



Semmelweis Egyetem

KARDIOLÓGIAI
KÖZPONT

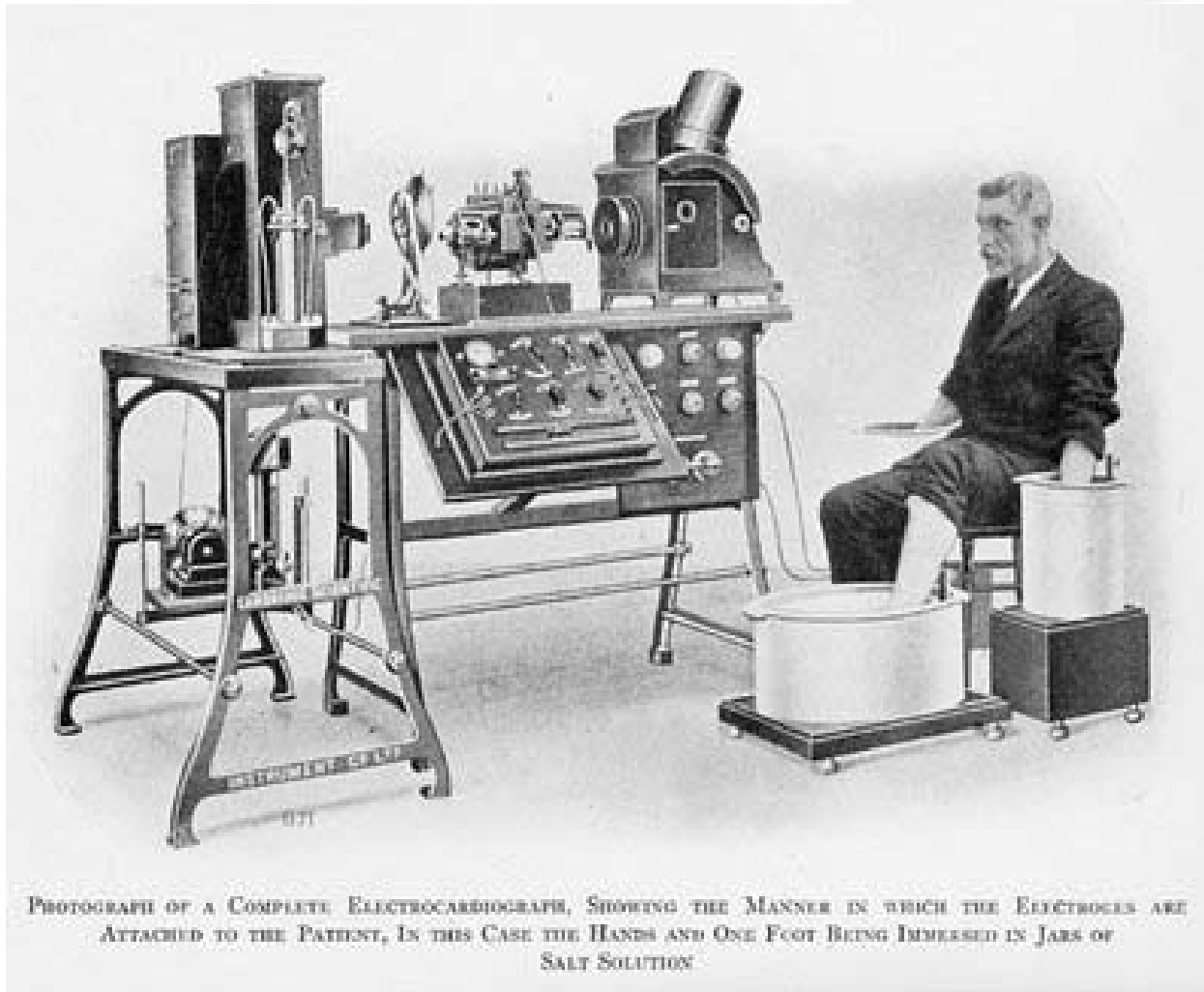
EKG alapismeretek

Amit az EKG görbe keletkezéséről tudni kell

Osztheimer István

2009. szeptember 22. kedd

Első EKG: Willem Einthoven 1903

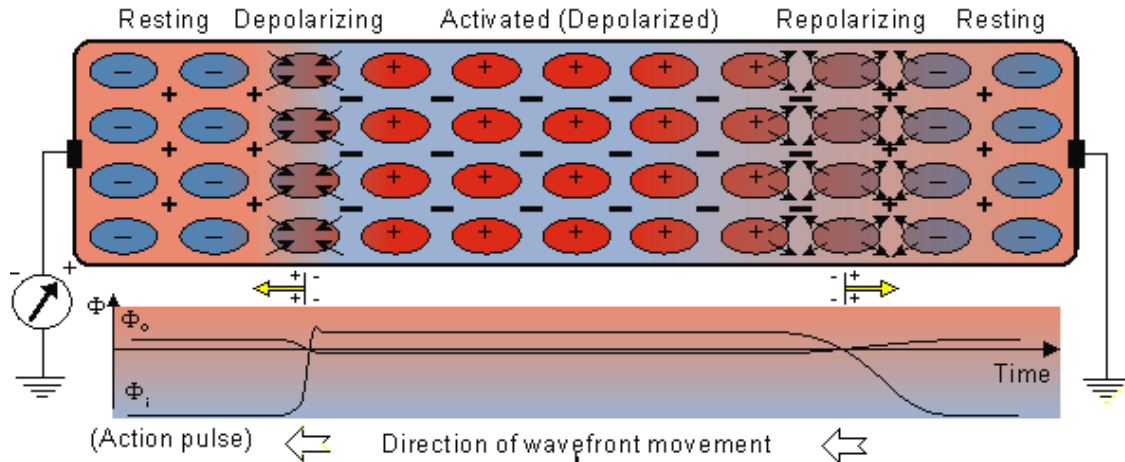


DEPOLARIZATION

Positive ions (Na^+) flowing into the depolarizing cells make Φ_o (outside the cells) more negative.

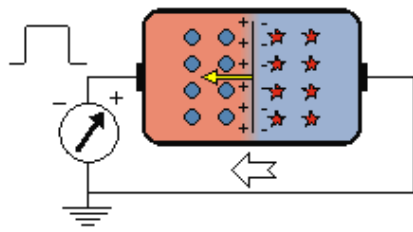
REPOLARIZATION

Positive ions (K^+) flowing out from the repolarizing cells make Φ_o (outside the cells) more positive.

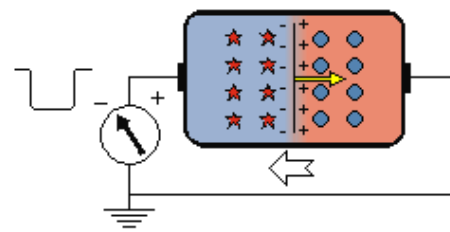


Potenciál különbség keletkezése felszíni elektródán

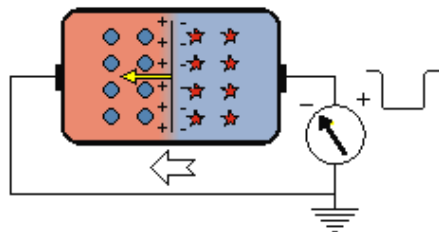
A * Resting Activated



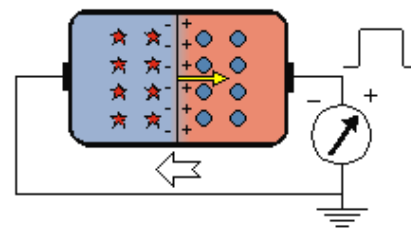
C Still activated Resting again



B Resting Activated



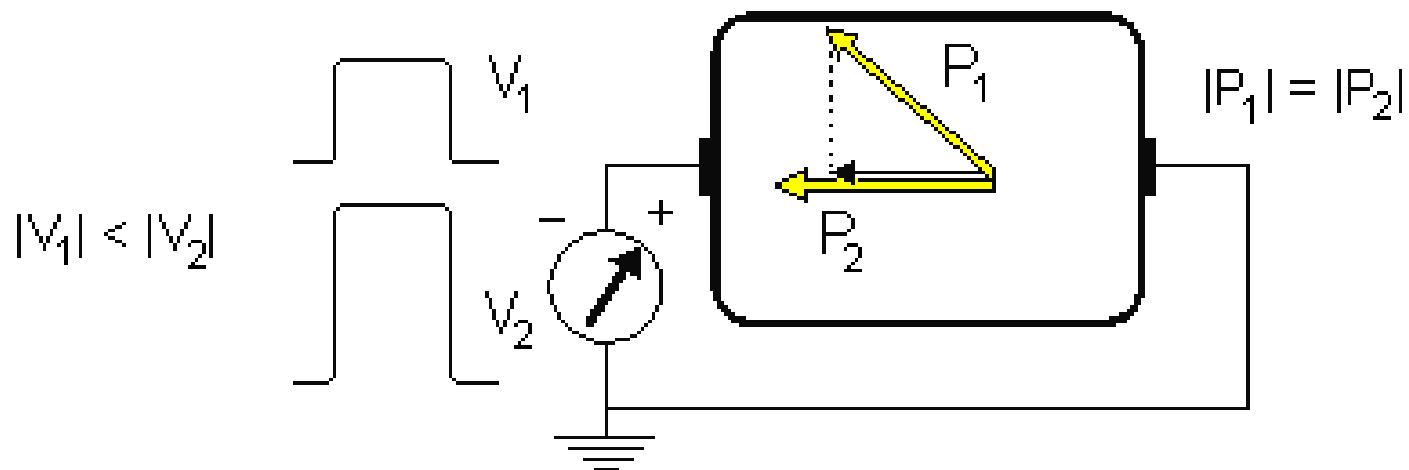
D * Still activated Resting again



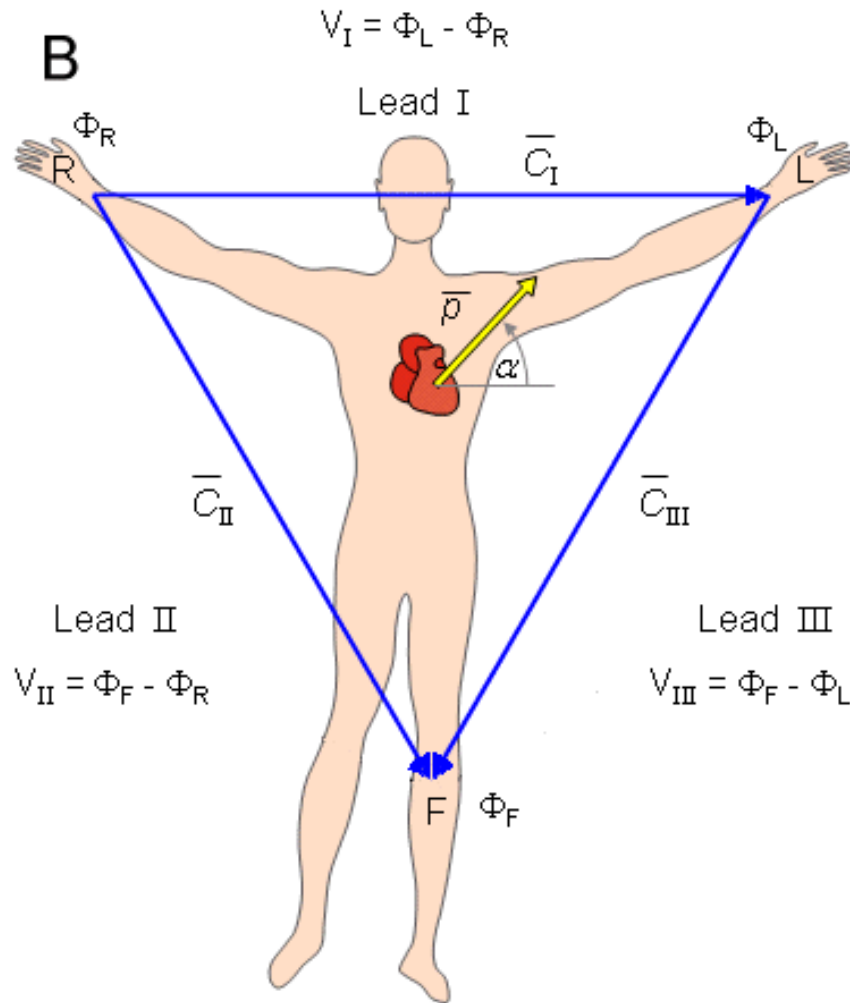
- ★ = Activated (depolarized) cell
- = Resting (repolarized) cell
- ← = Direction of depolarization or repolarization wavefront
- ← + - = Polarity of the double layer and its resultant dipole

Potenciál vektor vetület

E

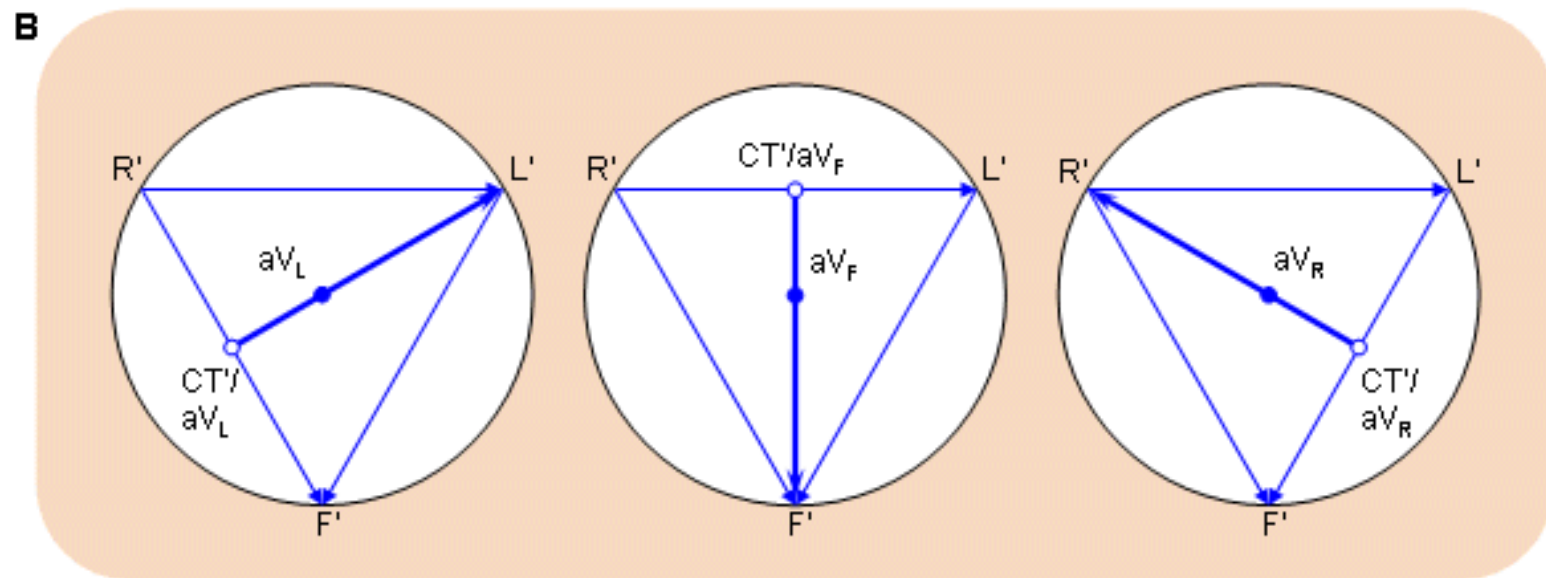
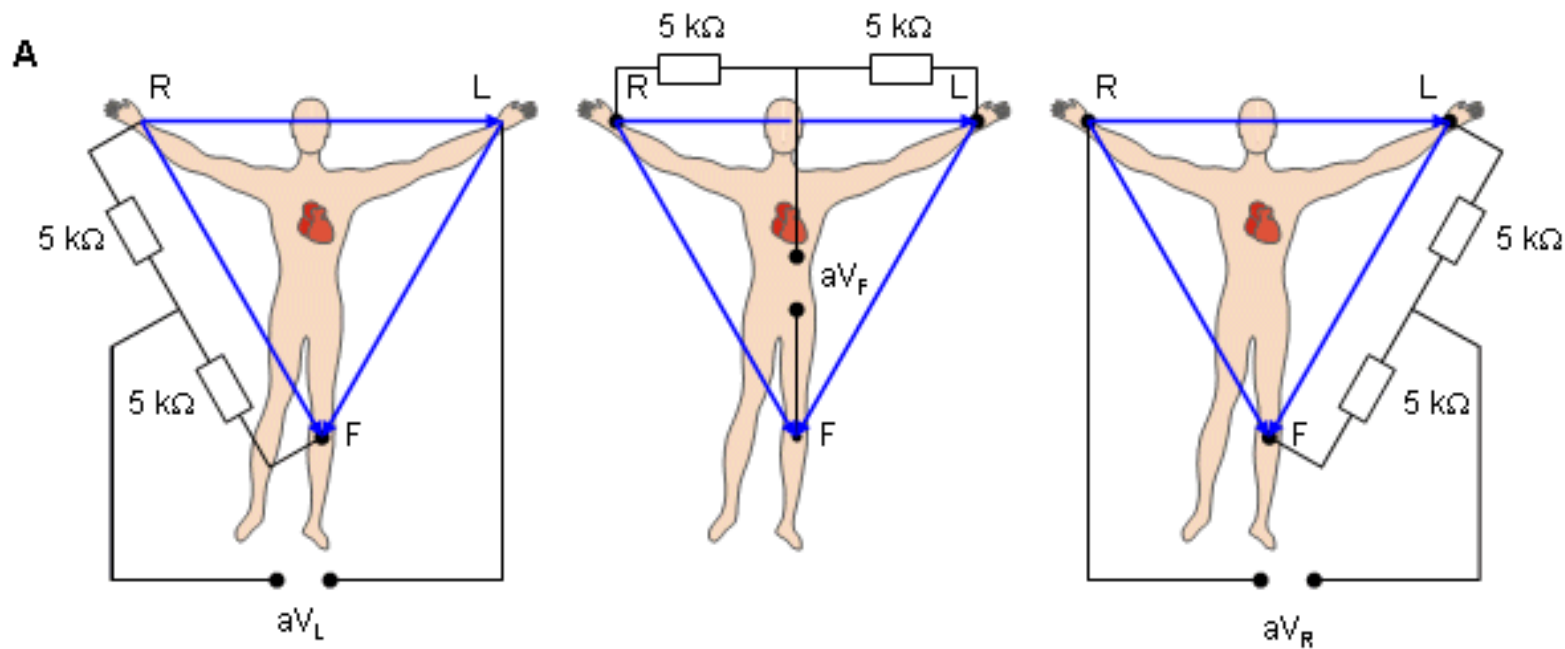


Einthoven háromszög

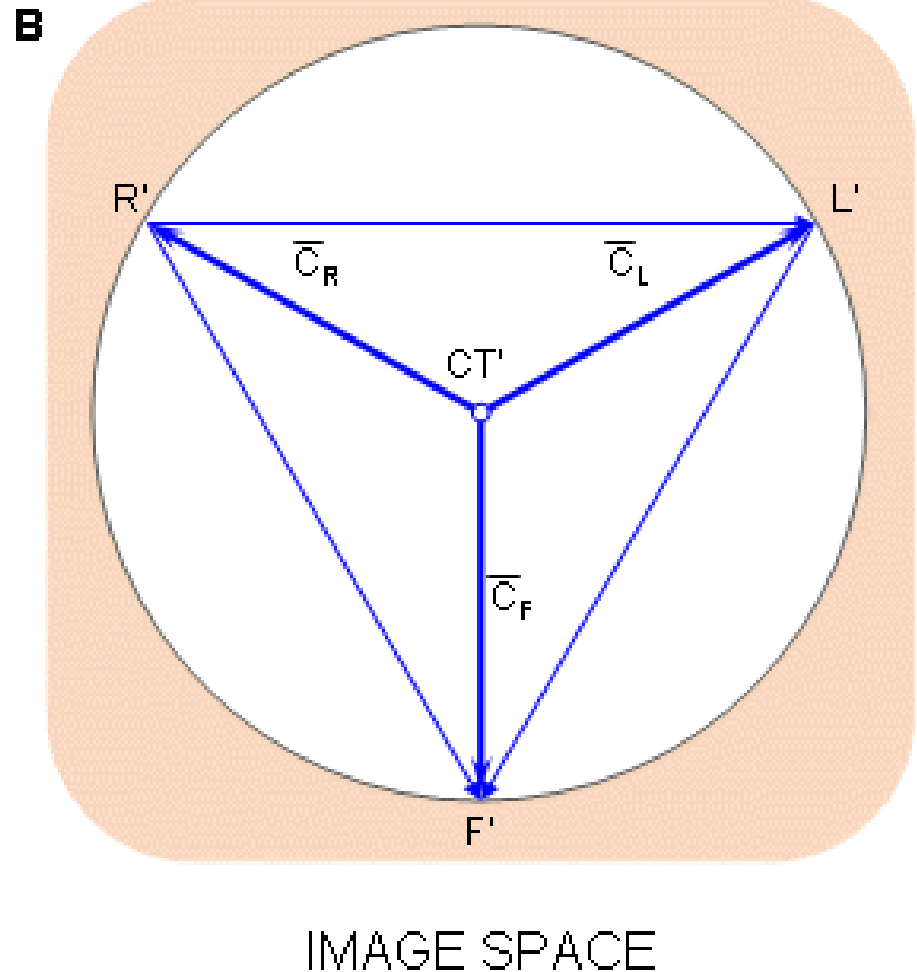
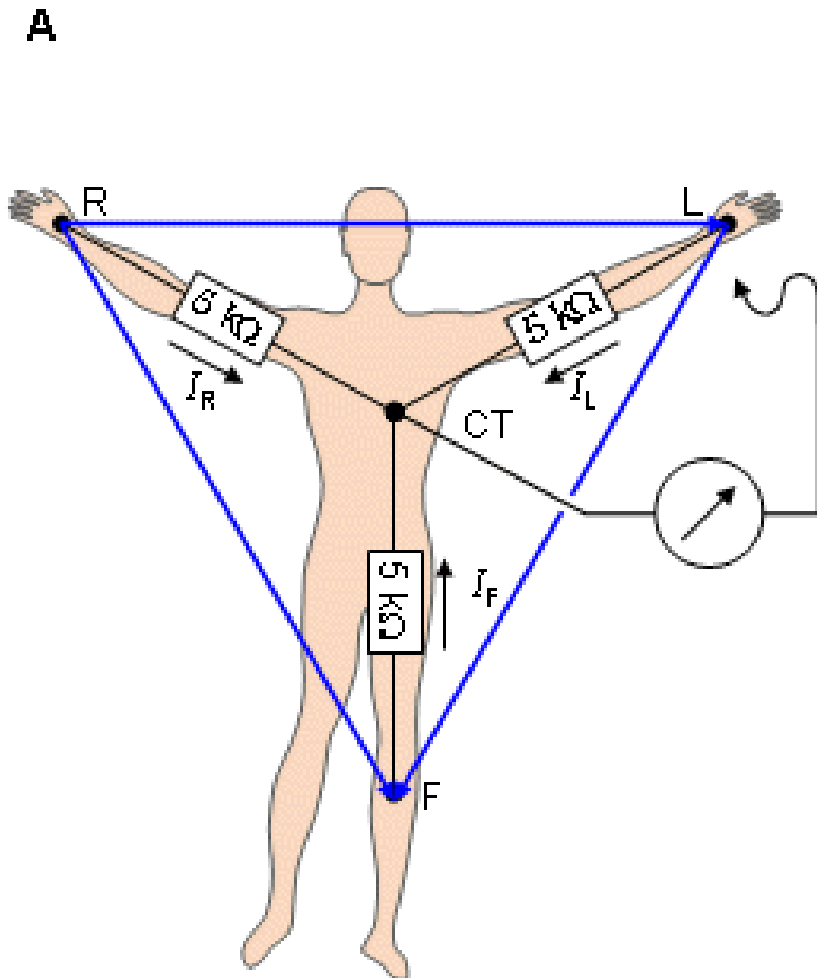


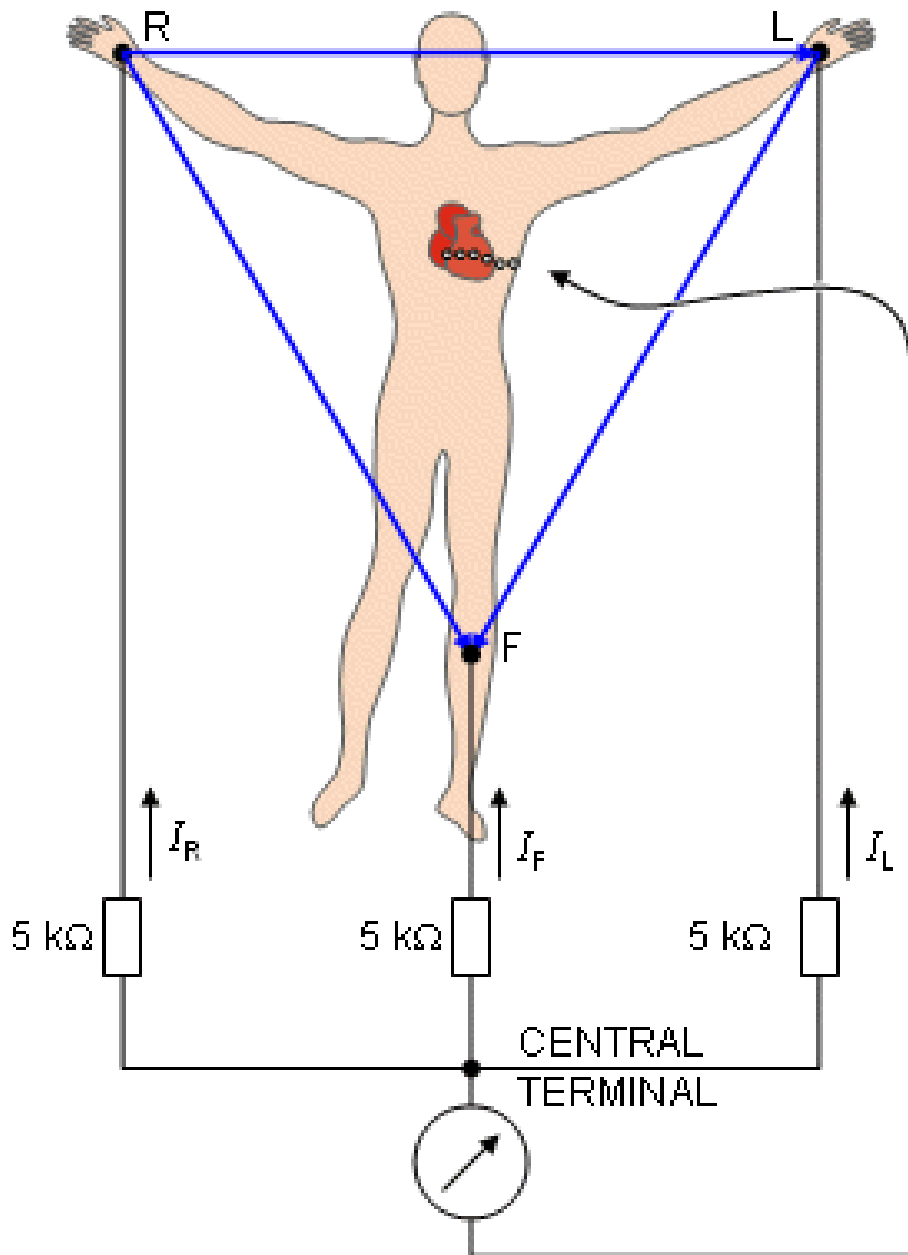
$$V_I + V_{III} = V_{II}$$

Goldberger féle augmented elvezetések



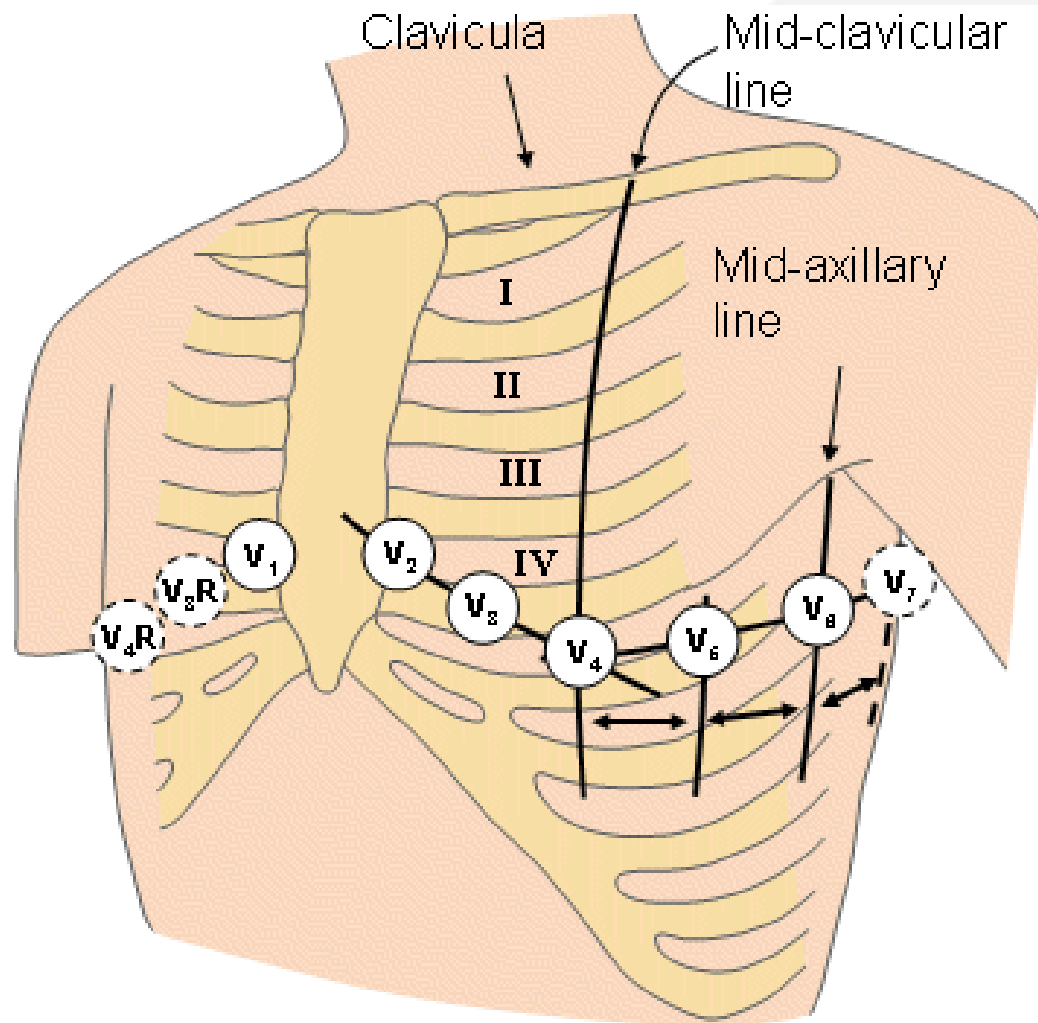
Wilson féle centrális terminál



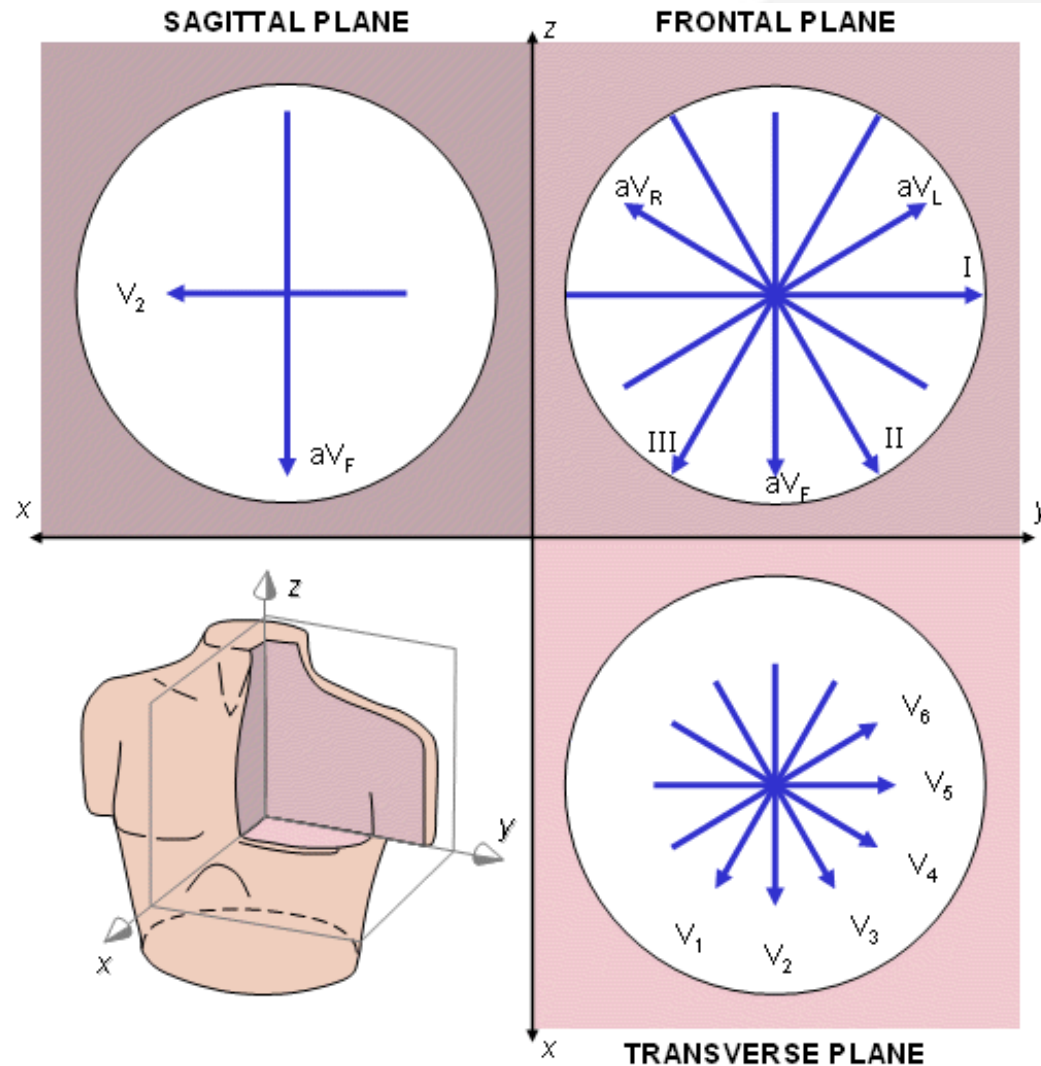


Wilson féle centrális terminál

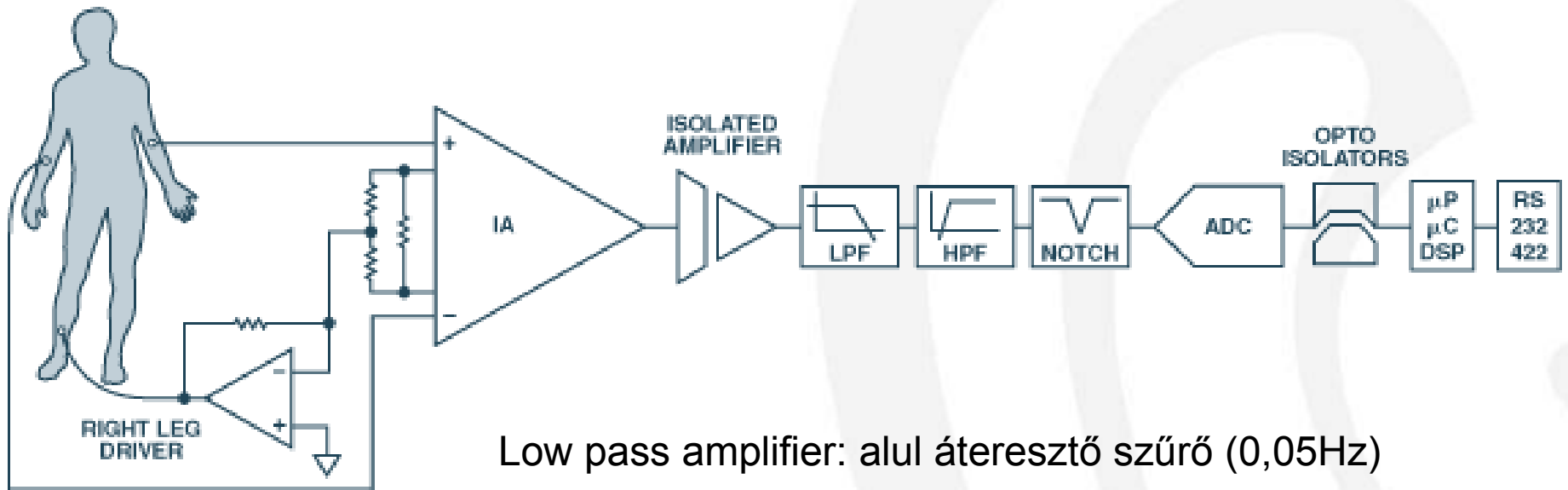
Prekordiális elvezetések



Elvezetések vektoriális iránya



Jelszűrés



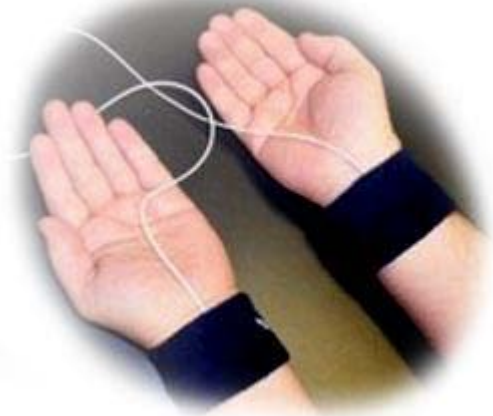
Low pass amplifier: alul áteresztő szűrő (0,05Hz)

High pass filter: felül áteresztő szűrő (200Hz)

Notch filter: 50 Hz szűrés

Elektródák

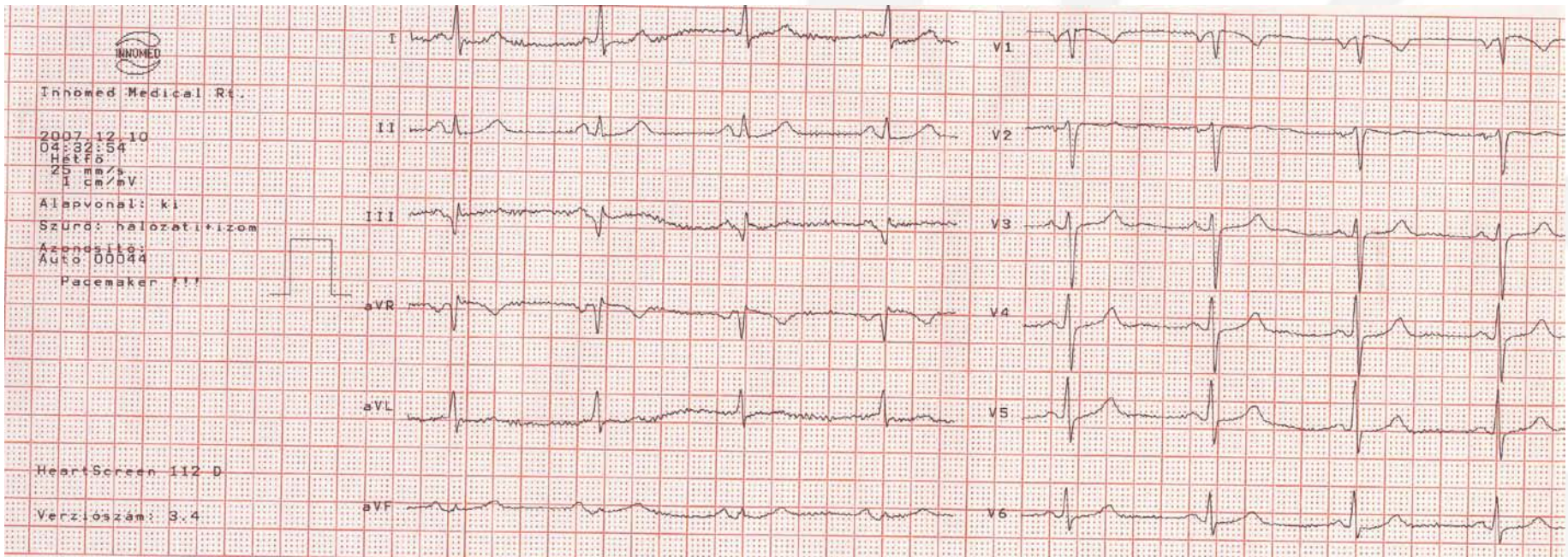
Száraz



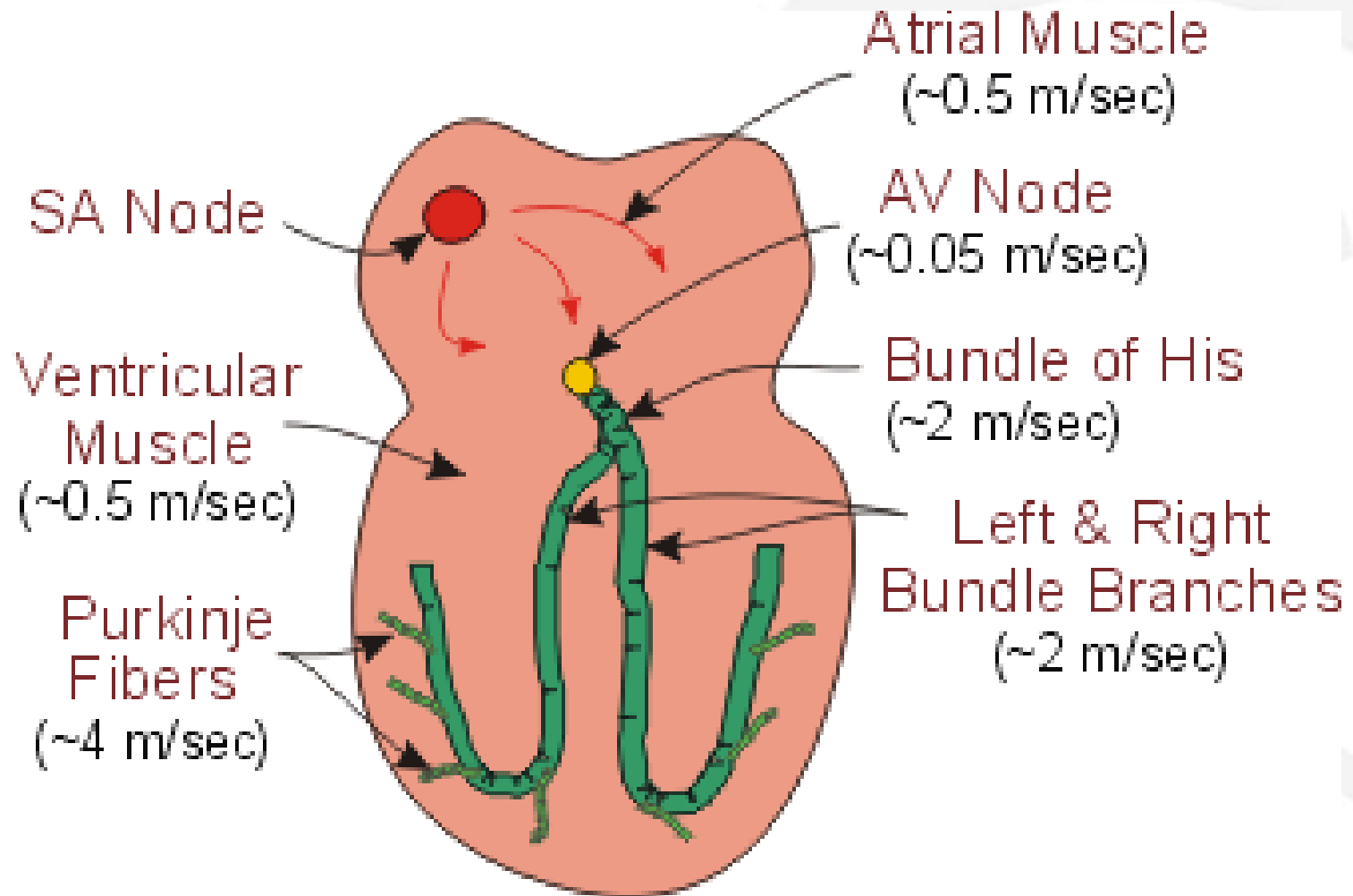
Nedves



Rögzítés

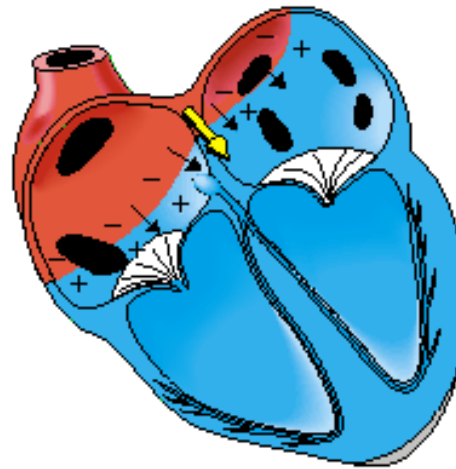


Normál ingervezető rendszer

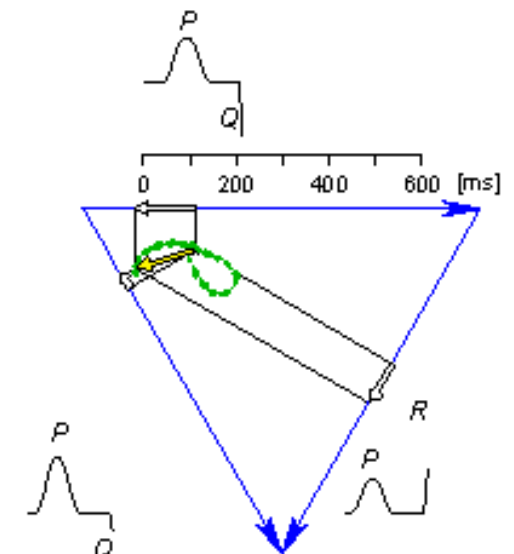
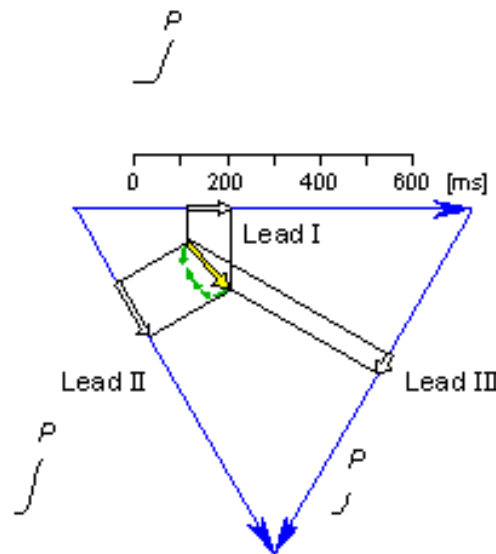


Normál depolarizáció

ATRIAL
DEPOLARIZATION
80 ms



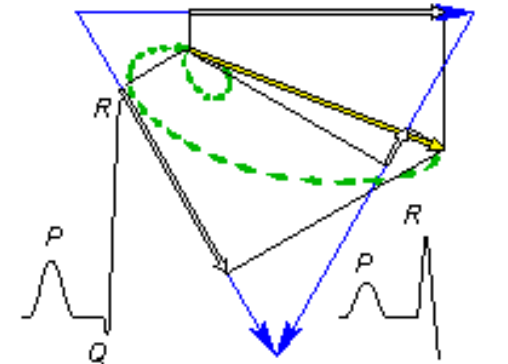
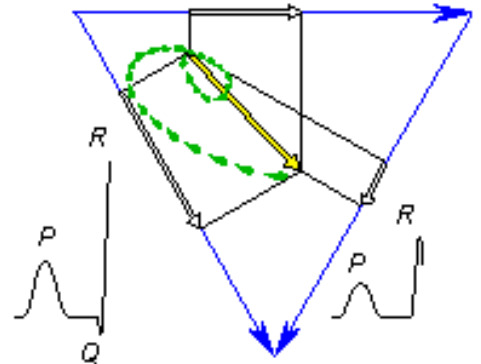
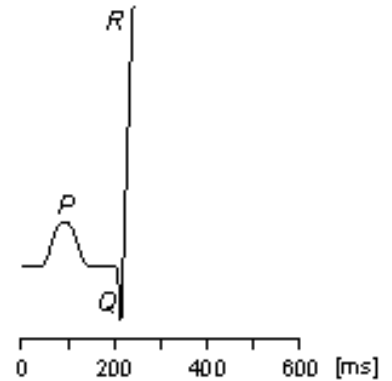
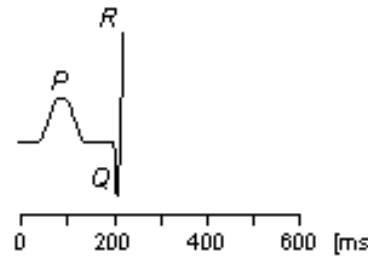
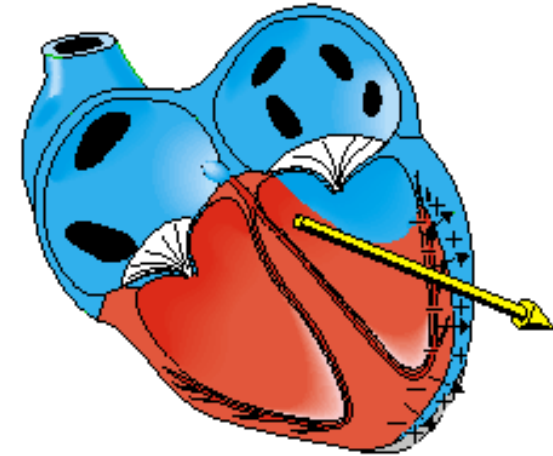
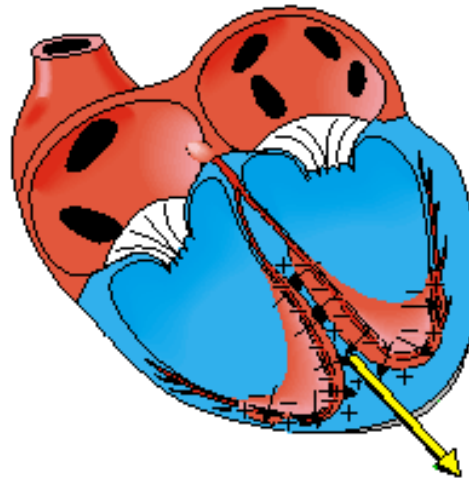
SEPTAL
DEPOLARIZATION
220 ms



Normál depolarizáció

APICAL
DEPOLARIZATION
230 ms

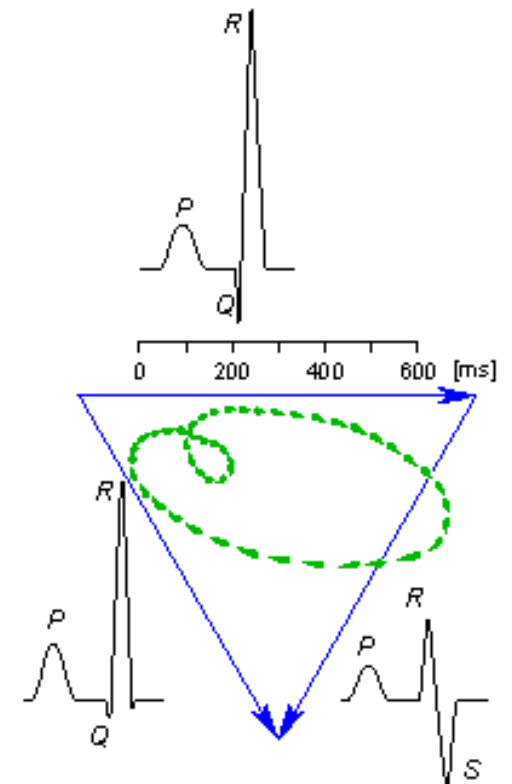
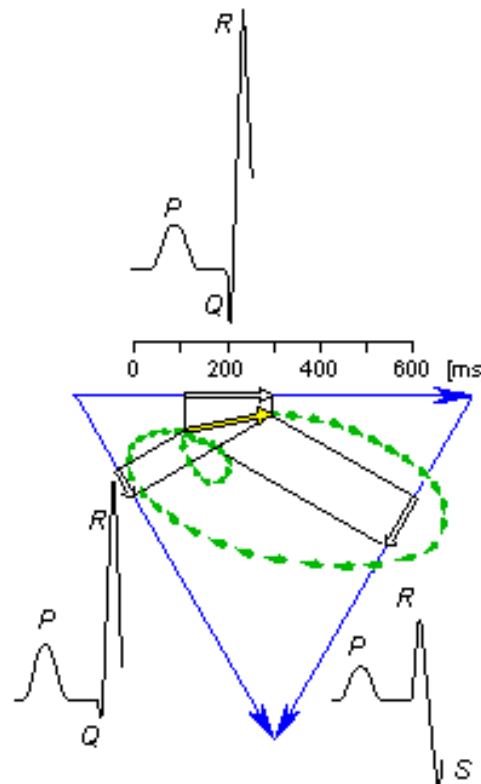
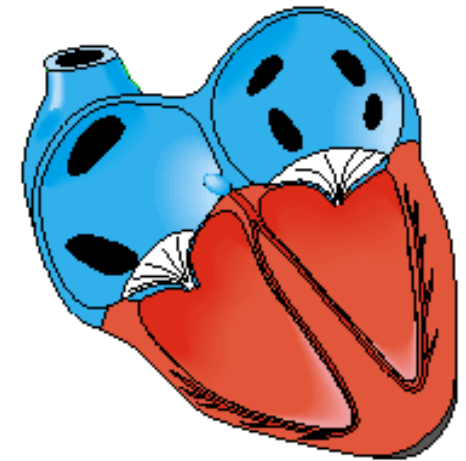
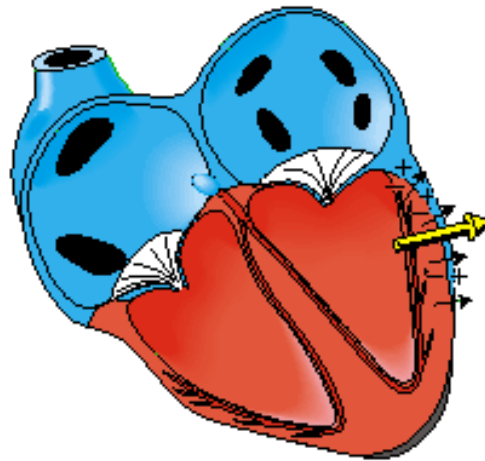
LEFT VENTRICUL AR
DEPOLARIZATION
240 ms



Normál depolarizáció

LATE LEFT VENTRICULAR
DEPOLARIZATION
250 ms

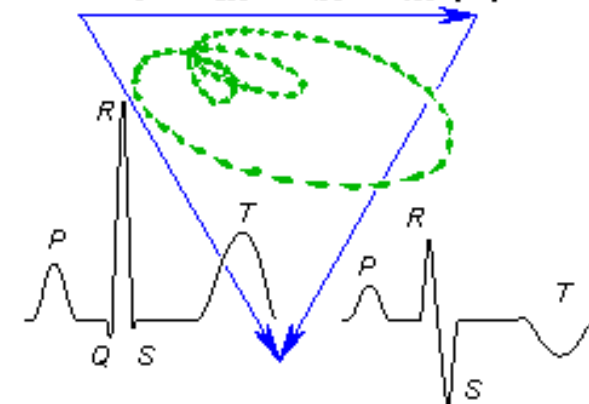
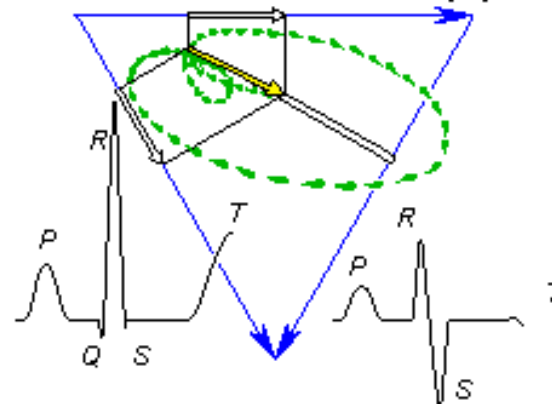
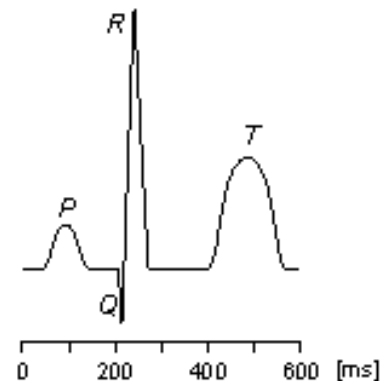
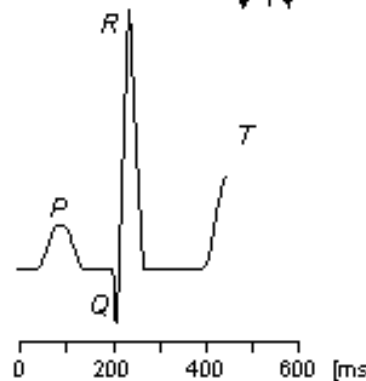
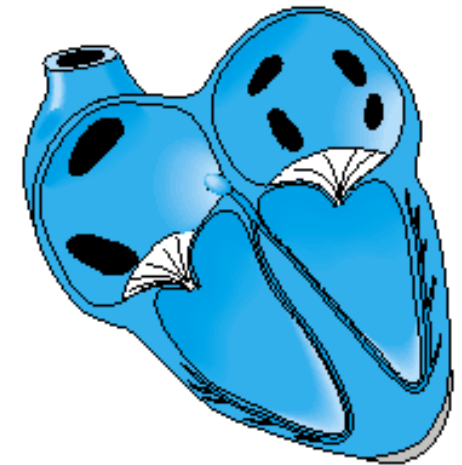
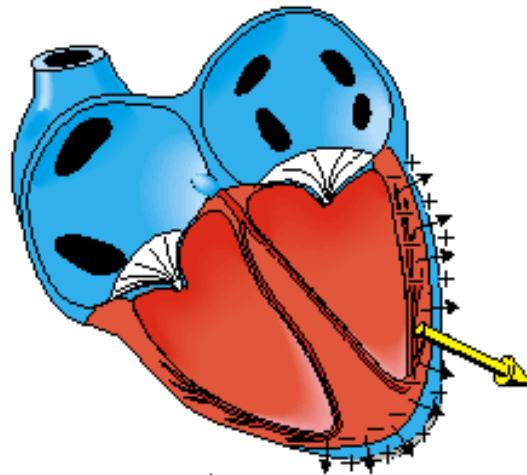
VENTRICLES
DEPOLARIZED
350 ms



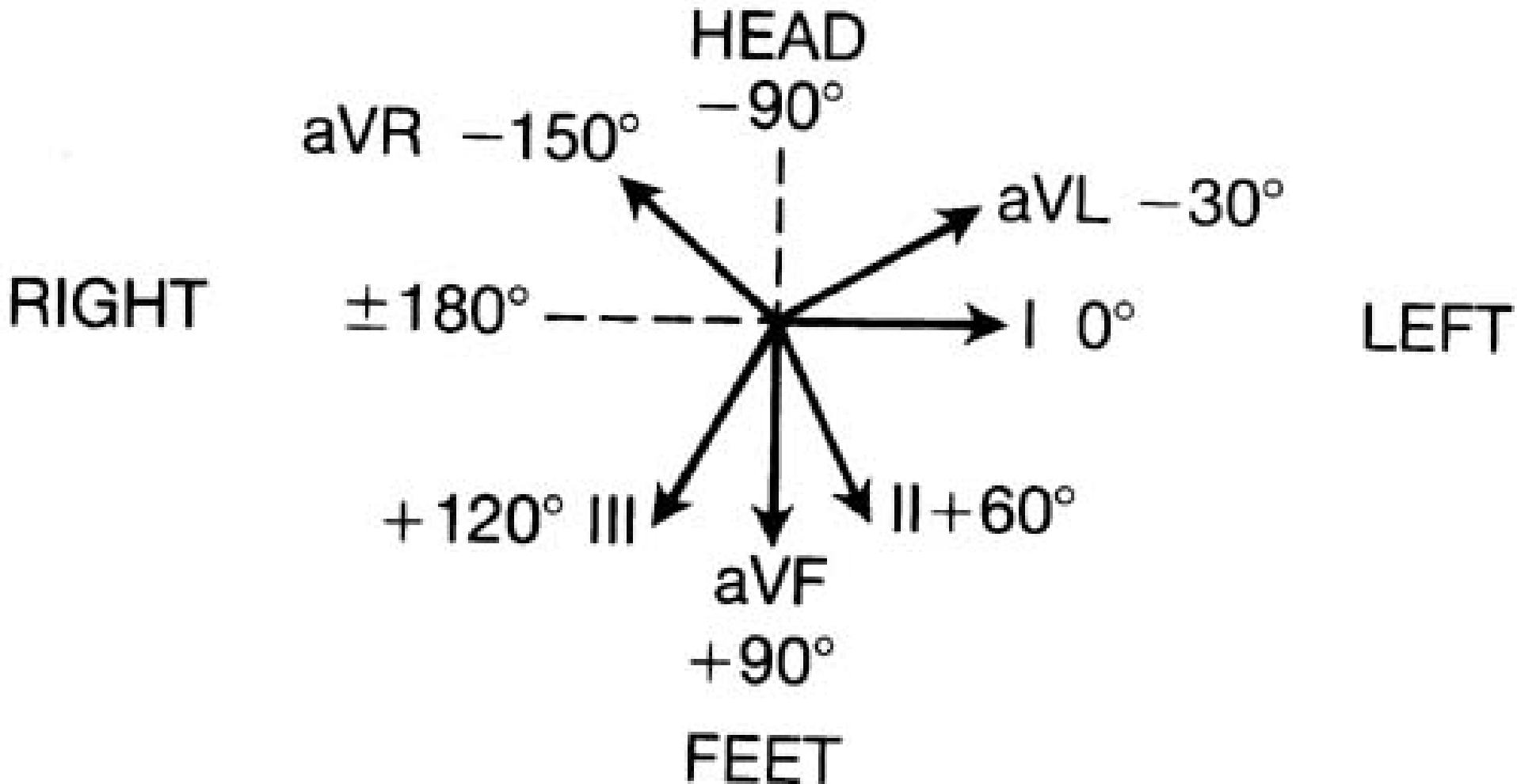
Normál repolarizáció

VENTRICULAR
REPOLARIZATION
450 ms

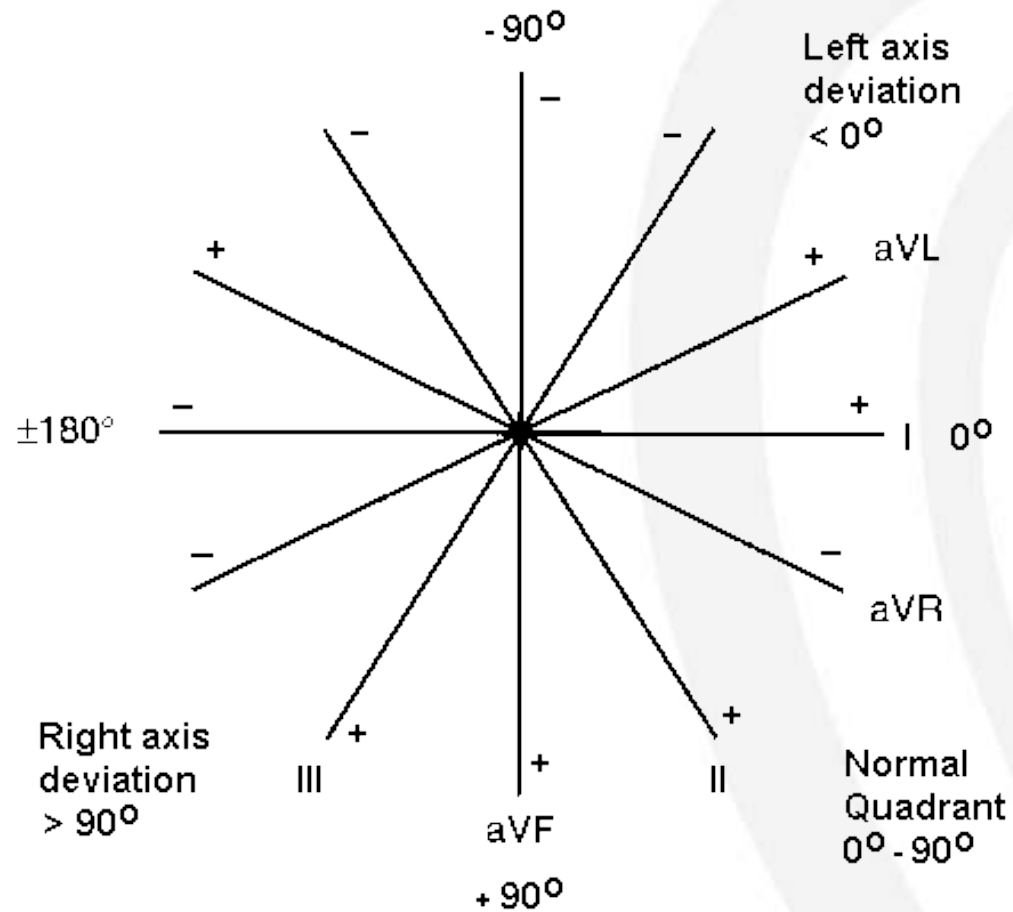
VENTRICLES
REPOLARIZED
600 ms



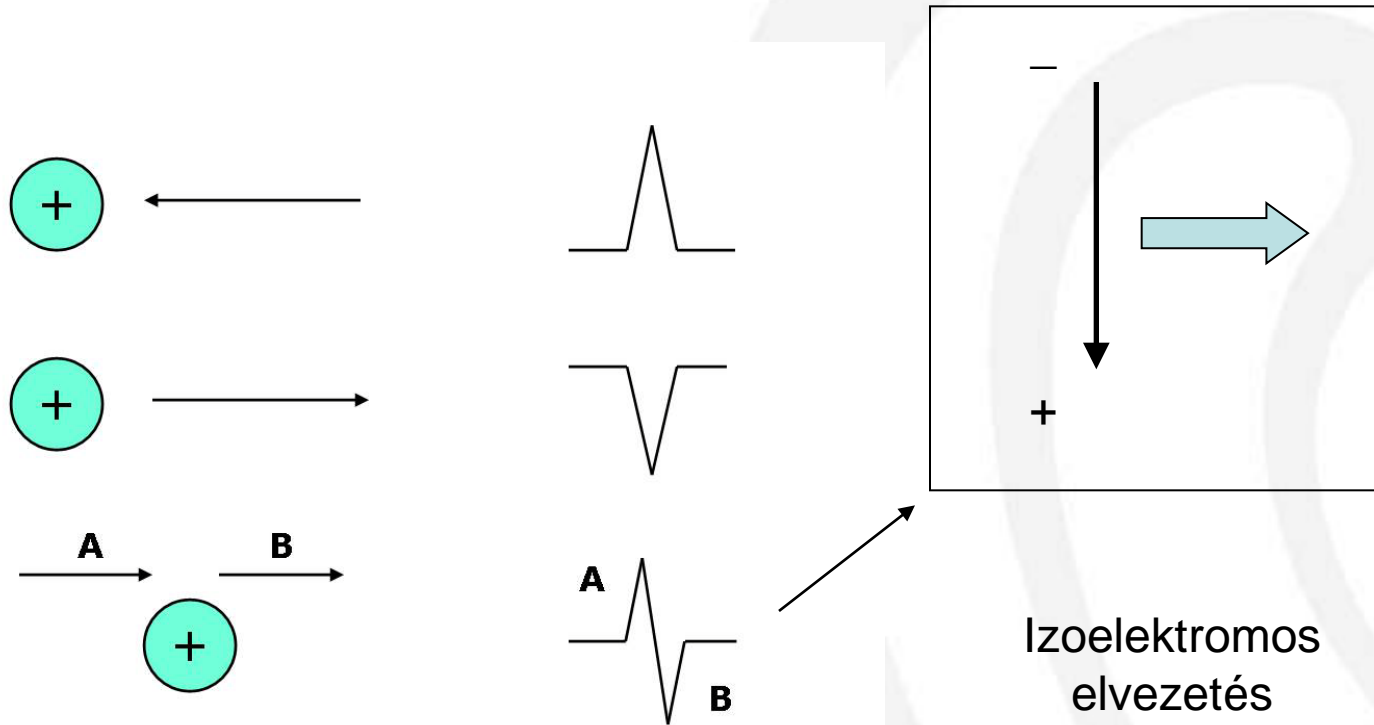
Frontális sík (QRS vektor)



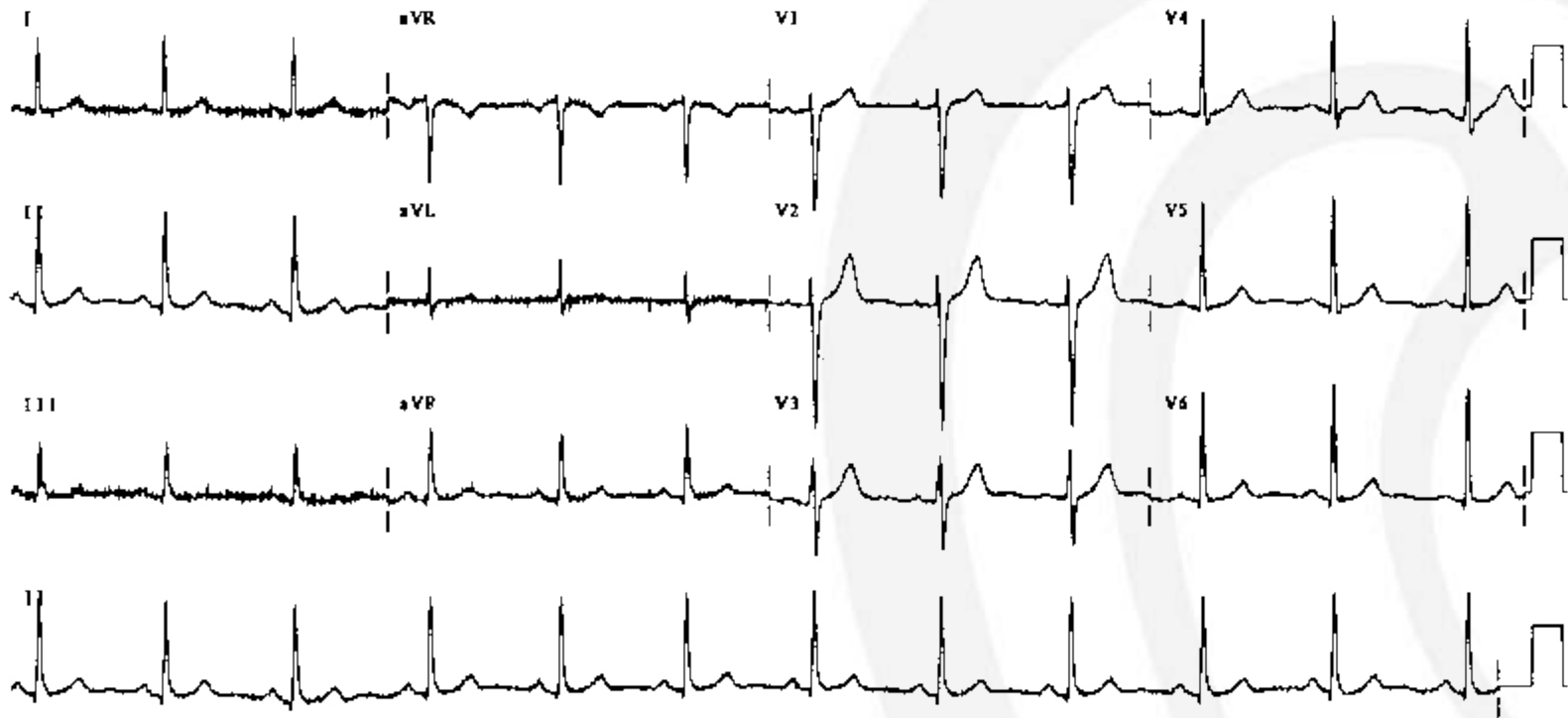
Frontális sík (QRS vektor)



QRS tengely meghatározása



Normál QRS tengelyállás

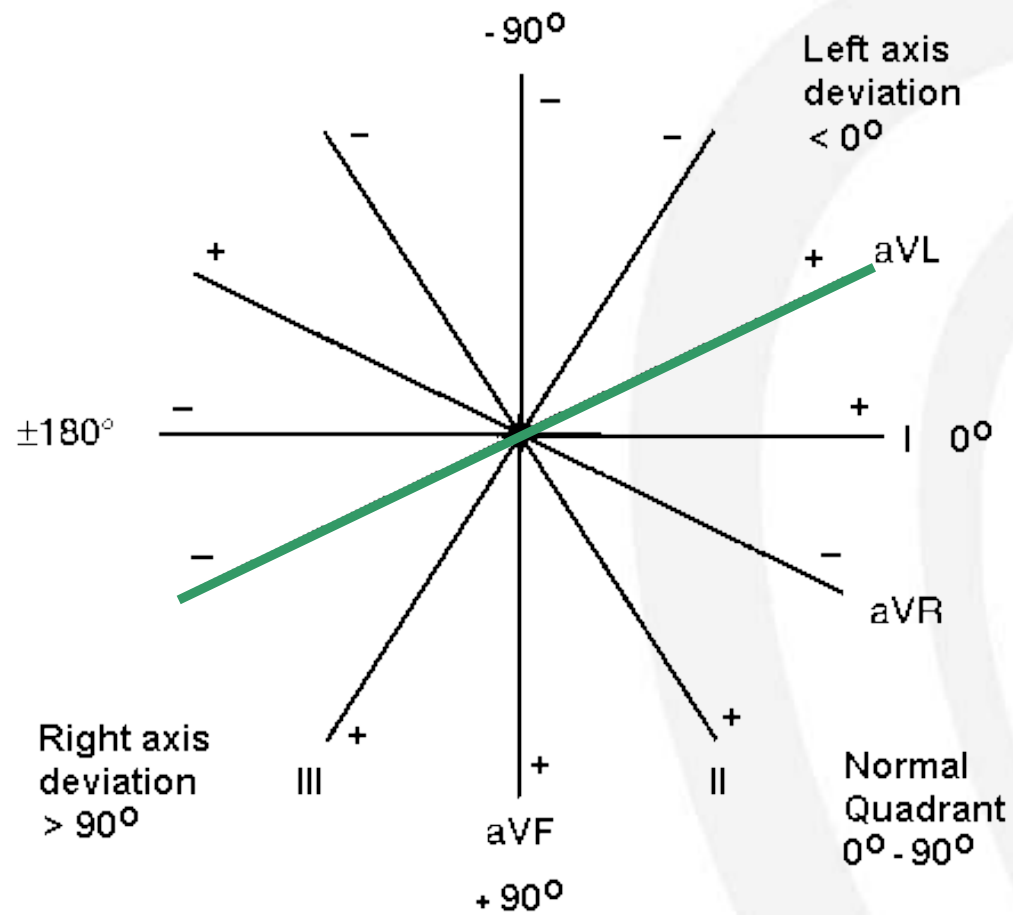


LOC 00000-0000 Speed: 25 mm/sec Limb: 10 mV Chest: 10 mm/mV

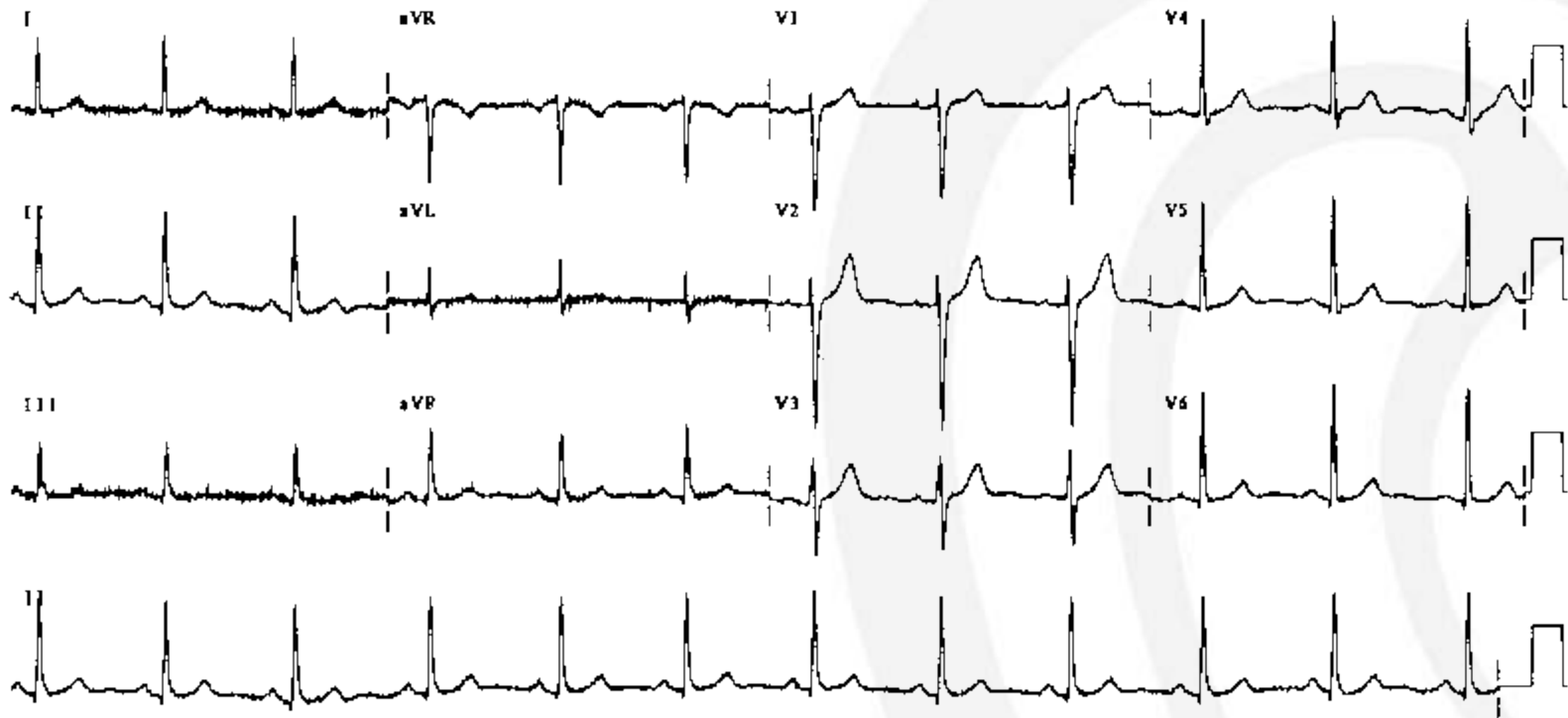
50% 0.15-150 Hz

16405





Normál QRS tengelyállás $\sim 60^\circ$



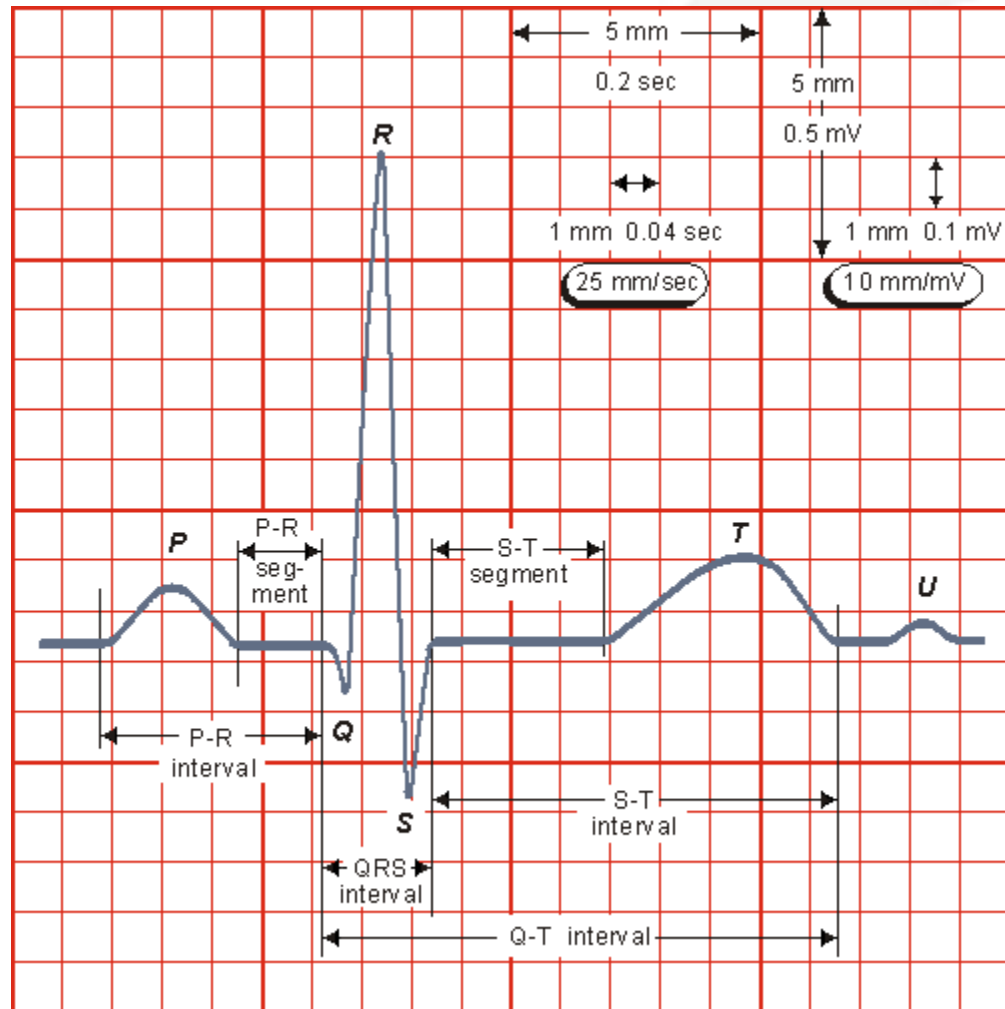
LOC 00000-0000 Speed: 25 mm/sec Limb: 10 mV Chest: 10 mm/mV

50% 0.15-150 Hz

16405



Vezetési intervallumok



Pulzus frekvencia számolása 25mm/s

Ha két RR távolság:

25mm (5 nagy négyzet)

60/min

20mm (4 nagy négyzet)

75/min

15mm (3 nagy négyzet)

100/min

10mm (2 nagy négyzet)

150/min

5mm (1 nagy négyzet)

300/min

$$frekvencia = \frac{60[\text{sec}]}{RR \text{ int}[\text{sec}]}$$

Köszönöm a figyelmet!



