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Jeunes médecins de famille suisses  
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Swiss Young Family Doctors



# Das EKG für Allgemeinmediziner

Hands-on workshop

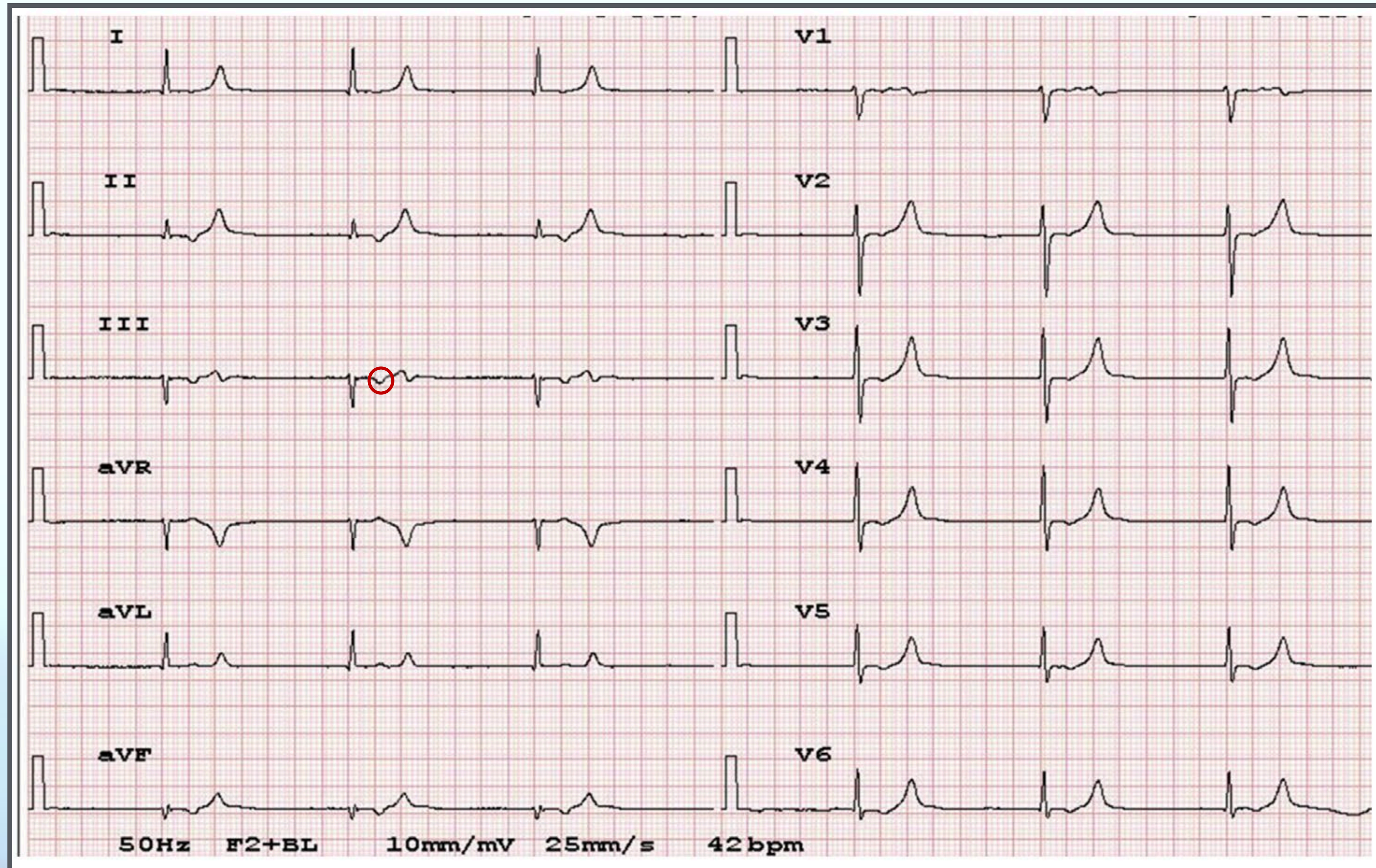
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Betreuung durch  
Hari Vivekanantham, MD, DRCPSC

# Interessenkonflikte

Keine

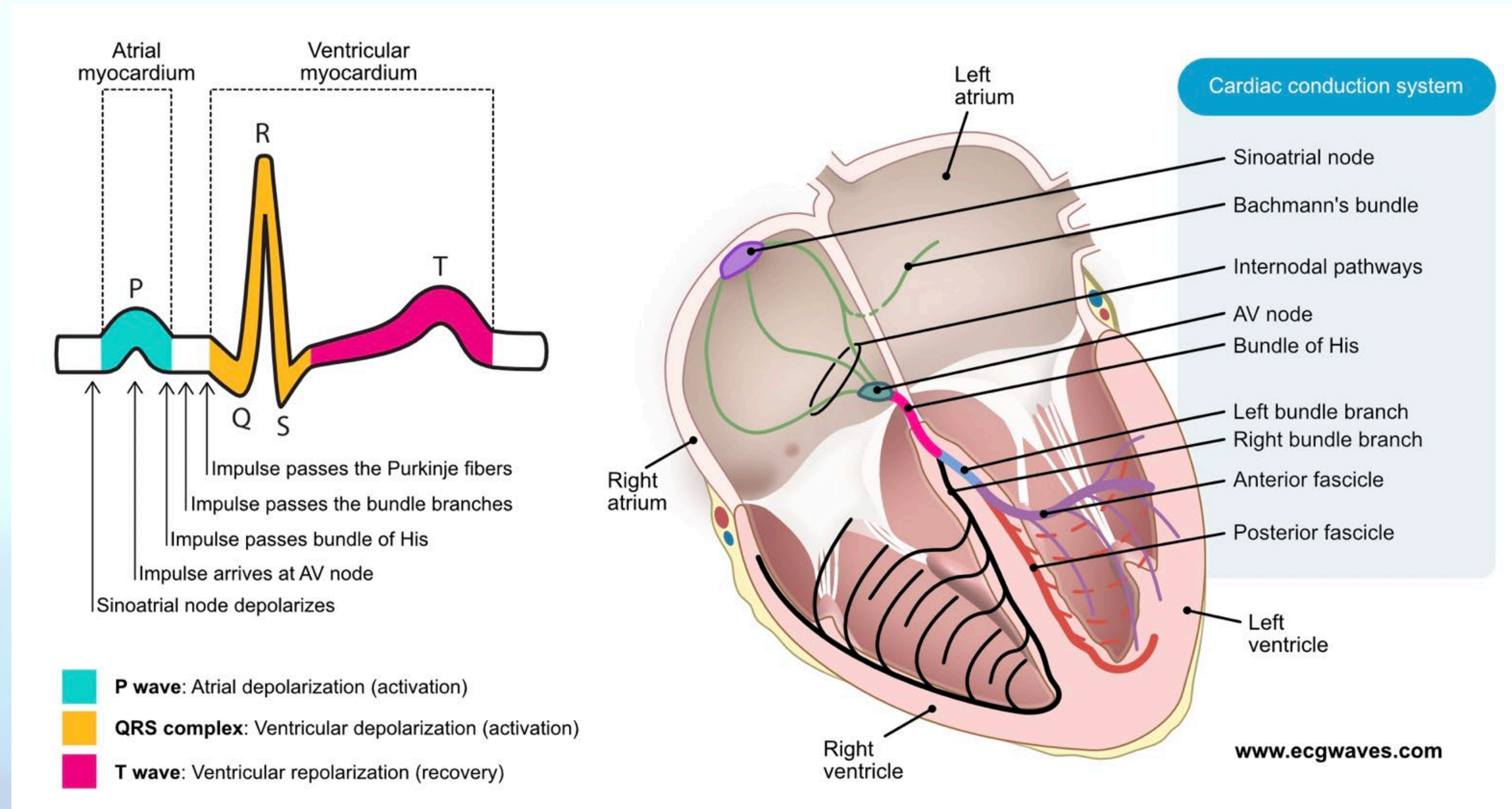
# ♀75 Jahre, Belastungsintoleranz



Junktionaler Rhythmus

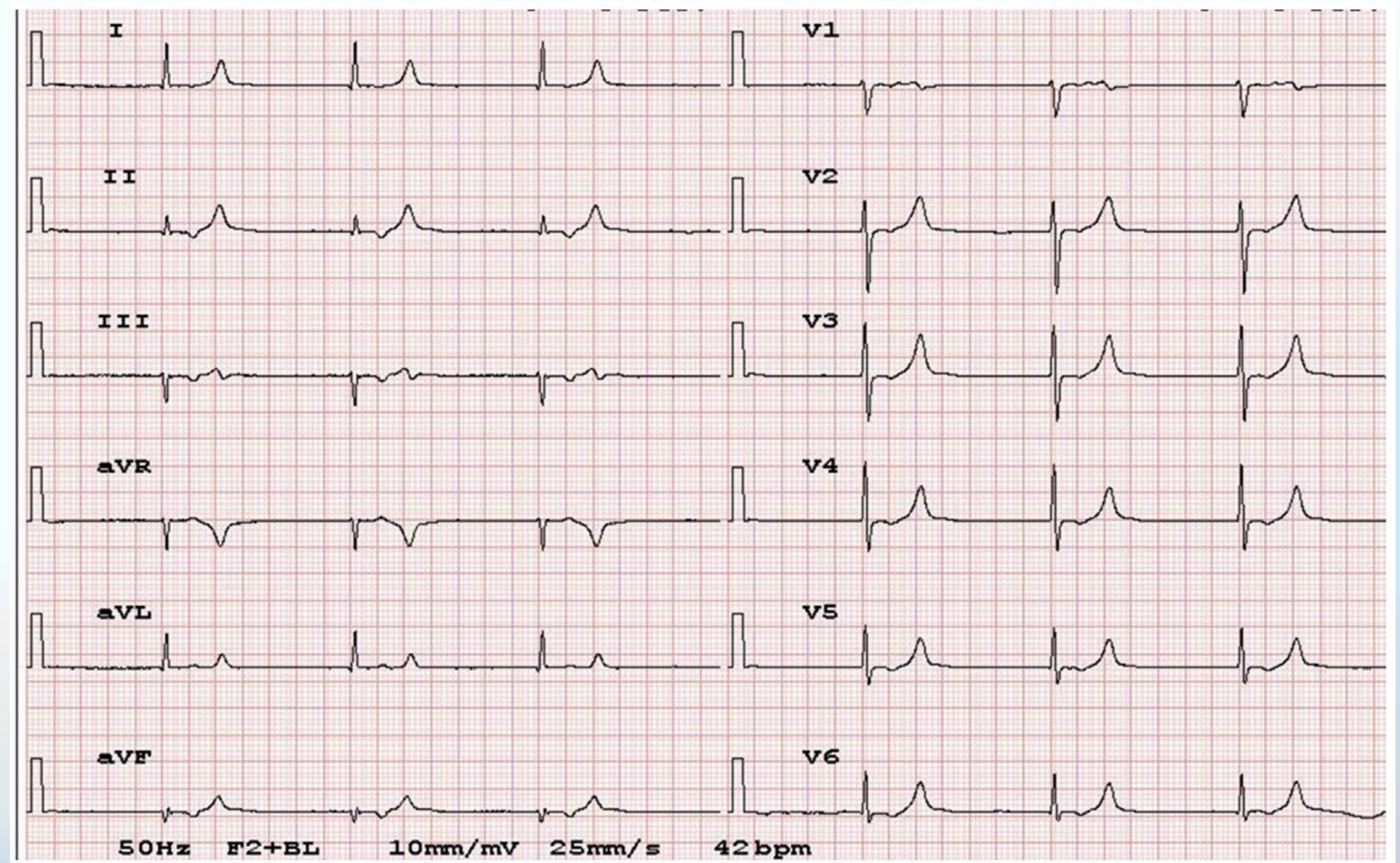
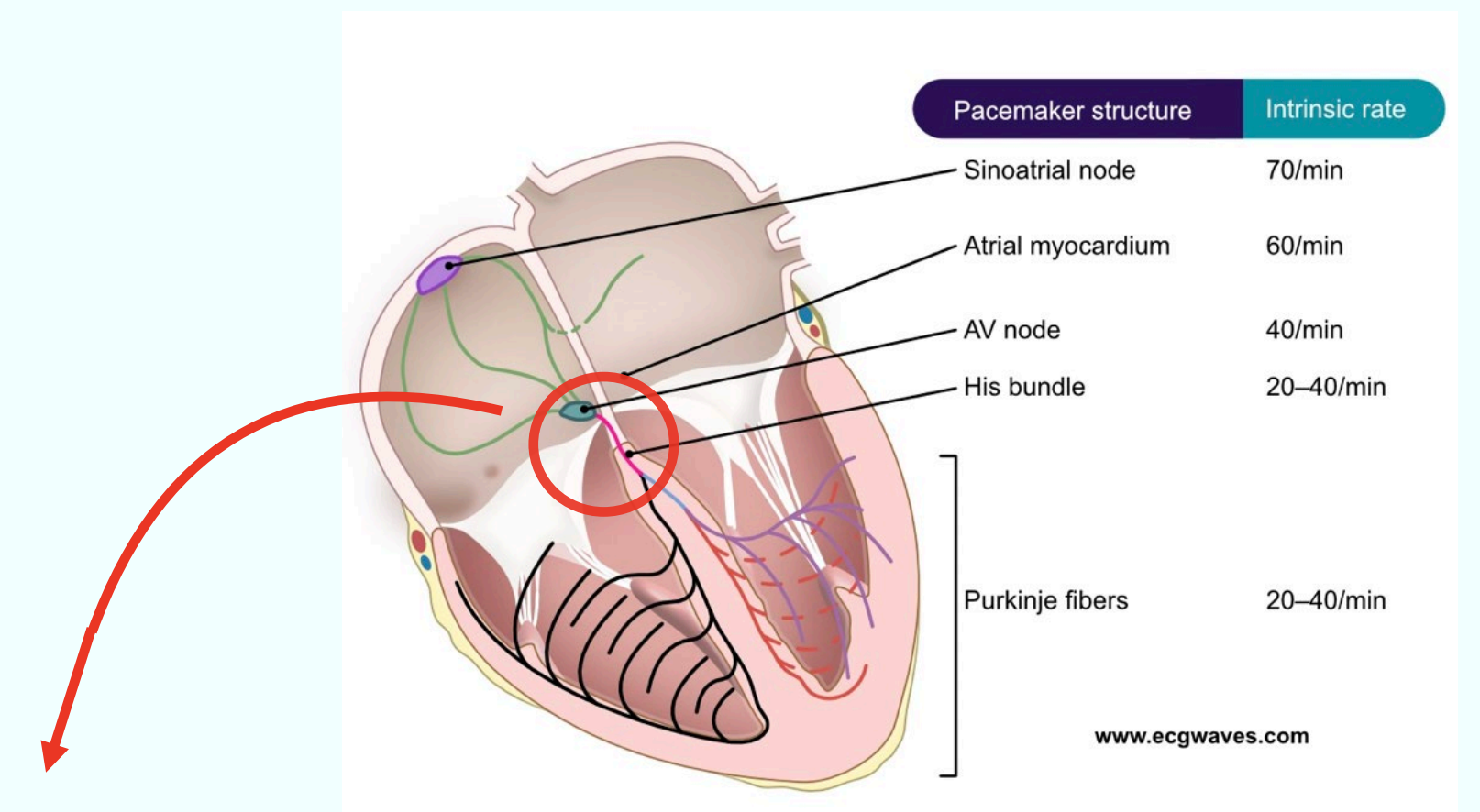
# Kardiale Elektrophysiologie

## Anatomische Wiederholung

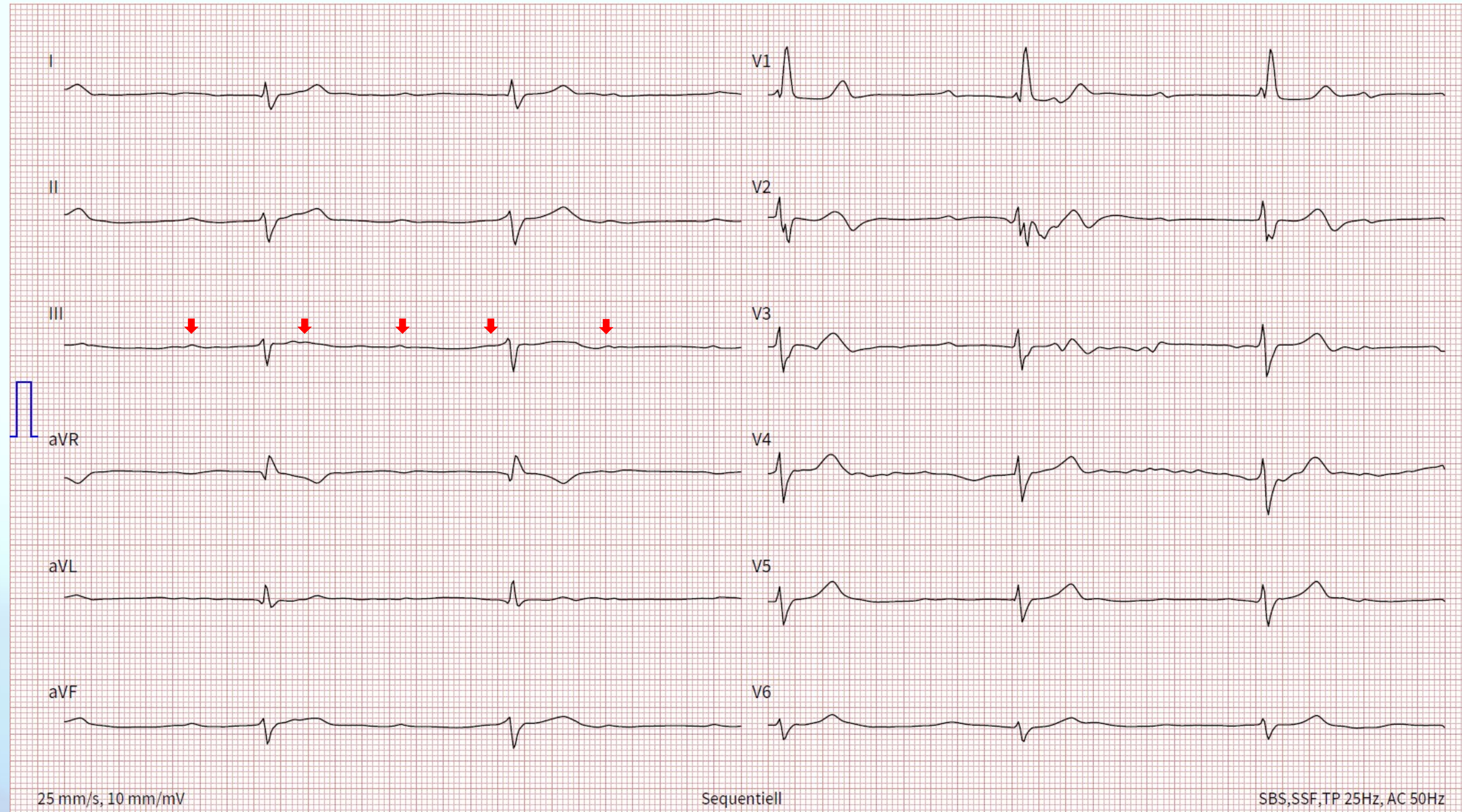


# Junktionaler Rhythmus

- Ektoper Rhythmus ausgehend von der Verbindung zwischen Vorhöfen und Ventrikeln
- Kann auftreten, wenn der normale Sinusimpuls ausfällt oder bei einem vollständigen AV-Block
- EKG Kriterien:
  - Regelmässiger Rhythmus mit einer HF von 40-60/min
  - Negative P-Welle vor oder nach dem QRS oder nicht sichtbar
  - Normales QRS (ausser bei gleichzeitig bestehender intraventrikulärer Leitungsstörung)



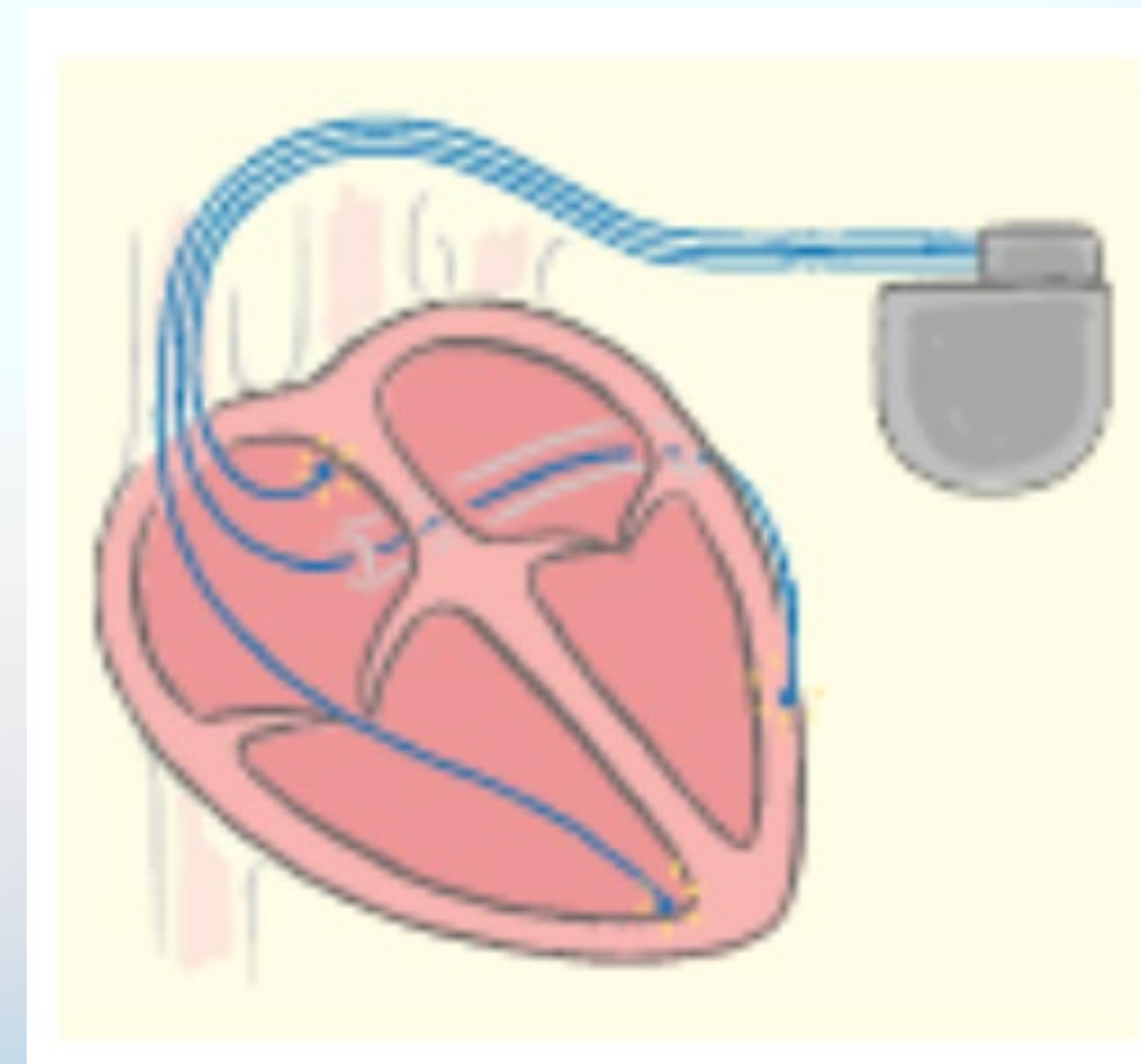
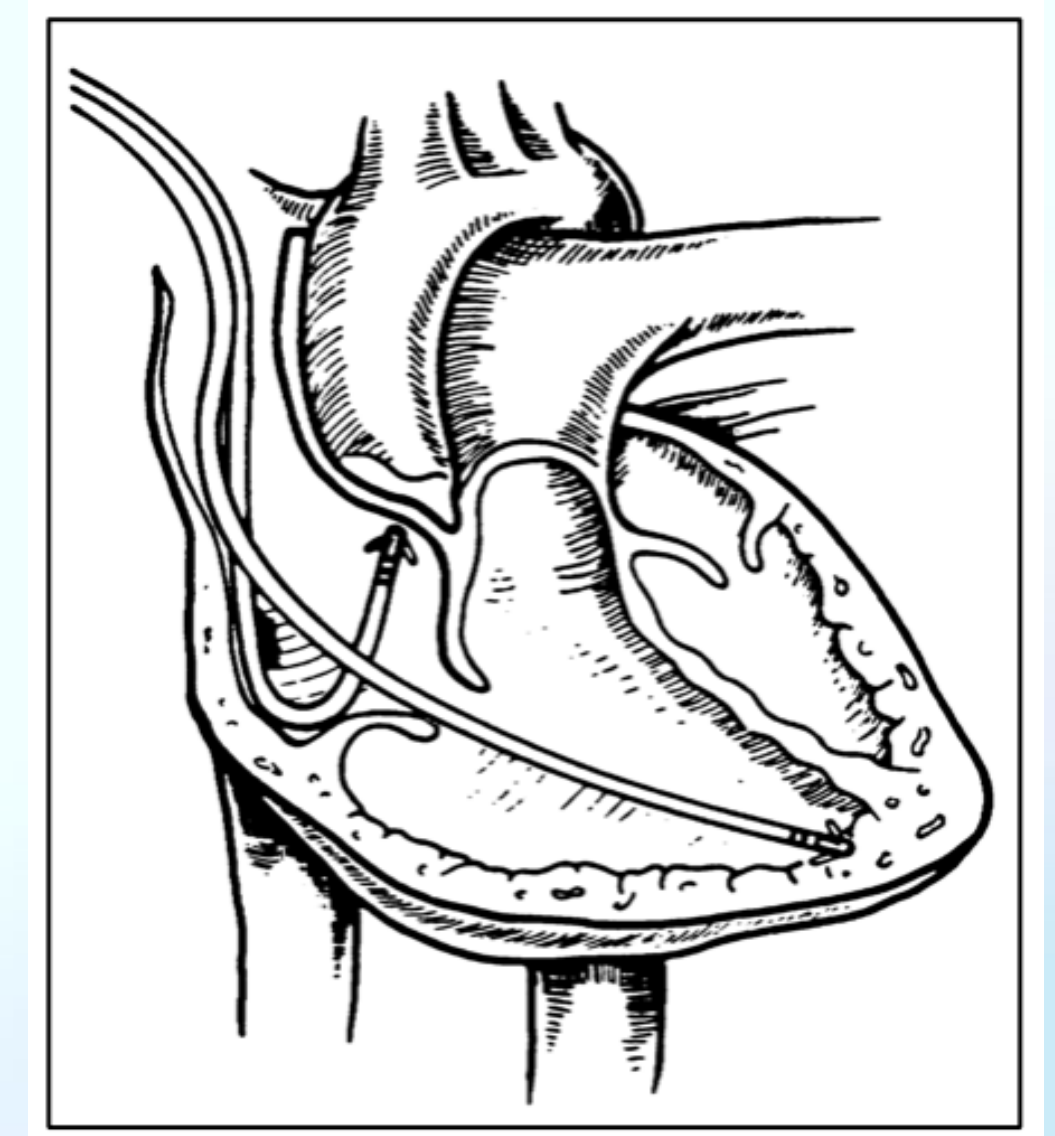
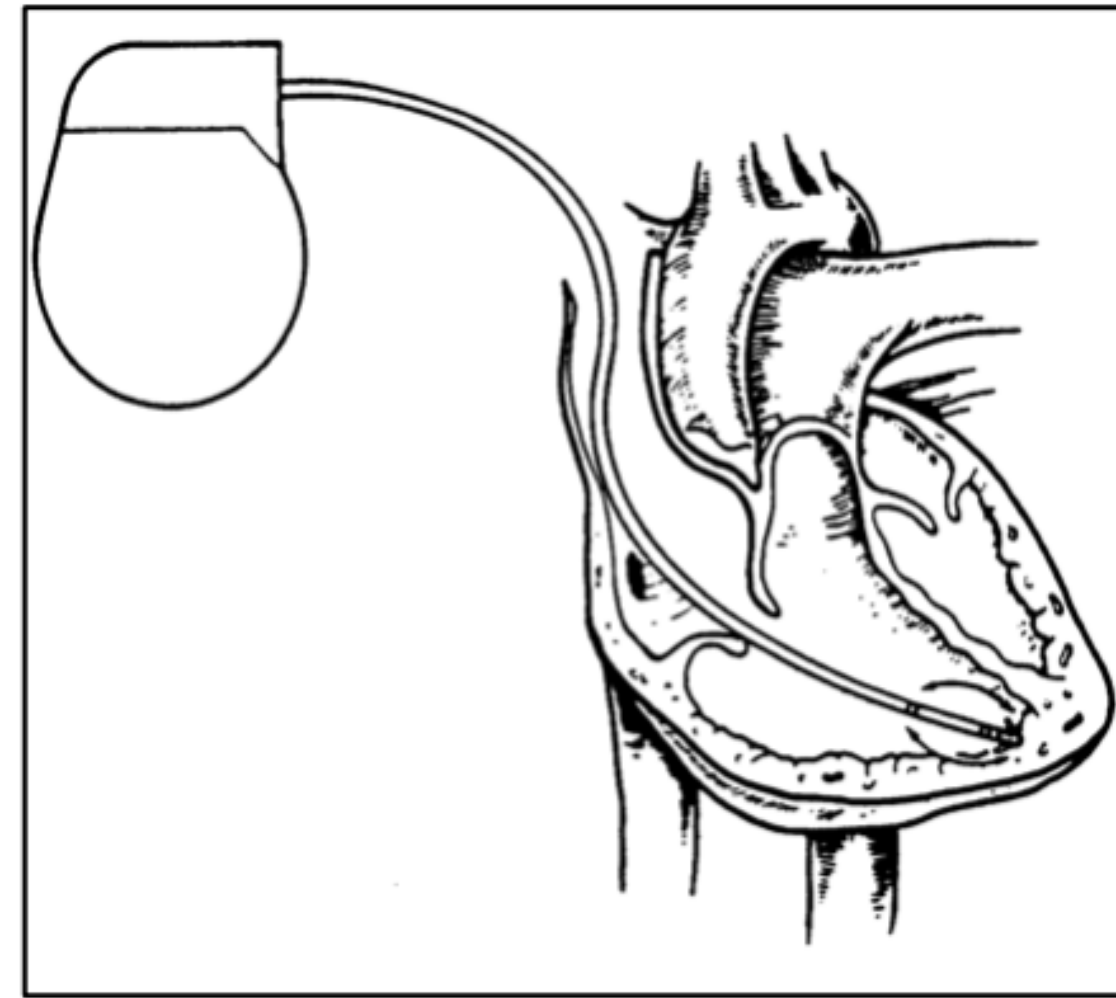
# ♀80 Jahre, Müdigkeit



Kompletter AVB mit ventrikulärem Ersatzrhythmus -> Schrittmacher

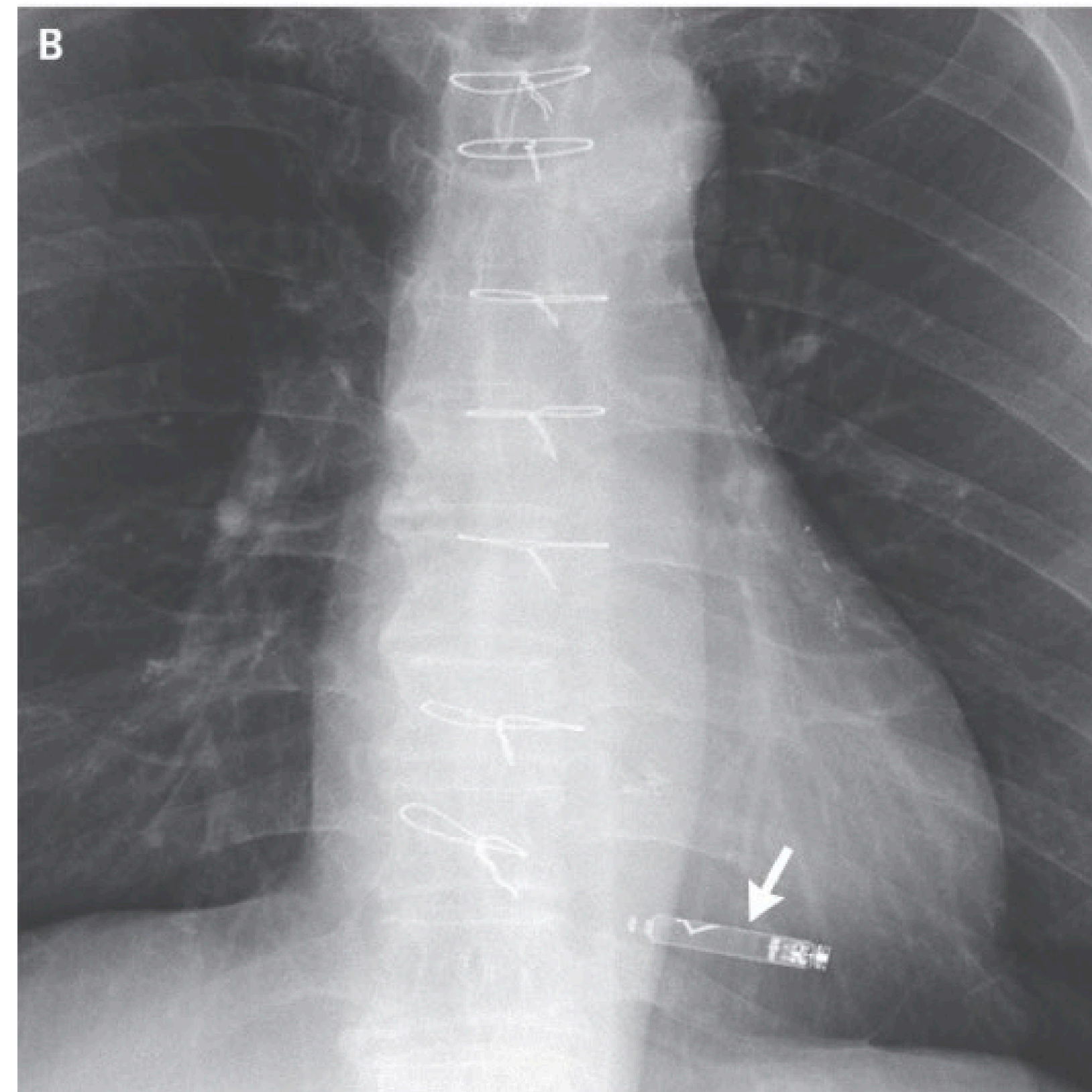
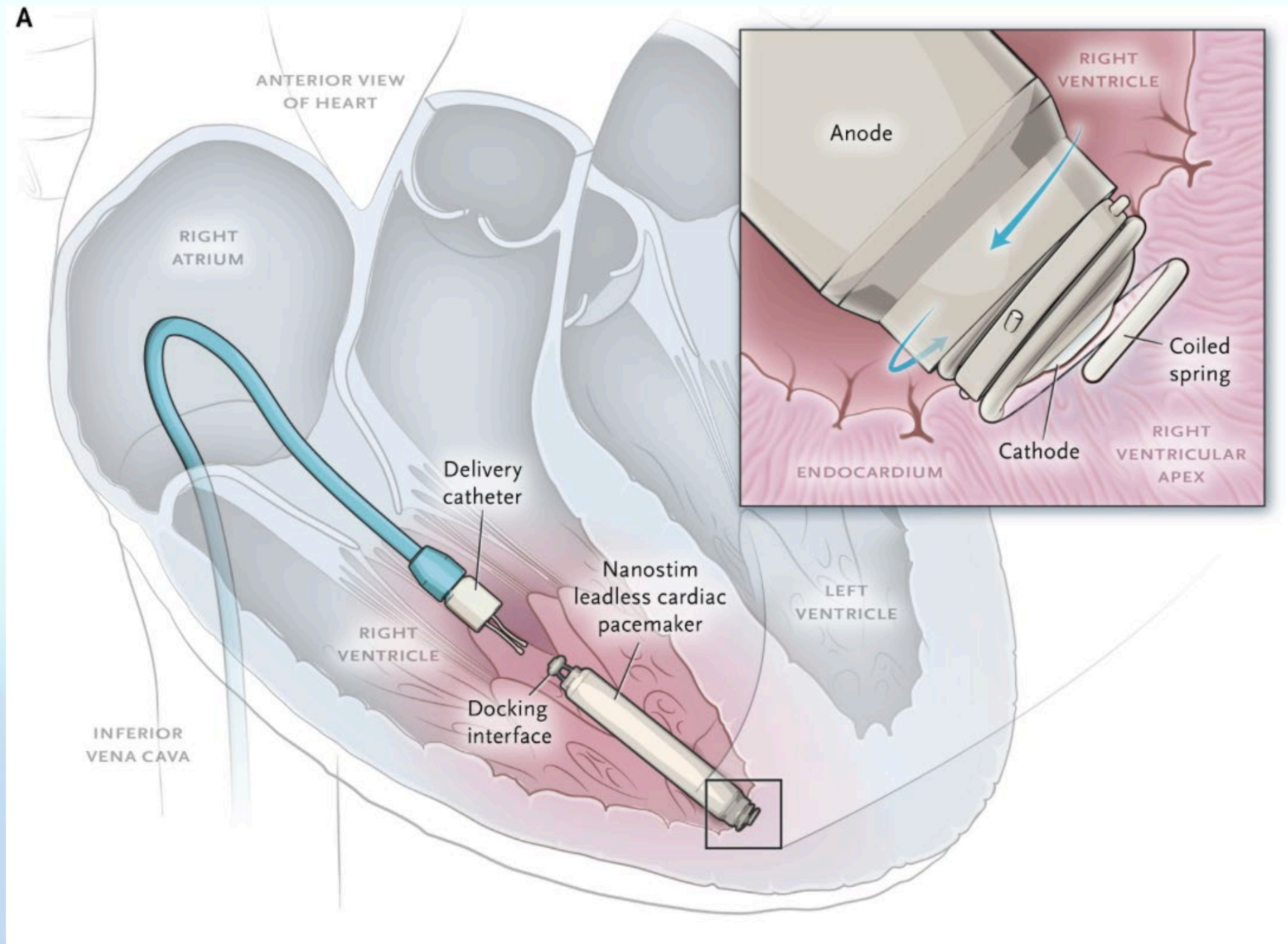
# Welche Arten von Schrittmacher gibt es?

- Einkammer-Schrittmacher (monokameral) : eine Elektrode entweder im Vorhof oder im Ventrikel
- Zweikammer-Schrittmacher (bikameral) : eine Elektrode im rechten Vorhof und eine im rechten Ventrikel
- Dreikammer-Schrittmacher (trikameral) : eine Elektrode im rechten Vorhof, eine im rechten Ventrikel und eine epikardiale Elektrode am linken Ventrikel

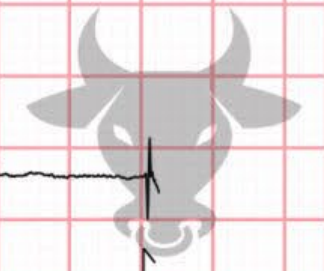
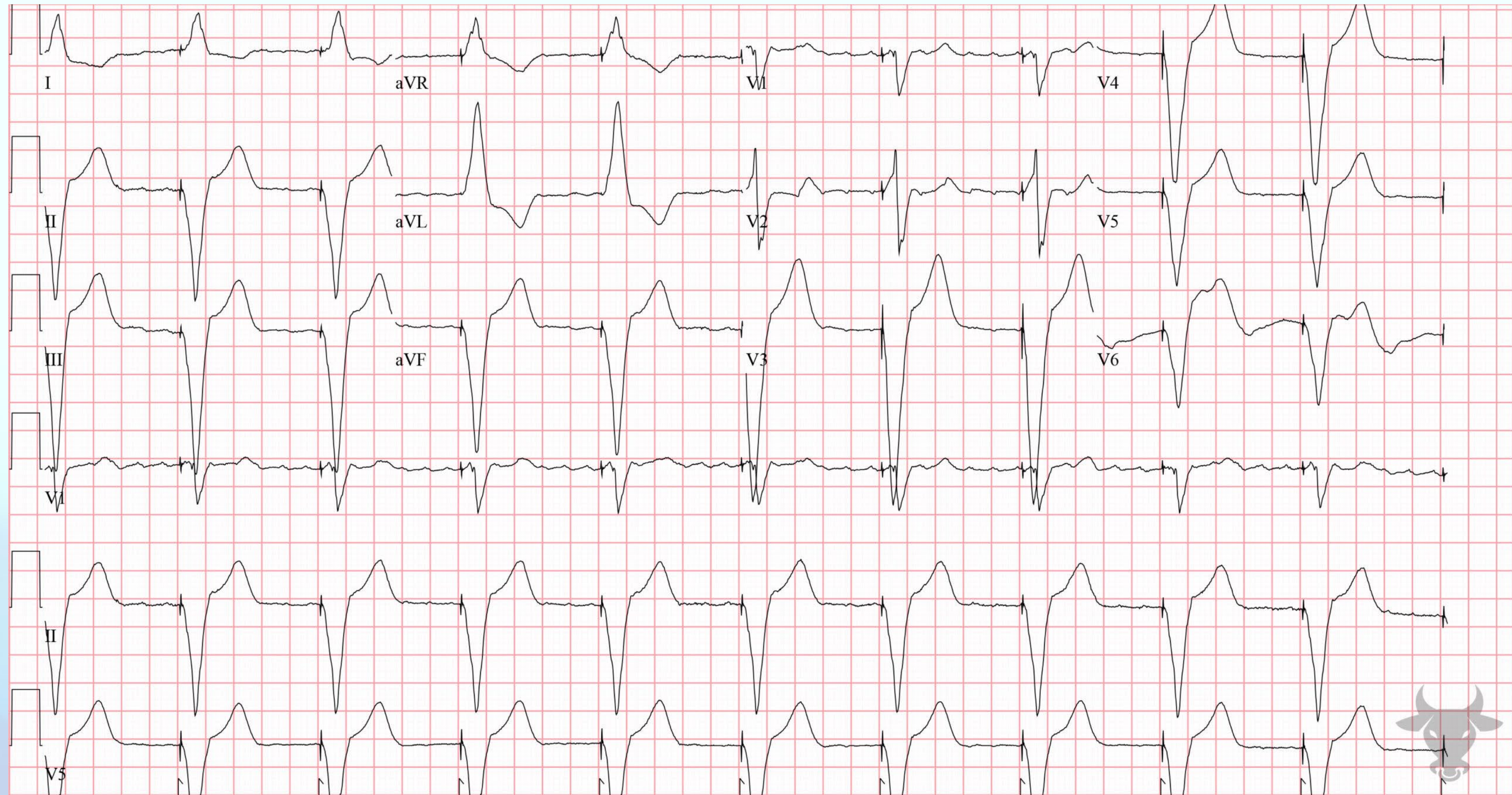


# Leadless-Schrittmacher

Im rechten Ventrikel implantiert



# «Konventionelle» rechstventrikuläre Stimulation



# Wirkung des Magneten auf Schrittmacher/ICD

## Schrittmacher

- Der Magnet versetzt den Schrittmacher in einen asynchronen Stimulationsmodus (VOO bzw. DOO) mit einer vom Hersteller festgelegten Frequenz (ca. 85-100/min), solange der Magnet auf dem SM liegt



## ICD

- Deaktivierung der Defibrillationstherapien, jedoch keine Änderungen der Schrittmacherfunktion (Pacing bleibt unverändert).



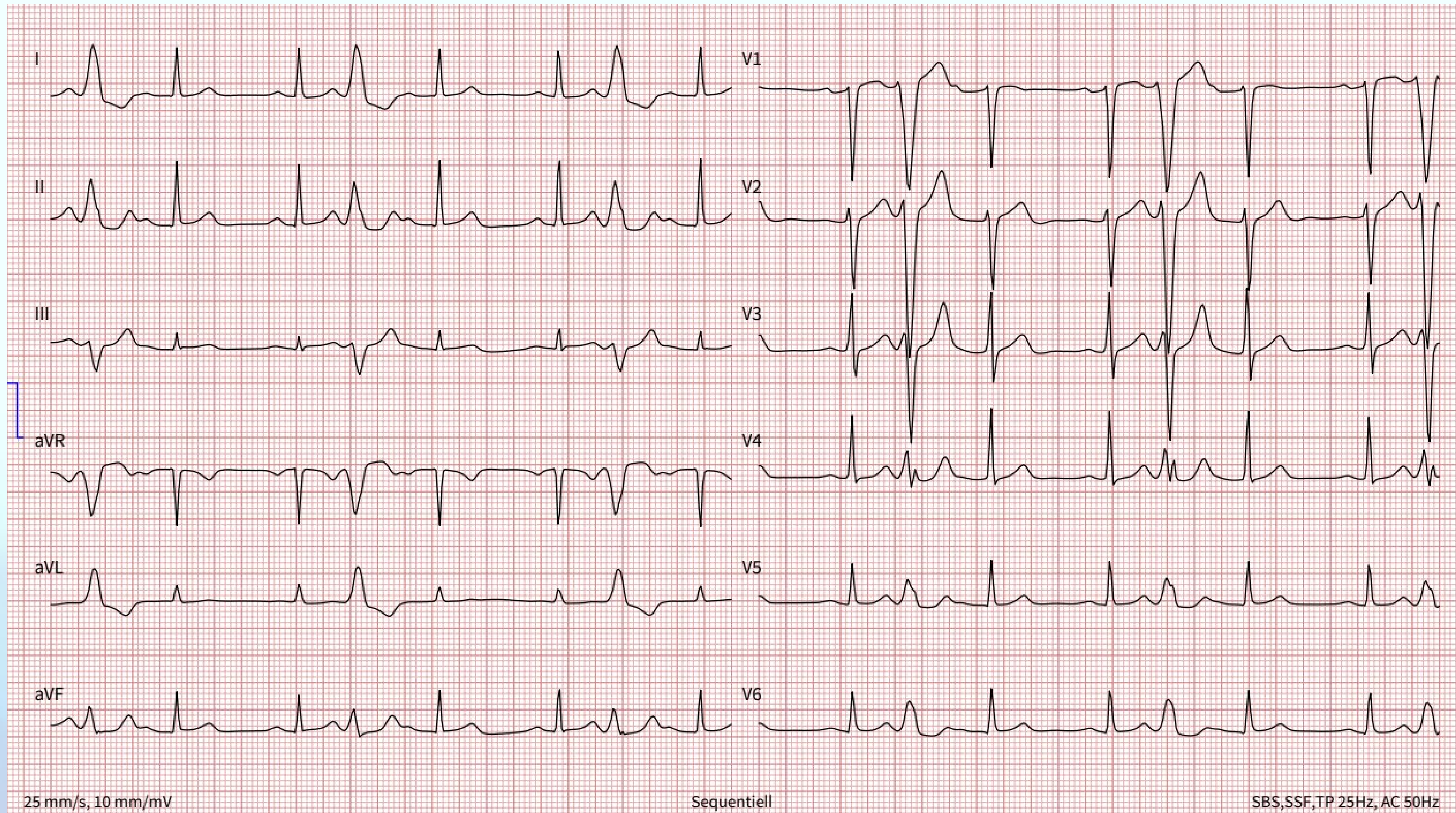
# ♂ 30 Jahre, Präsyncope

Shellong-Test



Sinusarrest bei Vasovagaler Syncope

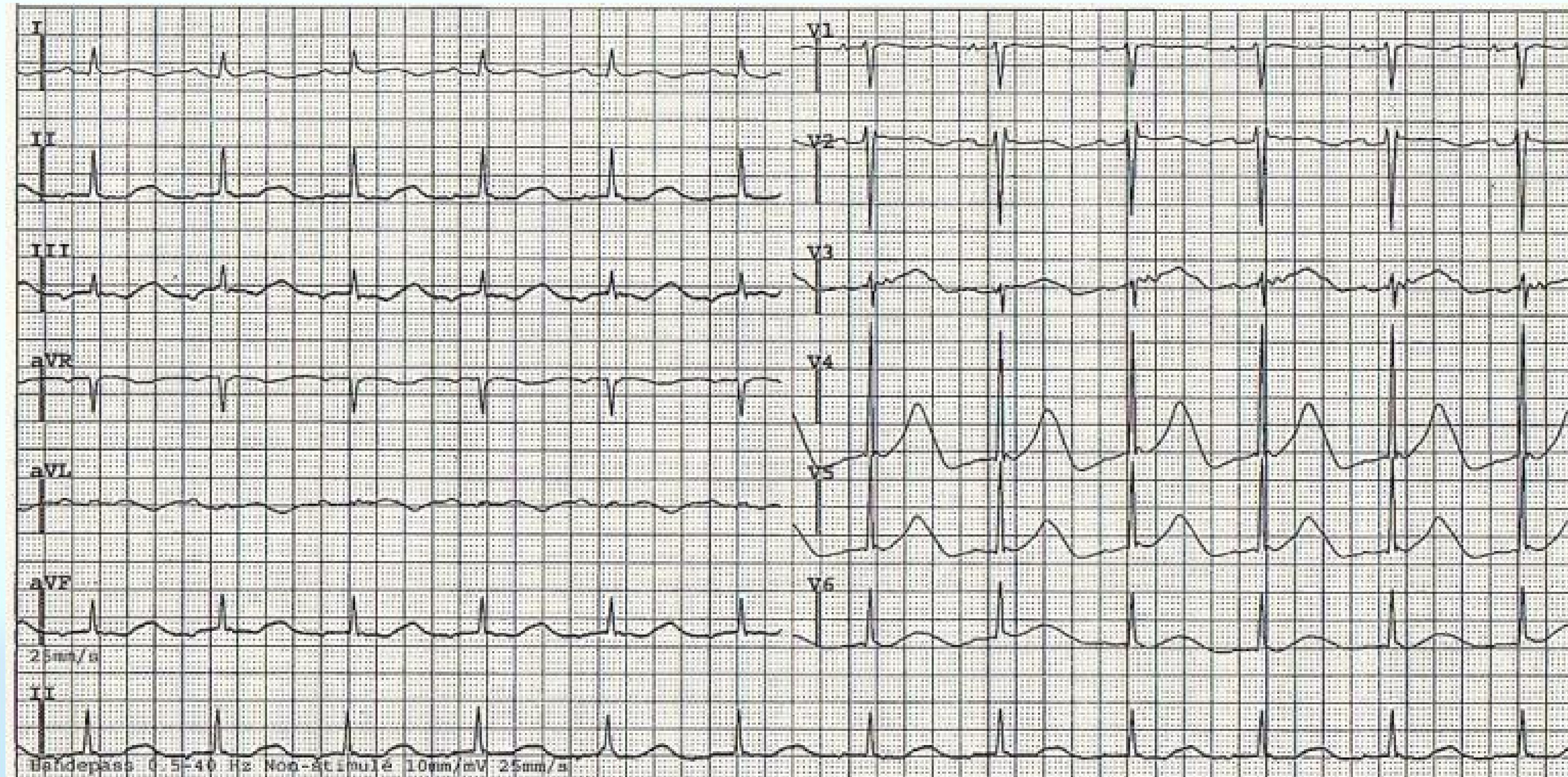
# ♀34 Jahre, Herzrasen



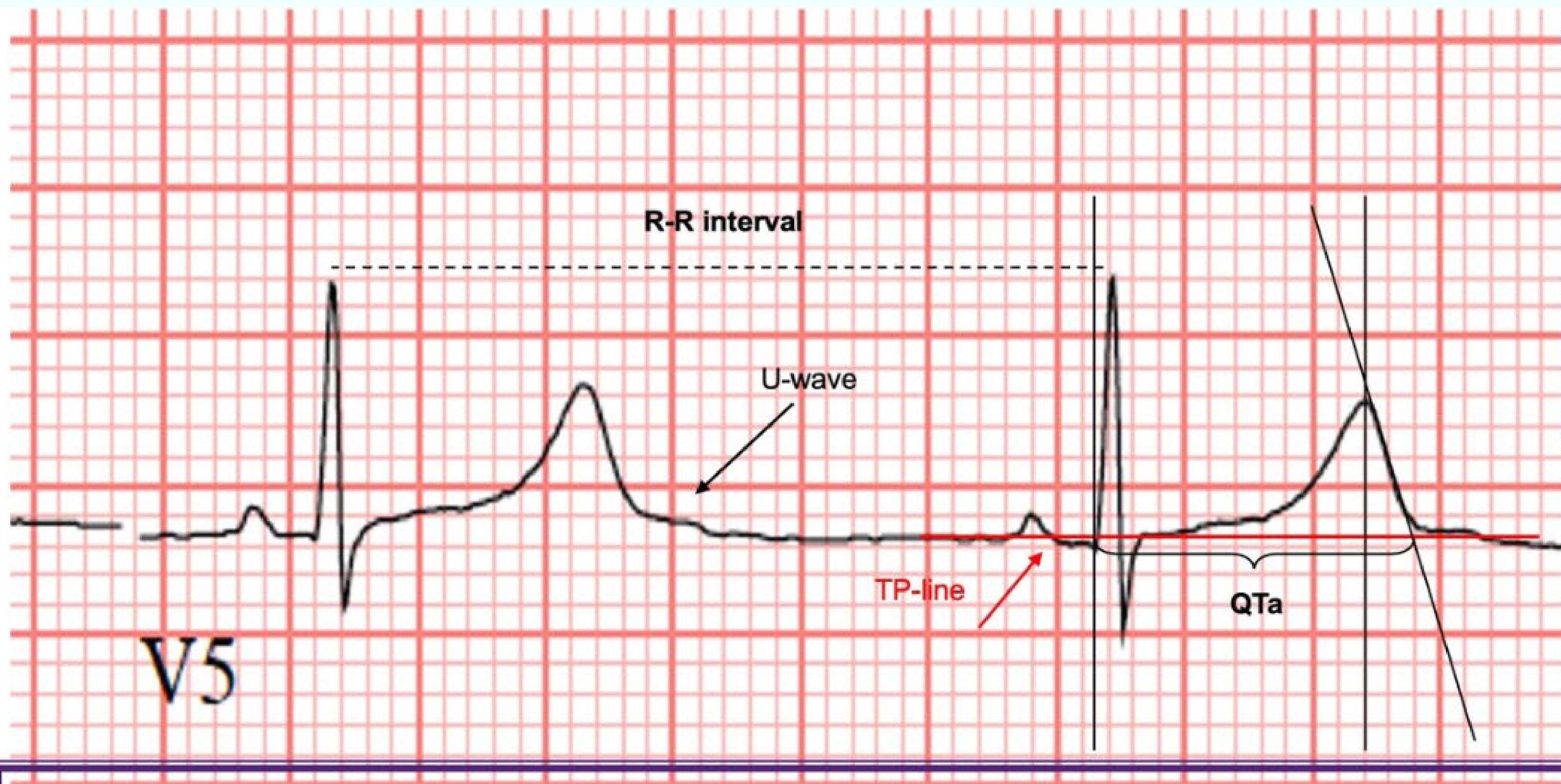
♀71 Jahre, keine Beschwerden... aber neu diagnostizierte LVEF 30%



♂ 30 Jahre, ohne Beschwerden



Long-QT-Syndrom → kardiologische und genetische Abklärung



### Tips and tricks

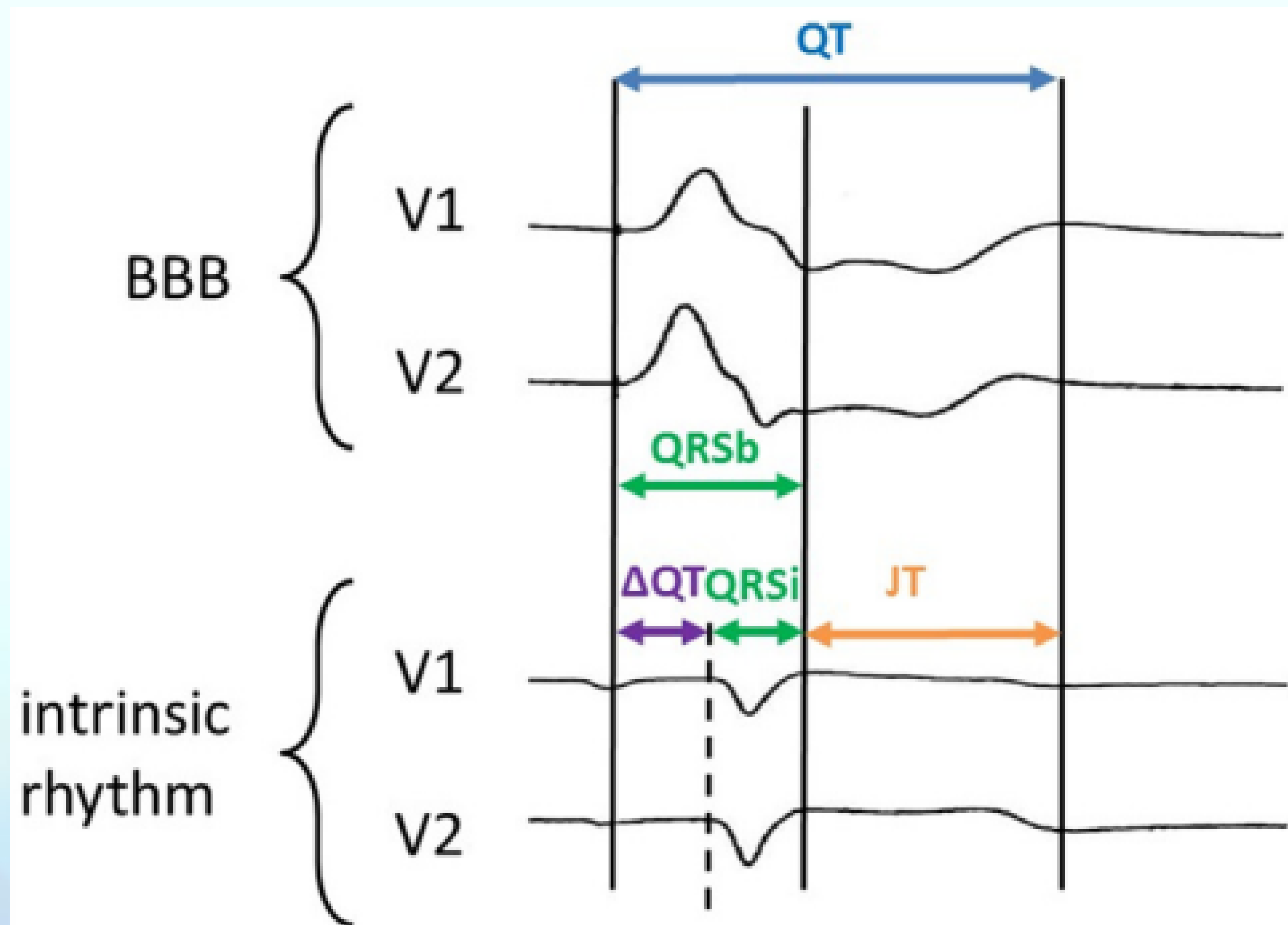
1. Make sure rhythm is regular
2. Make sure QRS < 110 ms
3. Don't include U-waves in the QT measurement

|               | Female (puberty to age 65) | Male (puberty to age 65) |
|---------------|----------------------------|--------------------------|
| Normal ms     | < 460                      | < 450                    |
| Borderline ms | 460-479                    | 450-469                  |
| Prolonged ms  | ≥ 480                      | ≥ 470                    |

### QTc measurement step-by-step

1. Determine the baseline (= TP line)
2. Draw perpendicular lines crossing the TP line at the Q-wave and the peak of the T-wave
3. Draw a tangent at the maximum slope of the T-wave crossing the TP-line and the peak of the T-wave → **QTa**
4. Enter QTa and the preceding **R-R** interval into **Bazett's** formula → **QTc**

# QT Korrektur bei verbreitertem QRS Komplex



$$\text{corrected QT in BBB} = \frac{\text{QRSb}}{2} + \text{JT}$$

$$\text{SIMPLIFIED FORMULA FOR BBB: } QT_m = QT_{\text{BBB}} - 50\% * QRS_{\text{BBB}}$$



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Assessing risk of drugs that prolong the QT interval and cause arrhythmias.

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ADECA QTdrugs Surveillance Metrics (last updated 04/04/2025)

|  |     |
|--|-----|
| Drugs under active surveillance for evidence of QT/TdP         | 893 |
| Drugs with new evidence of QT/TdP reviewed last month          | 35  |
| Drugs with new and revised labels reviewed last month          | 125 |
| QT/TdP-related new scientific publications reviewed last month | 106 |

QTdrugs Blog

https://crediblemeds.org/

**Table 4. Intra-class differences in risk of QTc prolongation**

| Drug class                               | Higher risk  | Lower risk   | Minimal risk  |
|--|--|--|---|
| SSRI antidepressants                     | Citalopram<br>Escitalopram   | Fluoxetine<br>Fluvoxamine                              | Sertraline<br>Paroxetine                              |
| Antipsychotic drugs                      | Amisulpride<br>Asenapine<br>Iloperidone<br>Sertindole<br>Thioridazine<br>Ziprasidone | Haloperidol<br>Risperidone<br>Quetiapine<br>Olanzapine | Aripiprazole<br>Clozapine<br>Droperidol<br>Lurasidone |
| Macrolide antibiotics                    | Erythromycin   | Clarithromycin   | Azithromycin  |
| Fluoroquinolone antibiotics              | Moxifloxacin   | Levofloxacin<br>Ciprofloxacin                          |   |
| 5-HT <sub>3</sub> antagonist antiemetics | Ondansetron  | Granisetron<br>Palonosetron                            |   |

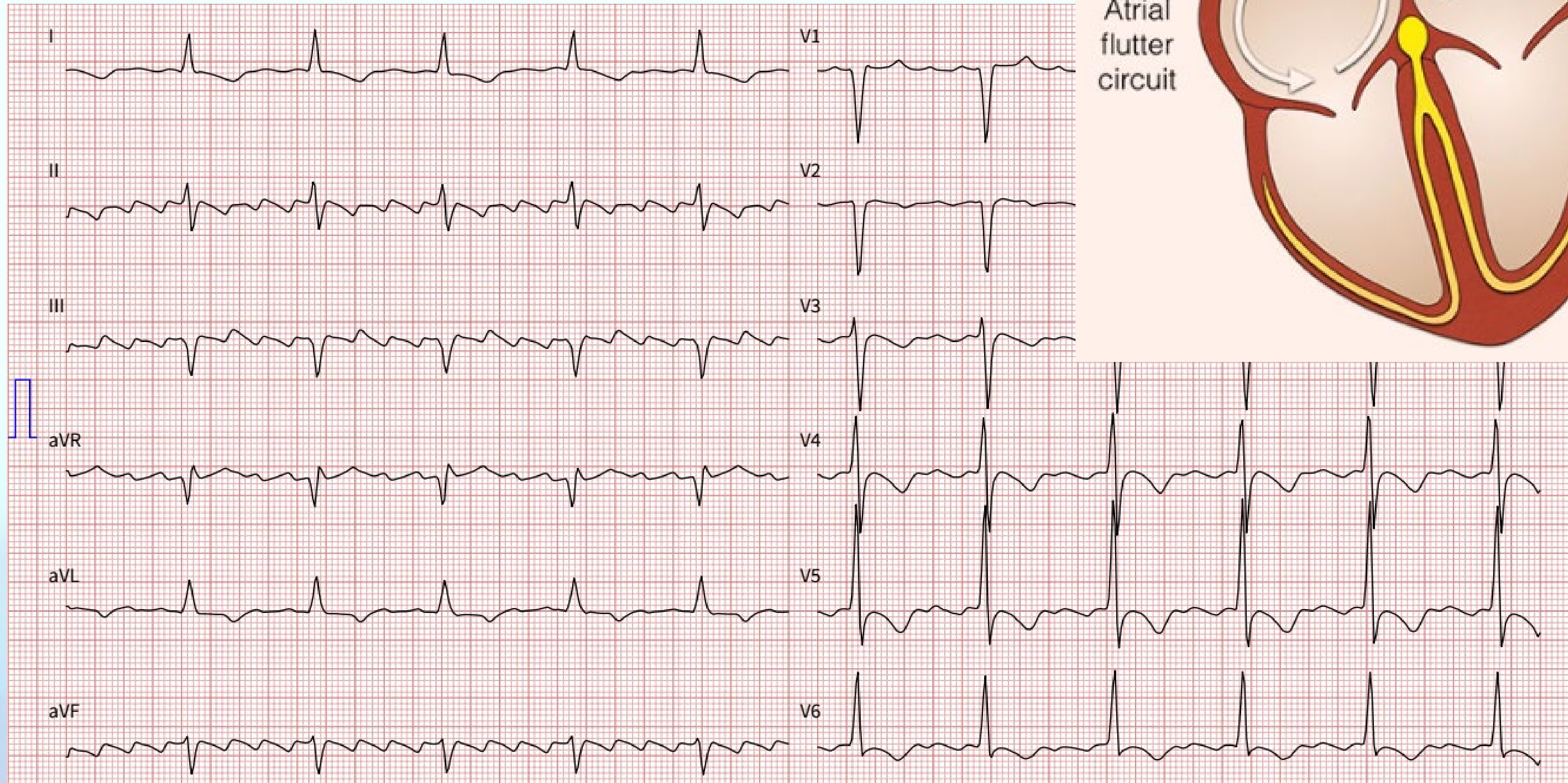
5-HT<sub>3</sub>, 5-hydroxytryptamine 3 receptor antagonist; QTc, QT interval corrected for heart rate; SSRI, selective serotonin reuptake inhibitor.

**Table 5. Drug interactions that increase the risk of acquired long QT syndrome and torsades de pointes**

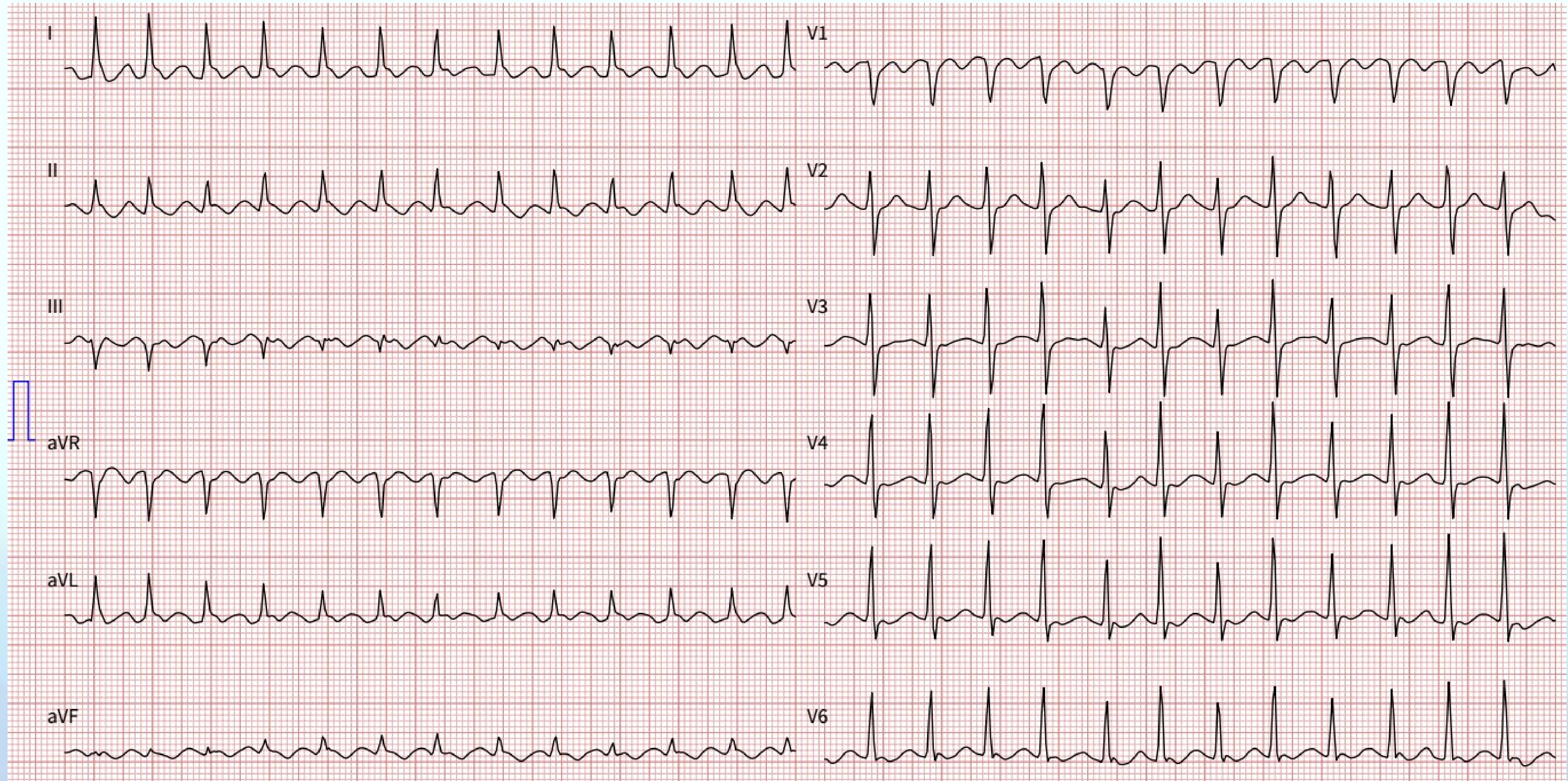
| Mechanism   | Examples  |
|---|---|
| Pharmacodynamic   |   |
| Concomitant use of 2 drugs that independently prolong QTc         | i) Methadone with ondansetron<br>ii) Sotalol with moxifloxacin<br>iii) Fluoxetine with clarithromycin   |
| Concomitant use of drugs that prolong QTc by different mechanisms | i) Ziprasidone with a thiazide or loop diuretic (ziprasidone prolongs QTc; diuretics might promote K <sup>+</sup> or Mg <sup>2+</sup> wasting)<br>ii) Itraconazole with cisplatin (itraconazole prolongs QTc; cisplatin might promote Ca <sup>2+</sup> or K <sup>+</sup> wasting) |
| Pharmacokinetic   |   |
| Concentration of a QTc-prolonging drug increased by another drug  | i) Flecainide metabolism (CYP2D6) inhibited by bupropion, paroxetine or terbinafine<br>ii) Pimozide metabolism (CYP3A4) inhibited by verapamil  |
| Mixed   |   |
| More than 1 mechanism   | i) Quetiapine with itraconazole (both drugs can prolong QTc; itraconazole inhibits quetiapine metabolism via CYP3A4)<br>ii) Sotalol with a proton pump inhibitor (sotalol directly prolongs QTc; PPIs can lead to hypomagnesemia, especially in combination with loop diuretics)  |

CYP, cytochrome P450; PPI, proton pump inhibitor; QTc, QT interval corrected for heart rate.

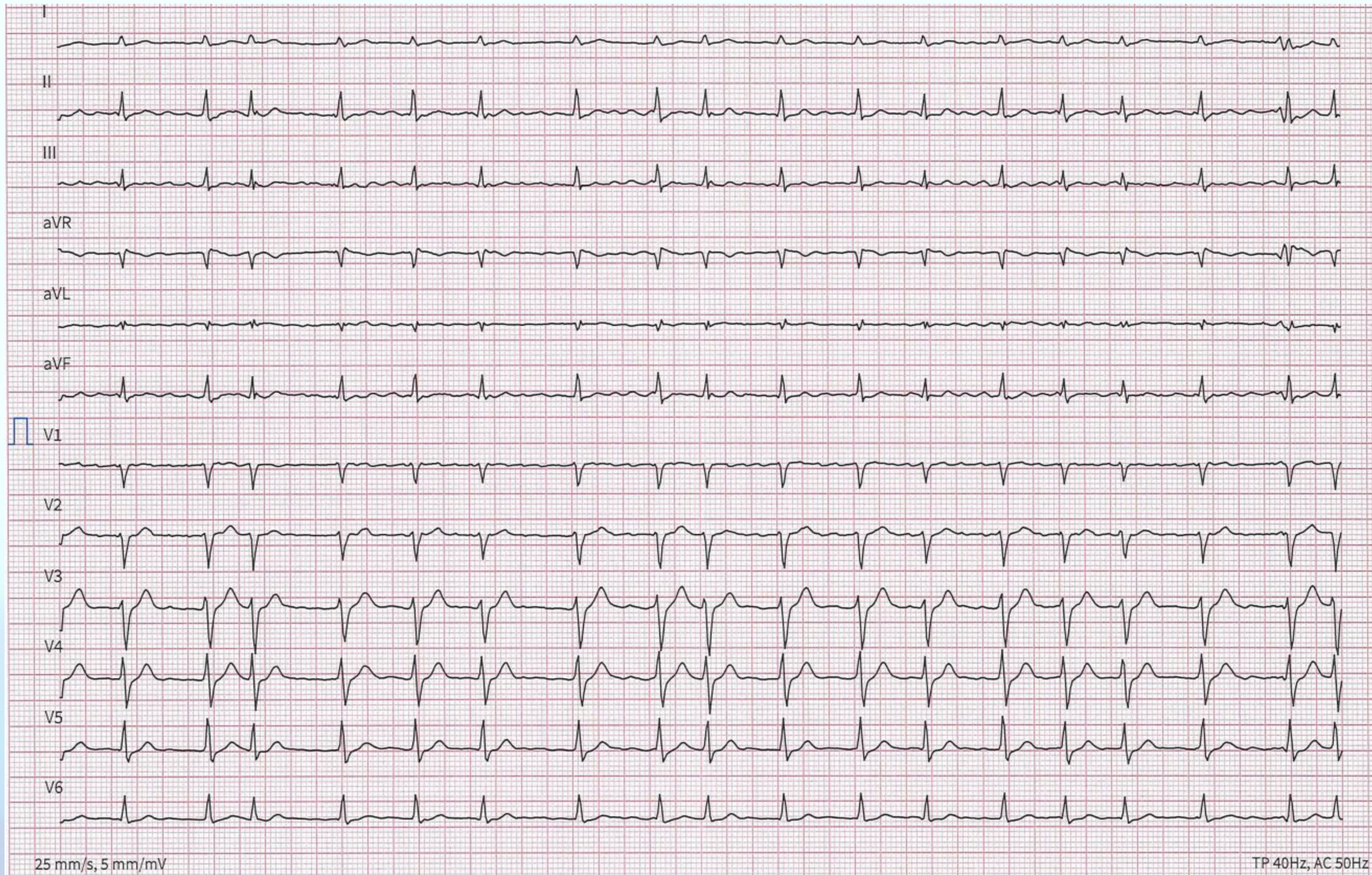
# Typische Vorhofflattern



# Typische Vorhofflattern, HF 150/min



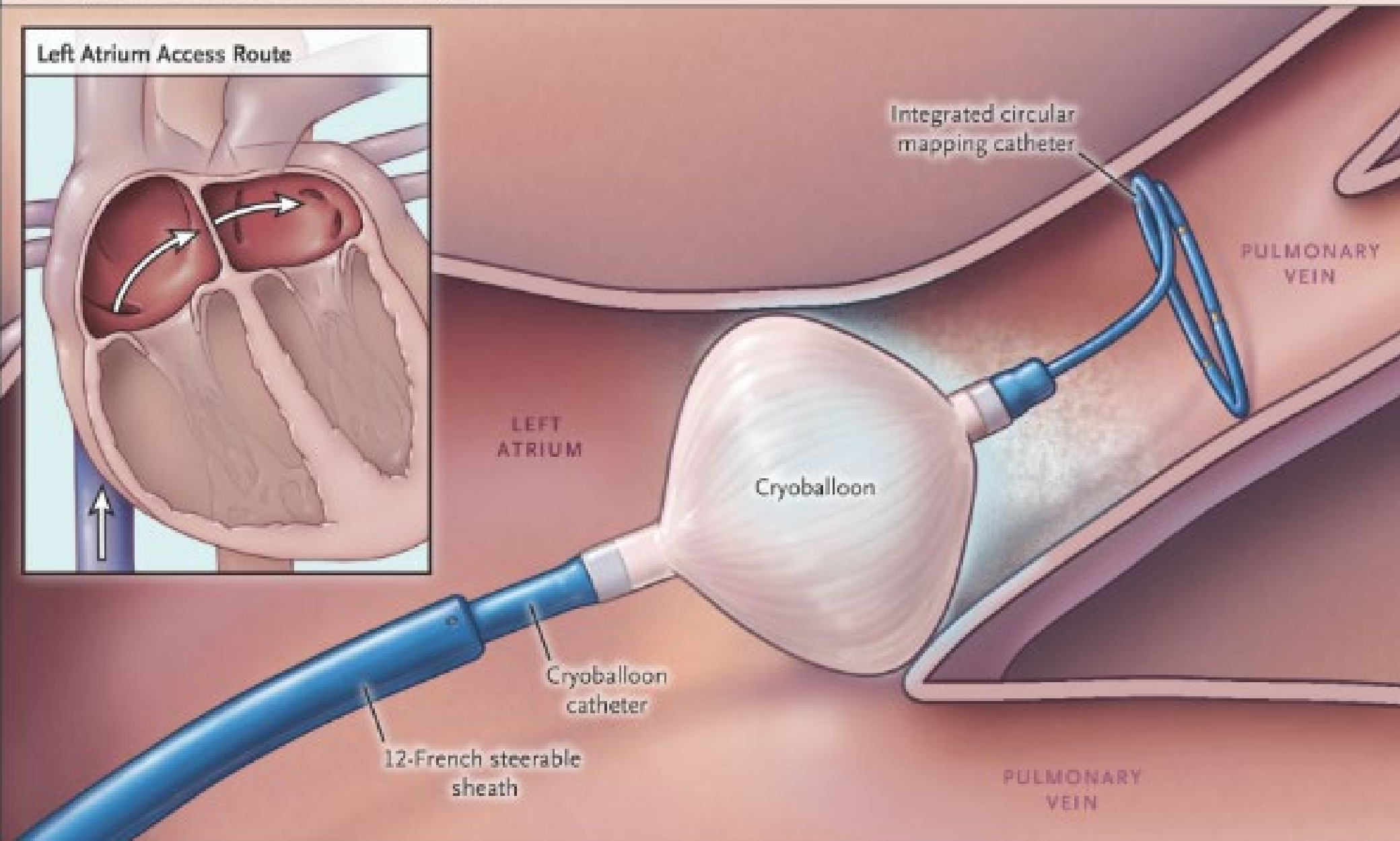
# Vorhofflimmern



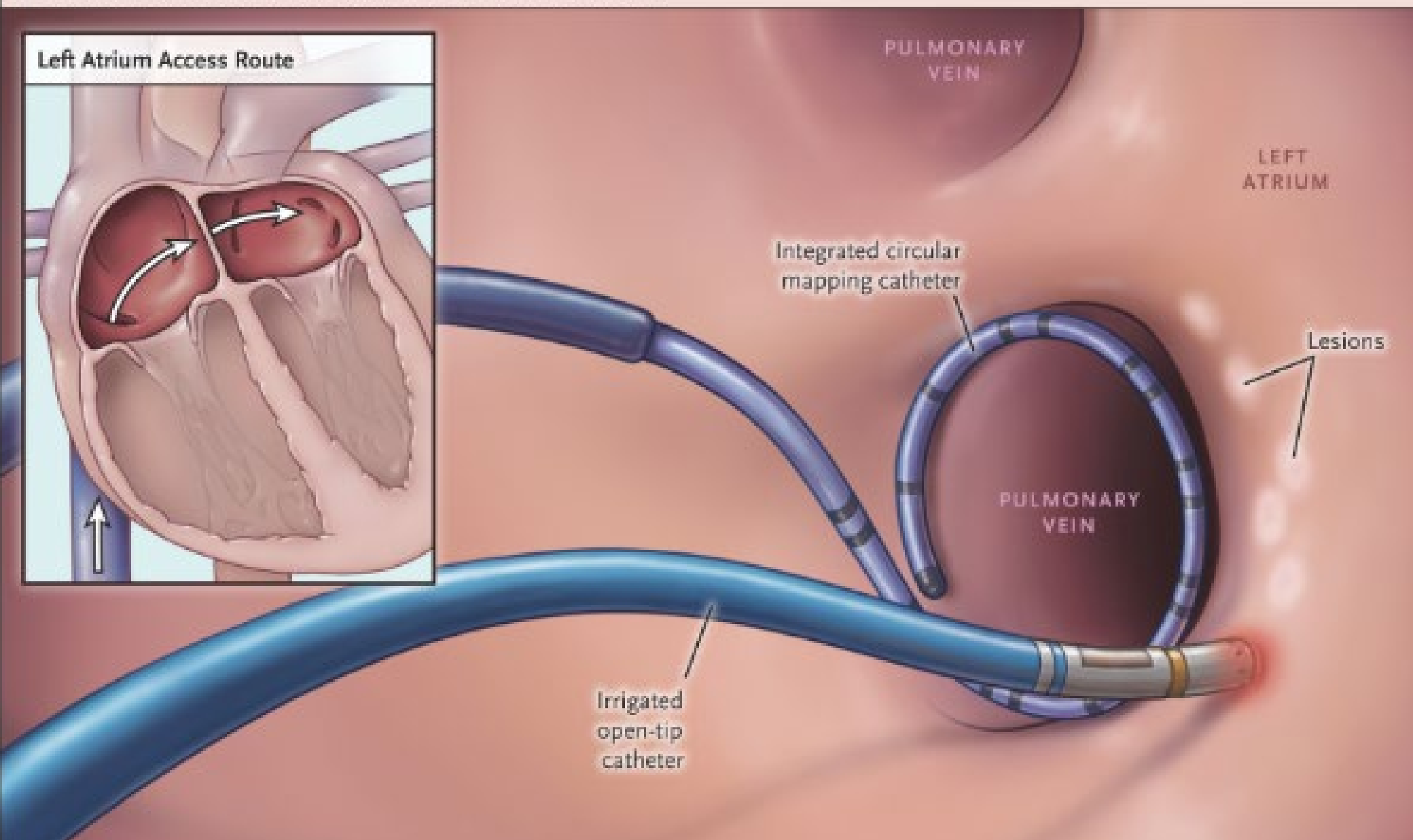
# Vorgehen in der Praxis?

- Rhythmuskontrolle bevorzugen (Amiodaron) – ausser in Sonderfällen
- Orale Antikoagulation (OAK) in angepasster Dosierung unabhängig vom CHA2DS2-VA (Vorbereitung auf eine mögliche Kardioversion/Ablation) ; Amiodaron i.d.R. nach 4 Wochen effektiver OAK
- Kardiologische Abklärung : TTE und Entscheidung zwischen Rhythmus- vs. Frequenzkontrolle, ggf. Anpassung der antiarrhythmischen Therapie

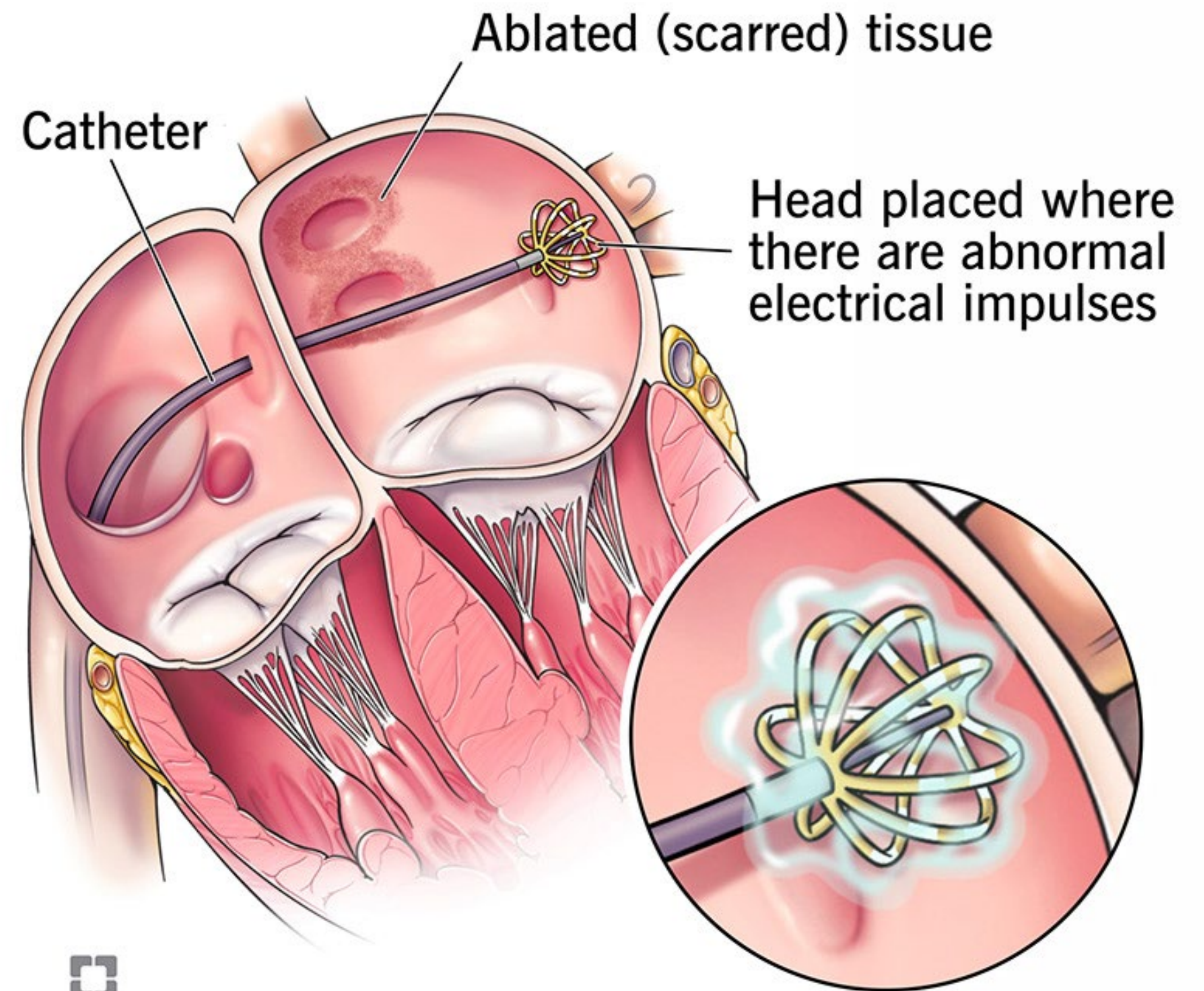
### A Cryoballoon Ablation of Pulmonary Vein



### B Radiofrequency Current Ablation of Pulmonary Vein

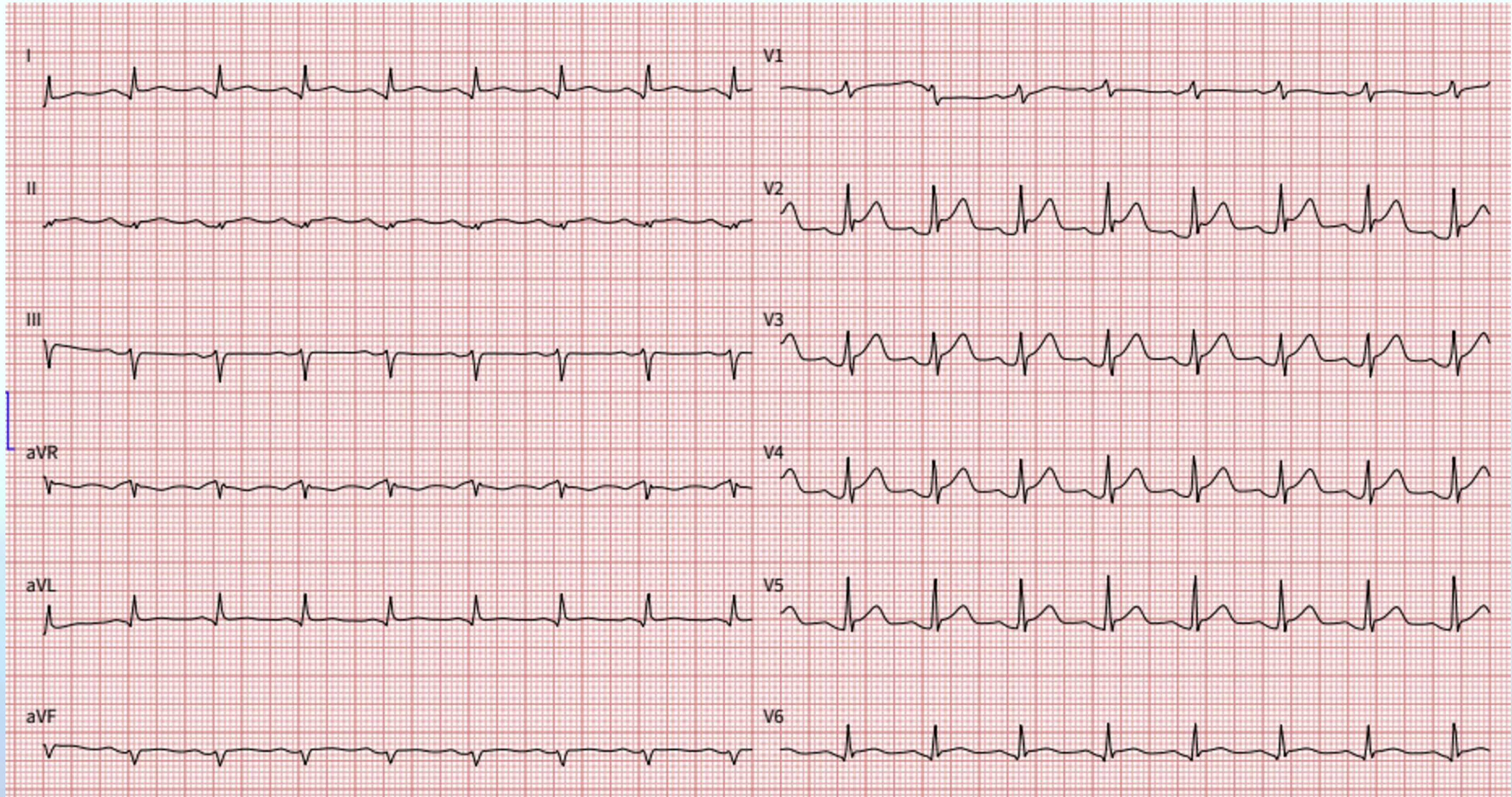


## Pulsed field ablation



Electrical pulse field  
deadens electrical signals

♂ 55 Jahre, Brustschmerzen,



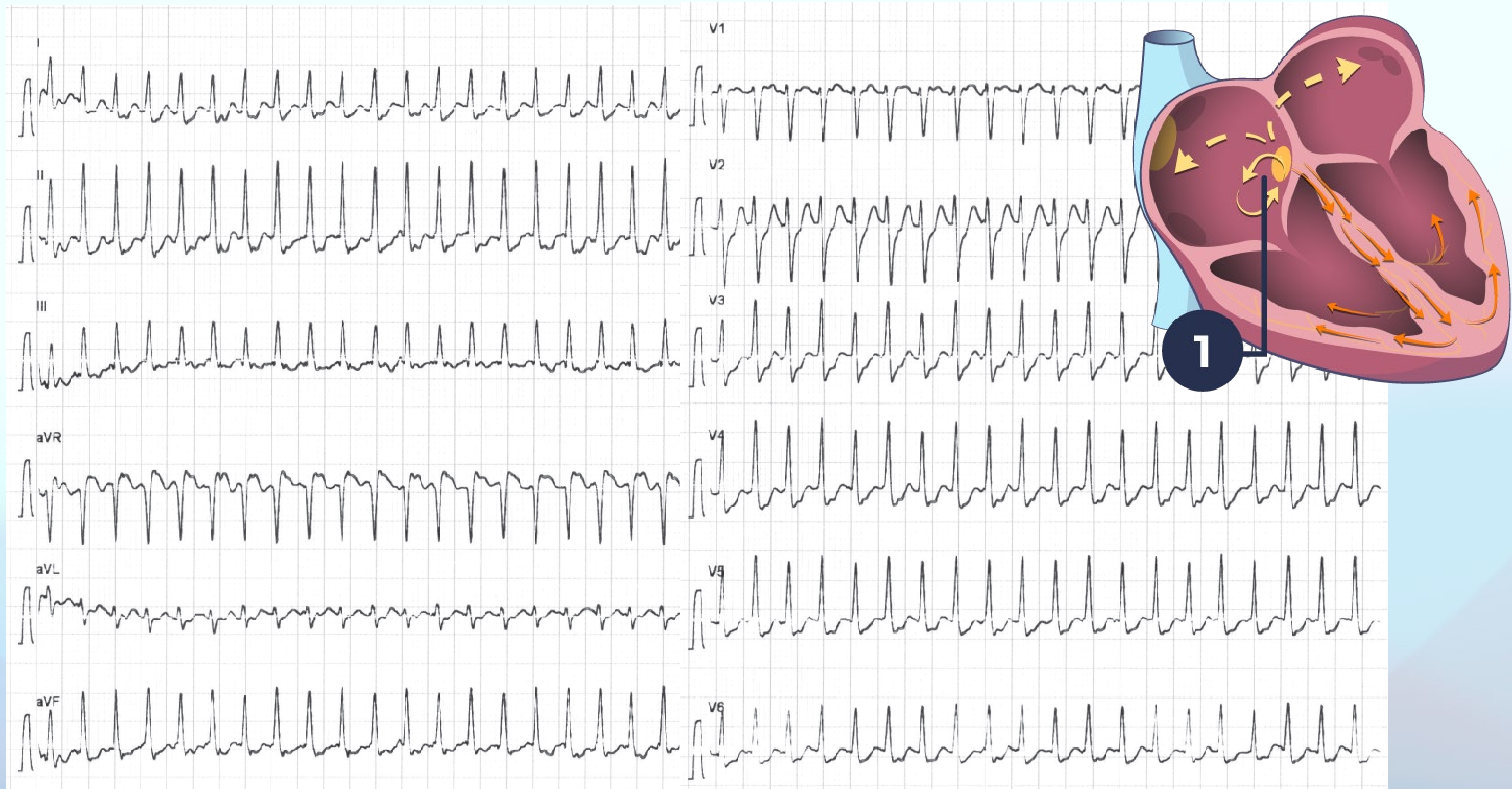
# EKG bei Perikarditis

- Diffuse ST-Hebungen mit Erhöhung des J-Punkts in mehreren Ableitungen
- Senkung des PQ-Intervall

## Behandlung

- Colchicine 0.5 mg 2x/Tag (1x/Tag wenn Gewicht < 60 kg)
- AINS mit regressive Schema
- Keine intensive Anstrengungen

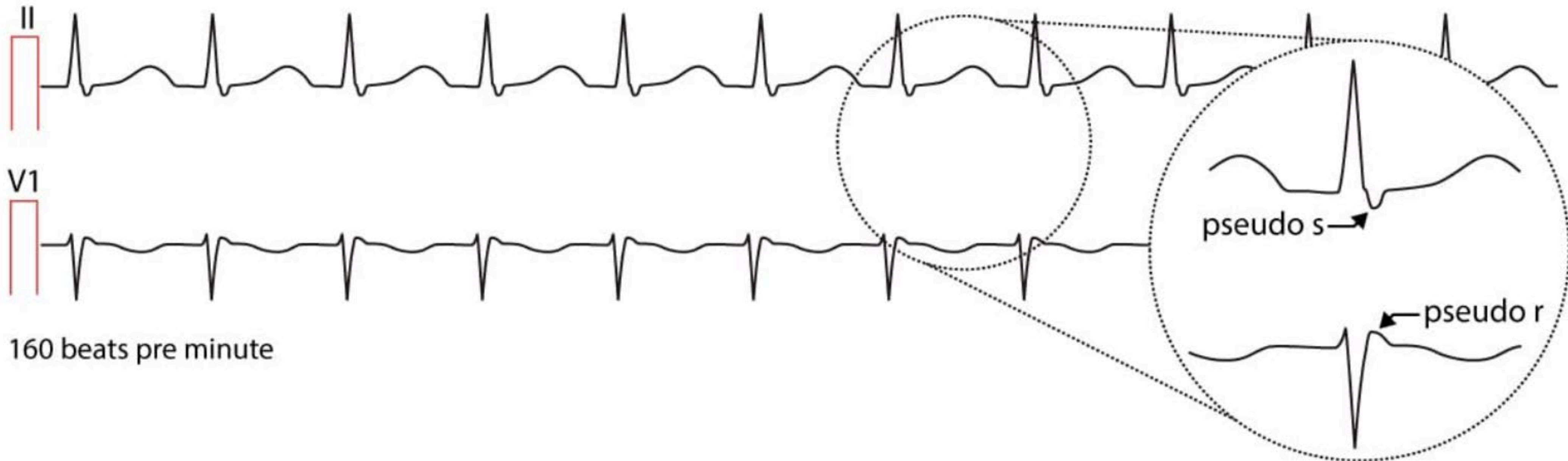
# ♀ 25 Jahre, thorakales Druckgefühl



## AVNRT

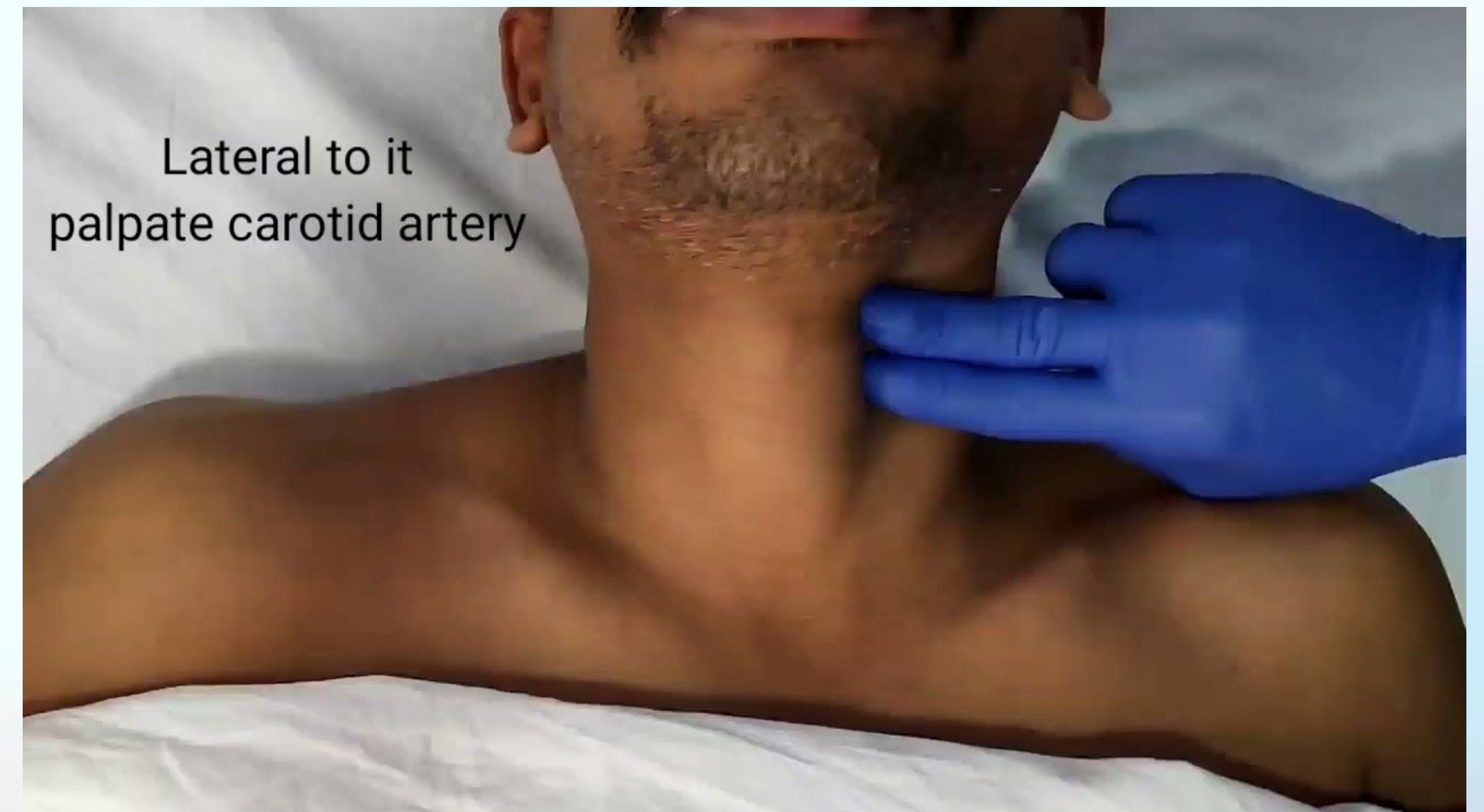
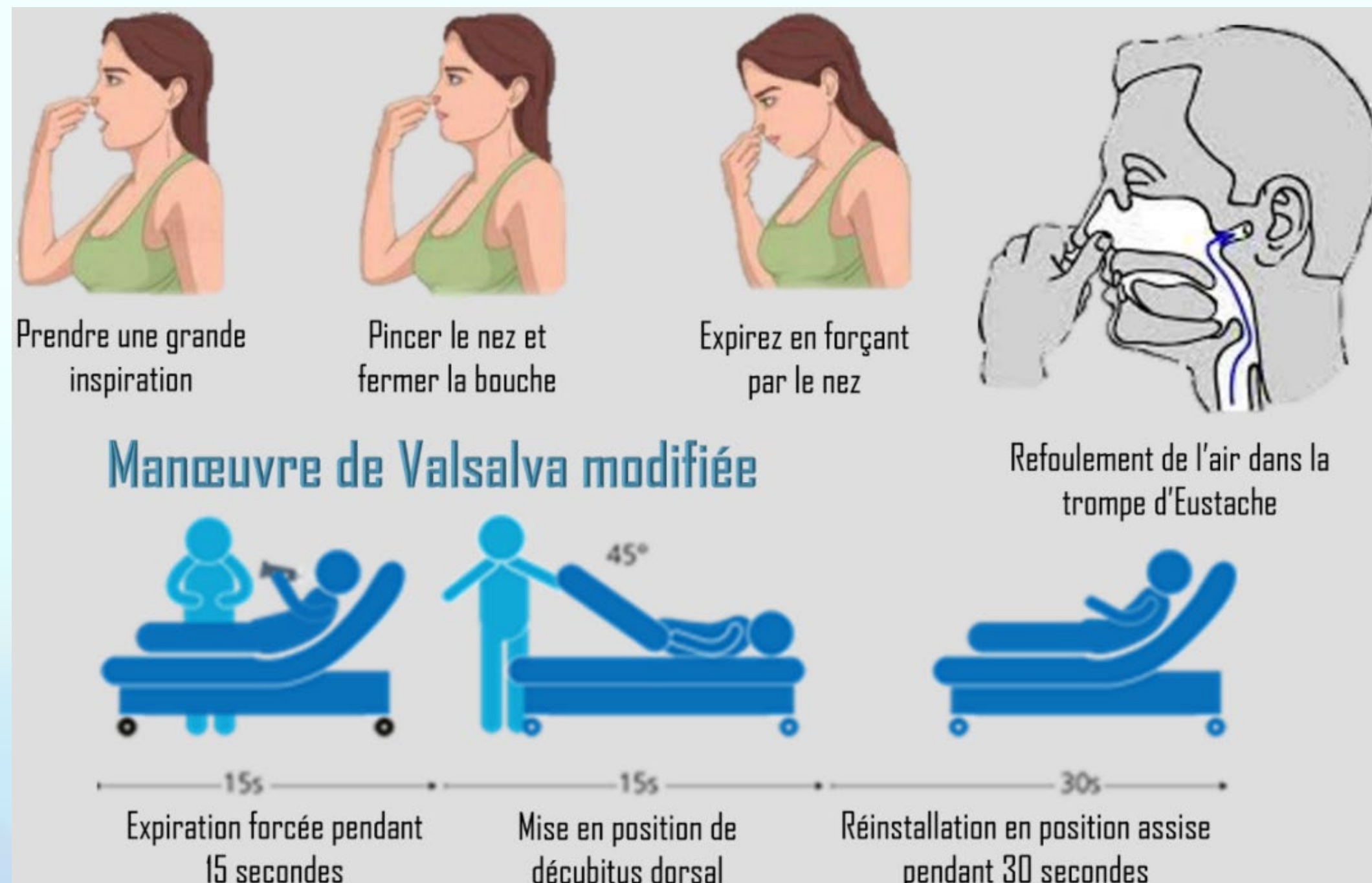
**Lead II:** Retrograde P-waves directly after the QRS imitates s-waves, which is why they are referred to as **pseudo s**.

**Lead V1:** The P-wave is also seen after the QRS in V1, where it imitates an r-wave, which is why it is referred to as **pseudo r**.



# Vorgehen in der Praxis?

Modifizierte Valsalva Manöver / Karotissinusmassage



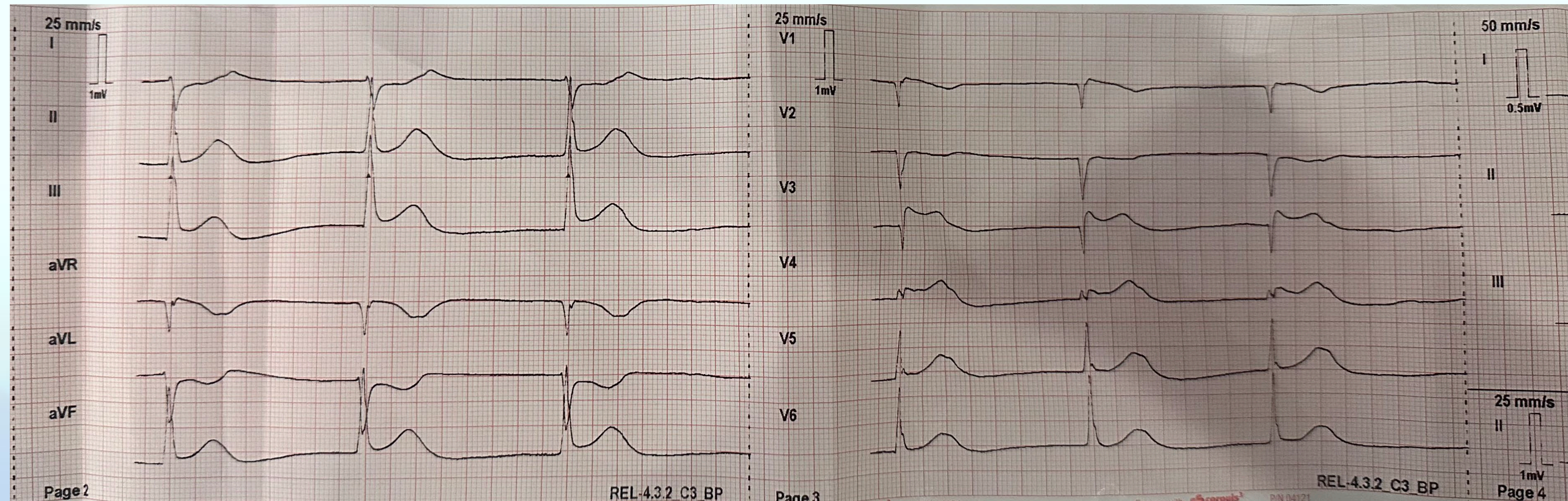
# ST-Senkungen während einer SVT

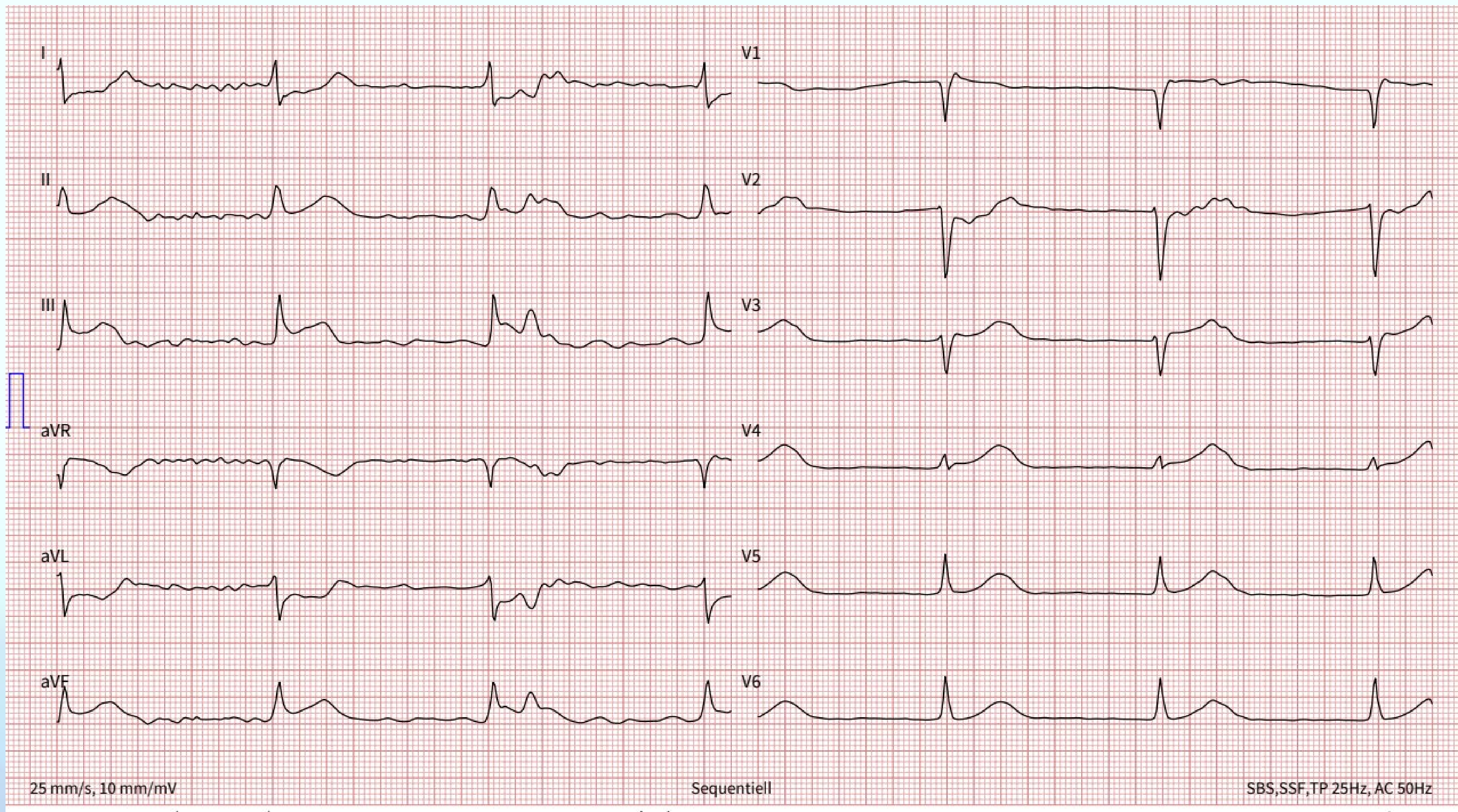
Using ST-segment deviations during supraventricular tachyarrhythmias, particularly during re-entrant atrioventricular tachycardias, per se, as reliable evidence of obstructive CAD, is not recommended.<sup>80–84</sup>

**III**

**B**

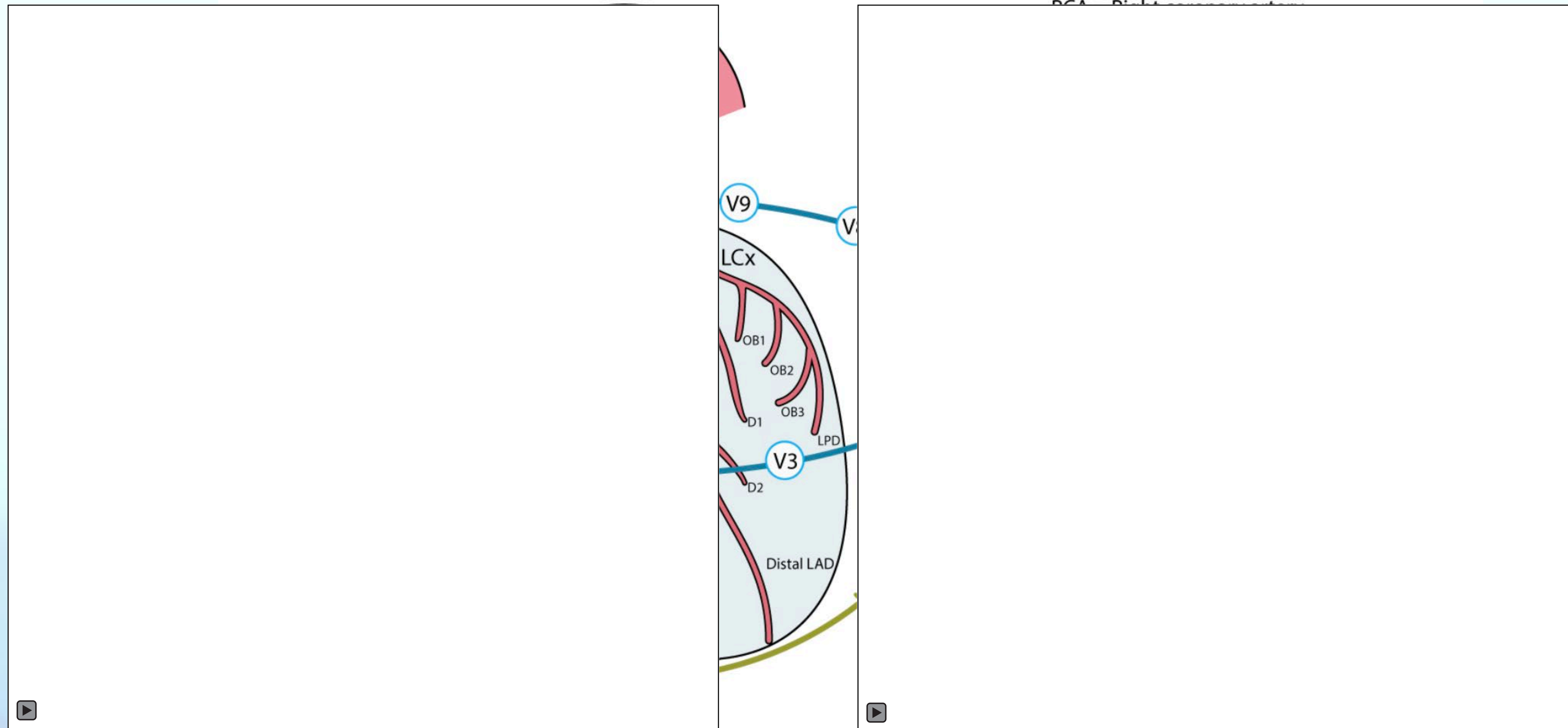
# ♀ 83 Jahre, thorakales Druckgefühl



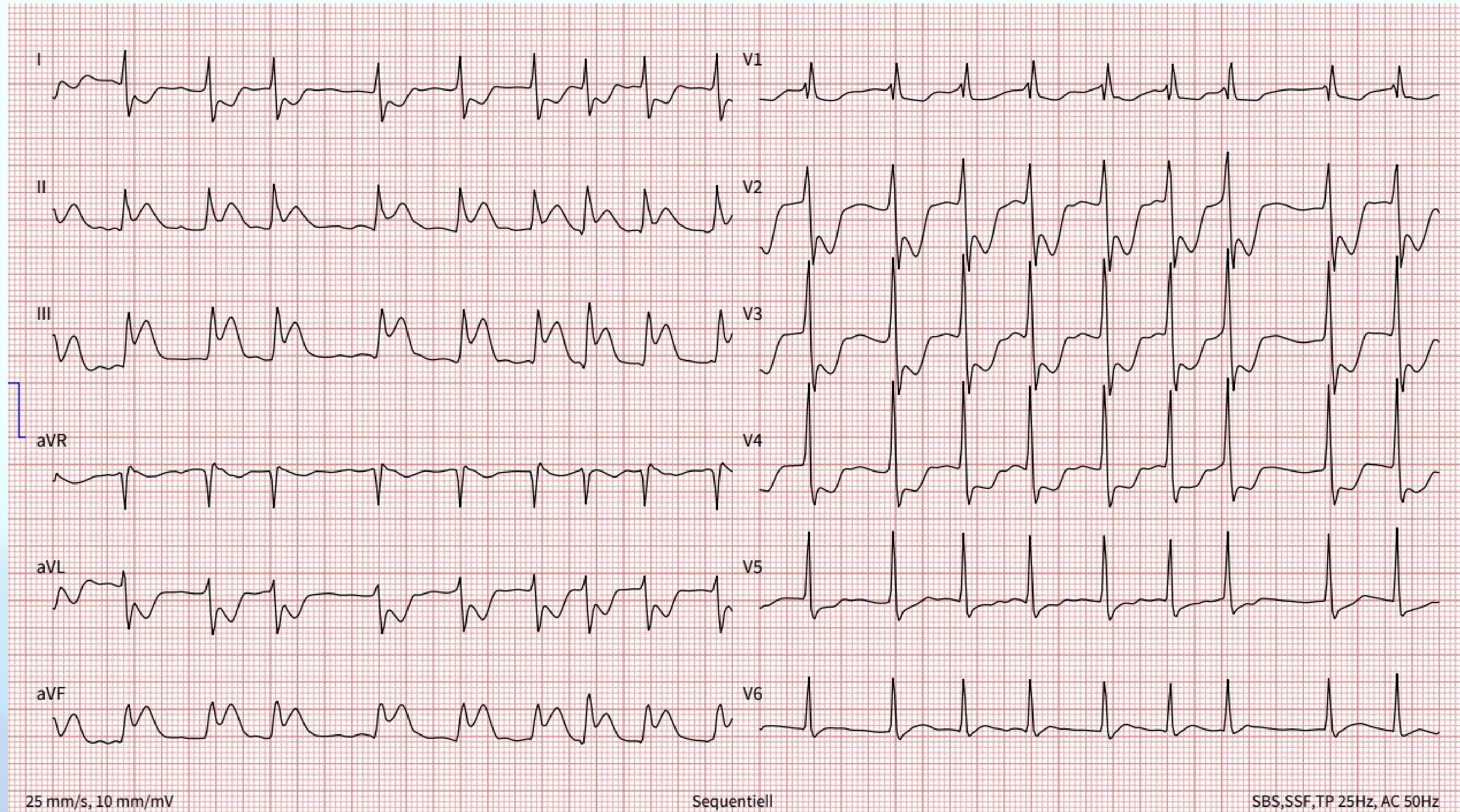


# Koronarographie

Schematic overview of the coronary arteries and their relation to the ECG leads



# STEMI



# Vorgehen in der Praxis?



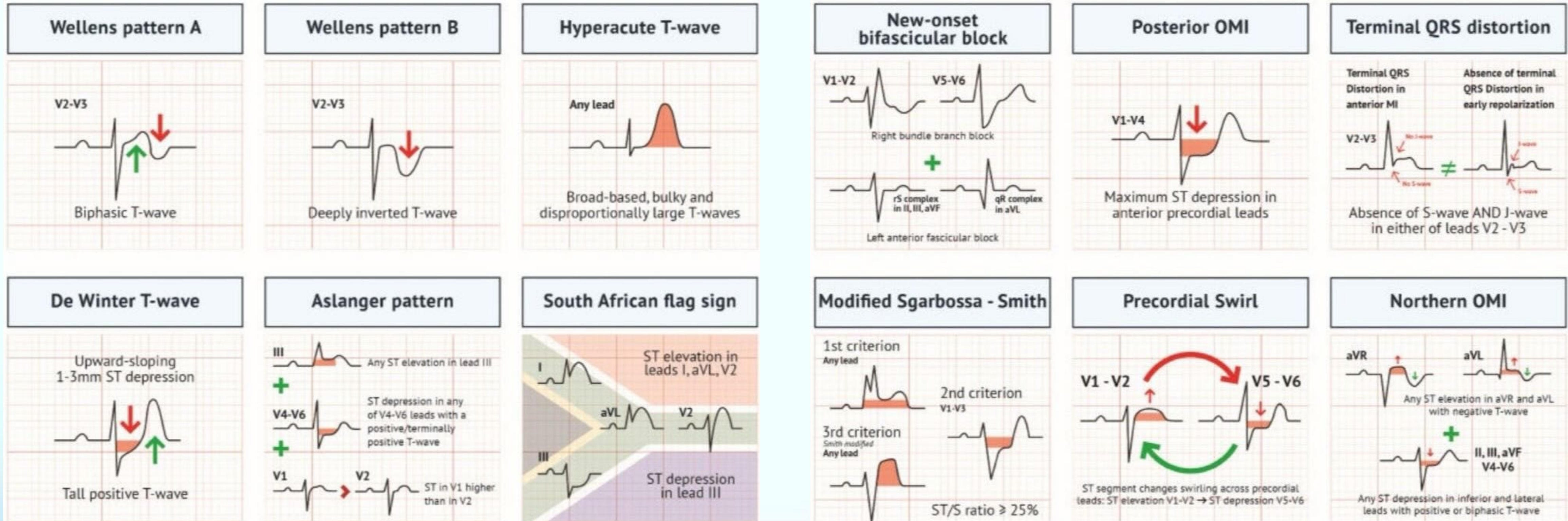
VVP

Aspirin cardio 500 mg po oder iv (wenn möglich), Heparin 5000 IE iv

026 306 32 00 (STEMI HOTLINE = Intensivstationsdienst)



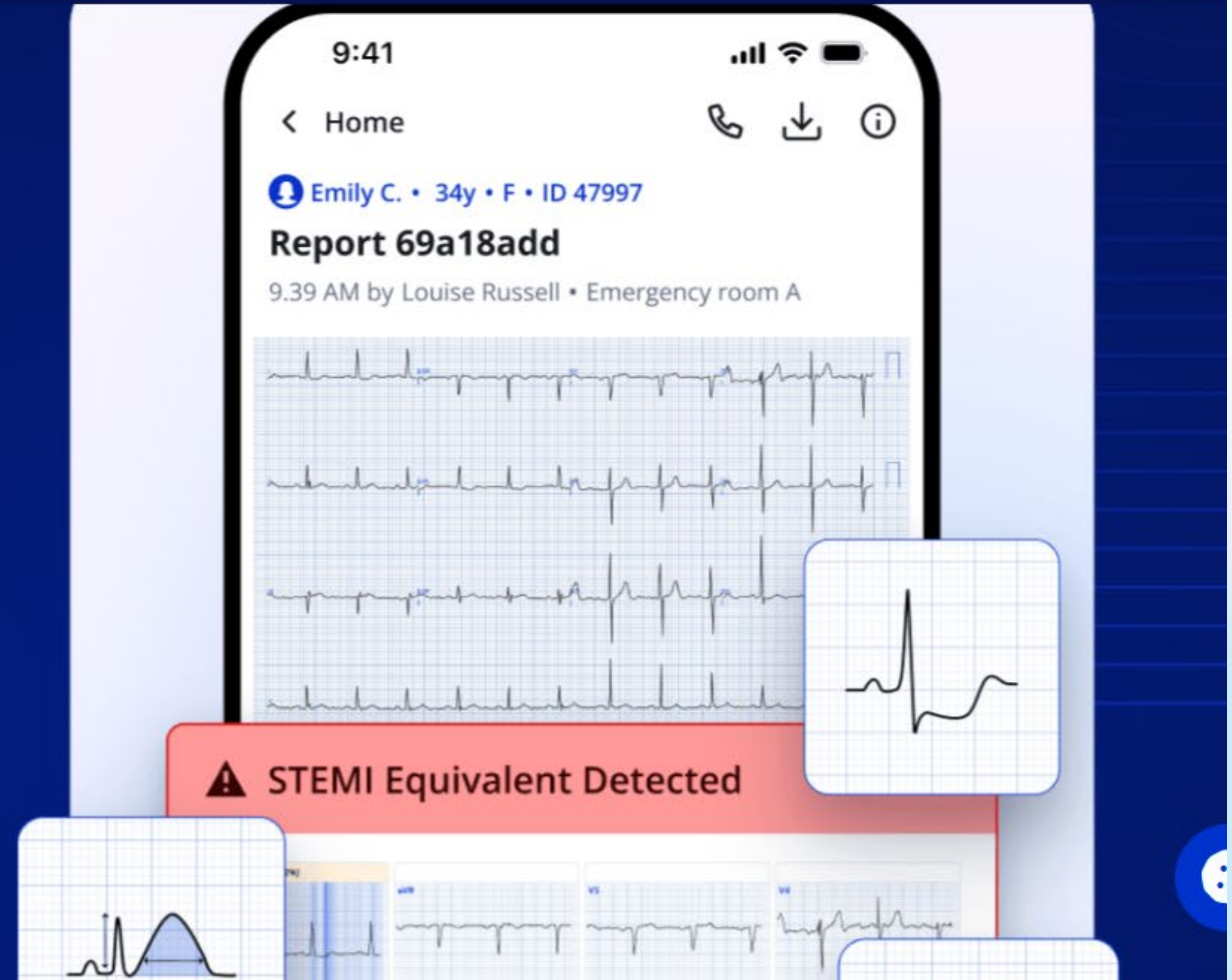
# Equivalents STEMI



● STEMI AI ECG Model

# Detect STEMI or equivalents with Queen of Hearts™

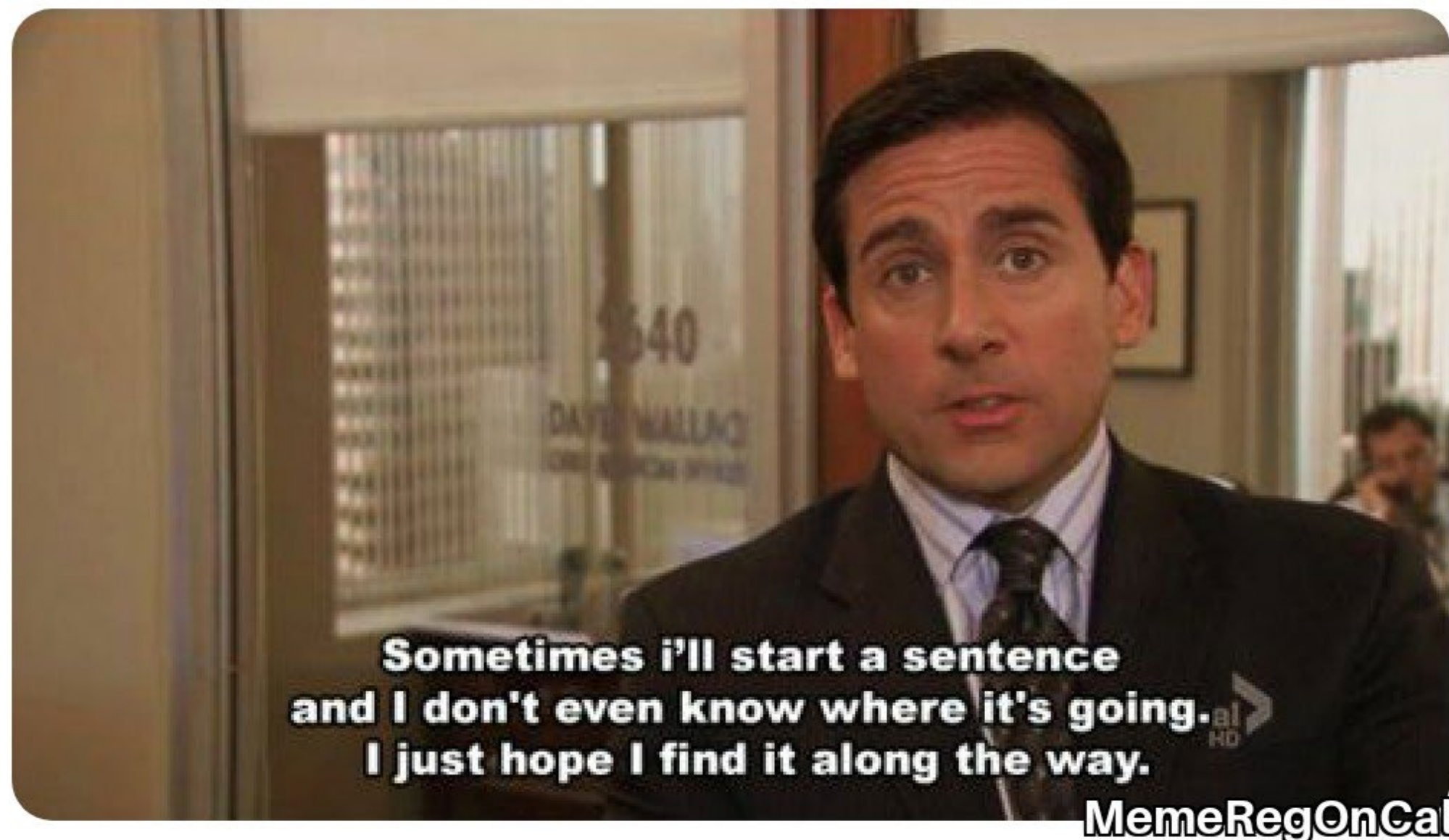
Detect true STEMI more accurately within seconds with a lower false positive rate. Clinically validated across 15+ studies involving over 10,000 patients.



Rabattcode : DRSMITH20

# Vielen Dank für Ihre Aufmerksamkeit!

When I'm asked to  
describe an ECG



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