Dag 2 Basiscursus ECG

Jonas de Jong
Voorzitter Stichting Cardionetworks

Ritmestoornissen

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Cursusoverzicht

- Dag 1: Basis, systematische beoordeling
  - Ivo van der Bilt
- Dag 3: Ritmestoornissen
  - Jonas de Jong
- Dag 2: Ischemie
  - Martijn Meuwissen

De cursus is interactief. Onderbreek gerust!

Cardionetworks

Auteurs:

- Jonas de Jong
- Ivo van der Bilt
- Dr. Martijn Meuwissen
- Dr. Renée van den Brink
- Dr. Joris de Groot

Illustraties:

- Rob Kreuger
- Bart Duineveld
- Jonas de Jong

Met dank aan:

- Prof. Dr. Arthur Wilde
- Dr. Rudolph Koster

Boeken:

- Wellens: *The ECG in Emergency Decision Making*
- Garcia / Miller: *Arrhythmia Recognition*
- *Braunwald Heart Disease*

Programma

- Korte herhaling
  - 7+2 stappenplan
  - Ischemie
  - Geleidingsstoornissen
- Ritmestoornissen
  - Theorie
  - Oefen-ECG’s

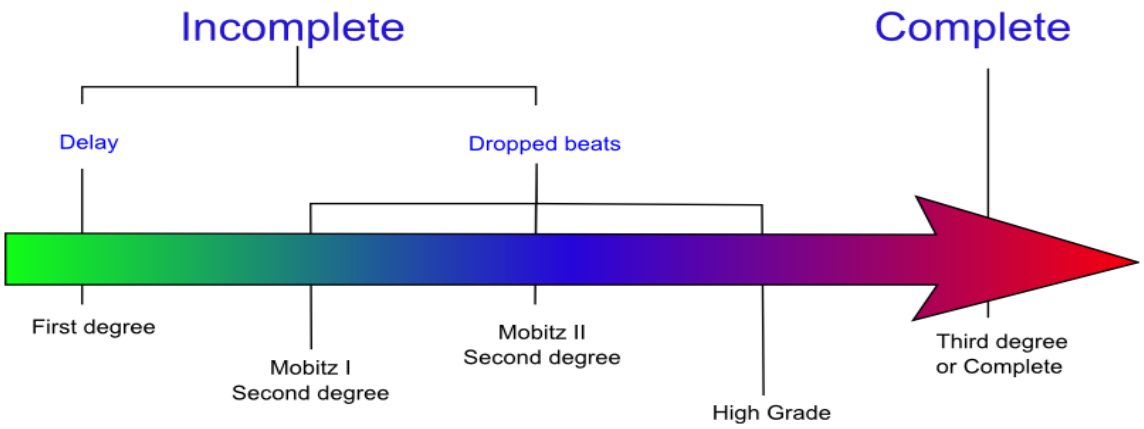
7+2 stappenplan

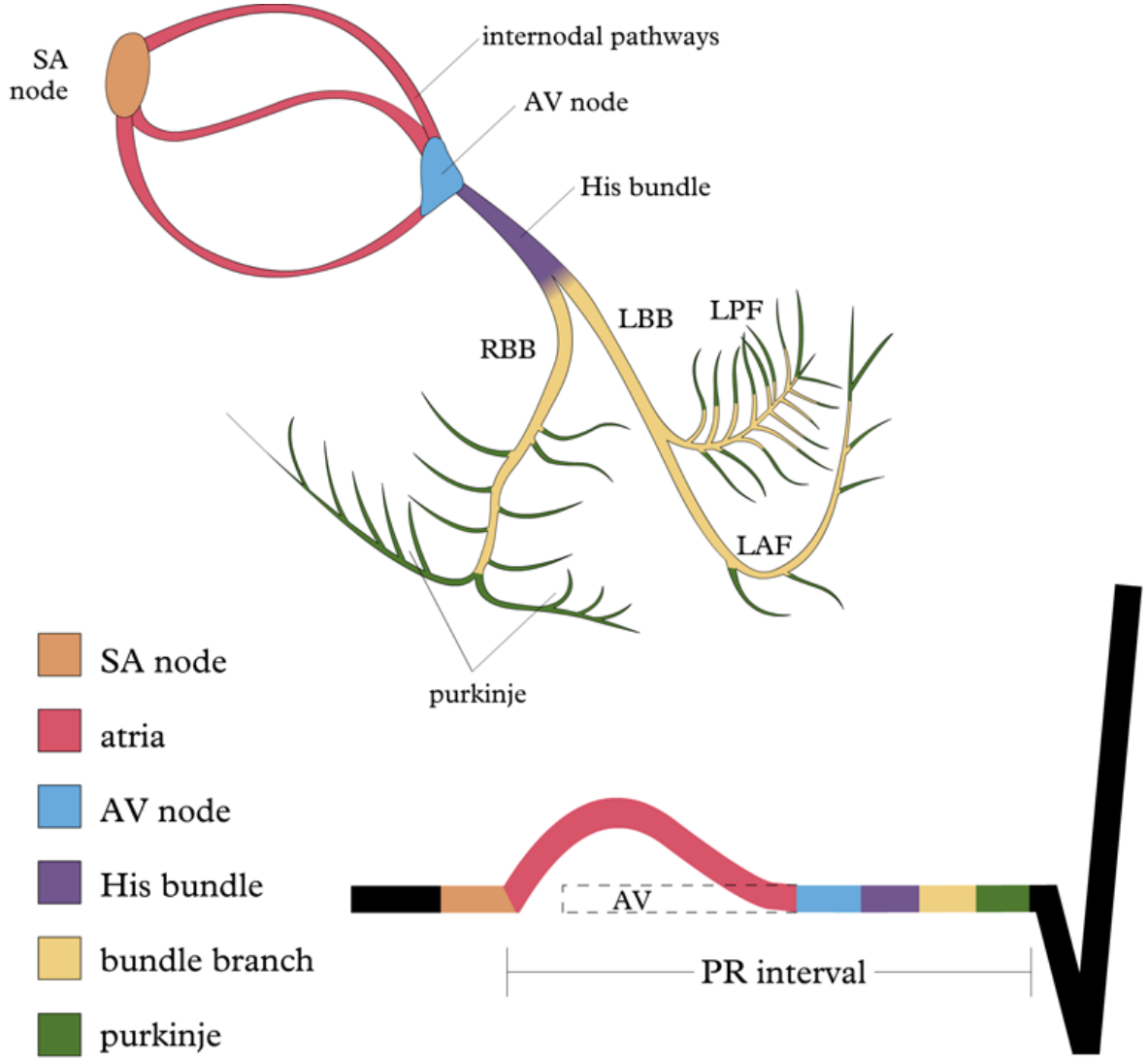
1. Ritme
2. Hartfrequentie
3. Geleidingstijden
4. Hartas
5. P top morfologie
6. QRS morfologie
7. ST morfologie

- Vergelijking met het oude ECG
- Conclusie

Geleidingsstoornissen

- 1e graads: verlengde PQ tijd > 200ms
- 2e graads
  - Type I (Wenkebach): PQ tijd neemt toe van complex tot complex tot er een complex uitvalt.
  - Type II (Mobitz): PQ tijd is normaal, maar niet alle p-toppen worden gevolgd (plotselinge uitval)
- Hooggradig AV blok
- 3e graads: totaal blok





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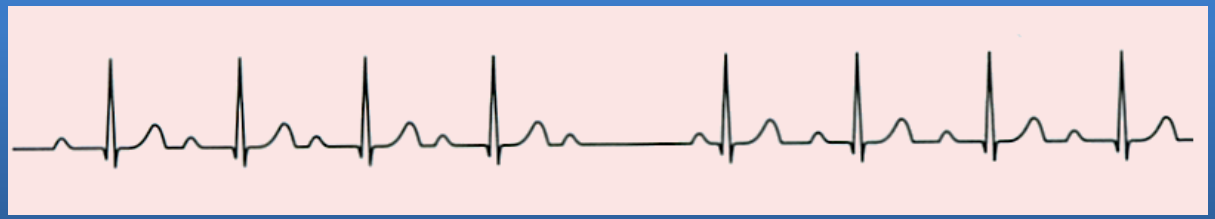
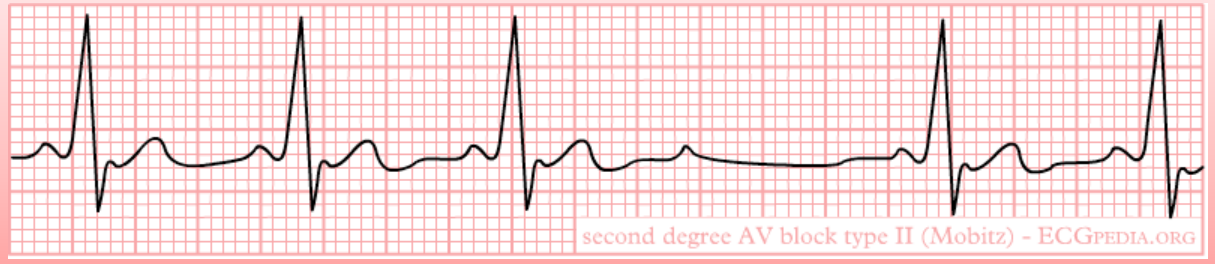
1e graads AV blok

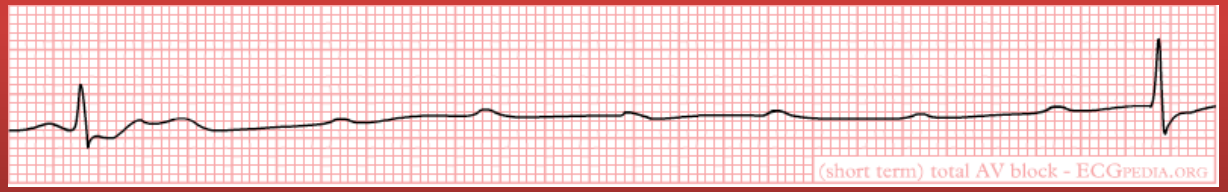
2e graads AV blok I
Wenkebach



2e graads AV blok II
Mobitz



3e graads AV blok
Totaal AV blok



RITMESTOORNISSEN

Indeling ritmestoornissen

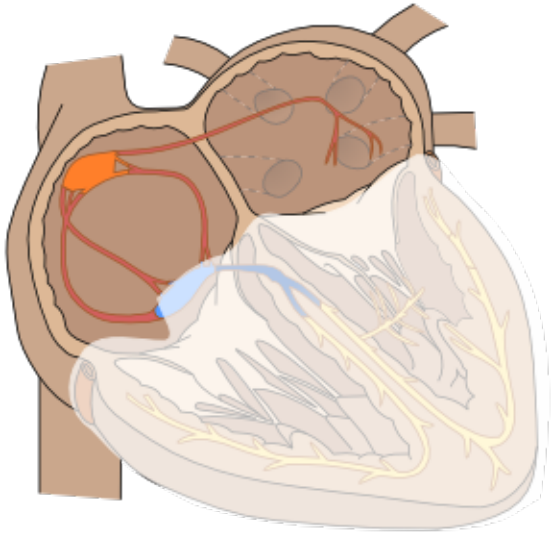
Naar oorsprong

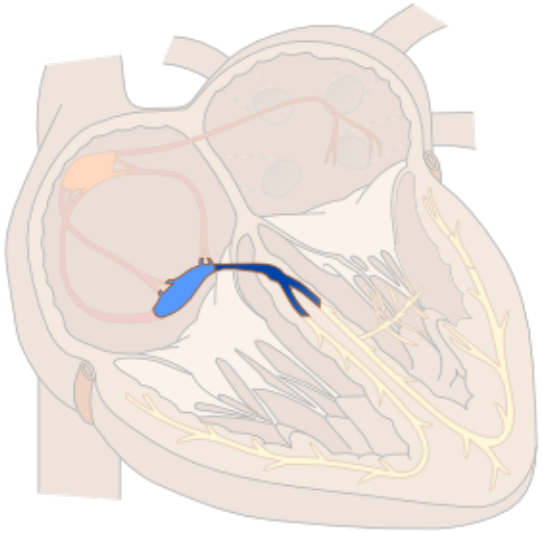
Supraventricular

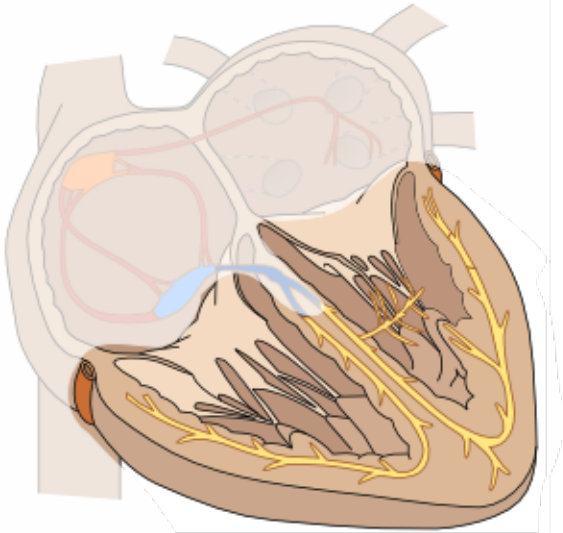
Atrial

Nodal

Ventricular







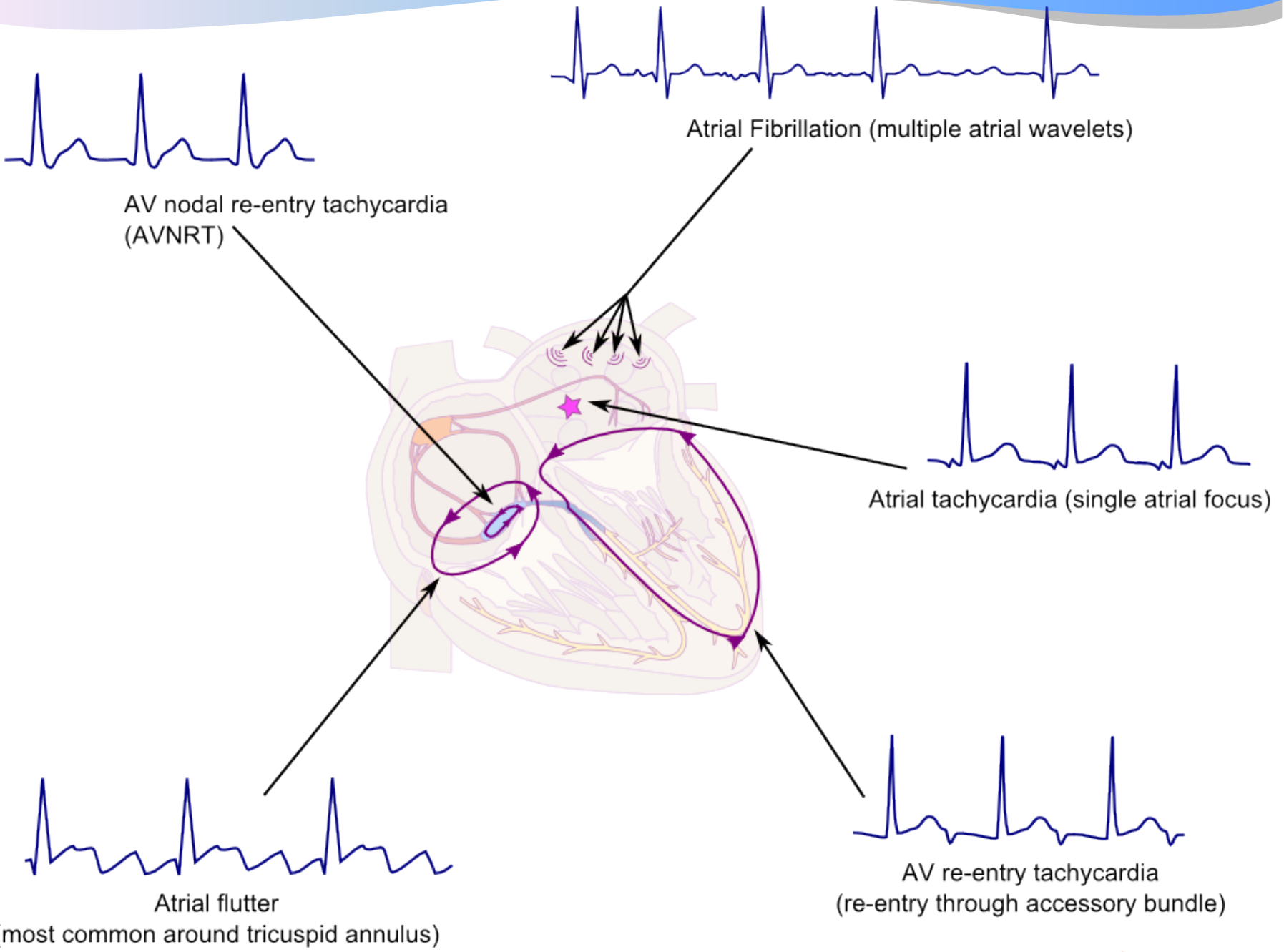
Ritmestoornissen

Nomenclatuur

- **extrasystole** : vroeg vallende slag
- **escapeslag**: slag volgend op pauze, meestal uit distaal weefsel
- **bradycardie** : < 60 bpm
- **tachycardie** : > 100 bpm
- **supraventriculaire ritmestoornis**: oorsprong van boven de bifurcatie in de bundel van His
- **re-entry** (anatomisch, Aflut/AVNRT/AVRT vs functioneel AF/VF)
- **ventriculaire ritmestoornis**: origine uit ventrikel (distaal van bifurcatie His)
- **breed** QRS complex (>0.12 sec)
- **smal** QRS complex (<0.12 sec)
- **AV dissociatie**: geen relatie tussen depolarisatie van atria en ventrikels

Indeling SVT

	Regulair	HR (bpm)	P-top	Therapie
Smal QRS(<0,12)				
Sinustachycardie	Ja	100-180	Voor ieder QRS complex	Geen of behandeling oorzaak (koorts, angst, anemie)
Atriale tachycardie	Ja	75-200	Voor ieder QRS complex maar afwijkende vorm	Sinus carotis massage, betablocker, amiodarone
Atriumfibrilleren	Nee	60-175	afwezig	Chemische/electrische cardioversie of rate control
Atriumflutter	Ja	75-150	Zaagtand m.n. in afleiding II	Chemische/electrische cardioversie of rate control
AVNRT	Ja	180-250	In of na QRS complex	Sinus carotis massage, adenosine
AVRT	Ja	150-250	RP<PR	Chemische/electrische cardioversie of rate control
Breed QRS(>0,12)				
SVT met block	Ja	75-200	afwezig	
AVRT	Ja	150-250	RP<PR	



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Supraventriculaire Ritmestoornissen

Sinusknoop

- Sinusritme: regelmatig,elk QRS-complex wordt
  voorafgegaan door een P-top (+ in I,II,AVF)
  » *normaal* :60-100/min
  » *sinusbradycardie* :< 60/min
  » *sinustachycardie* :>100/min
- Sinusaritmie: normale P-toppen, normaal PR-interval
  irregulair PP-interval met variatie > 0.16 sec.
- Sinusarrest

Smal complex tachycardie

- **Sinustachycardie**
- Sinusbradycardie
- Boezemfibrilleren
- Boezemflutter
- AVNRT
- (anders …)

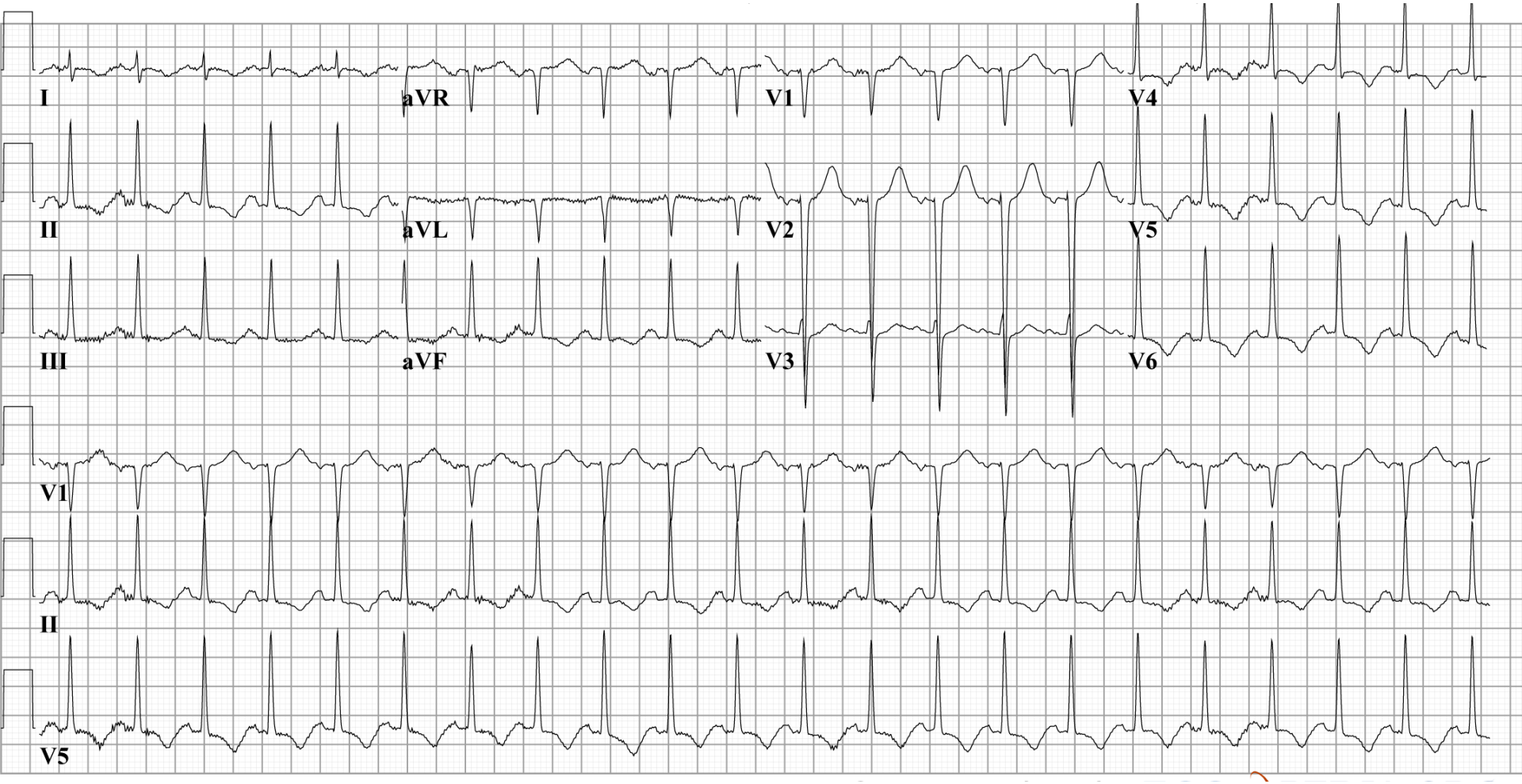
Sinusritme > 100 /min

- Inspanning
- Stress
- Alcohol / caffeine
- Medicatie

Bij ziekte:

- Koorts
- Hypotensie
- Anemie
- Hyperthyreoidie
- Cardiomyopathie

Sinustachycardie



Courtesy of I.A.C. van der Bilt

- Sinustachycardie
- **Sinusbradycardie**
- Boezemfibrilleren
- Boezemflutter
- AVNRT
- (anders …)

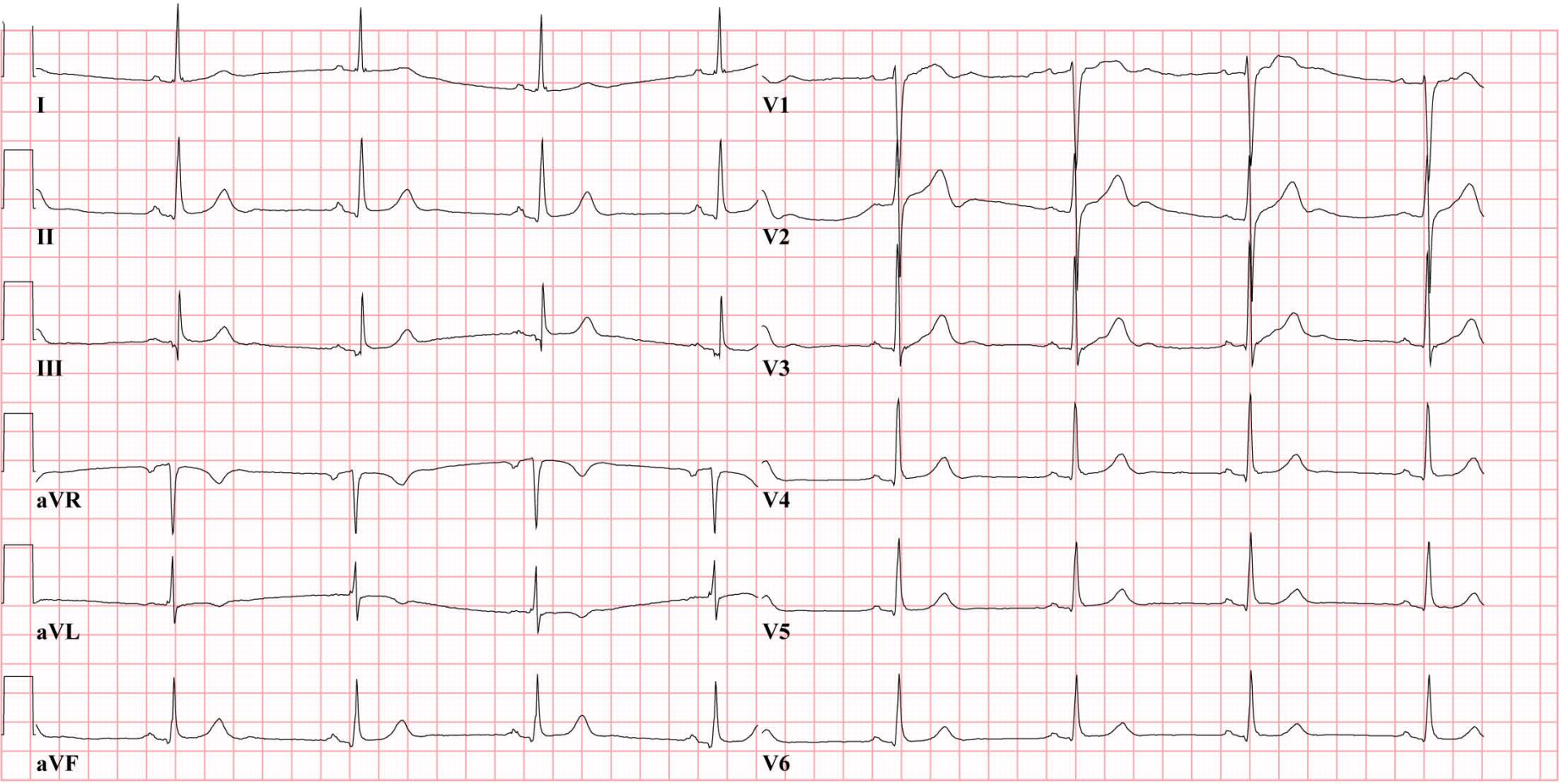
Sinusritme < 60 /min

- Sporters
- Rust
- Vagus stimulatie/sinus carotis massage/ vagale collaps
- Medicatie

Bij ziekte:

- SA blocks
- Neurotrauma
- Intracraniële druk verhoging
- Sick sinus syndrome

Sinusbradycardie



25mm/s 10mm/mV 150Hz 7.0.2 12SL 235 CID: 251

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Geen SR →Wat nu?

- Frequentie?
- Breed of smal?
- Extra slagen?
- Hartas?

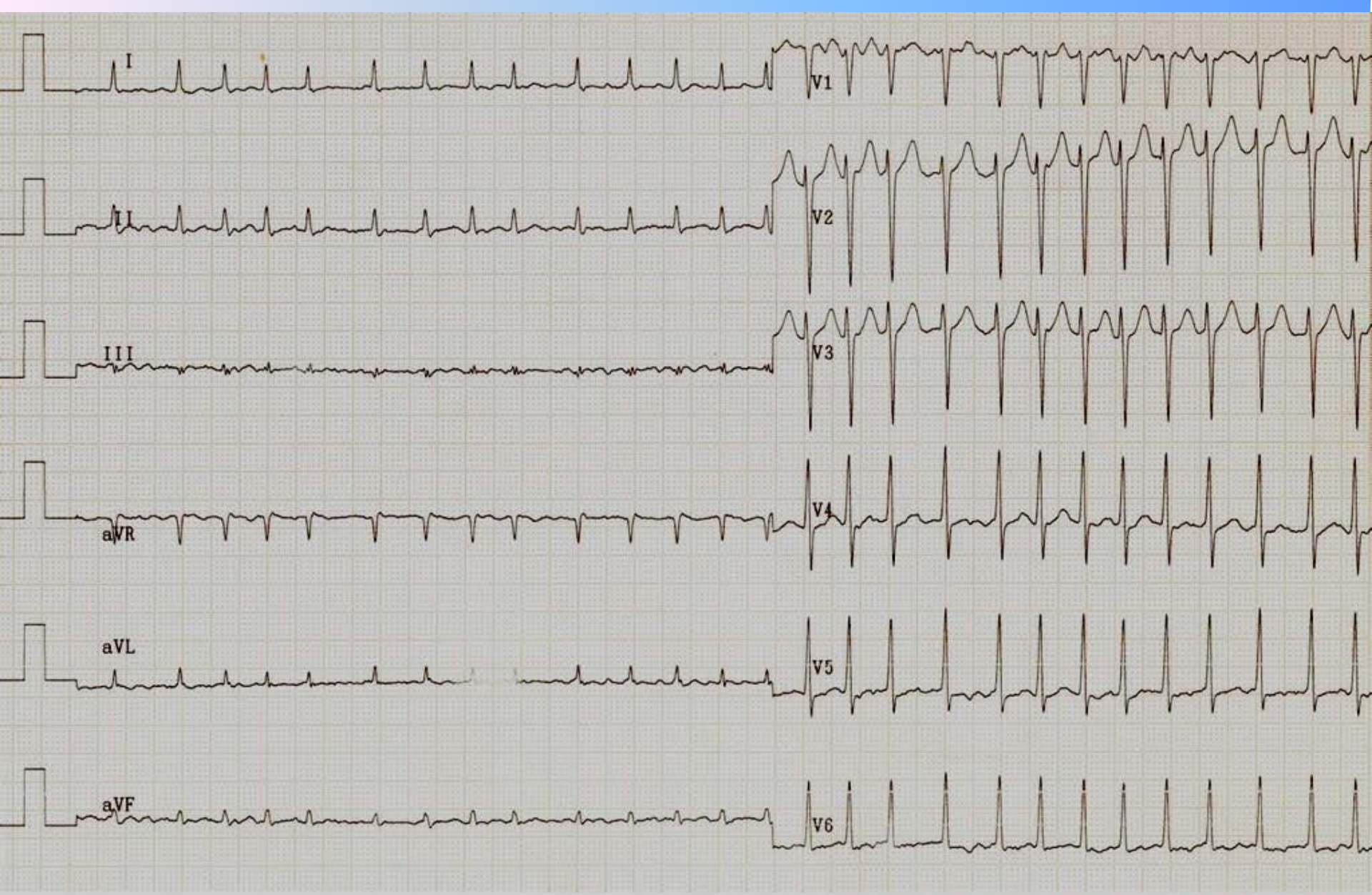
- Cherchez le “P”

Smal complex tachycardie

- Sinustachycardie
- Sinusbradycardie
- **Boezemfibrilleren**
- Boezemflutter
- AVNRT
- (anders …)

Volstrekt irregulair? → vrijwel altijd atriumfibrilleren (AF)

- **Permanent**: chronisch
- **Persisterend**: recidief ondanks chemische/electrische cardioversie
- **Paroxysmaal**: spontaan recidiverend



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AMC, The Netherlands

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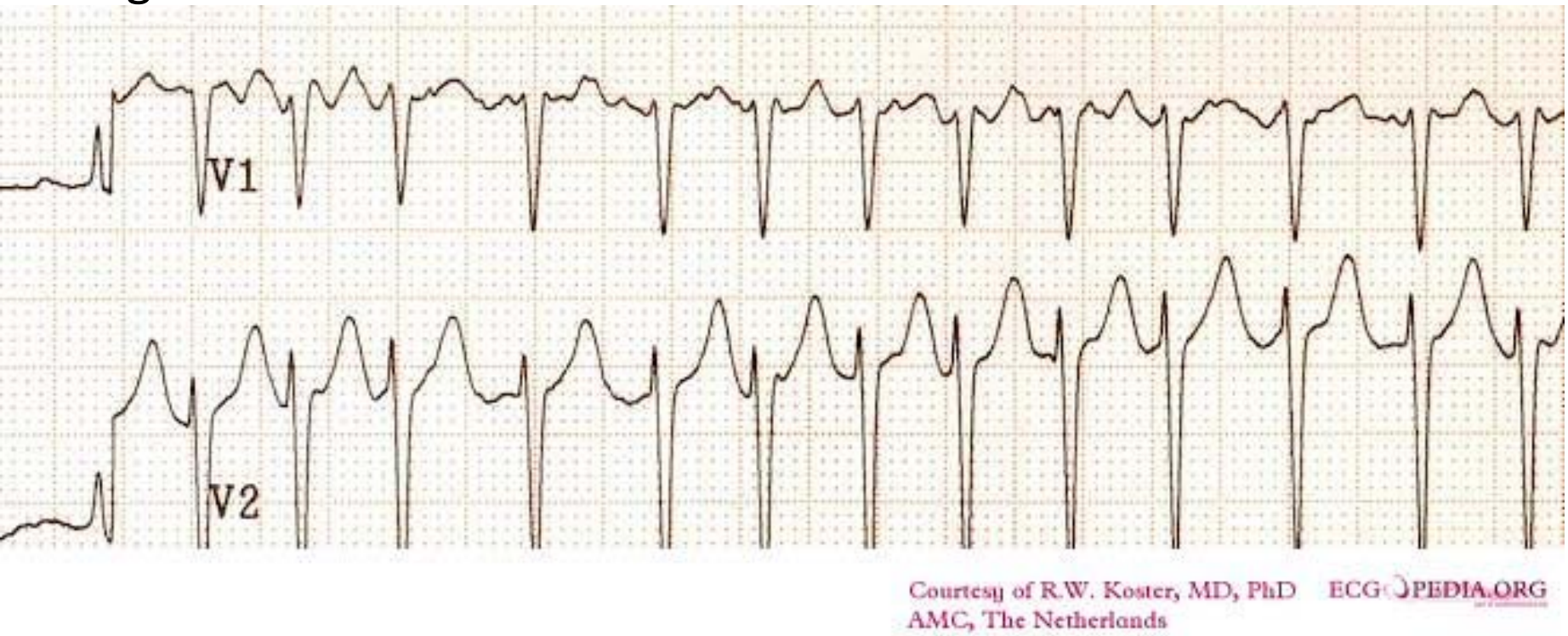
Irregulair


V1
V2
Courtesy of R.W. Koster, MD, PhD
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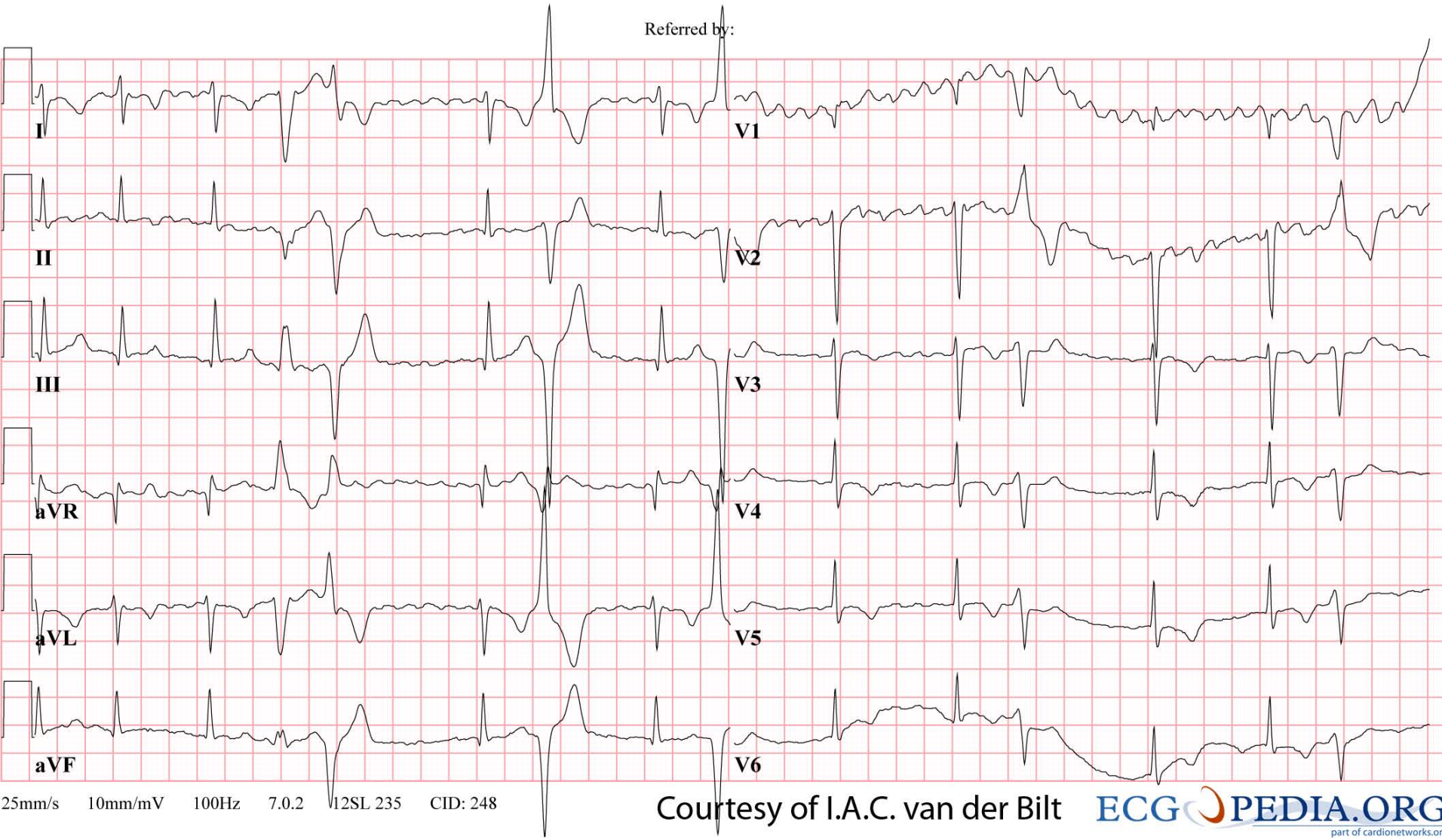

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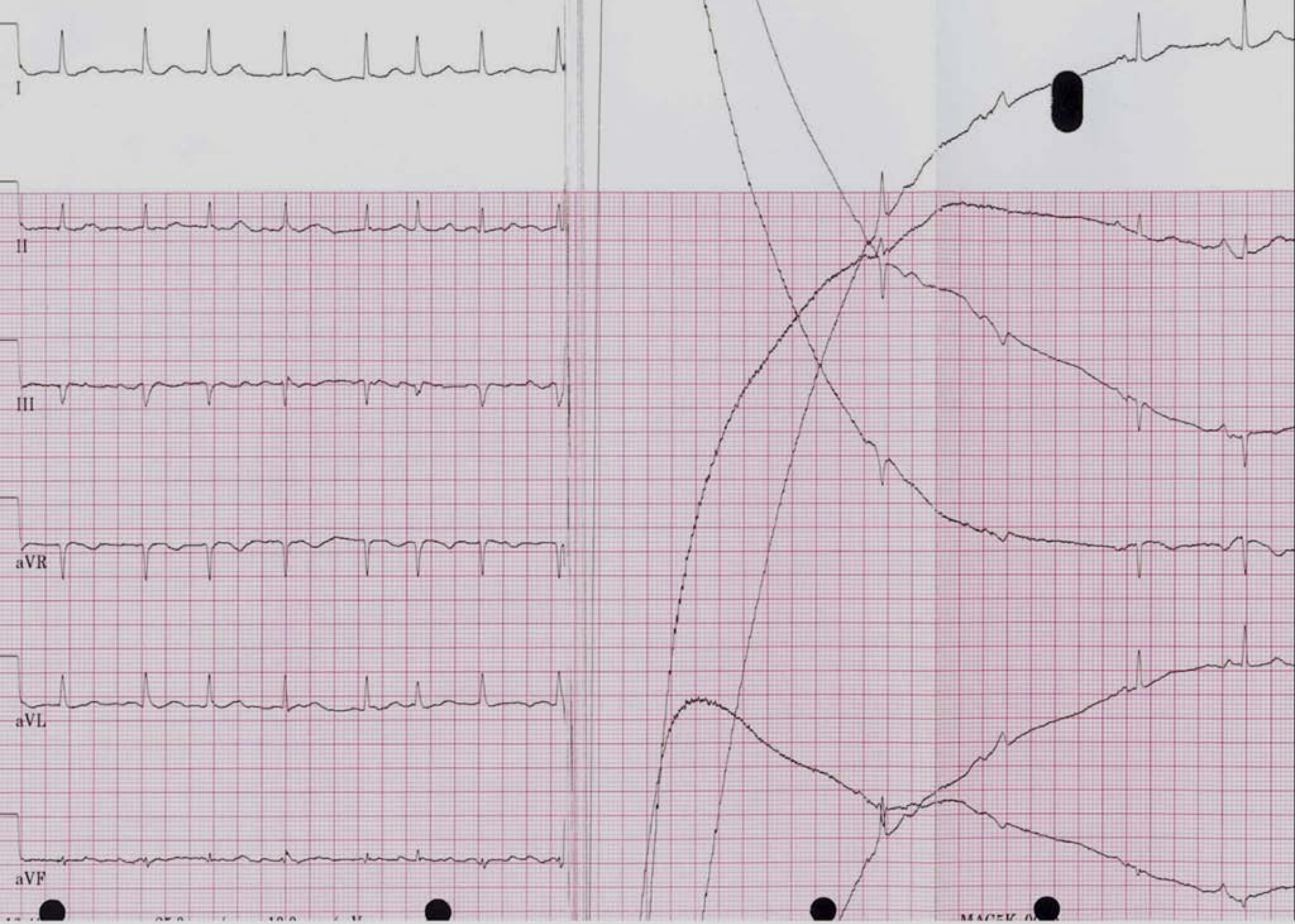

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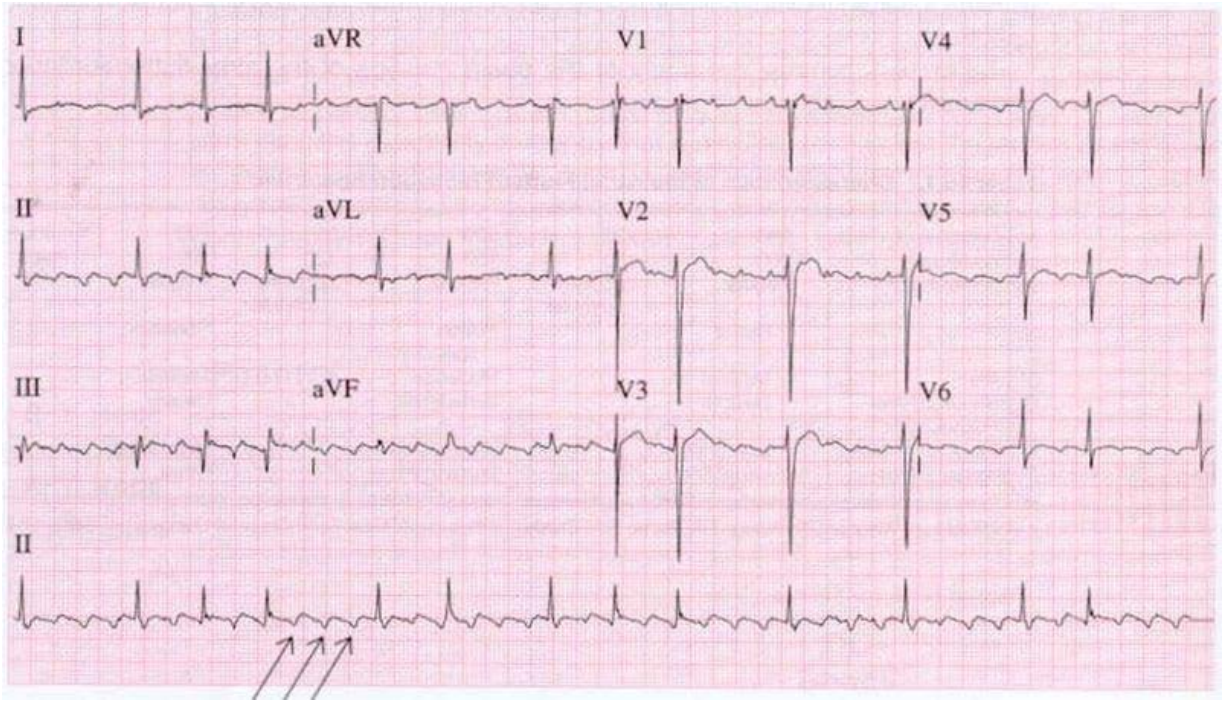
Smal complex tachycardie

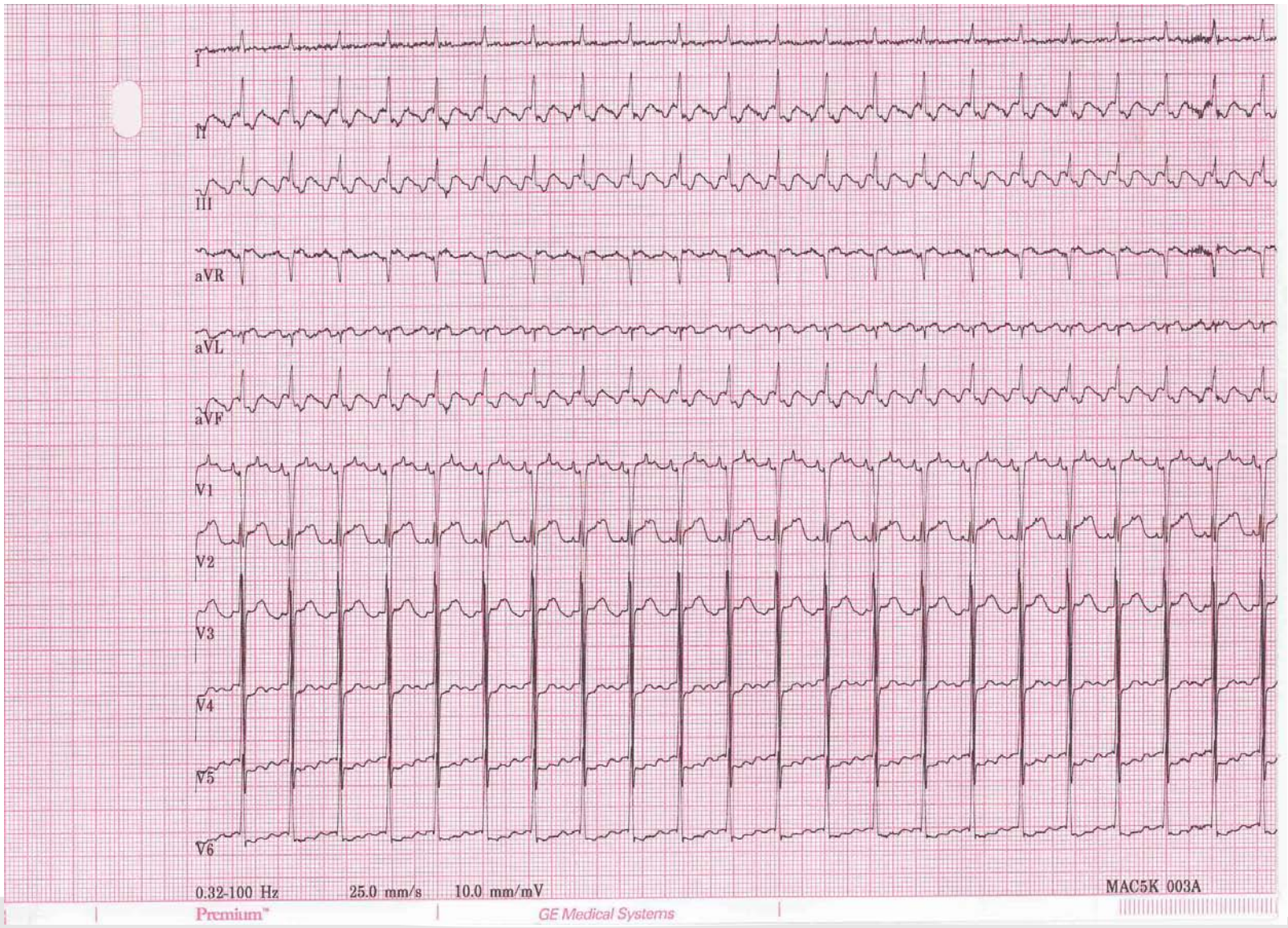
- Sinustachycardie
- Sinusbradycardie
- Boezemfibrilleren
- **Boezemflutter**
- AVNRT
- (anders …)

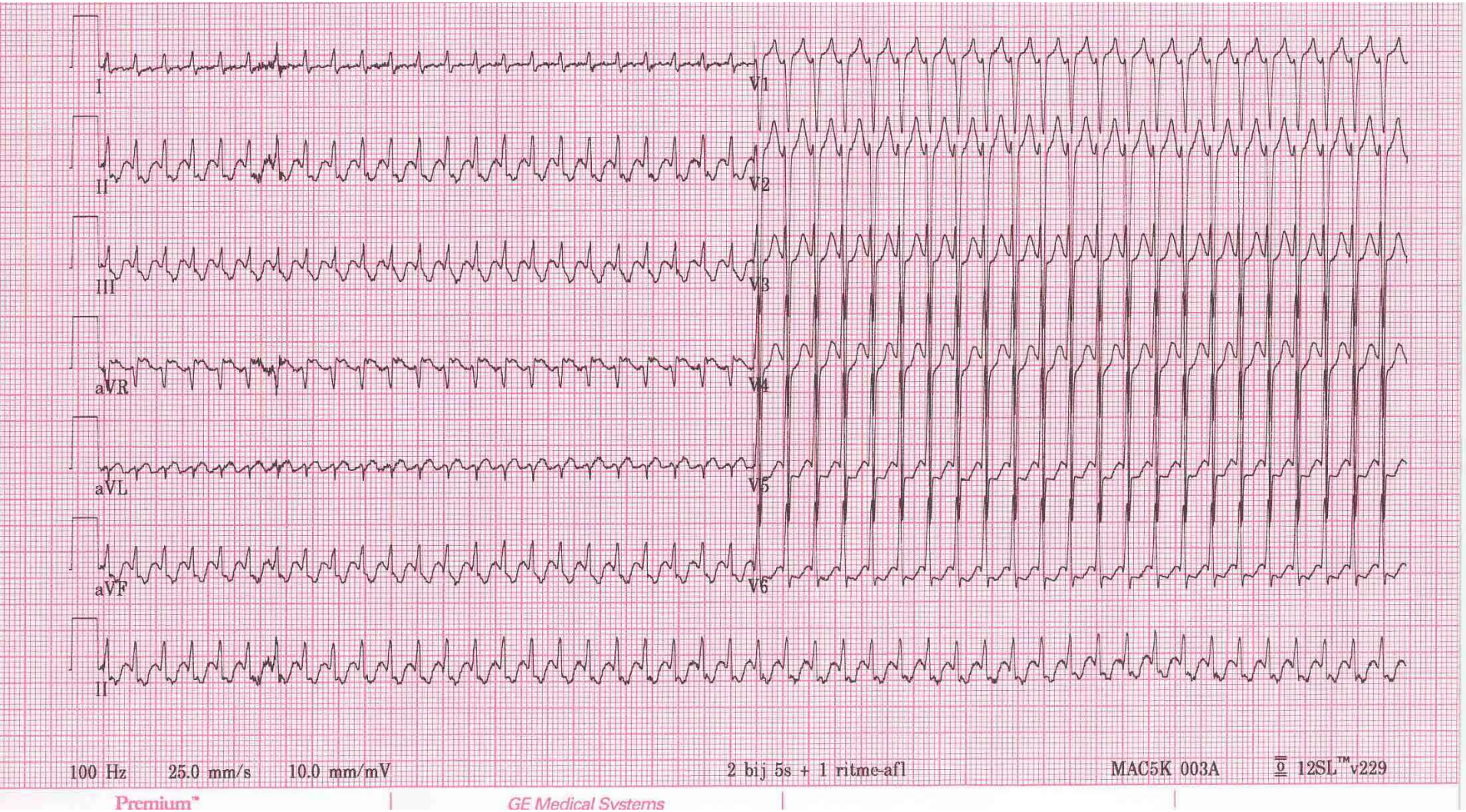
"Iedere tachycardie van 150/min is een boezemflutter tot het tegendeel bewezen is"



Zaagtand!

Boezemflutter




I
II
III
aVR
aVL
aVF
II
V1
V2
V3
V4
V5
V6
100 Hz
25.0 mm/s
10.0 mm/mV
2 bij 5s + 1 ritme-afl
MAC5K 003A
12SL™v229
Premium™
GE Medical Systems

Smal complex tachycardie

- Sinustachycardie
- Sinusbradycardie
- Boezemfibrilleren
- Boezemflutter
- **AVNRT**
- (anders …)

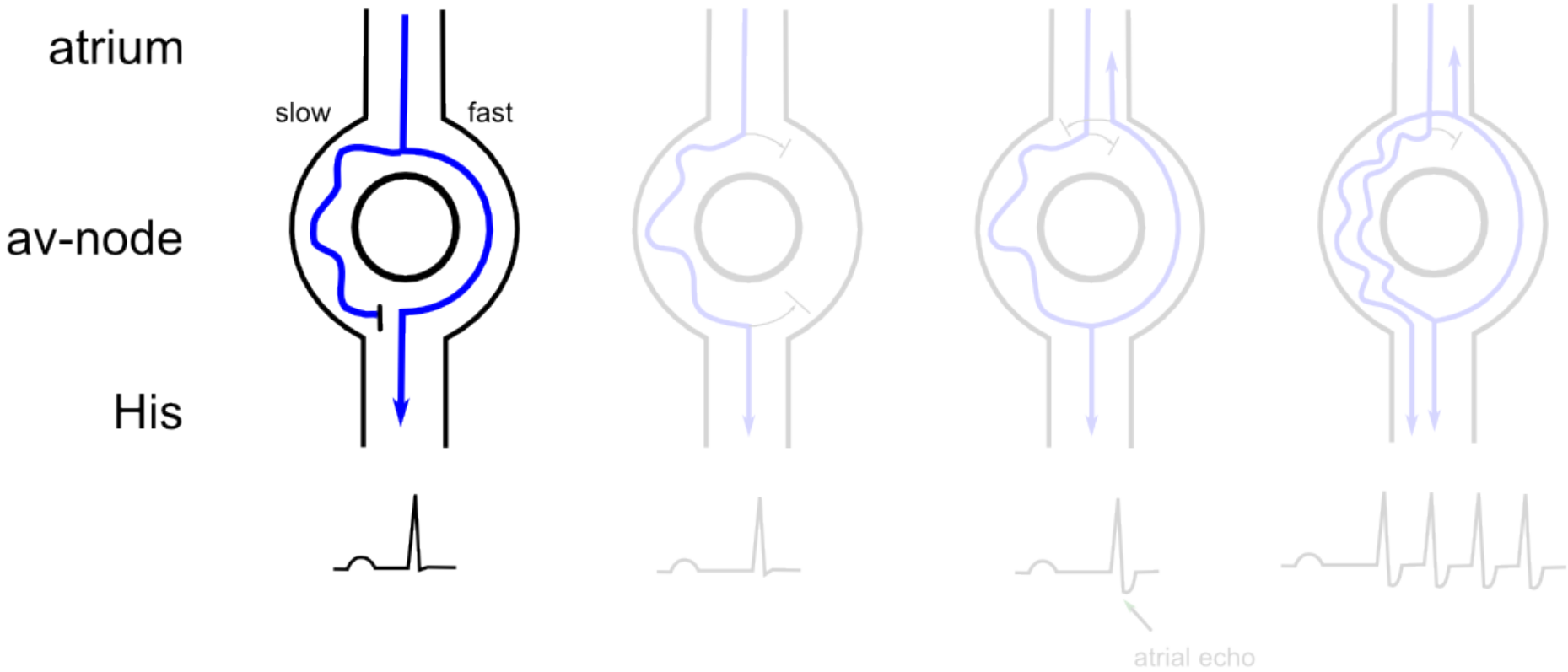
AV Nodale re-entry tachycardie.

- Frequentie: 180-250 / min
- R-R’ in V1
- Typisch jonge patiënt
- Recidiverend

Manoeuvres:

- Hurken
- Sinus carotis massage
- Adenosine

Re-entry



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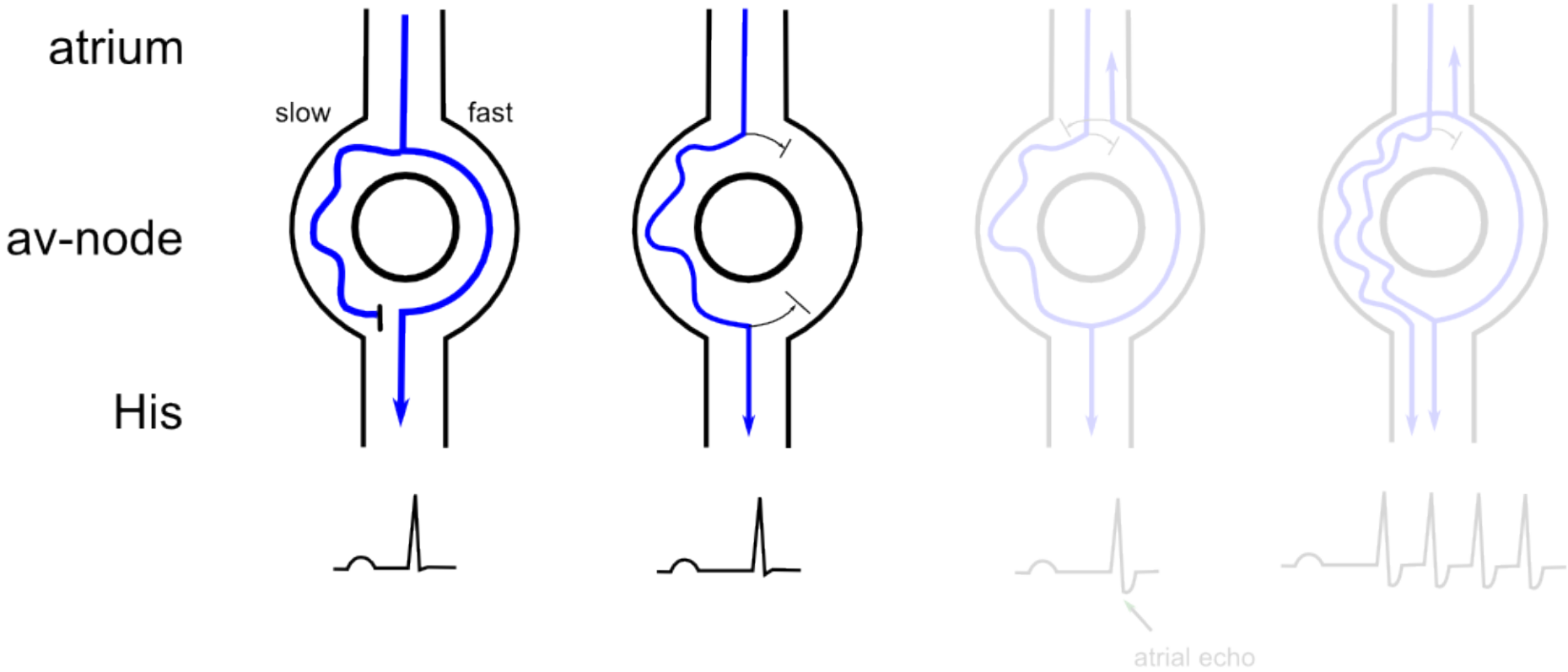
Re-entry



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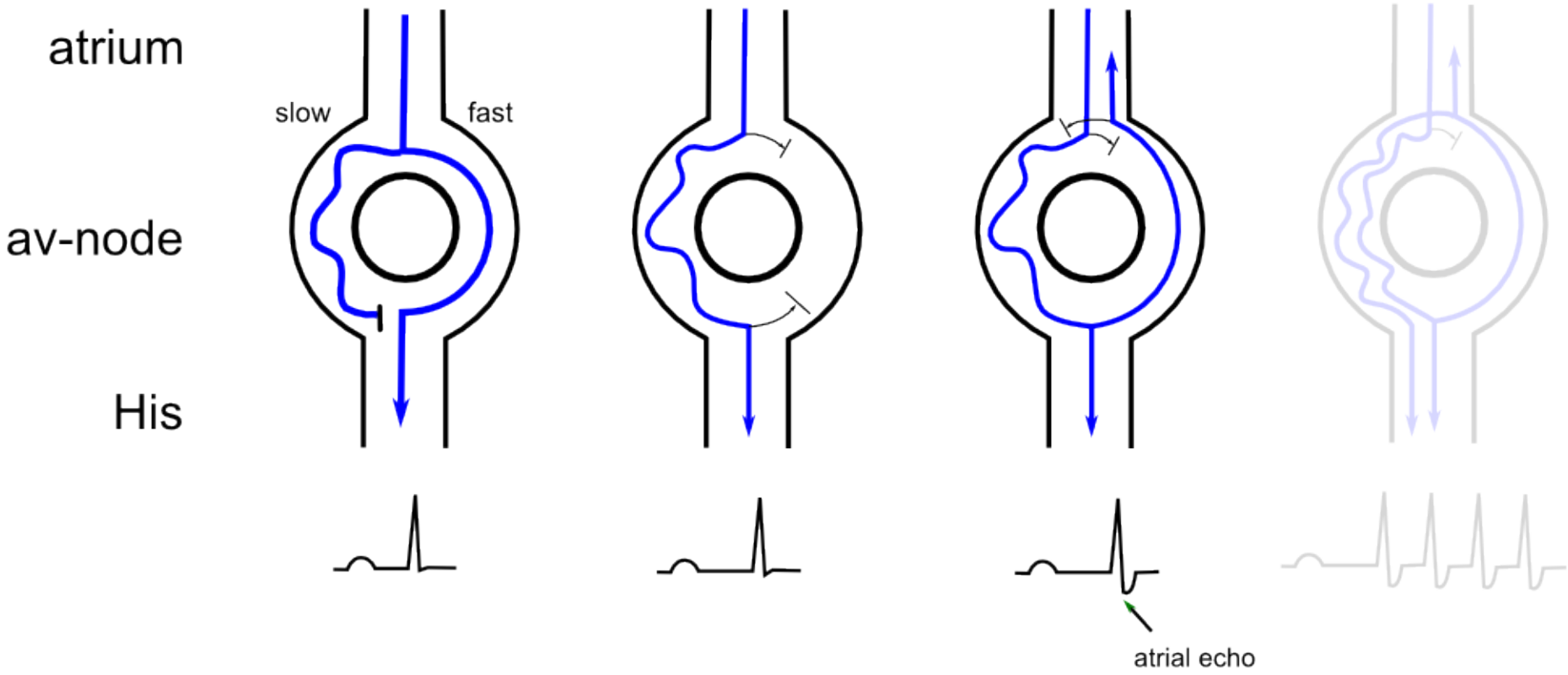
Re-entry



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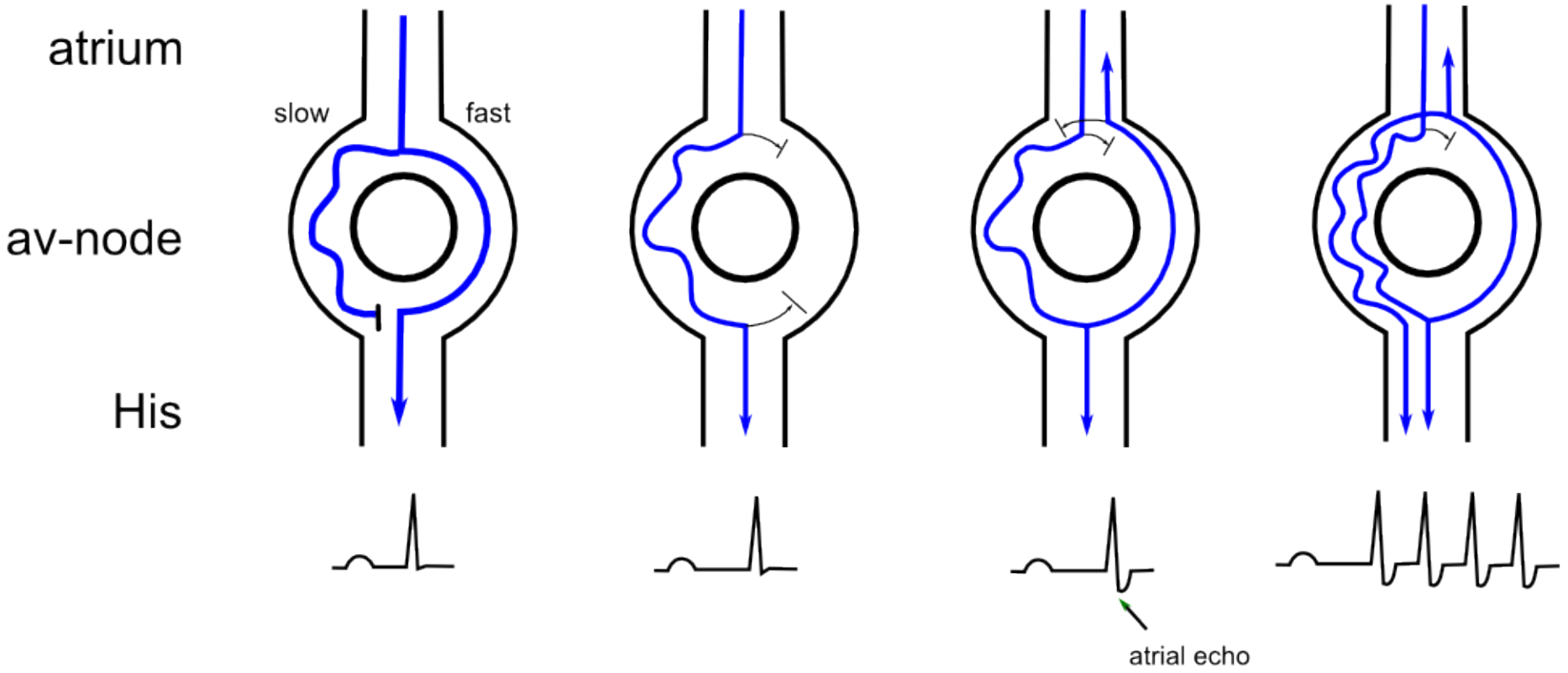
Re-entry



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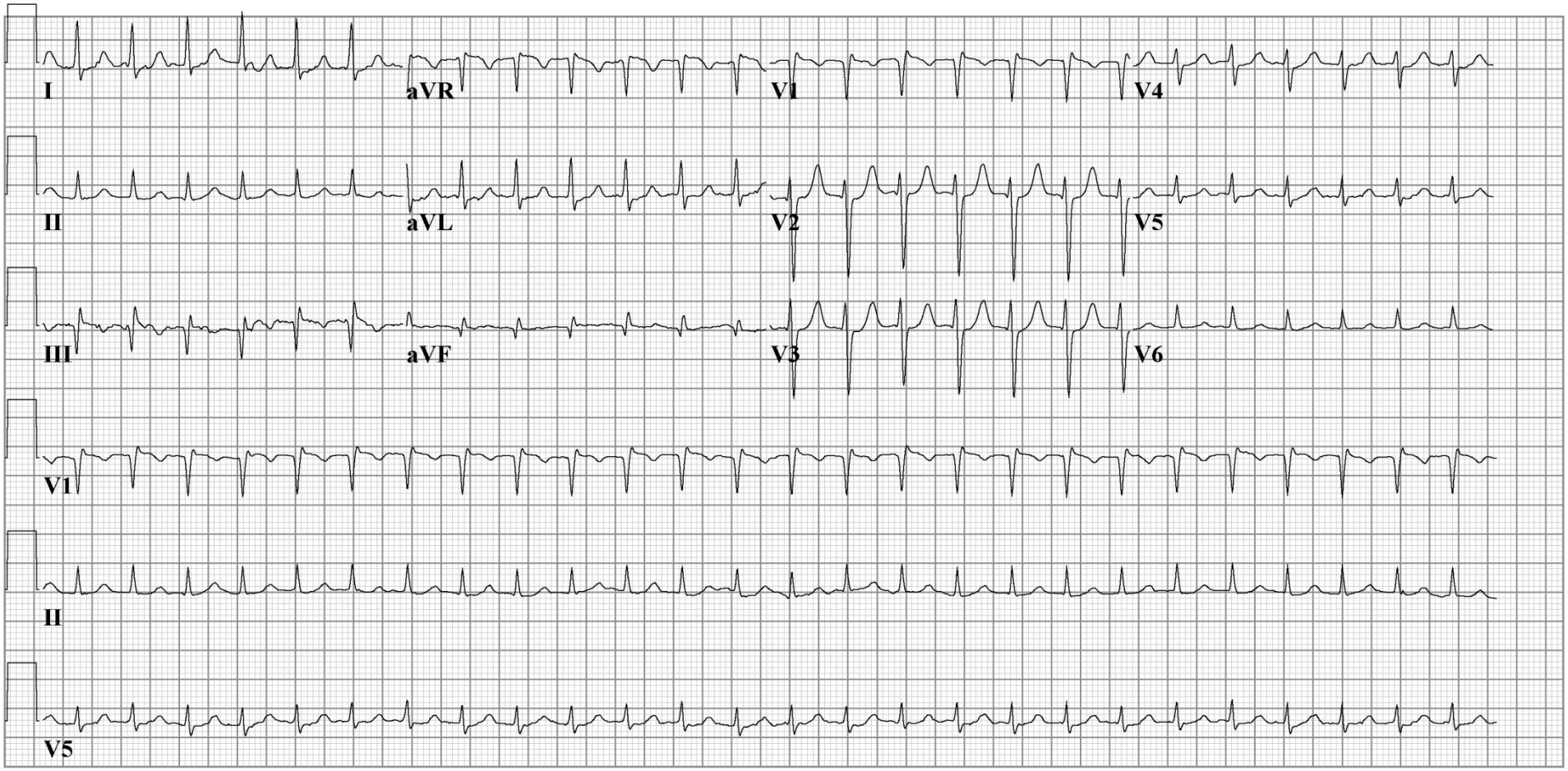
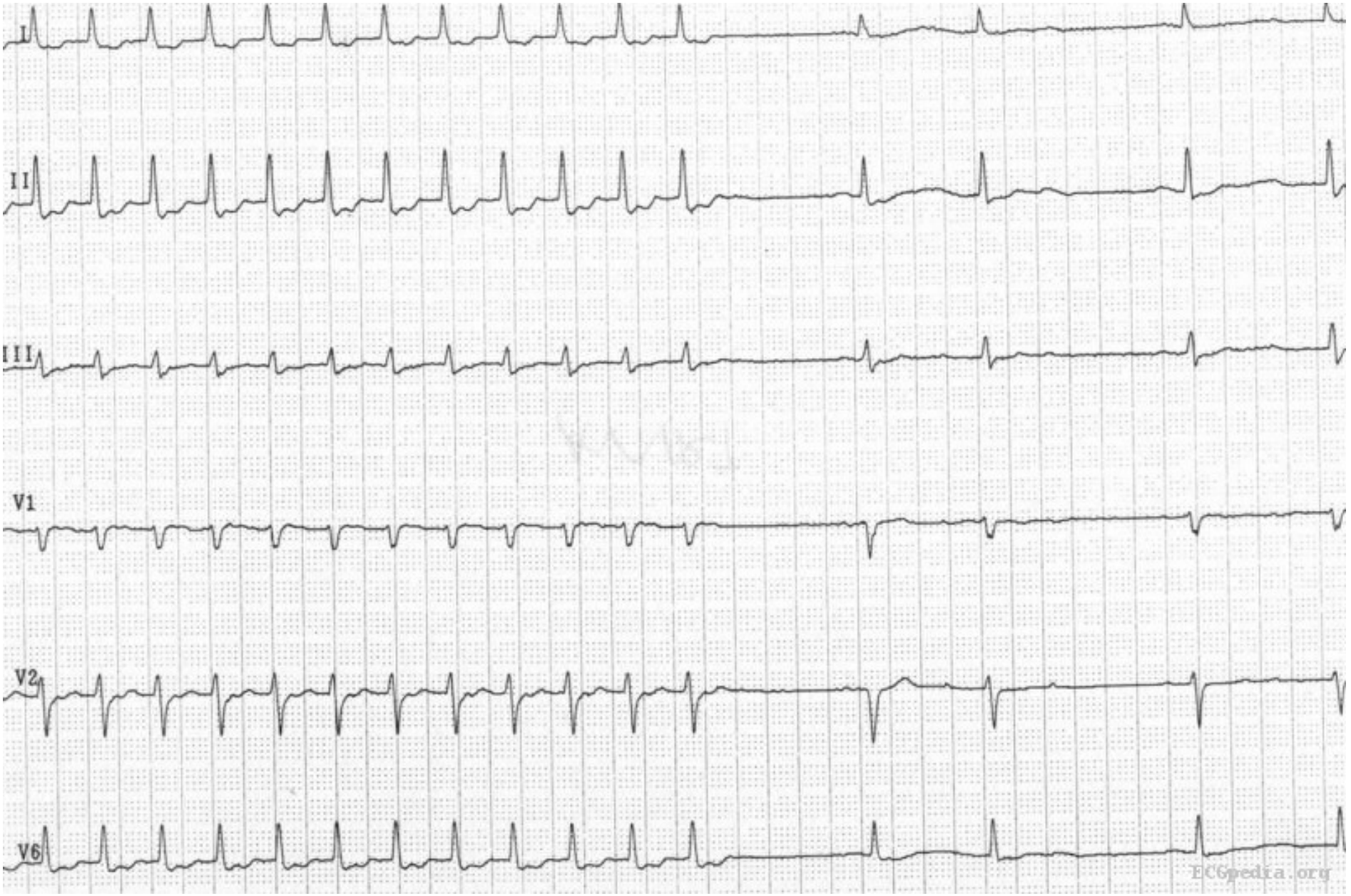
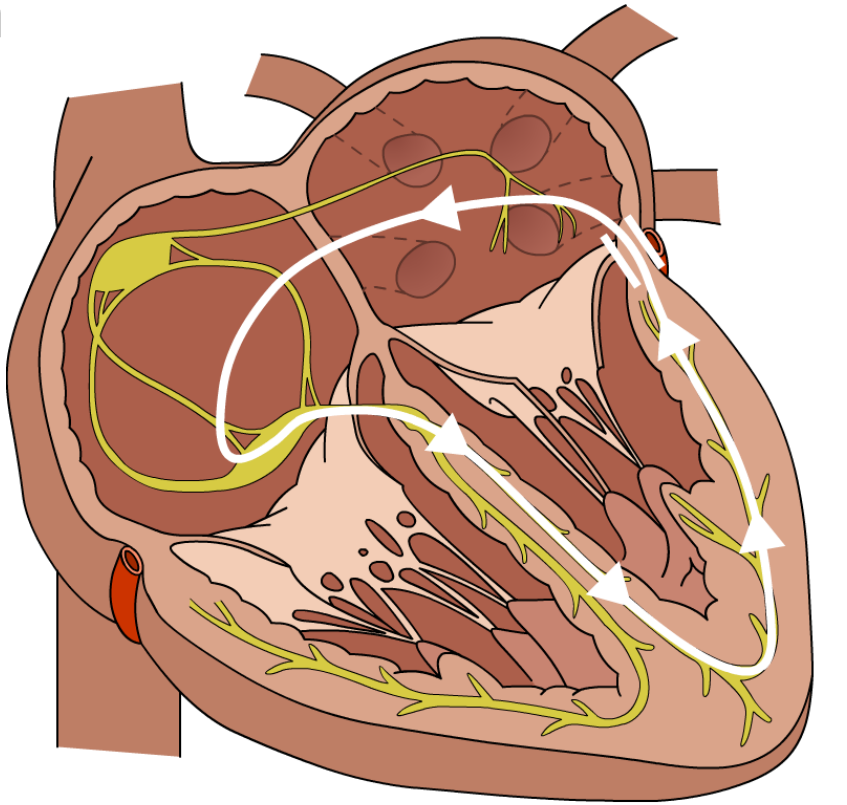

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5

Adenosine



AVRT: re-entry via een accessoire verbinding orthodroom



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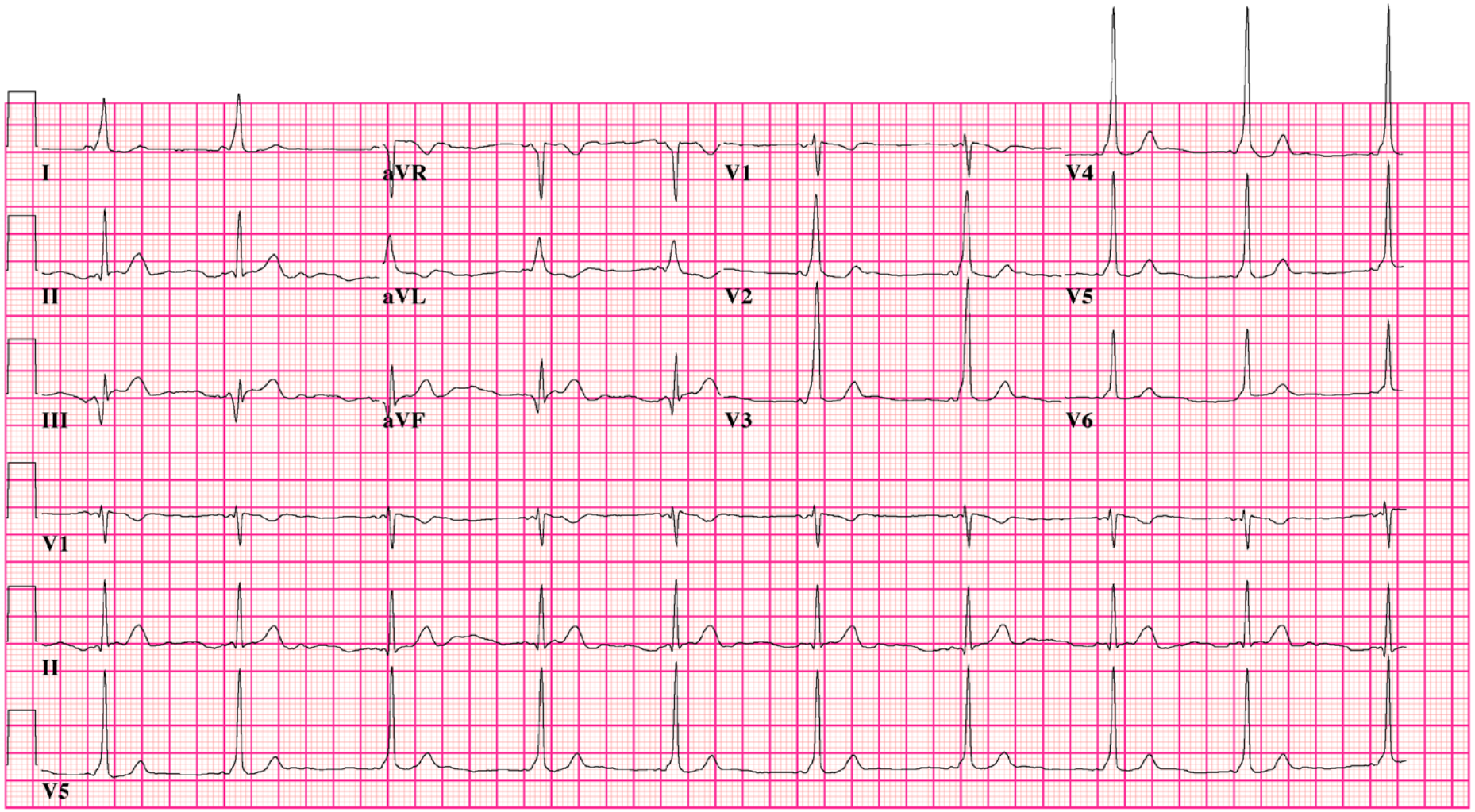

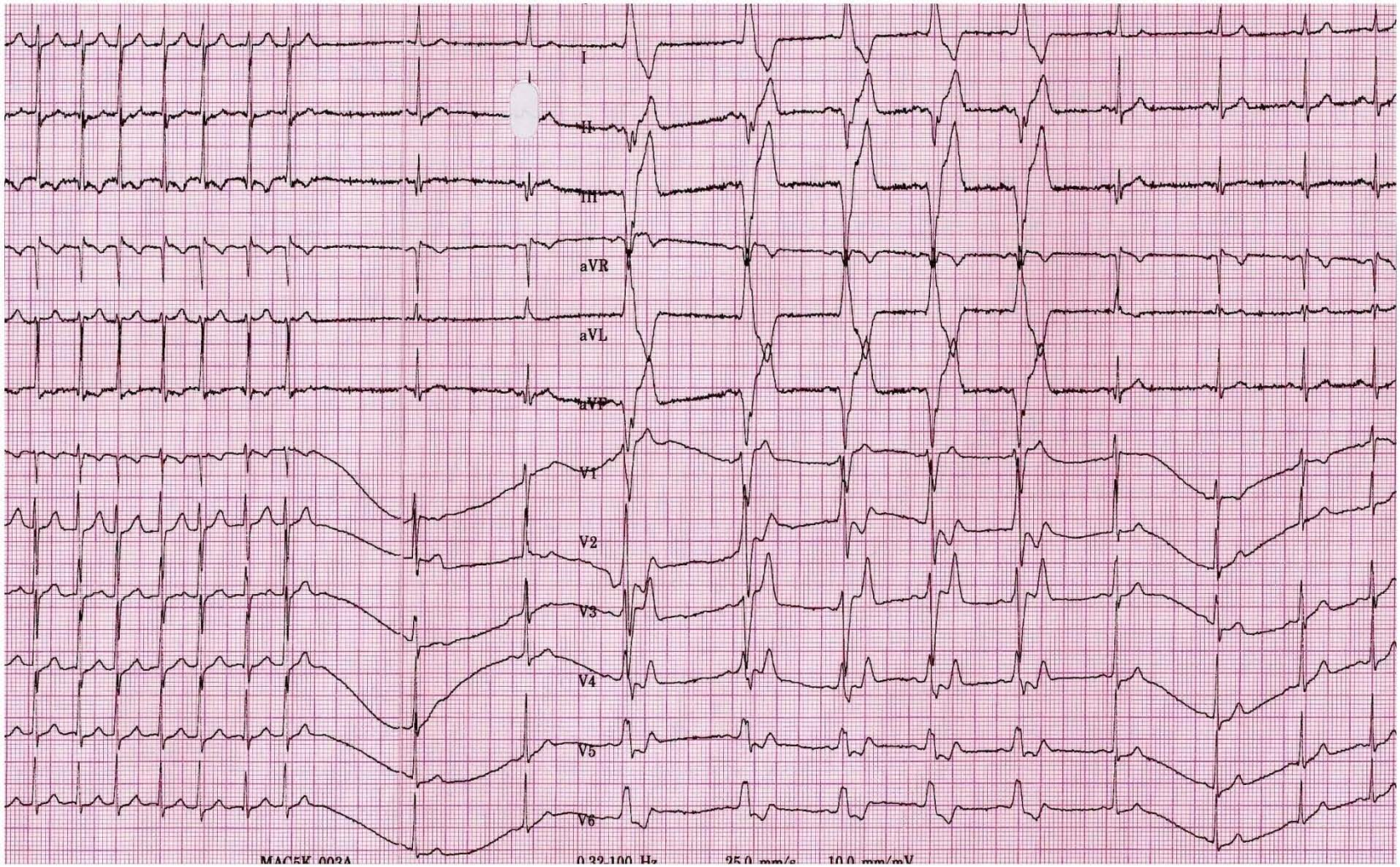

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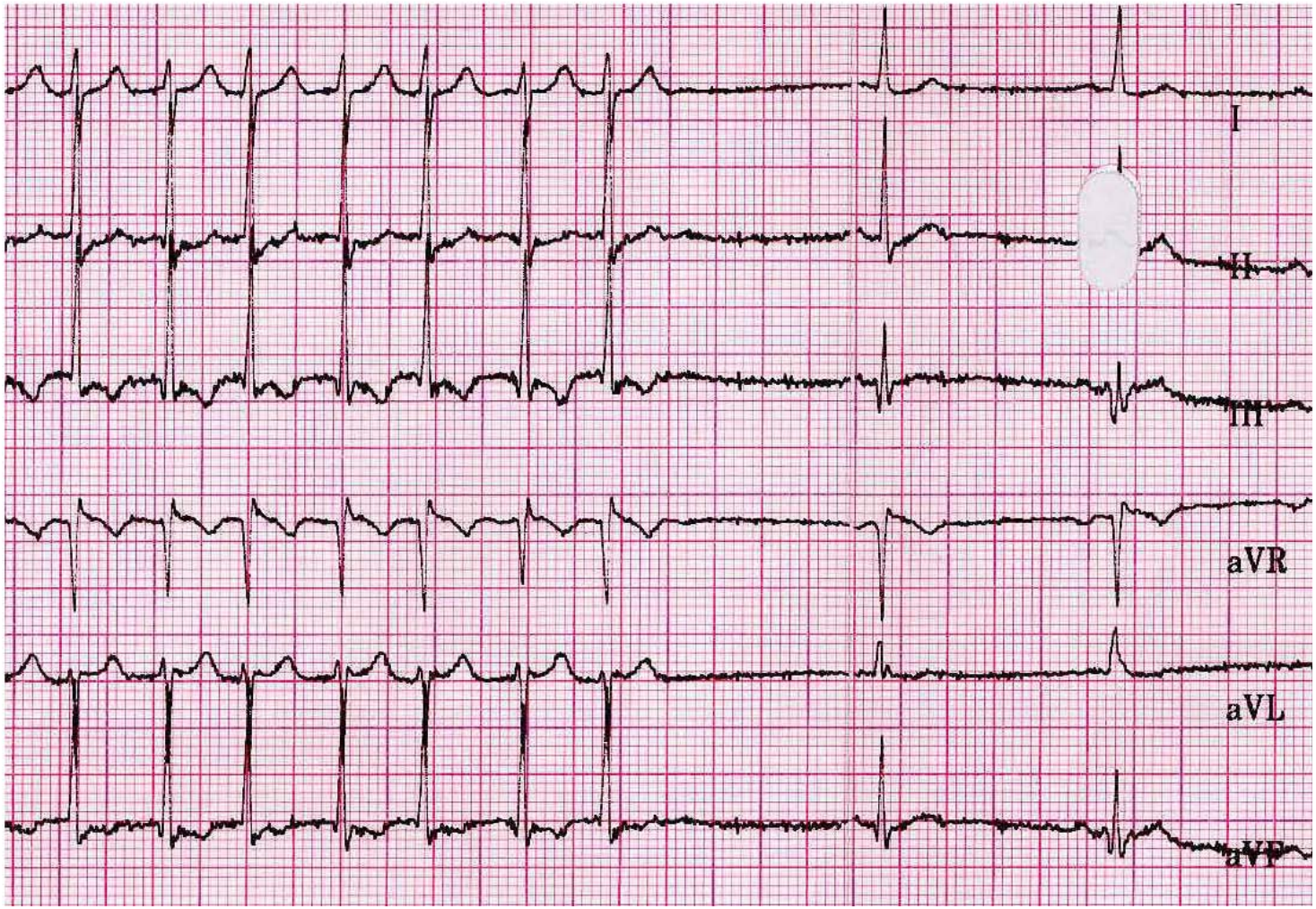

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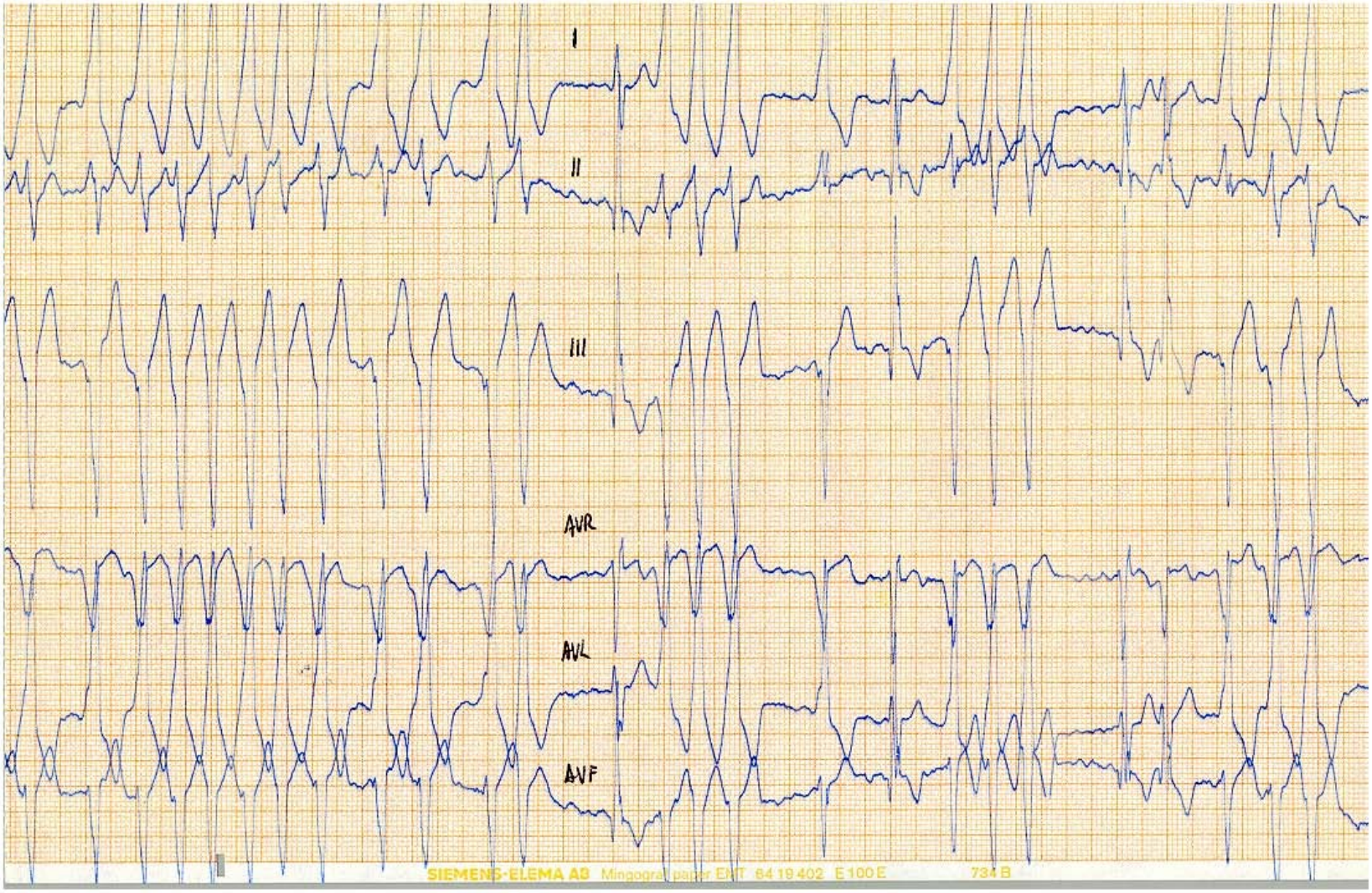

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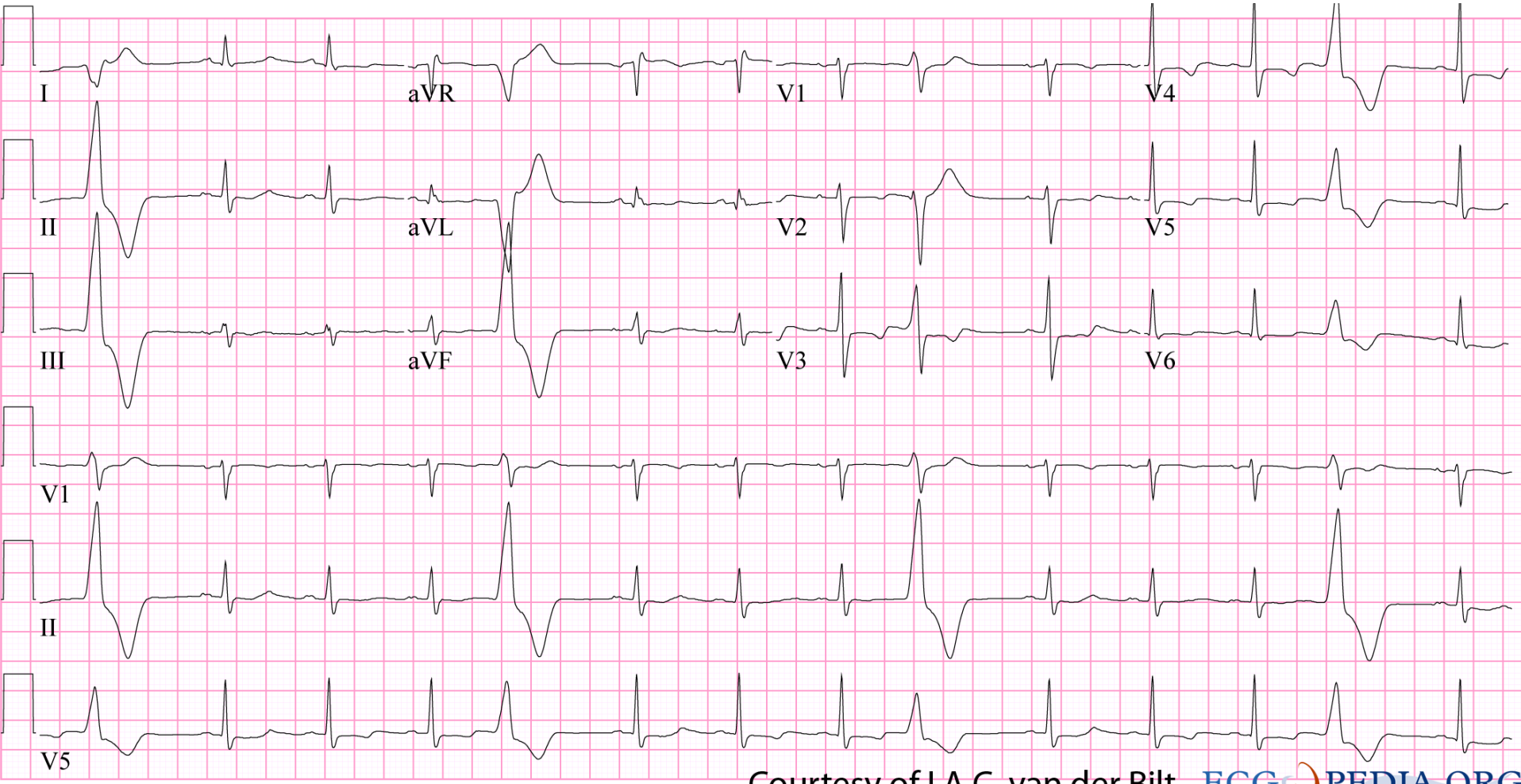
Ventriculaire ritmestoornissen

- Ventriculaire extrasystole (VES)
- (Idio)ventriculair escape ritme
- Accelerated IdioVentricular Rhythm (A.I.V.R.)
- Ventriculaire tachycardie
- Ventriculaire flutter
- Ventrikelfibrilleren
- Ventriculaire parasystolie

Indeling VT

	Regulair	HR(bpm)	P-top	Therapie
Altijd Breed QRS(>0,12)!				
Ventriculaire tachycardie	Ja(meestal)	110-250	AV dissociatie	Cardioversie, overpacing, medicatie
Ventrikel flutter	Ja	150-300	-	Defibrillatie
Ventrikel Fibrilleren	Nee	400-600	-	Defibrillatie
AIVR	Ja(meestal)	50-110	AV dissociatie	Geen
Torsades de pointes	Nee	150-300	AV dissociatie	Oorzaak behandelen

PVC



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Breed complex tachycardie

-**Ventrikeltachycardie**

-SVT met aberrante geleiding

-Ventrikelfibrilleren

-Ventrikelflutter

-AVRT/WPW

-(anders…)

Breedcomplex Tachycardie:
VT of SVT?

- Klinische kenmerken
- Brugada criteria
- Andere criteria

VT

Klinische kenmerken

Brugada criteria

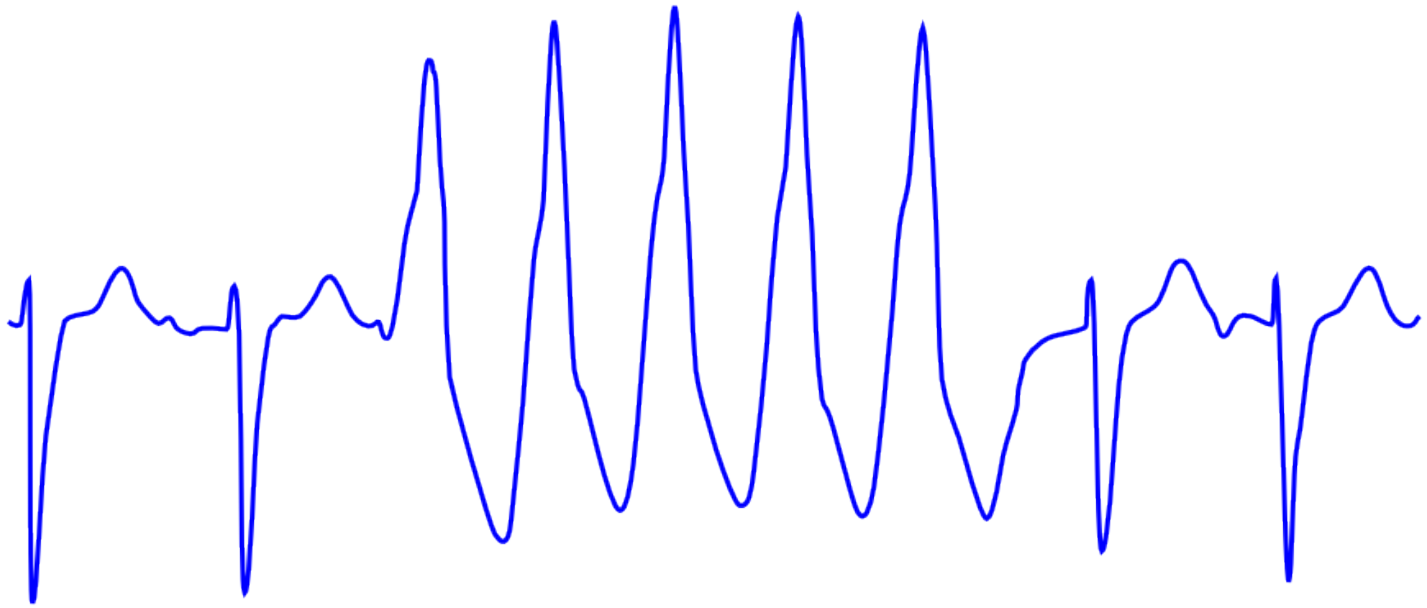
Andere criteria

Klinische kenmerken

- Patiënt ouder dan 65 jaar
- Myocardinfarct in VG
- “Horizontal entrance”
  - A priori kans op VT hoog!

Definities

- **Non-sustained VT**: 3 of meer slagen, max 30 seconde
- **Sustained VT**: > 30 seconde (of minder indien gecardioverteerd)
- **Monomorfe VT**: alle ventriculaire slagen hebben dezelfde configuratie
- **Polymorfe VT**: de ventriculaire slagen veranderen van configuratie.



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VT

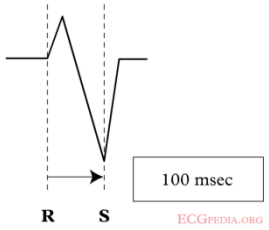
Klinische kenmerken

Brugada criteria

Andere criteria

- Fusieslagen? (SP 100)

- RS afwezig over de voorwand? (SN 21, SP 100)
- RS duur in een precordiale afl > 100ms (SN 66, SP 98)



- AV dissociatie (SN 82, SP 98,

- Morfologische criteria

VT

Klinische kenmerken

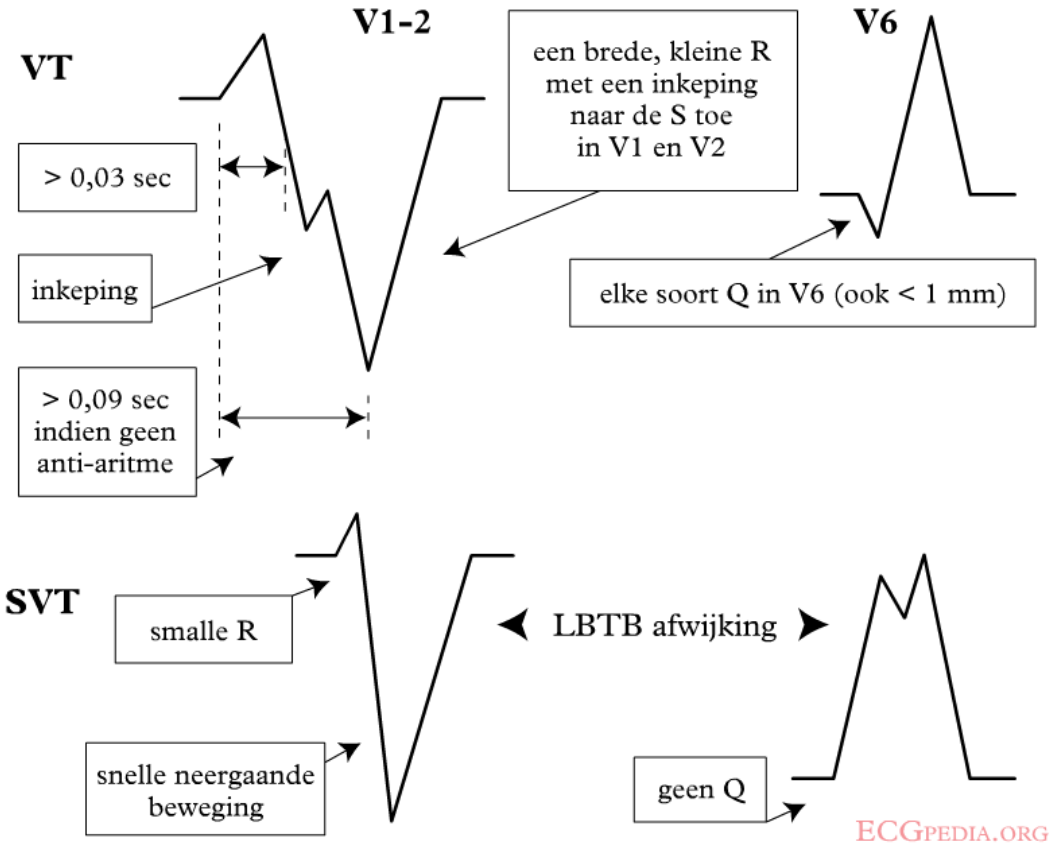
Brugada criteria

Andere criteria

Morfologische criteria: LBTB

Argumenten voor VT:

- Slurred of notched neergaand been van S golf in afleiding V1 of V2
- Begin Q tot nadir QS >60 ms in V1 of V2 (LR >50:1)
- Q of QS in V6 (LR >50:1)



VT

Klinische kenmerken

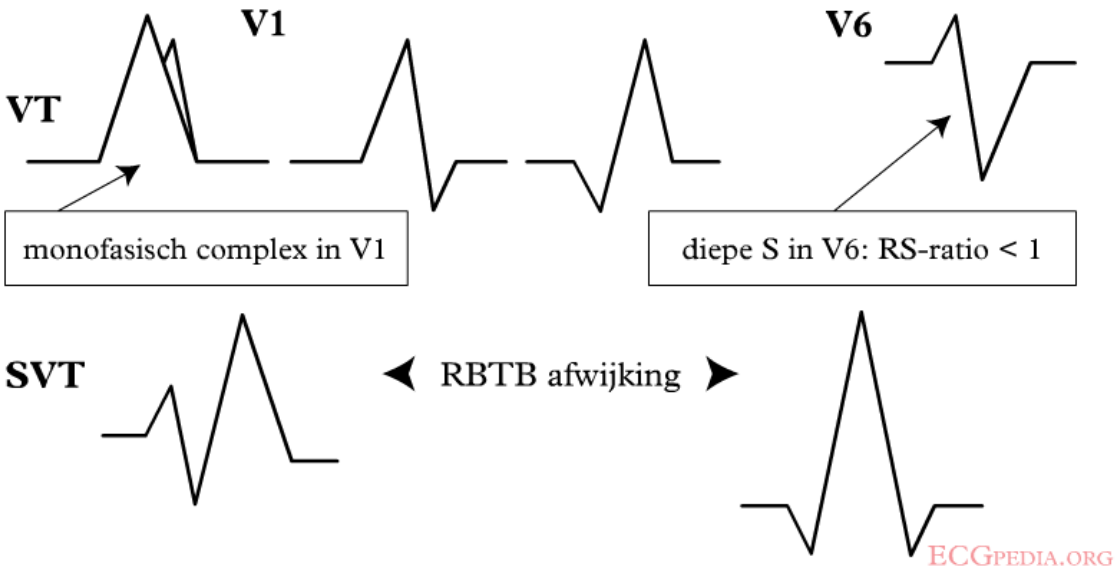
Brugada criteria

Andere criteria

Morfologische criteria: RBTB

Argumenten voor VT

- Monofasische R of qR in V1
- R hoger dan R' (rabbit-ear sign) (LR >50:1)
- rS in V6 (LR >50:1)



VT

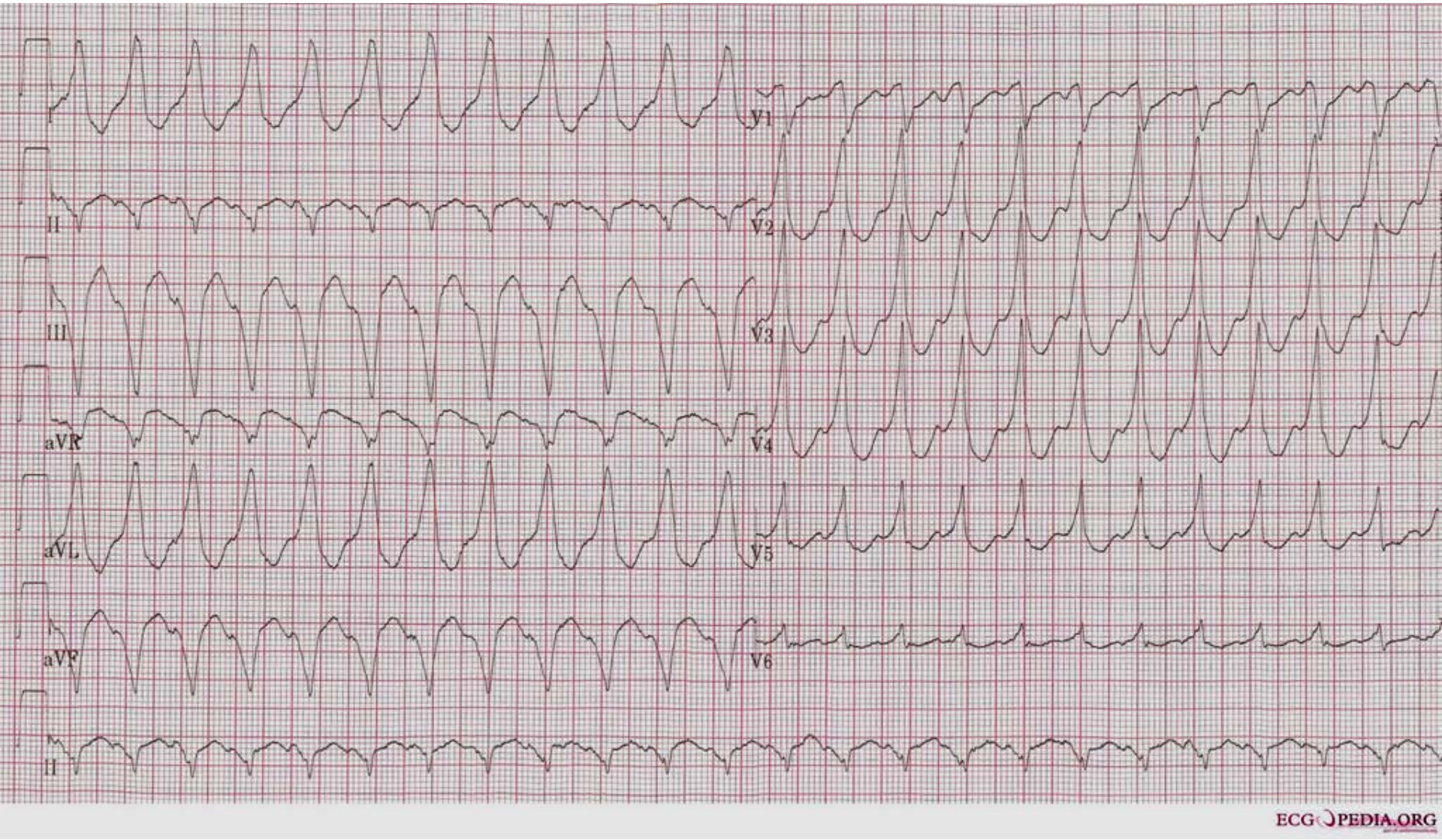
Klinische kenmerken

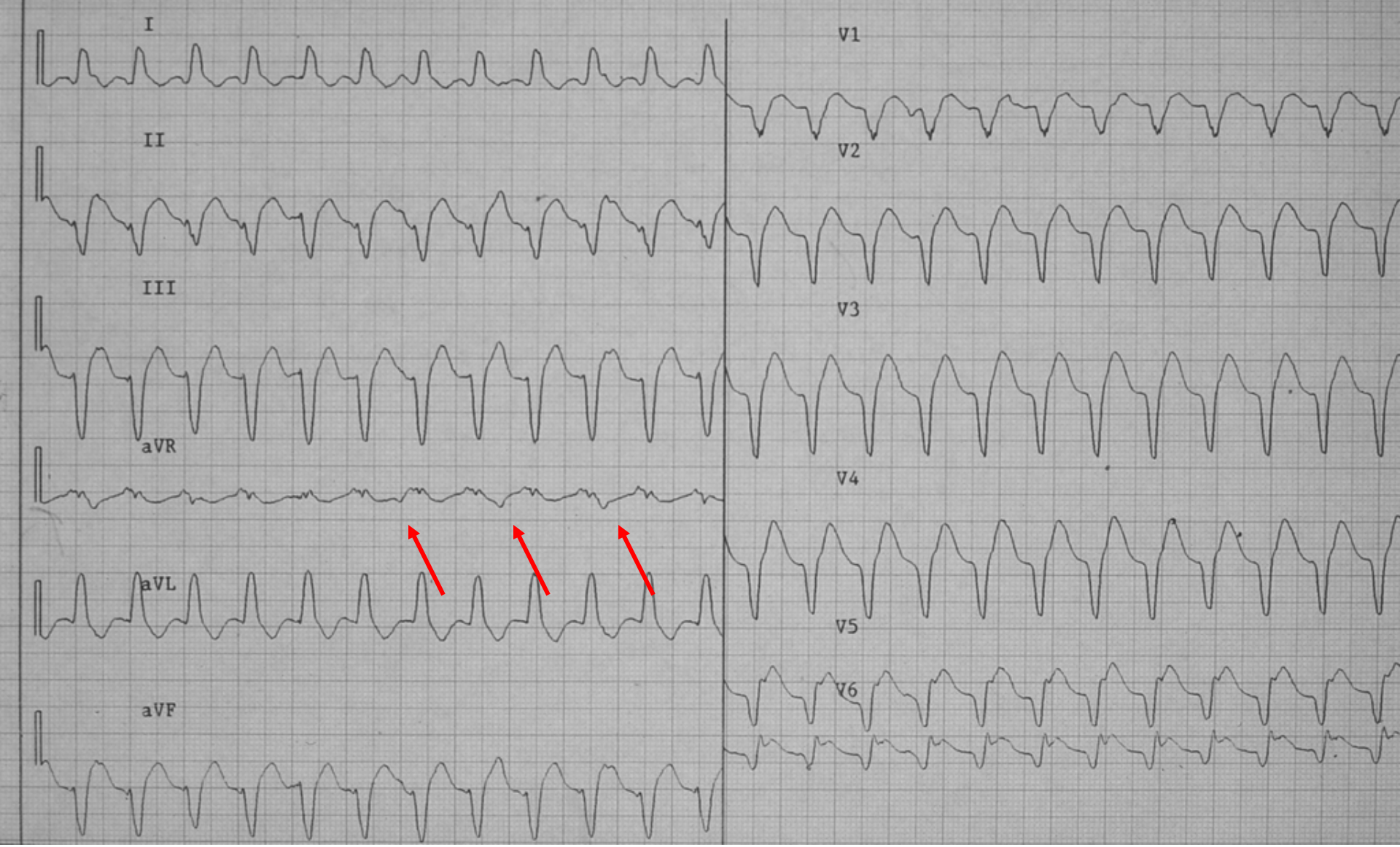
Brugada criteria

Andere criteria

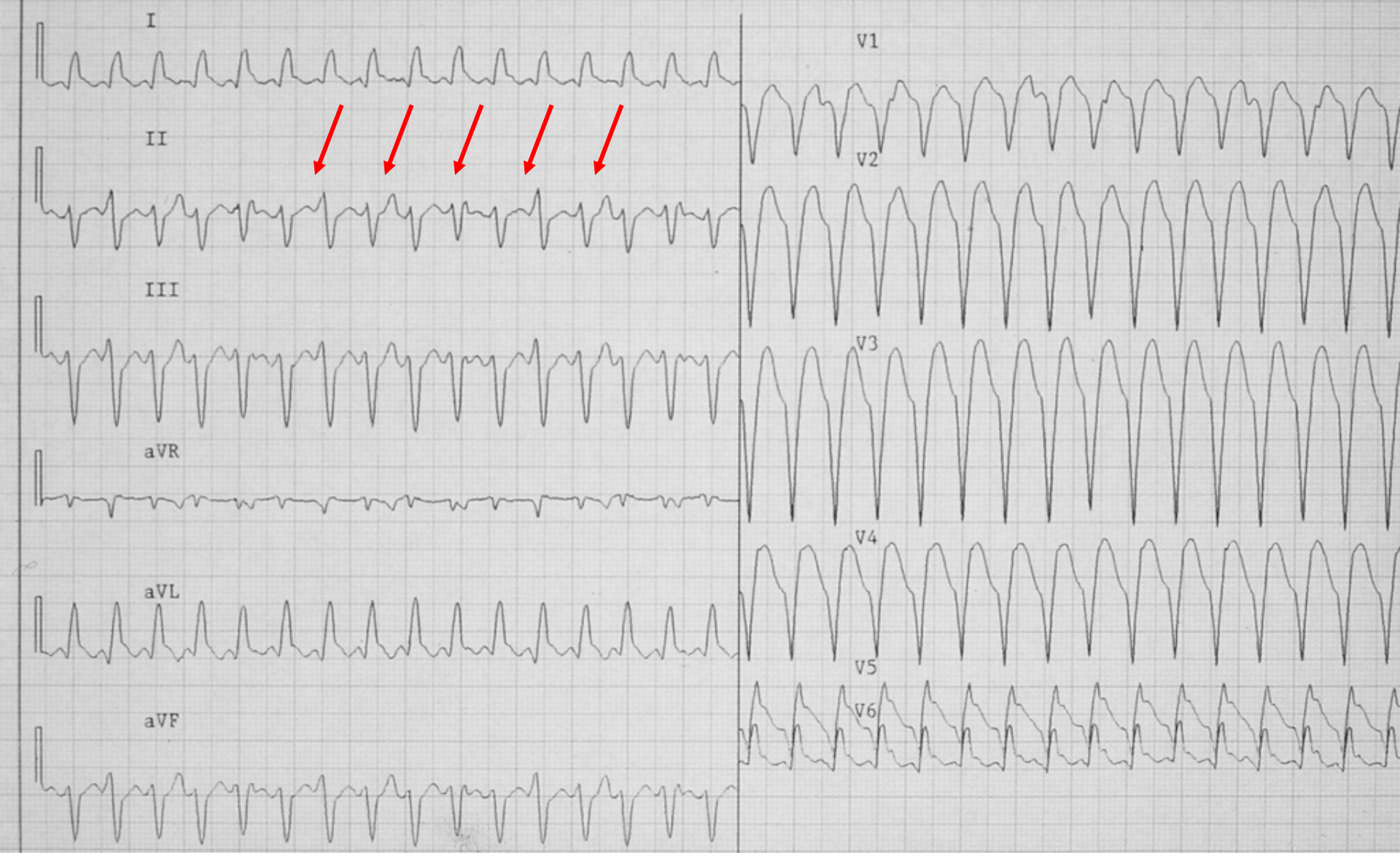
Argumenten vóór VT:

- **Positief complex in AVR**
- **Raaklijn 1^{e} 40ms (V*i*) tov raaklijn laatste 40ms (V*t*)**
- **Extreme hartas**

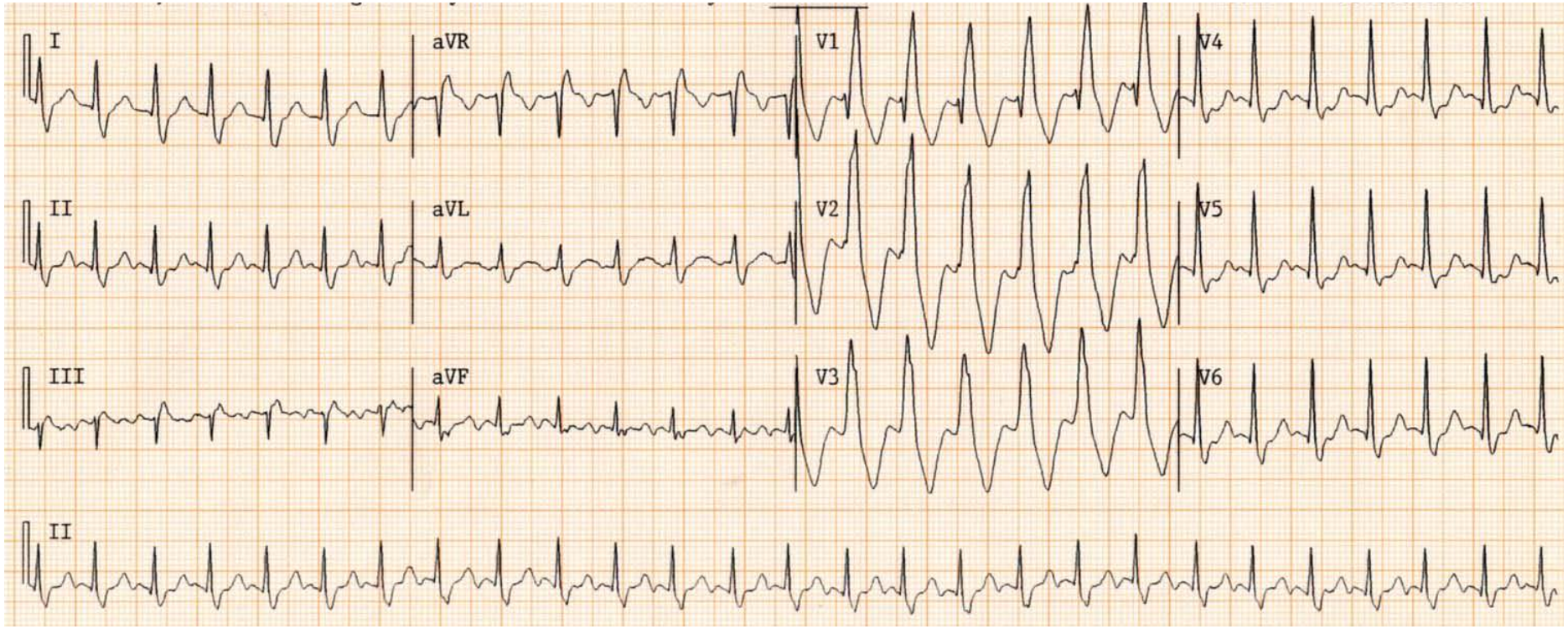

I
II
III
aVR
aVL
aVF
II
V1
V2
V3
V4
V5
V6
ECGPEDIA.ORG



Ventrikeltachycardie



Ventrikeltachycardie


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

Breed complex tachycardie

-Ventrikeltachycardie

-**SVT met aberrante geleiding**

-Ventrikelfibrilleren

-Ventrikelflutter

-AVRT/WPW

-(anders…)

Typisch jongere patiënt

- SVT:
  - AVNRT
  - Boezemfibrilleren
  - Boezemflutter
  - AVNRT
- + aberrantie:
  - LBTB
  - RBTB

Breed complex tachycardie

-Ventrikeltachycardie

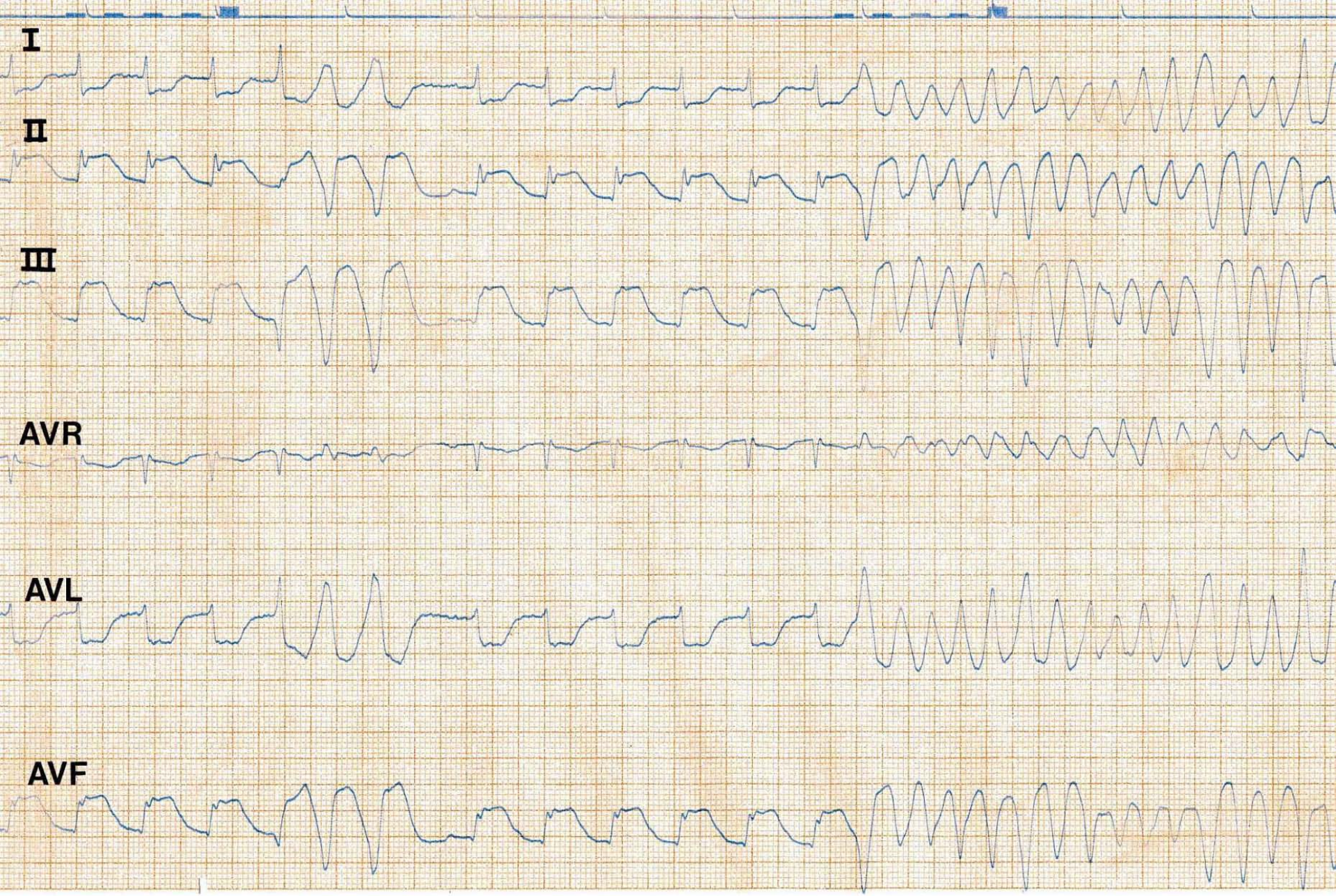
-SVT met aberrante geleiding

-**Ventrikelfibrilleren**

-Ventrikelflutter

-AVRT

-(anders…)



Ventrikelfibrilleren

Breed complex tachycardie

-Ventrikeltachycardie

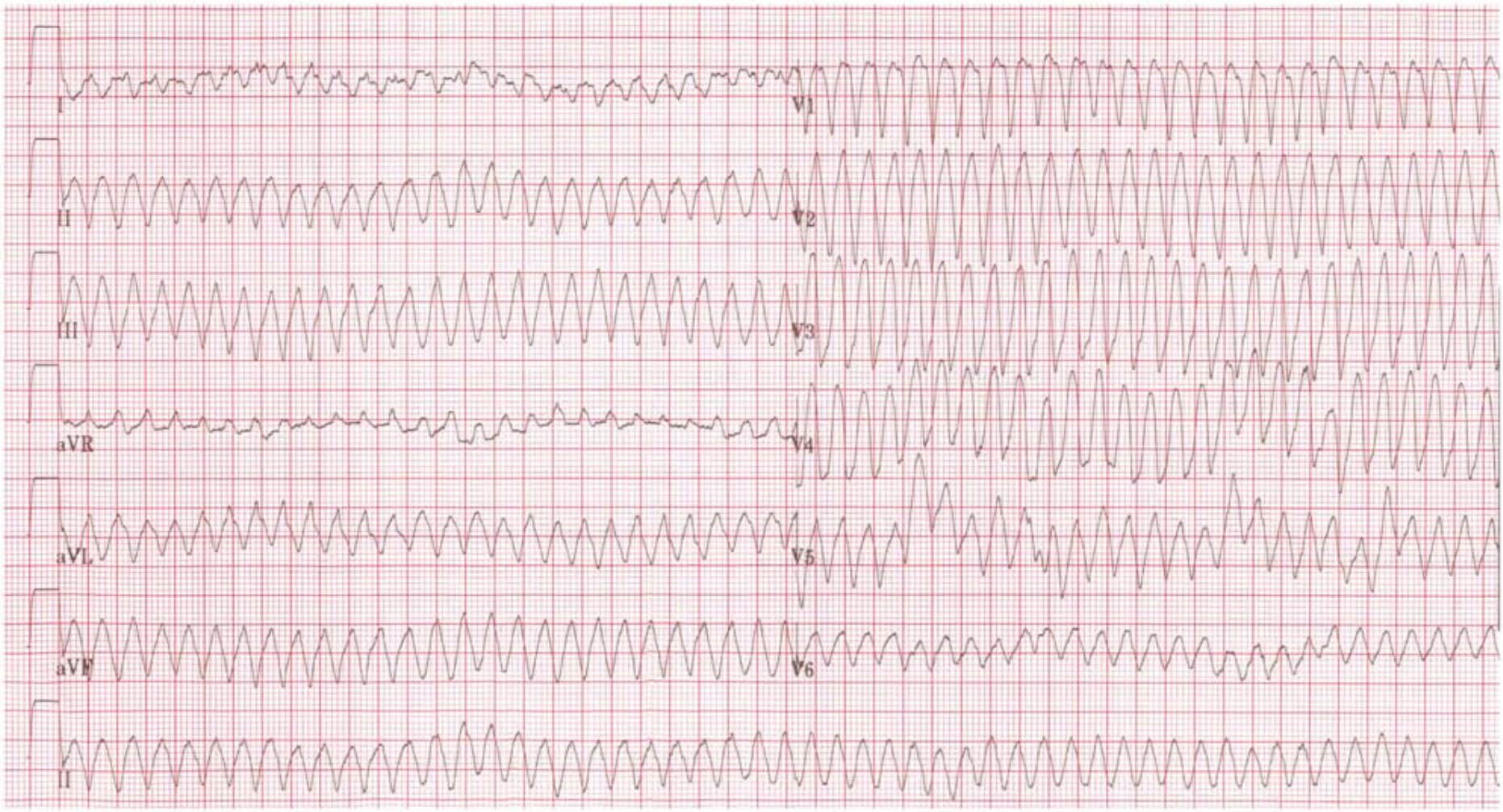
-SVT met aberrante geleiding

-Ventrikelfibrilleren

-**Ventrikelflutter**

-AVRT/WPW

-(anders…)



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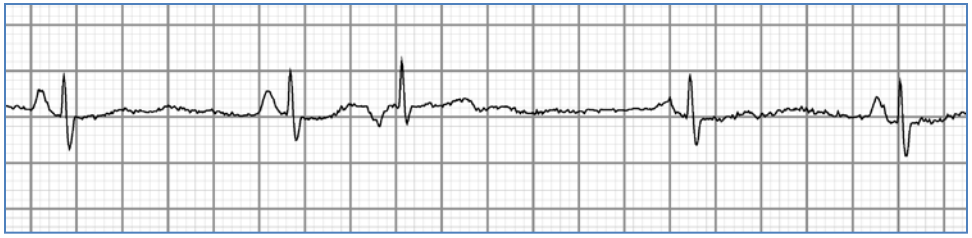
Extrasystolen

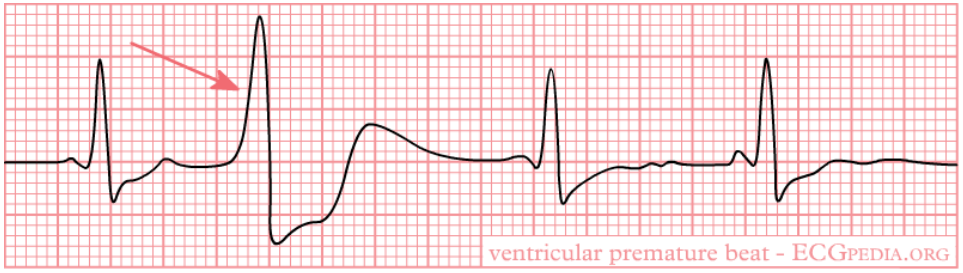
-Boezemextrasystole

Non-compensatoire pauze

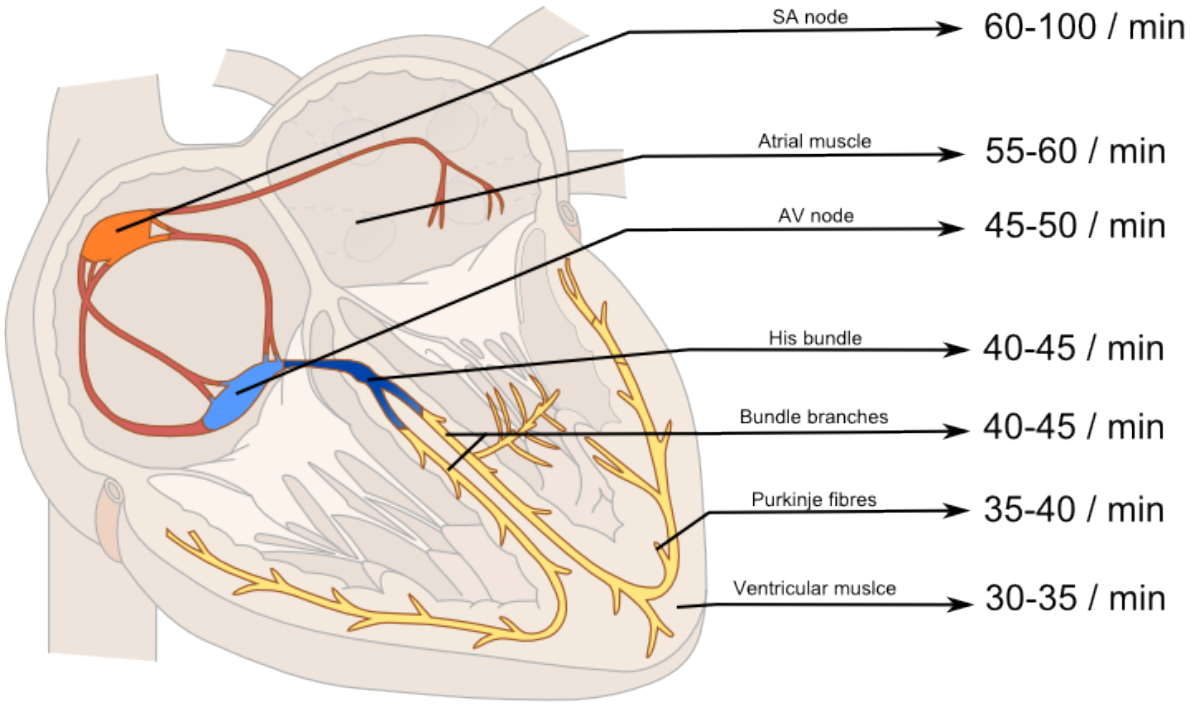
-Ventrikelextrasystole

Compensatoire pauze





Escaperitme



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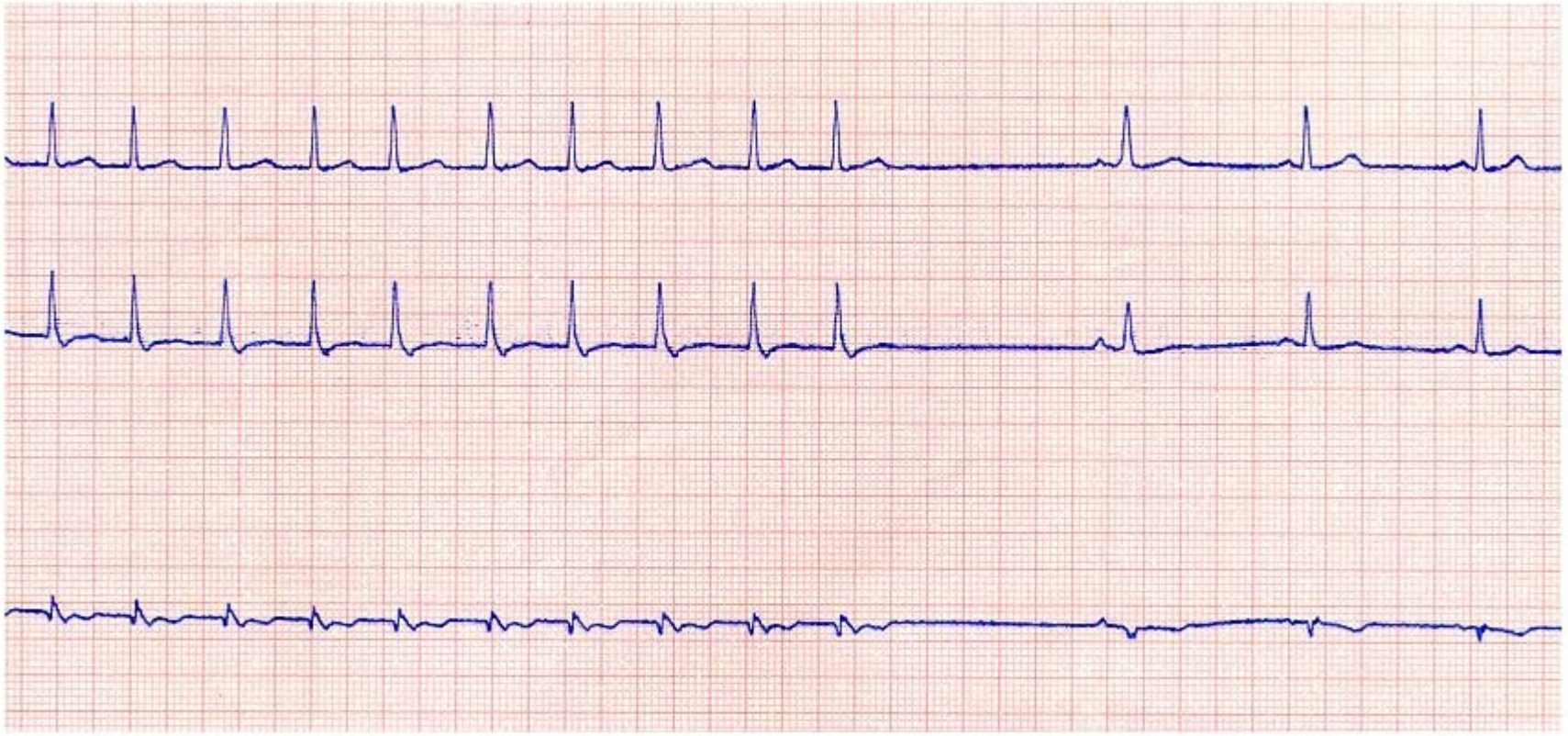

Courtesy of W.G. de Voogt, MD, PhD, Amsterdam, The Netherlands

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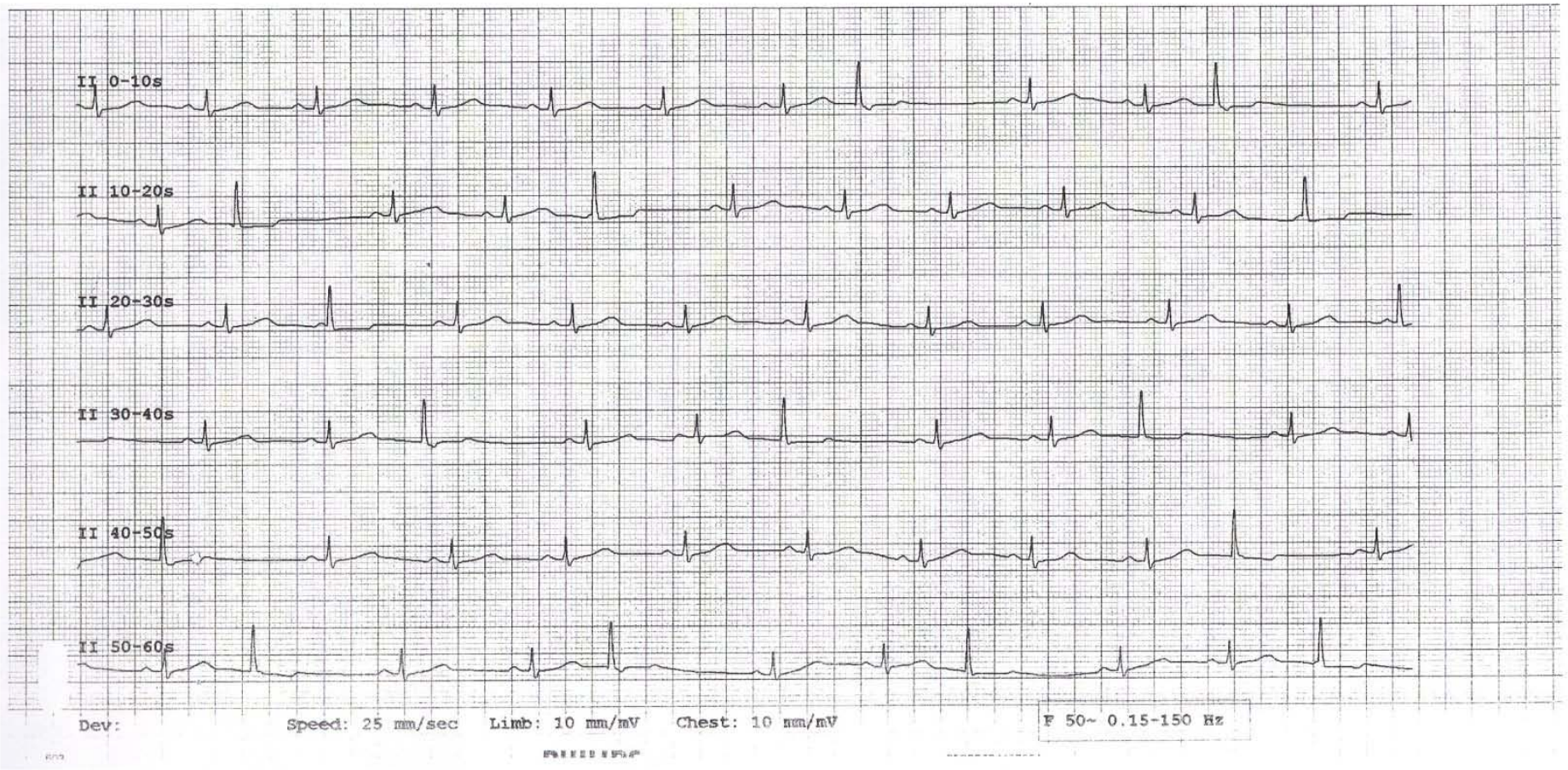
parasytolie



Courtesy of Chio Chan Fong, MD, Macau

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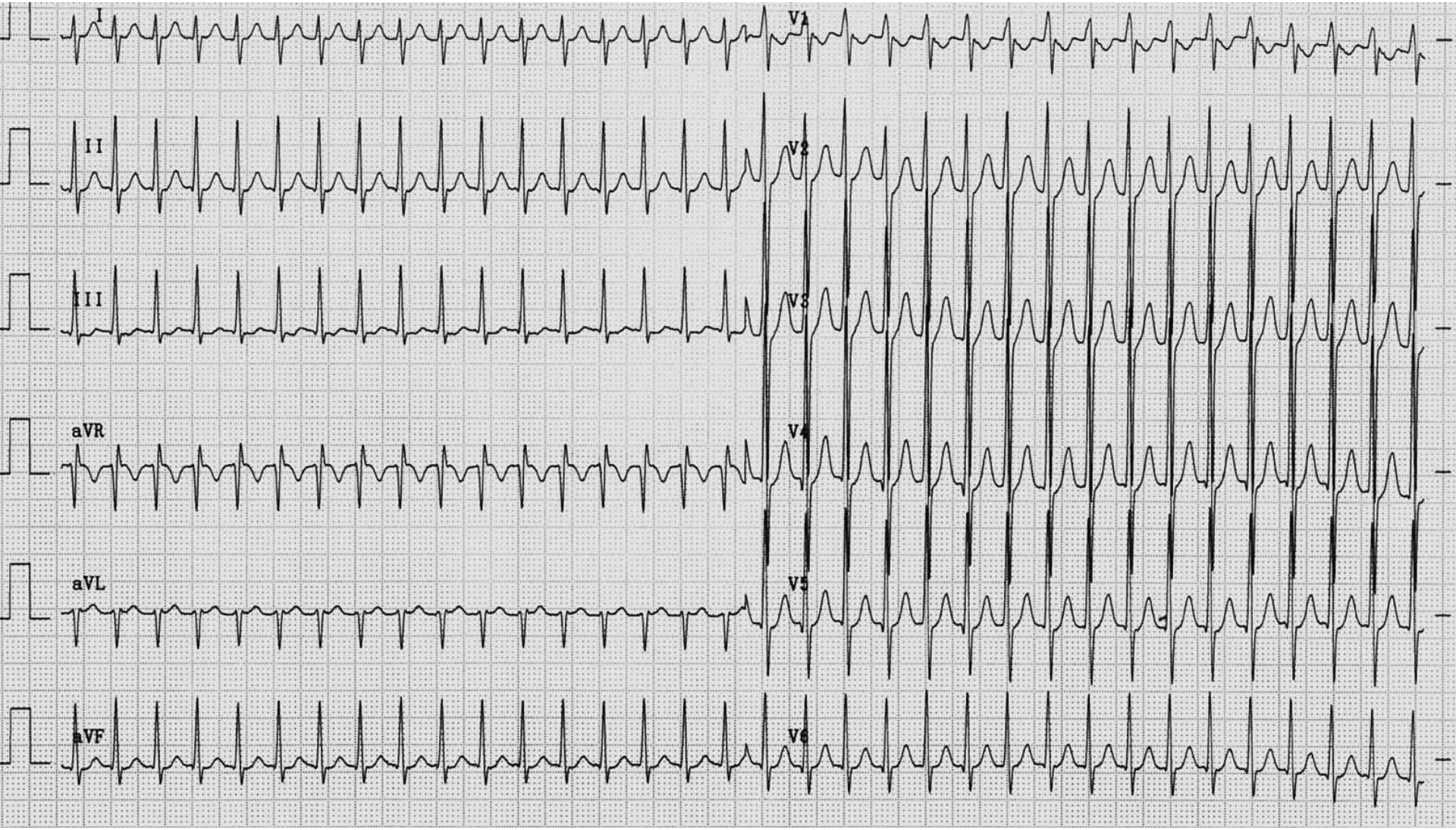
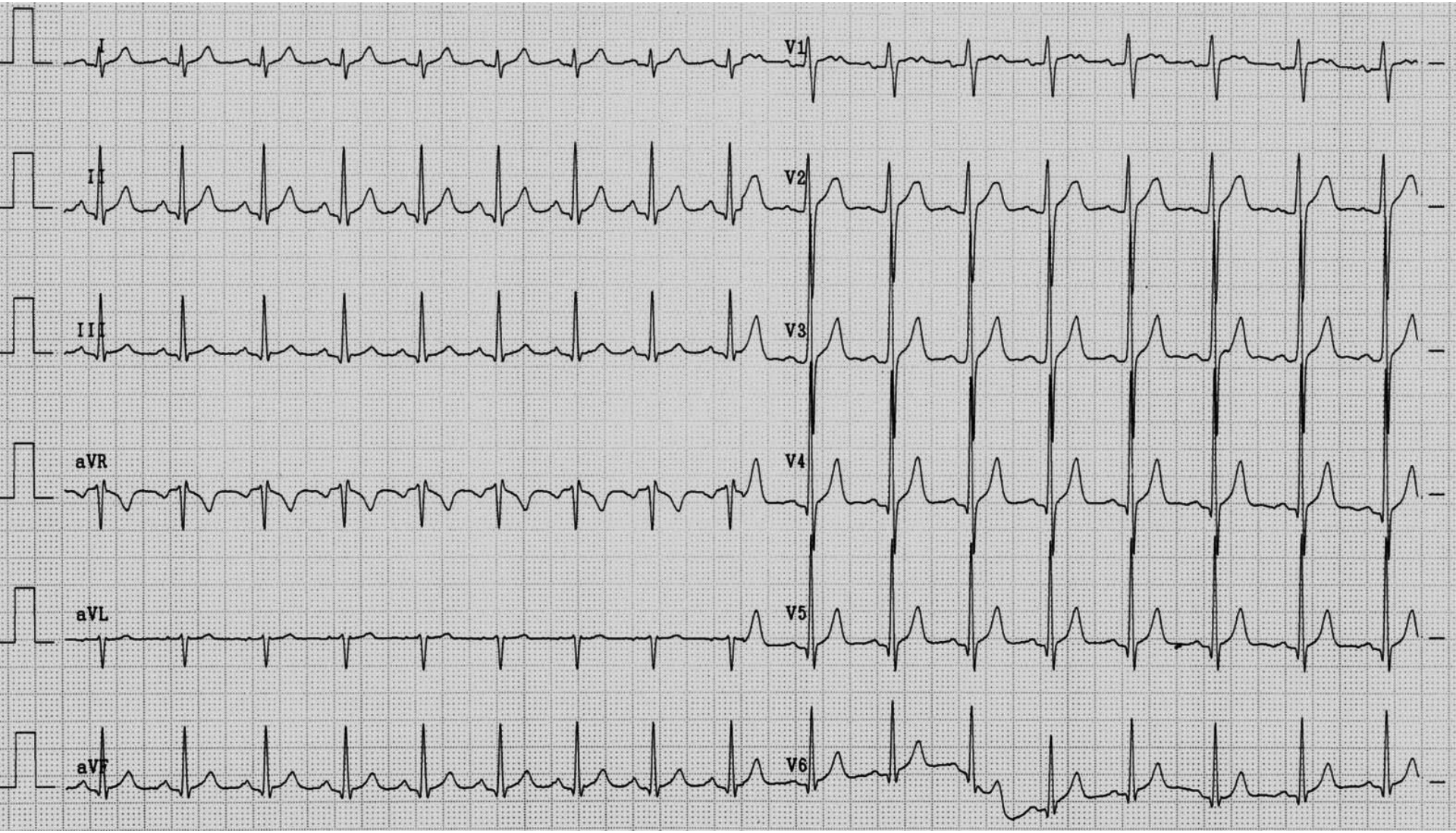
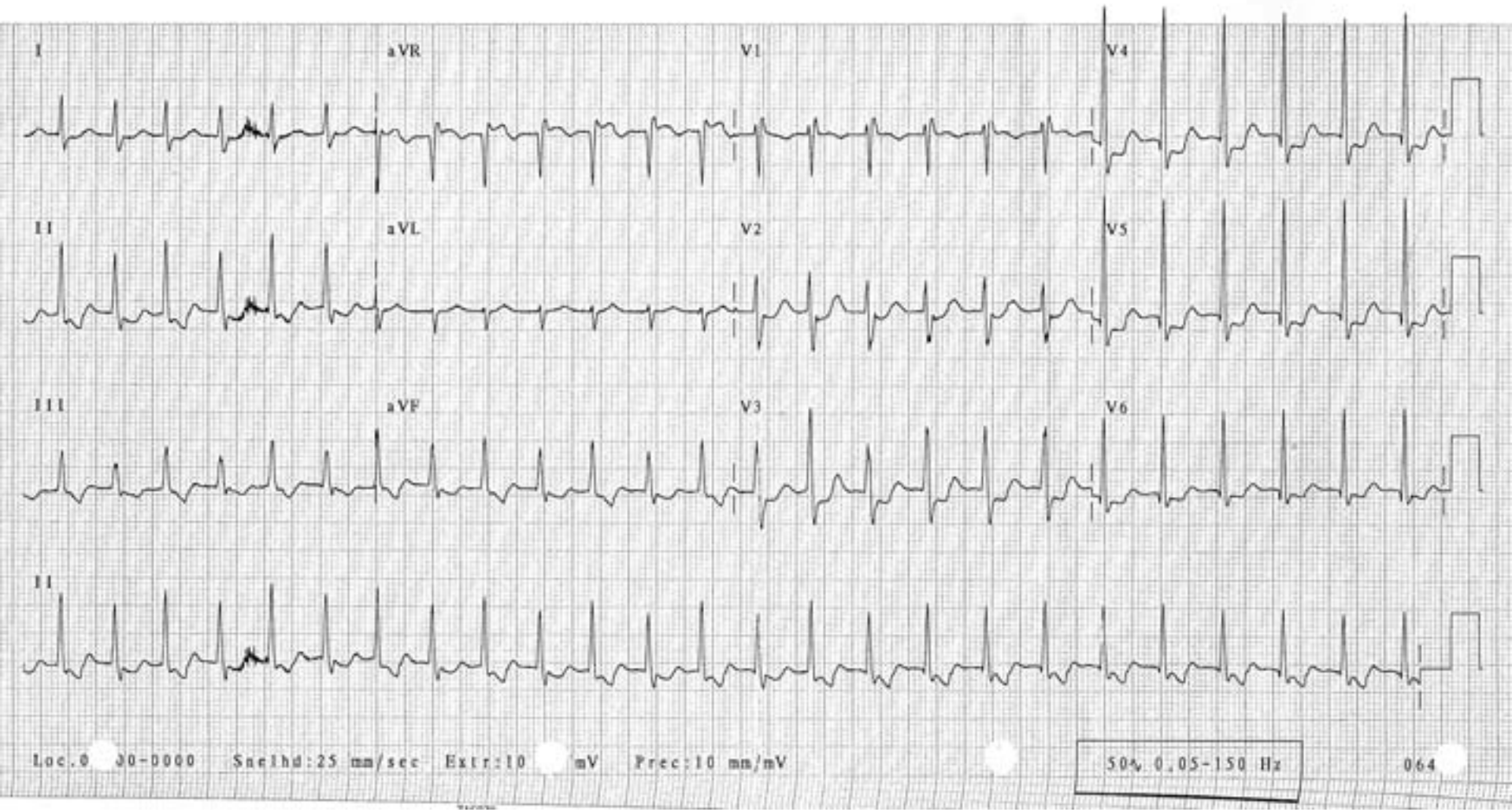
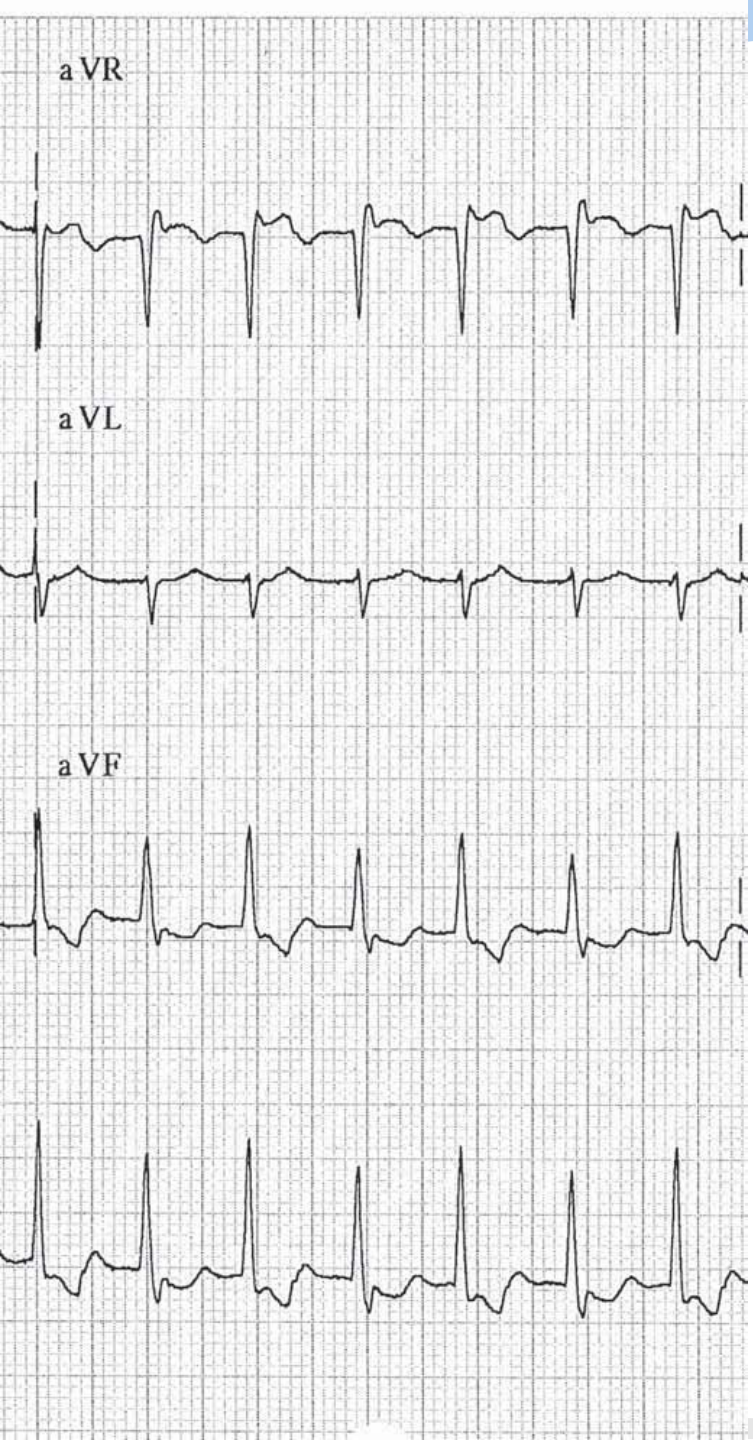
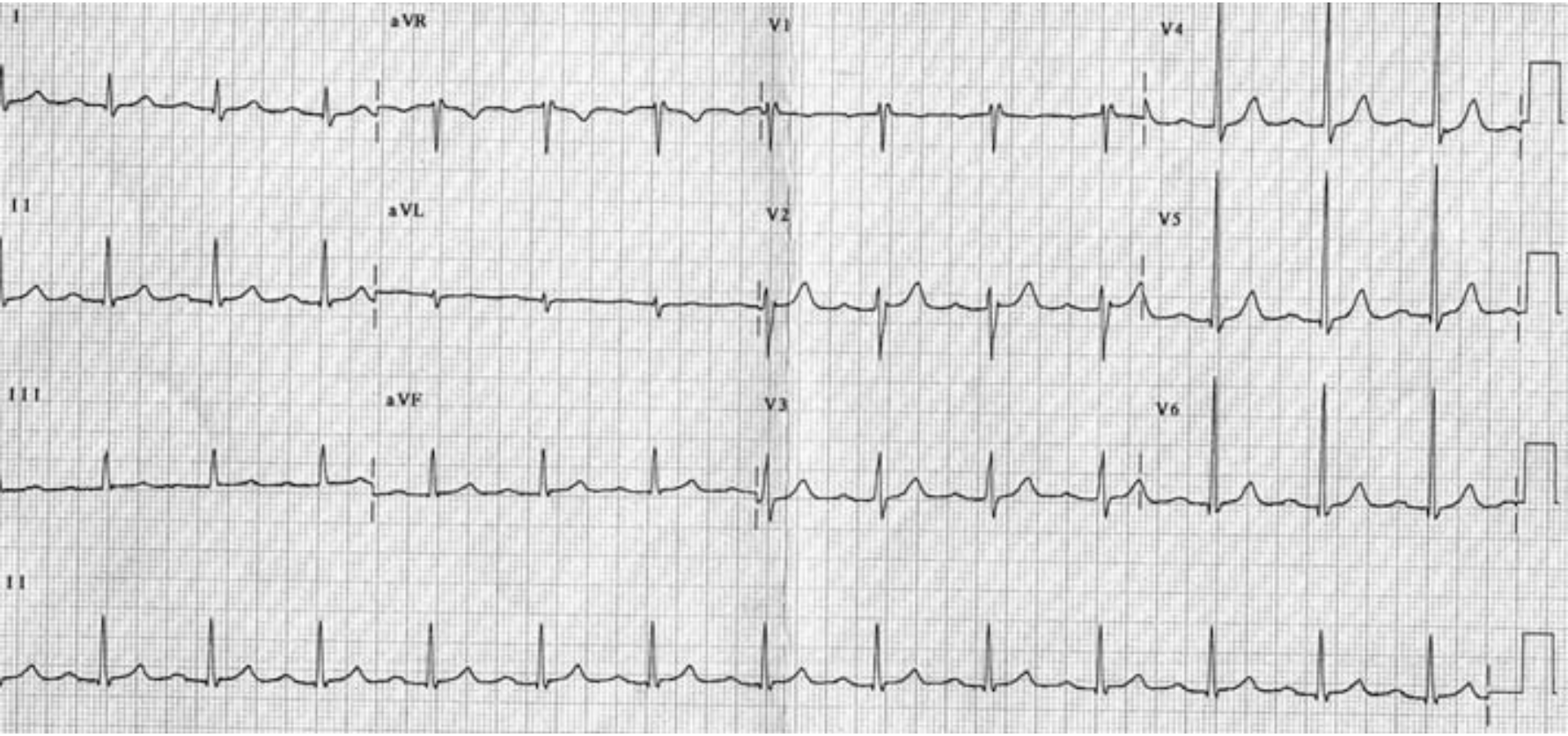
QUIZ

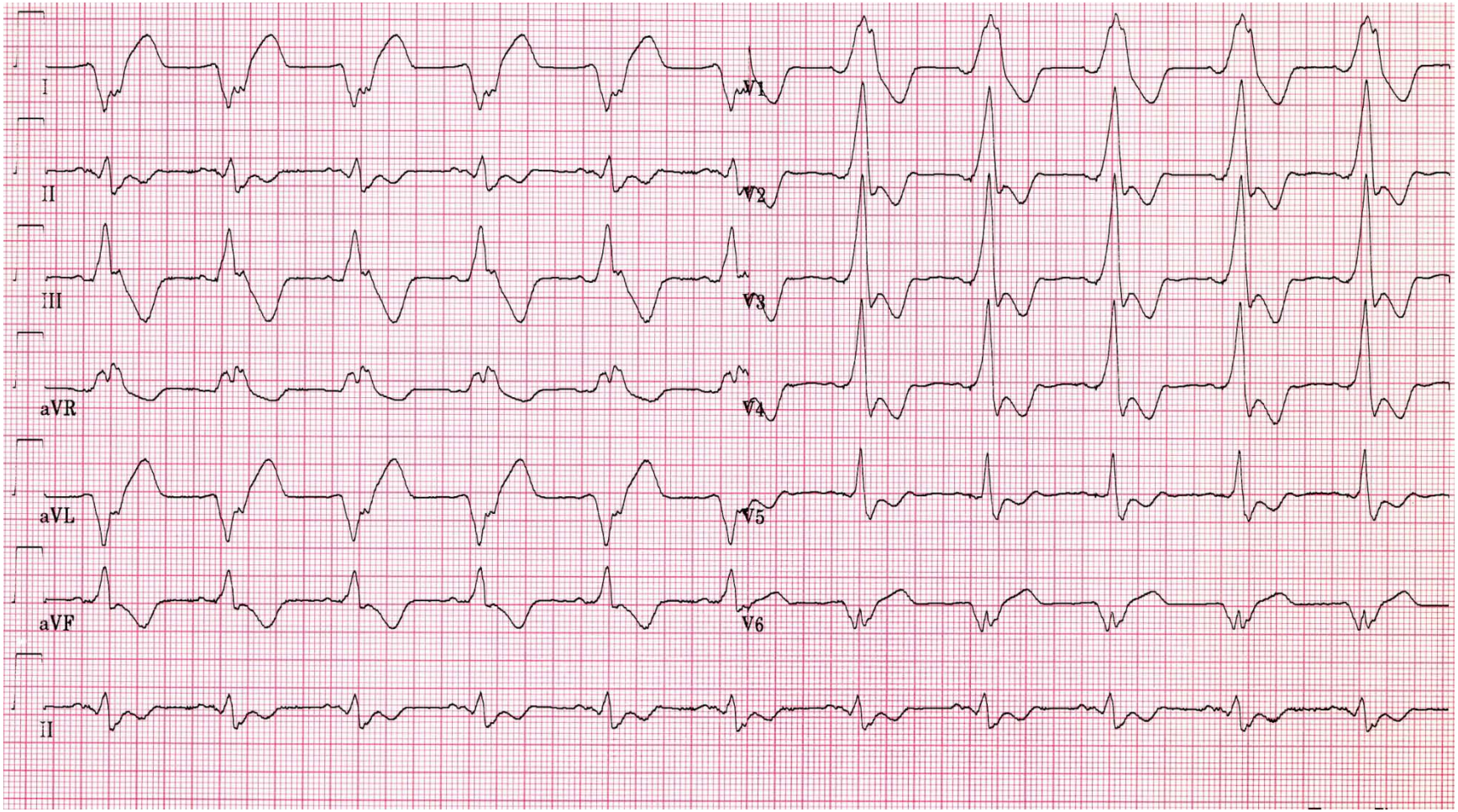

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

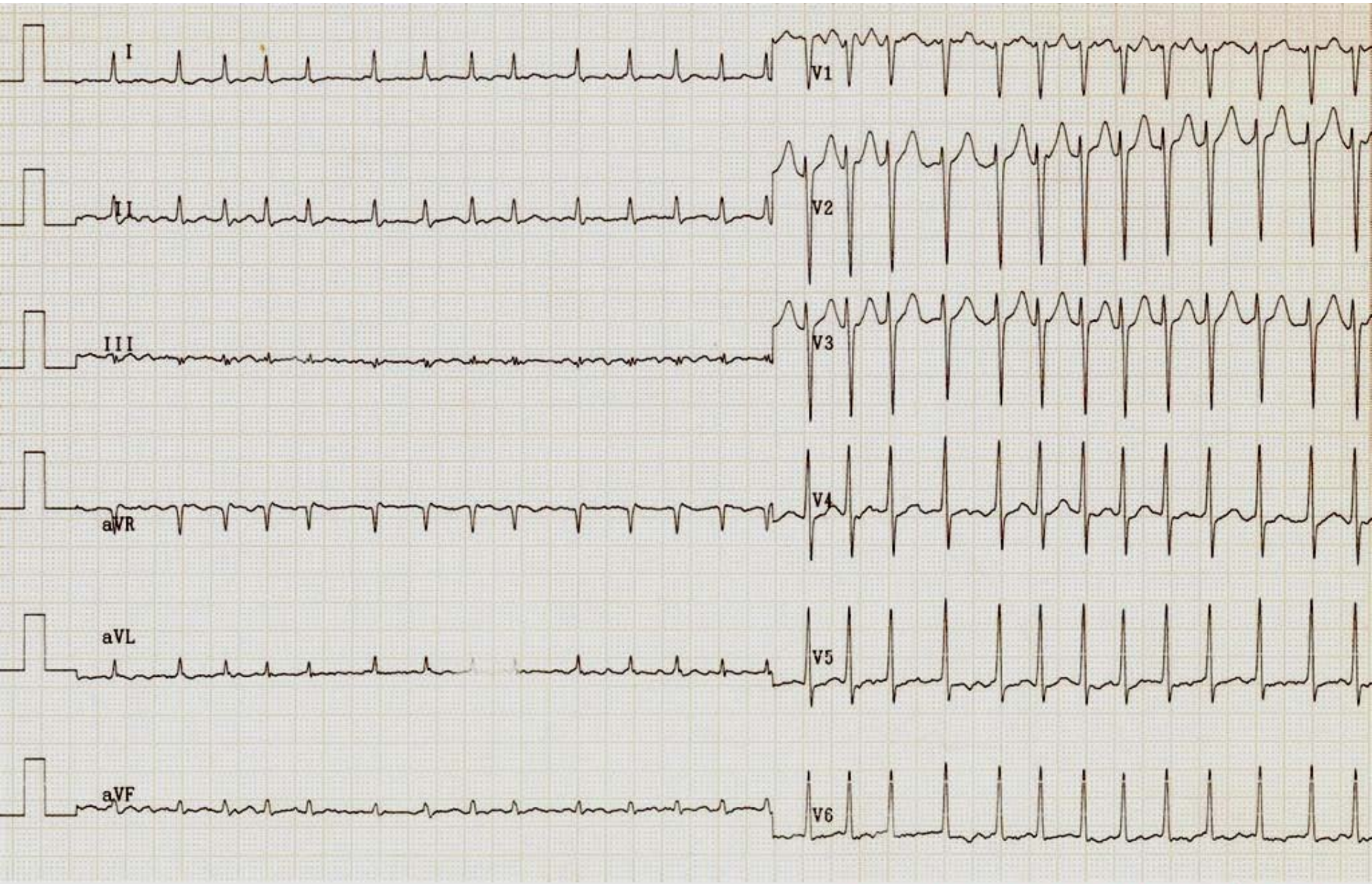

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Loc.0 J0-0000 Snelhd:25 mm/sec Extr:10 mV Prec:10 mm/mV
50Hz 0.05-150 Hz
064


aVR
aVL
aVF


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


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



Courtesy of R.W. Koster, MD, PhD
AMC, The Netherlands

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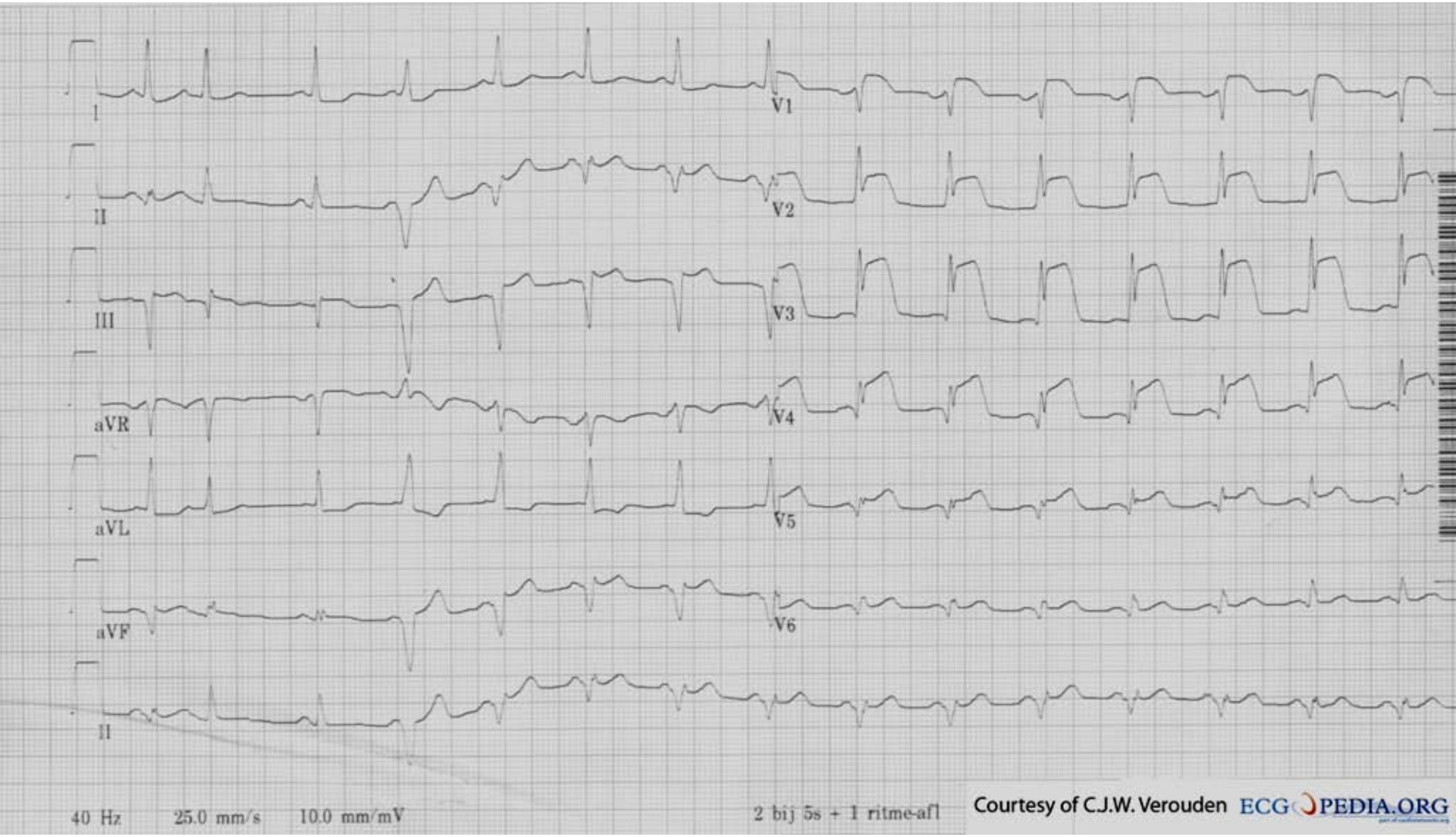
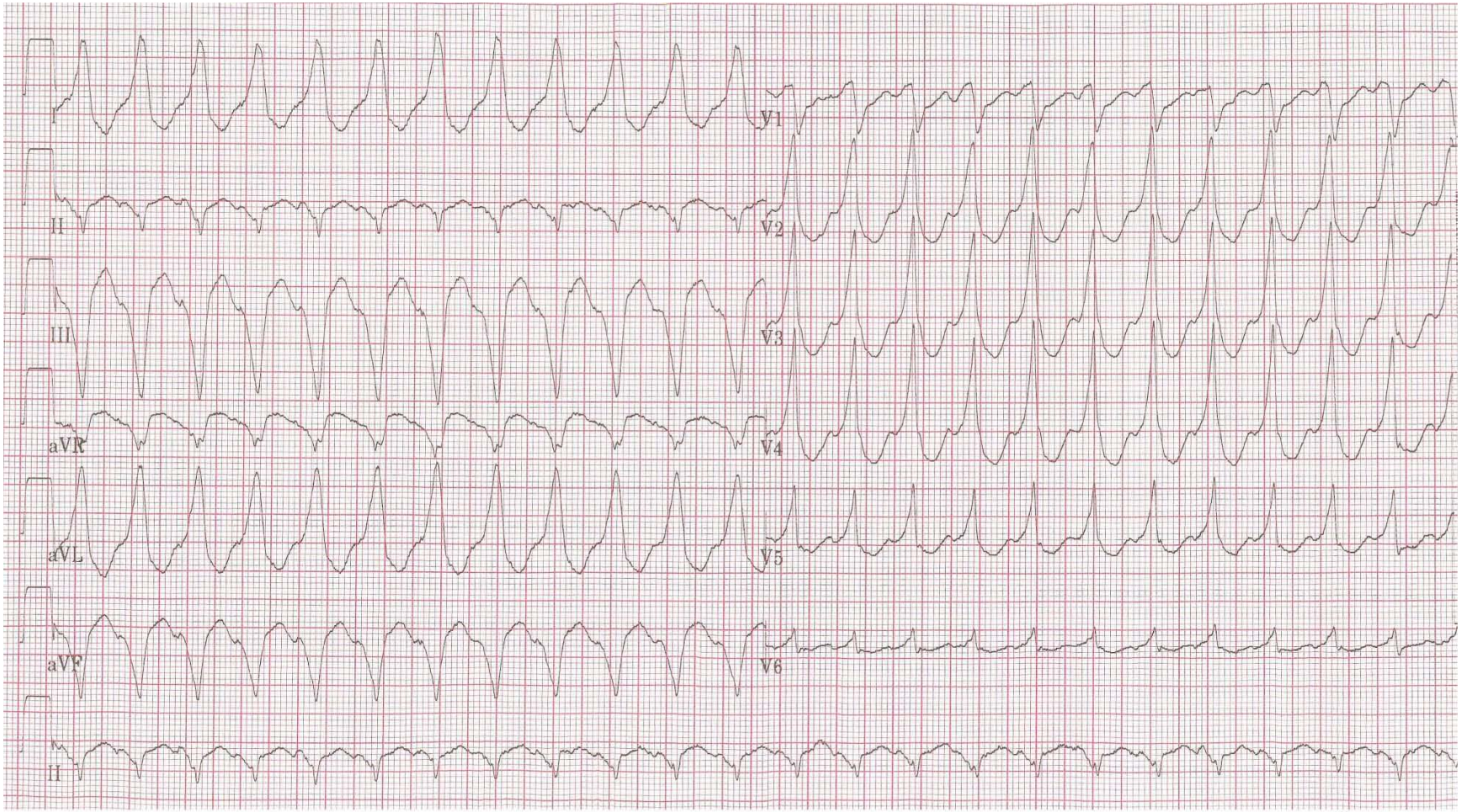
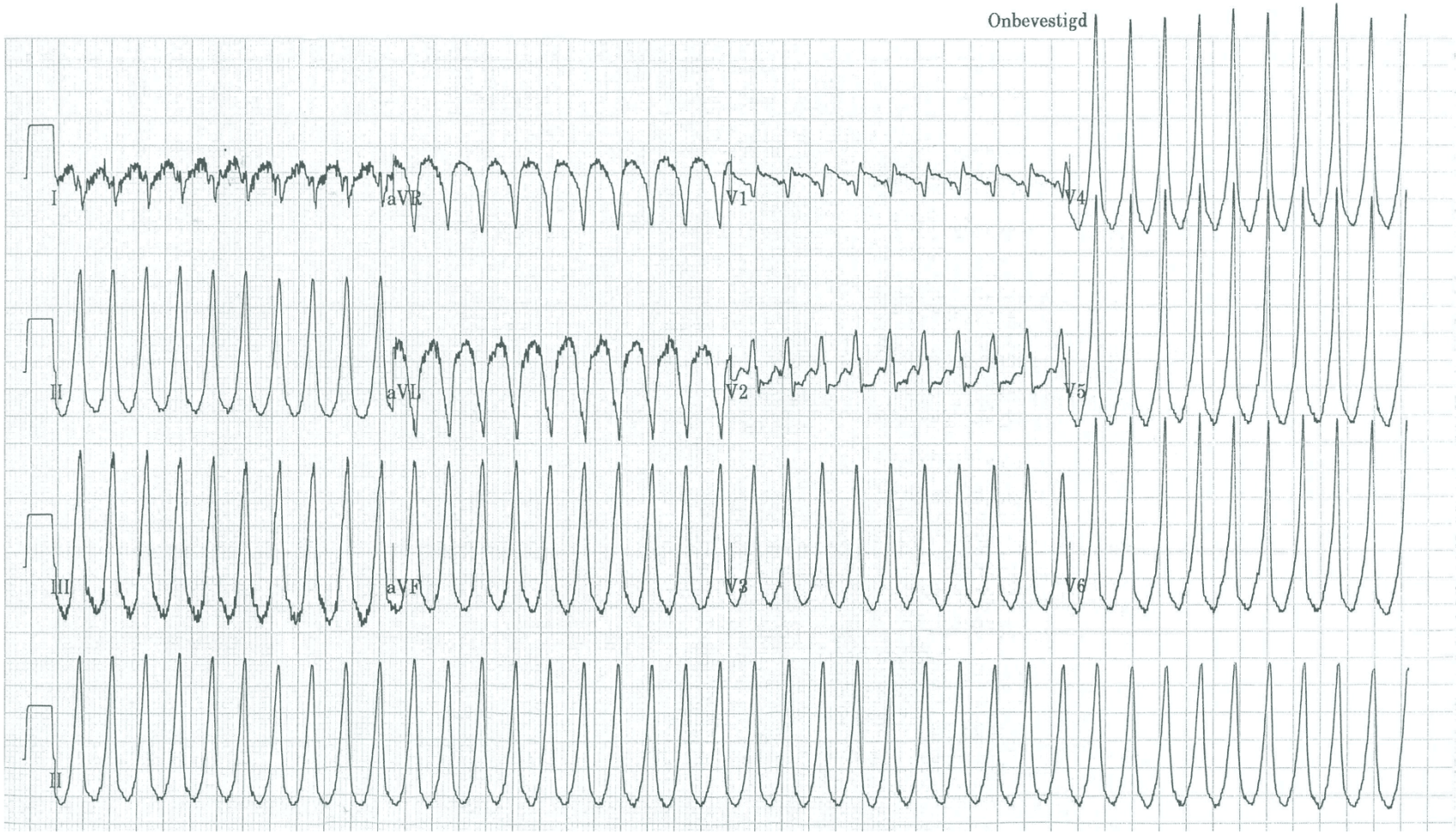

I
II
III
aVR
aVL
aVF
II
V1
V2
V3
V4
V5
V6
40 Hz
25.0 mm/s
10.0 mm/mV
2 bij 5s + 1 ritme-afl
Courtesy of C.J.W. Verouden
ECG PEDIA.ORG


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



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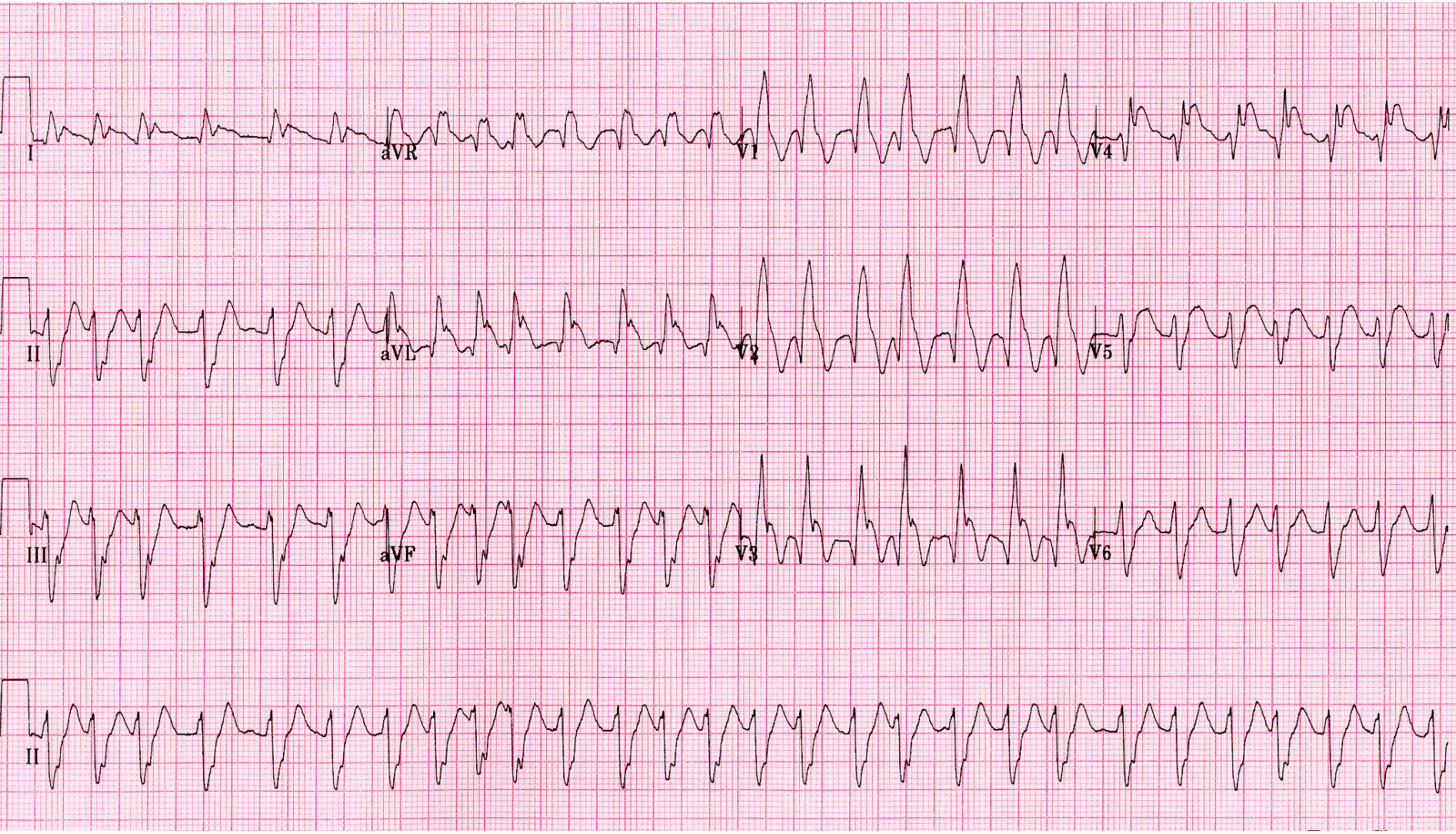
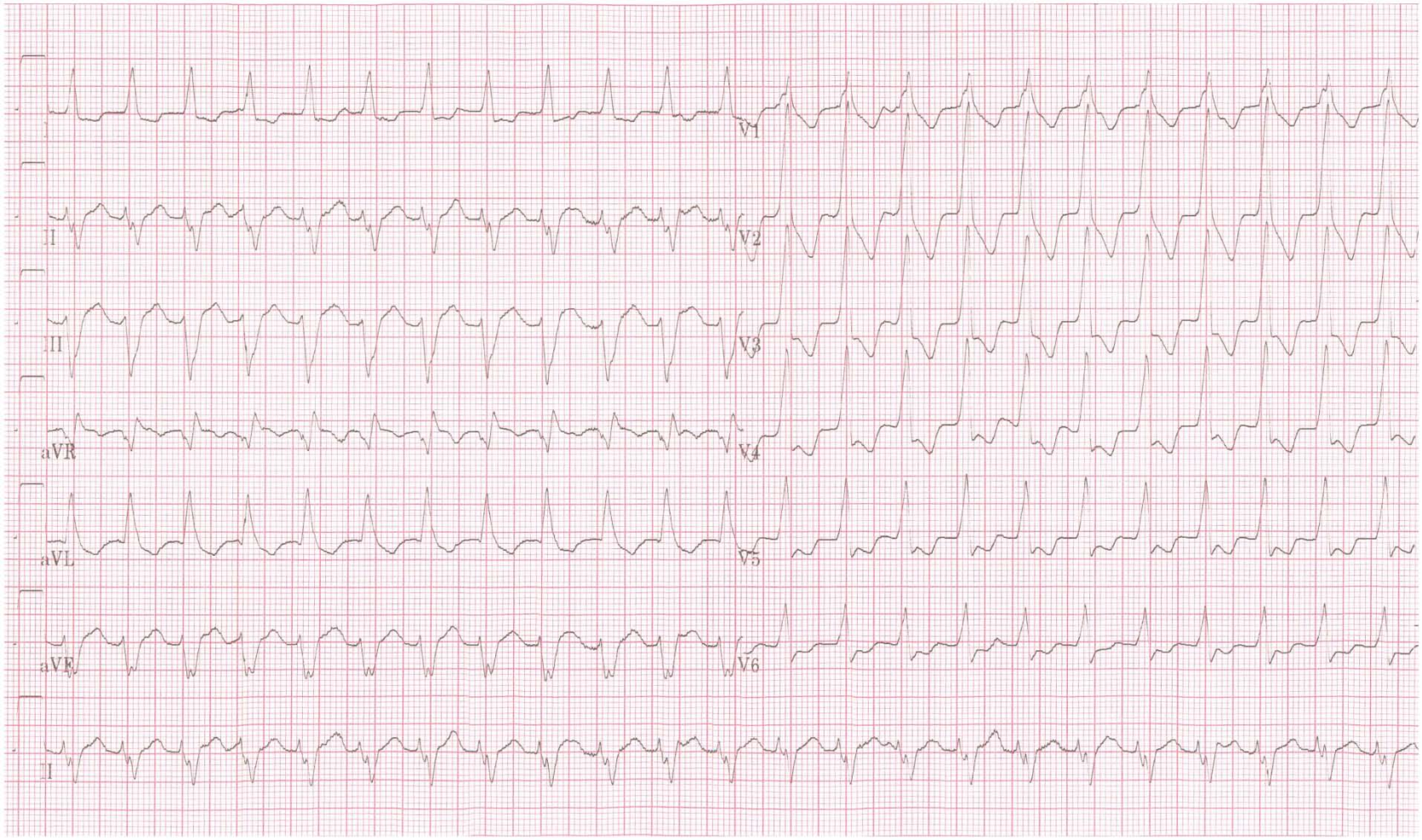

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
0.16-40 Hz
25.0 mm/s
10.0 mm/mV
MAC5K 006A
ARCHIVIST
GE Medical Systems
ECG PEDIA.ORG



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