638

25 mm/sec 10.0 mV/mV

P ~ W Q.50-100 S

V.D.  
**EKG #1**

22 yrs Female

20 DEC 1992

5:15:16PM

03481652

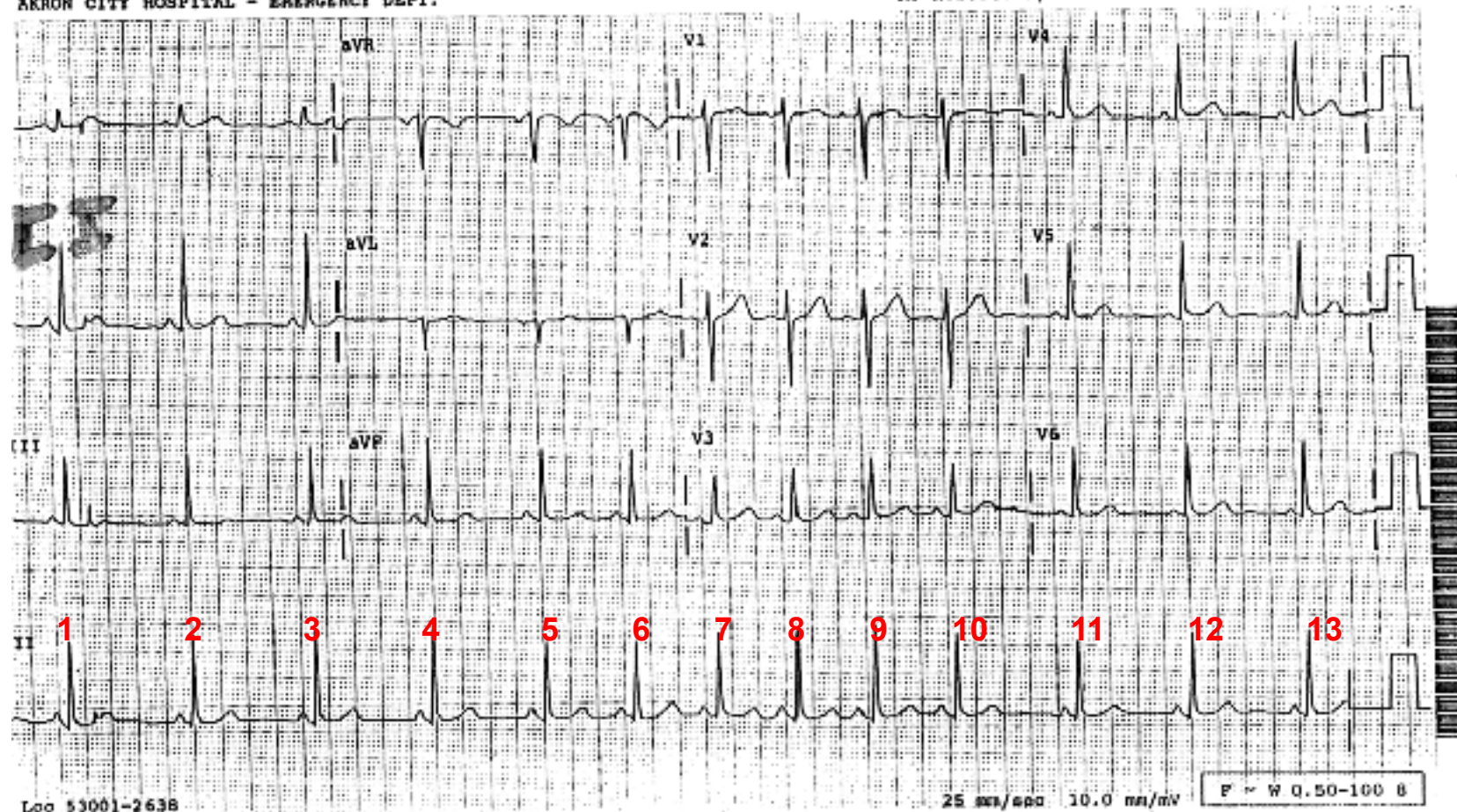
PR 140  
QRSD 66  
QT 354  
QTc 411

**Rate: 13 x 6 = 78**

--AXES--  
P 64  
QRS 72  
T 36

AKRON CITY HOSPITAL - EMERGENCY DEPT.

R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



V.D.  
**EKG #1**

22 yrs

Female

20 DEC 1992

5:15:16PM

03481652

**RHYTHM:**

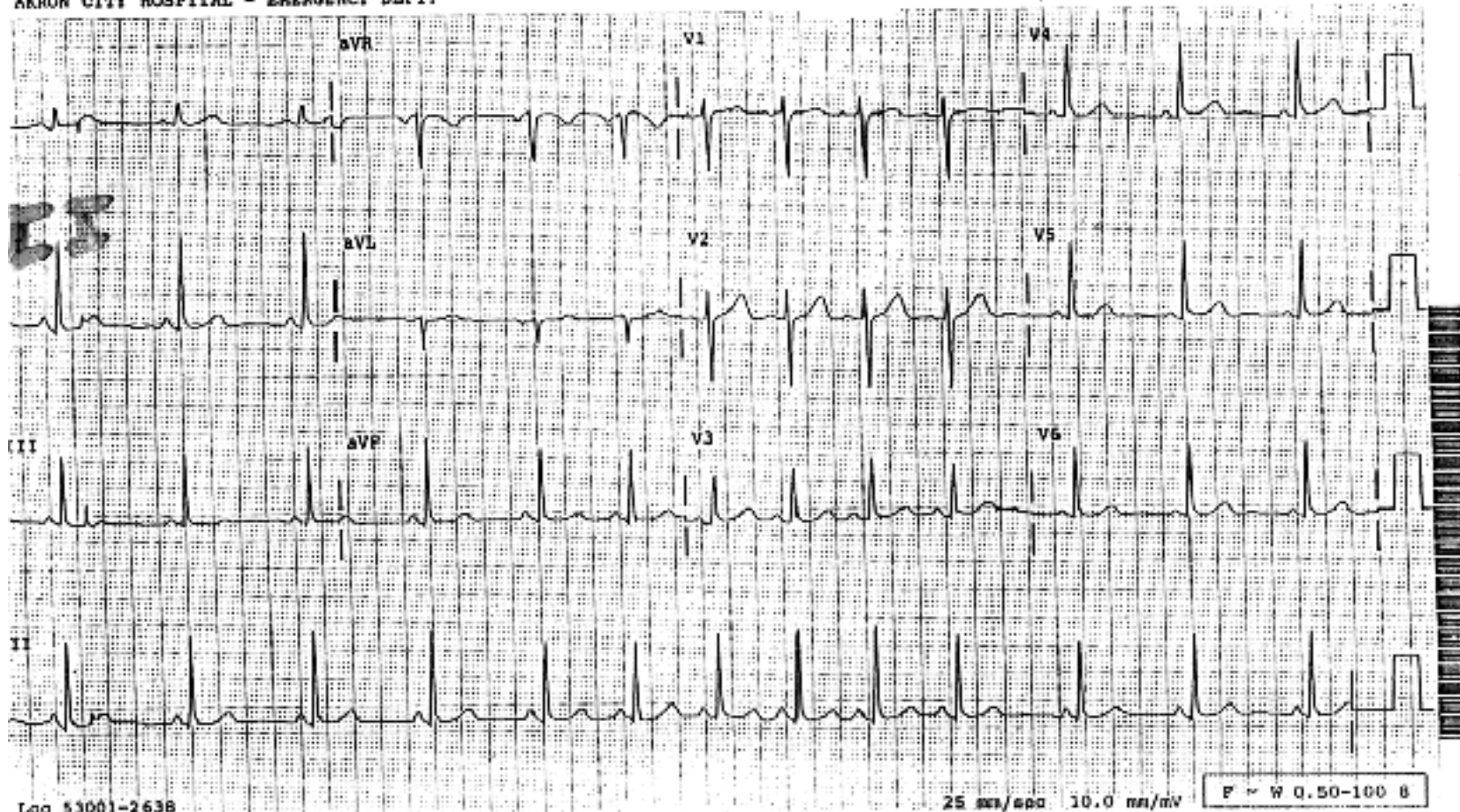
**Reg vs Irreg vs Patterned?**

PR 140  
QRSD 66  
QT 354  
QTc 411

--AXES--  
P 64  
QRS 72  
T 36

AKRON CITY HOSPITAL - EMERGENCY DEPT.

R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



Loe 53001-2638

V.D.  
**EKG #1**

22 yrs

Female

20 DEC 1992

5:15:16PM

03481652

PR 140  
QRSD 66  
QT 354  
QTc 411

--AXES--  
P 64  
QRS 72  
T 36

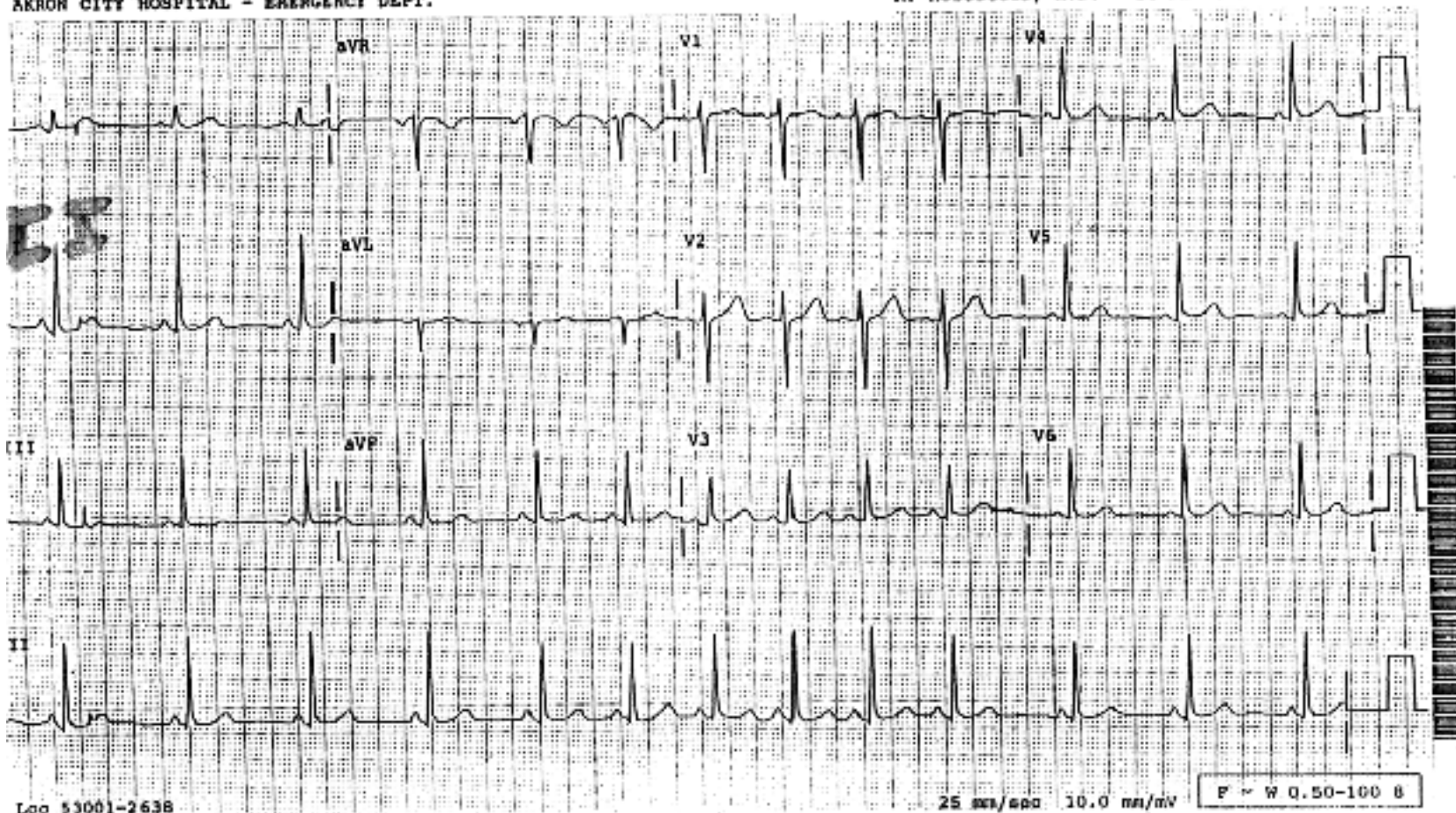
**RHYTHM: IRREGULAR**

**P waves upright in II?**

**P with every QRS? // Any hidden P's?**

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R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



Loe 53001-2638

25 mm/sec 10.0 mV/mV

P ~ W Q.50-100 B

EKG #1

20 DEC 1992

5:15:16PM

03481652

22 yrs

Female

PR 140  
QRSD 66  
QT 354  
QTc 411

--AXES--  
P 64  
QRS 72  
T 36

**RHYTHM: IRREGULAR**

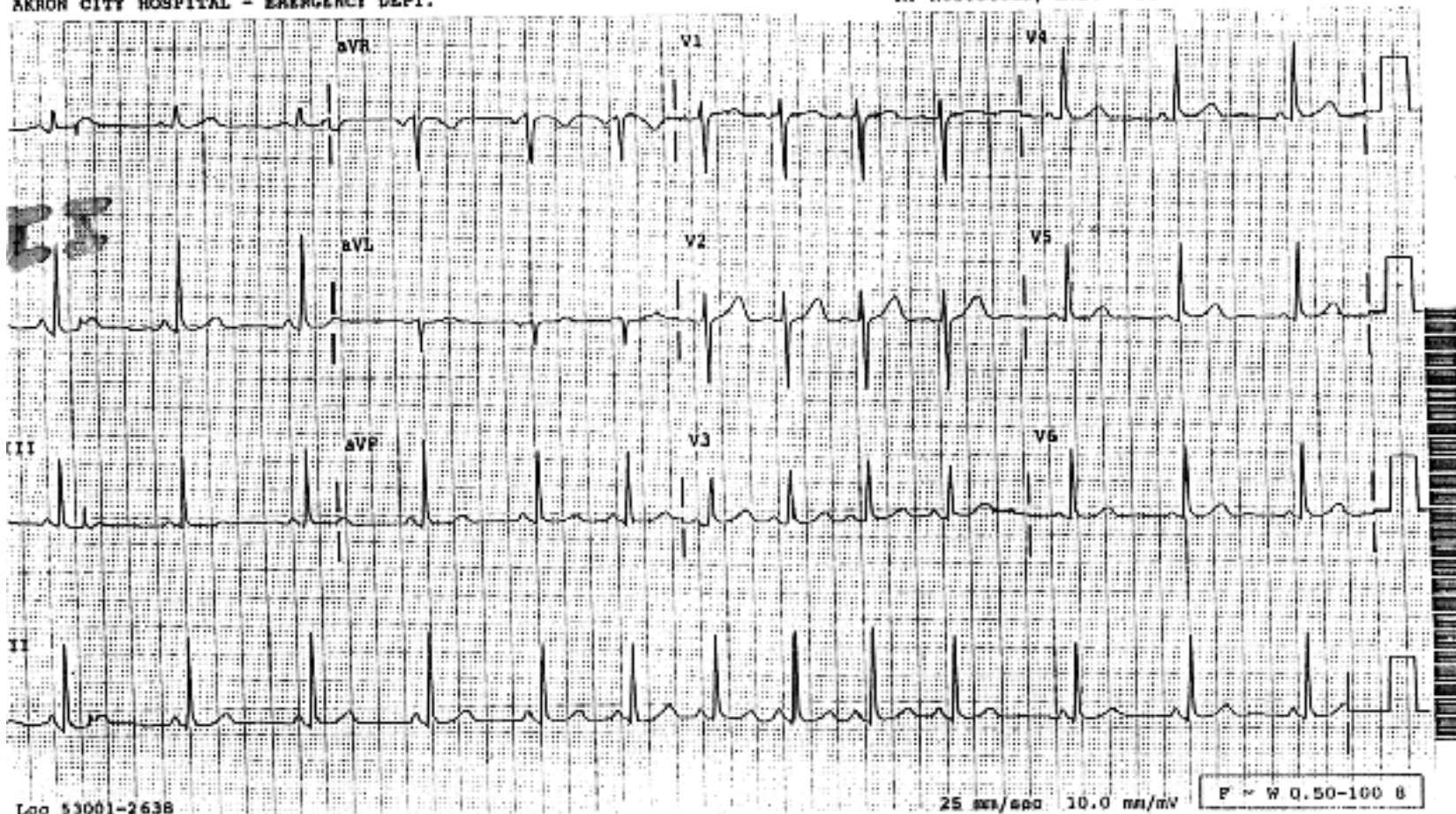
**P with every QRS? Yes**

**P waves upright in II/III/F? Yes**

**Dx: Sinus Arrhythmia (these QRS can only be coming from SA origin)**

AKRON CITY HOSPITAL - EMERGENCY DEPT.

R. Mosteller, M.D. - 21 DEC 1992 11:05:24AM



Loe 53001-2638

25 mm/sec 10.0 mV/mV

P ~ W Q.50-100 B

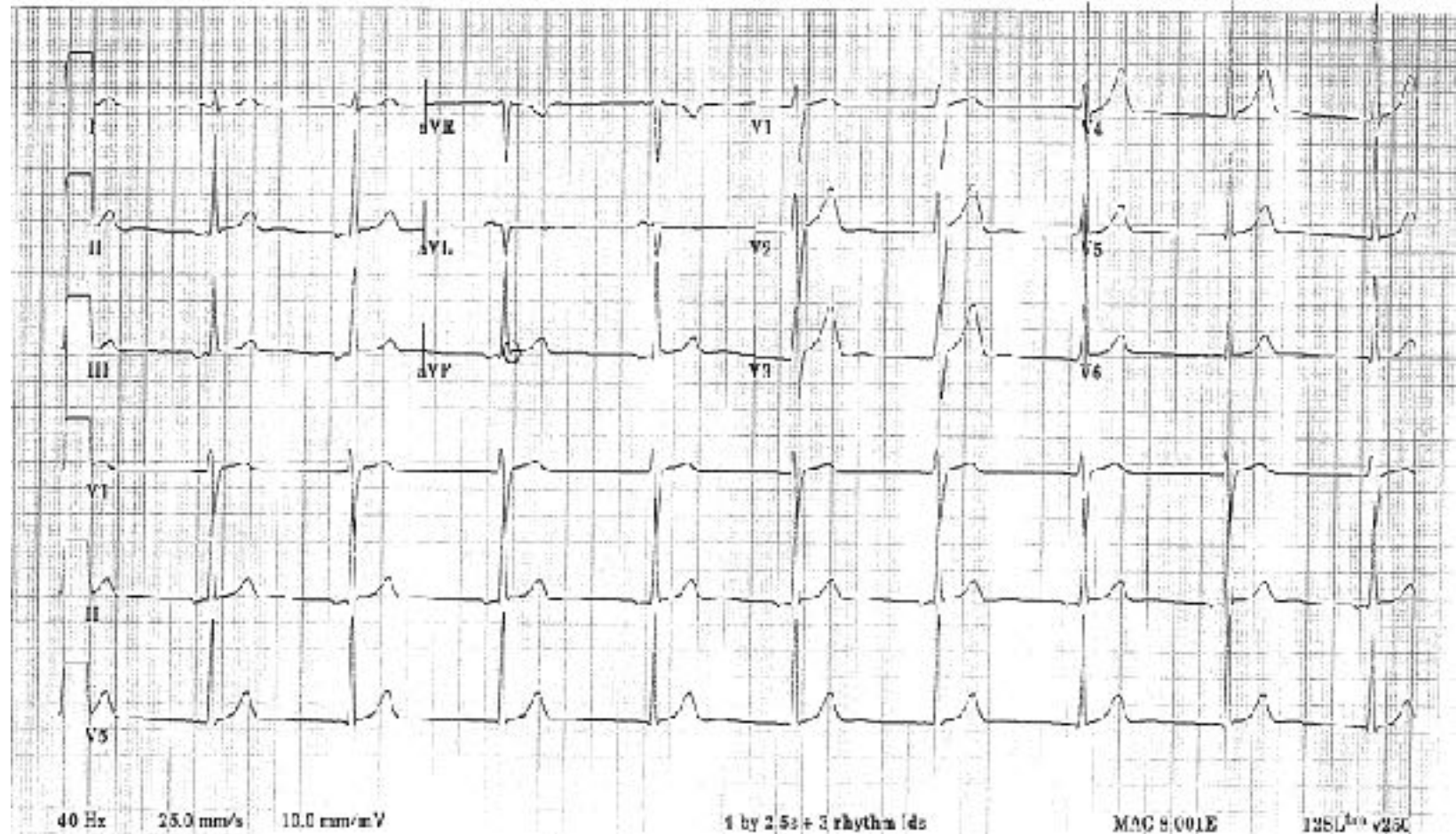
## EKG #2

25 years  
Male Caucasian  
69 in 126 lbs  
Vert. rate 64 bpm  
PR interval 108 ms  
QRS duration 100 ms  
QT/QTc 408/387 ms  
P-R-T axes -69 51 56

Technician: KMM

Referred by: PDS/IDT

Unconfirmed



## EKG #2

25 years  
Male  
69 in  
Caucasian  
126 lbs

Vert. rate 64 bpm  
PR interval 106 ms  
QRS duration 100 ms  
QT/QTc 408/387 ms  
P-R-T axes -69 51 56

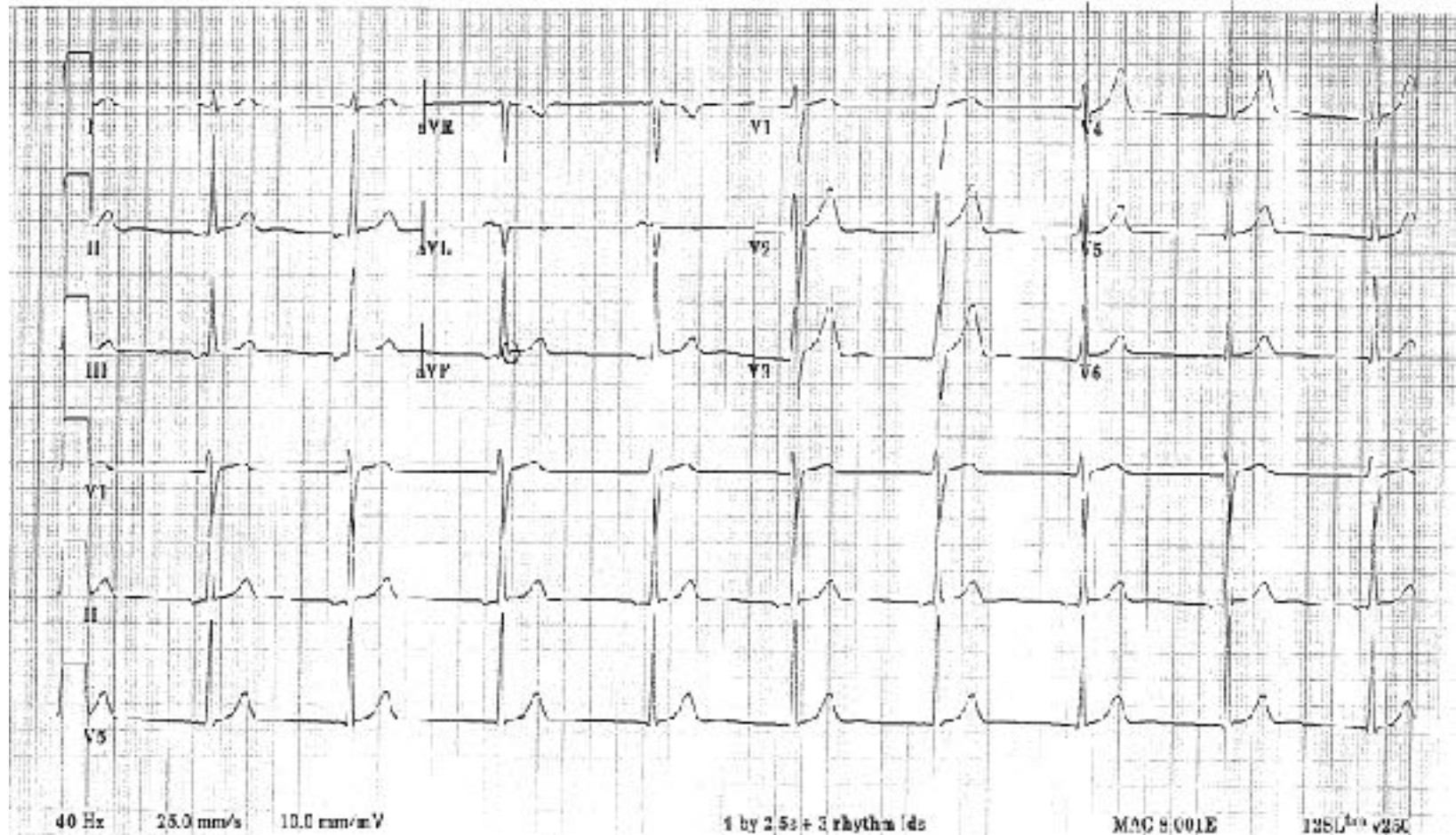
Rate = 55-60

Rhythm = Regular... did you see P's?

Technician: KMM

Referred by: PMS/IDT

Unconfirmed



## EKG #2

25 years  
Male Caucasian  
69in 126lbs  
Ventr. rate 64 bpm  
PR interval 106 ms  
QRS duration 100 ms  
QT/QTc 408/387 ms  
P-R-T axes -69 81 56

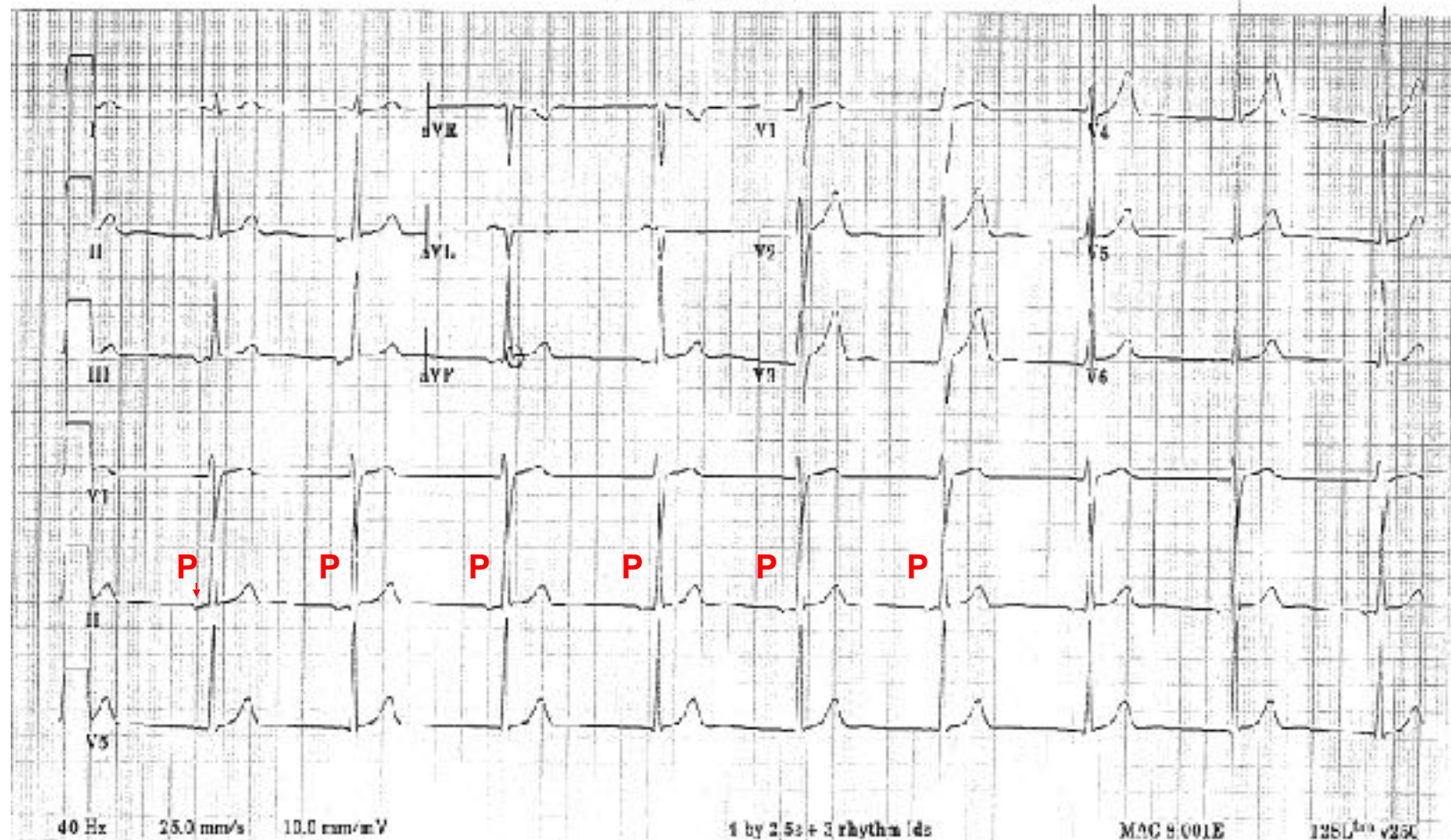
Inverted P's in lead II

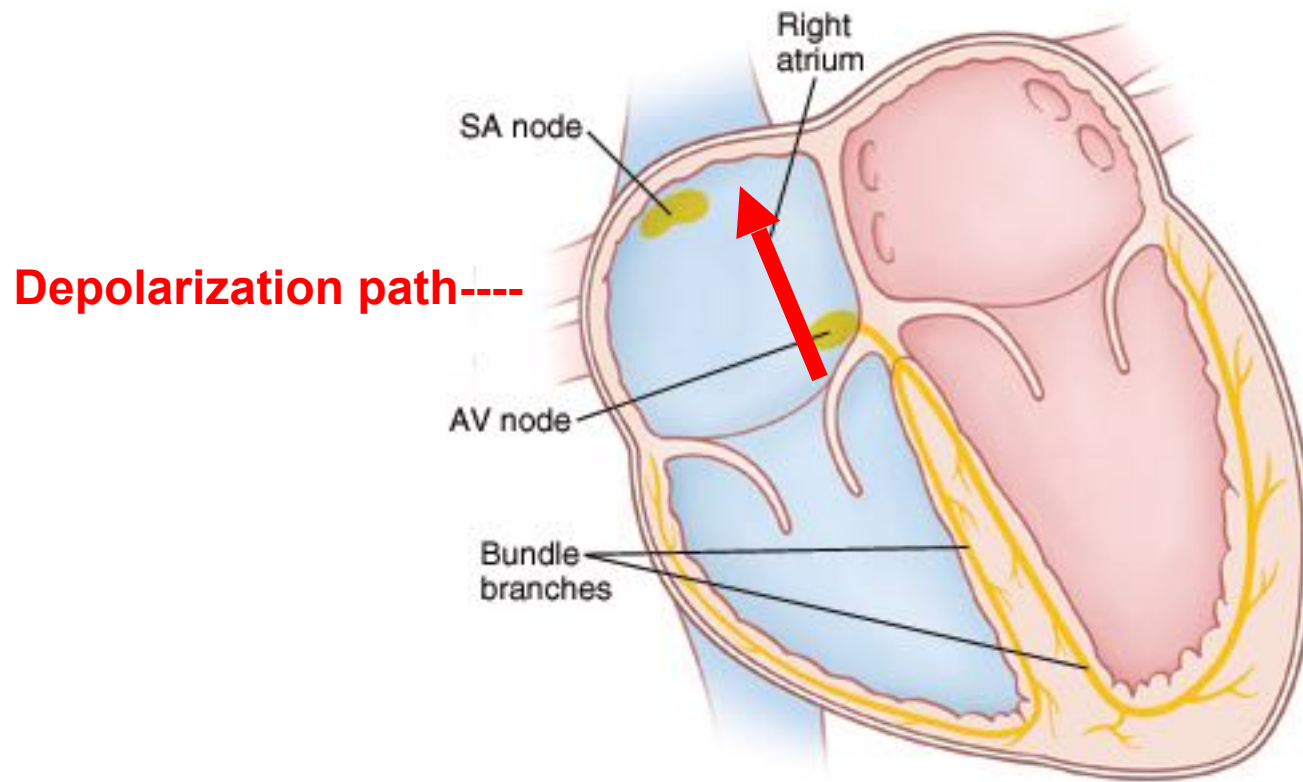
= Ectopic Atrial Pacemaker

Technician: KMM

Referred by: PMS/HPH

Unconfirmed





**Leads II / III / F**

Remember that a depolarization traveling away from the inferior leads will have an inverted P wave... thus it cannot be coming from the Sinus node

## EKG #3:

Slow Heart Rate:

-Is there heart block?

-prolonged PR interval?, non-conducted p-waves?

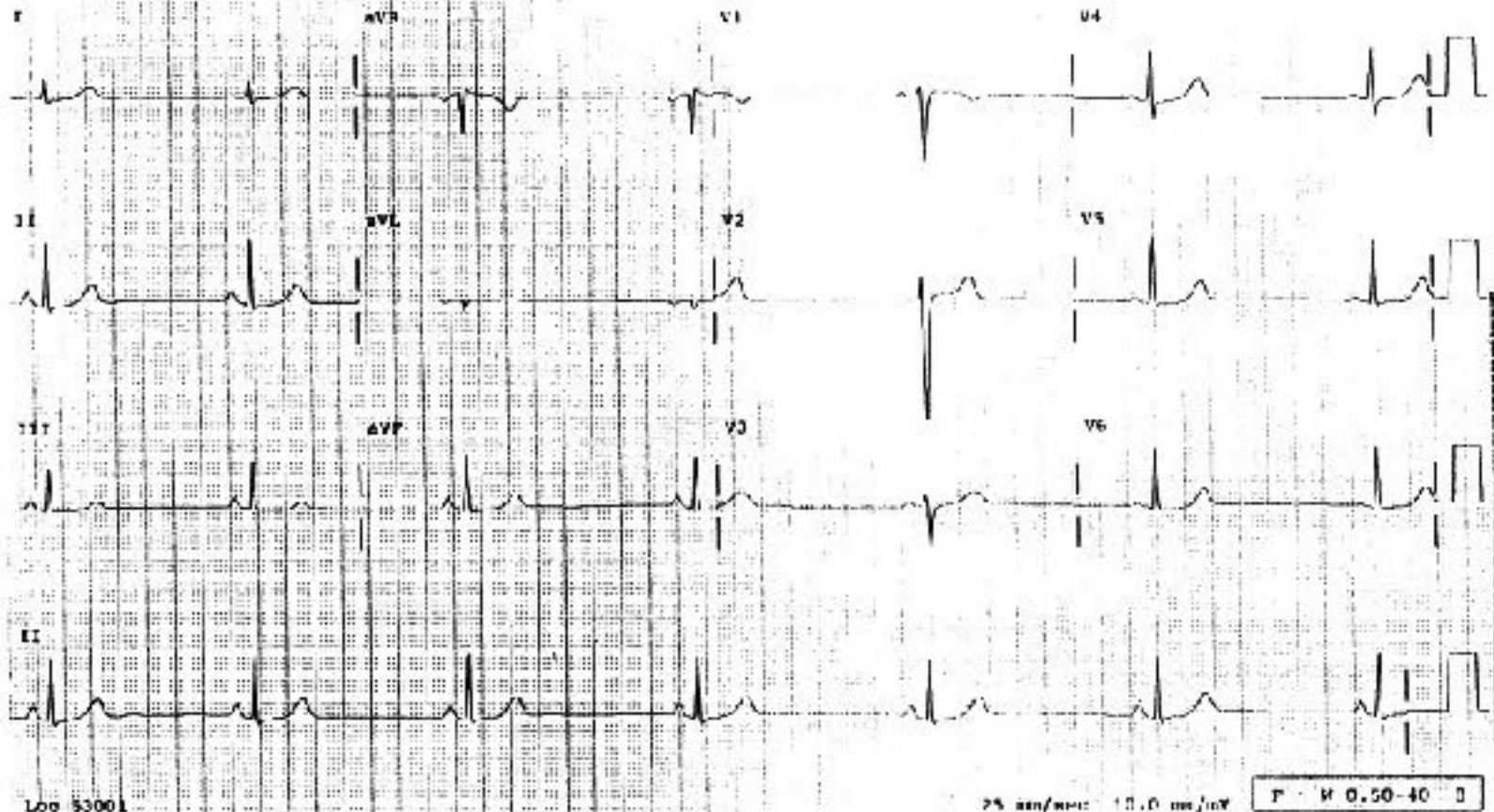
4

PP 155  
QRS 80  
QT 425  
QTc 362

--ANES--  
P 81  
QRS 72  
T 51

ARROW CITY HOSPITAL - EMERGENCY DEPT.

Dr. Heston, M.D. - 28 SEP 1992 5:04:26AM

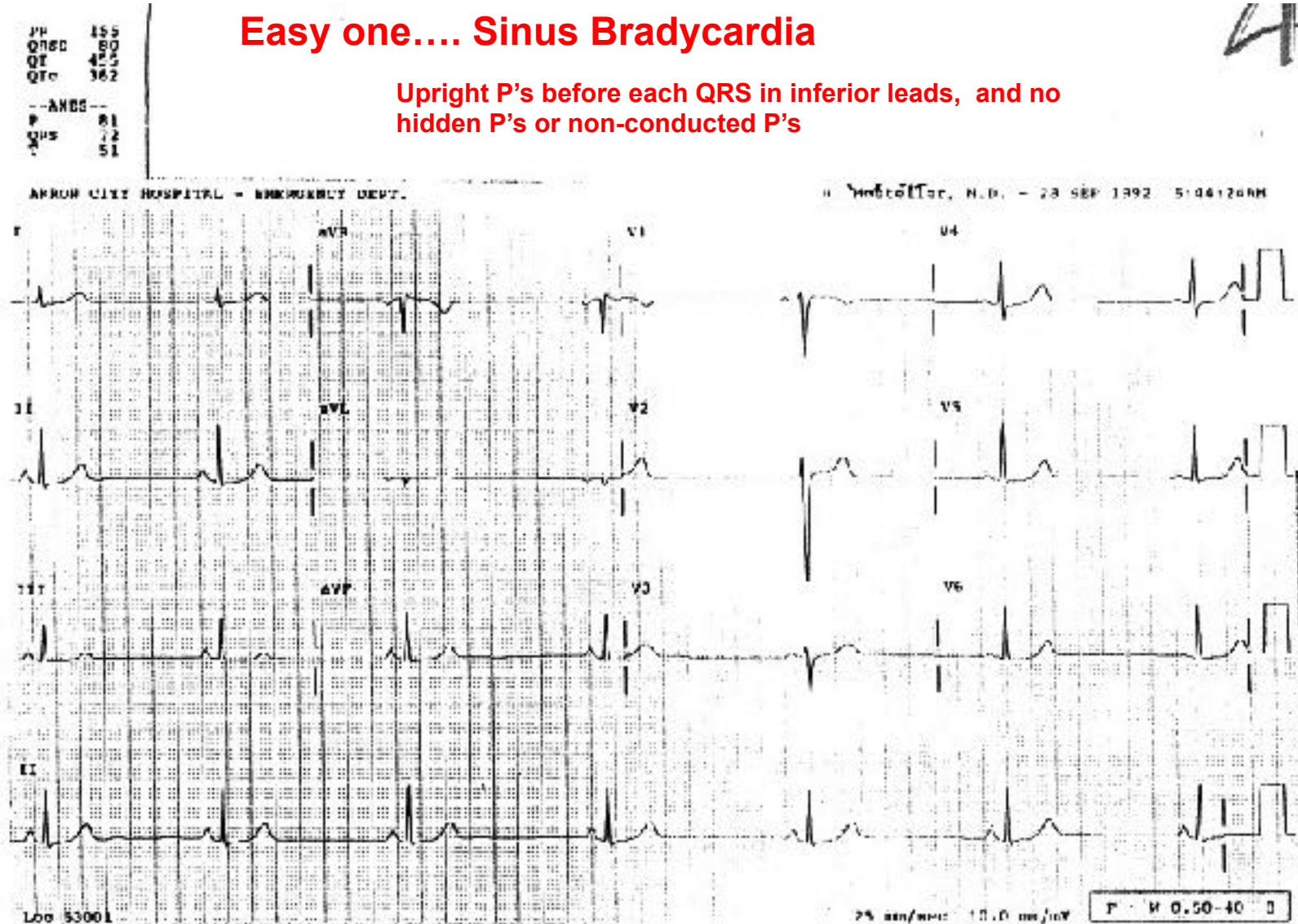


## EKG #3:

### Easy one.... Sinus Bradycardia

Upright P's before each QRS in inferior leads, and no hidden P's or non-conducted P's

4



## EKG #4:

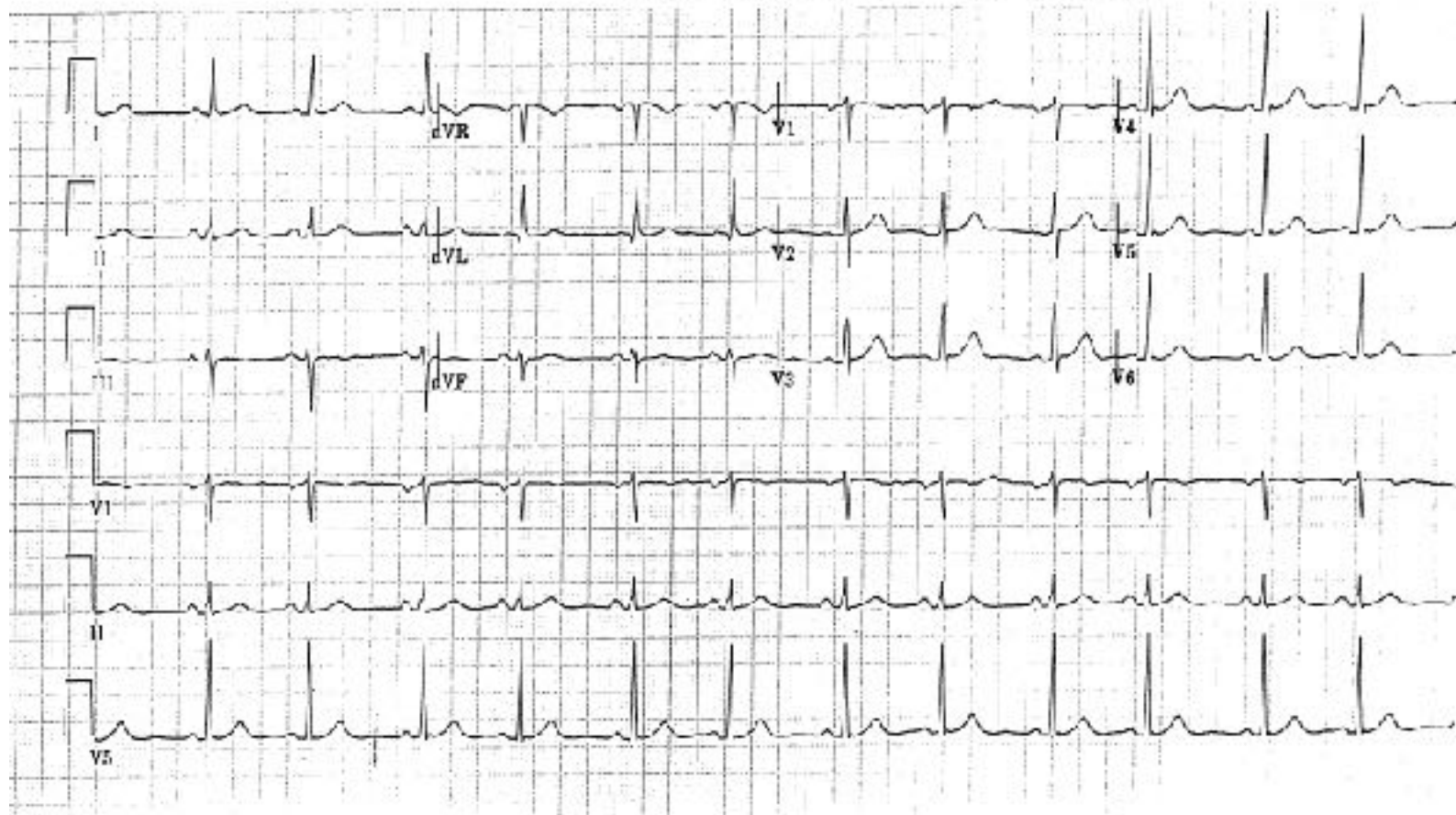
63 years		Vent. rate	73 bpm
Male	Unknown	PR interval	140 ms
		QRS duration	73 ms
		QT/QTc	388/413 ms
		P-R-T axes	82 -5 27

2

Technician: Magi Puffer CCT  
Test Ind: Chest Pressure

Referred by: Dr Smiley, BGAA

Unconfirmed



160 Hz 35.0 mm/s 10.0 mm/mV

d by 2.5s + 3 rhythm 13s

MAUVU 303A

128L<sup>100</sup> v200

## EKG #4:

63 years  
Male      Unknown  
Vent. rate      73 bpm  
PR interval      140 ms  
QRS duration      73 ms  
QT/QTc      368/413 ms  
P-R-T axes      58 -5 27

Rate: ~ 72

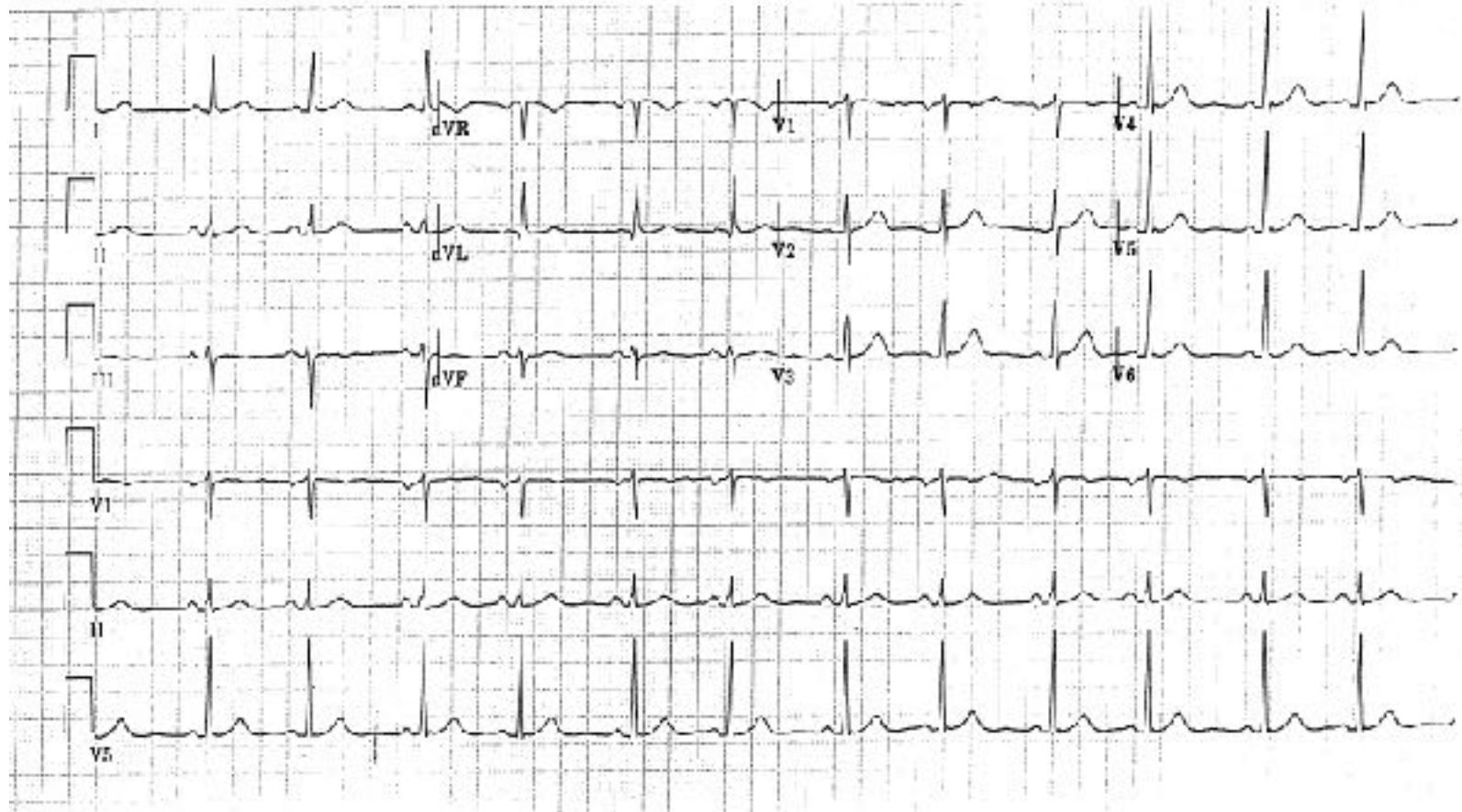
Rhythm: Is it REG or IRREG?

2

Technician: Magi Puffer CCT  
Test Ind: Chest Pressure

Referred by: Dr Smiley, BGAA

Unconfirmed



160 Hz    35.0 mm/s    10.0 mm/mV

d by 2.5s + 3 rhythm 1s

MAVU 303A

128L<sup>100</sup> v200

## EKG #4:

63 years  
Male      Unknown  
Vent. rate      73 bpm  
PR interval      140 ms  
QRS duration      73 ms  
QT/QTc      368/413 ms  
P-R-T axes      58 -5 27

Actually it is Patterned

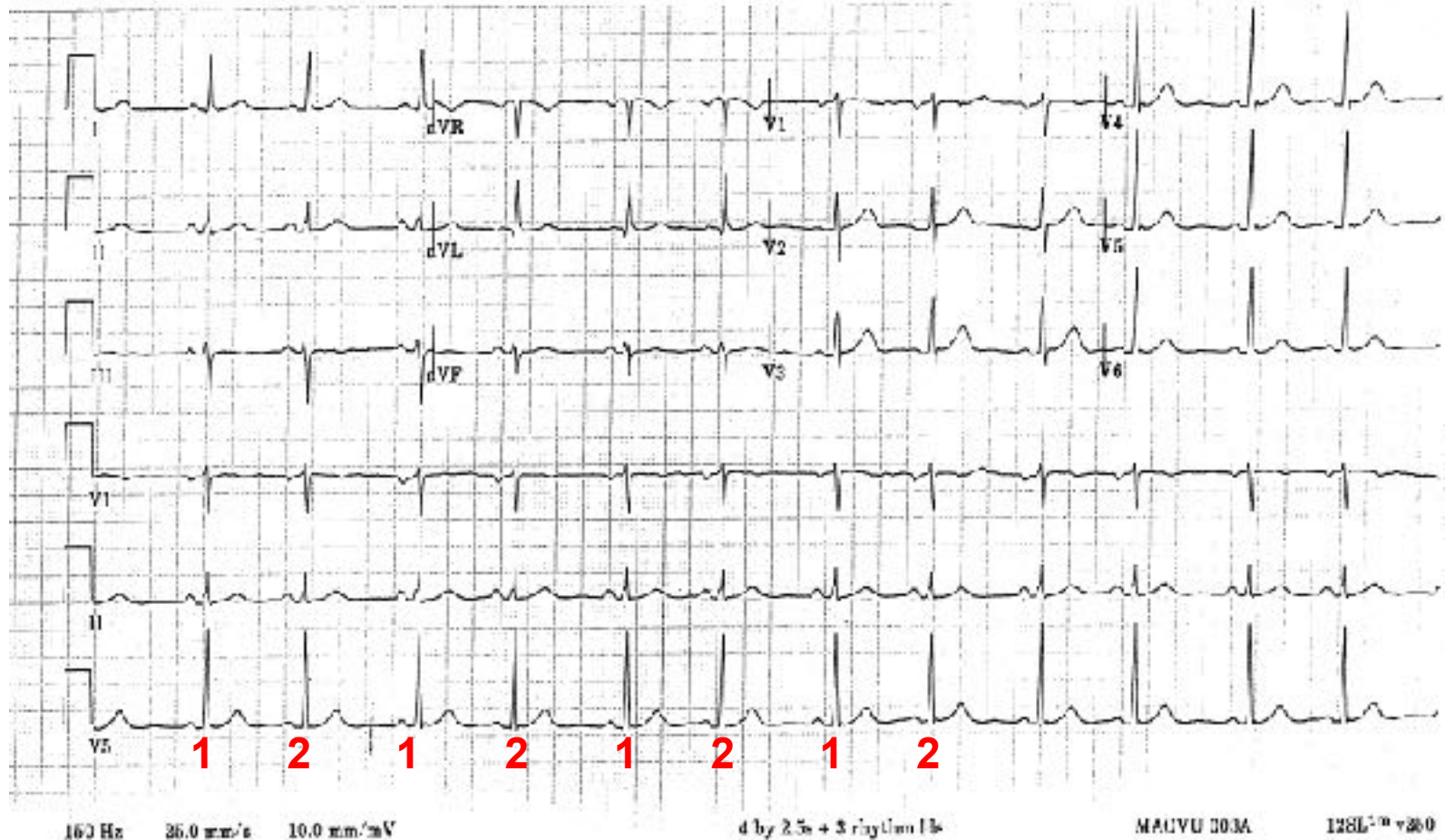
Grouped beats – normal beat then early beat

2

Technician: Magi Puffer CCT  
Test Ind: Chest Pressure

Referred by: Dr Smiley, BGAA

Unconfirmed



## EKG #4:

63 years  
Male      Unknown  
Vent. rate      73 bpm  
PR interval      140 ms  
QRS duration      73 ms  
QT/QTc      368/413 ms  
P-R-T axes      58 -5 27

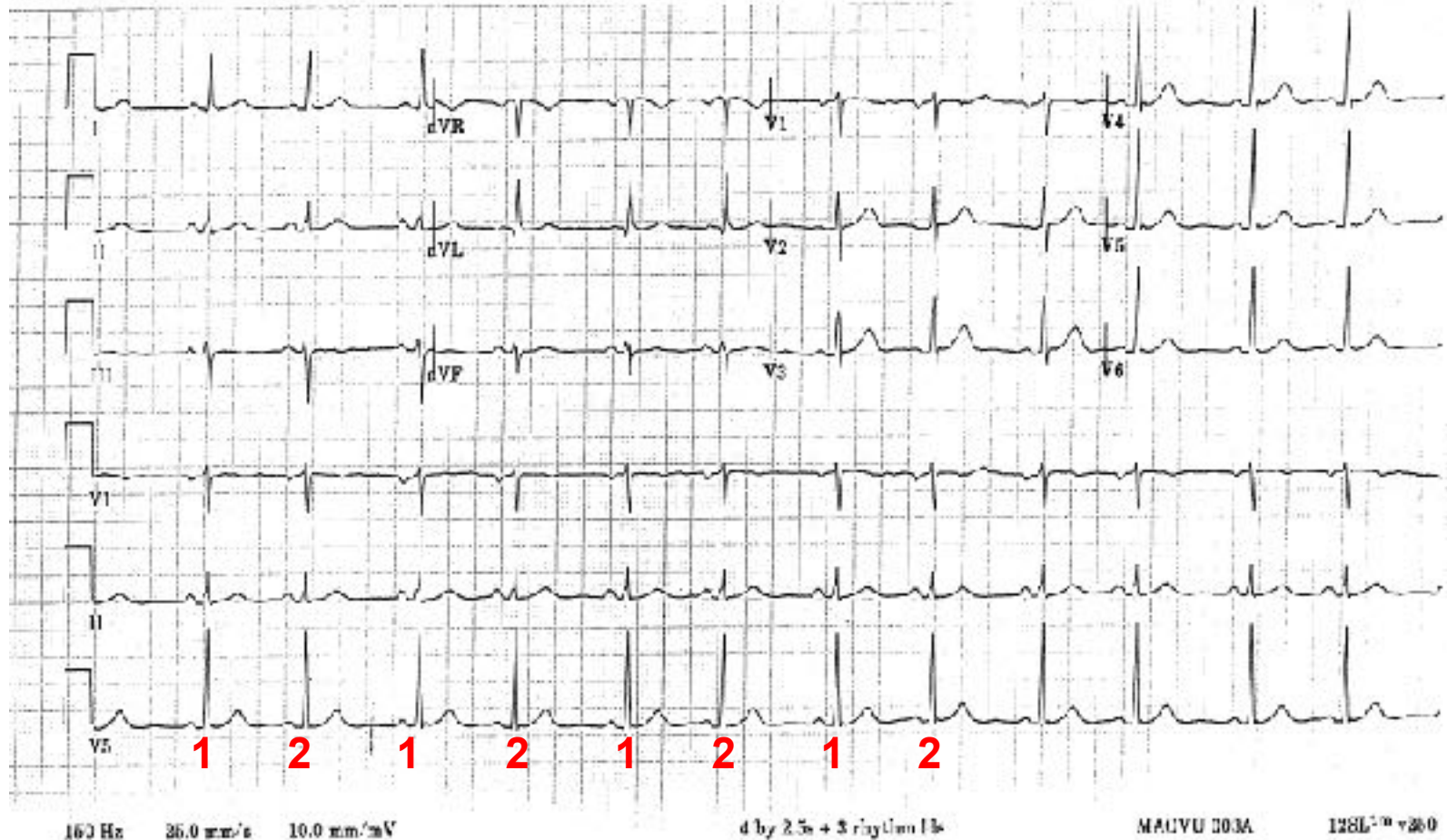
**Atrial Bigeminy...the sinus node won't usually beat early on itself. The early beat is likely a PAC**

2

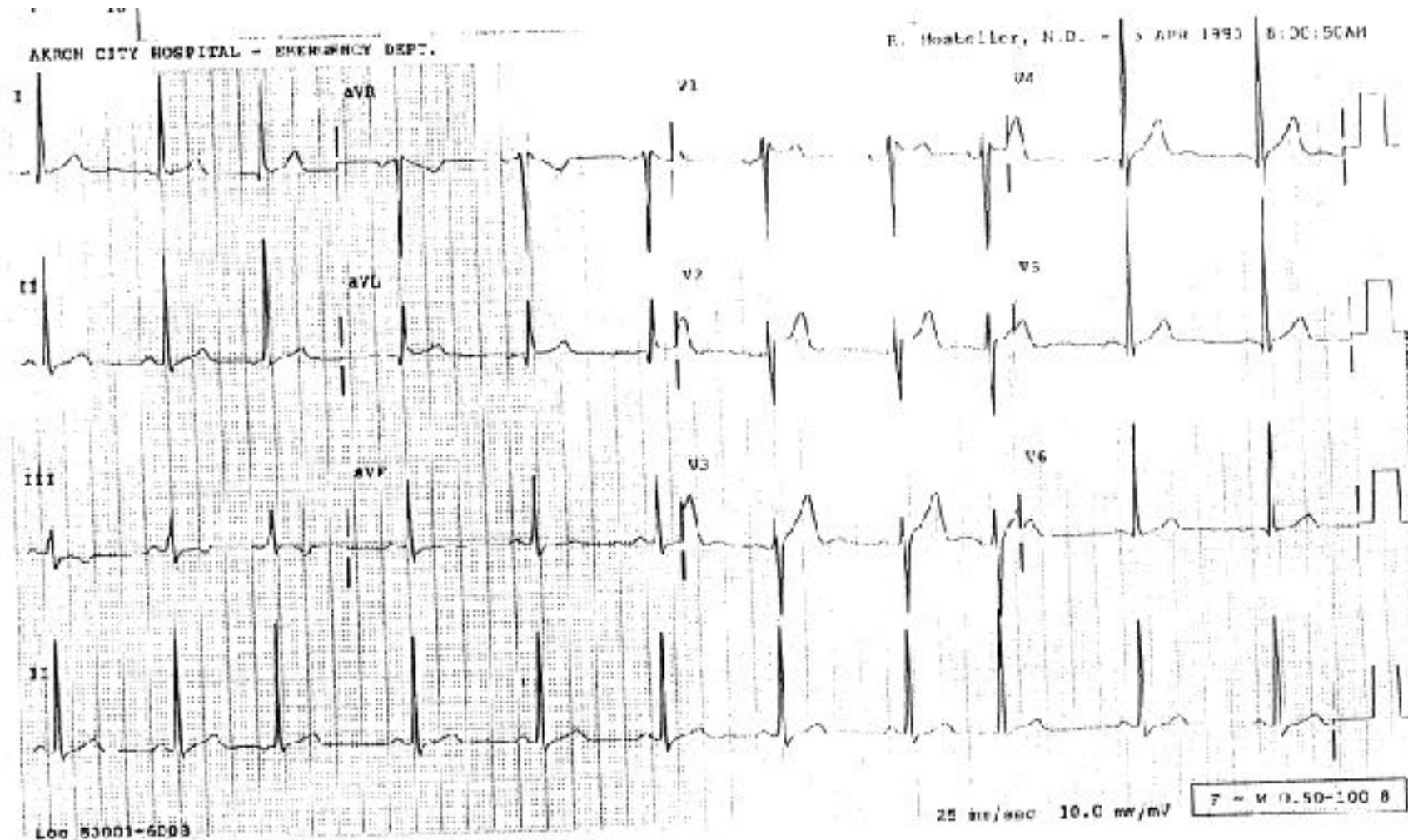
Technician: Magi Puffer CCT  
Test Ind: Chest Pressure

Referred by: Dr Smiley, BGAA

Unconfirmed



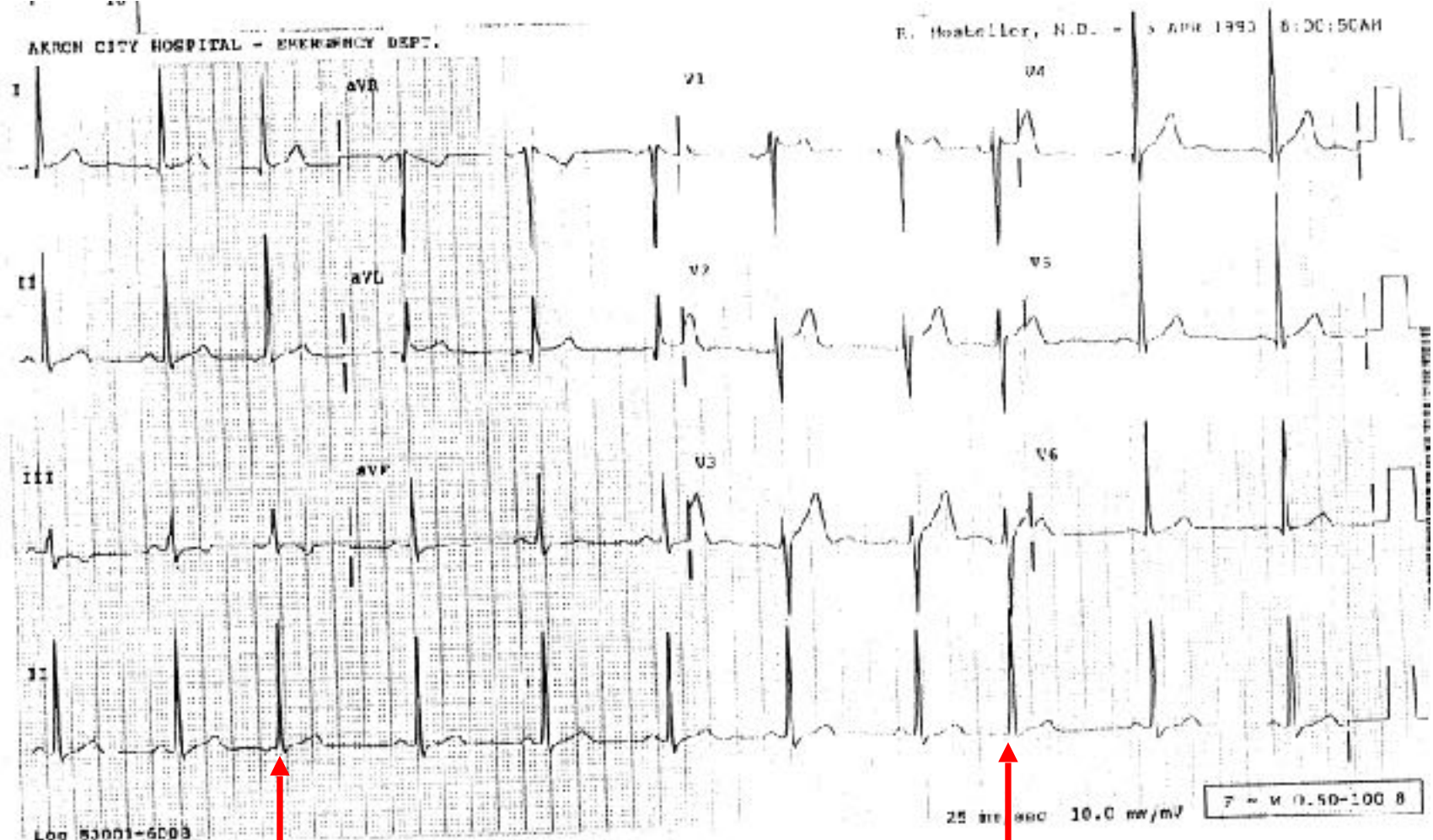
## EKG #5:



**EKG #5:** Rate = 60

**Rhythm:** This is actually regular (mostly). There is a P with every QRS, the P's are upright in lead II.

**Dx:** Normal Sinus Rhythm with two early beats. **What are the early beats?**

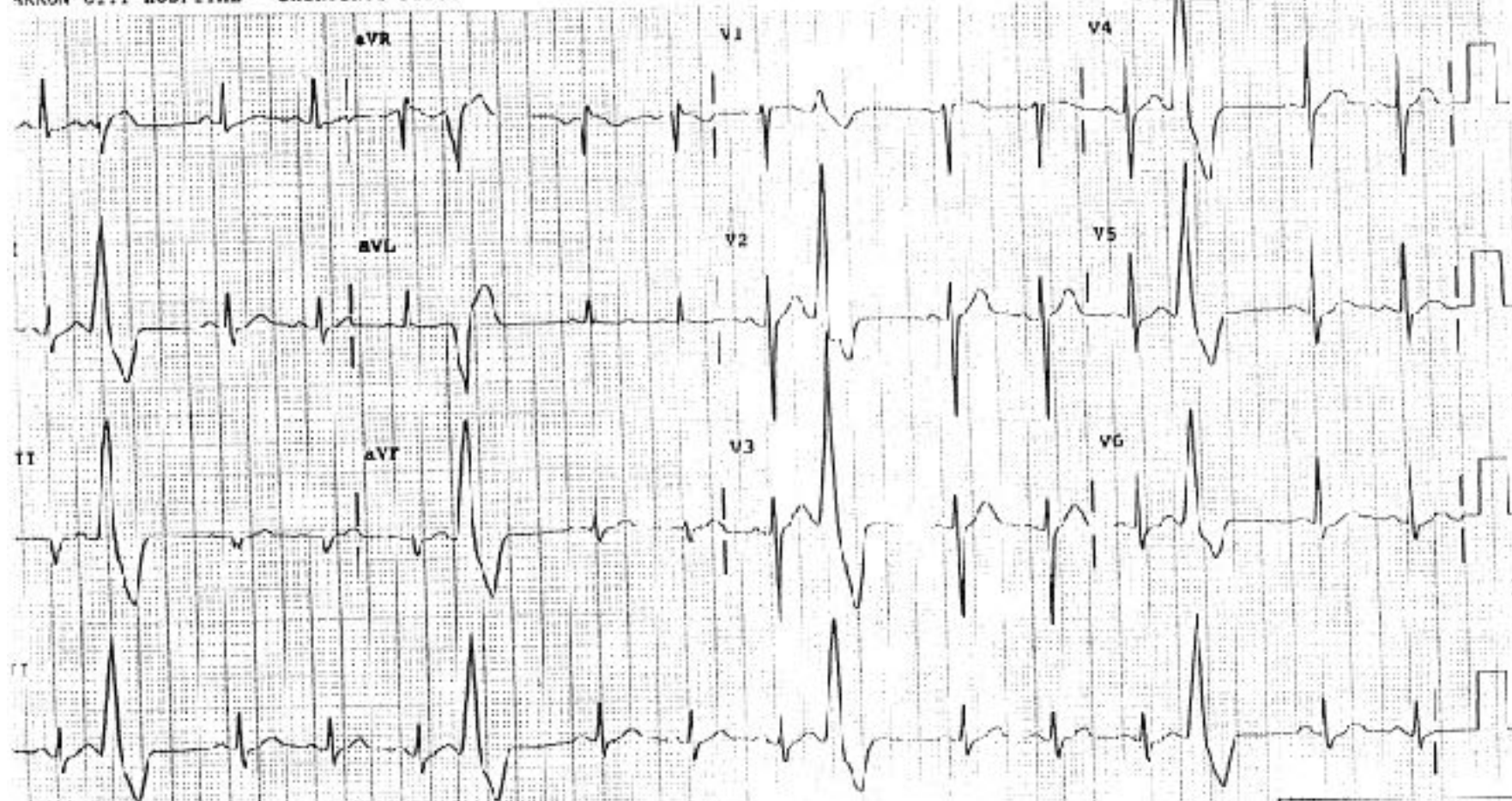


**PAC's (Premature Atrial Contractions)**

# EKG #6:

AKRON CITY HOSPITAL - EMERGENCY DEPT.

K. Montellier, R.D. - 4 JAN 1993 2:12:04PM



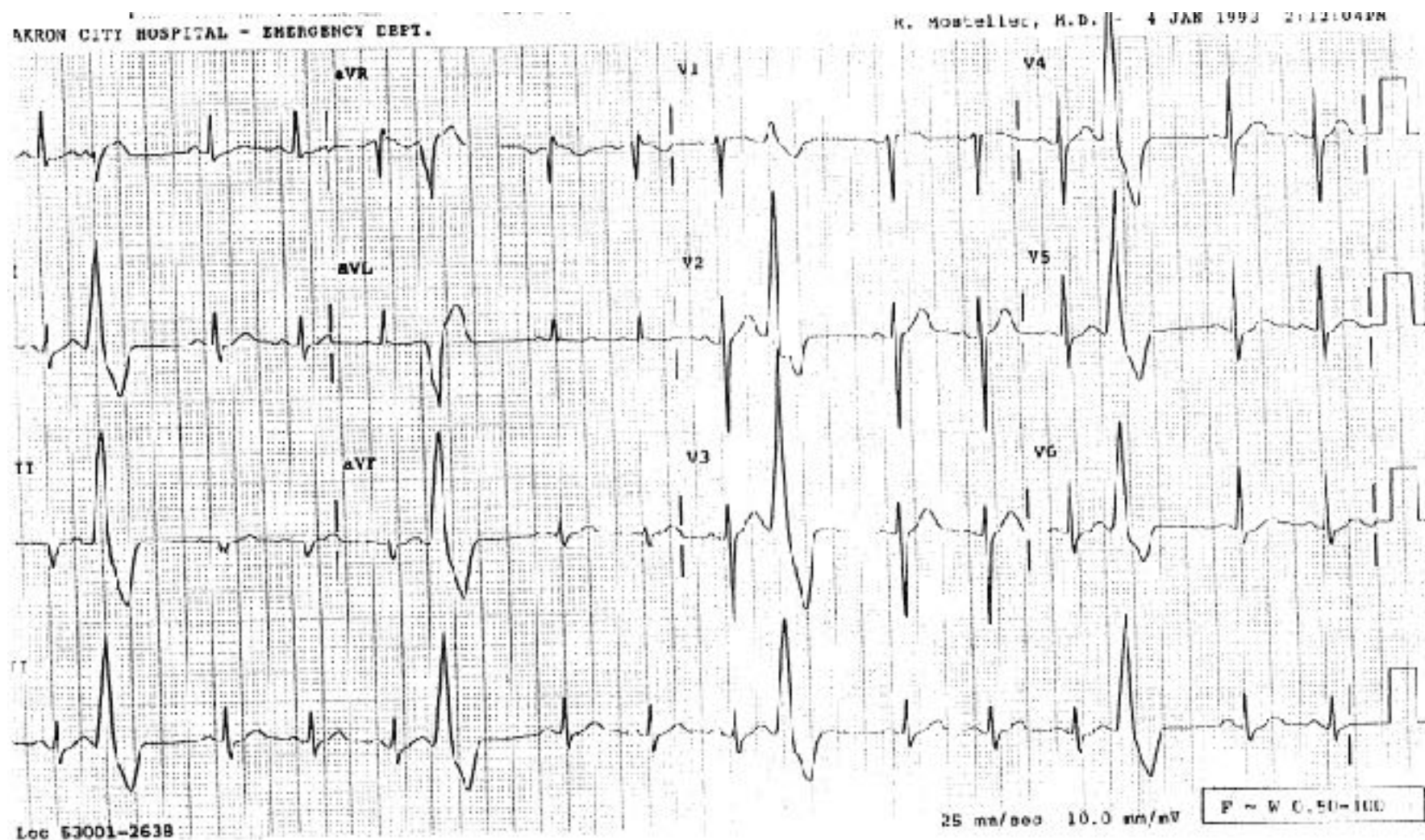
Loc 53001-2638

25 mm/sec 10.0 mm/mV

F ~ W C. 50-100

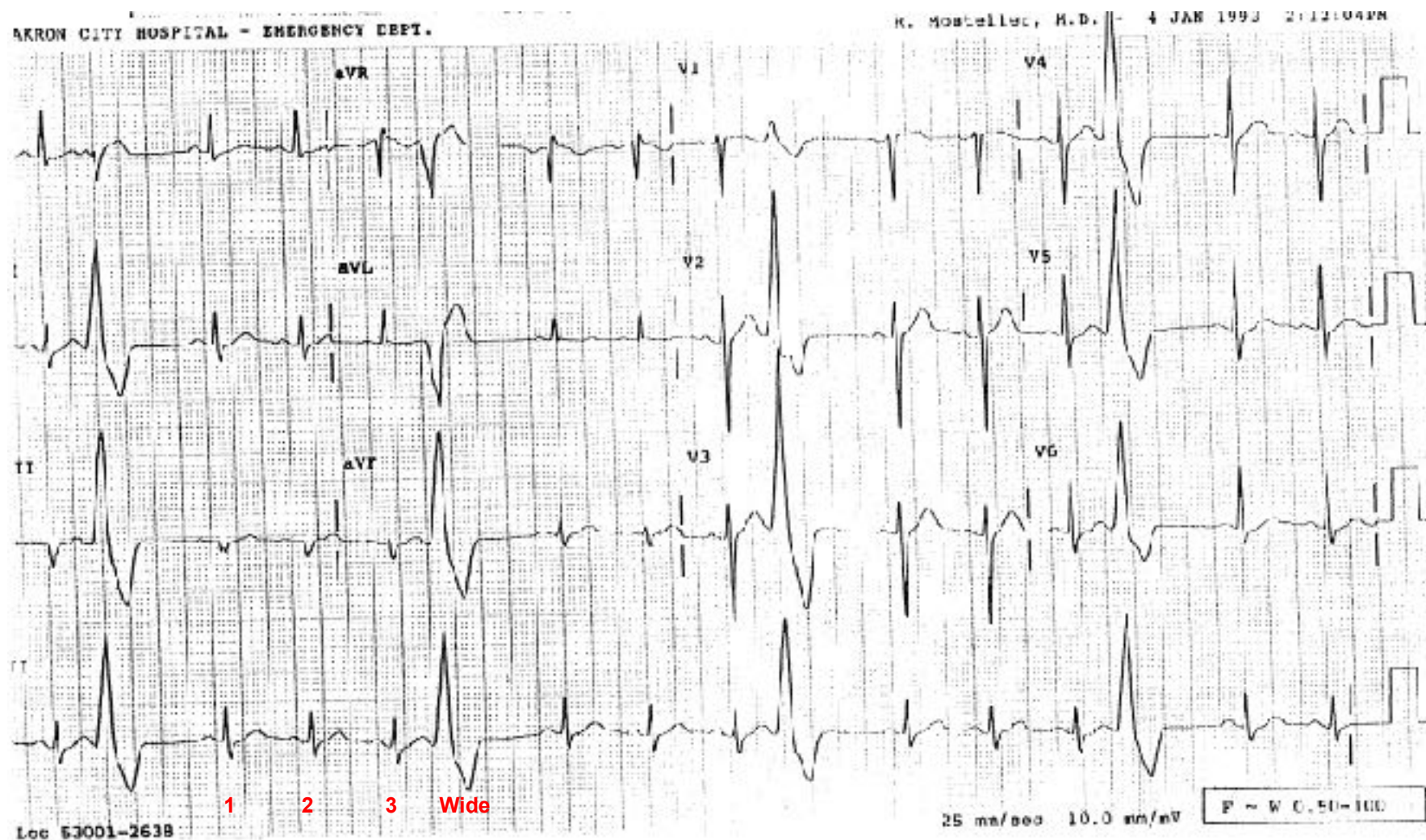
## EKG #6:

### Regular vs Irregular vs Patterned Irregularity?



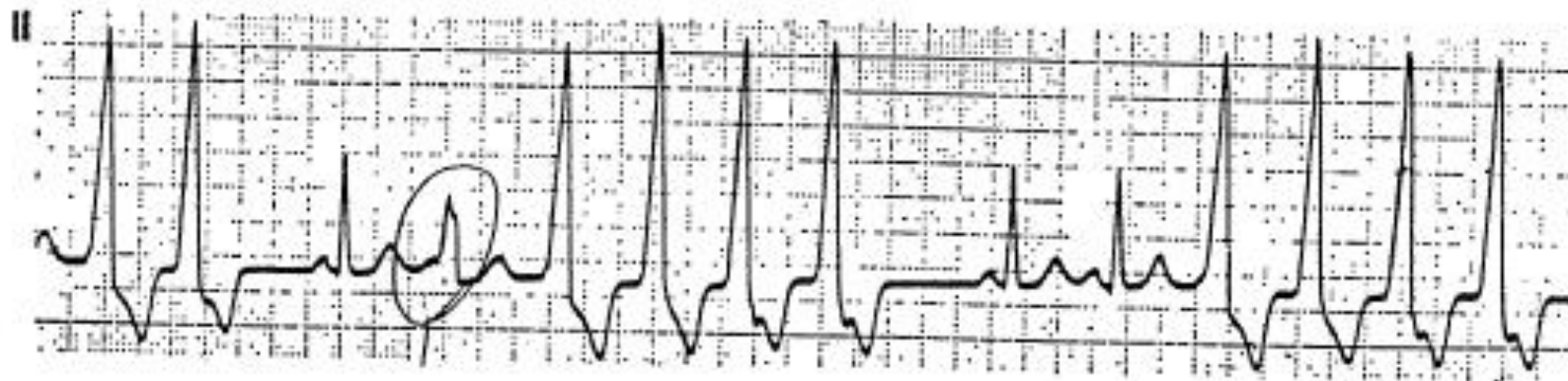
## EKG #6:

### Normal Sinus Rhythm with frequent PVC's





**7 Beat Run Non-Sustained Vtach**



**Couplet**

**4 Beat Run NonSust Vtach**

## EKG #7:

Abnormal ECG -

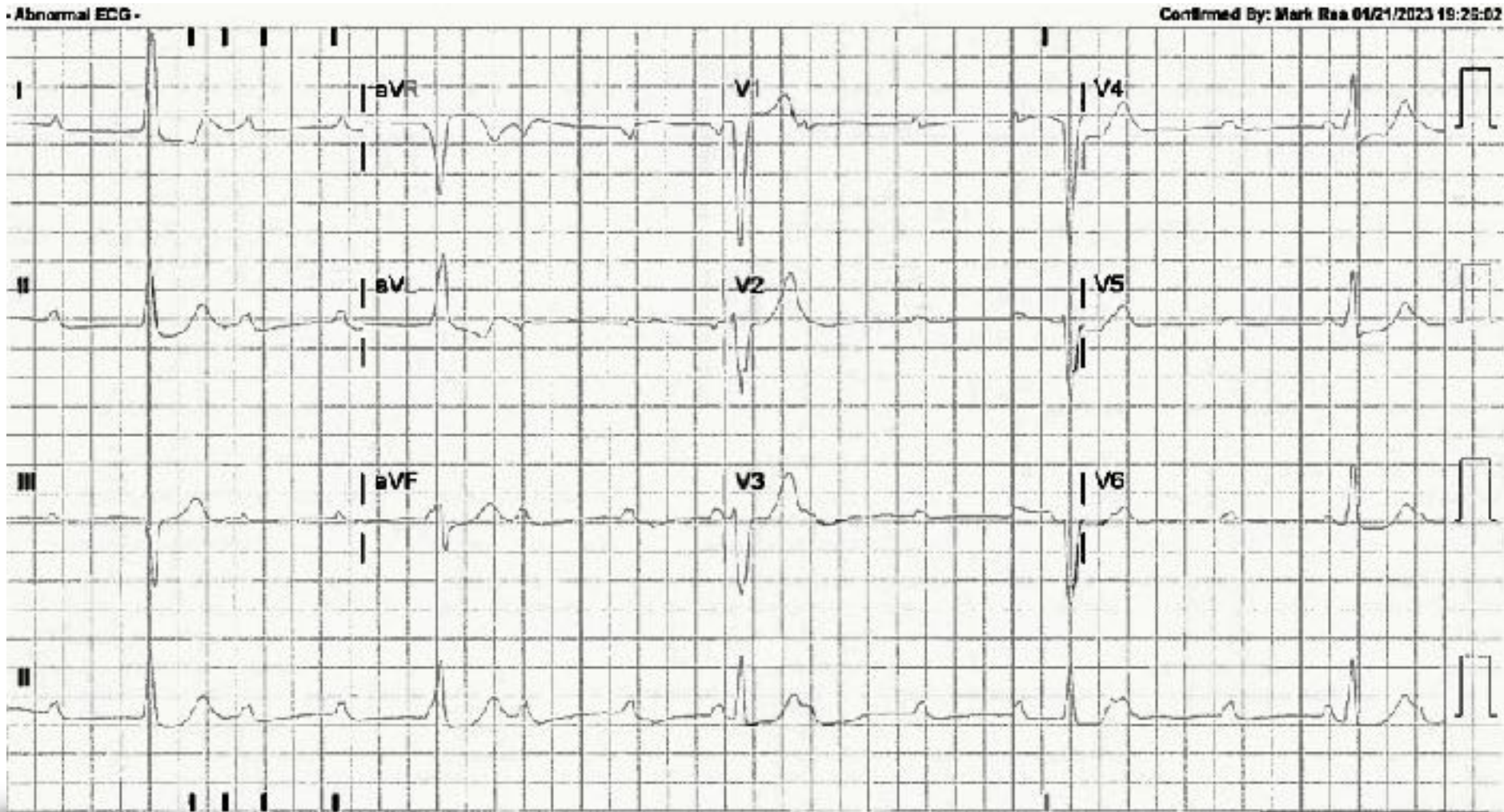
Confirmed By: Mark Raa 01/21/2023 19:25:02



## EKG #7:

Are there P waves?

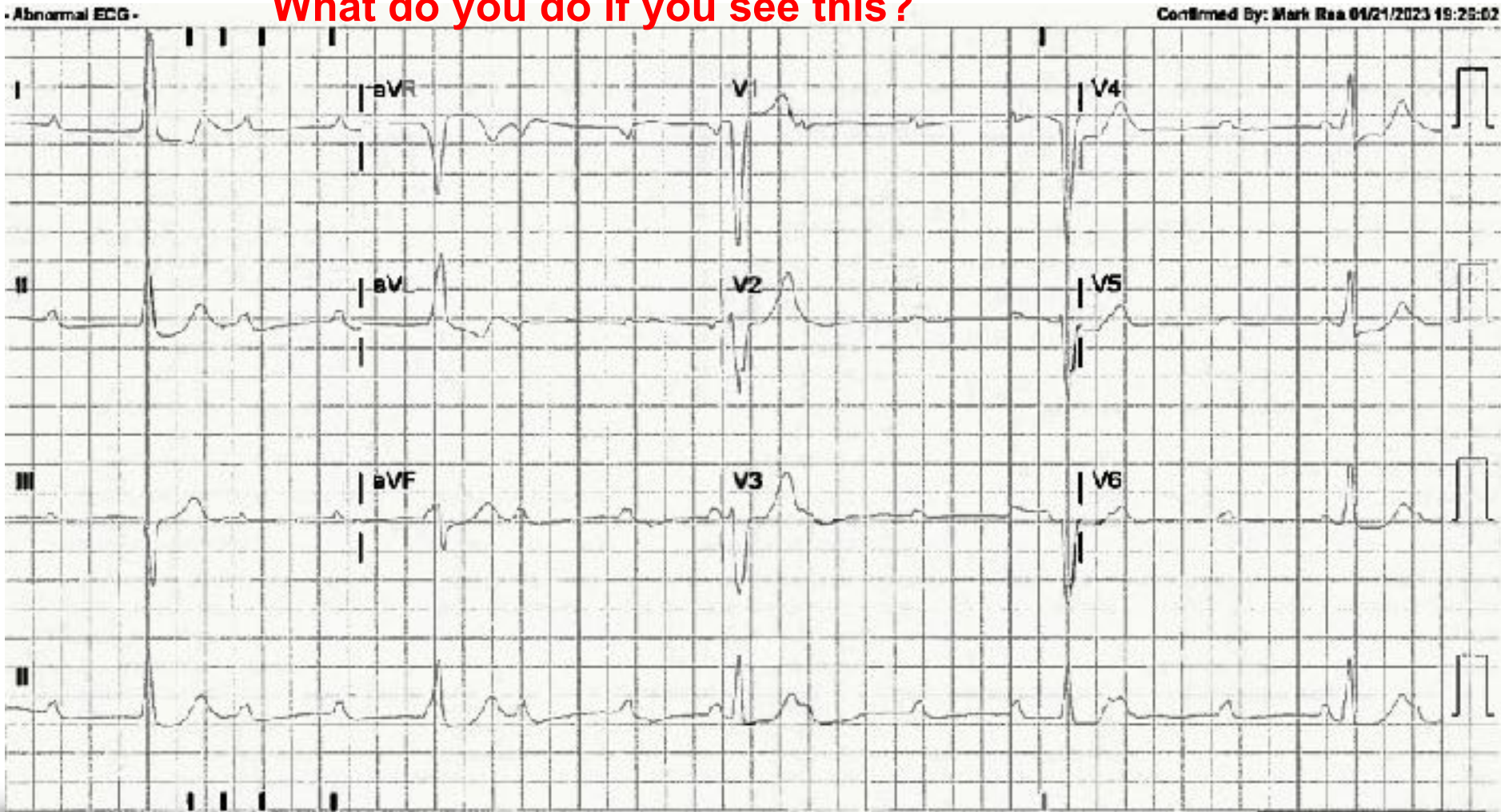
Are P waves causing the QRS's?



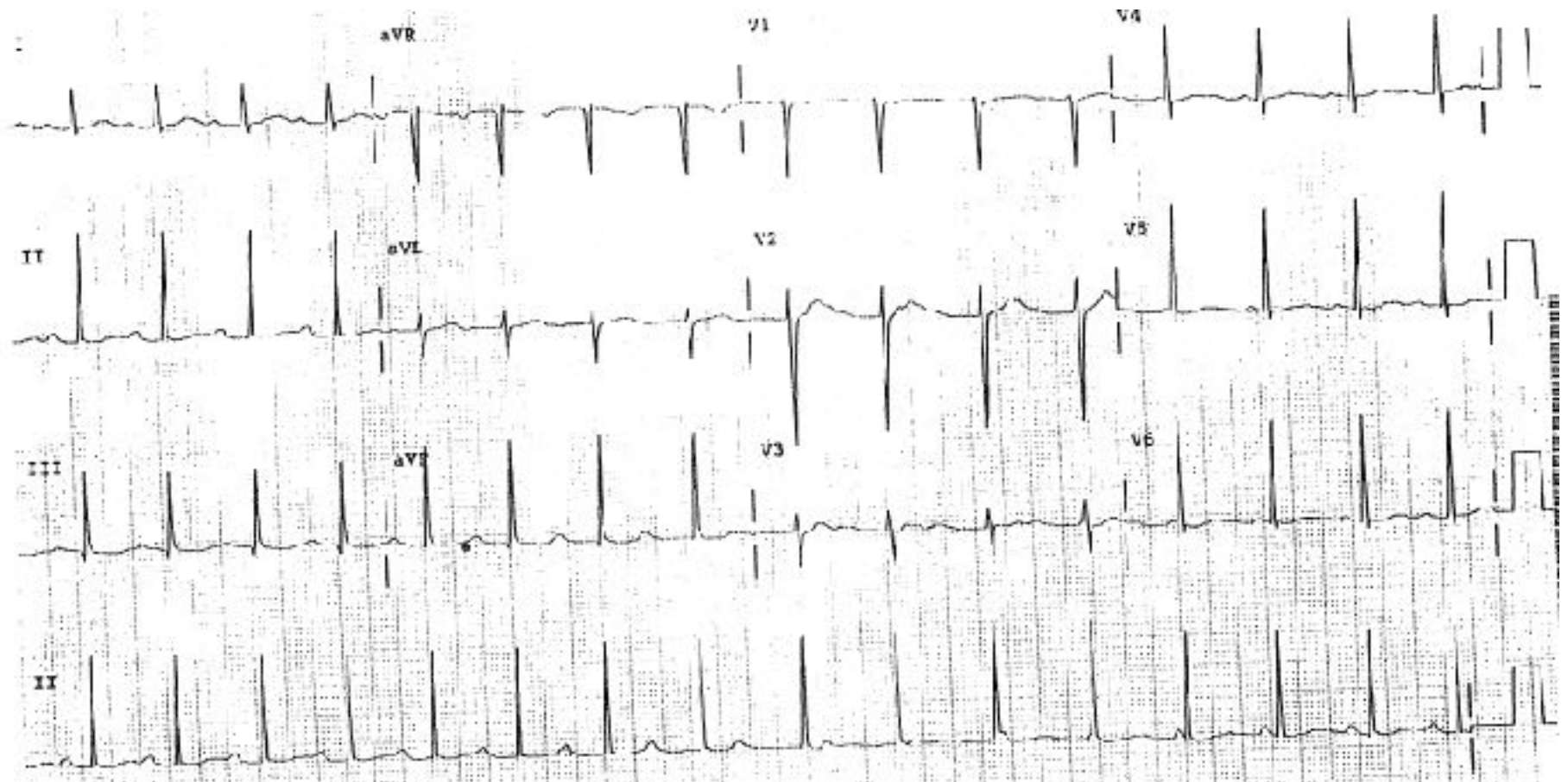
**EKG #7: What is the atrial rate?**

**What is the ventricular rate?**

**What do you do if you see this?**



## EKG #8:



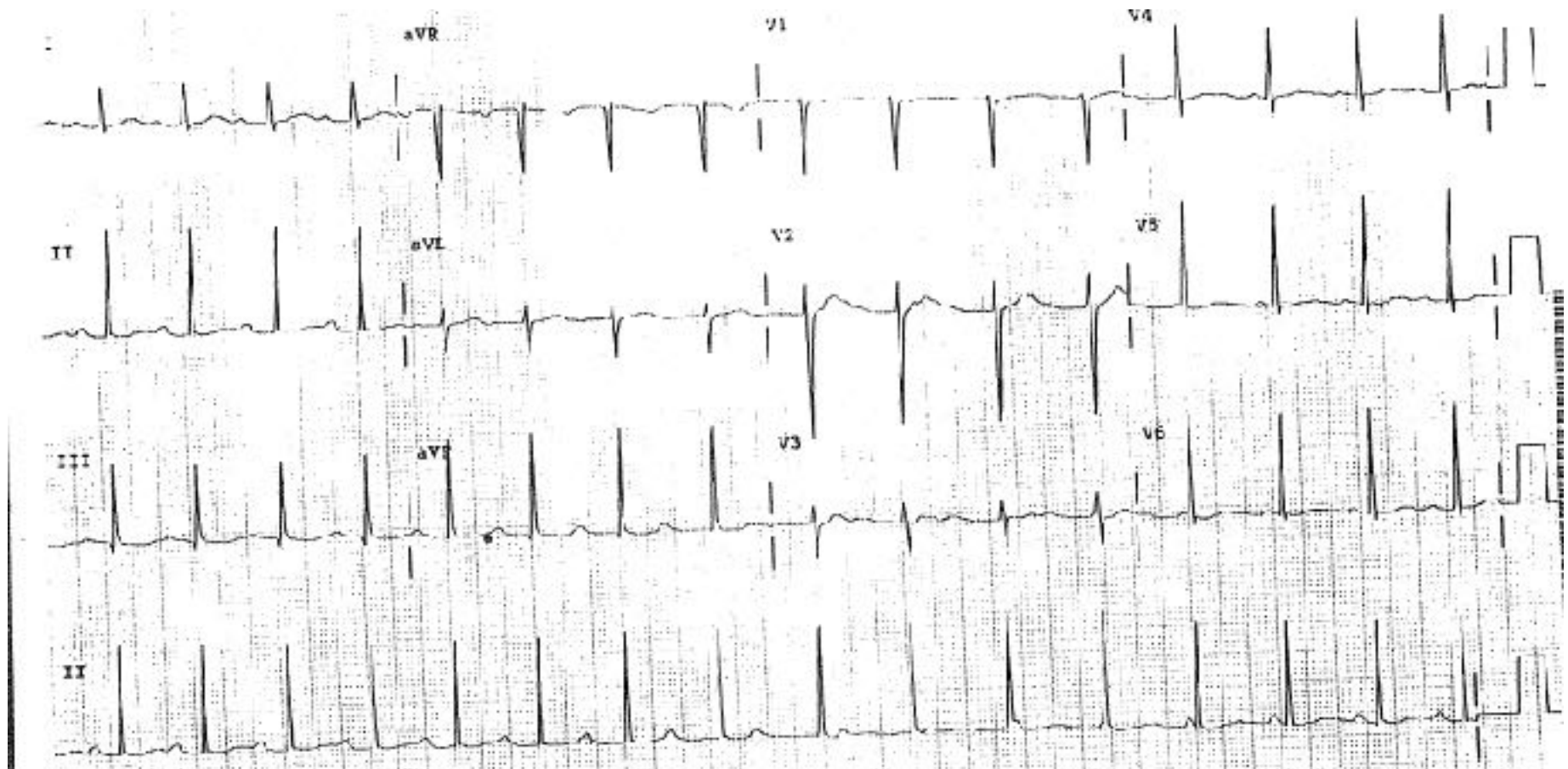
## EKG #8:

-Rate = ~90

-Regular

-Are there P waves? Are they upright in Inferior Leads?

-Is there a P – QRS relationship?

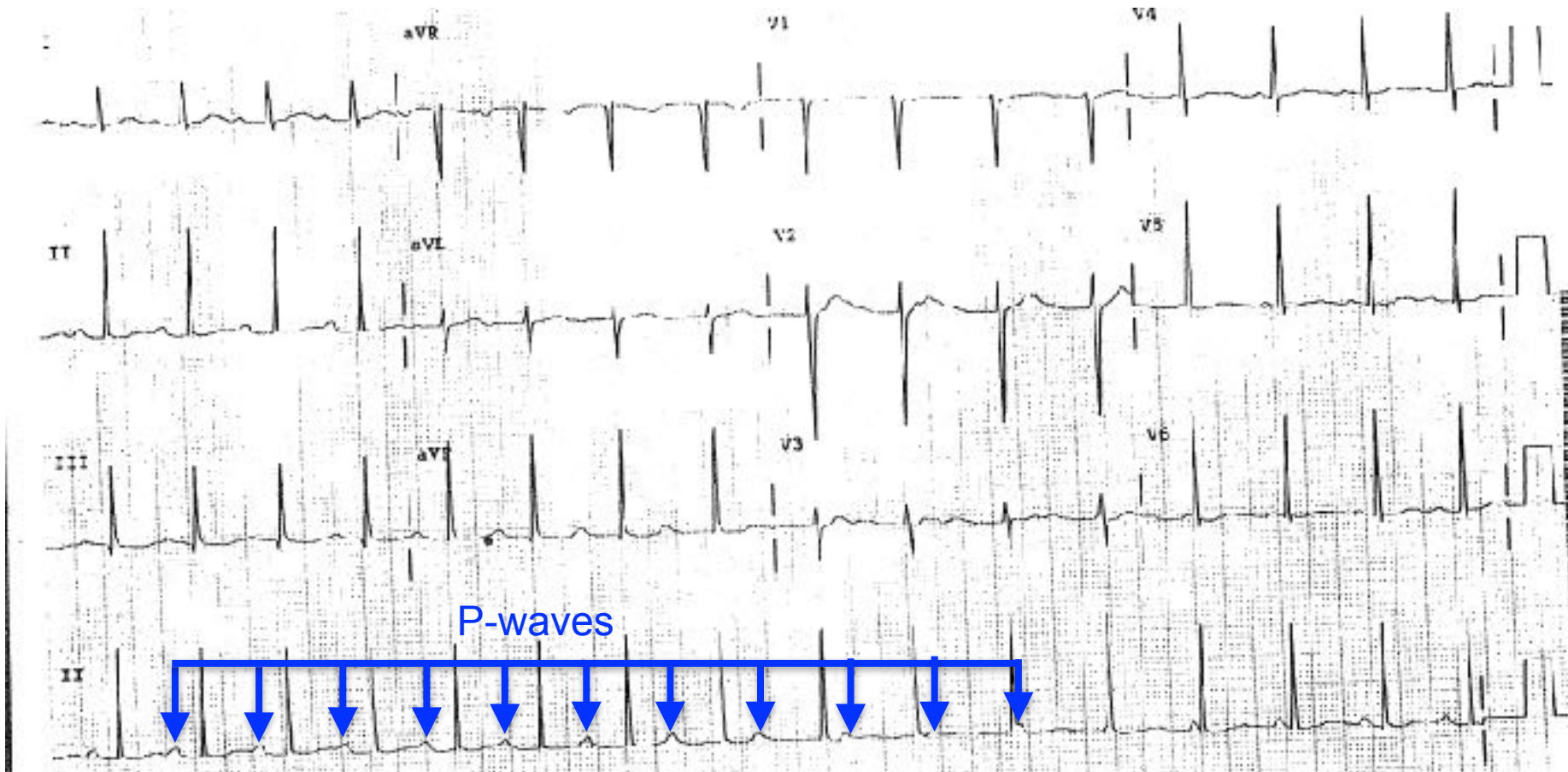


## EKG #8:

-No association between P waves & QRS

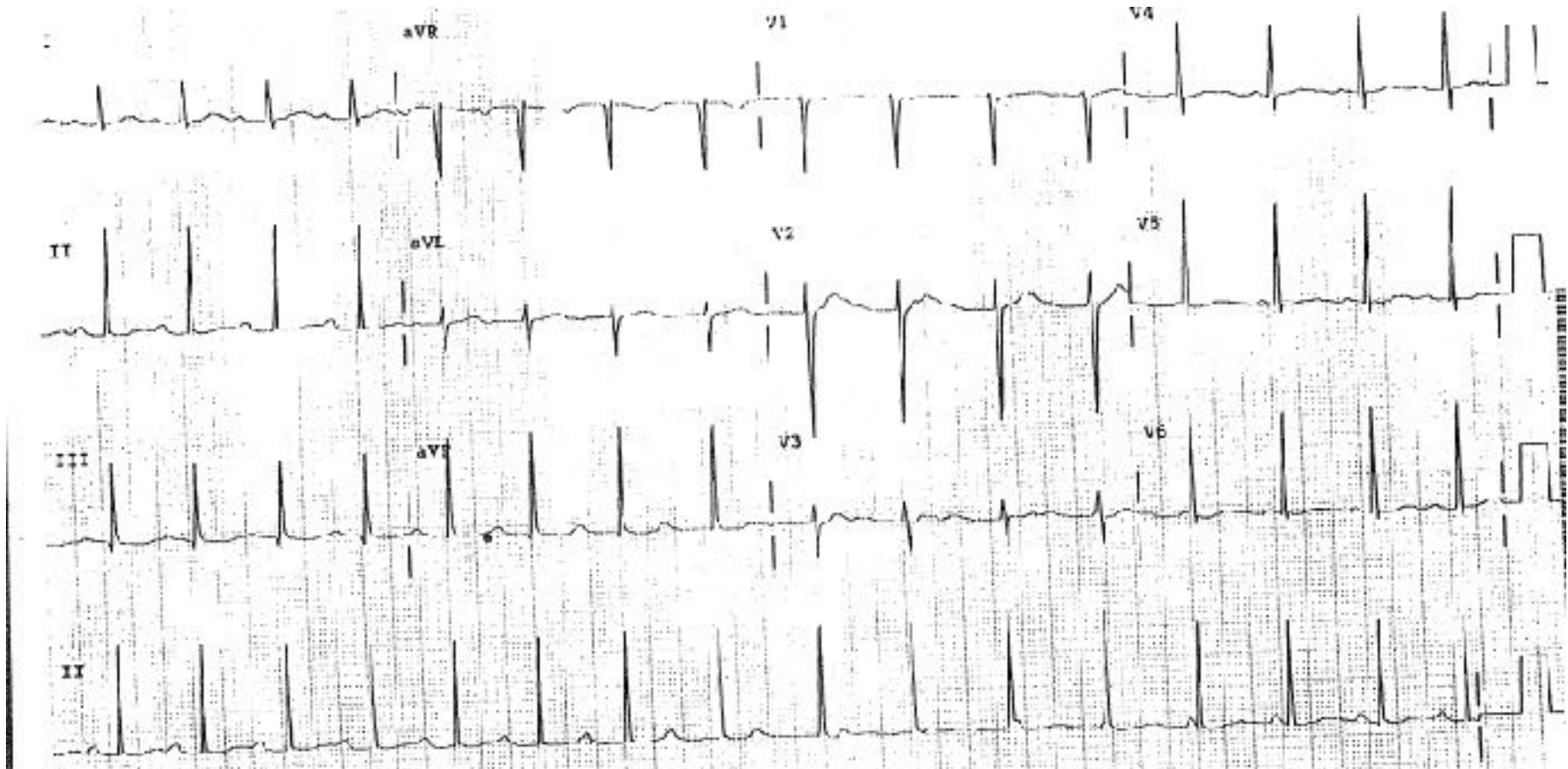
### 3<sup>rd</sup> Degree Heart Block

.... Now what is driving the ventricle to beat?

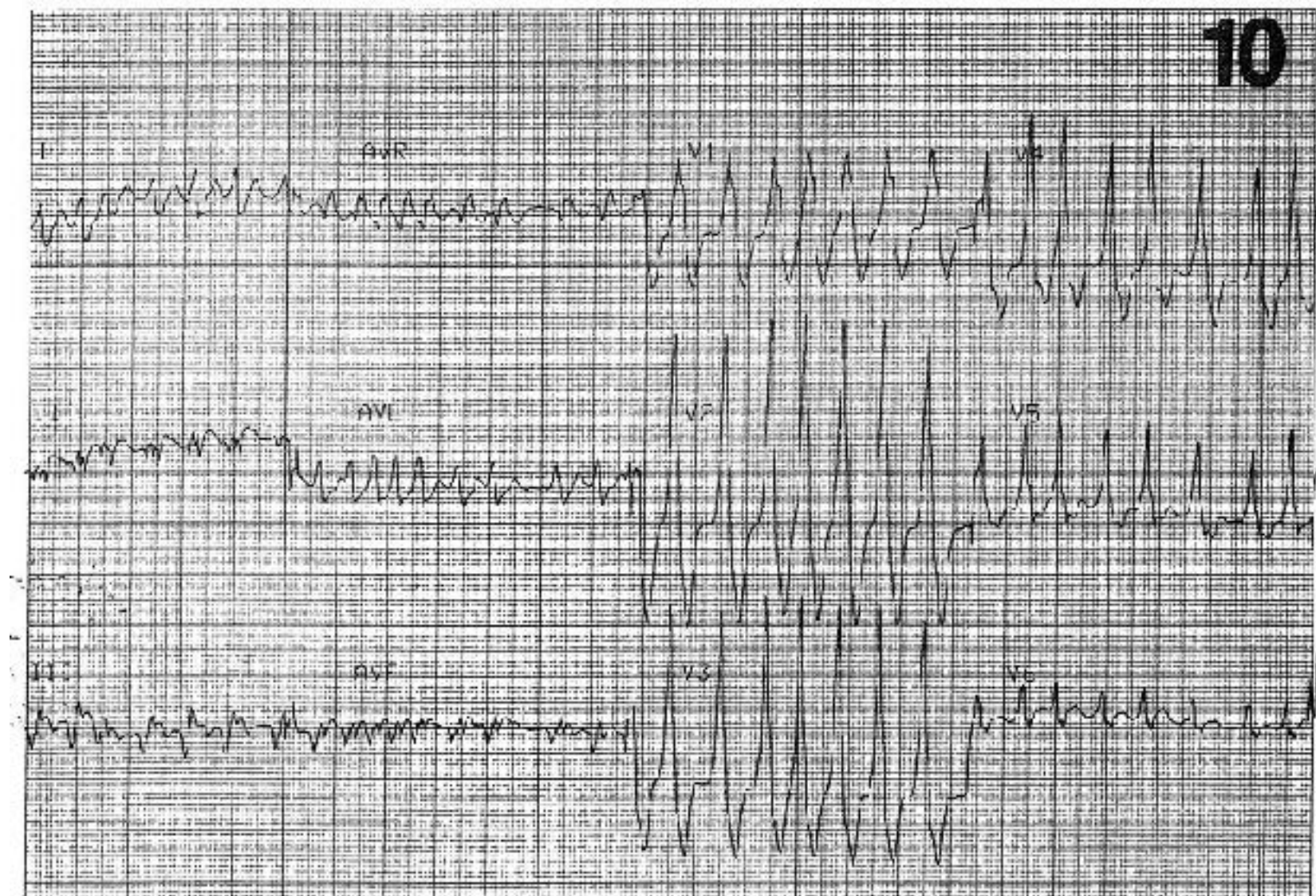


## EKG #8:

Since QRS narrow— “junctional escape” rhythm as nidus in his-purkinje system



## EKG #9:



## EKG #9:

Now the rate is remarkable.... 300bpm at some points...

Reg vs IRREG vs Patterned →

IRREG



**EKG #9:** It is wide! Is it Vtach? No...it is IRREG

What else can make the QRS wide?

What origin of these contractions can go at 300bpm and be irreg?



**EKG #9: Answer.....AFIB with aberrancy**

**Now how can the AV node be conducting at 300 BPM?**



**EKG #9: AFIB with conduction down an accessory pathway**

**AFIB in pt with Wolff-Parkinson-White!**

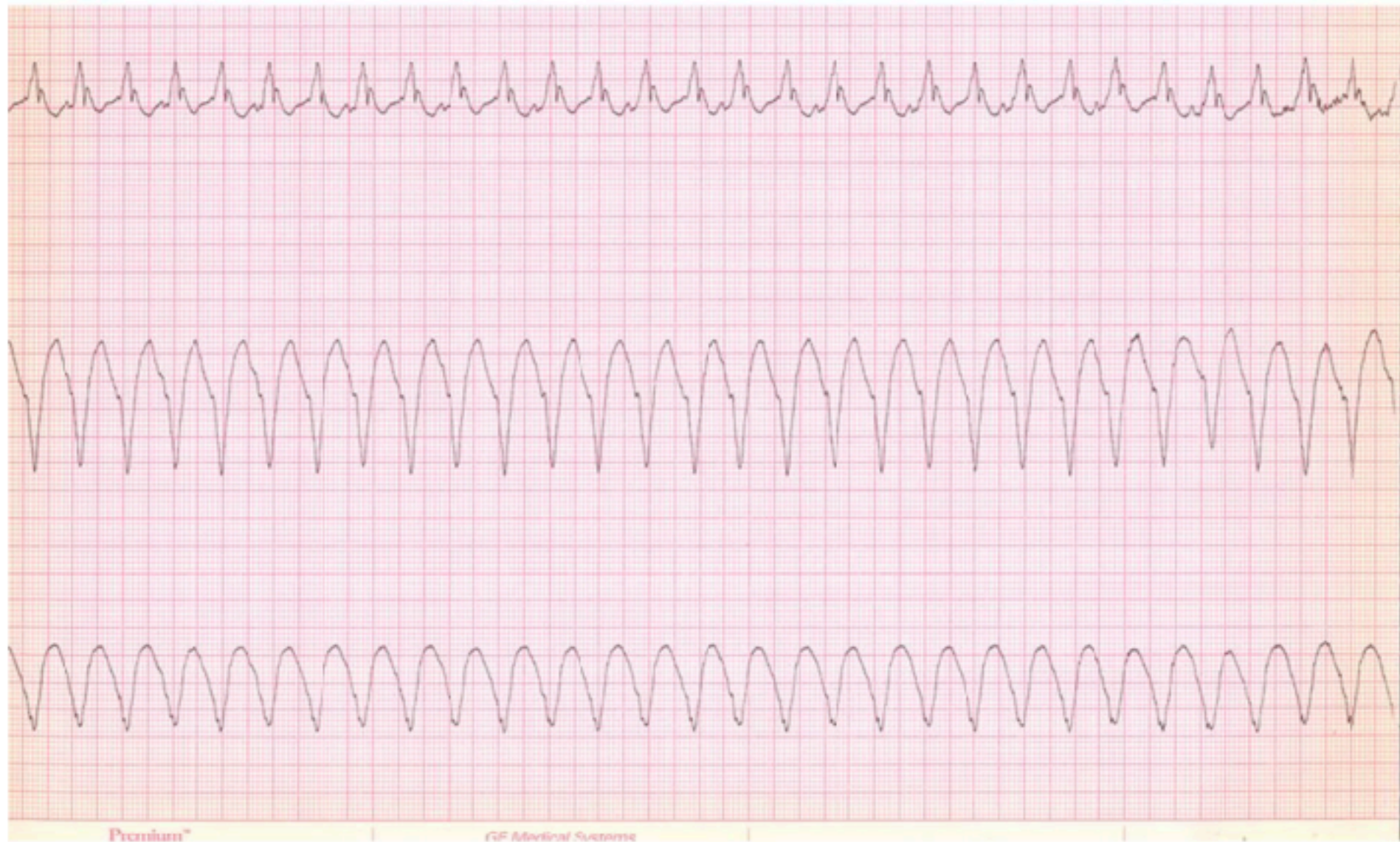


# V-fib



<https://litfl.com/ventricular-fibrillation-vf-ecg-library/>

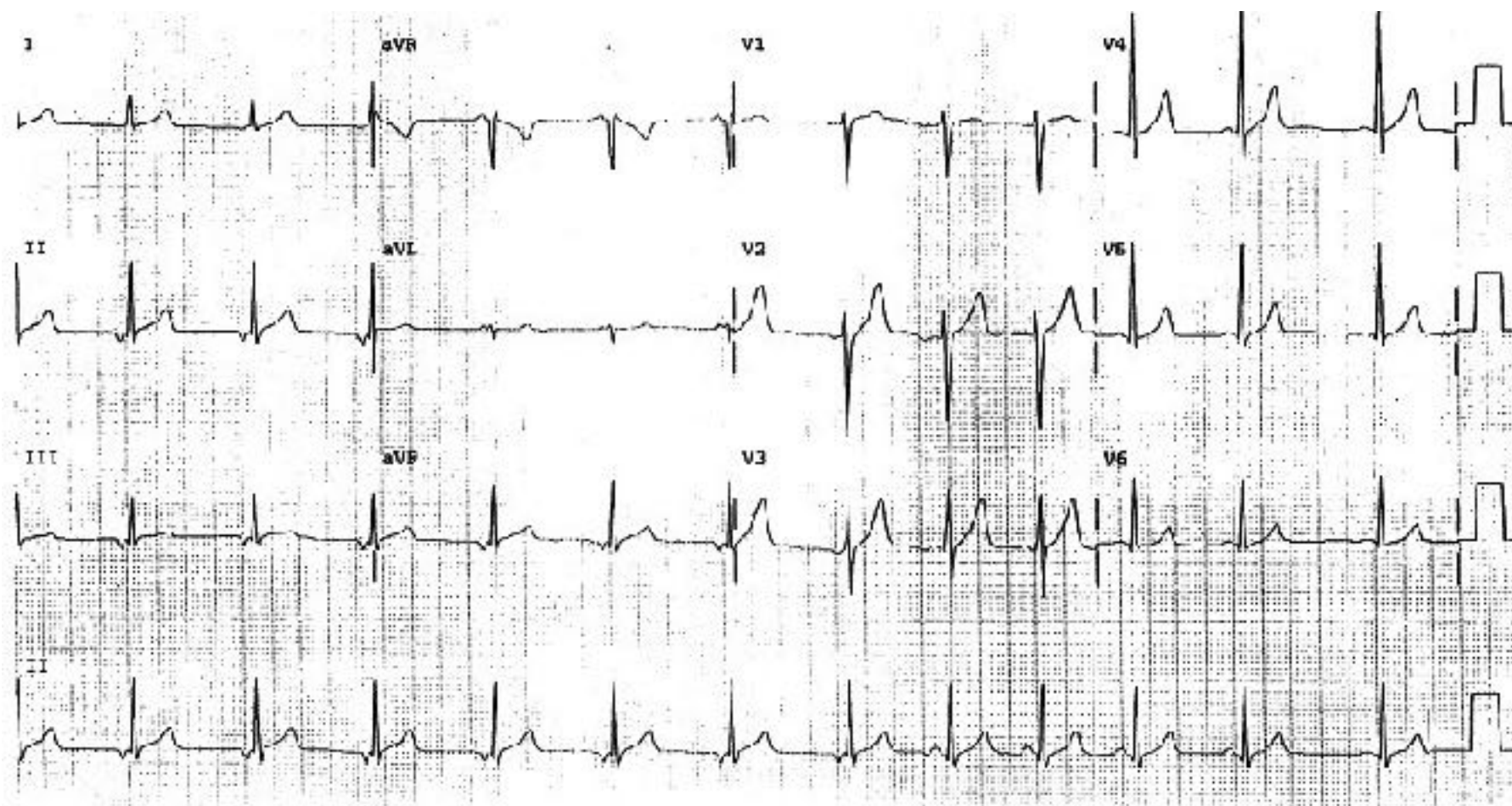
# Monomorphic V-tach



# Polymorphic V-tach— aka “Torsades”

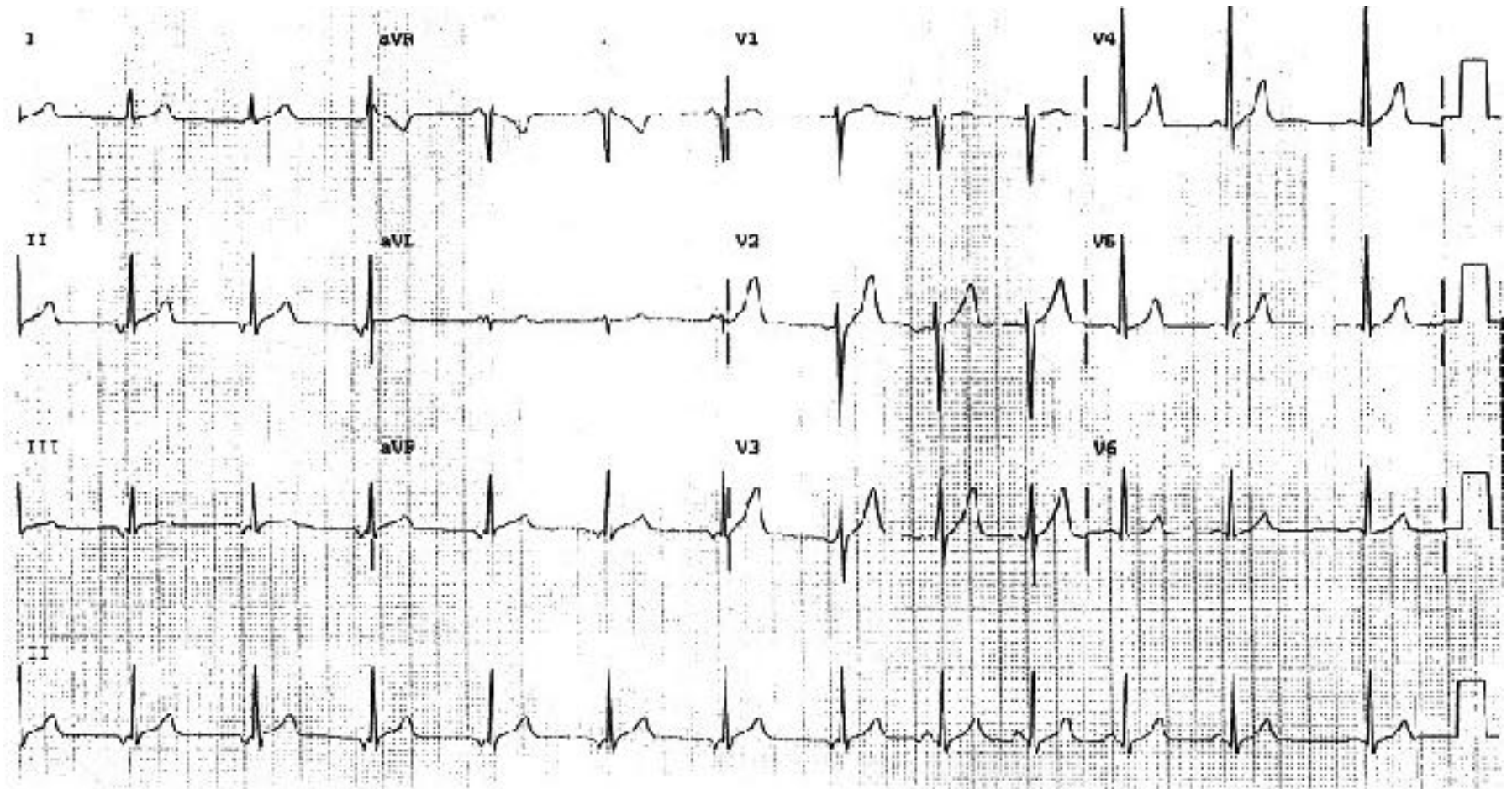


## EKG #10:



## EKG #10:

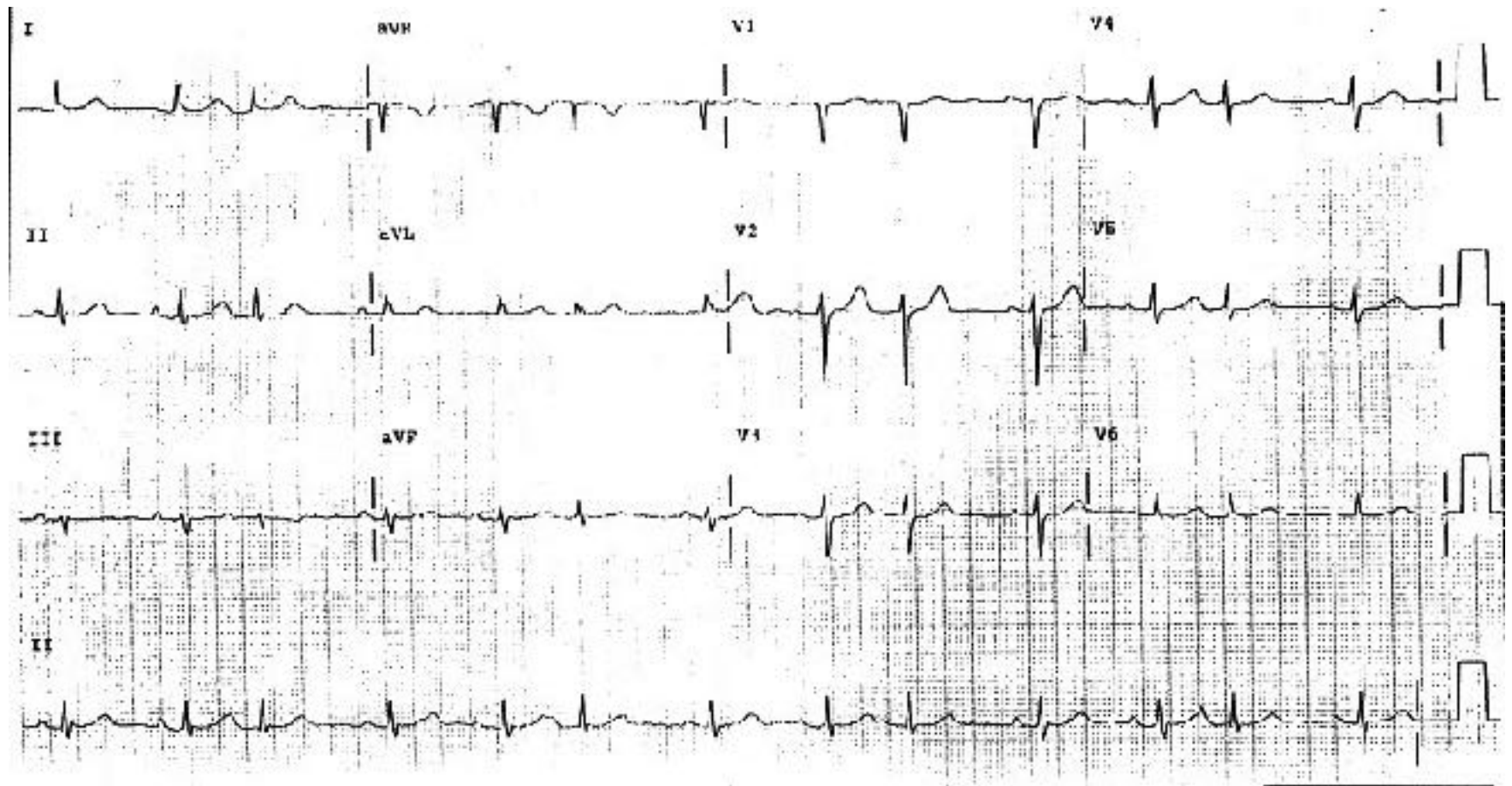
Ectopic Atrial rhythm that converts to sinus rhythm at end of strip



## EKG #11:

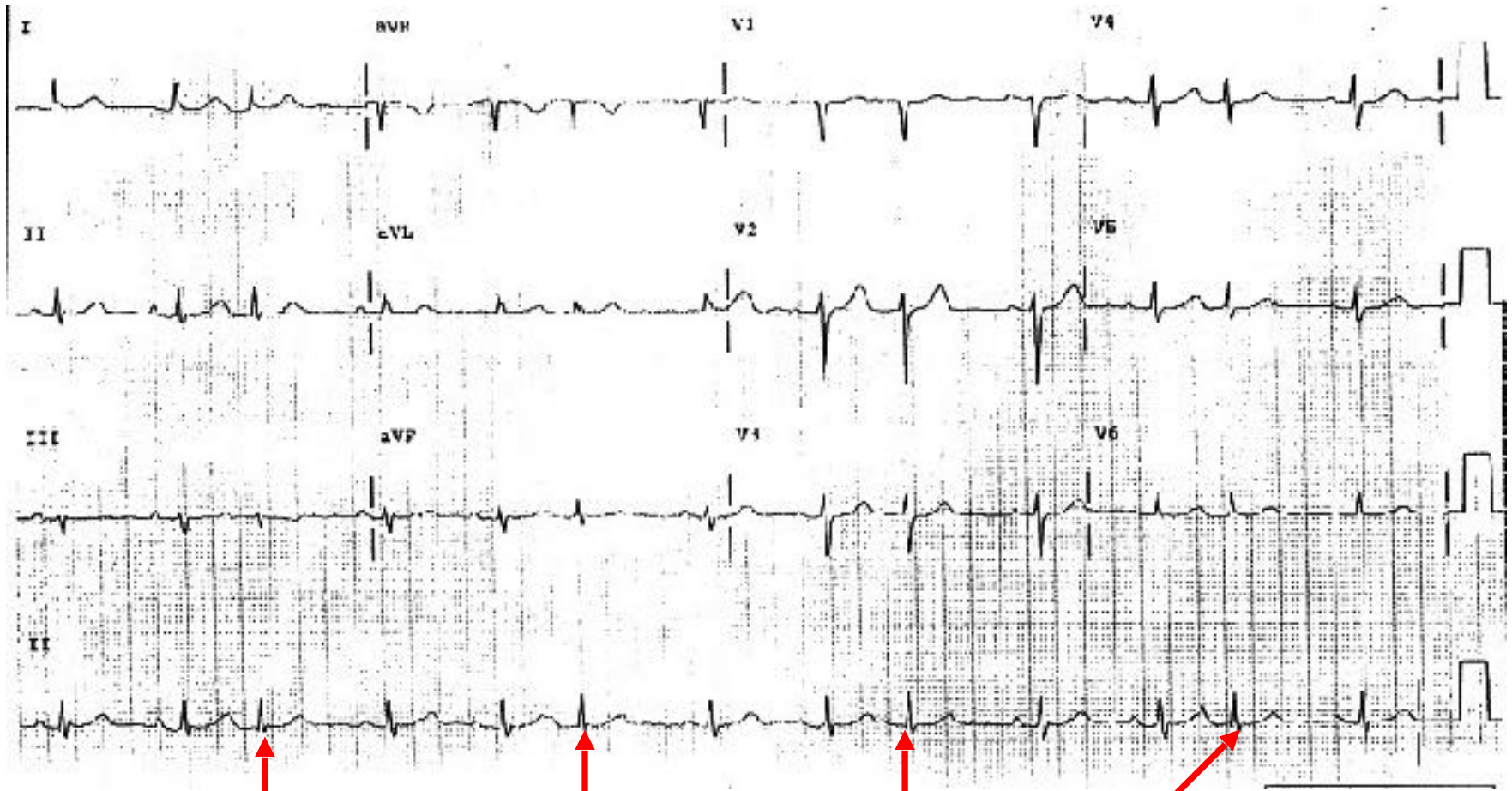
Rate:

Rhythm: Reg vs Irreg vs Patterned Irregular



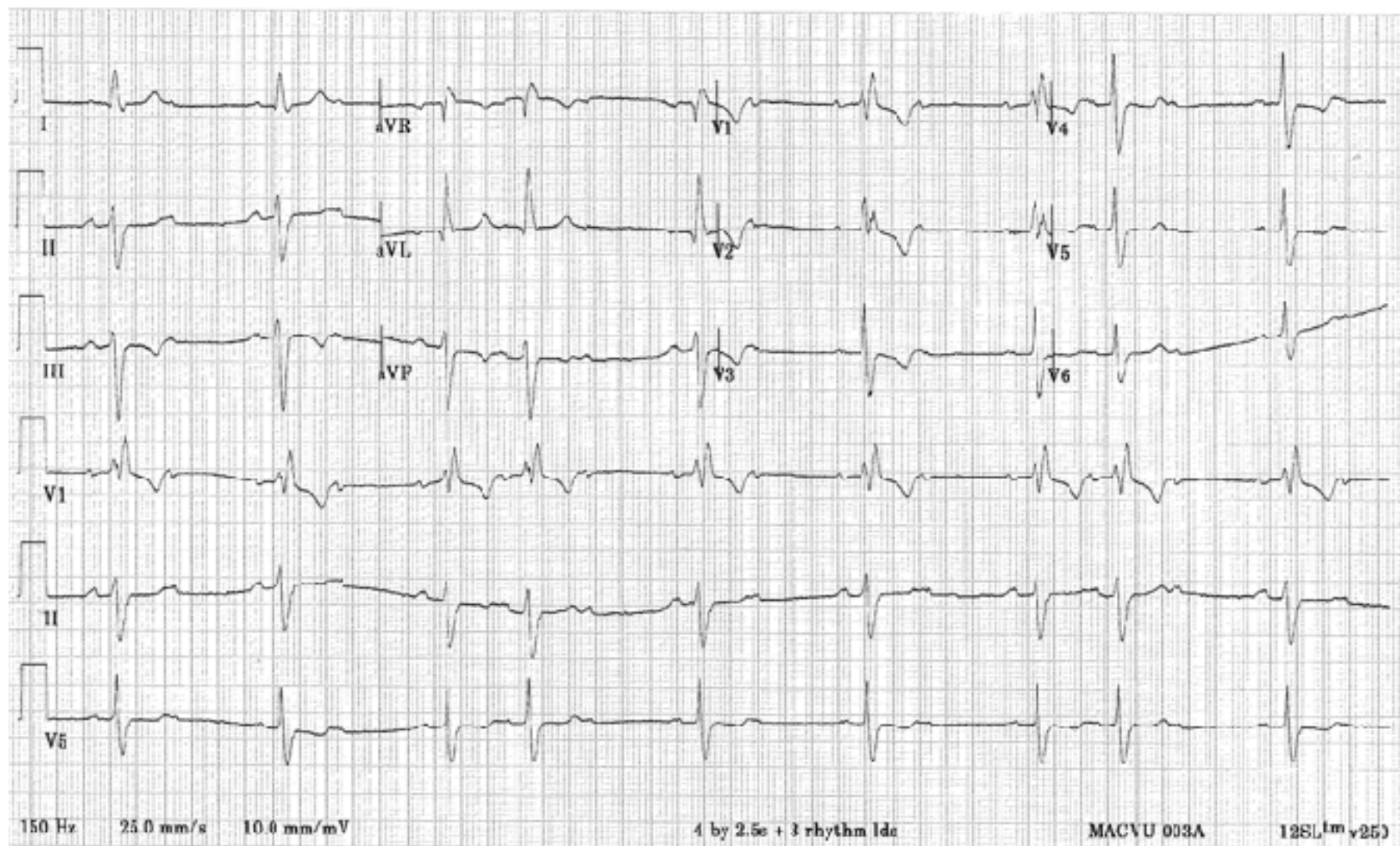
## EKG #11:

**Atrial Trigeminy (PAC every 3rd beat)**

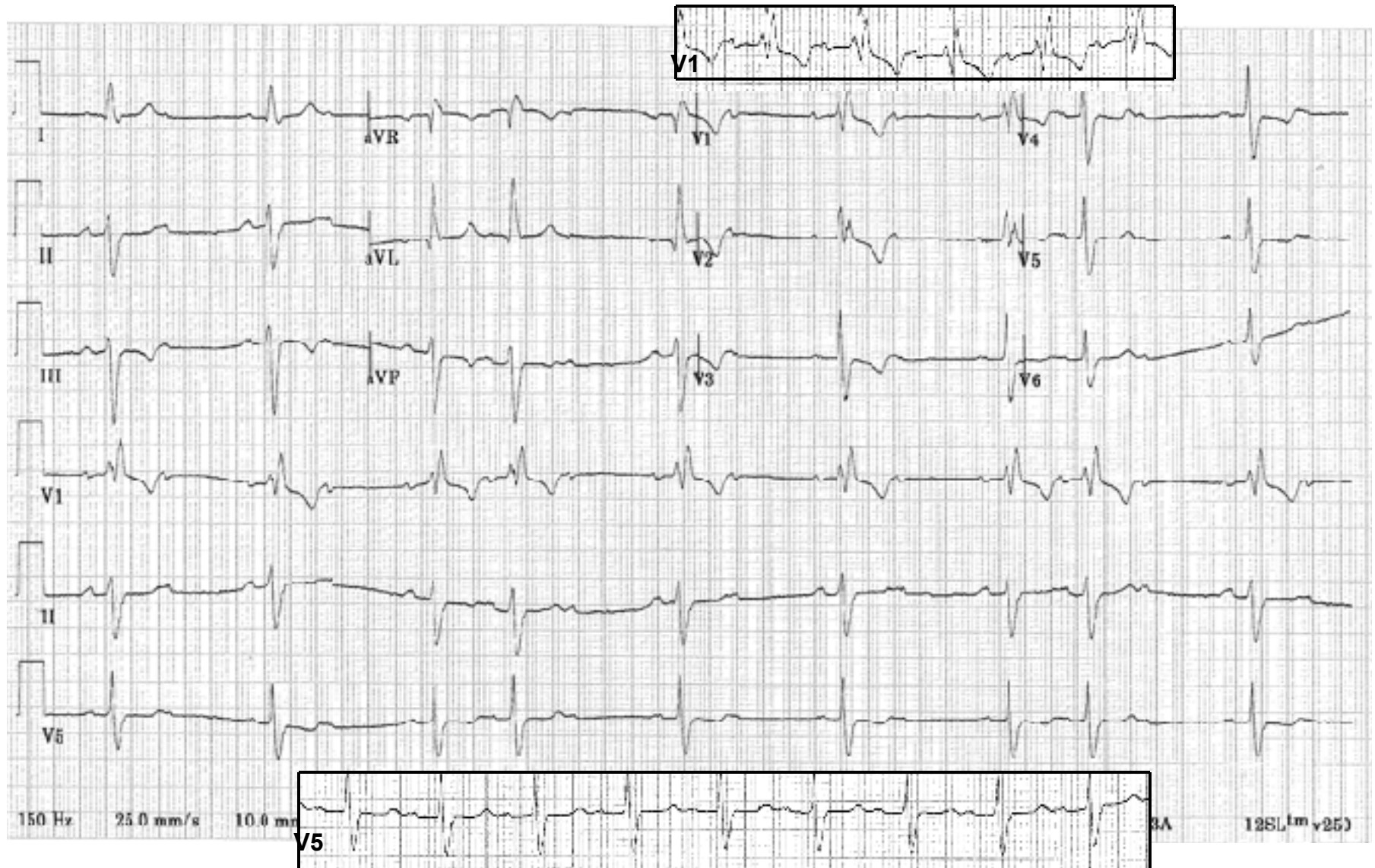


**PAC's (Premature Atrial Contractions)**

## Interpret EKG #12

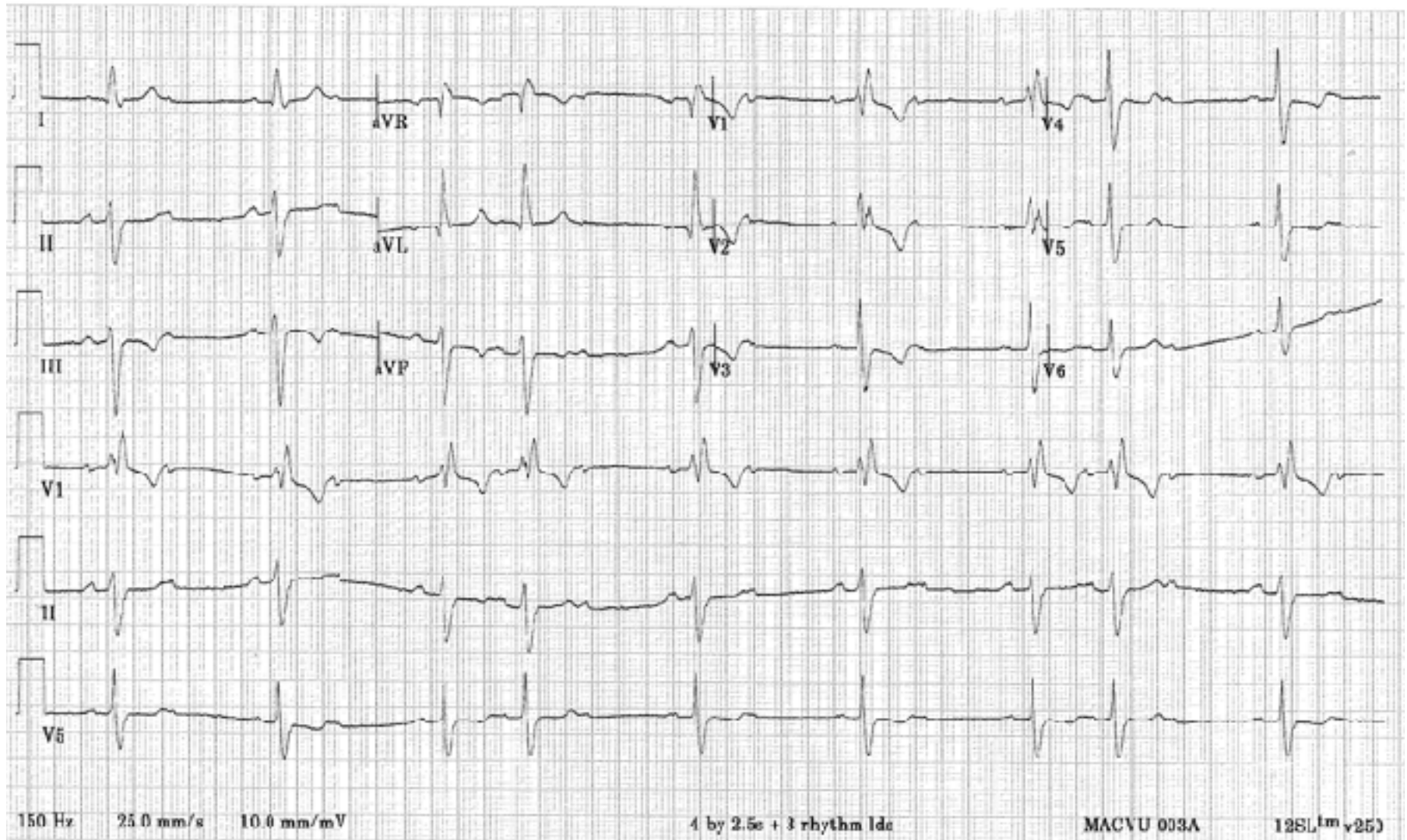


**Rhythm strip – same patient**

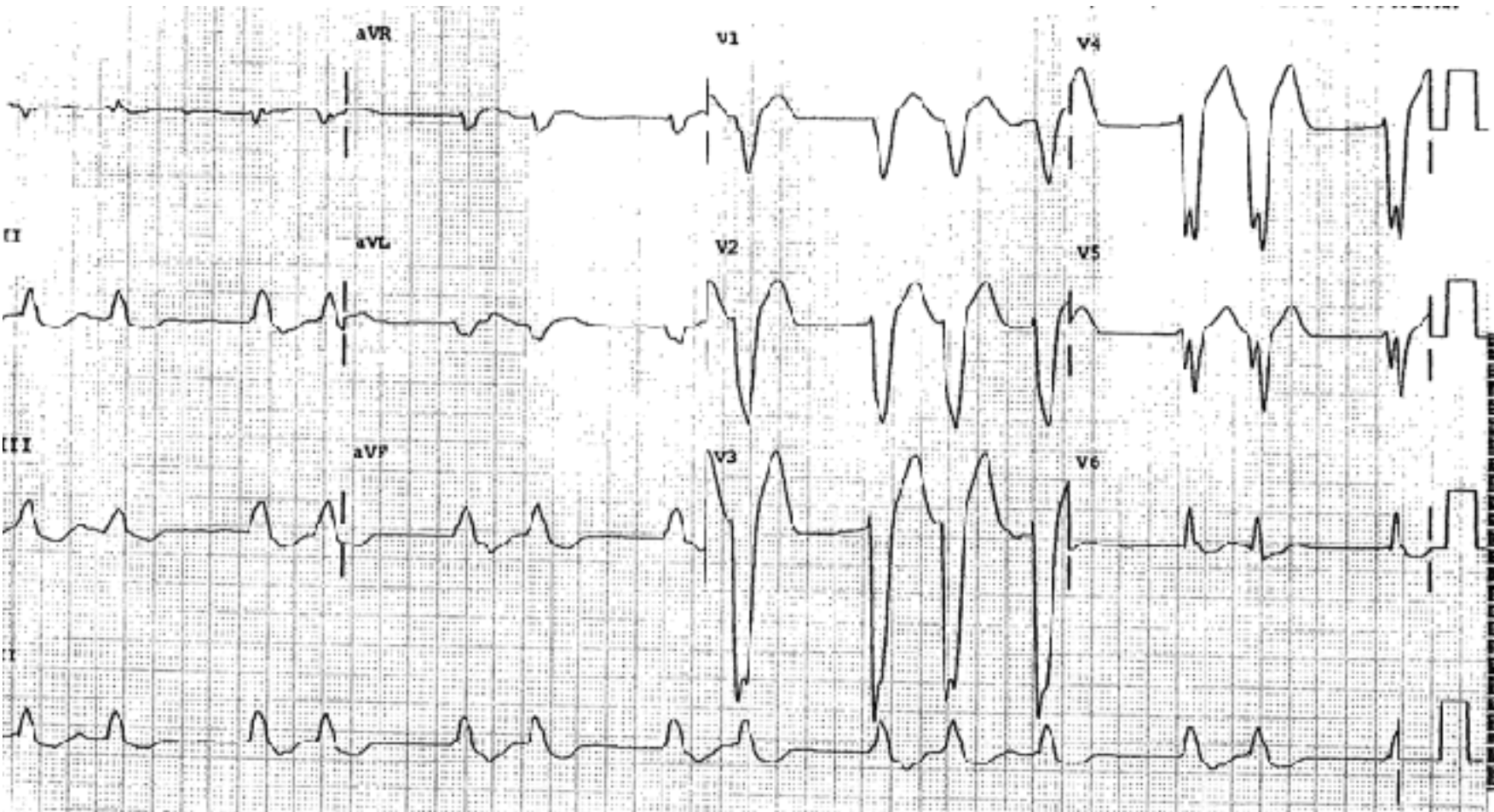


**Rhythm strip from the same patient earlier in same appt**

**EKG #12: 2° AVB Mobitz type 2, (p-waves causing QRS's but many p-waves that don't get conducted/have QRS's after) Pt got immediate transfer and pacer**

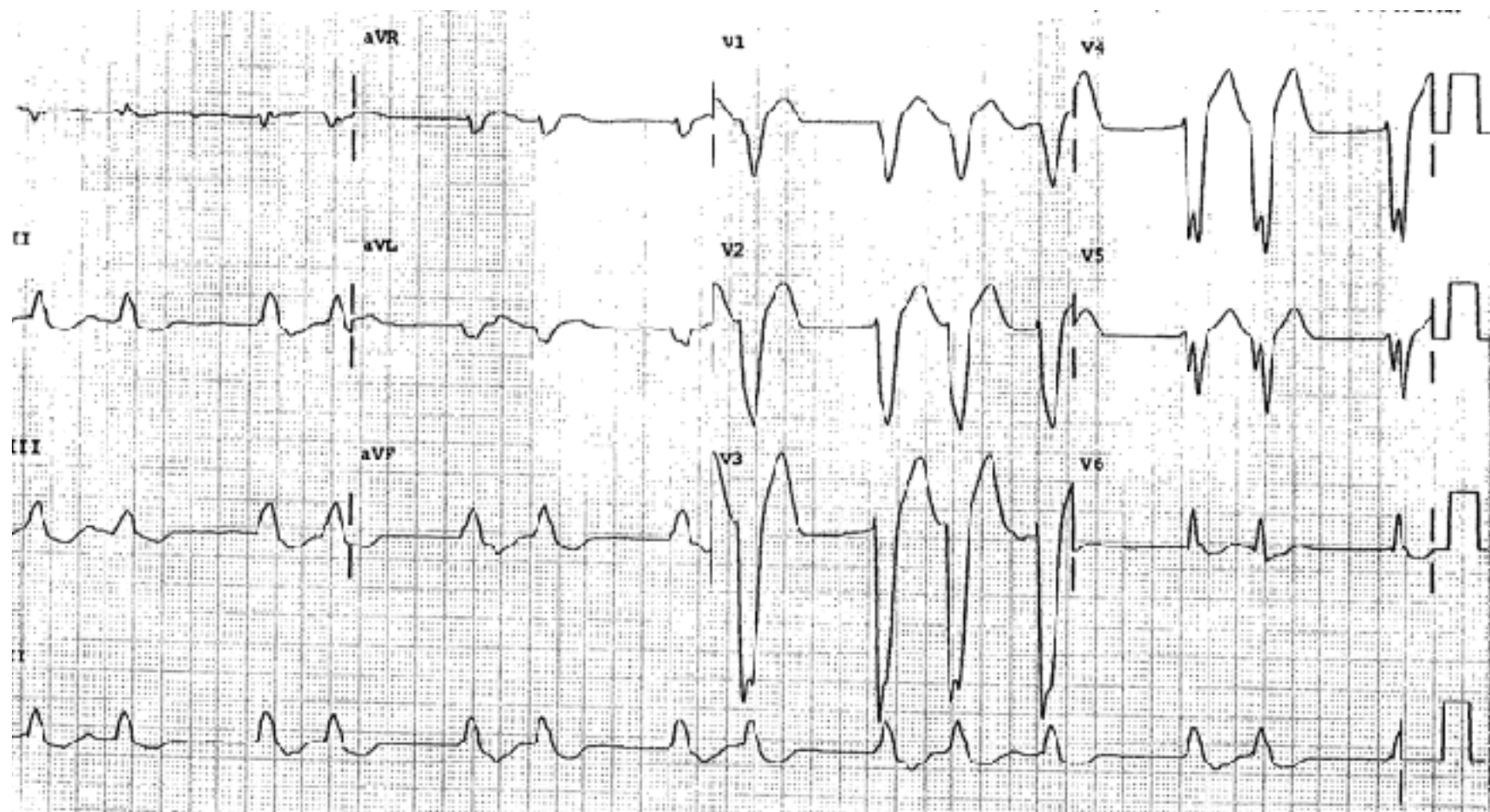


EKG #13



## EKG #13

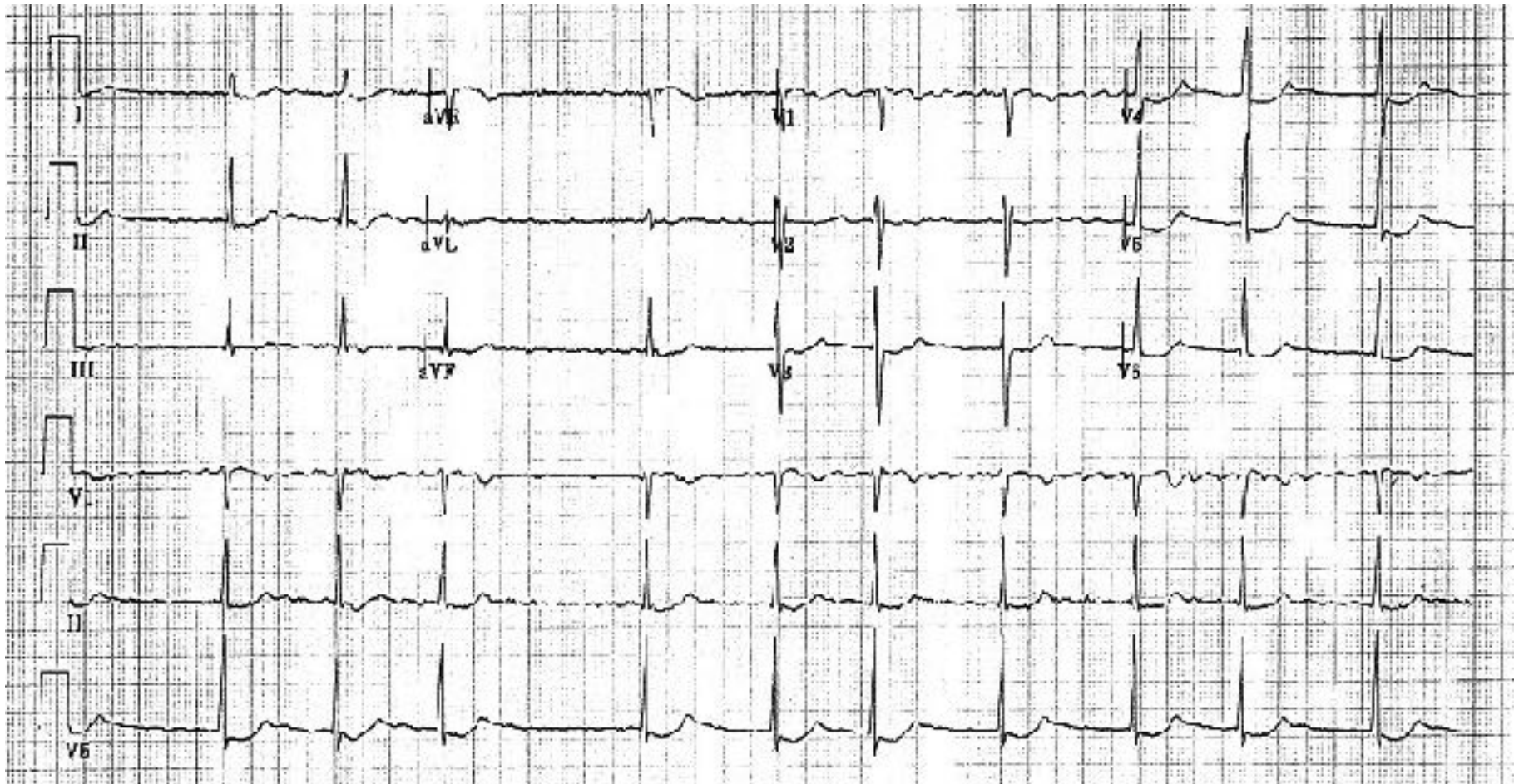
## Afib with LBBB



## EKG #15:

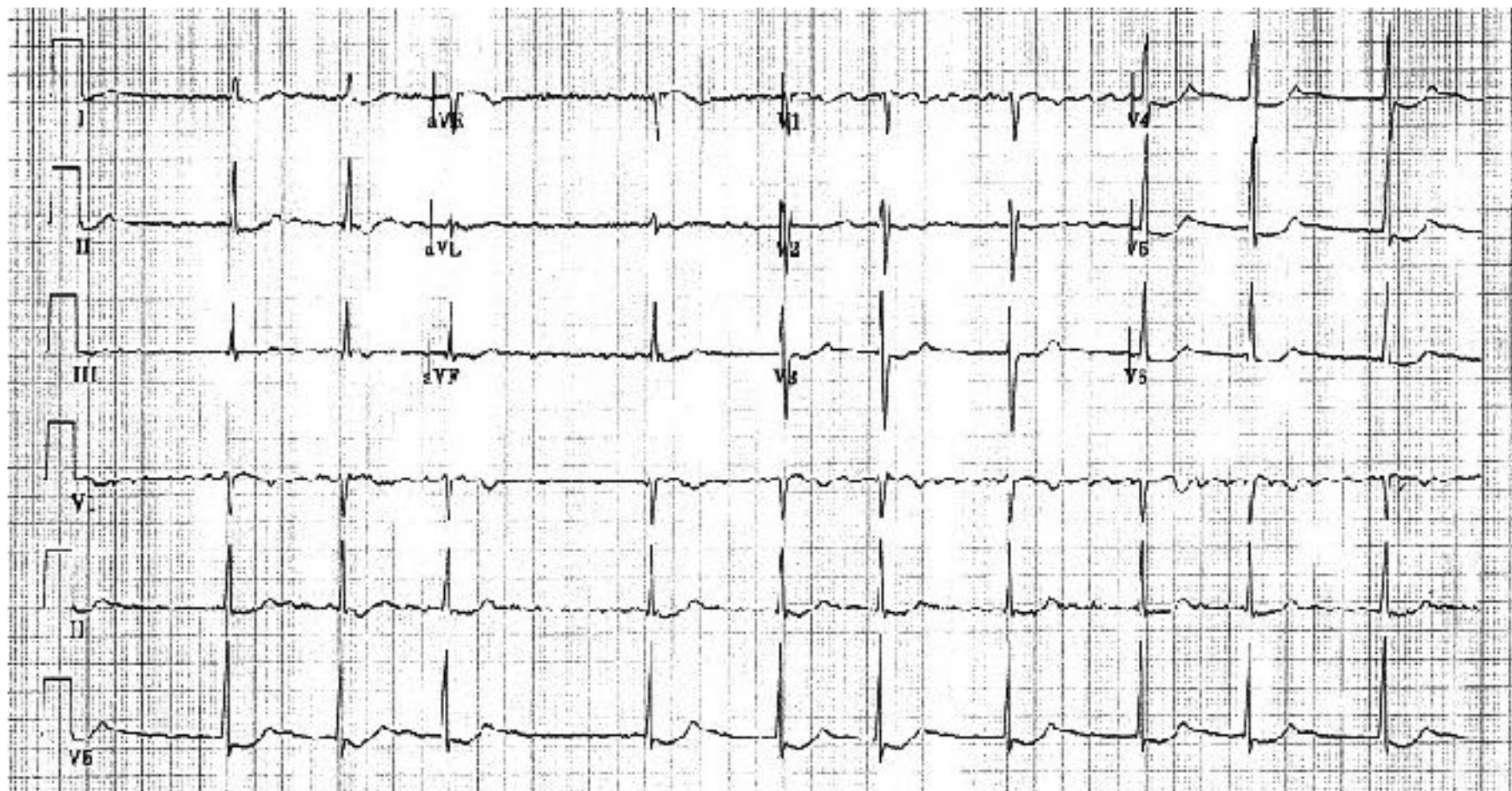
Rate

Rhythm: Reg vs Irreg vs Patterned Irreg



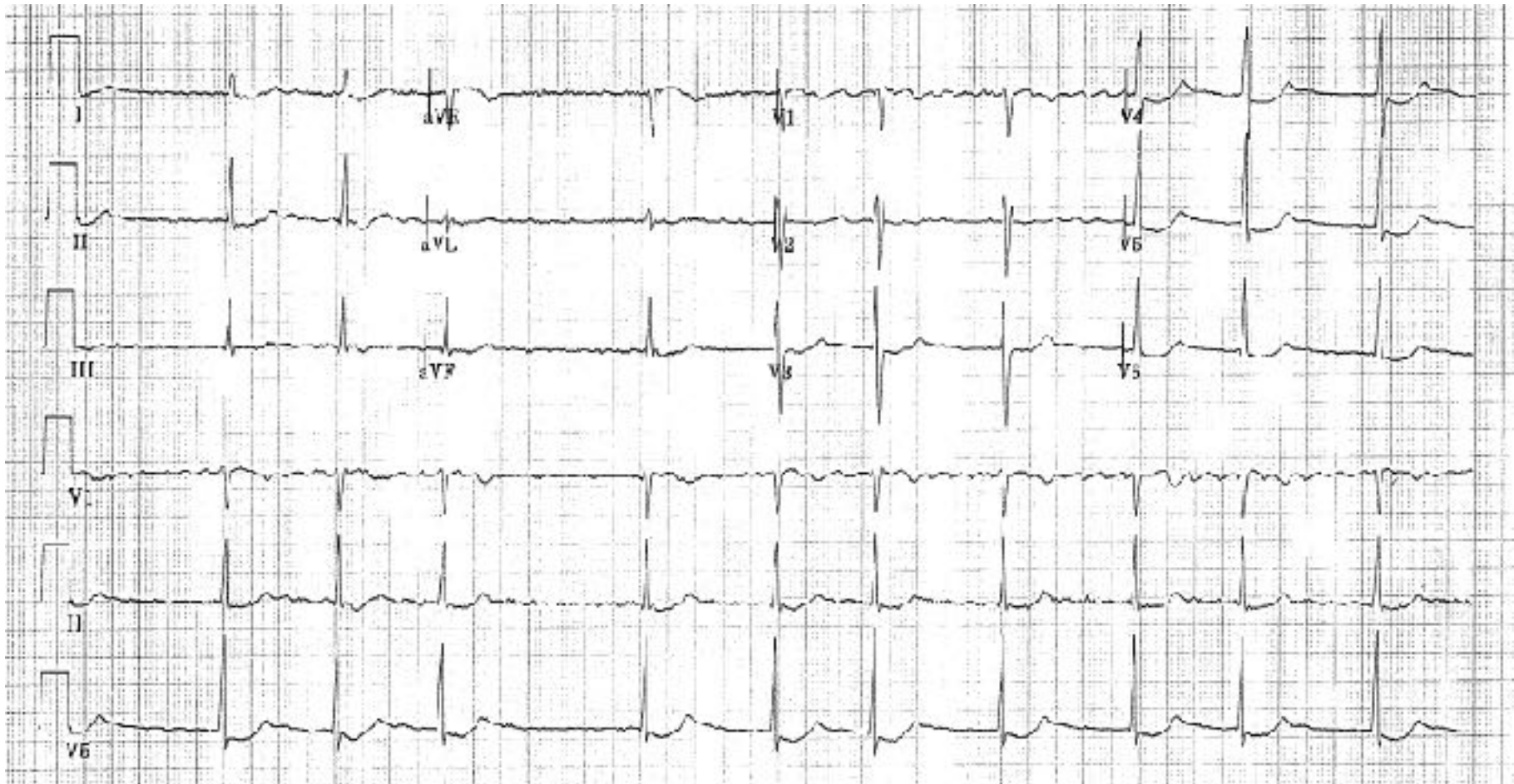
## EKG #15:

Irreg... now are there P waves?

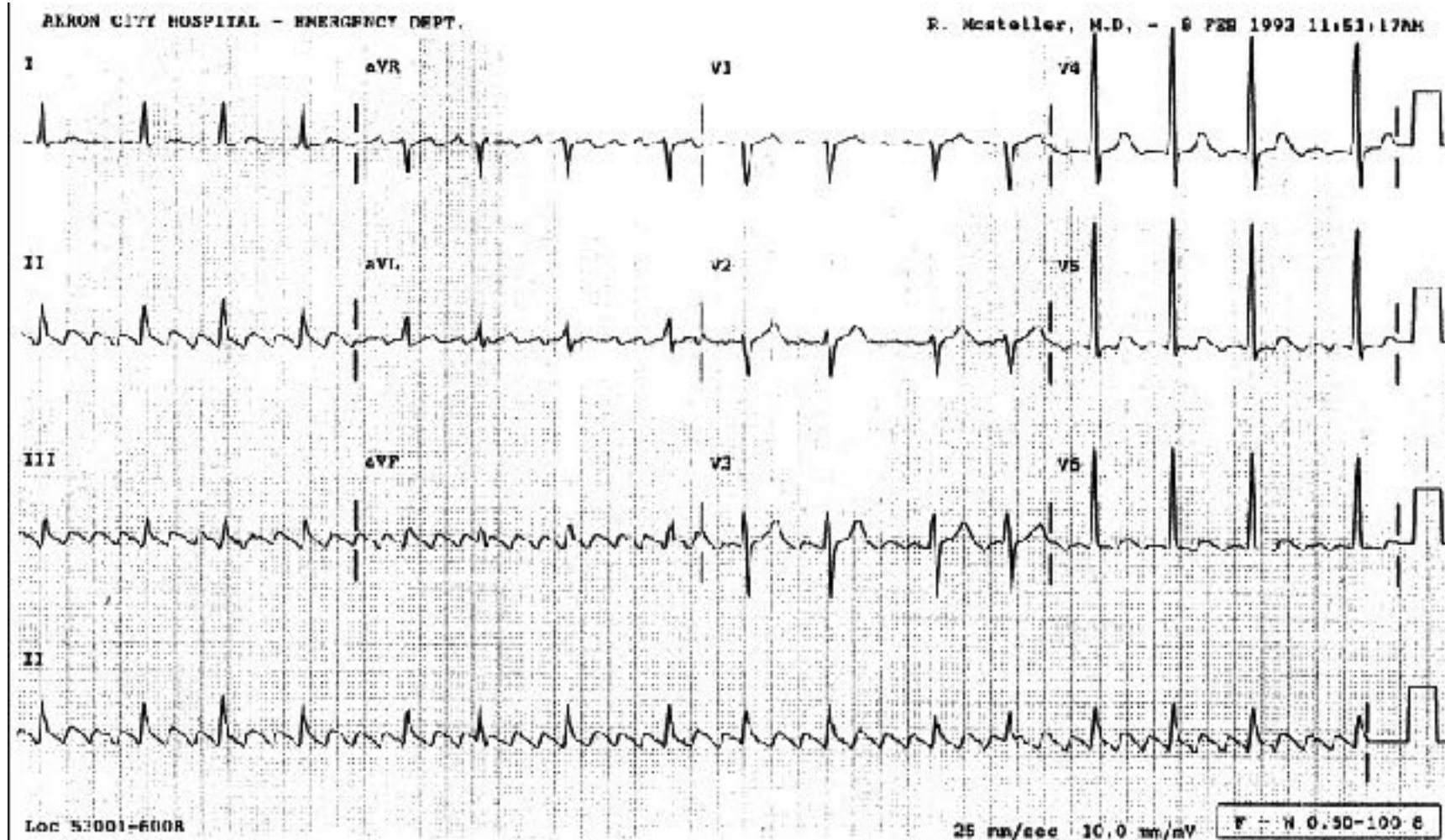


## EKG #15:

No p waves... that is atrial fibrillation

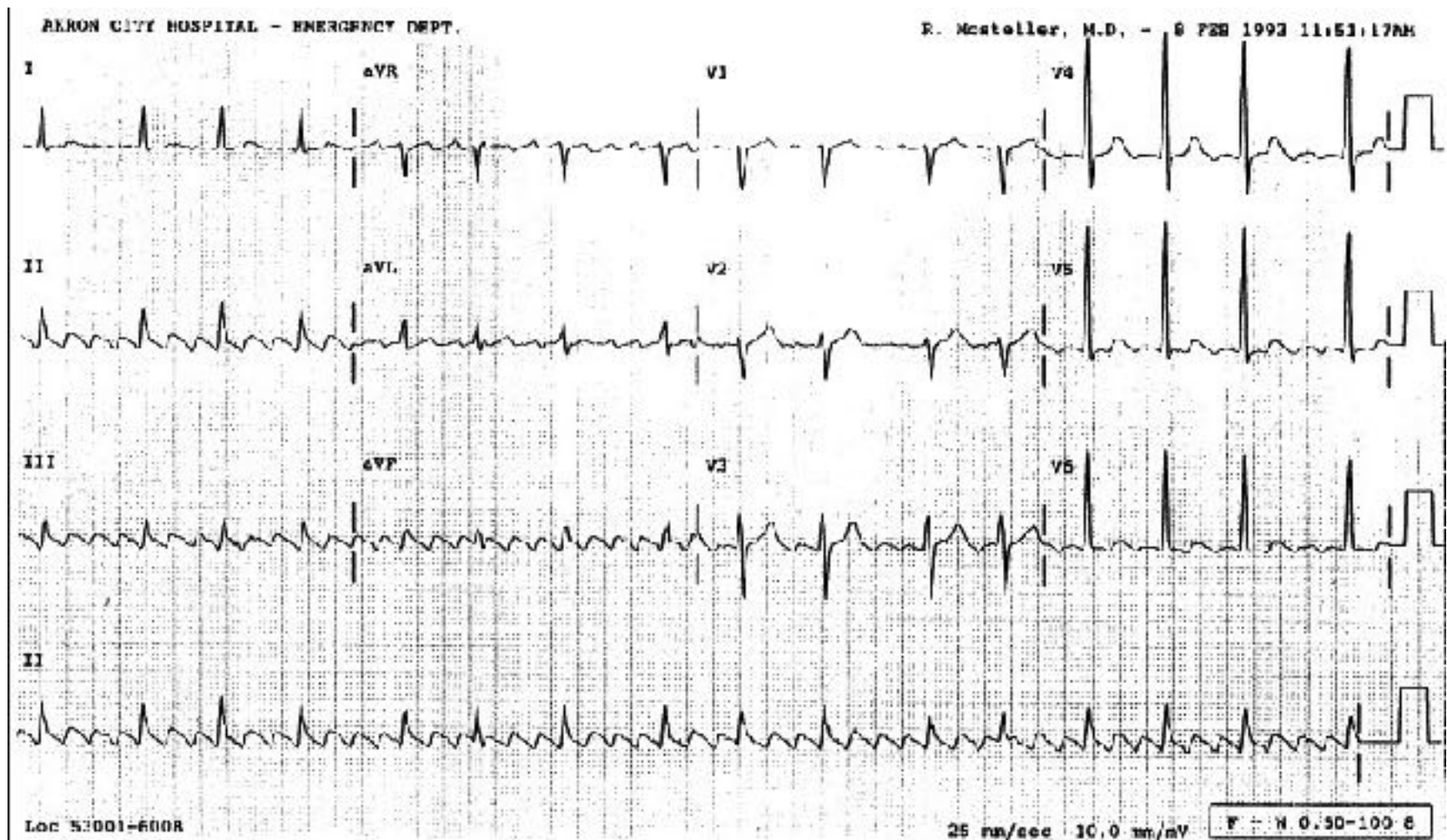


## EKG #16:



## EKG #16:

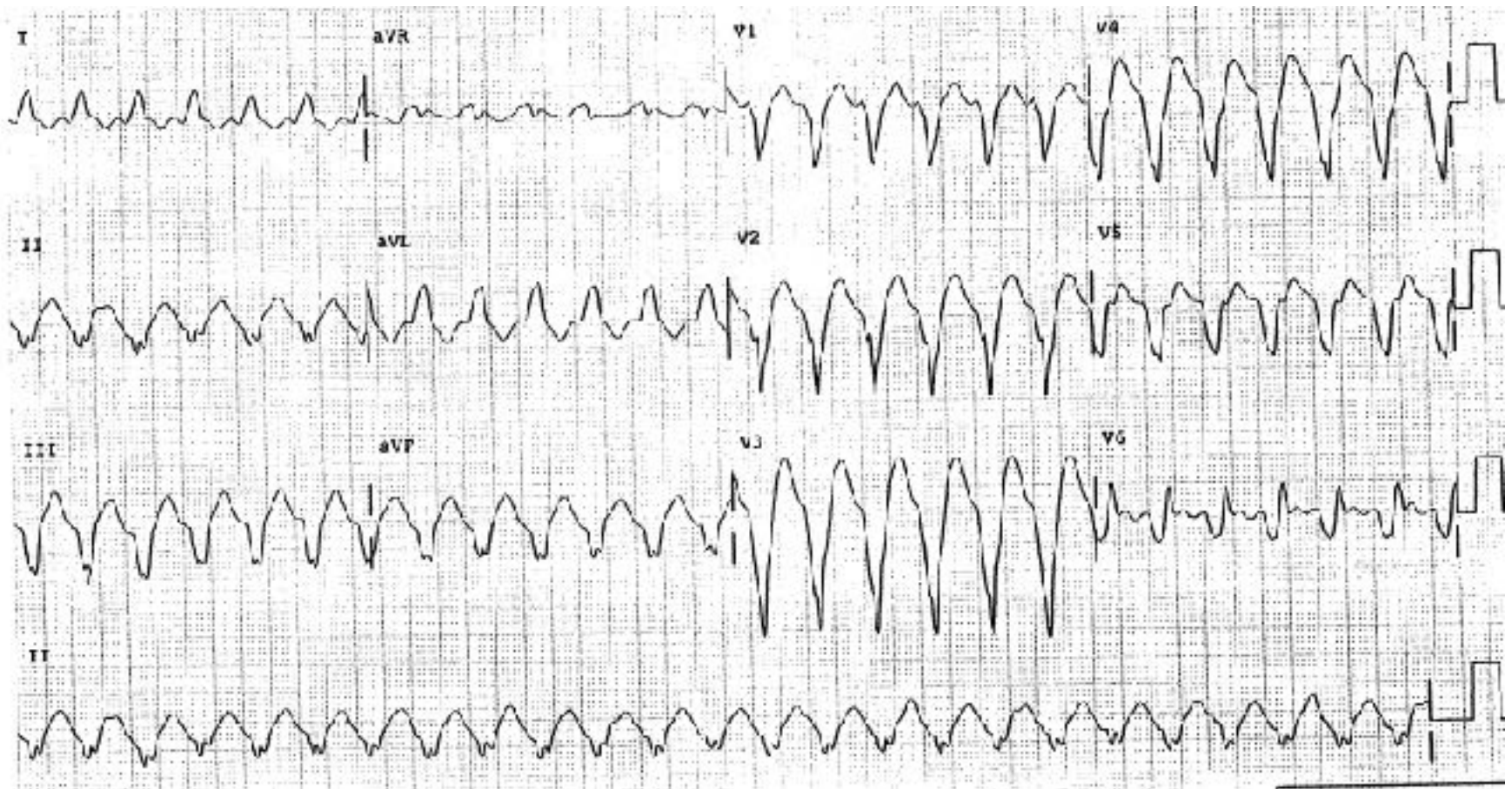
**Atrial Flutter with 3:1 conduction through AV node  
varying with 4:1 conduction**



## EKG #17:

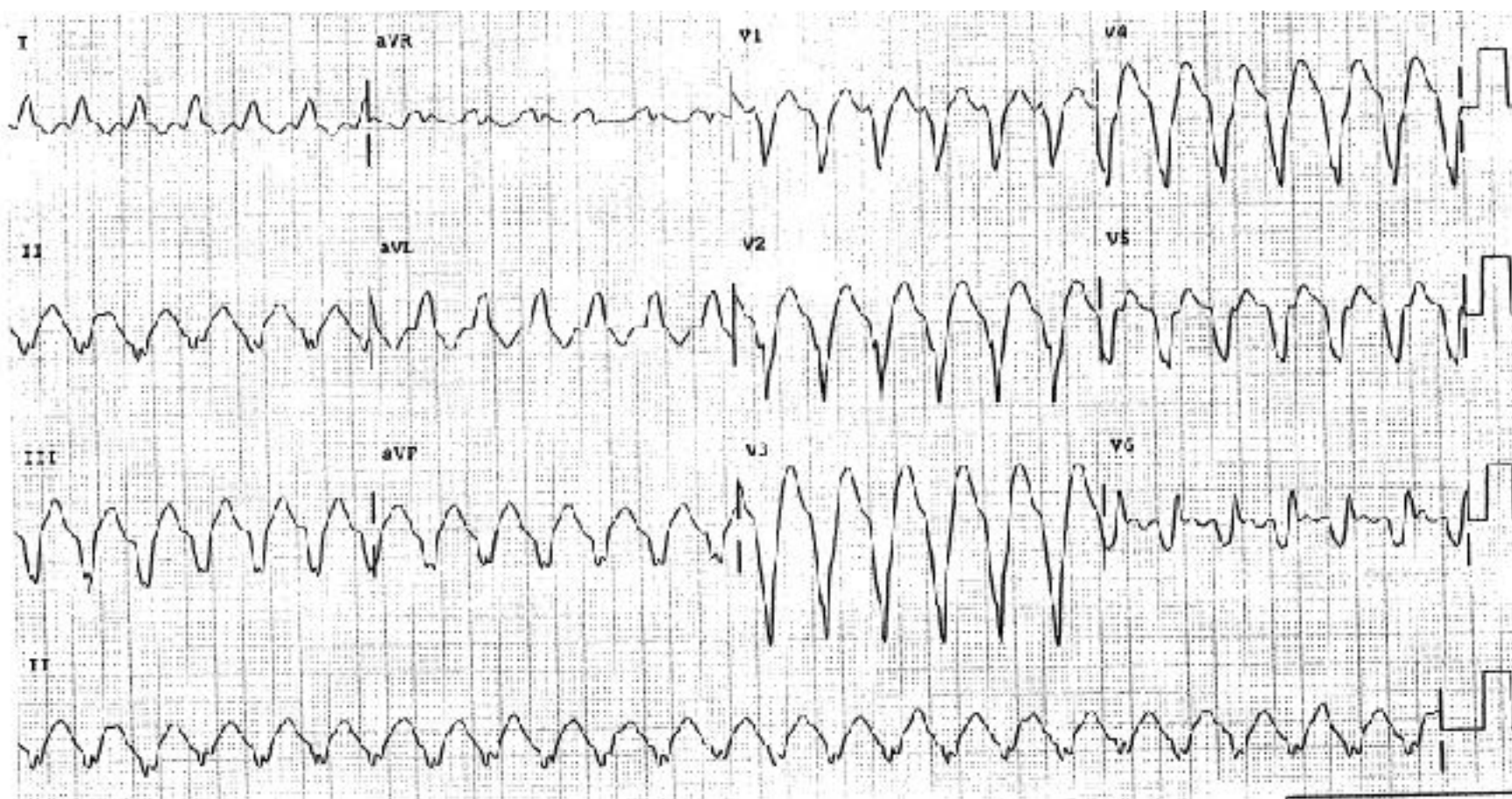
Rate... yes it is fast

Reg vs Irreg vs Patterned



**#17:**

**V- tach... someone get the crash cart!**



**Great job...keep practicing.**