

EKG und ARVCM

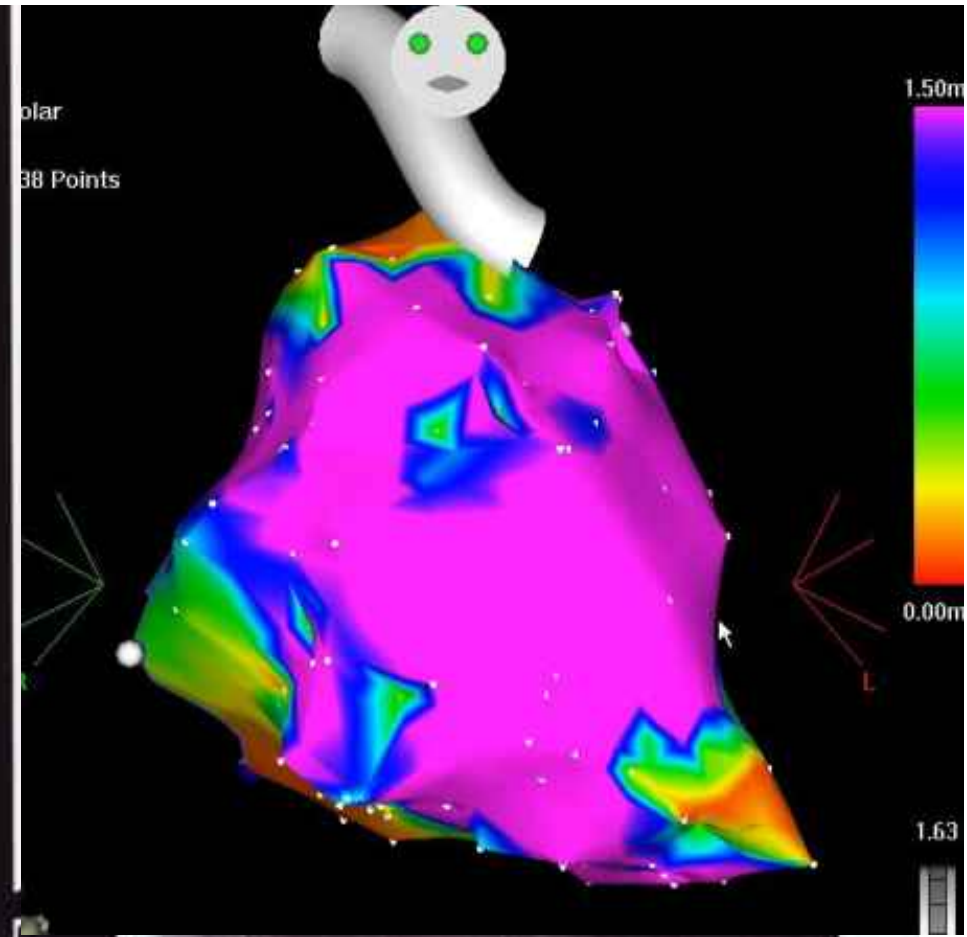
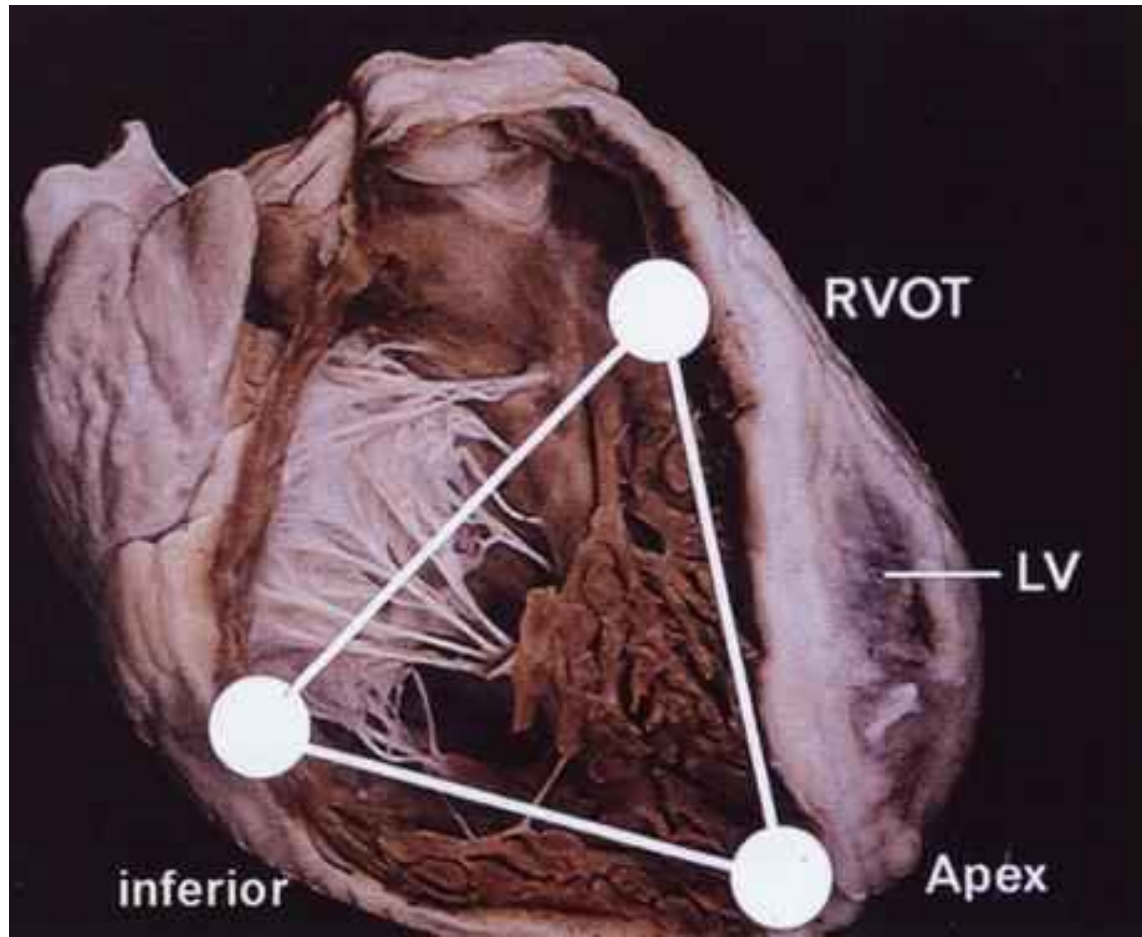
arvc-selbsthilfe.org – 24.03.2025

Lars Eckardt

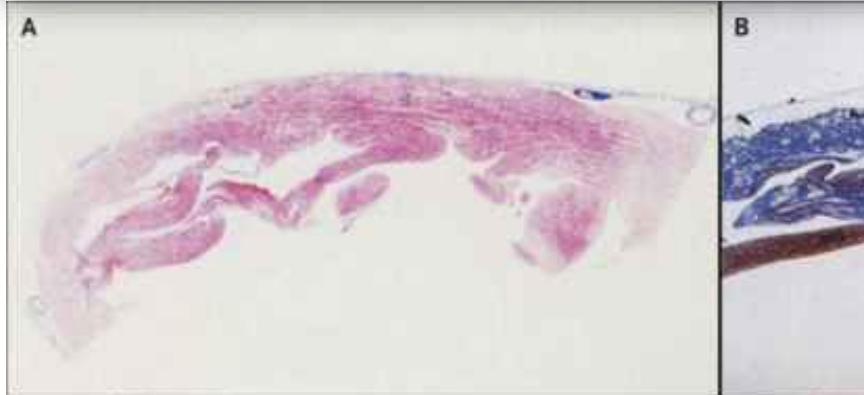
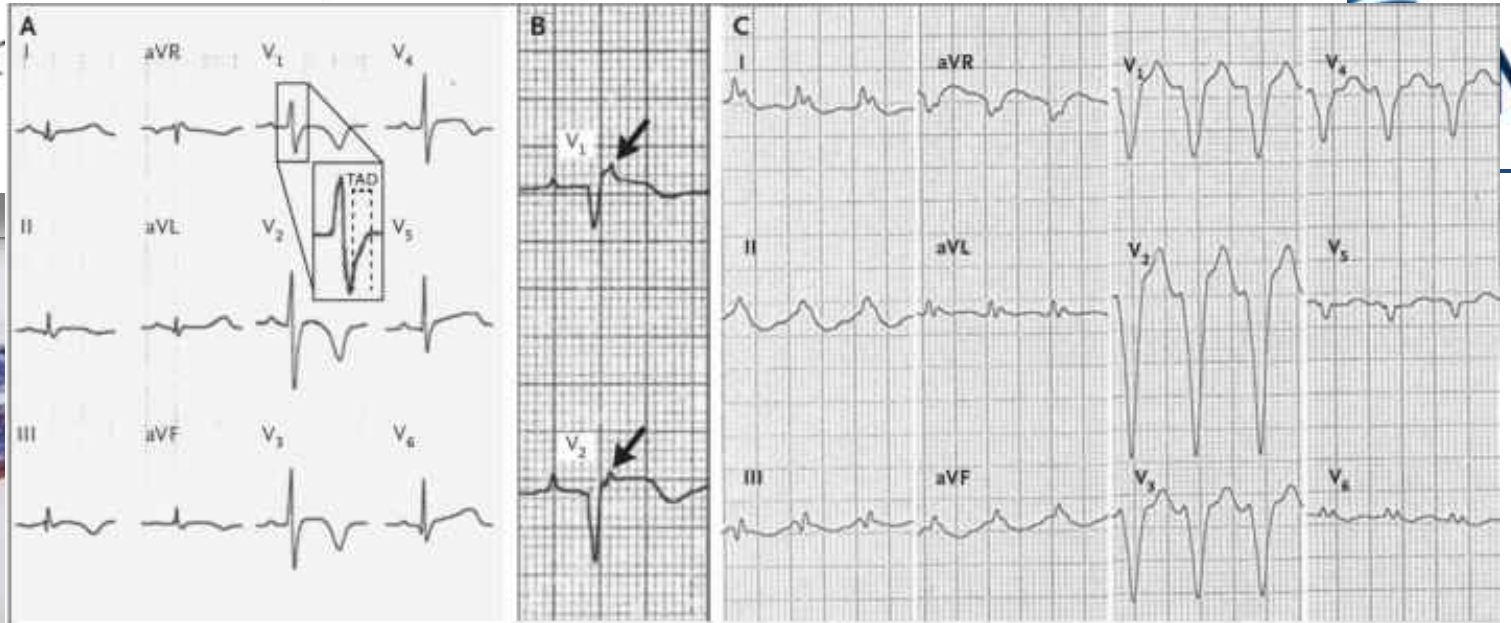
Klinik für Kardiologie II – Rhythmologie

Universitätsklinikum Münster

VT Ablation bei ARVD



Arrhythmogenic Right Ventricular Cardiomyopathy



2023 ESC Guidelines for the management of cardiomyopathies

Recommendation

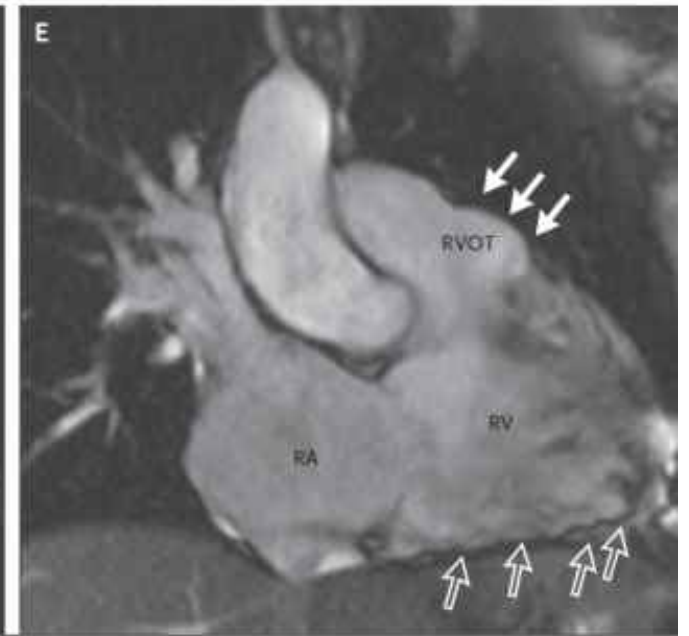
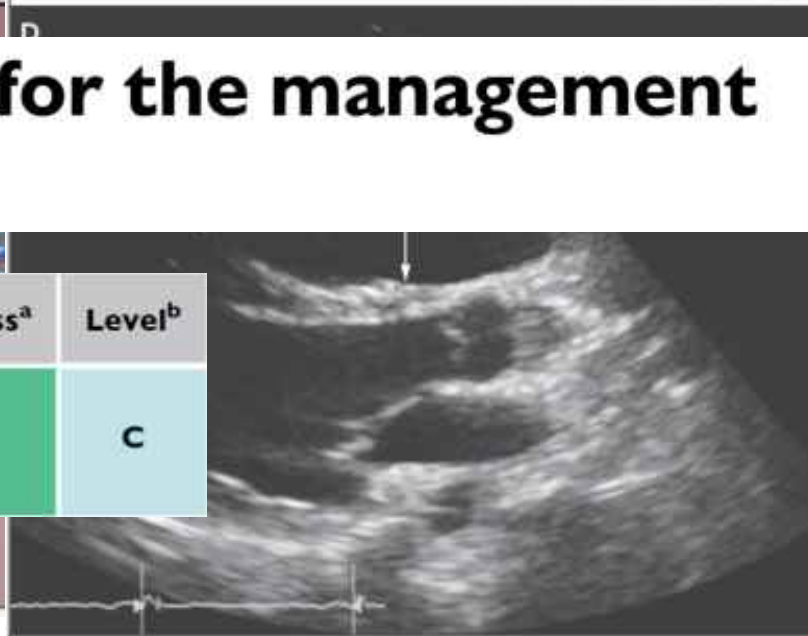
Annual ambulatory ECG monitoring is recommended in patients with ARVC to aid in diagnosis, management, and risk stratification.⁹⁰²

Class^a

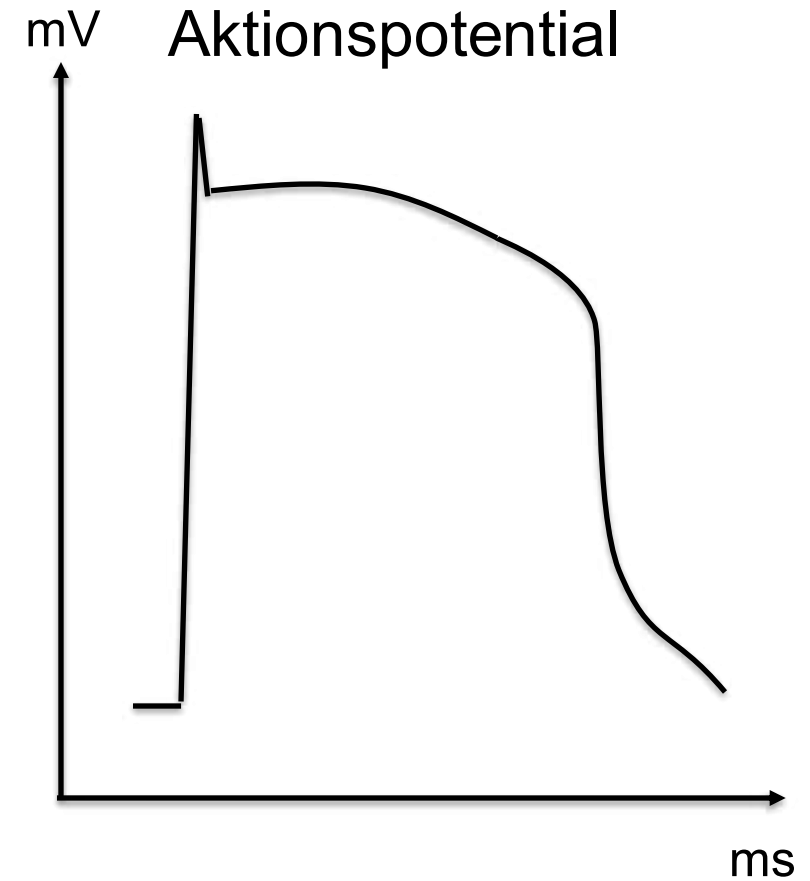
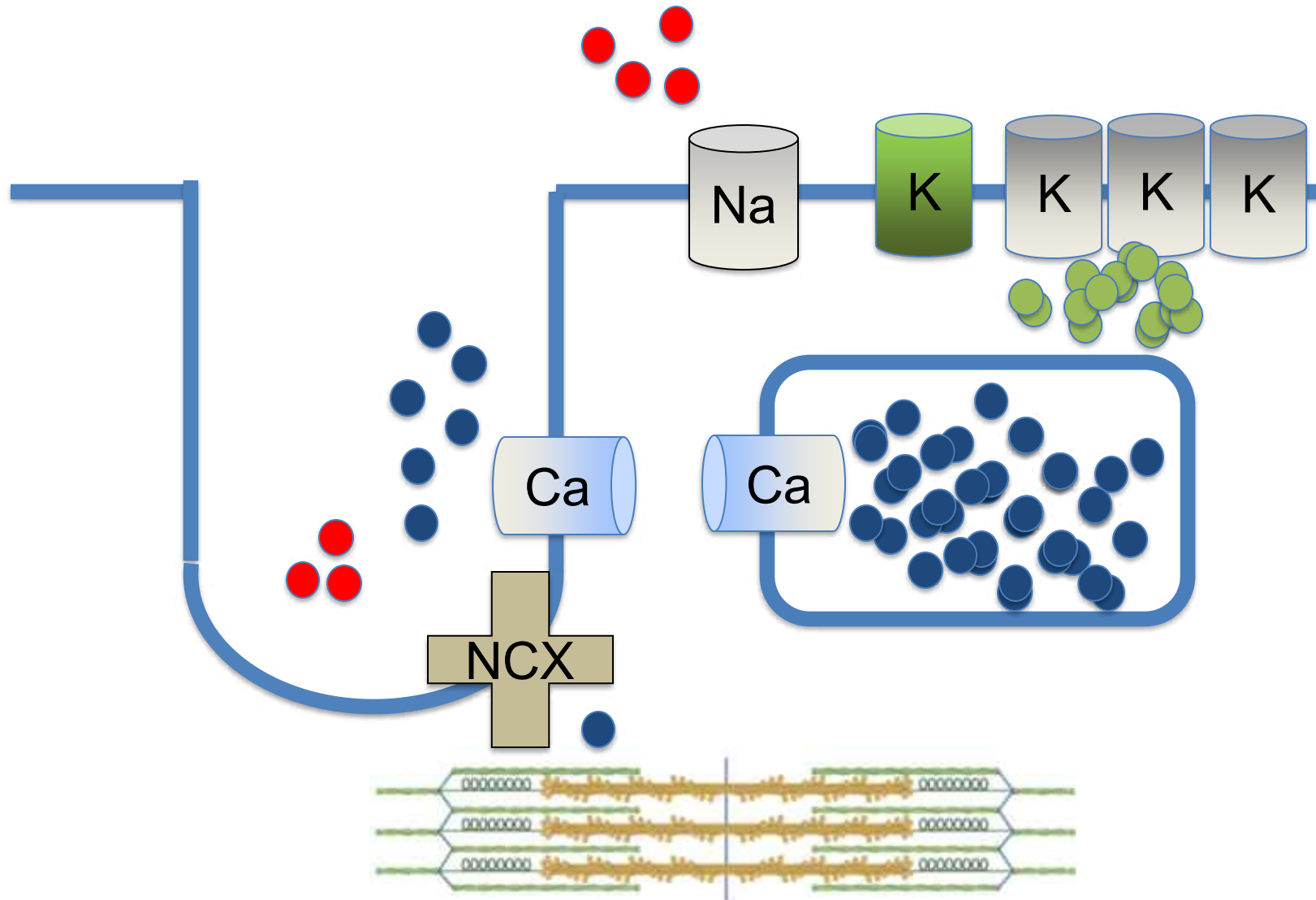
Level^b

I

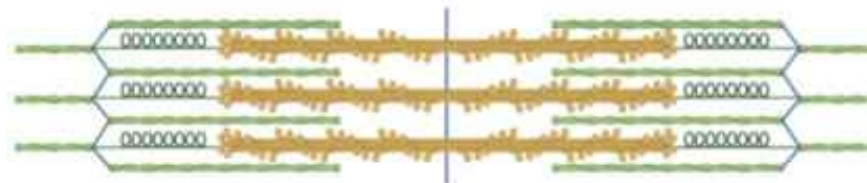
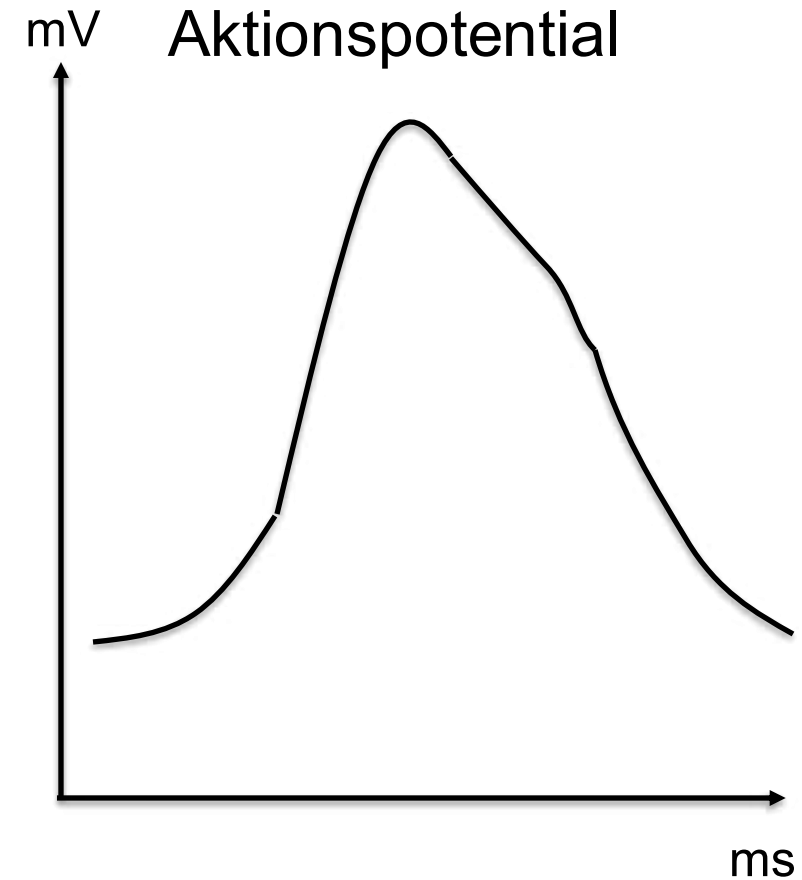
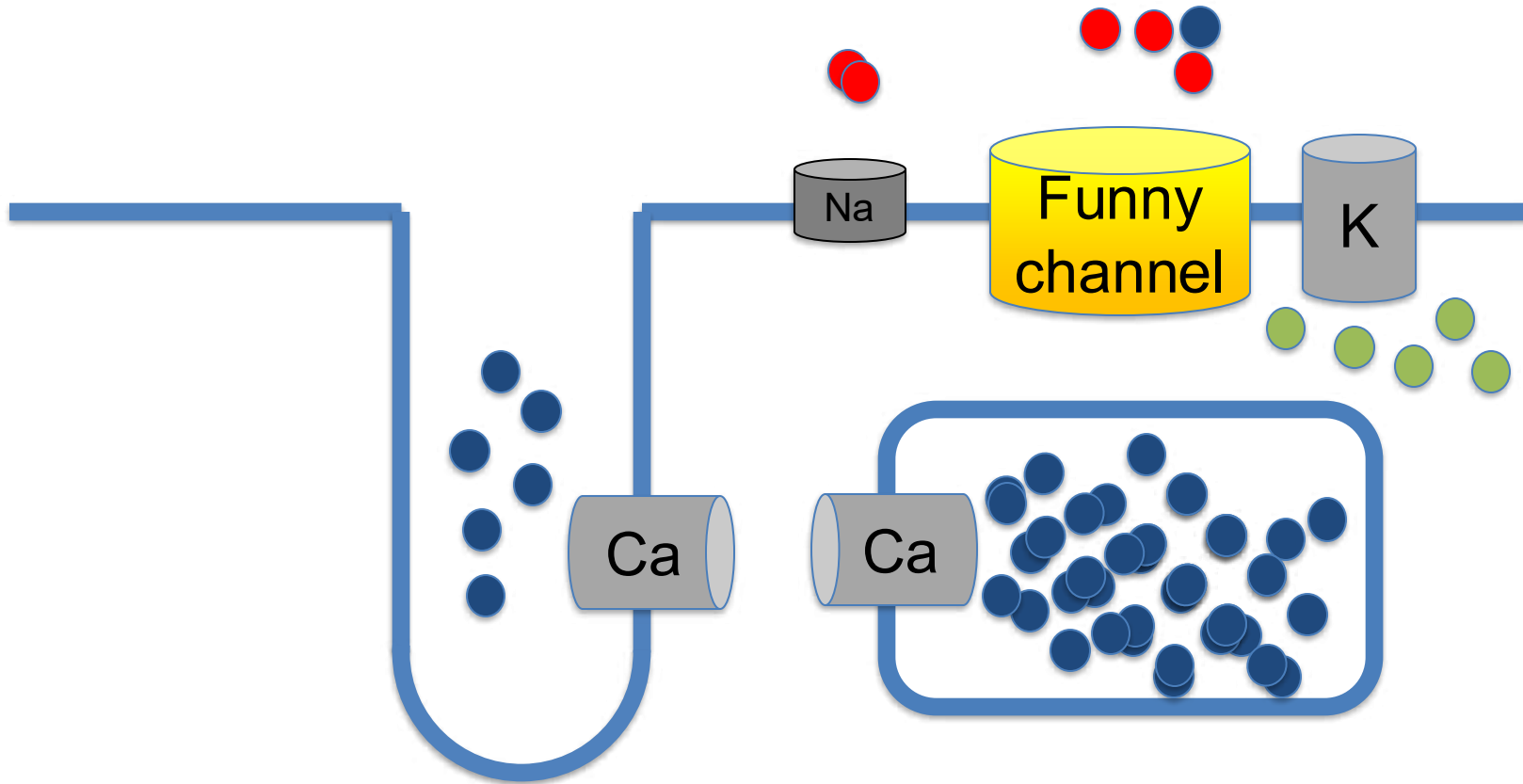
C



EKG Grundlagen: Vom AP zum EKG



EKG Grundlagen: Vom AP zum EKG



EKG Grundlagen: Vom AP zum EKG

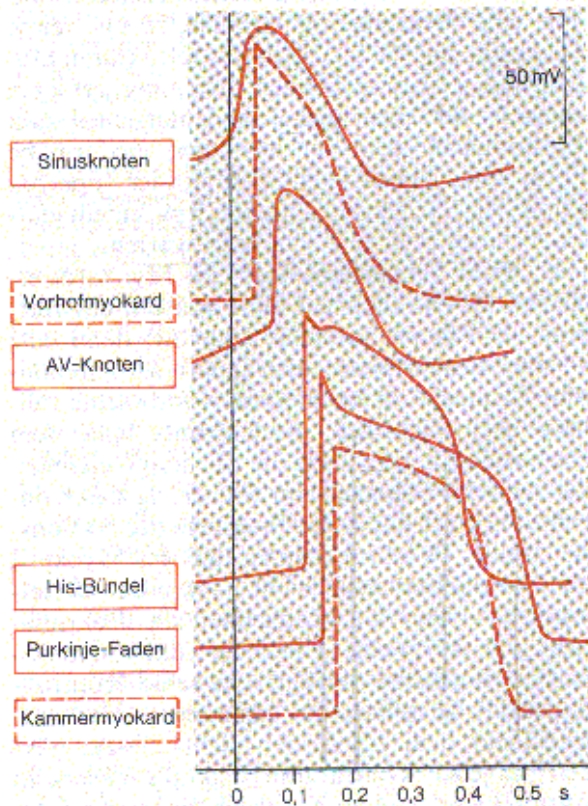
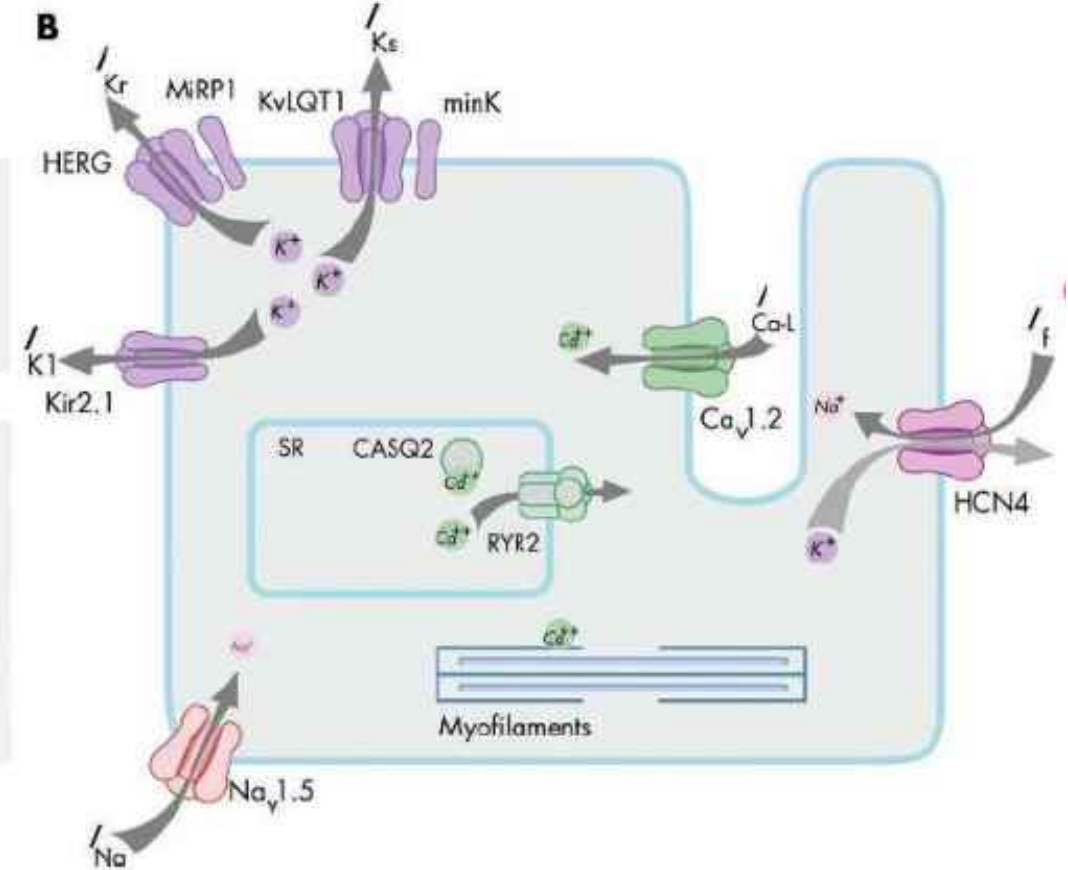
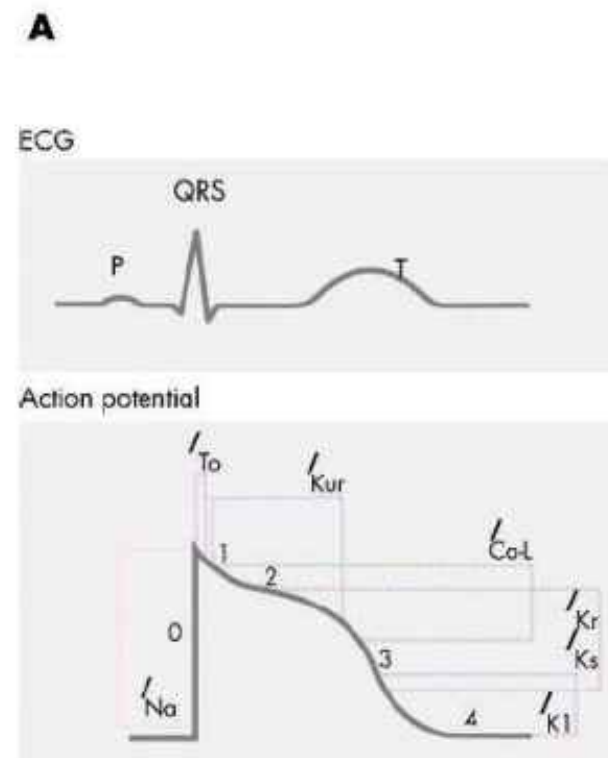
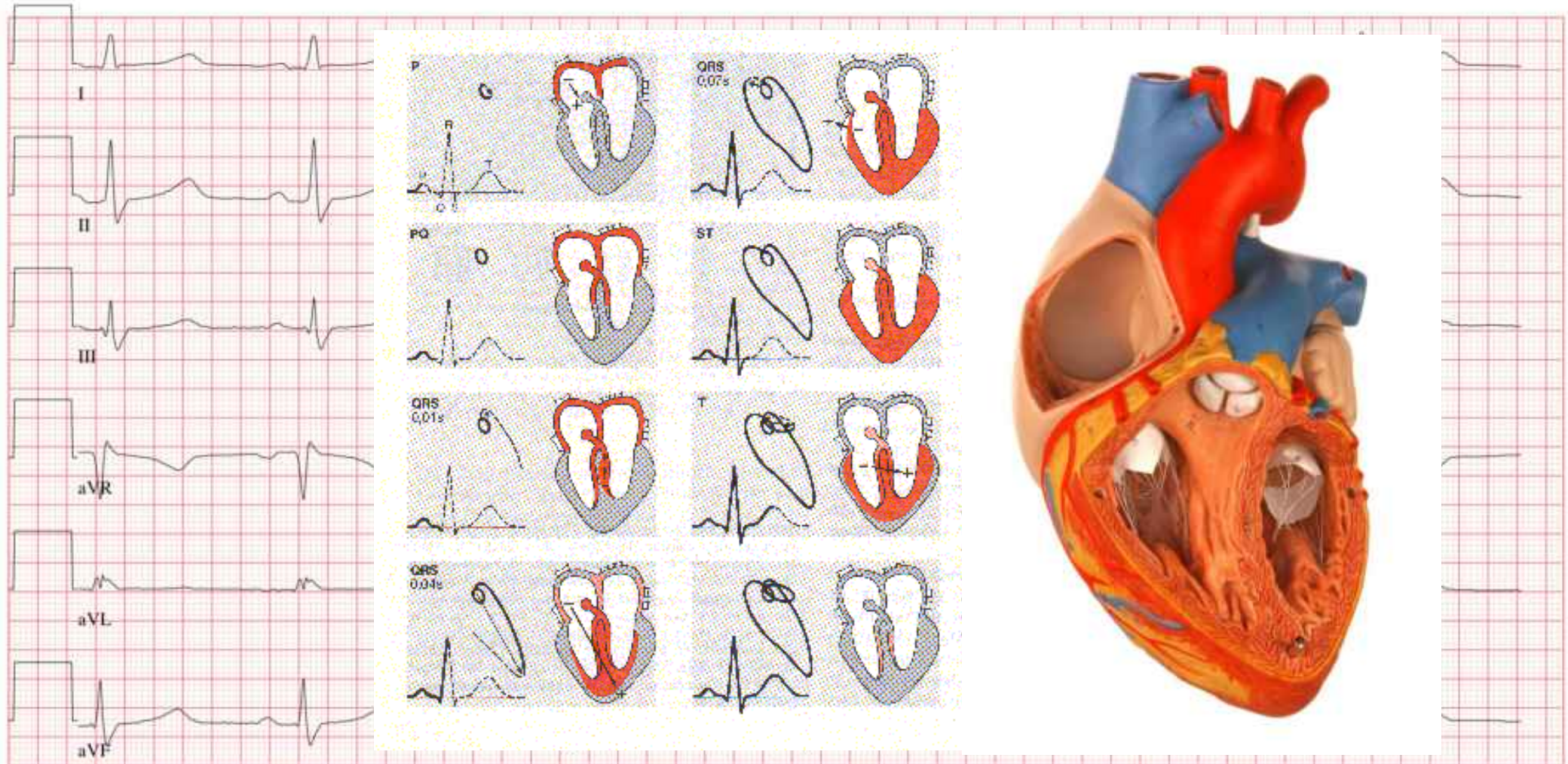


Abb. 19-8. Charakteristische Aktionspotentialformen in verschiedenen Herzregionen. Aktionspotentiale aus dem Erregungsbildungs- bzw. -leitungssystem sind durch *ausgezogene Linien* dargestellt. Die Zeitversetzung entspricht dem Eintreffen der Erregung in der betreffenden Region während der Erregungsausbreitung



EKG Grundlagen: EKG

I
II
III
aVR
aVL
aVF

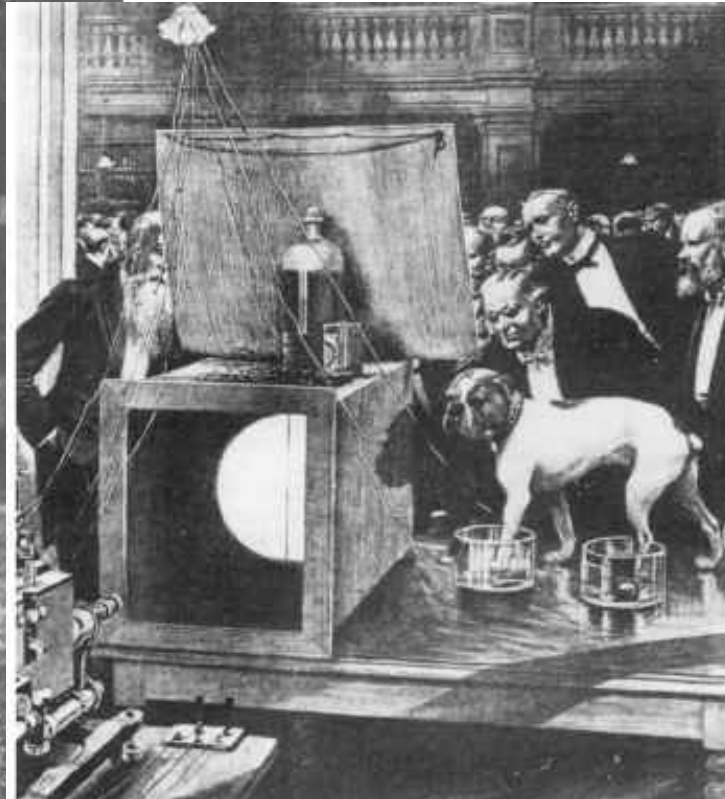


50mm/s 10mm/mV 40Hz 8.0 SP2 12SL 239 Gerät: 22

50mm/s



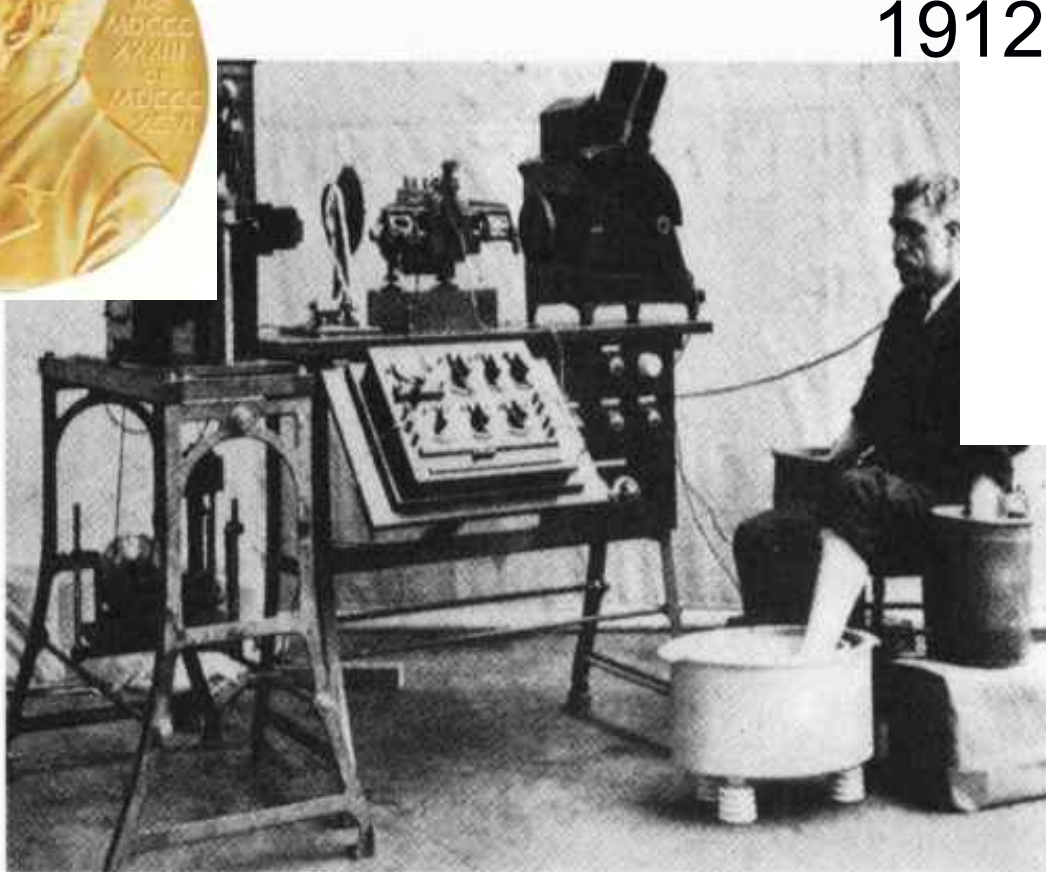
Augustus Desire Waller (1856-1922)



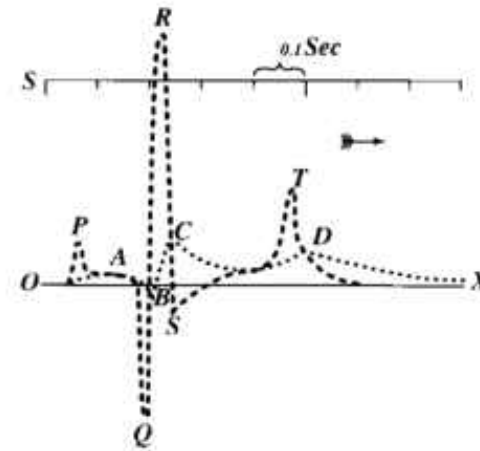
- Grundlegende Arbeiten:
- **1887:** Registrierung des ersten menschlichen EKGs; ABCD; (J of Physiology 1887)
- Er schuf die Bezeichnung „Elektrokardiogram“
- **1889:** Ableitung von der Brustwand, Dipol-Theorie

EKG Grundlagen: Brief History

„On the shape of the human electrocardiogram“ (1894) Willem Einthoven - „P, Q,R, S, T“

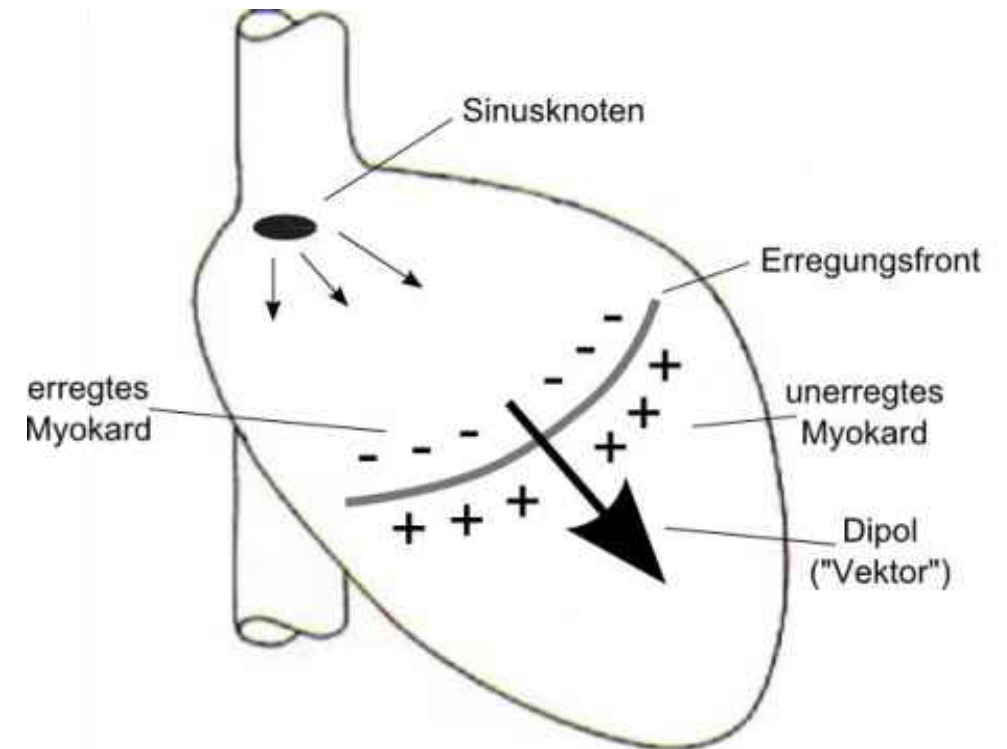


1912



Wichtige Konzepte

1. Wenn die Erregung in **Richtung der positiven Elektrode** erfolgt, ergibt sich im EKG ein **positiver Ausschlag**
2. Mittels der verschiedenen Ableitungen lässt sich die elektrische Aktivität des Herzens aus **unterschiedlichen Blickwinkeln** betrachten



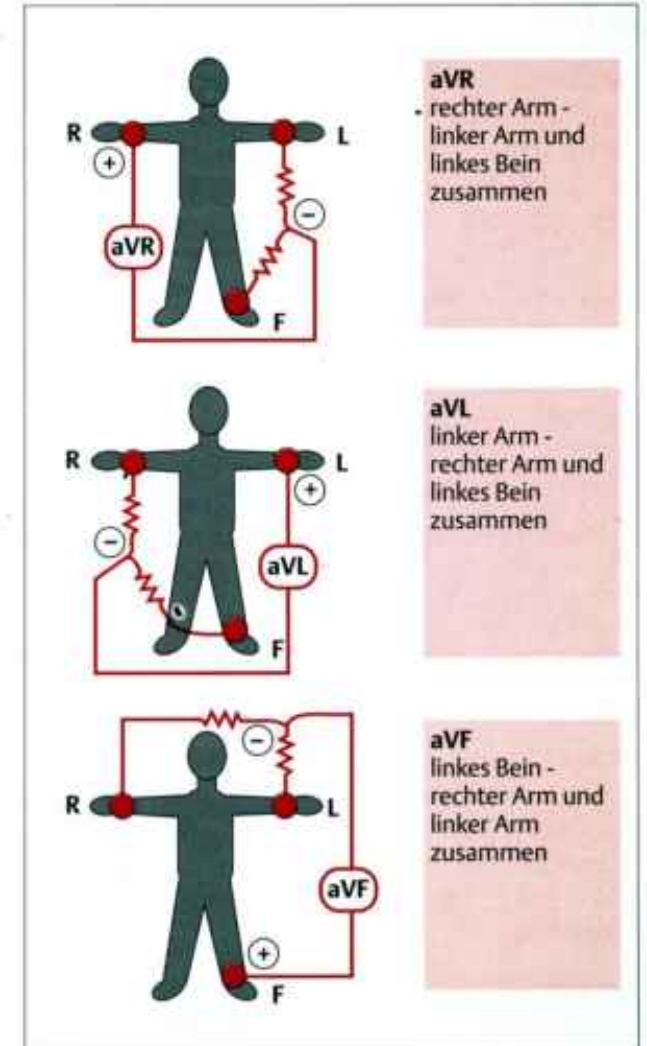
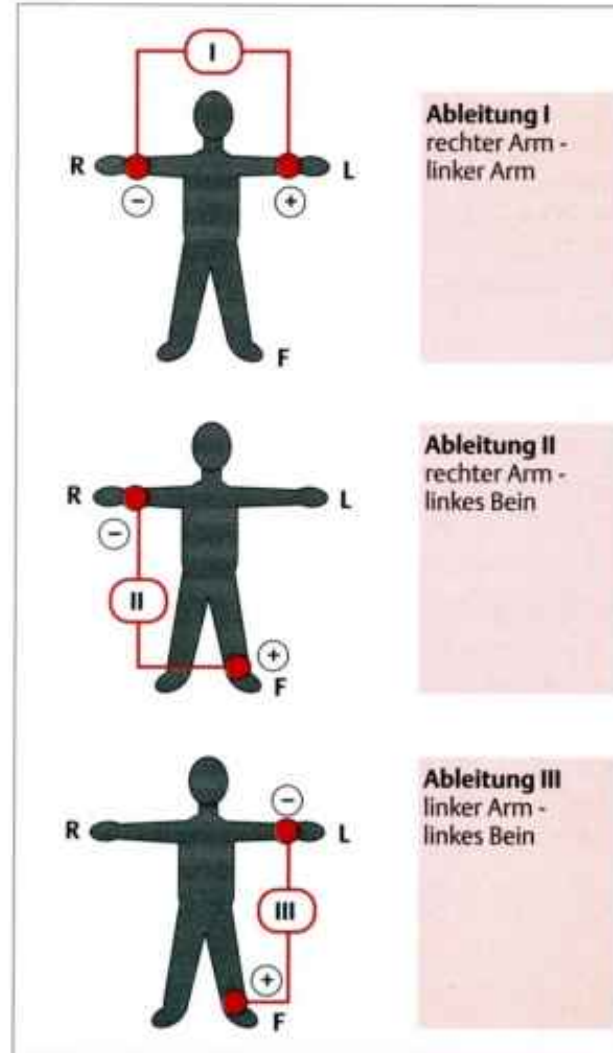
EKG Grundlagen: Standard Ableitungen

6 Extremitätenableitungen

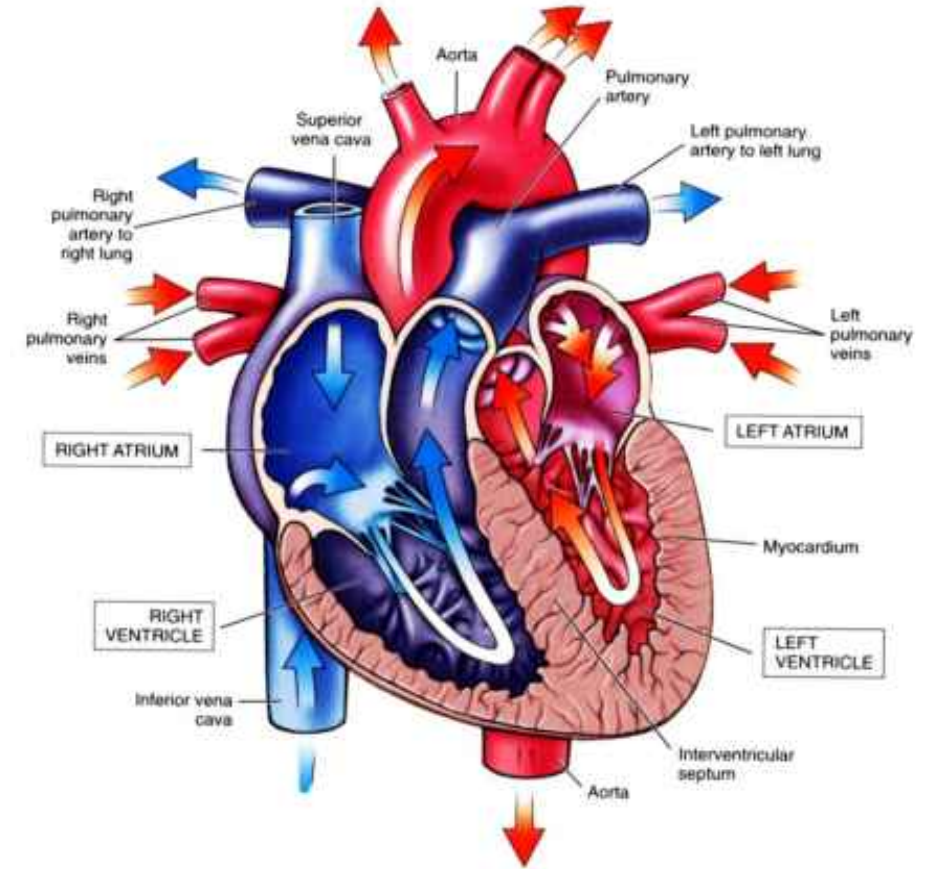
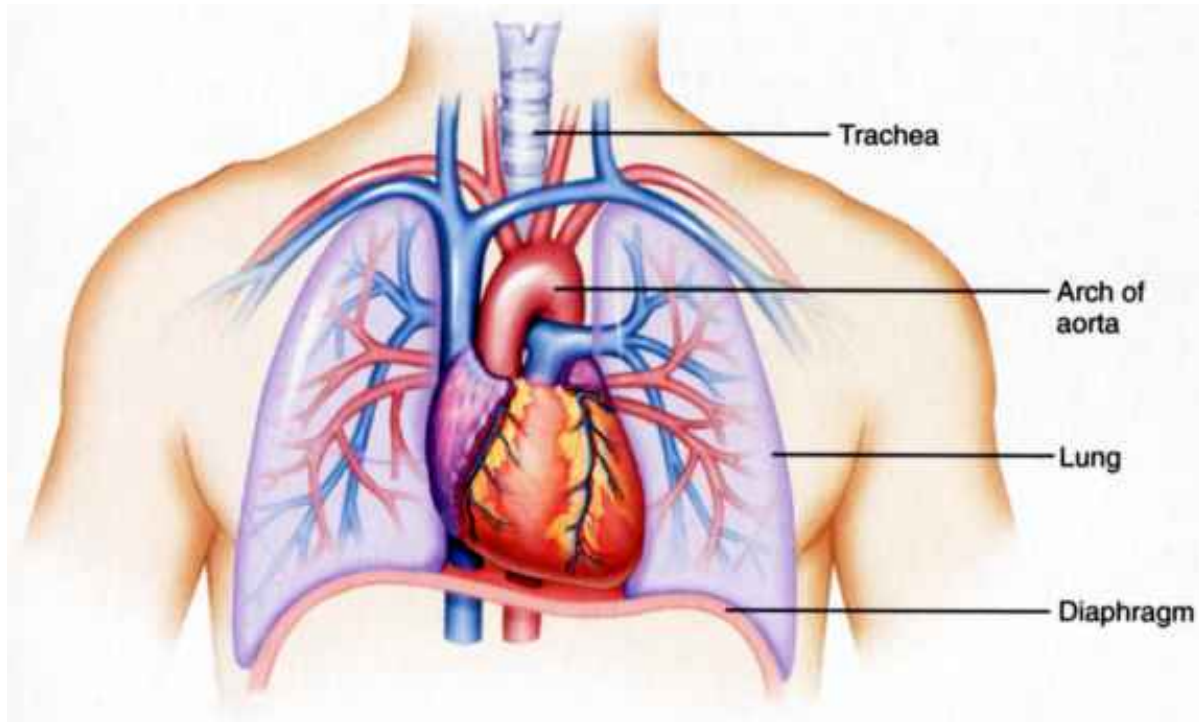
I, II, III; Einthoven, **bipolar**
aVR, aVL, aVF; Goldberger, **unipolar**

6 Brustwandableitungen

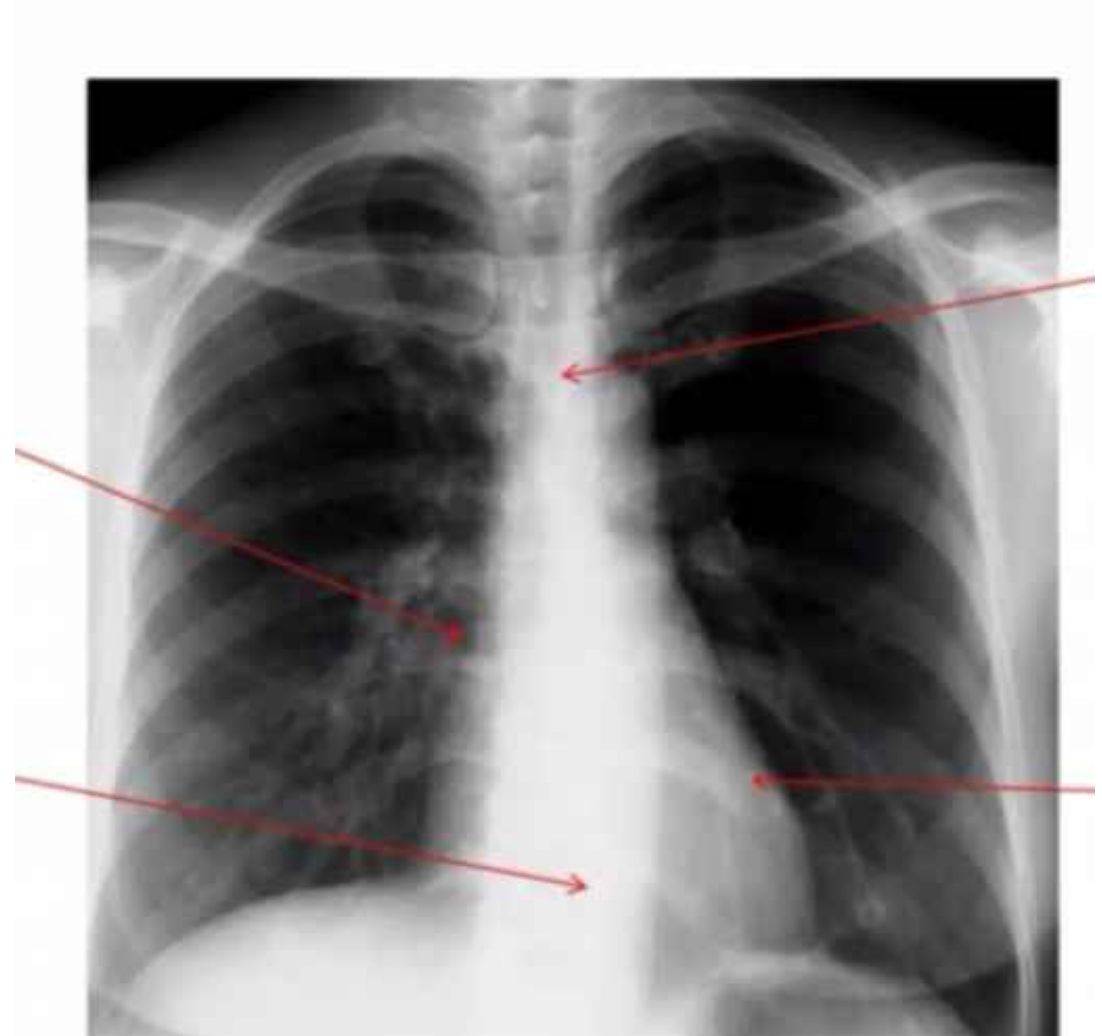
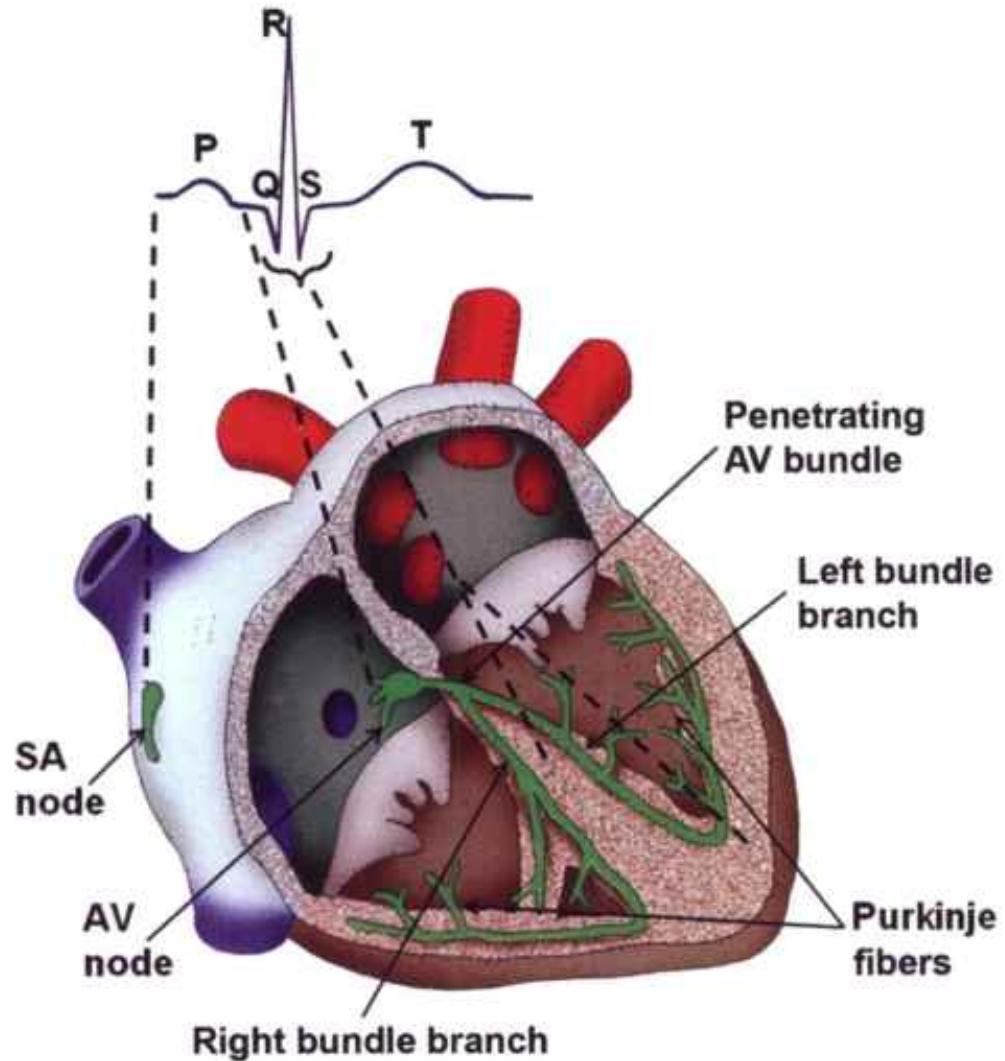
V1-V6; Wilson, **unipolar**



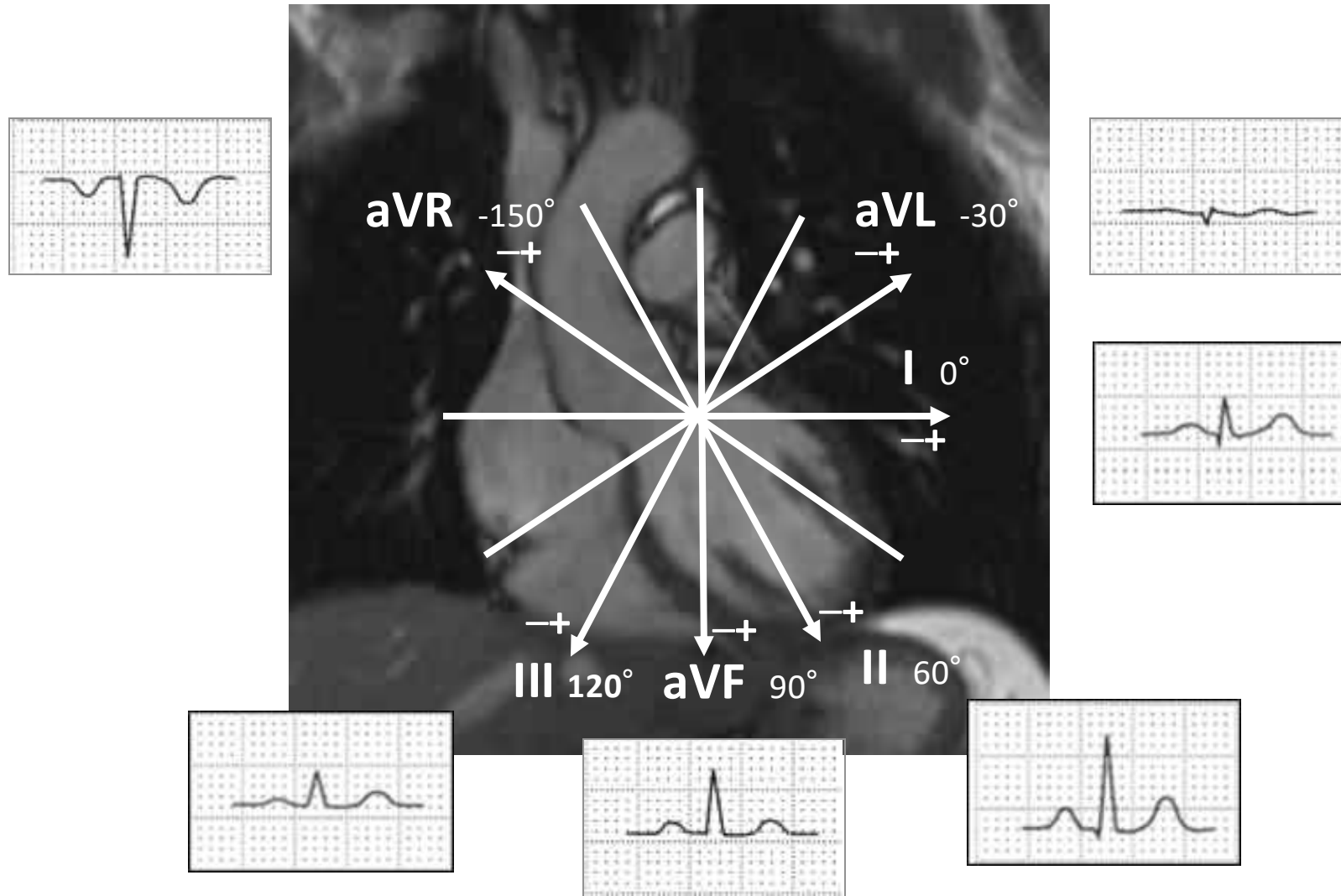
EKG Grundlagen: Anatomische Grundlagen



EKG Grundlagen: Anatomische Grundlagen

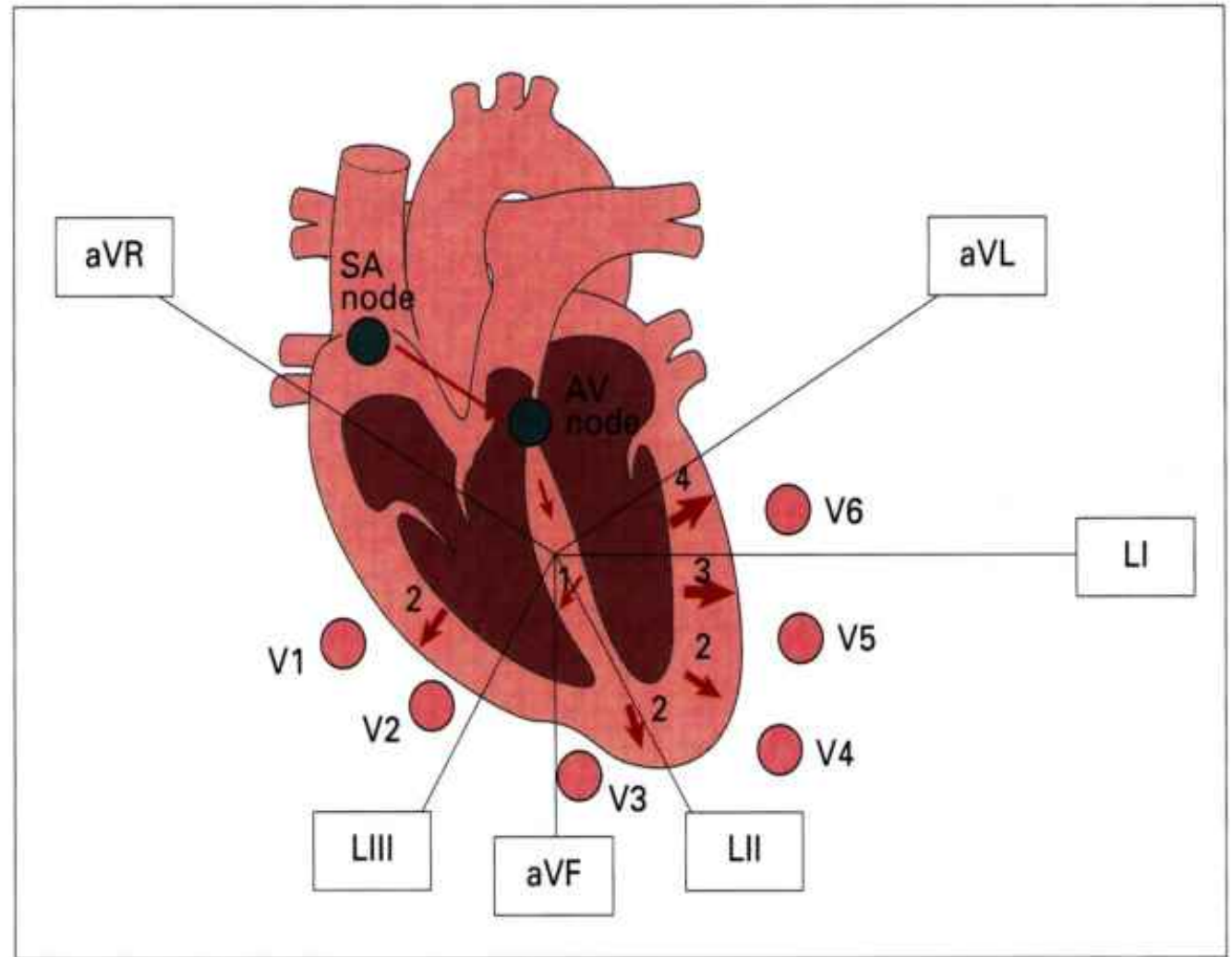
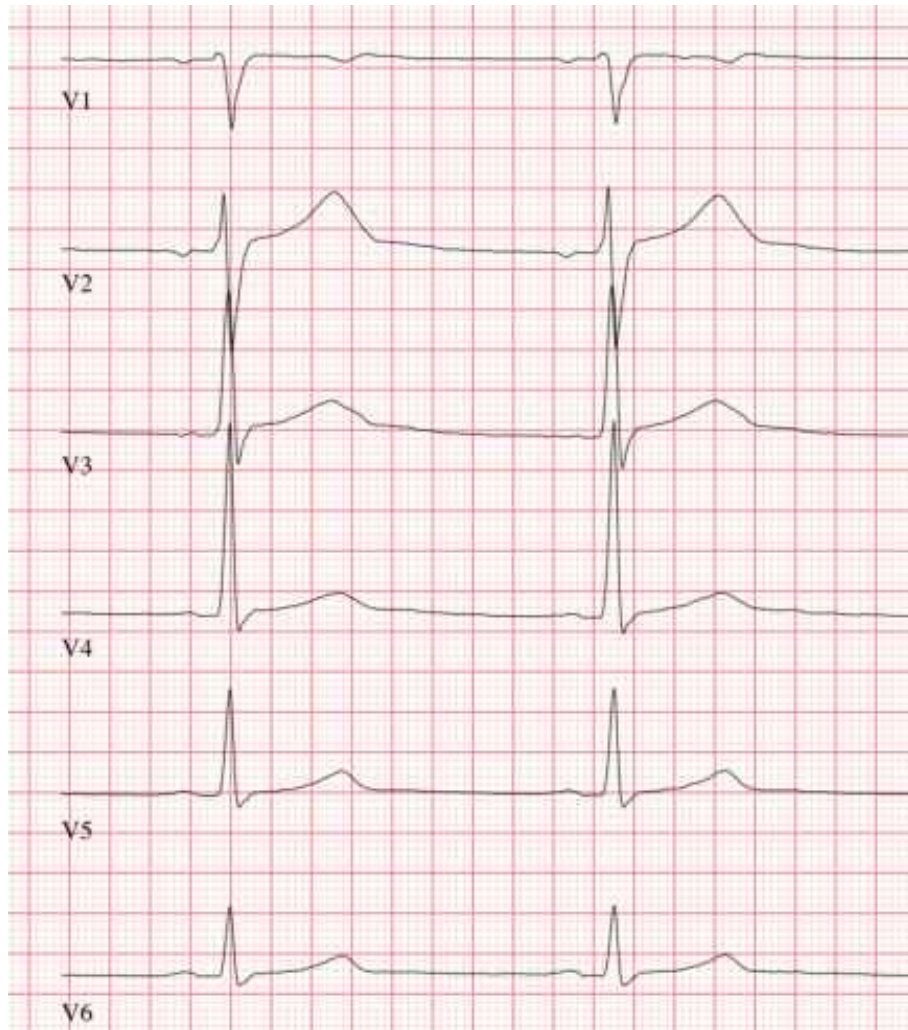


EKG Grundlagen: Haupttrichtung der ventrikulären Erregung



EKG Grundlagen: BWA Ableitungen

V1
V2
V3
V4
V5
V6



BWA Ableitungen nach Wilson

V1

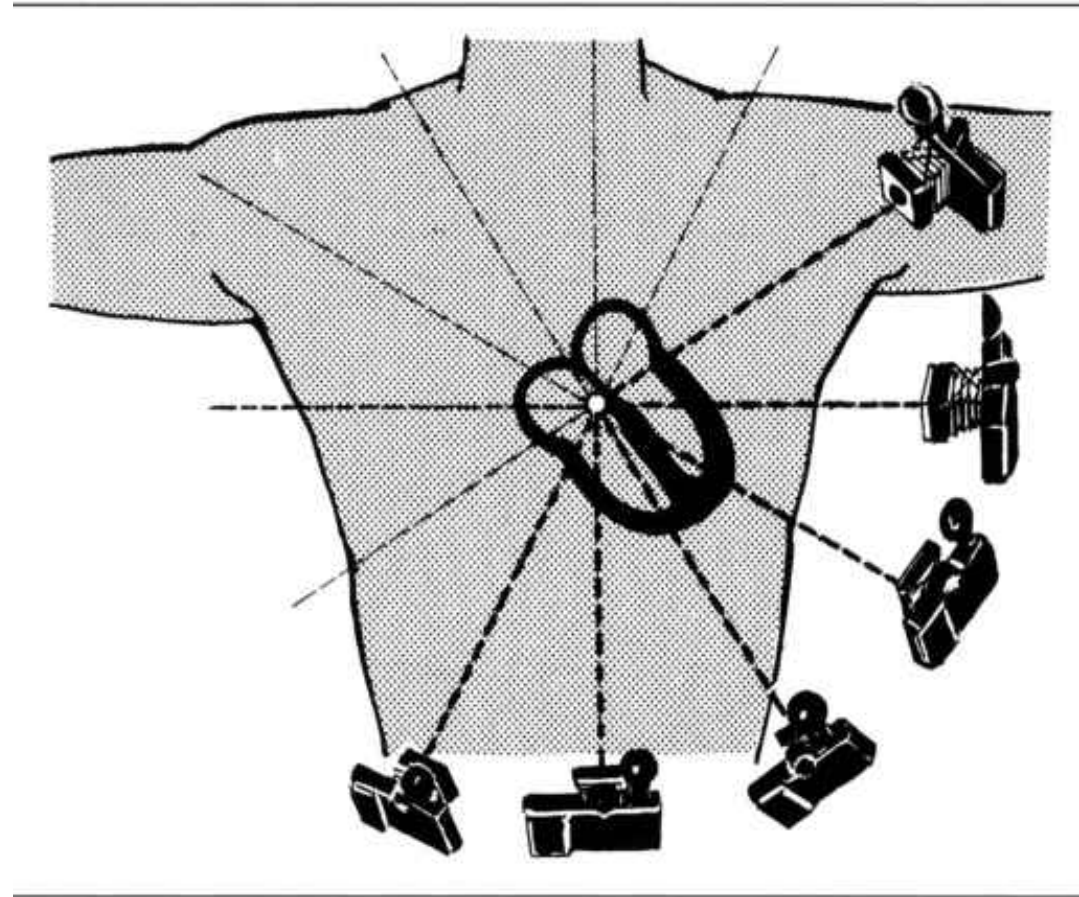
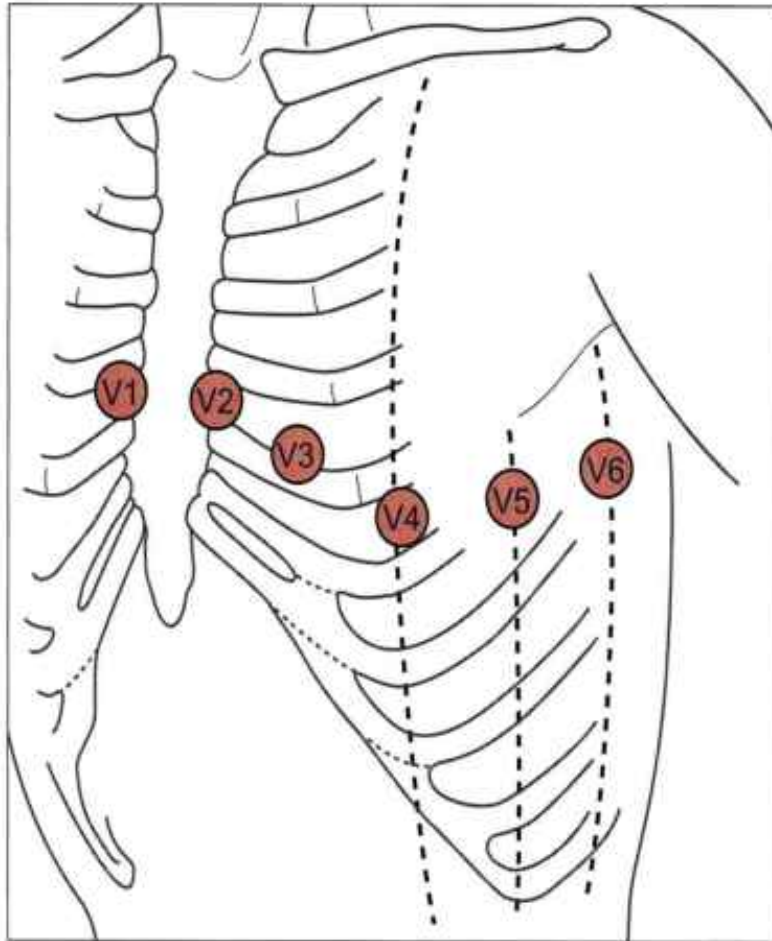
V2

V3

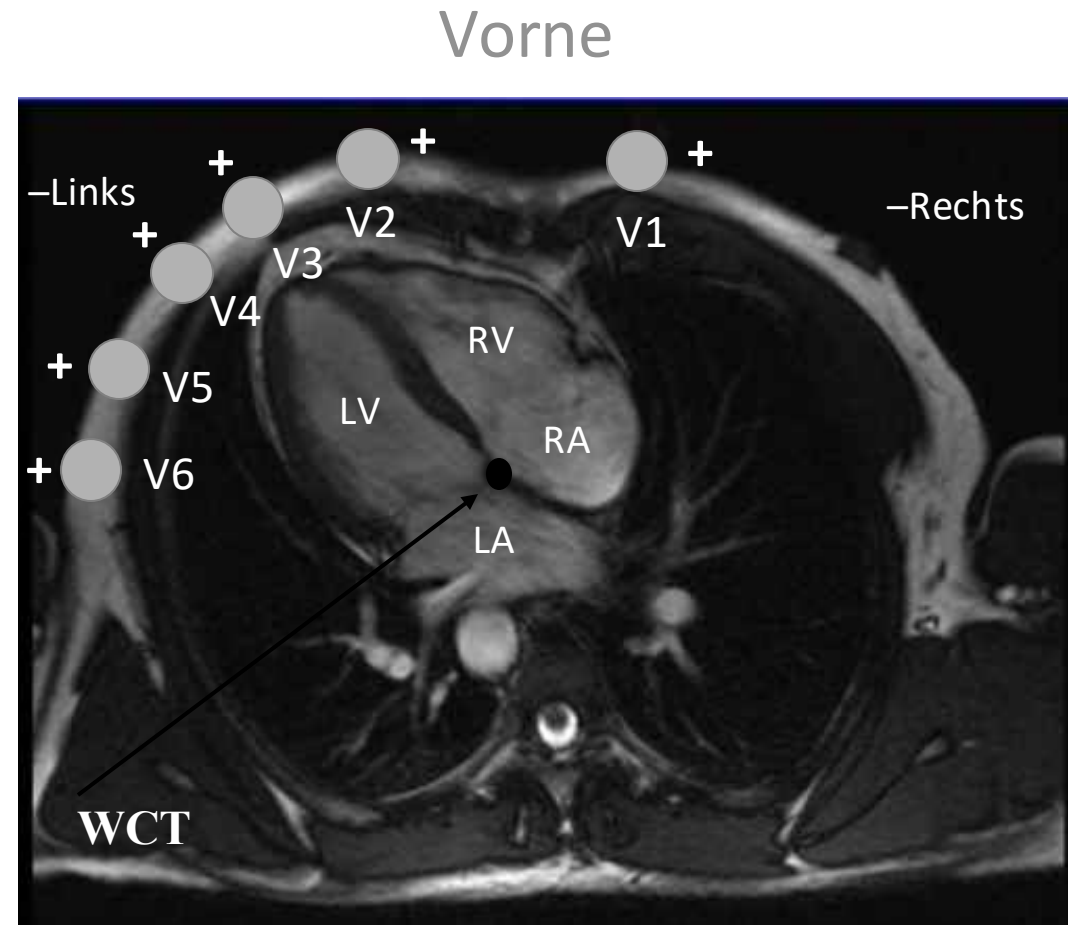
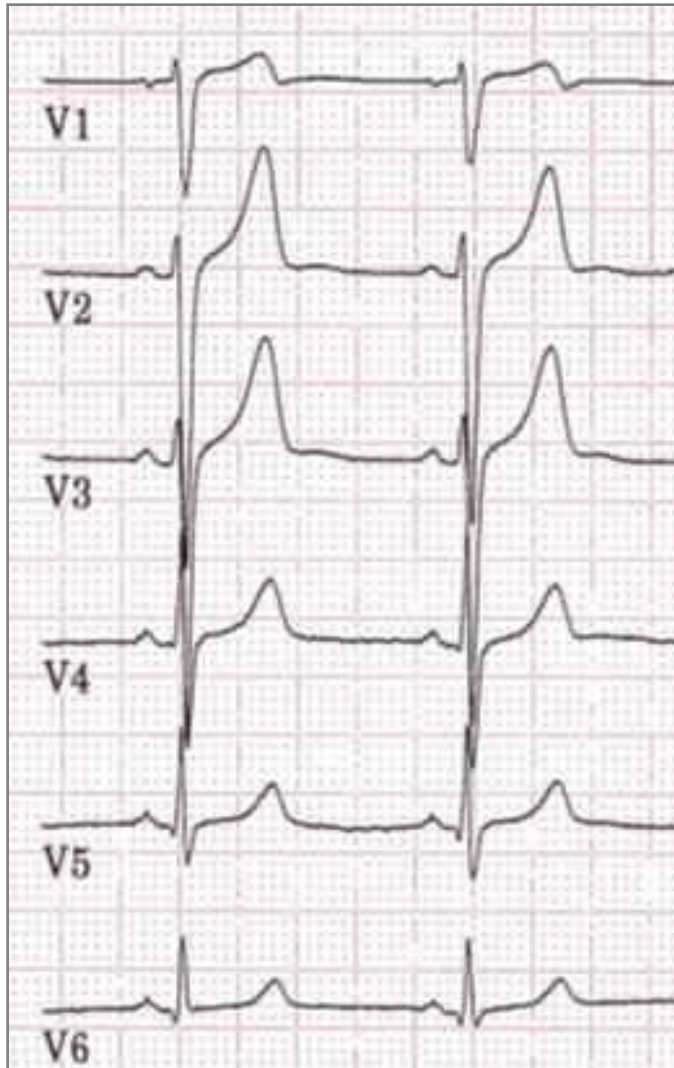
V4

V5

V6

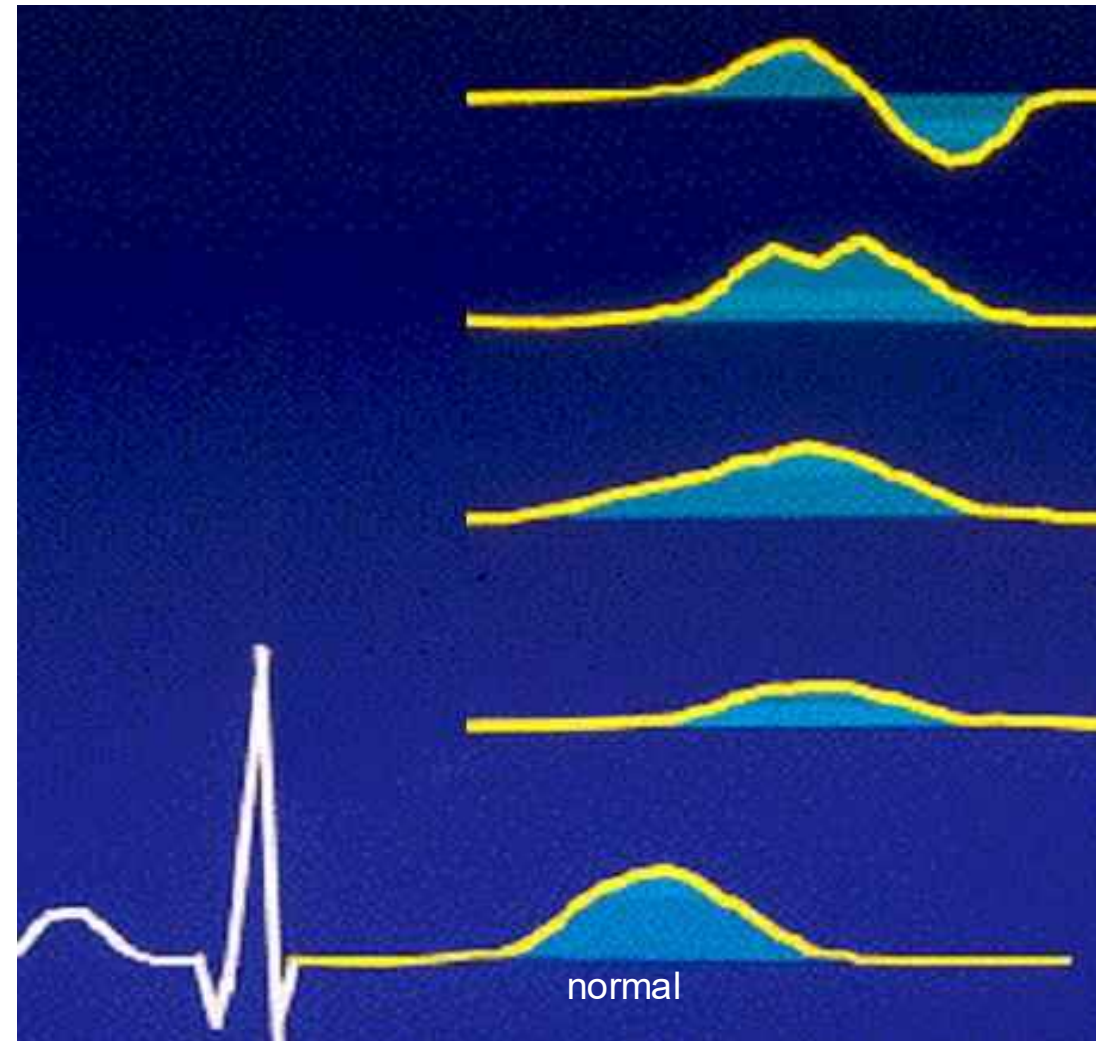
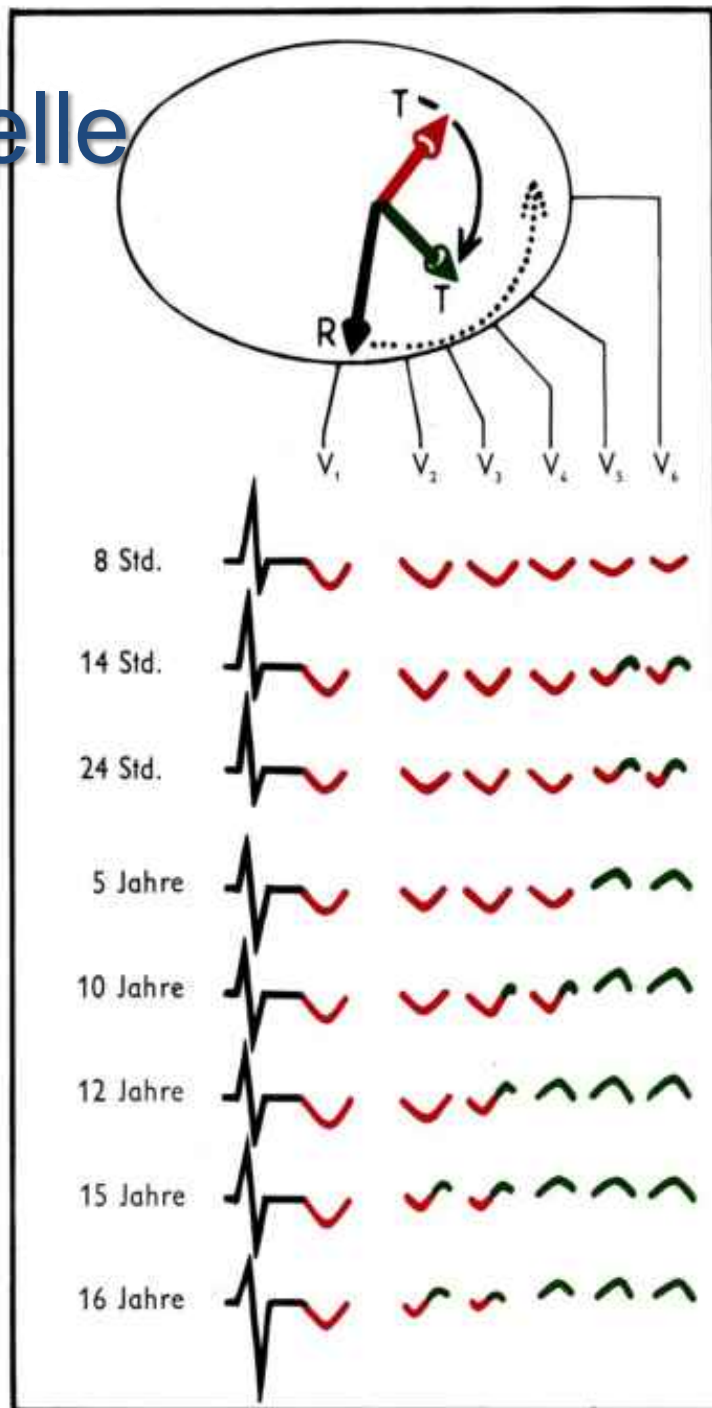


BWA Ableitungen nach Wilson



T Welle

Altersabhängigkeit



Proposed diagnostic criteria for arrhythmias

European Task Force consensus report

III. Repolarization abnormalities

Major

- Negative T waves in right precordial lead in individuals ≥ 14 year-old (in the absence preceded by J-point/ST-segment elevation)

Minor

- Negative T waves in leads V1 and V2 in absence of RBBB and not preceded by J-point
- Negative T waves beyond V3 in the presence of RBBB
- Negative T waves beyond V3 in individuals ≥ 14 year-old

IV. Depolarization and conduction abnormalities

Minor

- Epsilon wave (reproducible low-amplitude wave between end of QRS complex to onset of the T wave in the right precordial leads (V1 to V3))
- Terminal activation duration of QRS ≥ 55 ms (from the onset of the S wave to the end of the QRS, including the absence of complete RBBB)

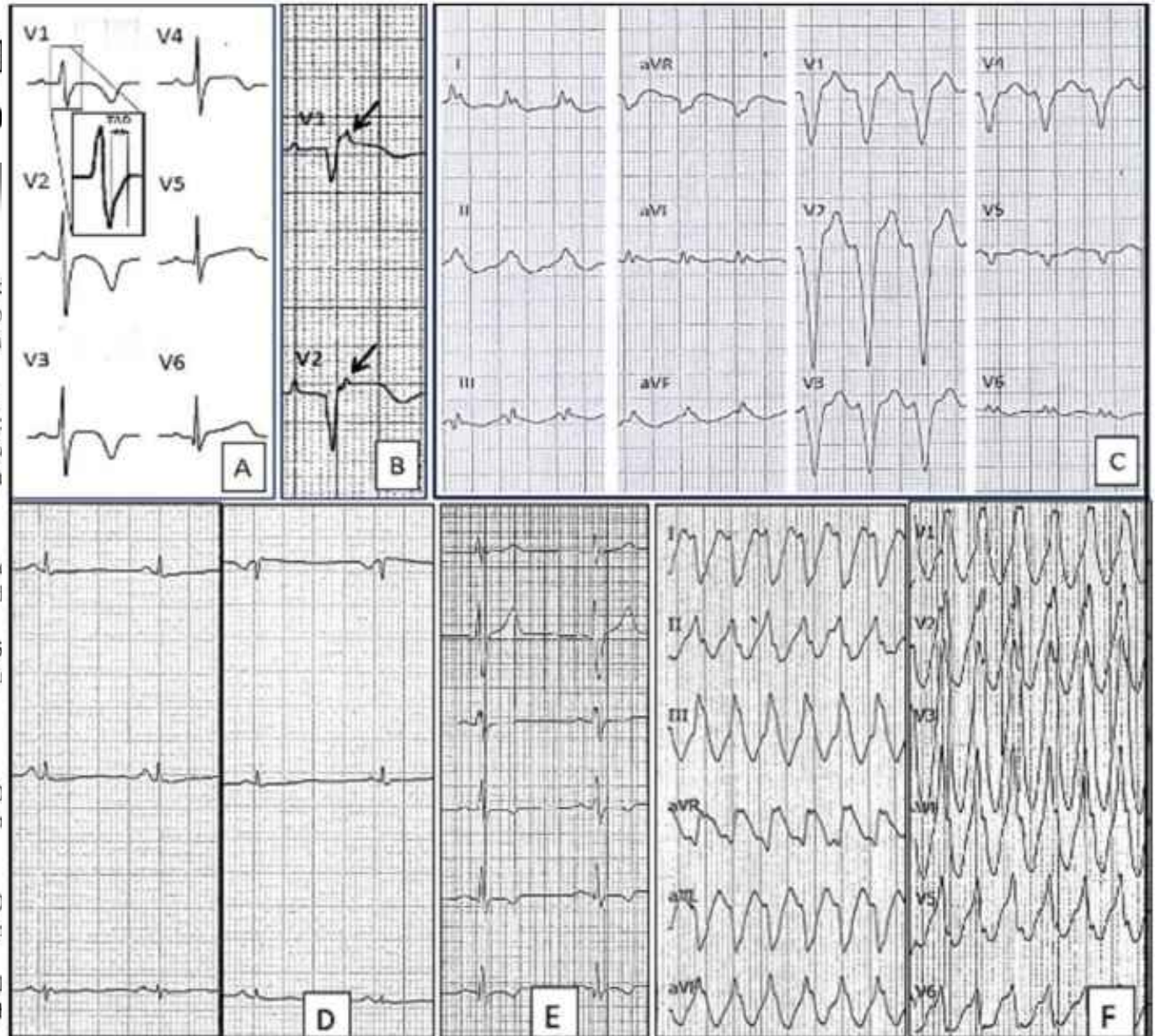
V. Arrhythmias

Major

- Frequent ventricular extrasystoles (>500 per 24h)
- Sustained ventricular tachycardia of LBBB morphology

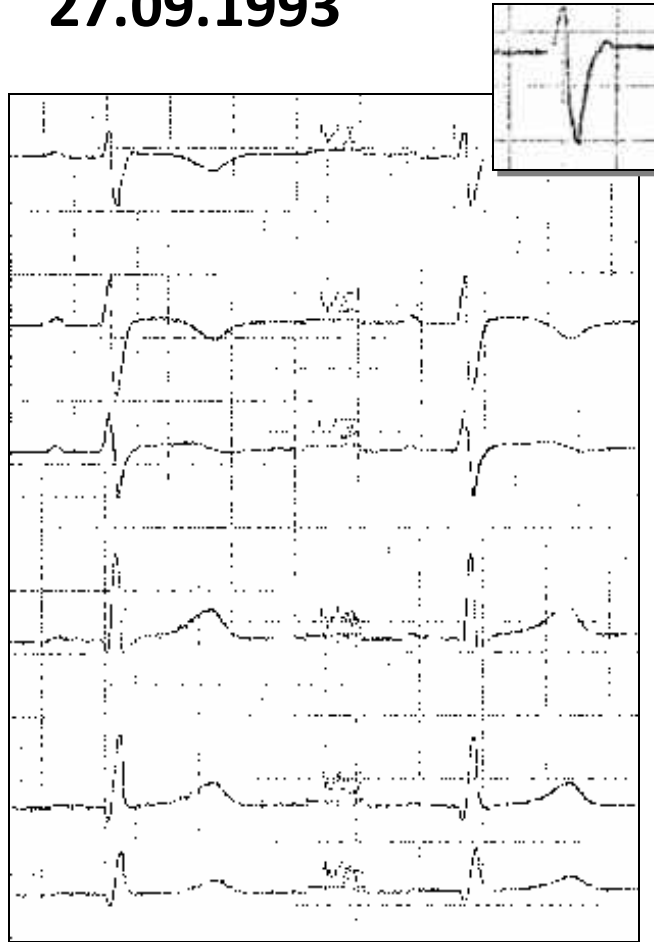
Minor

- Frequent ventricular extrasystoles (>500 per 24h)
- Sustained ventricular tachycardia of LBBB morphology ("RVOT pattern")
- History of cardiac arrest due to ventricular tachycardia of unknown morphology

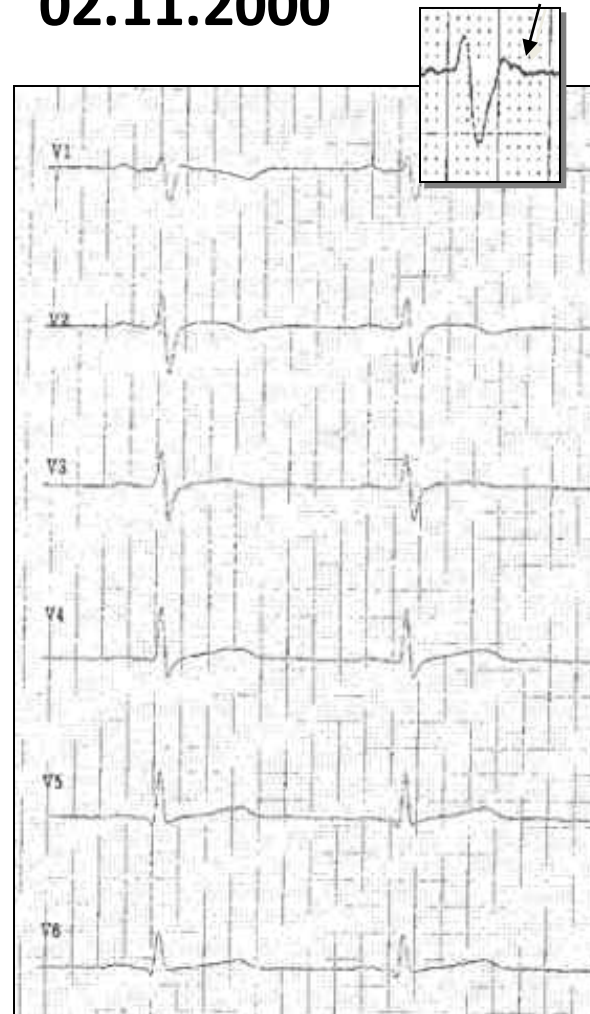


ARVC: EKG Veränderungen im Verlauf

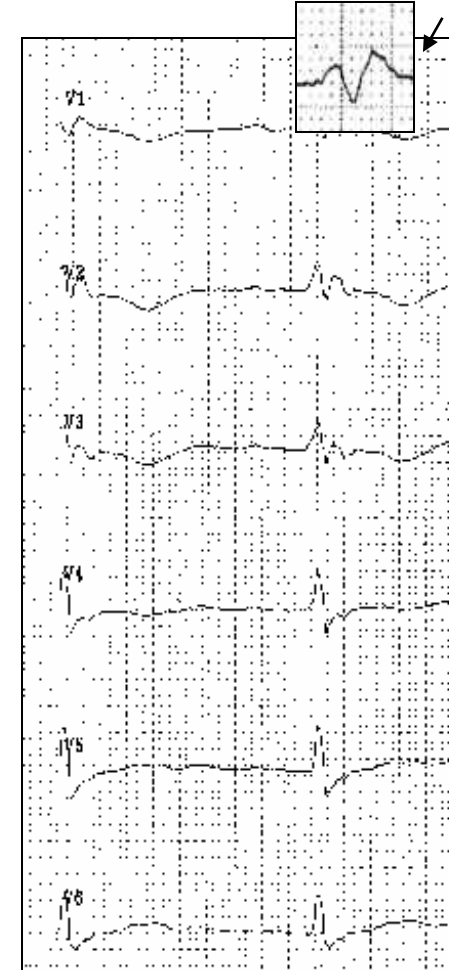
27.09.1993



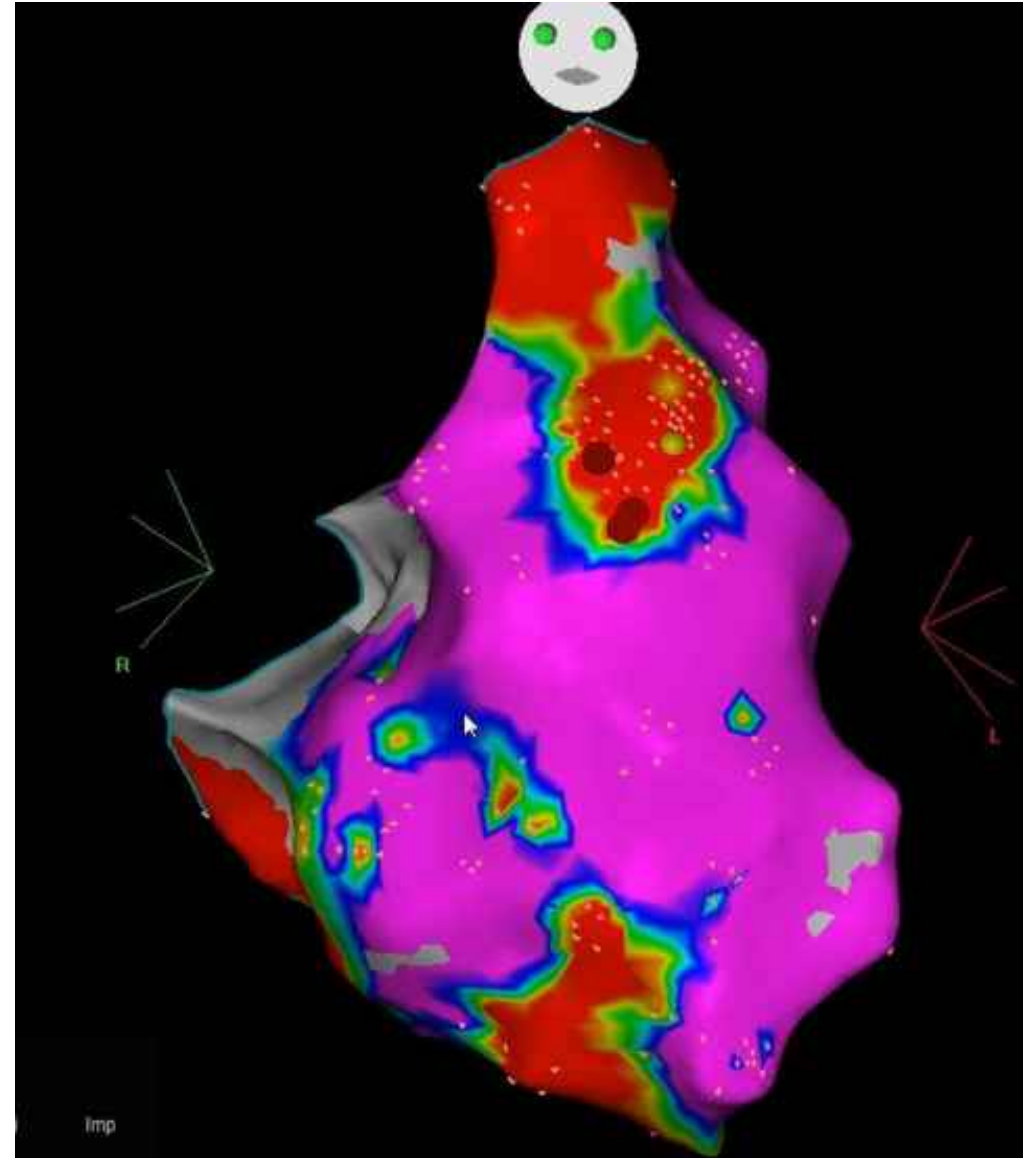
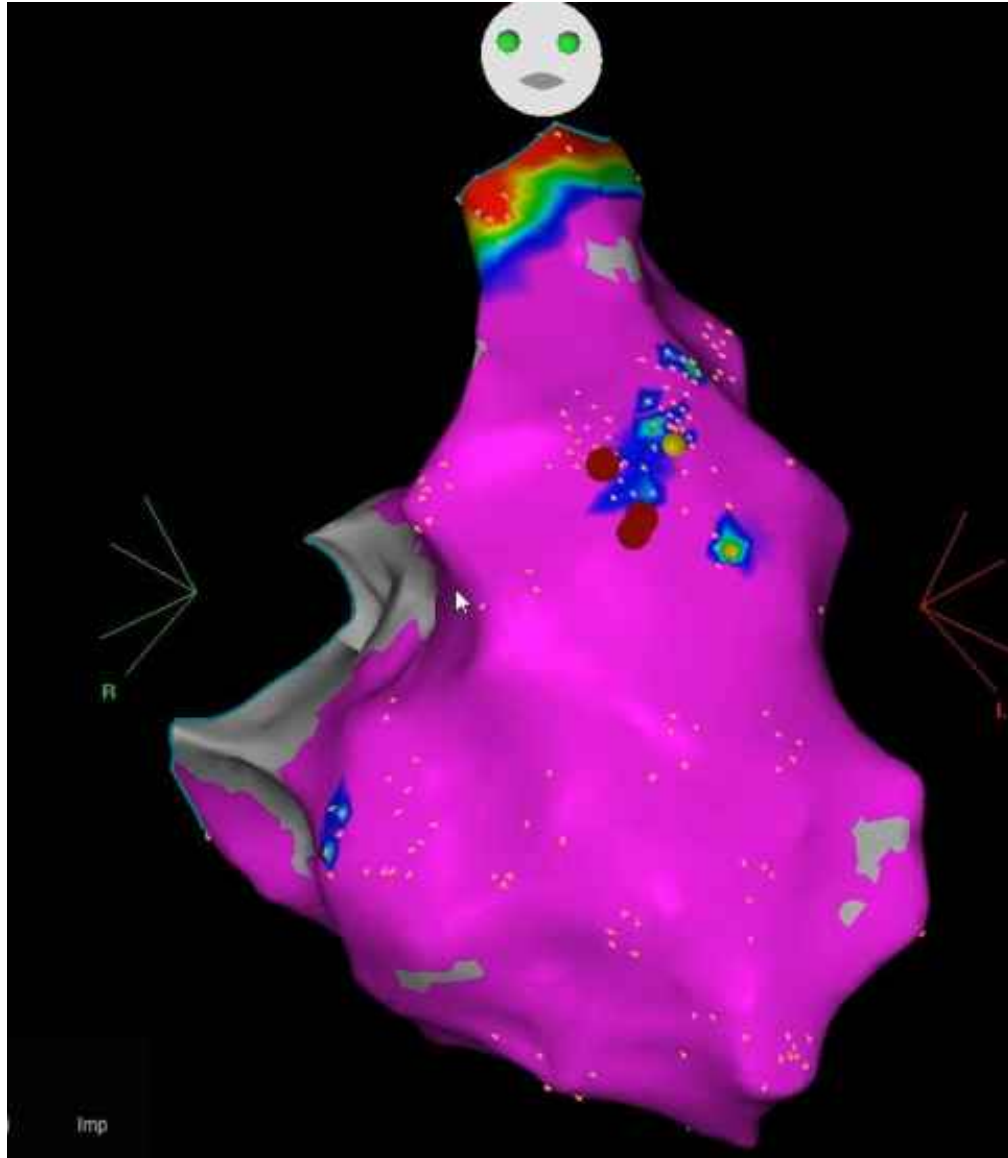
02.11.2000



14.02.2007

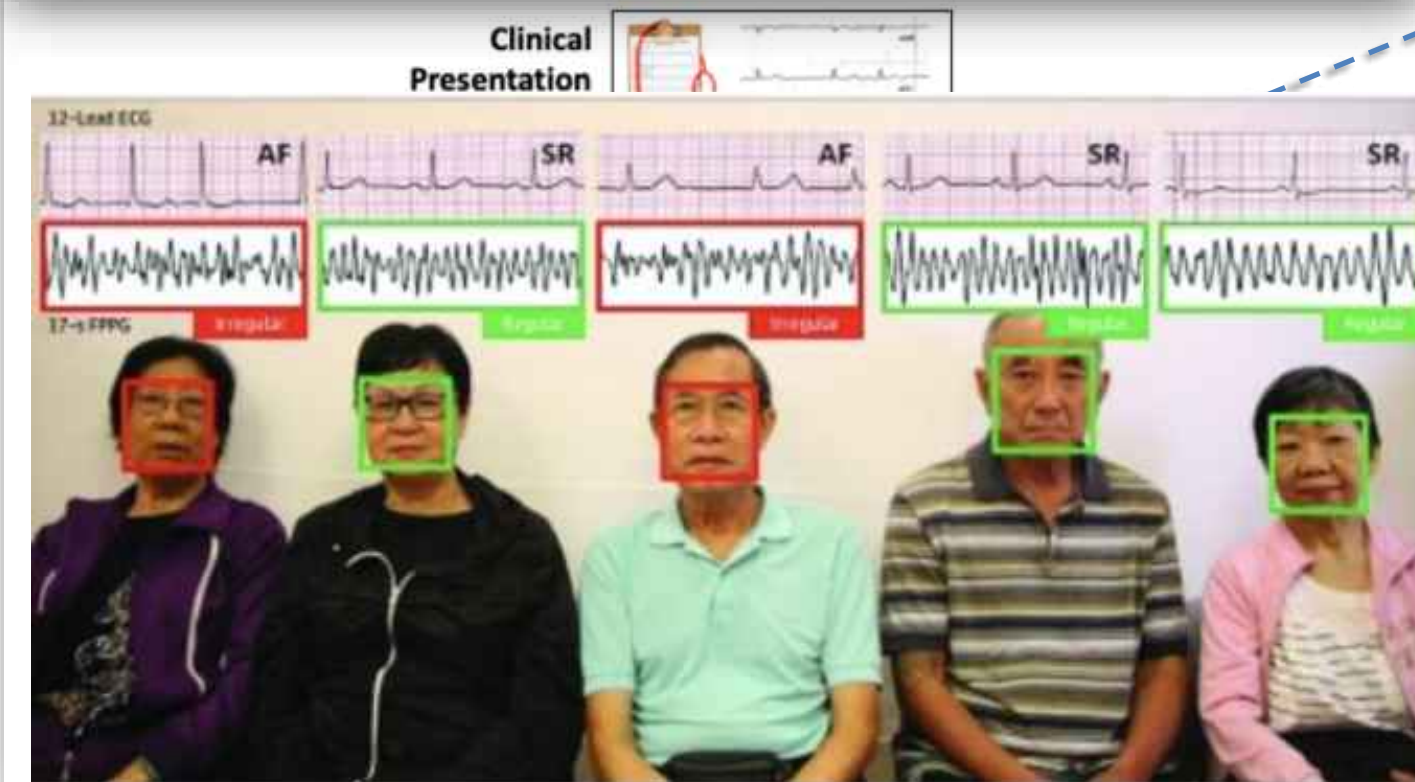


XX, 24.2.2000 (11/2019 Vorstellung)





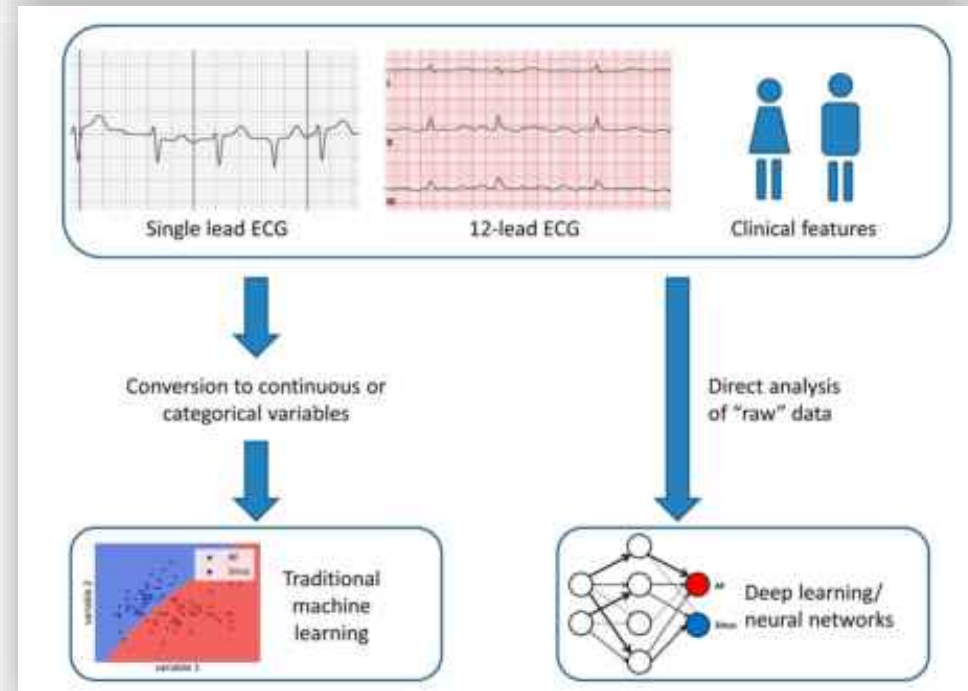
Identifying Atrial Fibrillation Mechanisms for Personalized Medicine



Deb et al., *J. Clin. Med.* 2021

Yan et al., *JAMA* 2020 ;5:105-7

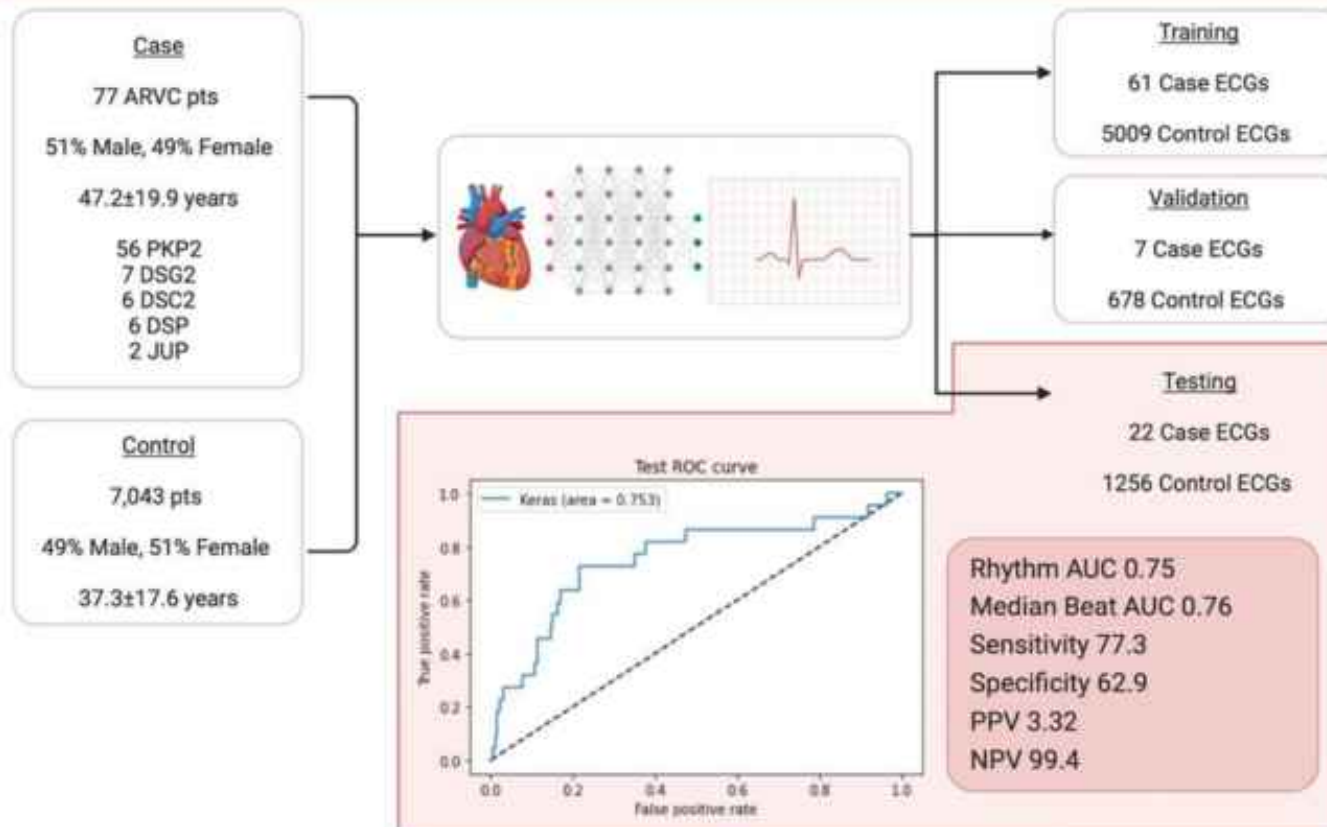
Machine learning in the detection and management of atrial fibrillation



Wegner et al., *Clin Res Cardiol* 2022

Artificial intelligence-enhanced electrocardiogram for arrhythmogenic right ventricular cardiomyopathy detection

AI-ECG for ARVC Detection



EKG und ARVCM

arvc-selbsthilfe.org – 24.03.2025

Lars Eckardt

Klinik für Kardiologie II – Rhythmologie

Universitätsklinikum Münster
