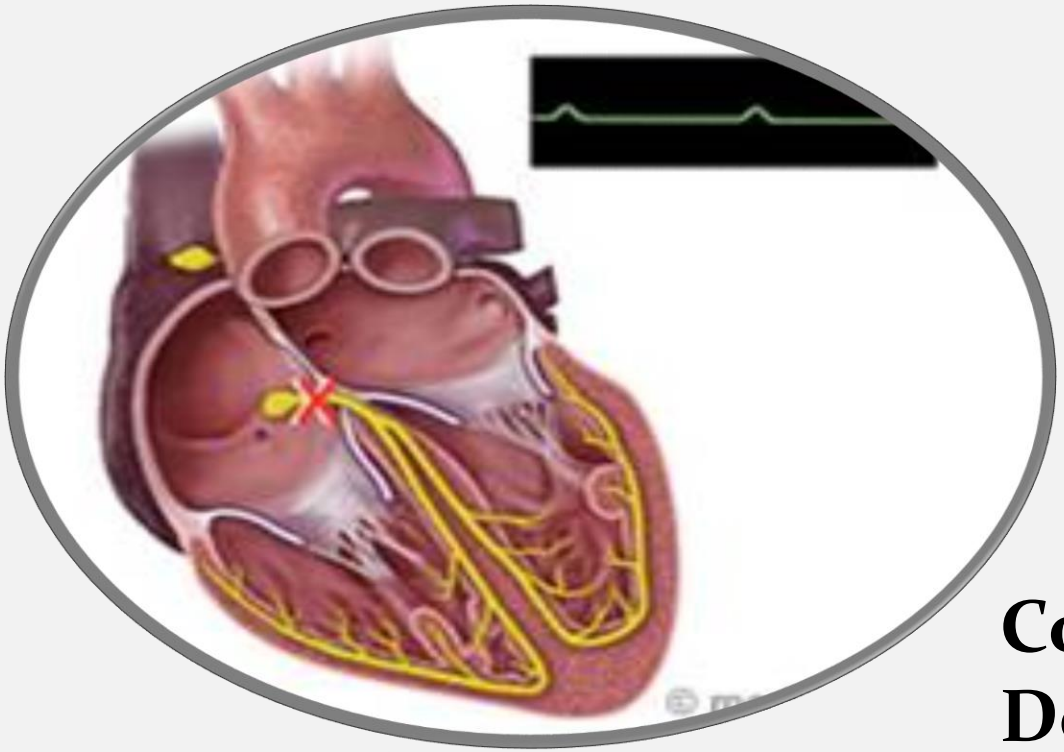
Blocurile cardiace

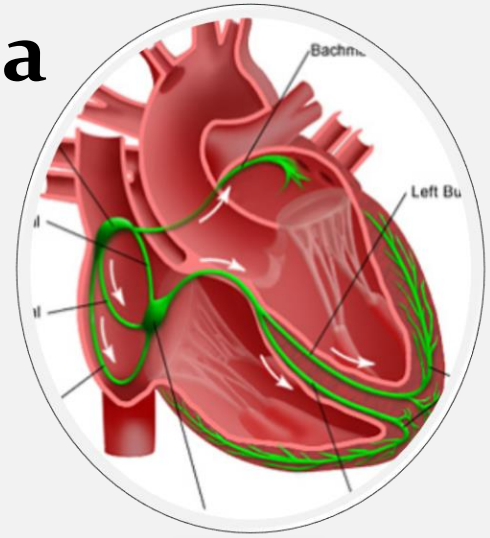


Conferențiar universitar
Doctor în medicină
Alexandra Grejdieru

Definiție

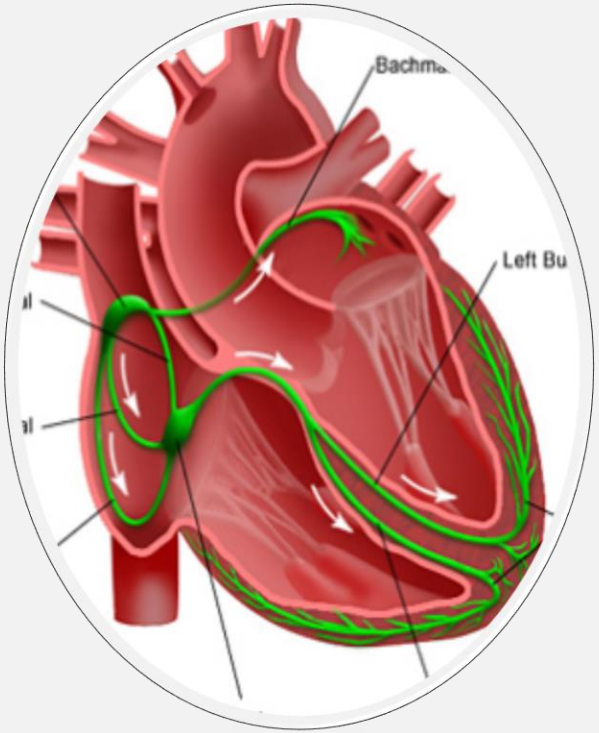
Blocurile cardiace sunt tulburări în conducerea impulsului, tranzitorii sau permanente, datorate unor anomalii funcționale sau organice.

Blocul poate apare în orice parte a inimii unde există o conducere a impulsului electric.



Clasificare

1. **Blocuri sinoatriale (SA)**
    - Gradul I
    - Gradul II
        - Tipul I (**Mobitz I**)
        - Tipul II(**Mobitz II**)
    - Gradul III (bloc total)
2. **Blocuri intraatriale**
3. **Blocuri atrioventriculare (AV)**
    - Gradul I
    - Gradul II
        - Tipul I (**Mobitz I**)
        - Tipul II(**Mobitz II**)
    - Gradul III (bloc total)



Clasificare

4. **Blocul intraventricular**

Blocul de ramură dreaptă a f. Hiss

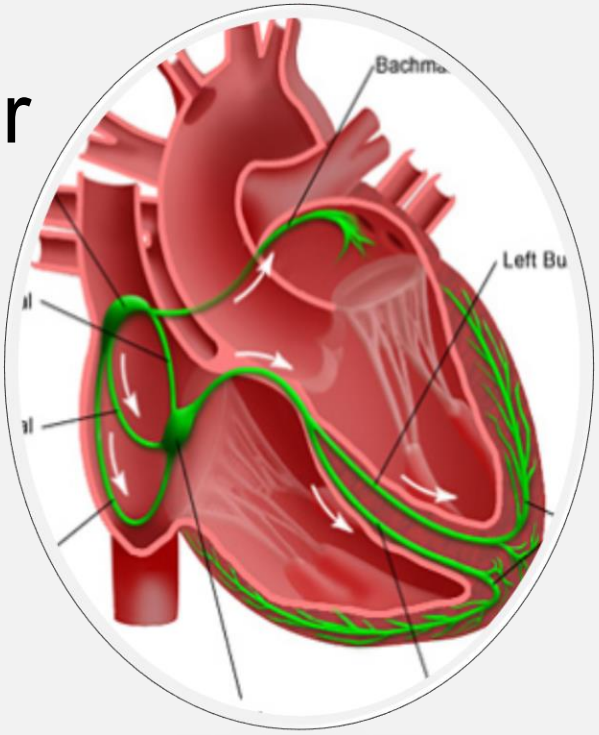
Blocul de ramură stângă a f. Hiss

hemibloc stâng anterior

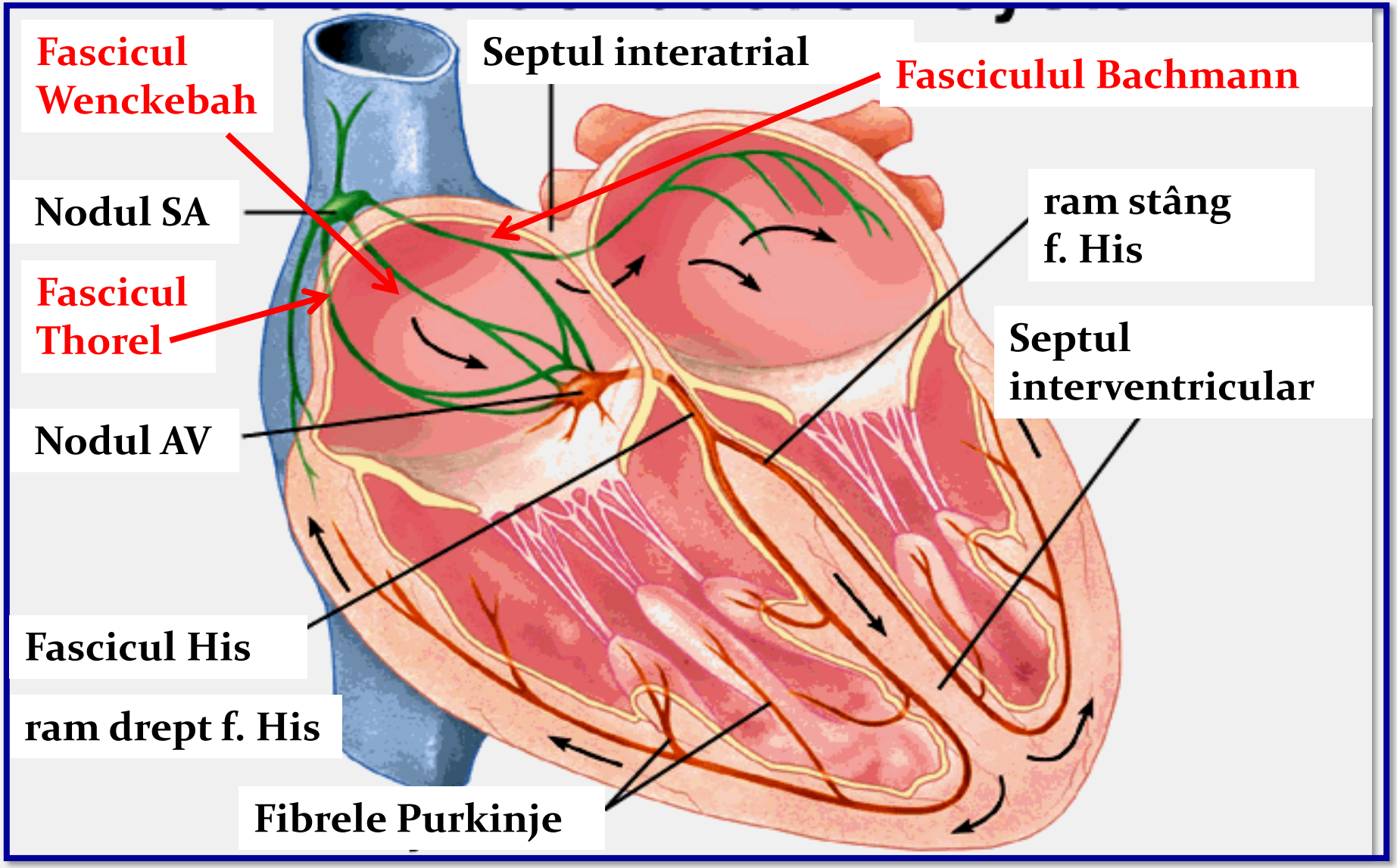
hemibloc stâng posterior

Bloc bifascicular

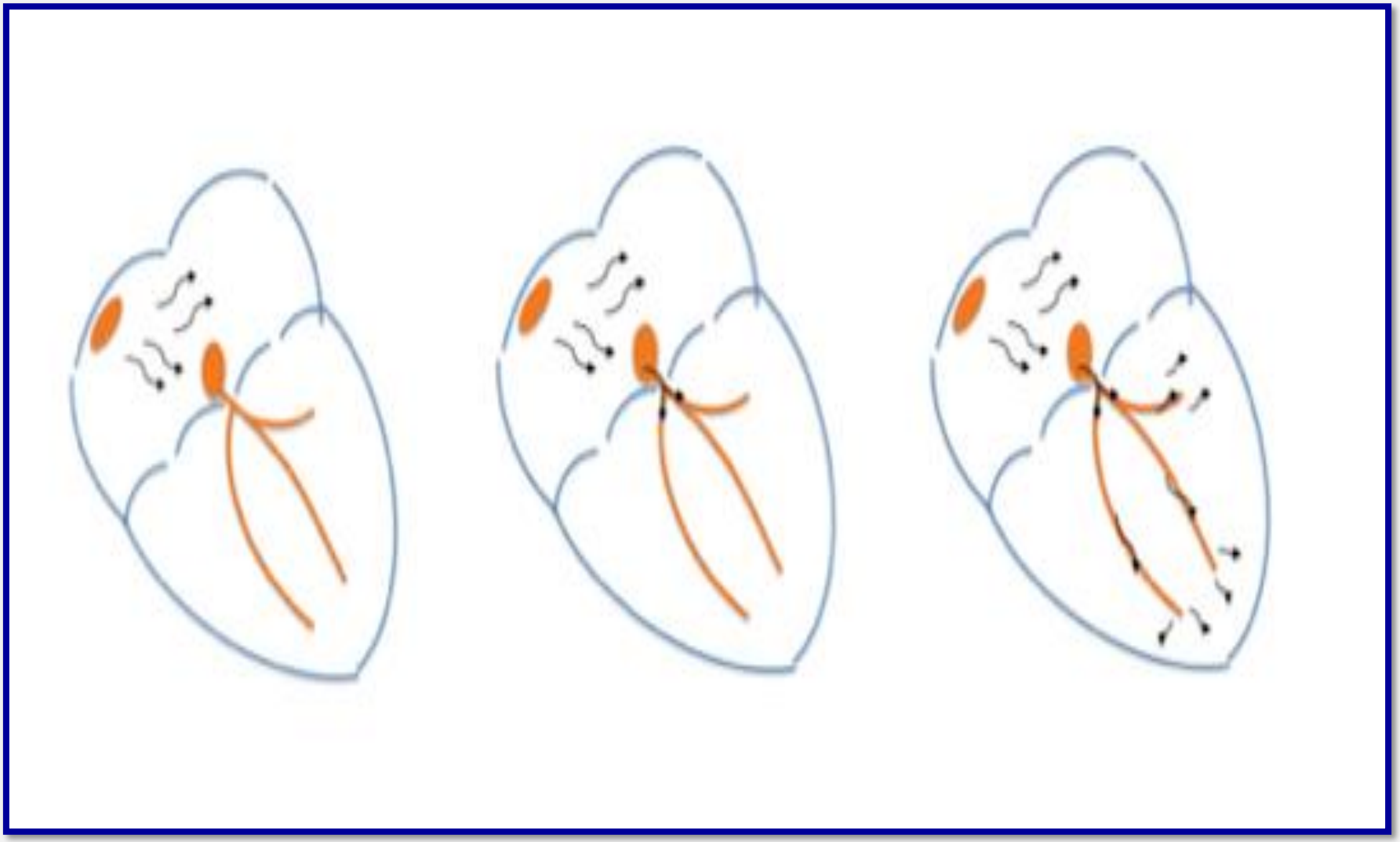
Bloc trifascicular



Sistemul de automatism și conducere a impulsului cardiac



Propagarea impulsului cardiac în normă



Etiologie

1. **Blocuri acute**

- **<u>boala coronariană</u>:**
  - ✓ infarctul miocardic acut (inferior-BAV cu sediu nodal, anterior-BAV cu sediu infranodal)
  - ✓ angina Printzmetal;
- **<u>post operator</u>**
  - ✓ protezare valvulara
- **<u>boli infecțioase</u>**:
  - ✓ endocardite bacteriene
  - ✓ Infecții virale
  - ✓ Rickețioze
  - ✓ Difterie
- **<u>medicamente</u>**:
  - ✓ beta blocante
  - ✓ Digitalice
  - ✓ Amiodarona
  - ✓ Verapamil
  - ✓ antiaritmice clasa I
- **<u>stimulare vagală</u>**

Etiologie

2. Blocuri cronice

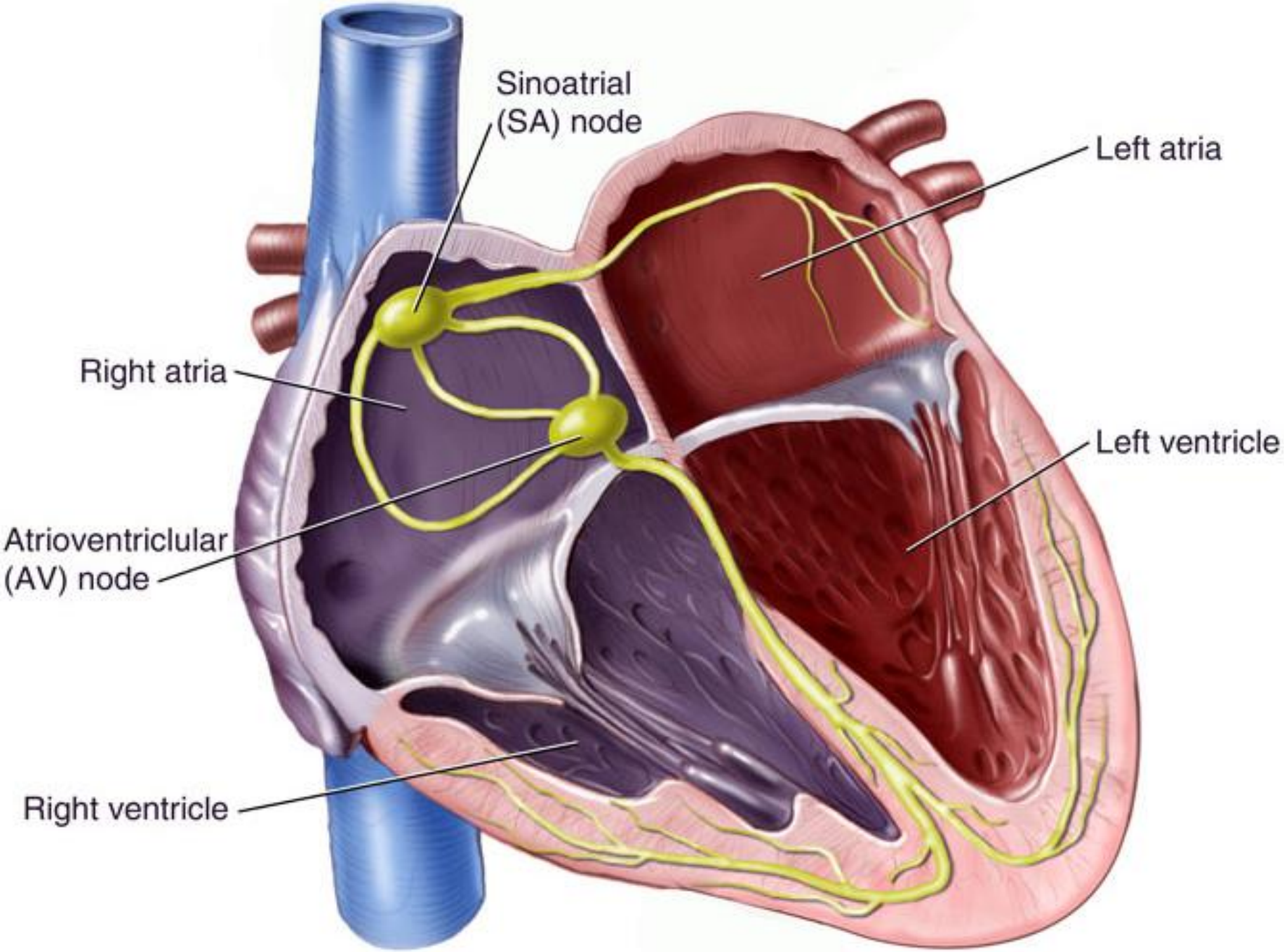
I. Congenitale

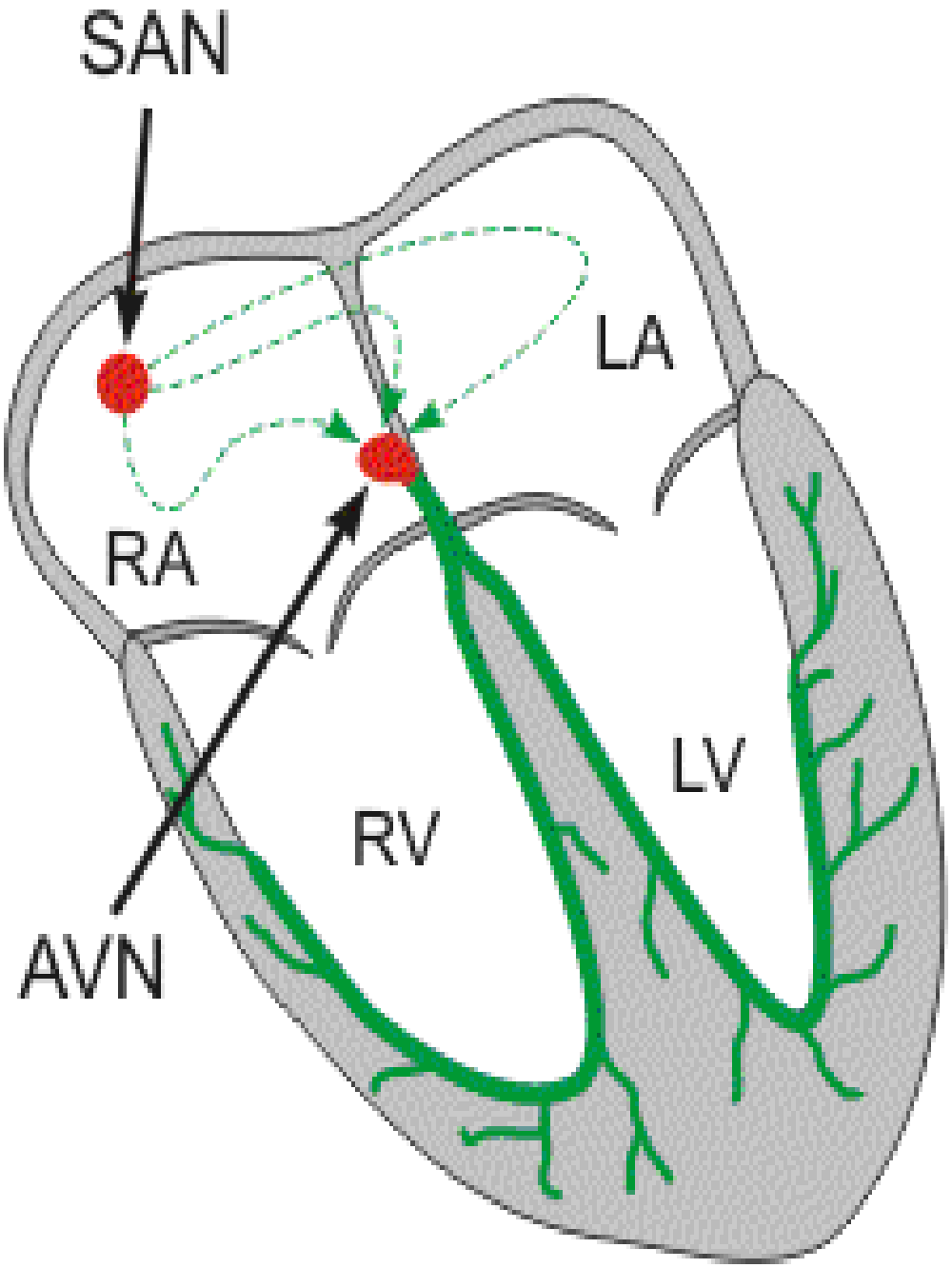
II. Dobândite

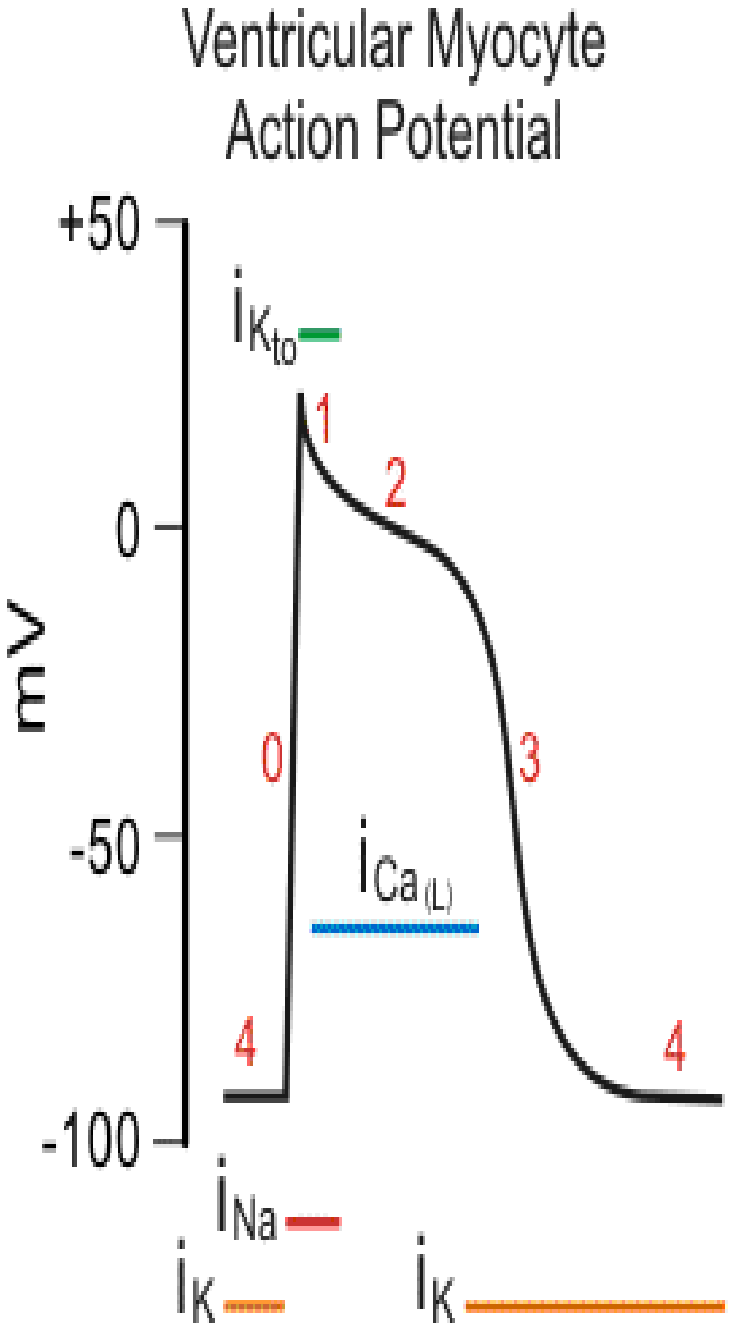
- **<u>Cardiopatii</u>**
  - ✓ valvulopatii degenerative (aortice)
  - ✓ CMH obstructivă
  - ✓ CMP fără obstrcucție
- **<u>Postoperator</u>**
  - ✓ protezare valvulară
- **<u>Manevre terapeutice</u>**
  - ✓ întreruperea propagării impulsului pe fasciculul His
- **<u>stimulare vagală cronică</u>** (sportivi antrenați)

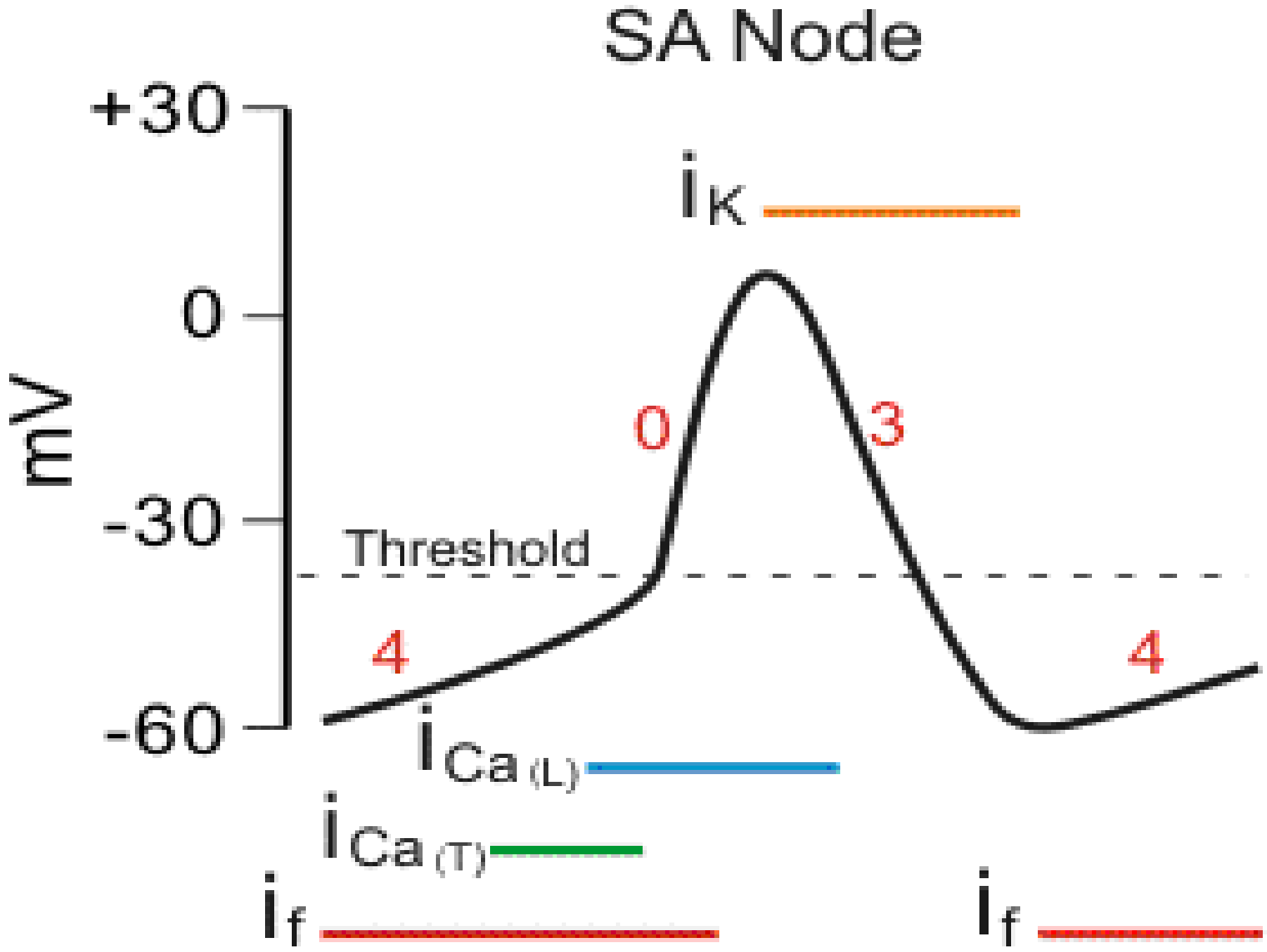
III. Ideopatice

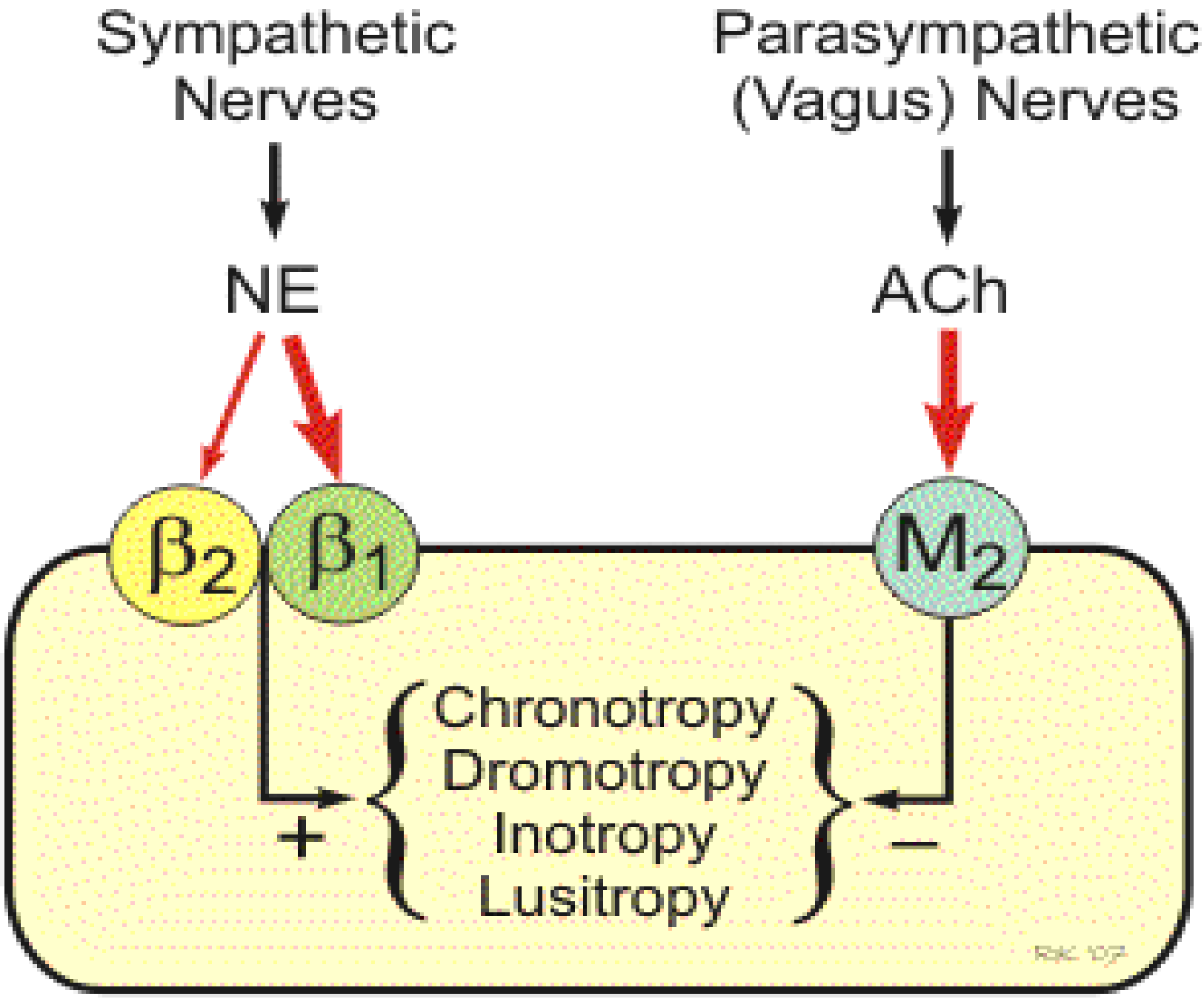
- leziuni degenerative (cele mai frecvente).


Sinoatrial
(SA) node
Left atria
Right atria
Left ventricle
Atrioventriclular
(AV) node
Right ventricle


SAN
LA
RA
LV
RV
AVN


Ventricular Myocyte
Action Potential
+50
0
-50
-100
mV
$i_{K_{to}}$
1
2
0
3
$i_{Ca(L)}$
4
4
i_{Na}
i_K
i_K

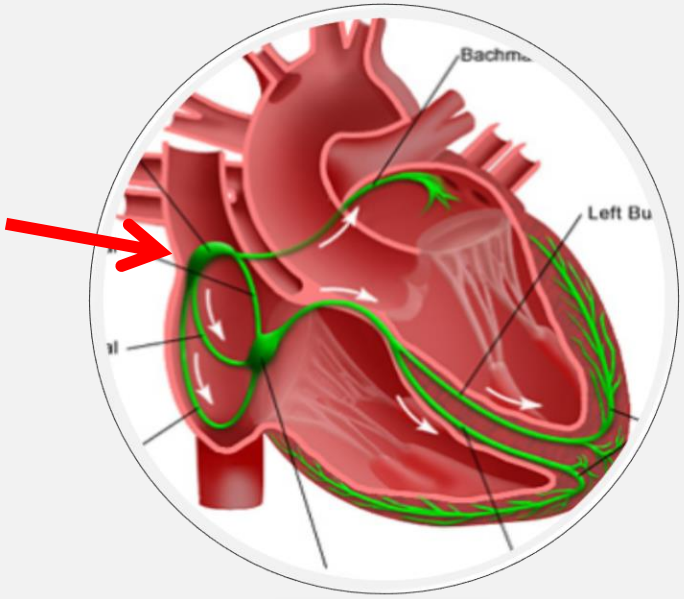

SA Node
+30
0
-30
-60
mV
i_K
0
3
Threshold
4
4
$i_{Ca\,(L)}$
$i_{Ca\,(T)}$
i_f
i_f



Cardiomyocyte

Blocul sino-atrial

o tulburare de conducere la nivel sino-atrial, cu întârzierea sau absența depolarizarii nodului sino-atrial și respectiv a miocardului atrial.

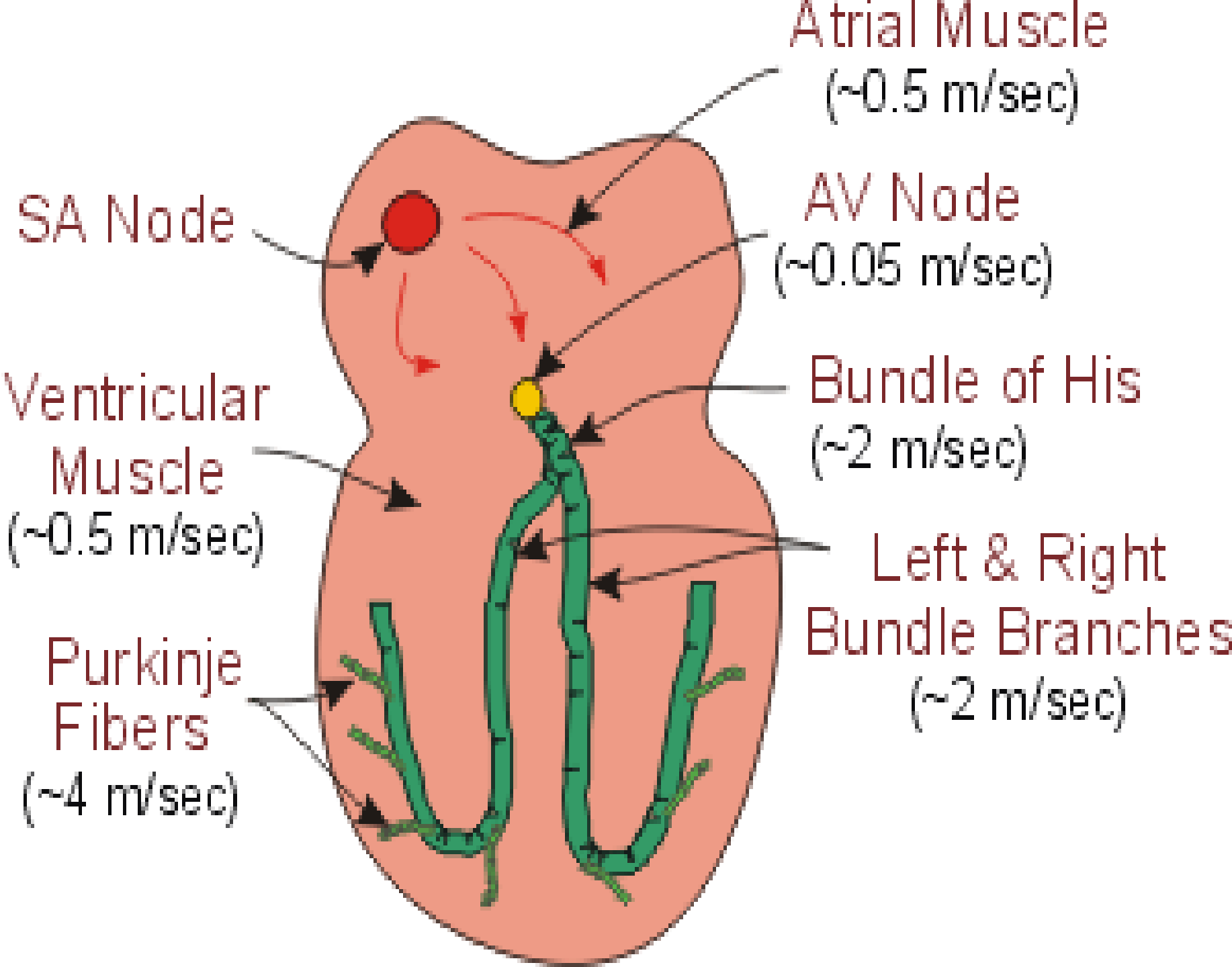


Blocul sino-atrial de gradul I

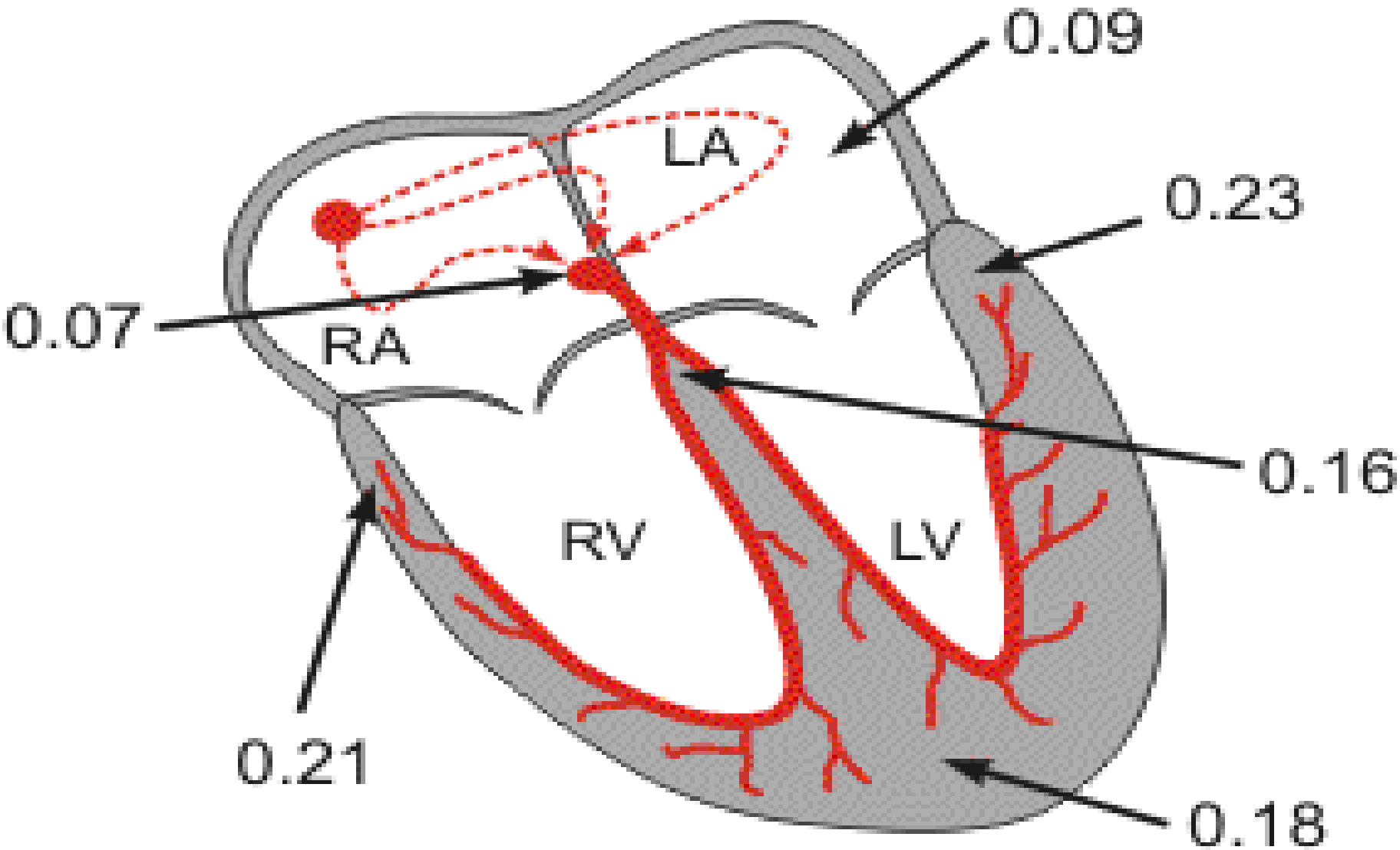
întârzierea depolarizarii de la nodul sinusal la atrii

nu poate fi diagnosticat pe ECG, dar clinic prezintă presincope

BOALA NODULUI SINUSAL


Atrial Muscle
(~0.5 m/sec)
SA Node
AV Node
(~0.05 m/sec)
Ventricular
Muscle
(~0.5 m/sec)
Bundle of His
(~2 m/sec)
Left & Right
Bundle Branches
(~2 m/sec)
Purkinje
Fibers
(~4 m/sec)

Cardiac Activation Times
(seconds)



Blocul sino-atrial de gradul II

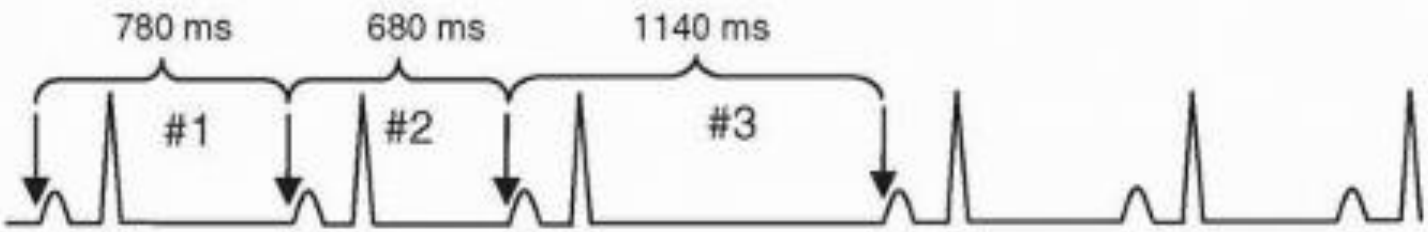
blocarea intermitentă a depolarizarii la nivel sino-atrial.

Blocul sino-atrial de gradul II tip II Mobits 2:1 persistent se suprapune perfect pe o bradicardie sinusală cu frecvenţă la jumătate din ritmul nodului sinusal.

- **poate fi asimptomatic**
- **poate apărea nocturn la**
  - **tineri**
  - **sportivi**

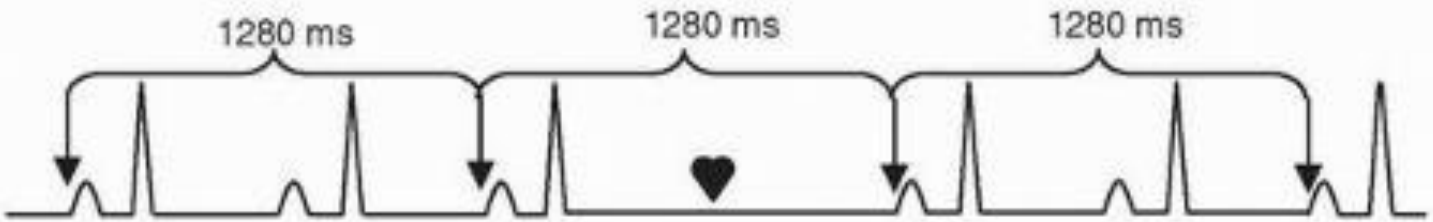
A. Normal Baseline:

B. 2° Type I or SA Wenckebach



P-P interval shortens before the pause

C. 2° Type II SA Exit Block

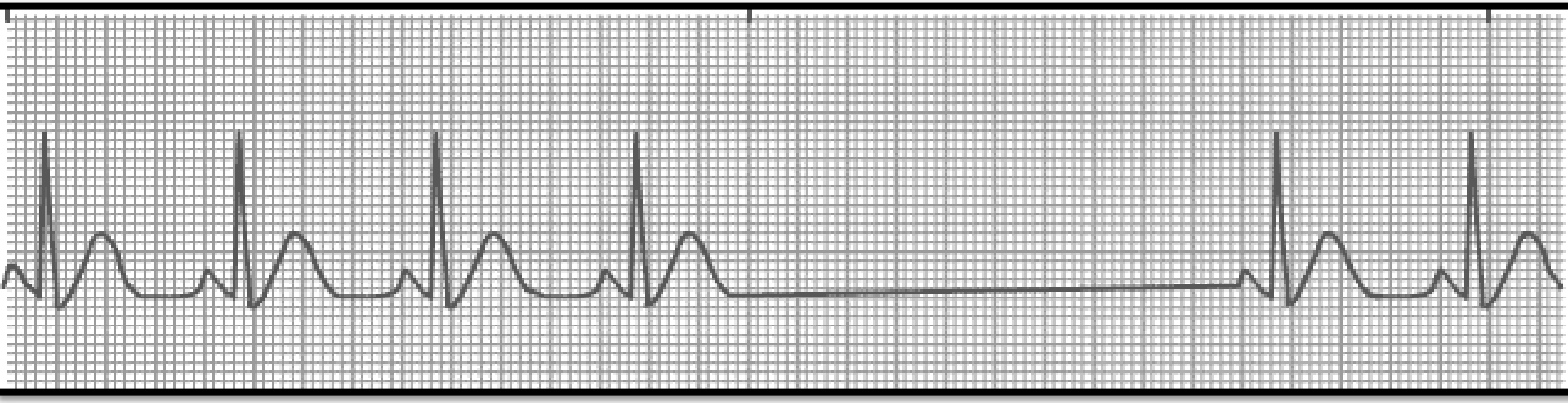


P-P intervals are fixed

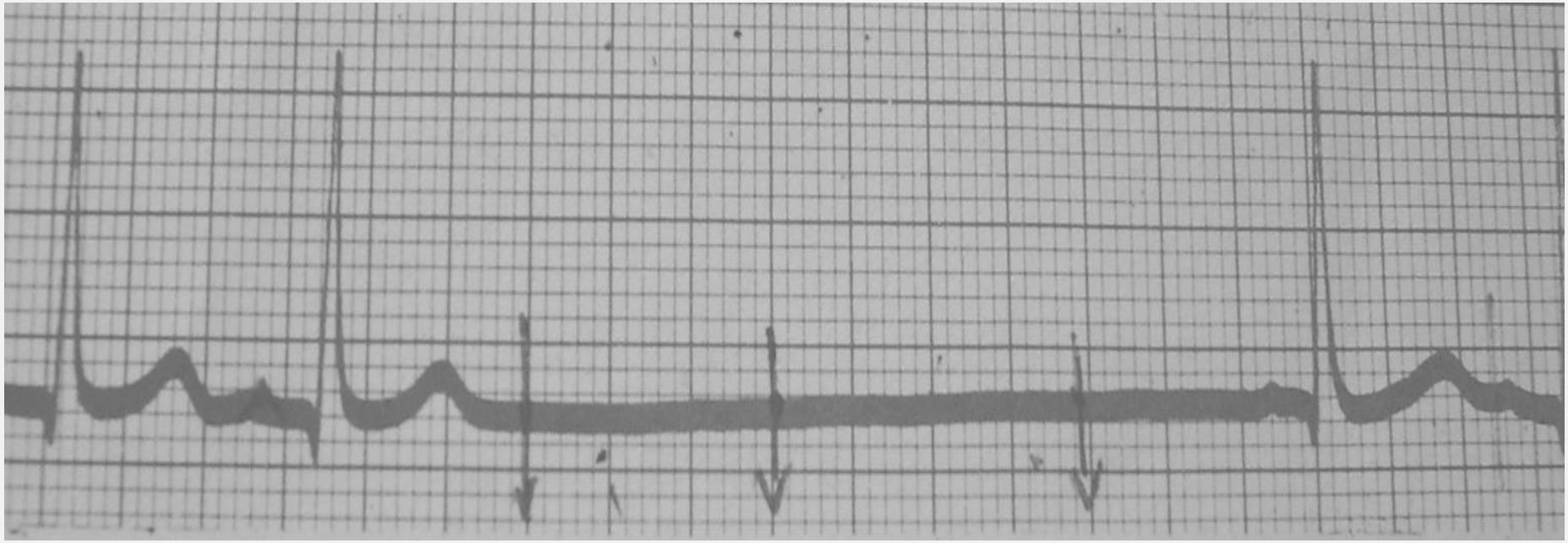
D. Probable 3° SA Exit Block or Sinus Arrest

Bloc sinoatrial gr. II, tip I

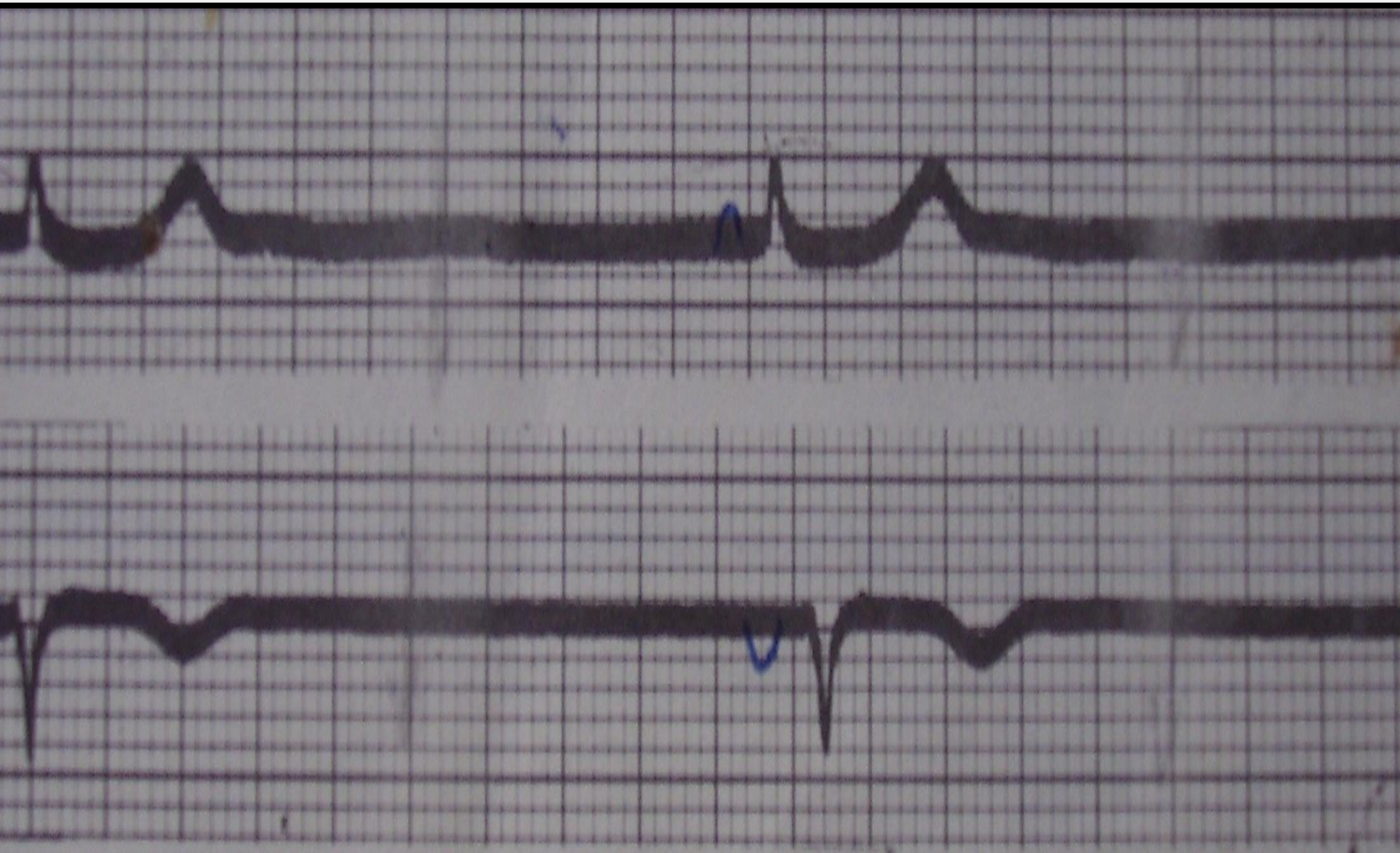
Bloc sinoatrial gr. II, tip II



Bloc sinoatrial gr. II, tip II Mobitz, cu căderea a 1,2,3... complexe PQRST



Bloc sinoatrial gr. II, tip II cu căderea fiecărui al 2 c. PQRS

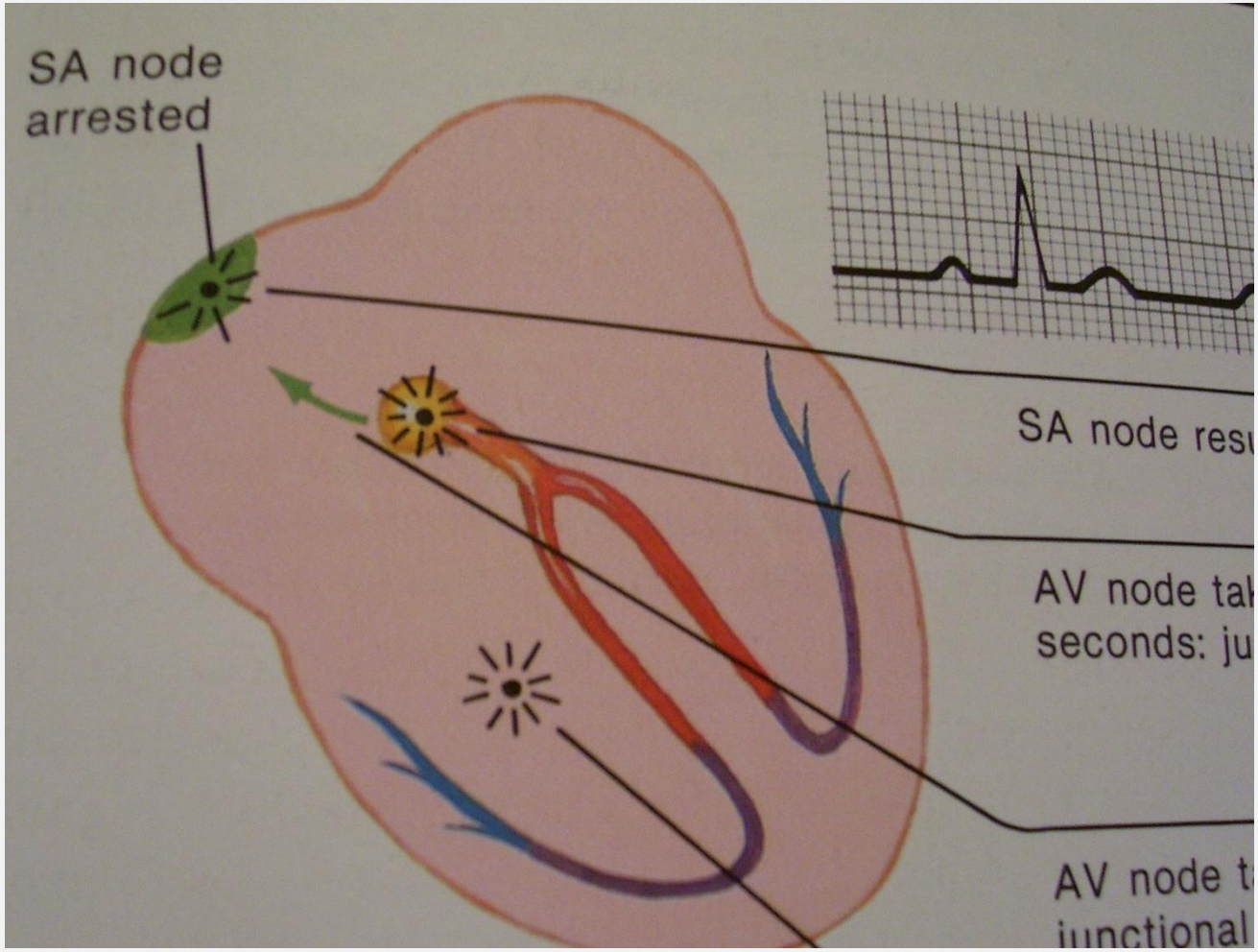


Blocul sino-atrial de gradul III

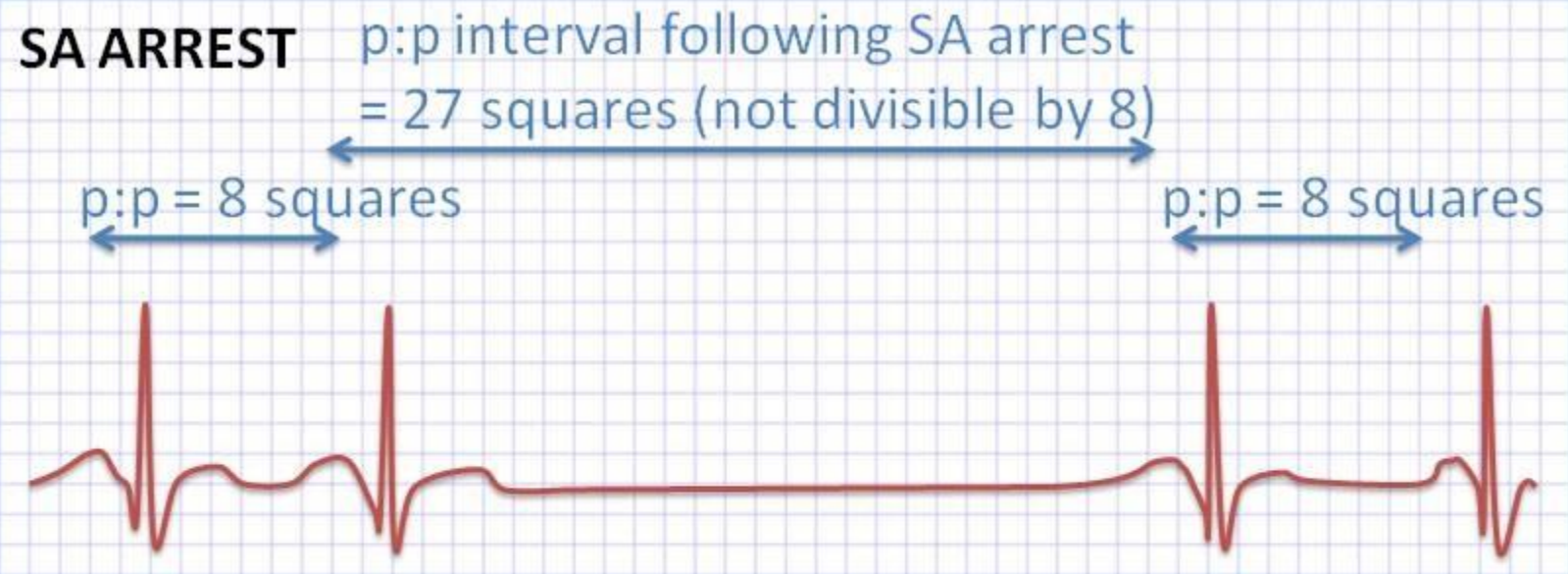
blocarea transmiterii impulsului de la nodul sino-atrial la atrii și înlocuirea ritmului sinusal cu un alt ritm, ectopic:

- **atrial inferior**
- **jonctional (superior, mediu și inferior)**
- **ventricular**

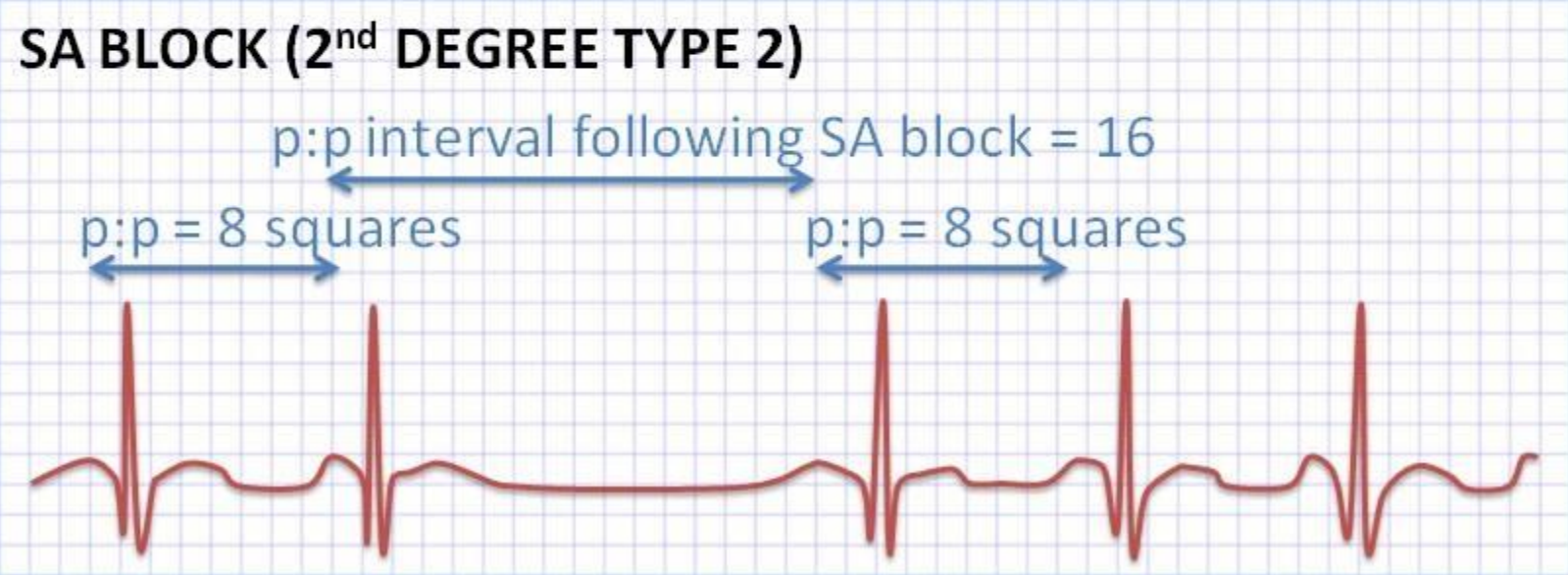
Bloc sinoatrial gr. III



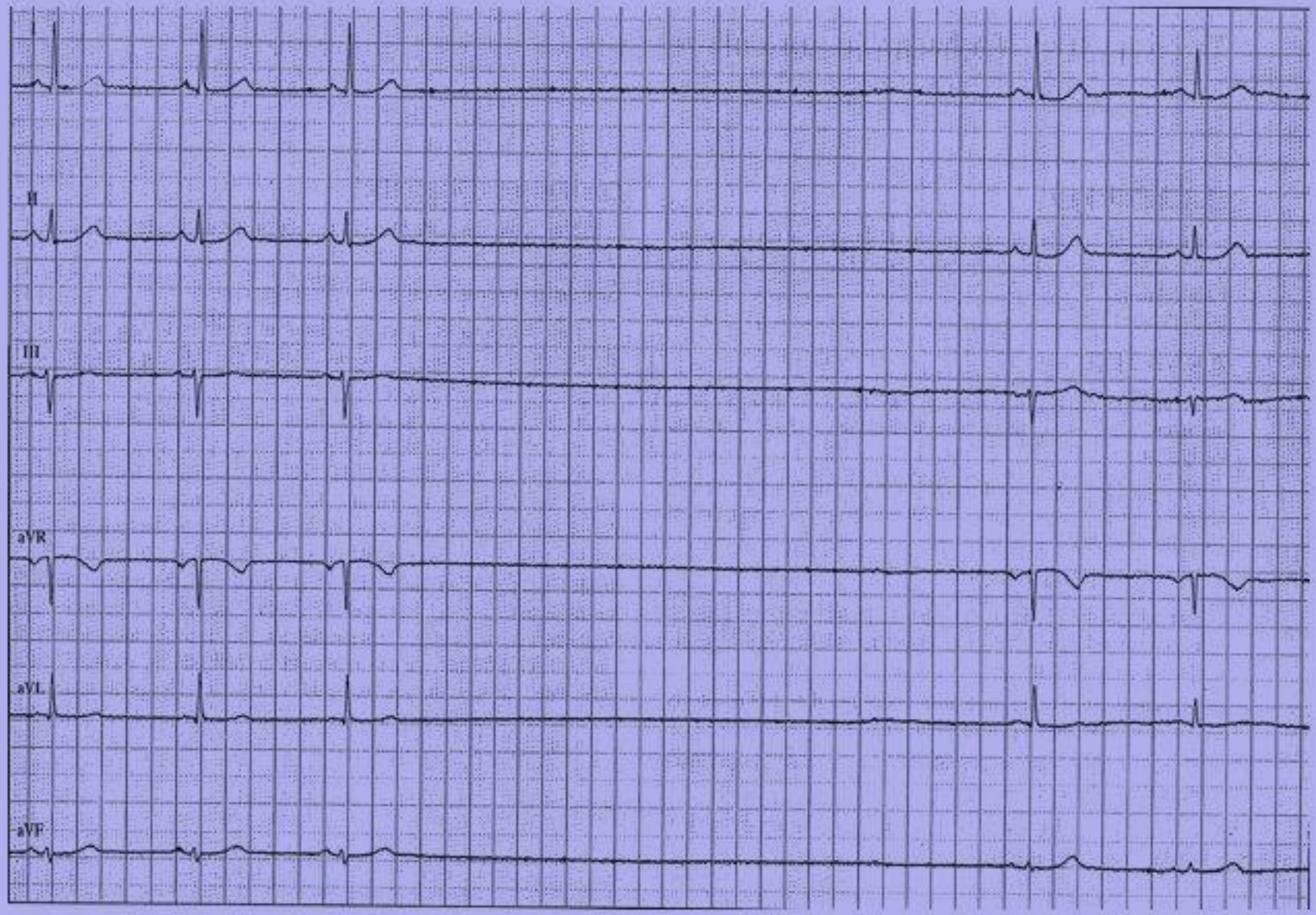
SA ARREST



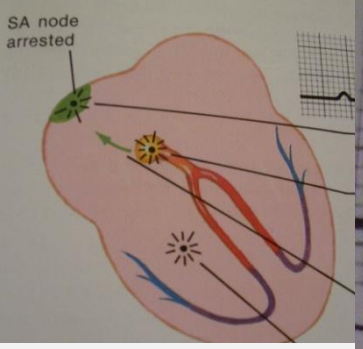
SA BLOCK (2nd DEGREE TYPE 2)

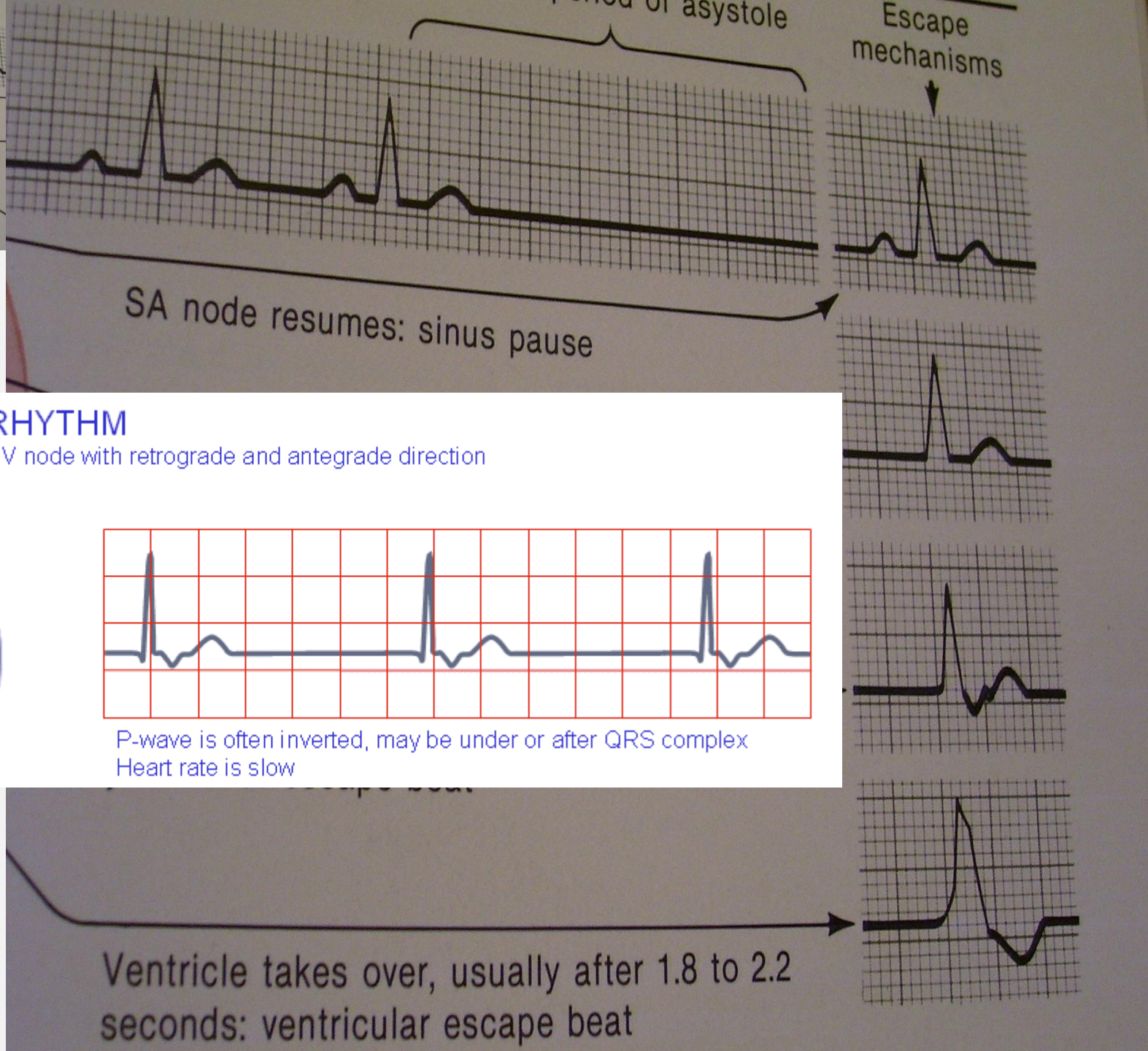


fastbleep))



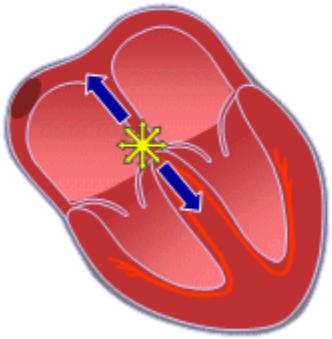
BY EPDATABANK BY CARDIOSTIM





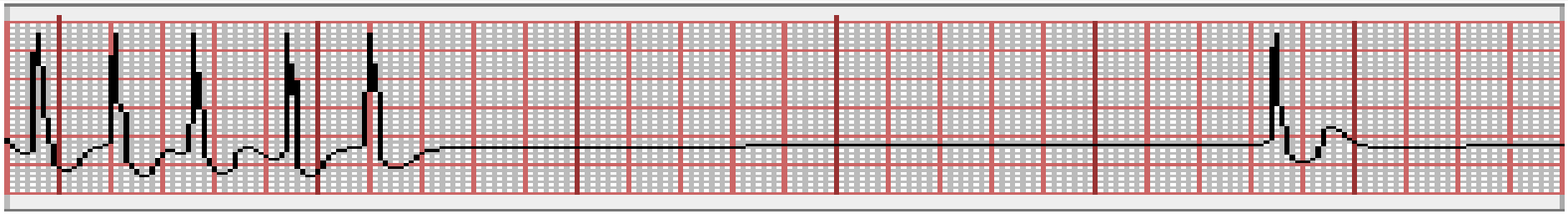
JUNCTIONAL RHYTHM

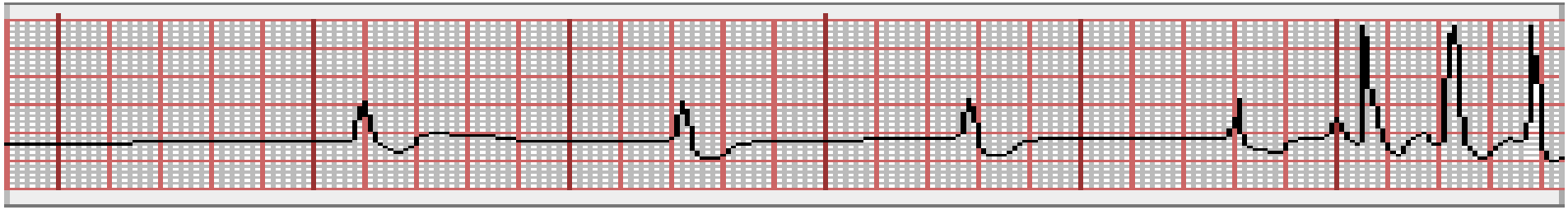
Impulses originate at AV node with retrograde and antegrade direction

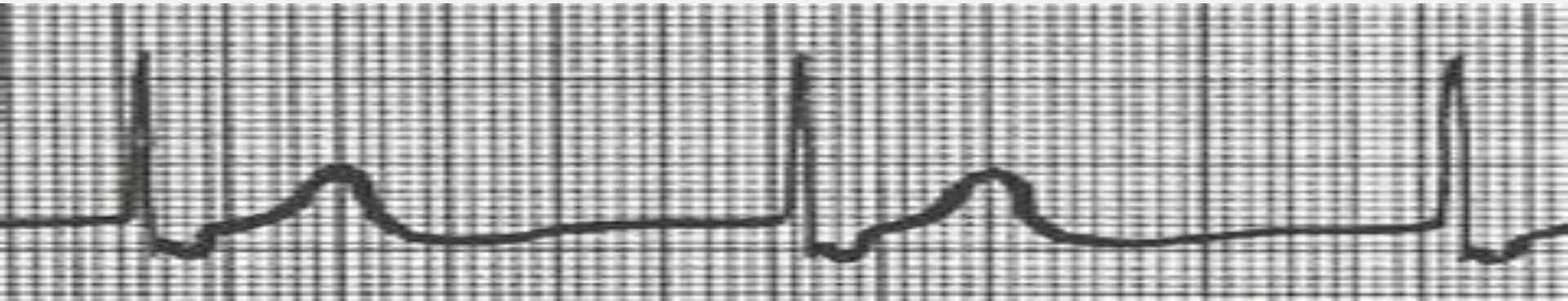


P-wave is often inverted, may be under or after QRS complex
Heart rate is slow

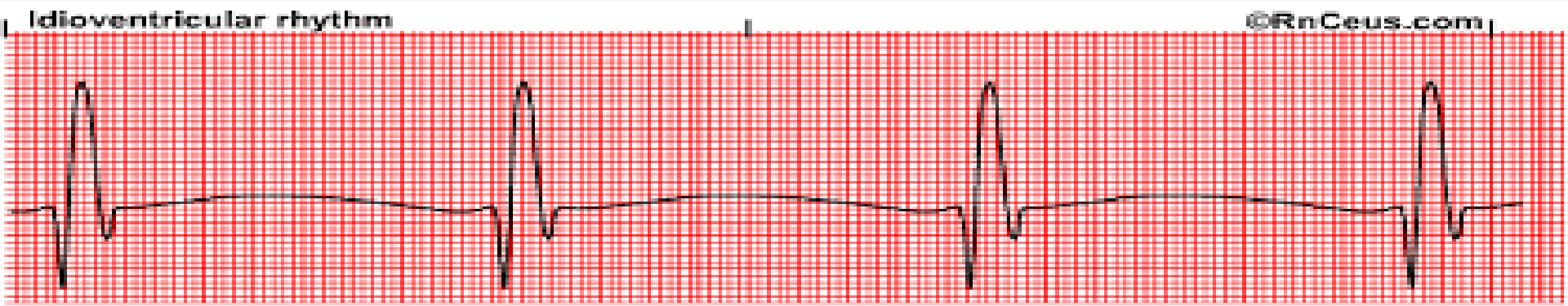
BLOC SA GR.III





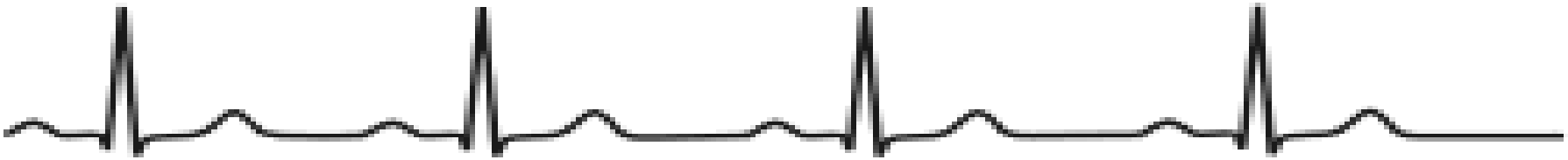


BLOC SA GR.III

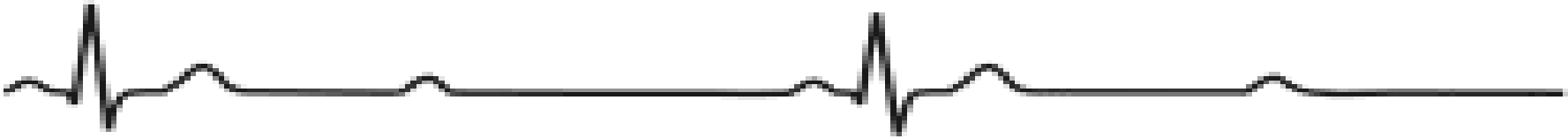


BLOCURILE ATRIOVENTRICULARE

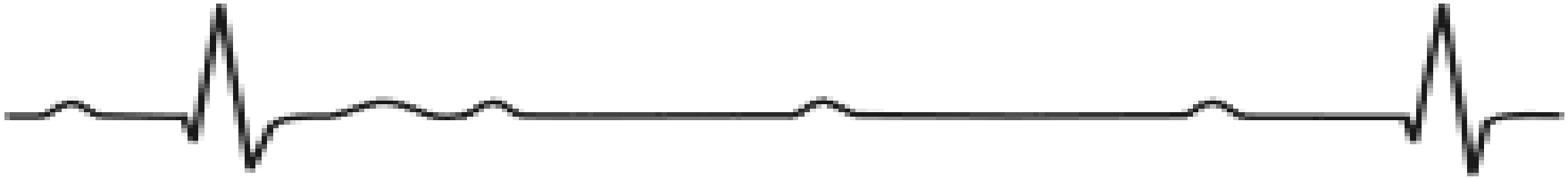
Ritm sinusal



Bloc atrioventricular gradul I



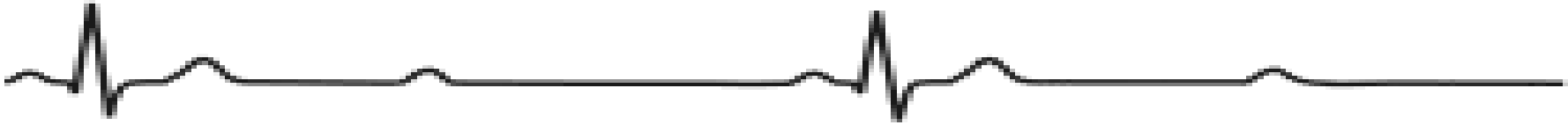
Bloc atrioventricular gradul II, tipII, Mobitz II, 2:1



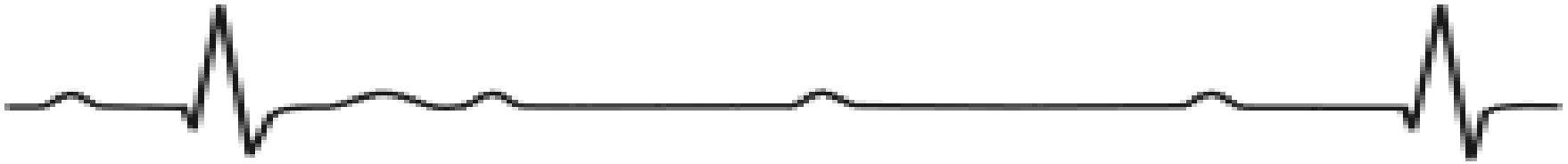
Bloc atrioventricular gradul III

Normal

First-Degree AV Block



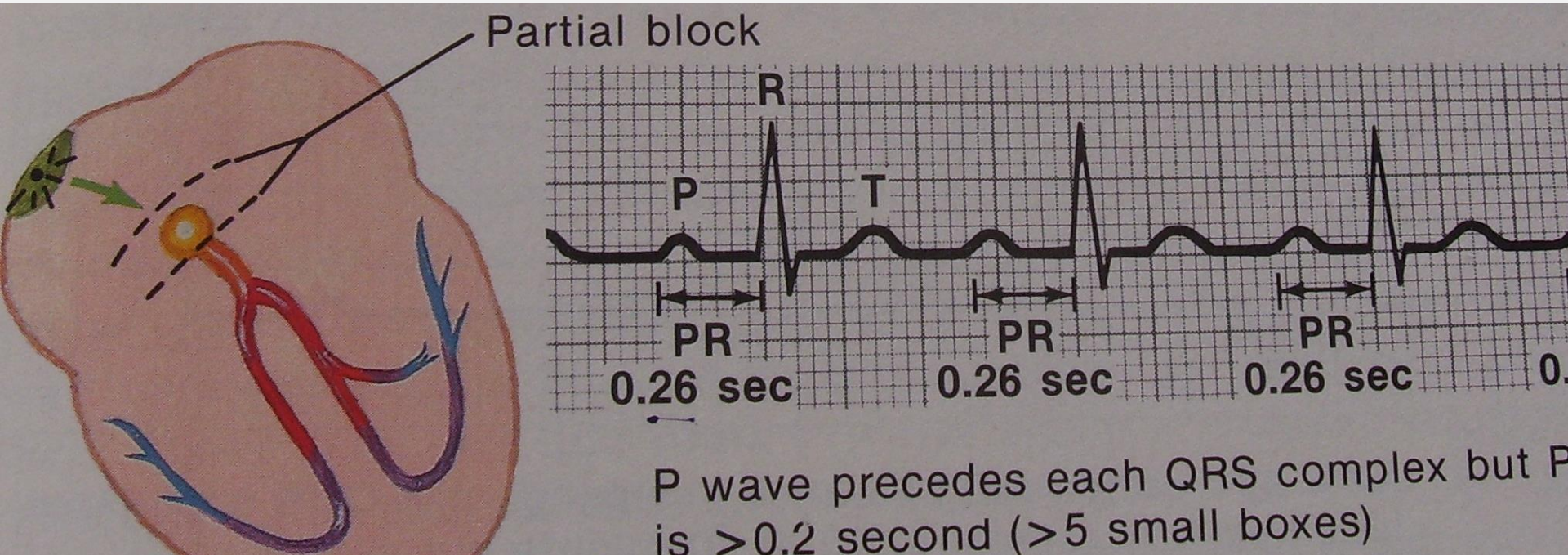
Second-Degree AV Block (2:1)



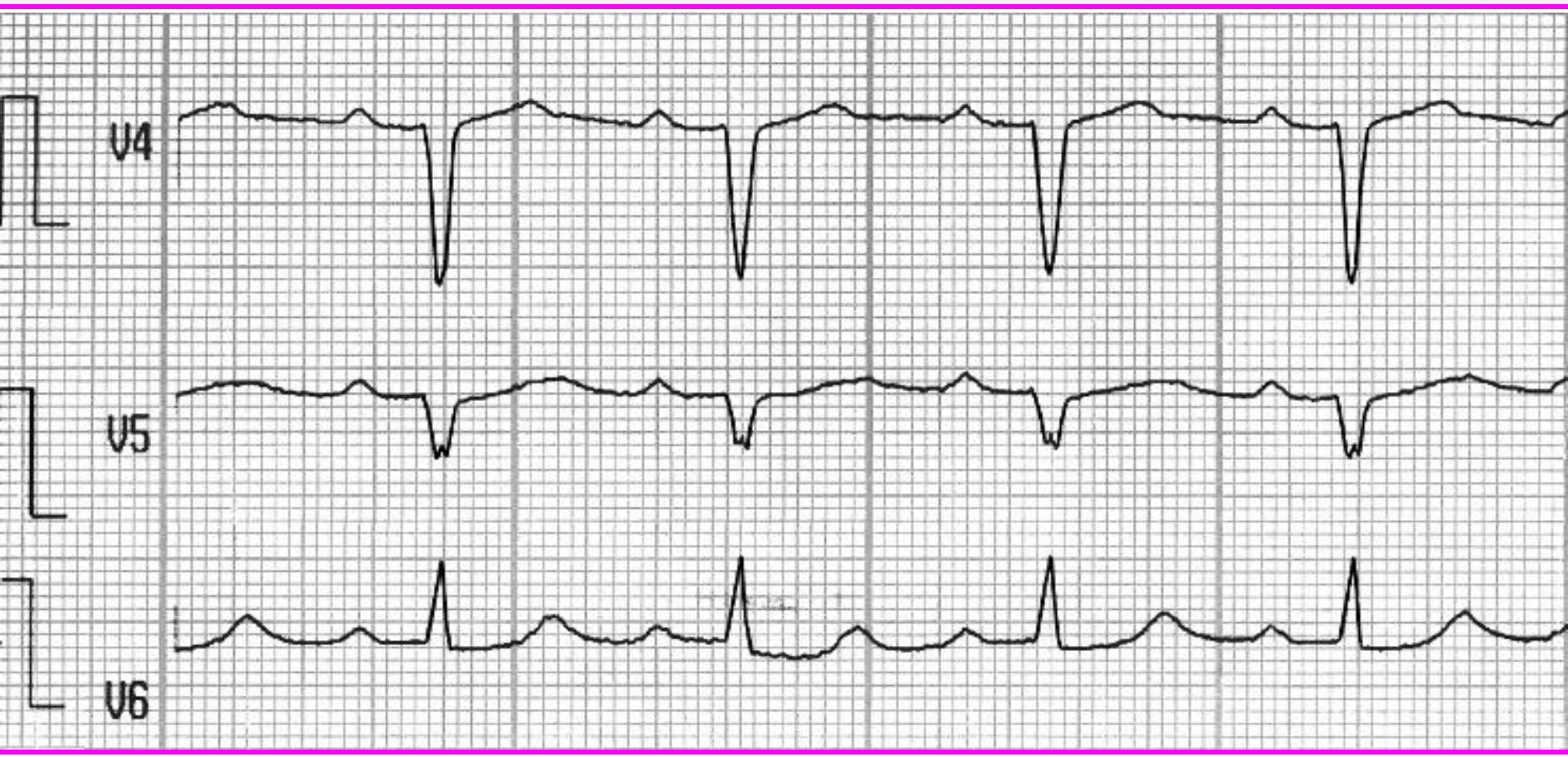
Third-Degree AV Block

Bloc atrioventricular gr. I

Caracteristica EKG
1.Intervalele PQ > 0,2 sec
2.Distantele PQ = PQ
3.Fiecare undă P este urmată de QRST

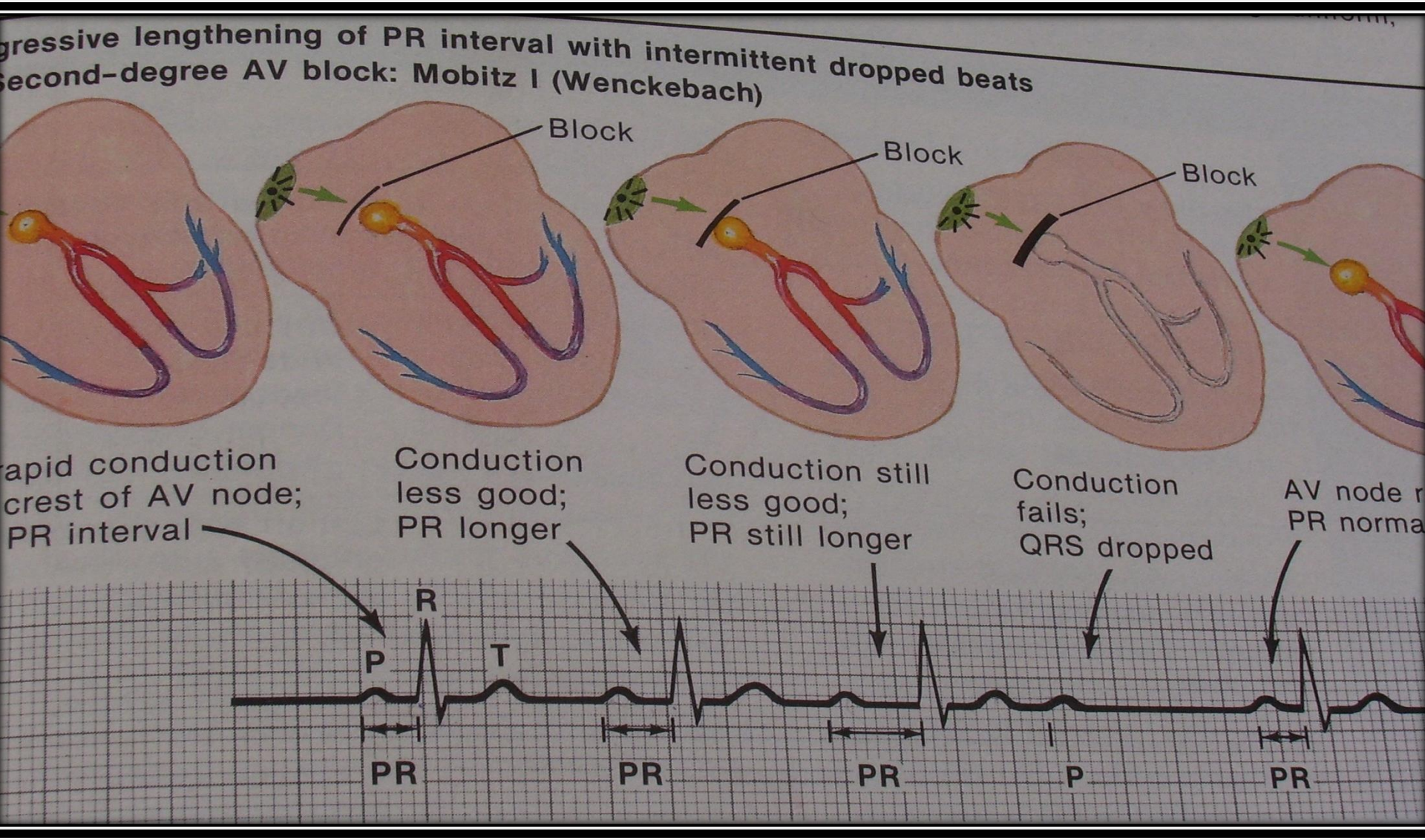


Blocul atrioventricular gr. I

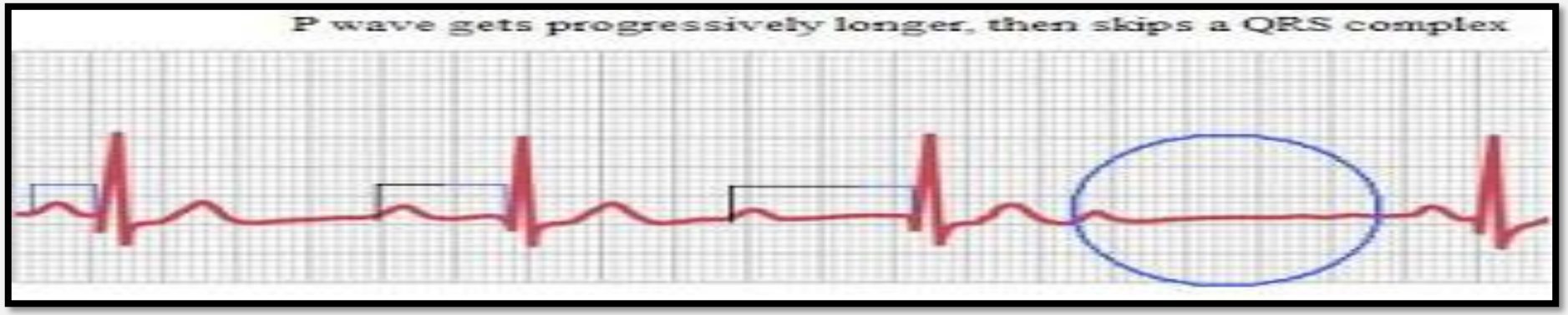


BAV gr.I. Fiecare undă P este urmată de complexe QRS, dar intervalul PR este alungit - 0,26”

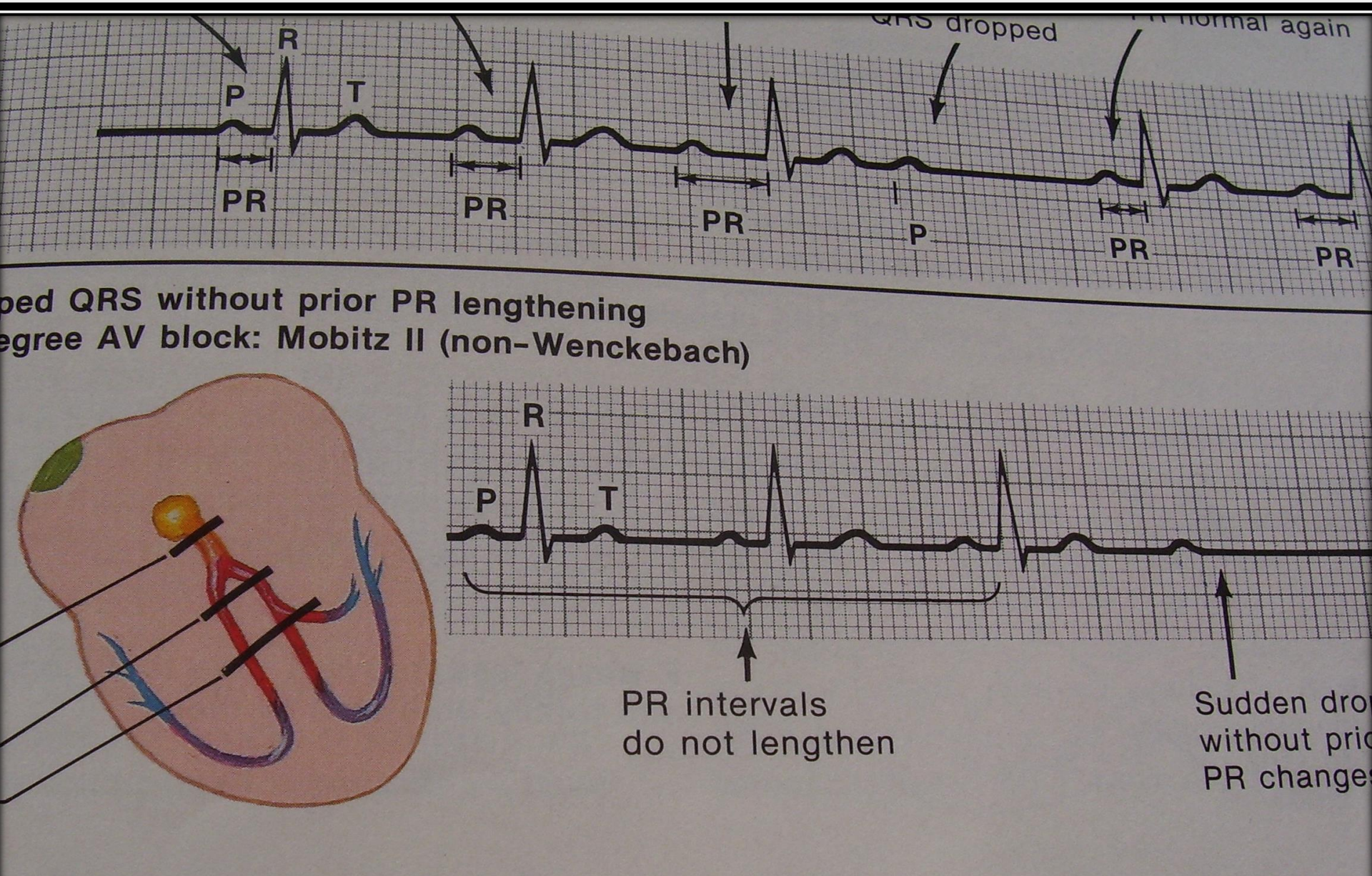
Bloc atrioventricular gr. II, tip I, Mobitz I



Bloc atrioventricular gr. II, tip I, Mobitz I

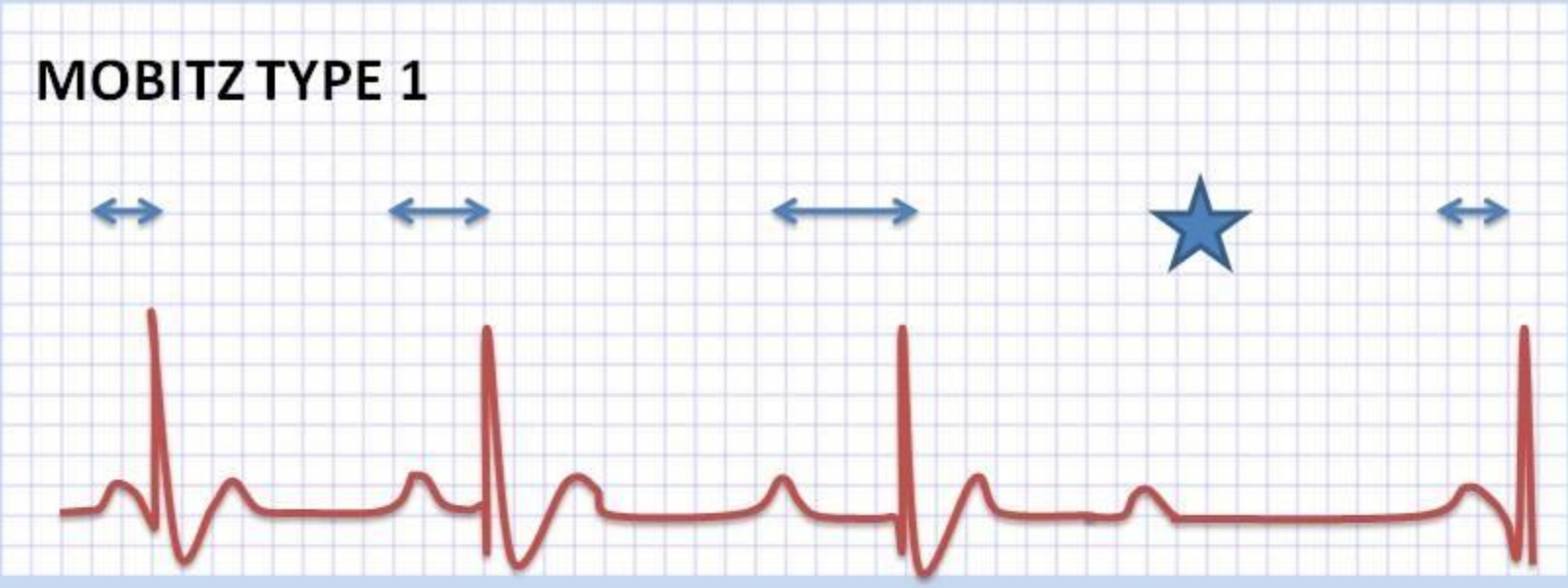


Bloc atrioventricular gr. II, tip II, Mobitz II

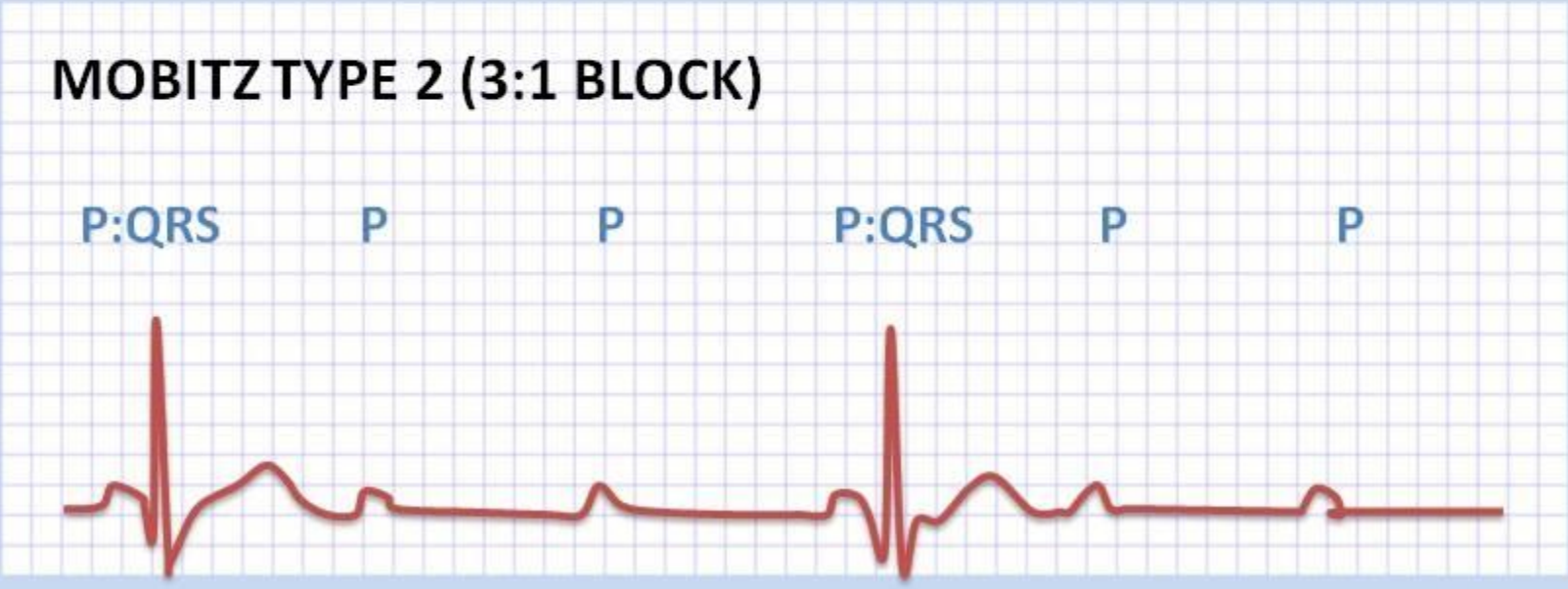


Blocul atrioventricular gr. II

MOBITZ TYPE 1

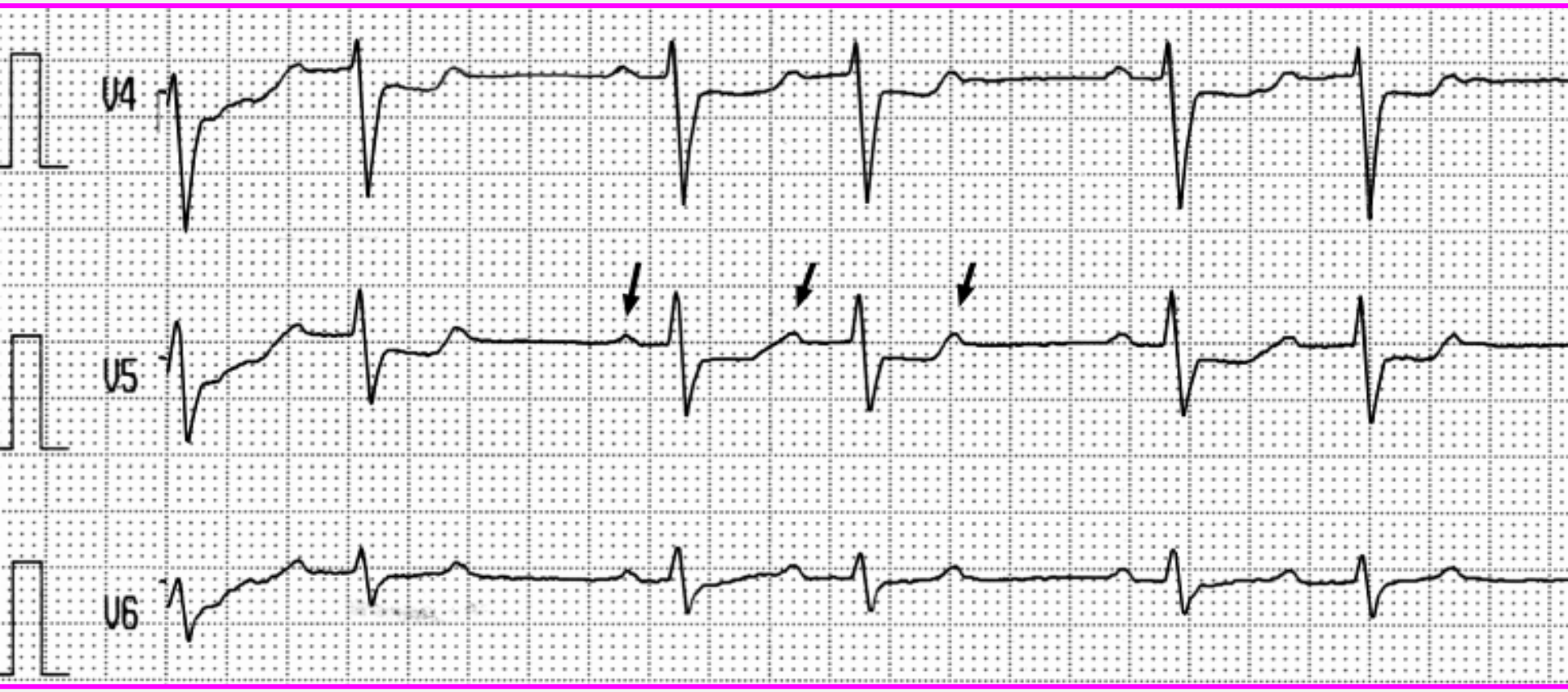


MOBITZ TYPE 2 (3:1 BLOCK)



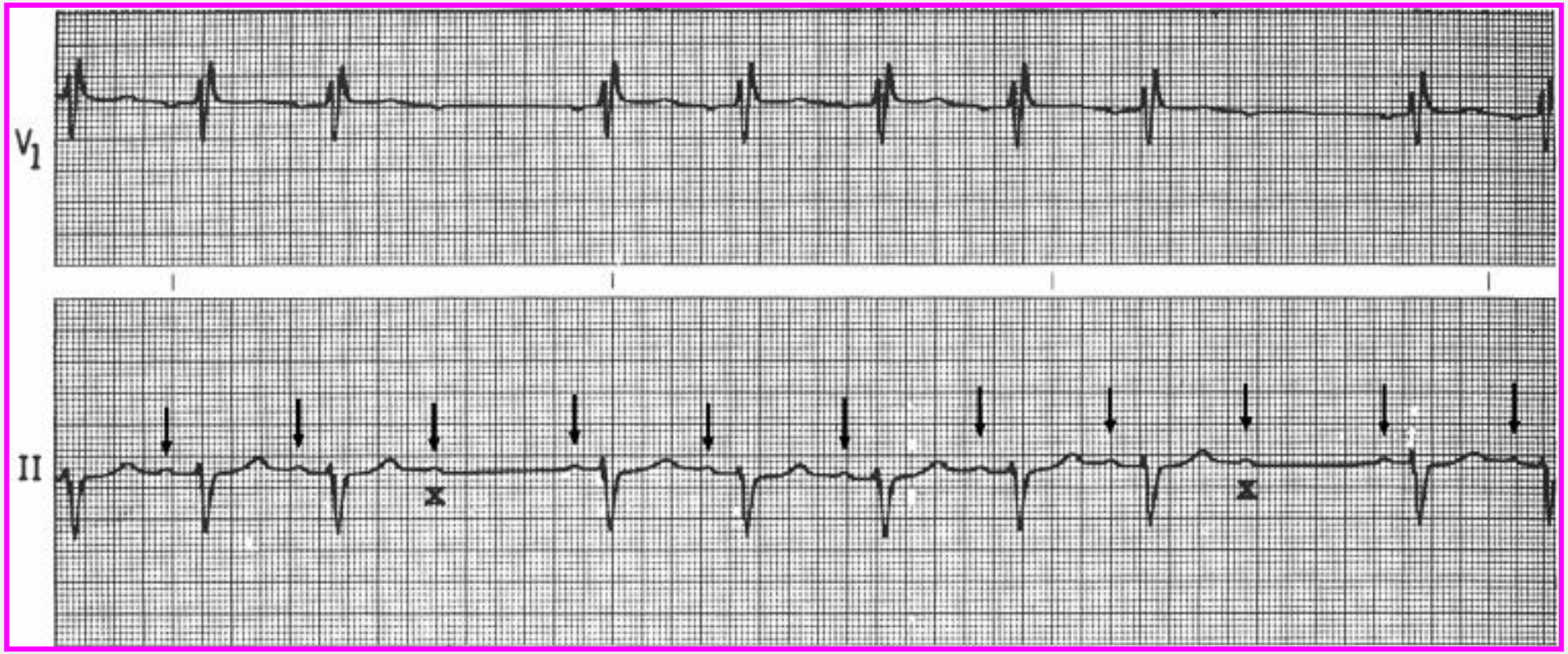
fastbleep))

Blocul atrioventricular gr. II



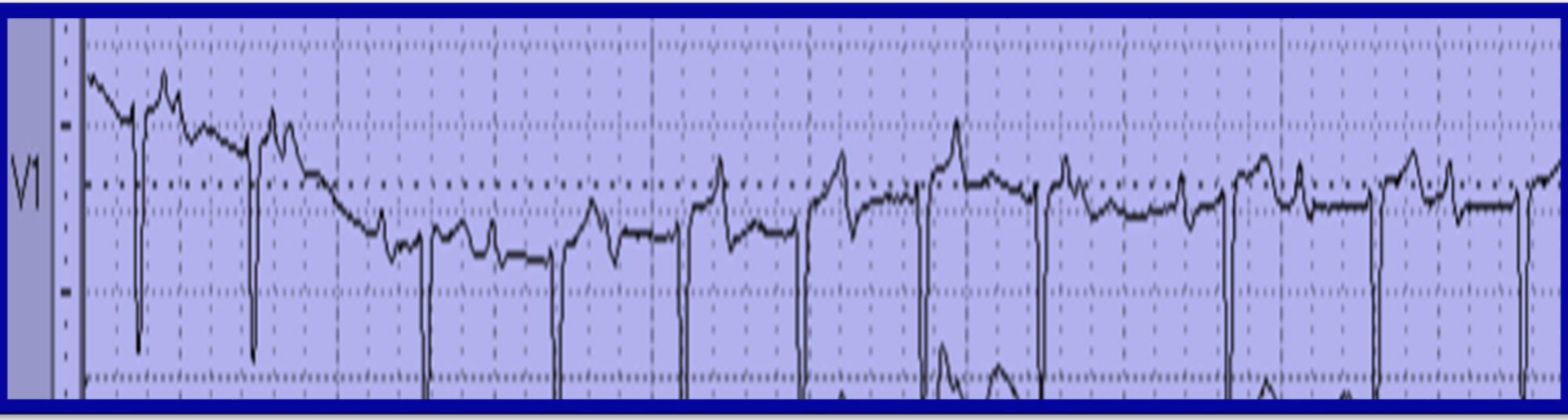
BAV gr.II cu bătăti omise intermitent, tip Mobitz I, PR-ul iniţial de 0,08” se alungeşte progresiv la 0,16”, pentru ca cea de a 3-a undă P’ să fie blocată (neurmată de complex QRS). În continuare ciclul se reia

Blocul atrioventricular gr. II

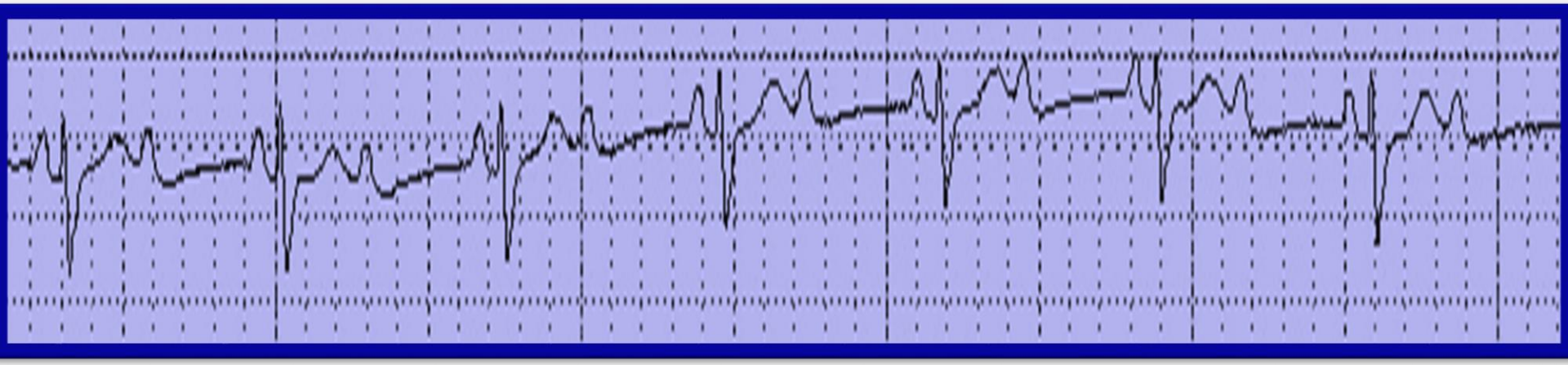


BAV gr.II cu bătăi omise intermitent
PR-ul este constant înainte de unda
P blocată (5)

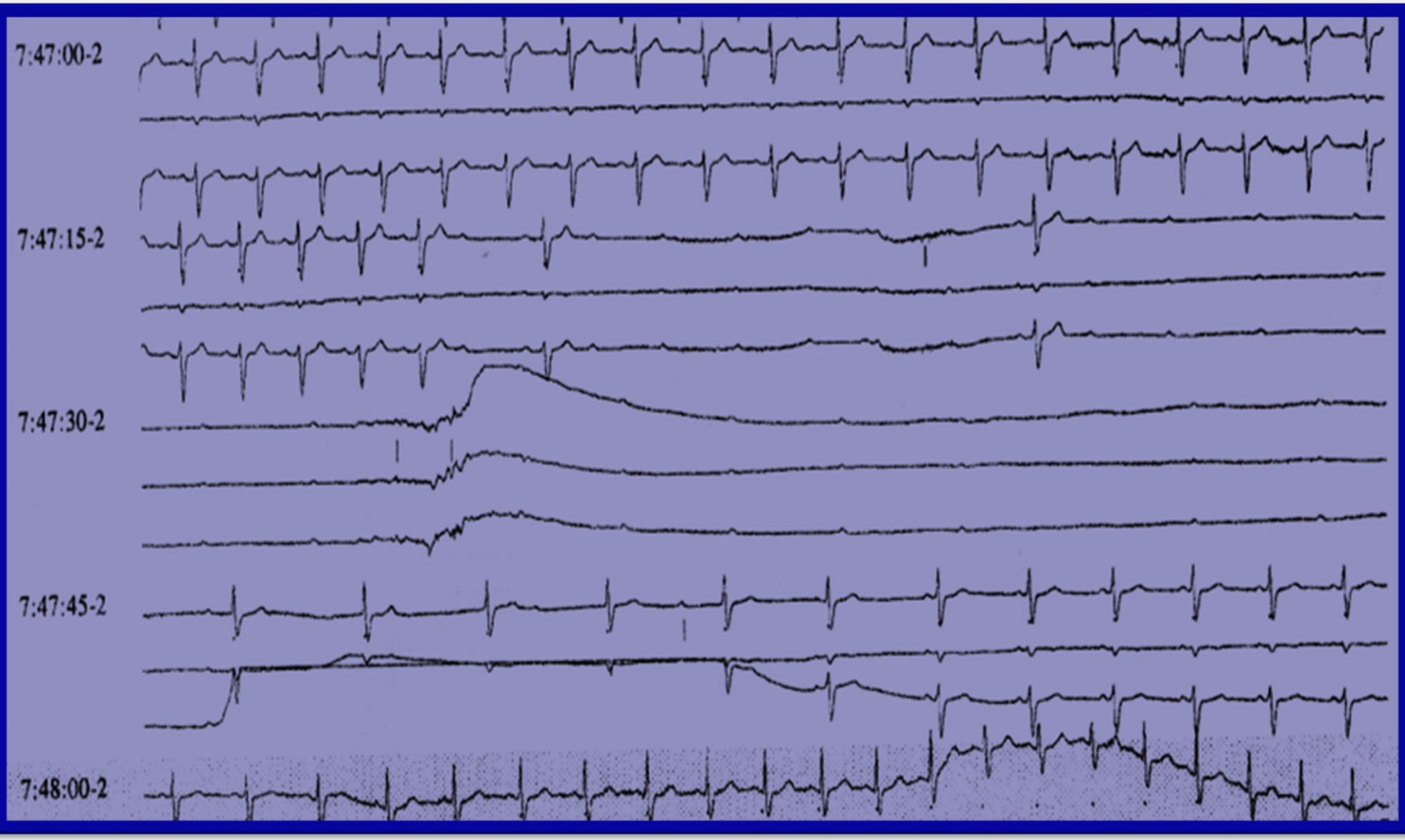
Blocul AV gr.II (Mobitz I)



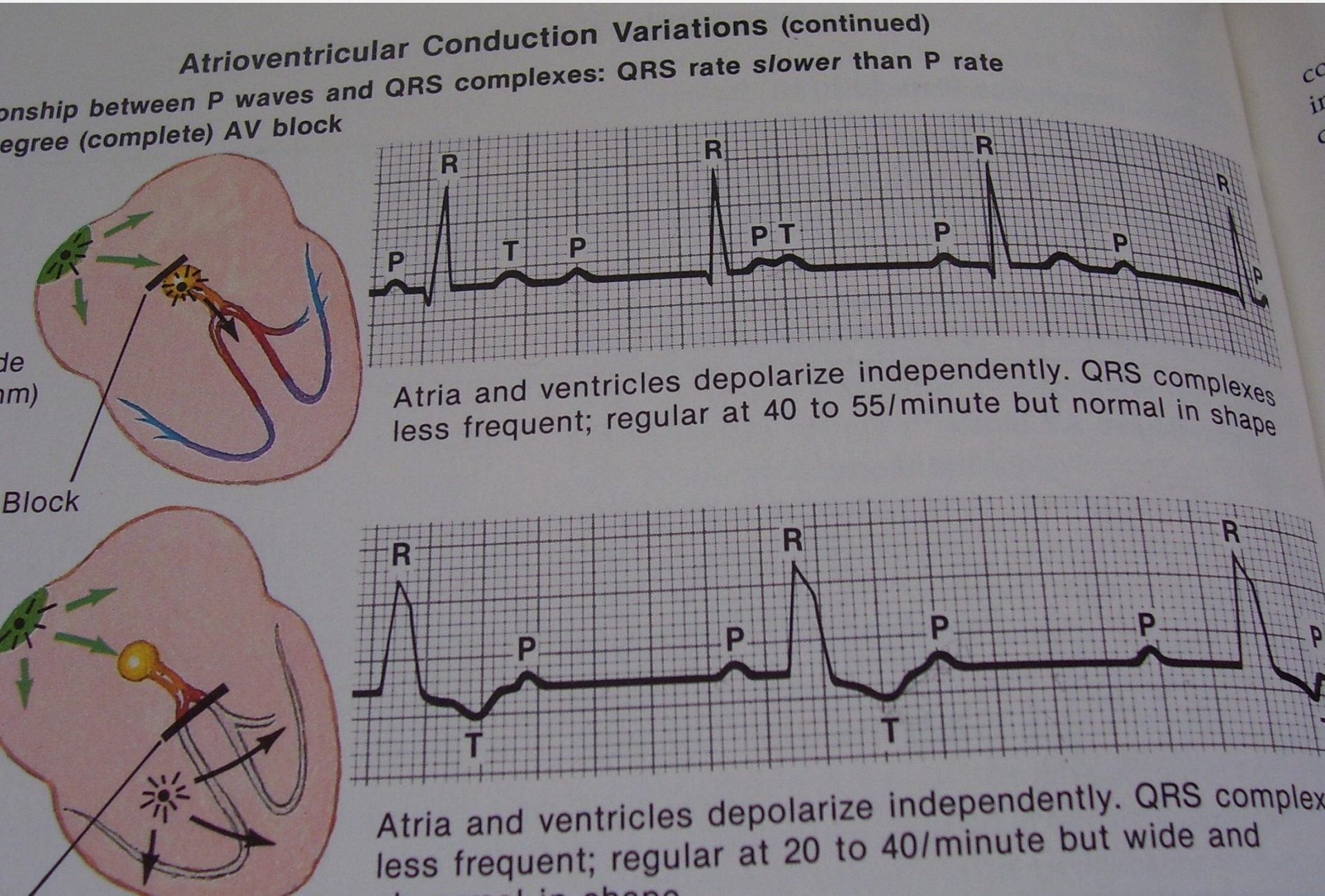
Blocul AV gr.II (Mobitz II)



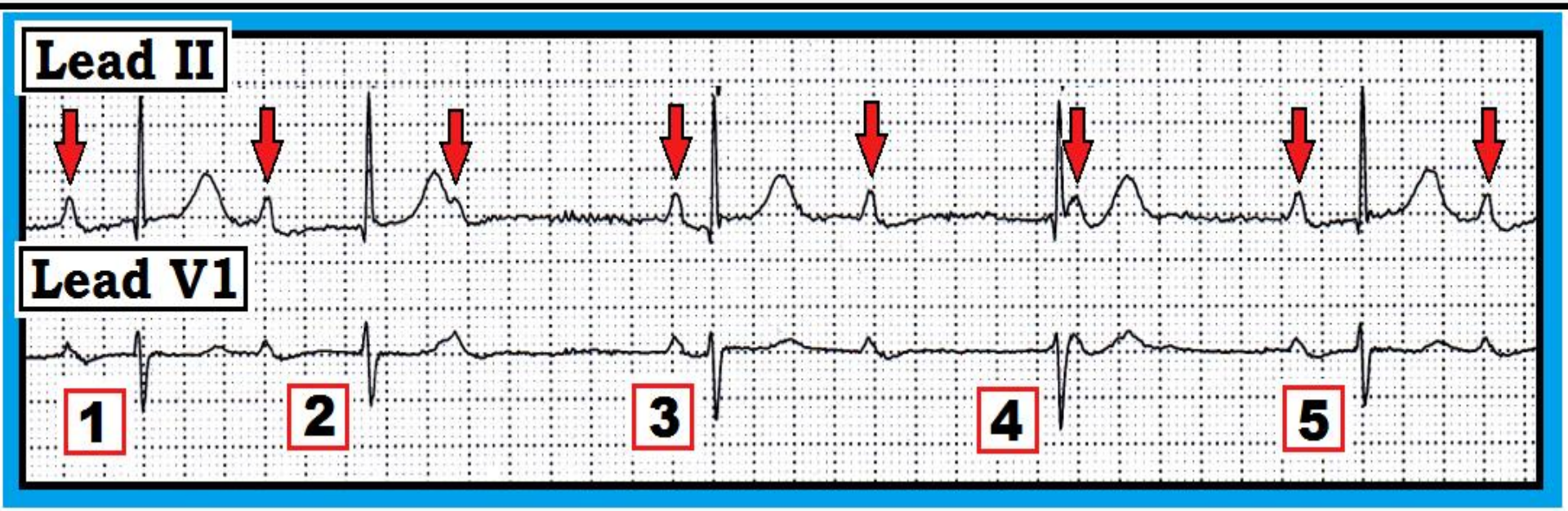
Преходящая полная поперечная блокада (пауза до 16200 мс - потеря сознания второй раз в жизни)

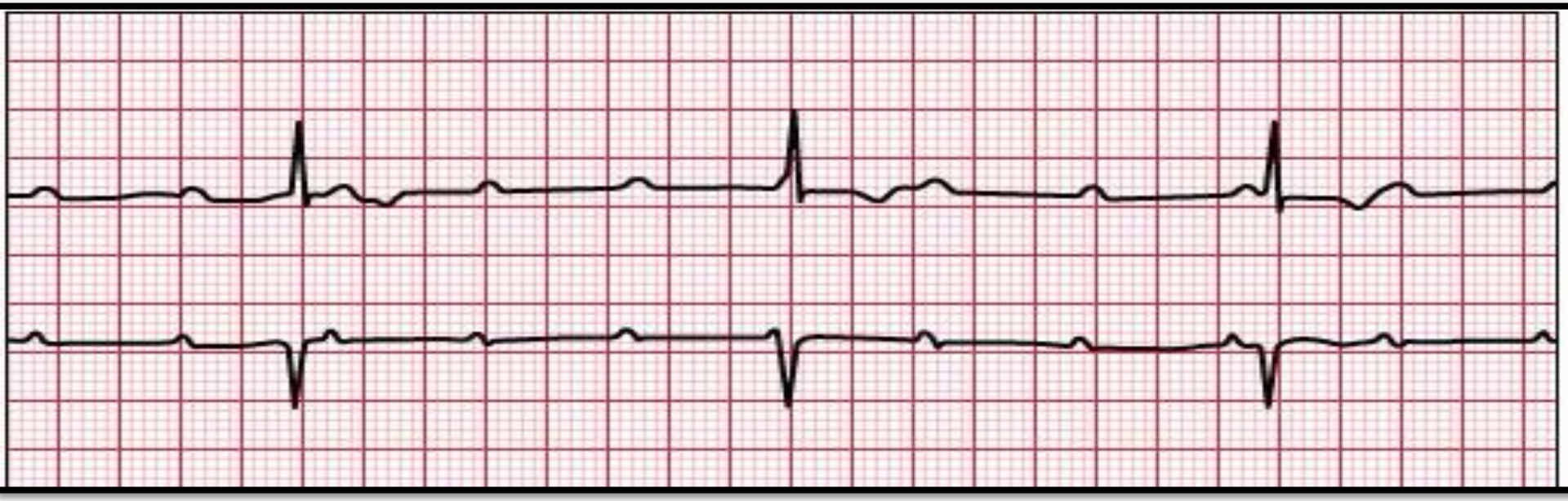


Blocul atrioventricular gr. III, complet

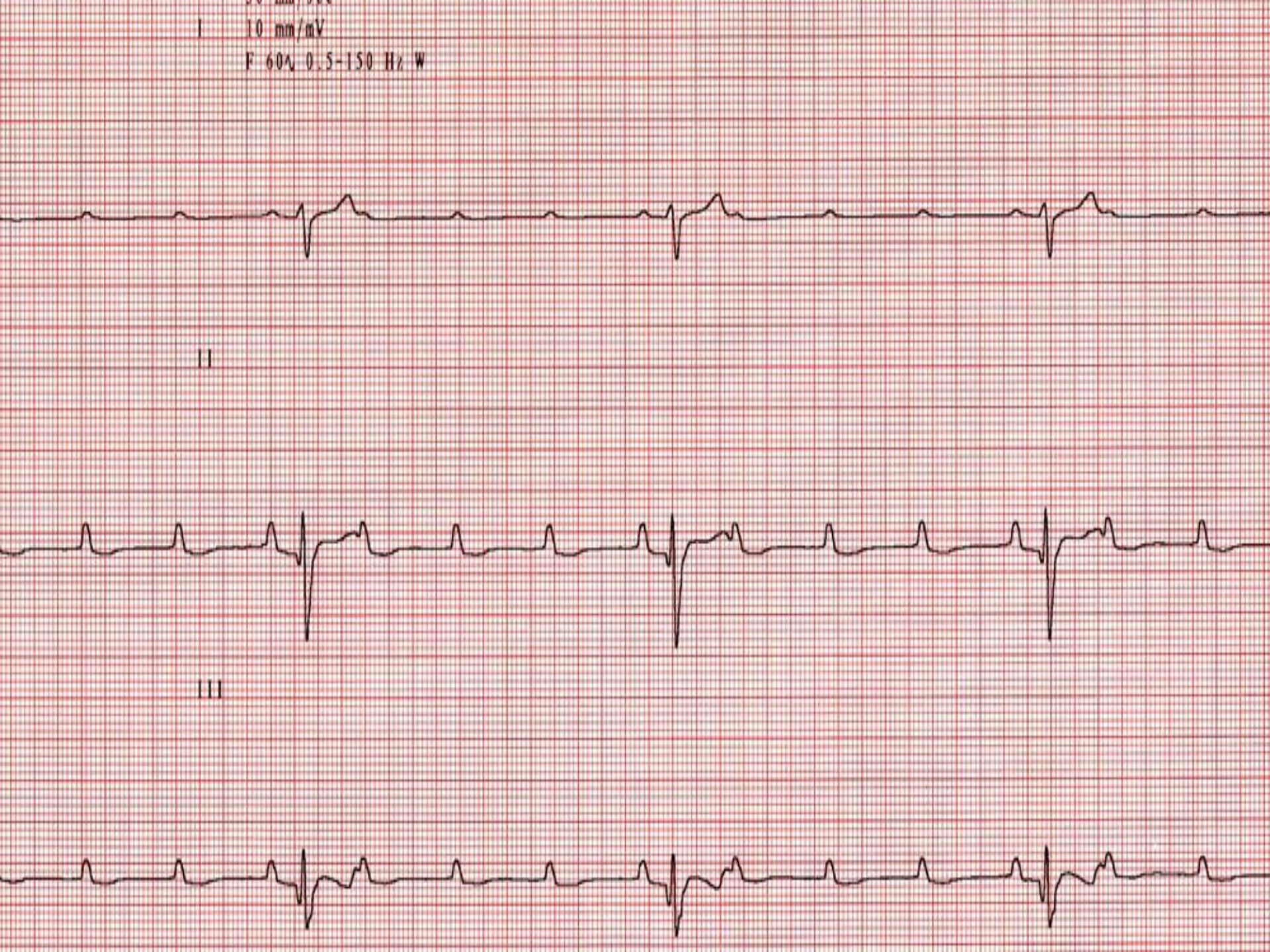


Blocul atrioventricular gr. III, complet

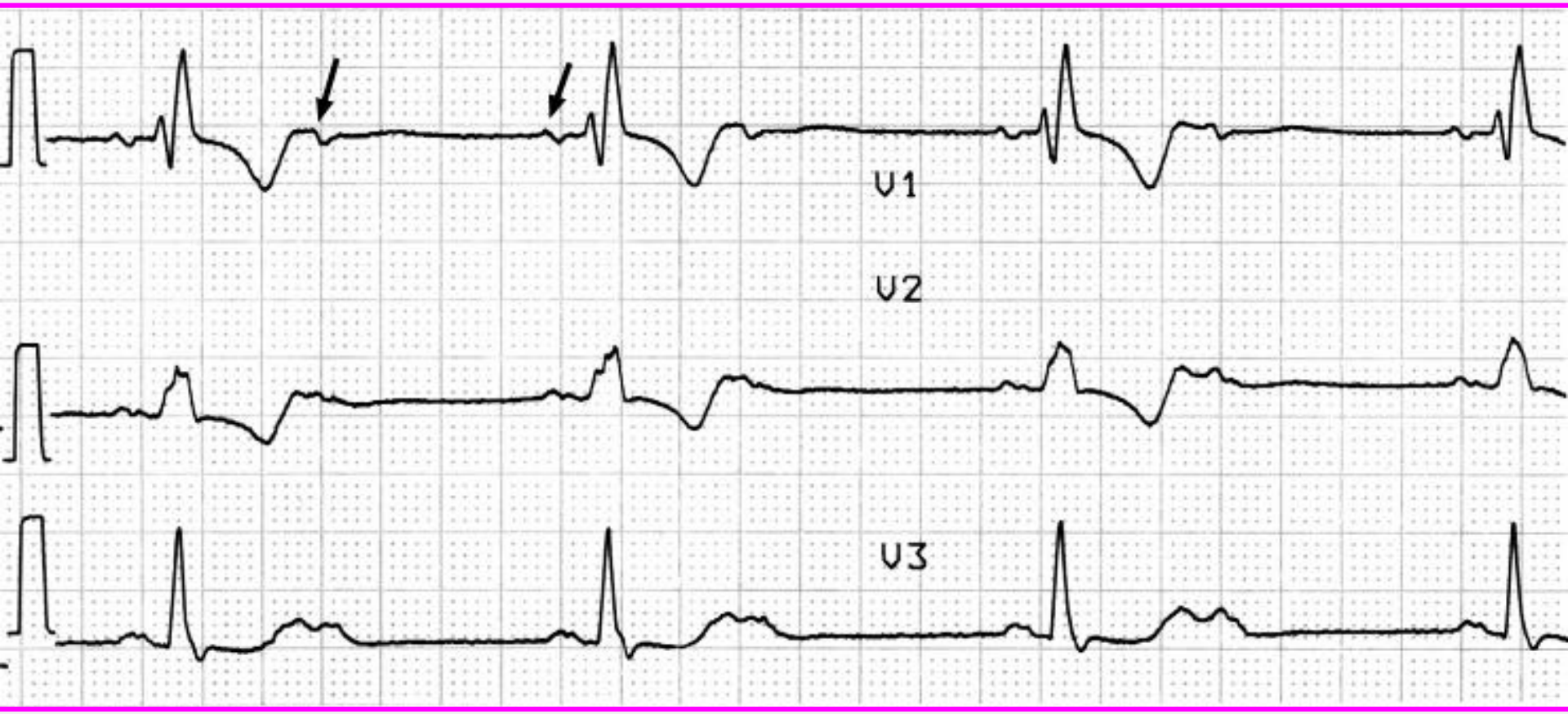




Blocul atrioventricular gr. III, complet

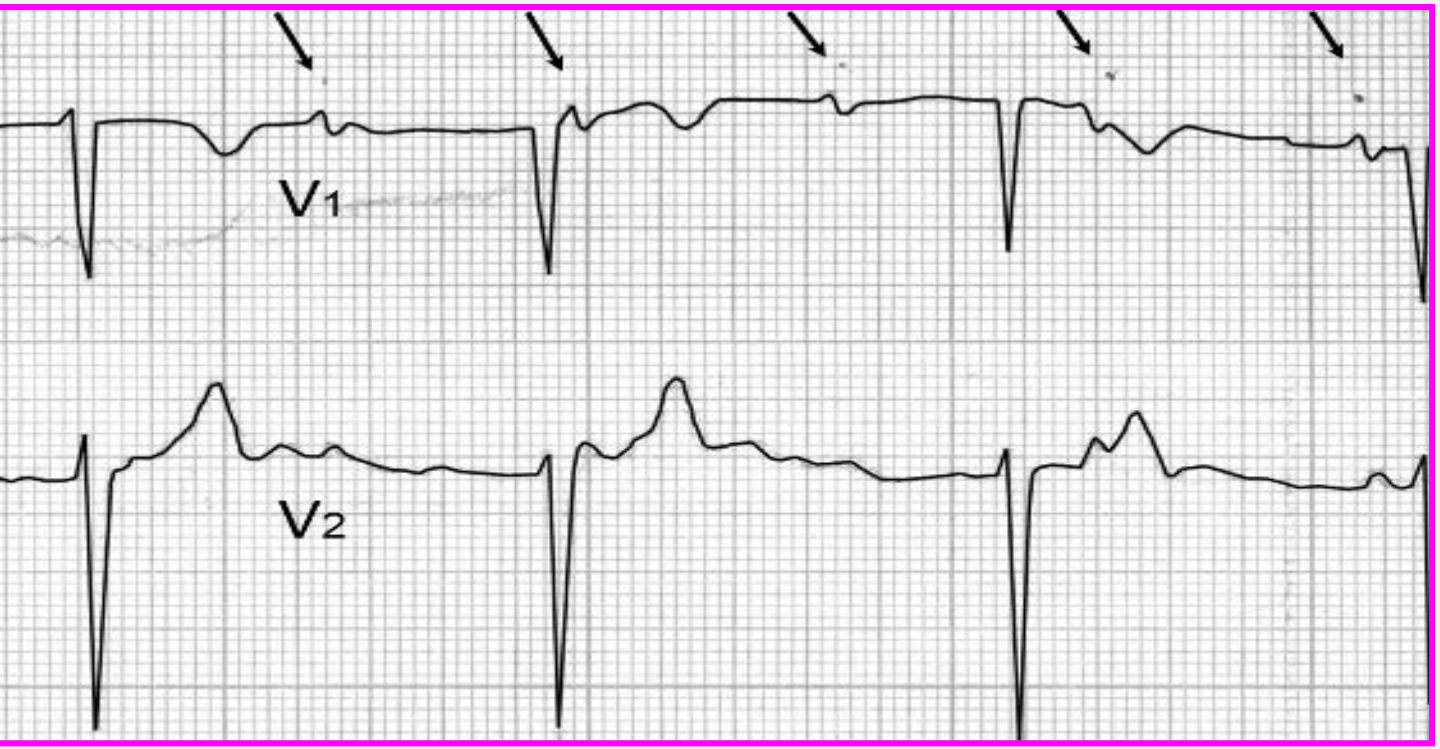

I
10 mm/mV
F 60∿ 0.5-150 Hz W
II
III

Blocul atrioventricular gr. III, complet



BAV gr.II 2:1
Fiecare a doua undă P nu este urmată de complex QRS

Blocul atrioventricular gr. III



BAV gr.III suprahisian cu RIJV, cu complexe QRS suple, frecvenţa 48/min. Se evidenţiază şi disociaţia A-V

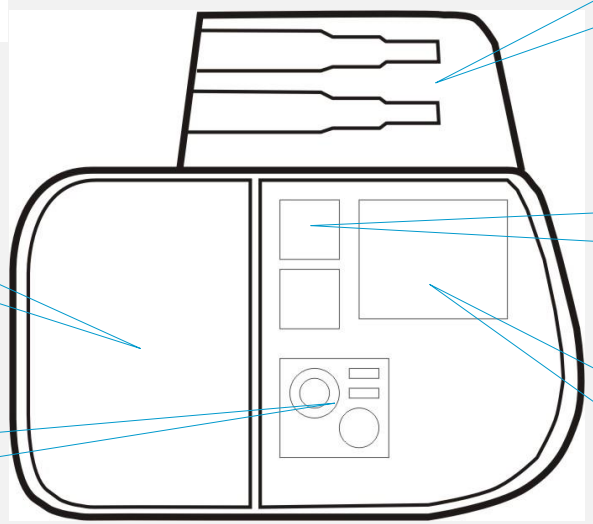
Sindrom Frederika

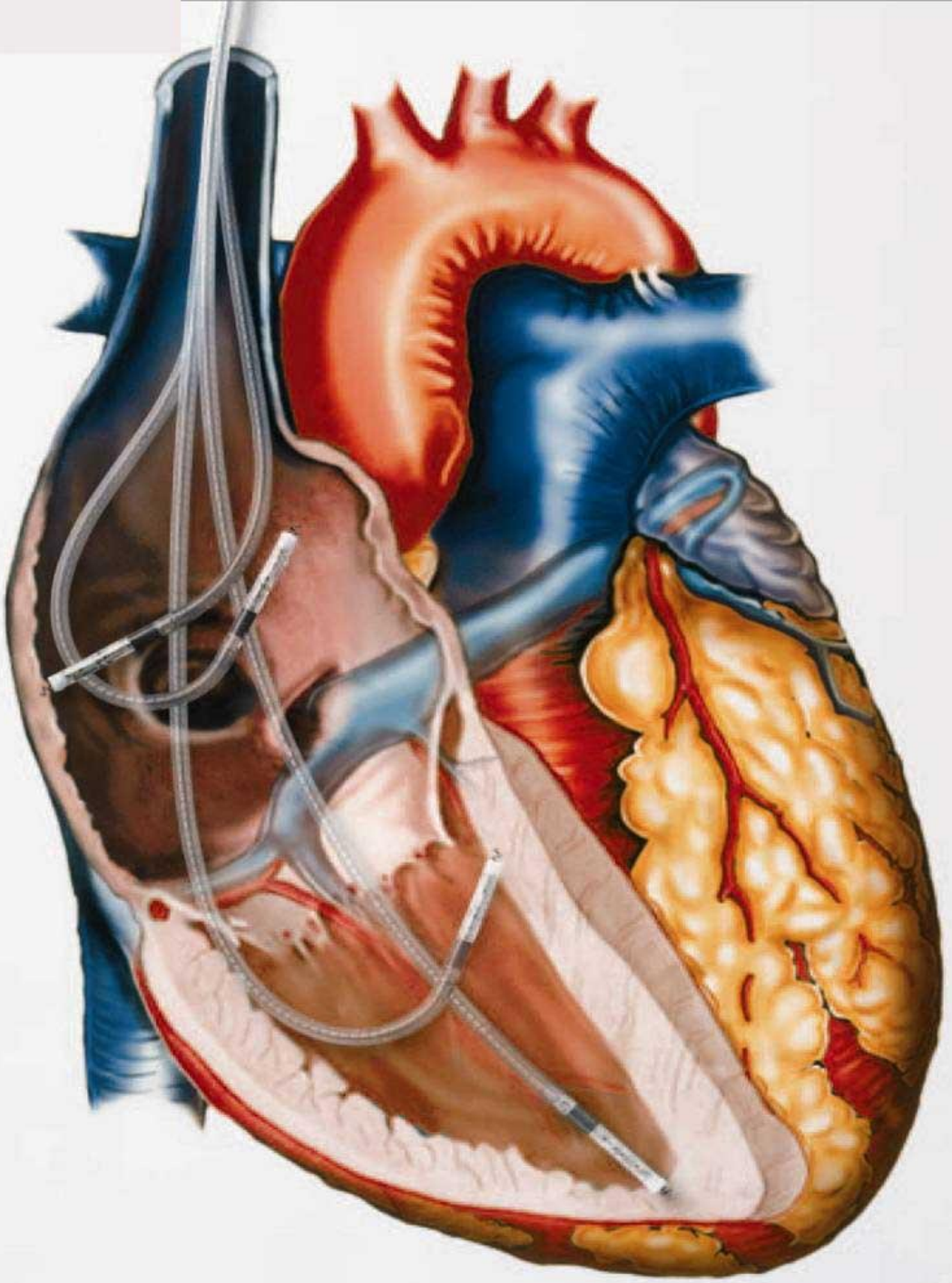
Fibrilație atrială și bloc atrioventricular gr. III

Pacemakerul este un dispozitiv programabil, parametrii de bază a căruia sunt definiți de medic!

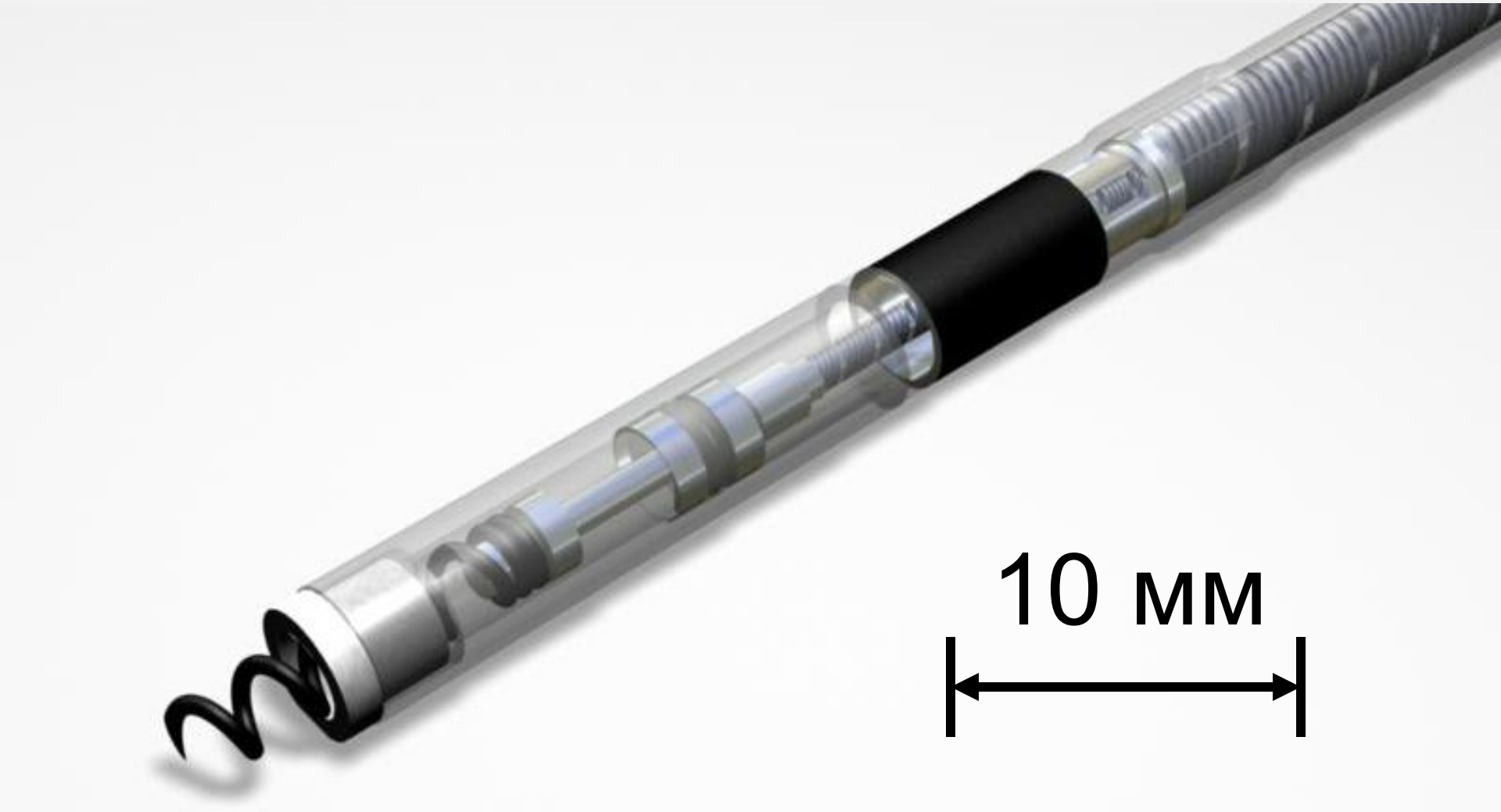
Se implantează sub anestezie locală
Durata lucrului 6-12 ani

Se programează la distanță

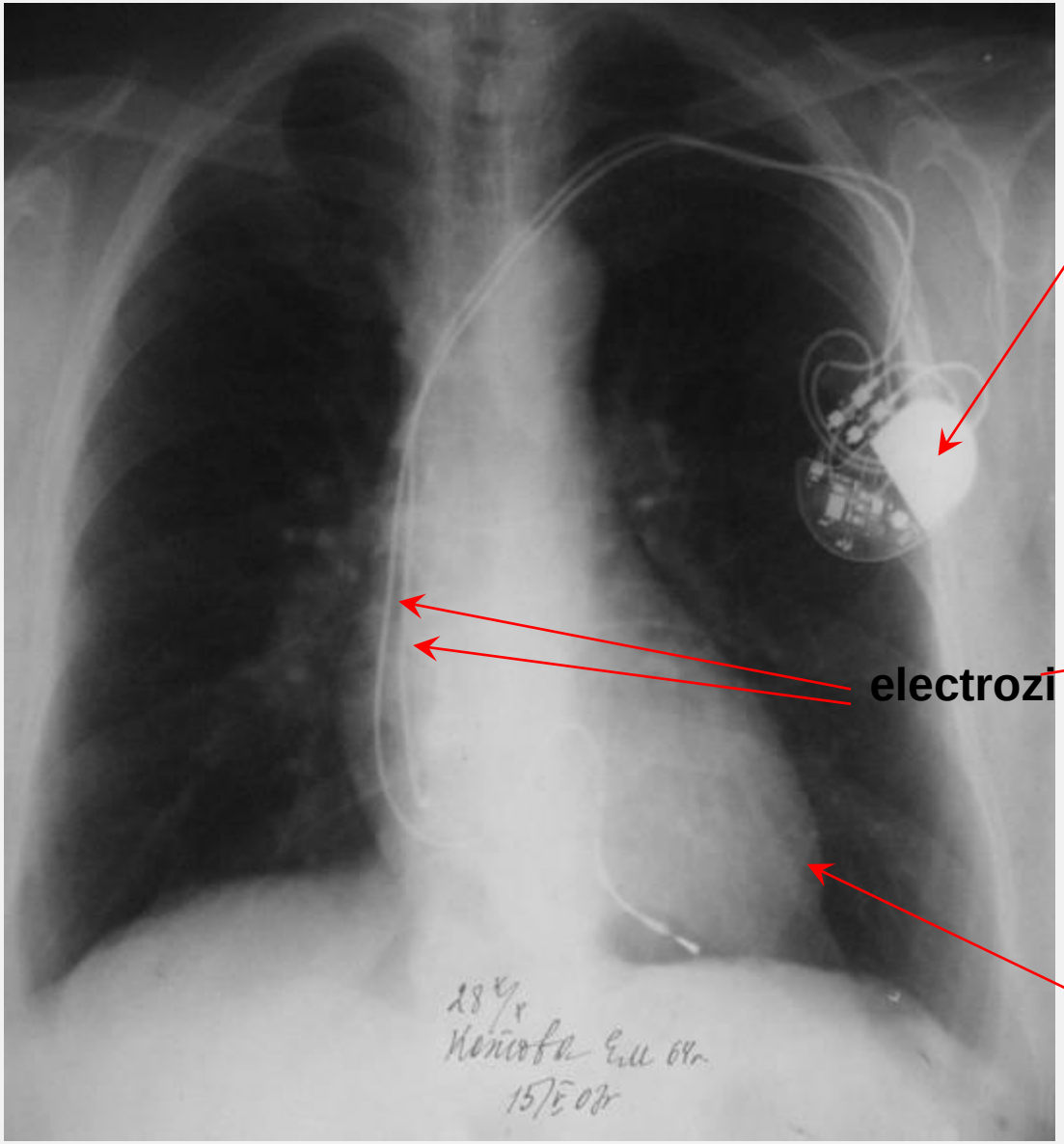




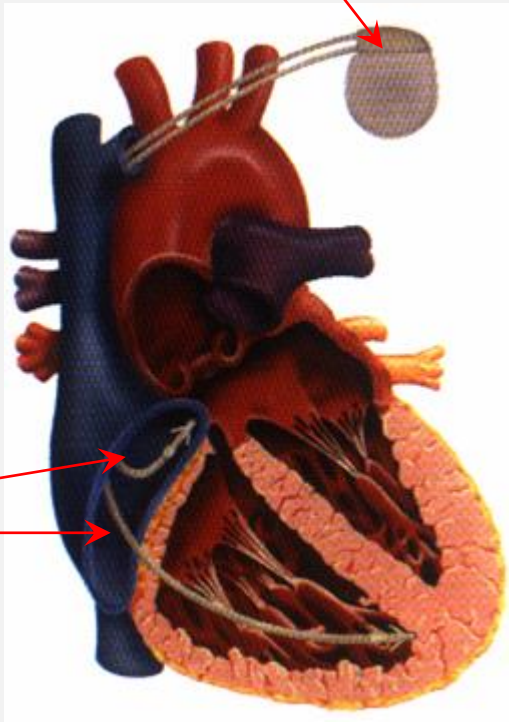
Electrod cu fixare activă



Stimulare bicamerală



Cardiostimulator



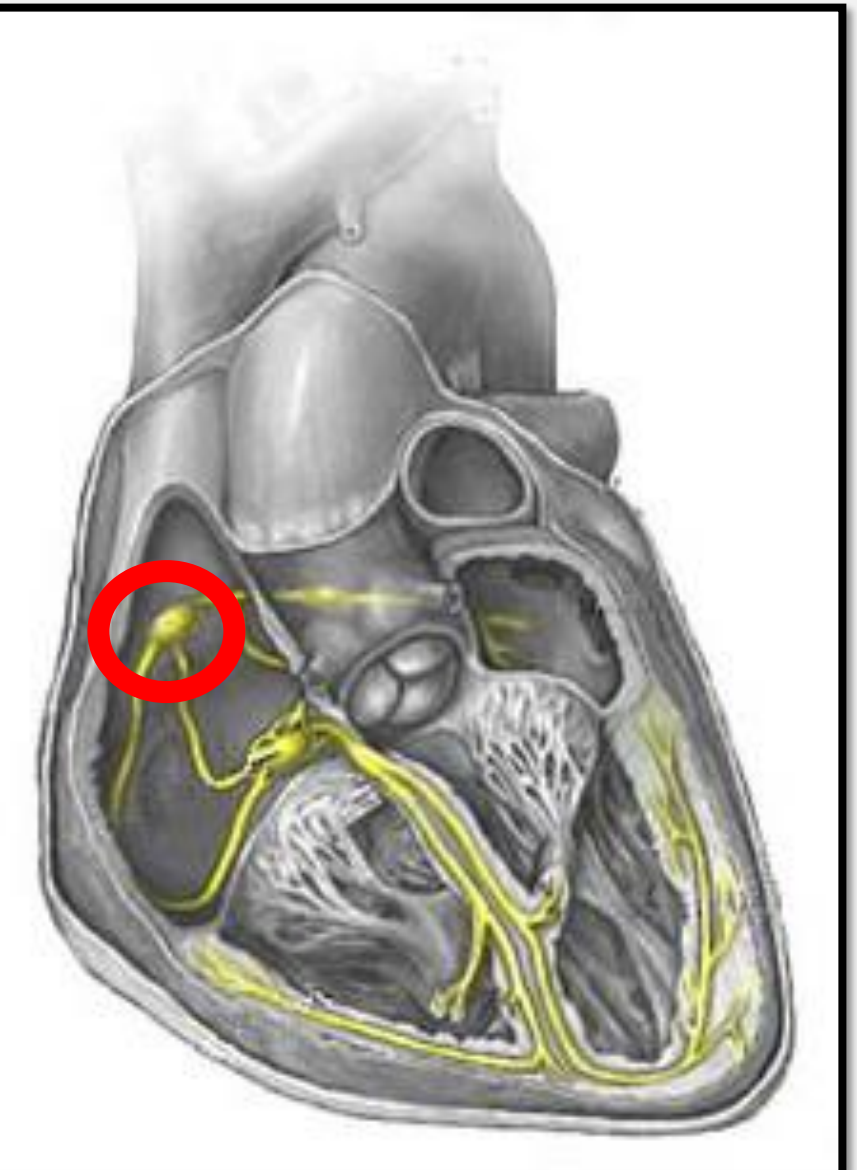
electrozi

cordul

Ce stimulăm?

Principiu de bază constă în: înlocuirea zonei afectate a sistemului de conducere a inimii

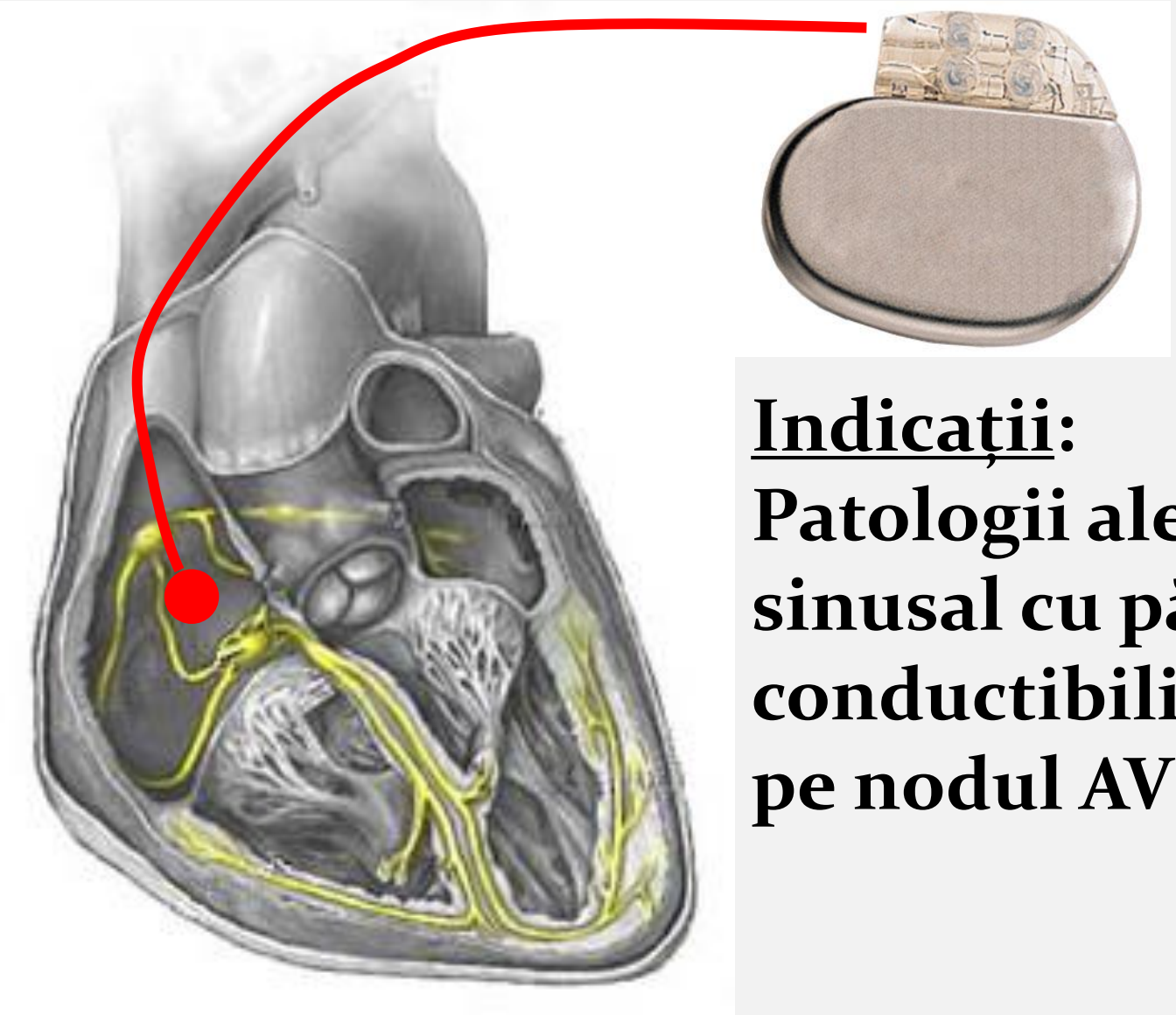
Indicații pentru implantarea cardiostimulatorului



Dereglări de ritm atriale

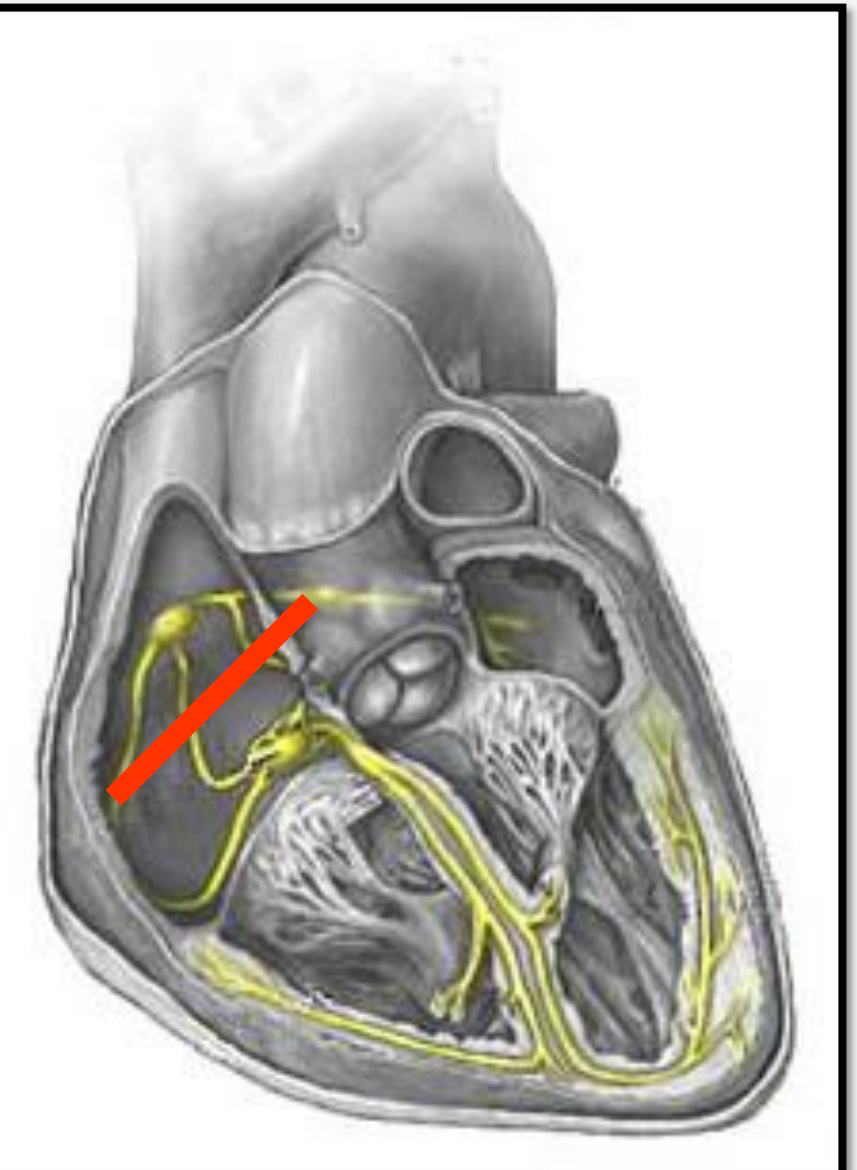
- *Bradicardie sinusală*
- *Boala nodului sinusal*
- *Sindrom tahi - bradi*
- *Sindromul nodului carotid*
- *Sincope vazo-vagale*

Stimulare atrială



<u>Indicații</u>:
Patologii ale nodului sinusal cu păstrarea conductibilității pe nodul AV

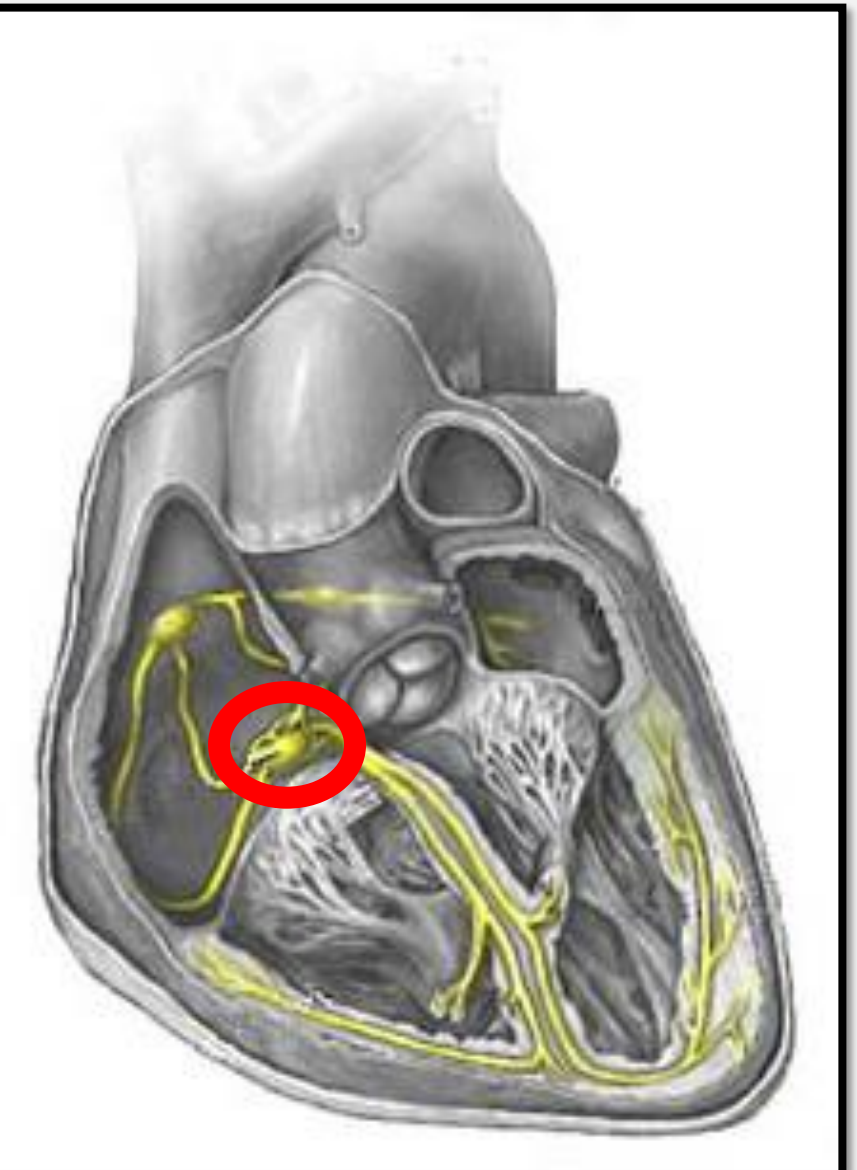
Indicații pentru implantarea cardiostimulatorului



Dereglări de ritm atrioventriculare

- ***Blocuri atrioventriculare de gr. II și III, cu FCC mai joasă de 45 b/min și stări sincopale***

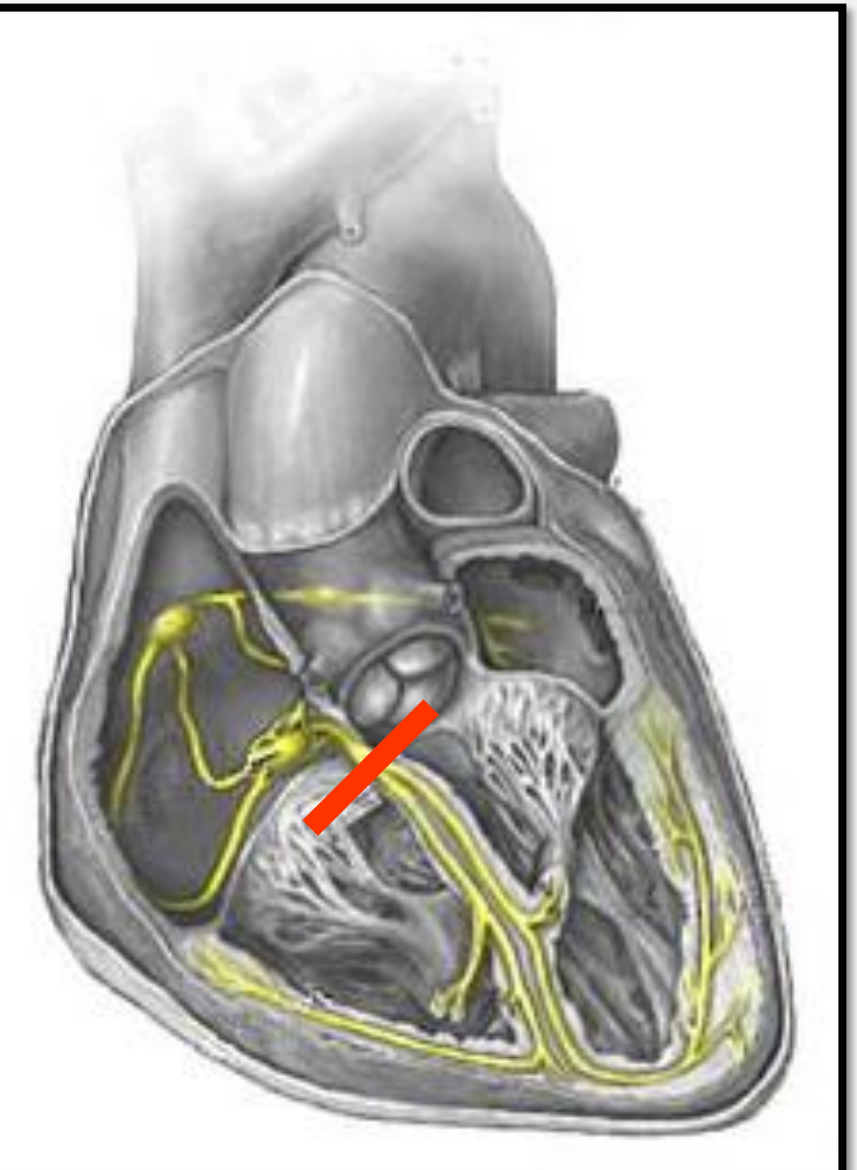
Indicații pentru implantarea cardiostimulatorului



Dereglări de ritm joncționale

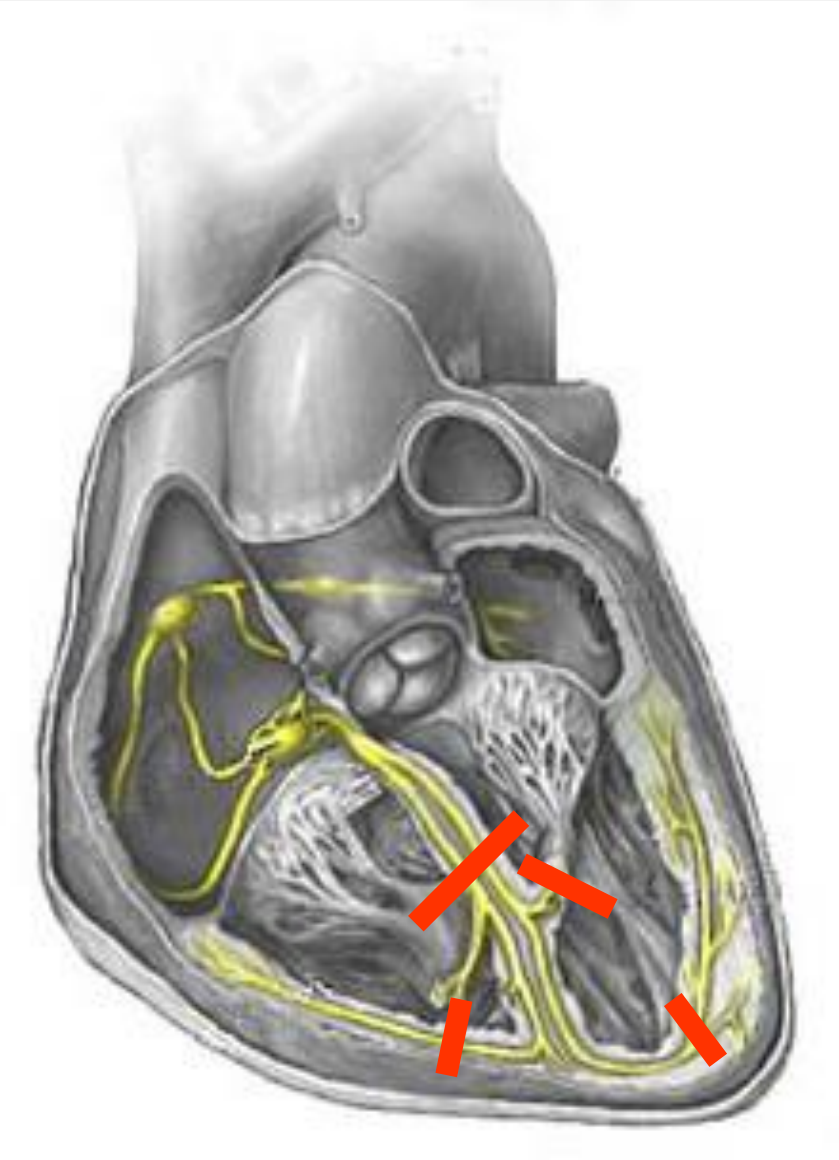
- ***Blocuri atrioventriculare – nodale***

Indicații pentru implantarea cardiostimulatorului



- *Bloc atrioventricular la nivelul fasciculului His*

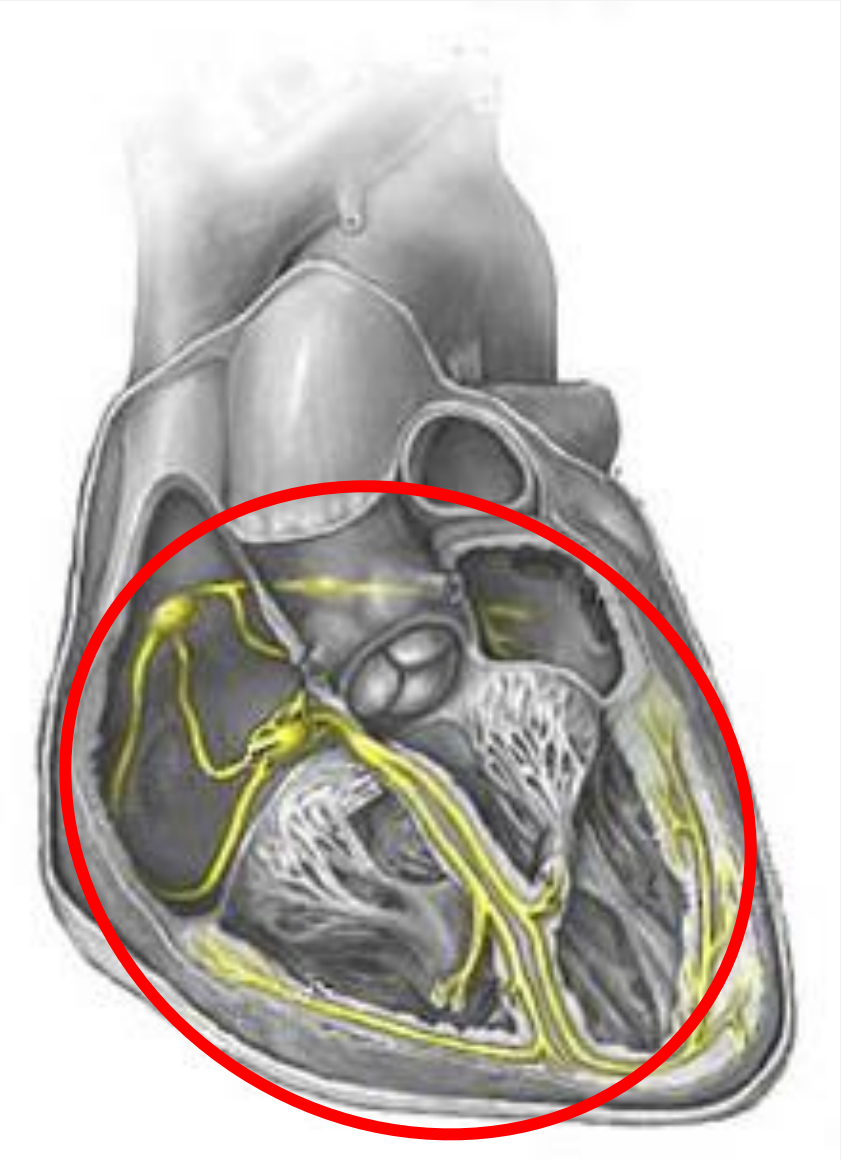
Indicații pentru implantarea cardiostimulatorului



Dereglări de ritm mai jos de nodul AV

- ***Bloc bifascicular***
- ***Bloc trifascicular***
- ***Bloc de ram***

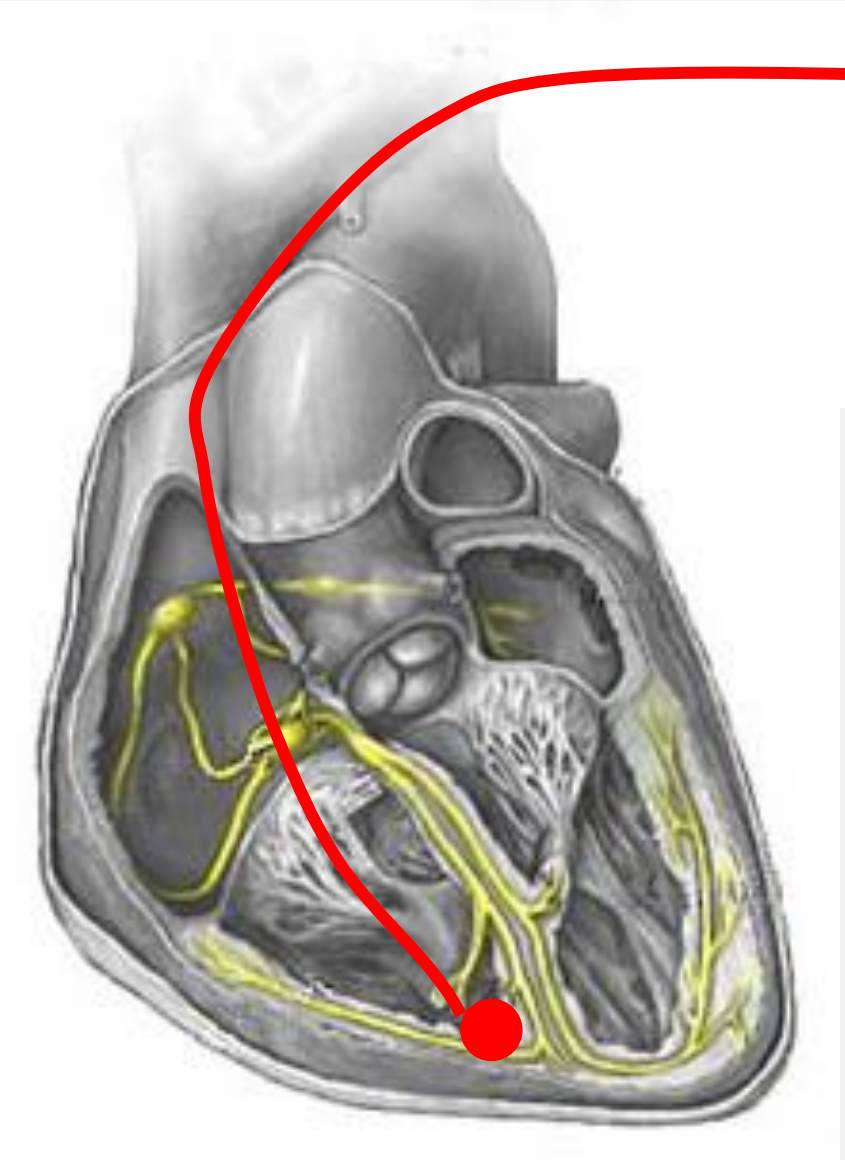
Indicații pentru implantarea cardiostimulatorului



Alte patologii

- *Cardiomiopatie hipertrofică obstructivă*
- *Cardiomiopatie dilatativă*
- *Transplant de cord*
- *etc.*

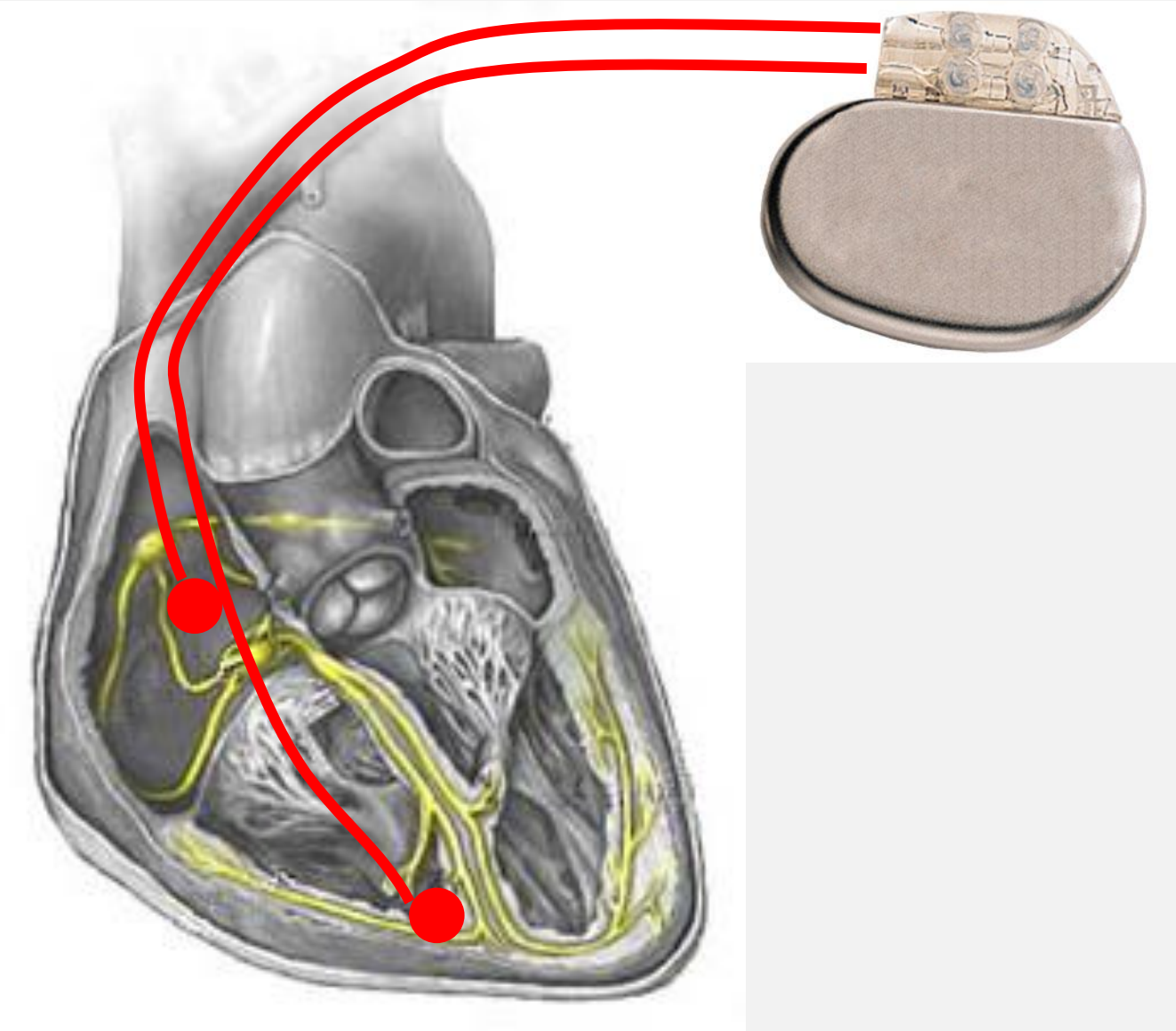
Stimulare ventriculară



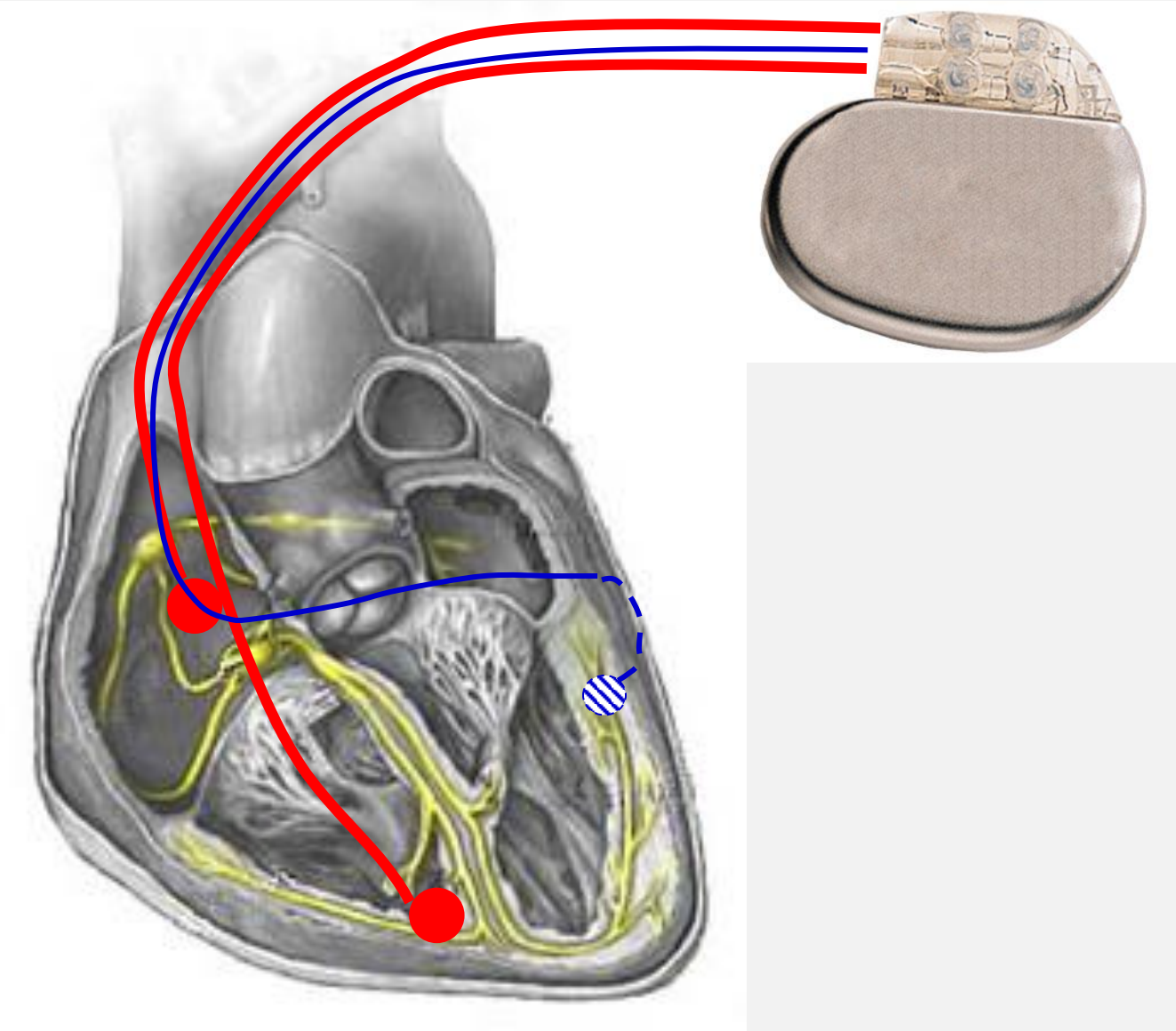
<u>Indicații</u>:

Fibrilație atrială cronică cu blocuri de ram a f. His

Stimulare bicamerală (fiziologică)



Cardiostimulare tricamerală (biventriculară)



Când stimulăm?

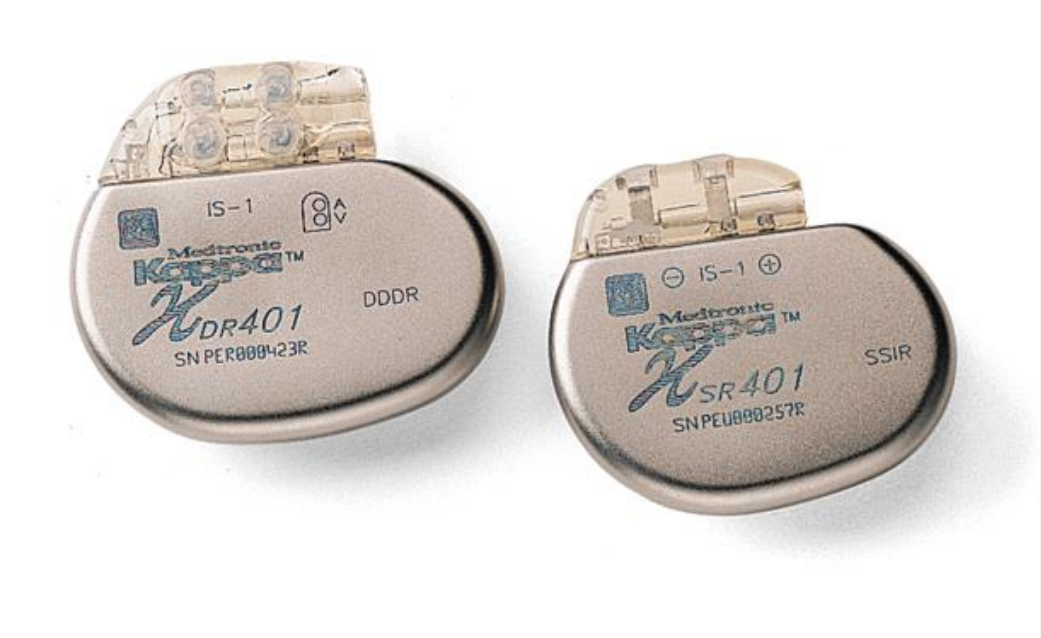
Contracțiile miocardului generate de sistemul conductor propriu – sunt mai fiziologice!

De regulă ECS nu trebuie să lucreze 100% din timp

Este necesar să apreciem activitatea electrică a miocardului pacientului!

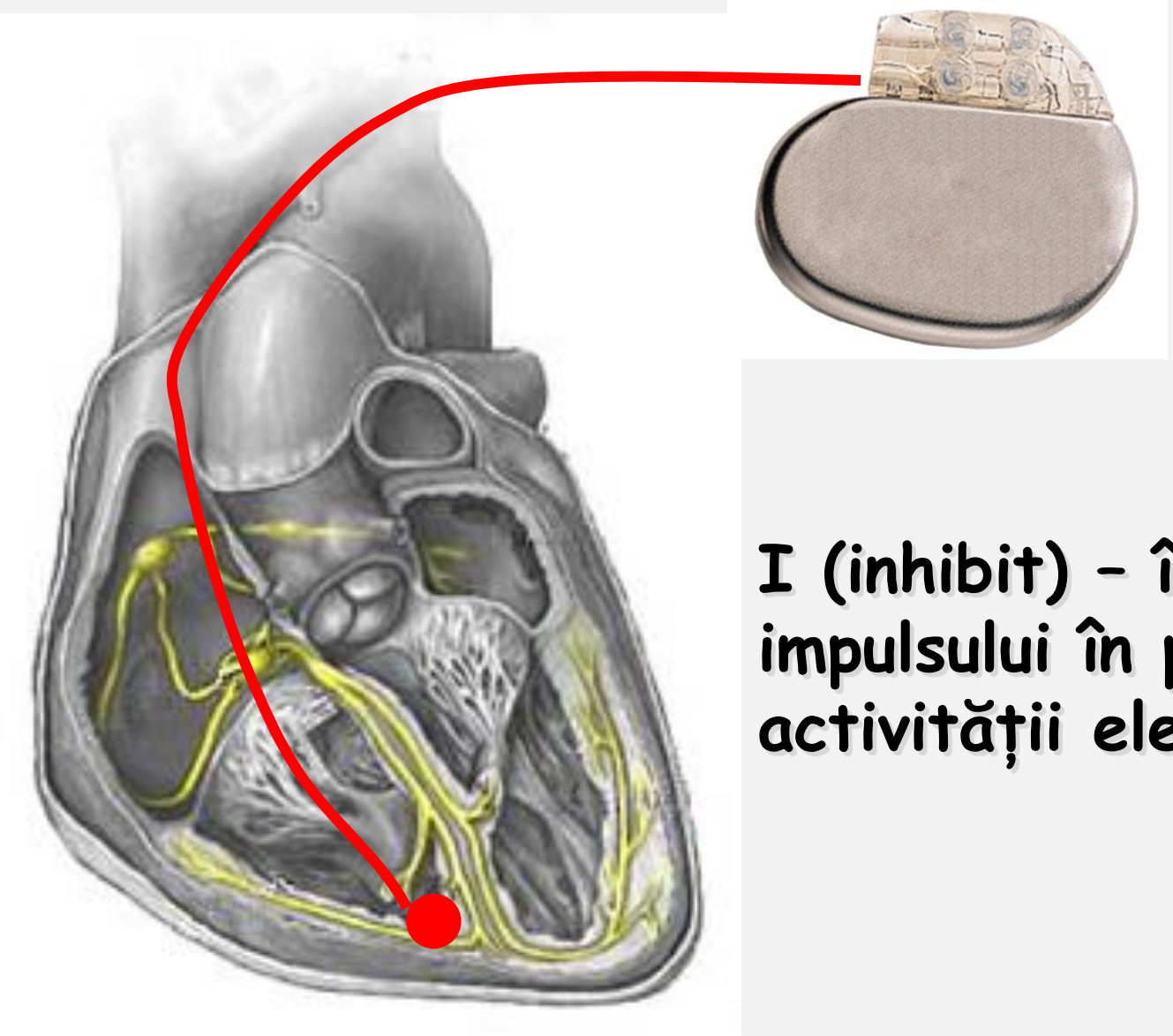
Kardiostimulatorul oferă un impuls electric miocardului ca el să se excite și monitorizează activitatea internă electrica a inimii.

Important!



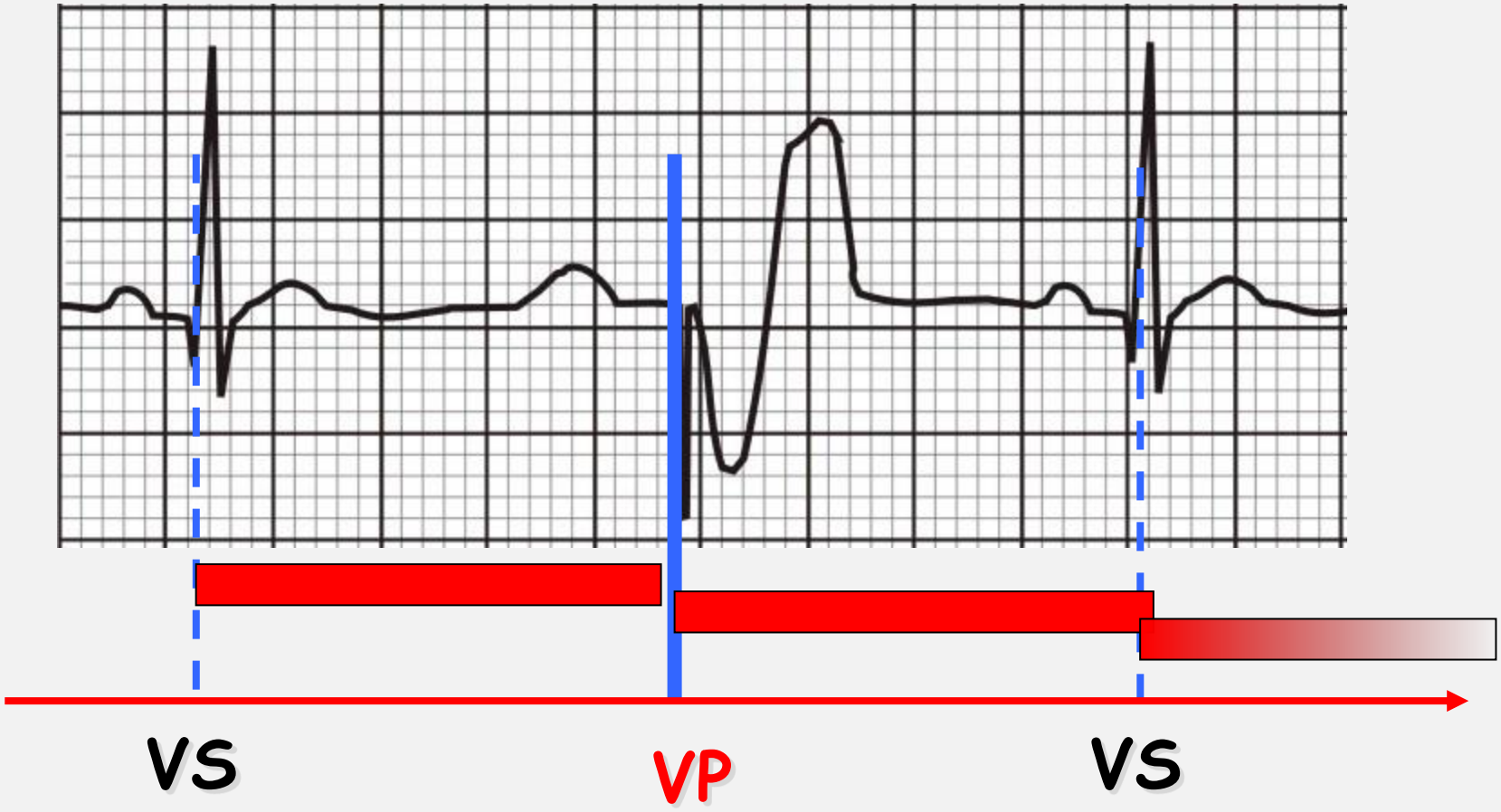
Stimulatoare cardiace moderne nu numai că preiau funcțiile pacemacherului cardiac în asitolie, dar pot oferi și măsuri urgente de terapie (defibrilare, stimulare)!

Regimul de lucru "demand"

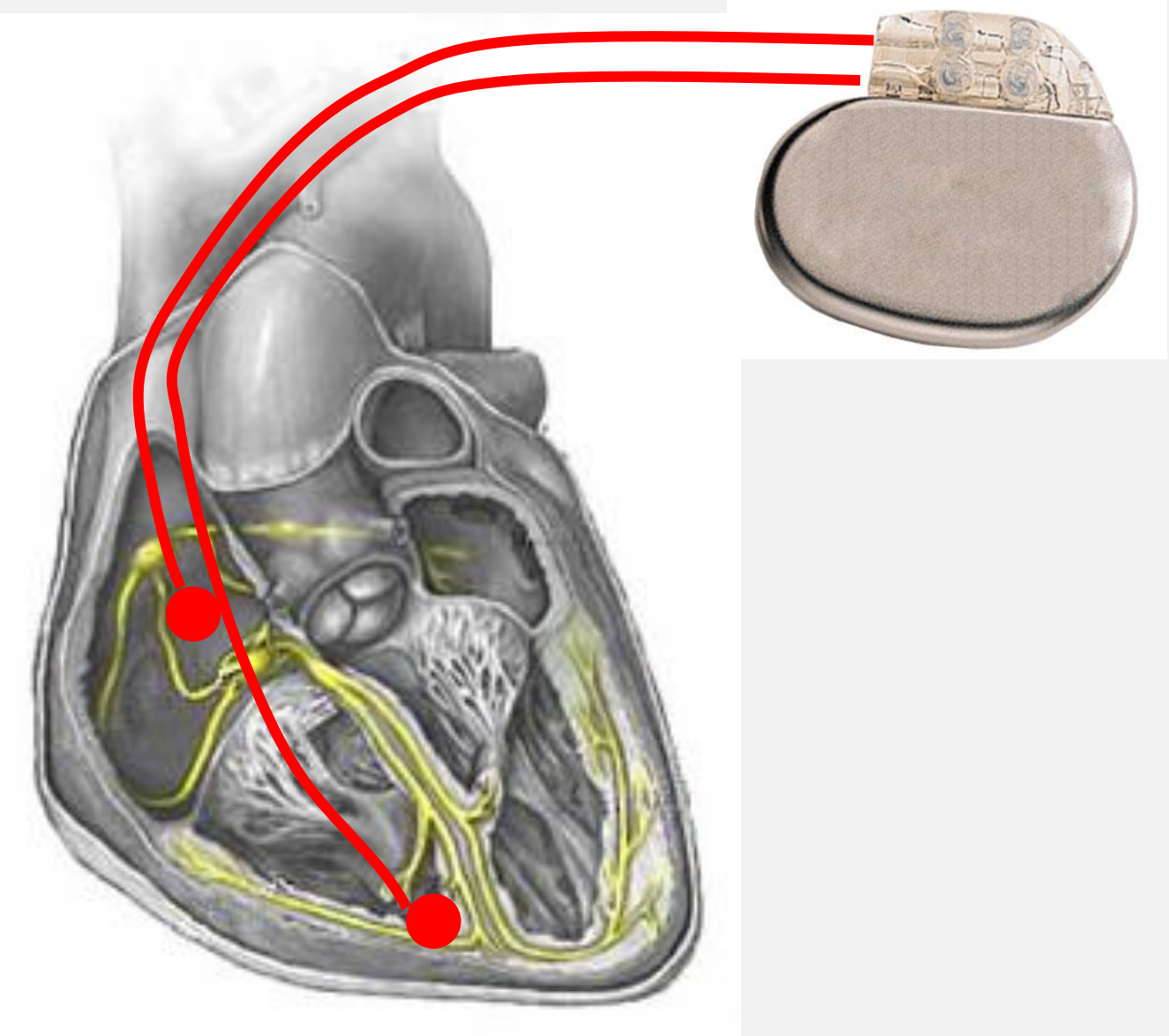


I (inhibit) – întârzierea impulsului în prezența activității electrice proprii

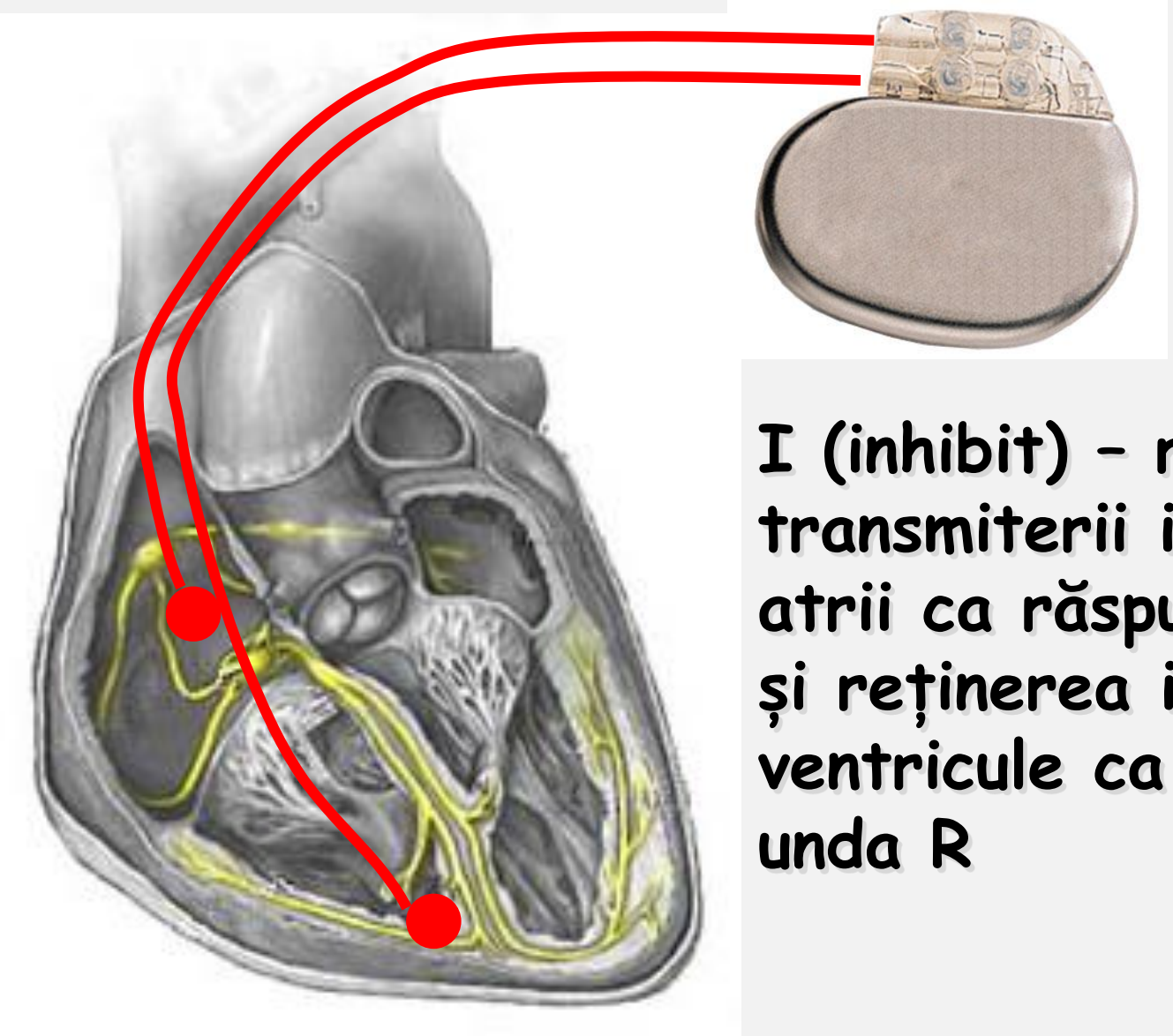
Regimul "demand" (unicameral)



Regimul stimulării bicamerale

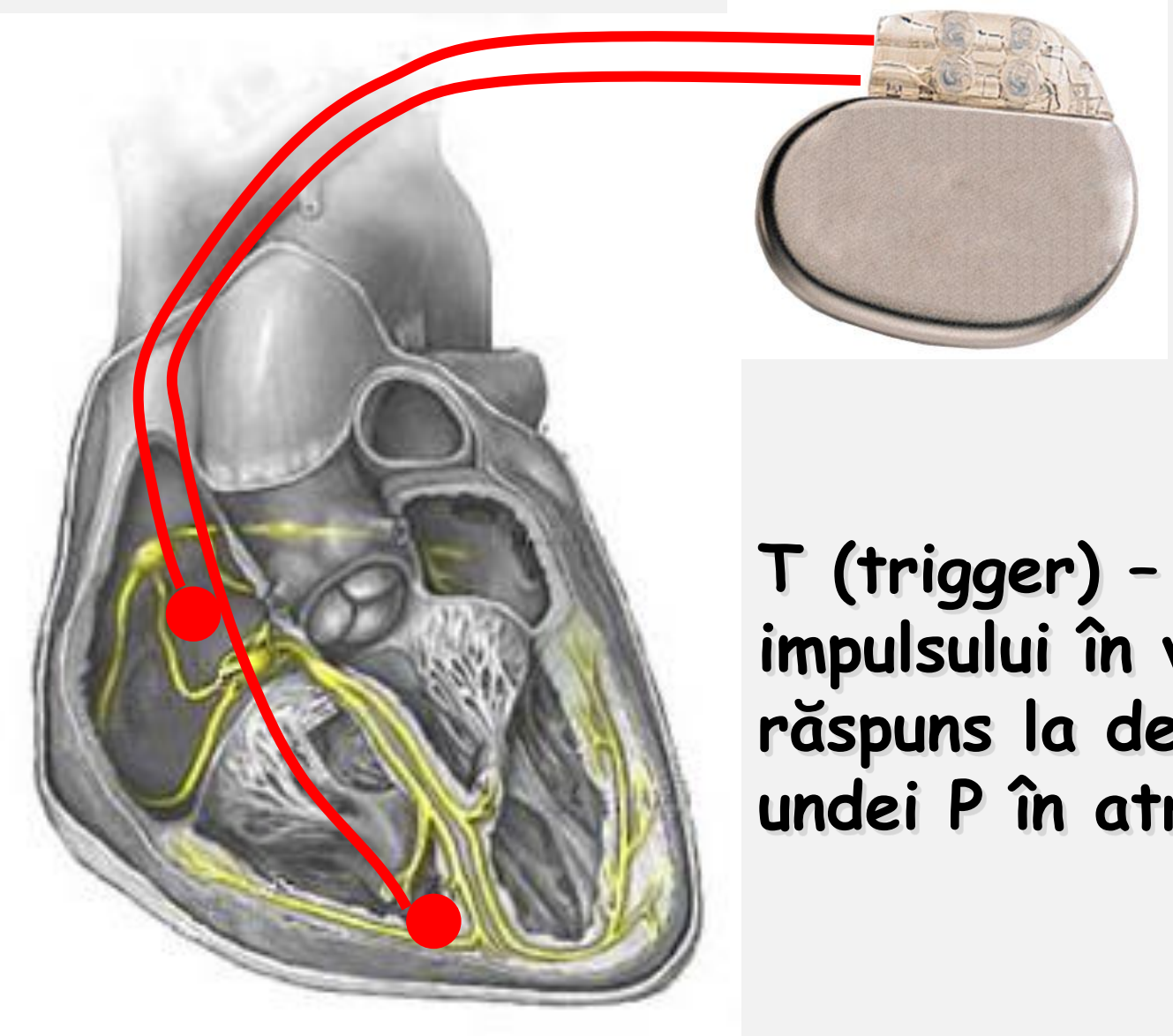


Regimul de lucru "demand"



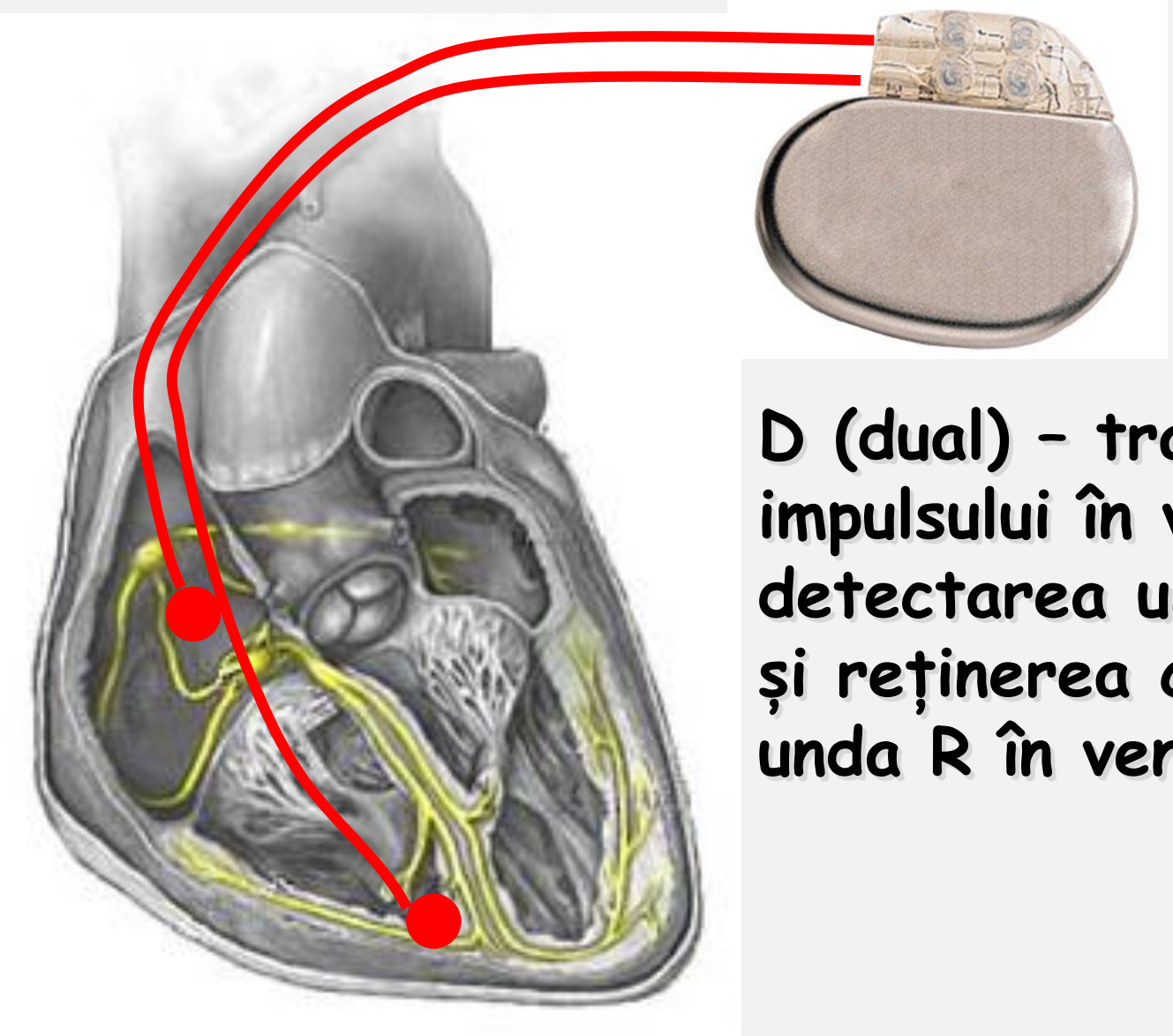
I (inhibit) – reținerea transmiterii impulsului la atrii ca răspuns la unda P și reținerea impulsului în ventricule ca răspuns la unda R

Regim de lucru "trigger"



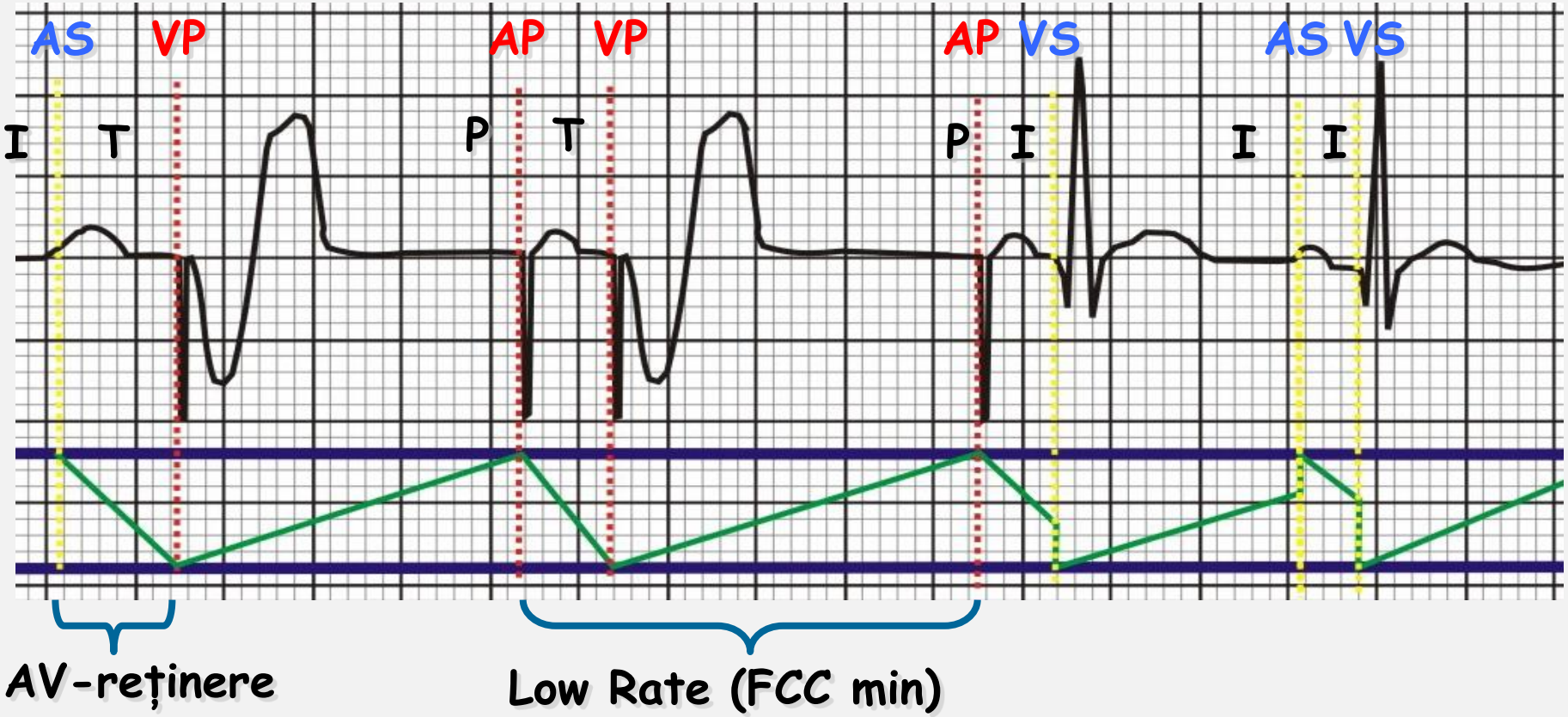
T (trigger) – transmiterea impulsului în ventriculul ca răspuns la detectarea undei P în atrii

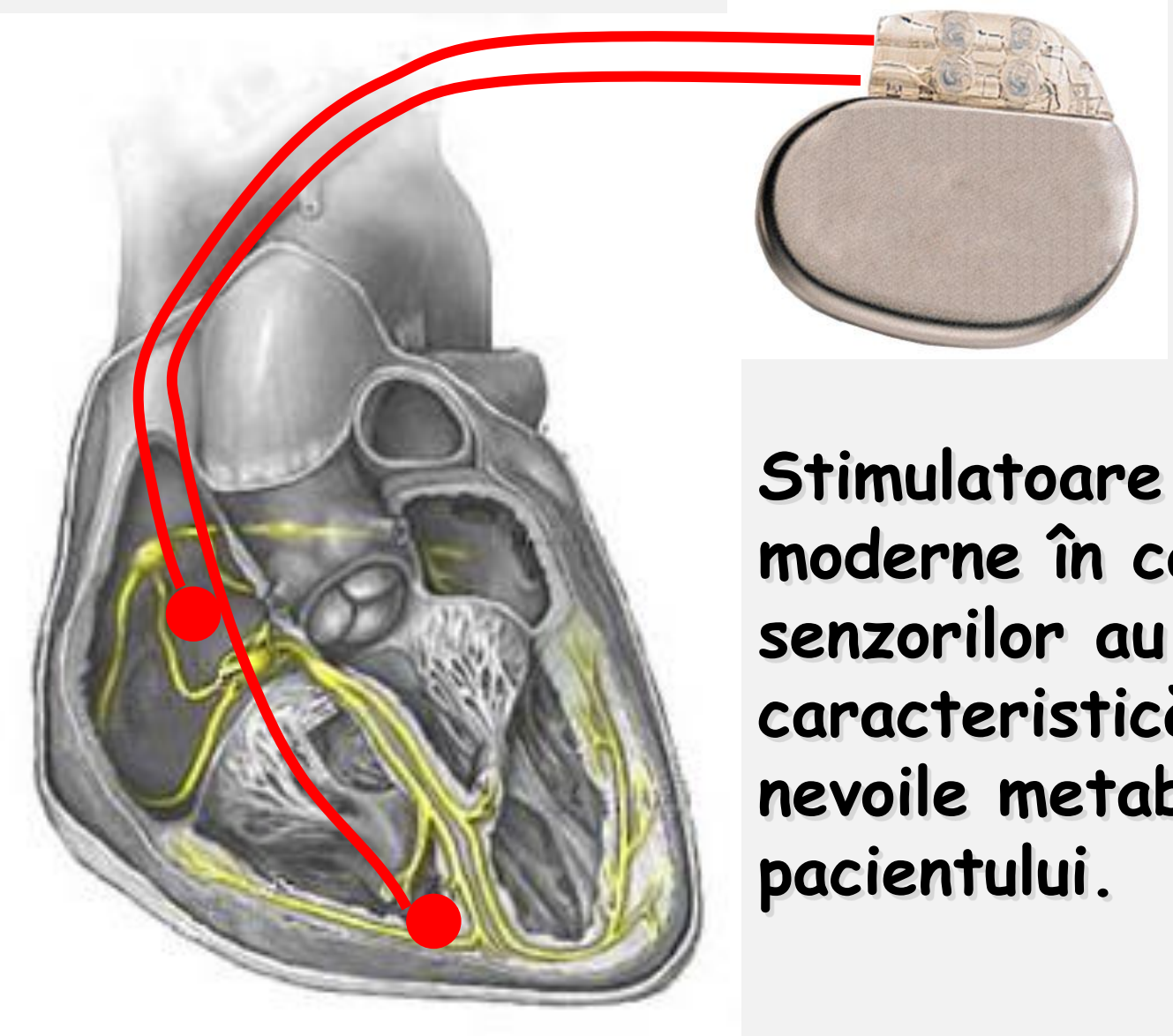
Regim de lucru "dual"



D (dual) – transmiterea impulsului în ventricul la detectarea undei P în atrii și reținerea ca răspuns la unda R în ventricul

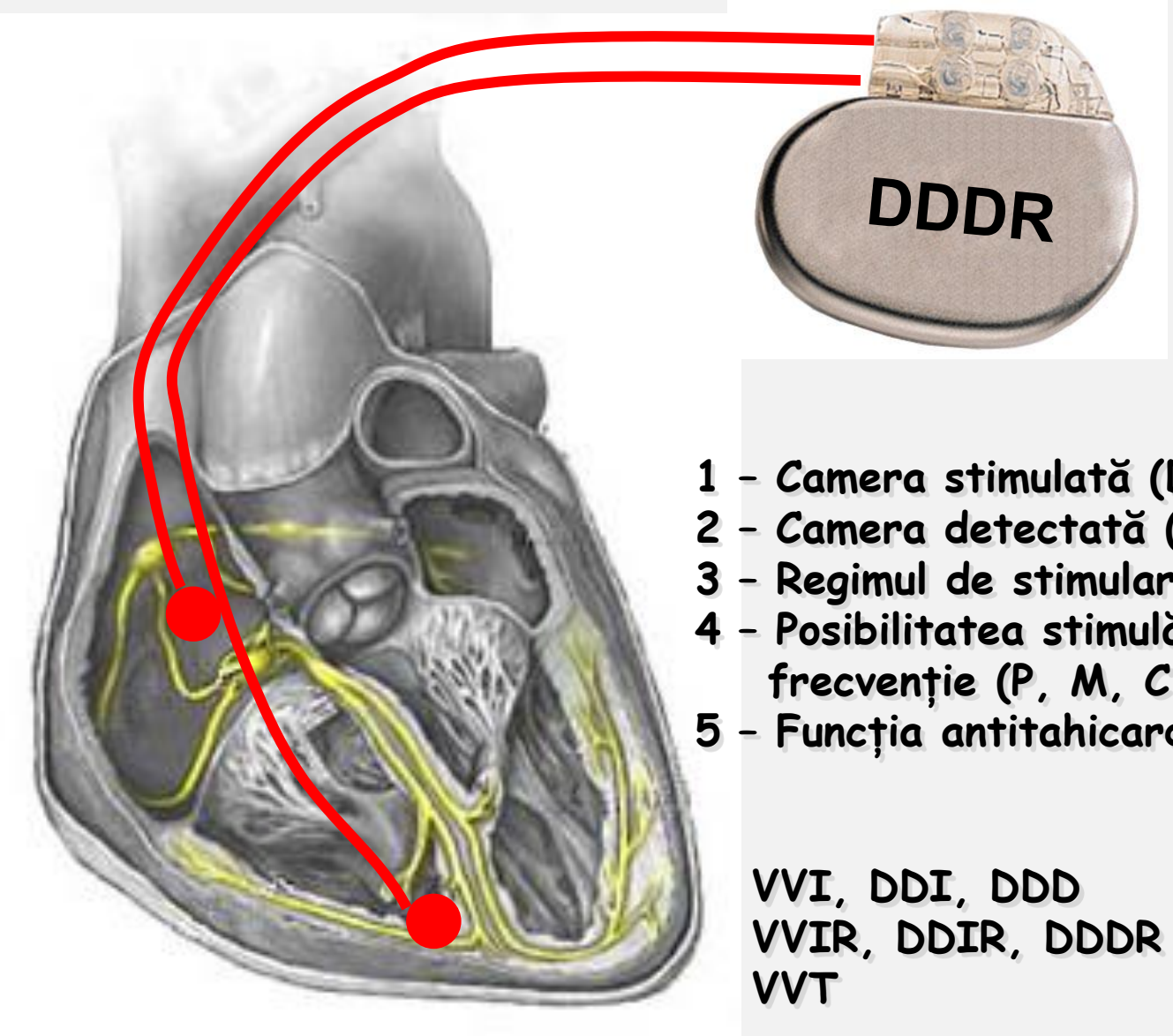
Lucrul stimulatorului bicameral





Stimulatoare cardiace moderne în cazul prezenței senzorilor au o adaptare caracteristică a FCC la nevoile metabolice ale pacientului.

Codul cardiostimulatorului

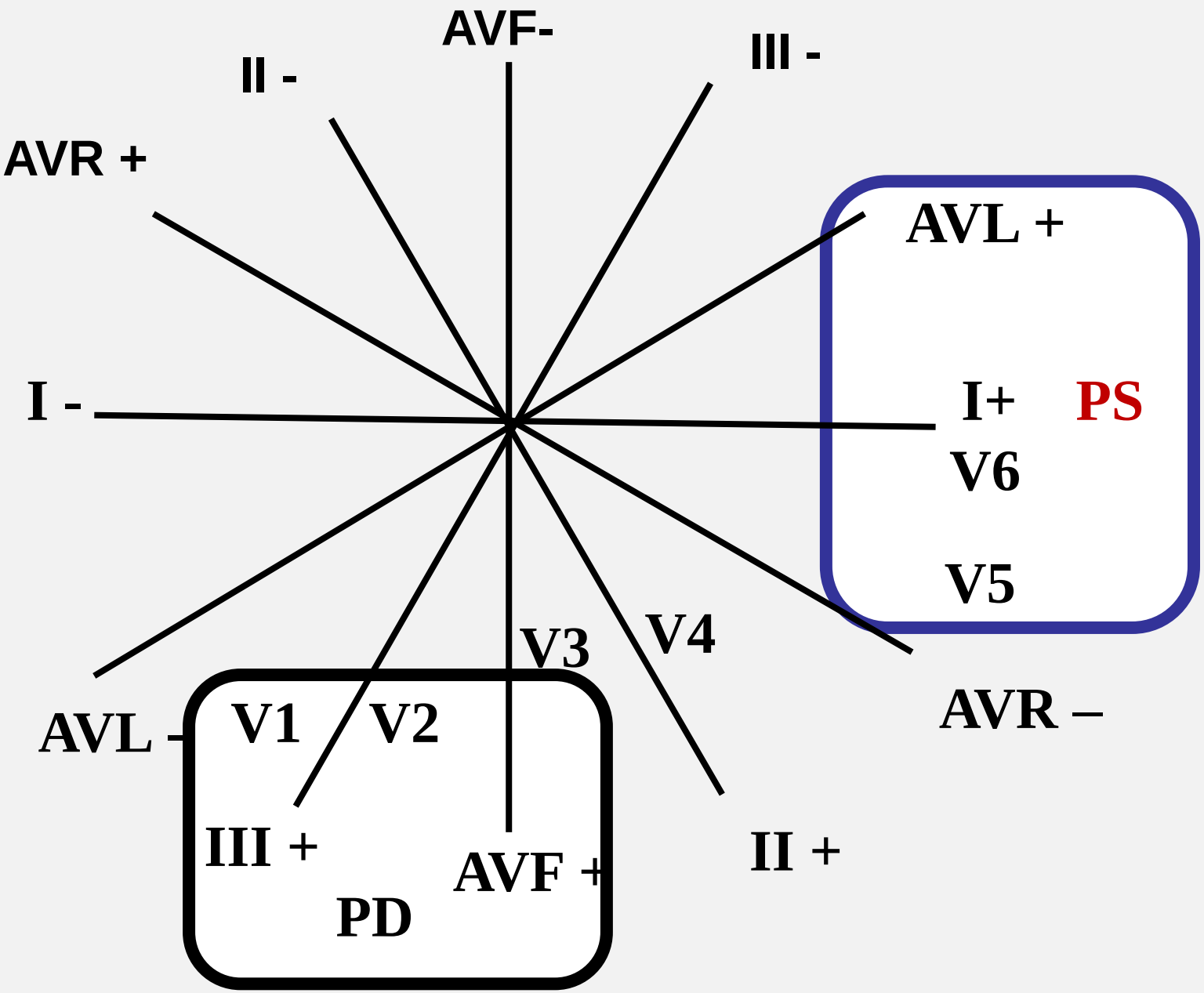


1 – Camera stimulată (D, V, A, O)
2 – Camera detectată (D, V,A, O)
3 – Regimul de stimulare (D, I, T, O)
4 – Posibilitatea stimulării cu adaptarea frecvenție (P, M, C, R, O)
5 – Funcția antitahicardică (P, S, D, O)

VVI, DDI, DDD
VVIR, DDIR, DDDR
VVT

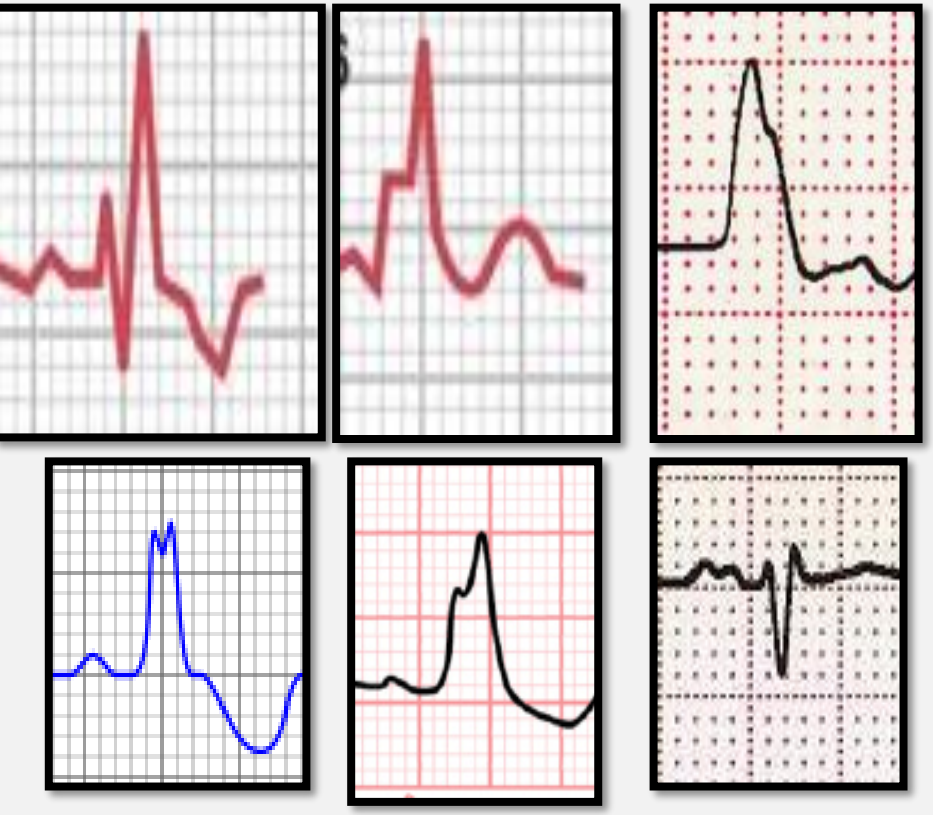
Codul cardiostimulatorului

Camerele stimulate	Camerele detectoare	Răspuns la detectare	Programarea, adaptarea frecvenței	Funcția antitahicardică
O – absent	O – absent	O – absent	O – absent	O – absent
A – atrii	A – atrii	T – trigerr	P – simplă	P – antitahi stimulare
V – ventricul	V – ventricul	I – inhibit	M – multiprogram	S – șoc
D – două (A+V)	D – două (A+V)	D – dublu(T+I)	C – regim comunicativ	D – dublu (P+S)
			R – adaptare la frecvență	


AVF-
III -
II -
AVR +
AVL +
I -
I+
PS
V6
V5
V4
V3
AVR –
AVL –
V1
V2
III +
AVF +
II +
PD

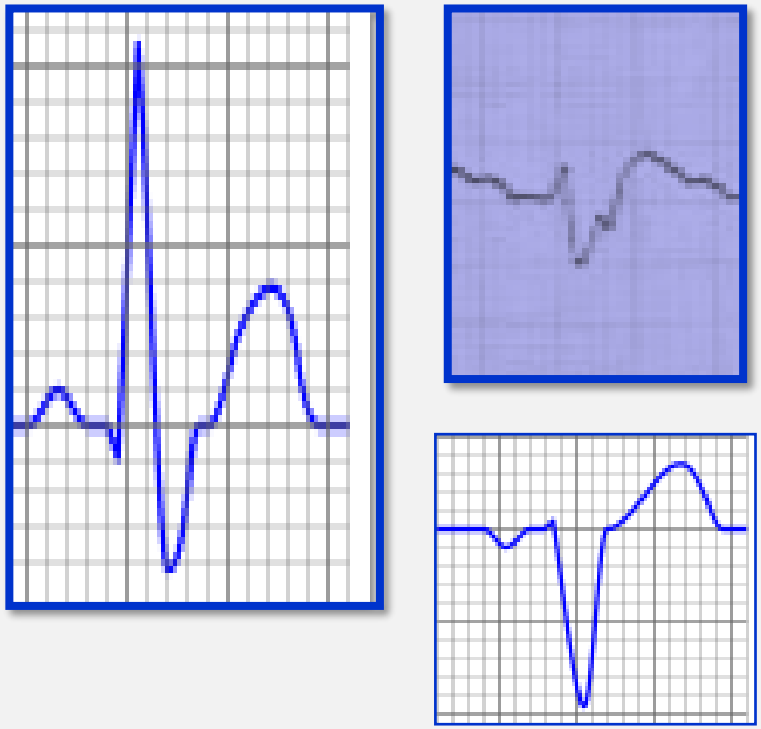
Bloc de ram drept a f. His

III, AVF, V1; V2



I, AVL, V5; V6

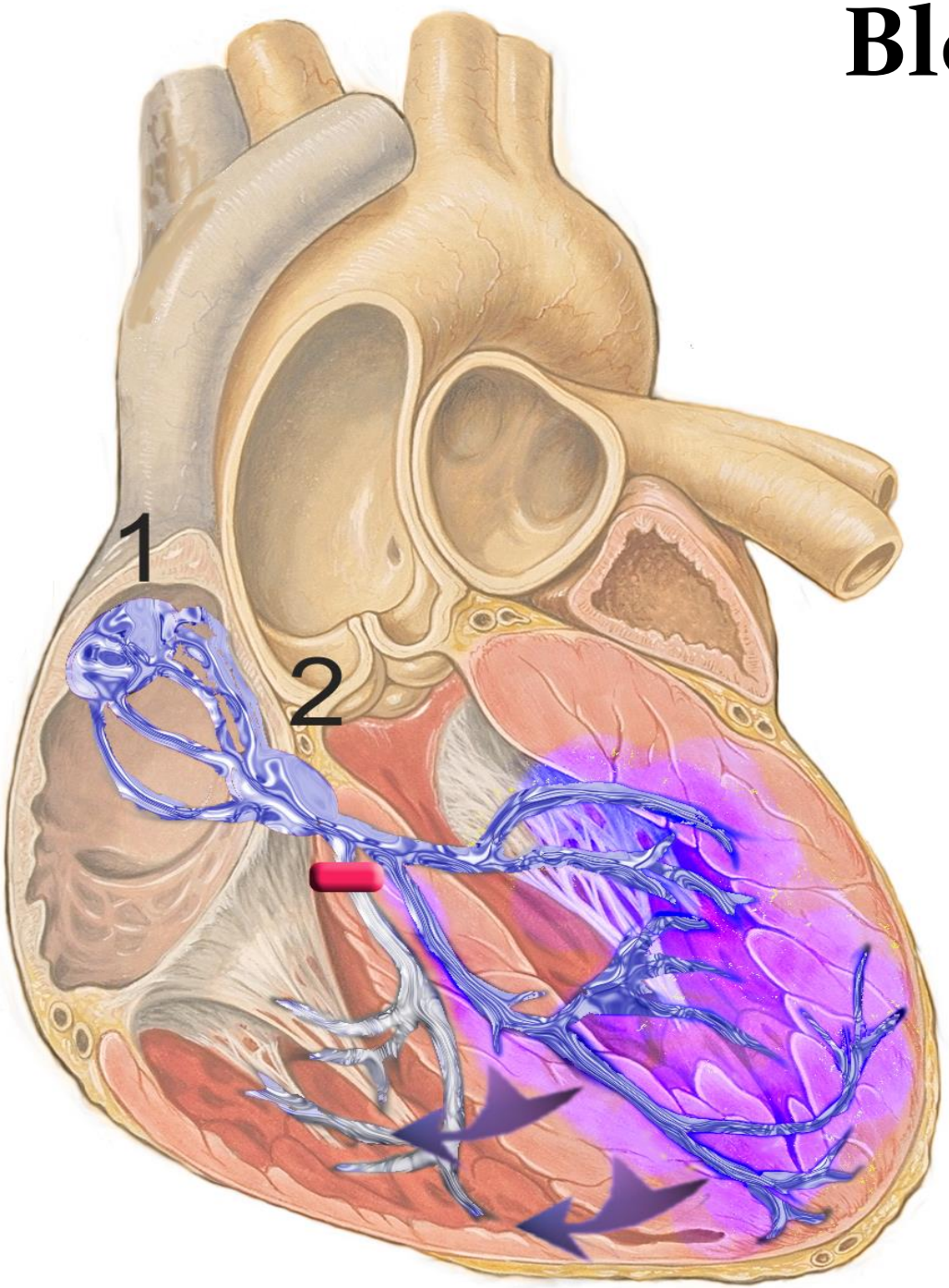
I, AVL, V5; V6



III, AVF, V1; V2

Bloc de ram stâng a f. His

Bloc de ram drept f. His



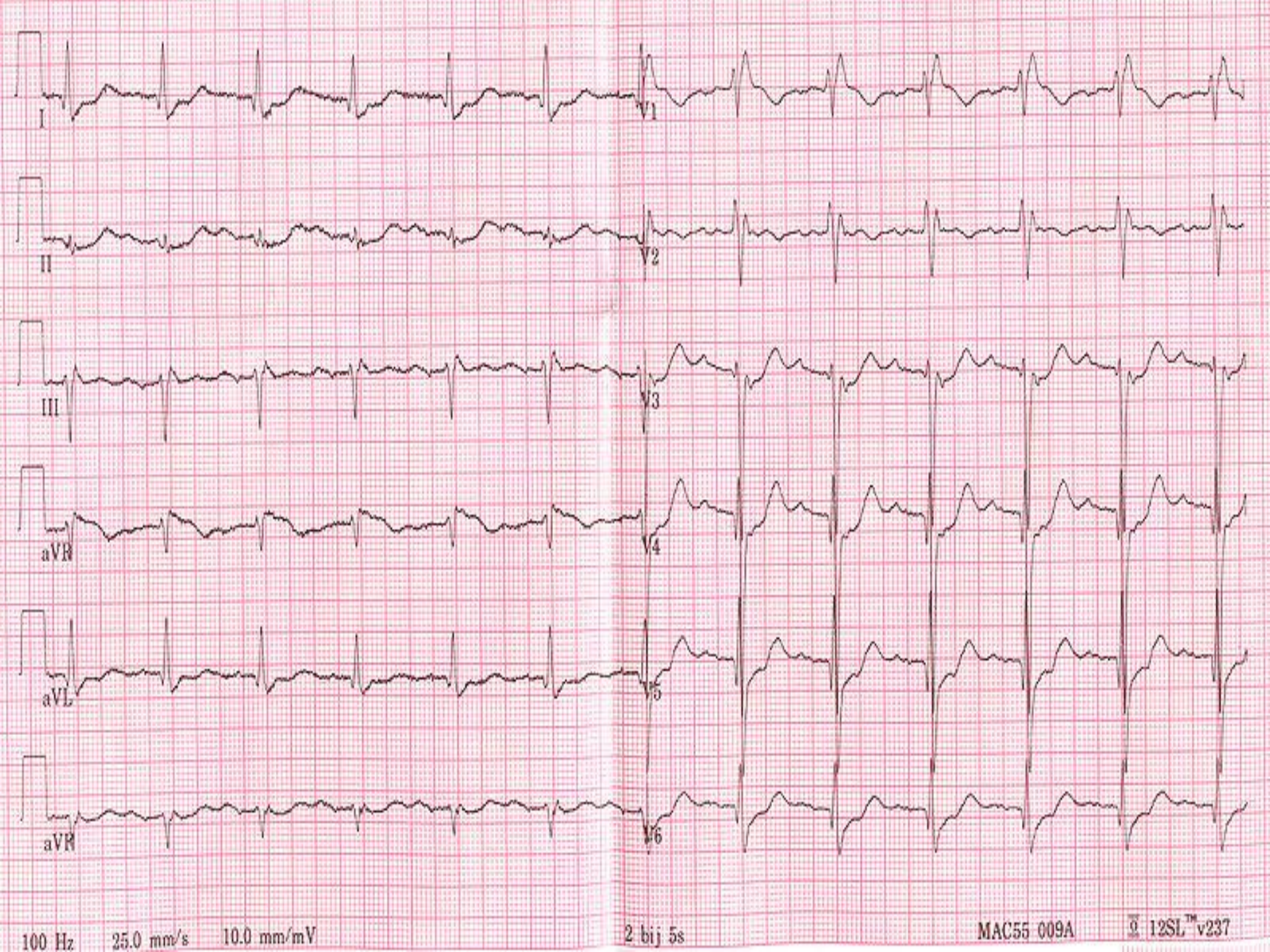
Bloc de ram drept a f. Hiss

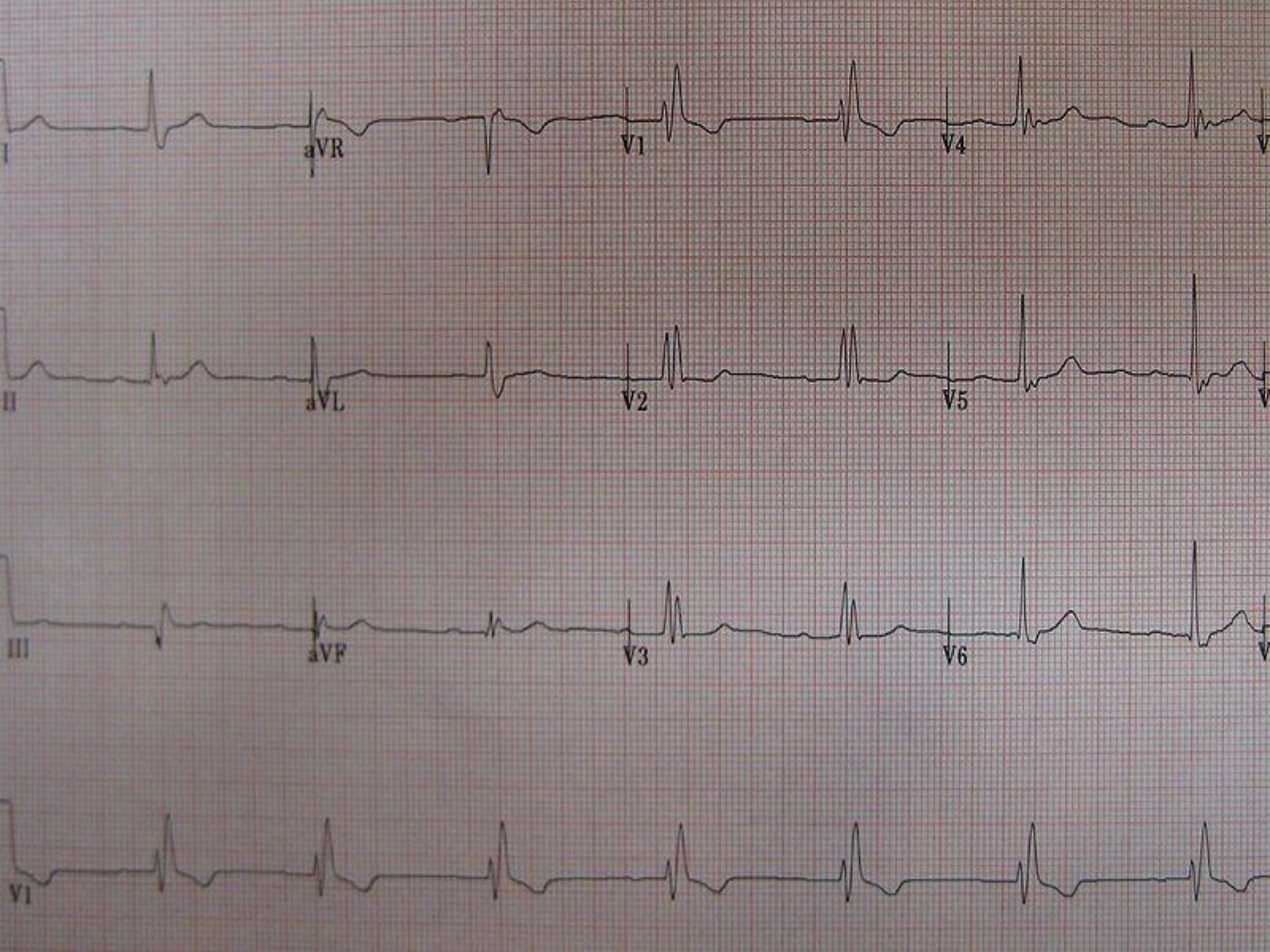
III, AVF, V1, V2

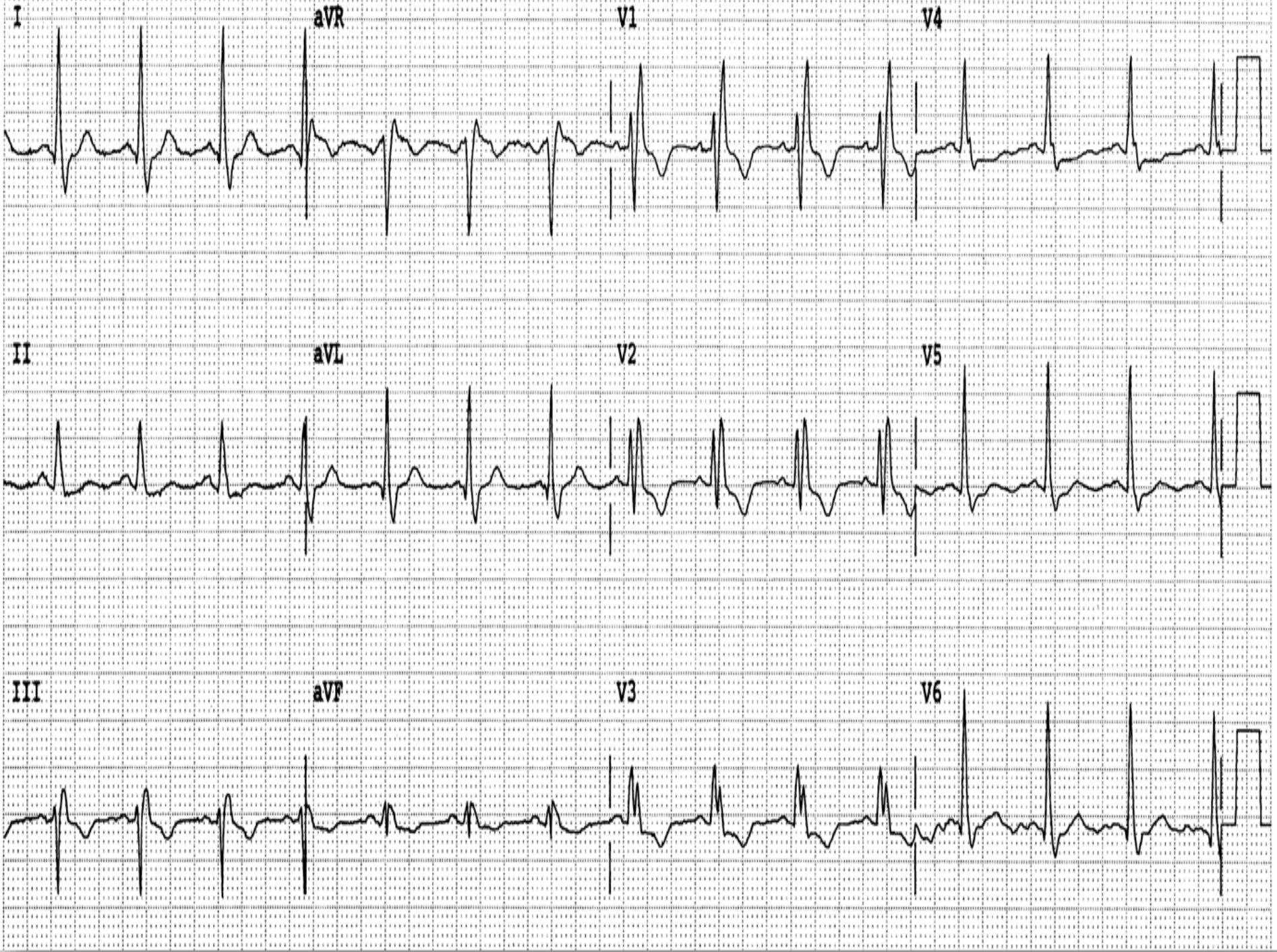
I, AVL, V5, V6

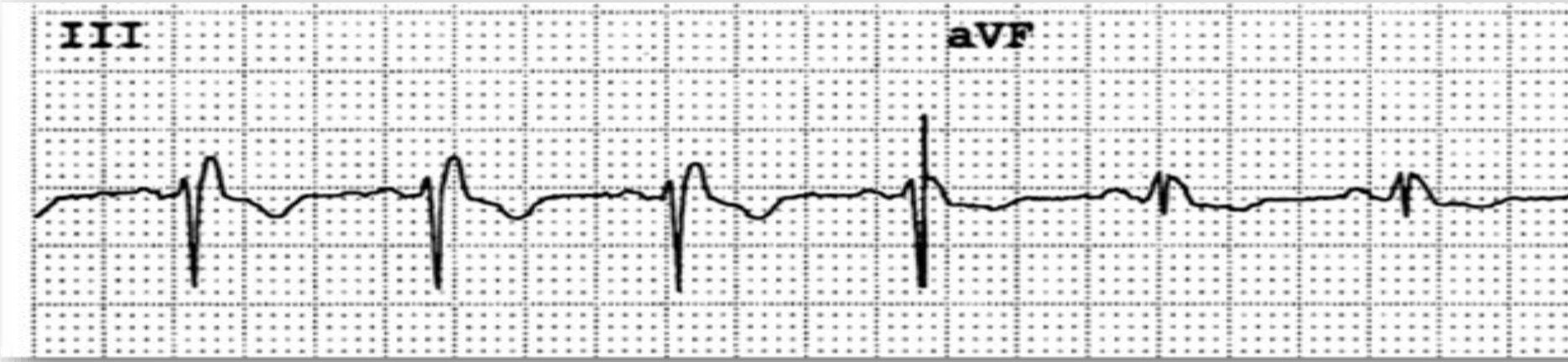
Bloc de ramură dreaptă

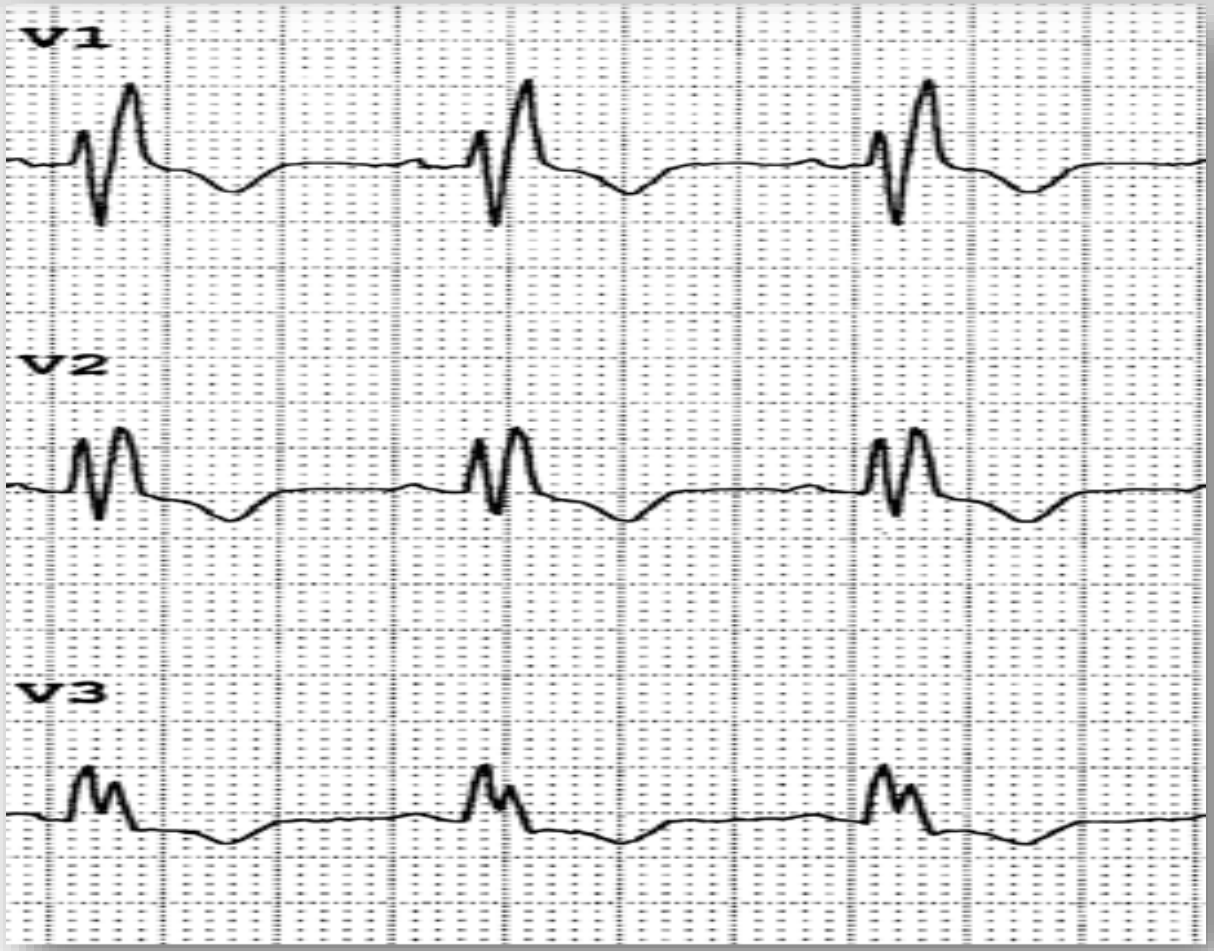
Unda P	int PQ (sec)	QRS (sec)	Caractere
Normal	0,12-0,20	**>0.12 sec**	RSR_{V1}; $S_{V5,6}$ ax deviat la dr.


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
100 Hz
25.0 mm/s
10.0 mm/mV
2 bij 5s
MAC55 009A
12SL™v237

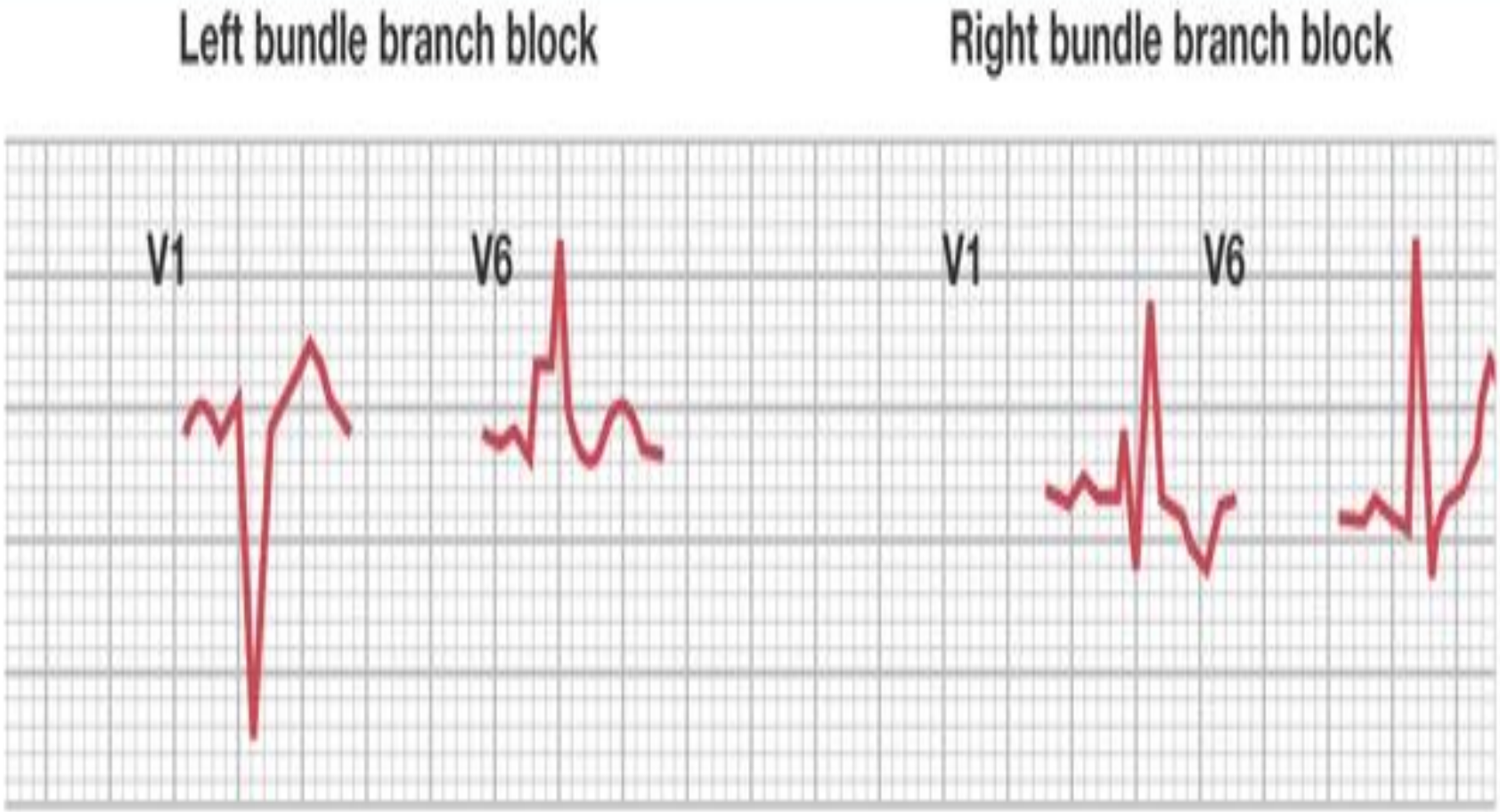

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

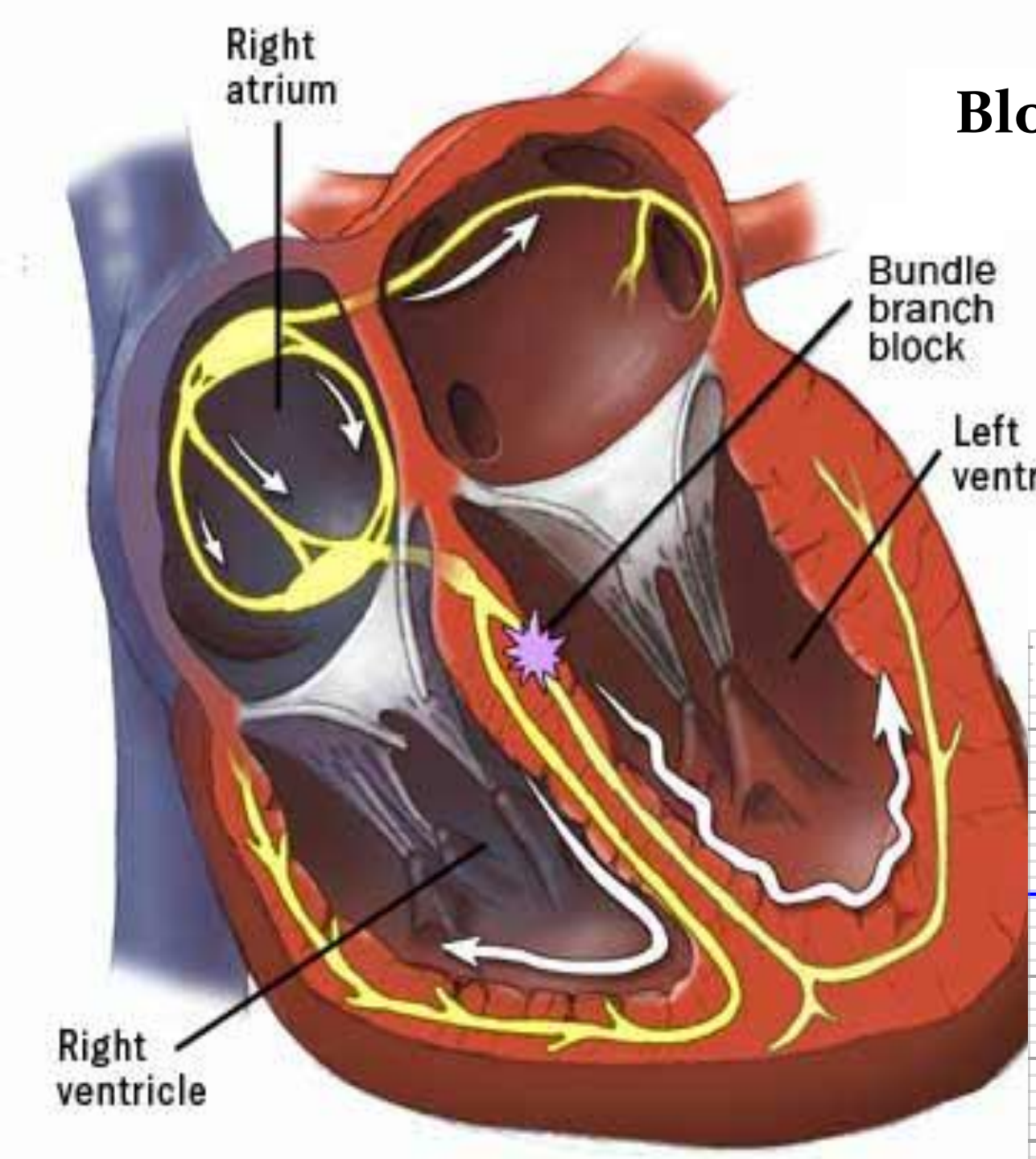

III
aVF

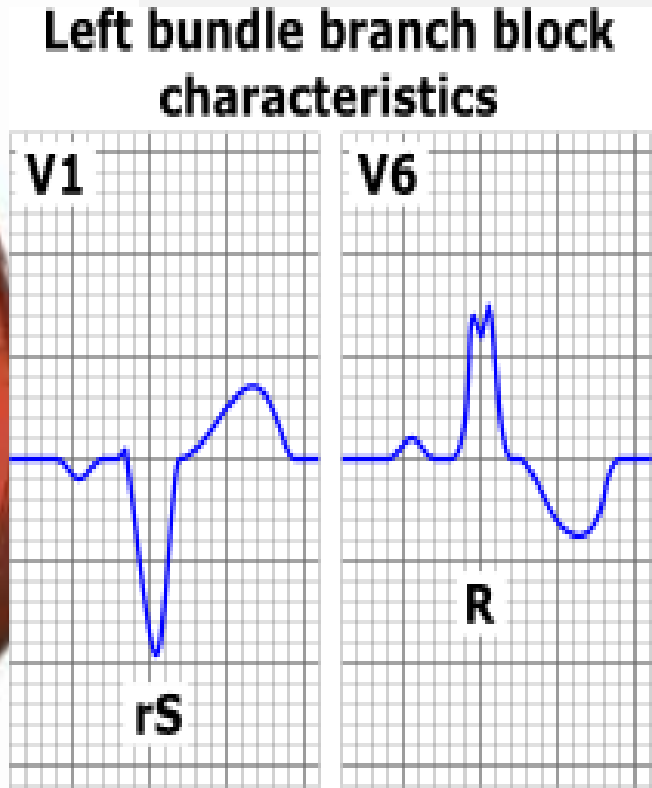

V1
V2
V3

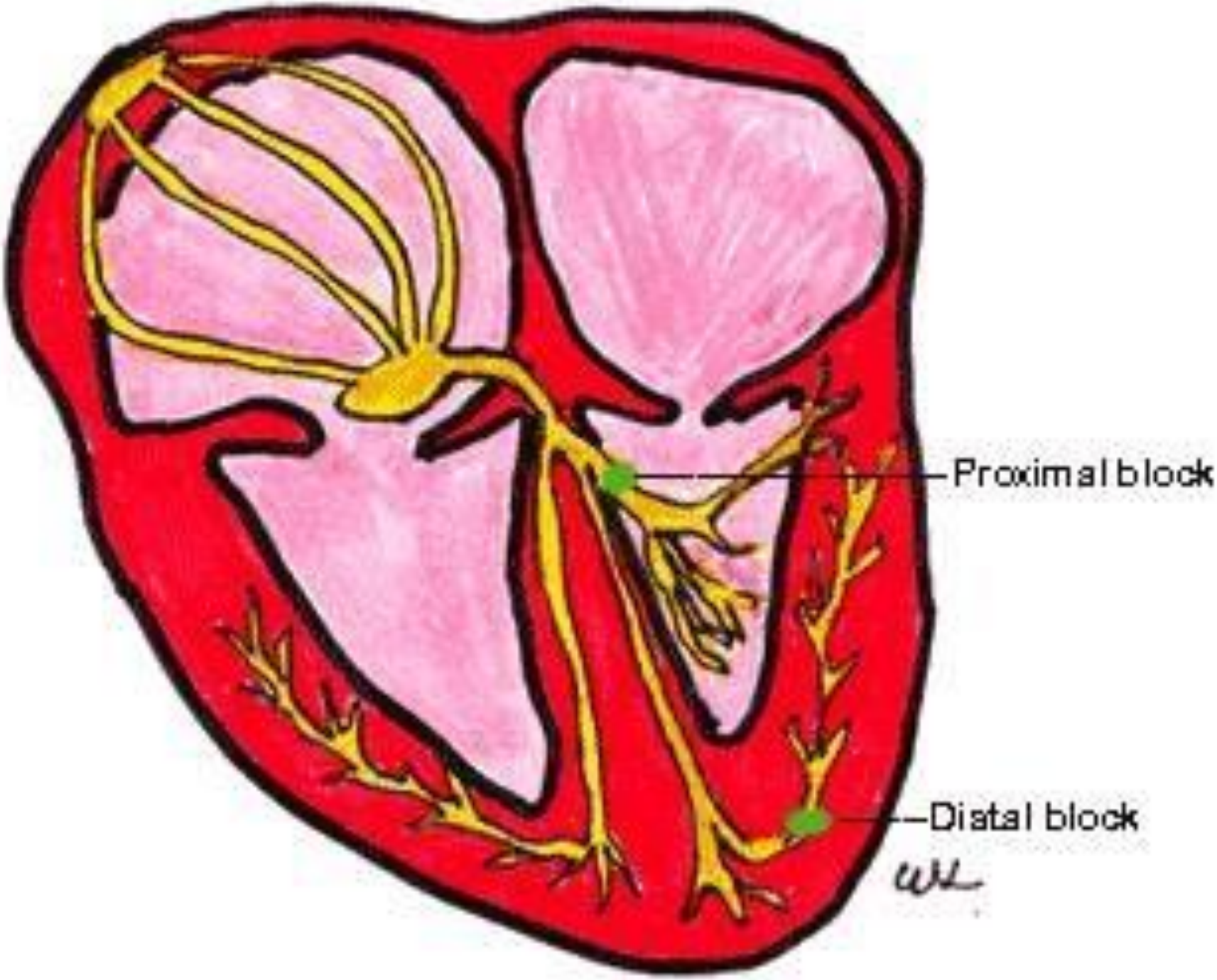
Blocuri de ram drept și stâng a f. His



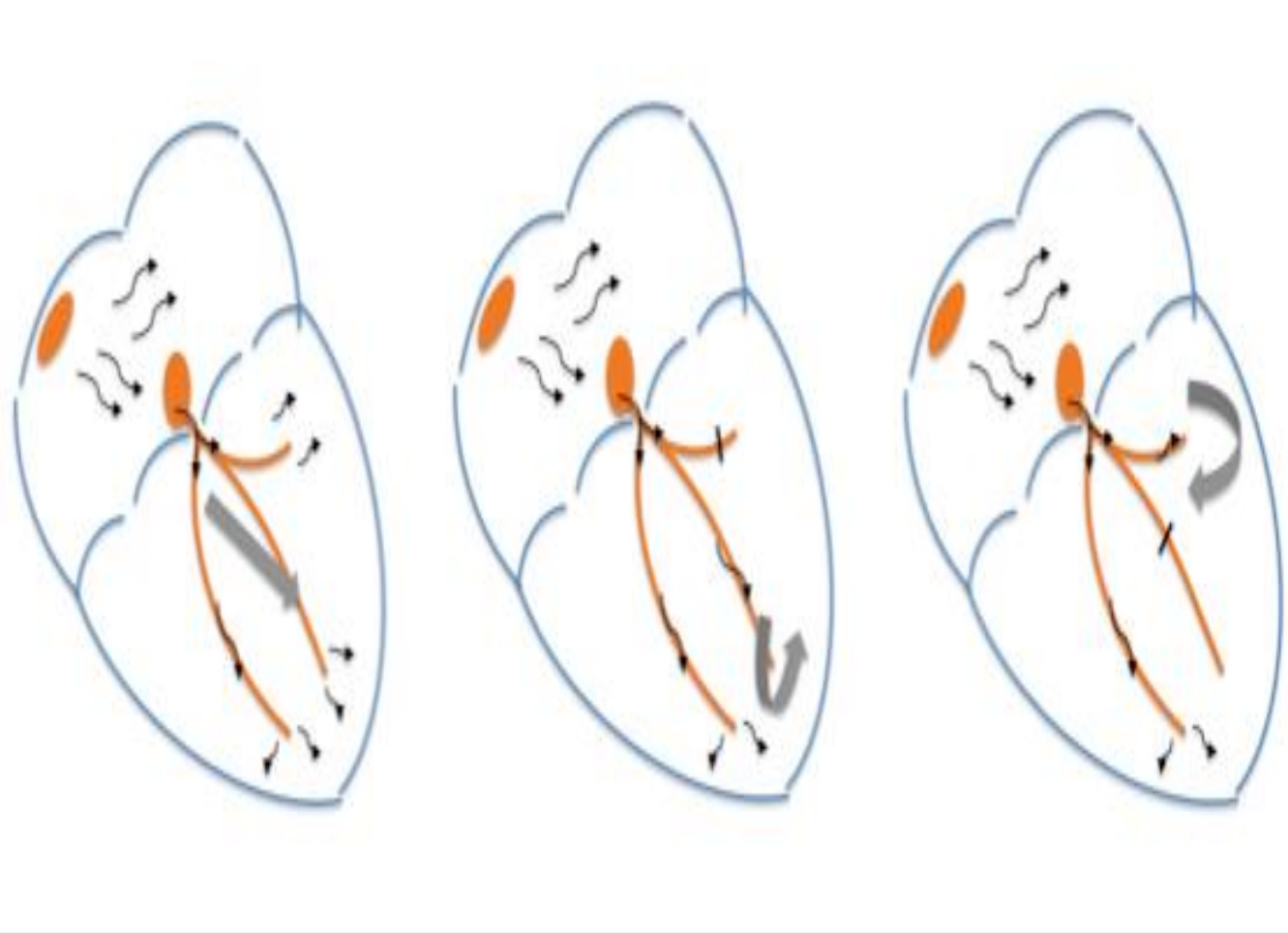
Bloc de ram stâng f. His






Proximal block
Distal block
WL

BLOC RAM STÂNG F. HIS



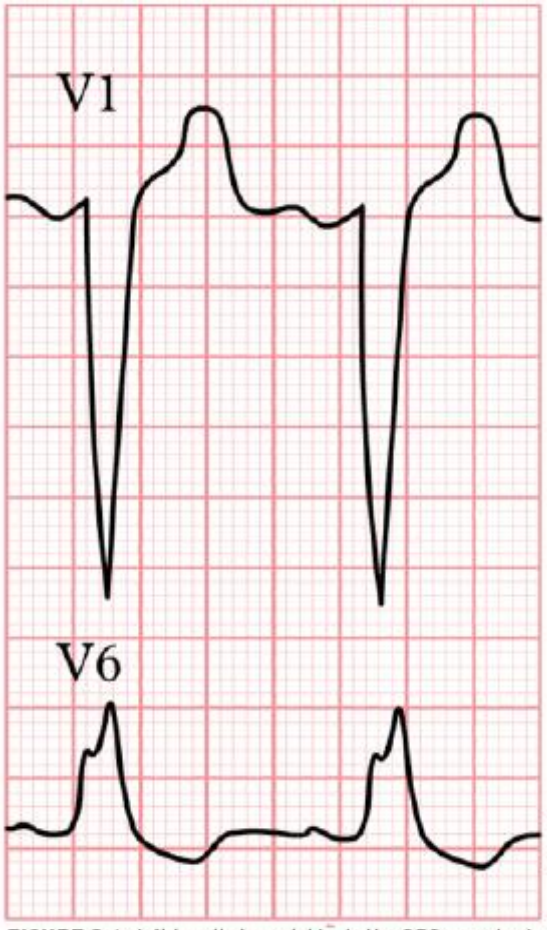
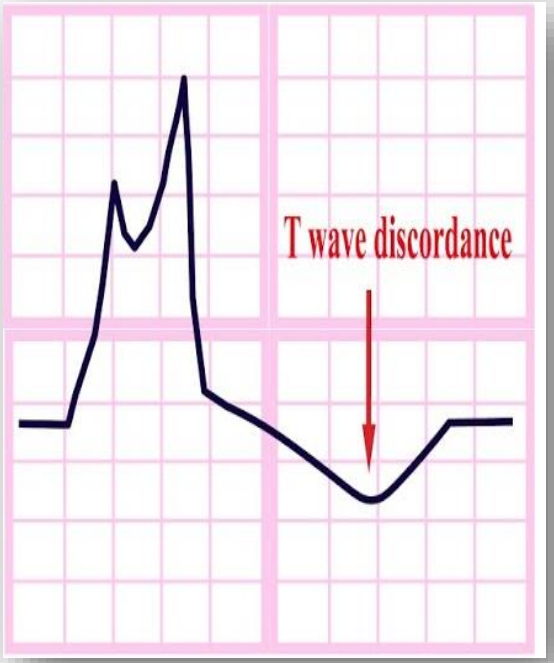
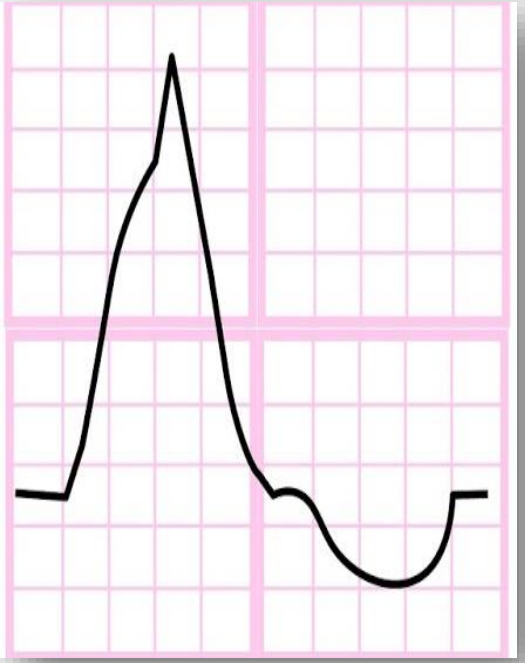
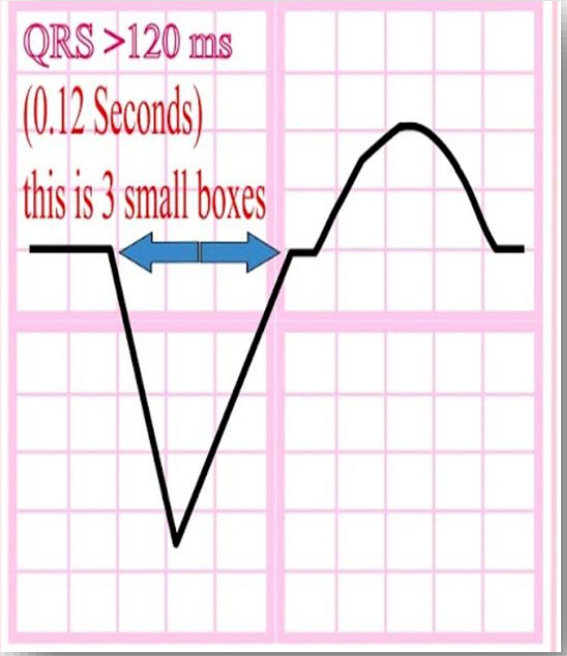


FIGURE 3. In left bundle branch block, the QRS complex is below the baseline in lead V1 and there is prolongation of the R wave, which may appear notched at the top.

Bloc de ram stâng a f. Hiss





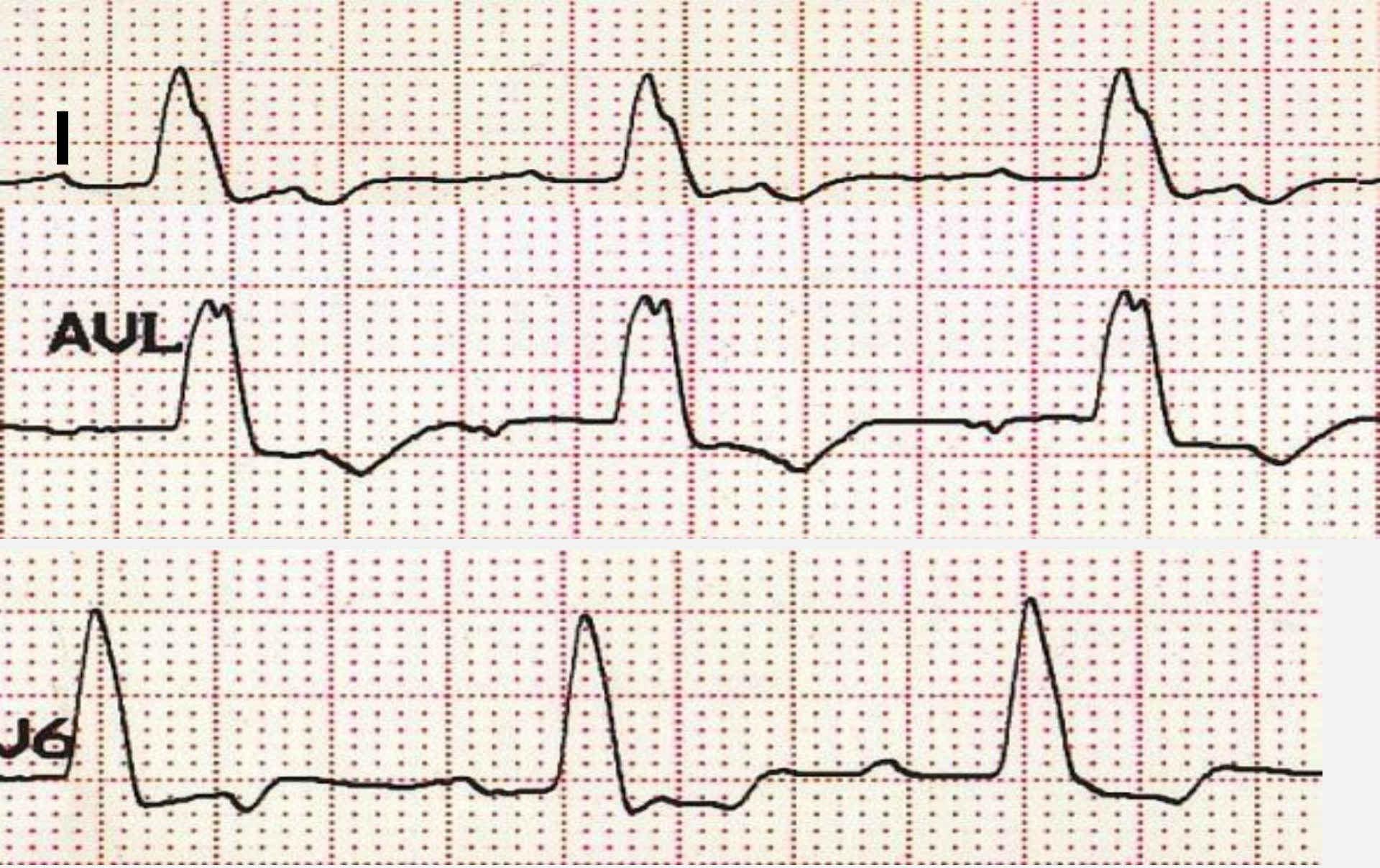


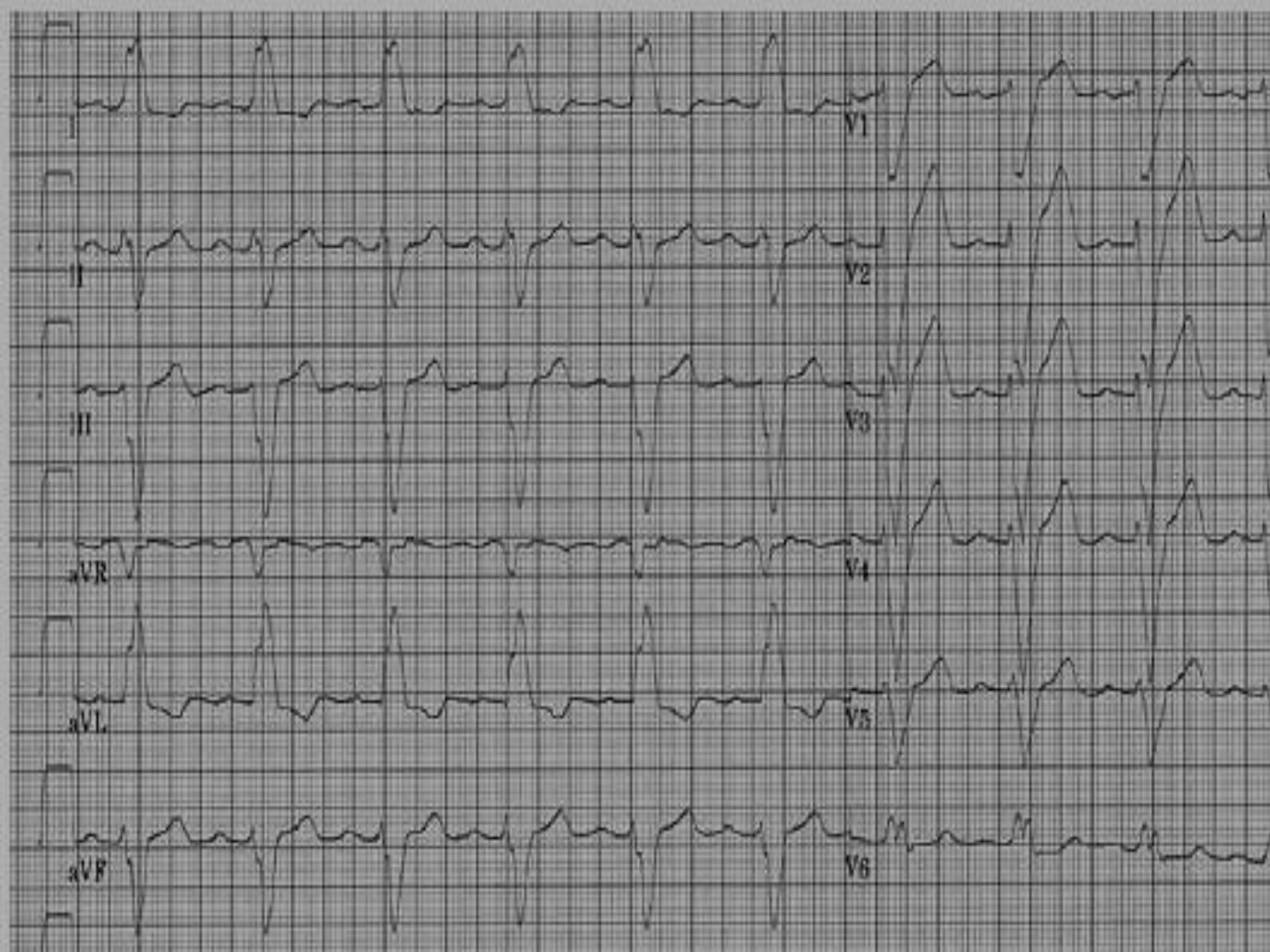
I, AVL

V5, V6

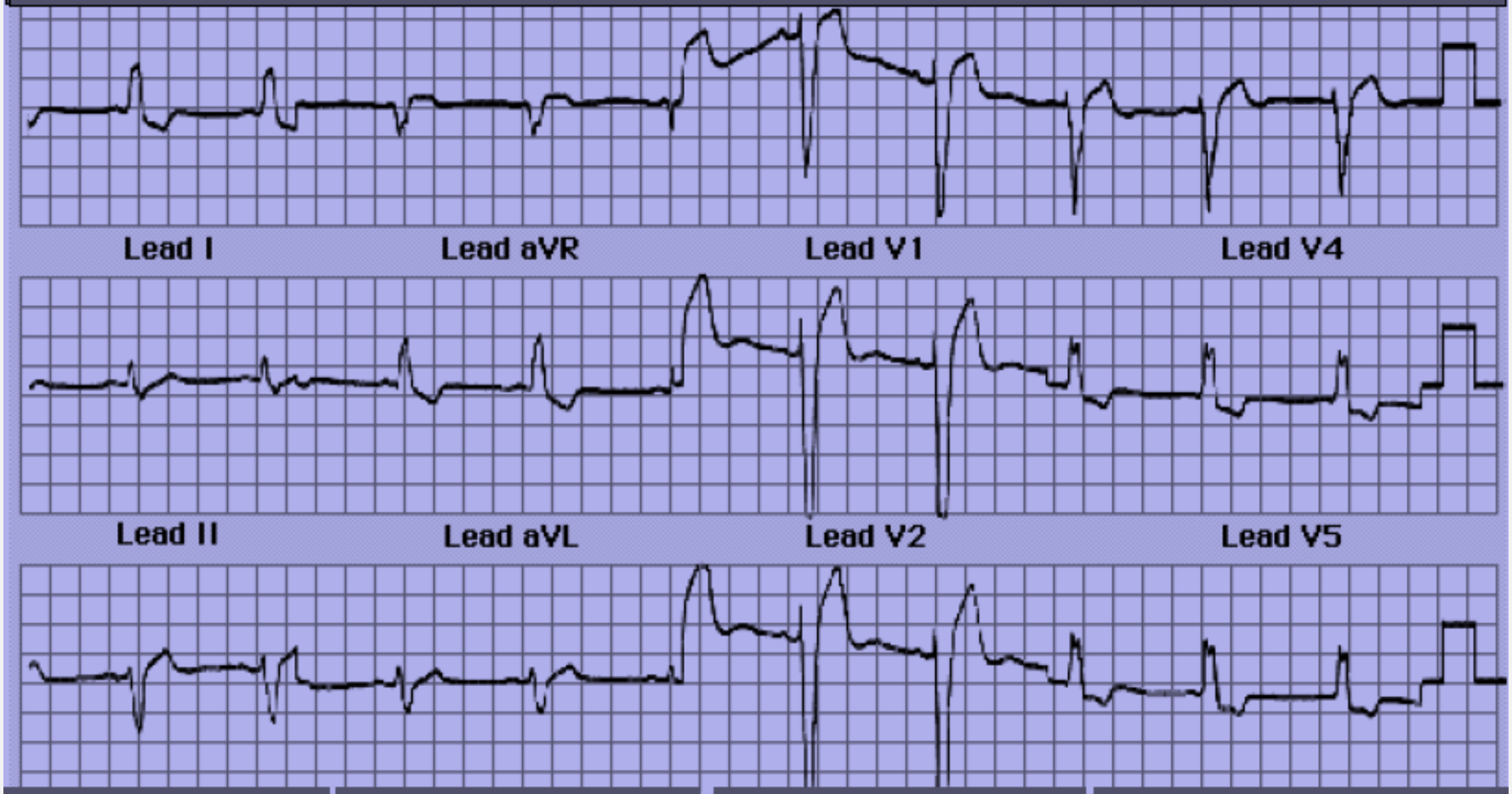
V1, V2

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

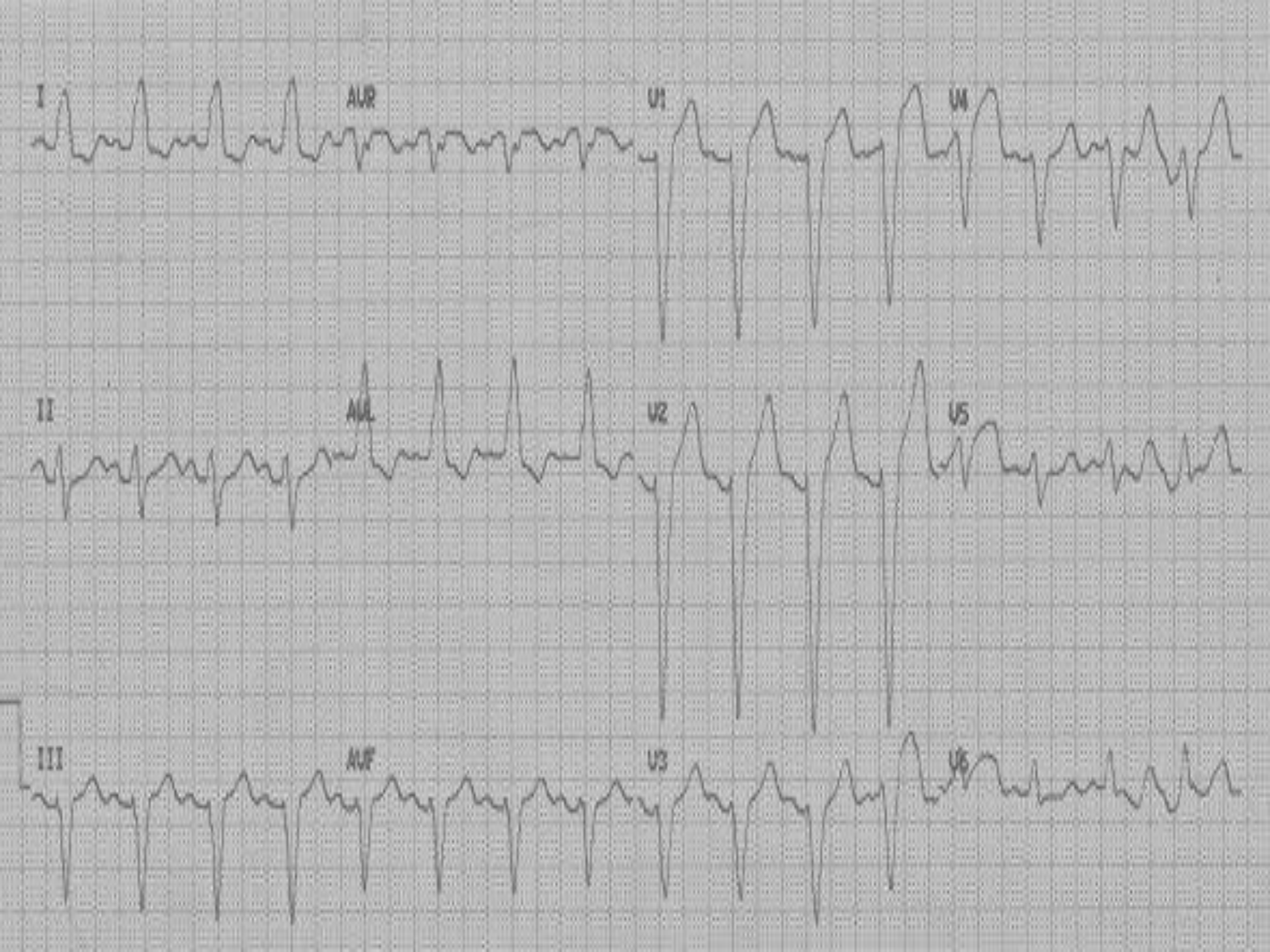

I
AUL
V6


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

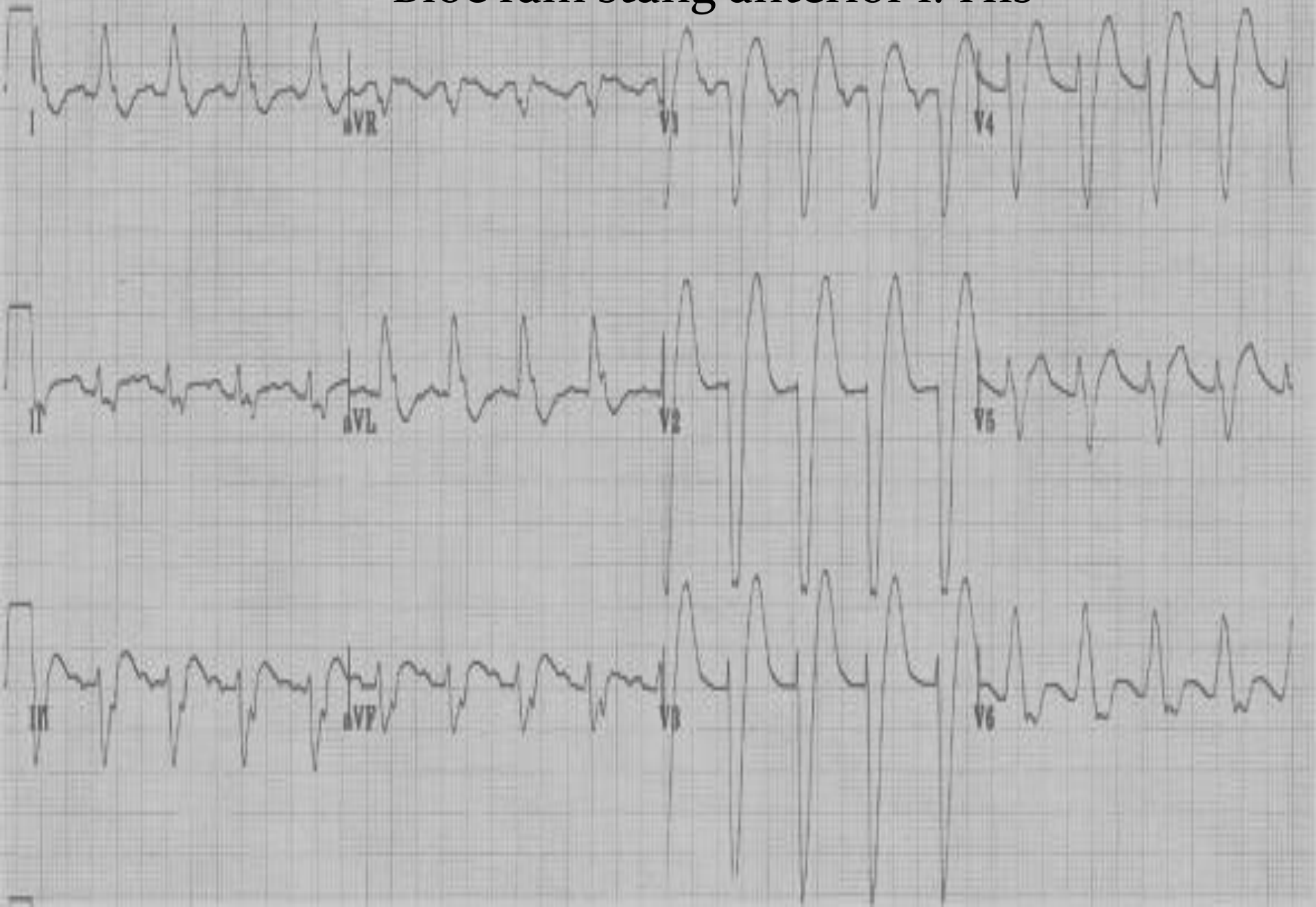
Bloc de ramură stângă



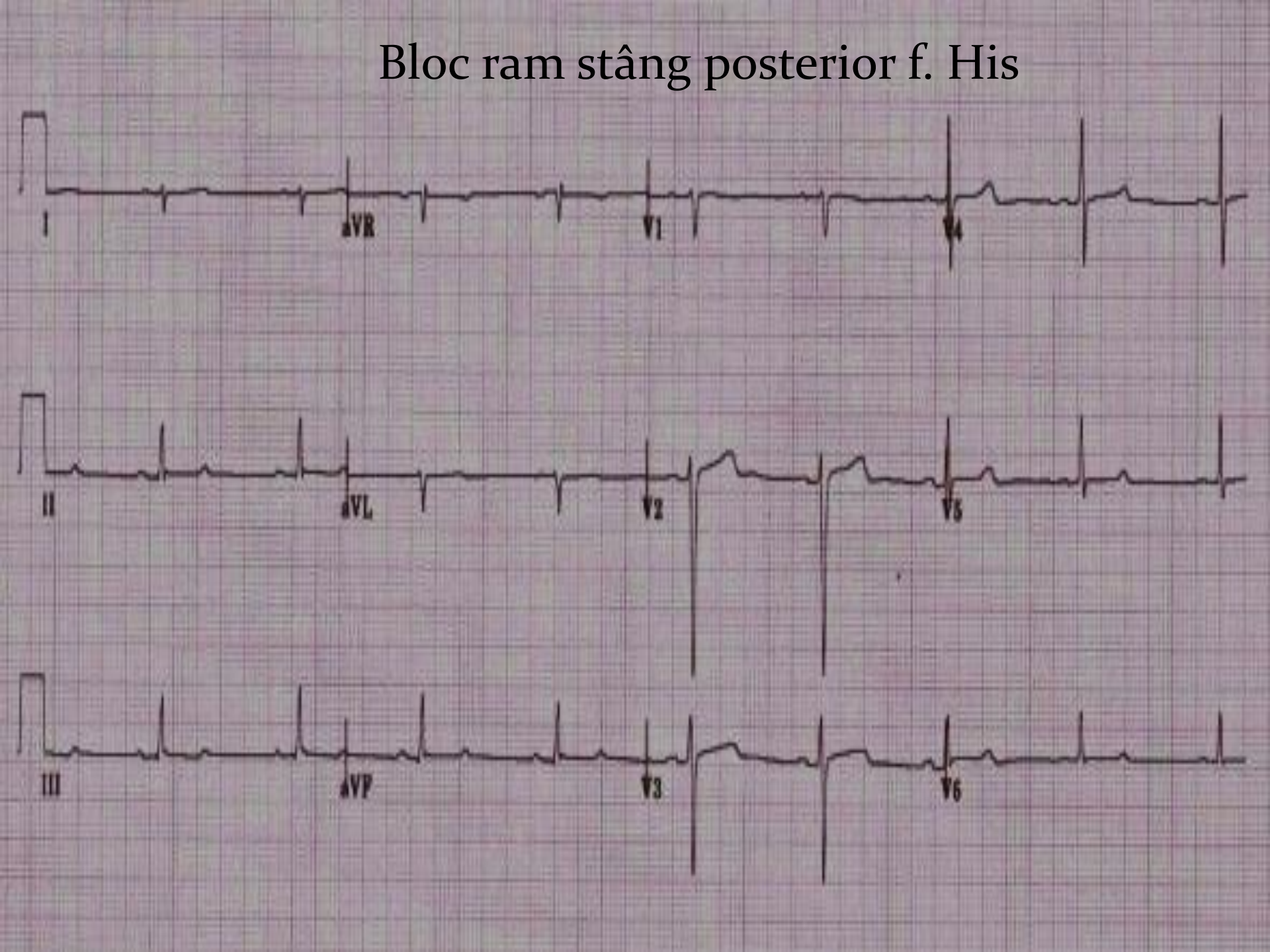
Unda P	int PQ (sec)	QRS(sec)	Caractere
Normal	0,12-0,20	**>0.12 sec**	$R_{V5}+S_{V1}>35$mm ax deviat la stg.


I
AVR
V1
V4
II
AVL
V2
V5
III
AVF
V3
V6

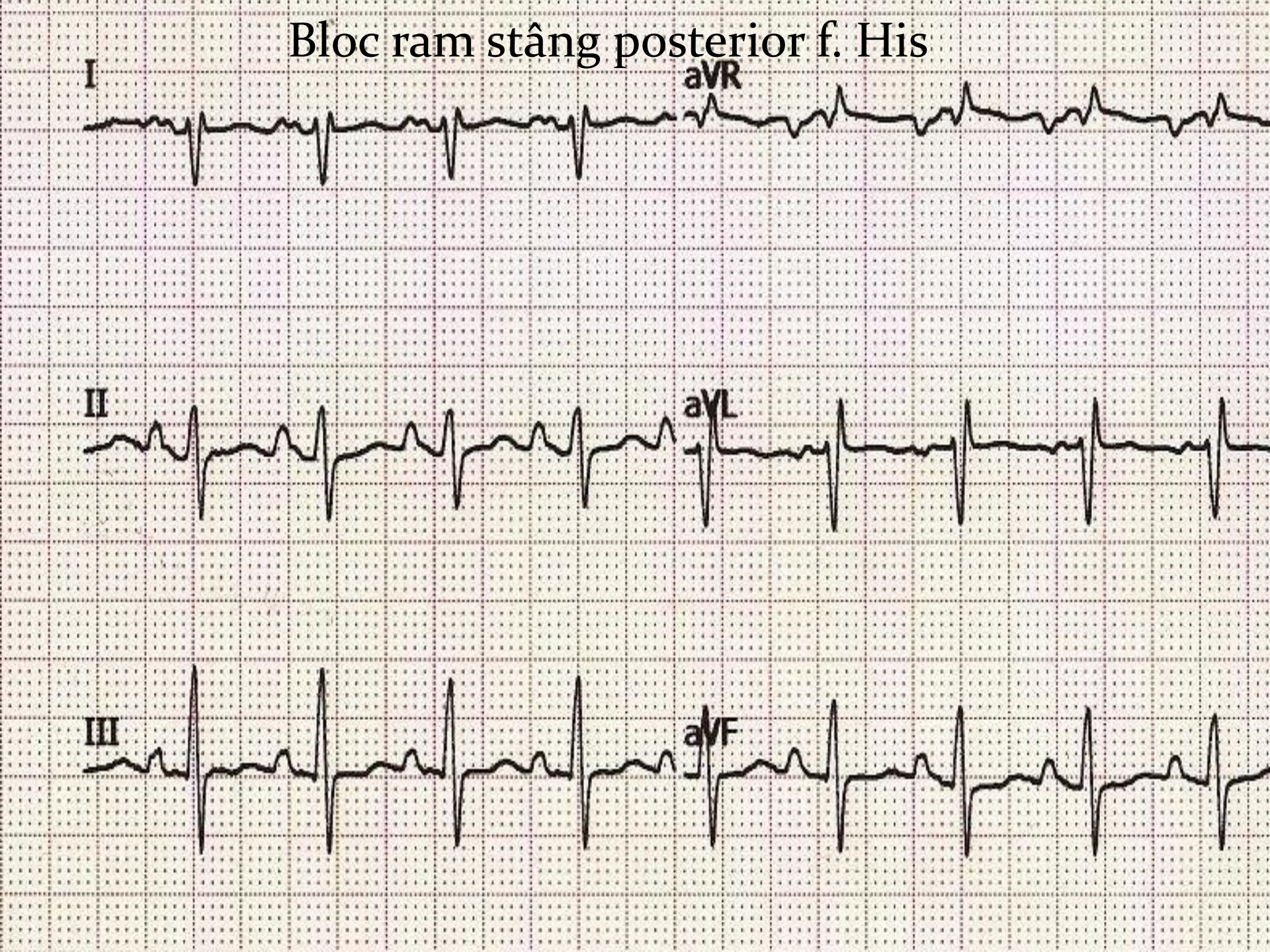
Bloc ram stâng anterior f. His



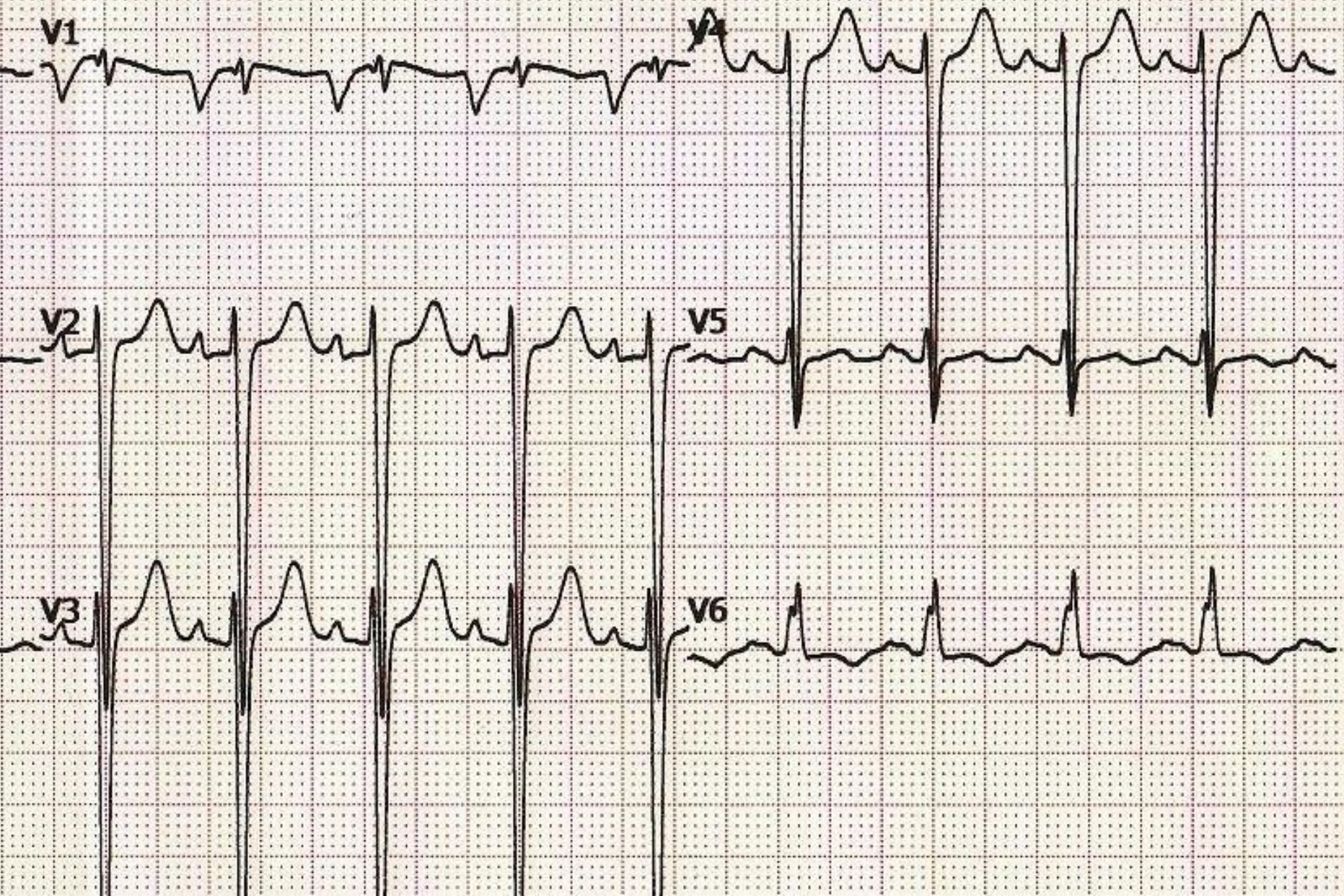
Bloc ram stâng posterior f. His

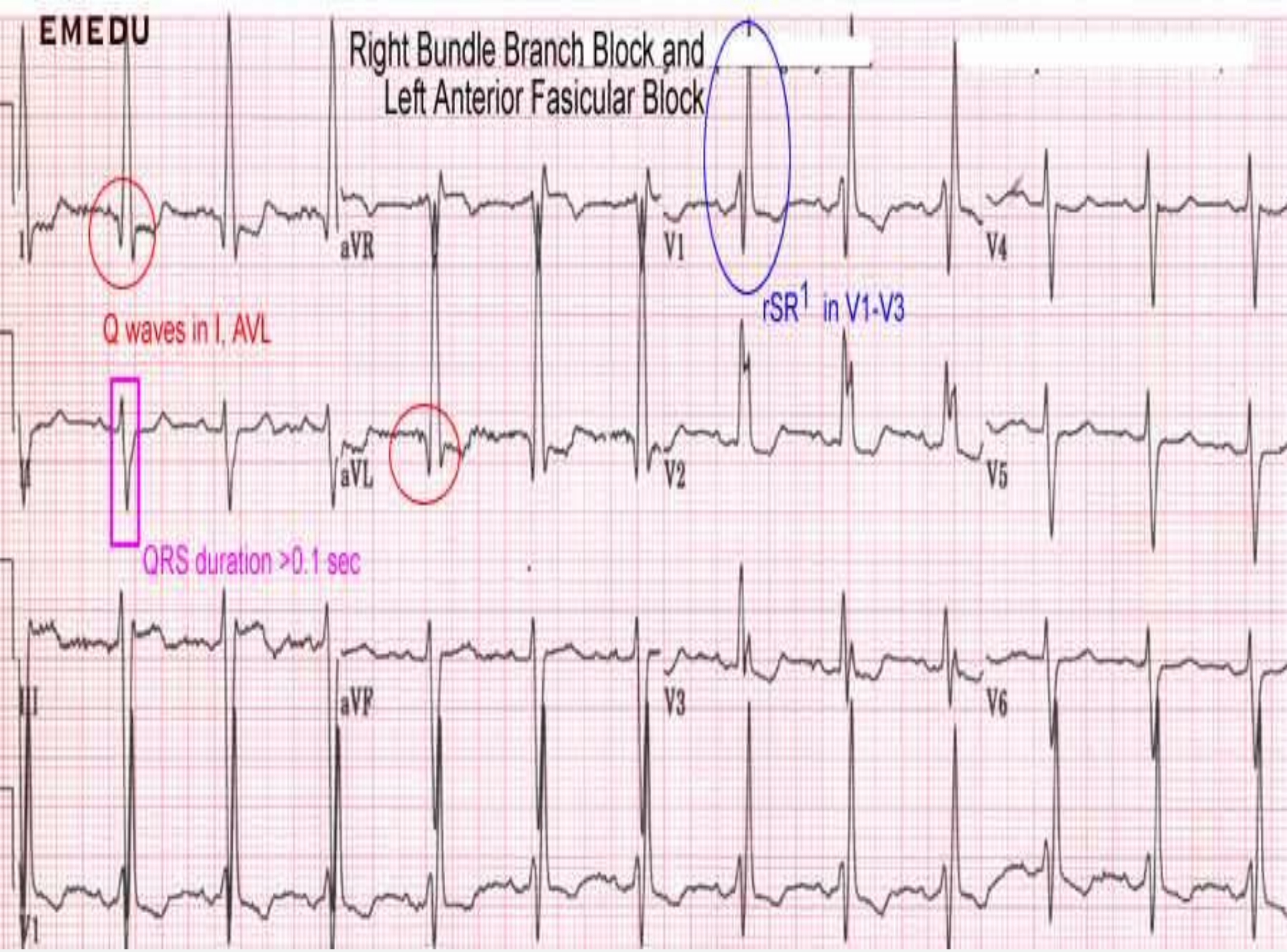


Bloc ram stâng posterior f. His



Bloc ram stâng posterior f. His




EMEDU
Right Bundle Branch Block and
Left Anterior Fasicular Block
I
aVR
V1
V4
Q waves in I, AVL
rSR1 in V1-V3
aVL
V2
V5
QRS duration >0.1 sec
aVF
V3
V6
V1

Dumnezeu să vă
binecuvinteze !

Deschide-ţi inima la
învăţătură, şi urechile la
cuvintele ştiinţei. Proverbe 23:12