Elektrokardiografi
EKG

Föreläsning (LPG002)

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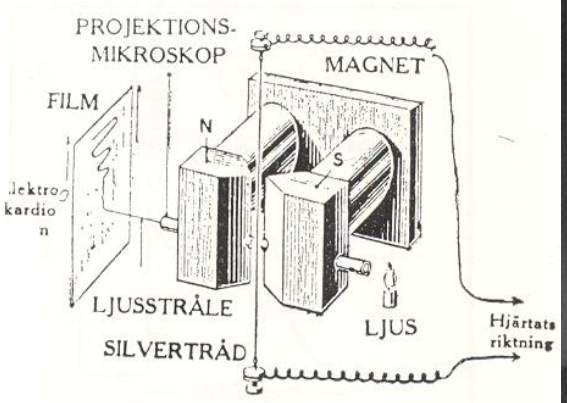
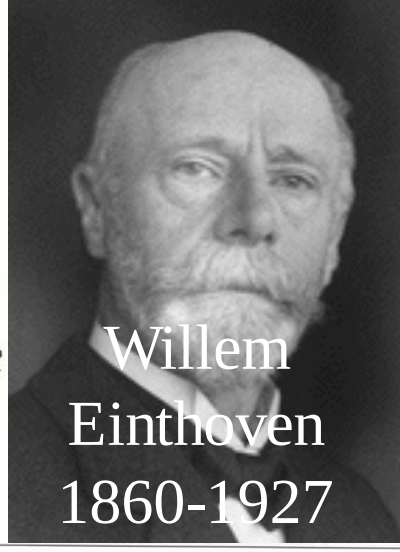
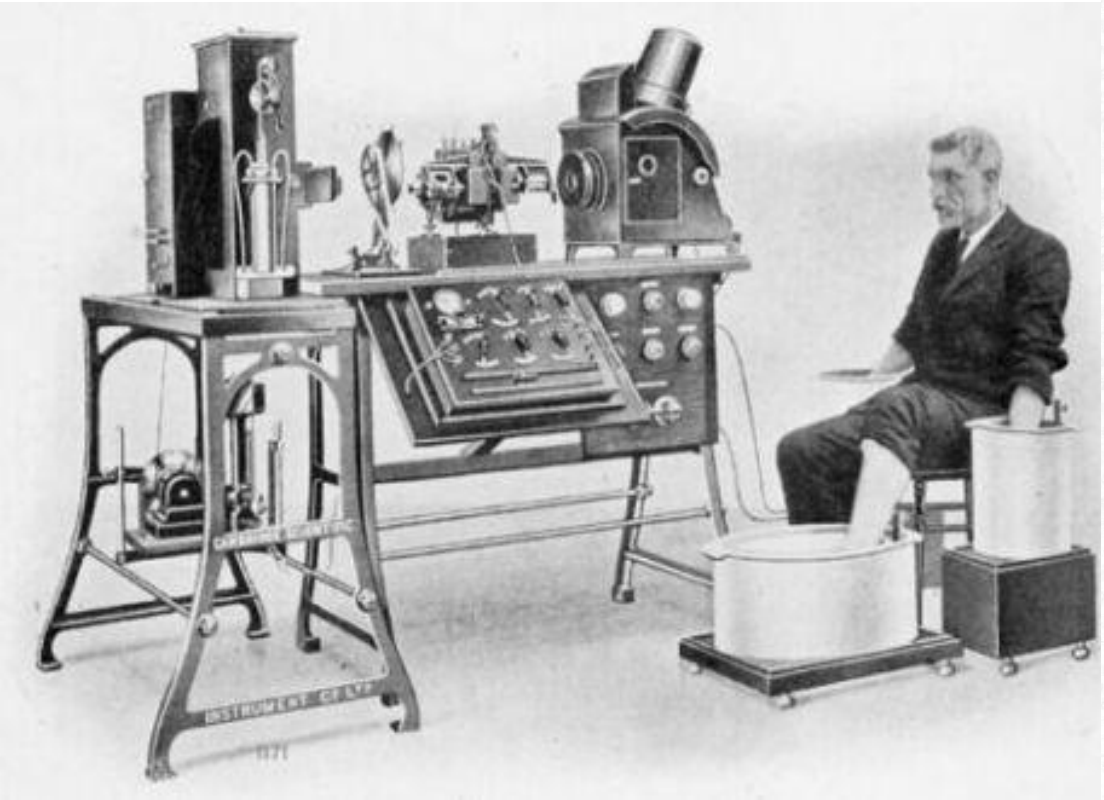
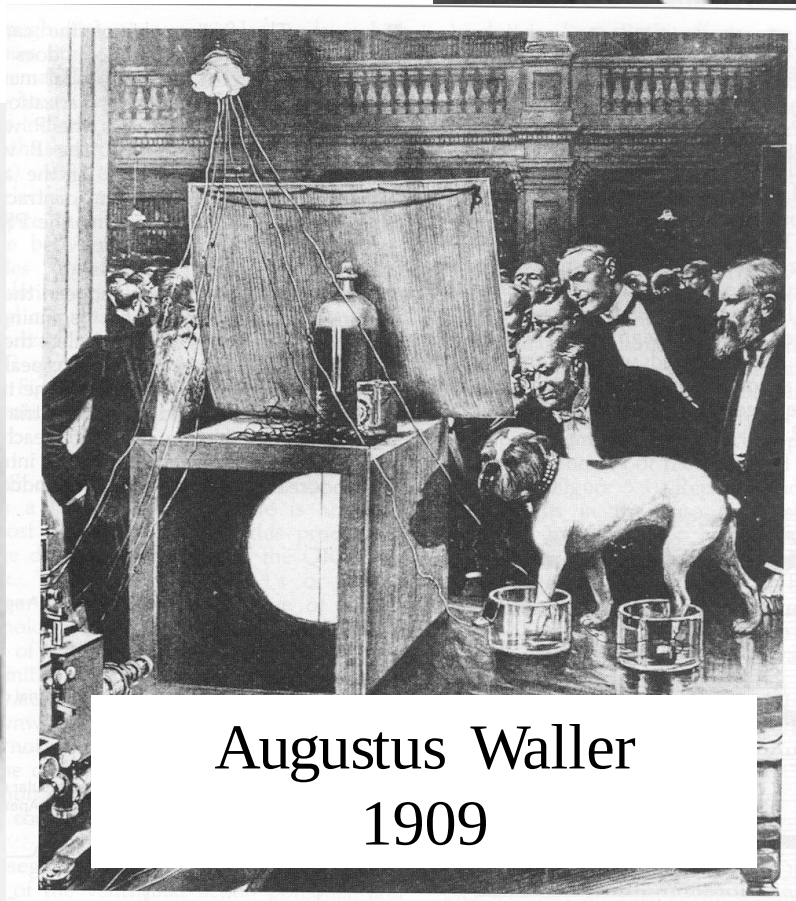
- **Institutionen för neurovetenskap och fysiologi, Sektionen för fysiologi**





Willem Einthoven
1860-1927



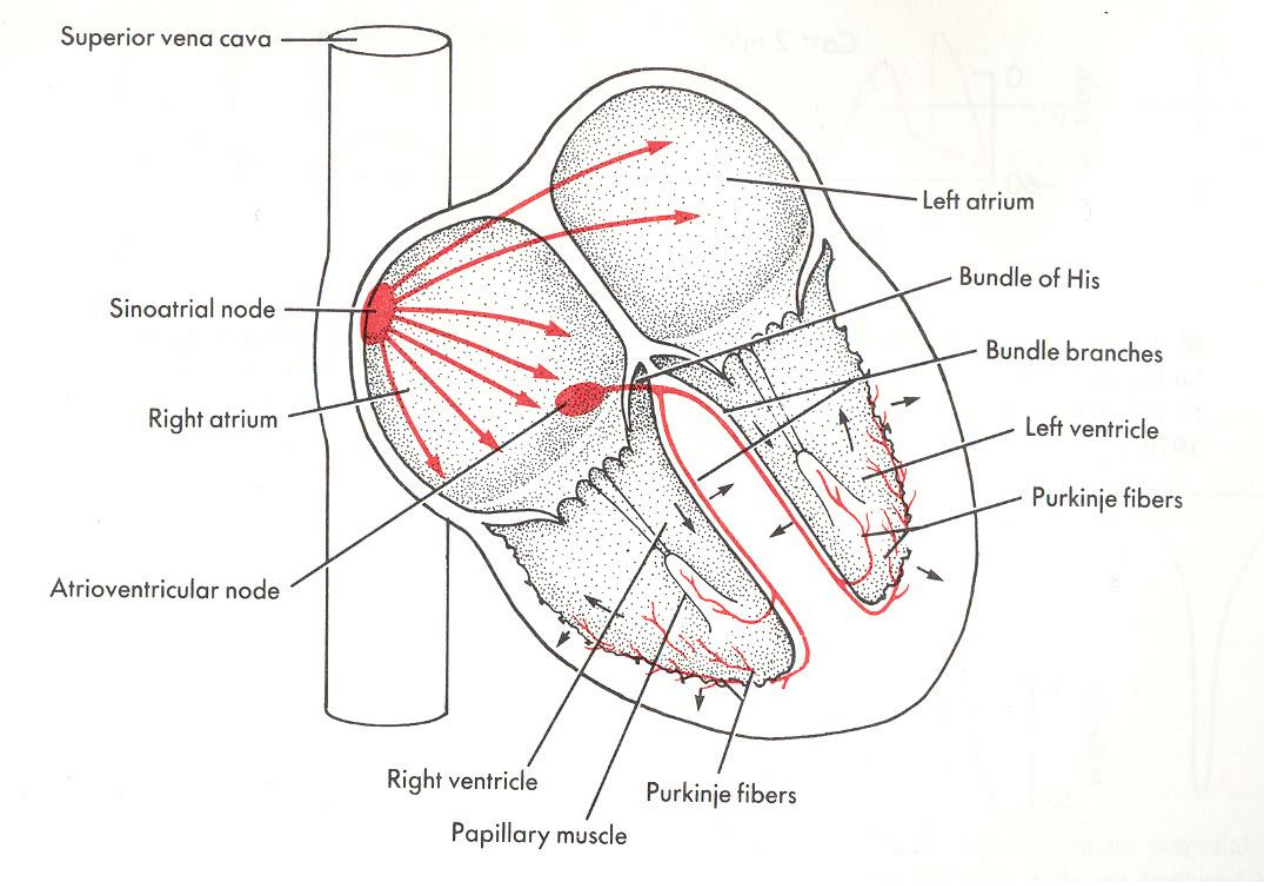


Augustus Waller
1909

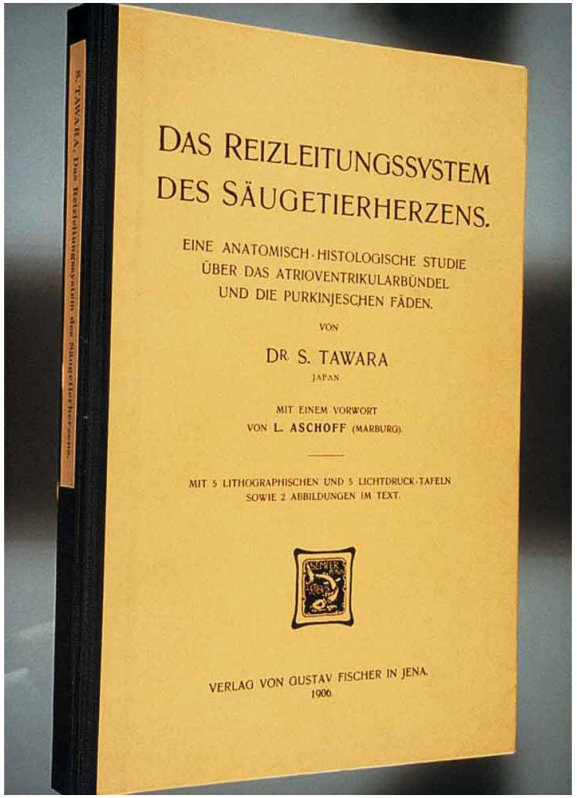
EKG

- Impulsspridning över hjärtat
- Principen för EKG registrering
- Excitationsspridning
- P, QRS och T-vågorna
- Olika EKG-avledningar
- Principer för tolkning
- Några exempel

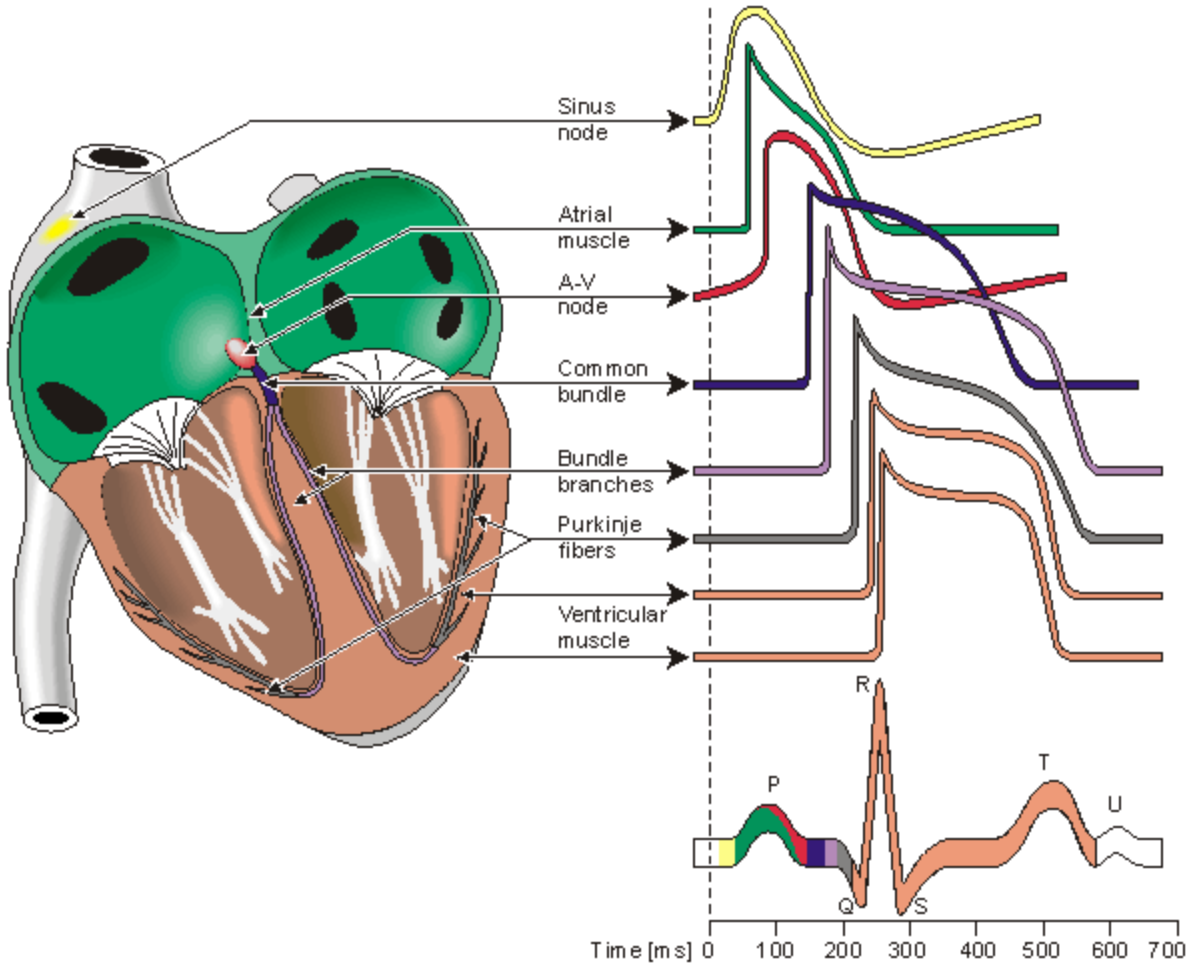
Excitationens spridning över hjärtat

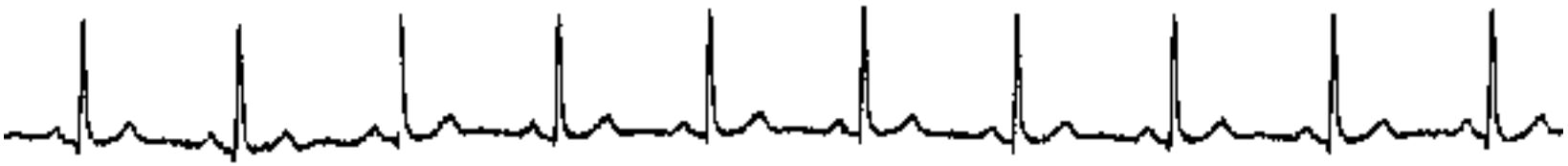


Aktionspotentialer-EKG

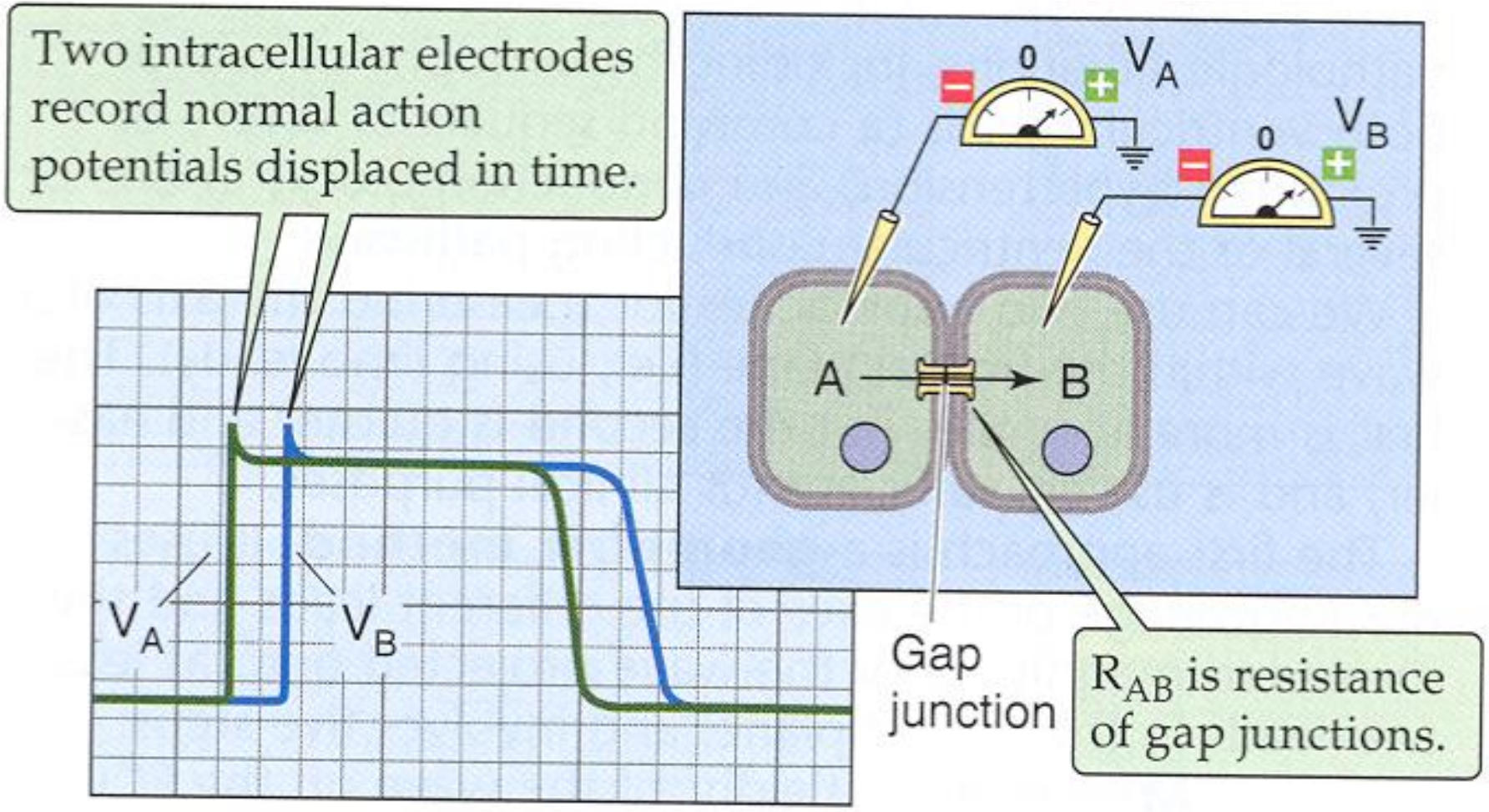


Sunao Tawara, (1873-1952)

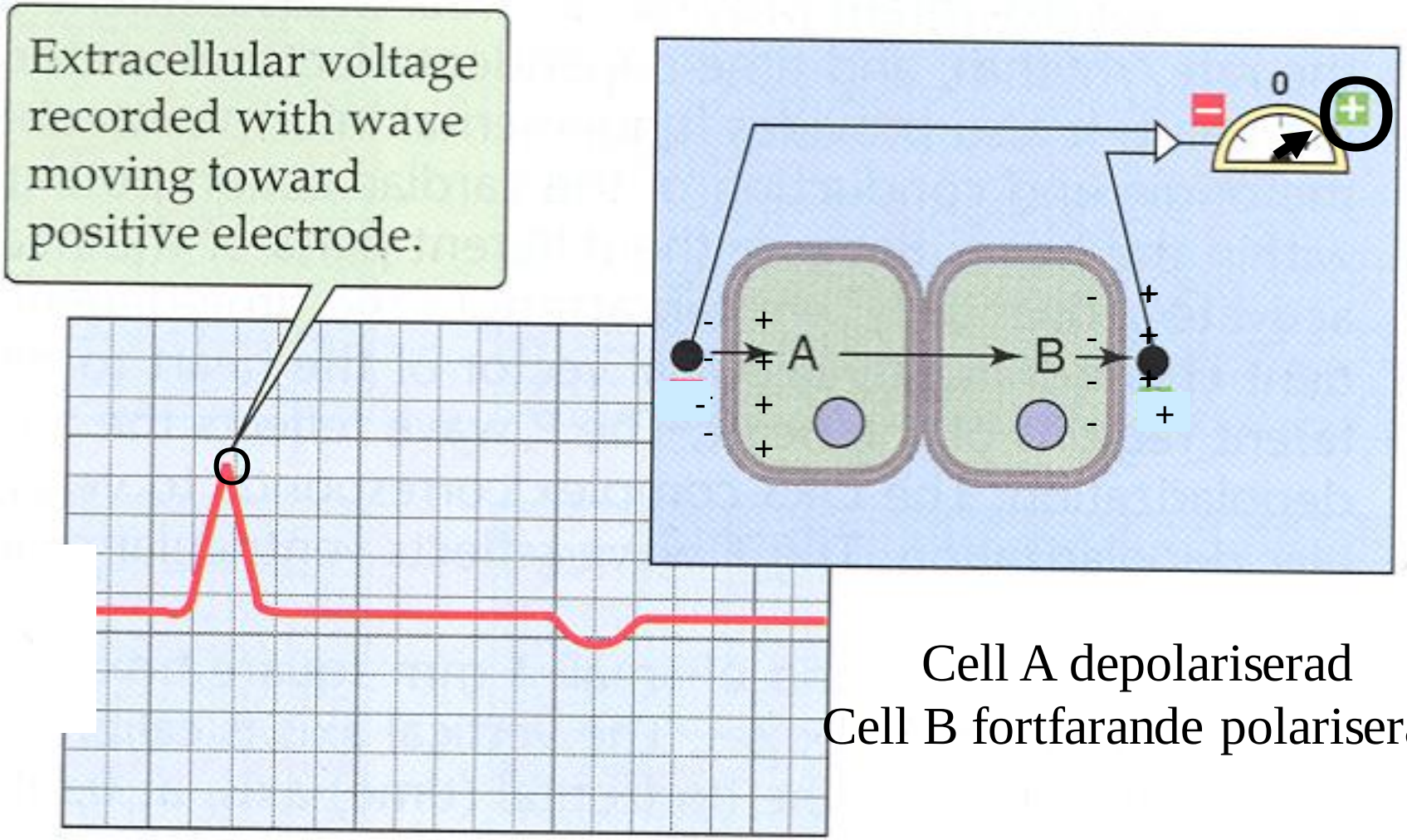




Aktionspotentialer i två celler

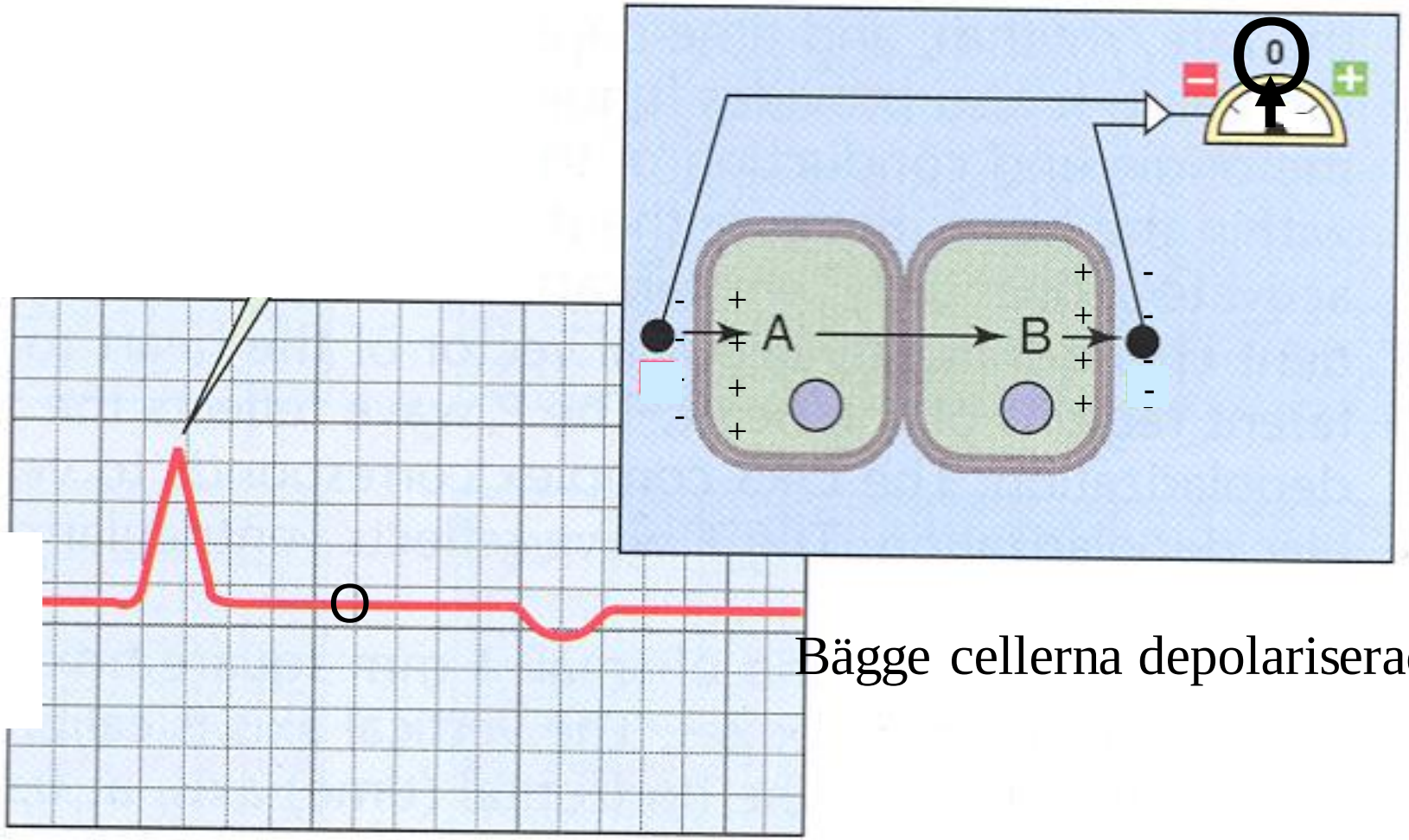


Depolarisation mot positiv elektrod



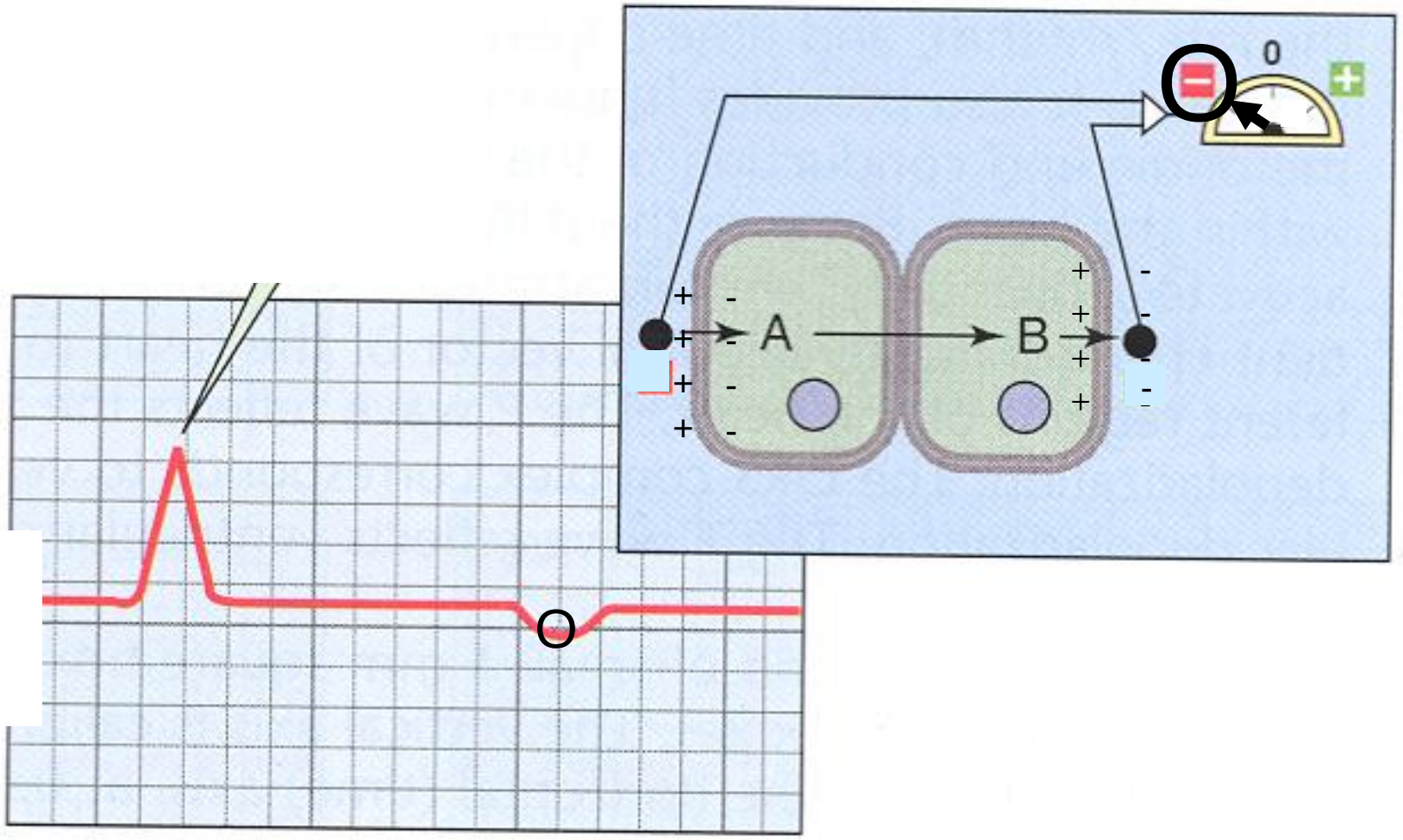
Cell A depolariserad
Cell B fortfarande polariserad

Depolarisation avslutad

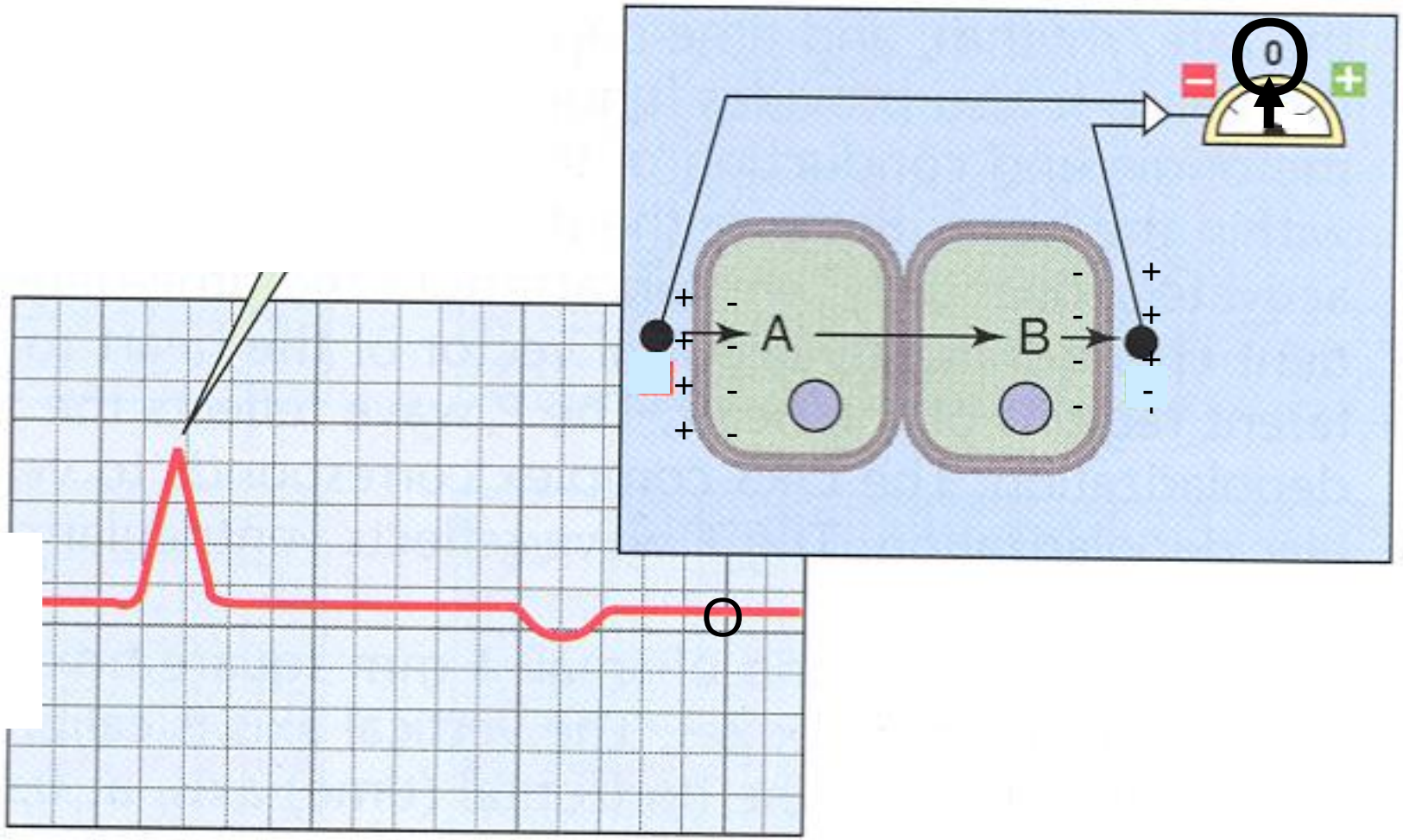


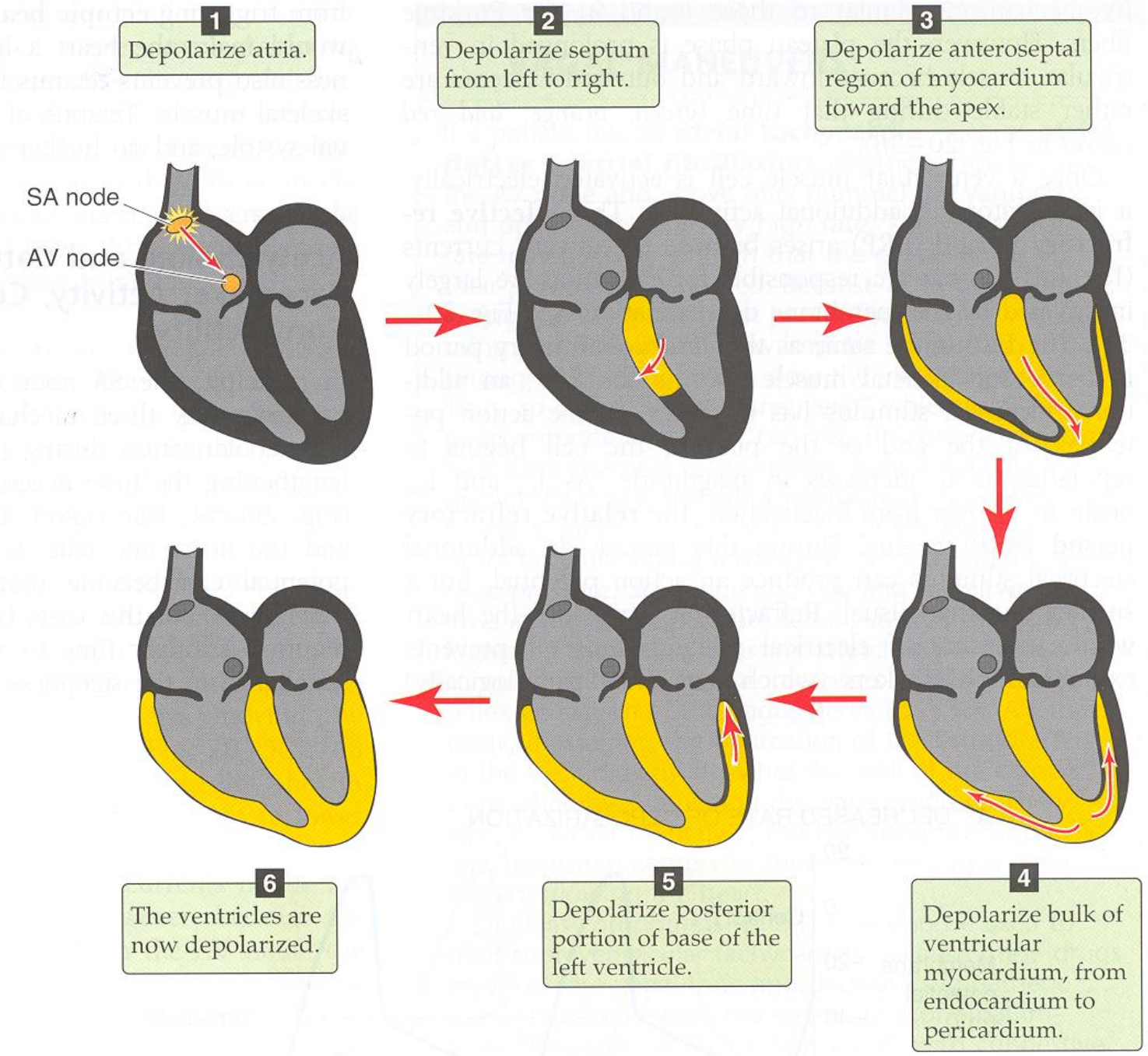
Bägge cellerna depolariserade

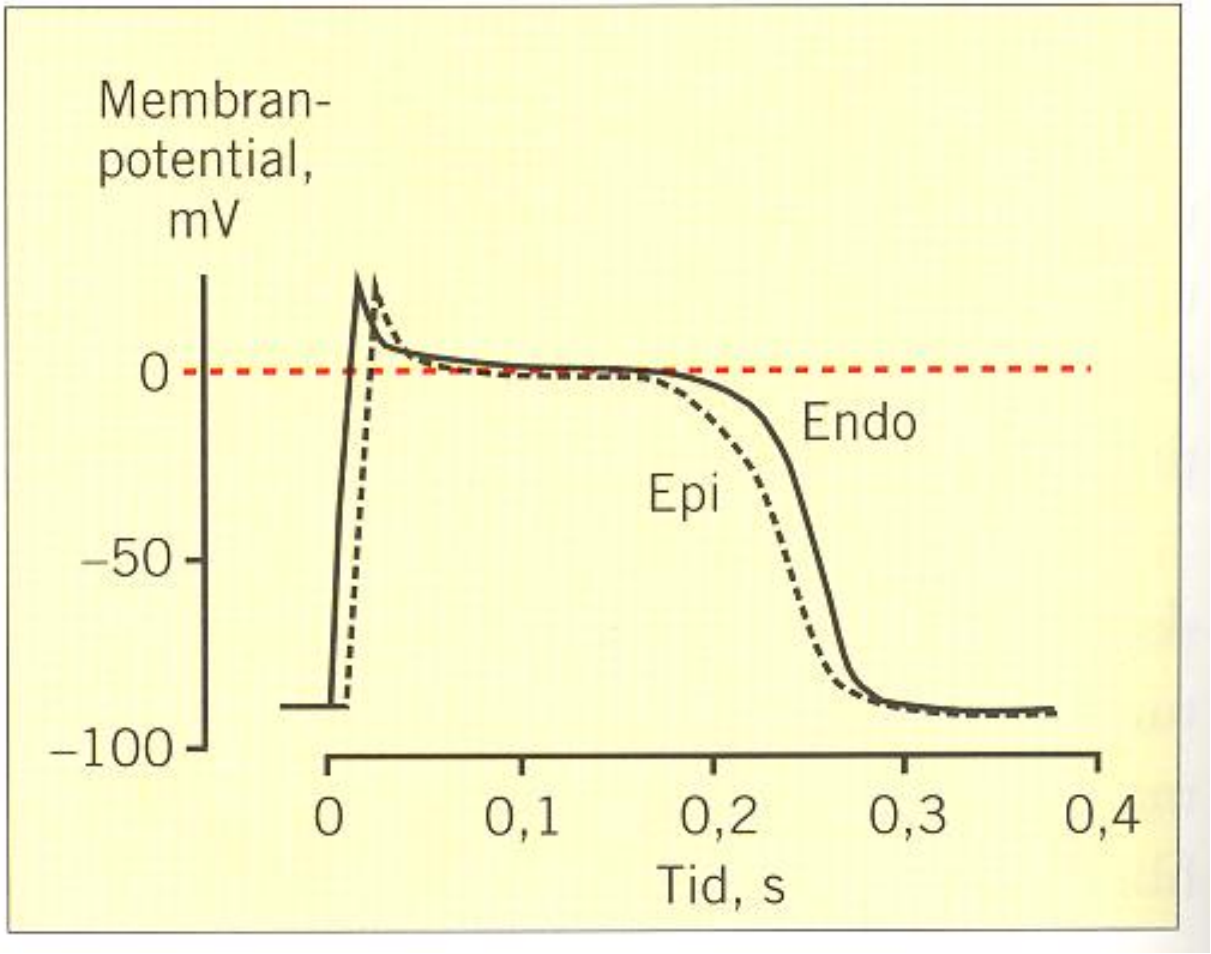
Repolarisation mot positiv elektrod



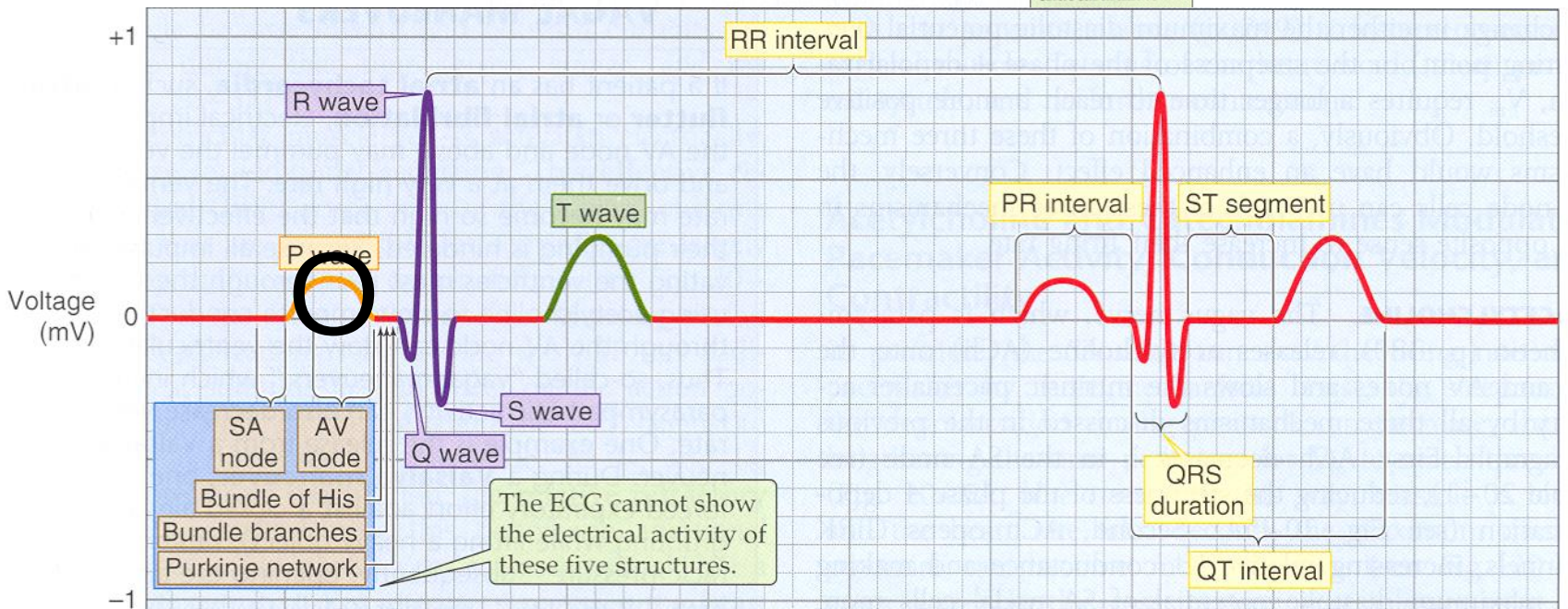
Repolarisation avslutad




1
Depolarize atria.
2
Depolarize septum from left to right.
3
Depolarize anteroseptal region of myocardium toward the apex.
SA node
AV node
4
Depolarize bulk of ventricular myocardium, from endocardium to pericardium.
5
Depolarize posterior portion of base of the left ventricle.
6
The ventricles are now depolarized.



Repolarisering startat epikardiellt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SA no
AV n
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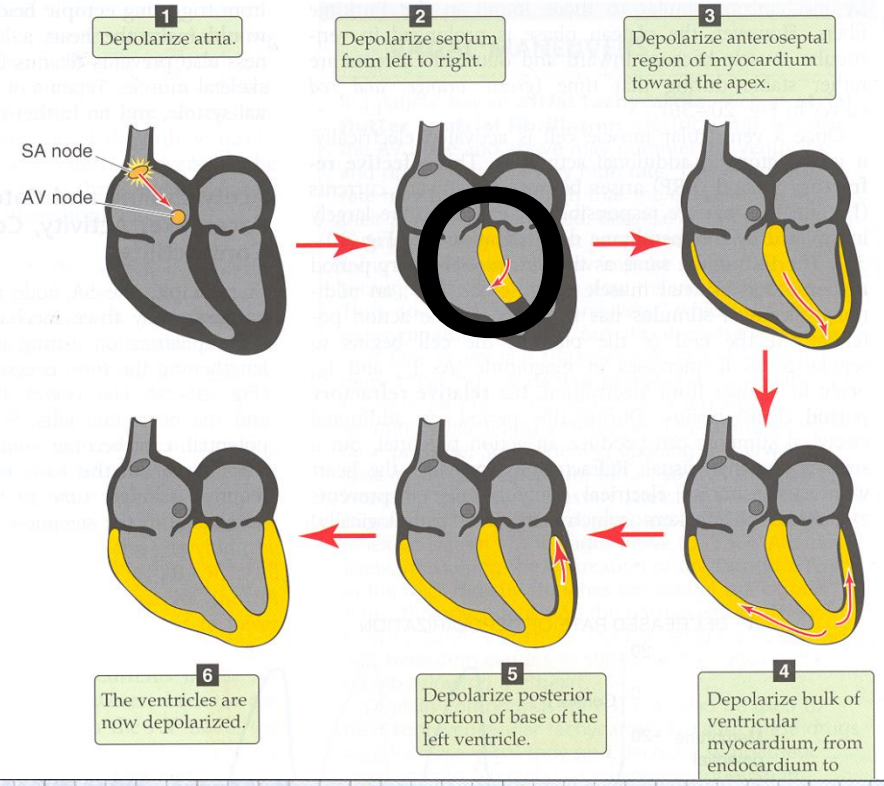
5
Depolarize posterior portion of base of the left ventricle.
6
The ventricles are now depolarized.
+1
0
−1
Voltage (mV)
RR interval
R wave
T wave
P wave
PR interval
ST segment
S wave
Q wave
QRS duration
QT interval
SA node
AV node
Bundle of His
Bundle branches
Purkinje network
The ECG cannot show the electrical activity of these five structures.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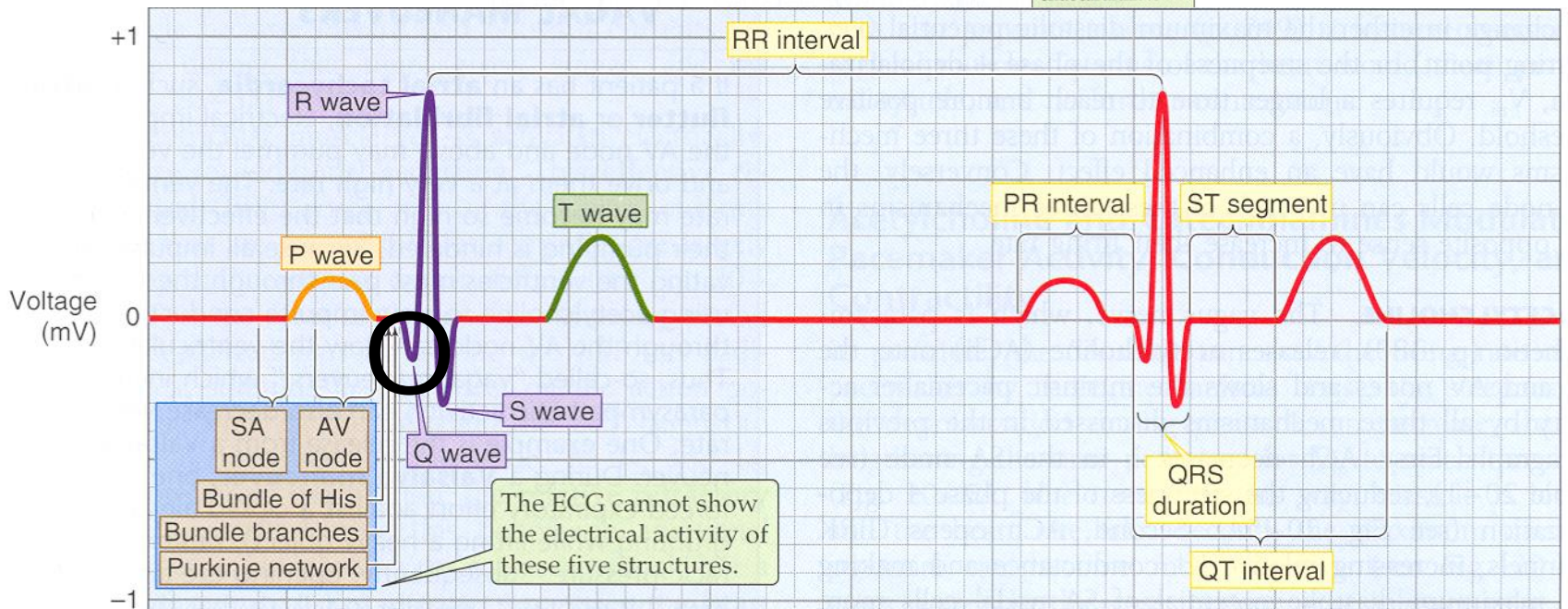
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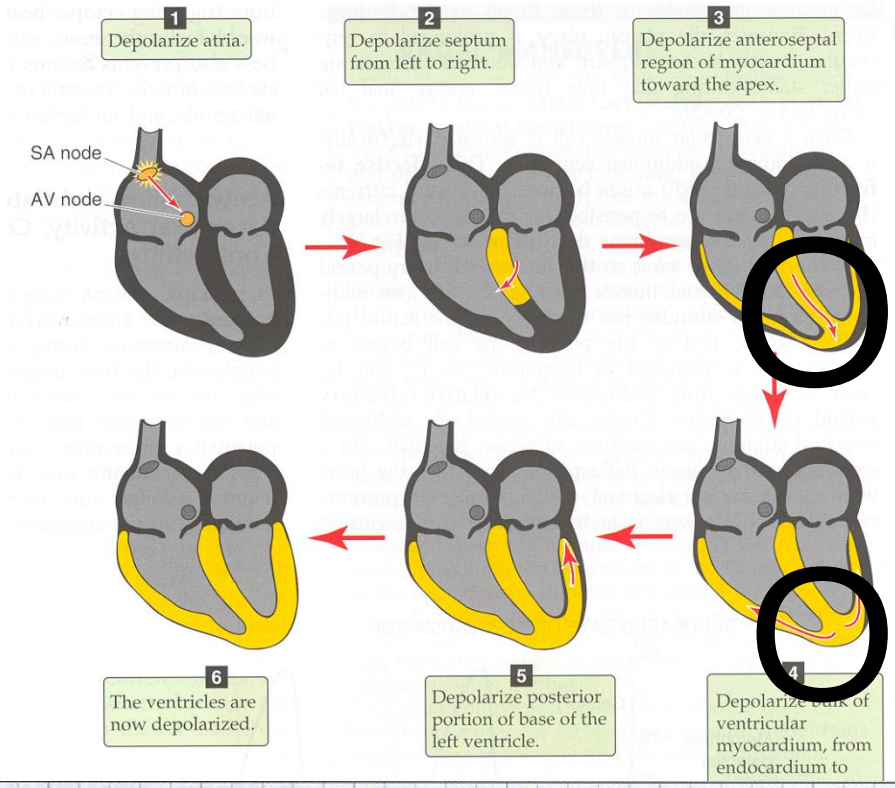
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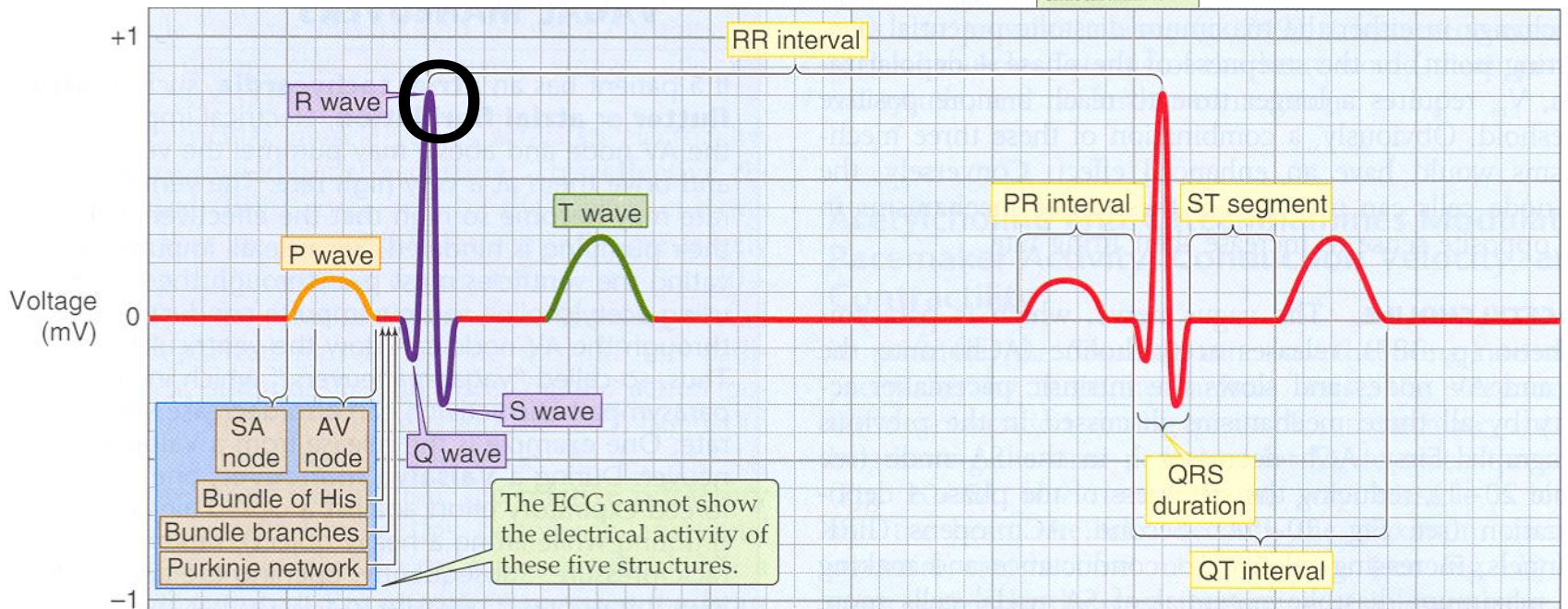
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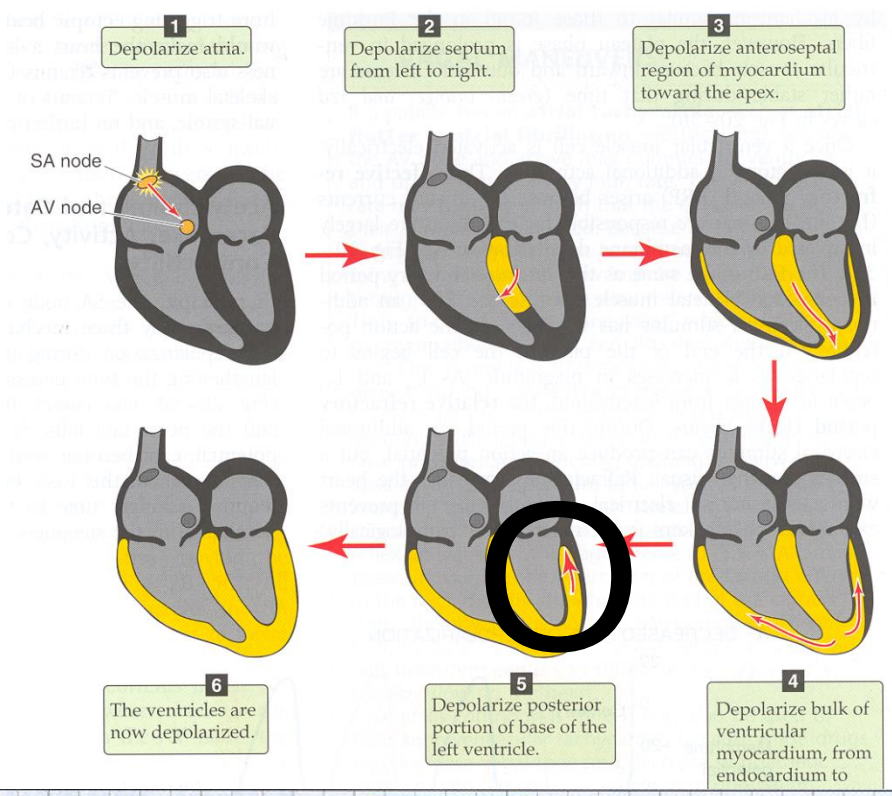
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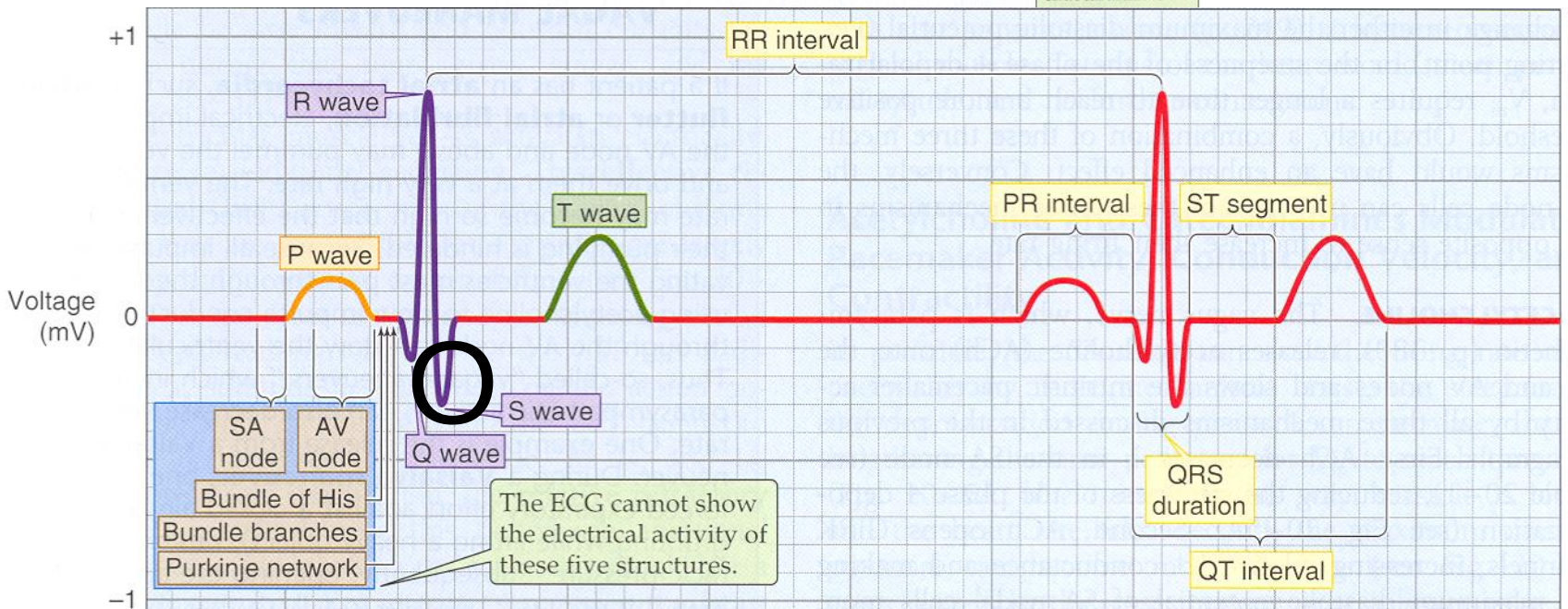
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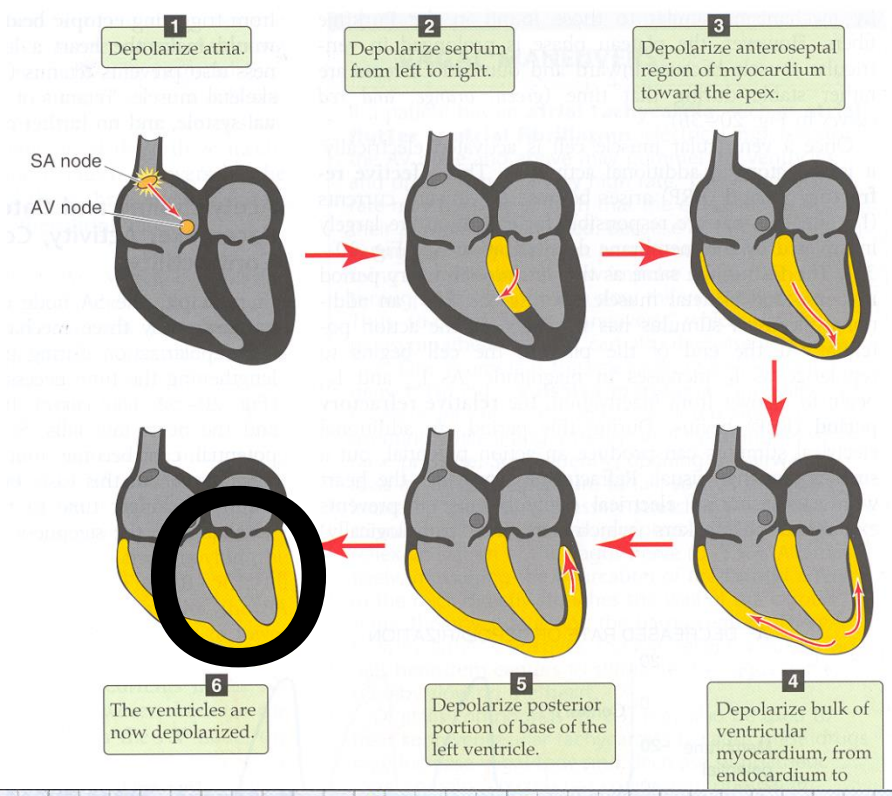
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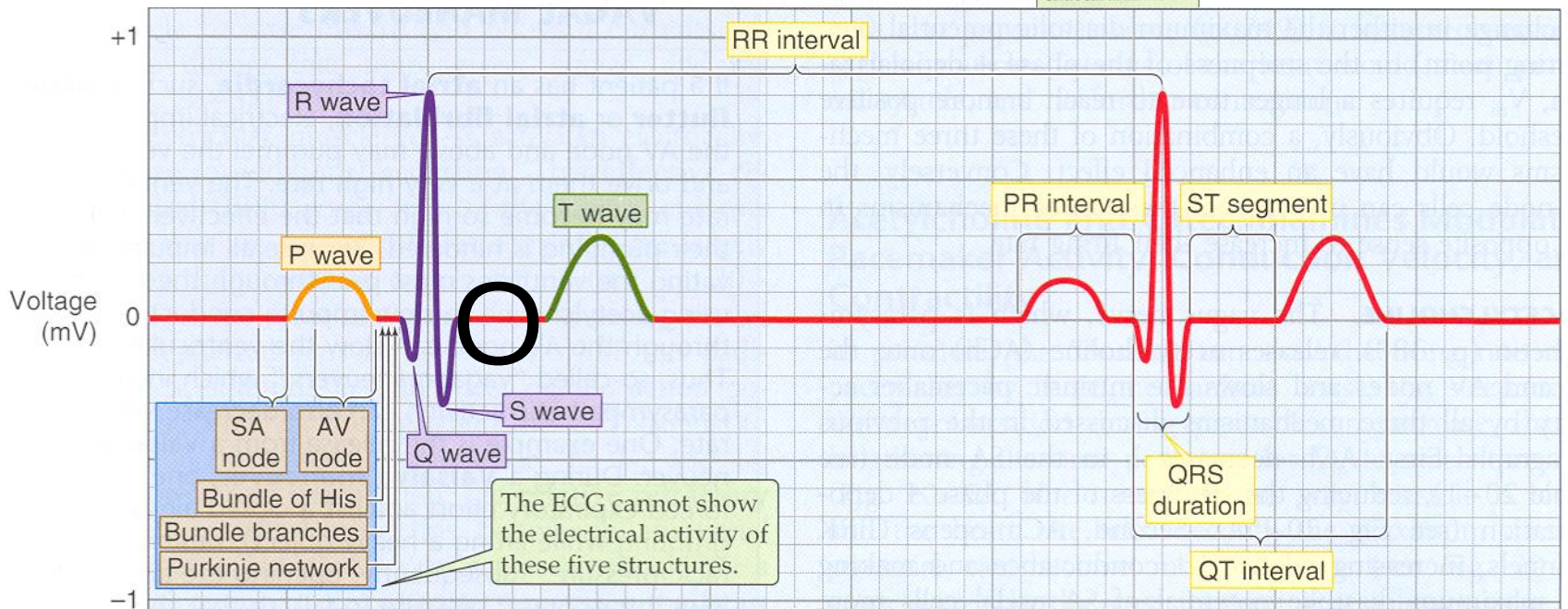
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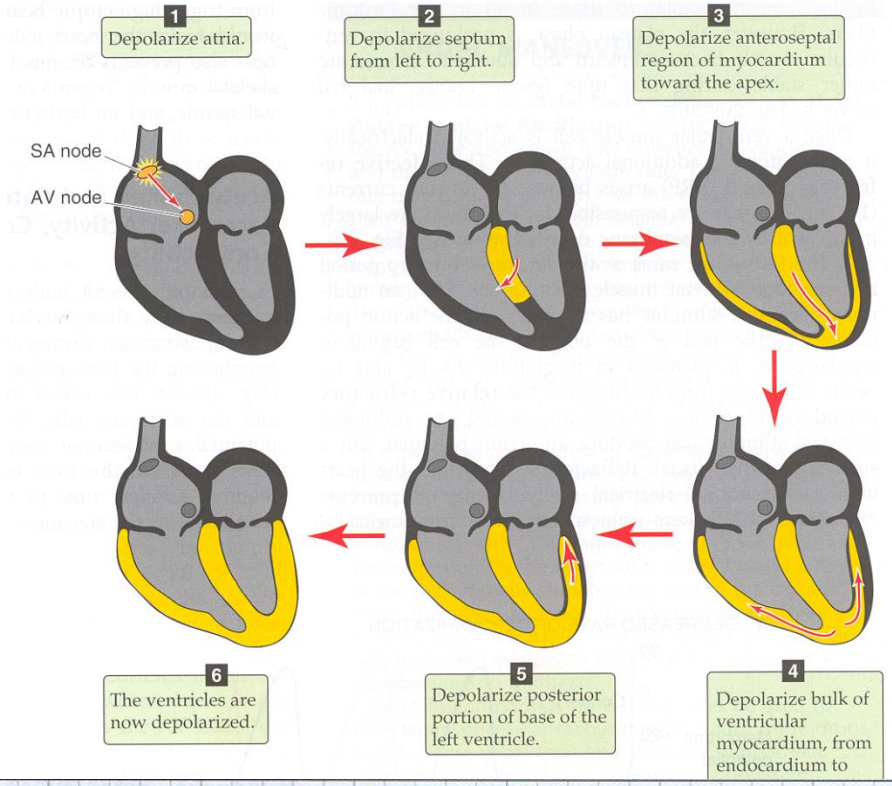
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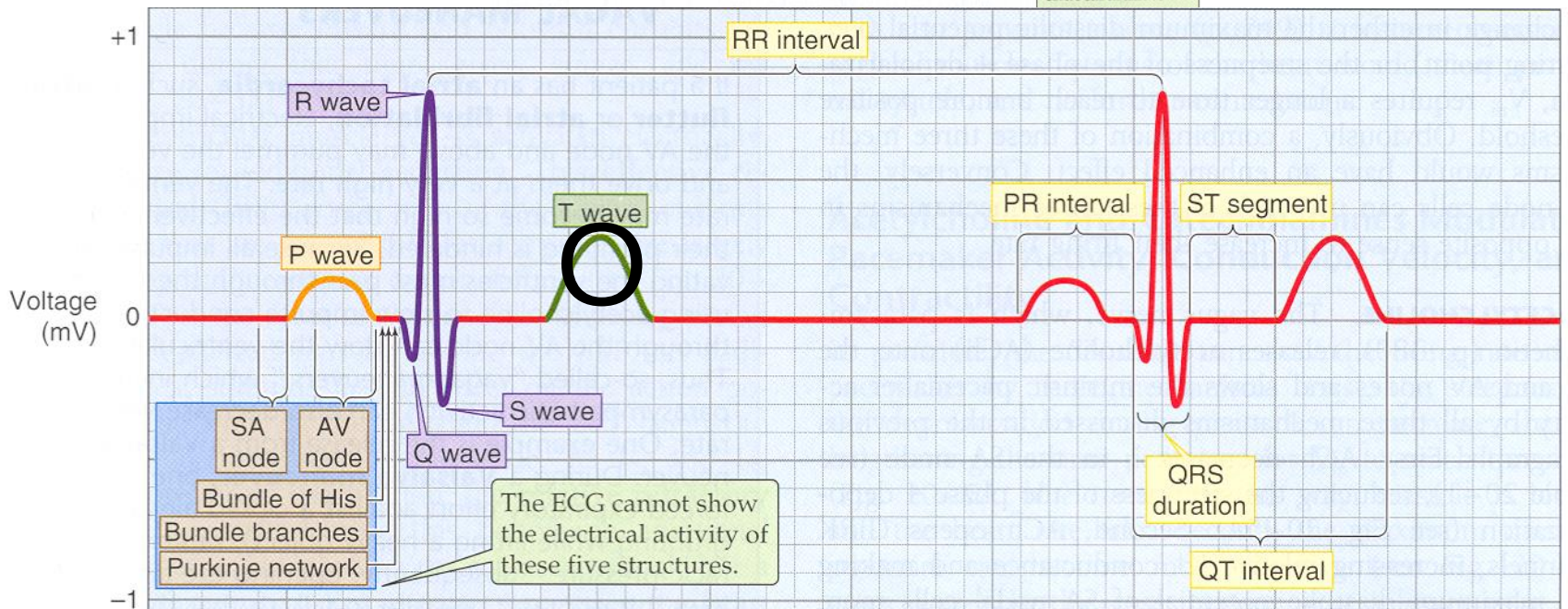
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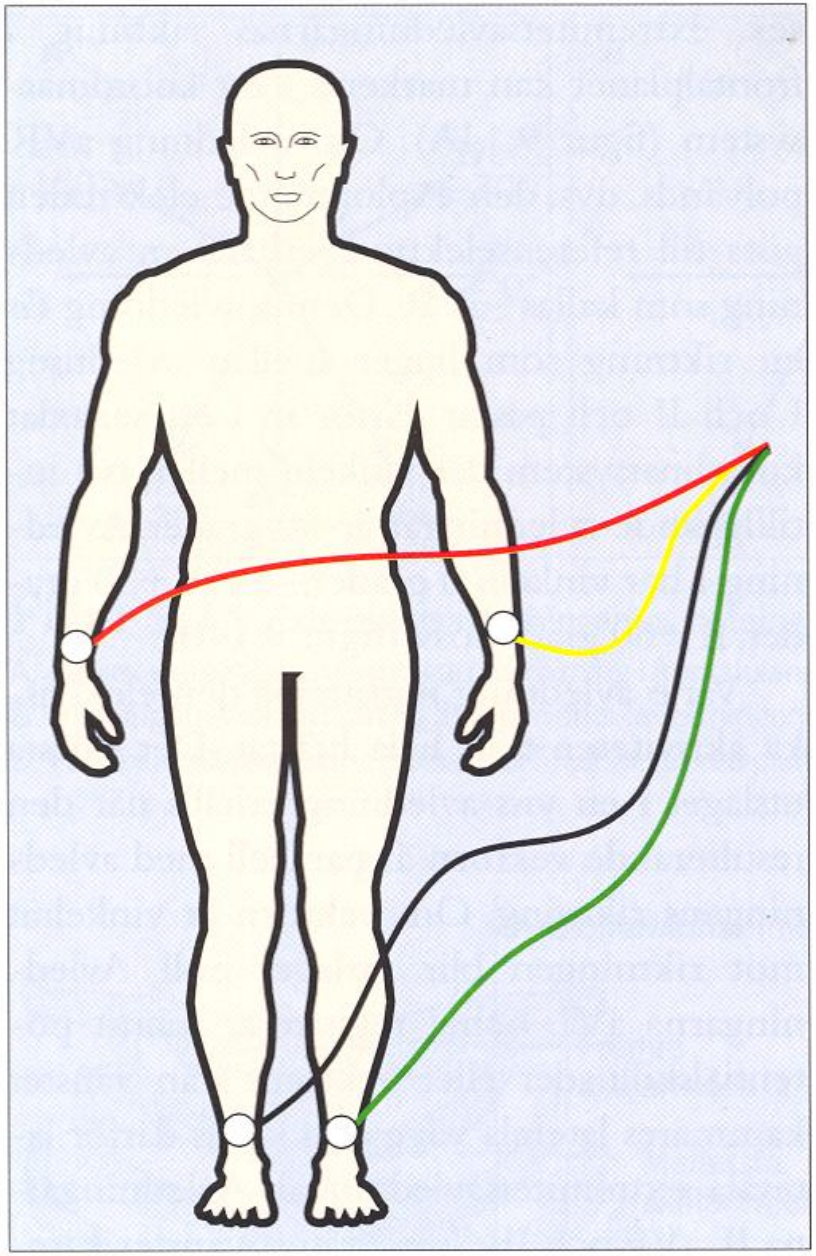
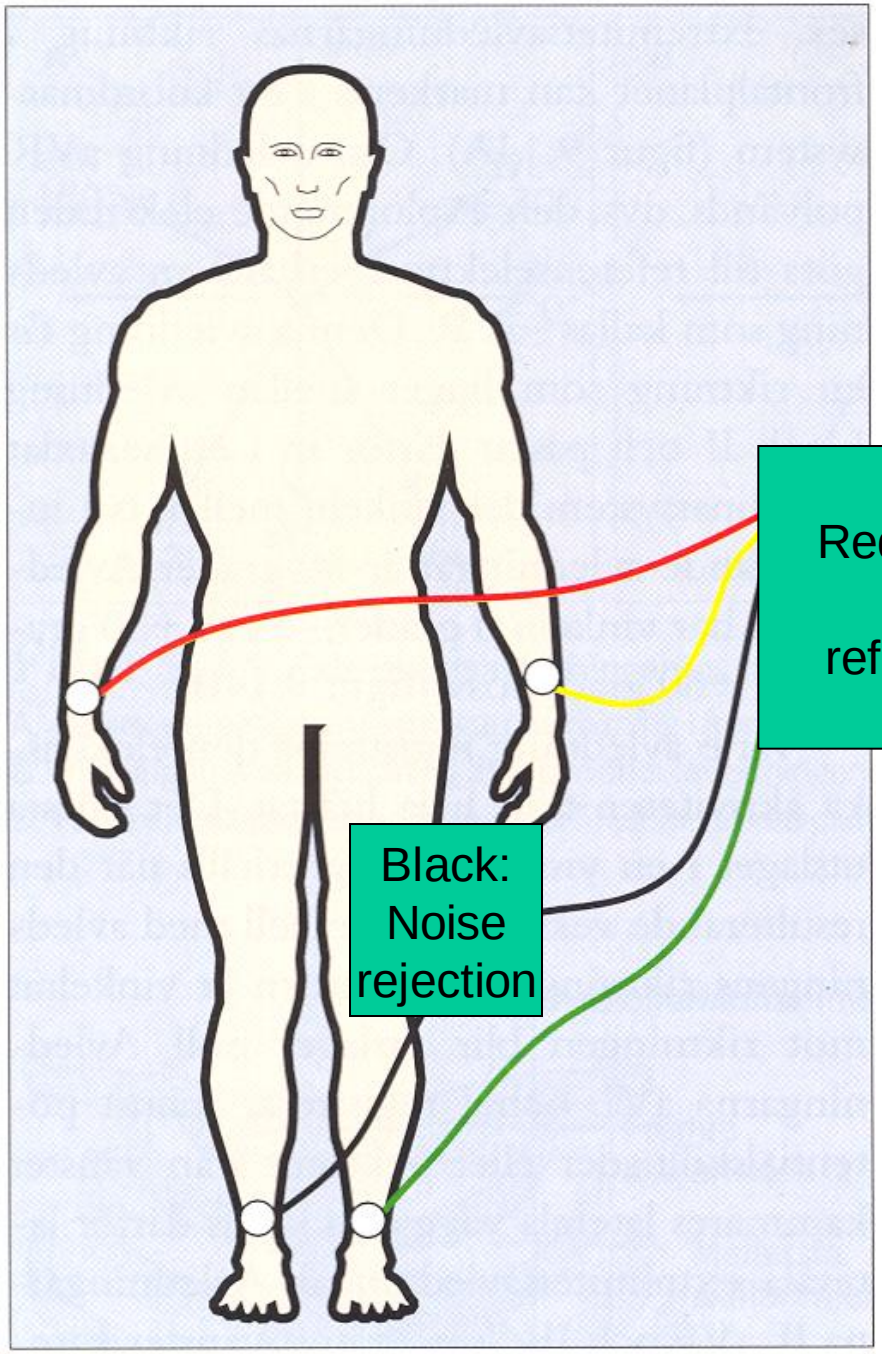
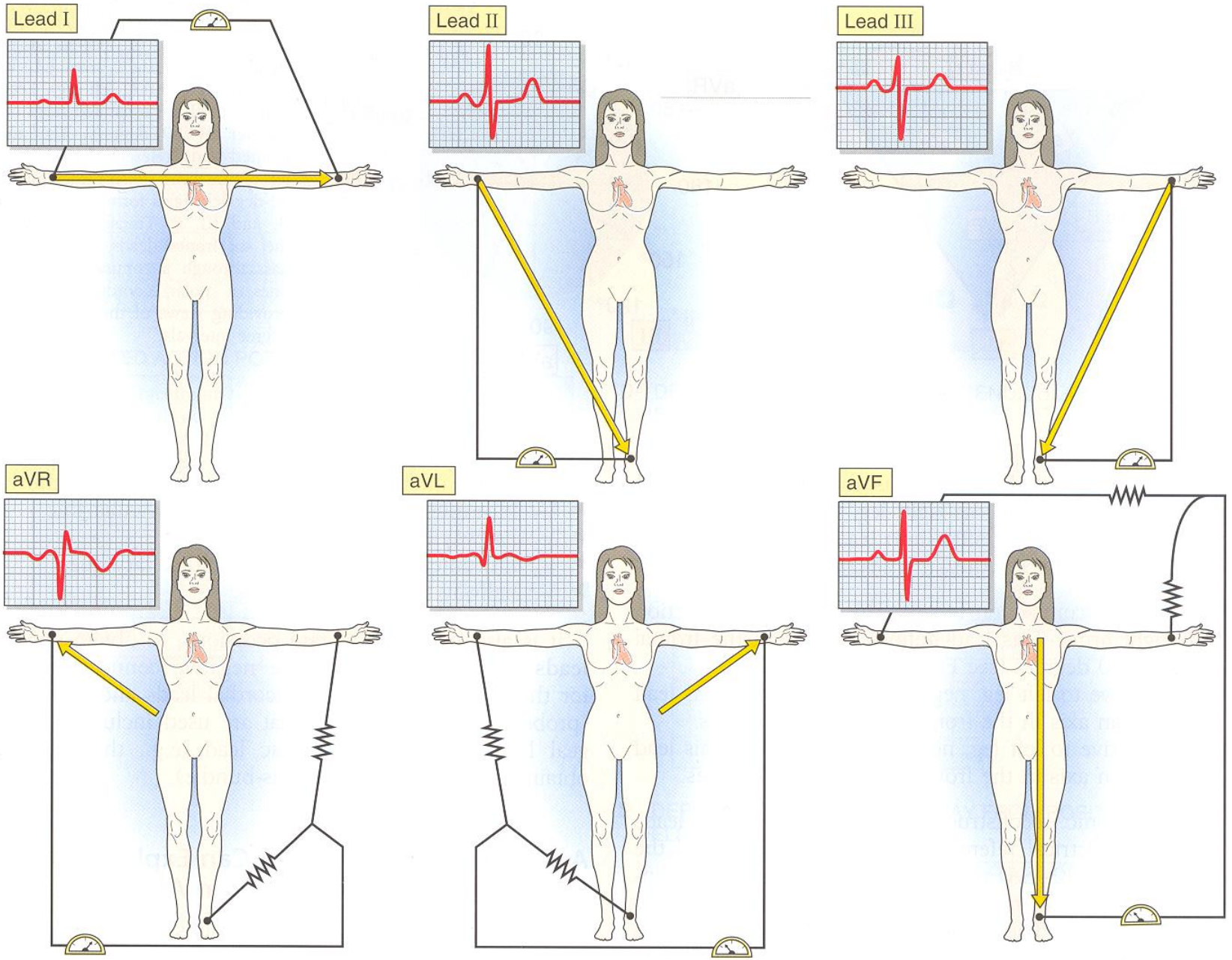
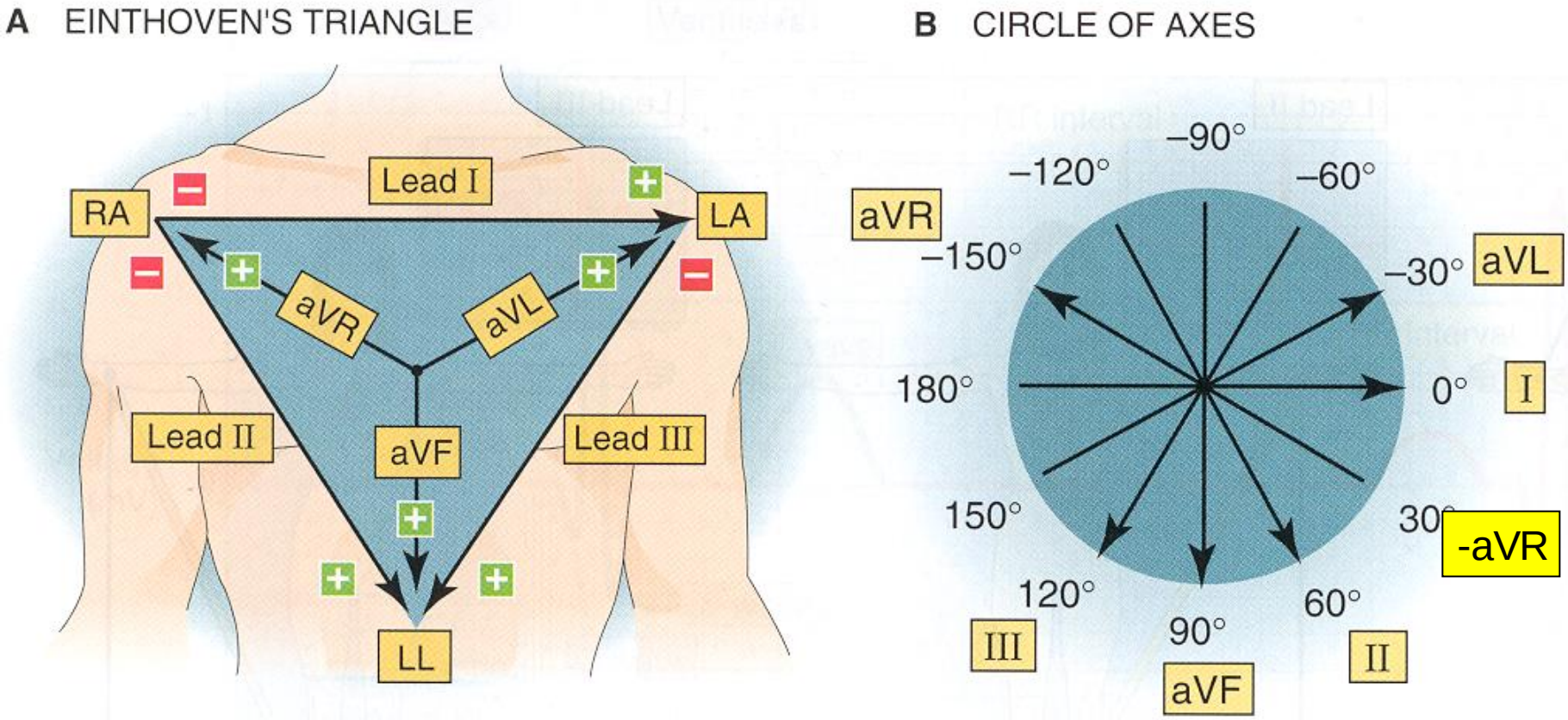



Red+yellow+green=
”neutral”
reference electrode
Black:
Noise
rejection

A FRONTAL PLANE LEADS



Extremitetsavledningar, hjärtat i frontalplanet



Bipolära (+,- elektroder) och
unipolära (explorerande och referenselektrod) avledningar

Elektrisk axel

- Einthovens triangel
- Normalställd (-30->+110), vänsterställd (<-30) och högerställd (>+110)
- Cabrerasystemet

Bröstavledningar, hjärtat i horisontalplanet

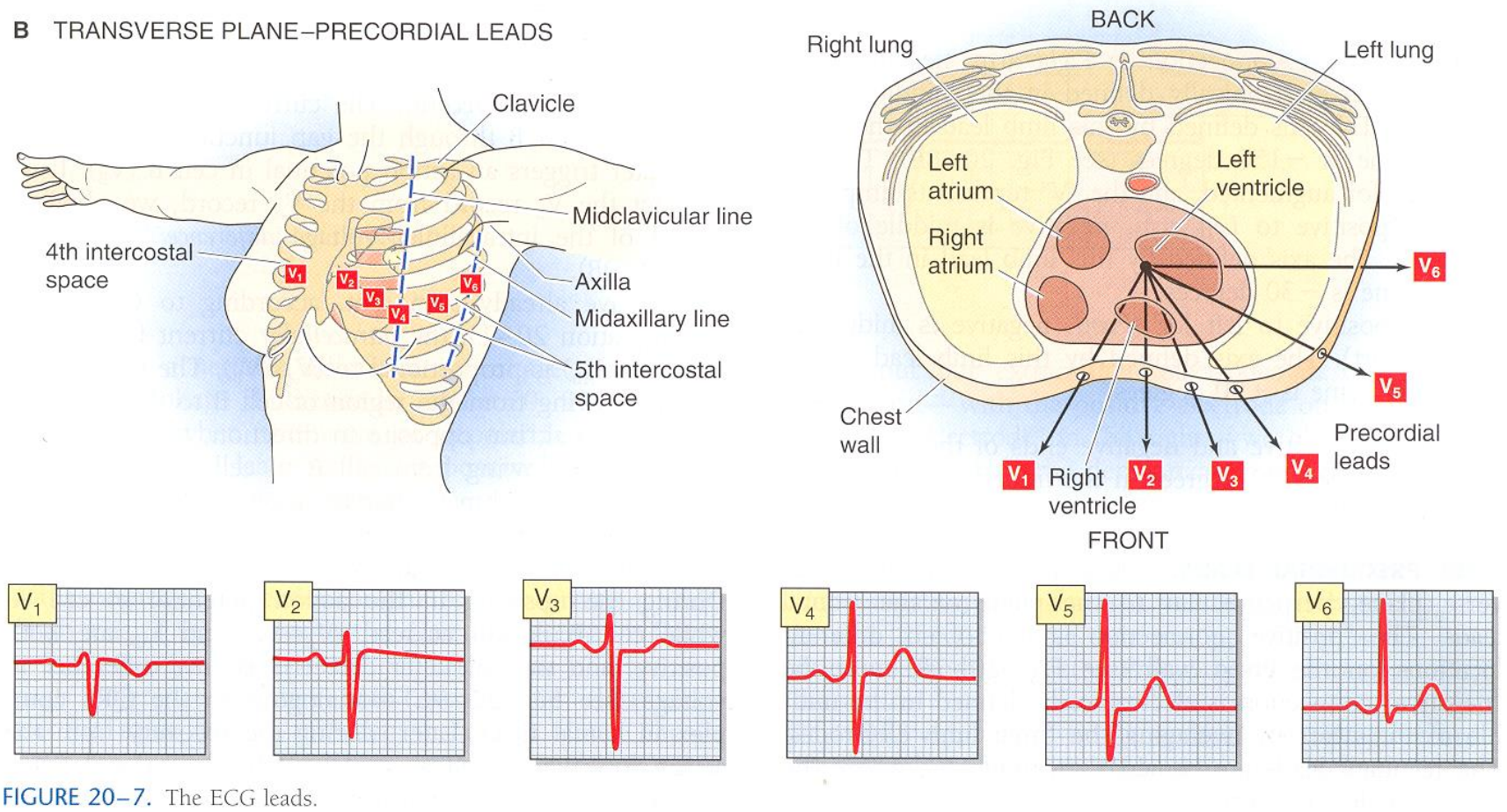
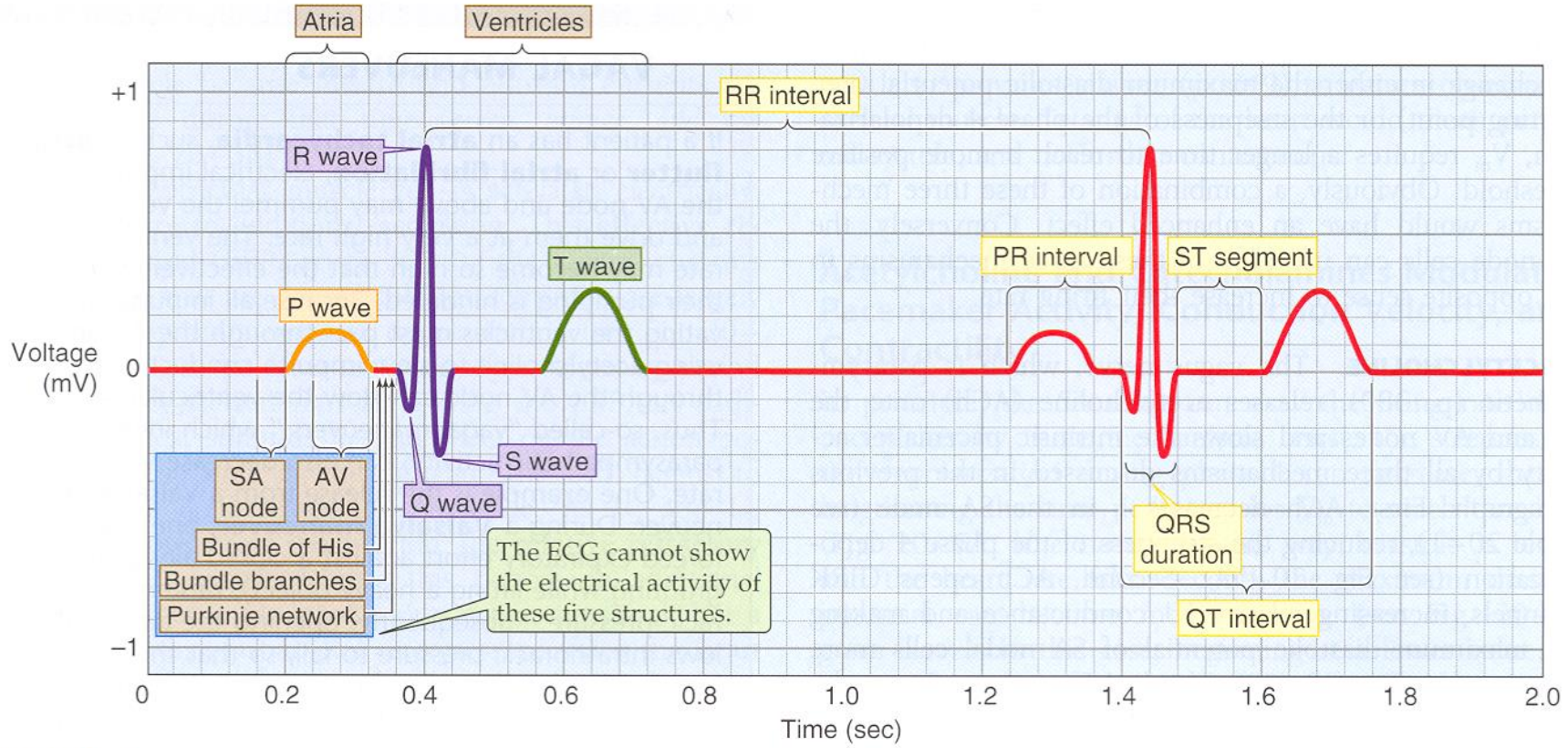


FIGURE 20–7. The ECG leads.

Unipolära avledningar extremitetsanslutningar bildar referenspunkt



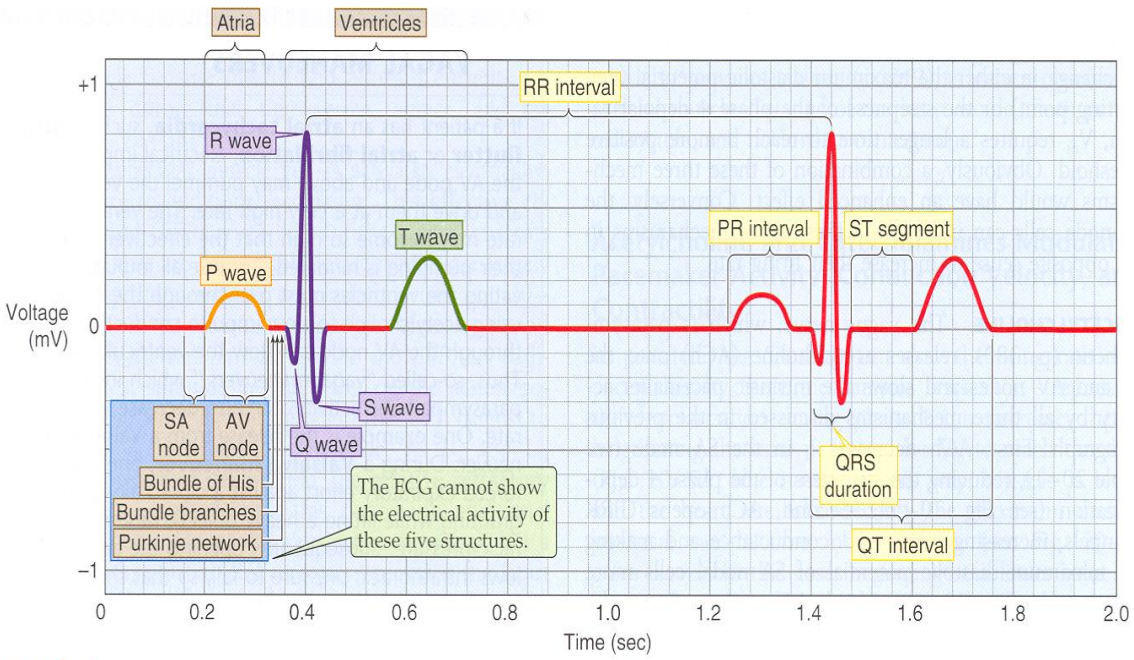
P-våg, PQ-sträcka, QRS-tid, ST-sträcka, T-våg

Några felkällor

- Felkoppling
- Muskelstörningar
- Växelströmsstörningar
- Glapp i elektroder, kalibrering

Principer för tolkning

- Rytm (puls, extraslag)
- P-vågen
- PR-(PQ)-duration (överledningstid)
- QS-durationen
- Elektrisk axel
- QRS-komplexet
- ST-sträckan
- T-vågen



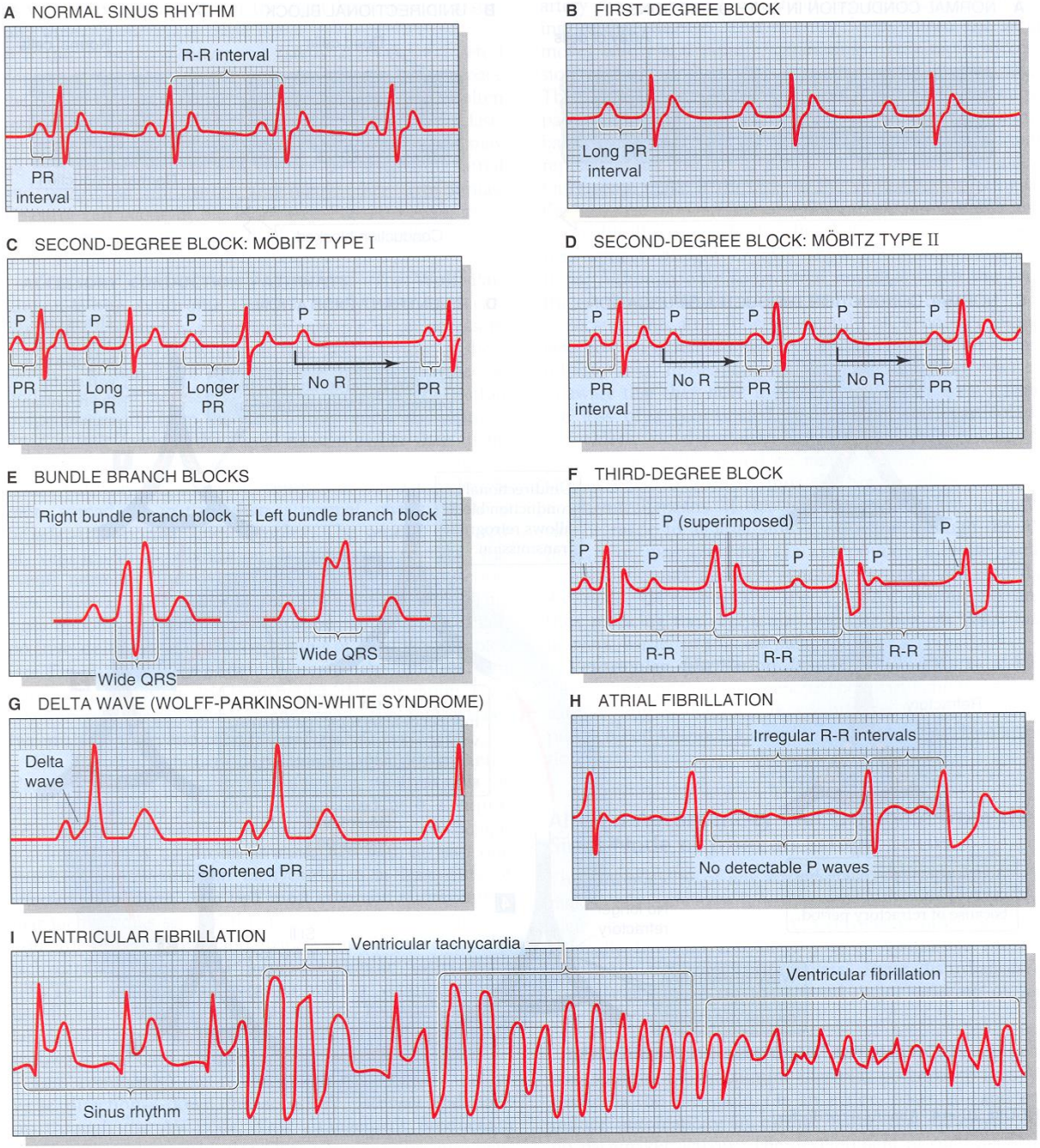


FIGURE 20–13. Pathological ECGs. In *F*, right bundle branch block is visible in the V_1 or V_2 precordial leads, whereas left bundle branch block is visible in the V_5 or V_6 leads. (Data from Chernoff HM: Workbook in Clinical Electrocardiography. New York, Medcom, 1972.)