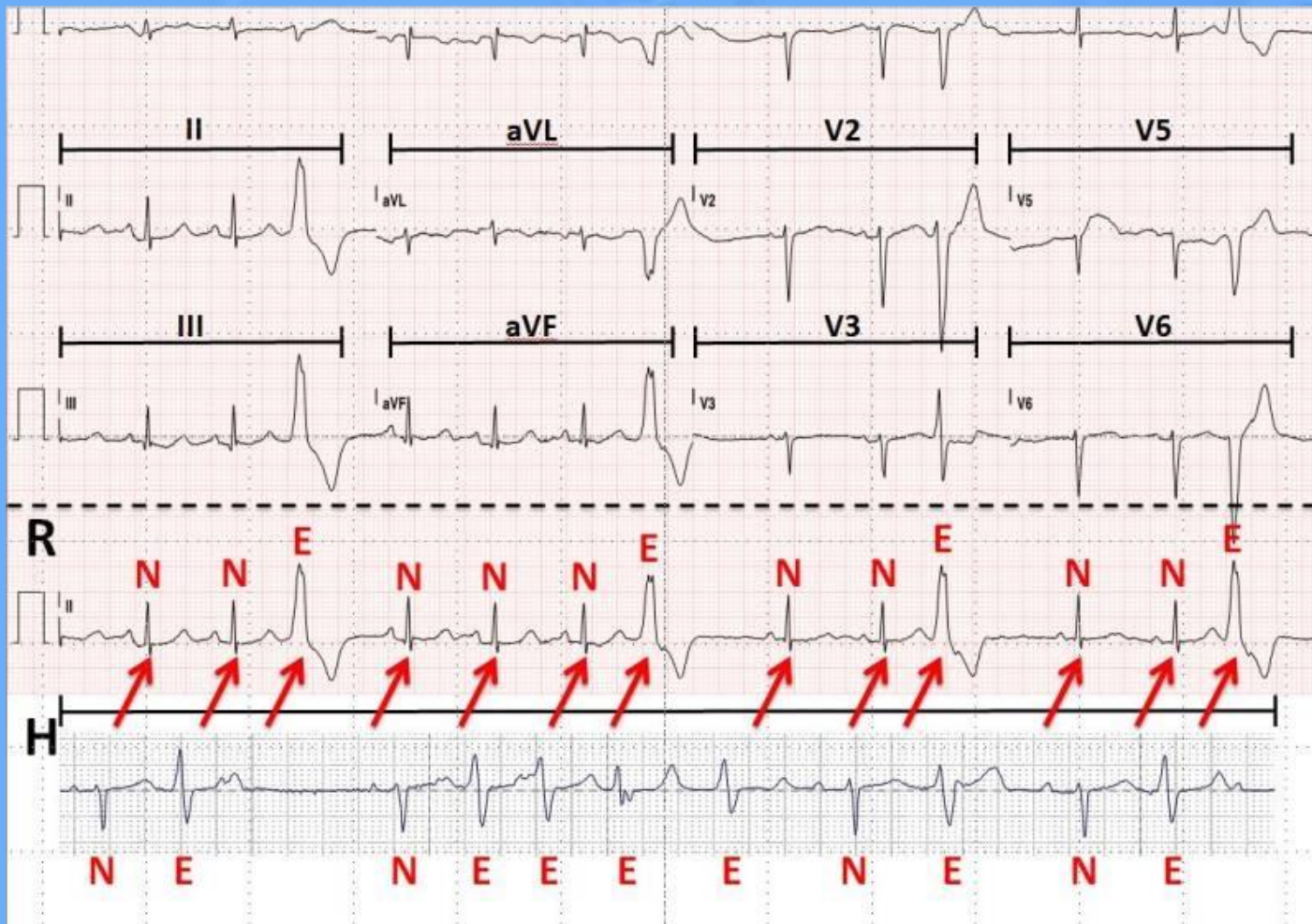


ECG LEER

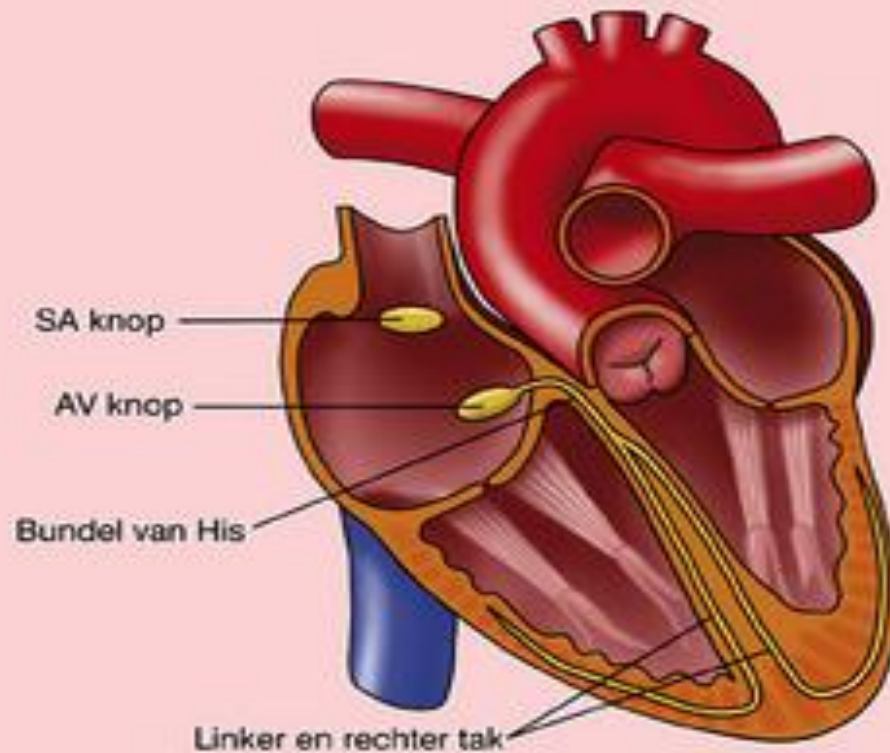
Prikkelvorming en prikkelgeleiding



Lesopbouw

- Geleidingssysteem
- Actiepotentiaal
- QRS complex
- ECG afleidingen/12 kanaals ECG
- Sinusritme
- Ritme en geleidingsstoornissen
- Ischaemie en coronairen

Geleidingssysteem



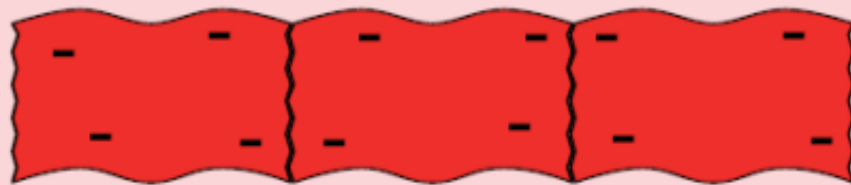
Het geleidingssysteem zorgt voor de verspreiding van het elektrische signaal door het hart

Enkele termen

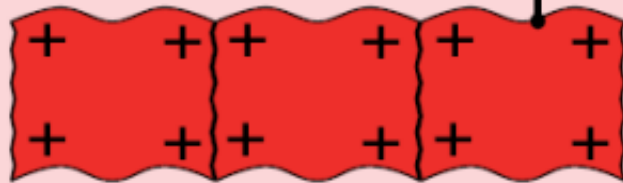
- **Depolarisatie**
- **Repolarisatie**
- **Absolute refractaire periode**
- **Relatief refractaire periode**

Actiepotentiaal

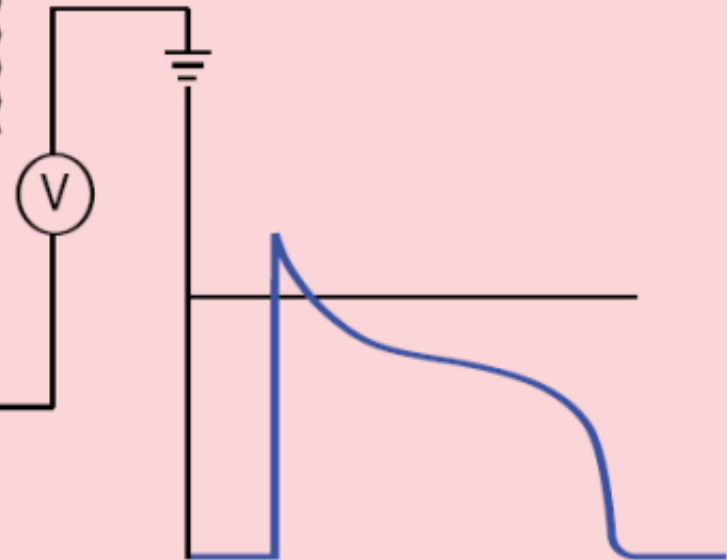
(elektrolyten stroom na-k-ca)



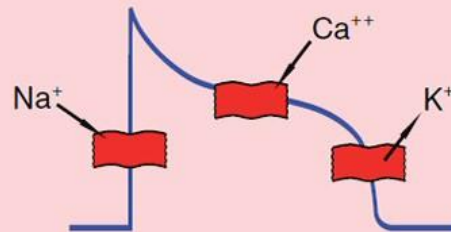
Hartcellen zijn in rust negatief geladen



Tijdens contractie verandert de lading

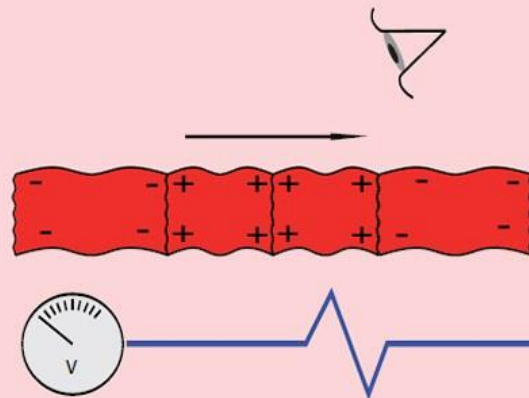


(elektrolyten stroom na-k-ca)



De lading verandering zorgt voor ion stromen over de hartcelwand.

Eerst Na^+ stromen naar binnen, dan Ca^{++} en daarna K^+ naar buiten



Signaal naar je toe is positieve uitslag

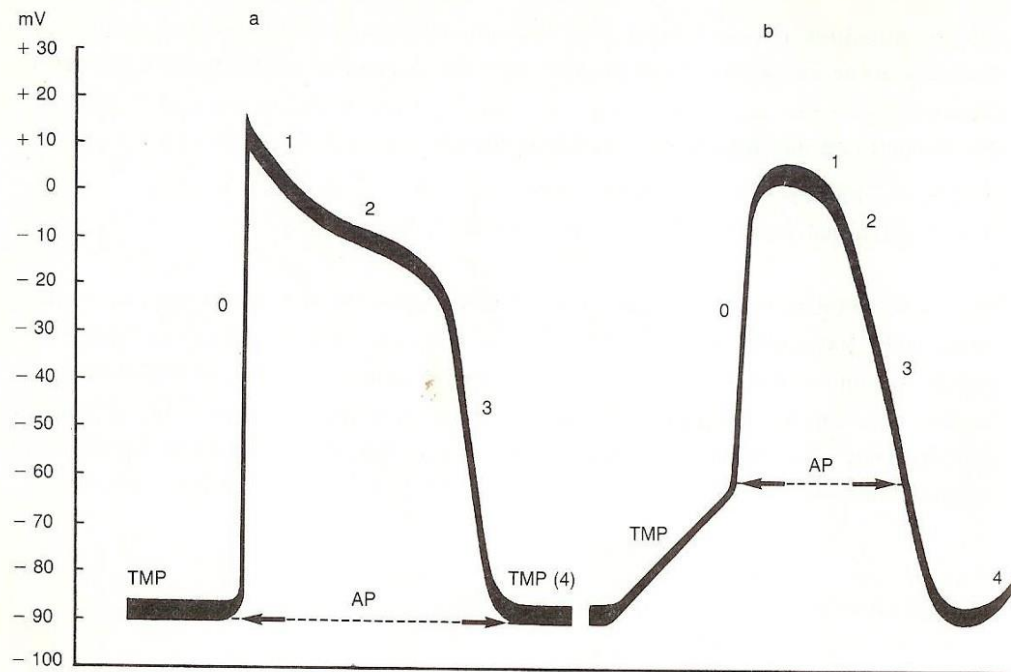
- Calcium stroomt in 2e instantie de cel in en veroorzaakt in 2e instantie de fase 2 (plateaufase) in de actiepotentiaal.
- hartspiercellen ontladen en herladen continue. Ontladen wordt depolarisatie genoemd en herladen repolarisatie. Het depolariseren en repolariseren gebeurt onder invloed van het uitwisselen van natrium en kalium over het celmembraam. Dit wordt de natrium/kalium pomp genoemd. Hartspiercellen zijn in rust negatief geladen. Door natrium/kalium uitwisseling worden de cellen meer positief tot een bepaald moment, dan “ontladen” de cellen zich als het waren (depolarisatie) Na de ontlading volgt een plateufase waarna de cellen weer terug gaan naar het originele negatief geladen begin. Dan begint het opladen weer tot het moment van ontladen.
- de myocardcel is in repolarisatie negatief geladen en wordt bij depolarisatie positief

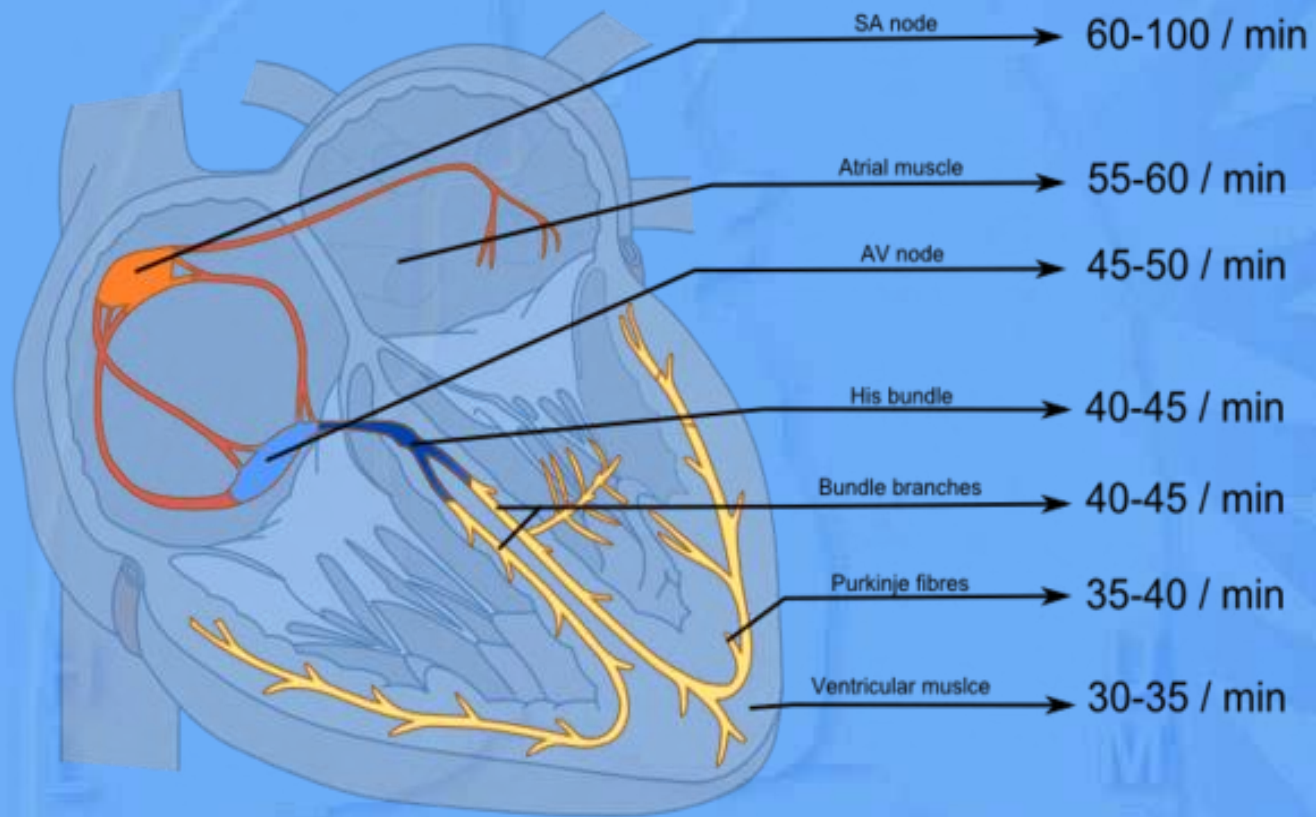
Depolarisatie

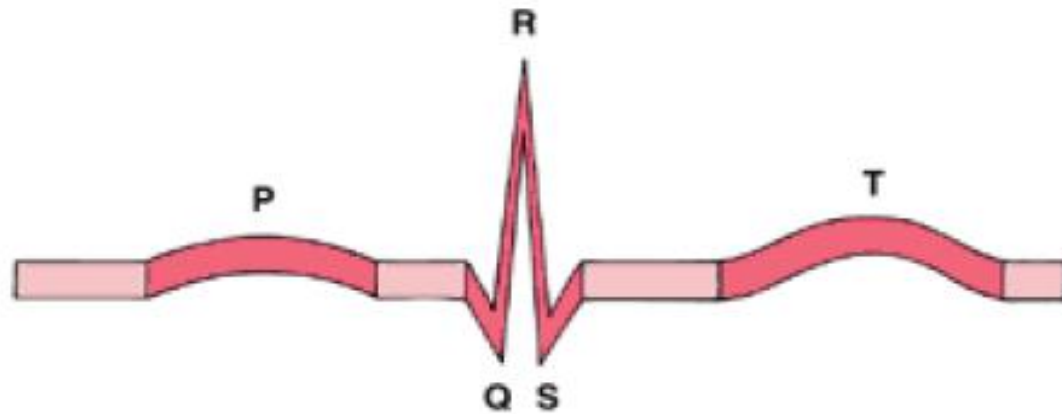
- **Depolarisatie gewone hartspiercel:
op commando**
- **Depolarisatie pacemakercel:
automatisch
(sinus/av-knoop/bundeltakken)**

Actiepotentiaal

Figuur 5







P-top

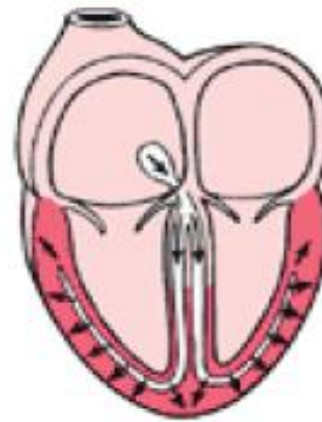
QRS complex

T top

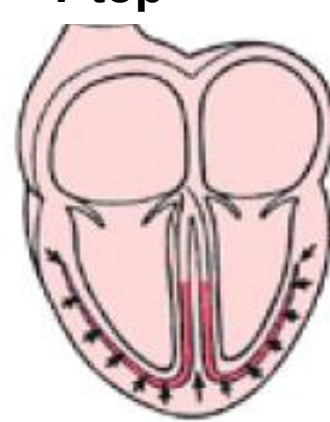


Ac

Activatie boezems



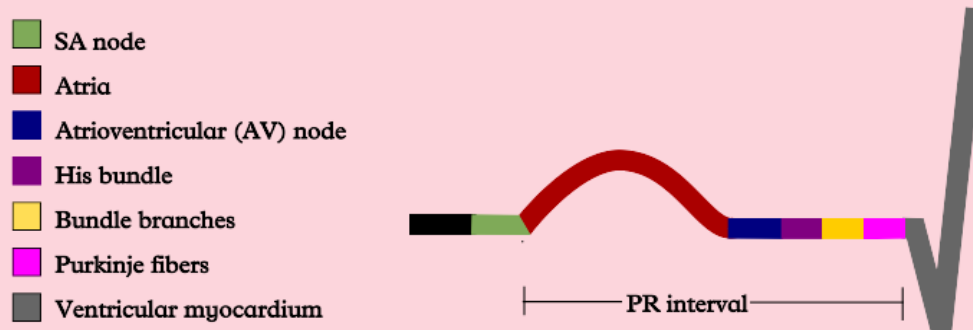
Activatie kamers



Herstel kamers

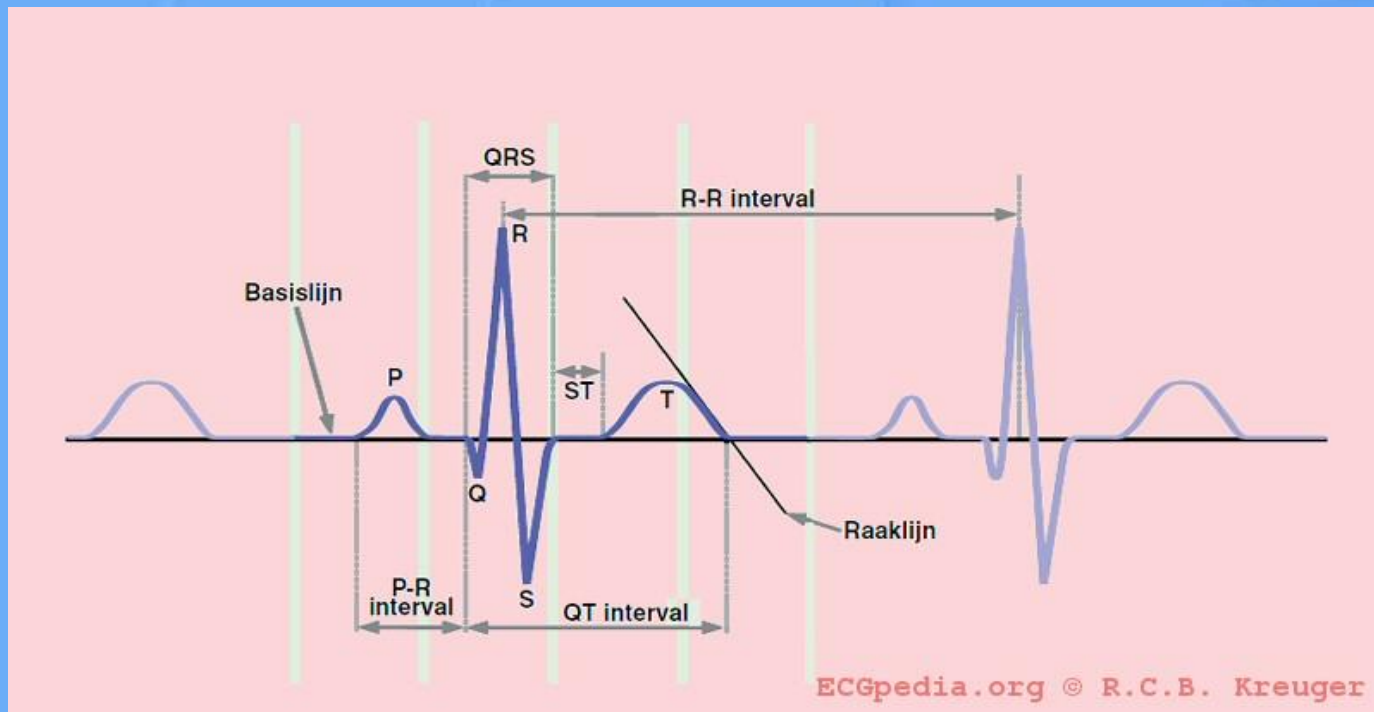
PQ tijd (activatie v.d. boezems)

- Normale PQ tijd 0,12 – 0,20 sec.
- Vanaf begin p-top tot begin QRS



QRS complex.

- Activatie van de kamers.
- 0,07 - 0,12 sec.
- septum/apex/rest



Geleidingsnelheid

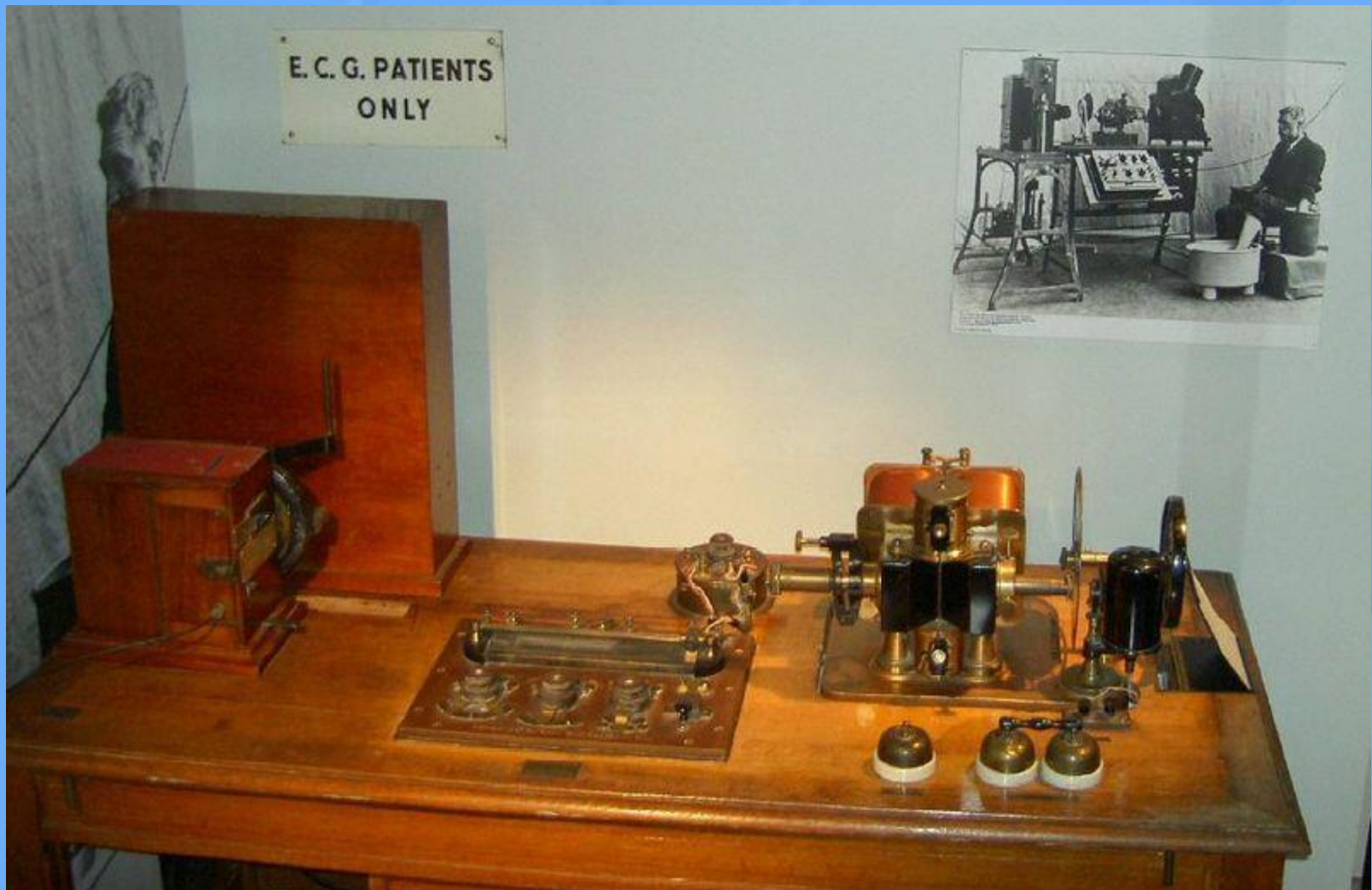
- Geleidingsweefsel; snelheid met 2-4 m/sec.

snel → smal complex

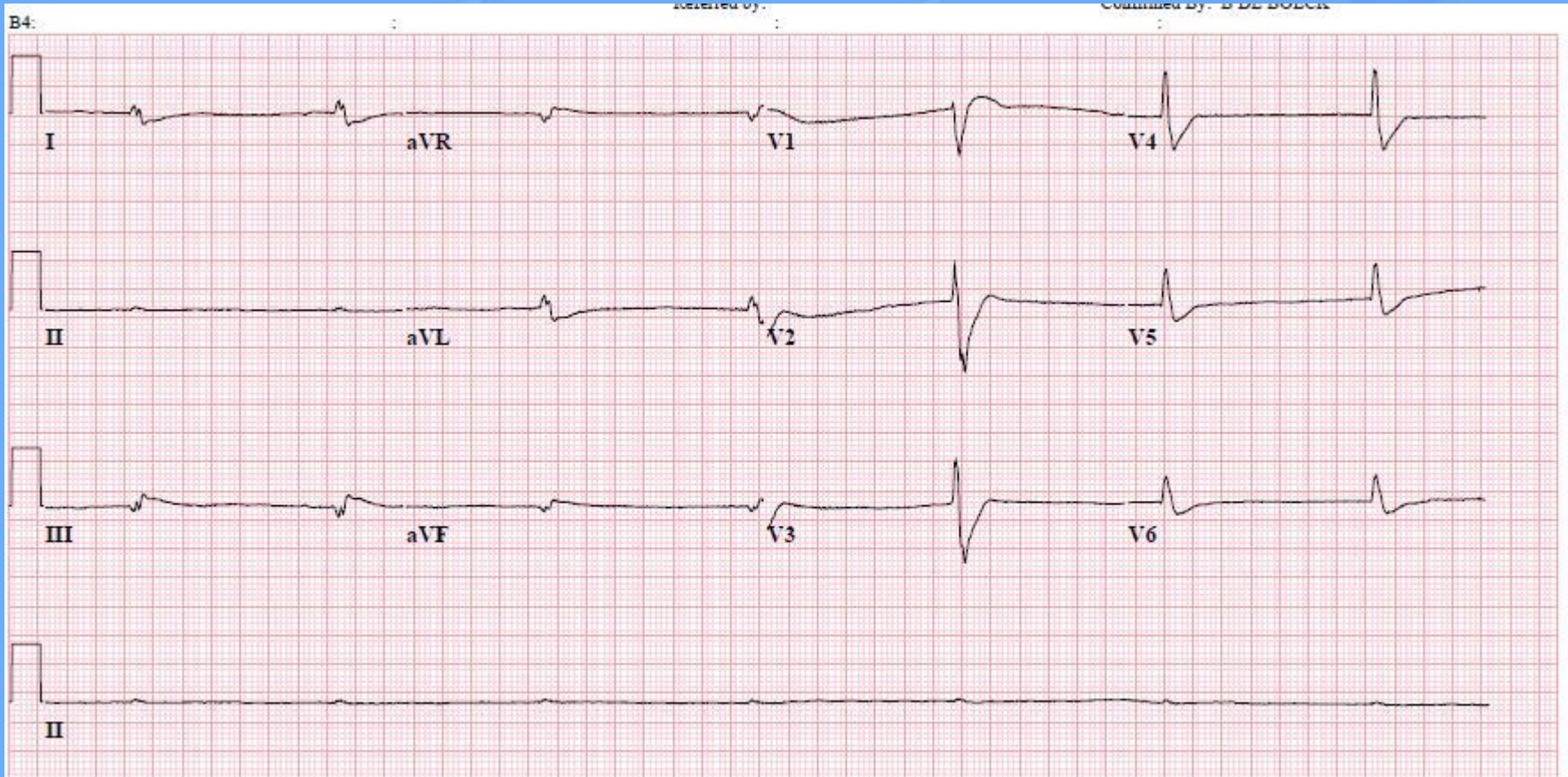
- Andere myocardcellen; 0,5 m/sec.

traag → breed complex

Het 12 kanaals ECG

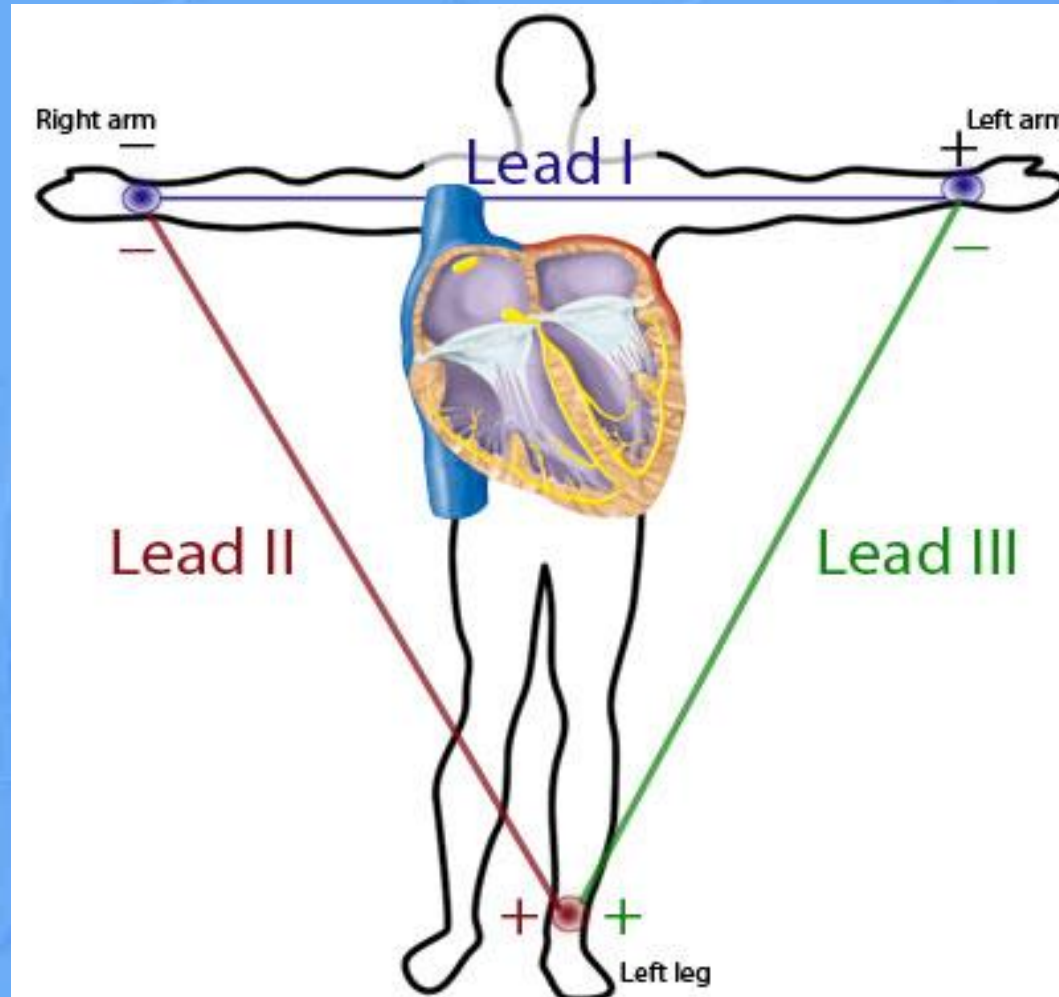


Waarom een ECG?

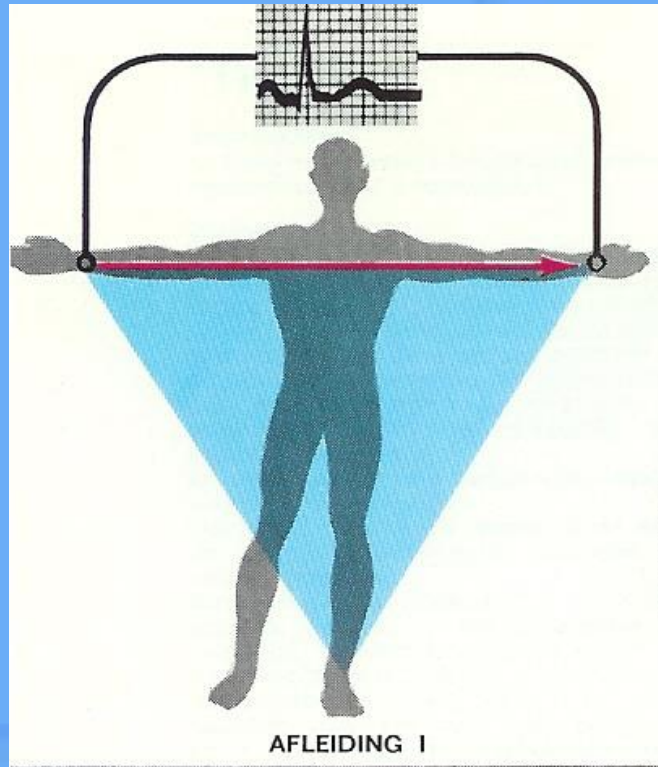


Driehoek van Einthoven (1905)

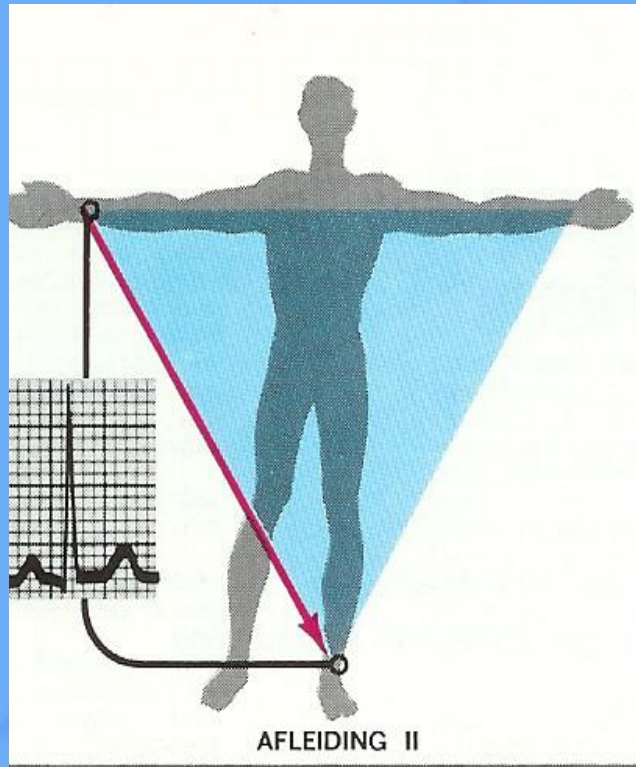
extremiteitsafleidingen



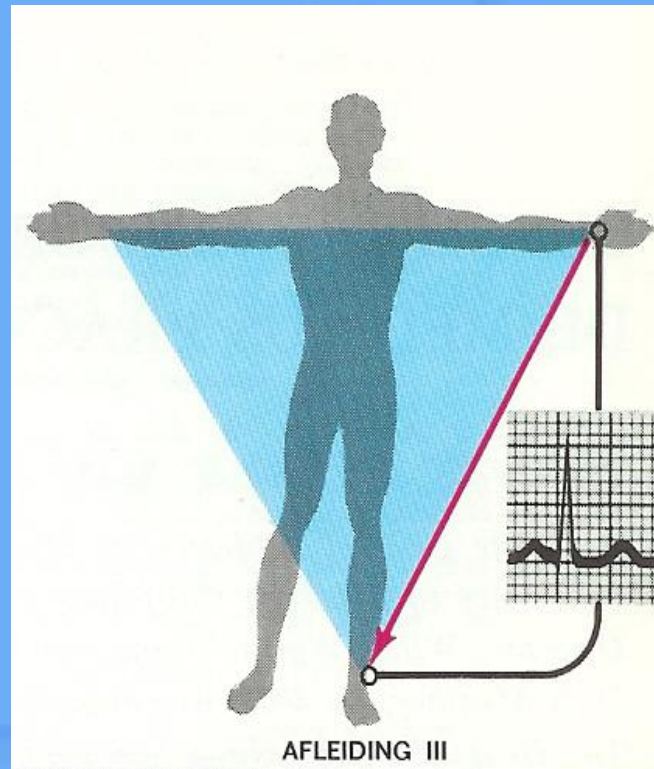
Afleiding 1



Afleiding 2

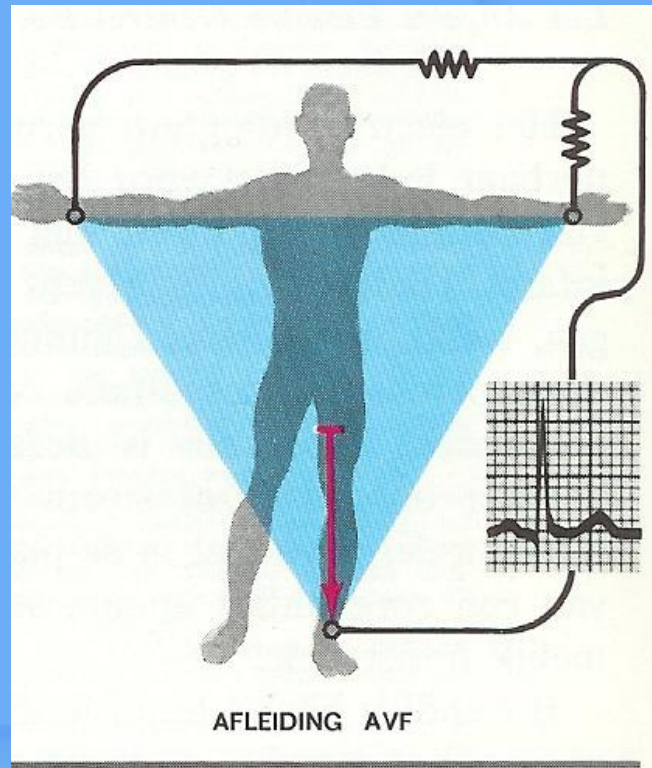


Afleiding 3



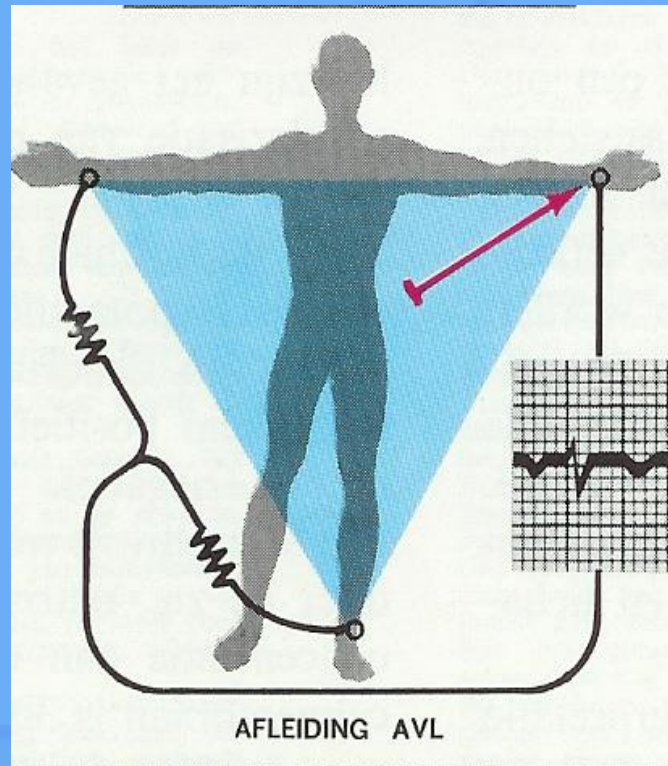
Afleiding AVF

(afgeleide afleiding)



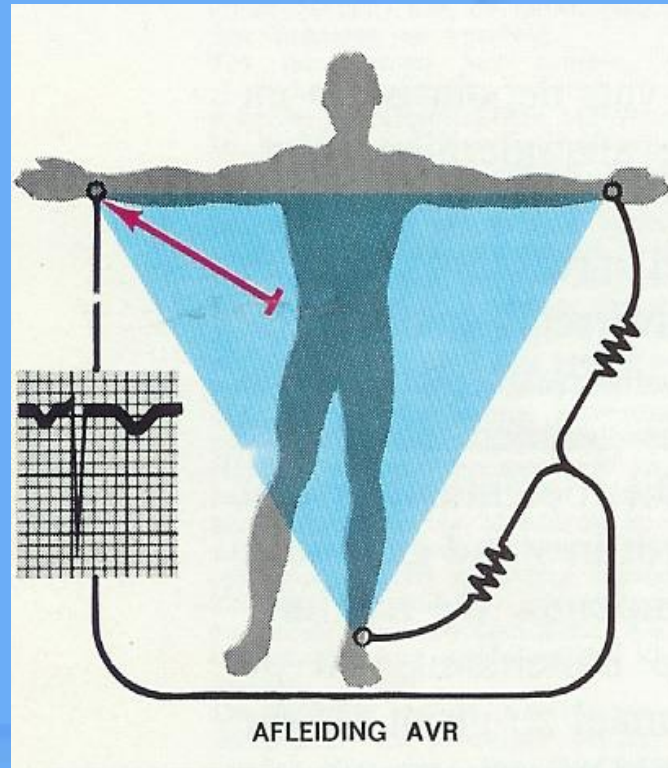
Afleiding AVL

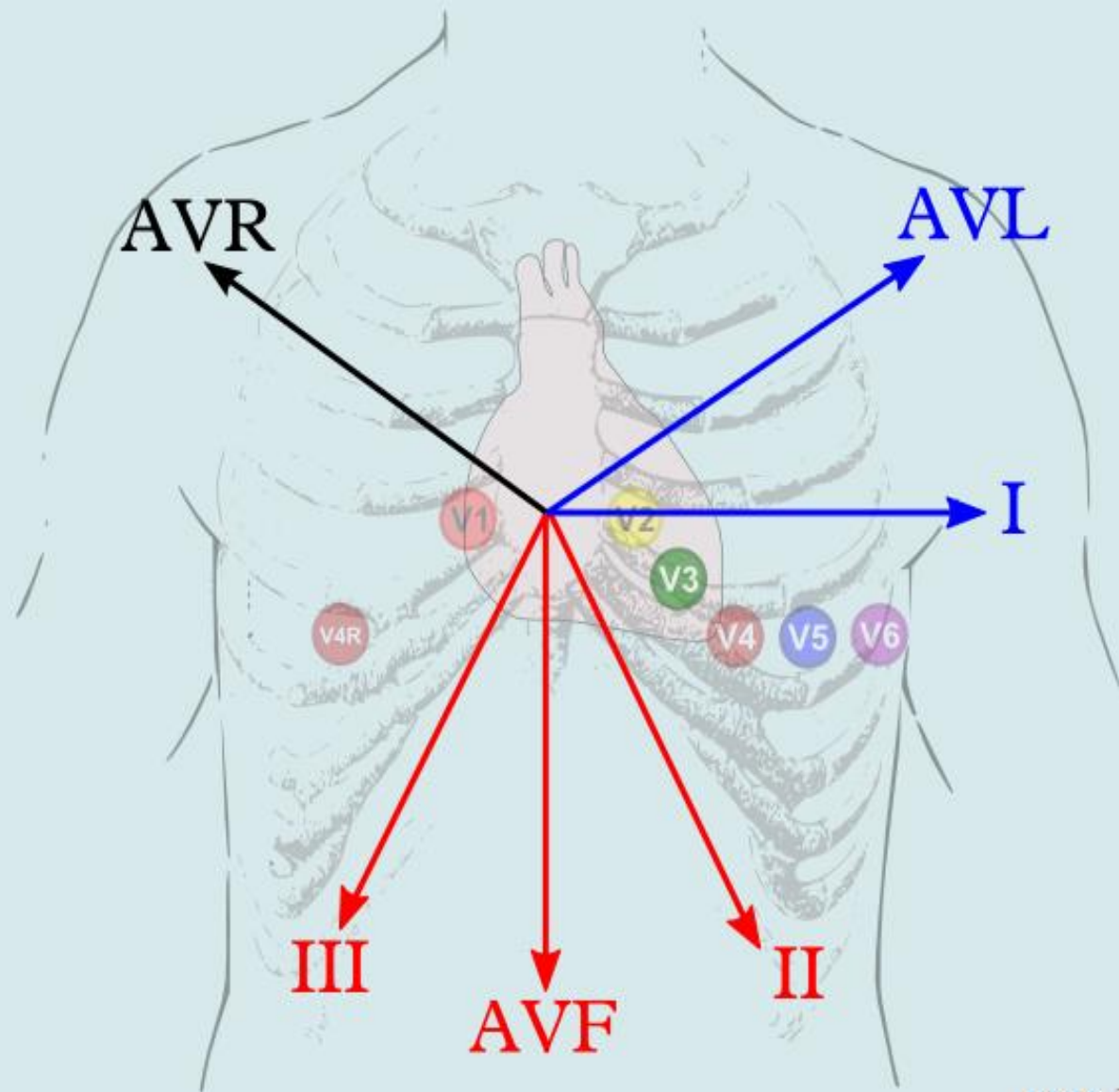
(afgeleide afleiding)

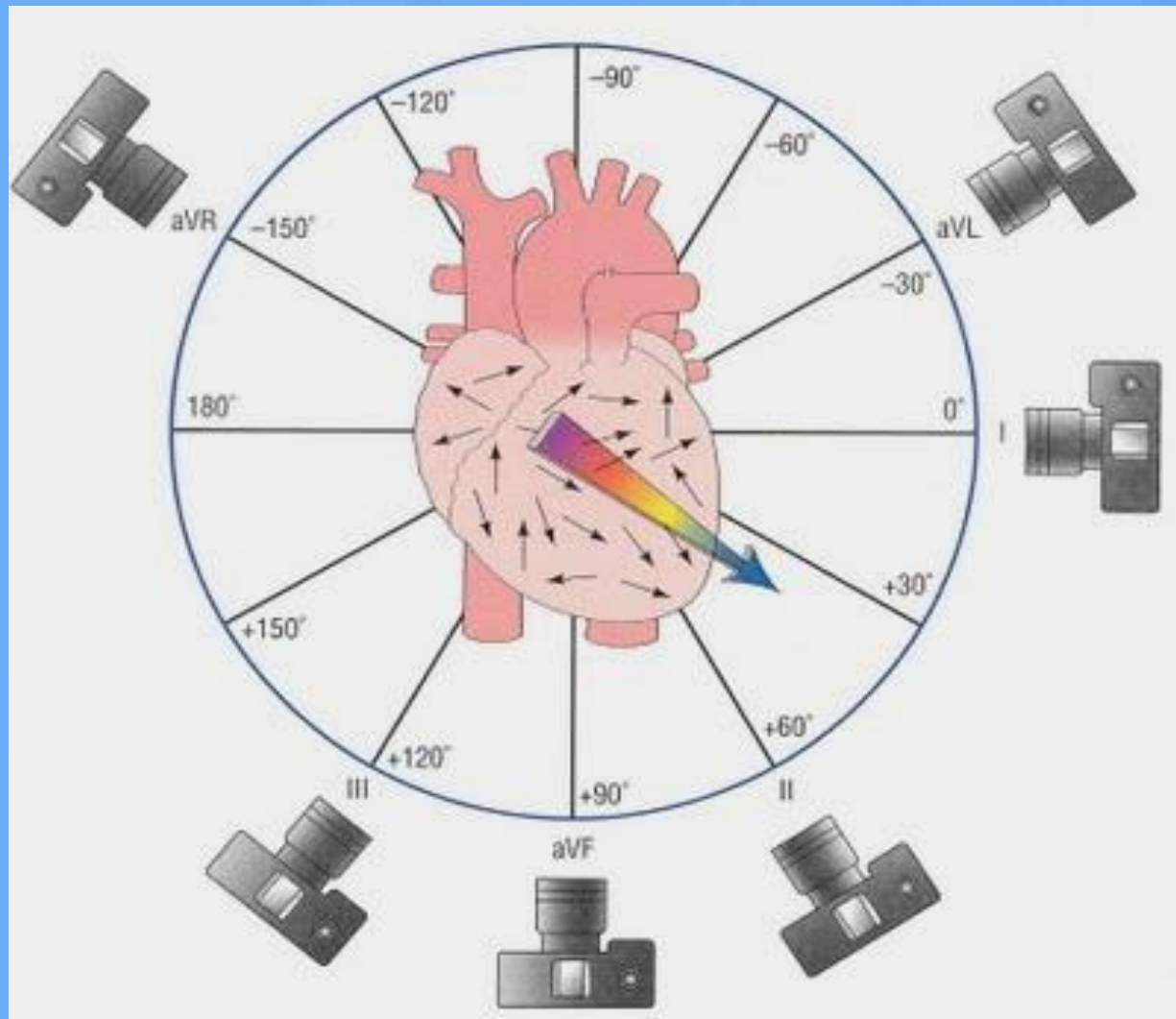


Afleiding AVR

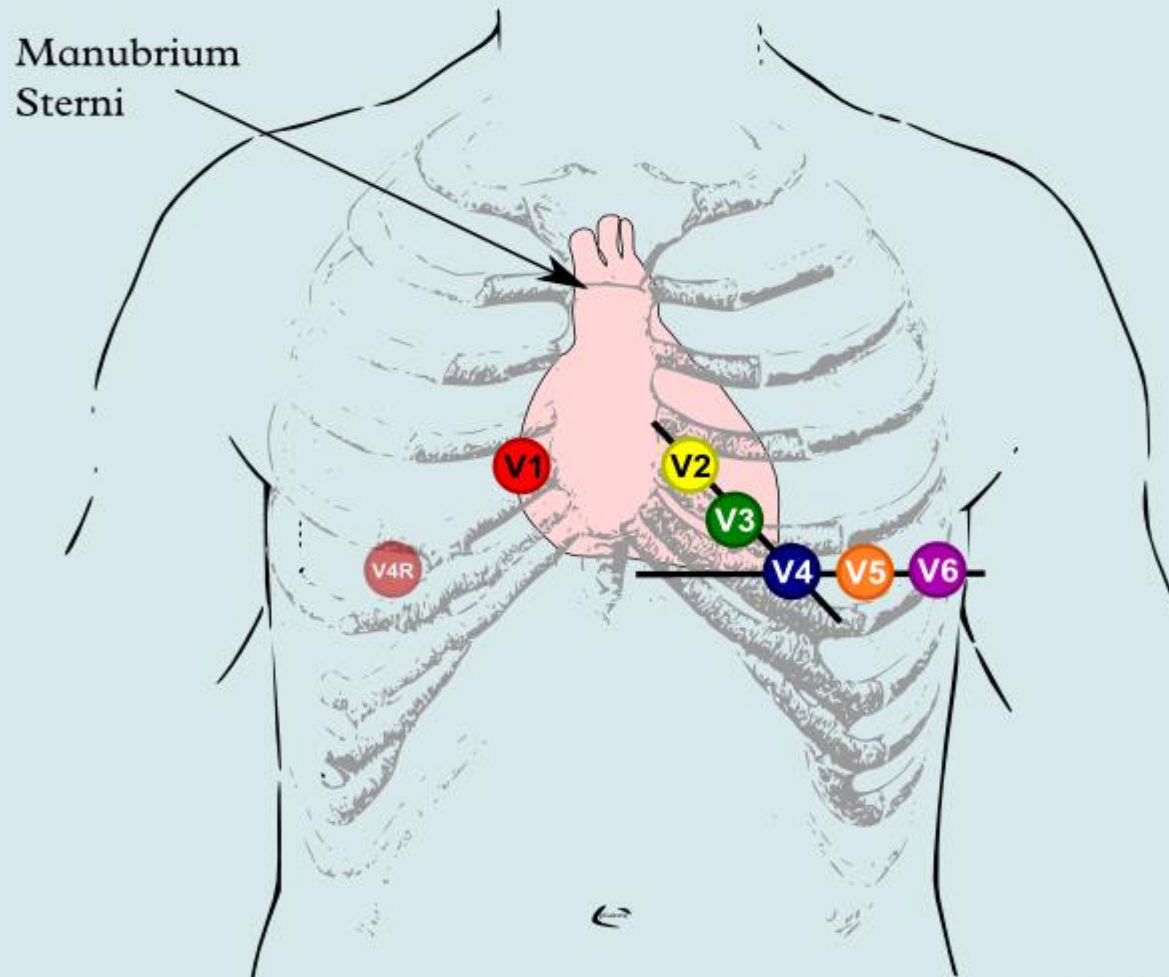
(afgeleide afleiding)



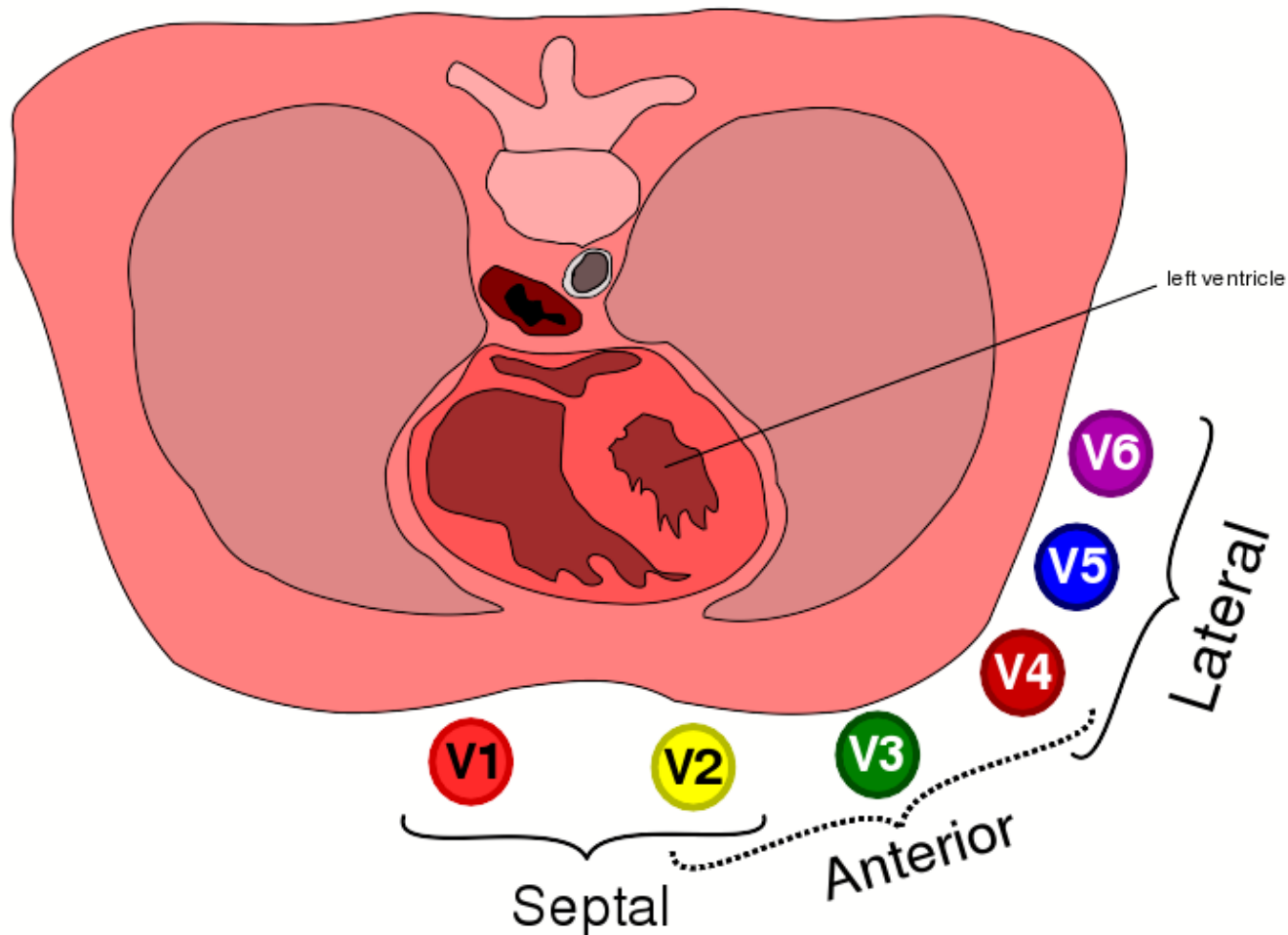




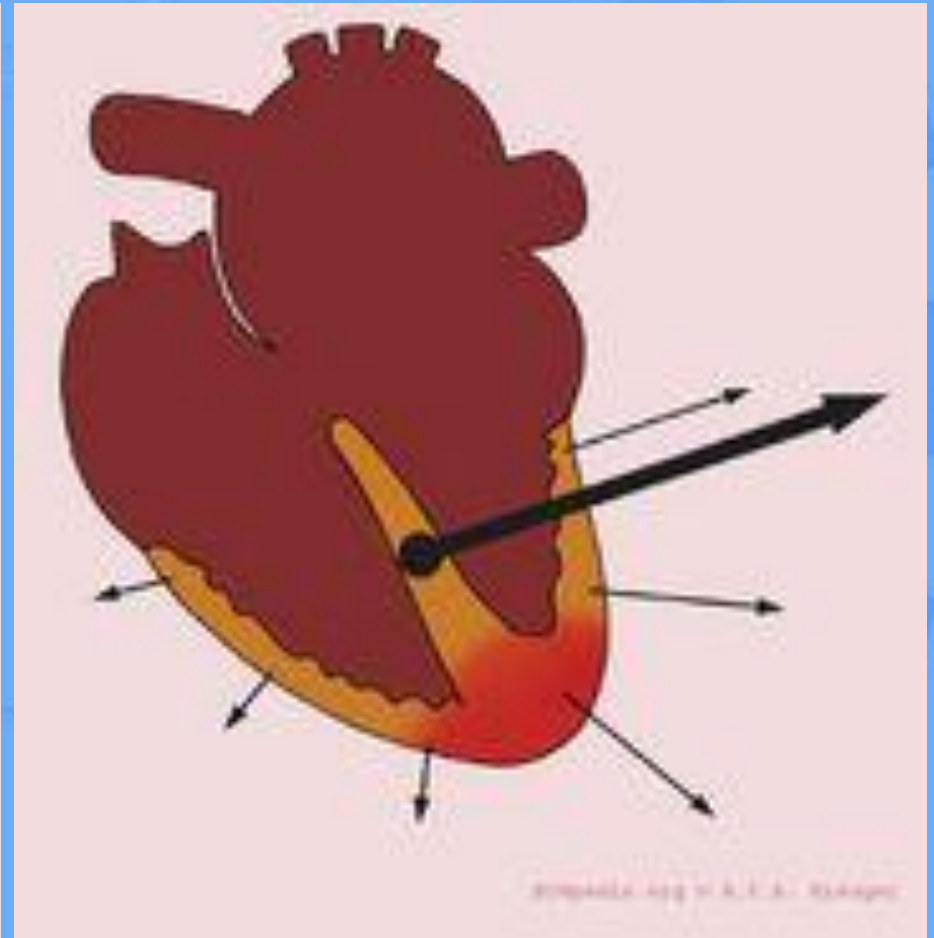
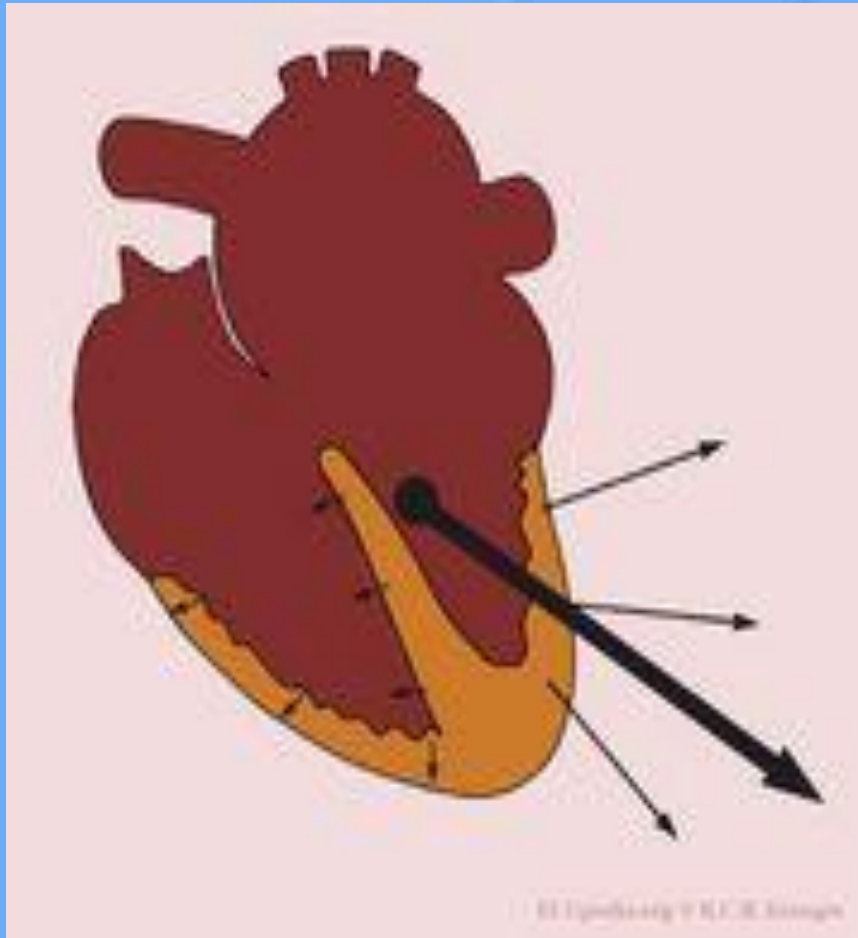
De voorwandsafleidingen



De voorwandsafleidingen



Electrische hartas





04-AUG-1941 (64 yr)
Male

Vent. rate	68	BPM
PR interval	190	ms
QRS duration	94	ms
QT/QTc	398/423	ms
P-R-T axes	46 77	93

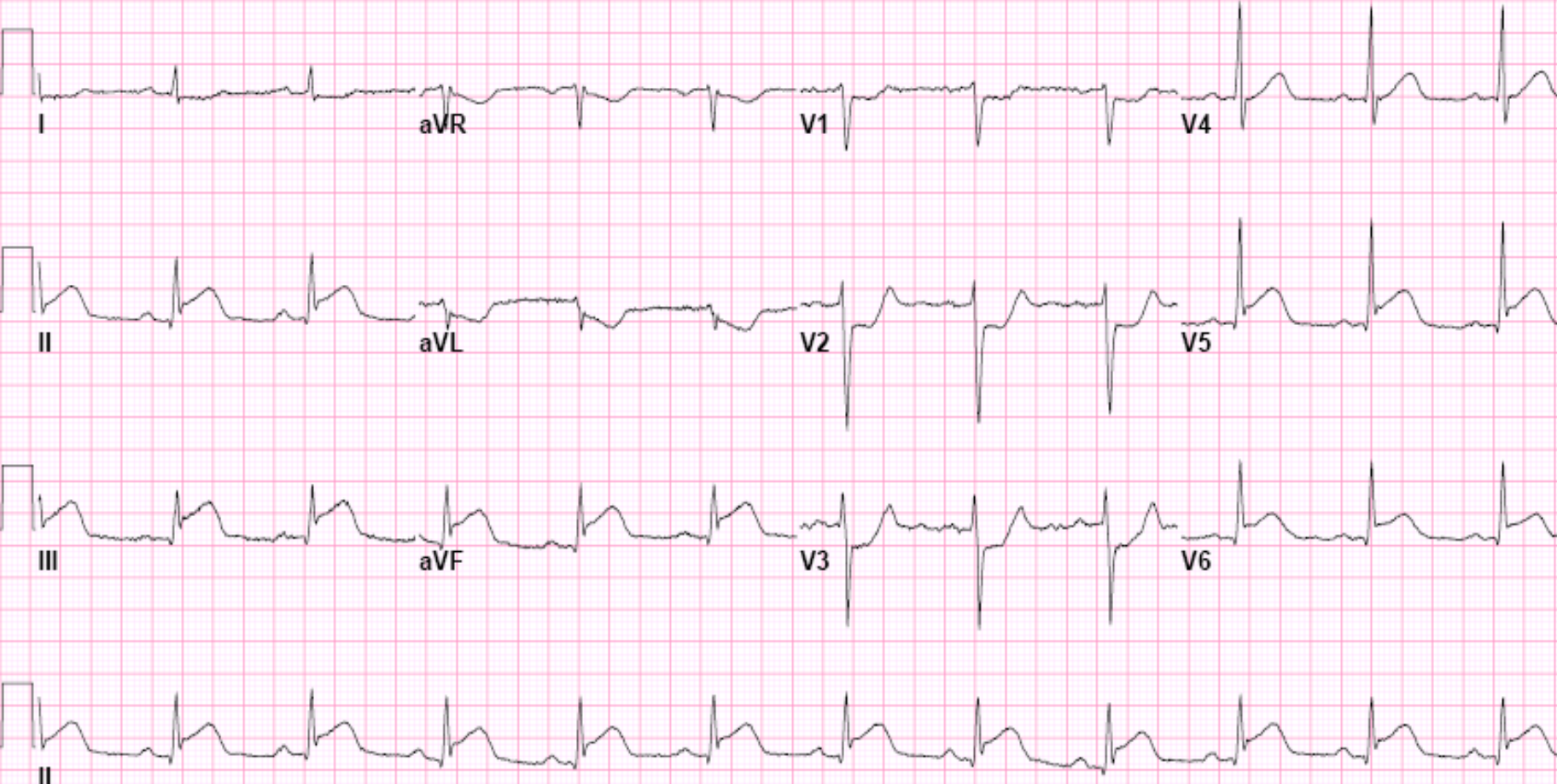
Loc:37

Technician: 64

Referred by:

Confirmed By: ECG AFD COMPUTER

CCU:

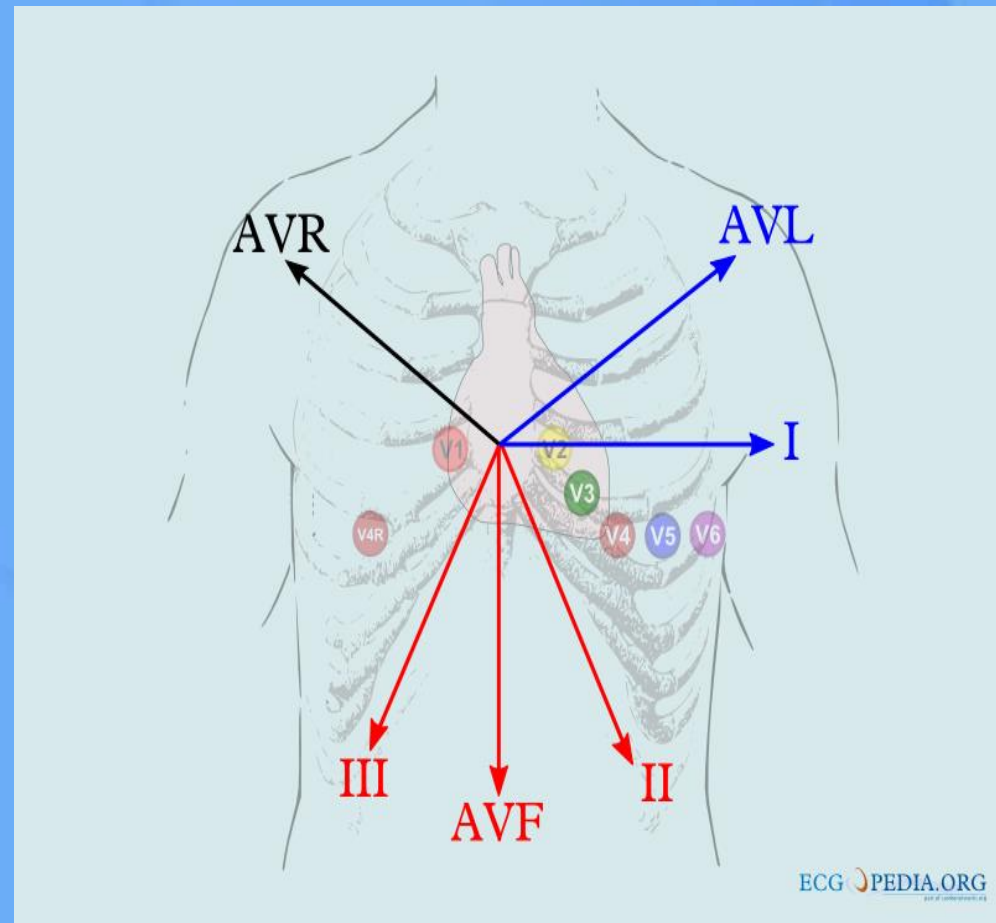


Sinusritme.

- Normale ritme is sinusritme.
- Ontstaat in de sinusknop.
- Spreidt zich uit over de boezems.
- De elektrische activiteit van de boezem noemen we de p-top.

Kenmerken sinusritme.

- Boezemactiviteit
- (p top) vanuit de sinusknoop.
- P top positief in afleiding II.
- Negatief in afleiding AVR.
- Positief/negatief in VI.



ID:4077981

14-SEP-2006 15:31:21

UMC UTRECHT

24-APR-1962 (44 yr)
Male

Vent. rate	70	BPM
PR interval	172	ms
QRS duration	118	ms
QT/QTc	374/403	ms
P-R-T axes	37 -45	40

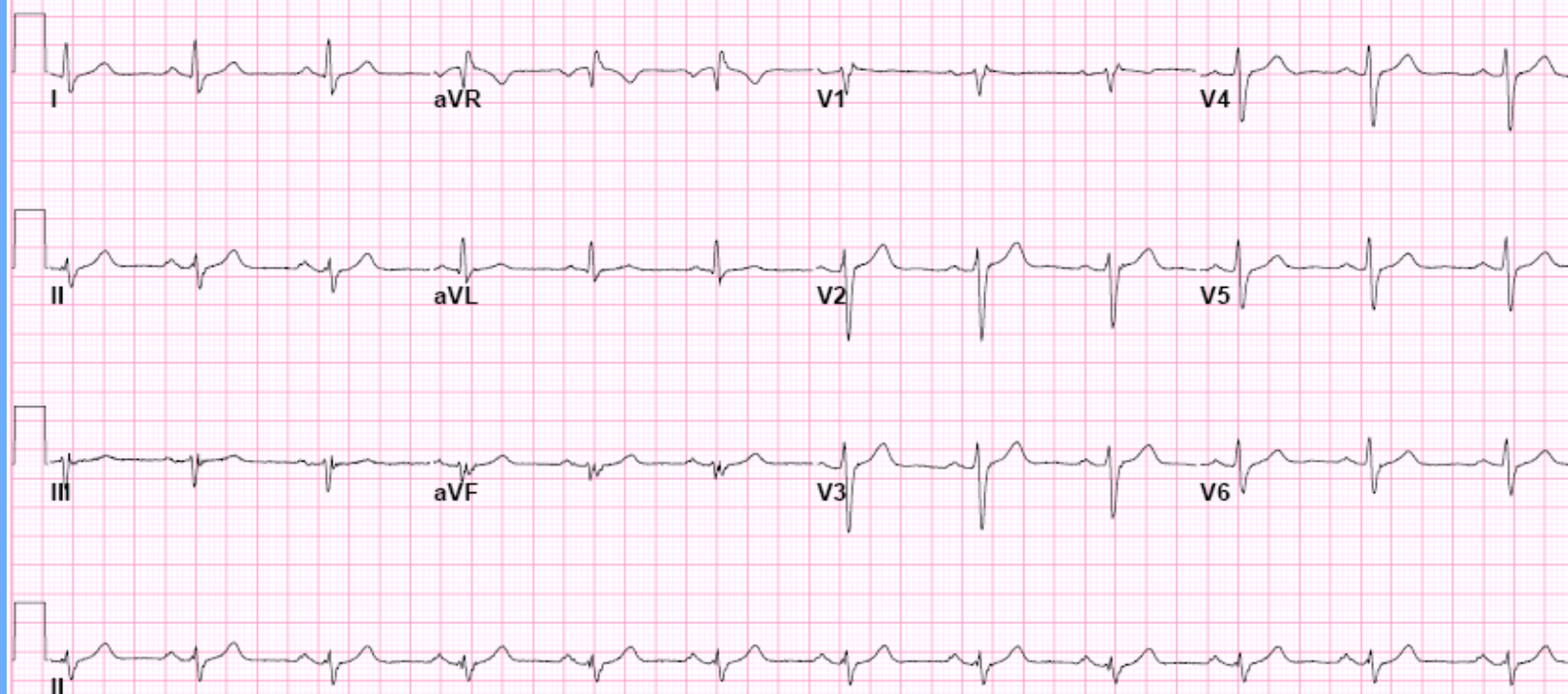
Loc:37

Technician: 56

Referred by:

Confirmed By: ECG AFD COMPUTER

CCU:



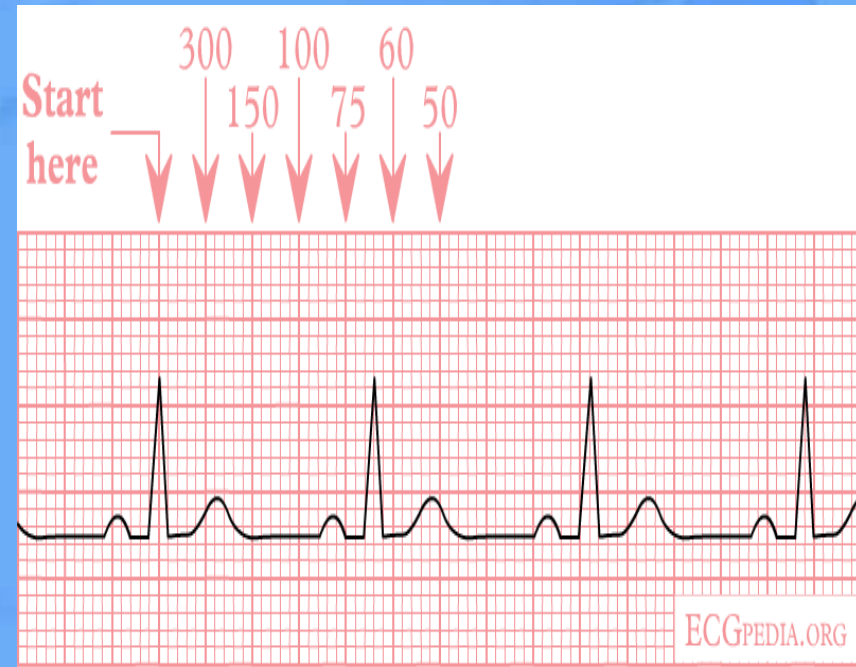
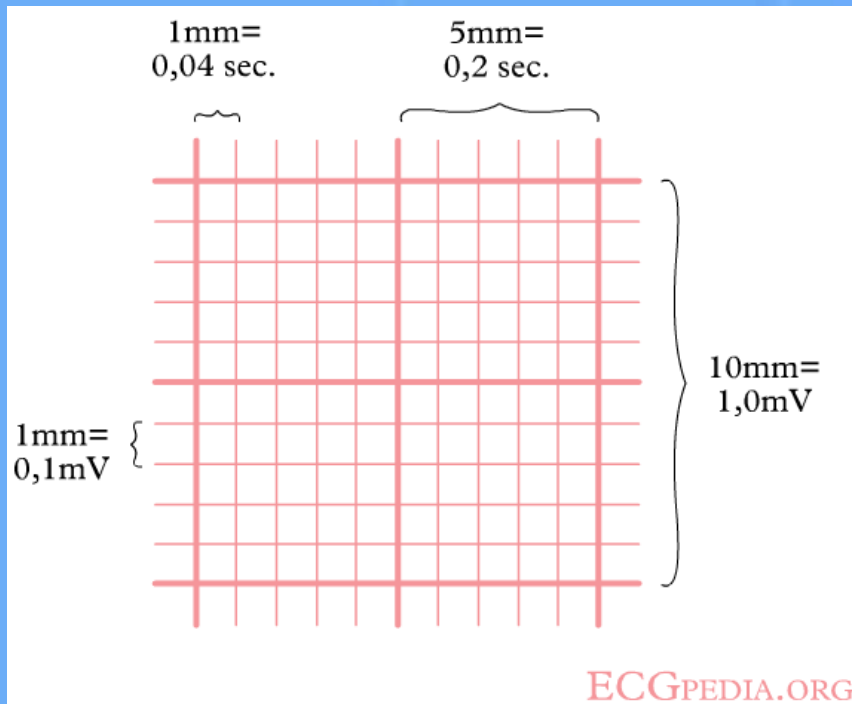
25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 1

EID:102 EDT: 12:06 15-SEP-2006 ORDER:

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Hartfrequentie

(25 mm per seconde)



ID:1587414

09-JAN-2006 02:05:11

UMC UTRECHT

31-DEC-1940 (65 yr)

Male

Vent. rate	126	BPM
PR interval	154	ms
QRS duration	96	ms
QT/QTc	296/428	ms
P-R-T axes	64 4	148

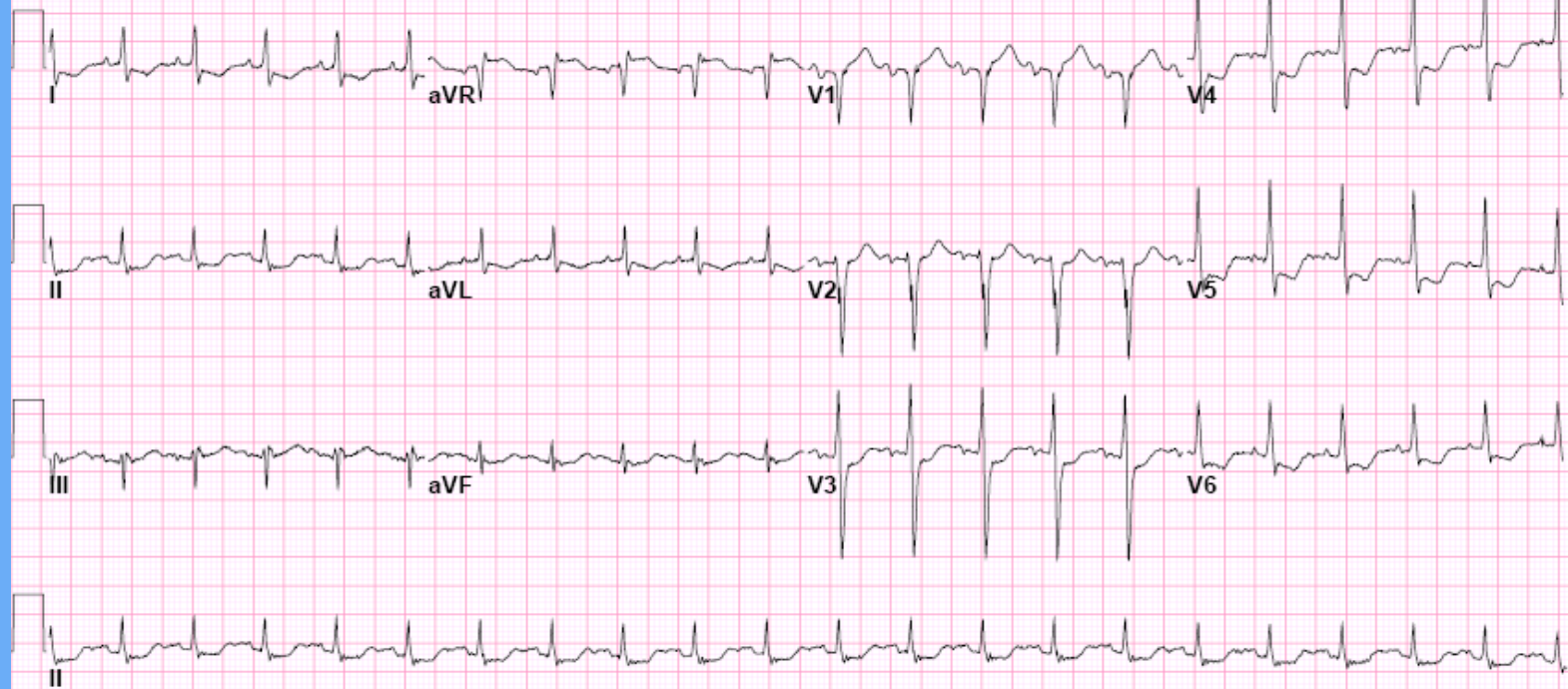
Loc:37

Technician: 55

Referred by:

Confirmed By: ECG AFD COMPUTER

CCU:

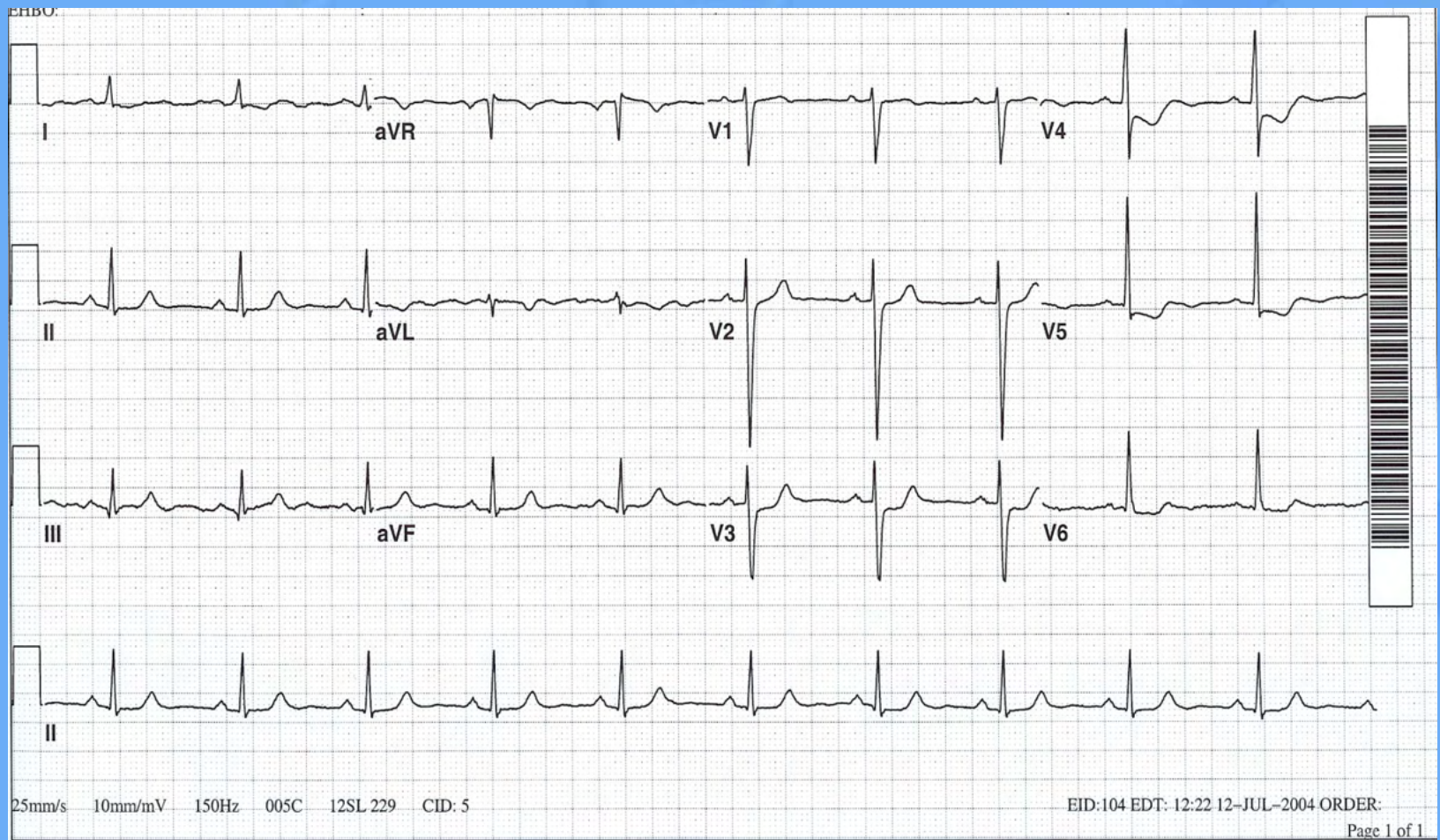


25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 1

EID:102 EDT: 12:14 09-JAN-2006 ORDER:

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Sinusritme?



04-AUG-1941 (64 yr)
Male

Vent. rate	68	BPM
PR interval	190	ms
QRS duration	94	ms
QT/QTc	398/423	ms
P-R-T axes	46 77	93

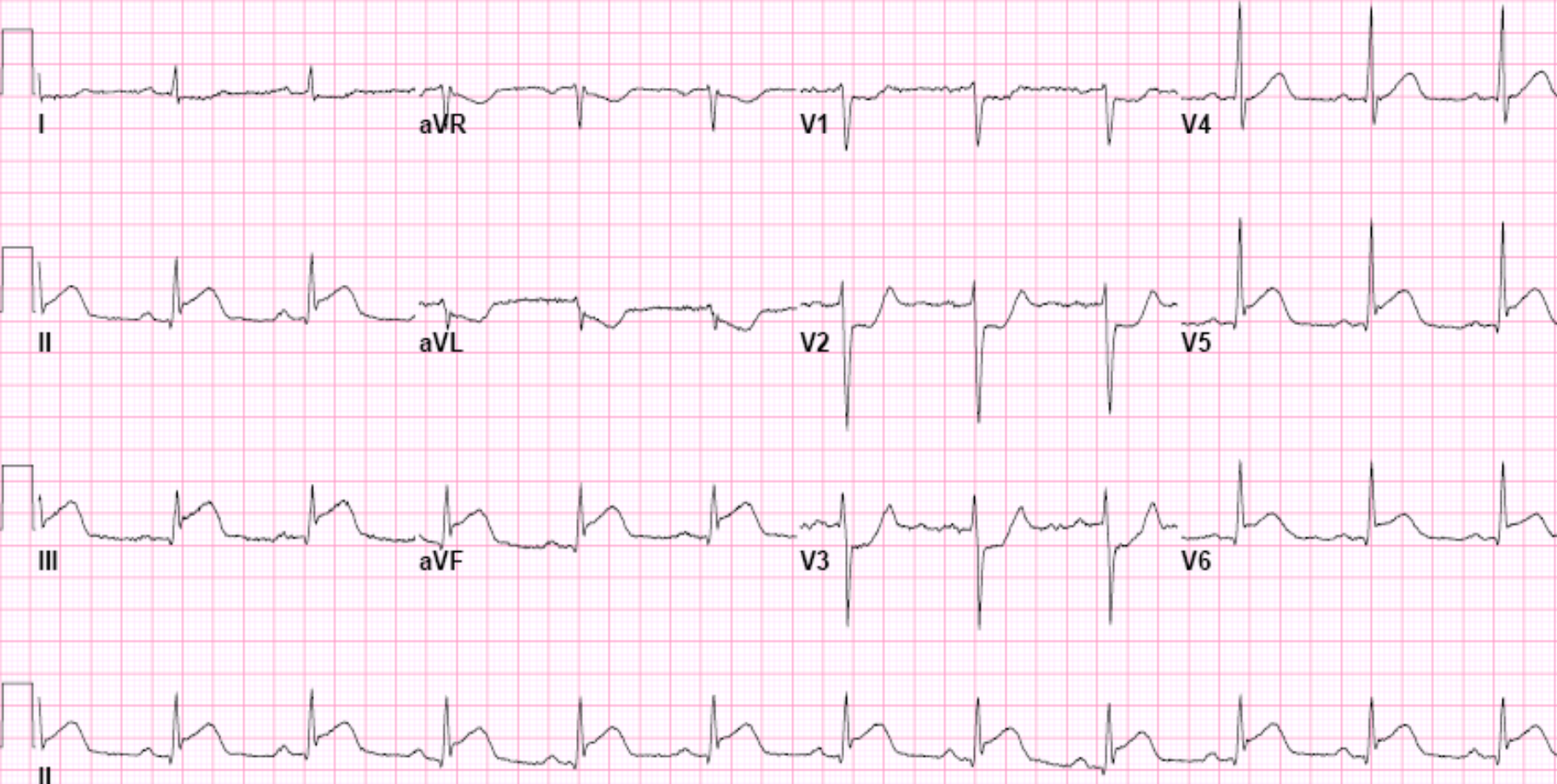
Loc:37

Technician: 64

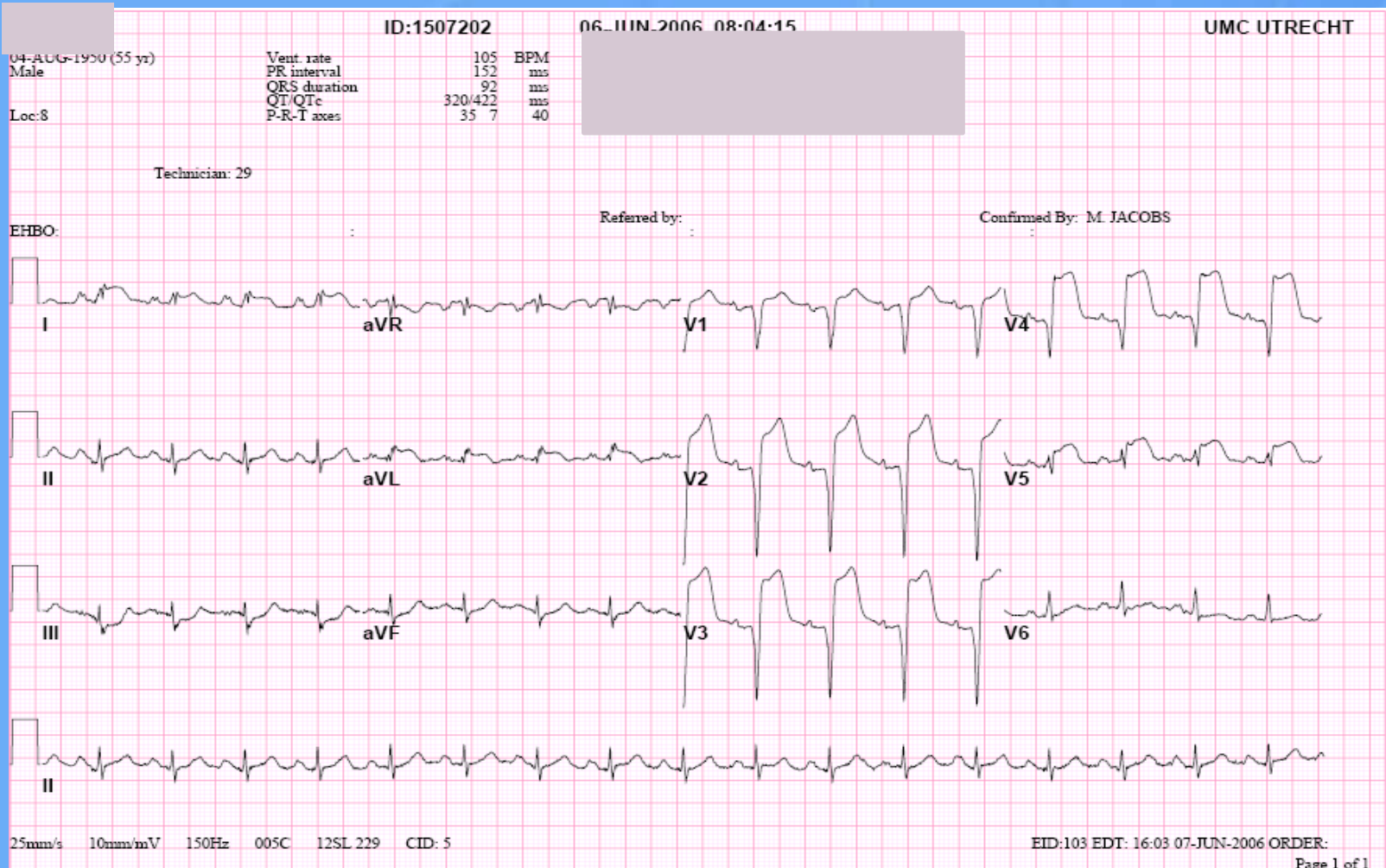
Referred by:

Confirmed By: ECG AFD COMPUTER

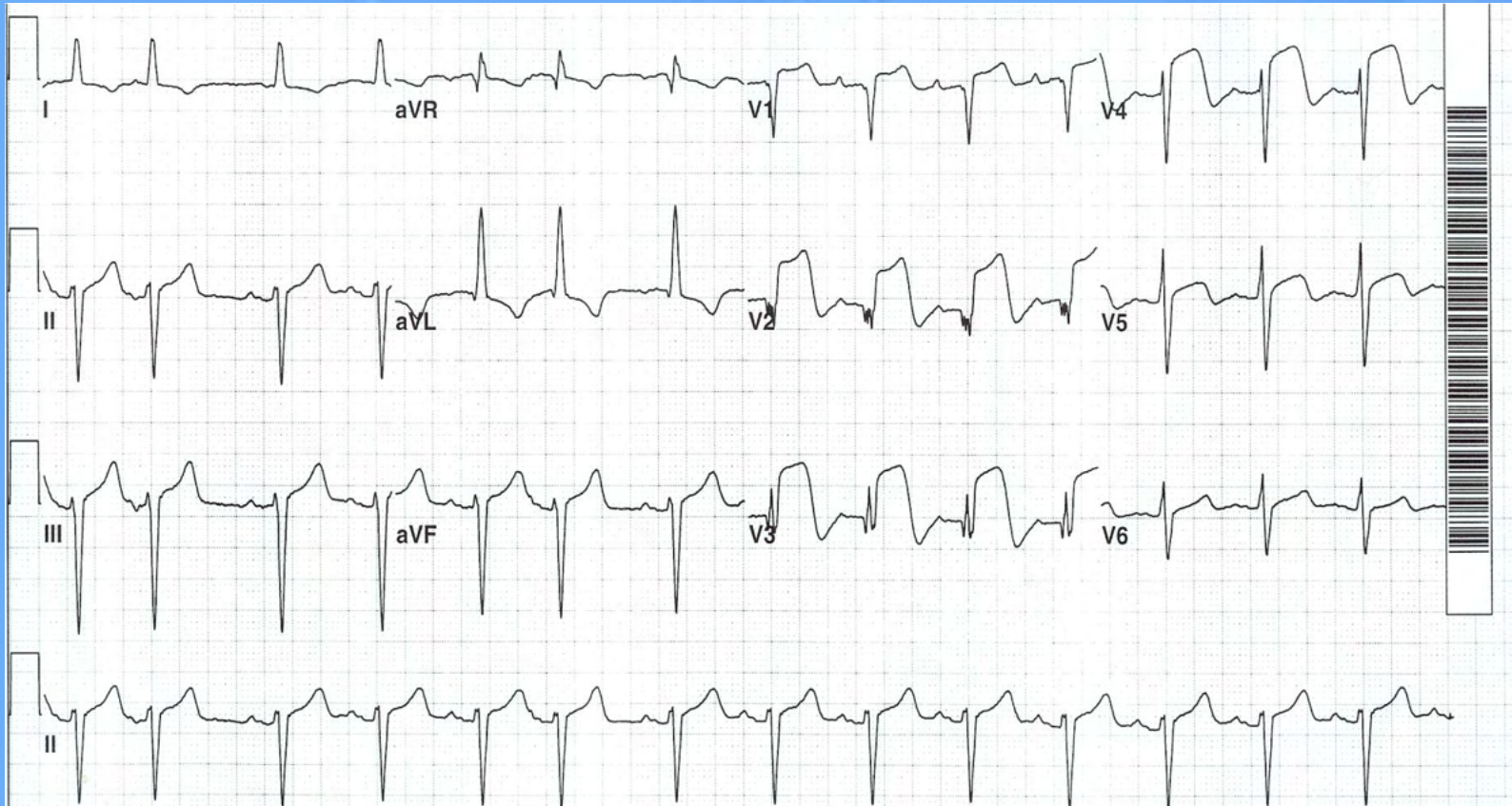
CCU:



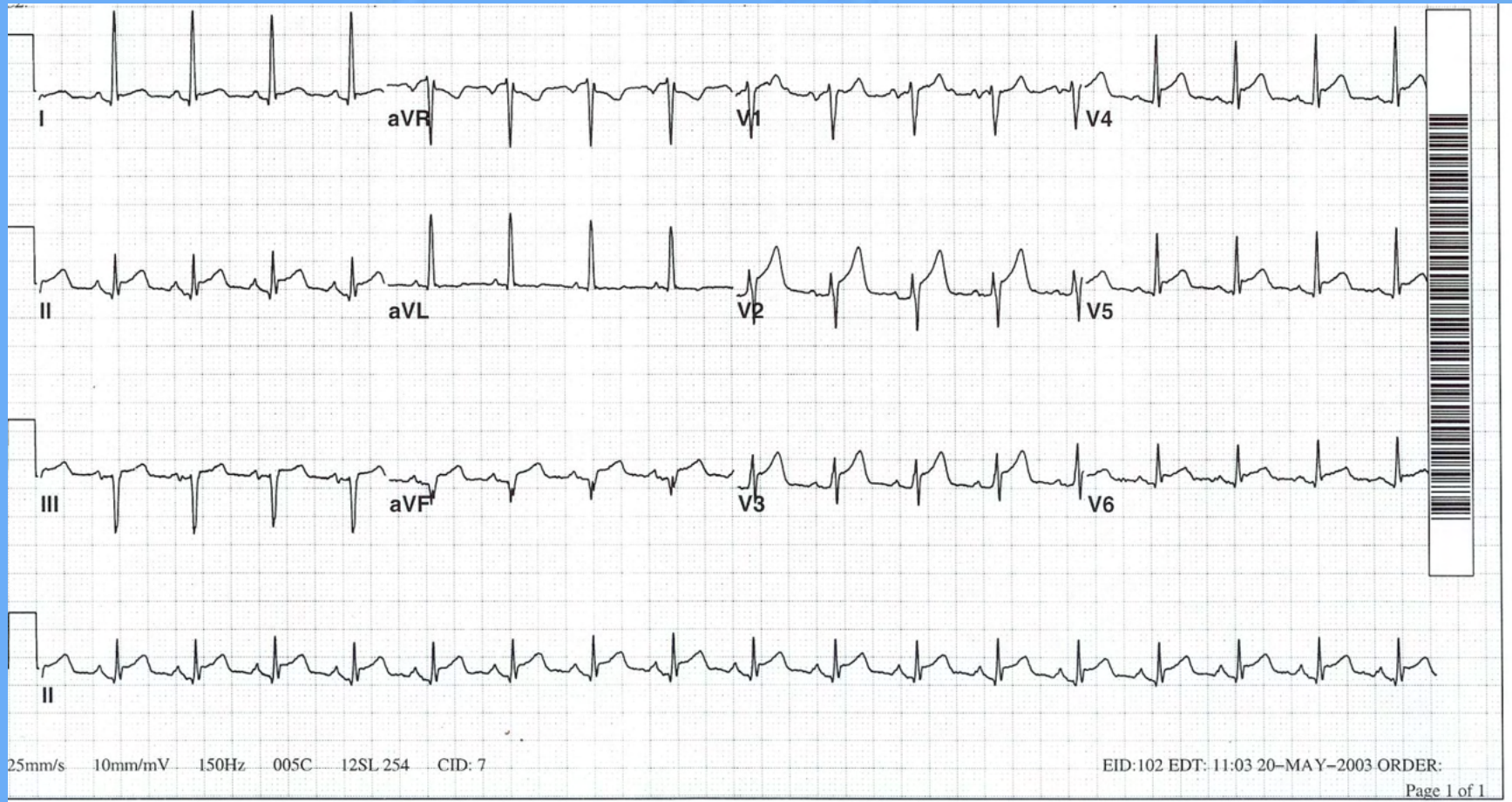
Sinusritme?



Sinus ritme?



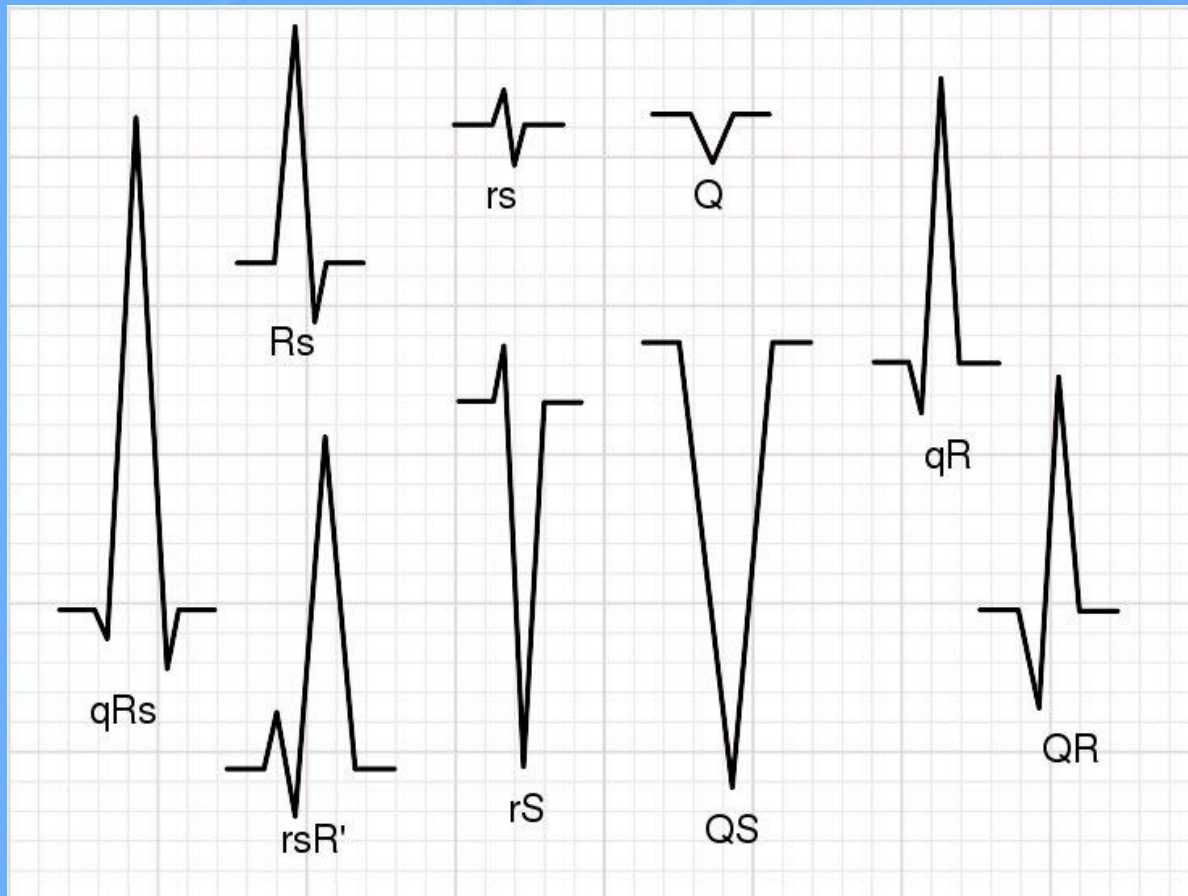
Sinusritme?



Sinusritme?



Hoe benoem je een complex

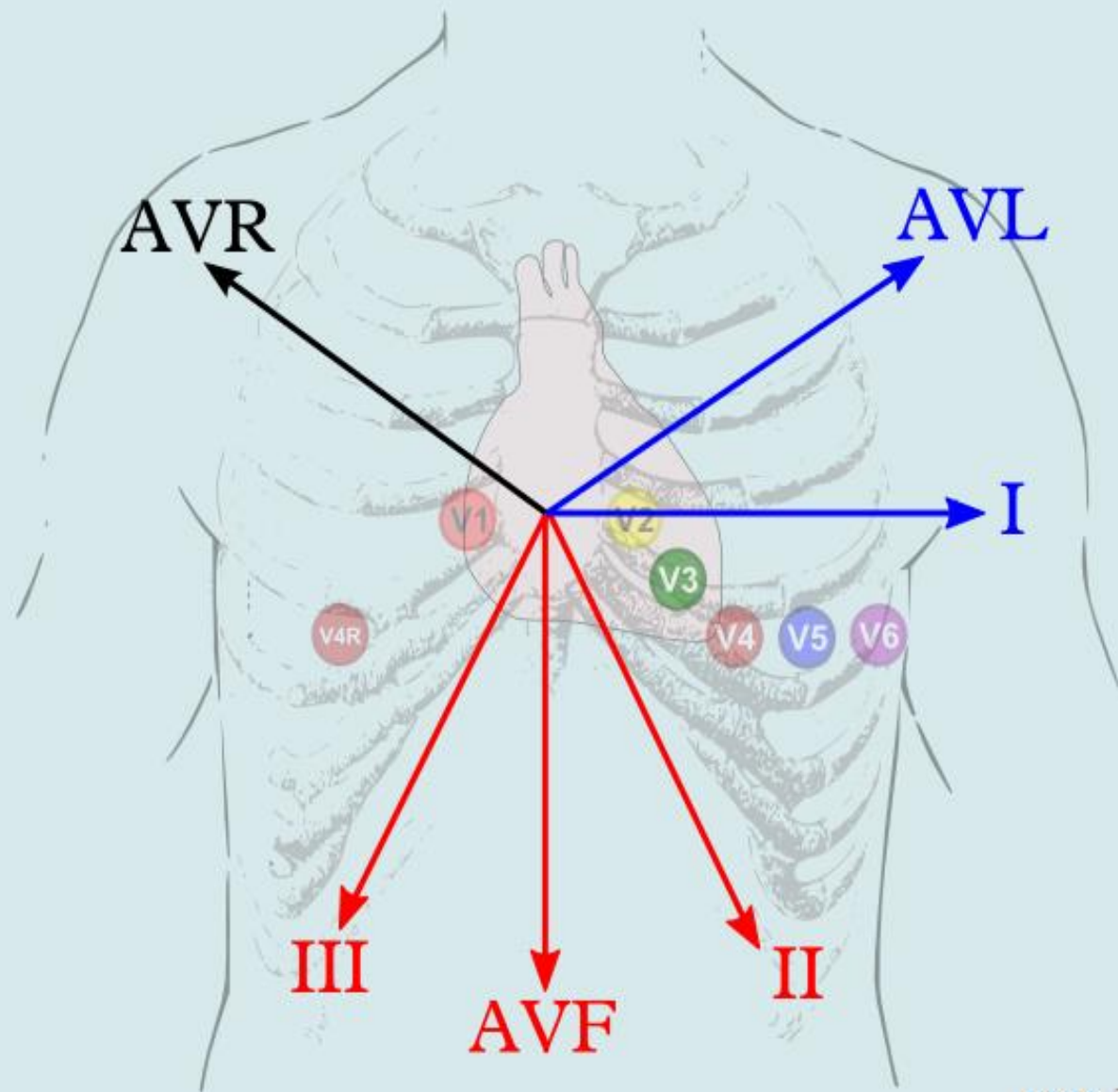


Einde basis ECG

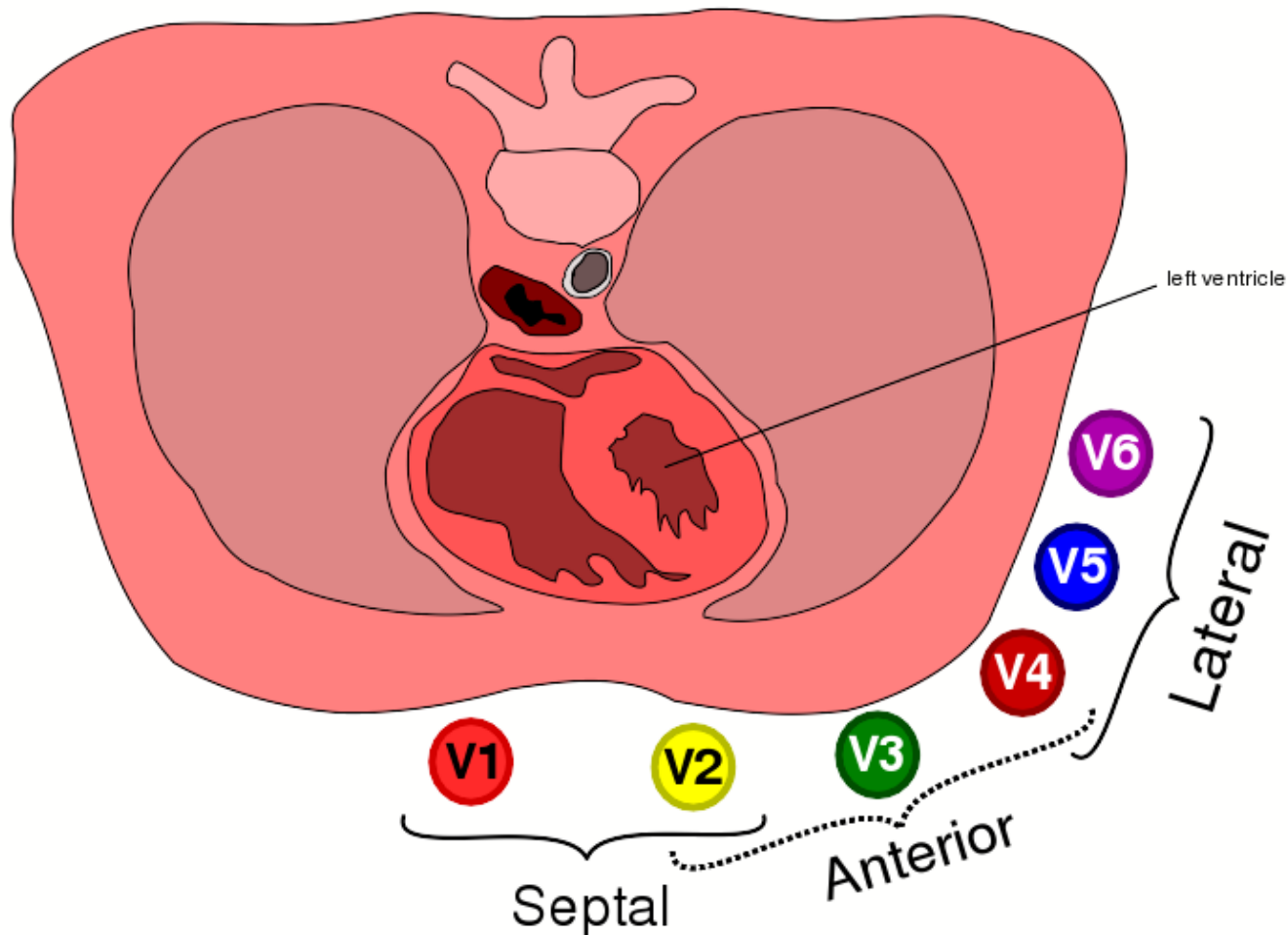


ISCHAEMIE/ MYOCARDINFARCT

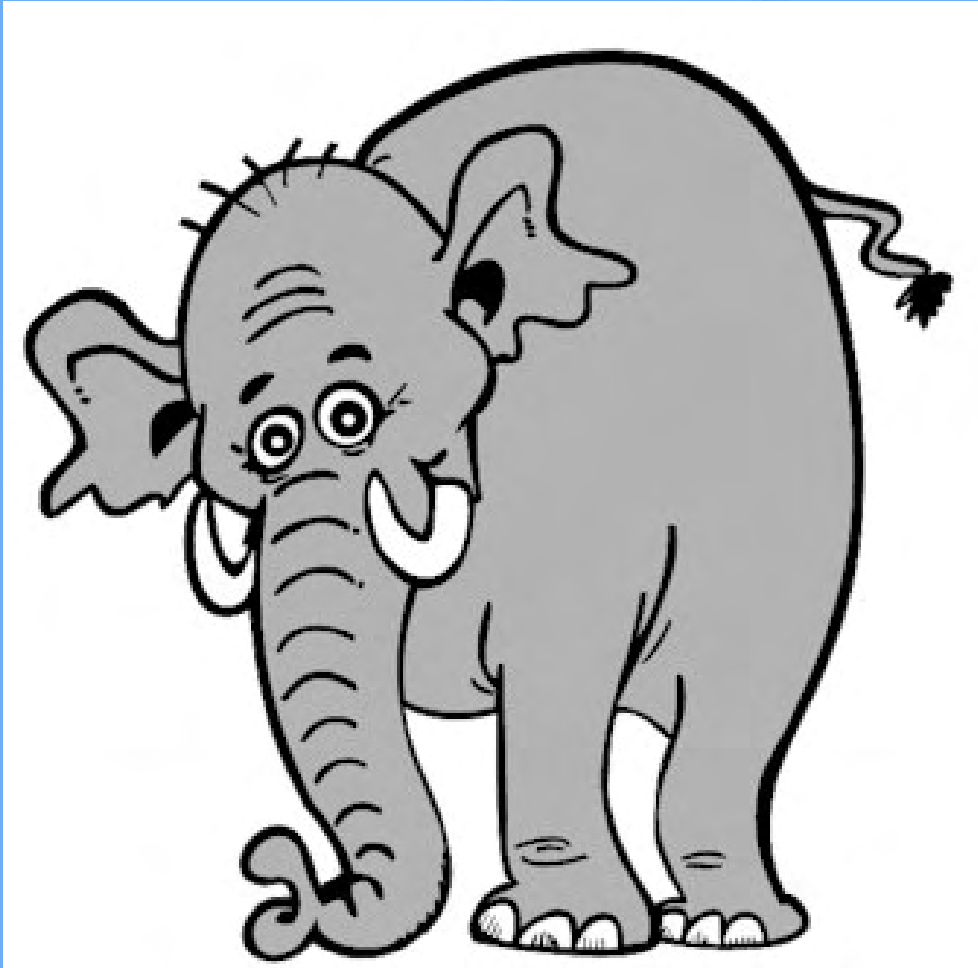




De voorwandsafleidingen



Wat zien we?



Wie ziet wat?

- **II, III, AVF “kijken” naar de onderwand.**
- **I, AVL, V5 en V6 “zien” de laterale wand.**
- **V1, V2 “kijken” naar het septum.**
- **V3 en V4 “kijken” naar de voorwand**

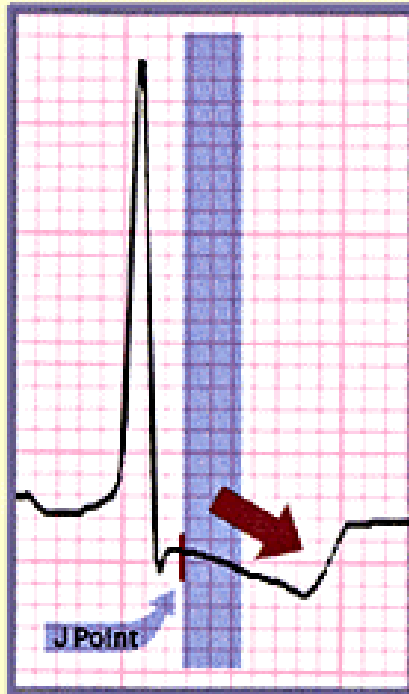
ECG kenmerken

non transmurale ischaemie (subendocardiale ischaemie)

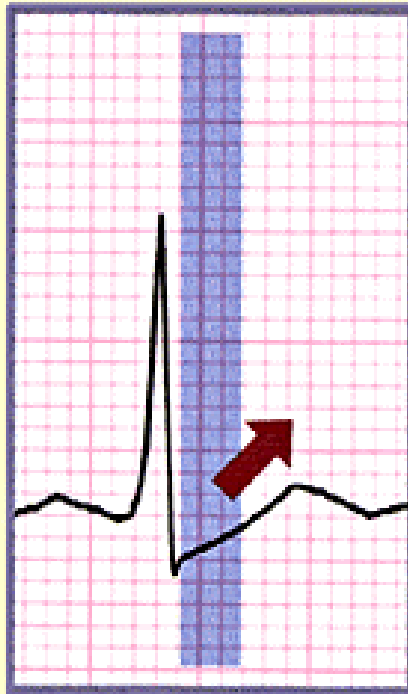
S-T depressie in het gebied met ischaemie.

- S-T segment schuin oplopend. (normaal bij insp.)
- S-T segment gestrekt. (verdacht)
- S-T segment schuin aflopend. (ischaemie)

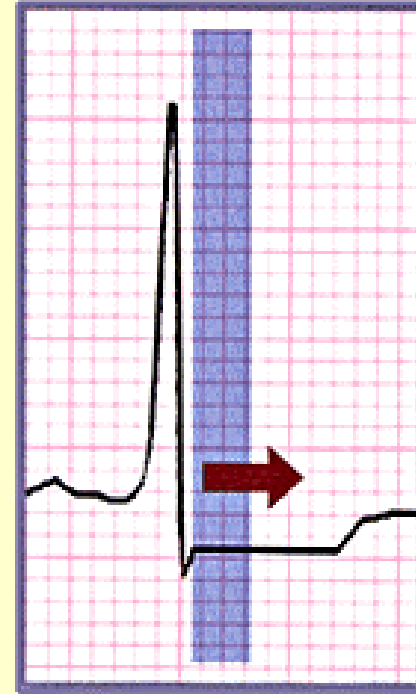
S-T depressions



Downsloping ST



Upsloping ST

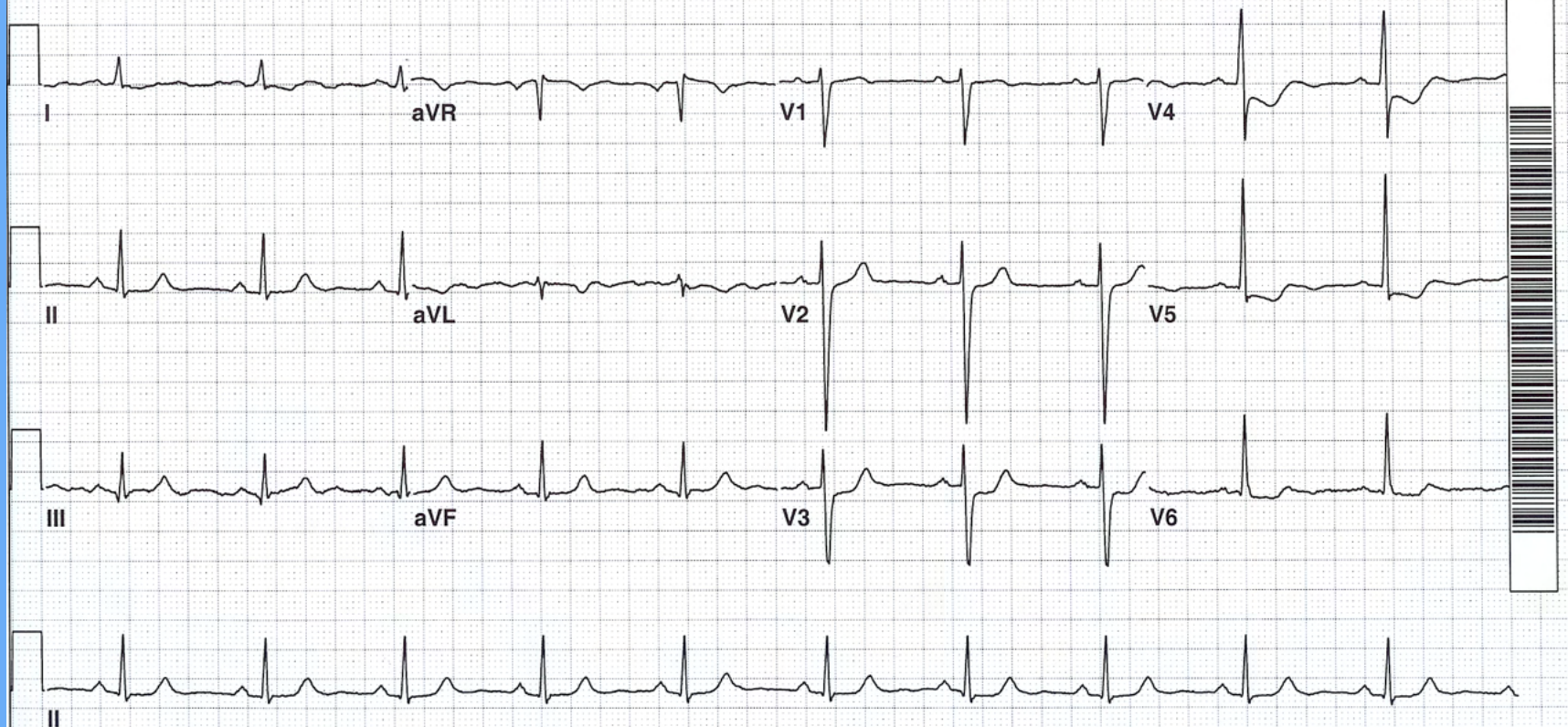


Horizontal ST

The J point occurs at the end of the QRS complexes.
The ST segment begins at the J point and extends to a user defined interval

ST Segment Depression

EHBO.



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 5

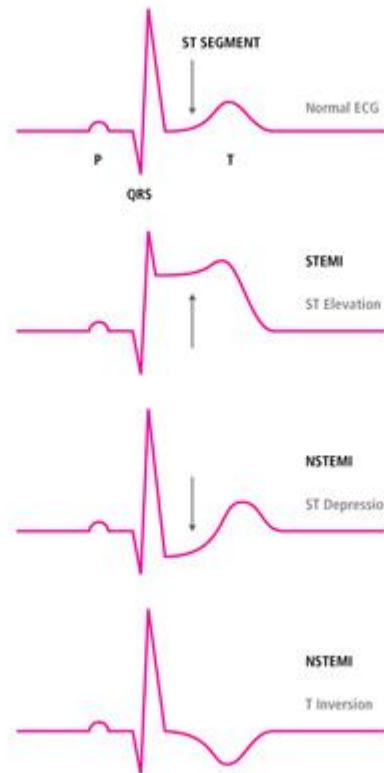
EID:104 EDT: 12:22 12-JUL-2004 ORDER:

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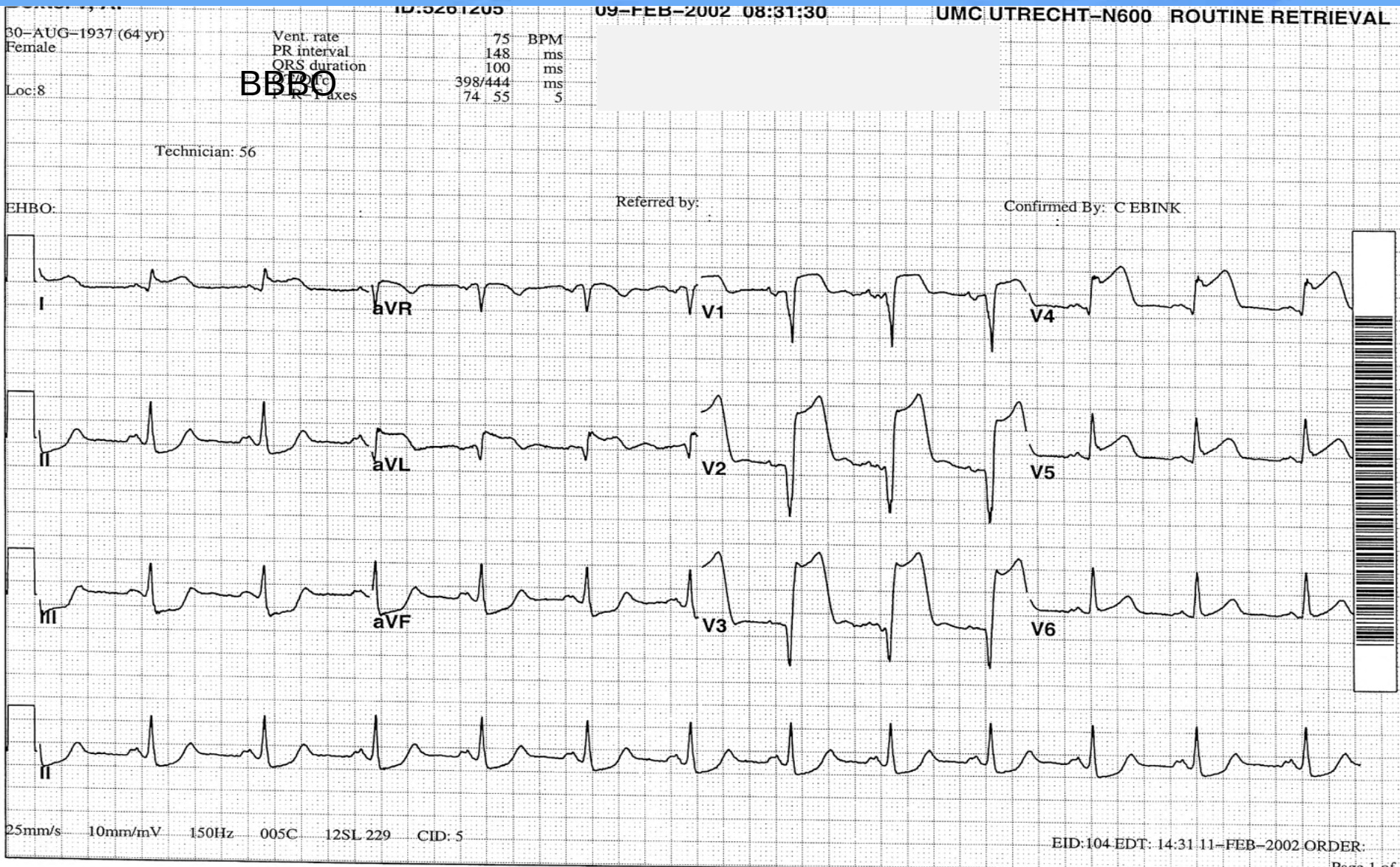
Transmurale ischemie.

- **S-T elevatie in het gebied met ischemie**
- **Reciproke S-T depressie**
- **(“S-T shift” maat voor direct ingrijpen)**

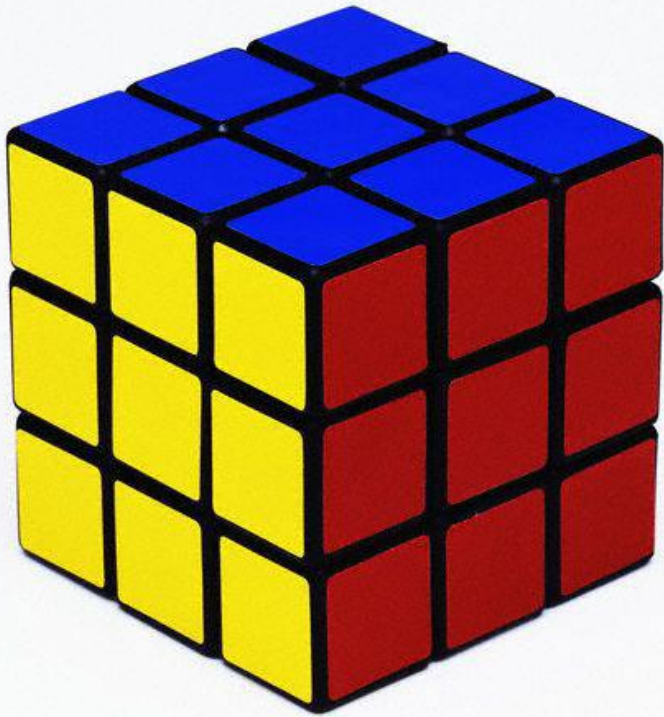
ST elevatie



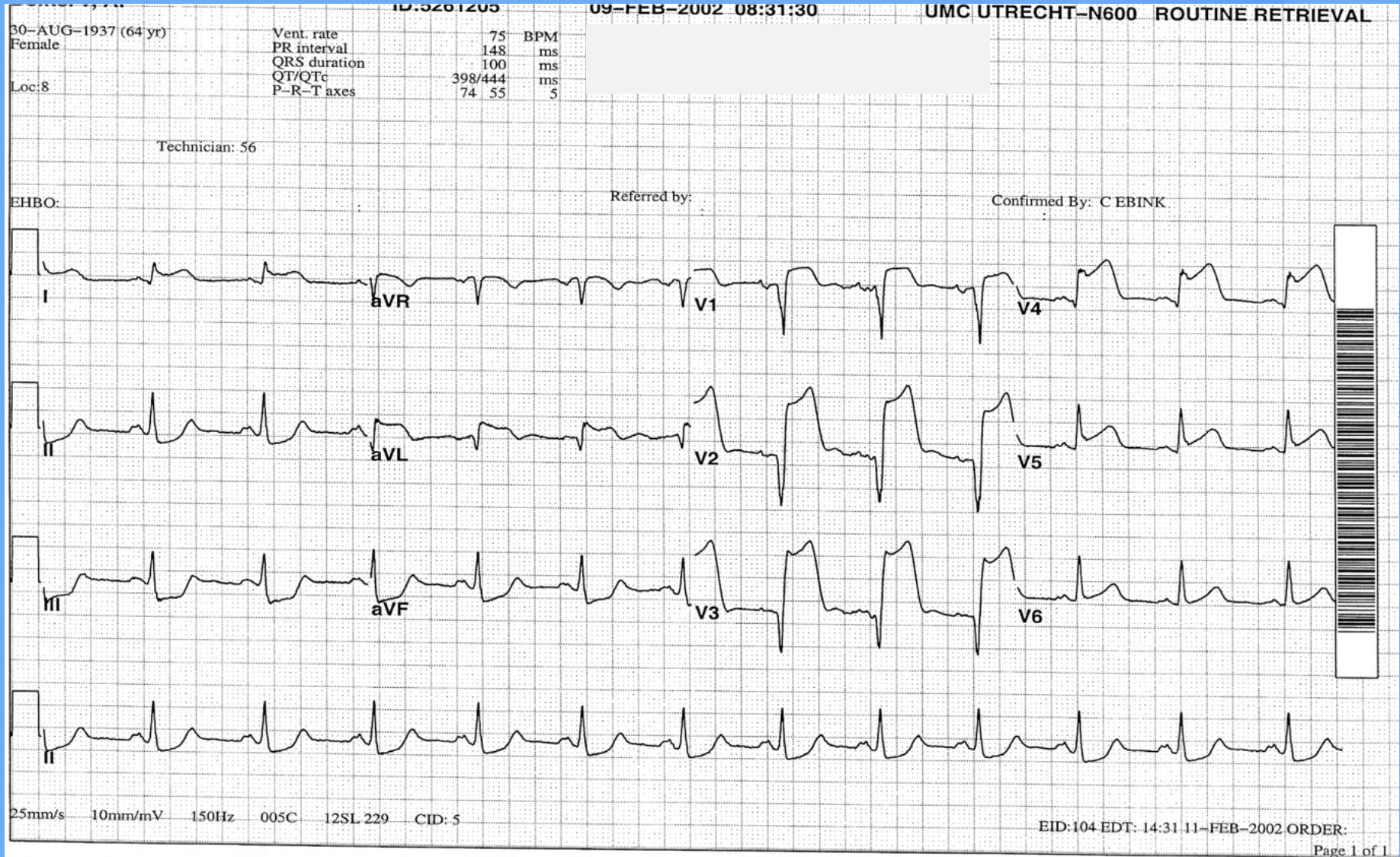
Transmurale ischaemie/infarct



Reciproke ST depressie



En nu nog eens



Beoordeel het ECG

- Ritme?
- Ischemie?
- Welk gebied?



ID:9496969

19-MAR-2006 10:59:45

UMC UTRECHT

01-AUG-1929 (76 yr)
Female

Heart rate	91	BPM
PR interval	172	ms
QRS duration	102	ms
QT/QTc	368/452	ms
P-R-T axes	56 46	93

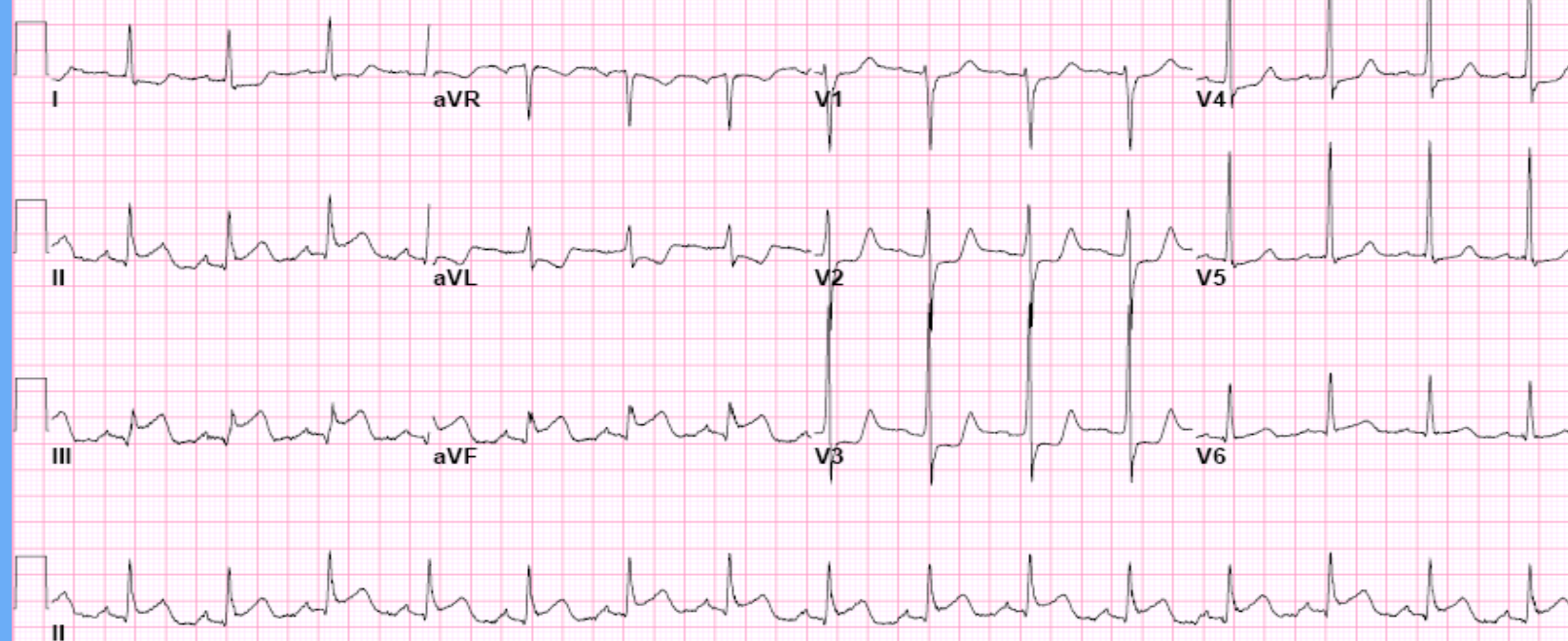
Loc:37

Technician: 37

Referred by:

Confirmed By: ECG AFD COMPUTER

CCU:



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 1

EID:102 EDT: 12:04 20-MAR-2006 ORDER:

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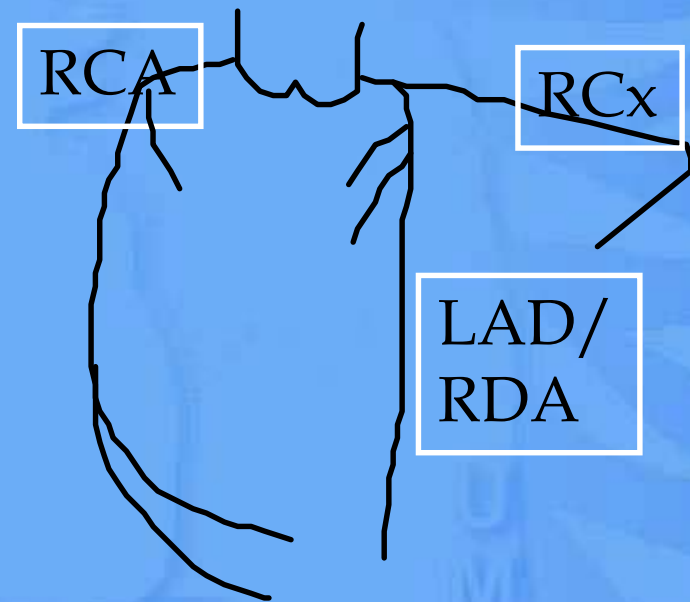
Beoordeel het ECG

- Welke coronair is de boosdoener?



Coronairen en hun verzorgingsgebied

- **Rechter Coronair Arterie**
 - onder/achterwand
 - 80% sinus en AV
 - 85% Posterior Descending A (dominant) en RV
- **Linker Coronair Arterie**
 - **LAD/RDA**
 - septum
 - Voorwand
 - **Ramus Circumflex**
 - achter/lateraal/onderwand
 - 20% sinus en AV



21-NOV-1948 (57 yr)
Male

ID:5098684

31-DEC-2005 00:34:20

UMC UTRECHT

Loc:8

Vent. rate	47	BPM
PR interval	*	ms
QRS duration	102	ms
QT/QTc	478/423	ms
P-R-T axes	43 44	96

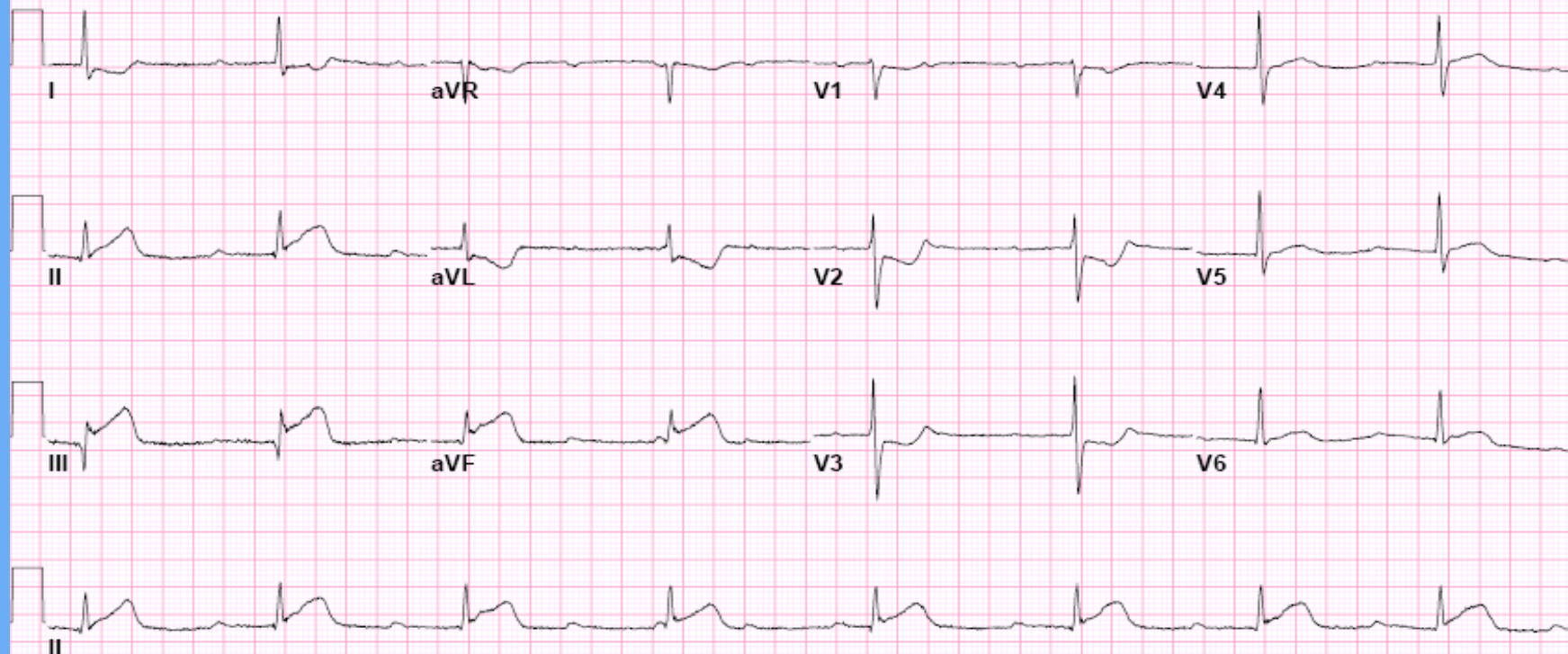
ABNORMAAL ECG

Technician: 46

Referred by:

Confirmed By: M. JACOBS

EHBO:



ID:1499199

04-APR-2006 14:10:32

UMC UTRECHT

04-AUG-1941 (64 yr)
Male

Vent. rate	68	BPM
PR interval	190	ms
QRS duration	94	ms
QT/QTc	398/423	ms
P-R-T axes	46 77	93

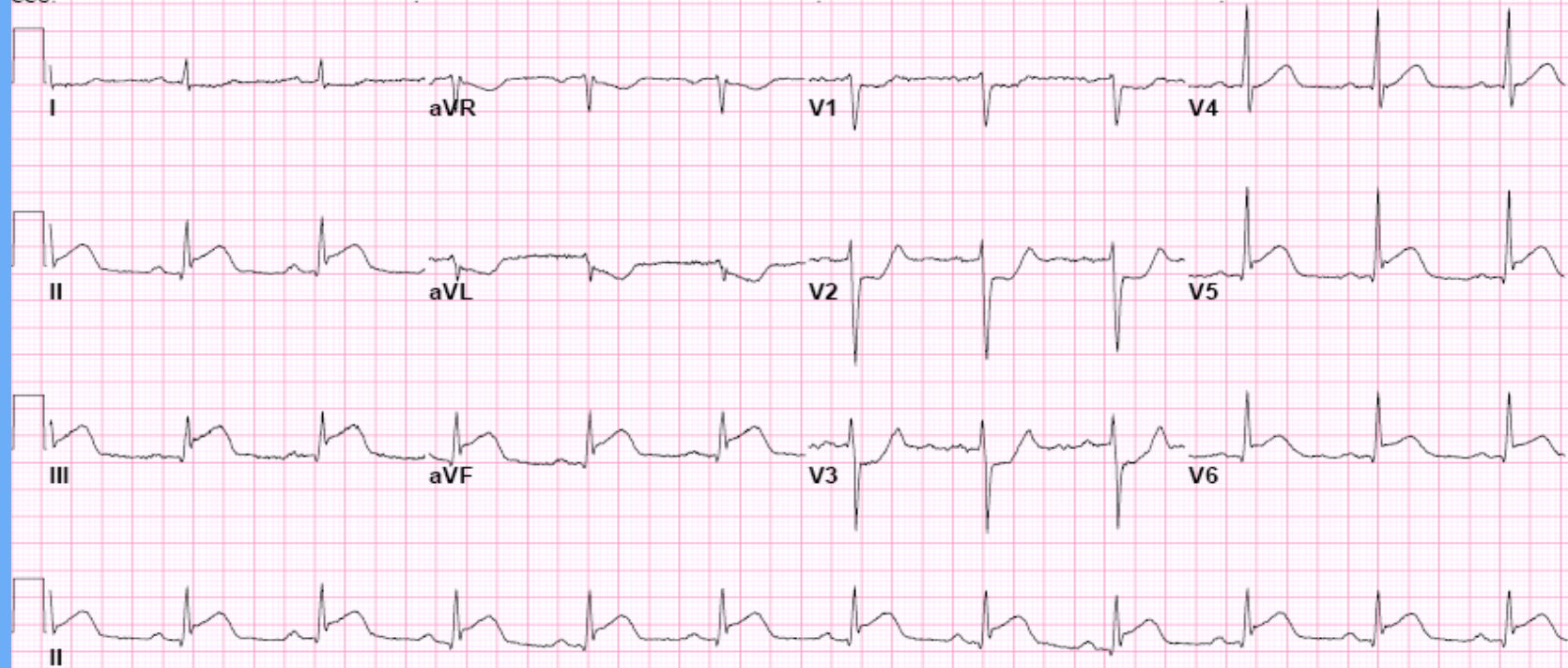
Loc:37

Technician: 64

CCU:

Referred by:

Confirmed By: ECG AFD COMPUTER



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 1

EID:119 EDT: 12:53 05-APR-2006 ORDER:

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12-JUN-1951 (55 yr)
Male

Loc: 8

Vent. rate	91	BPM
PR interval	130	ms
QRS duration	90	ms
QT/QTc	328/403	ms
P-R-T axes	33 -32 79	

04-SEP-2006 10:37:02

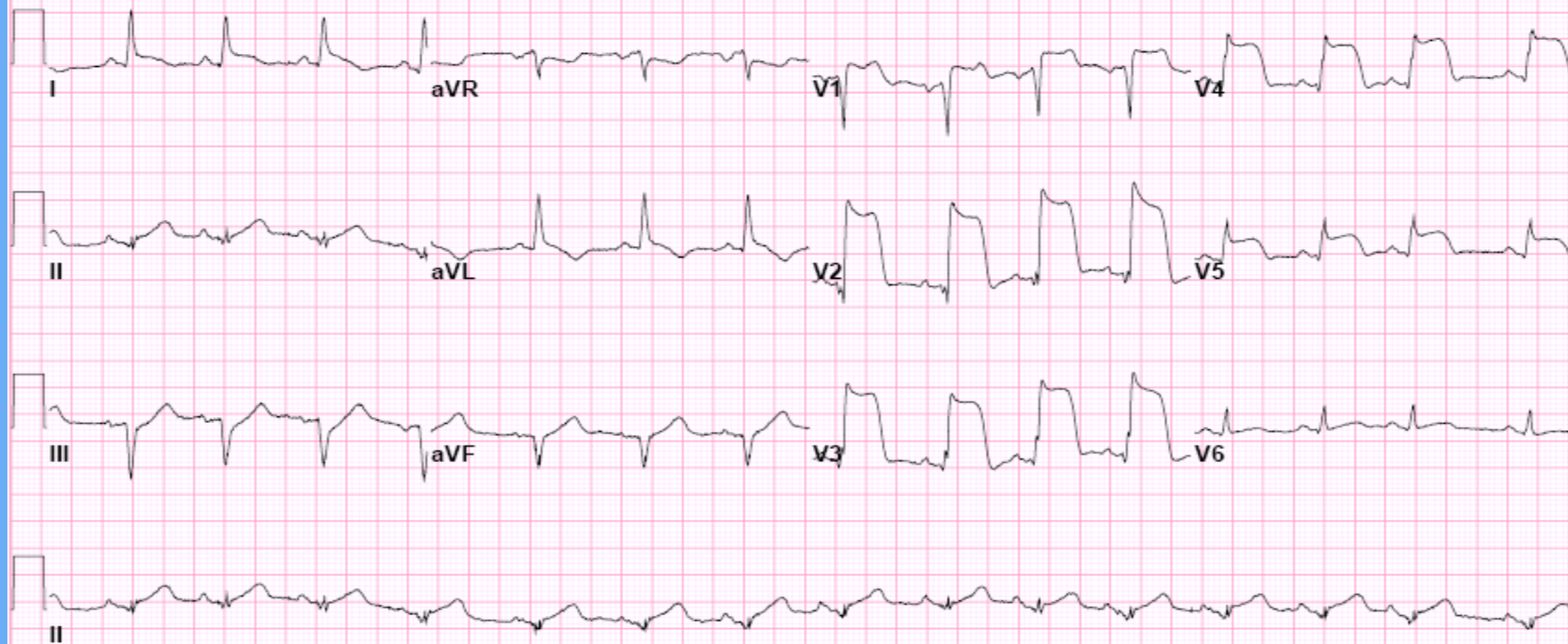
UMC UTRECHT

Technician: 69

Referred by:

Confirmed By: L. OTTERSPOOR

B4 WEST:



ID:6551532

08-JUN-2002 14:07:32

UMC UTRECHT-N600 ROUTINE RETRIEVAL

14-FEB-1924 (78 yr)
Female

Vent. rate	65	BPM
PR interval	354	ms
QRS duration	94	ms
QT/QTc	414/430	ms
P-R-T axes	71 89	99

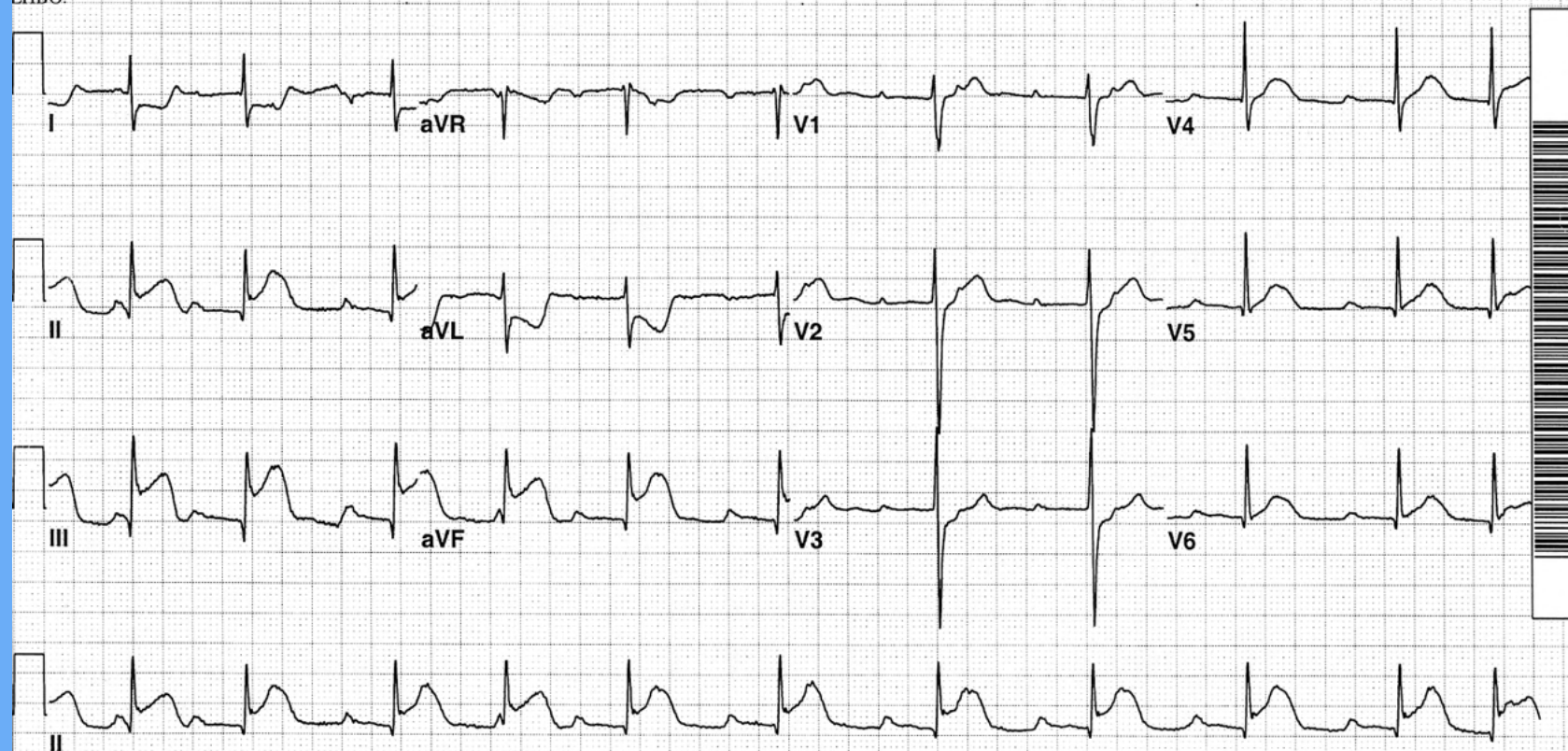
Loc:8

Technician: I

Referred by:

Confirmed By: M AKARRIOU

EHBO:



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 5

EID:102 EDT: 14:26 10-JUN-2002 ORDER:

Page 1 of 1

ID:1507202

06-JUN-2006 08:04:15

UMC UTRECHT

04-AUG-1950 (55 yr)
Male

Vent. rate	105	BPM
PR interval	152	ms
QRS duration	92	ms
QT/QTc	320/422	ms
P-R-T axes	35 7	40

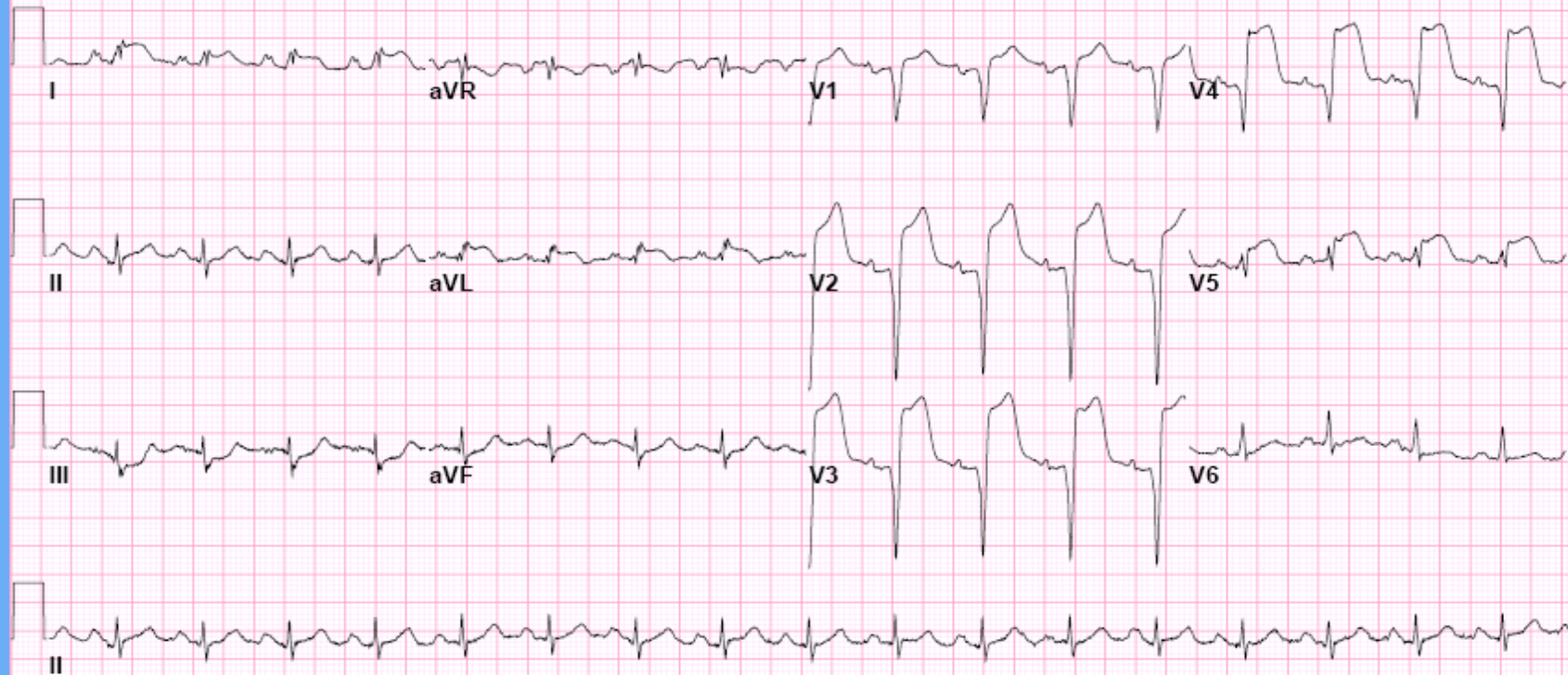
Loc:8

Technician: 29

EHBO:

Referred by:

Confirmed By: M. JACOBS



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 5

EID:103 EDT: 16:03 07-JUN-2006 ORDER:

Page 1 of 1

ID: 2203607

19-MAR-2000 12:55:22

UMC UTRECHT-N600 ROUTINE RETRIEVAL

18-DEC-1918 (81 yr)

Male

Vent. rate	51	BPM
PR interval	*	ms
QRS duration	98	ms
QT/QTc	502/462	ms
P-R-T axes	* 25	112

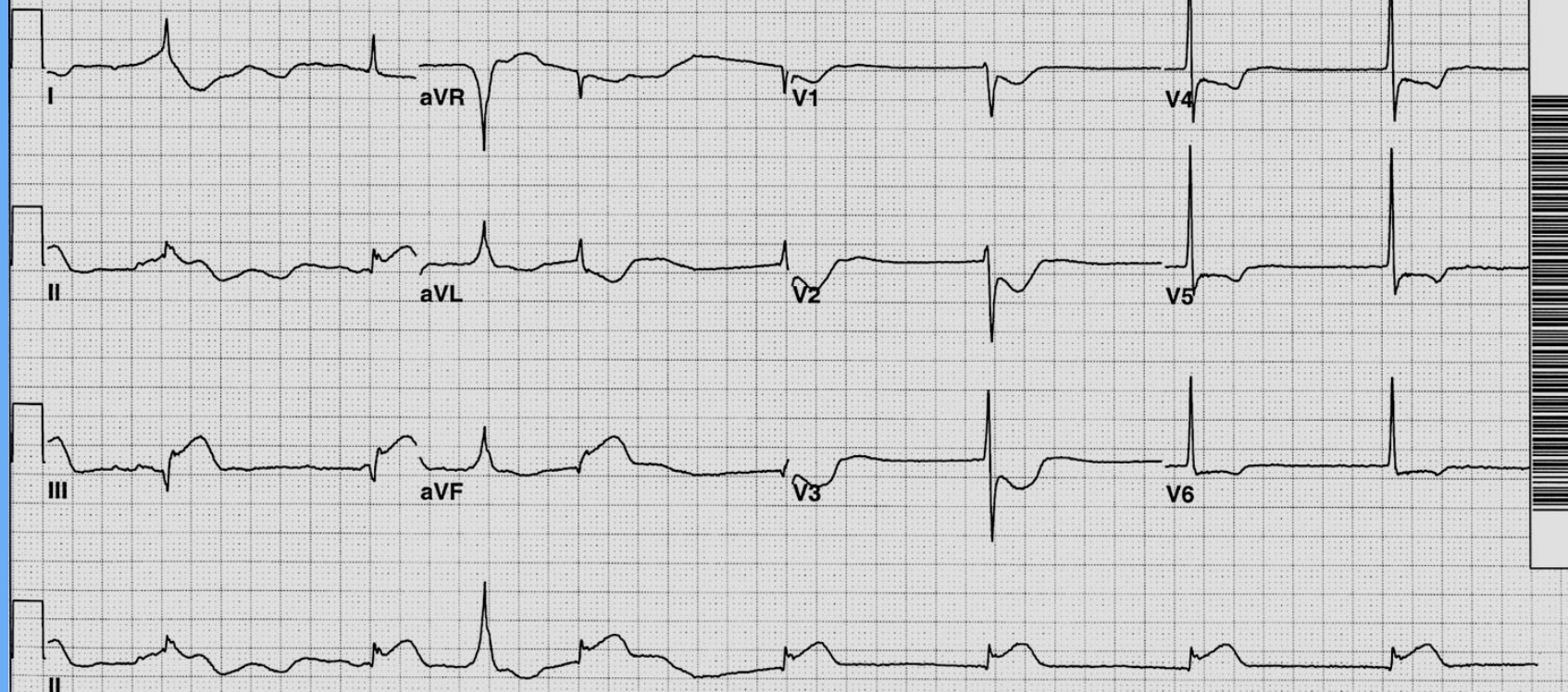
Loc: 8

Technician: 39

EHBO:

Referred by:

Confirmed By: PROF F L MEIJER



25mm/s 10mm/mV 150Hz 005C 12SL 252 CID: 5

EID: 102 EDT: 13:30 20-MAR-2000 ORDER:

Page 1 of 1

31-DEC-1940 (65 yr)
Male

Loc:37

Vent. rate	126	BPM
PR interval	154	ms
QRS duration	96	ms
QT/QTc	296/428	ms
P-R-T axes	64 4	148

ID:1587414

09-JAN-2006 02:05:11

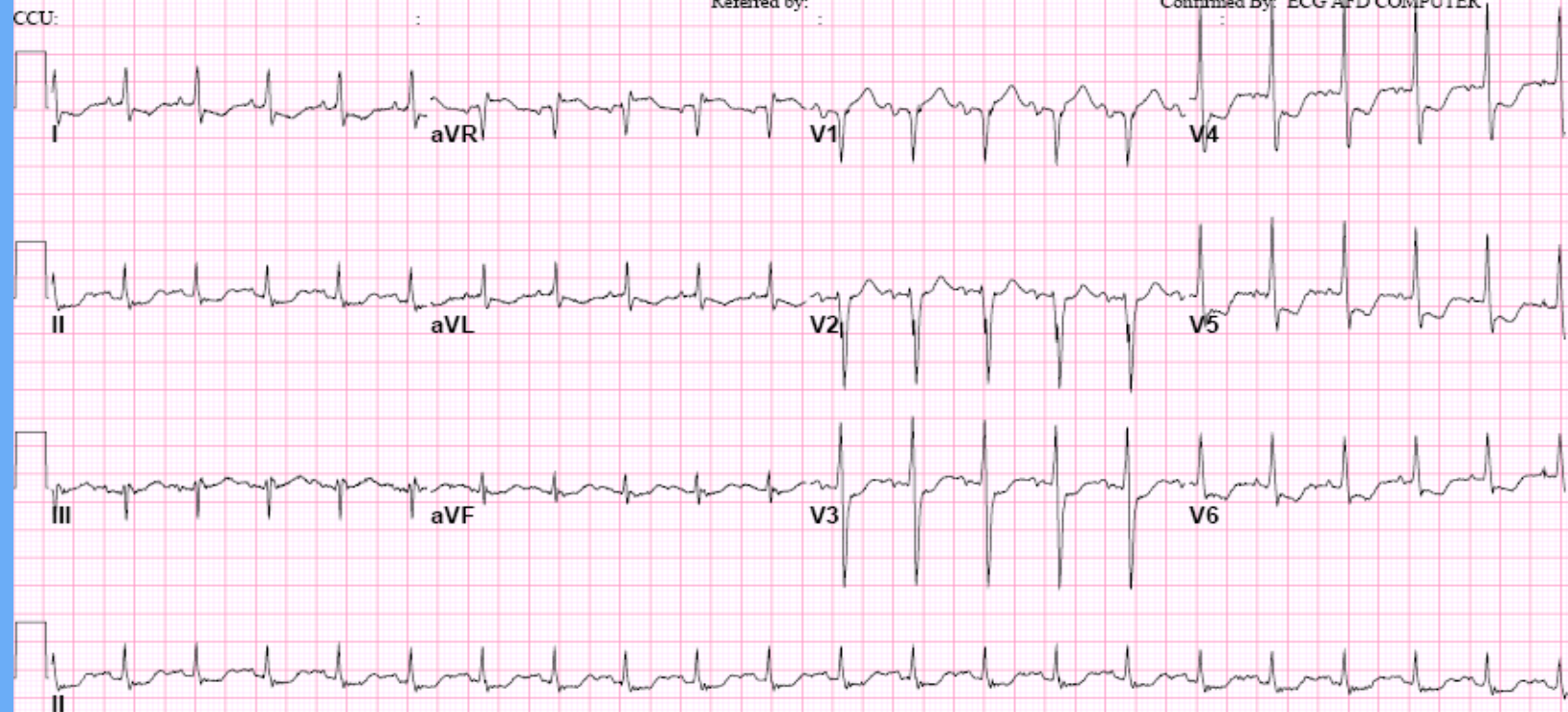
UMC UTRECHT

Technician: 55

CCU:

Referred by:

Confirmed By: ECG AFD COMPUTER



30-MAR-1953 (53 yr)
Male

ID:8519220

09-SEP-2006 19:41:35

UMC UTRECHT

Loc:37

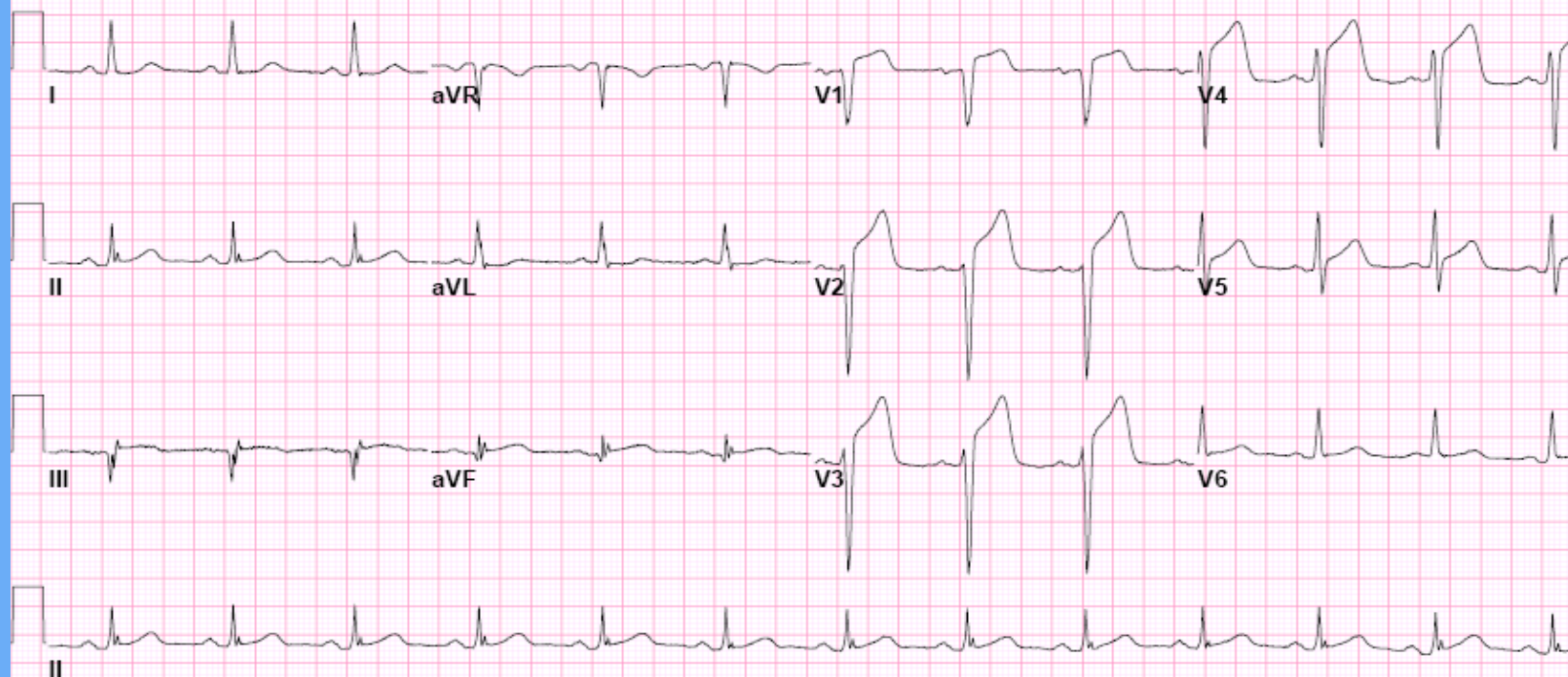
Vent. rate	76	BPM
PR interval	162	ms
QRS duration	102	ms
QT/QTc	394/443	ms
P-R-T axes	38 13	50

Technician: 29

Referred by:

Confirmed By: ECG AFD COMPUTER

CCU:



SCHULTZ, P.

ID: 0471004

00-JAN-2002 09:32:33

CMC SYSTEM-NO00 ROUTINE RETRIEVAL

13-APR-1955 (46 yr)

Male

Loc: 8

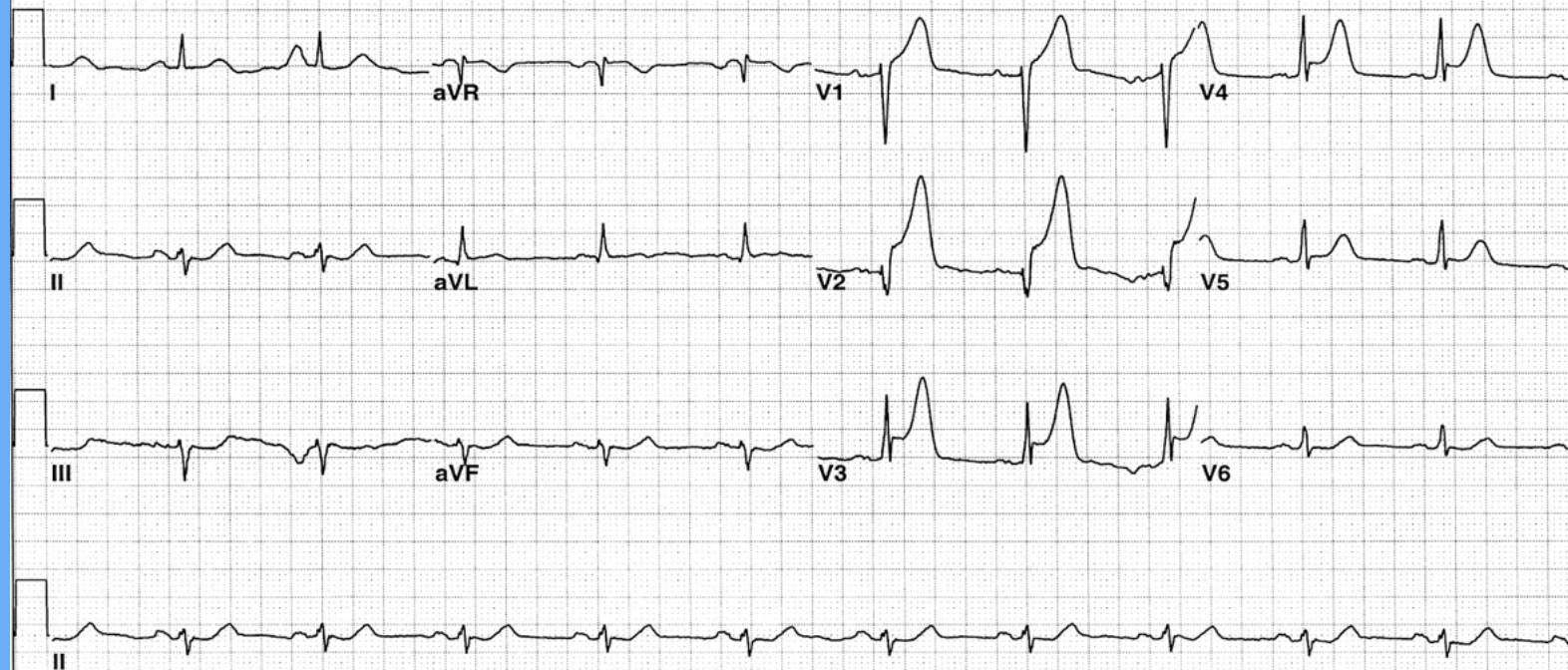
Vent. rate	65	BPM
PR interval	168	ms
QRS duration	100	ms
QT/QTc	396/411	ms
P-R-T axes	49 -31	34

Technician: 56

EHBO:

Referred by:

Confirmed By: ECG AFD COMPUTER



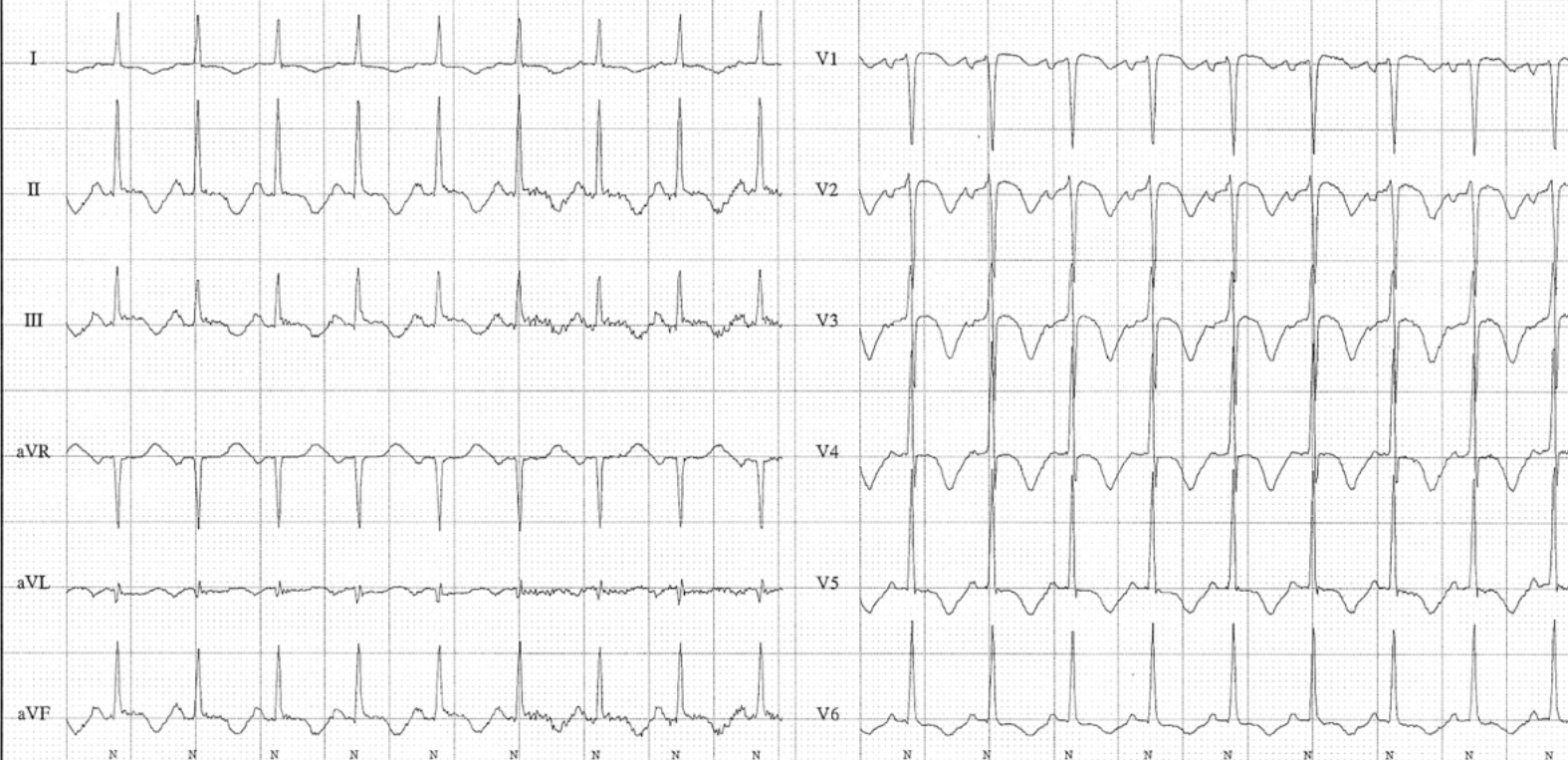
25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 5

EID:103 EDT: 09:34:30-JAN-2002 ORDER:

Page 1

do 16 jan 2003 08:11:16

25 mm/s 10 mm/mV



Lieshout v-Regt, B.

ID: 6367982

21-AUG-2002 11:56:20

UMC UTRECHT-B310 ROUTINE RETRIEVAL

04-JUN-1939 (63 yr)
Female

Vent. rate	69	BPM
PR interval	176	ms
QRS duration	88	ms
QT/QTc	380/407	ms
P-R-T axes	25 -12 -56	

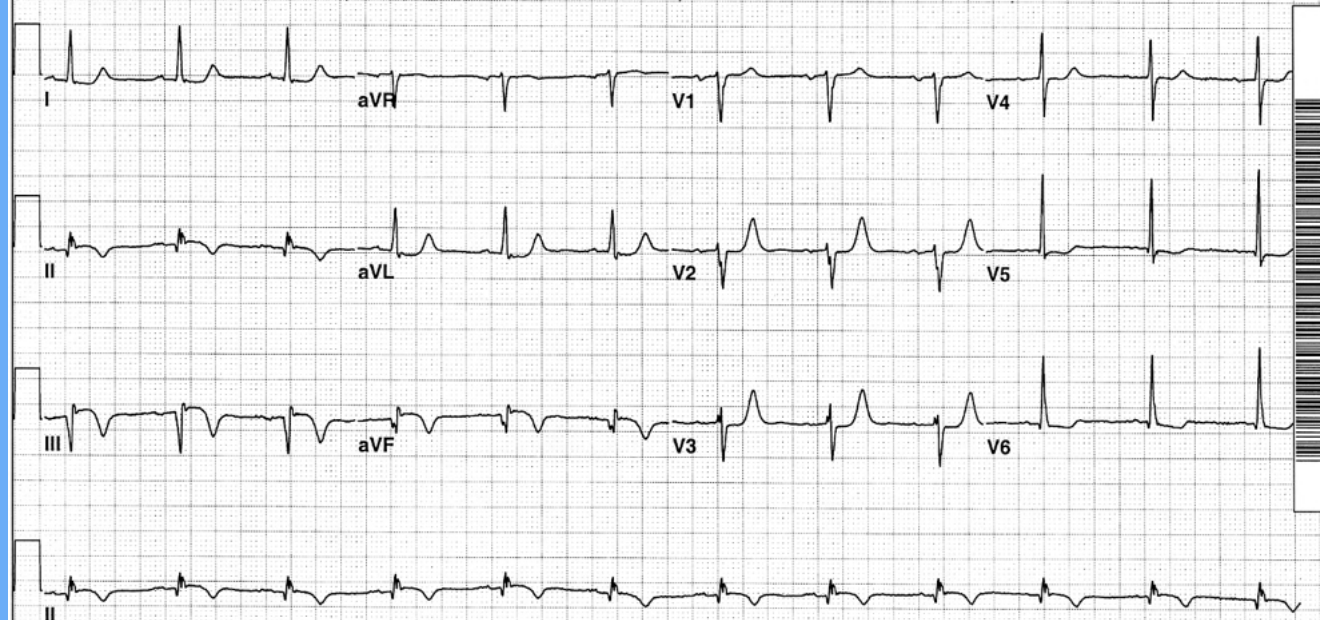
Loc: 13

Technician: 19

Referred by:

Confirmed By: ECG AFD COMPUTER

B4:



25mm/s 10mm/mV 150Hz 005C 12SL 229 CID: 4

EID: 104 EDT: 13:00 22-AUG-2002 ORDER:

Page 1 of 1

09-SEP-1926 (75 yr)

ID: 1007020

12-JUL-2002 22:33:30

OMC STRECHT-N000 ROUTINE RETRIEVAL

Female

Vent. rate	125	BPM
PR interval	148	ms
QRS duration	78	ms
QT/QTc	284/409	ms
P-R-T axes	64 30 79	

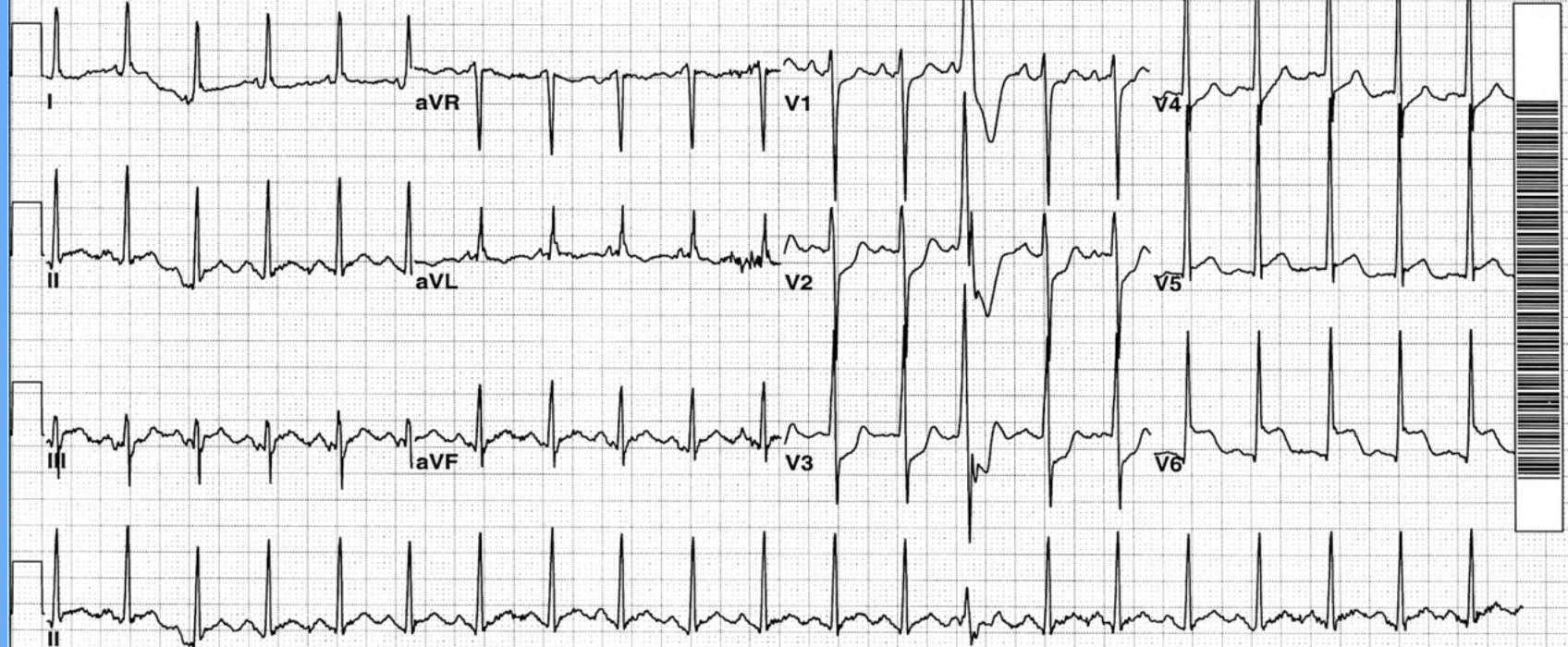
Loc: 8

Technician: 56

Referred by:

Confirmed By: L. OTTERSPOOR

RESERVE:

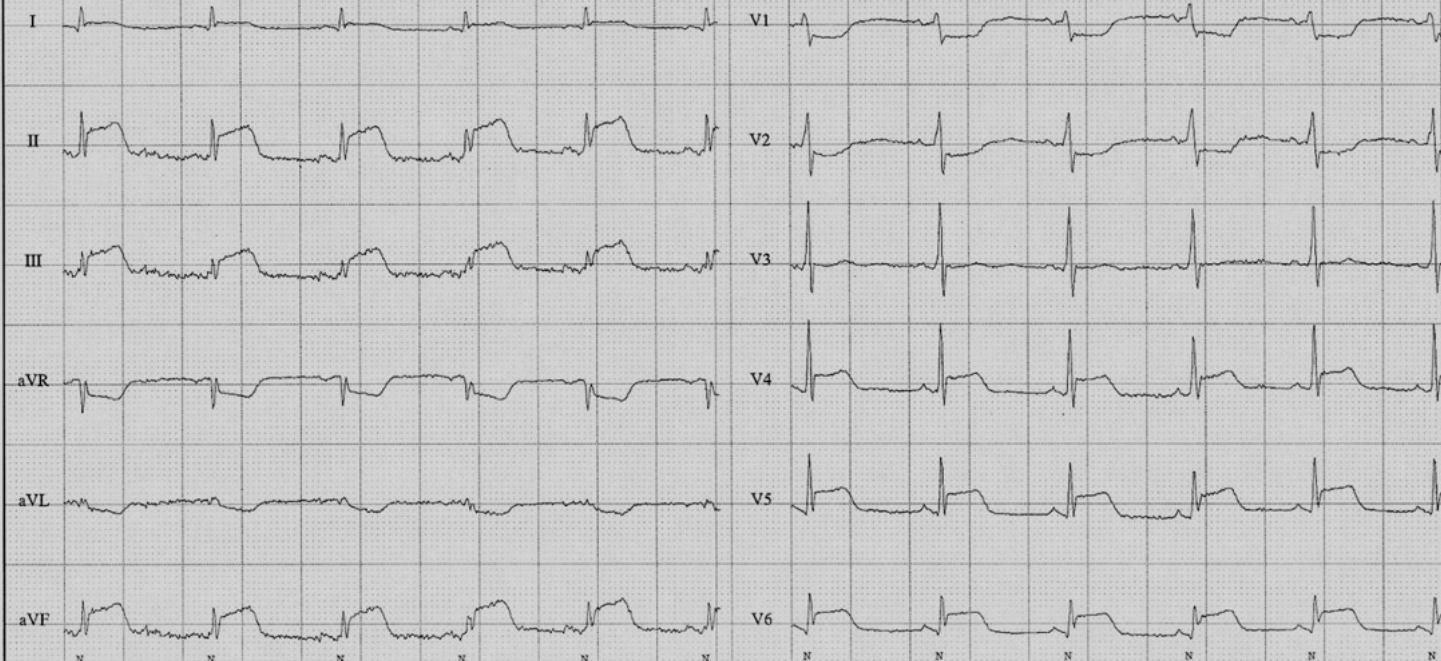


Naam patiënt : berkel v
Patiënt ID : 3216950
Site : Hospital CCU Unit Number

Cursor tijd : 04 jan 2003 01:39:36
Voorval/Ritme :

za 4 jan 2003 01:39:34

25 mm/s 10 mm/mV



11-AUG-1920 (79 yr)
Male

Loc: 13

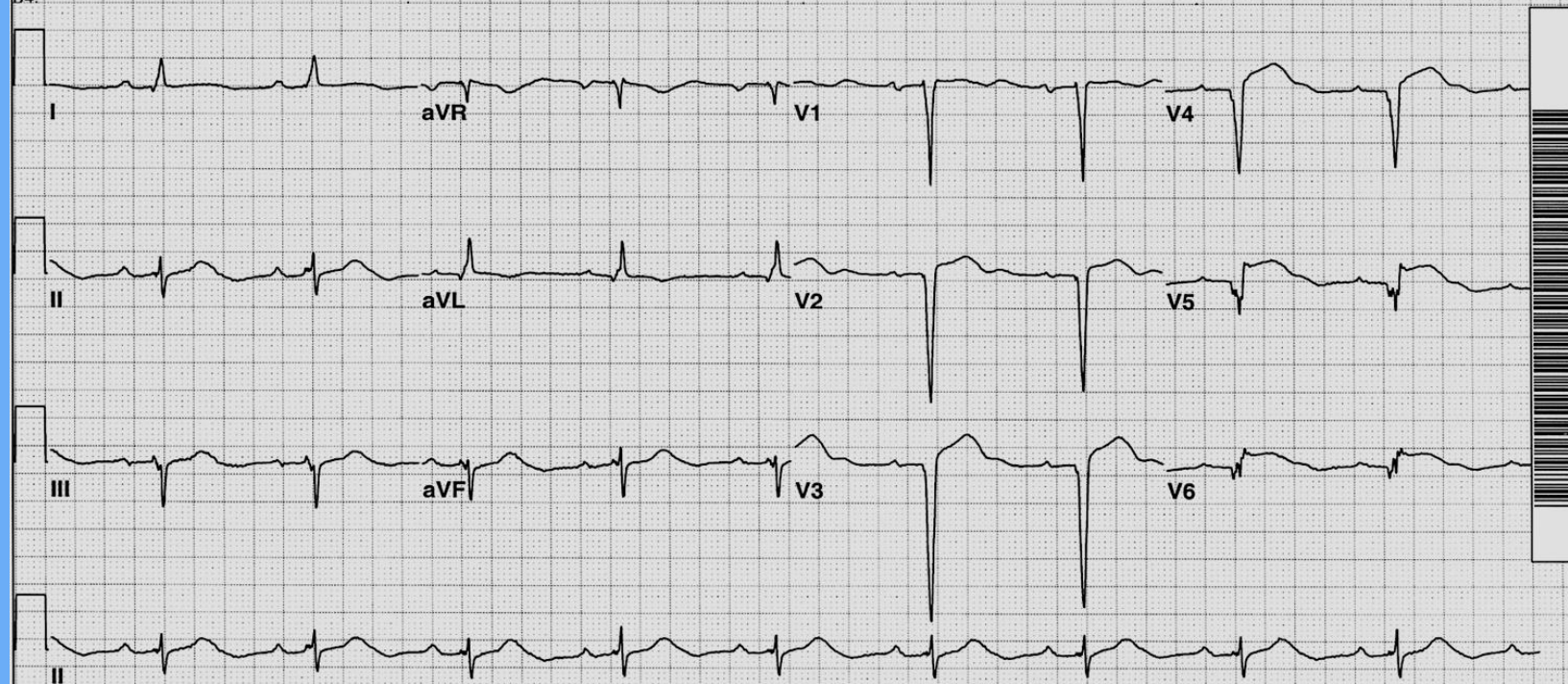
Vent. rate	57	BPM
PR interval	228	ms
QRS duration	104	ms
QT/QTc	438/426	ms
P-R-T axes	39 -43	74

Technician: 53

Referred by:

Confirmed By: ECG AFD COMPUTER

B4:



25mm/s 10mm/mV 150Hz 005C 12SL 252 CID: 4

EID: 103 EDT: 12:29:09-JUN-2000 ORDER:

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