Elettrocardiogramma in età pediatrica

Agata Privitera

AOU Policlinico Catania

Cardiologia Pediatrica

Presidio San Marco

www.cardiologiapediatricact.com

Padova 22/02/2025

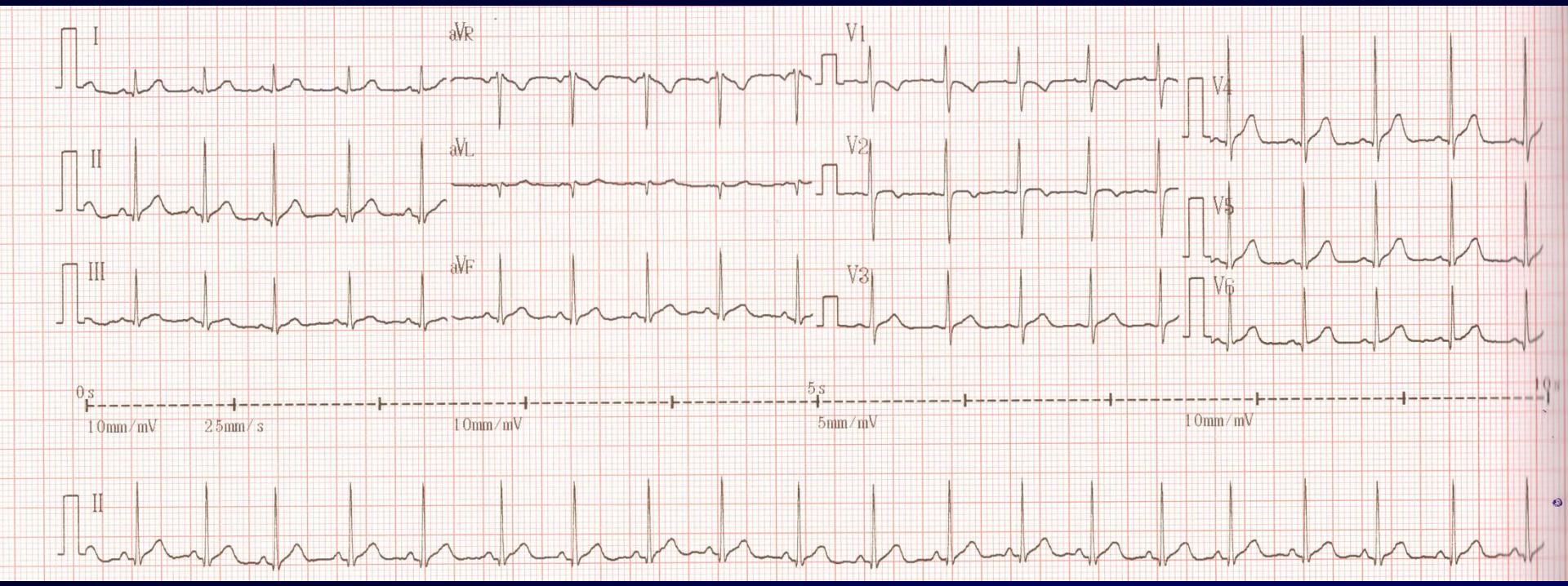
Il tuo intervento su:

- ELETTROCARDIOGRAFIA PEDIATRICA e DELLE CARDIOPATIE CONGENITE
- ***Contenuti:***
  - Valutazione del ritmo nel feto;
  - Valutazione dell'ECG neonatale e delle successive modificazioni nelle varie fasi di crescita;
  - Riconoscimento dell'ECG normale nel bambino e nell'adolescente.
  - Caratteristiche elettrocardiografiche nelle varie cardiopatie congenite e sull'ECG delle cardiopatie congenite operate

Obiettivi del Corso parte prima

- Riprendiamo conoscenze teoriche basi dell'Elettrocardiogramma (ECG)
- Peculiarità e come cambia un ECG in età pediatrica
- Varianti ECGrafiche normali in età pediatrica

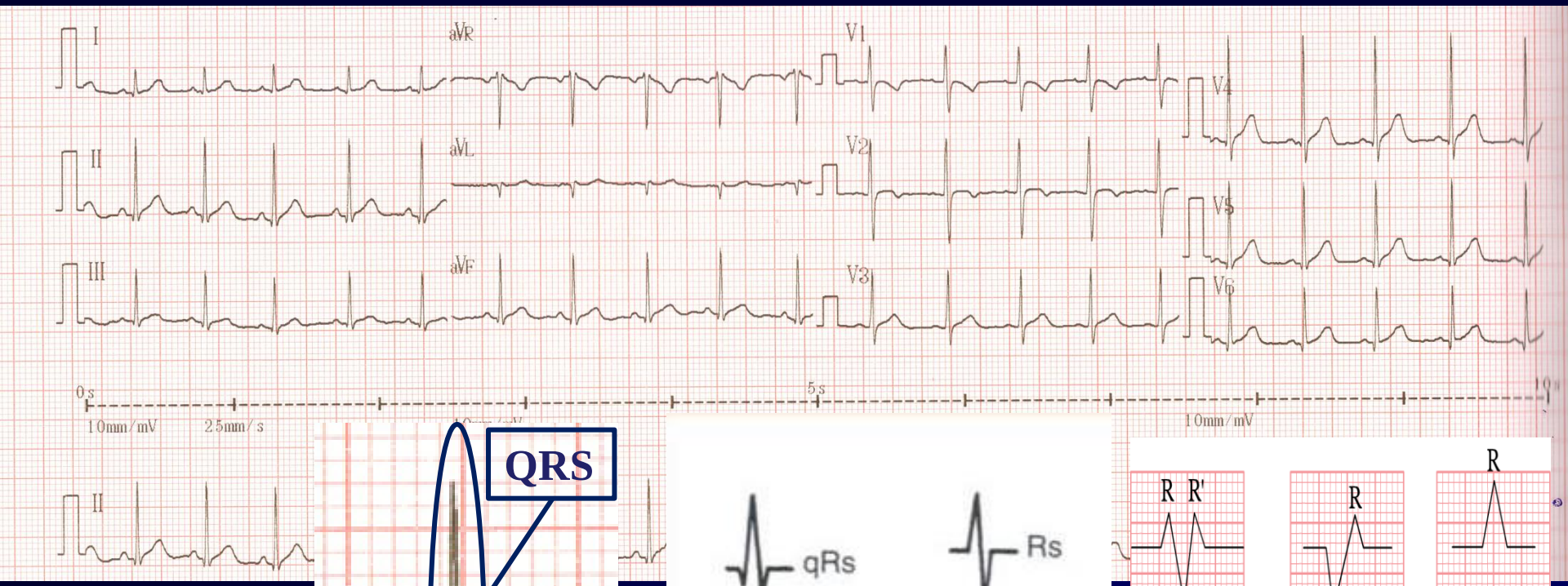
Elettrocardiogramma a 12 derivazioni

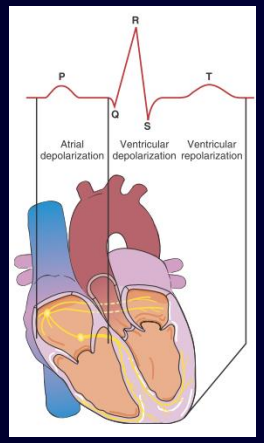


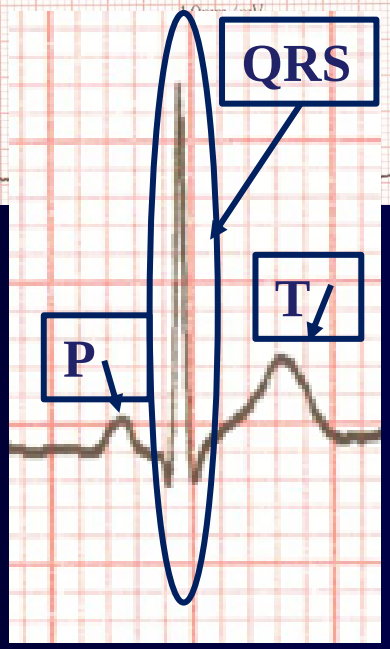
1. **Ritmo e Frequenza Cardiaca**
2. **Asse Elettrico**
3. **Morfologia complesso QRS**
4. **Ripolarizzazione ventricolare**
5. **Tempi di conduzione: PR, QRS, QTc**

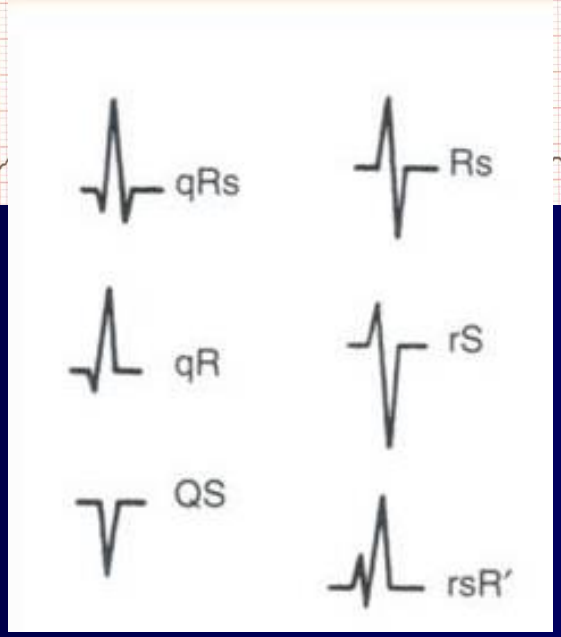
Analizzeremo come cambiano questi parametri in età pediatrica

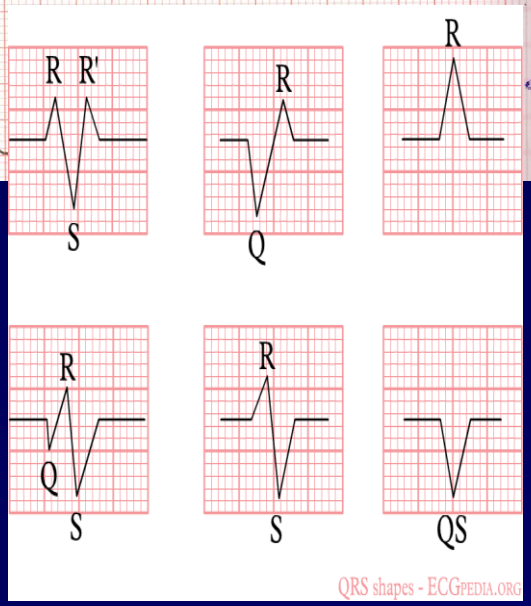
Elettrocardiogramma a 12 derivazioni

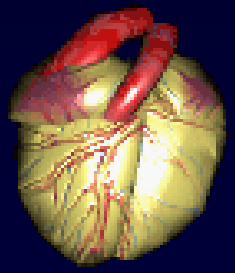




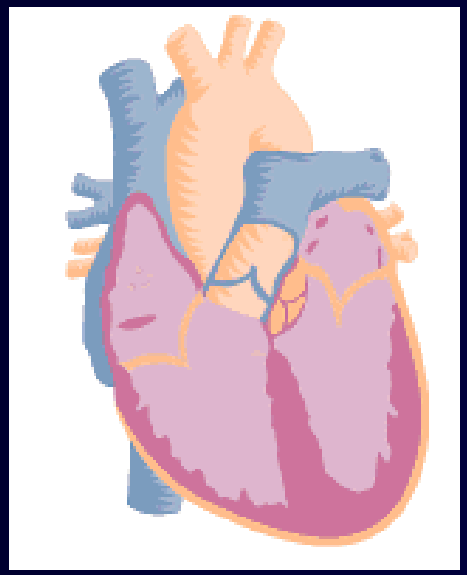






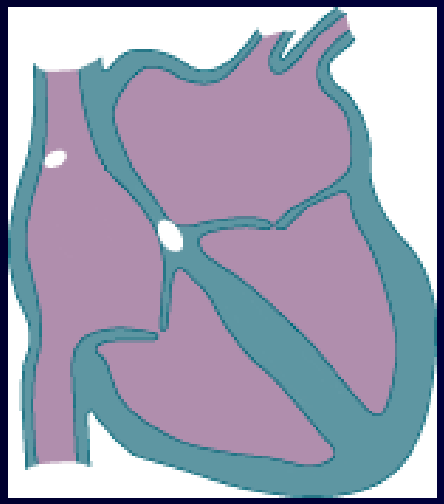


Il cuore
Ha funzione di pompa
spinge il sangue in quantità adeguata al fabbisogno dell'organismo



Un ciclo cardiaco completo è costituito:

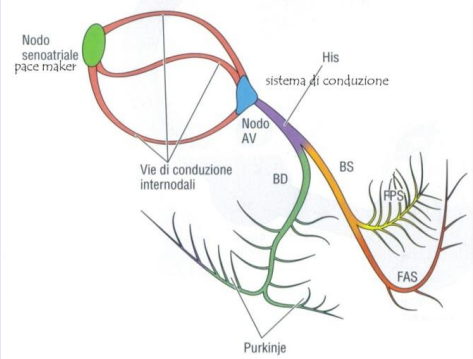
1. da una diastole e da una sistole atriale
2. da una diastole e da una sistole ventricolare



Una Stimolazione Elettrica precede e determinata la contrazione meccanica

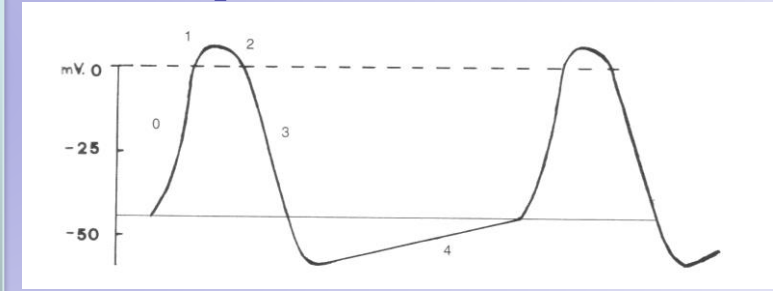
Fibrocellule cardiache suddivisione:

Miocardio specifico
(cellule deputate alla attività elettrica):



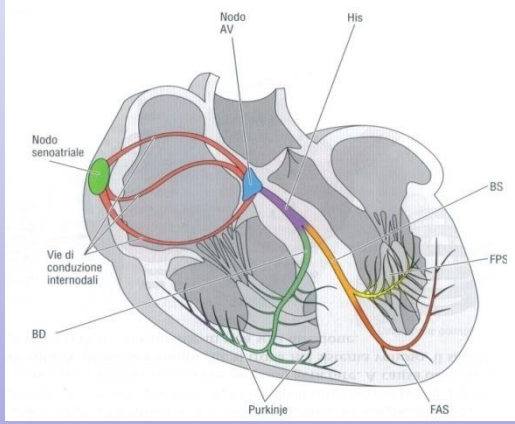
- Nodo seno atriale
- Nodo atrioventricolare
- Fascio di His
- Branche
- Rete del Purkinje

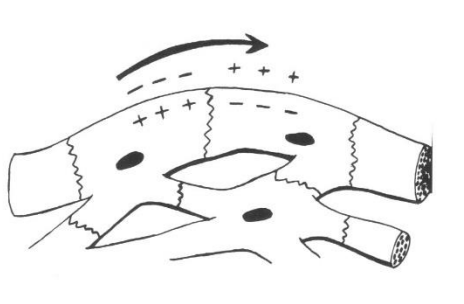
Si depolarizzano spontaneamente durante la fase di recupero (4) fino a dare un potenziale d'azione a -30mV

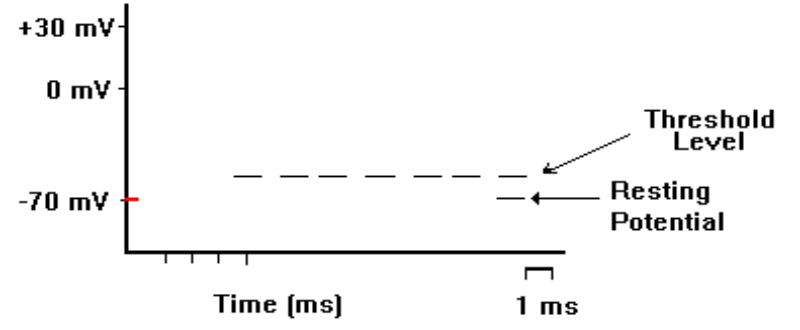


Miocardio comune
(cellule deputate alla contrazione meccanica):

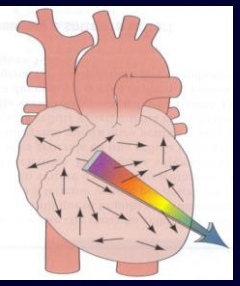
vengono depolarizzate dalle cellule pacemaker

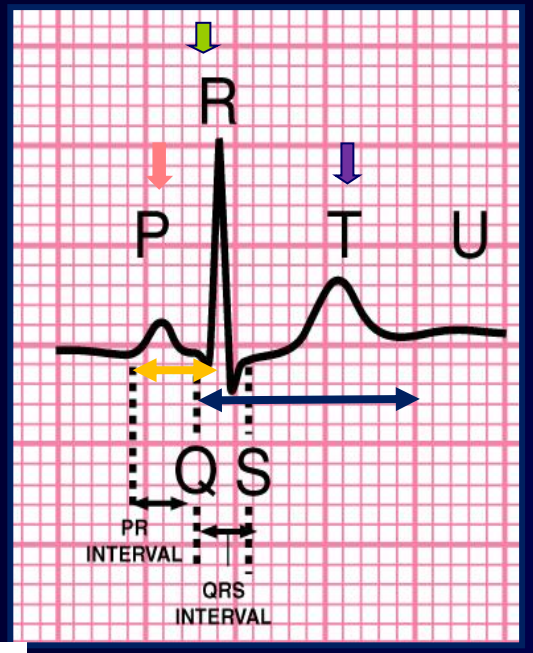


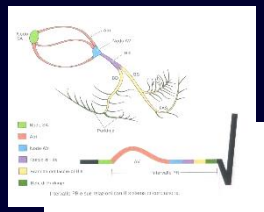


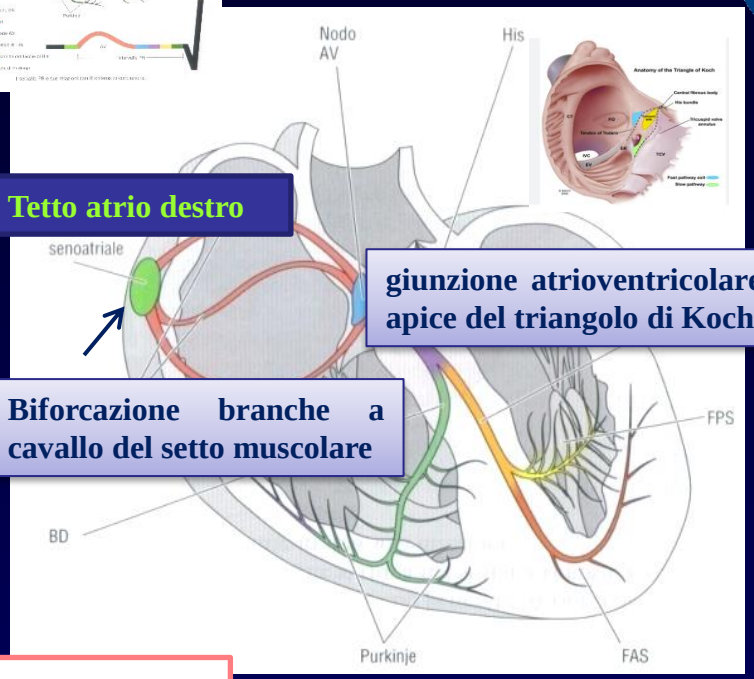


Elettrofisiologia





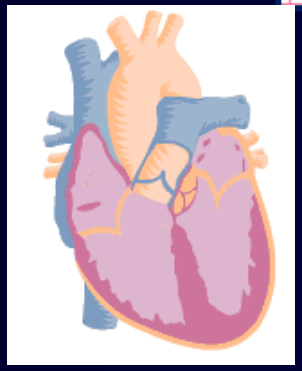




Tetto atrio destro

giunzione atrioventricolare apice del triangolo di Koch

Biforcazione branche a cavallo del setto muscolare



Il NSA depolarizza le cellule atriali dando origine all'onda P

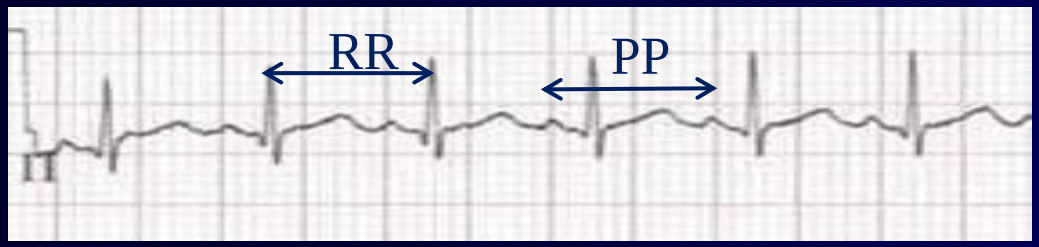
PR: tempo che intercorre che l'impulso dagli atri arrivi ai ventricoli

Le fibre del Purkinje depolarizzano le cellule miocardiche commune dando origine al complesso **QRS**

Tratto ST-T: ripolarizzazione ventricolare

Il tratto QT depolarizzazione e ripolarizzazione ventricolare

Ritmo Cardiaco



RR ciclo completo ventricolare diastole e sistole

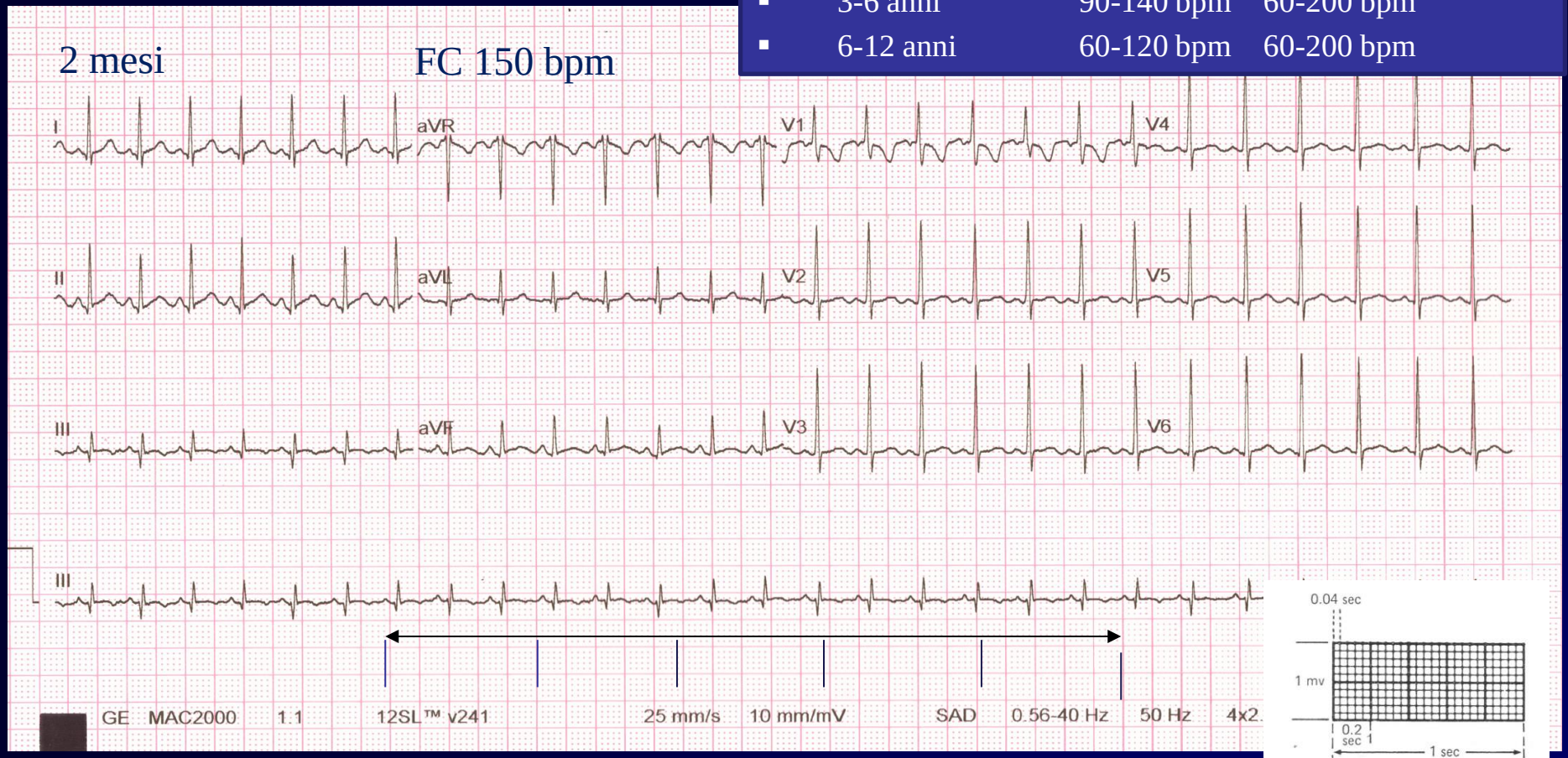
PP ciclo completo atriale di diastole e sistole

ECG

Age	Frequenza cardiaca (battiti/min)					
	Min.	5 %	Media	95 %	Max.	S.D.
0-24 ore	85	94	119	145	145	16,1
1-7 giorni	100	100	133	175	175	22,3
8-30 giorni	115	115	163	190	190	19,9
1-3 mesi	115	124	154	190	205	18,6
3-6 mesi	115	111	140	179	205	21,0
6-12 mesi	115	112	140	177	175	18,7
1-3 anni	100	98	126	163	190	19,8
3-5 anni	55	65	98	132	145	18,0
5-8 anni	70	70	96	115	145	16,1
8-12 anni	55	55	79	107	115	15,0
12-16 anni	55	55	75	102	115	13,5

Elettrocardiogramma a 12 derivazioni
Frequenza Cardiaca

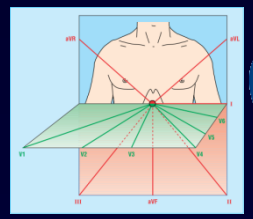
Range di normalità		sonno/attività
▪ Neonato /lattante	90-180 bpm	80-220 bpm
▪ 1-2 anni	90-160 bpm	60-200 bpm
▪ 3-6 anni	90-140 bpm	60-200 bpm
▪ 6-12 anni	60-120 bpm	60-200 bpm



300/numero di quadrati grandi tra due onde R (60 sec/min = 300 box/min)

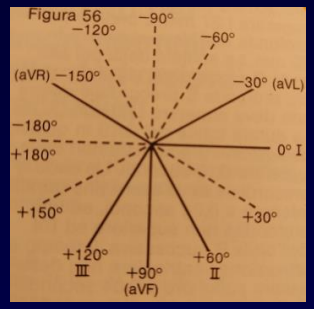
1500/numero di quadrati piccoli tra due onde R (60 sec/min = 1500 box/min)

ECG di superficie

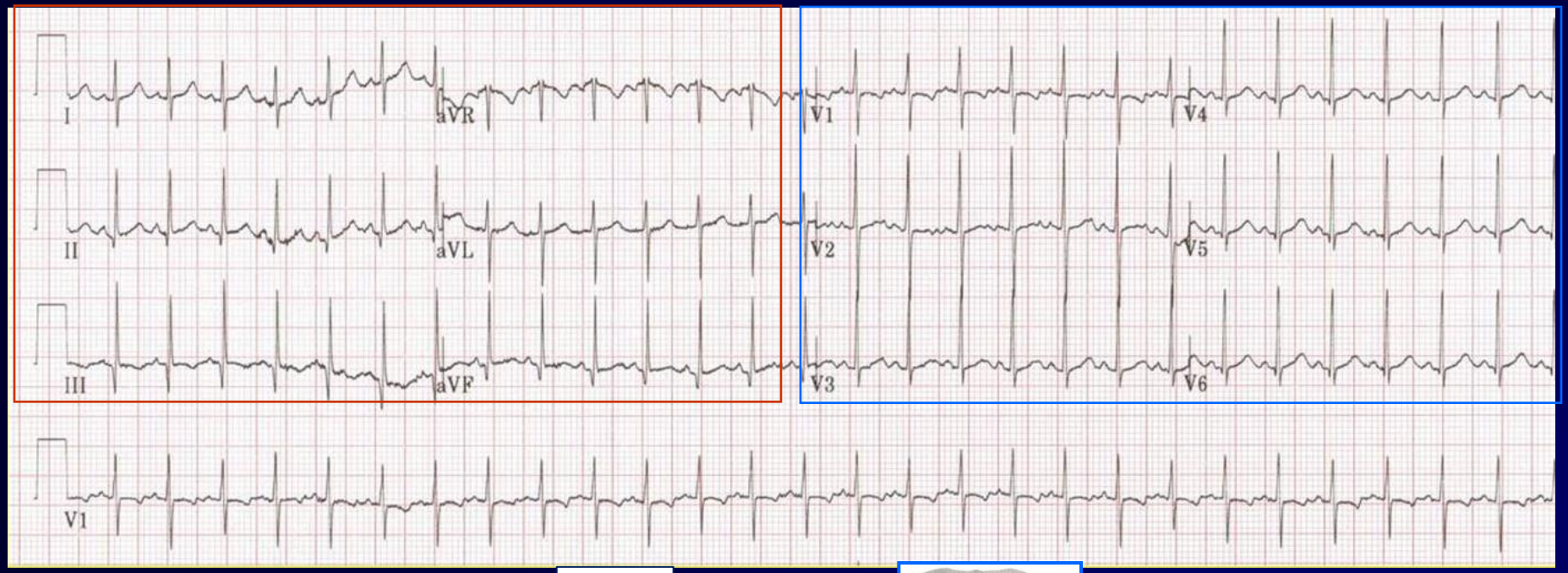


I potenziali elettrici del cuore vengono registrati mediante ***elettrodi***

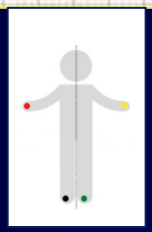
Gli elettrodi sono variamente orientati nello spazio secondo assi standardizzati che vengono chiamati ***derivazioni***

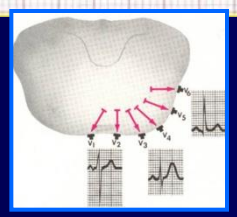


Dodici derivazioni



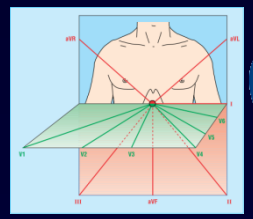
Sei *periferiche* registrate *su un piano frontale*





Sei *precordiali registrati su un piano orizzontale*

ECG di superficie



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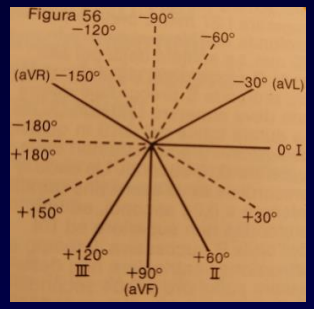

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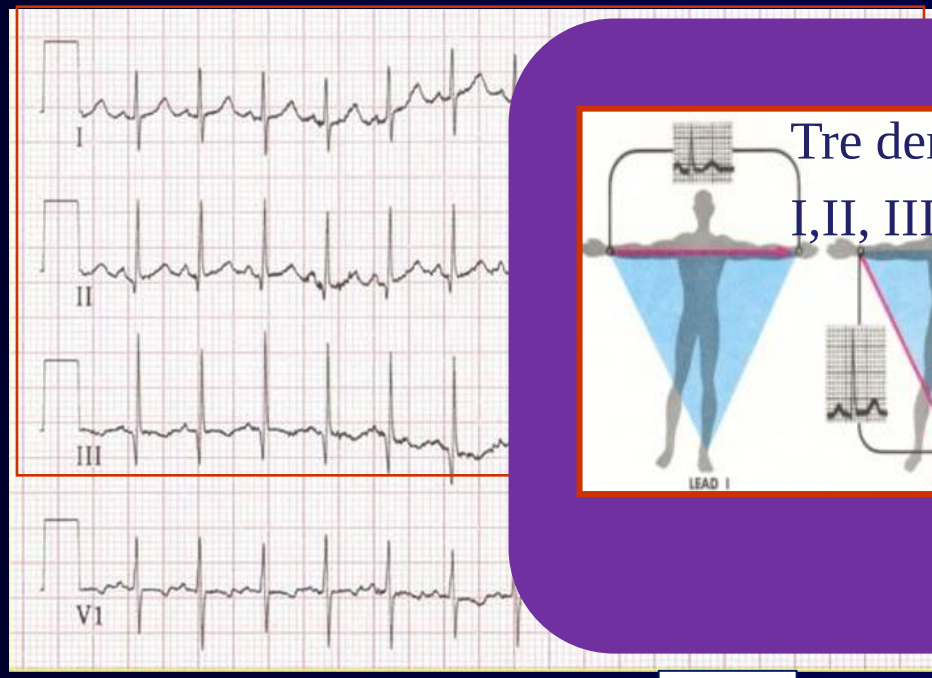
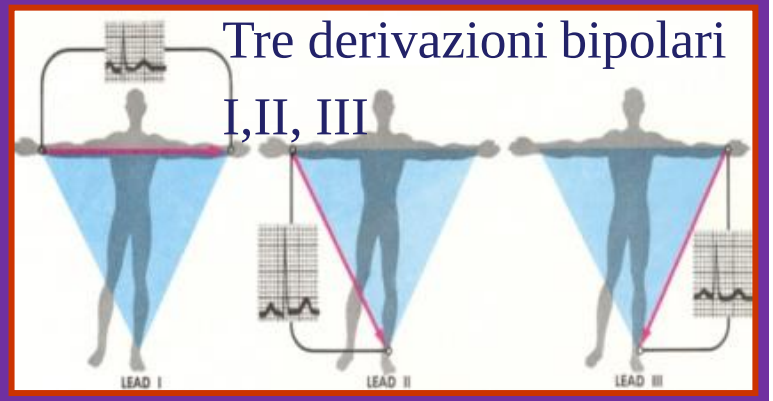
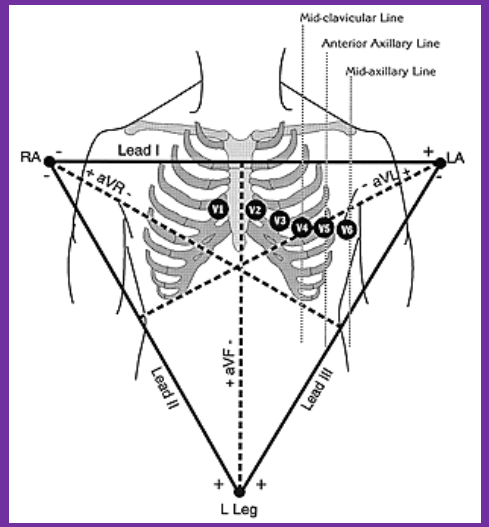


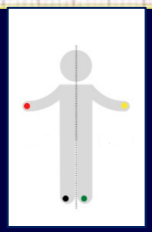
Tre derivazioni bipolari

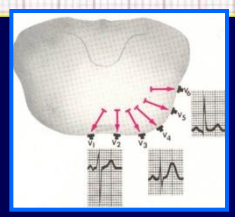
I,II, III





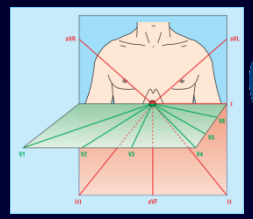
Sei *periferiche* registrate *su un piano frontale*





Sei *precordiali registrati su un piano orizzontale*

ECG di superficie



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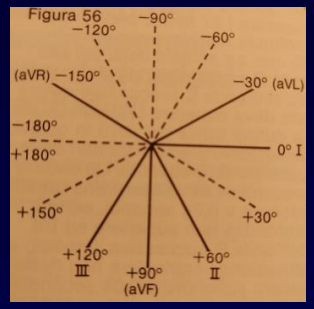
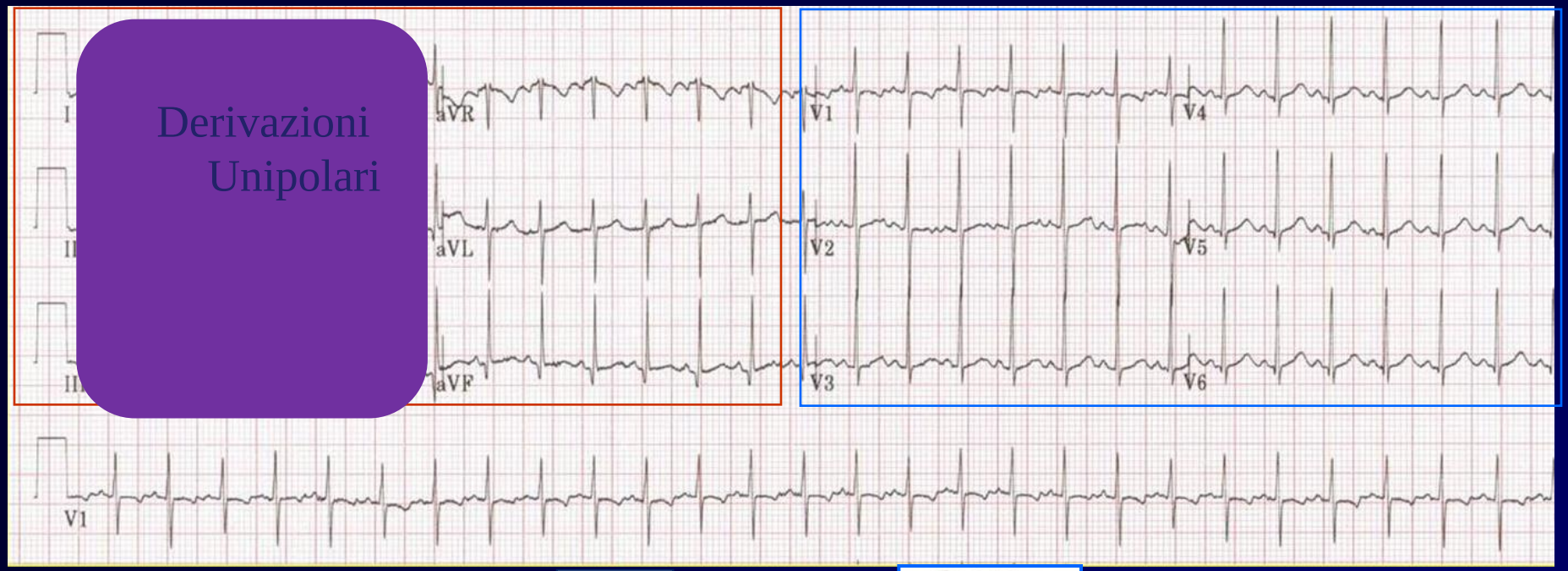


Dodici derivazioni



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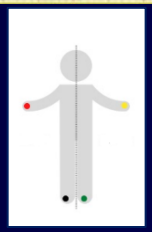
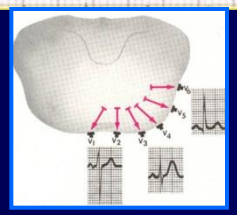
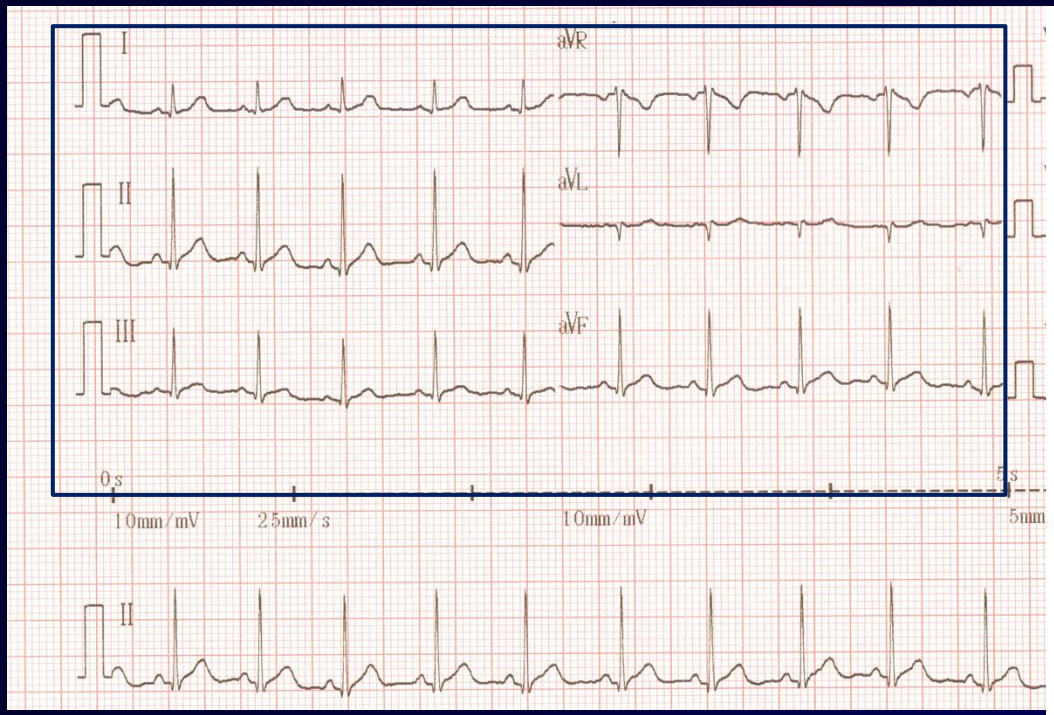
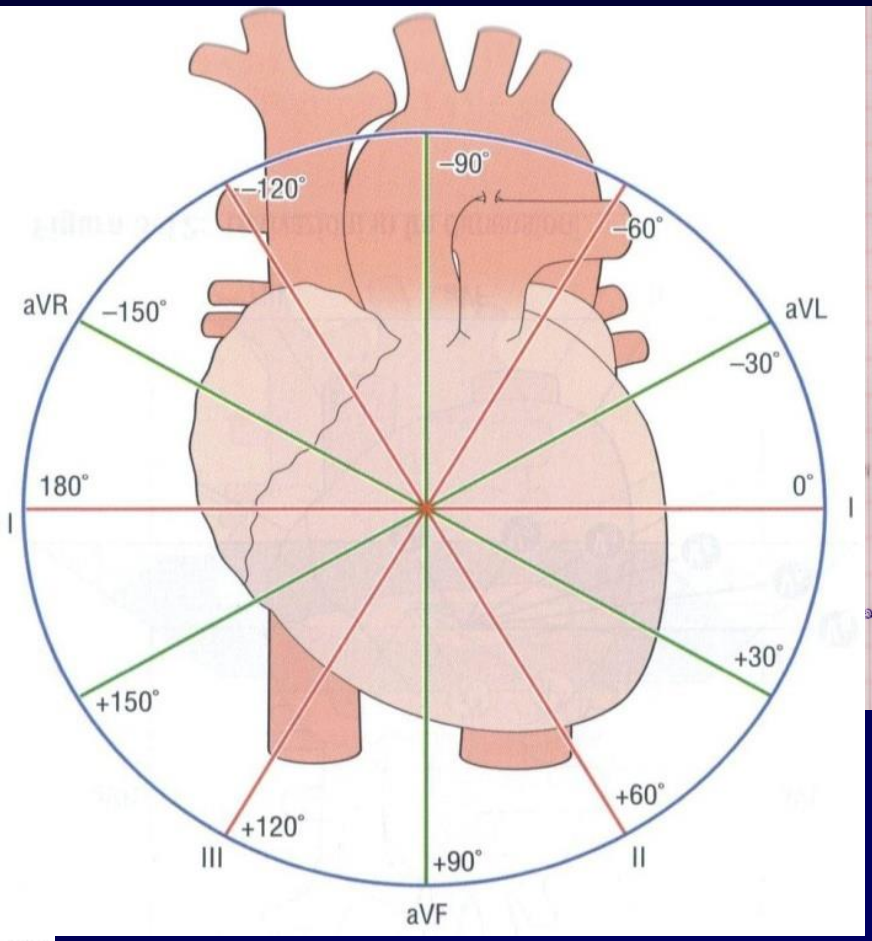


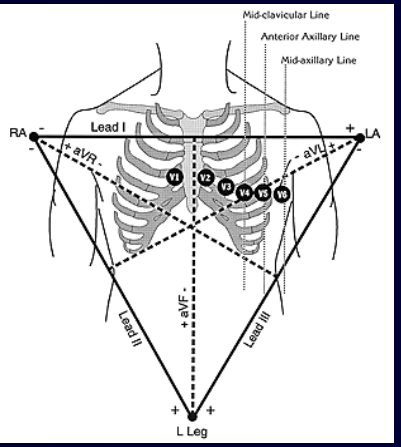


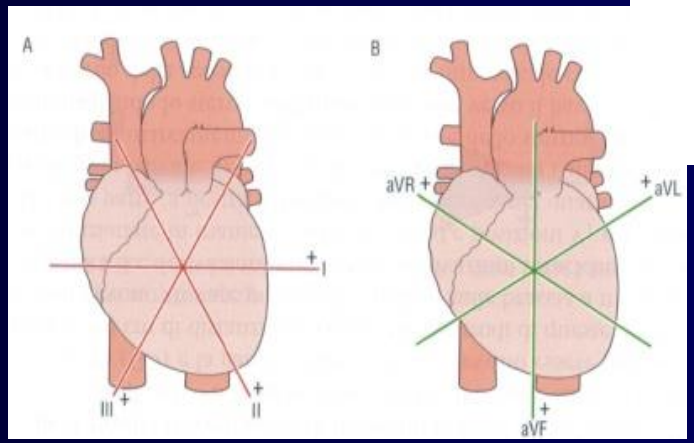
Sei *precordiali registrati su un piano orizzontale*

Elettrocardiogramma a 12 derivazioni

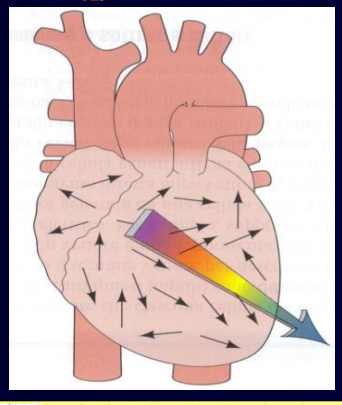


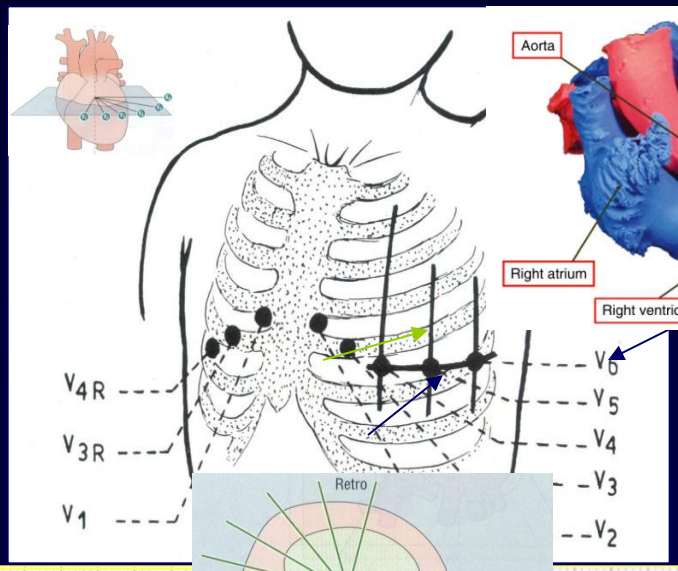


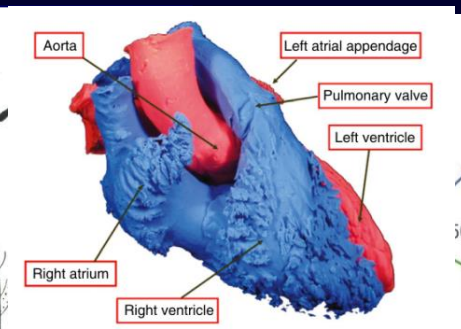


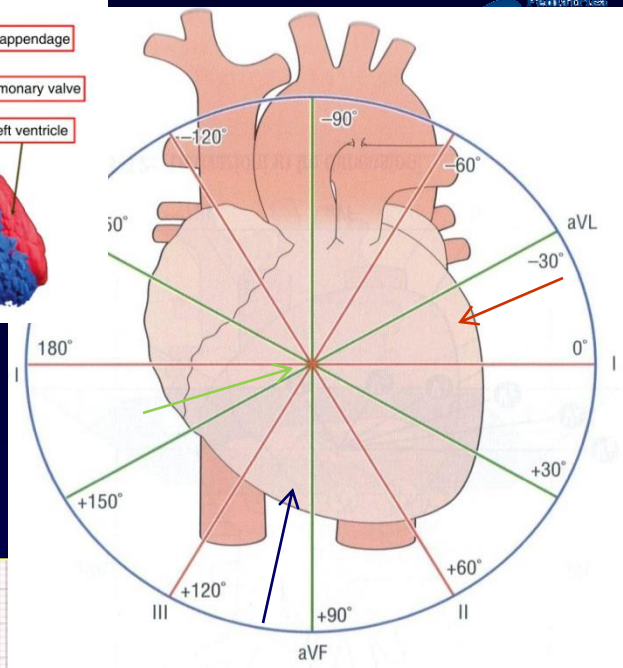


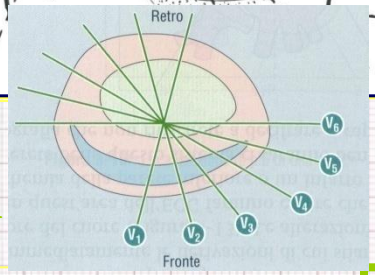
ECG





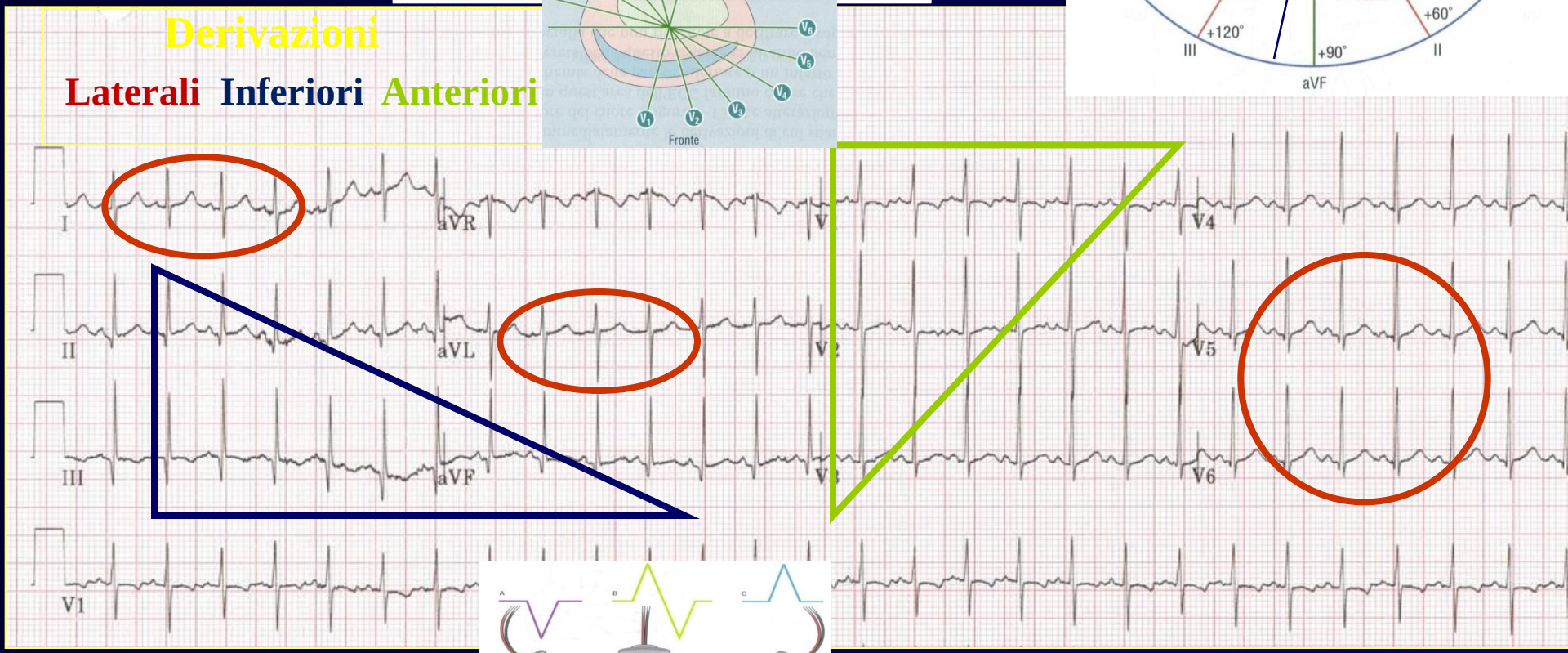




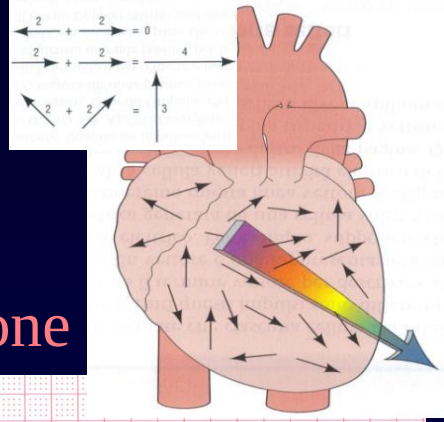


Derivazioni

Laterali **Inferiori** **Anteriori**

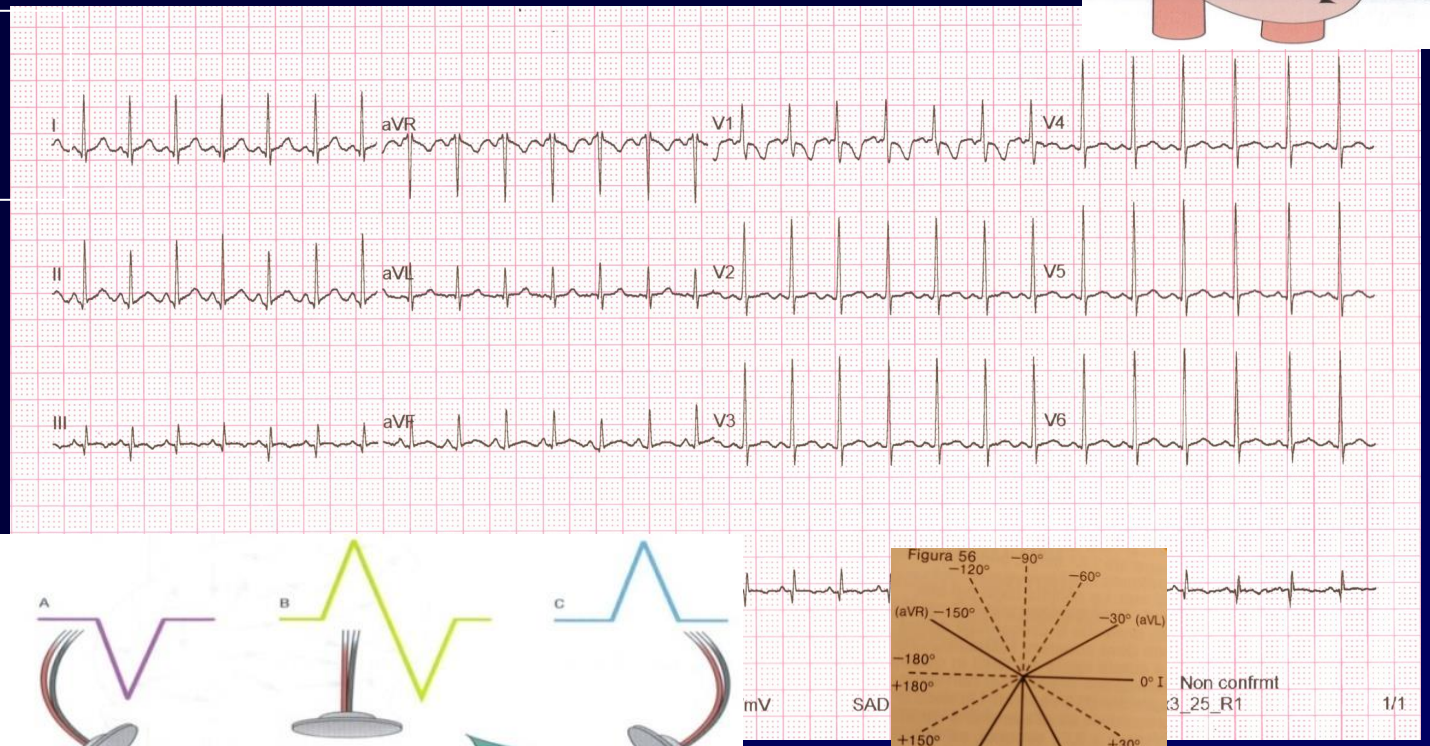


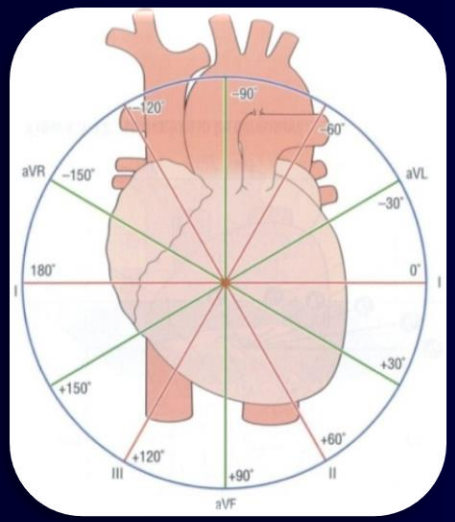
Asse elettrico cardiaco

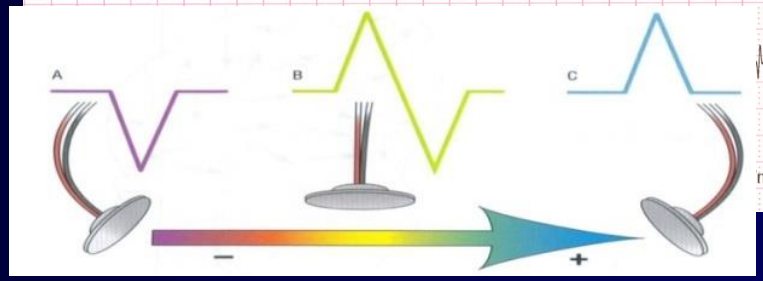


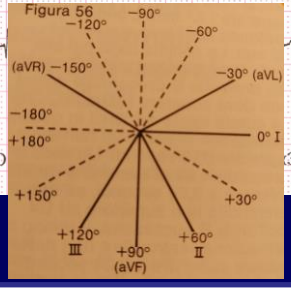
L'asse elettrico o del QRS è la sommatoria risultante di tutti i vettori istantanei generati durante la depolarizzazione

Sei derivazioni periferiche









L' asse del QRS Esprime:

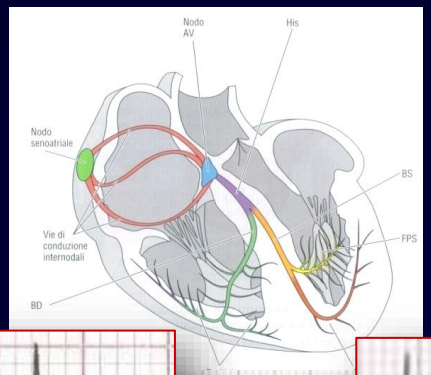
- Posizione del cuore
- Cavità prevalente

Si calcola anche:

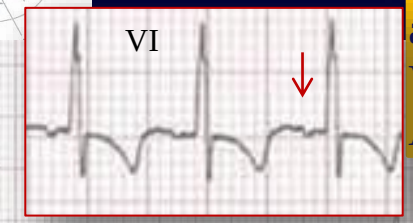
asse elettrico onda P definisce origine del ritmo

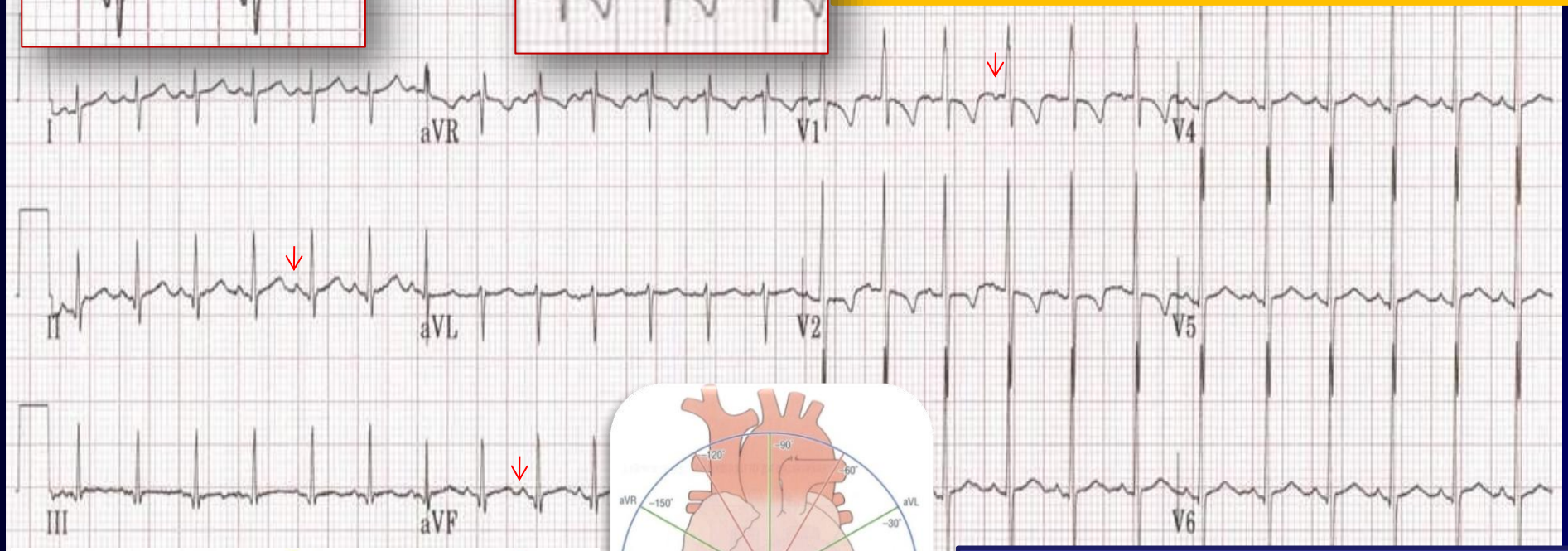
asse onda T concordanza con QRS

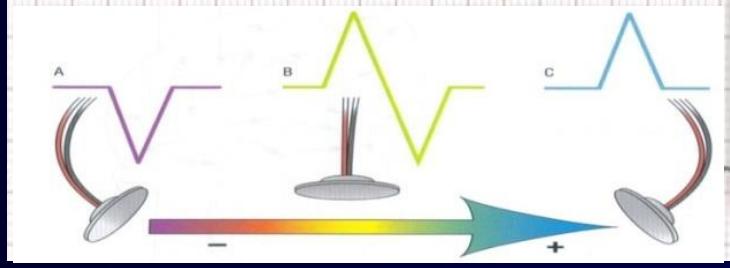
Ritmo Sinusale!

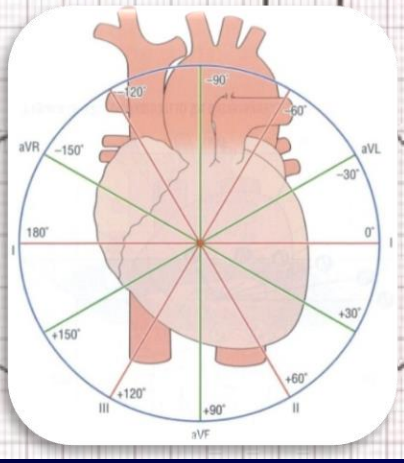


Studio Onda P :	Quando Ritmo Sinusale?
I,II,III, aVL,aVF,V2-V6	positiva
aVR	negativa
V1	isodifasica
Asse elettrico onda P	0-90°





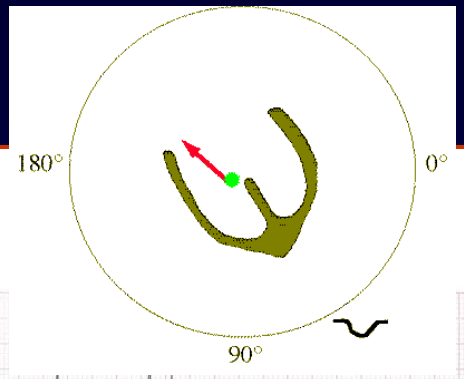


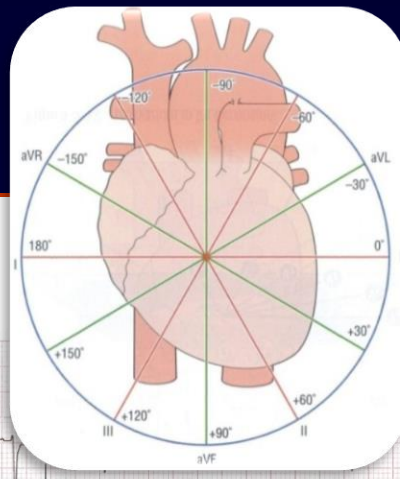


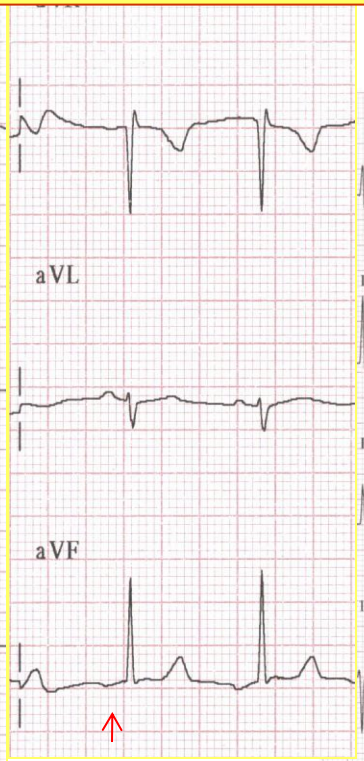
Onda P: depolarizzazione bi-atriale	
Ampiezza	$\geq$1.5 $\leq$ 2.5 mm
Durata	0.06$\pm$0.02 sec
Durata max	0.08 sec < 12 mesi 0.10 sec > 12 mesi

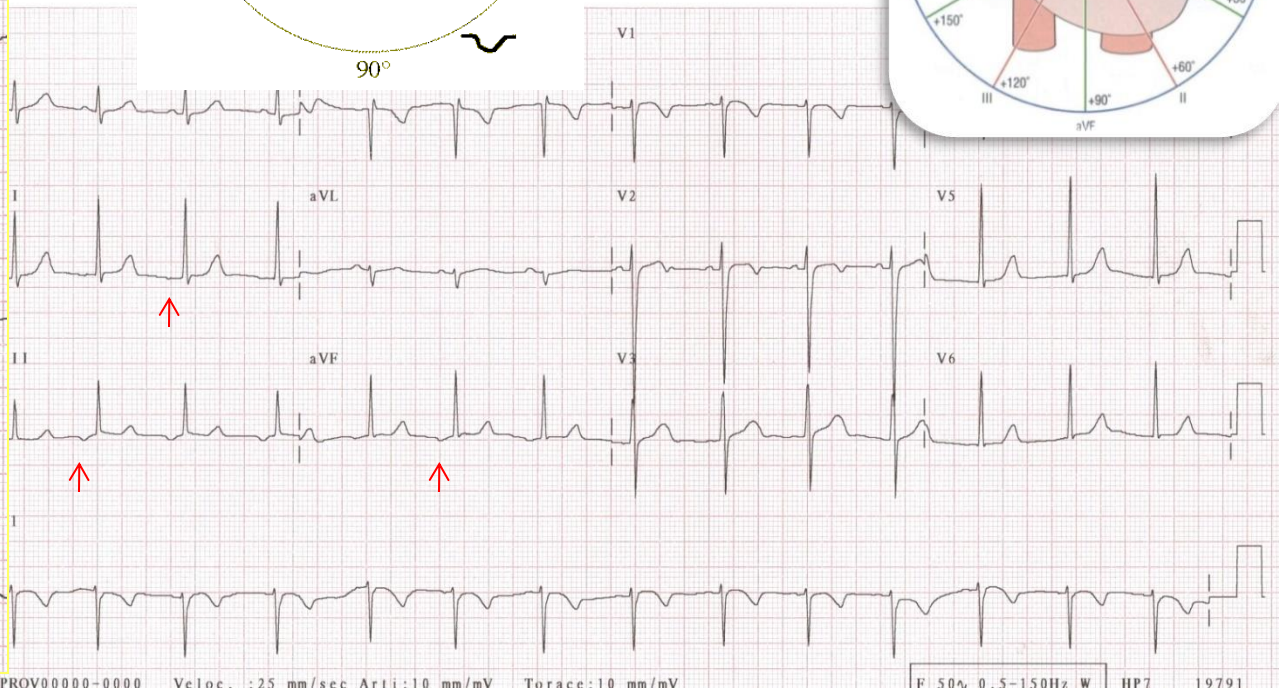
Variante Normale Ritmo
Ritmo del Seno Coronarico

Asse dell'onda P – 30°



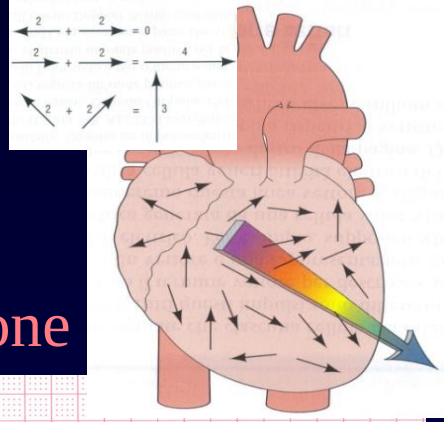






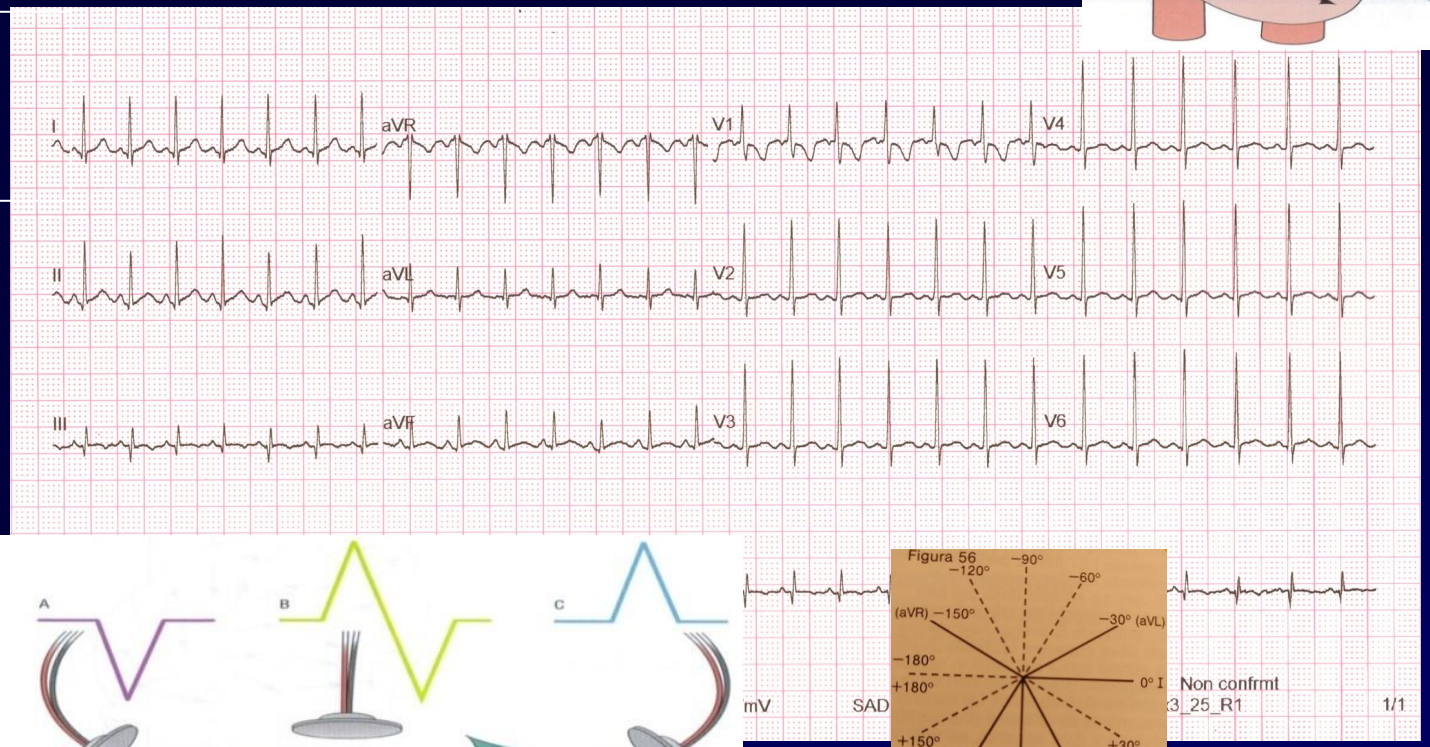
Una attivazione atriale che origina in modo anomalo – atrio destro basso- darà onde P negative in II, aVF, III

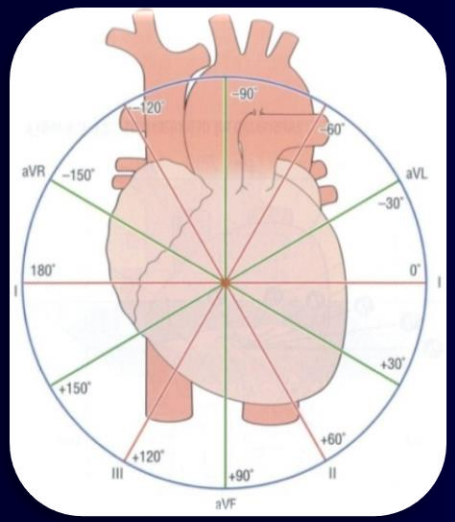
Asse elettrico cardiaco

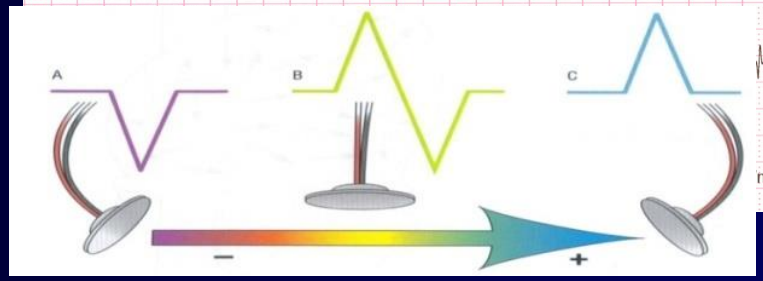


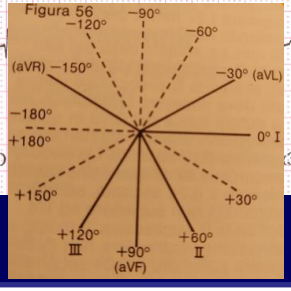
L'asse elettrico o del QRS è la sommatoria risultante di tutti i vettori istantanei generati durante la depolarizzazione

Sei derivazioni periferiche









L' asse del QRS Esprime:

- Posizione del cuore
- Cavità prevalente

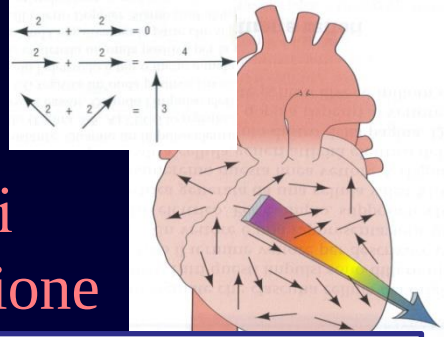
Si calcola anche:

asse elettrico onda P definisce origine del ritmo

asse onda T concordanza con QRS

Asse elettrico cardiaco

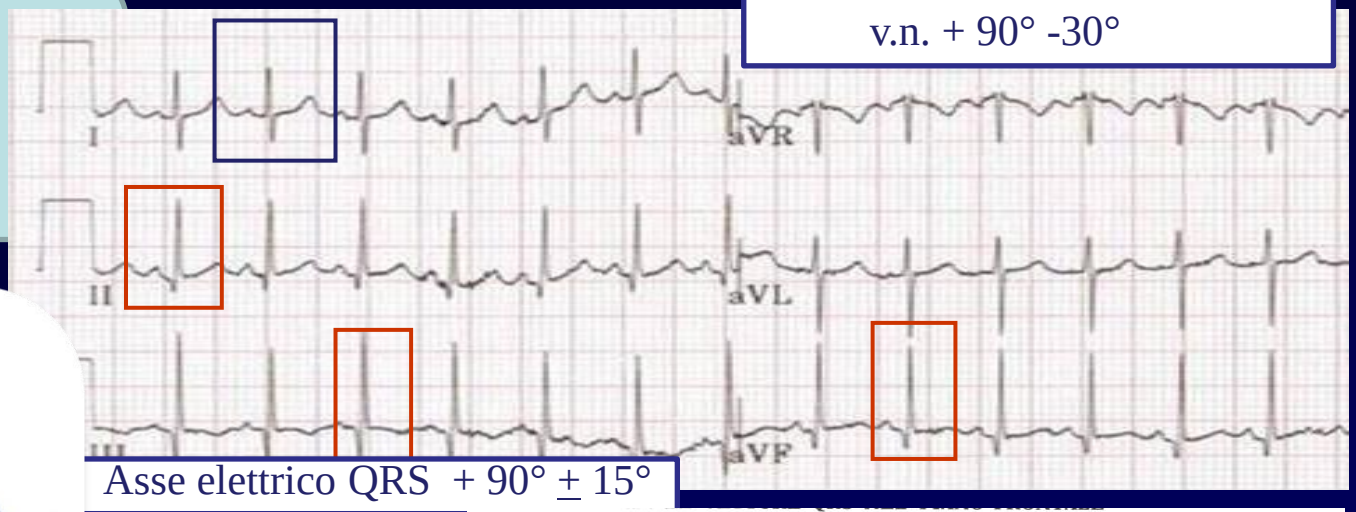
L'asse elettrico è la sommatoria risultante di tutti i vettori istantanei generati durante la depolarizzazione



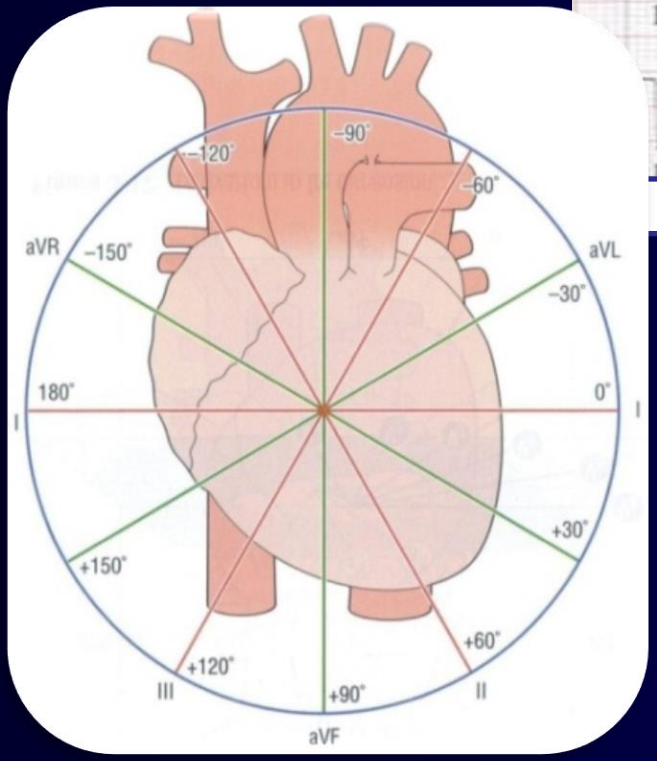
L' asse del QRS Esprime:

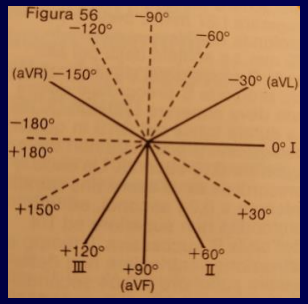
- Posizione del cuore
- Cavità prevalente

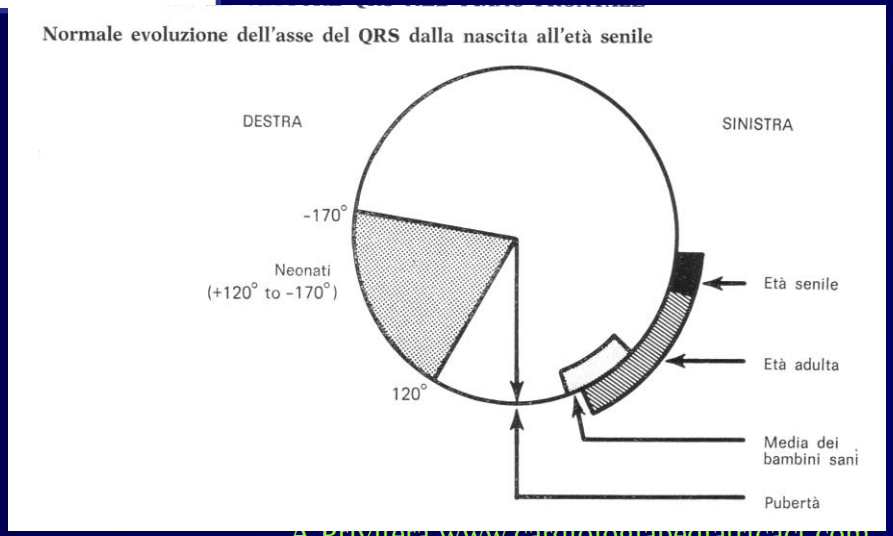
Asse elettrico QRS Adulto
v.n. + 90° -30°



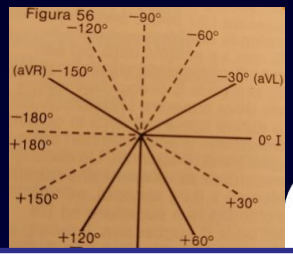
Asse elettrico QRS + 90° ± 15°

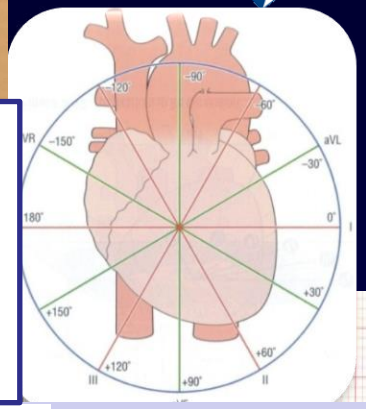






“Modello Neonatale”



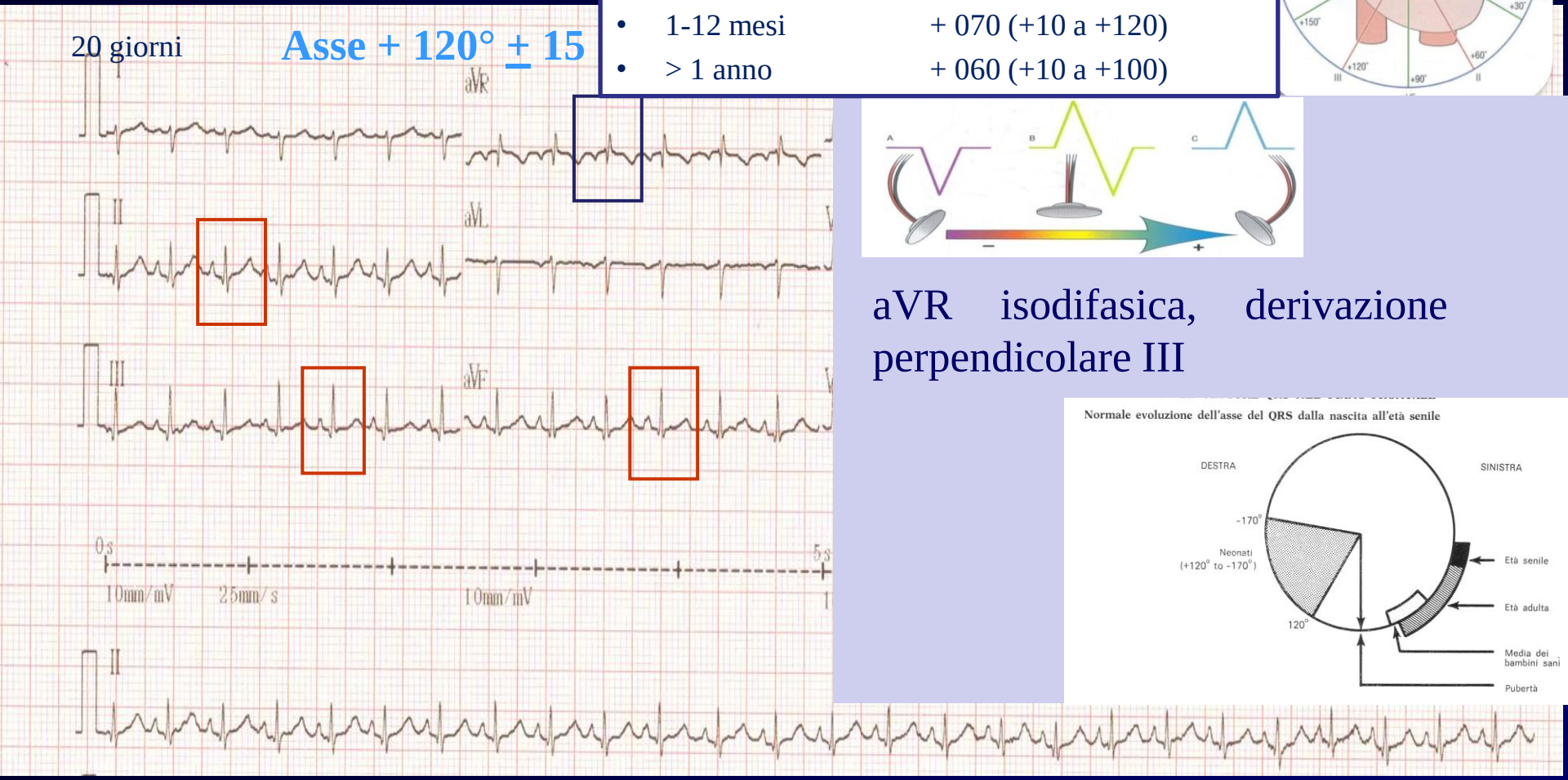


Asse elettrico normale ≥120° (III positiva)

Asse QRS Valori normali per età

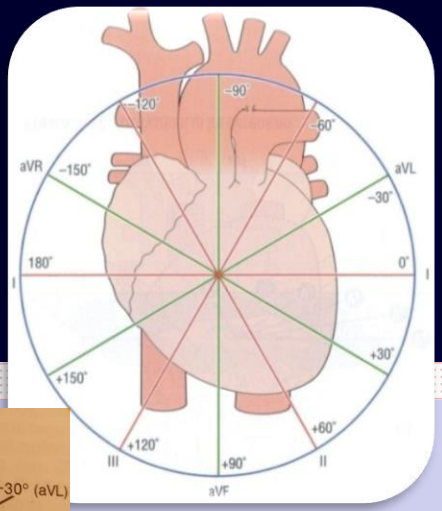
- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anno + 060 (+10 a +100)

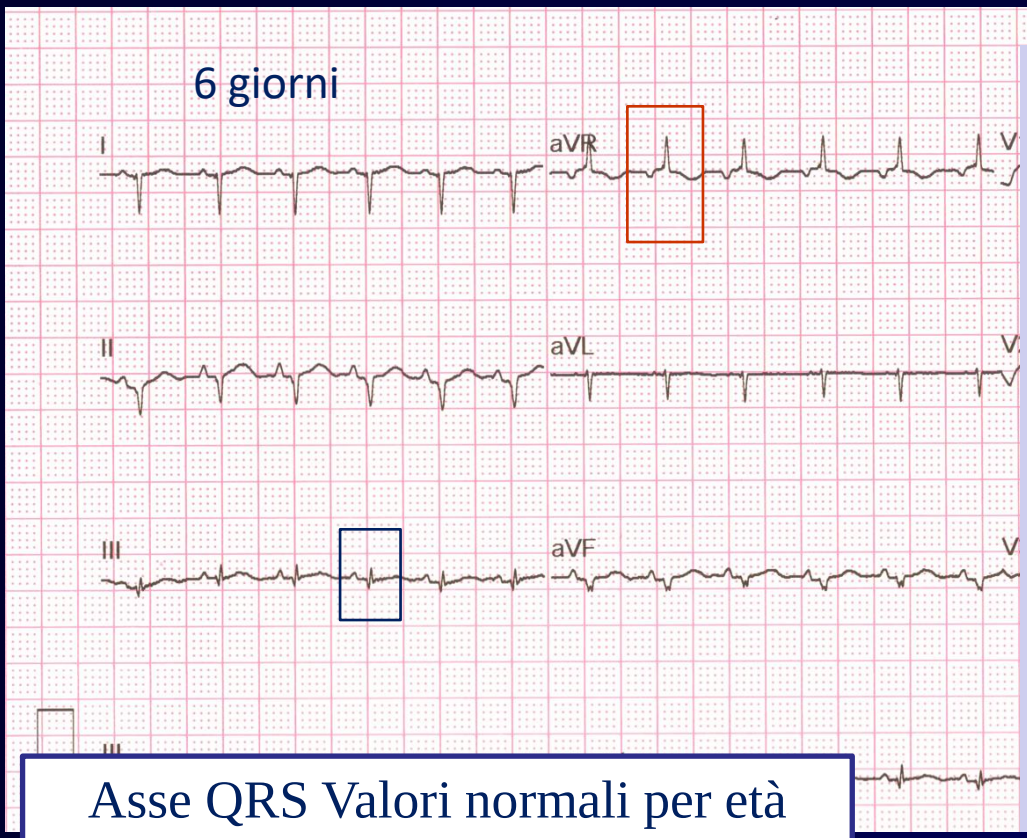
20 giorni **Asse + 120° ± 15**

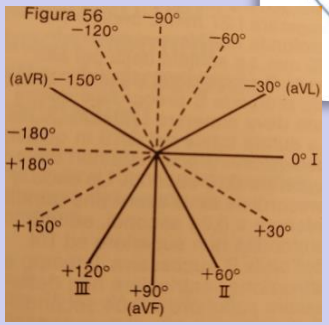


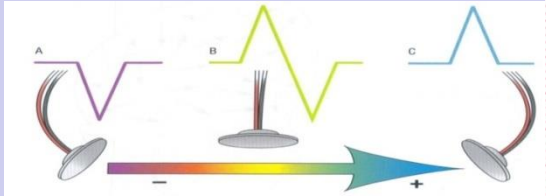
aVR isodifasica, derivazione perpendicolare III

“Modello Neonatale”
I^ settimana



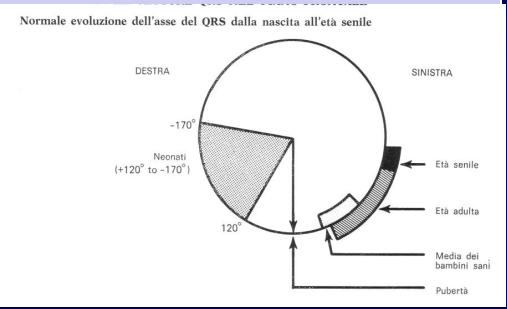






III isodifasica, derivazioni perpendicolari aVR

Asse elettrico: estrema prevalenza destra + 210°



Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

“Modello Lattante”

Asse elettrico

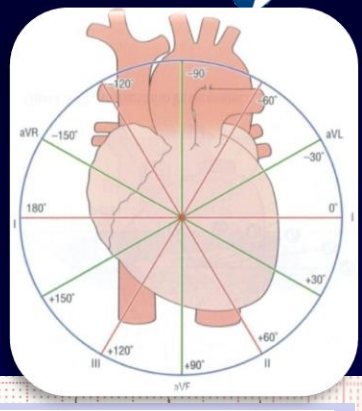
inferiore a 120° (III positiva)

Asse + 60° ±15, Asse +90° ±15

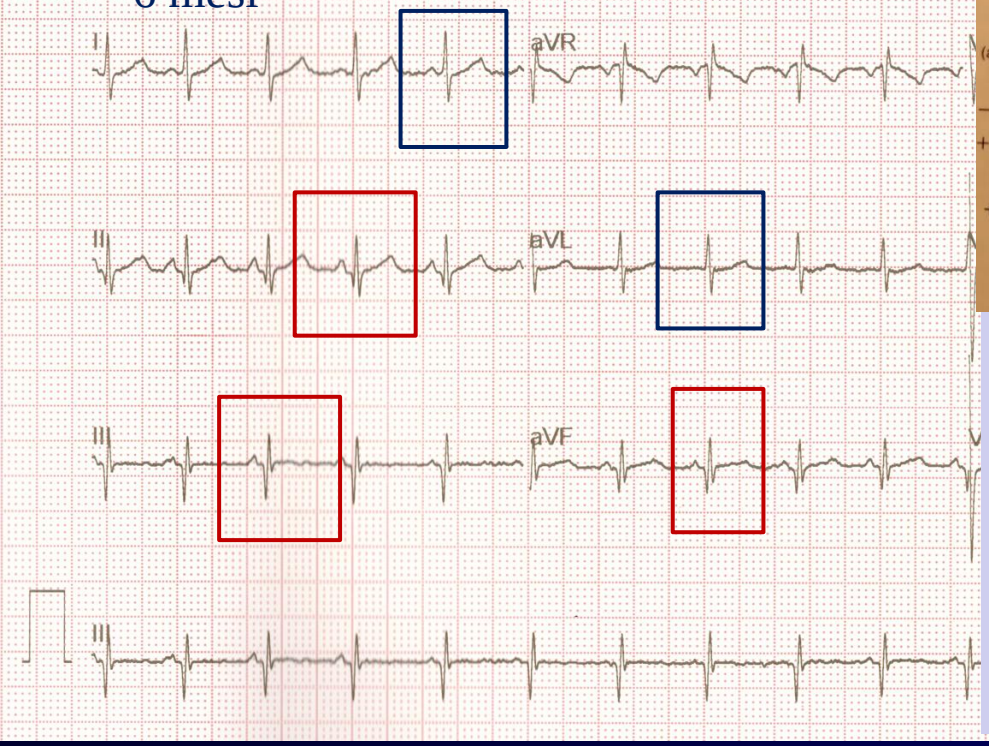
Asse +75°

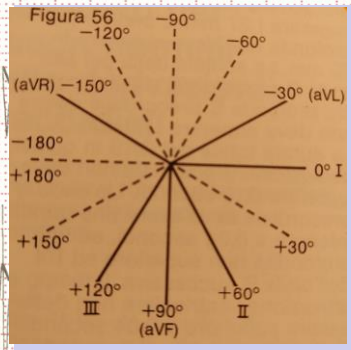
Asse QRS Valori normali per età

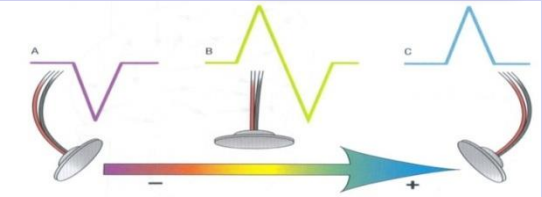
- I^ sett. + 110 (+30 a +180/210)
- Neonato + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)



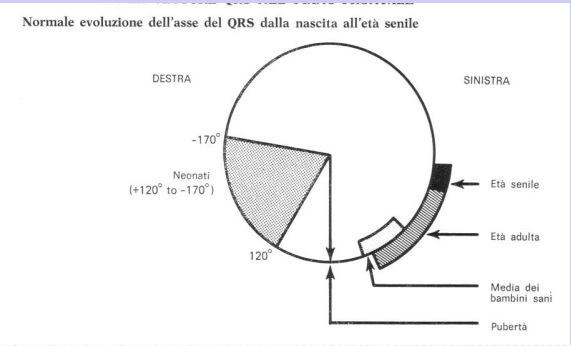
6 mesi







aVL quasi isodifasica, derivazioni perpendicolare II



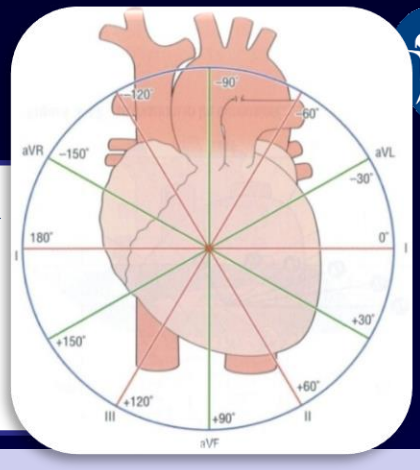
“Modello Adulto”

Asse elettrico dopo il I anno

Normale inferiore a 100°

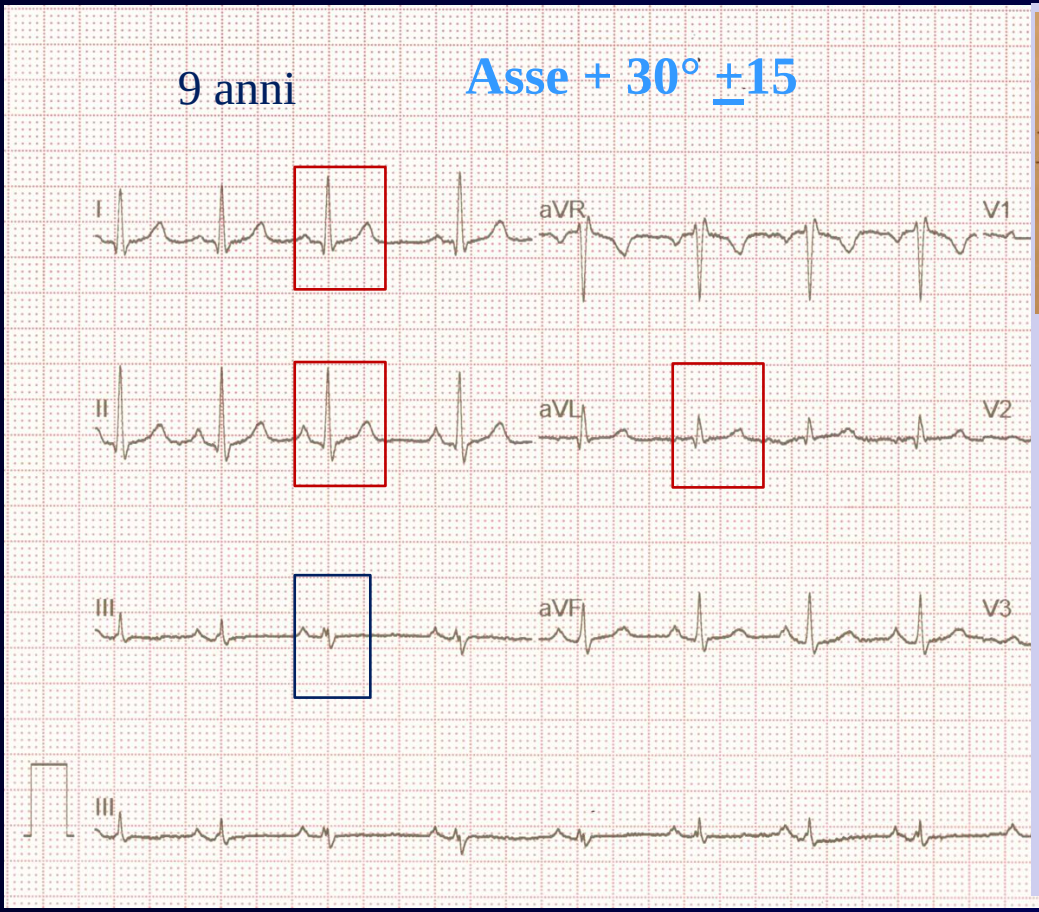
Asse QRS Valori normali per età

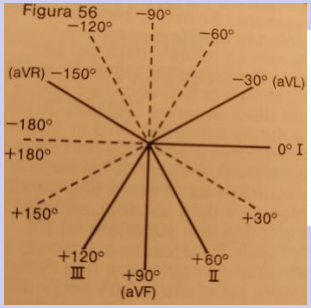
- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

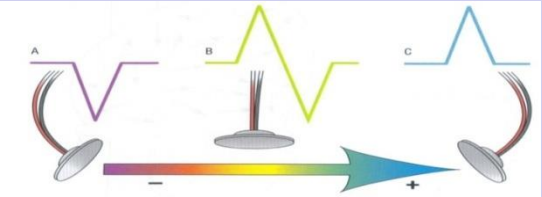


9 anni

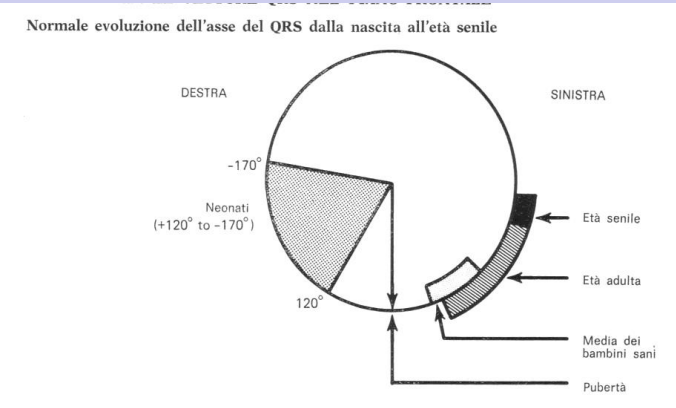
Asse + 30° ±15



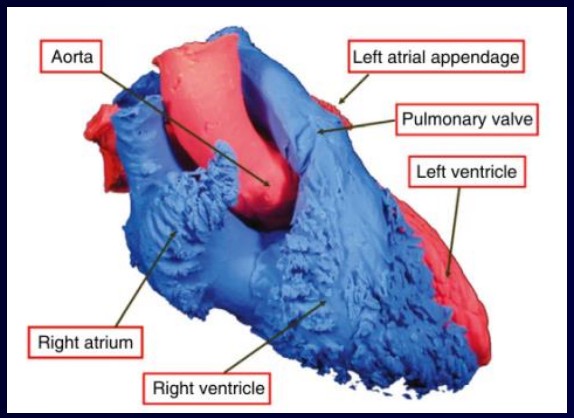


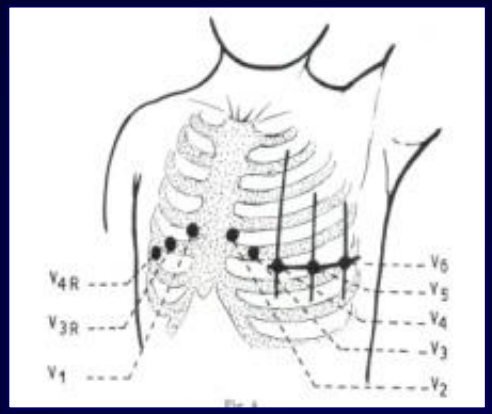


III isodifasica derivazione perpendicolare aVR

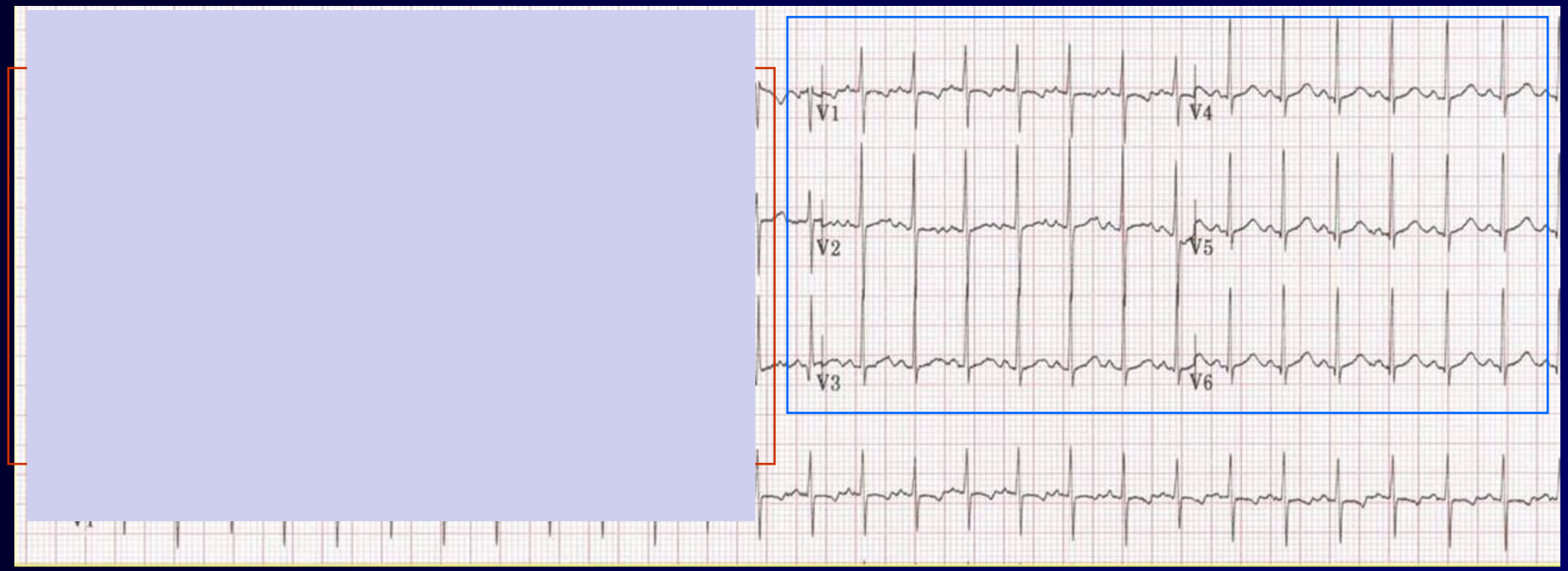


Elettrocardiogramma a 12 derivazioni

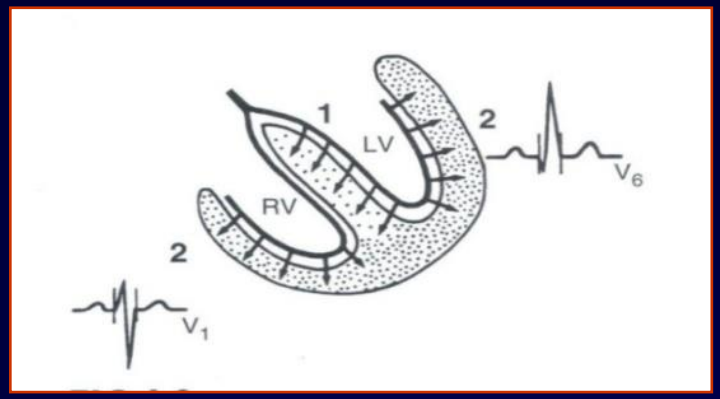


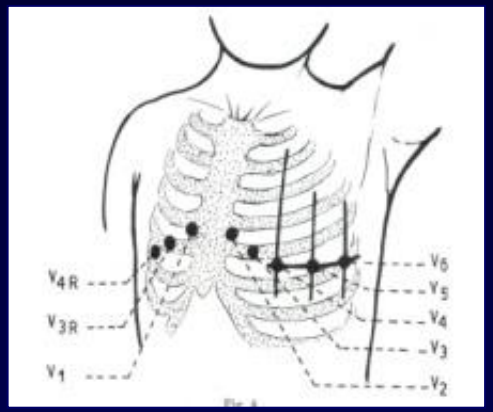


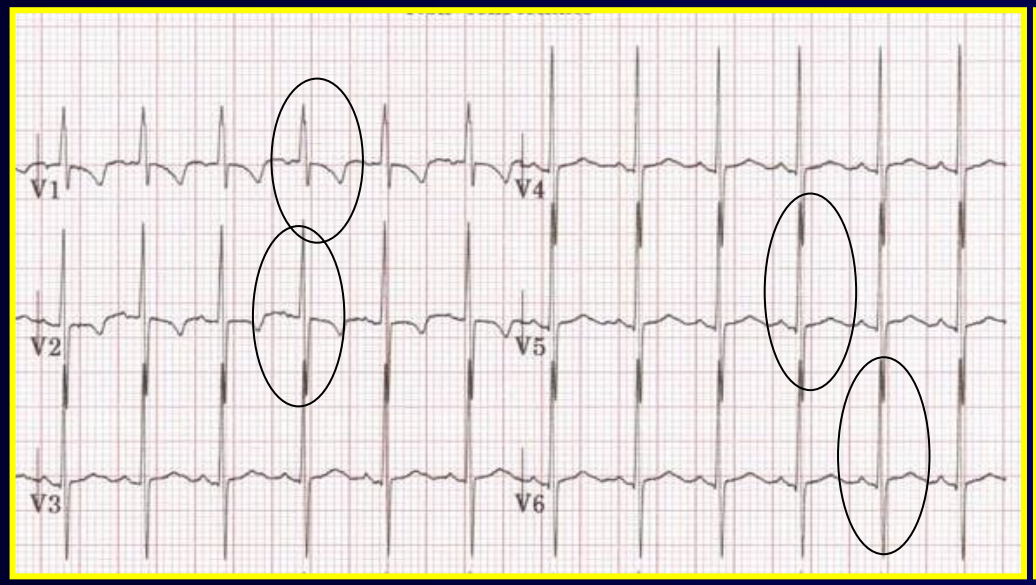
- –V1 4 spazio intercostale margimo sternale dx
- –V2 4 spazio intercostale margimo sternale sn
- –V3 tra V2 e V4
- –V4 5 spazio intercostale nella linea emiclaveare
- –V5 5 spazio intercostale linea ascellare anteriore
- –V6 5 spazio intercostale ascellare media



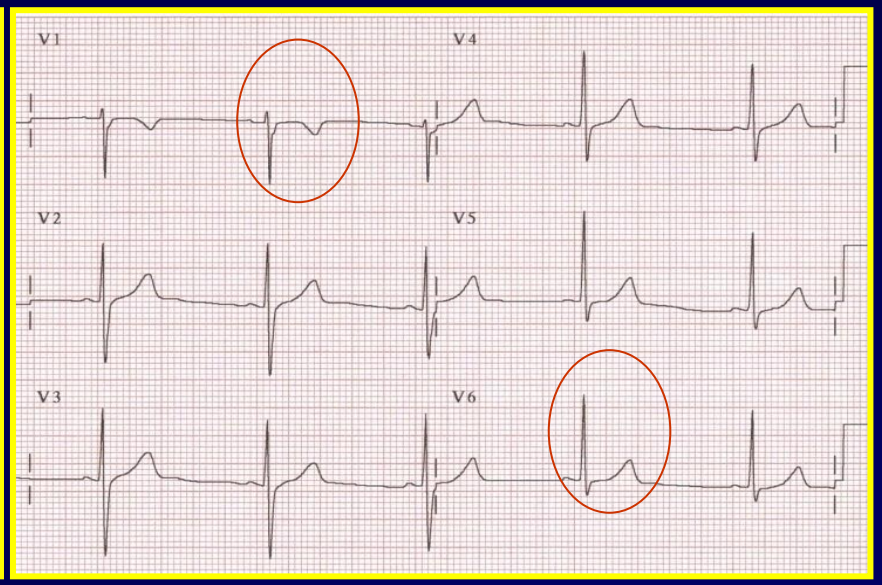
Ecg: complesso QRS







Modello pediatrico



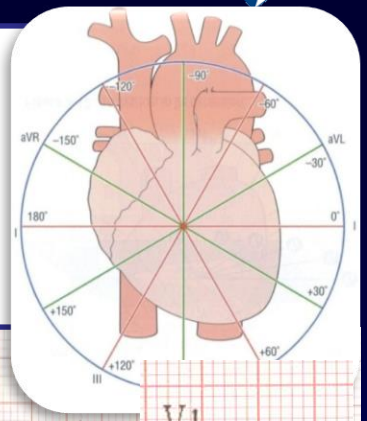
Modello adulto

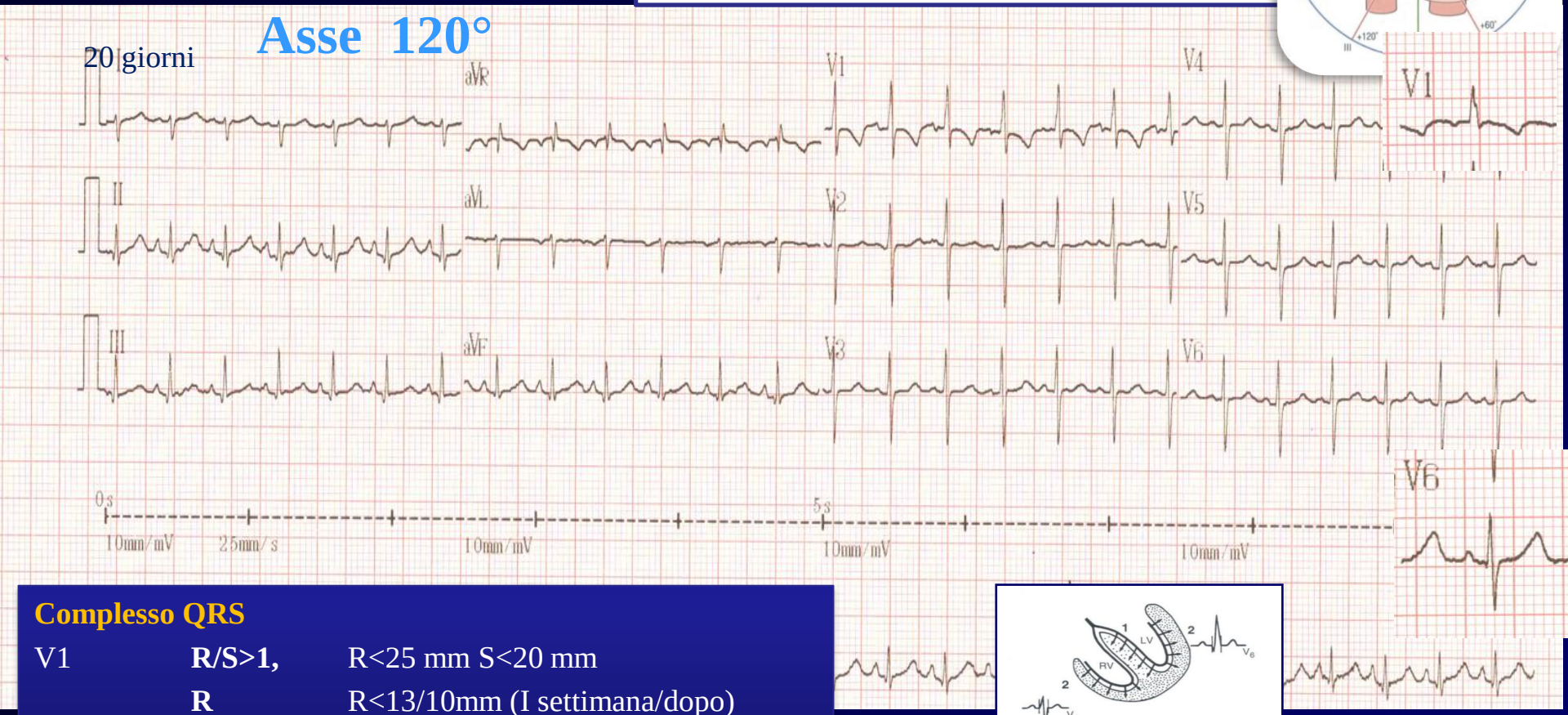
“Modello Neonatale”

Asse elettrico normale ≥120° (III positiva)

Asse QRS Valori normali per età

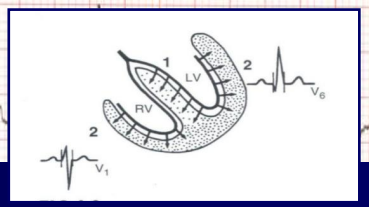
- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)





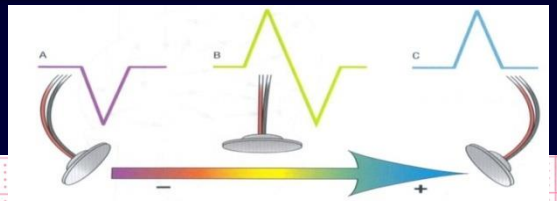
Complesso QRS

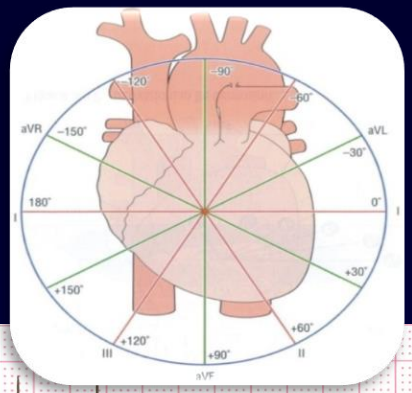
V1	**R/S>1,**	R<25 mm S<20 mm
	R	R<13/10mm (I settimana/dopo)
V6:	**R/S≤1**	o R/S> 1 S < 10mm;

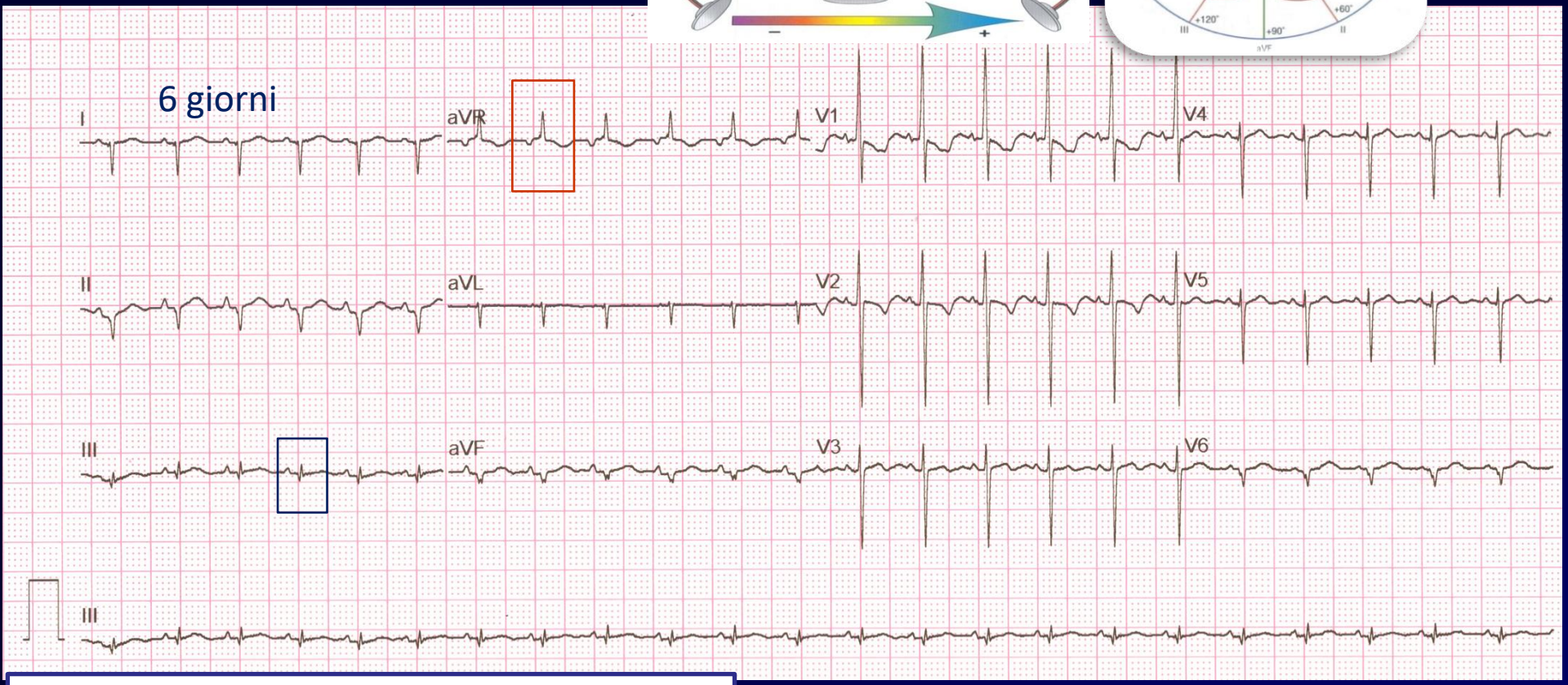


“Modello Neonatale”

I^ settimana



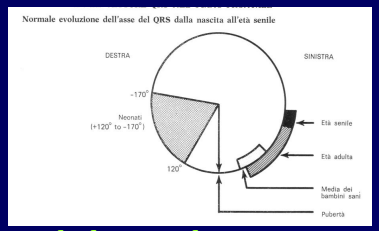




Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

Asse elettrico: estrema prevalenza destra 220°

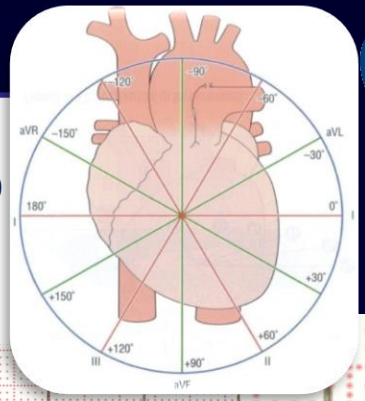


“Modello Lattante”

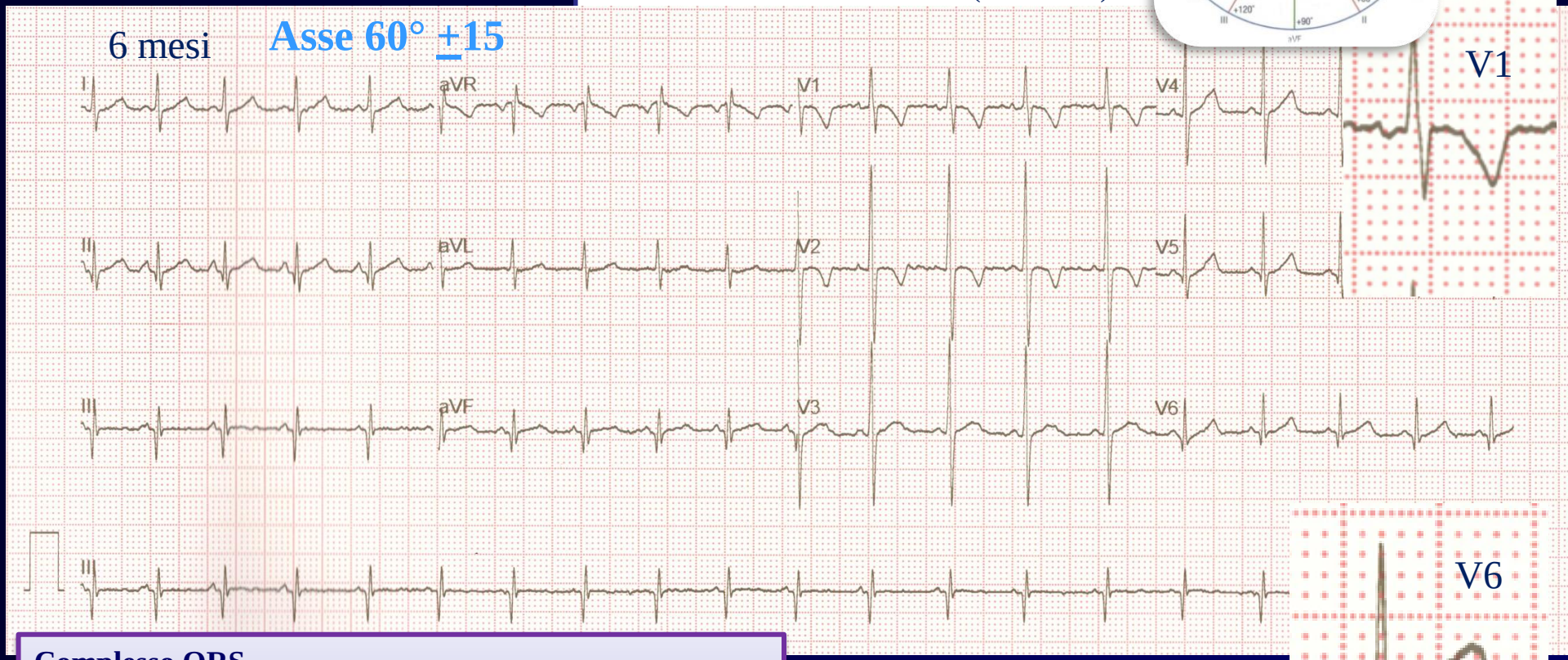
Asse elettrico inferiore a 120° (III positiva) sino al 1 anno

Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

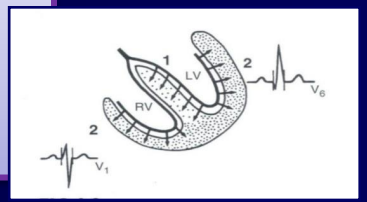


6 mesi **Asse 60° ±15**



Complesso QRS

V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

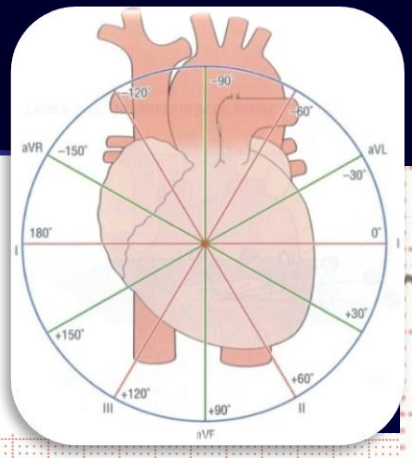


“Modello Adulto”

Asse elettrico dopo il I anno inferiore a 100°

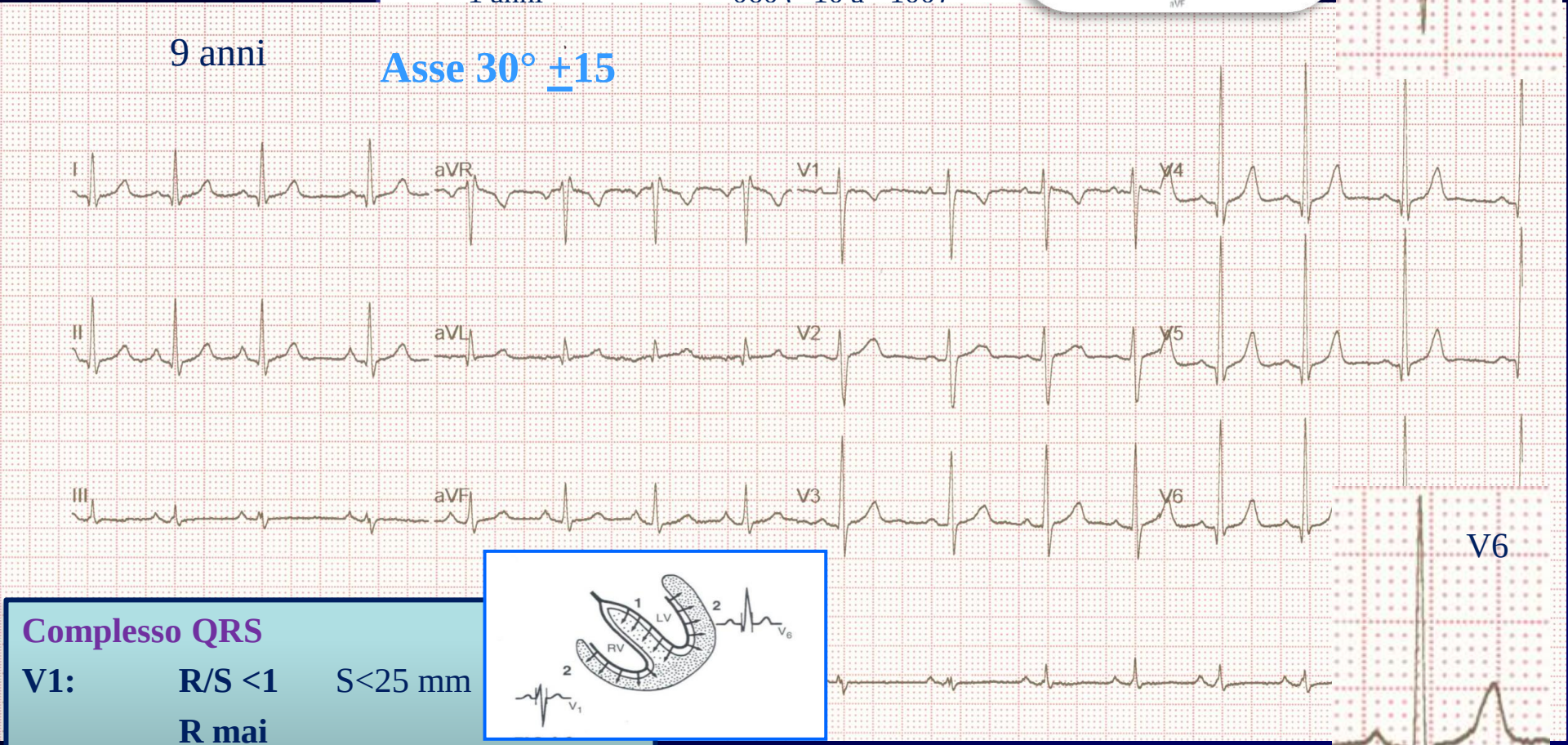
Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)



9 anni

Asse 30° ±15



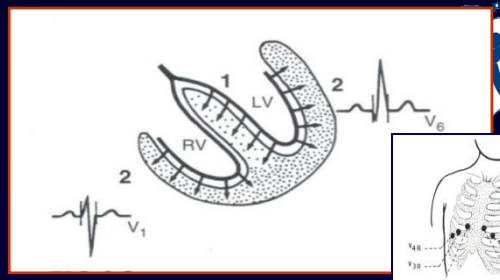
Complesso QRS

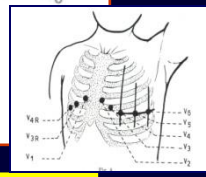
V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

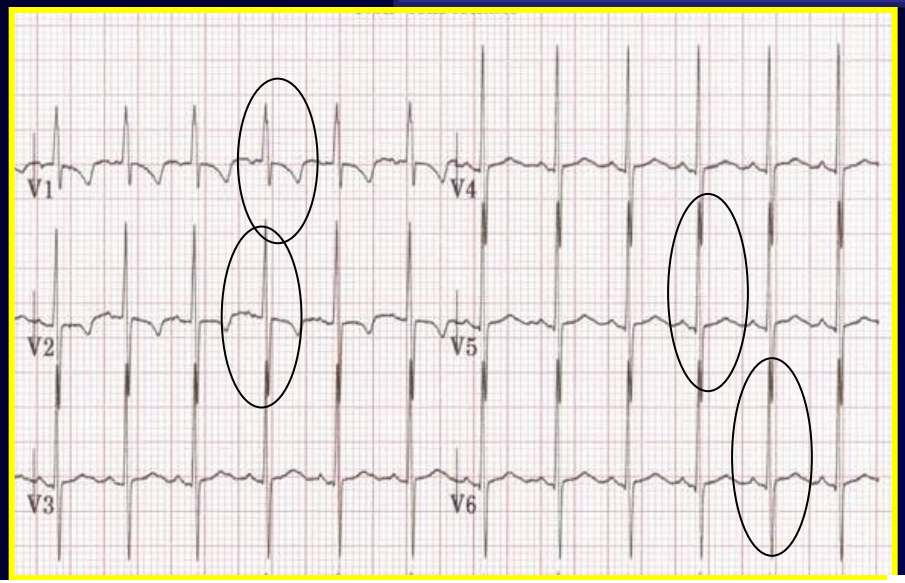
Complesso QRS Precordiali

QRS ≥ 0.05 < 0.07 sec

R< 10 mm in V1 onda q < 5 mm in V6







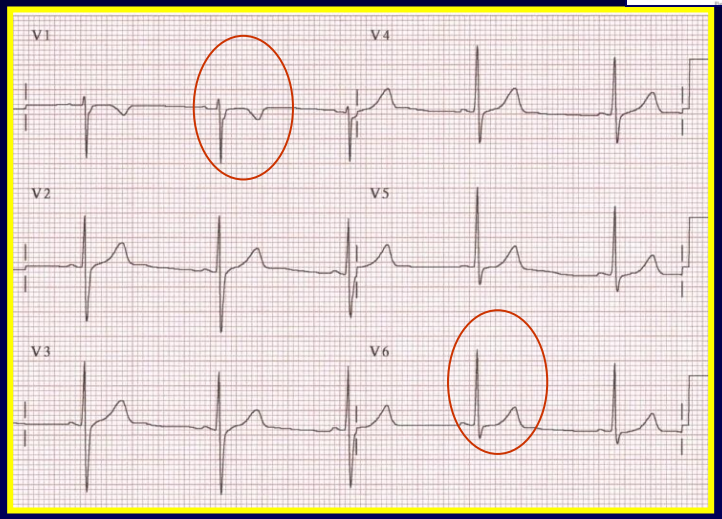


Tabella 6. - Ampiezza delle principali componenti del complesso QRS nelle derivazioni precordiali destre.

Ampiezze in V1 (mm)

	Onda R						Onda S					
Age	Min.	5 %	Media	95 %	Max.	S.D.	Min.	5 %	Media	95 %	Max.	S.D.
0-24 ore	5,5	7,0	14,8	20,0	20,5	3,72	0,0	2,5	9,3	27,0	28,5	7,99
1-7 giorni	5,5	9,0	18,2	27,4	29,5	5,44	1,5	4,6	10,4	18,8	25,5	4,70
8-30 giorni	2,5	4,2	11,4	19,8	26,5	4,97	0,0	2,5	5,0	12,8	18,5	3,73
1-3 mesi	0,0	3,6	9,4	17,9	20,5	5,12	0,0	2,0	5,7	17,4	19,5	5,52
3-6 mesi	5,5	6,1	10,8	16,7	17,5	3,14	1,5	2,1	6,8	11,8	13,5	2,80
6-12 mesi	0,0	4,0	7,3	16,0	17,5	3,84	1,5	1,9	6,2	14,4	16,5	3,73
1-3 anni	2,5	3,6	8,8	15,0	17,5	3,23	0,0	2,2	10,7	20,5	28,5	5,90
3-5 anni	0,0	2,6	6,9	15,6	17,5	3,84	4,5	5,0	11,8	24,8	34,5	6,00
5-8 anni	0,0	2,6	6,7	13,5	20,5	3,84	1,5	5,3	12,7	21,0	25,5	5,21
8-12 anni	0,0	3,6	5,7	11,3	17,5	3,10	1,5	4,8	14,0	22,3	25,5	5,74
12-16 anni	0,0	2,1	4,8	11,1	17,5	3,19	1,5	5,5	13,4	22,3	25,5	5,32

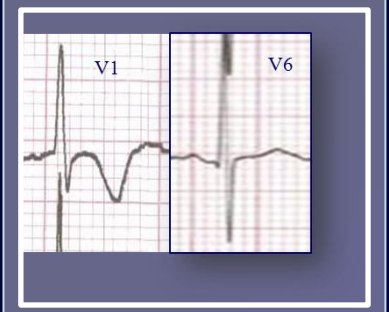
Tabella 7. - Ampiezza delle principali componenti del complesso QRS nelle derivazioni precordiali sinistre.

Ampiezze in V5 (mm)

	Onda R						Onda S					
Age	Min.	5 %	Media	95 %	Max.	S.D.	Min.	5 %	Media	95 %	Max.	S.D.
0-24 ore	0,0	4,0	10,2	18,0	24,0	5,44	0,0	0,0	11,9	24,0	31,5	6,87
1-7 giorni	0,0	3,4	10,7	19,3	28,0	5,54	0,0	3,6	6,8	16,2	19,5	4,73
8-30 giorni	0,0	3,5	11,9	27,0	36,0	7,28	0,0	2,7	4,8	12,3	13,5	3,50
1-3 mesi	4,0	7,3	13,6	20,7	24,0	3,87	0,0	2,0	4,7	12,7	13,5	4,14
3-6 mesi	8,0	9,3	17,8	25,5	28,0	4,83	0,0	1,9	4,2	15,4	16,5	5,08
6-12 mesi	8,0	9,7	17,1	24,7	28,0	4,03	0,0	2,0	2,9	8,0	10,5	2,41
1-3 anni	8,0	9,1	17,6	27,7	40,0	6,69	0,0	1,8	2,2	7,0	10,5	2,33
3-5 anni	8,0	9,4	18,5	30,0	36,0	6,59	0,0	1,8	2,0	5,8	7,5	1,91
5-8 anni	8,0	10,0	20,2	31,2	40,0	6,15	0,0	1,9	2,4	6,6	10,5	2,08
8-12 anni	8,0	10,9	21,9	30,0	36,0	6,23	0,0	1,8	1,7	4,4	10,5	1,91
12-16 anni	4,0	8,4	17,2	26,7	36,0	5,42	0,0	1,8	1,7	5,0	7,5	1,81

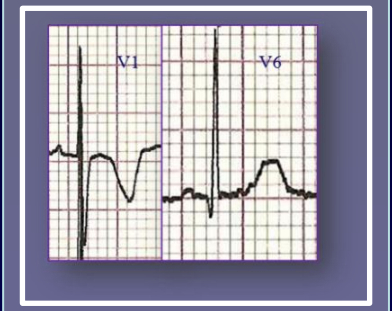
Asse Elettrico e morfologia complesso QRS nelle derivazioni precordiali

Tre Modelli ECG



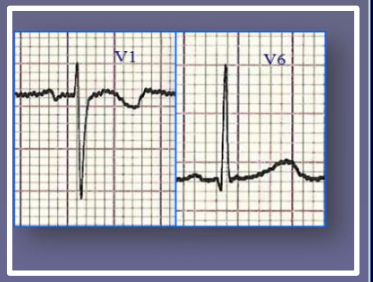
"Modello Neonatale"

1-30 giorni: prevalenza delle forze elettriche del ventricolo destro



"Modello Lattante"

1 mese 3 anni: forze elettriche ventricolo sn/dx bilanciate



"Modello Adulto"

2- 3 anni: prevalenza delle forze elettriche del ventricolo Sn

"**Modello Neonatale**": risente dall'emodinamica fetale, tipica dalla 31° settimana in poi

- piccolo circolo contro alte resistenza polmonari,
- grande circolo contro basse resistenze placentari

"**Modello Lattante**": risente dall'emodinamica postnatale " prima fase di equilibrio di forze"

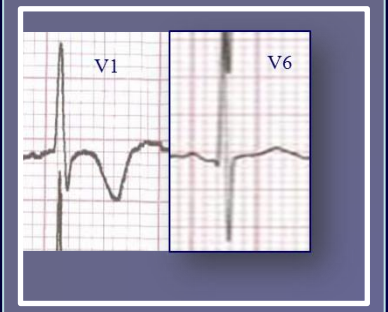
- Inizia il processo di caduta delle resistenze polmonari
- Il ventricolo sinistro pompa contro alte resistenze periferiche

"**Modello Adulto**": ultima evoluzione morfologica in età pediatrica

- completamento dell'emodinamica già descritta nel "modello lattante"

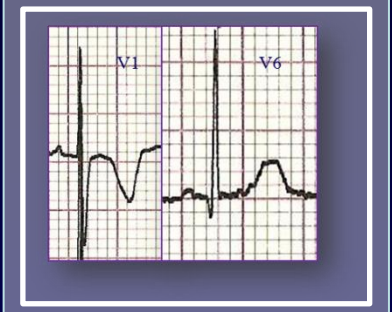
Asse Elettrico e QRS nelle derivazioni precordiali Punti chiave

Tre Modelli ECG



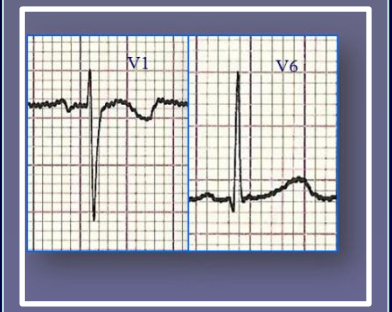
"Modello Neonatale"

1-30 giorni: prevalenza delle forze elettriche del ventricolo destro



"Modello Lattante"

1 mese 3 anni: forze elettriche ventricolo sn/dx bilanciate



"Modello Adulto"

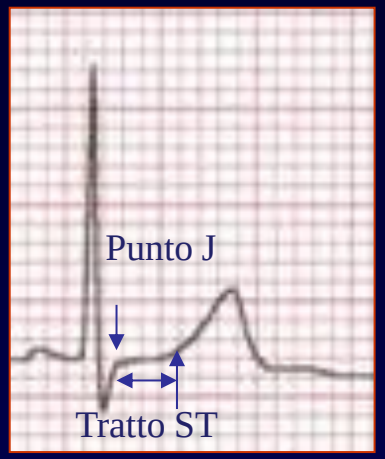
2- 3 anni: prevalenza delle forze elettriche del ventricolo sinistro

- Il "modello neonatale" è caratteristico solo del I mese di vita
- Il "modello lattante" può essere già presente nel primo mese di vita
- Il "modello adulto" talvolta, può anche caratterizzare l'ECG nel I mese di vita
  - criteri utili di normalità voltaggio onda S in V1 e dell'onda R da V4-V6, ancora morfologia onda T e asse QRS

Ripolarizzazione Ventricolare tratto ST-T

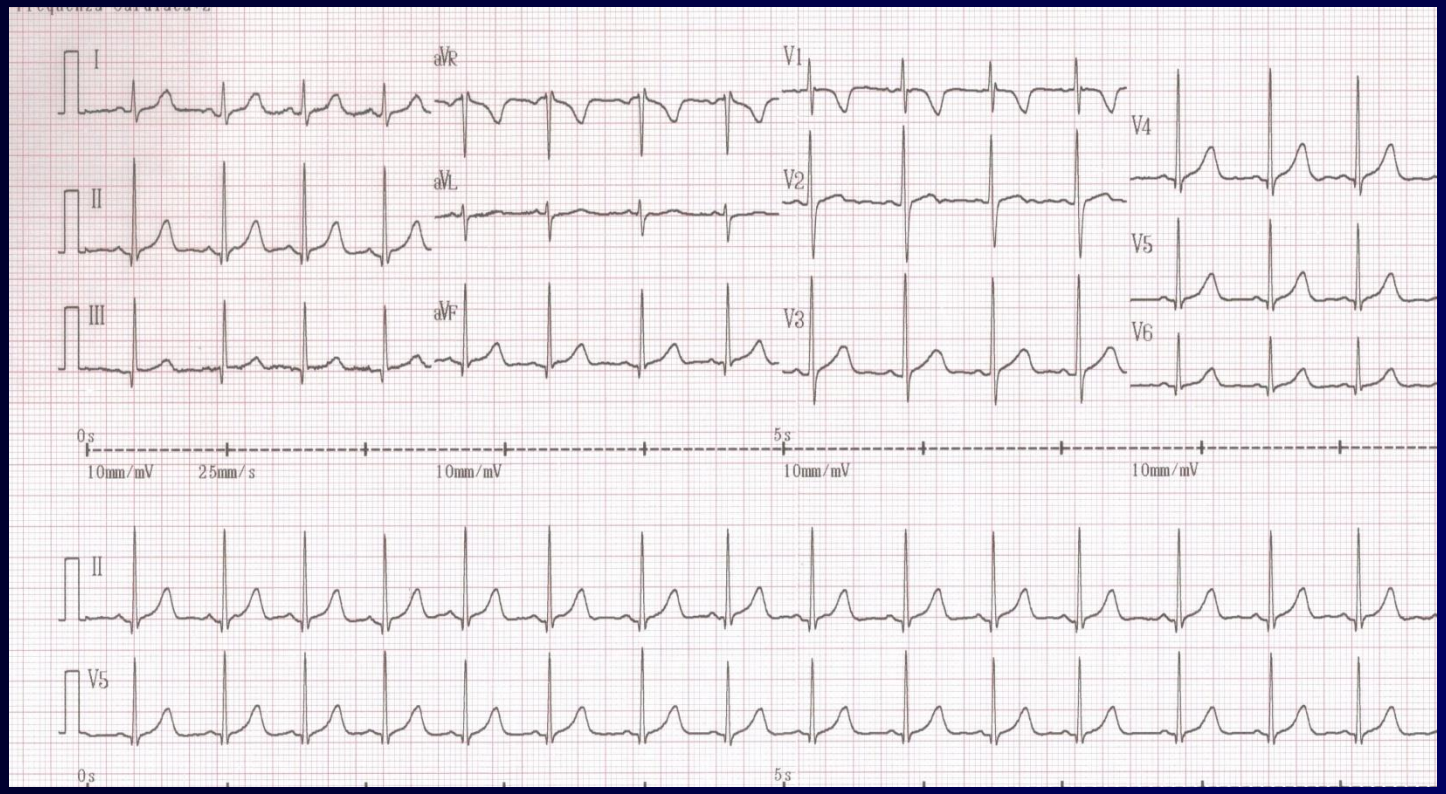
Tratto ST

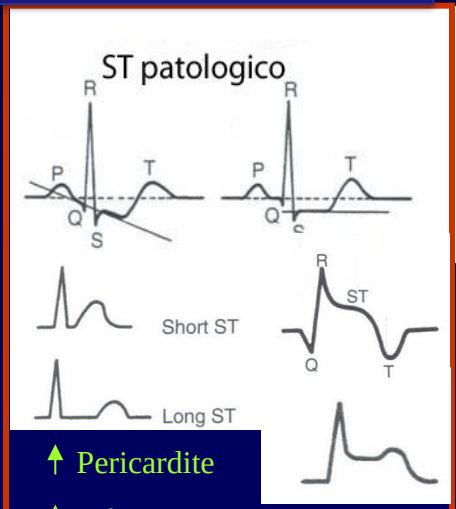
rappresentato da un segmento orizzontale "isoelettrico" stessa linea del tratto PR e TP



Sono anormali:

- Sopralivellamenti
- Sottolivellamenti

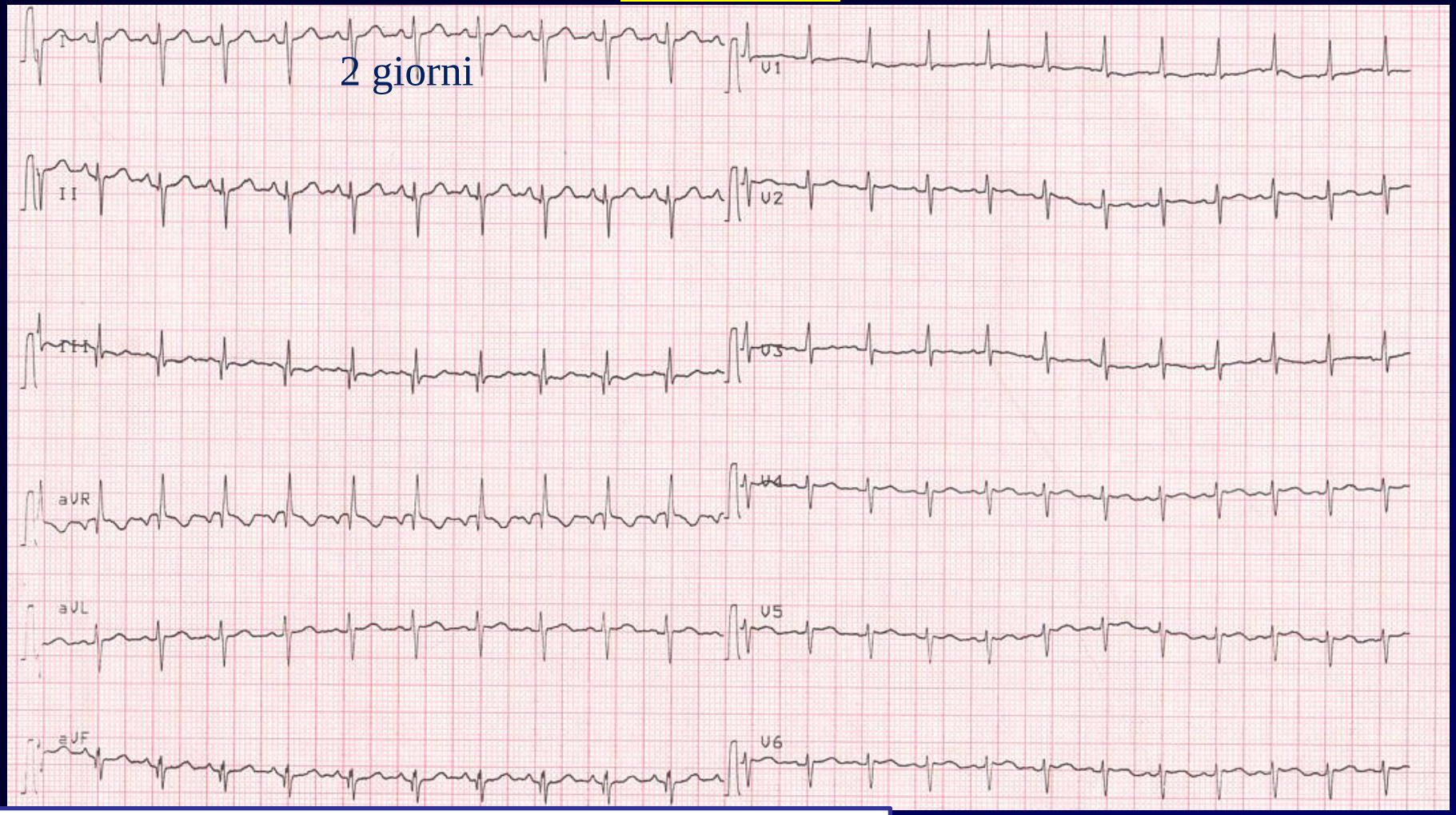




- ↑ Pericardite
- ↑ Infarto miocardico
- ↑ Aneurisma ventricolare
- ↓ Ischemia miocardica
- ↓ Ipertrofia ventricolare
- ↓ Farmaci –digitale
- ↓ Miocardite

Ripolarizzazione Ventricolare Tratto ST-T

ONDA T

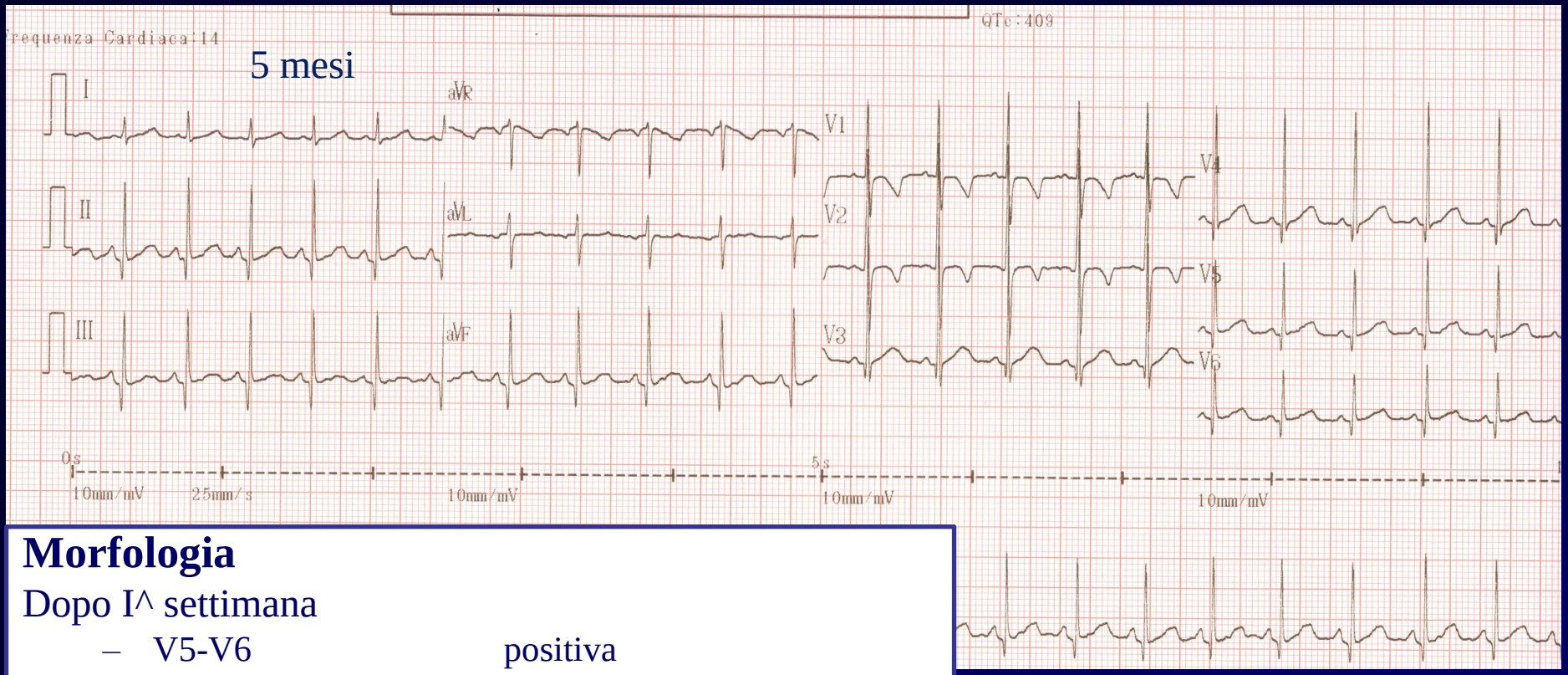


Morfologia onda T I^ settimana di vita

- V1 positiva/negativa
- V6 positiva/piatta/negativa

Ripolarizzazione Ventricolare tratto ST-T

ONDA T



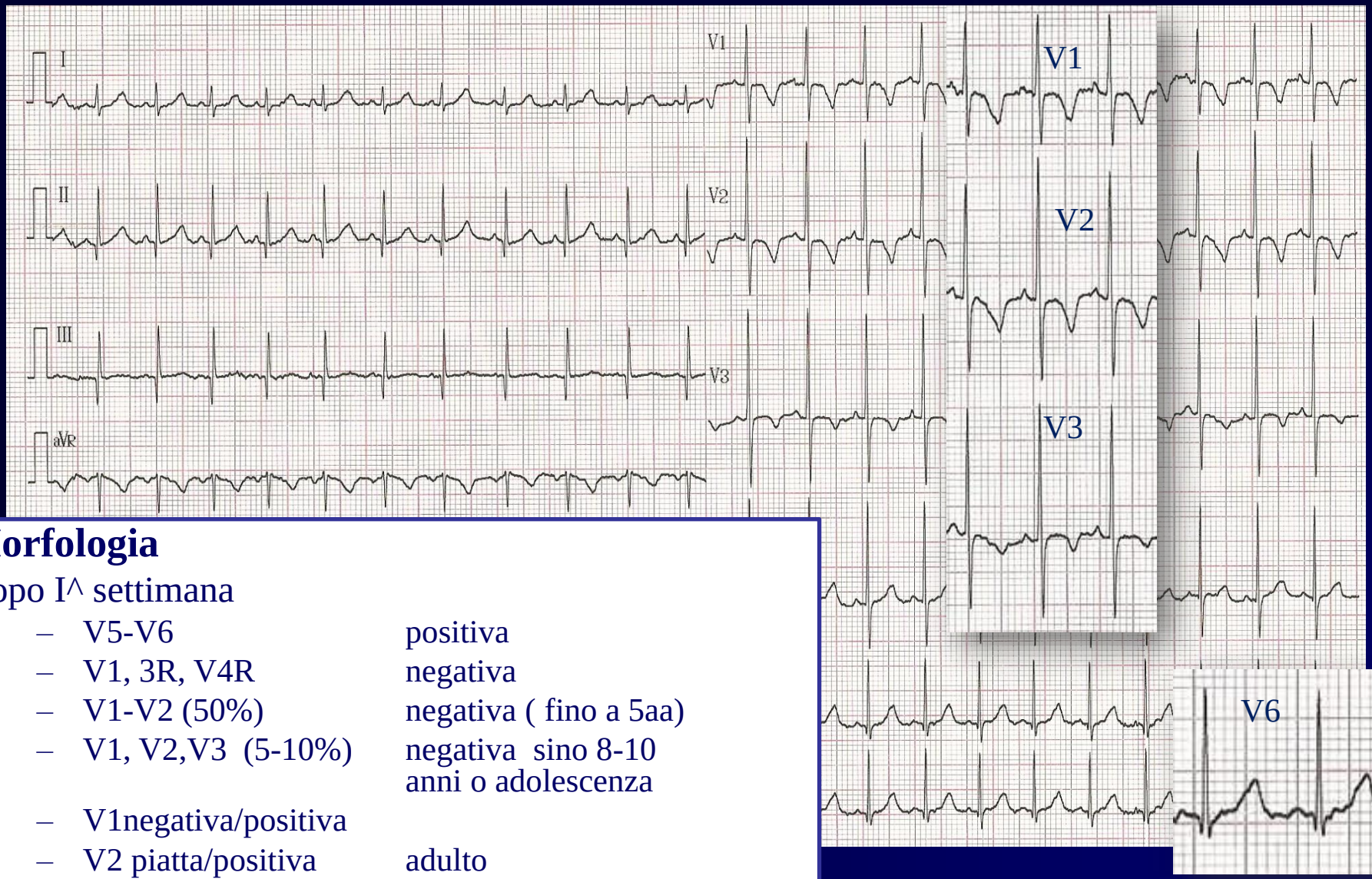
Morfologia

Dopo I^ settimana

- V5-V6 — positiva
- V1, 3R, V4R — negativa
- V1-V2 (50%) — negativa (fino a 5aa)
- V1, V2,V3 (5-10%) — negativa sino 8-10 anni o adolescenza
- V1negativa/positiva
- V2 piatta/positiva — adulto

Ripolarizzazione VentricolareTratto ST-T

ONDA T

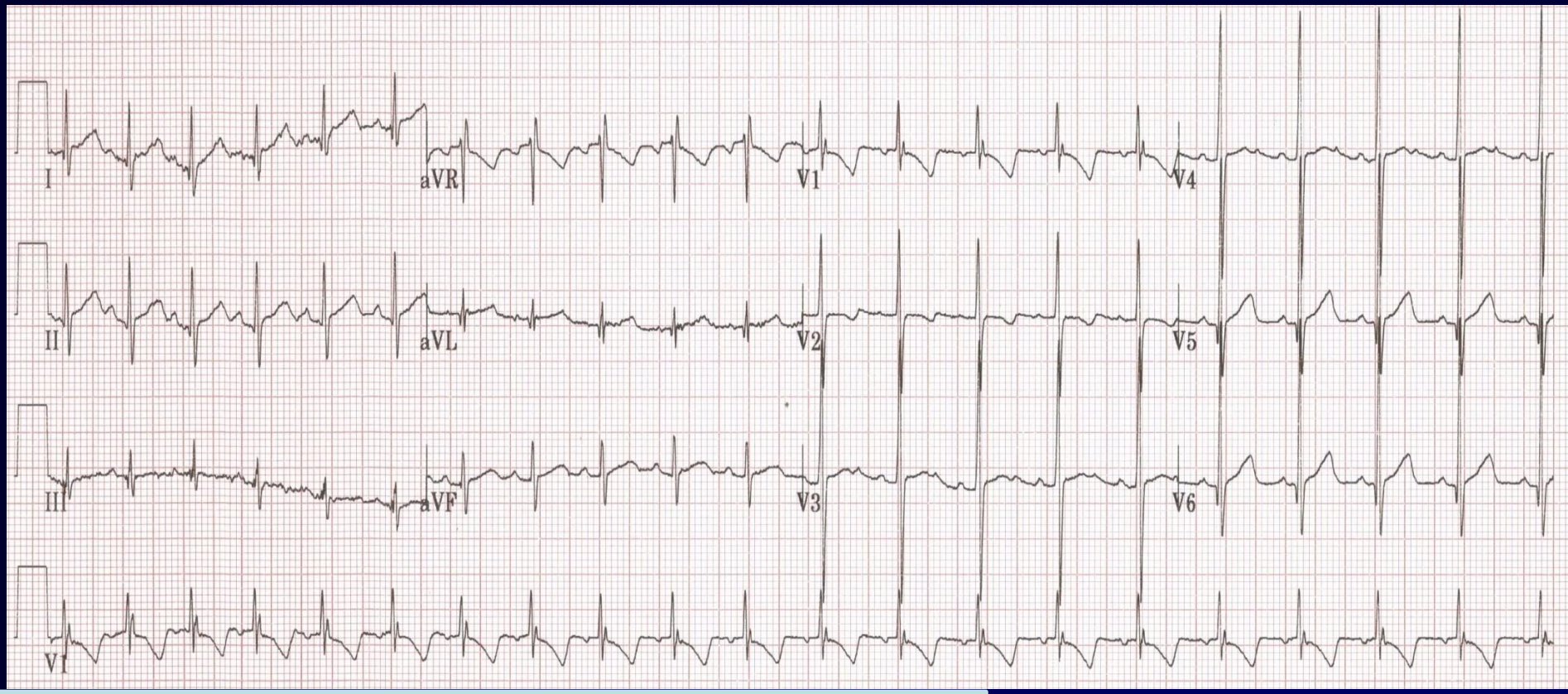


Morfologia

Dopo I^ settimana

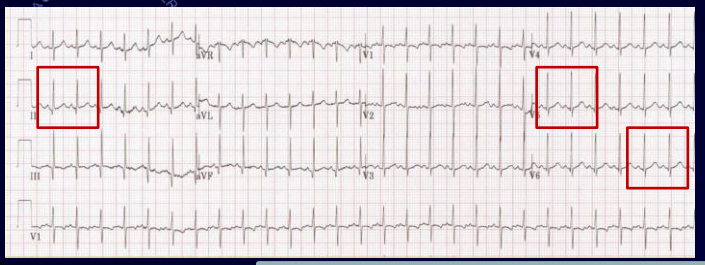
- V5-V6 positiva
- V1, 3R, V4R negativa
- V1-V2 (50%) negativa (fino a 5aa)
- V1, V2,V3 (5-10%) negativa sino 8-10 anni o adolescenza
- V1negativa/positiva
- V2 piatta/positiva adulto

Ripolarizzazione Ventricolare
ONDA U

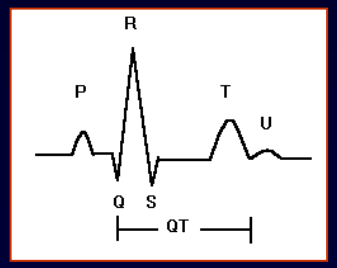


Rappresenta (opinioni controverse):

- Postpotenziali del muscolo ventricolare
- **Ripolarizzazione delle fibre del Purkinje**
- Presenti nelle derivazioni precordiali V2-V5



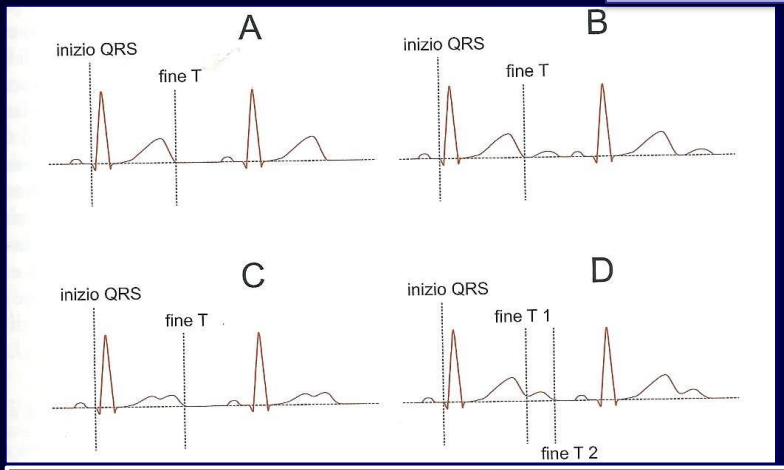
Intervallo QTc
< 440, > 320 msec



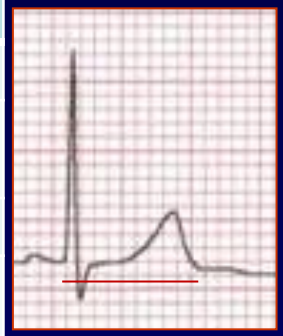
È misurato dall'inizio del QRS al termine della T, onda U esclusa

II-V5-V6 sono le derivazione che meglio si prestano alla misurazione

La durata è in funzione della frequenza, pertanto, deve essere corretto per la frequenza cardiaca con la formula di Bazett



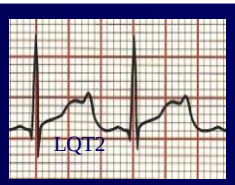
	Formula di Bazett QTc= QT/√ RR (in sec)	Misura QT
A	onda T unica	Termine della T
B	onda T seguita da onda U separata	Termine della T senza onda U
C	T bifida con cuspidi simili	Termine dell'onda bifida
D	Onda T e U fuse, il passagio non raggiumge l'isoelettrica	QT1 fine I° onda QT2 (QTU) fine II° onda



Note

– Misurare il QT senza onda U

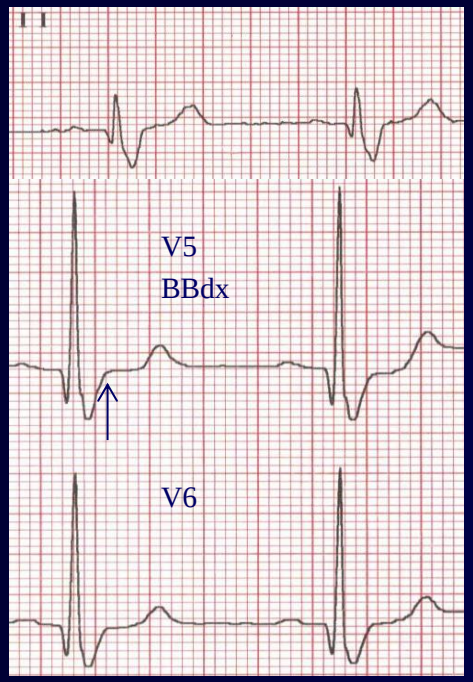
– differenziare onda U da onda T bifida

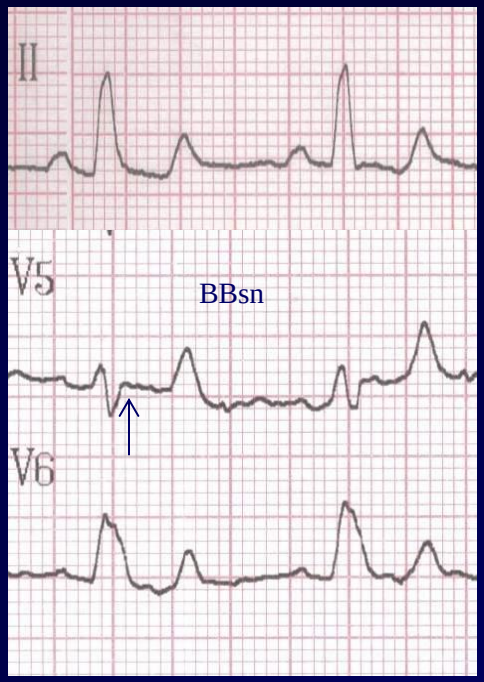


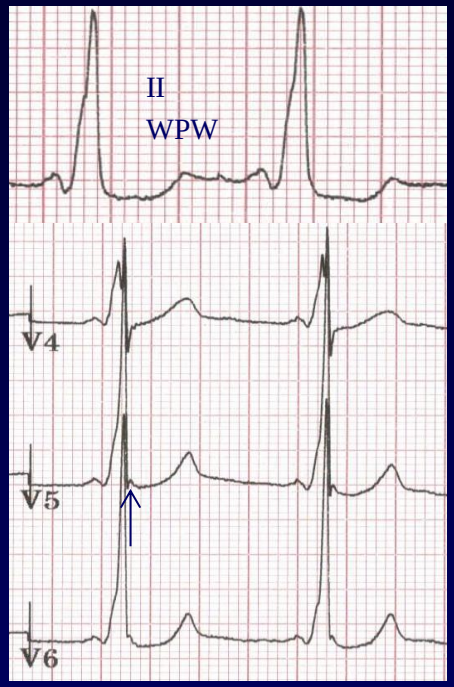
– Onda U solo precordiali V2-V5 → considerare QT1

– Onda T bifida in più derivazioni comprese periferiche → considerare QT2

Corretta Misurazione Intervallo QT
in presenza: blocchi di branca e preeccitacone ventricolare







- In presenza di turbe della conduzione il QTc può risultare prolungato conseguente a una maggiore durata del complesso QRS
- Più sensibile, in questo caso, misurare l'intervallo **JT**
  - Punto J giunzione onda S e segmento ST (vedi ↑)
- Applicando la formula di Bazett
  - valore normale **JTc** = 340 msec bambini e adolescenti

Am J Cardiol 1994;74: 1254-1257

Valori normali:

onda P, durata PR, QRS, onda T, QTc

Onda P: depolarizzazione bi-atriale

Ampiezza	≥1.5 ≤ 2.5 mm
Durata	0.06±0.02 sec
Durata max	0.08 sec < 12 mesi 0.10 sec > 12 mesi

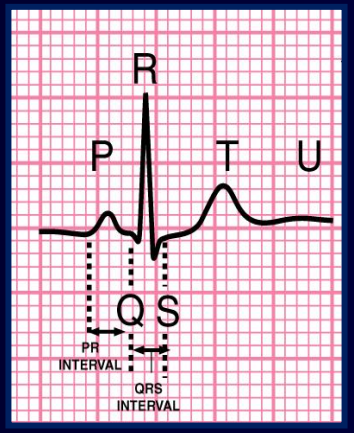
Il valore del PR correla con l'età e non con la Frequenza Cardiaca

Valore adulto dopo i 12 anni

Età	PR msec
1-30 giorni	80-120
1mese-1 anno	80-140
1-5 anni	100-160
6-12 anni	110-180
> 12 anni	120-220

Età	QRS durata
1-30 giorni	0.05- < 0.065 sec
1 mese – 8/10 anni	0.055- < 0.075 sec
adulti	0.08 - < 0.10 sec

Età	Onda T V5	Onda TV6
< 1 anno	7 mm	5 mm
1-16 anni	11 mm	7 mm

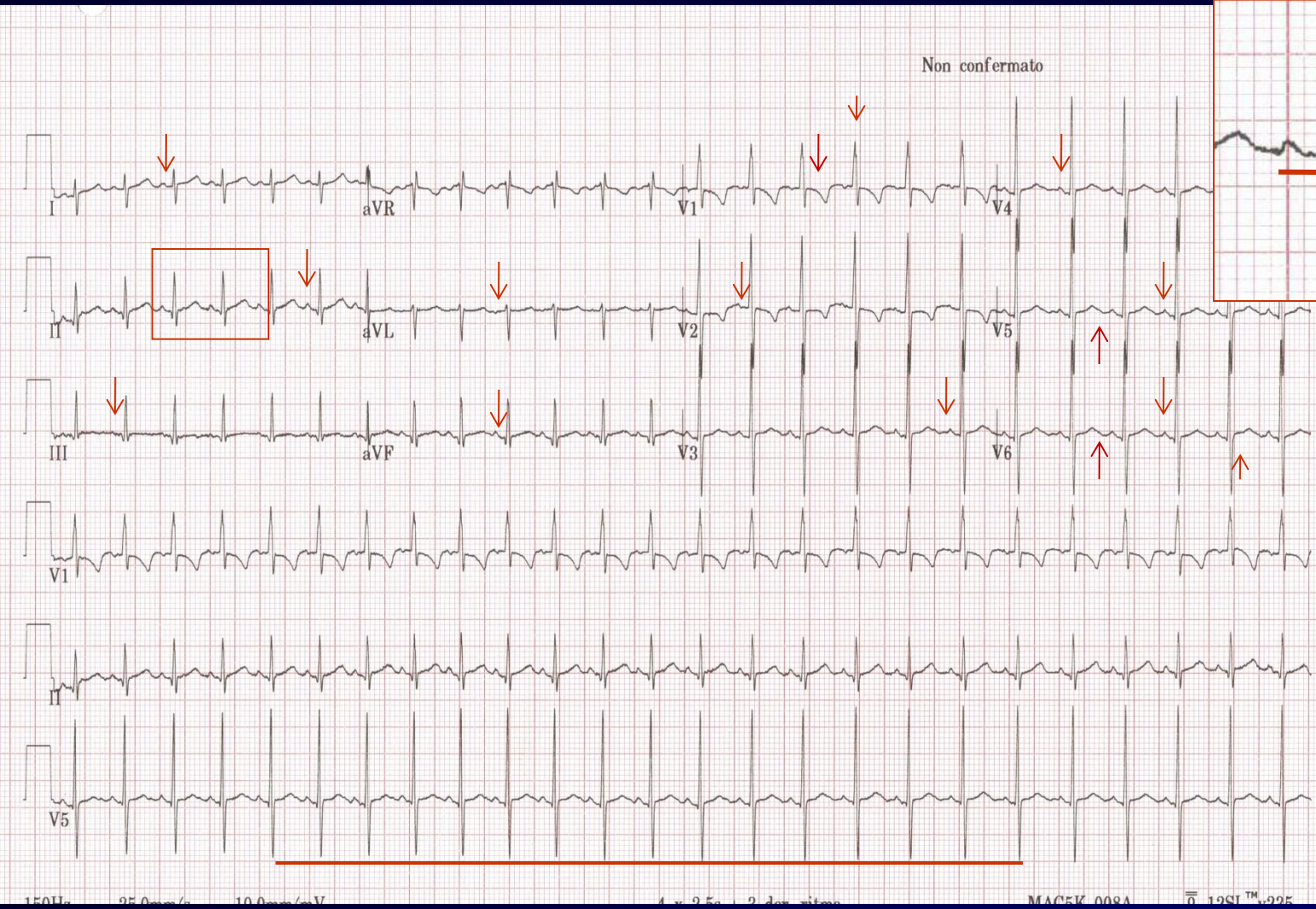


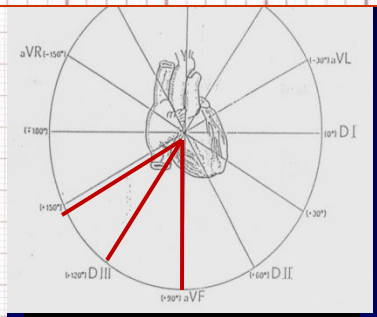
Formula di Bazett QTc= QT/√ RR (in sec)

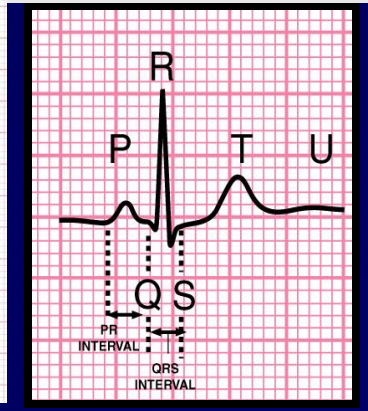
QTc	1-16 anni	> 16 maschio	> 16 femmina
normale	< 440 msec	<440 msec	< 450 msec
bordeline	440-460	430-450	450-470
lungo	> 460	> 450	> 470
corto ST manca	< 320		

Quindi per un corretto approccio all'elettrocardiogramma bisogna…

Calcolare il QT corretto > 320 msec < 440 msec



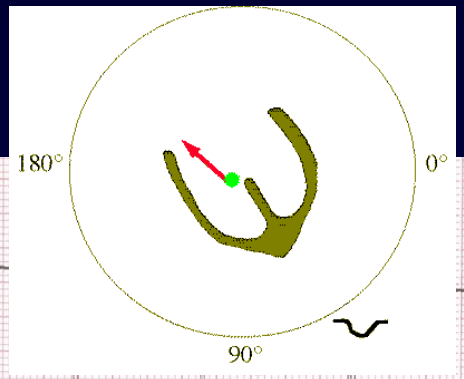


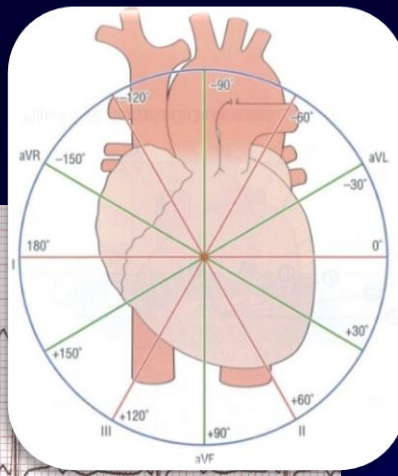


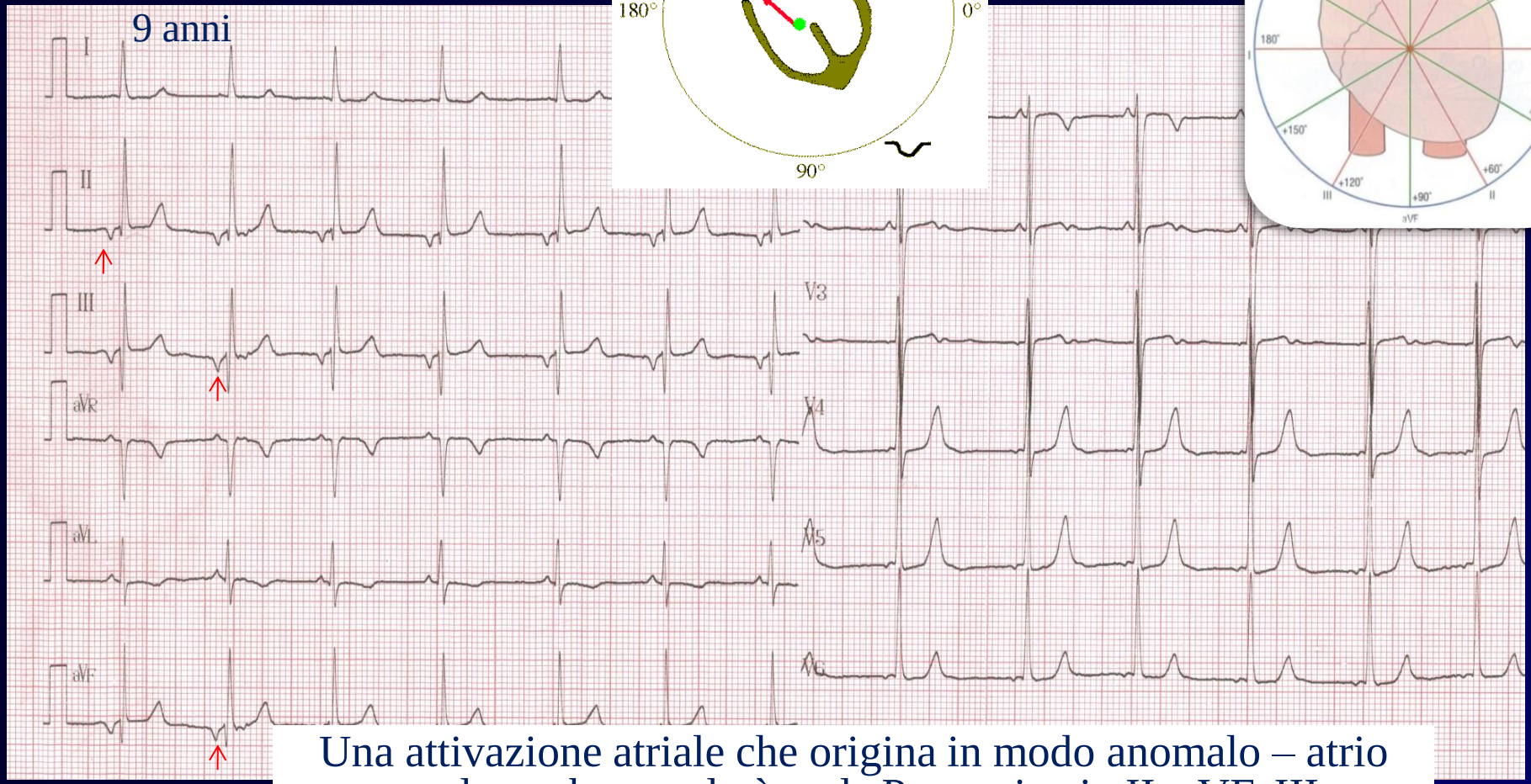
Varianti Normali

Variante Normale Ritmo
Ritmo del Seno Coronarico

Asse dell'onda P – 30°





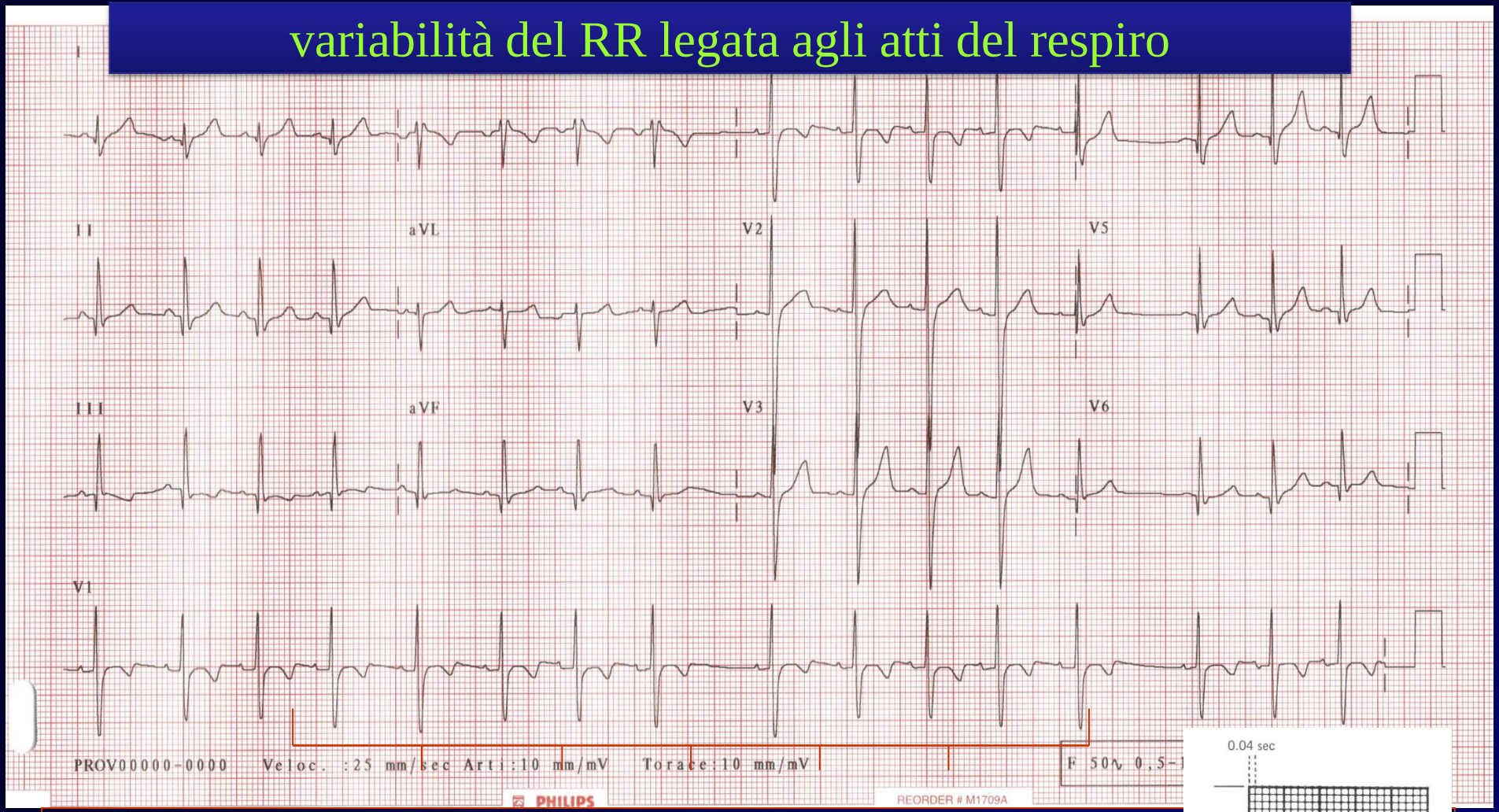


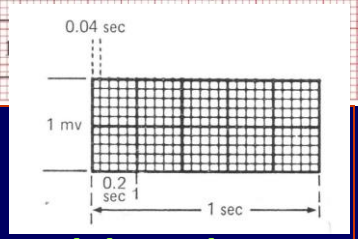
Una attivazione atriale che origina in modo anomalo – atrio destro basso- darà onde P negative in II, aVF, III

Variante Normale Ritmo

Aritmia sinusale fasica respiratoria

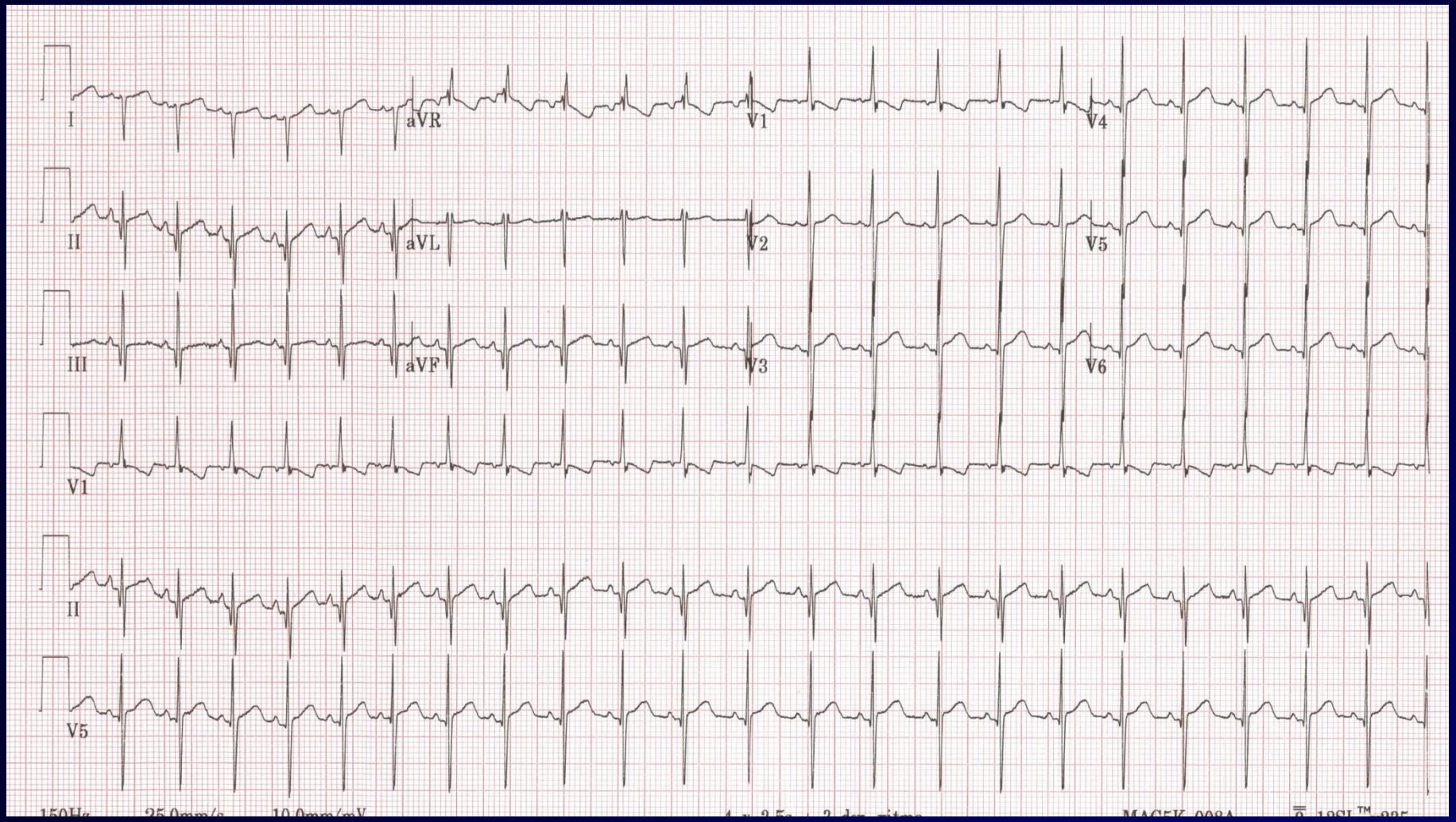
variabilità del RR legata agli atti del respiro





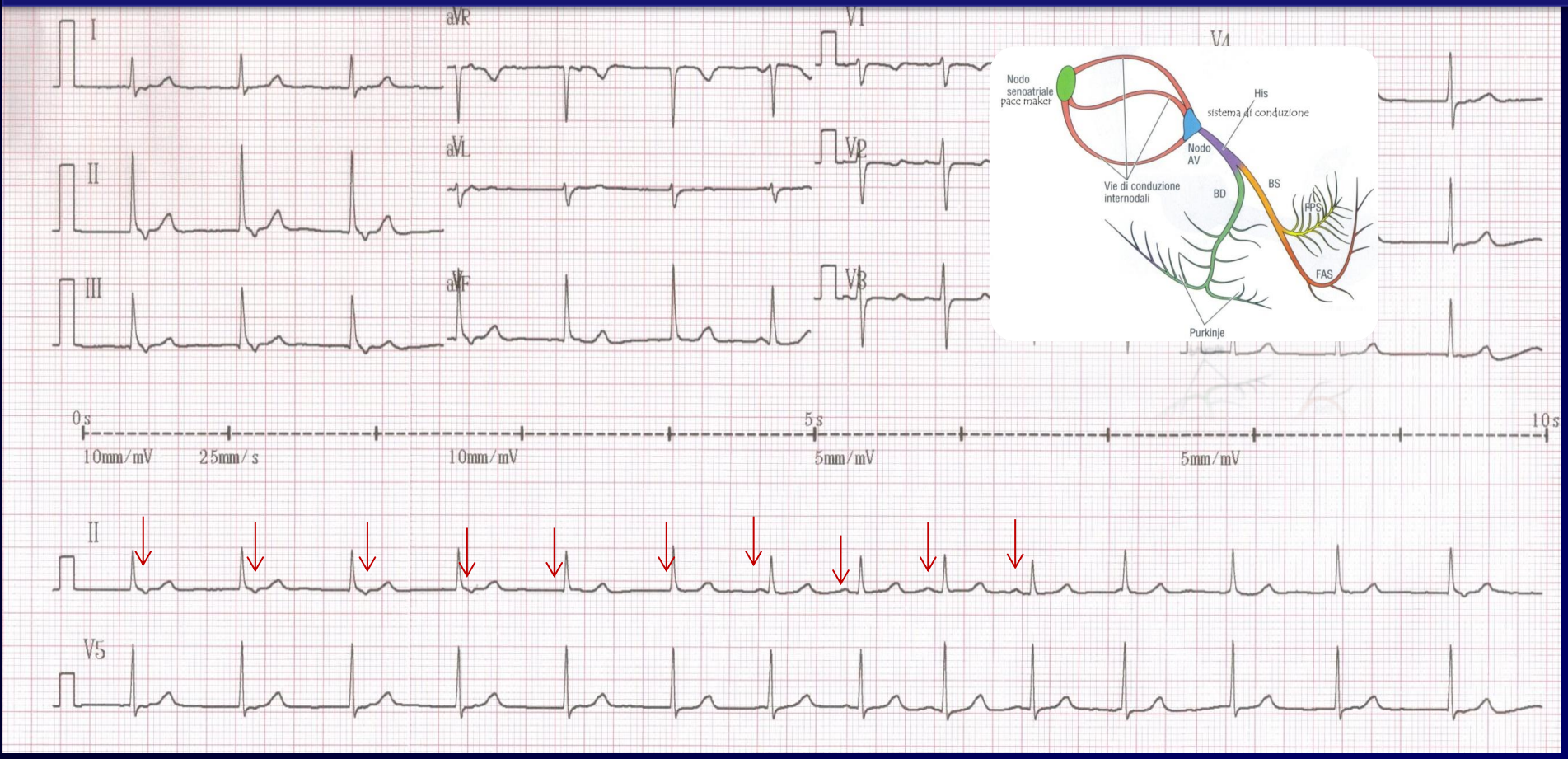
- Indica che il ritmo cardiaco è sotto il controllo del vago
- Segno di buona riserva cardiaca

ECG neonatale Ritmo

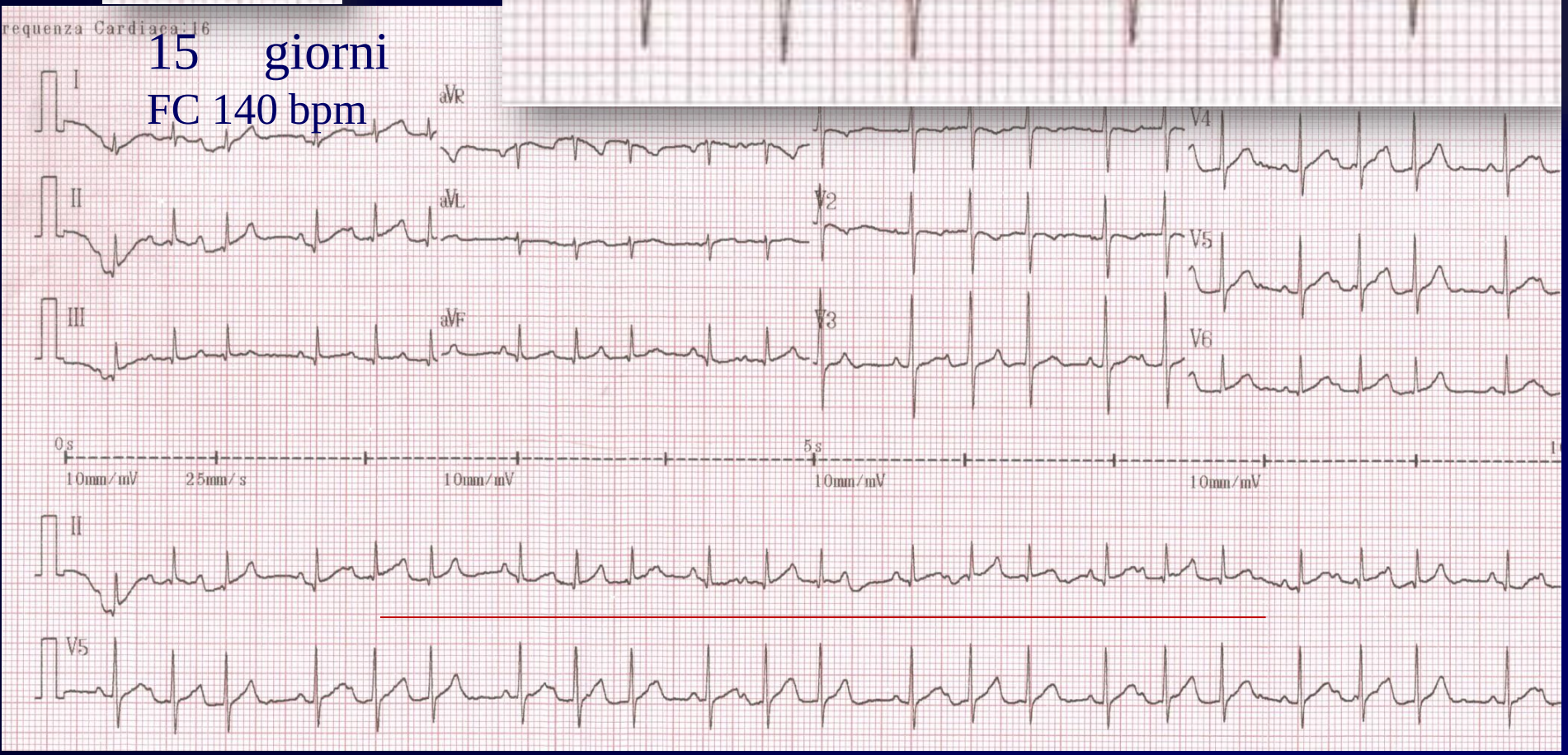


Variante Normale Ritmo Migrazione del Segnapassi o “Wandering Pacemaker”

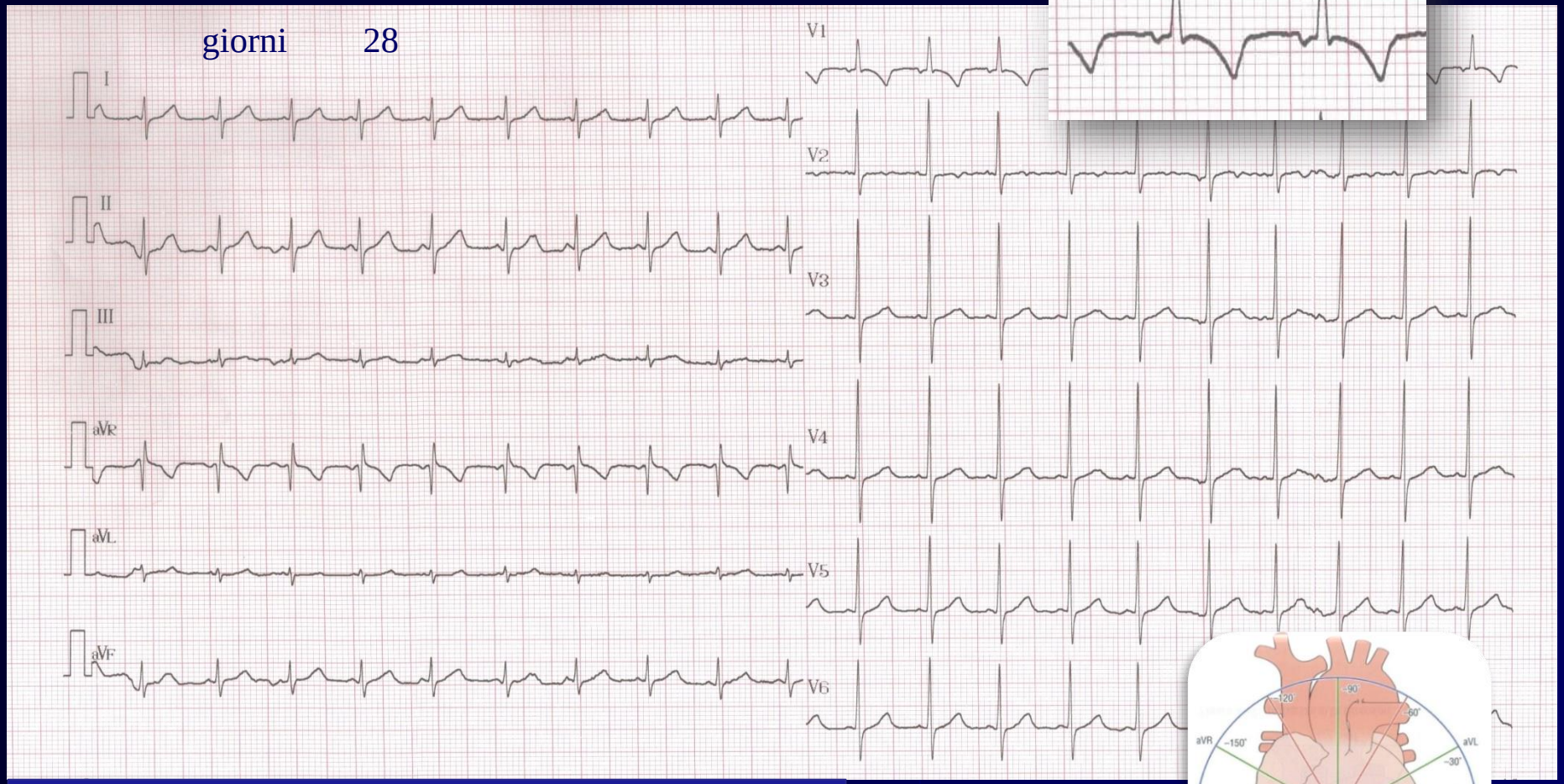
Il ritmo passa progressivamente dal nodo seno atriale ad atriale basso a giunzionale

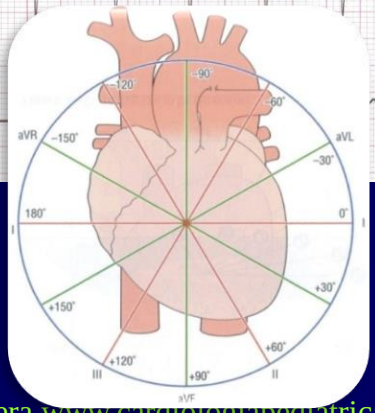


Variante Ritmo nei giovani atleti si può trovare un Blocco atrioventricolare di II grado tipo I Mobitz con periodismi di Luciani Wencheback



“Modello Neonatale” 1-30 giorni
Complesso QRS



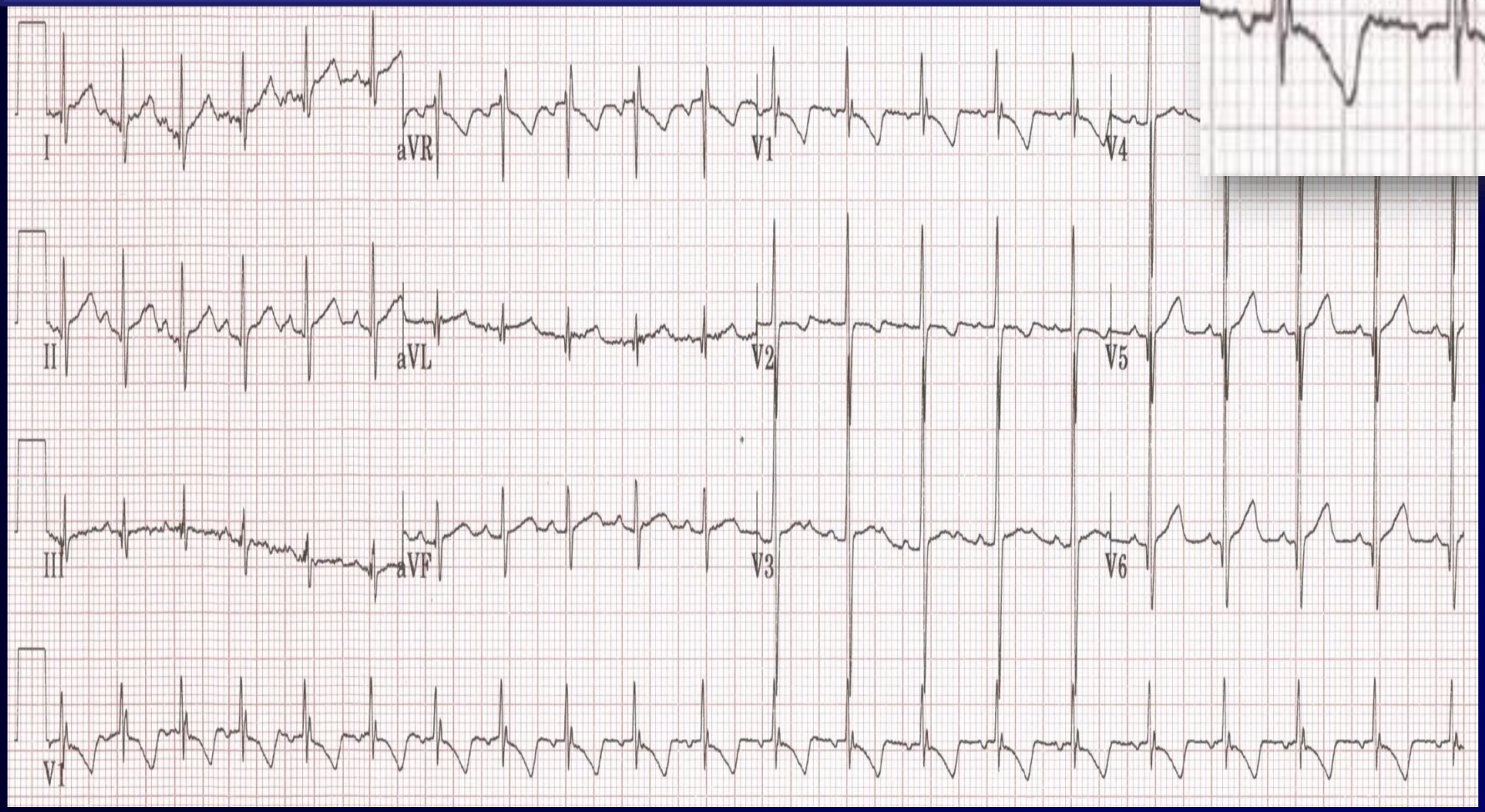


Complesso QRS

V1	**R/S>1,**	R<25 mm S<20 mm
	R	R<13/10mm (I settimana/dopo)
V6:	**R/S≤1**	o R/S> 1 S < 10mm;

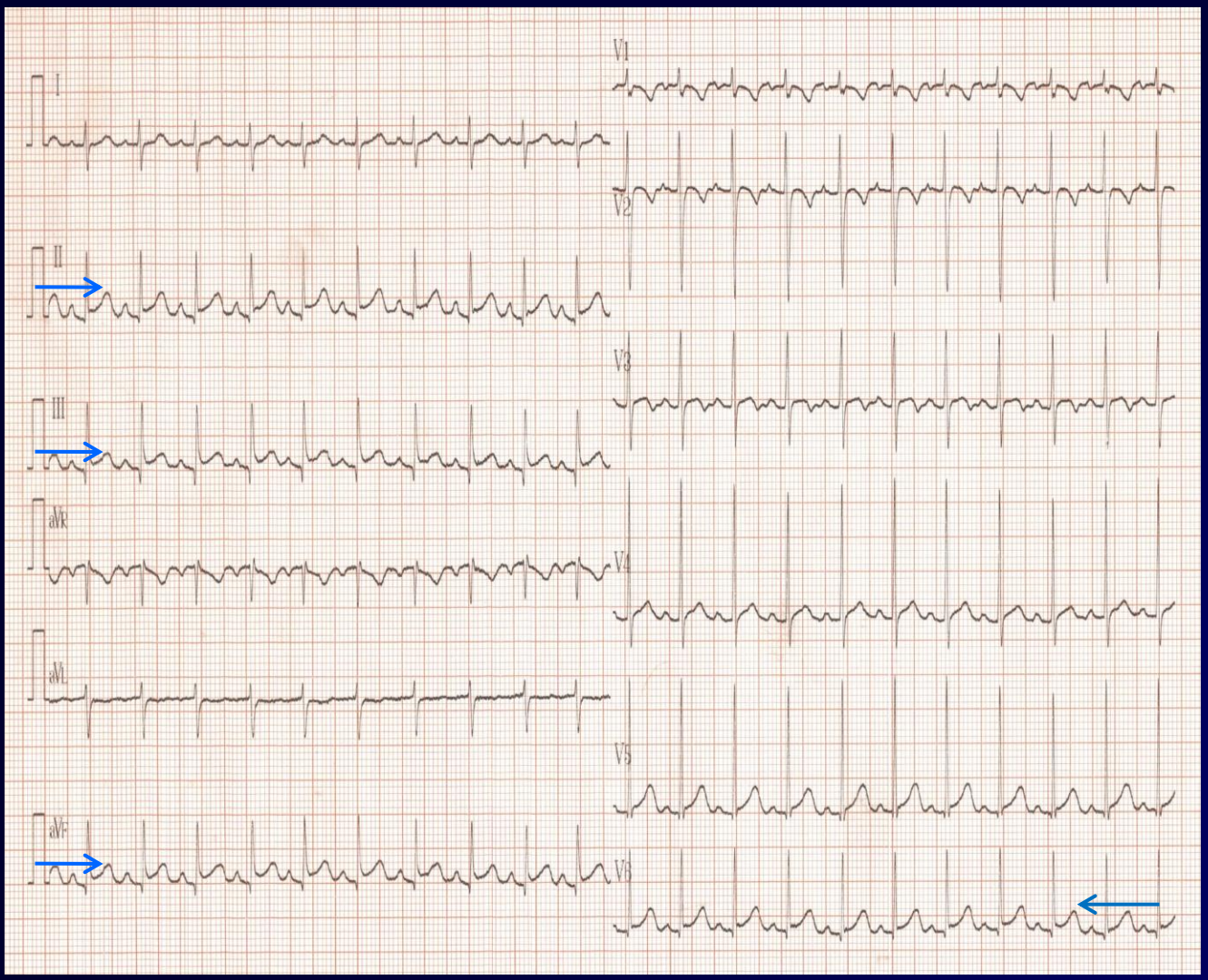
Variante Normale complesso QRS in V1 Rr’

V1 complesso RR’ con R> r’ durata QRS normale



Tratto ST- T Variante normale

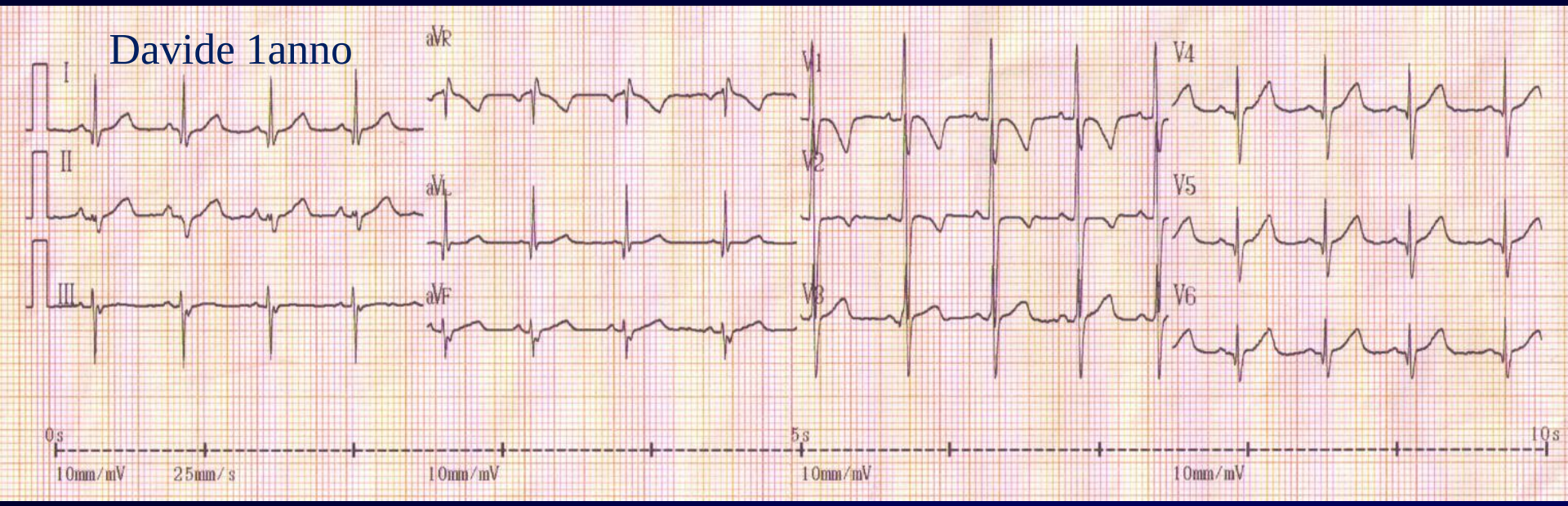
Ripolarizzazione ventricolare precoce



Nelle derivazioni periferiche e sinistre sopra/sottolivellamento dell'ST≤1mm può essere normale

Un sottolivellamento rapidamente ascendente che rientra a 0.08 sec dal punto J è normale

Asse elettrico deviato a sinistra, cuore normale



Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

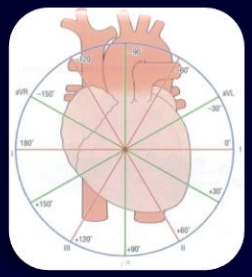
Asse del QRS

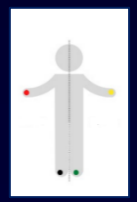
Deviazione assiale sinistra possiamo riscontrarlo anche in soggetti con cuore normale.

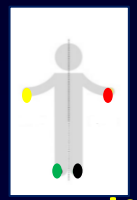
Espressione di semplice ritardo della conduzione intraventricolare (emiblocco anteriore sinistro), deve essere sempre accertata: esame fisico, ecocardiogramma

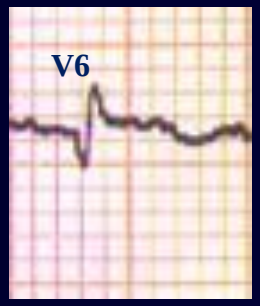
Asse elettrico posizione cuore

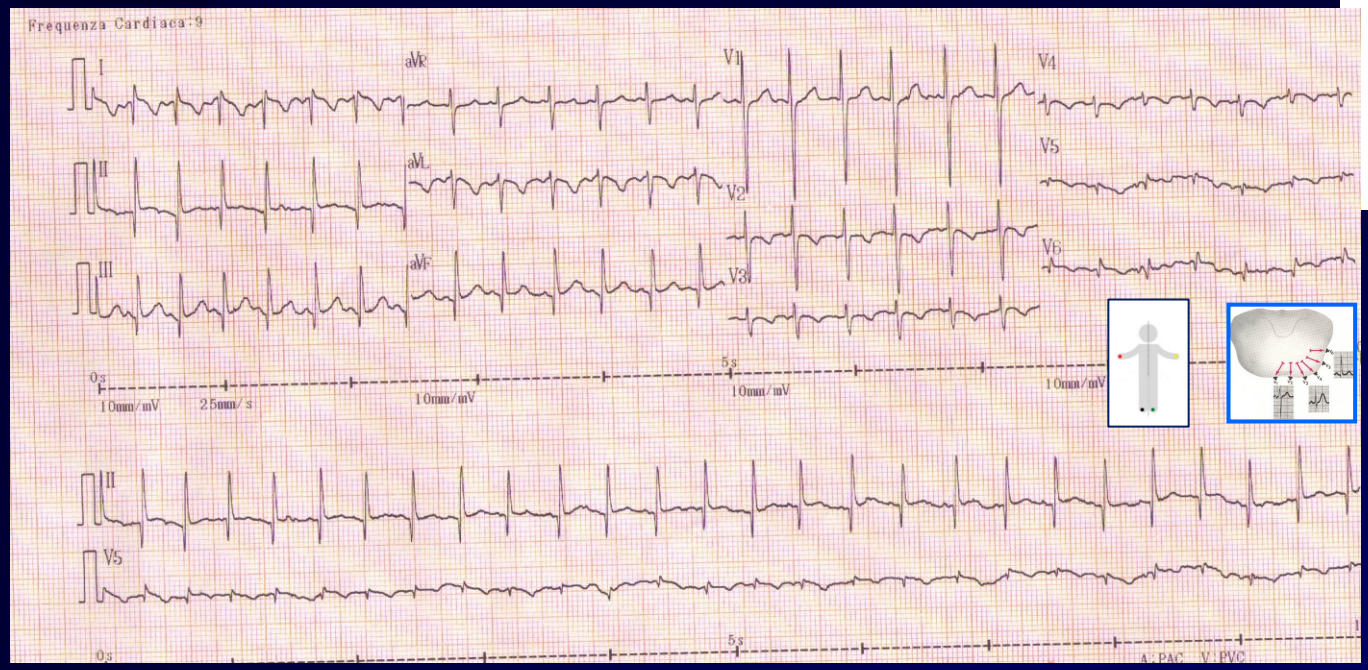
Situs Inversus in destrocardia

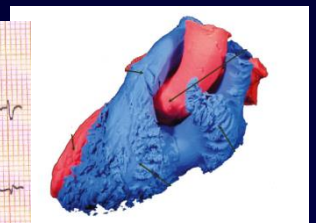


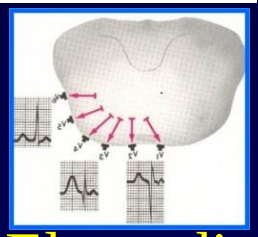






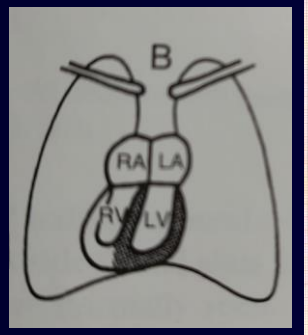


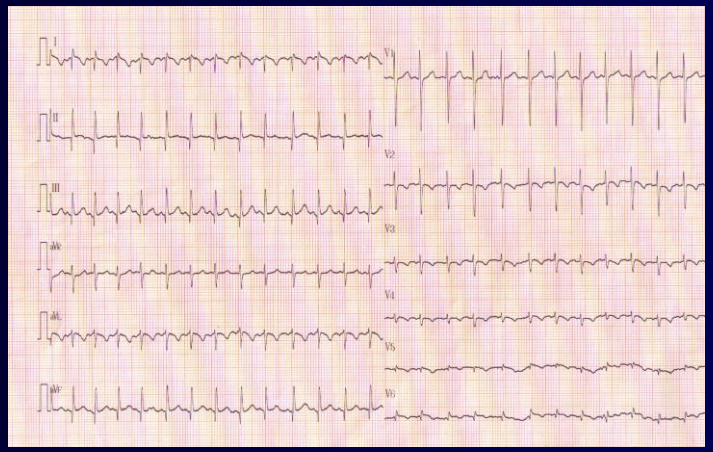


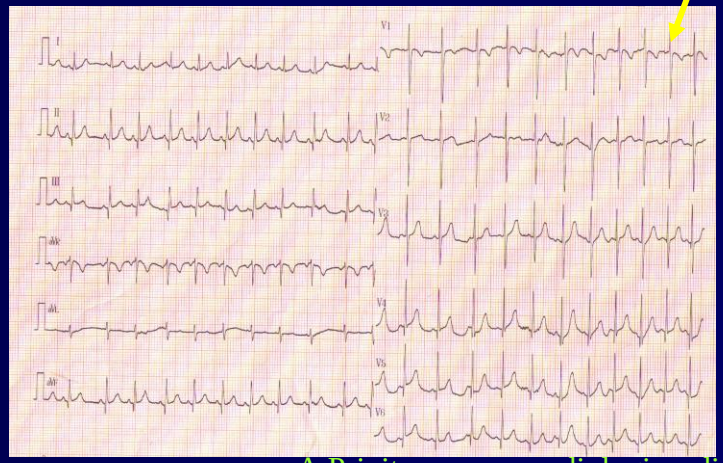


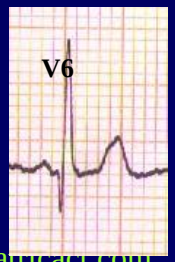
Elettrodi invertiti

Complessi rSr' in I e V6

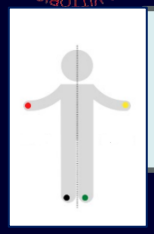








Situs Solitus cuore in destrocardia

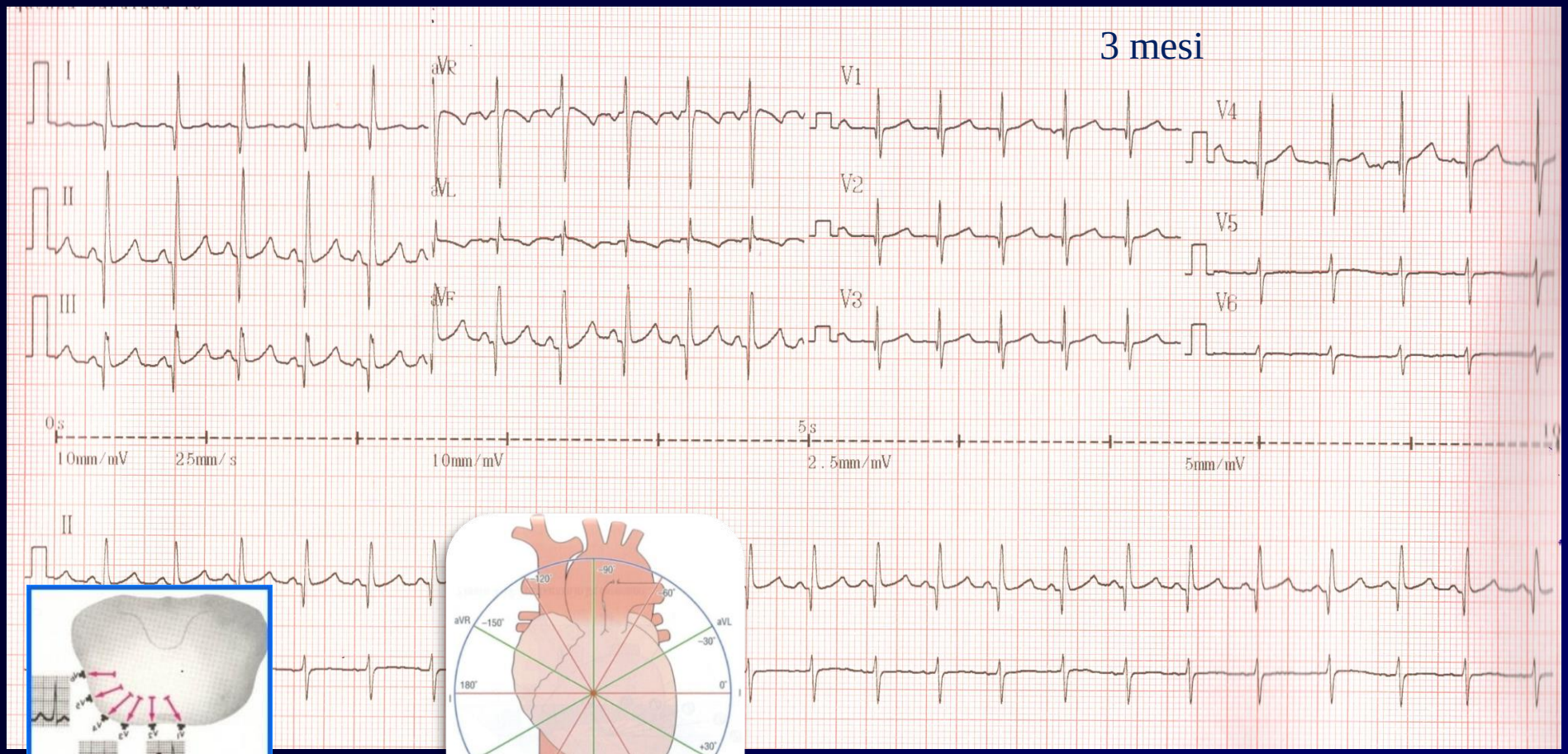


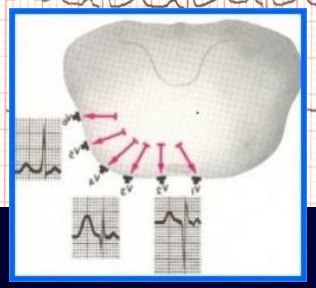
–Elettrodi periferiche normali

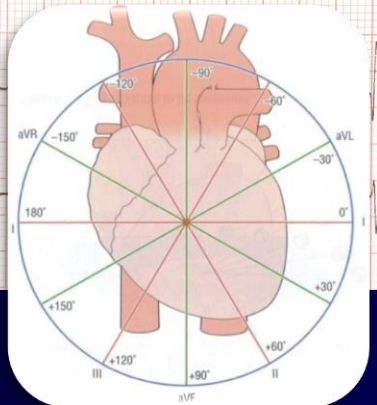
–Elettrodi precordiali emitorace destro

–V1-V2 legge il ventricolo sinistro

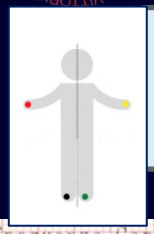
–V5-V6 legge il ventricolo destro







Situs Solitus cuore in destrocardia

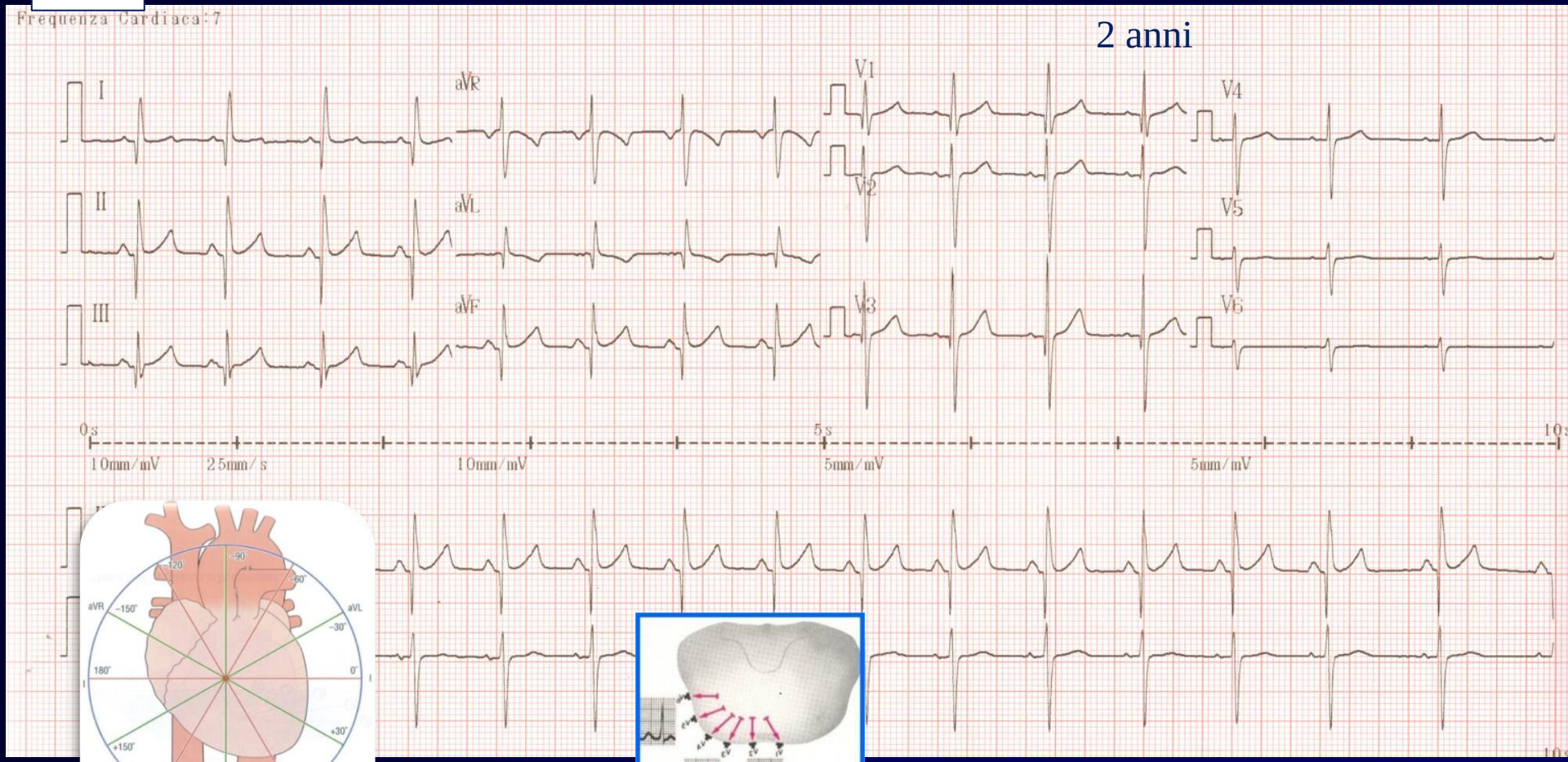


–Elettrodi periferiche normali

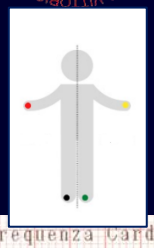
–Elettrodi precordiali emitorace destro

–V1-V2 legge il ventricolo sinistro

–V5-V6 legge il ventricolo destro

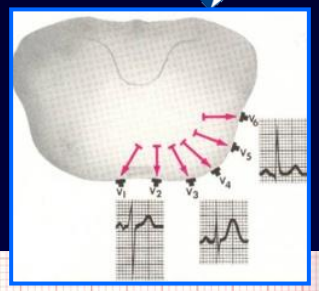


Situs Solitus cuore in destrocardia

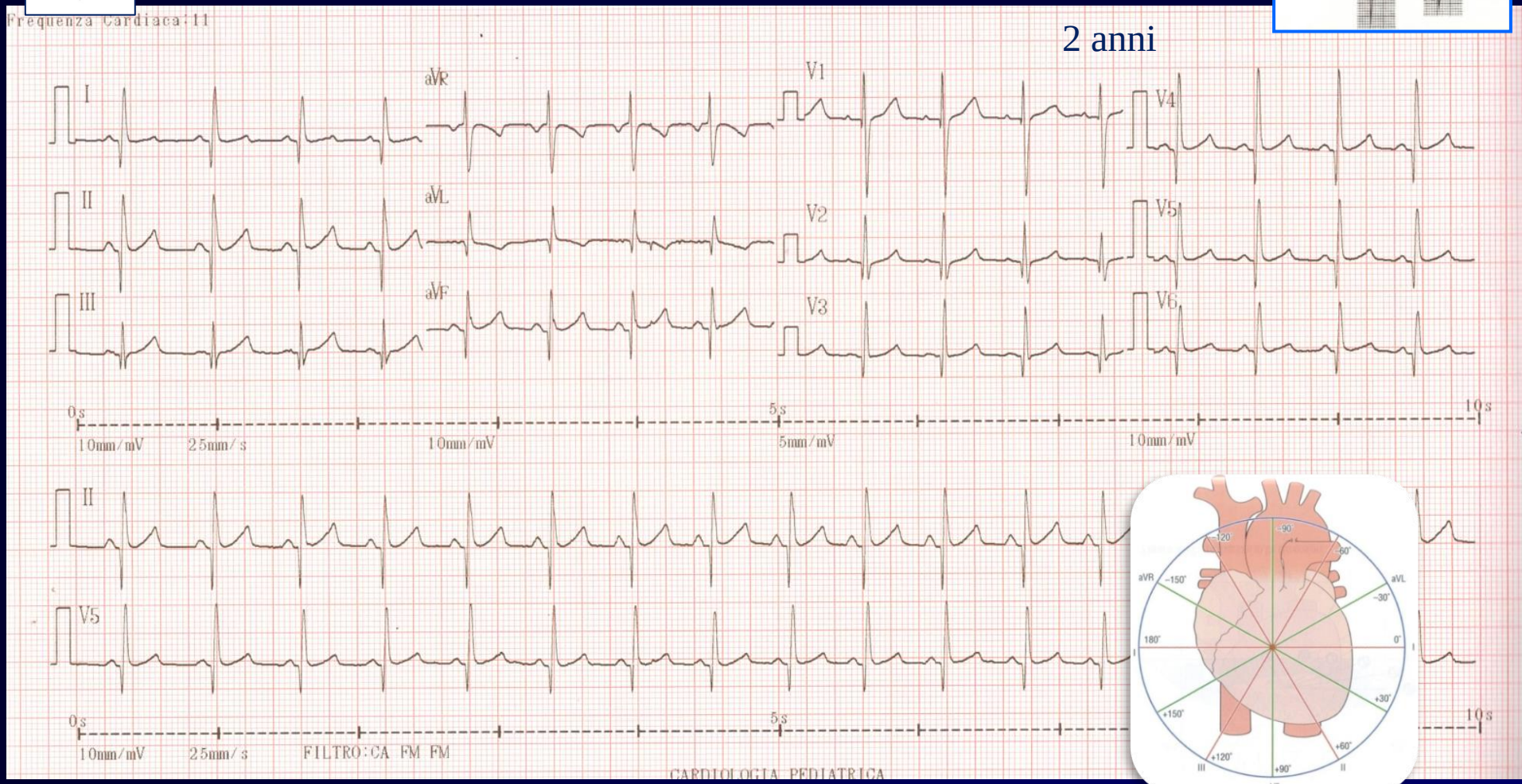


–Elettrodi periferiche e precordiali normali

V1-V6 legge il ventricolo sinistro



2 anni



Conclusioni

- La normalità è ritrovare un modello ECG adeguato all'età del paziente a cui è stato registrato
- Il riscontro di un modello ECG non congruo con l'età del paziente deve far considerare quell'ECG come patologico
  - per esempio un modello neonatale che persiste oltre il primo mese di vita
- Utile eseguire l'ECG tra la terza e quarta settimana di vita, in neonati considerati a rischio:
  - se presenti apnea, bradicardie, storia familiare di morte improvvisa o SIDS o familiarità per sindromi del QT lungo
- In caso di sospetto di aritmia o di cardiopatia

Elettrocardiogramma in età pediatrica

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Presidio San Marco

www.cardiologiapediatricact.com

Padova 22/02/2025

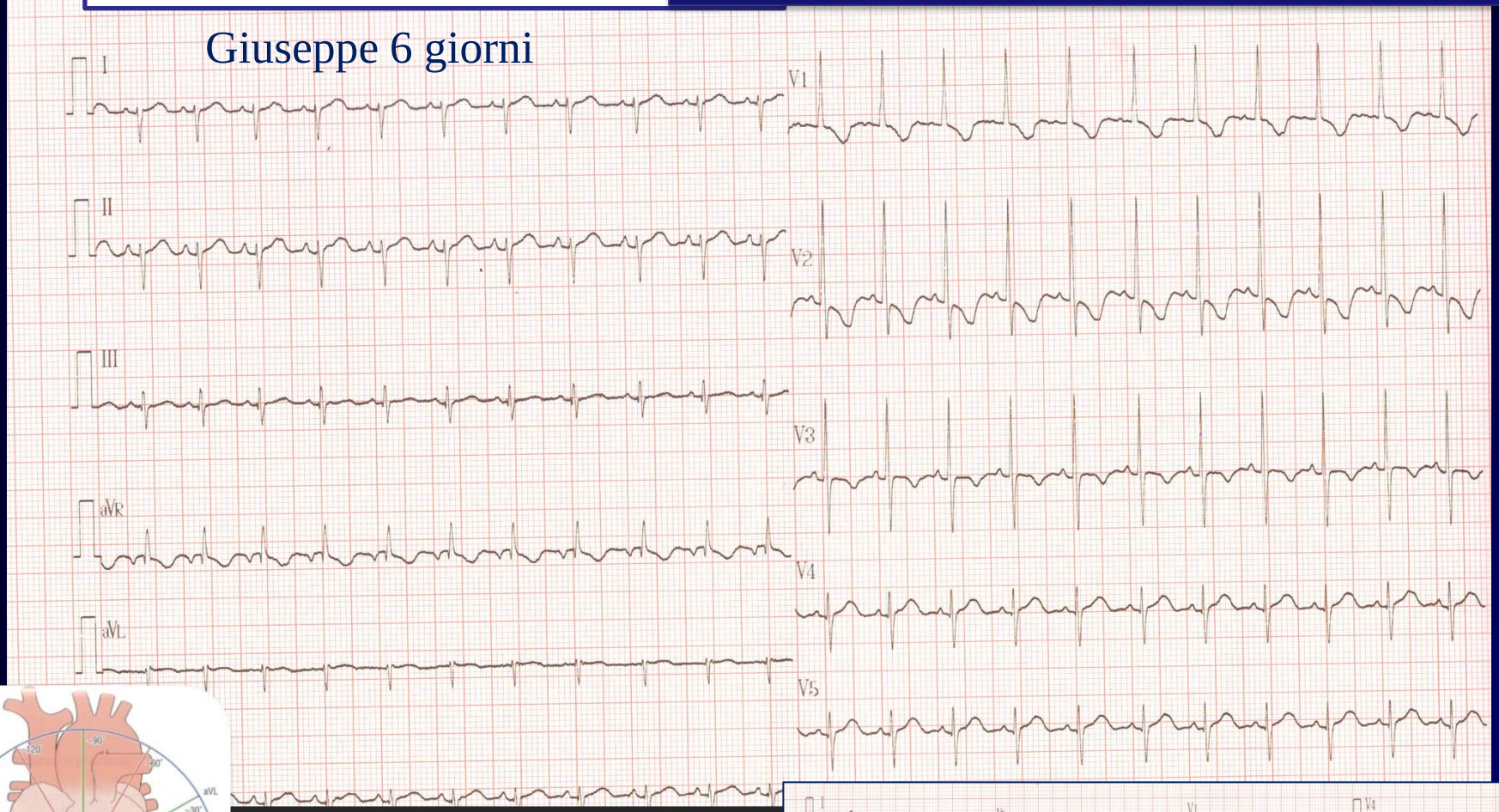
Asse QRS Valori normali per età

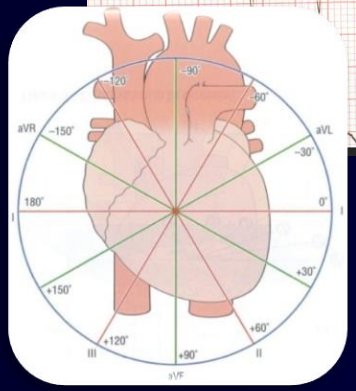
- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

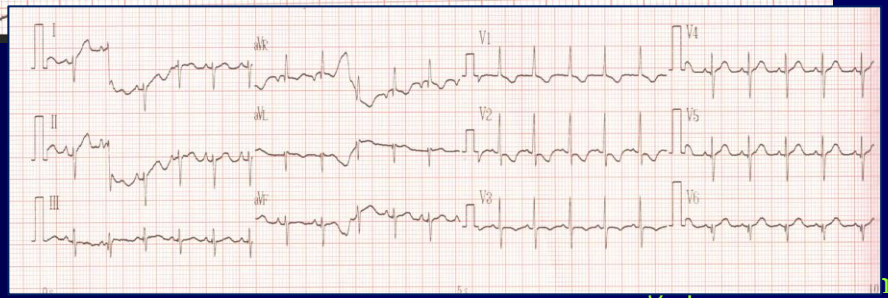
Complesso QRS

V1	**R/S>1,**	R<25 mm S<20 mm
	R	R<13/10mm (I sett./dopo)
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;

Giuseppe 6 giorni







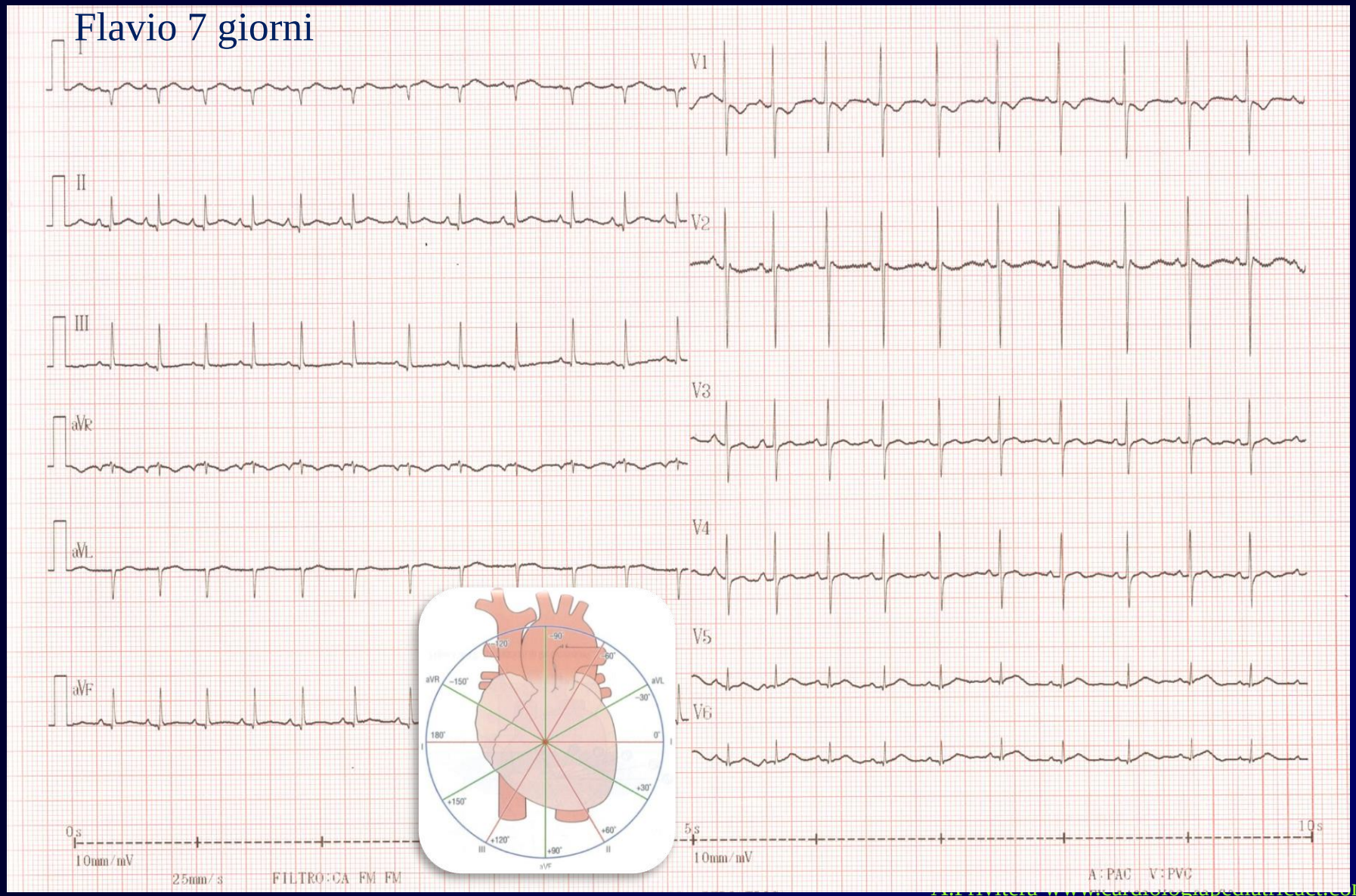
Asse QRS Valori normali per età

- I^ sett. +110 (+30 a +180/210)
- 7-30 gg + 120 (+30 a +190)
- 1-12 mesi + 070 (+10 a +120)
- > 1 anni + 060 (+10 a +100)

Complesso QRS

V1	**R/S>1,**	R<25 mm S<20 mm
	R	R<13/10mm (I sett./dopo)
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;

Flavio 7 giorni



www.cardiologiapediatrica.com

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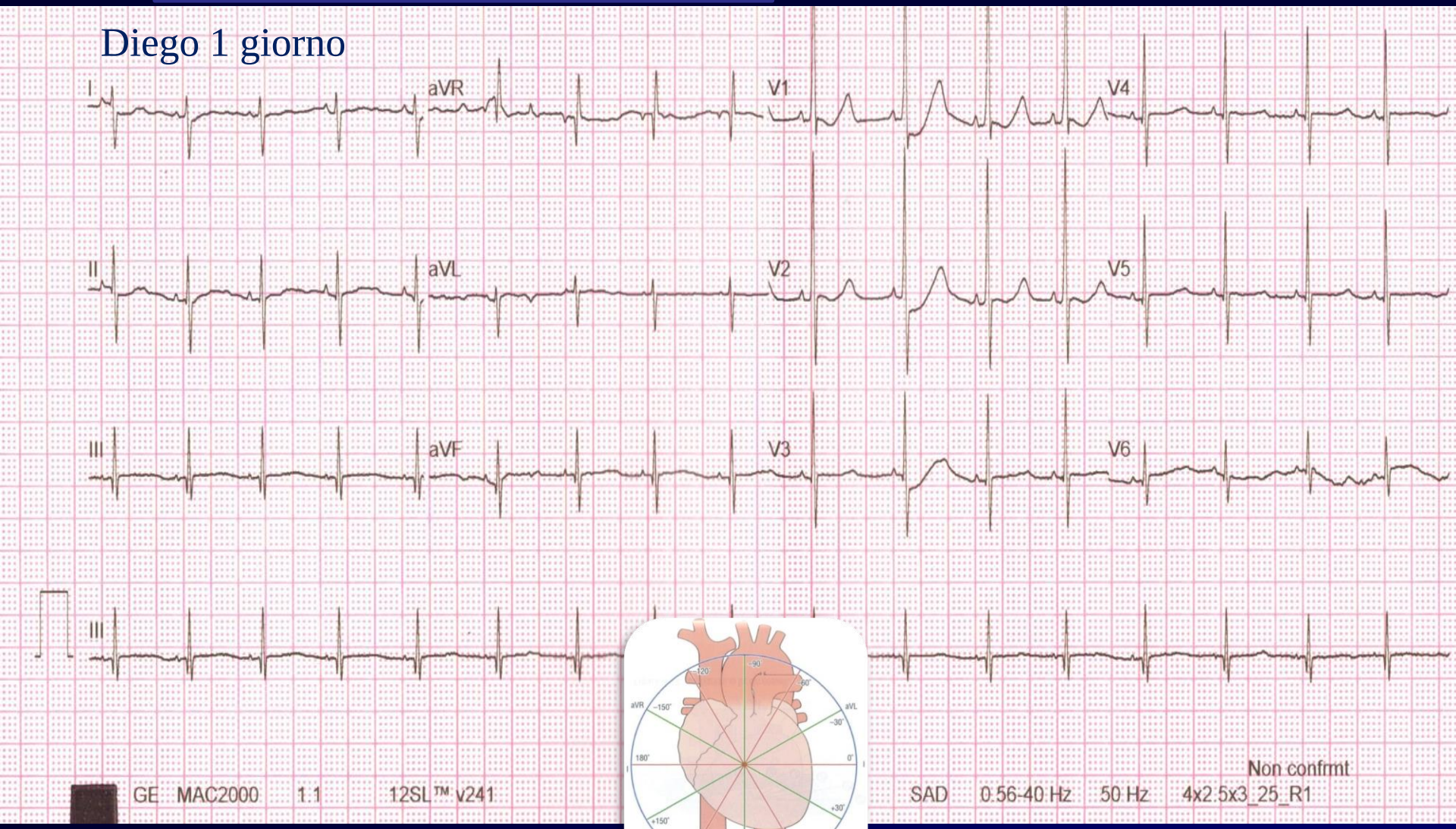
Complesso QRS

V1	**R/S>1,**	R<25 mm S<20 mm
	R	R<13/10mm (I sett./dopo)
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;

Diego 1 giorno



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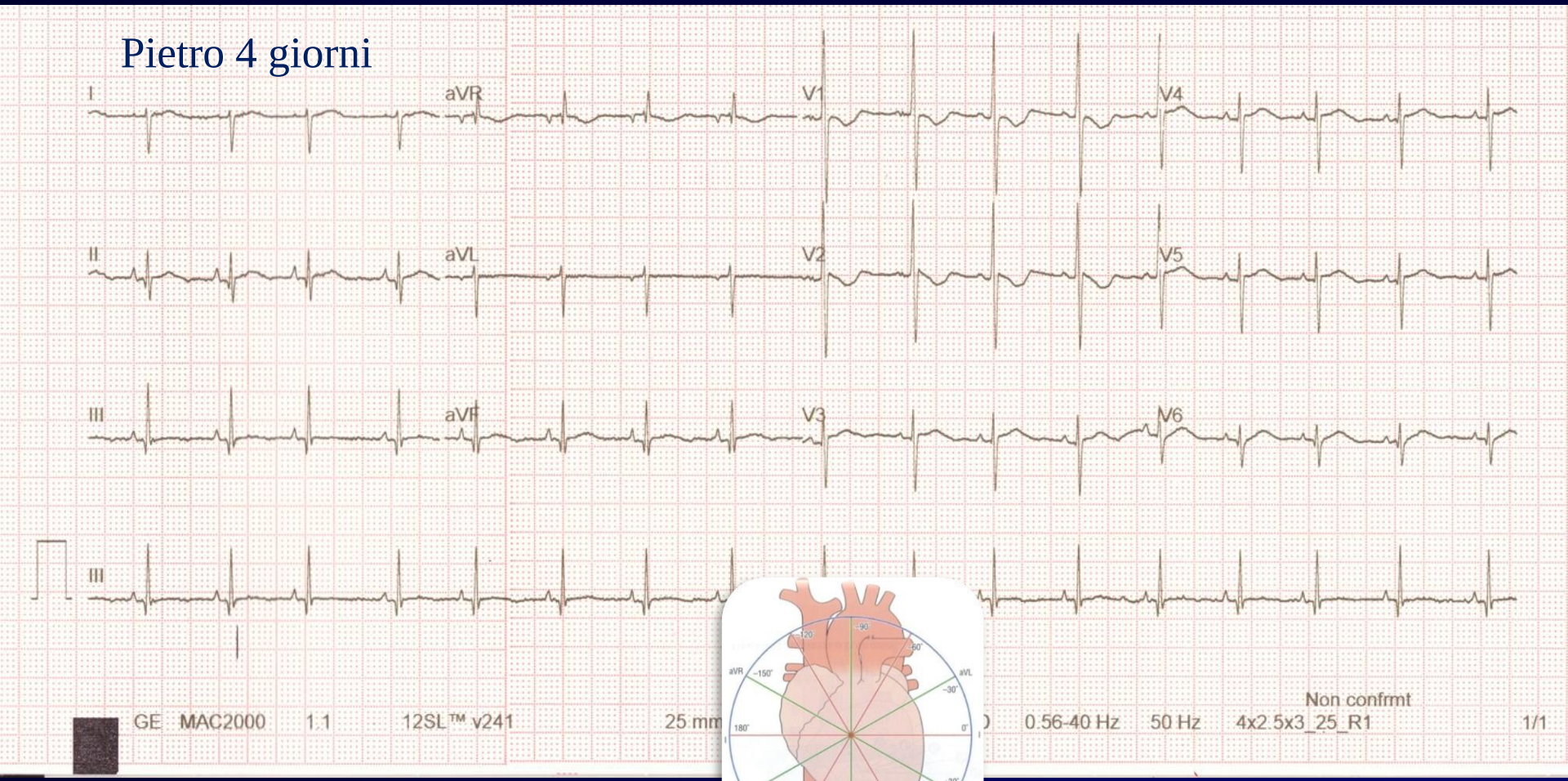
	R	R<13/10mm (I sett./dopo)
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;

Pietro 4 giorni



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	R	R<13/10mm (I sett./dopo)
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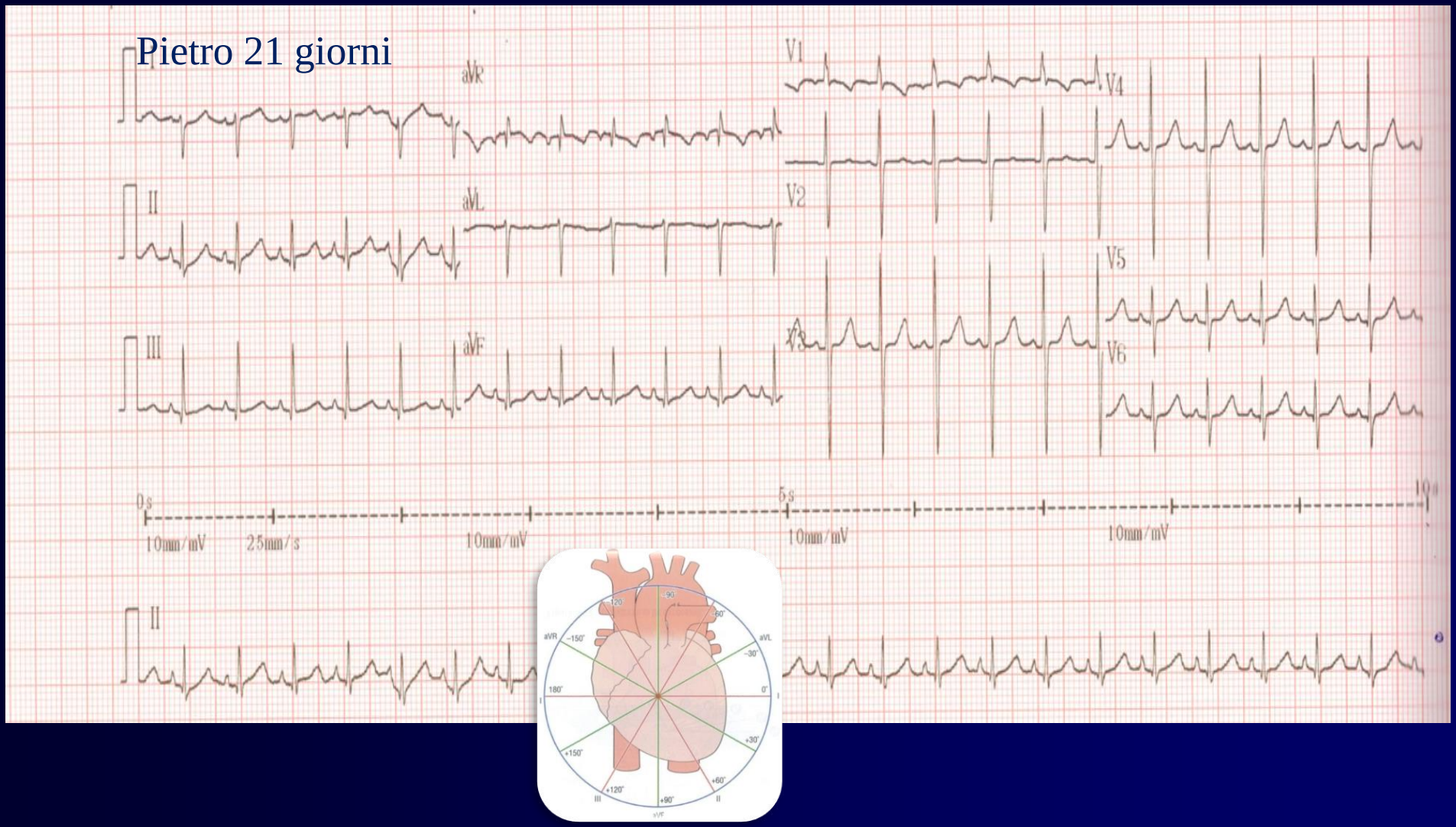

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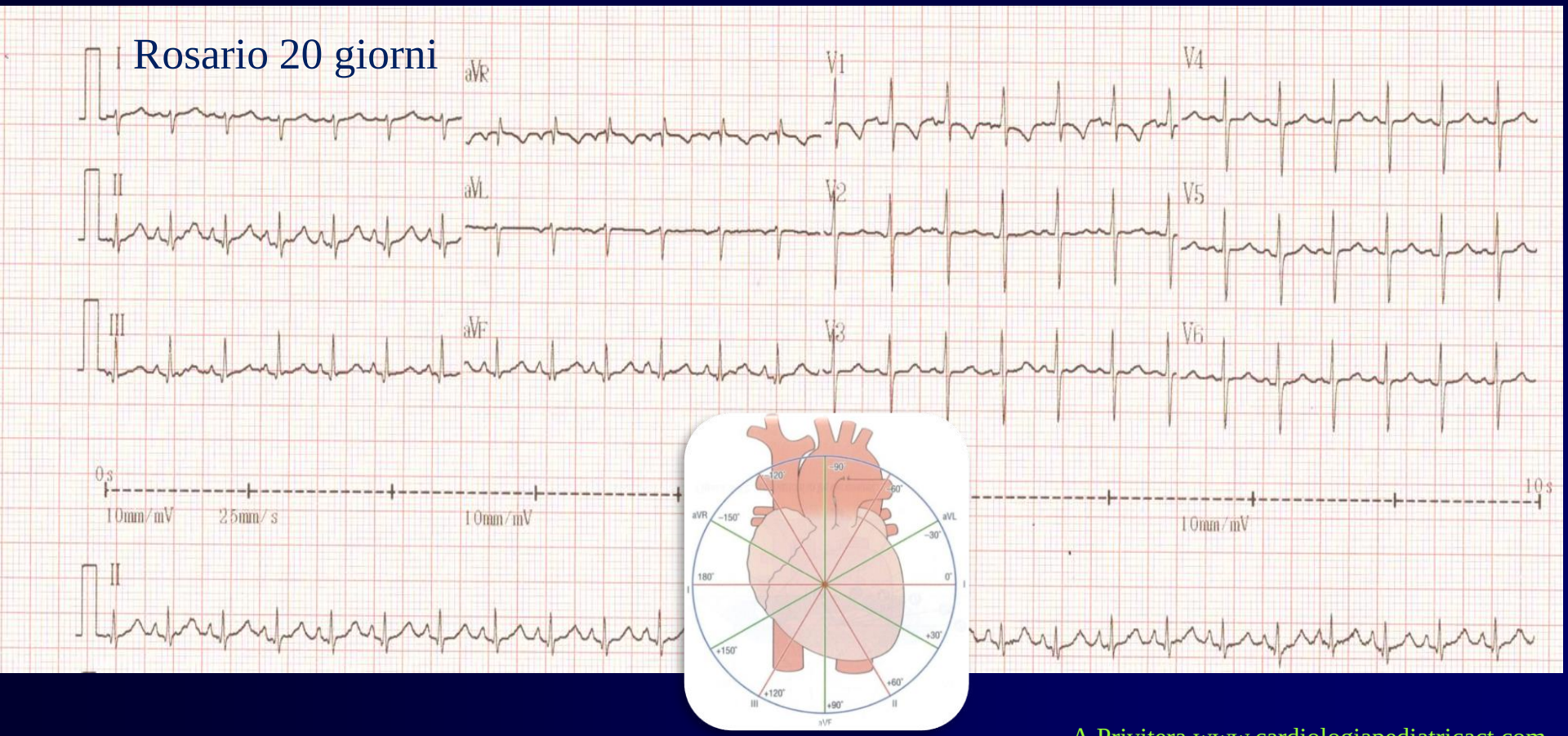

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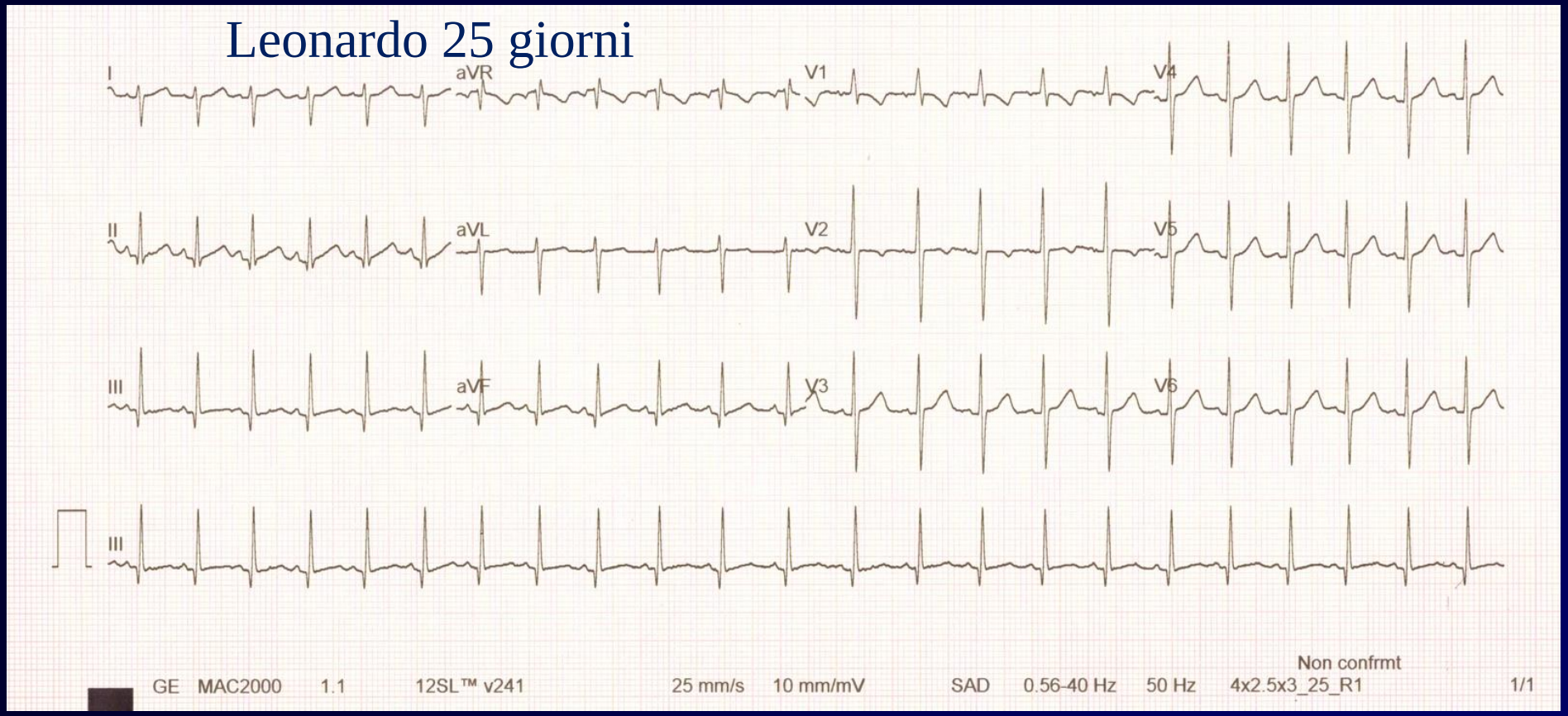
	R	R<13/10mm (I sett./dopo)
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;

Leonardo 25 giorni



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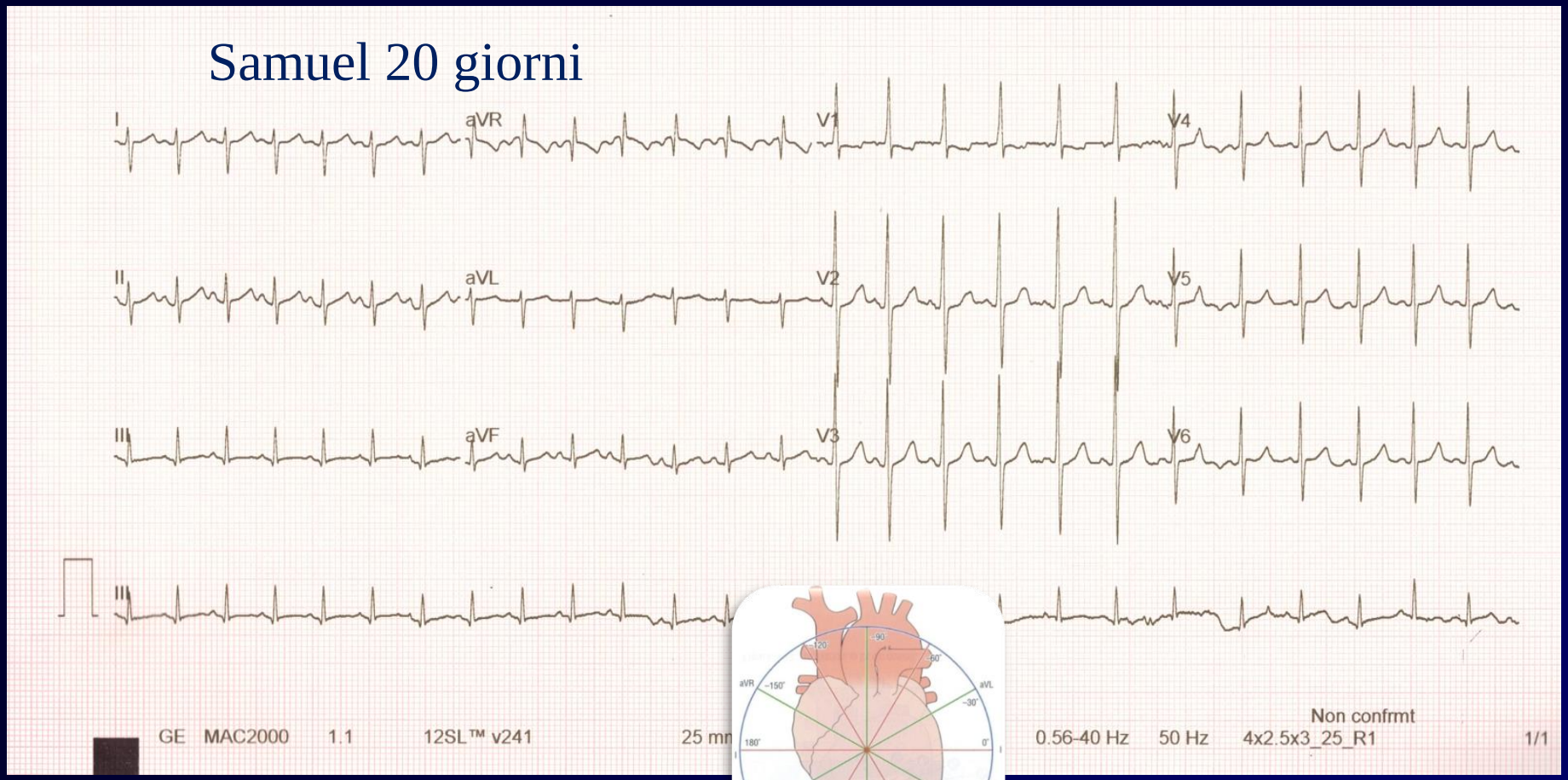
V6:	**R/S≤1**	o R/S> 1 S profonda < 10 mm;



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- 7-30 gg + 120 (+30 a +190)
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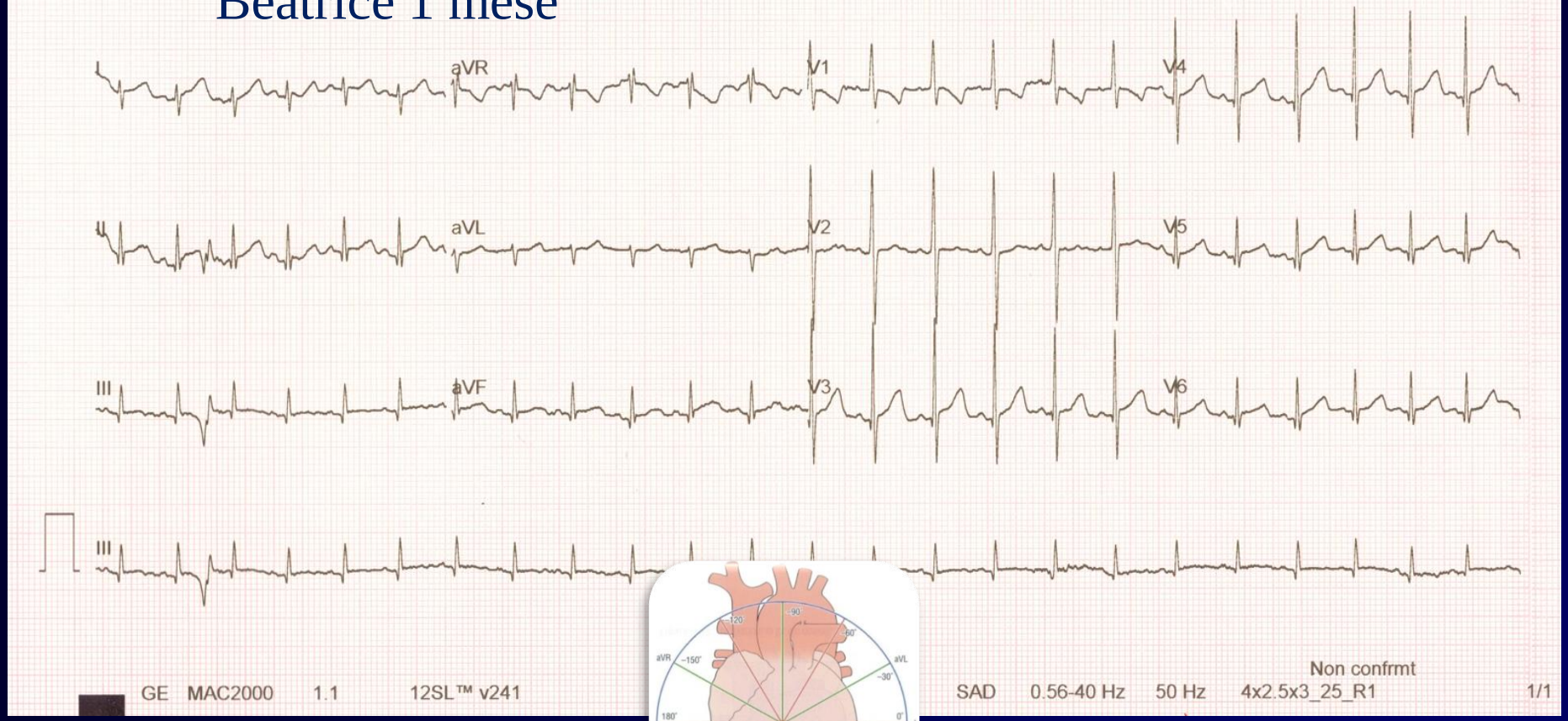
Complesso QRS

V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

Beatrice 1 mese



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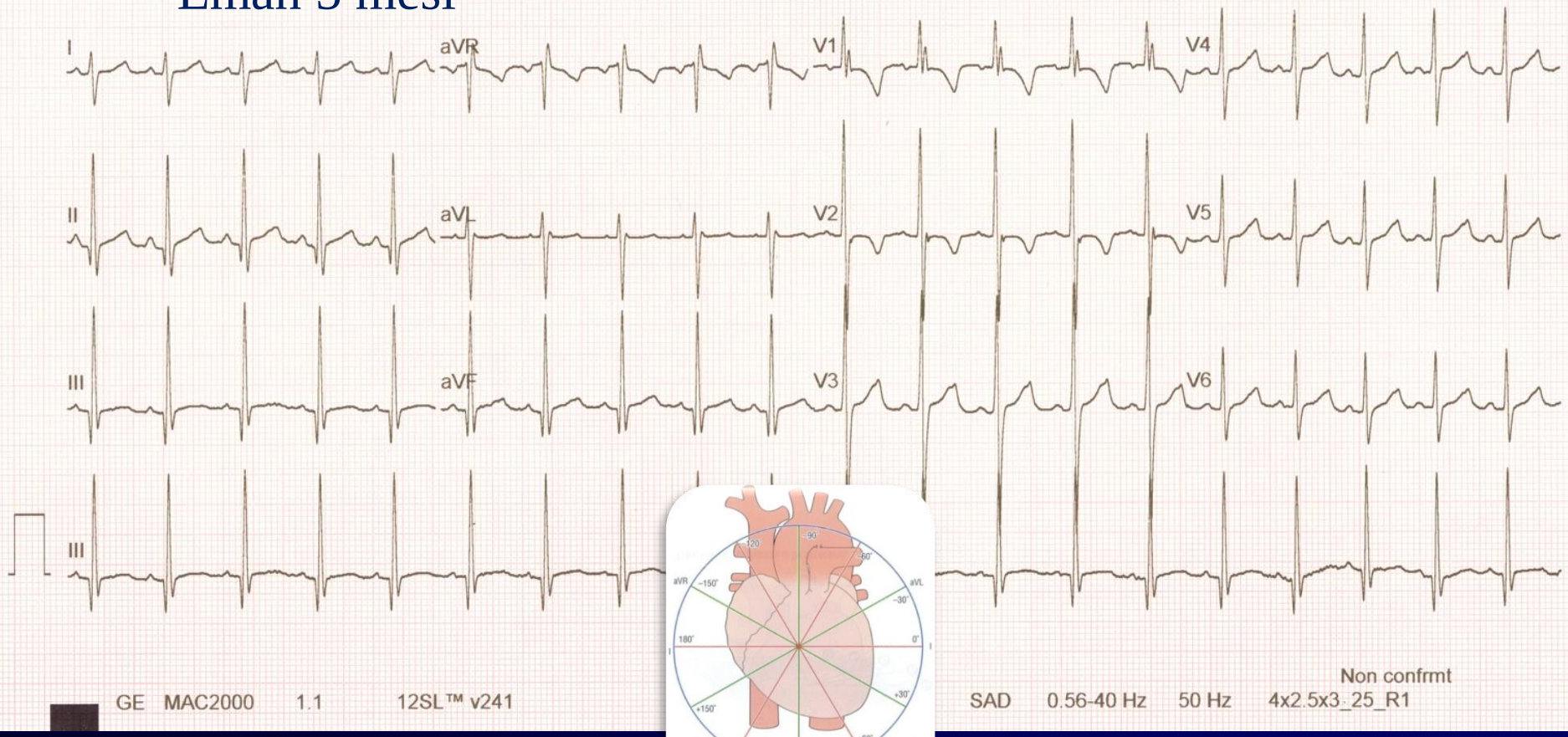
V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

Eman 5 mesi



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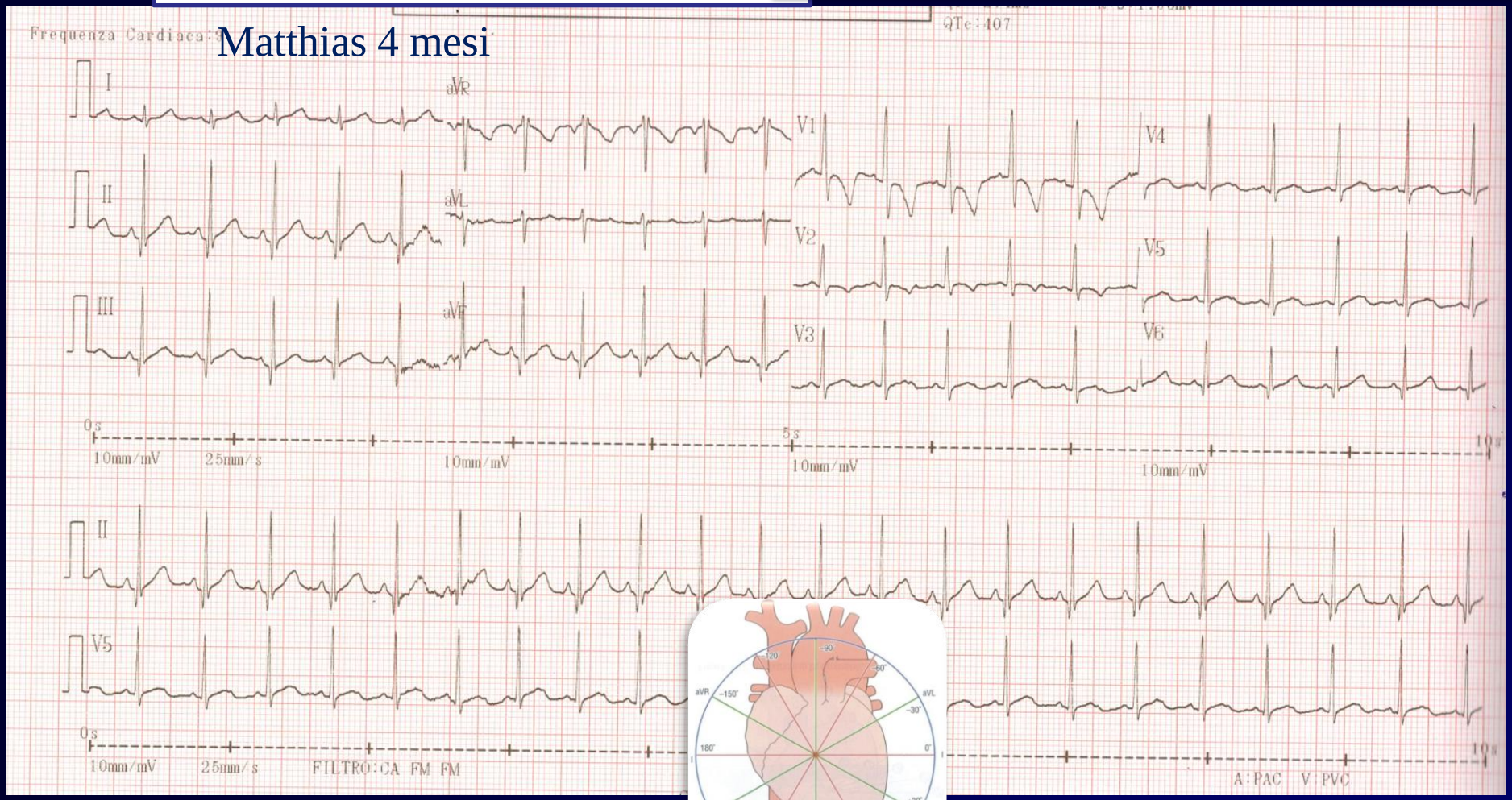
Complesso QRS

V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

Matthias 4 mesi



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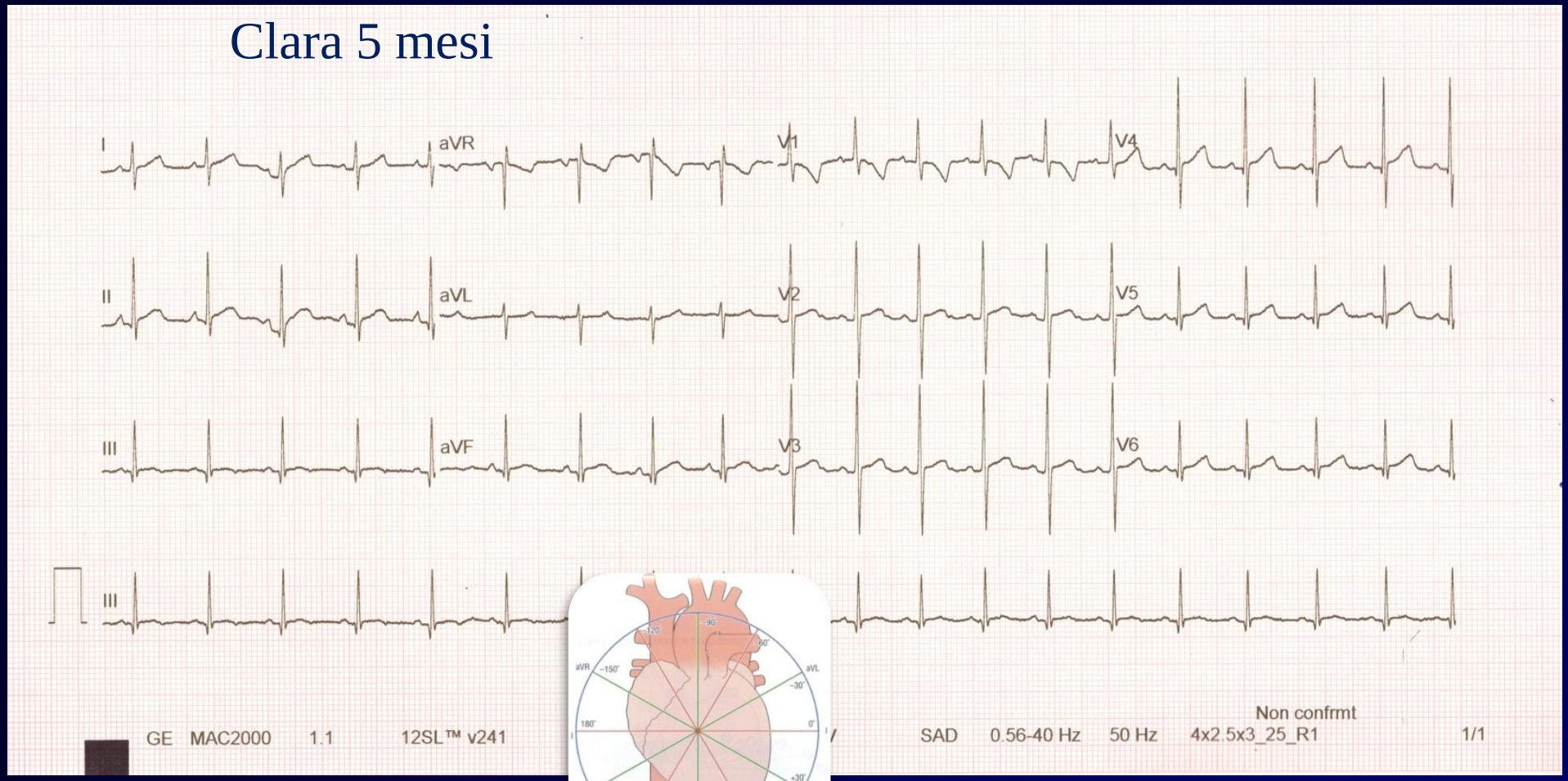
Complesso QRS

V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

Clara 5 mesi



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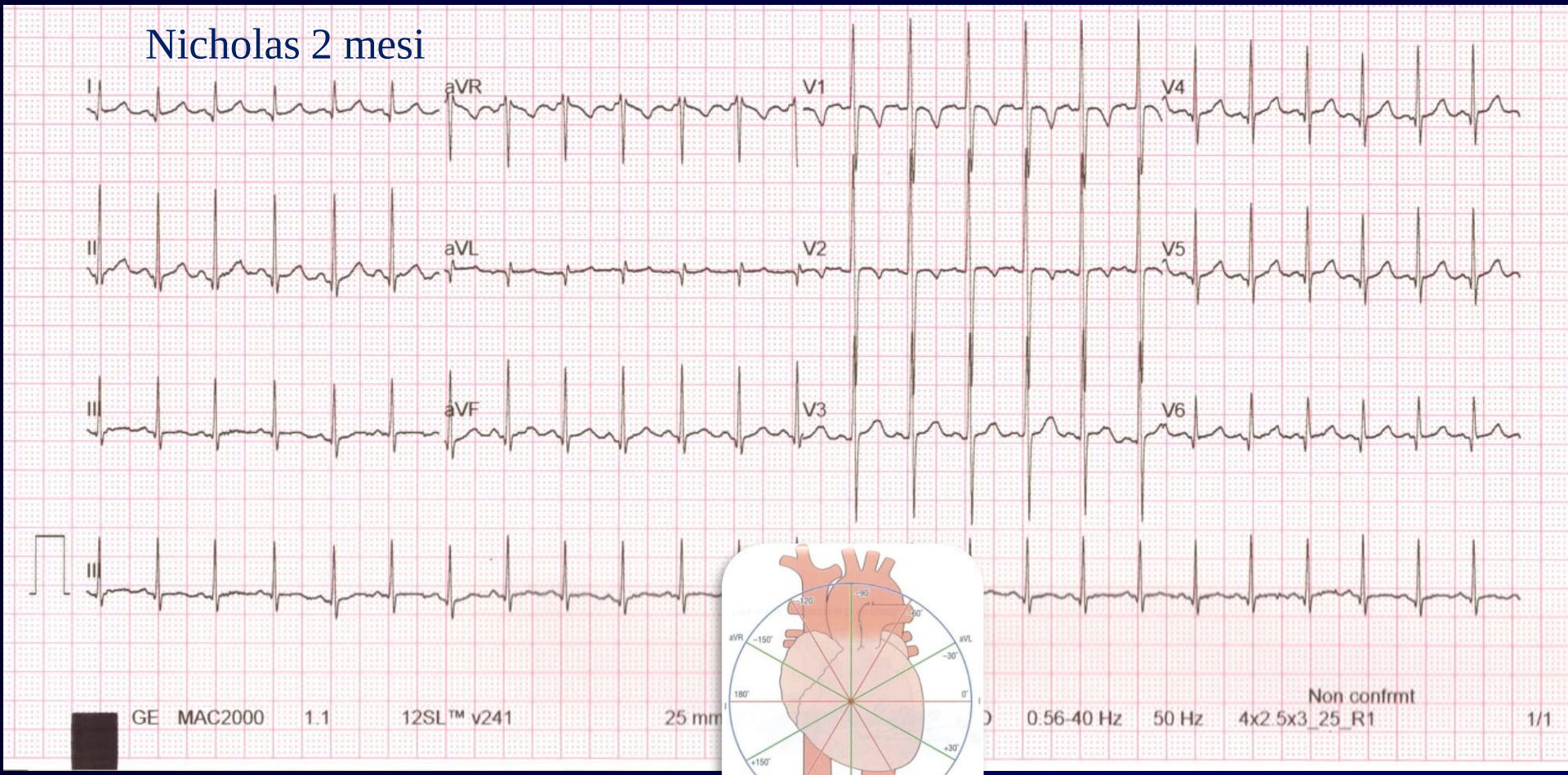
Complesso QRS

V1:	**R/S≥1**	R<20 mm
	R	R<10 mm (mai dopo il 1 anno)
V6:	**R/S>1**	R<25 mm S<10 mm
II-III-aVF-V6		q max 10 mm

Nicholas 2 mesi



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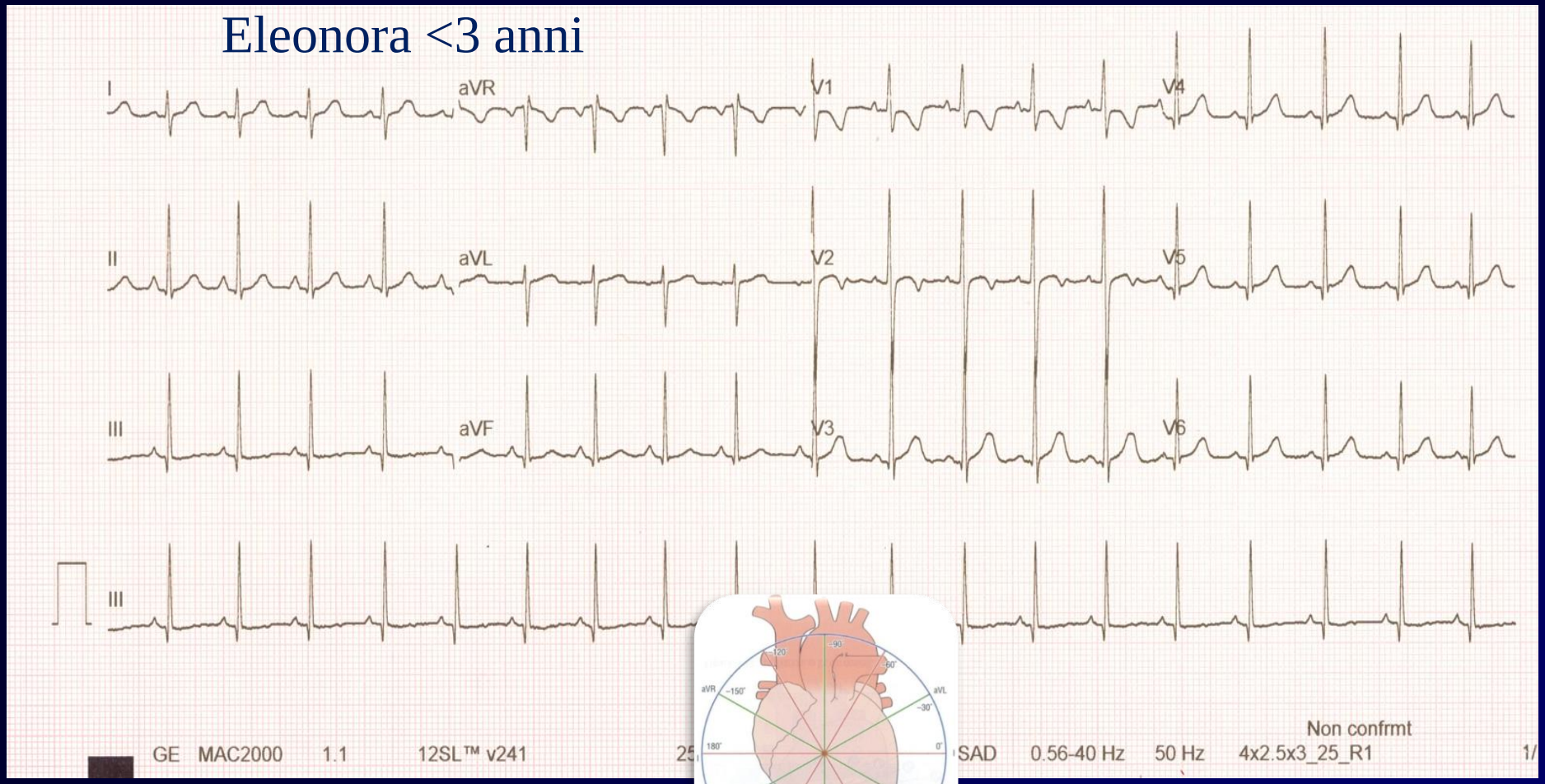
- > 1 anni + 060 (+10 a +100)

Complesso QRS

V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

Eleonora <3 anni



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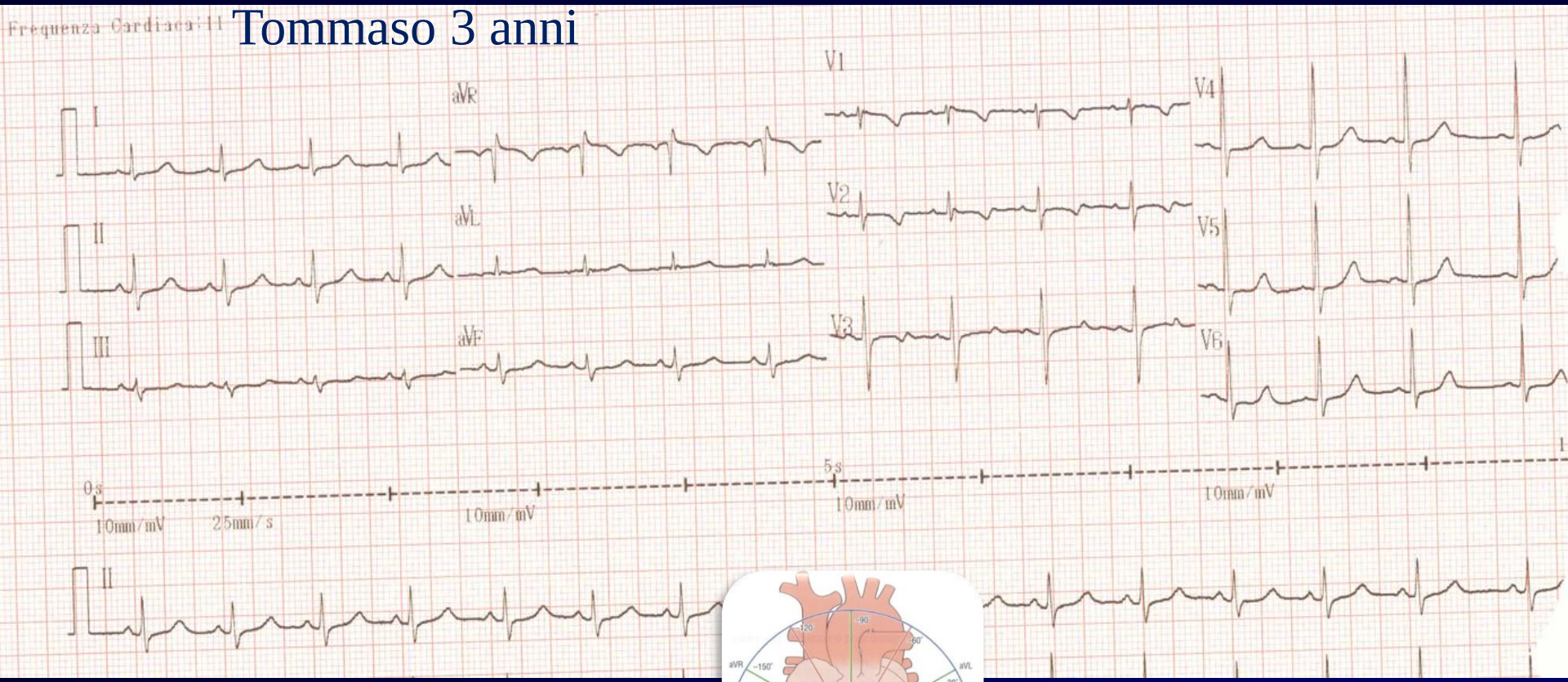
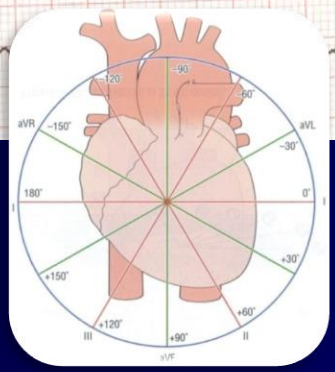
Complesso QRS

V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

Tommaso 3 anni





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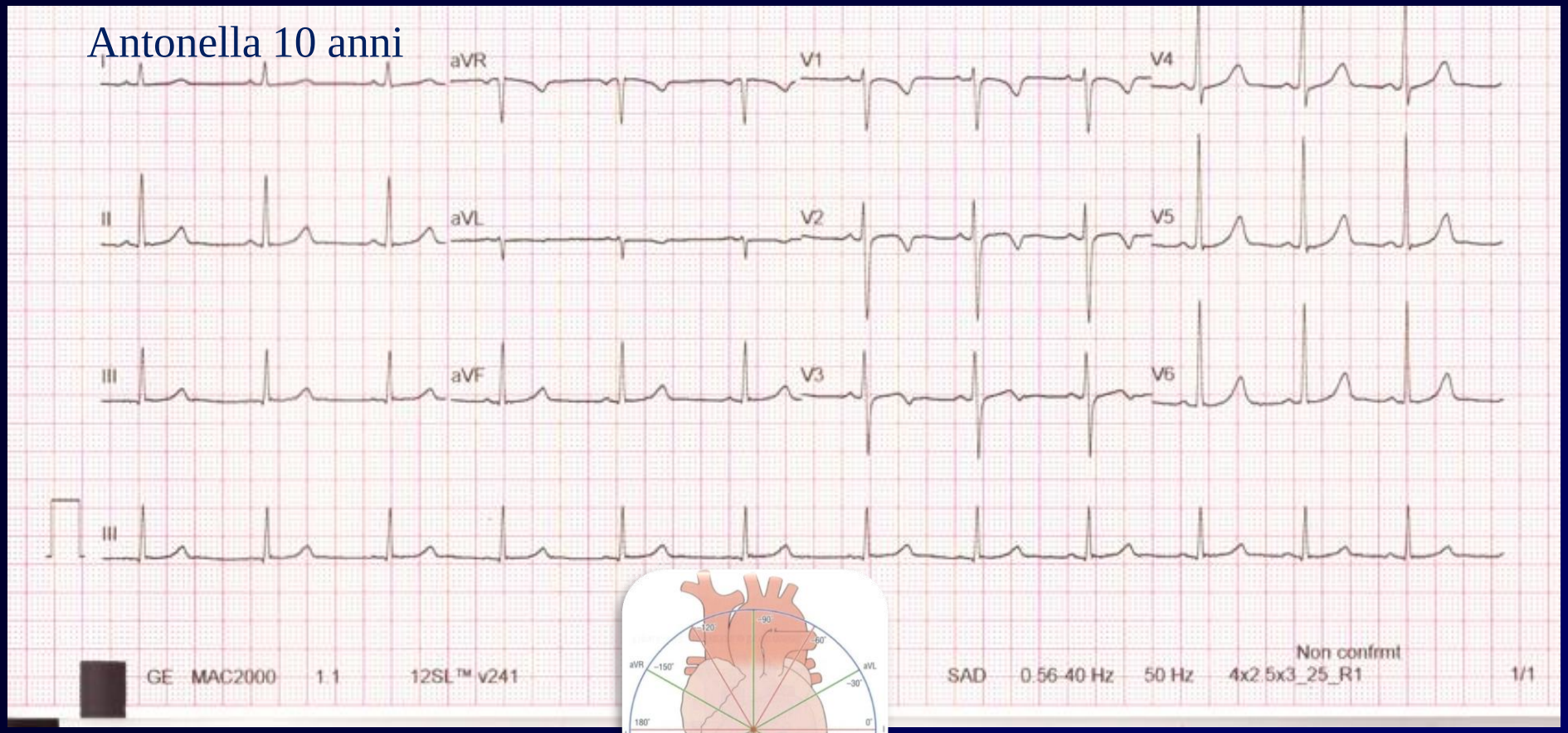
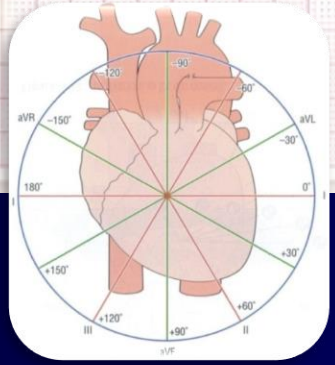
Complesso QRS

V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

Antonella 10 anni





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Complesso QRS

V1:	**R/S <1**	S<25 mm
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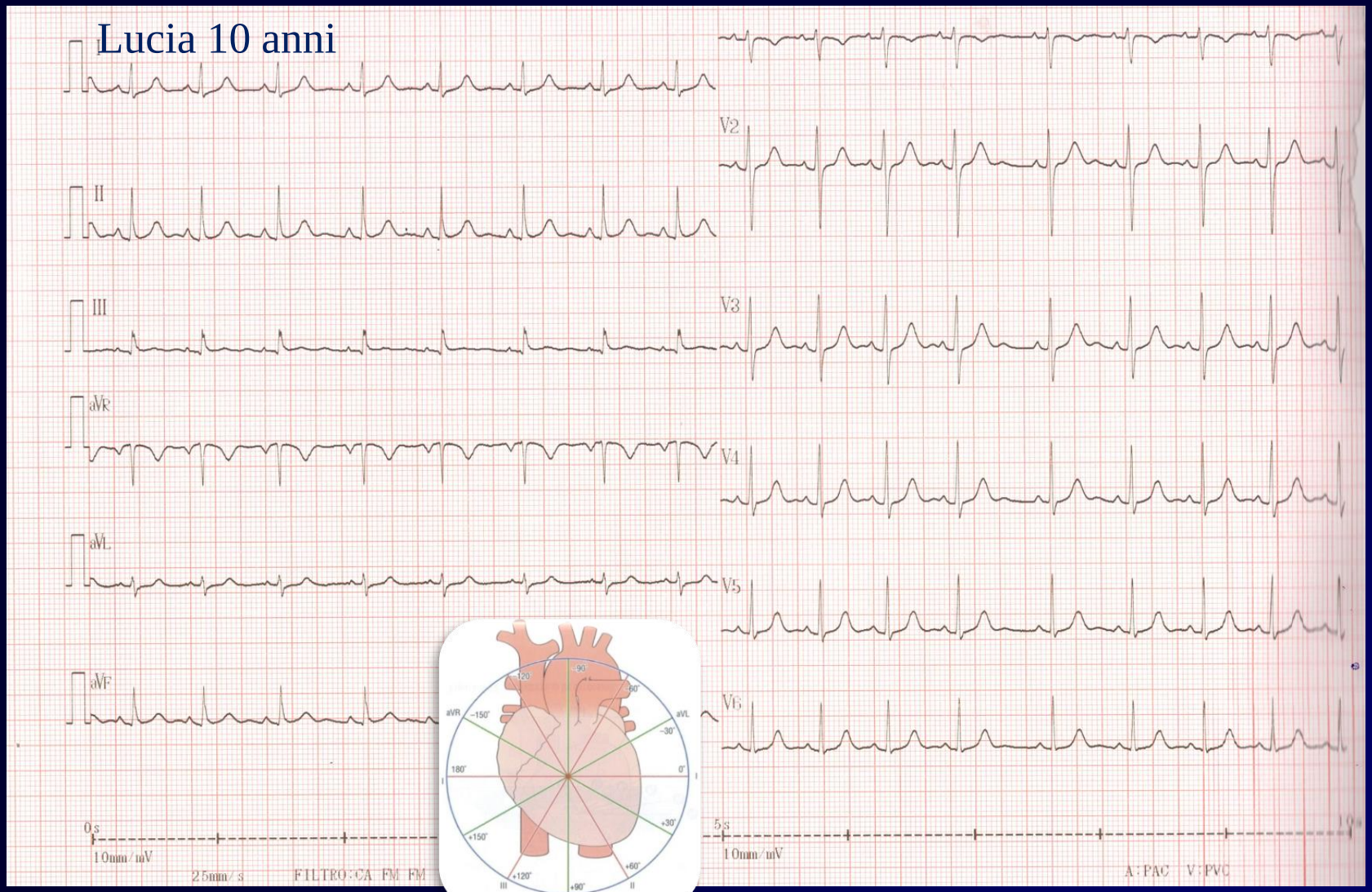

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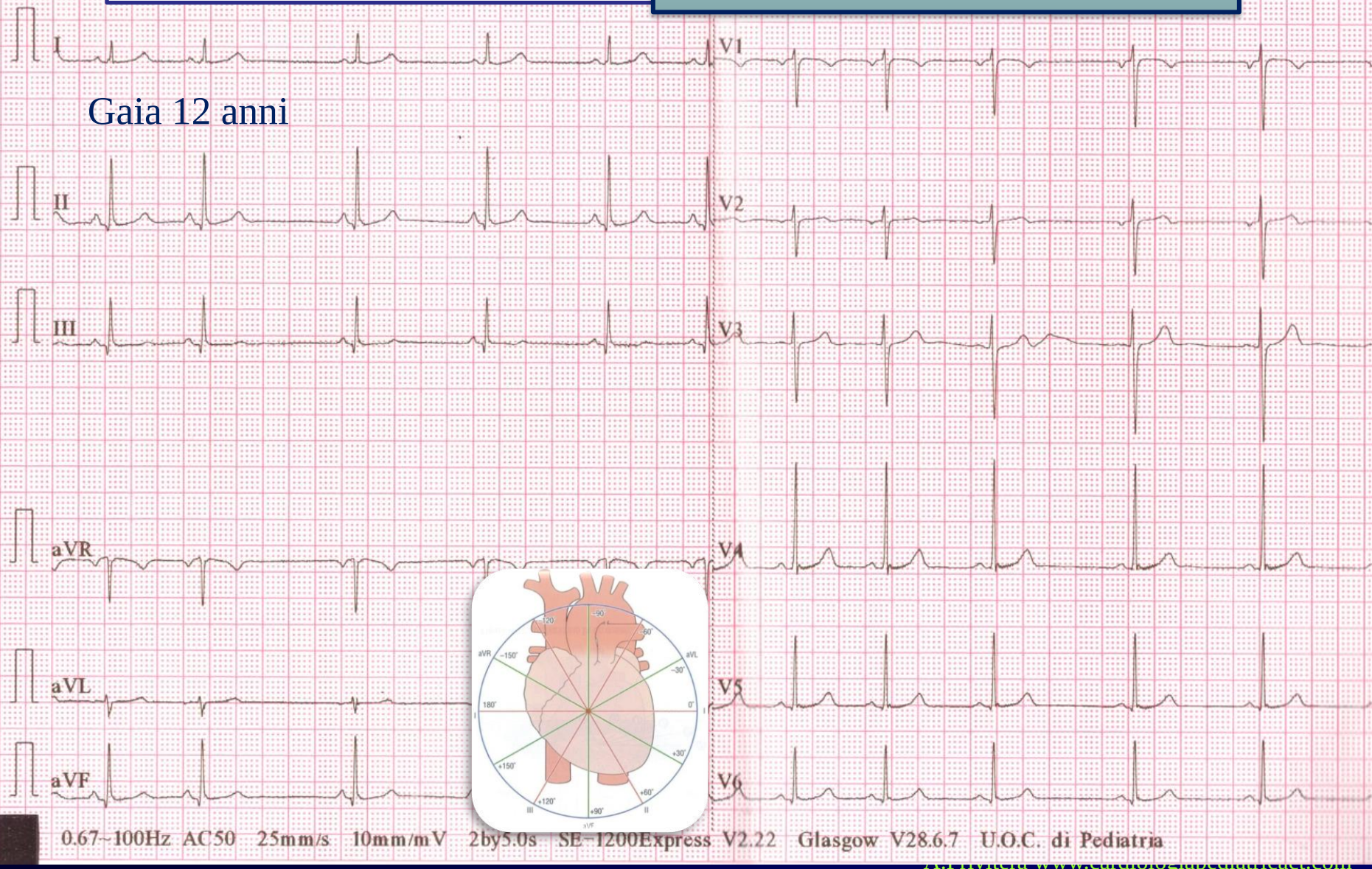
Complesso QRS

V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

Gaia 12 anni



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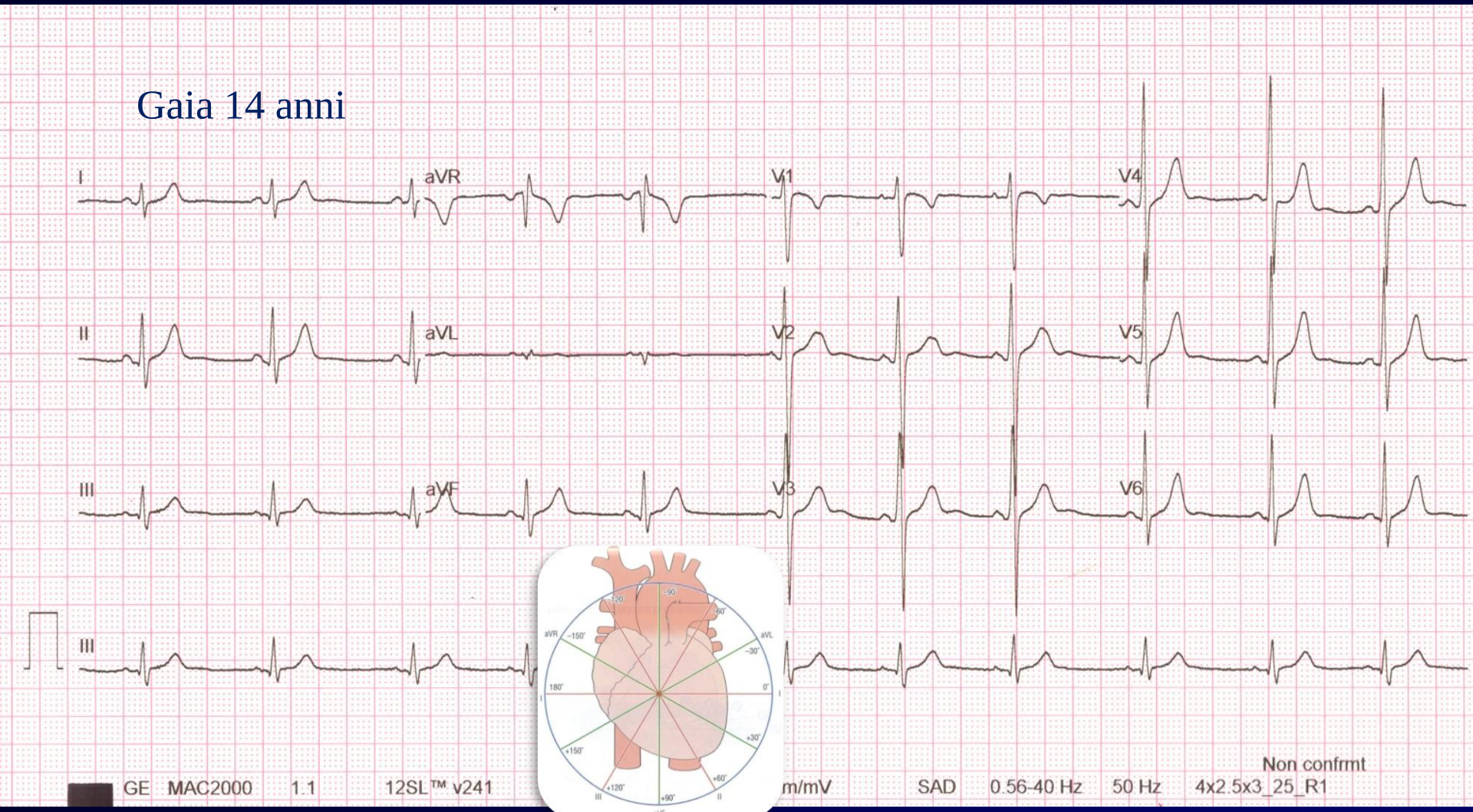
Complesso QRS

V1:	**R/S <1**	S<25 mm
	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

Gaia 14 anni



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	R mai	
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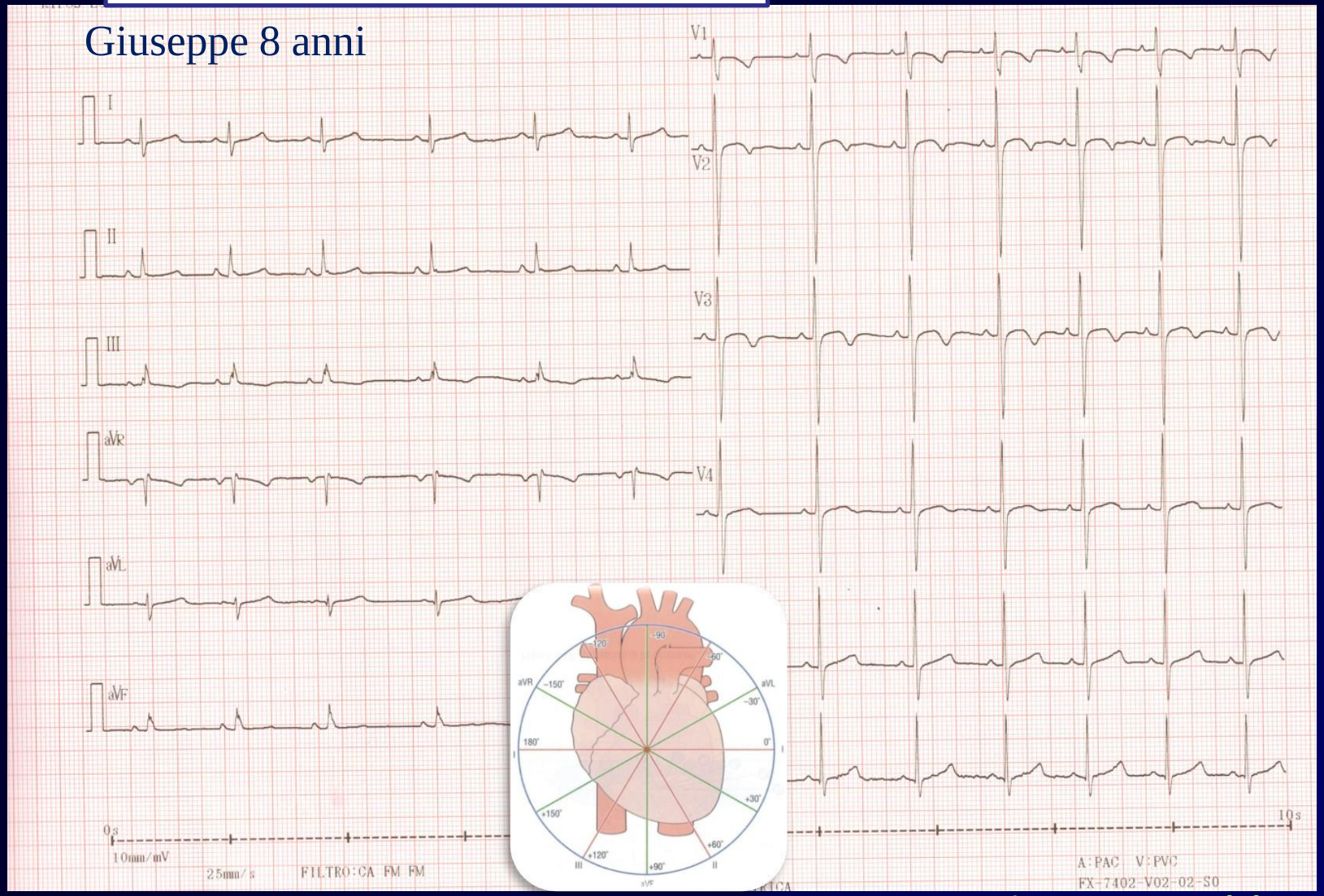
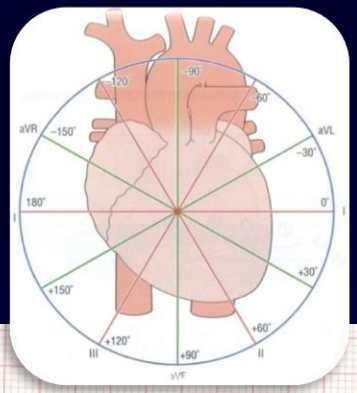
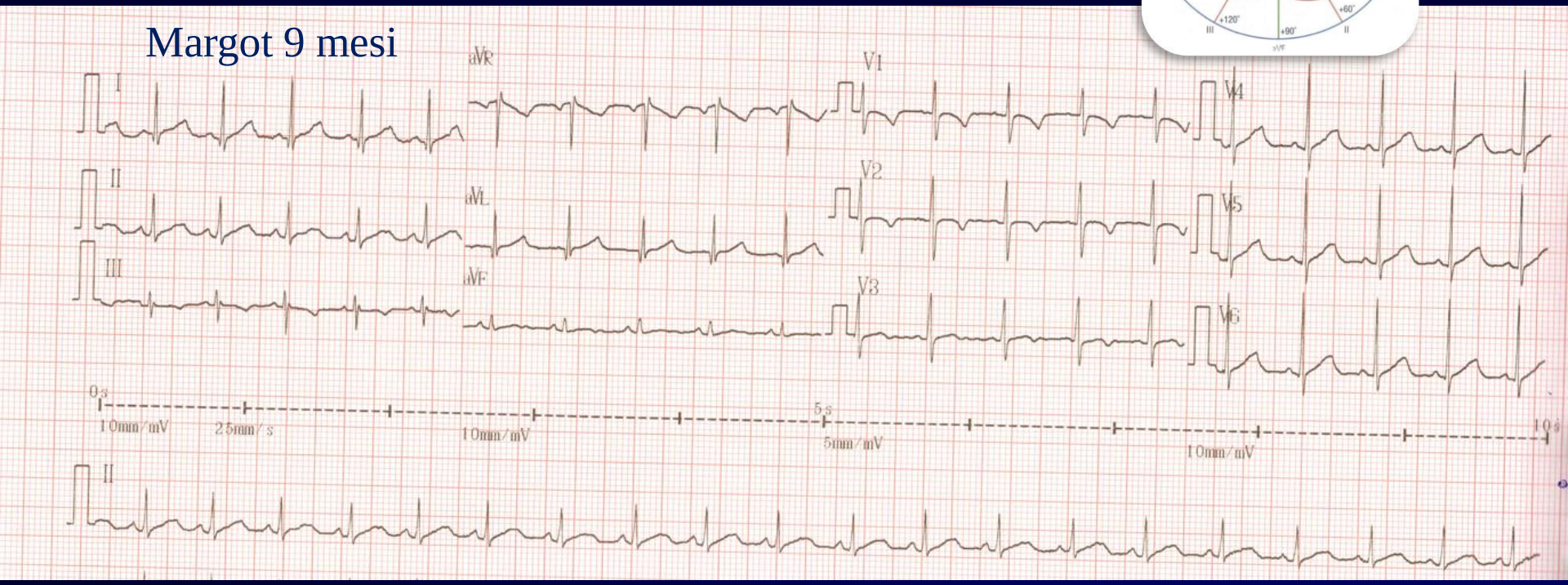
Giuseppe 8 anni



Asse a 30 gradi





Complesso QRS

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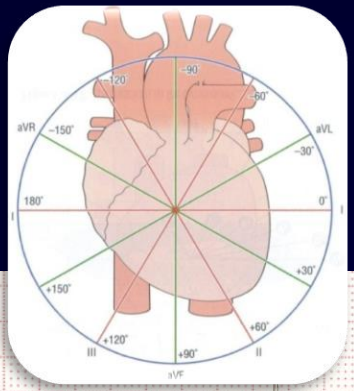
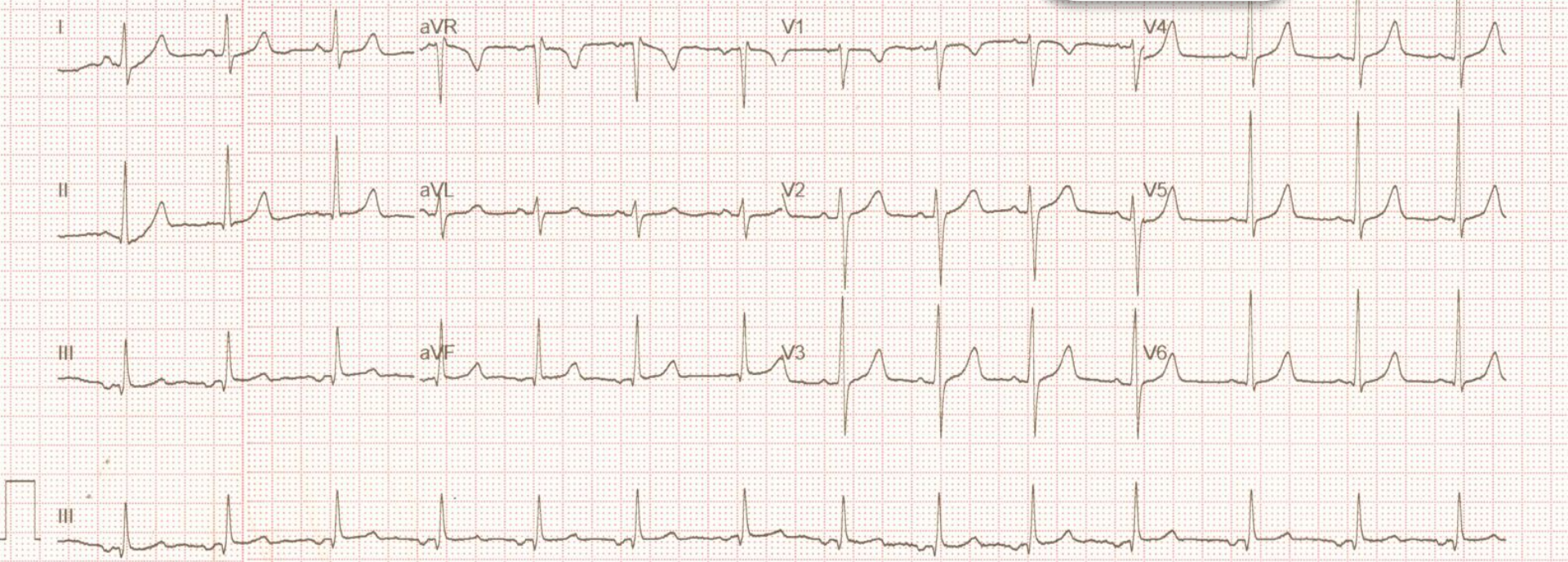
Ritmo seno coronarico



Benedetta 9 anni



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Complesso QRS

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	R mai	
V6:	**R/S>1**	R<25 mm S<5mm

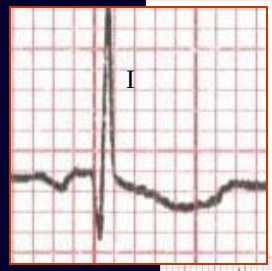
Neonato di 2 giorni

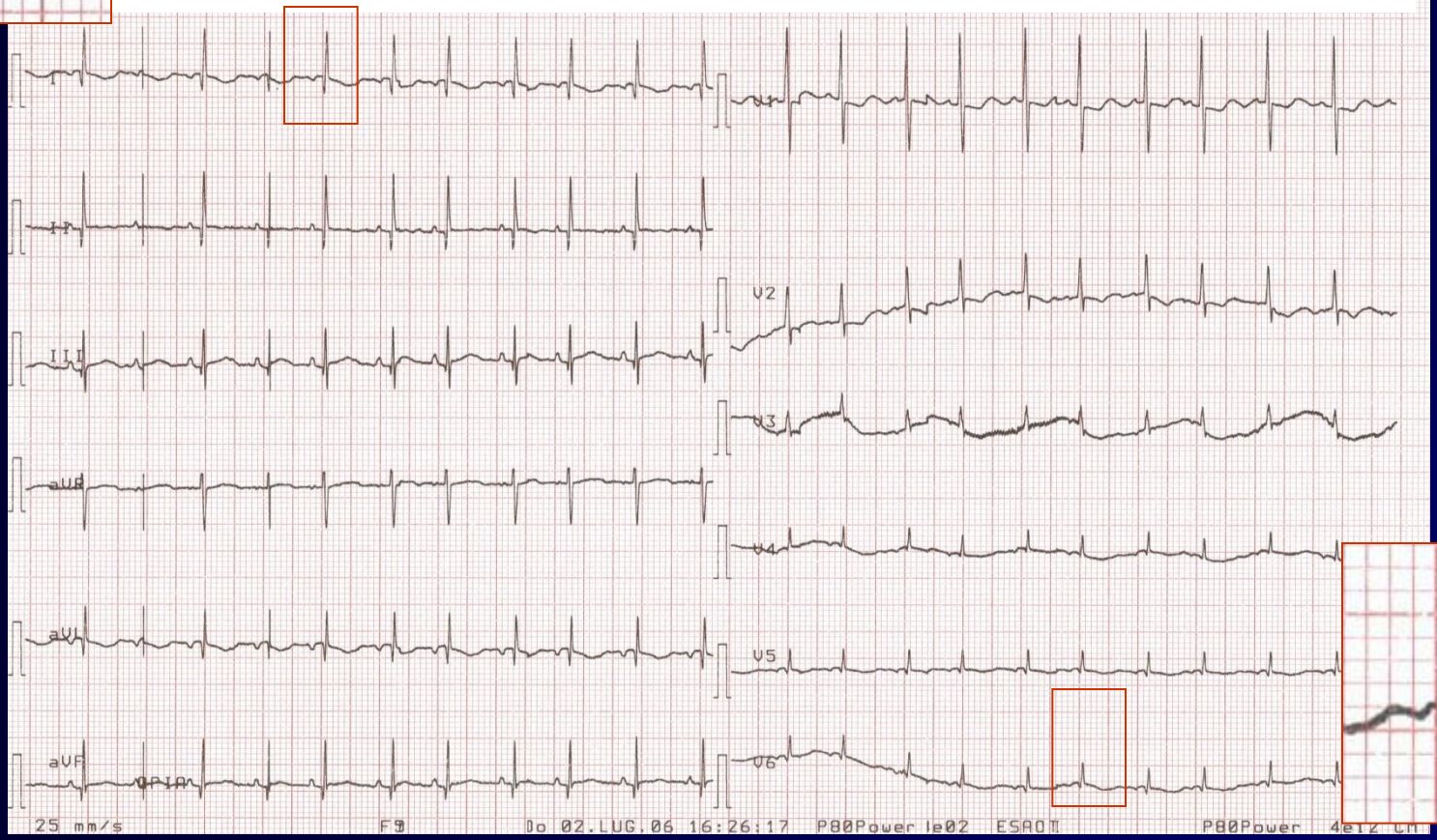
Onda P negativa in I e aVL, V3, V4, V5, V6

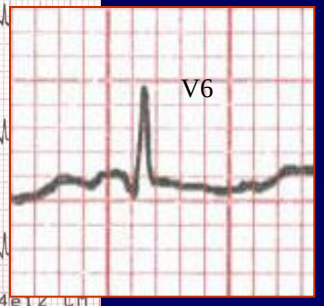
Complessi rR^{I} in I ,aVL V6, mancata progressione della R nelle precordiali

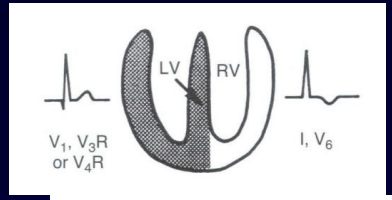
Di cosa si Tratta?

Situs inversus in destrocardia







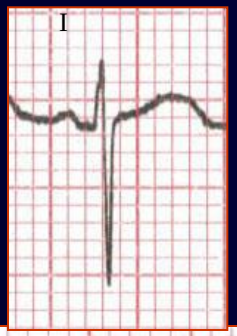


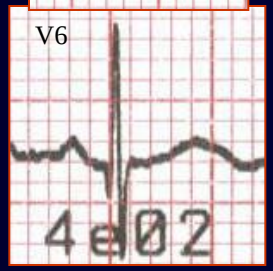
Stesso bambino con elettrodi invertiti

Situs inversus in destrocardia neonato 2g

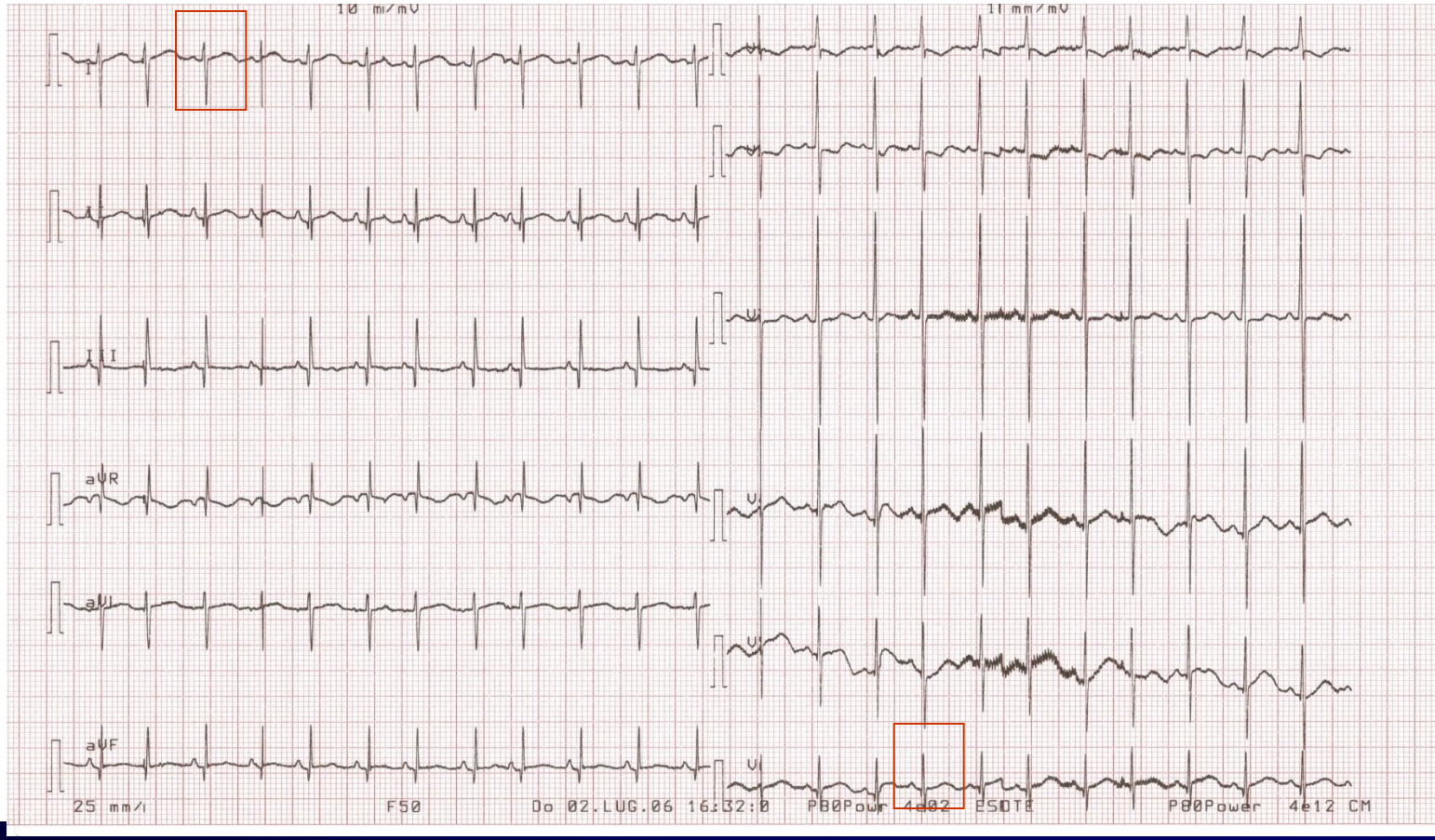
Onde P positive in tutte le derivazioni

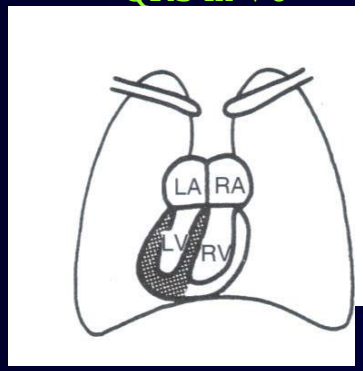
Complesso rS in I, aVL; normale progressione della R nelle precordiali





Complessi QRS in V6





Elettrocardiogramma in età pediatrica

GRAZIE!

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Padova 22/02/2025