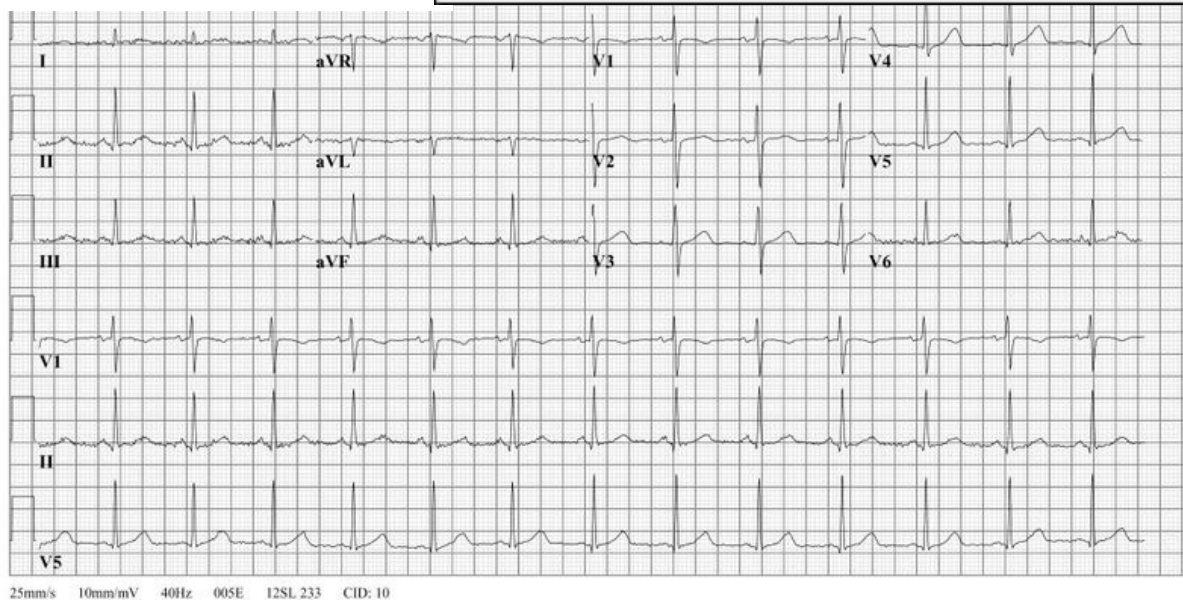
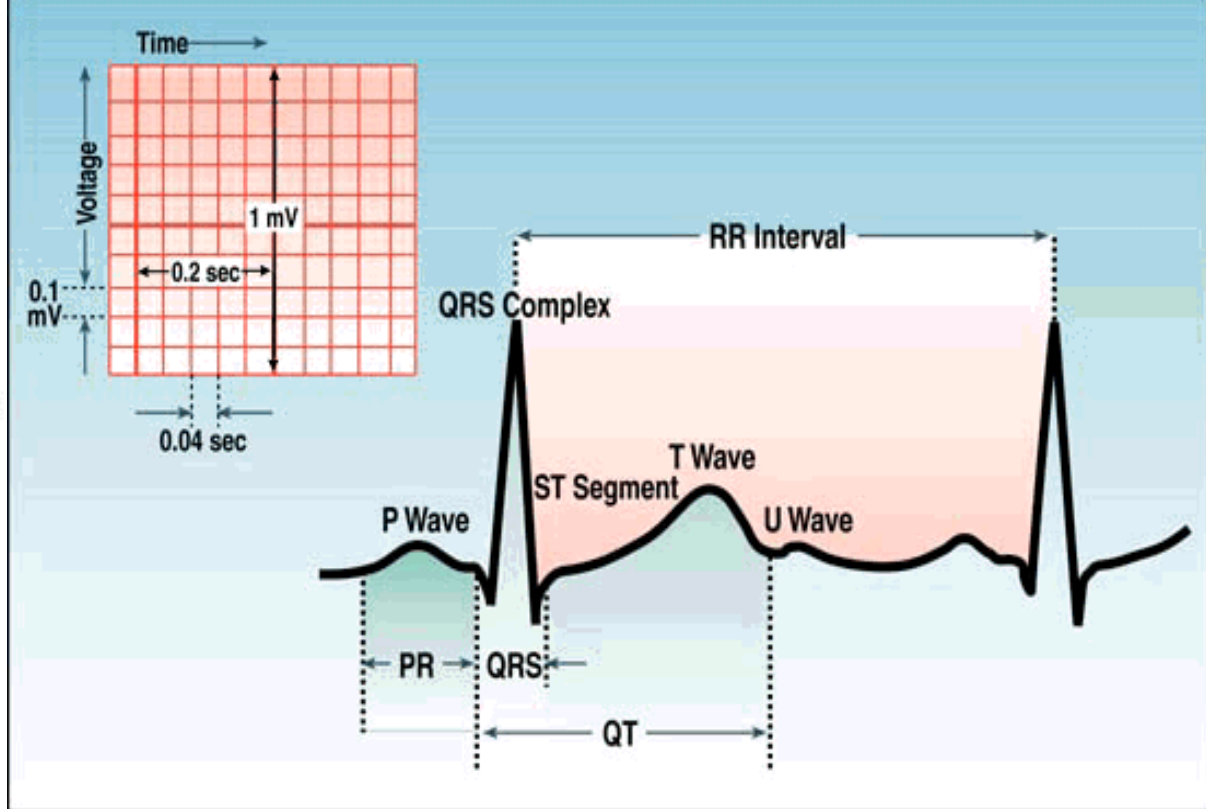
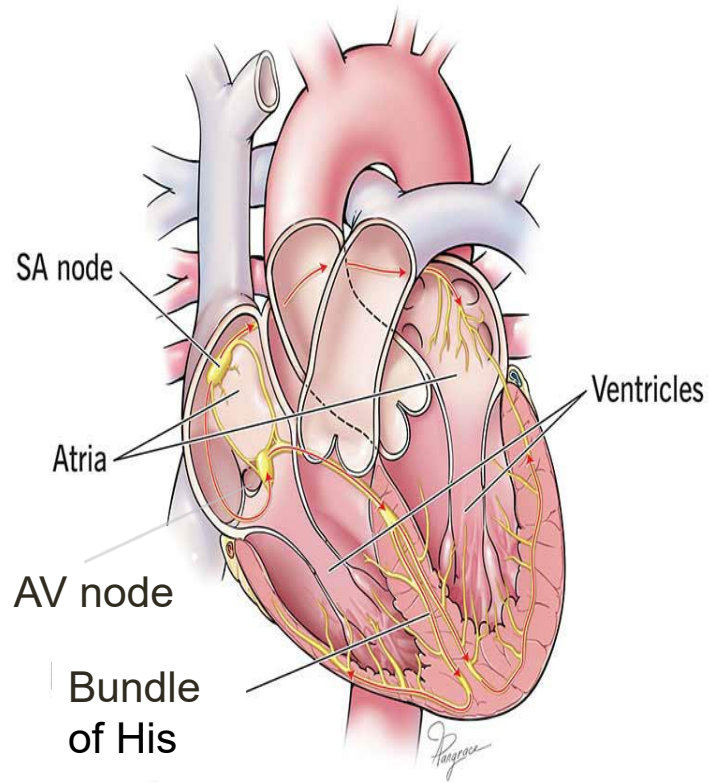
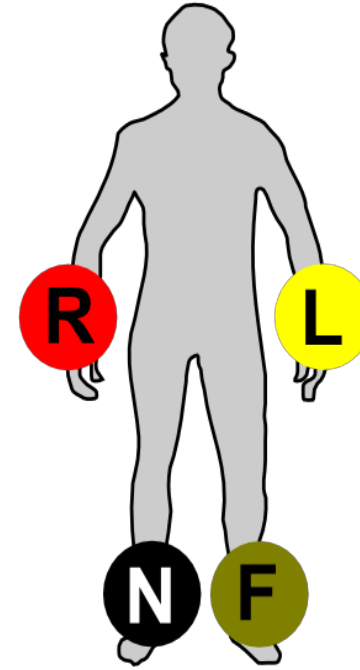
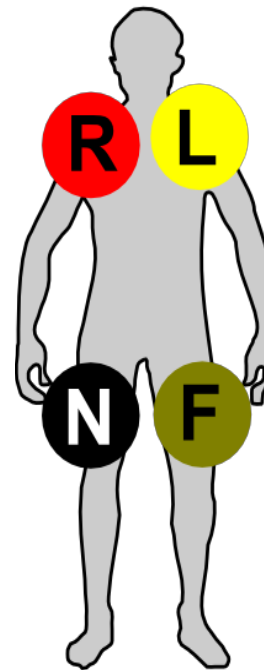
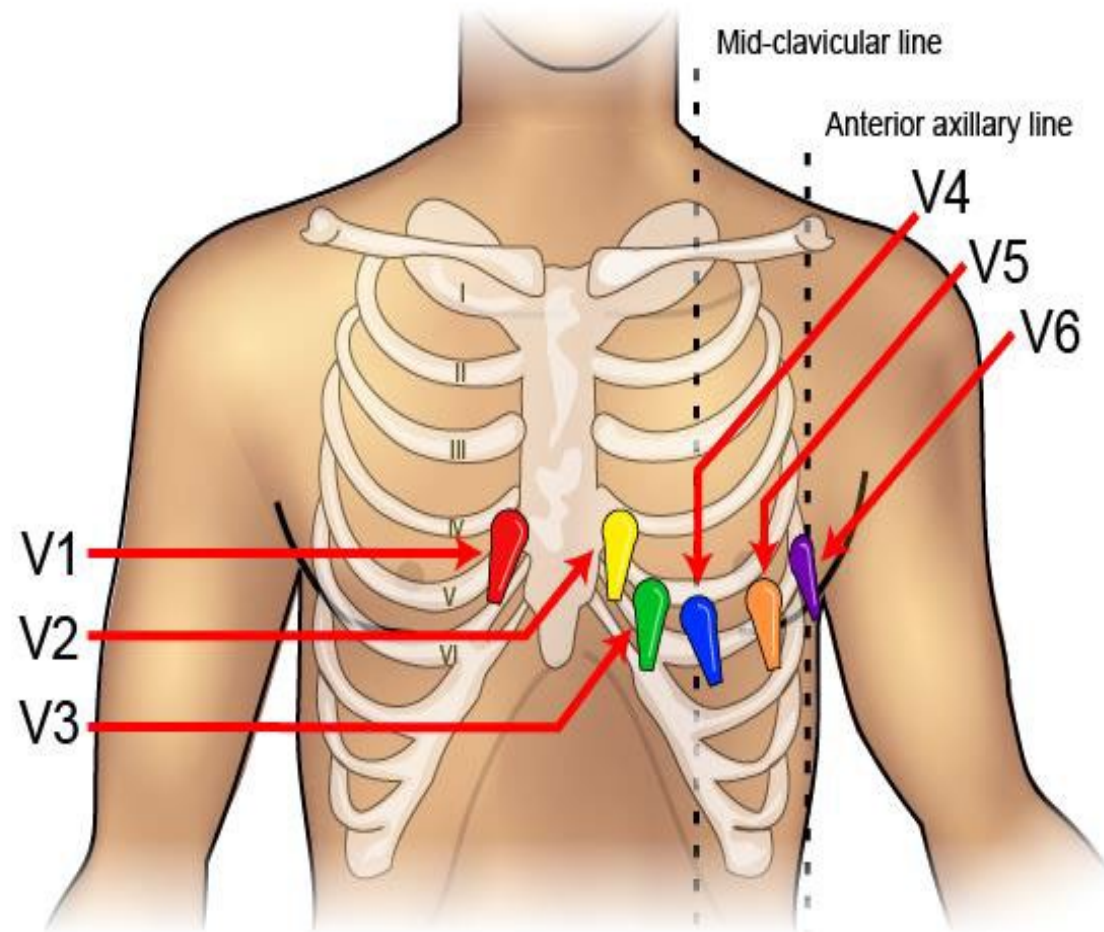


# ECG

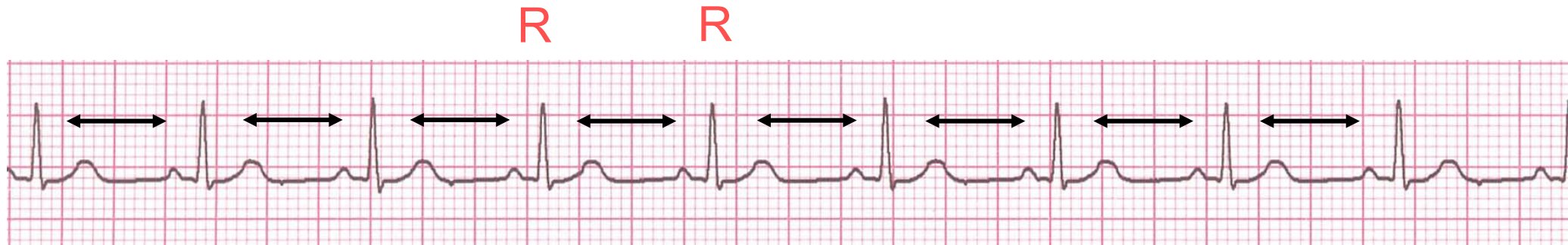
Alison Verstraets



# ECG afleidingen



# Stap 1: regelmatig ritme?



## RR-interval

- Hebben de RR-intervallen dezelfde afstand?
- Lichte variatie van het RR interval door ademhaling



# Stap 2: frequentie



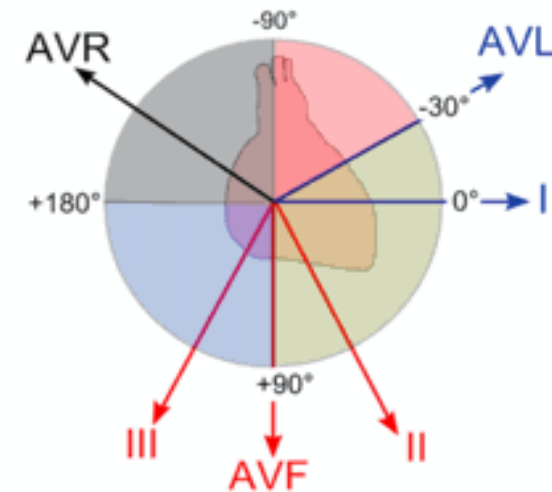
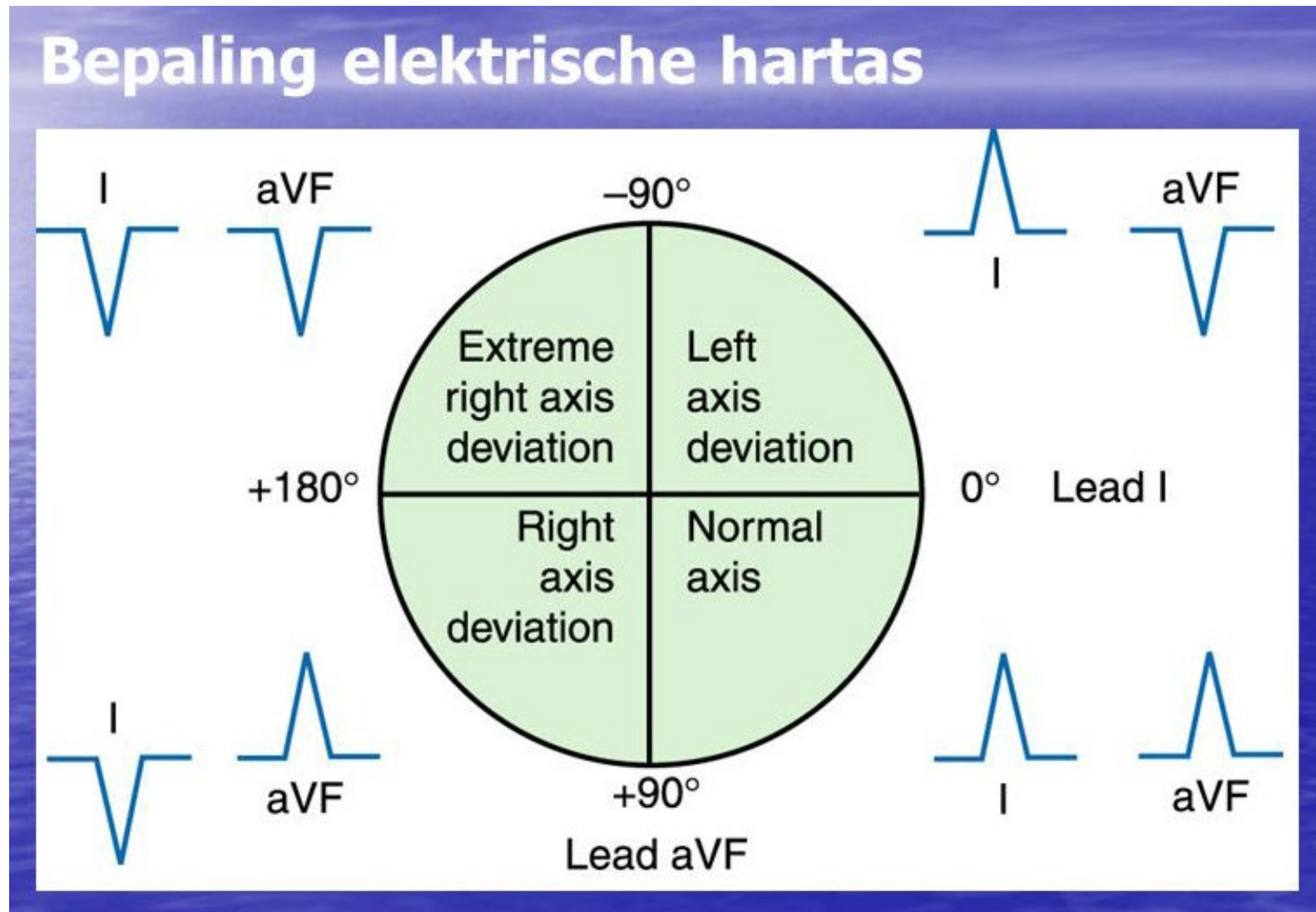
- normaal: 60-100/min
- bradycardie < 50-60/min
- tachycardie > 100/min

# Stap 3: evaluatie P-top en PR-interval

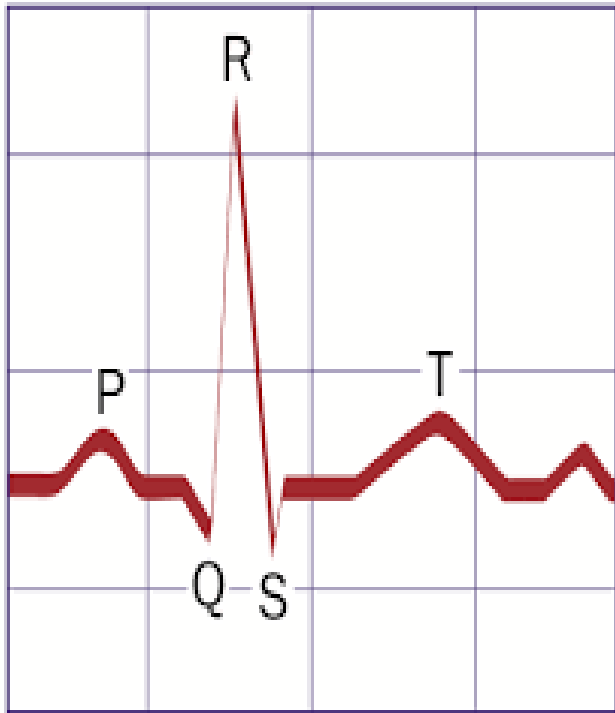


- Zijn er P-toppen?
- Is elke P-top gevolgd door een QRS complex?
- Normale geleiding = 120 – 200 msec (3 – 5 mm)

# Stap 4: hart as



# Stap 5: QRS complex



Breedte: maximaal 3 mm ( $< 0,12$  sec)  
(is de snelheid van de doorgeleiding normaal?)

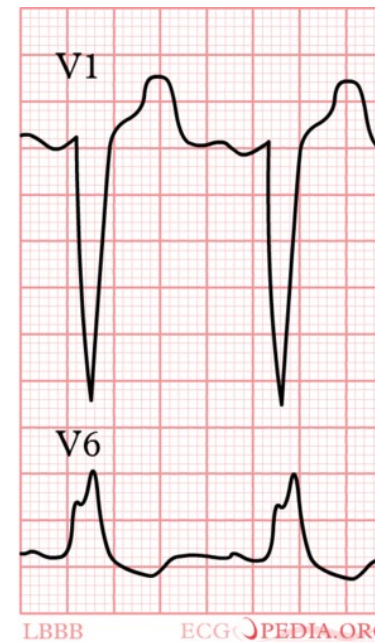
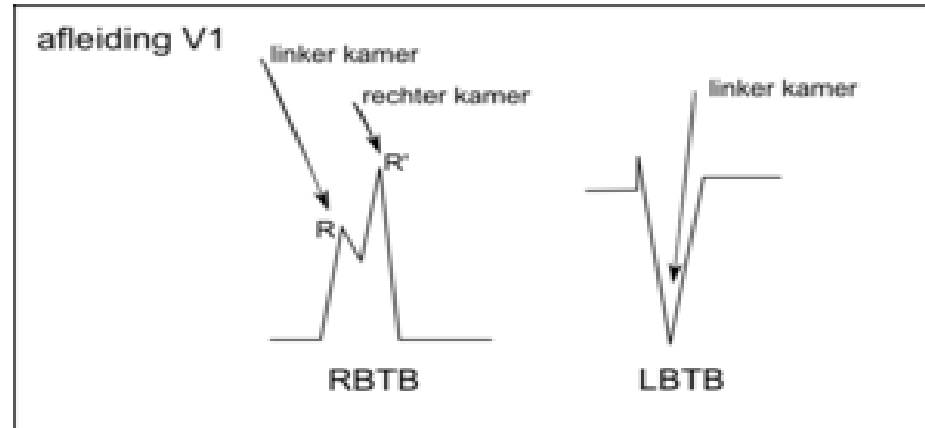
R-progressie

Hoogte (is het aantal hartspiercellen normaal ?)

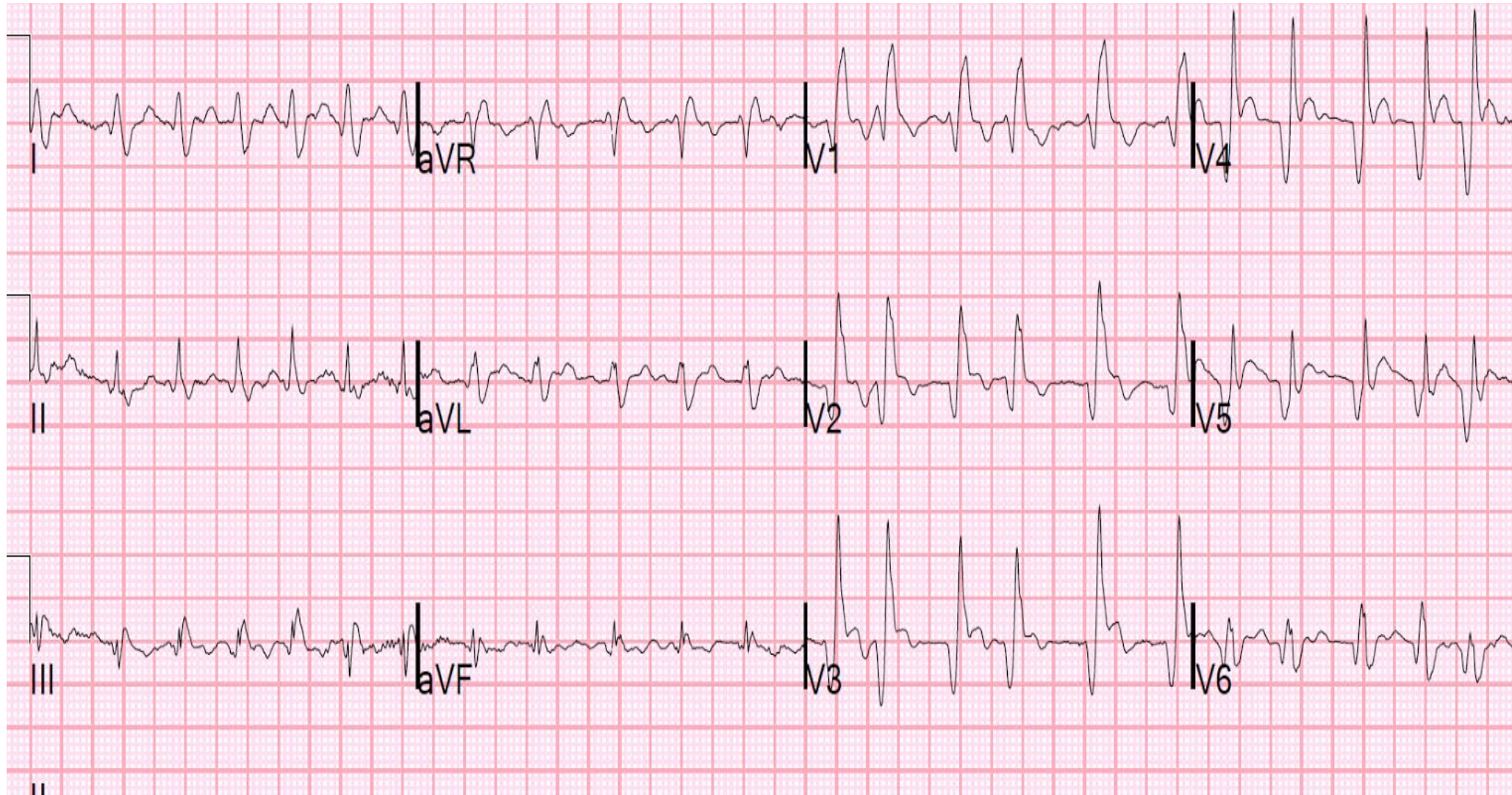


# VRBTB

# VLBTB

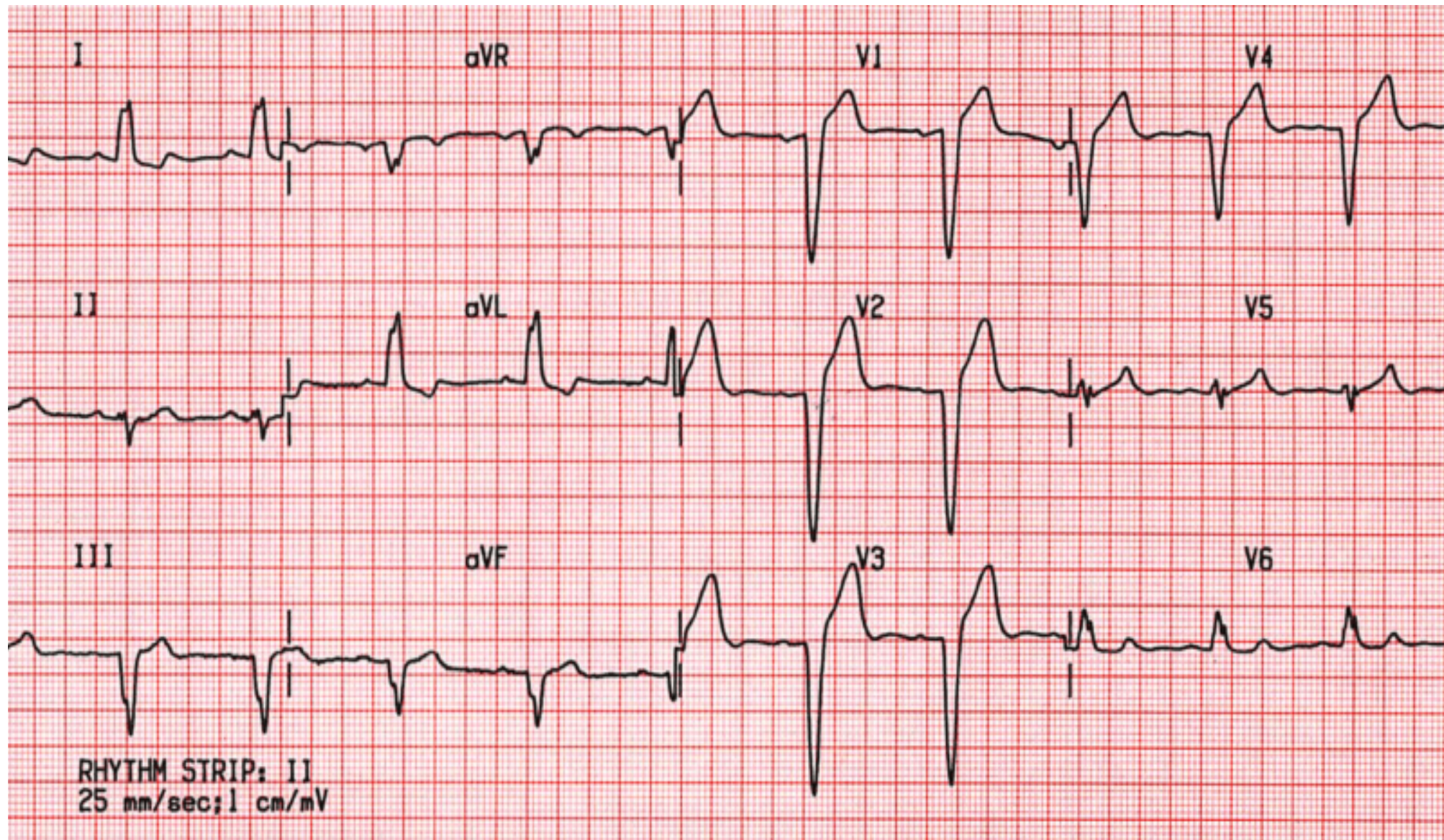


# ECG





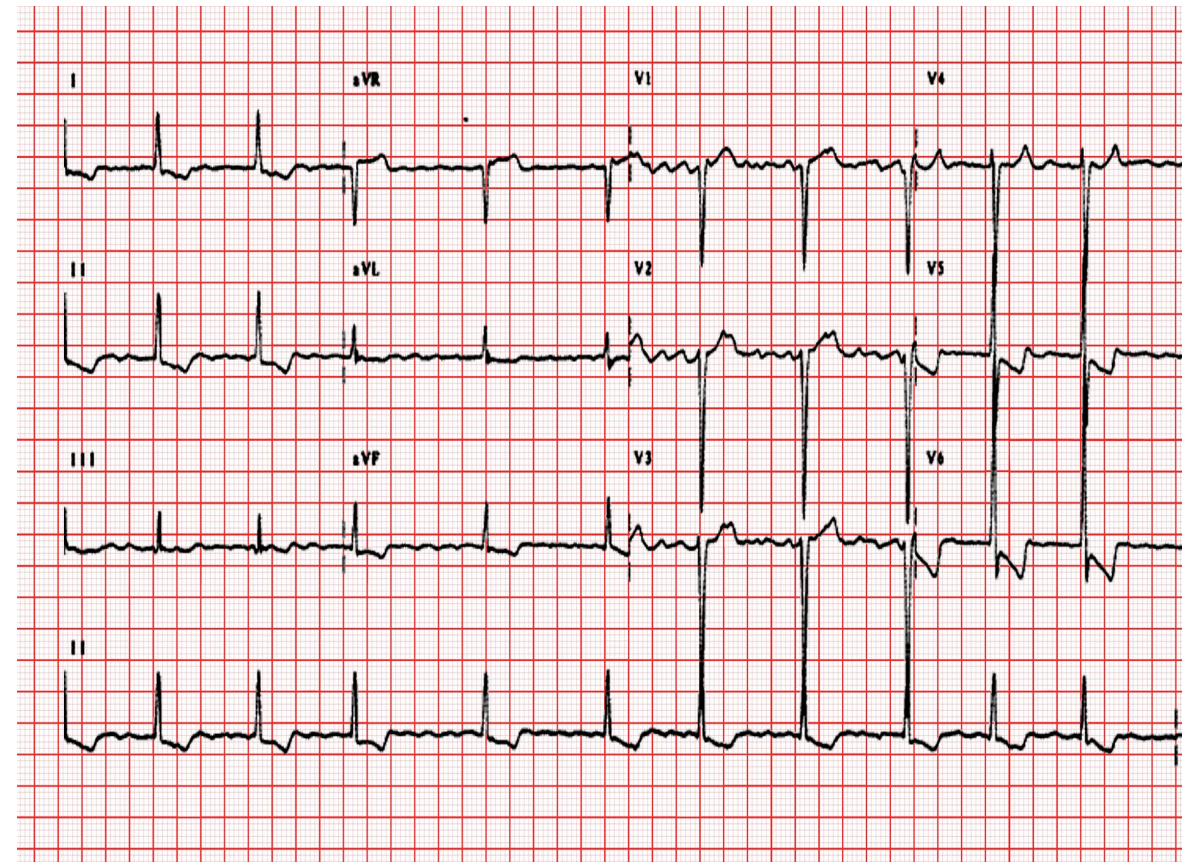
# ECG





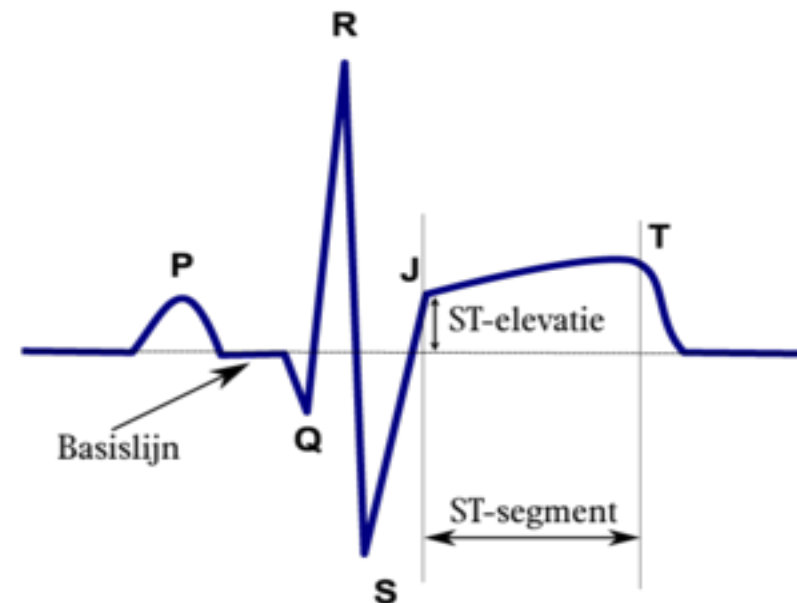
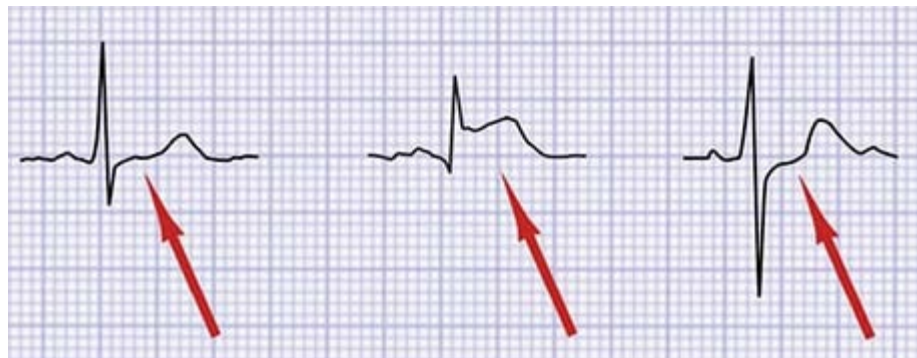
# Hoogte van QRS-complex: linker ventrikel hypertrofie?

- Sokolow index = S golf in V1 of V2 + R top in V5 of V6  $\geq$  35 mm (de som vd grootste)
- R in aVL  $\geq$  12 mm
- R in V5 of V6  $\geq$  26 mm
- R in I, II of III  $\geq$  20 mm
- Repolarisatie: strain





# Stap 6: evaluatie ST segment



Hoe meet je ST-elevatie?

Normaal: isoelectrisch (op de basislijn)

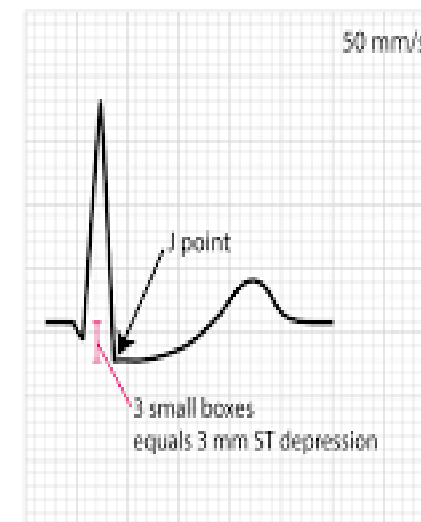
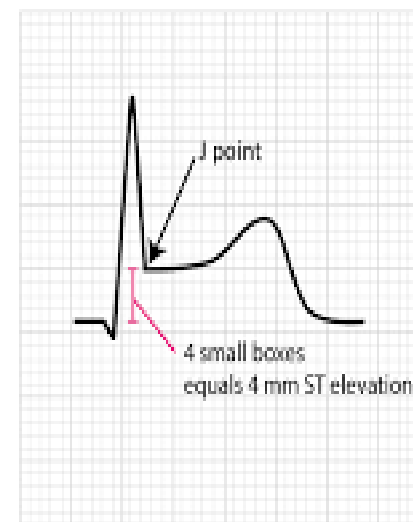
Abnormaal:

## – Elevatie

- Myocardinfarct, pericarditis, vroege repolarisatie, enzovoort

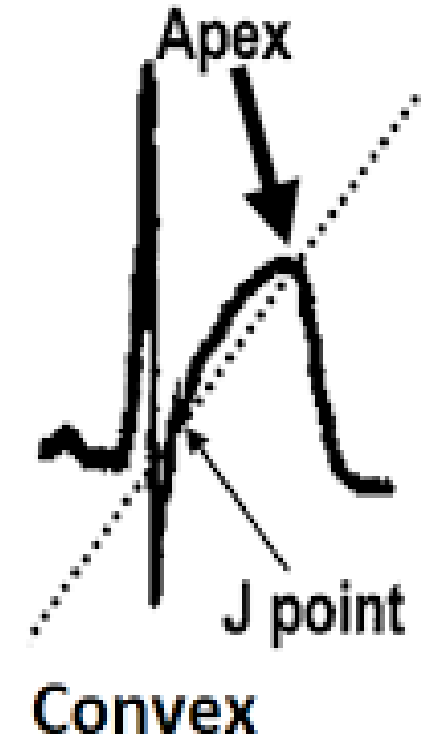
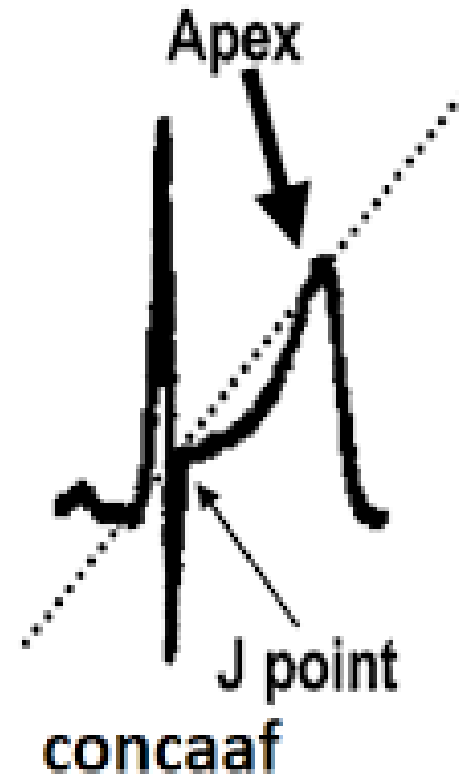
## – Depressie

- Ischemie, LBTB, LVH, aspecifiek



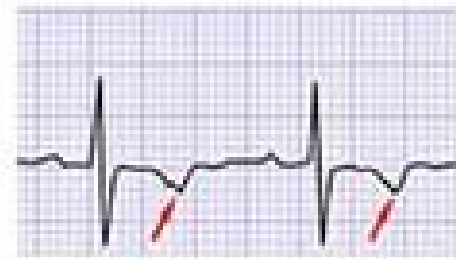
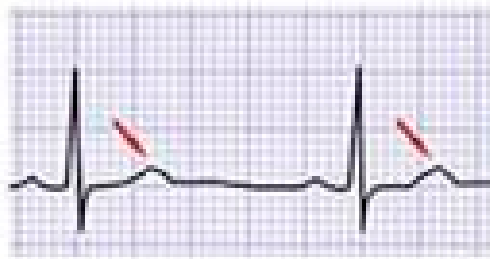
# ST-segment elevatie

- Pericarditis: concaaf
- STEMI: convex



# Stap 7: evaluatie T-top

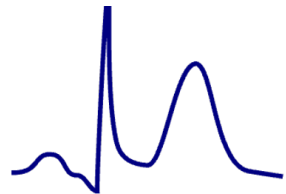
## – T-top inversie



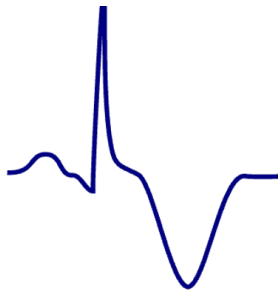
## – T-top afwijkingen



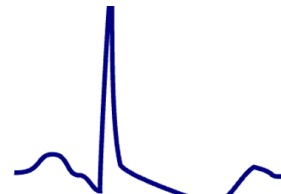
Hyperkalemia



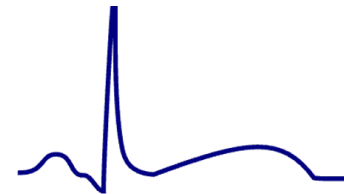
Repolarization Variant



Ischemia

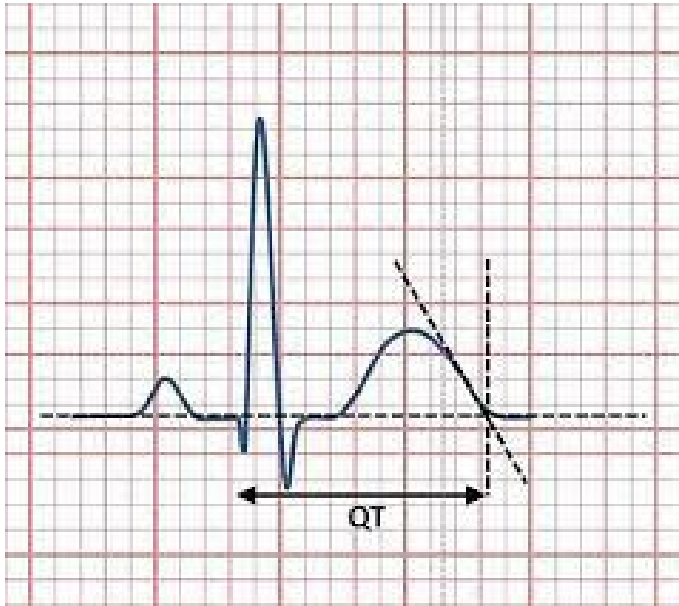


Strain



Prolonged QT interval

# Stap 8: QTc-tijd



QTc normaal waarden:

- Man  $\leq 450$  msec
- Kinderen  $\leq 460$  msec
- Vrouw  $\leq 470$  msec



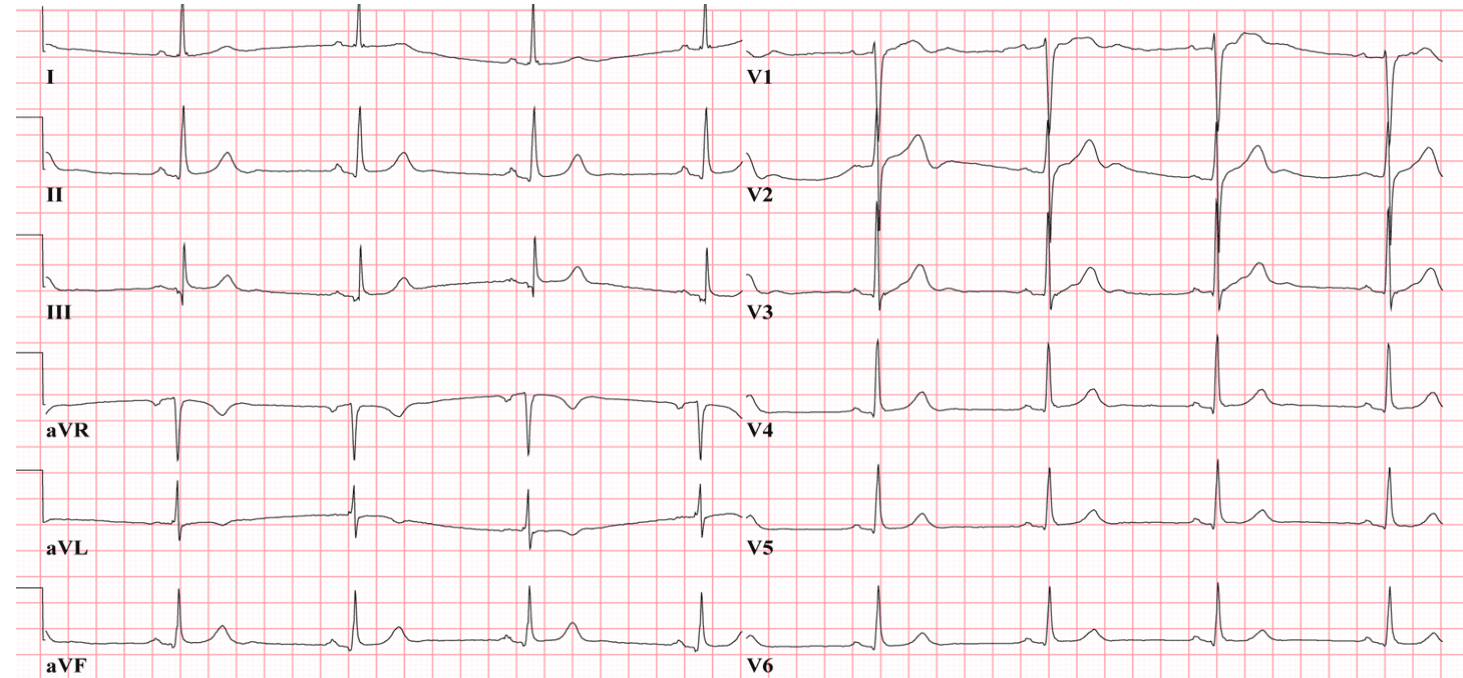
Bazett formule: 
$$QTc = \frac{QT}{\sqrt{RR \text{ interval (sec)}}}$$



# Bradyaritmie < 50 bpm

## Sinusbradycardie

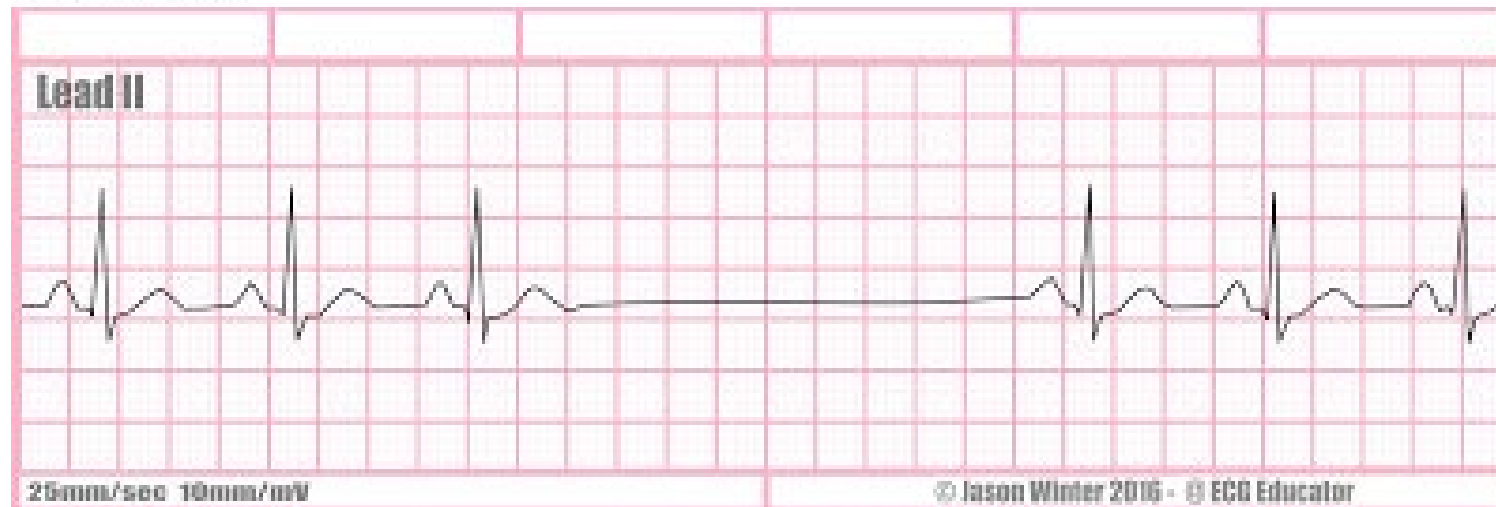
- Rust of slaap
- Verhoogde vagale tonus (sporters)
- Medicatie bv. betablokkers



# Sinusarrest

- Geen impuls in de sinusknop → geen activatie van de atria  
→ geen P-top
- Pauze op ECG > 2 seconden

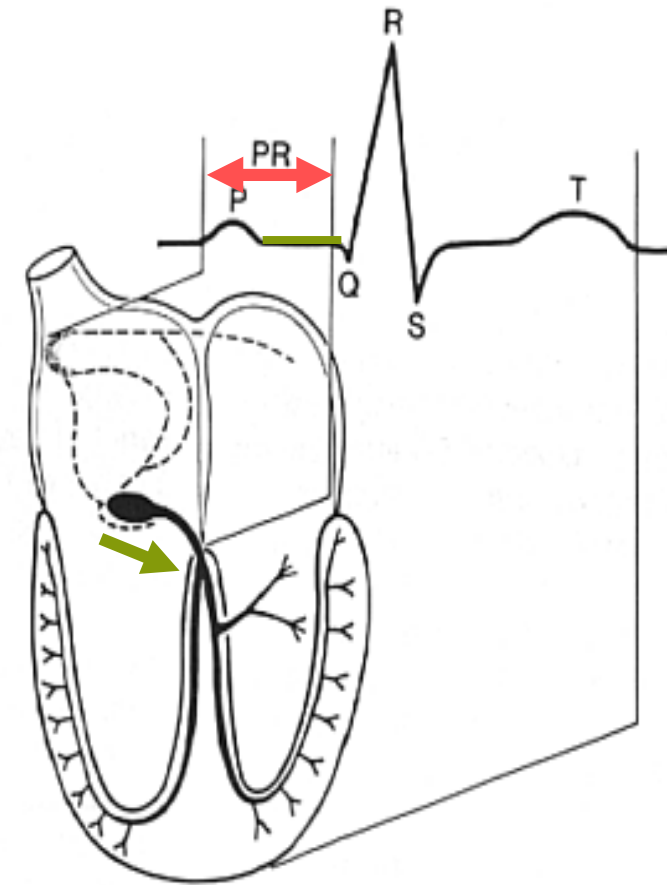
## Sinus Arrest



- 5 grote vierkanten = 1 seconden

# Eerste graads AV Blok

- Vertraging AV-geleiding  $\neq$  blok
- $> 200$  msec en constant
- Elke P-top  $\rightarrow$  QRS complex



# Tweede graads AV Blok

## Type I Mobitz of Wenckebach

- P-R = wisselend

**Mobitz I or Wenckebach**



**Mobitz II**



**2:1 block**



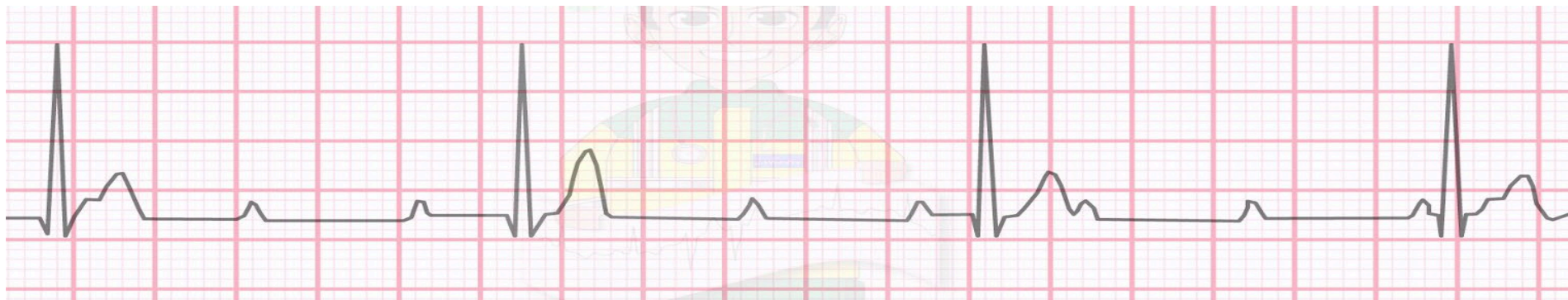
## Type II Mobitz

- P-R = constant



# Derde graads = totaal AV Blok

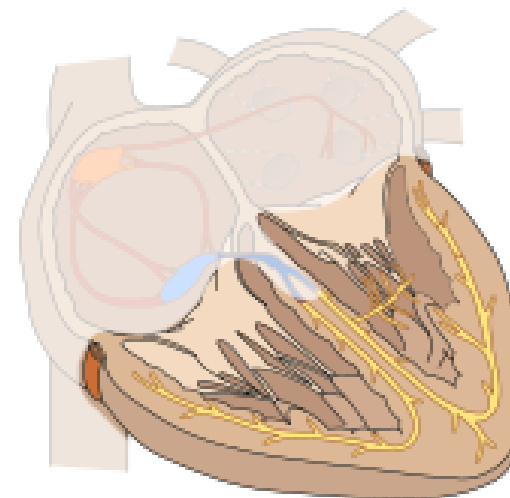
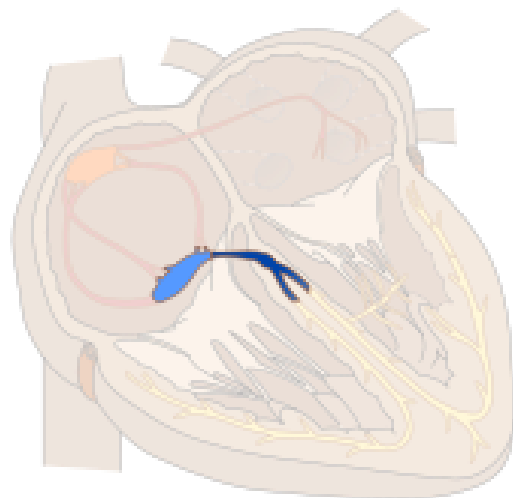
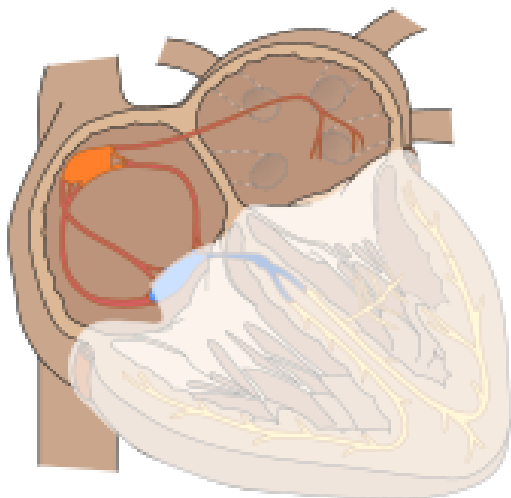
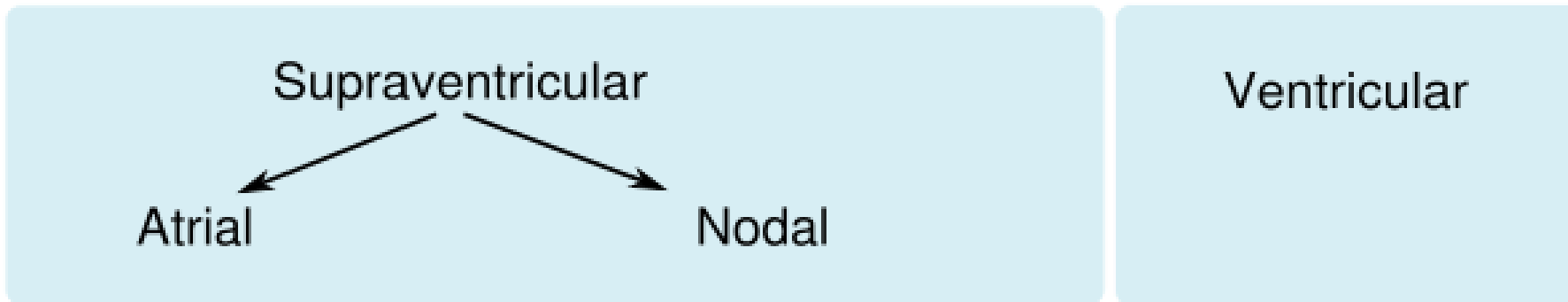
- AV dissociatie
- Escape ritme: nodaal of ideoventrikulair of afwezig (asystolie)



# Tachyarritmie > 100 bpm

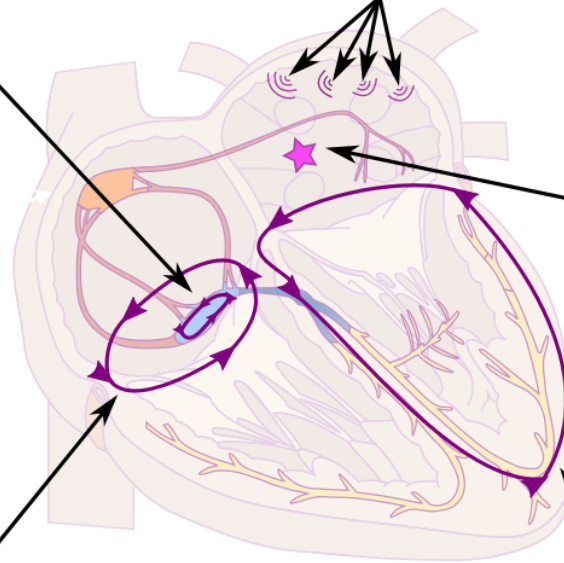
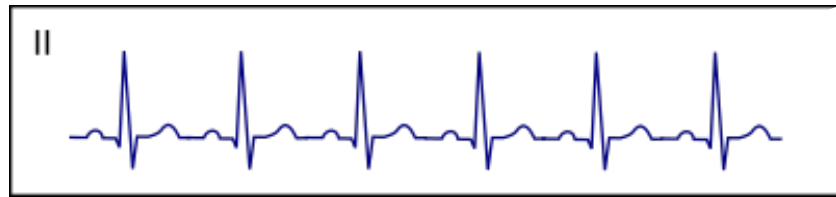
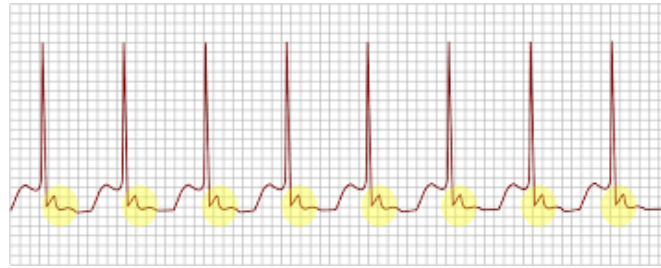
QRS-complex < 120 msec

QRS-complex > 120 msec



AV nodal re-entry tachycardie (AVNRT)

Boezemfibrilleren / atriumfibrilleren

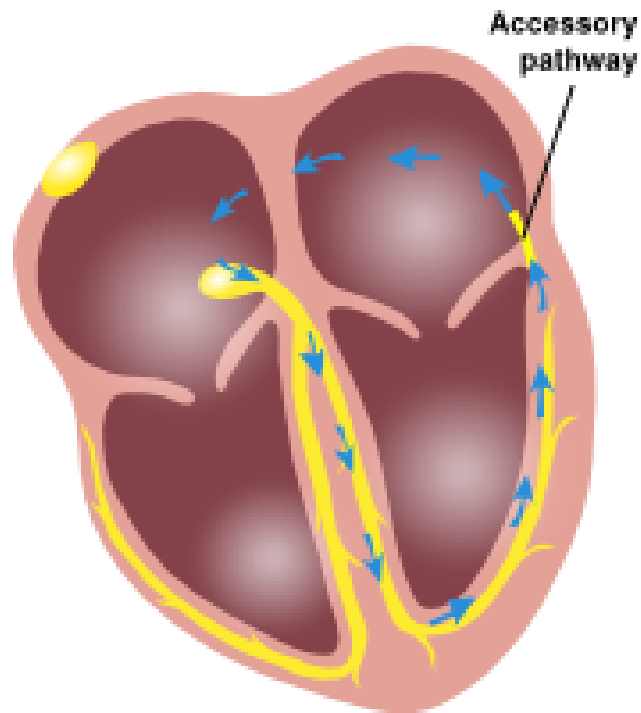


Atriale tachycardie (enkelvoudig)

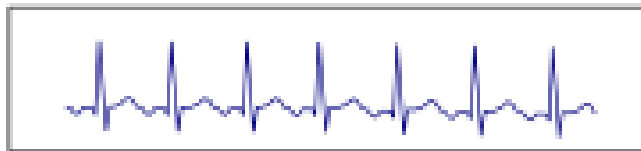
Boezemflutter (meestal rond de tricuspidalis annulus)

AV re-entry tachycardie (re-entry door accessory bundle)

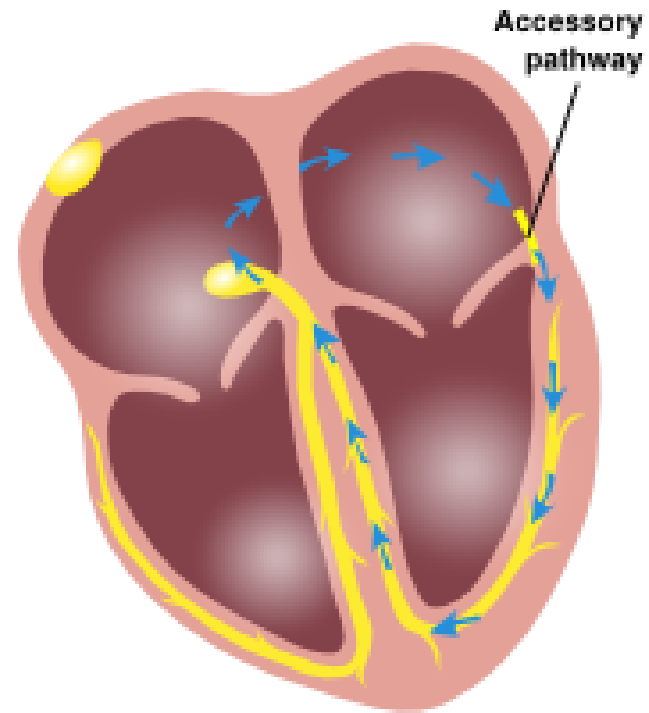
# Mechanism of AVRT



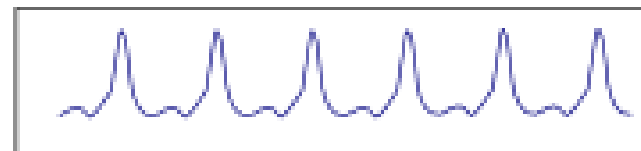
**Orthodromic Circular Tachycardia  
in a patient with an accessory pathway**



Retrograde geleiding

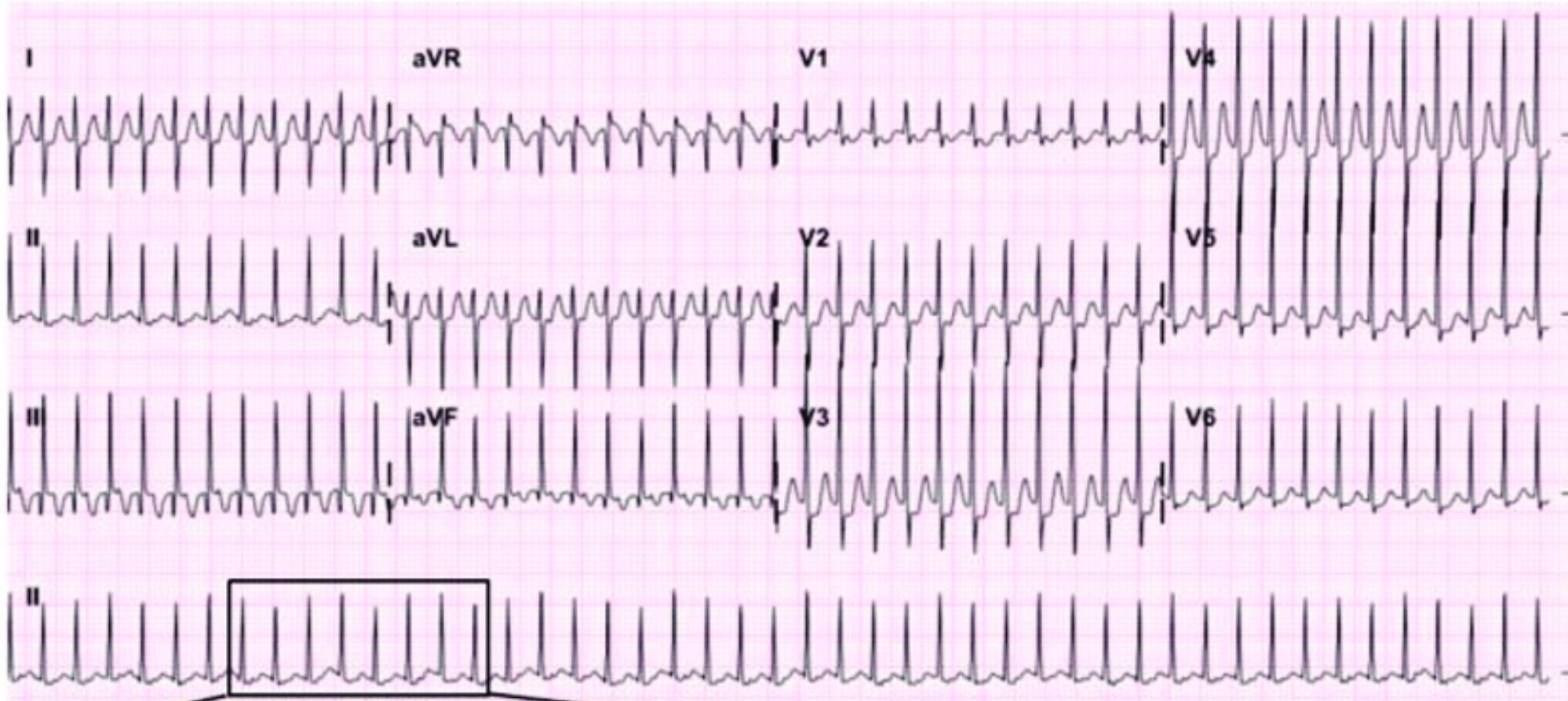


**Antidromic Circular Tachycardia  
in a patient with an accessory pathway**

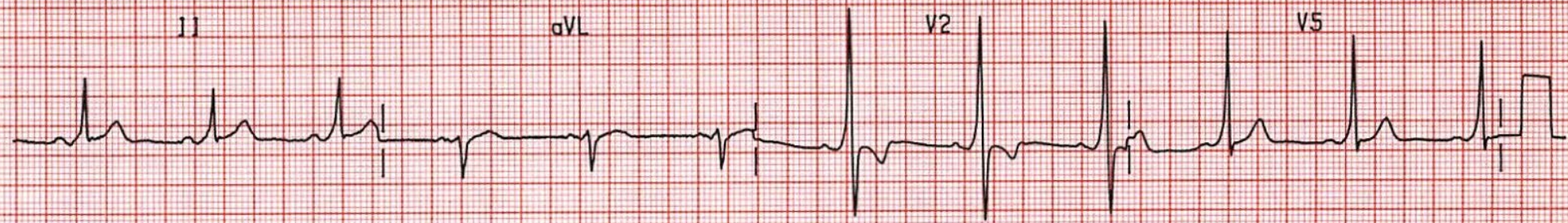
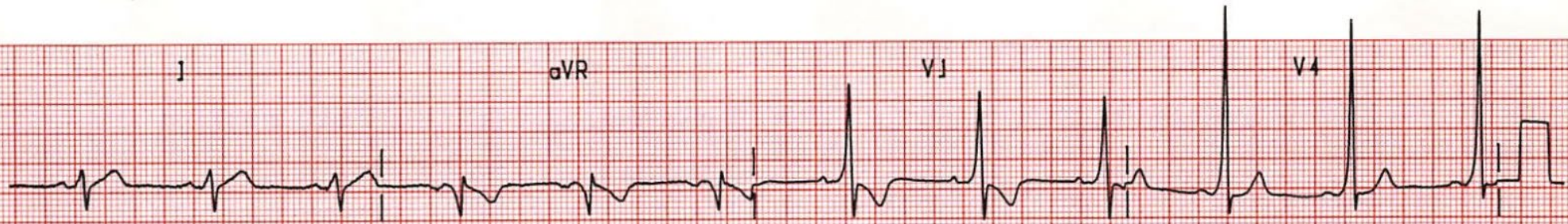


Antegrade geleiding over  
accessoire bundel

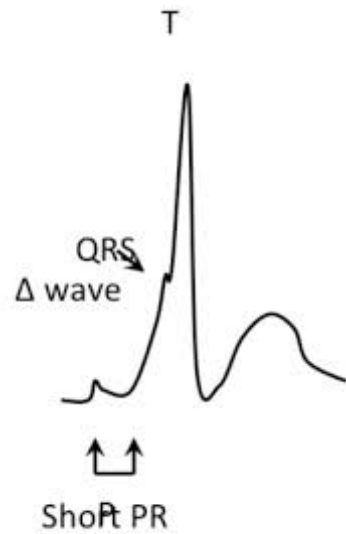
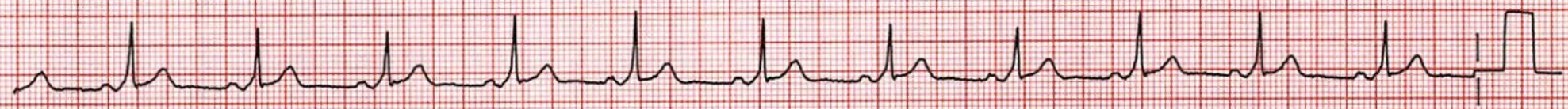






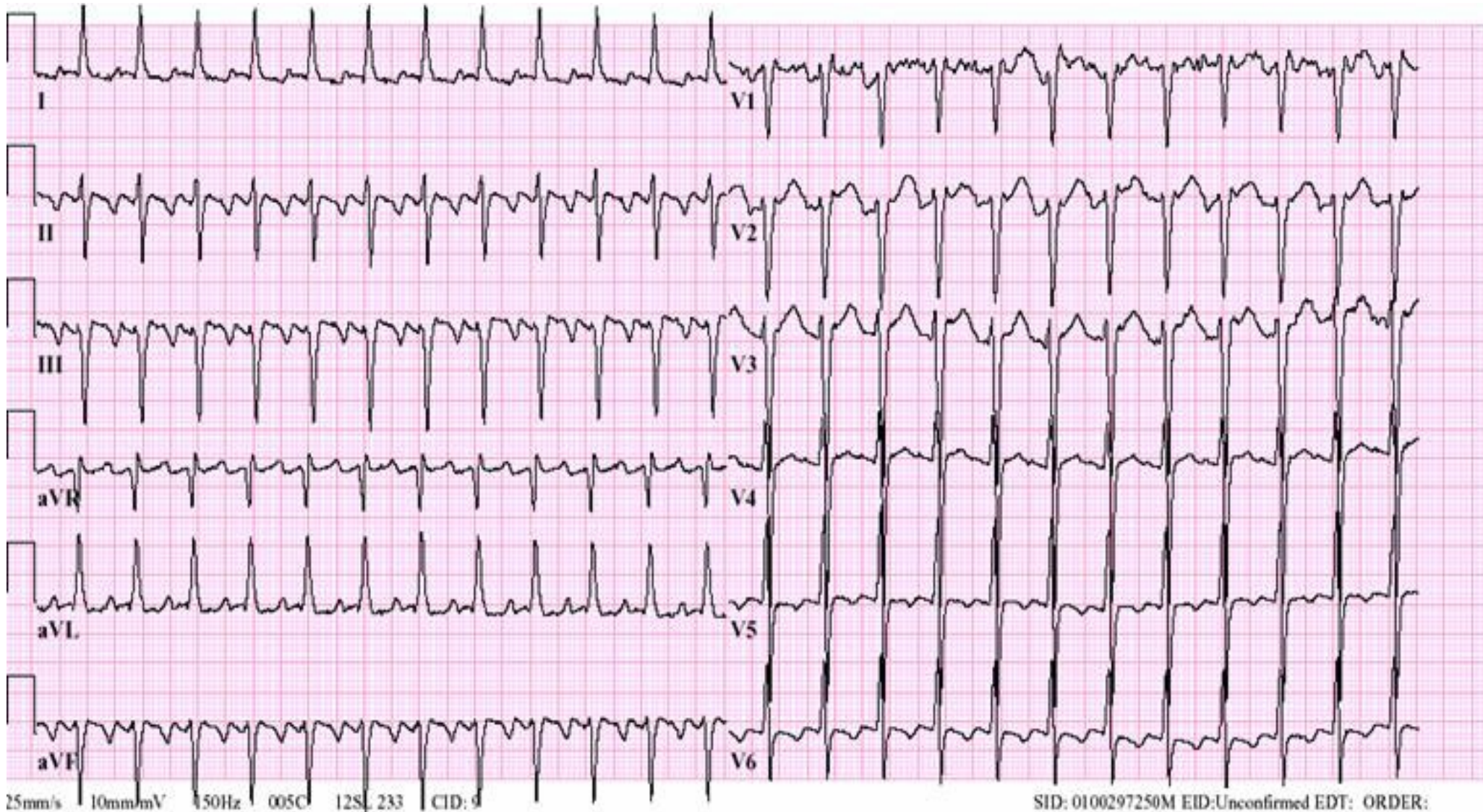


RHYTHM STRIP: II  
25 mm/sec; 1 cm/mV





# Smal QRS ritme 150/' denk aan VKFlutter



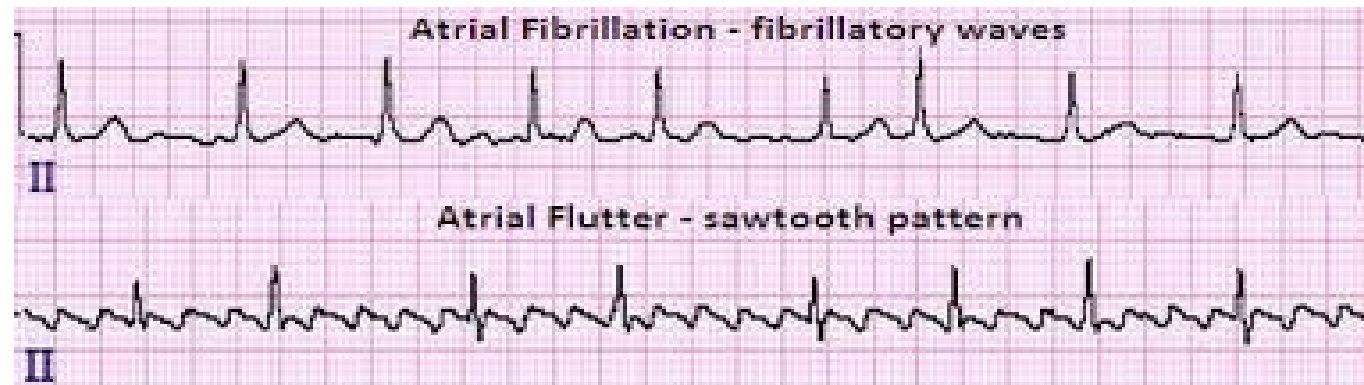
# VKF versus VKFlutter

## VKF

- Soms medicamenteus te reconverteren
- Pulm vene isolatie of ablatie: linker atrium, technisch complexer, succesrate 70% (1/4 twee procedures)
- Antistolling: CHAD2S2-VASc score
- VKF en VKFlutter vaak bij zelfde p. aanwezig

## VKFlutter

- Medicamenteuze reconversie lukt meestal niet, bijna steeds el rec nodig
- Ablatie van circuit: rechtszijdig, technisch gemakkelijk, hoge kans op succes (>98%)
- Antistolling: CHAD2S2-VASc score
- VKF en VKFlutter vaak bij zelfde p aanwezig

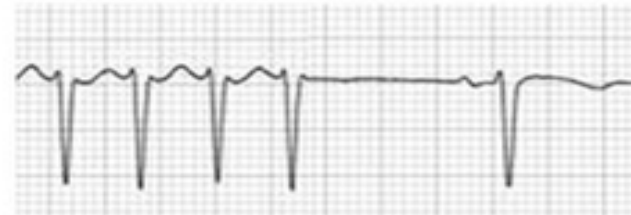




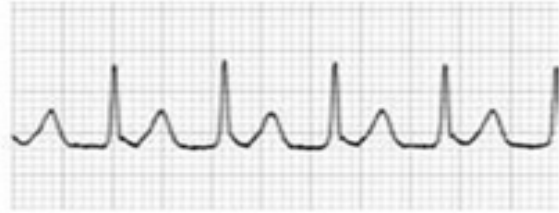
## Tachycardia

## Response to adenosine

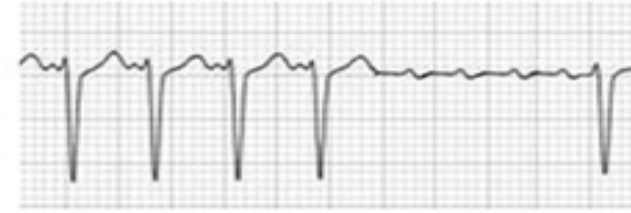
AVNRT



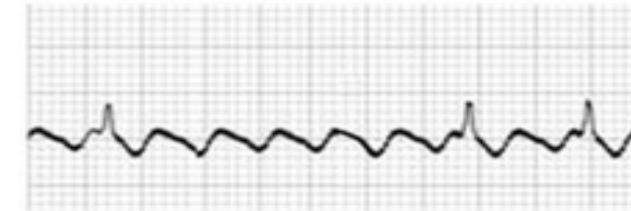
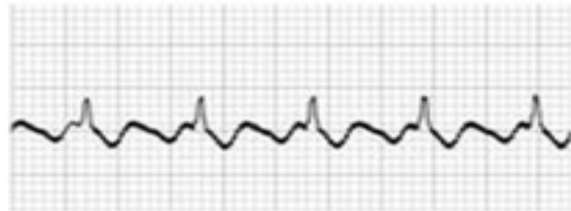
Orthodromic  
AVRT



Atrial  
tachycardia



Atrial flutter

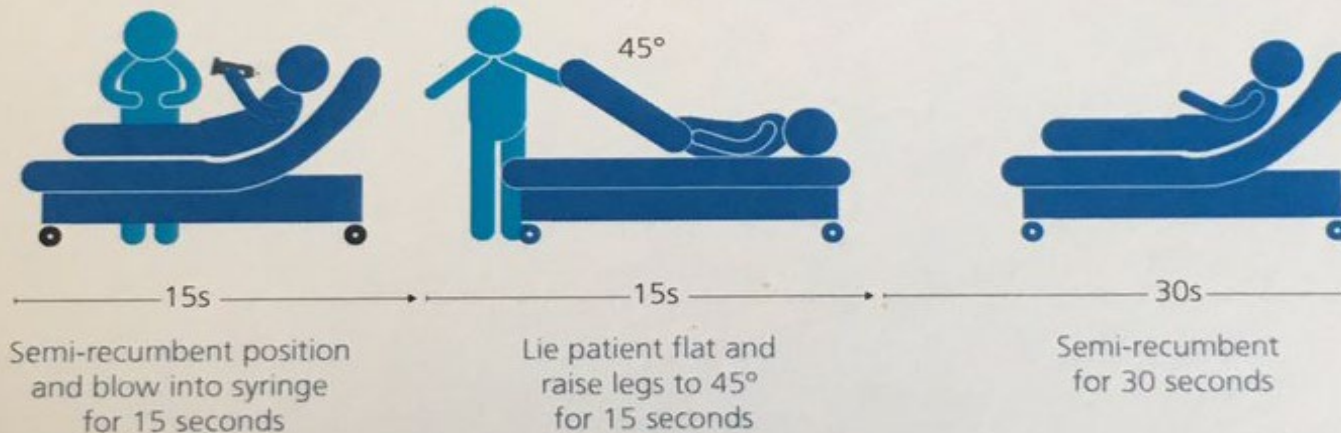


# Modified Valsalva Manoeuvre

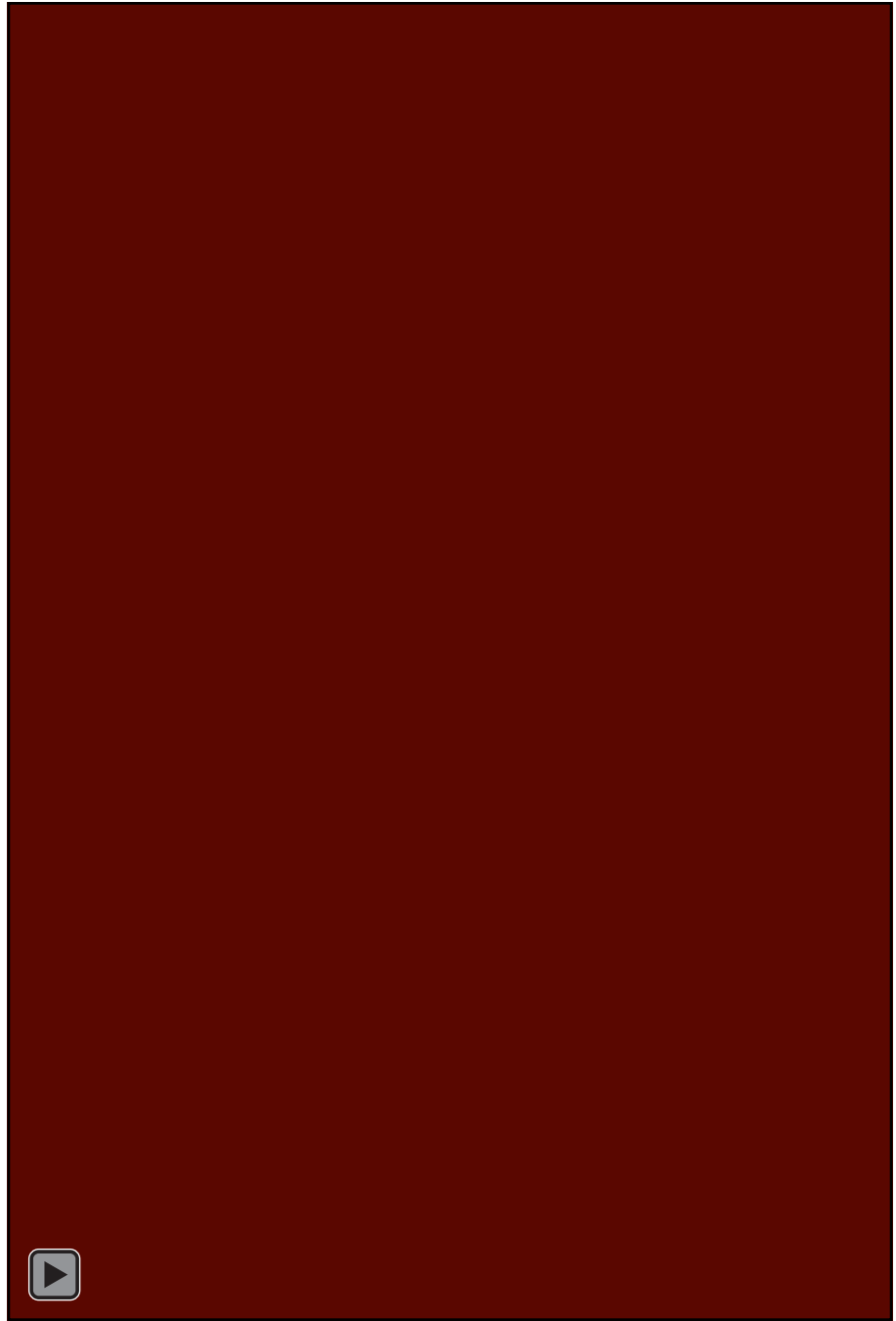
12-lead ECG and confirm diagnosis of SVT



Explain the procedure to the patient and obtain consent. Use 10ml syringe with plunger loosened



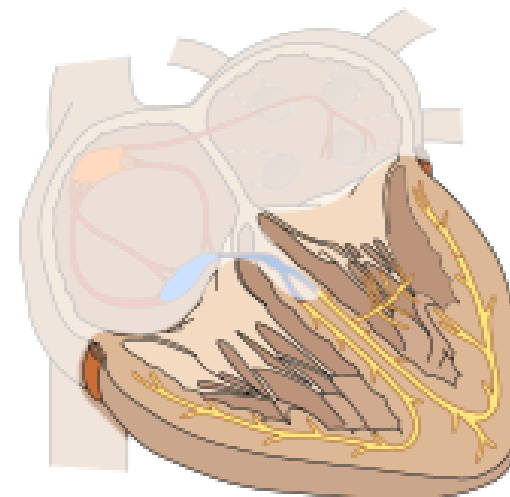
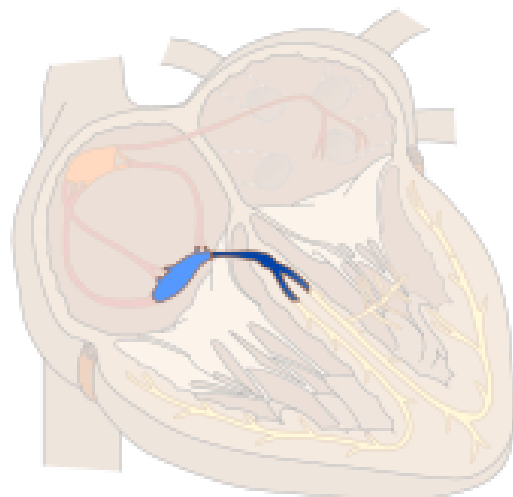
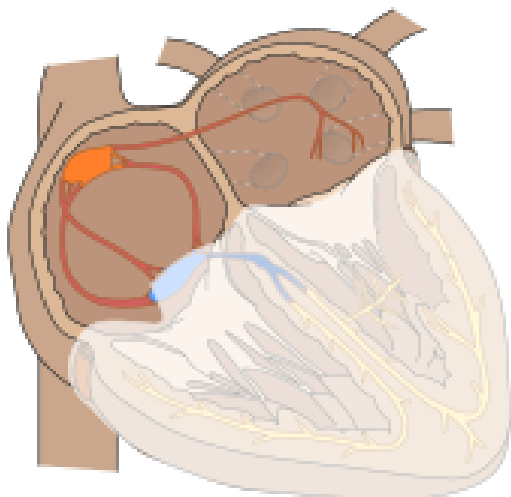
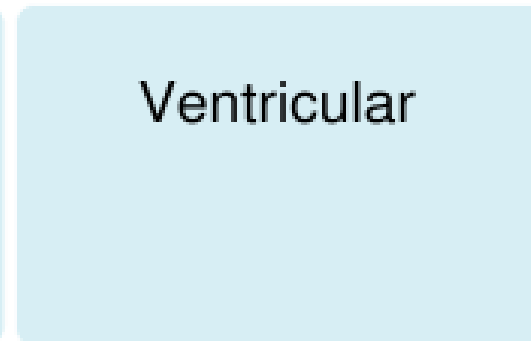
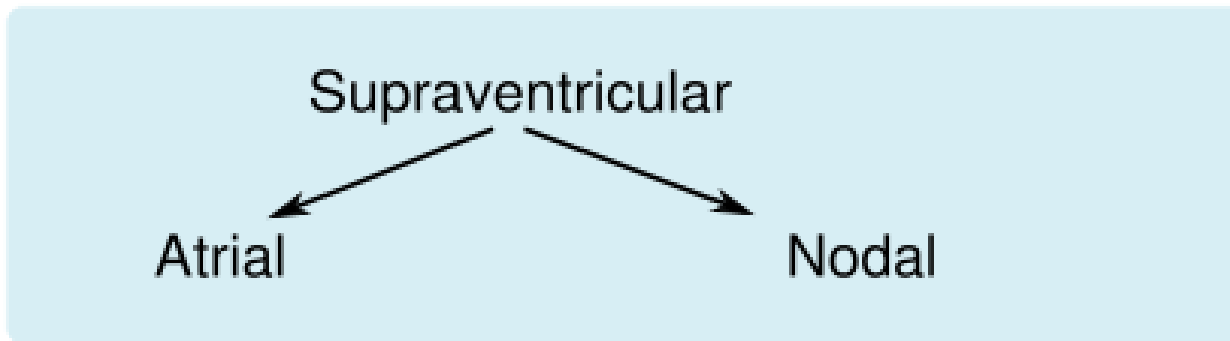
Re-assess rhythm and repeat as necessary, up to three times



# Tachyarritmie > 100 bpm

QRS-complex > 120 msec

QRS-complex > 120 msec



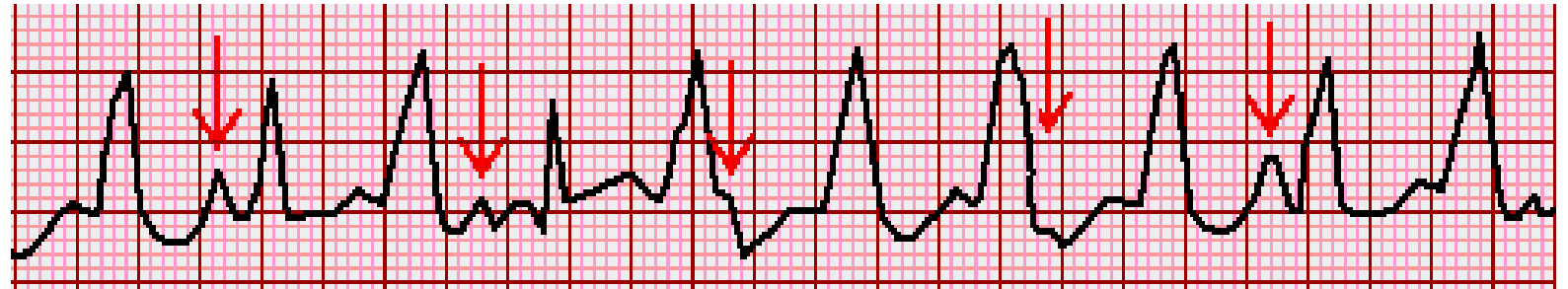


# Breed QRS tachycardie

- QRS > 120 msec
- Differentieel diagnose:
  - Ventrikeltachycardie (VT)
  - SVT met vooraf bestaand BTB
  - SVT met aberrante geleiding
  - SVT met AV-geleiding over een accessoire bundel

# Wat pleit voor ventrikeltachycardie?

- VG: onderliggend structureel of ischaemisch hartlijden
- Klinisch: cannon A-waves of kikkerpols (AV dissociatie)
- ECG:
  - AV dissociatie

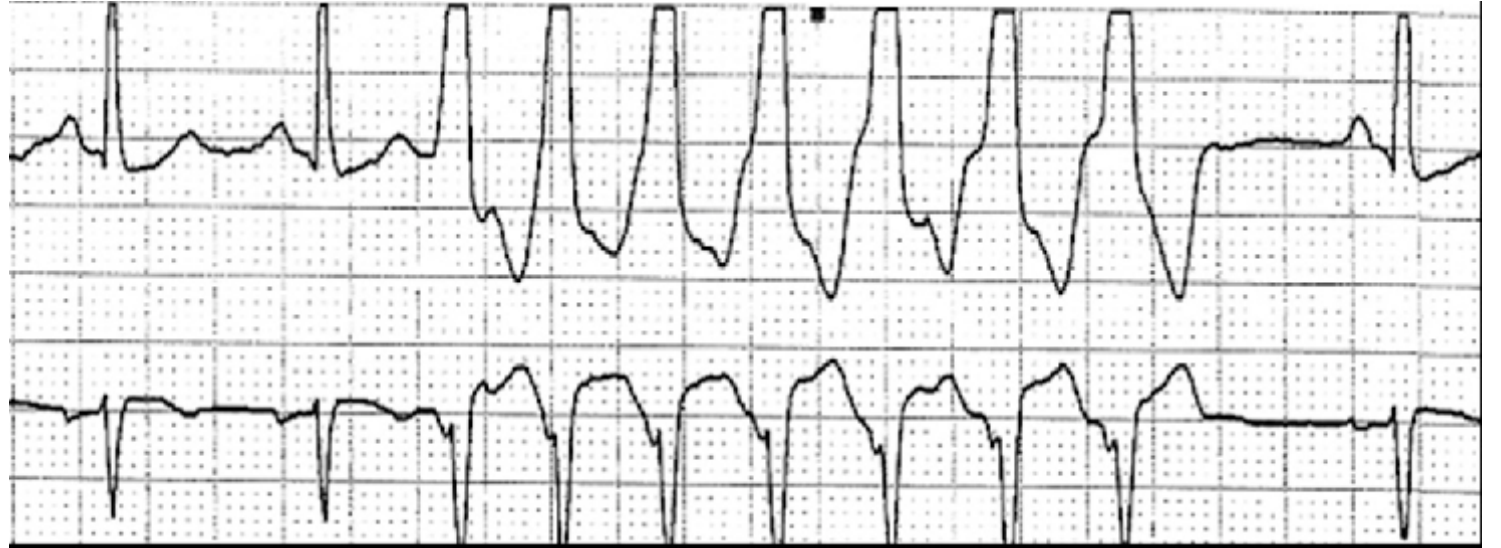


De atria en ventrikels worden onafhankelijk van elkaar aan verschillende frequenties gedepolariseerd; geen verband tss p-top en QRS complex.  
VK frequentie < kamerfrequentie dwz aantal p-toppen < QRS complexen

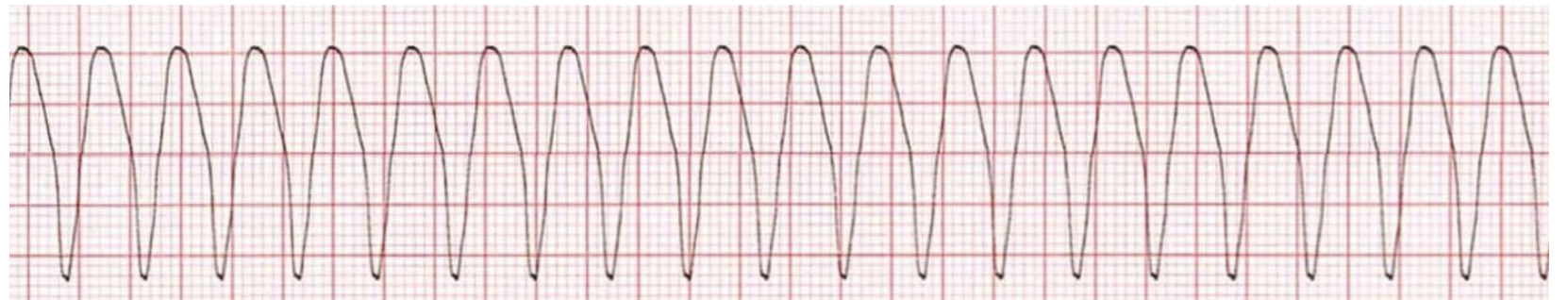
- QRS Breedte : > 140 msec en > 160 msec bij VLBTB
- vorig ECG ?

# VT

Non sustained VT



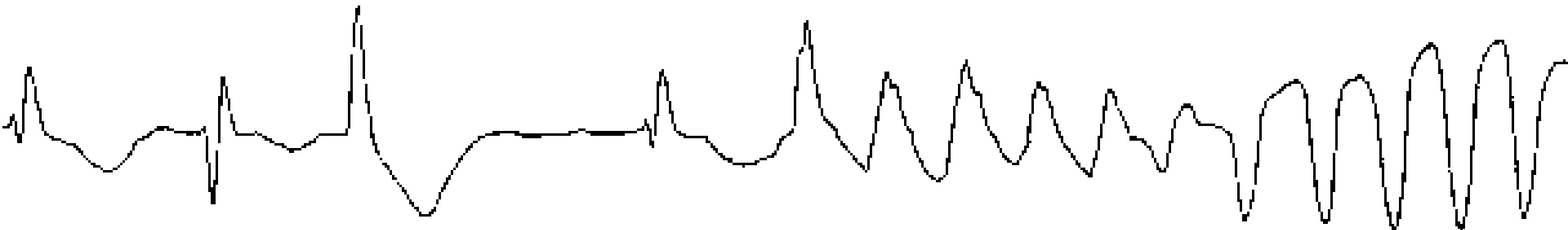
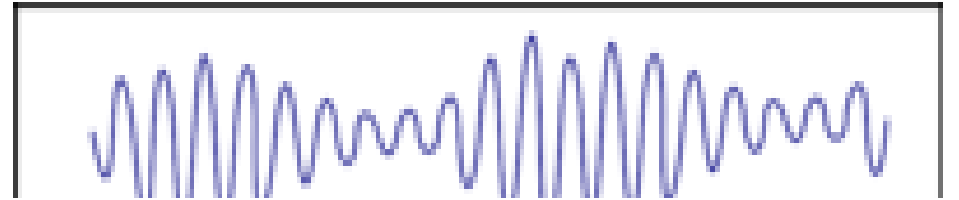
Sustained VT



# Polymorfe ventrikeltachycardie: Torsade de pointes

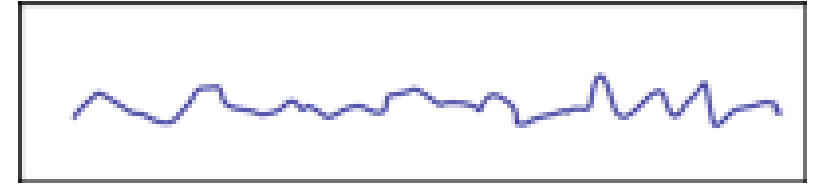
!!! Ontaarden in VFIB → plotse †; zo kortstondige cycli  
→ syncope

ECG: lang QTc (> 500 msec)





# Ventrikelfibrillatie

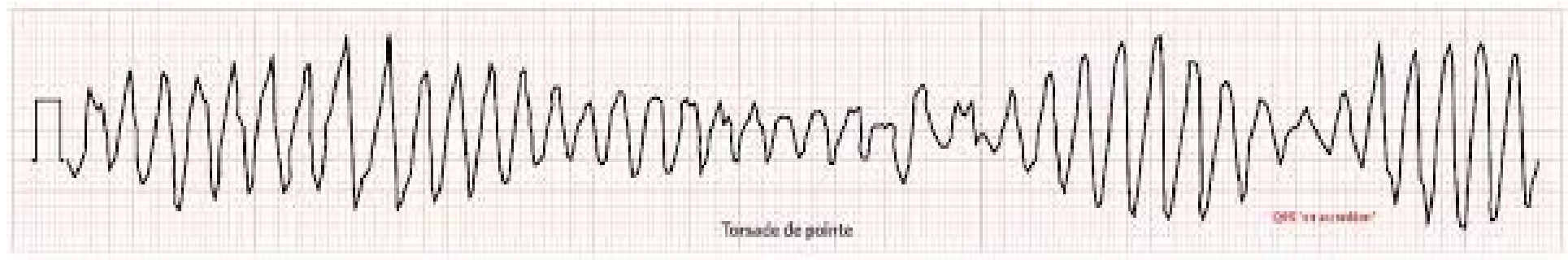


Chaotisch depolariseren van de ventrikels

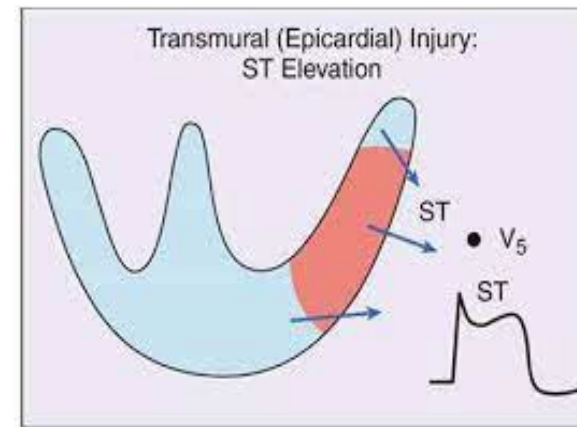
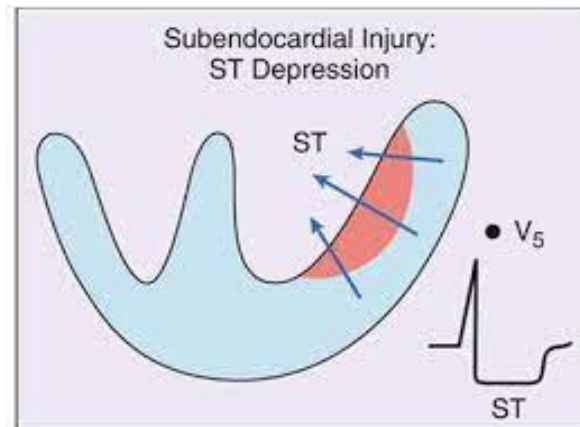
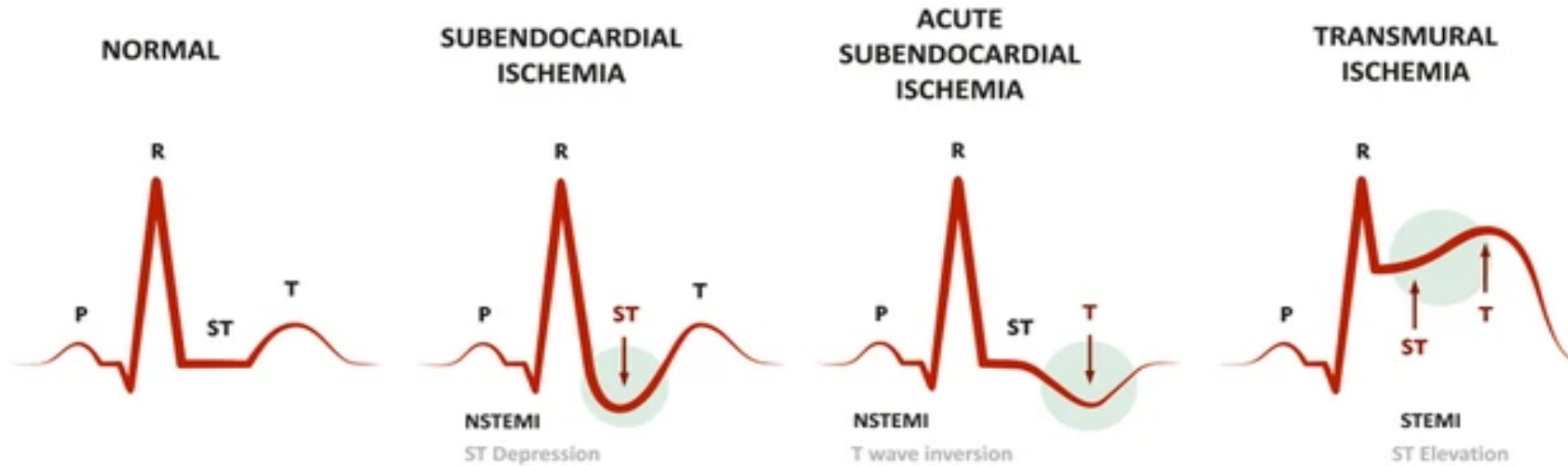
Mechanische hartstilstand



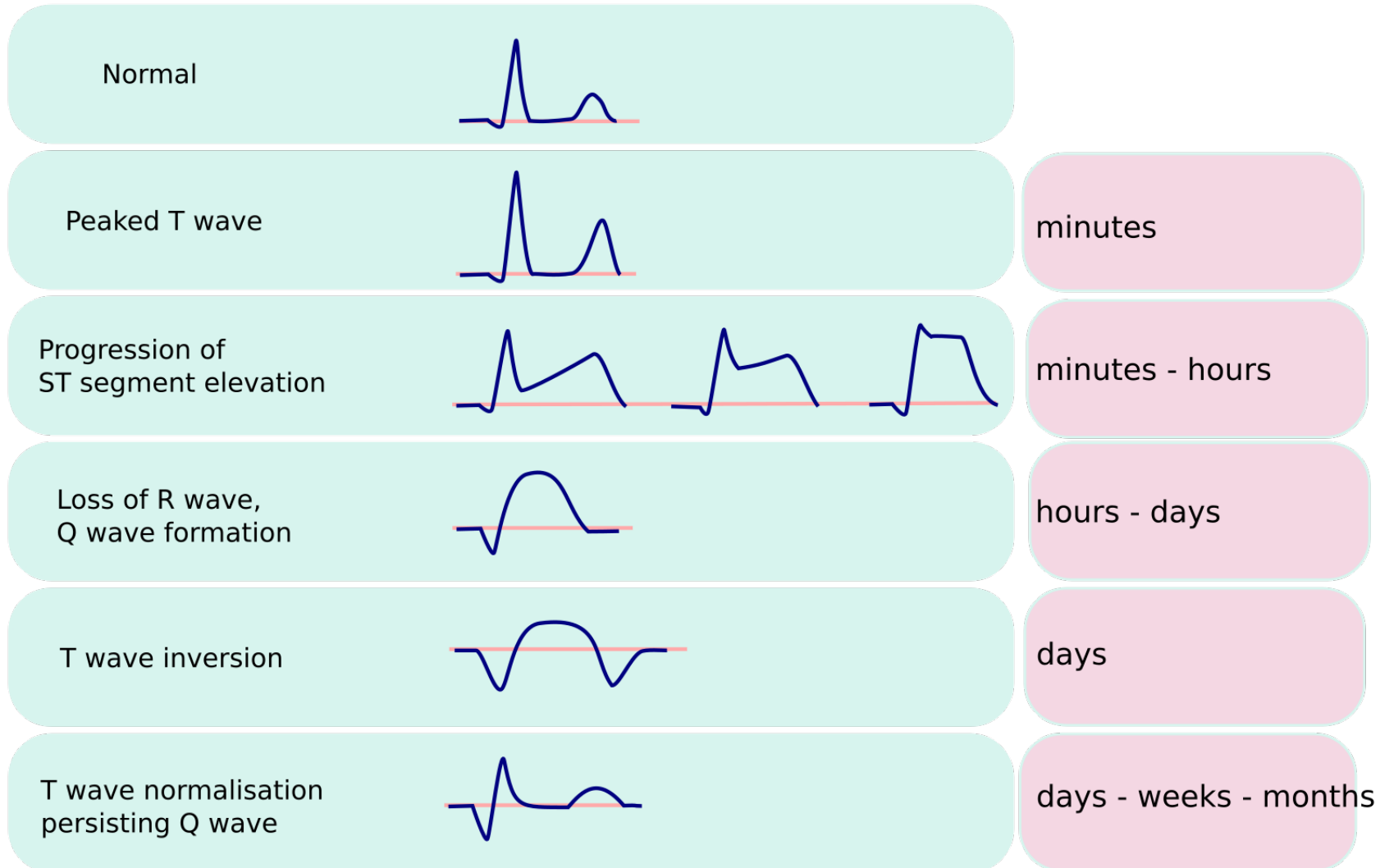
Torsade de pointes (QTc > 500 ms)



# non-STEMI vs STEMI



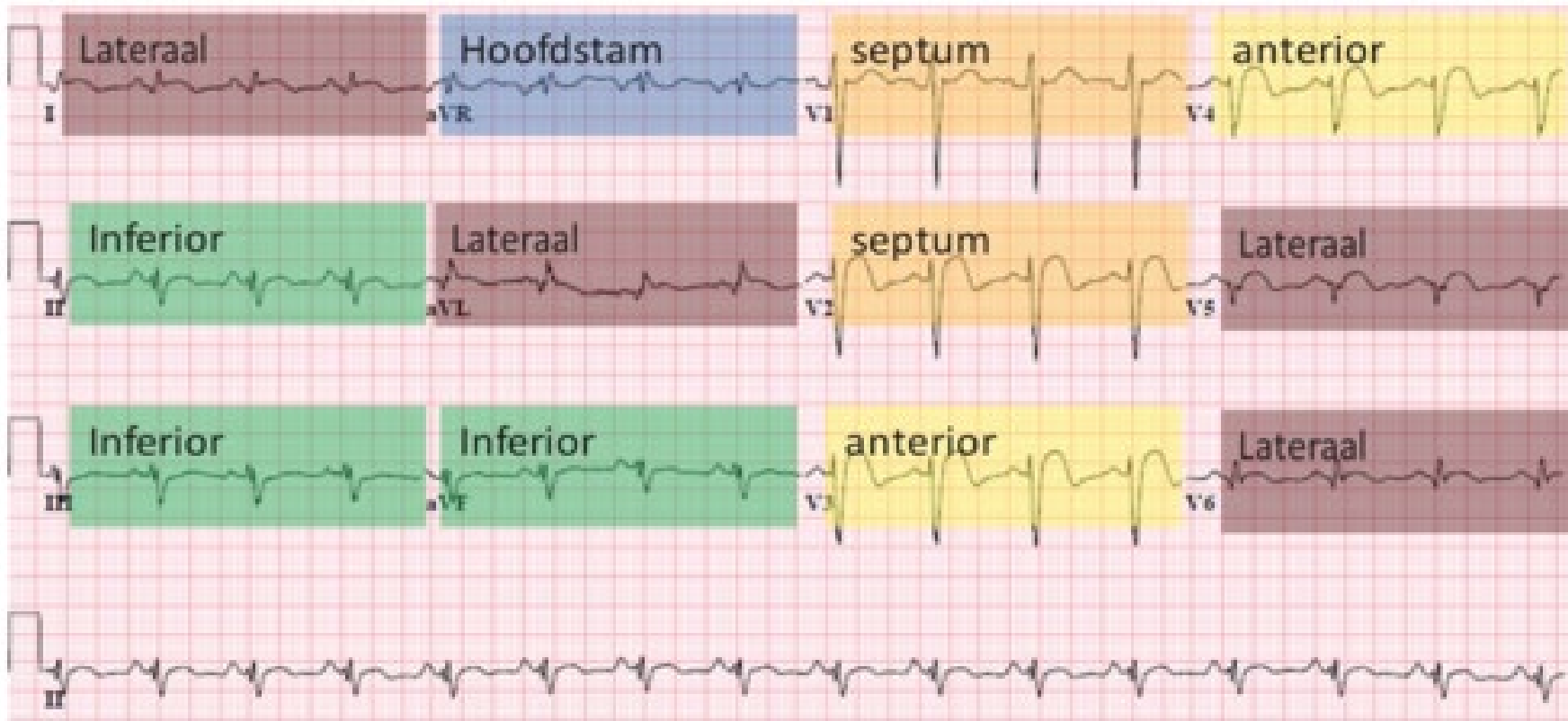
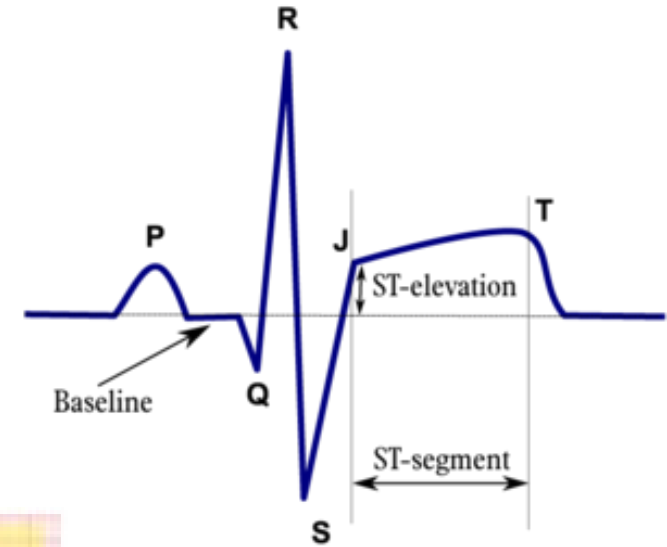
# ECG evolution in non-reperfused myocardial infarction



# STEMI

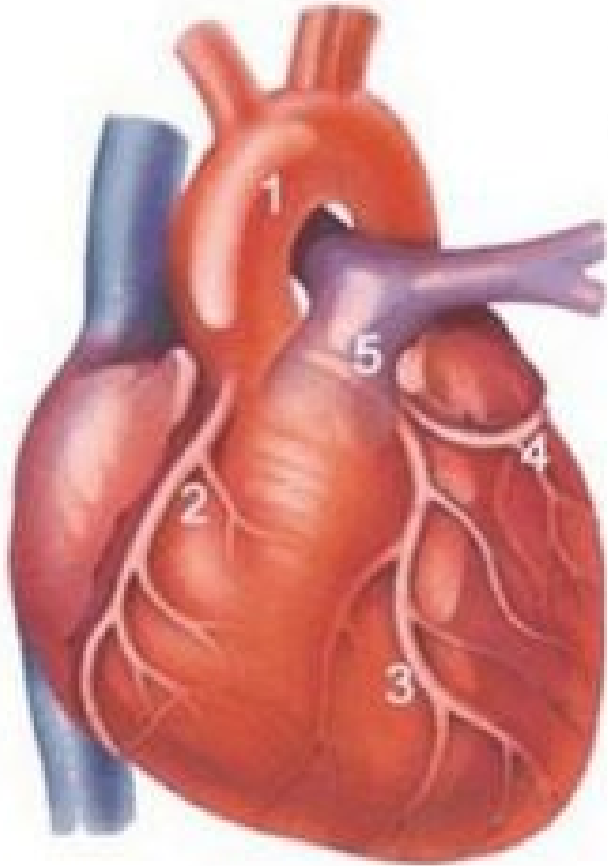
V2-V3  $\geq 2$  mm

Andere afleidingen  $\geq 1$  mm



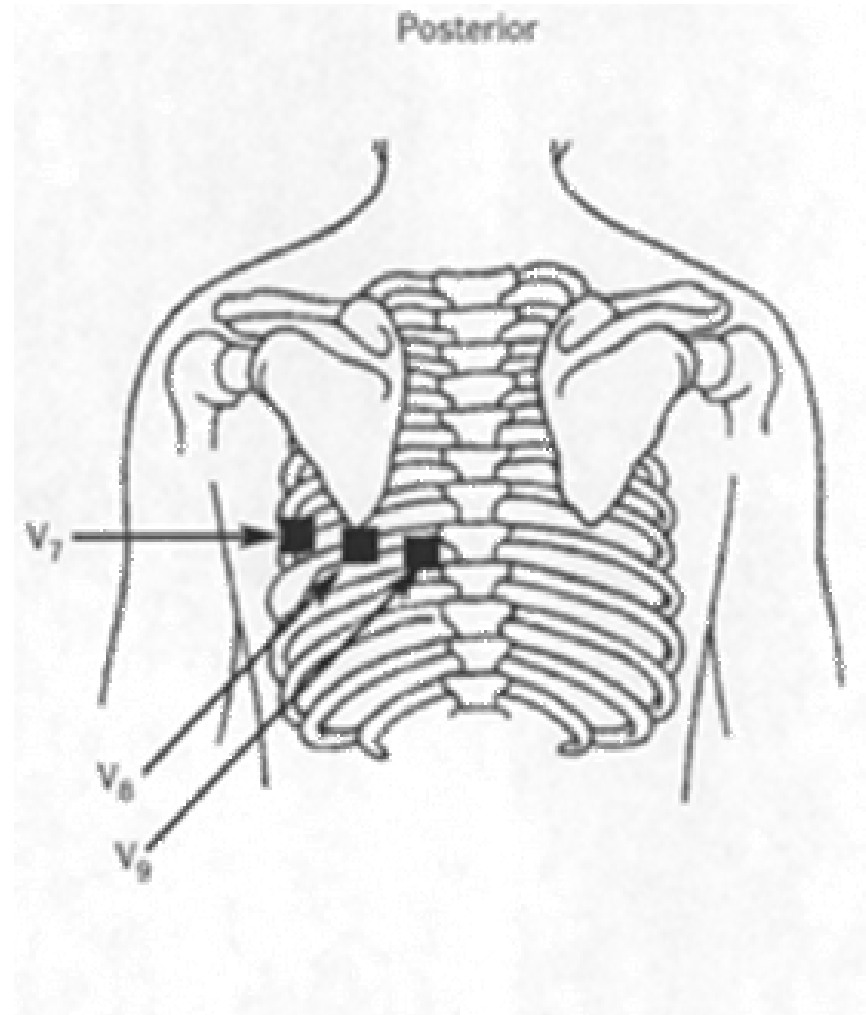


# Anatomie coronairen

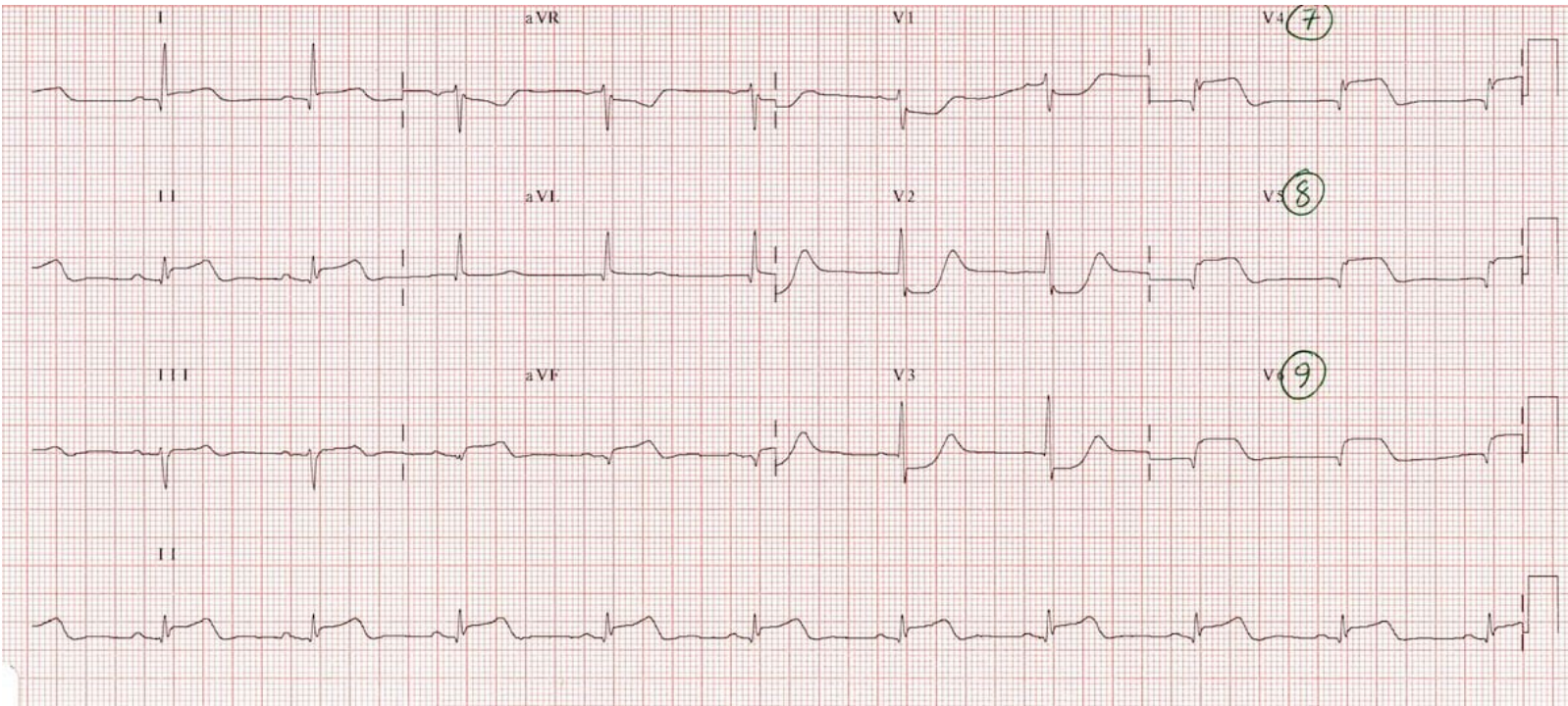
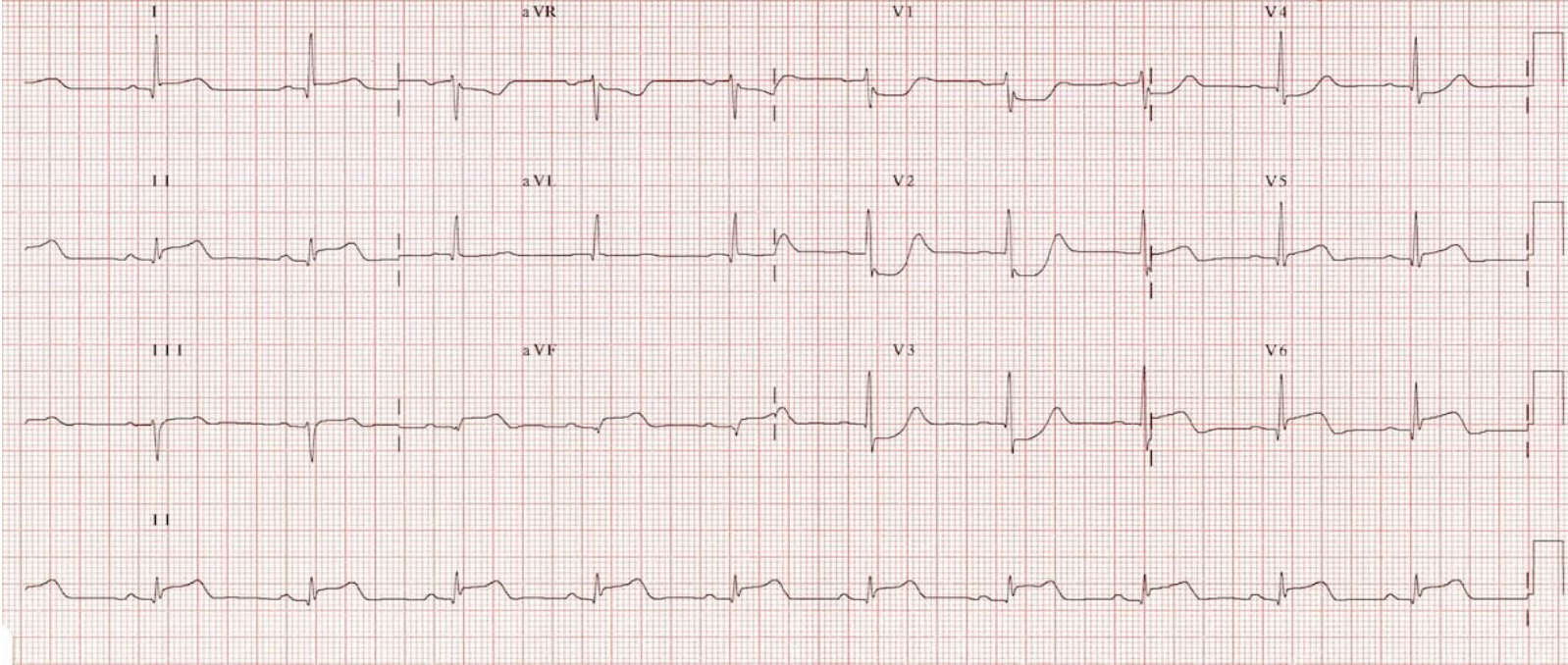


1. Aorta
2. RAC
3. LAD
4. Cx
5. Hoofdstam

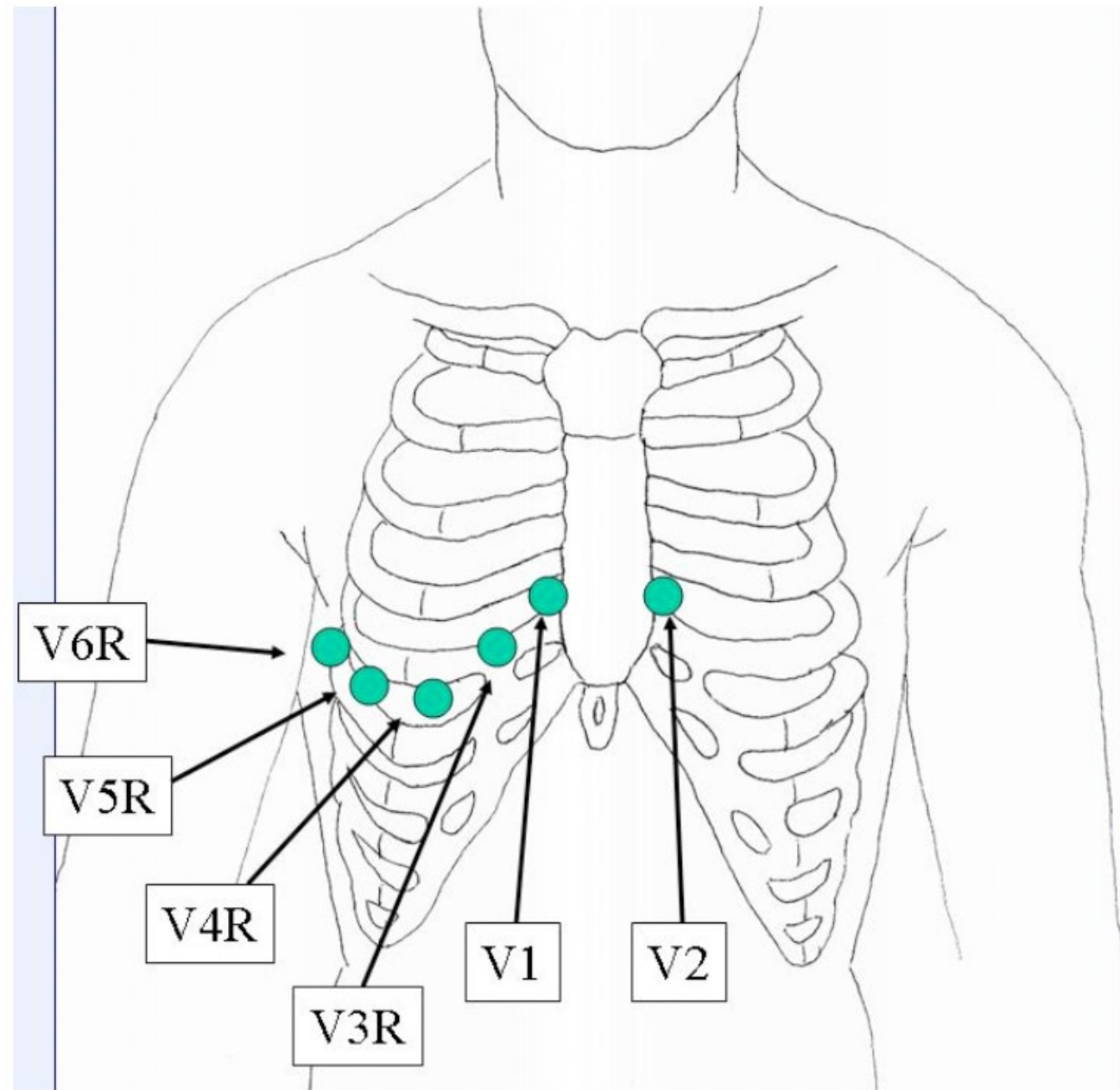
# Uitbereiding van de ECG afleidingen



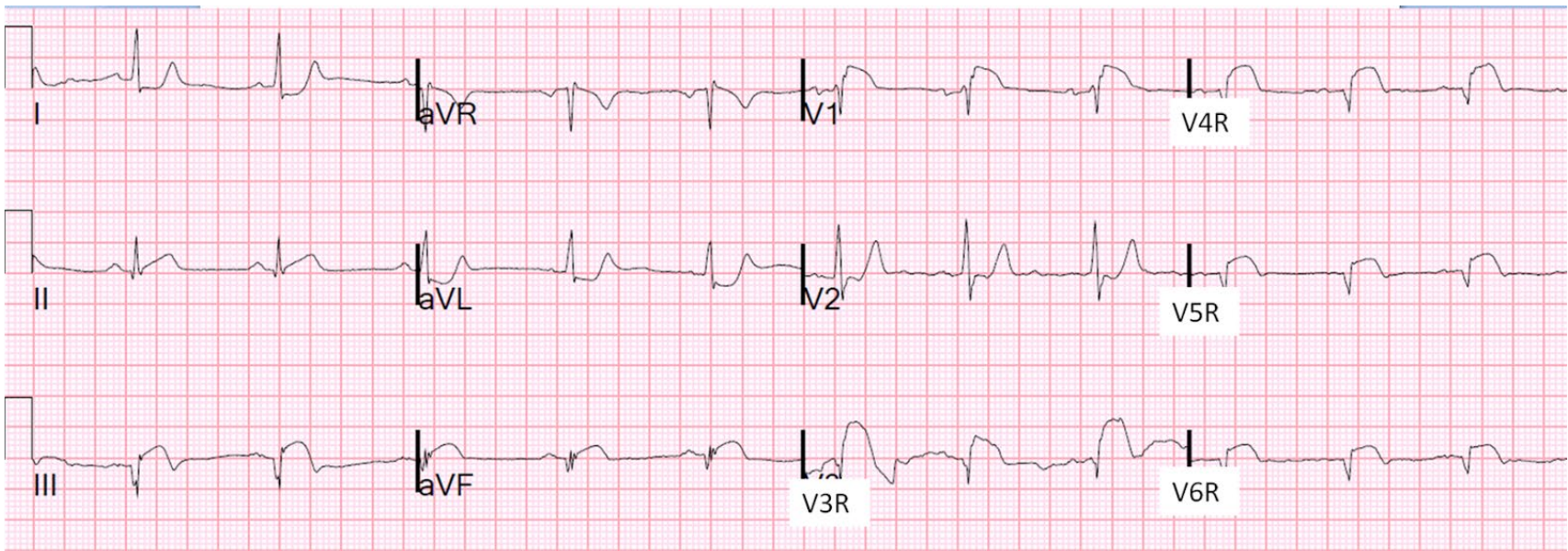
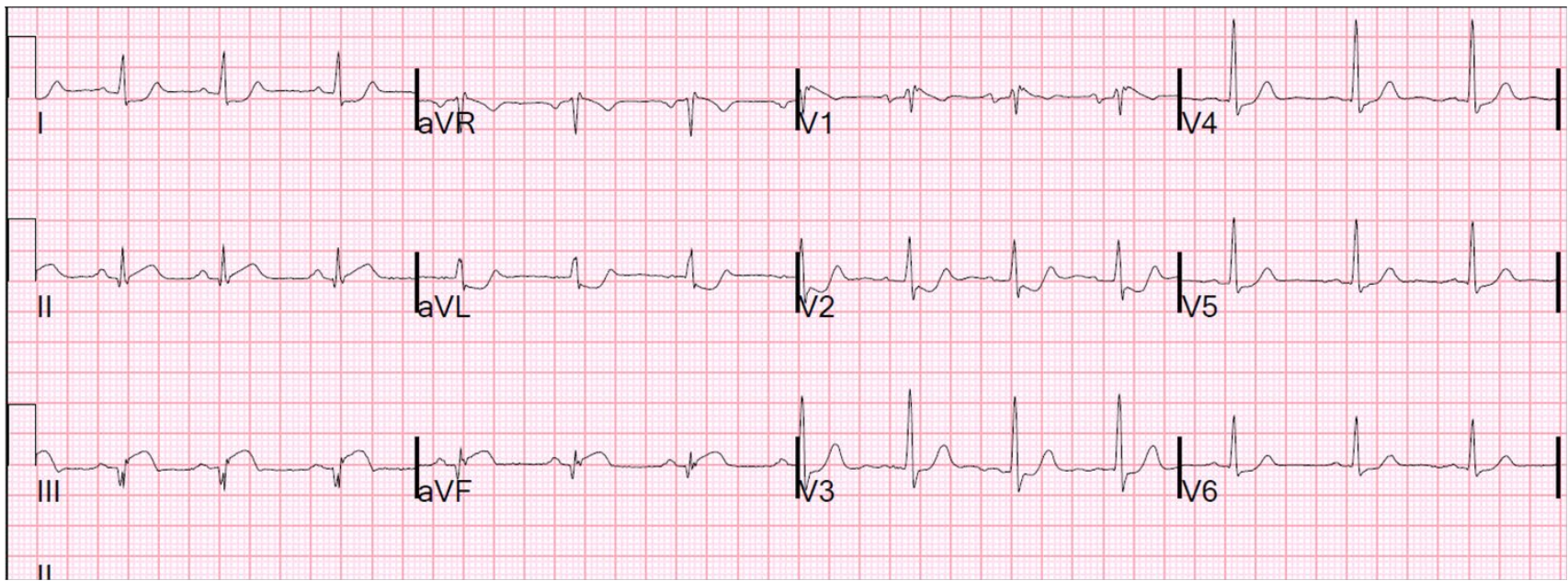






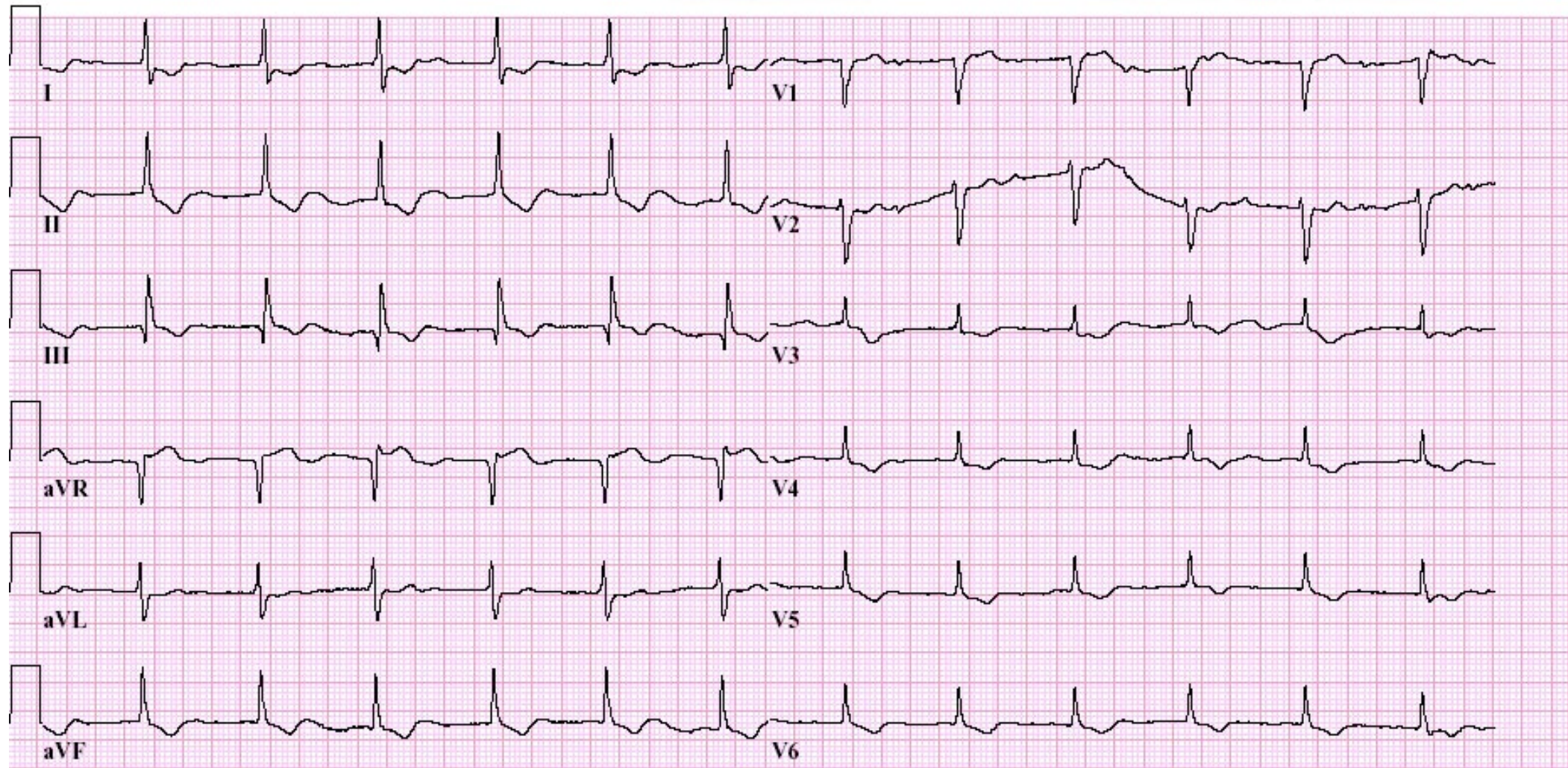








# Hoofdstam stenose



25mm/s 10mm/mV 150Hz 005C 12SL 233 CID: 5

SID: 0100102048A EID:9999 EDT: 20:23 26-MAY-2003 ORDER: