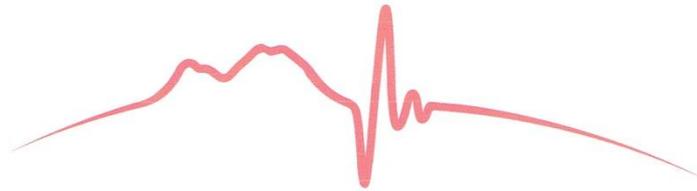


Interpretazione ECG nelle tachicardie a complesso QRS largo



x congresso nazionale
SIMEU
NAPOLI 18-20 NOVEMBRE 2016



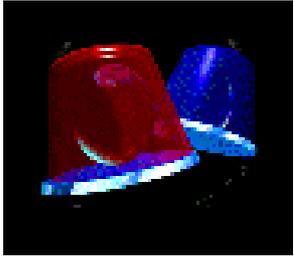
**Il volto della Medicina
di Emergenza-Urgenza:**

identità professionale e servizio pubblico.

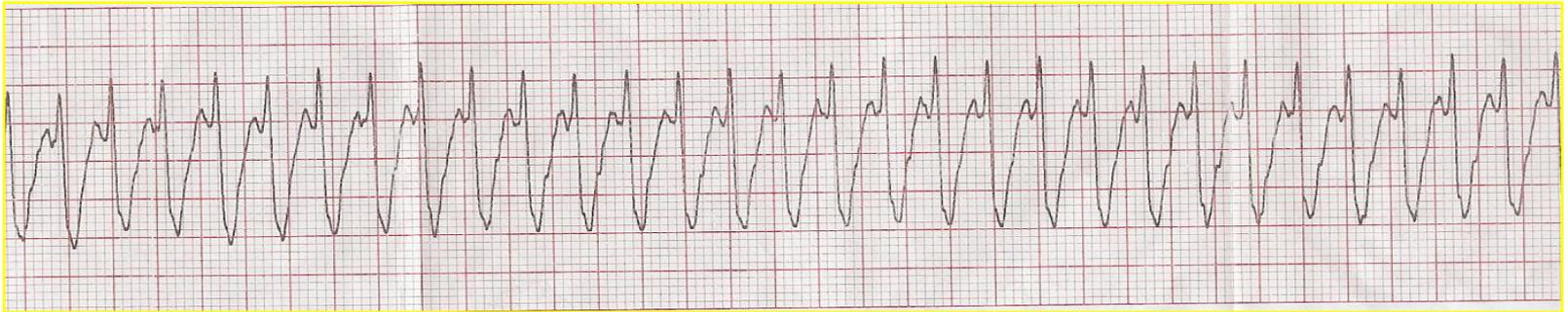
Enrico G. Ruggiero

**Medicina di Urgenza – PS – OBI
Ospedale S. Paolo Napoli**

Napoli 18 novembre 2016



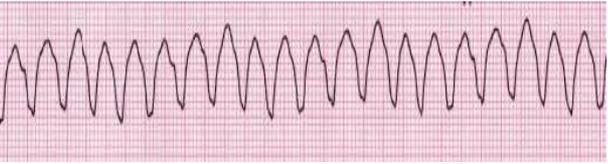
immaginiamoci in... Pronto Soccorso



la solita domanda...
è una TV?



tachicardia a QRS largo



gittata cardiaca non efficace
scompenso cardio-dinamico

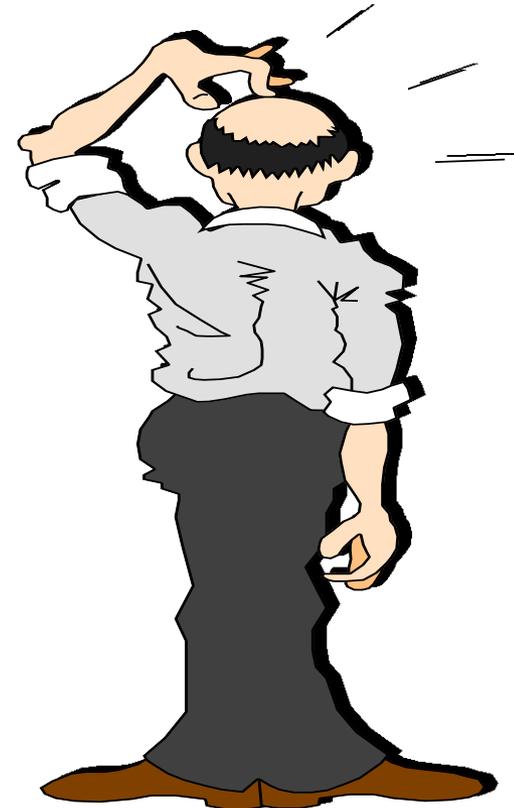
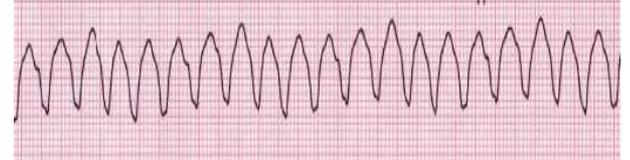
possibile degenerazione in FV
morte per arresto di circolo

**spia di SCA o di patologia
cardiaca non nota**

**spia di disordine
idro-elettrolitico**

**spia di squilibrio
acido-basico**

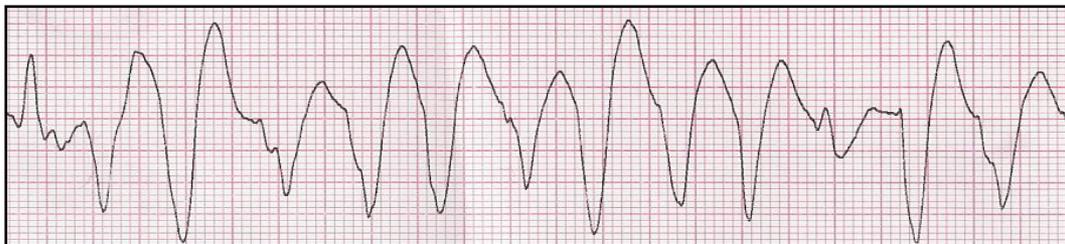
TACHICARDIA VENTRICOLARE



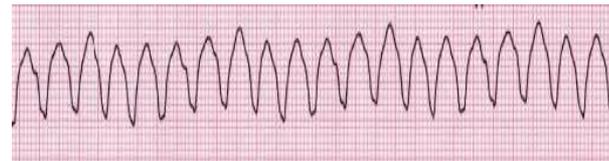


POSSIBILE CONFUSIONE

TPS condotta con aberranza



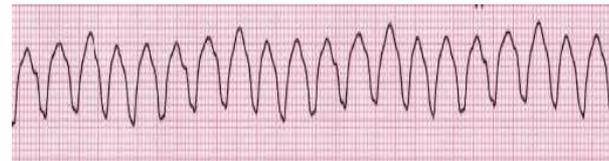
TACHICARDIA VENTRICOLARE





POSSIBILE CONFUSIONE

TACHICARDIA VENTRICOLARE



Tachicardia pre-eccitata





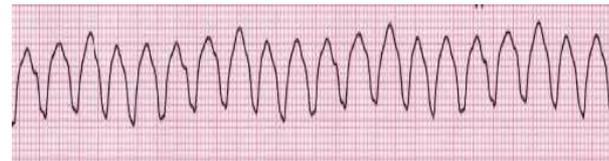
ATTENZIONE!

...diverso è il rischio

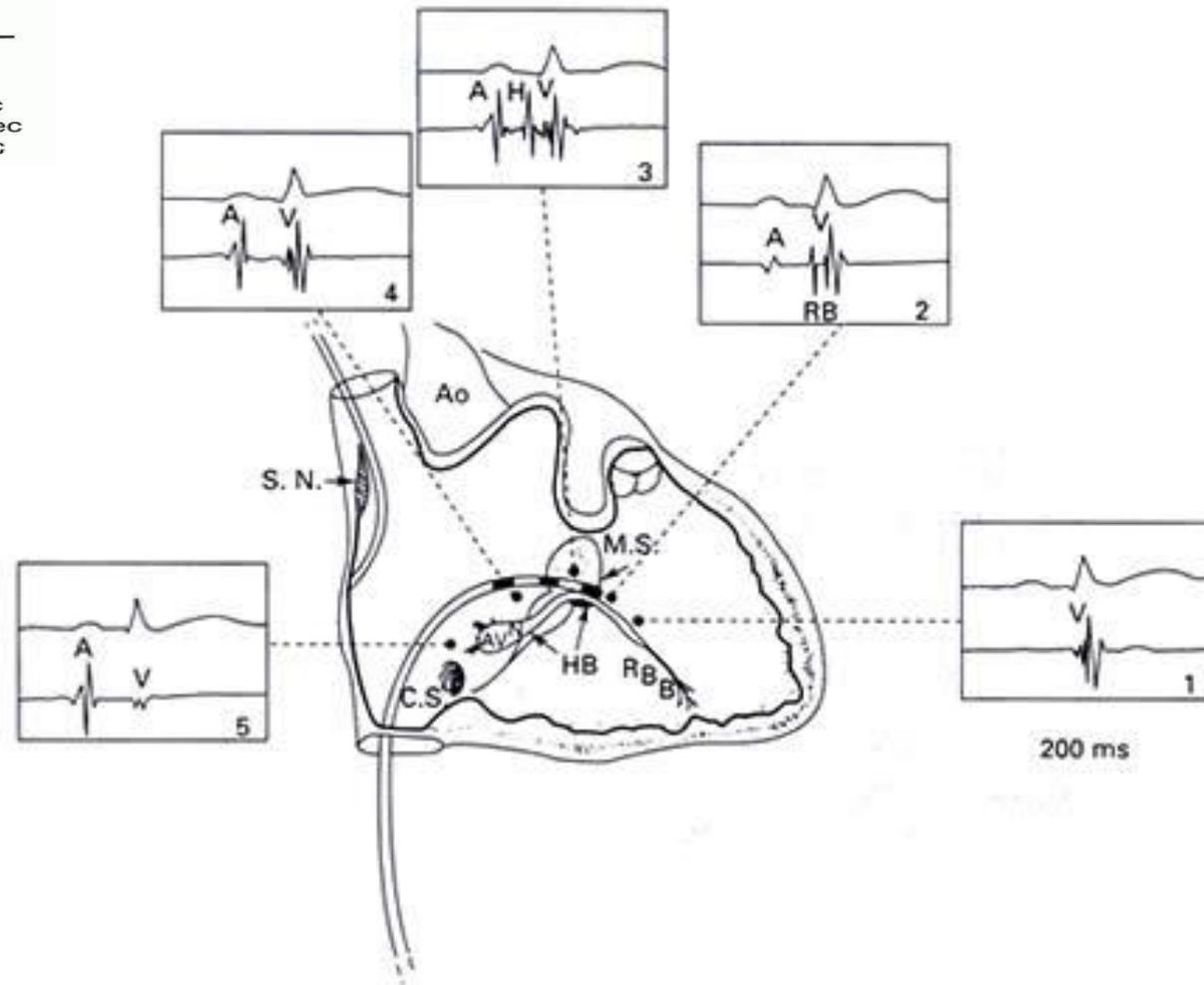
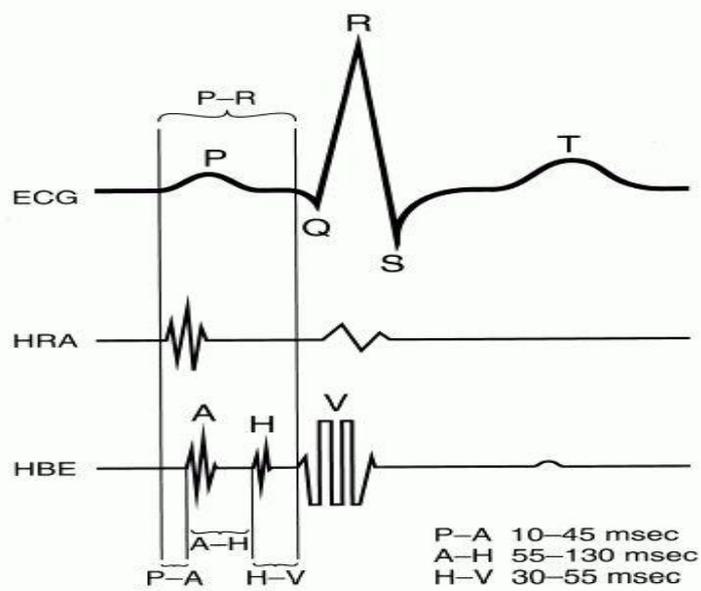
...diversa è la prognosi

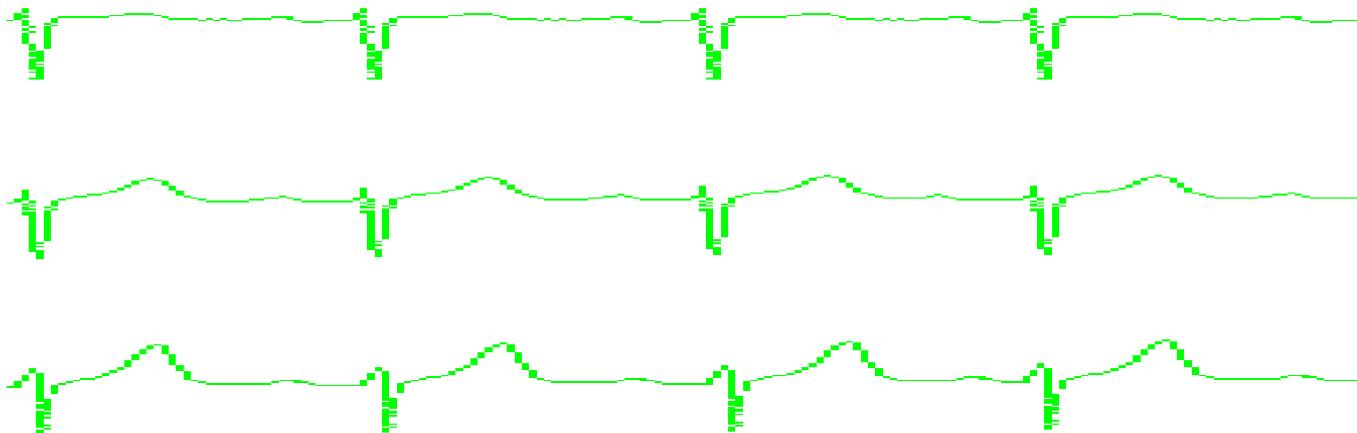
...diversa è la terapia

TACHICARDIA VENTRICOLARE



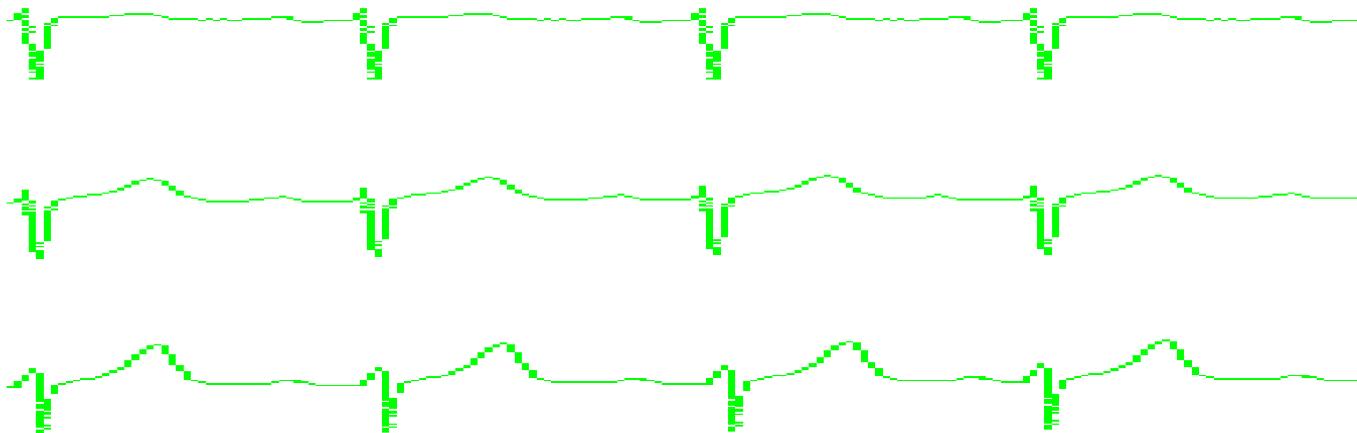
Studio elettrofisiologico endocavitario





...attenta lettura dell'ecg di superficie





...conoscenza di key points





**Interpretazione ECG
nelle tachicardie a complesso QRS largo**

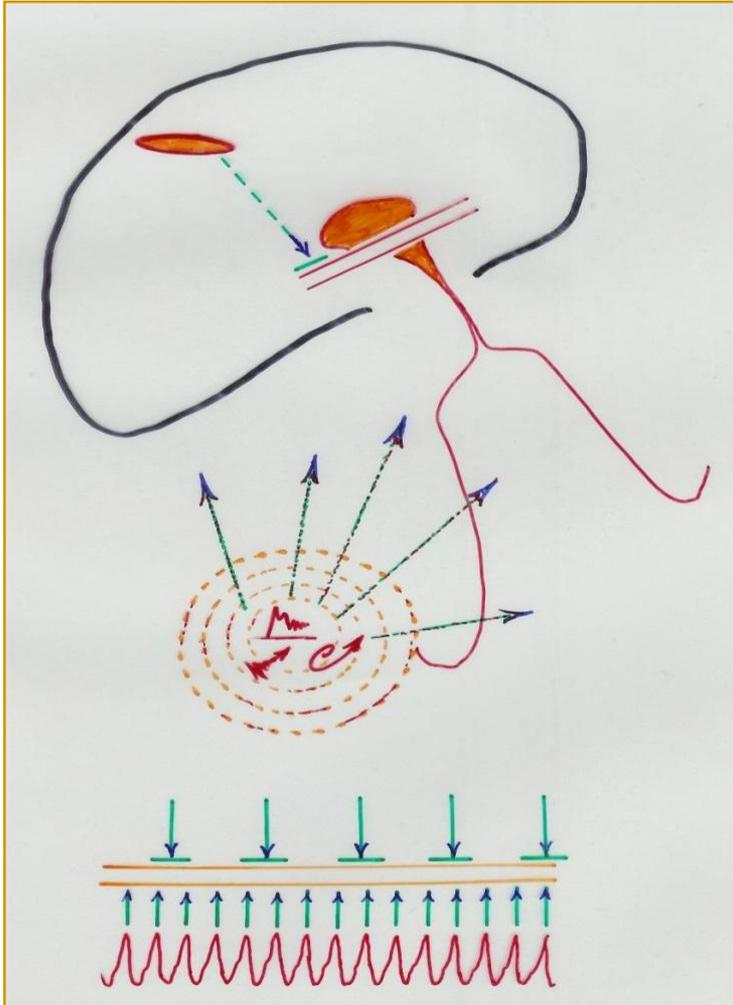
inizia il nostro viaggio...



TACHICARDIA VENTRICOLARE

diagnosi di certezza

l'ecg fornisce diagnosi di certezza solo in caso di **ECTOPIA VENTRICOLARE**



concordanza

battiti di cattura / fusione

dissociazione A/V – associazione V/A

asse elettrico

analisi morfologica delle onde

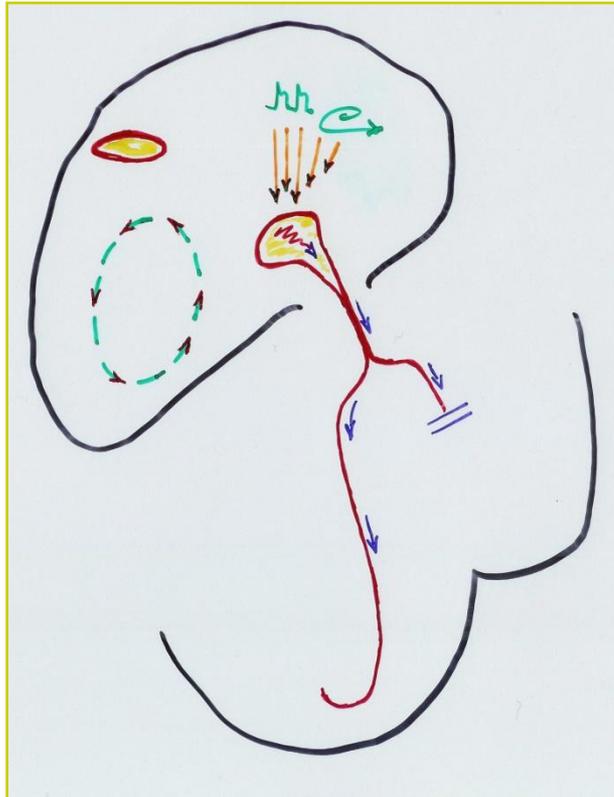
analisi morfologica aVR

manovra vagale

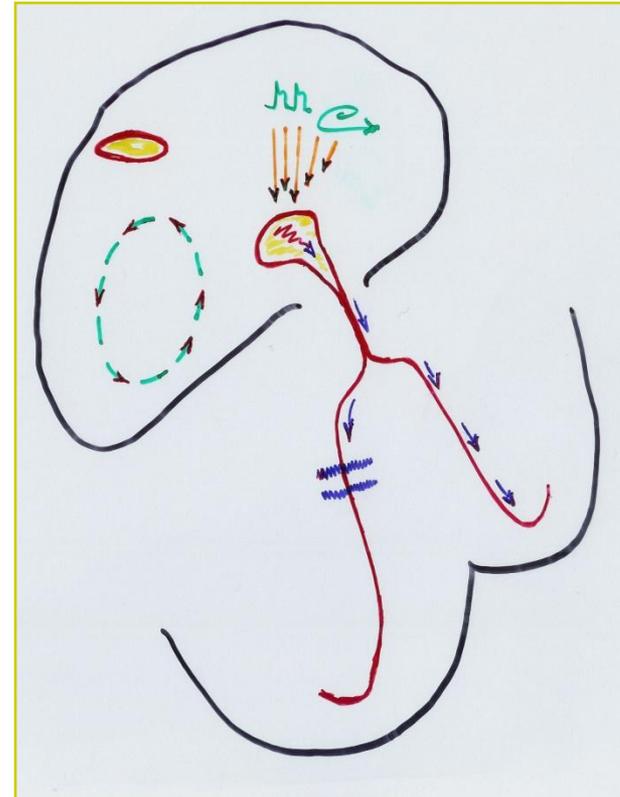
TACHICARDIA SOPRAVENTRICOLARE

diagnosi di esclusione

...su assenza di elementi indicativi di ectopia ventricolare



**TSV condotta con...
blocco branca preesistente**



**TSV condotta con...
aberranza**

TACHICARDIA PREECCITATA

diagnosi di presunzione

...per la mancanza di segnali diretti

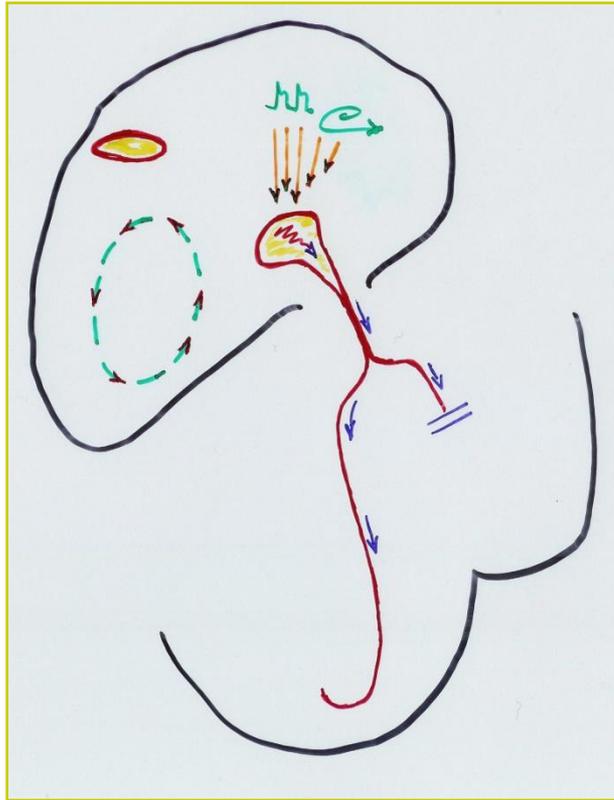




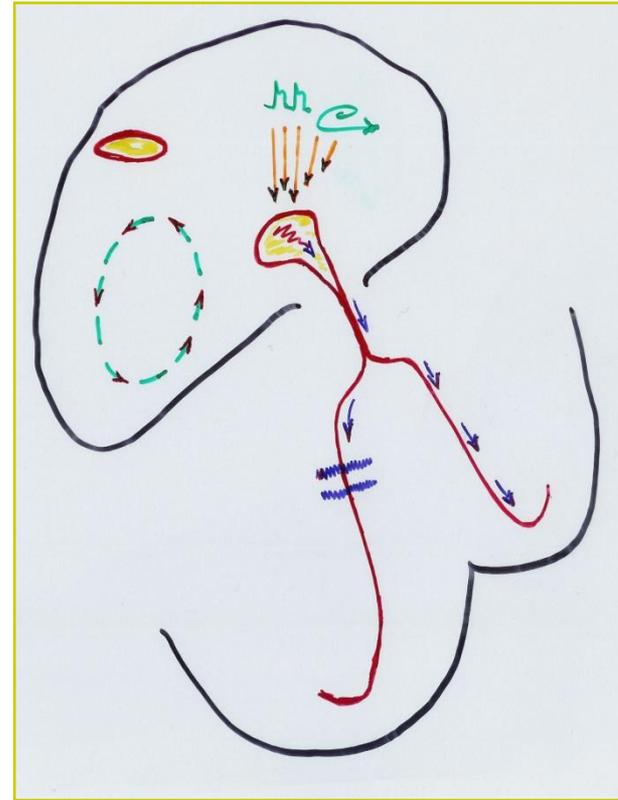
Key point

...tachicardia sopraventricolare

TACHICARDIA SOPRAVENTRICOLARE

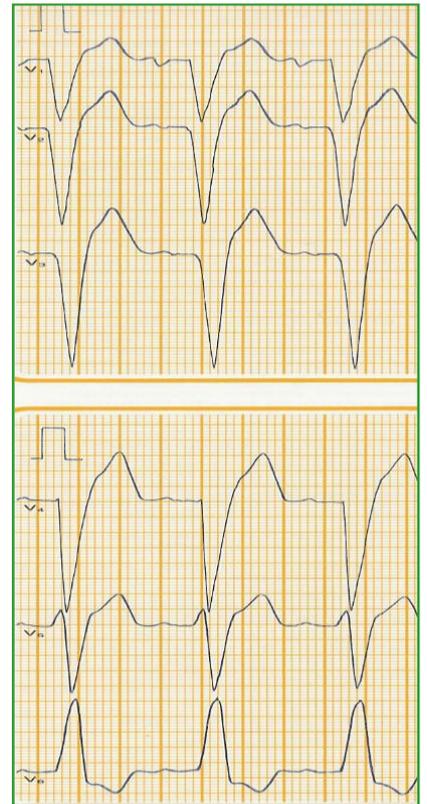
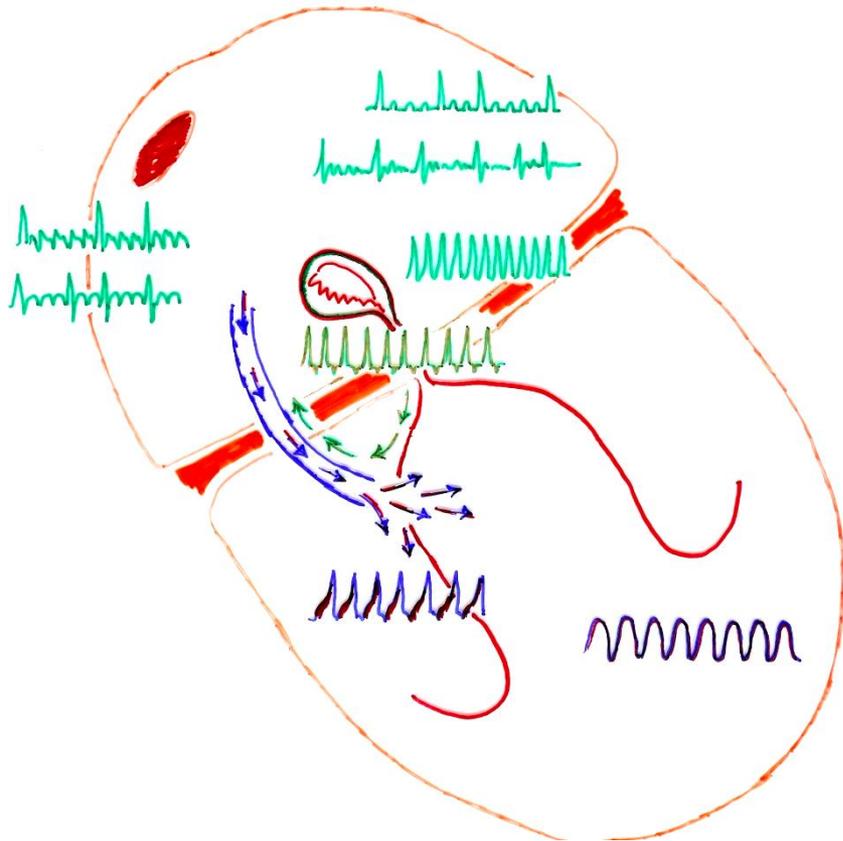
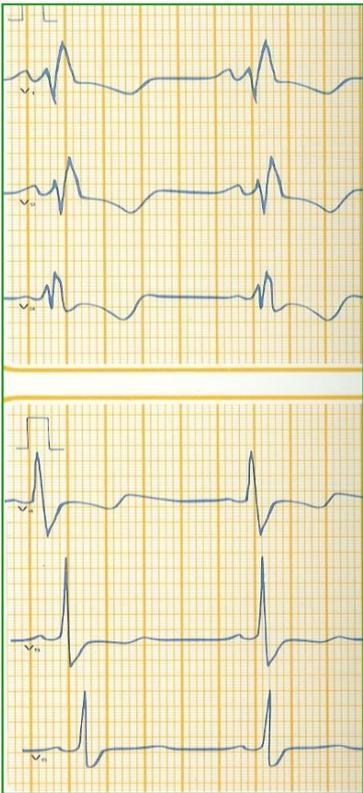


TSV condotta con...
blocco branca preesistente



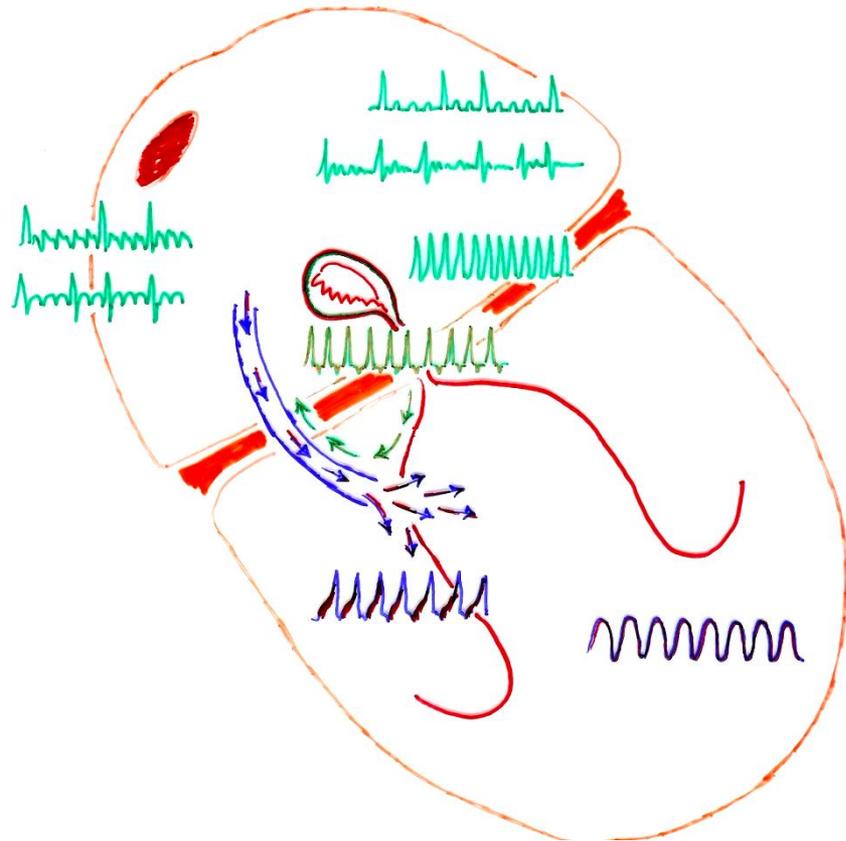
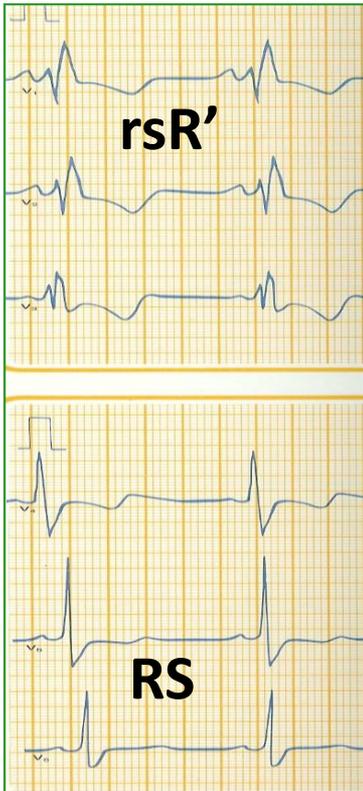
TSV condotta con...
aberranza

...riconoscere la morfologia dell'onda di attivazione ventricolare secondaria a blocco di branca

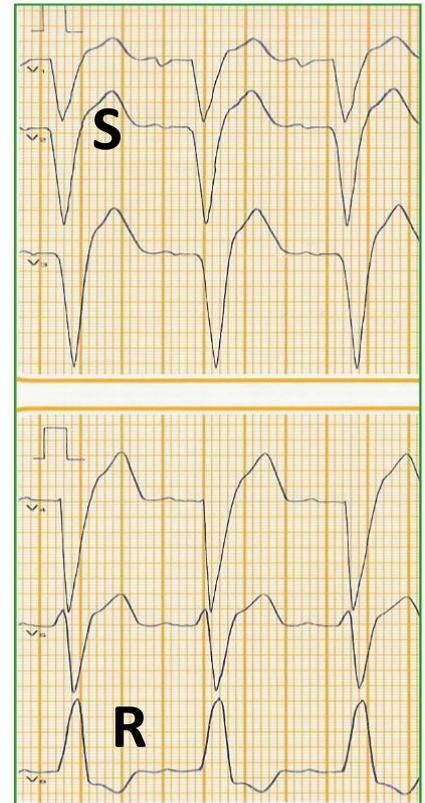


...riconoscere la morfologia dell'onda di attivazione ventricolare secondaria a blocco di branca

B.B. destra



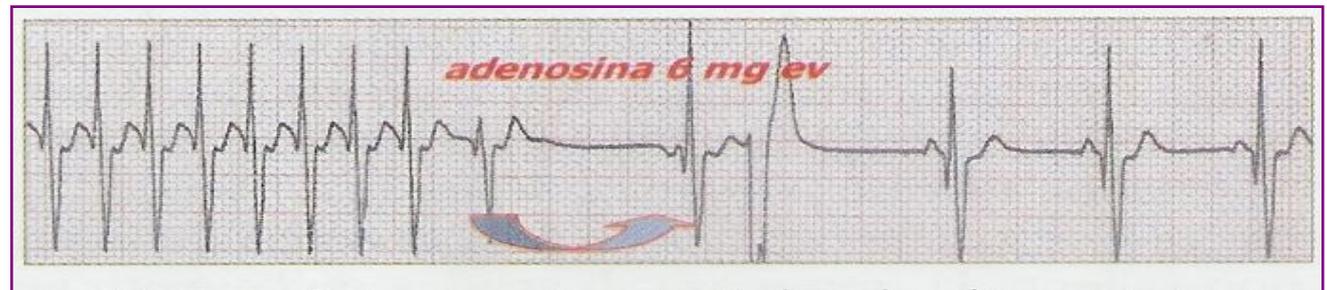
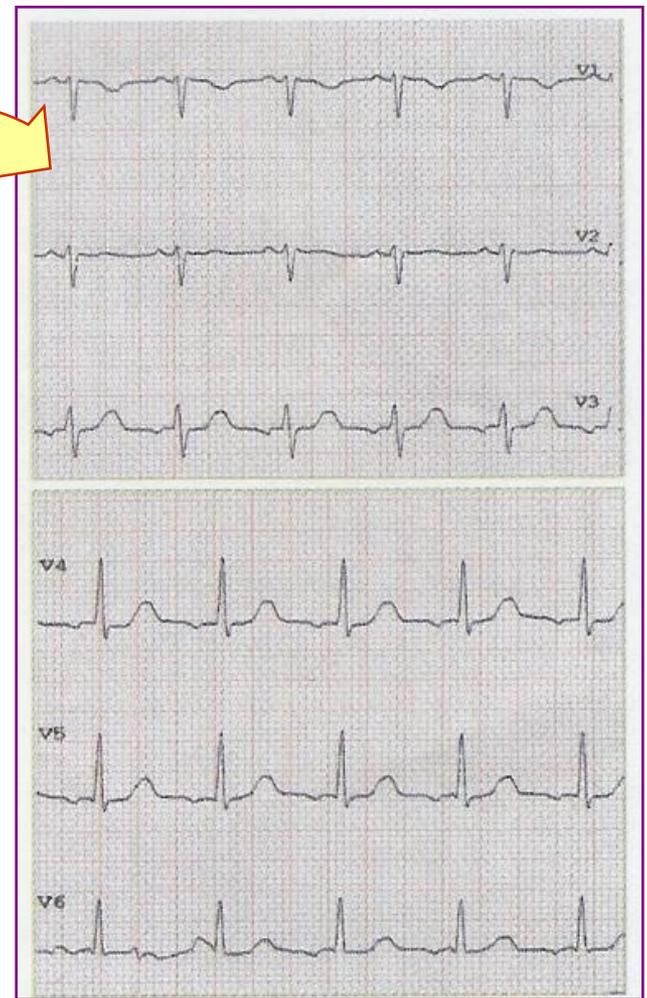
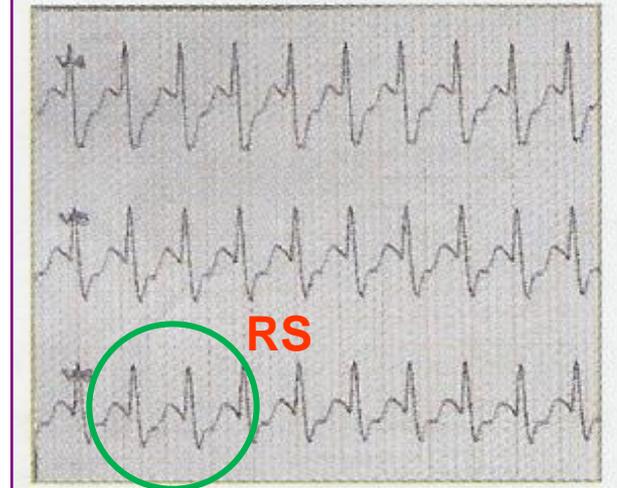
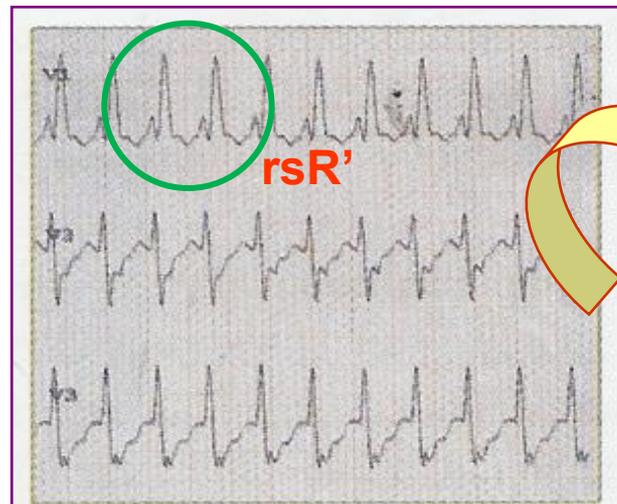
B.B. sinistra



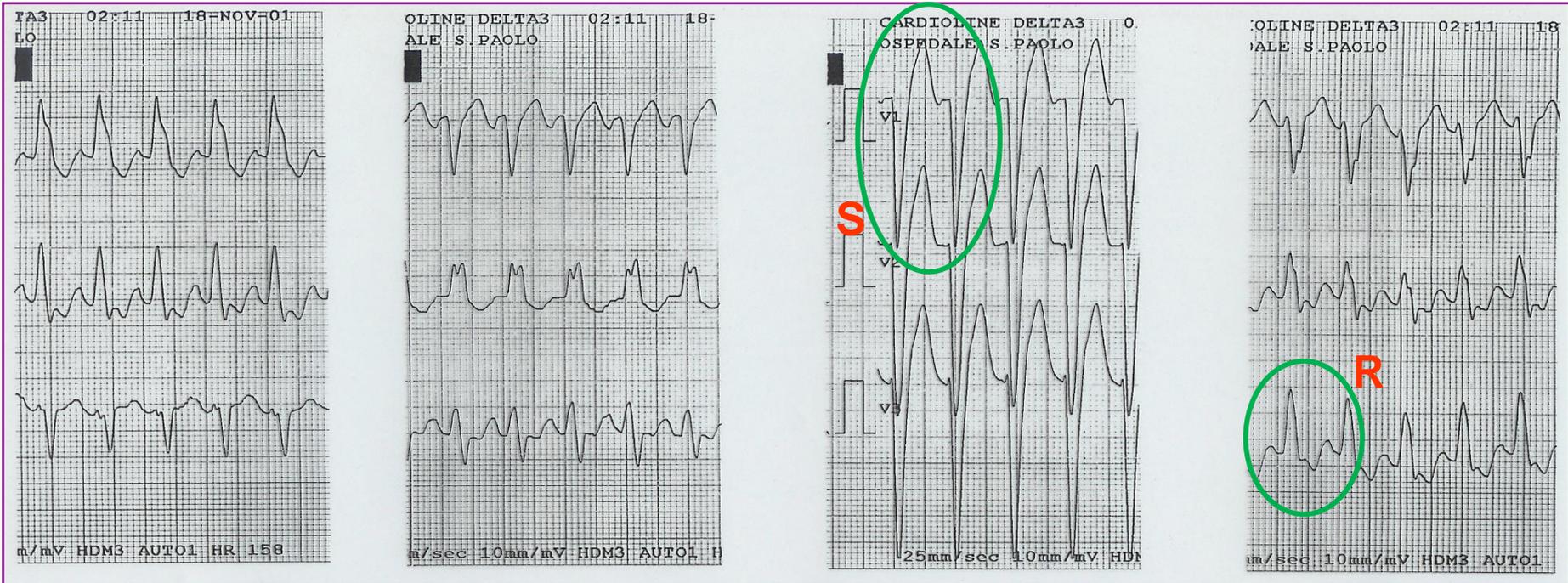
Paolo anni 27

**BBdx
da aberranza**

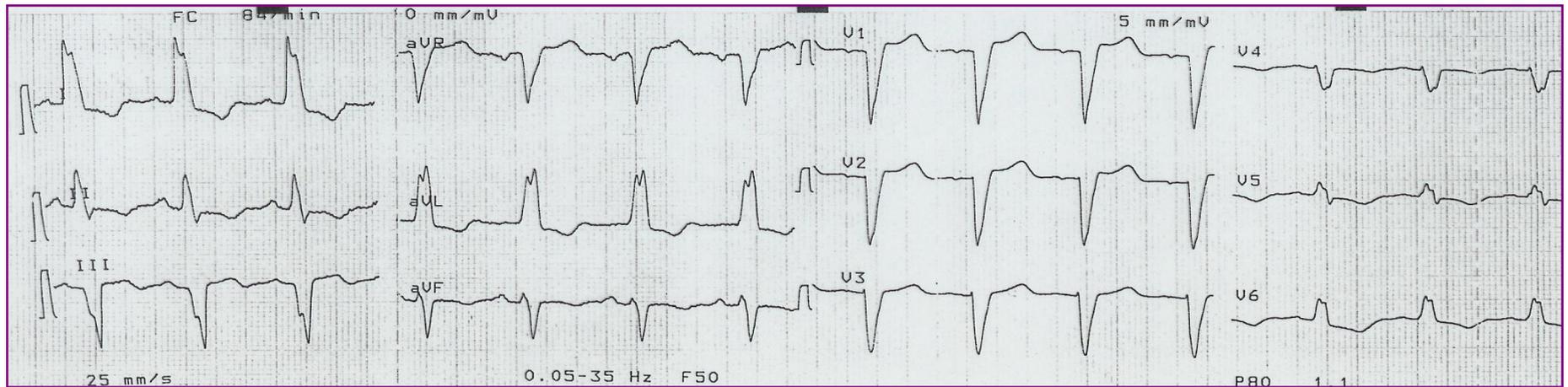
**durante circuito
nodale da rientro**



Domenico anni 68



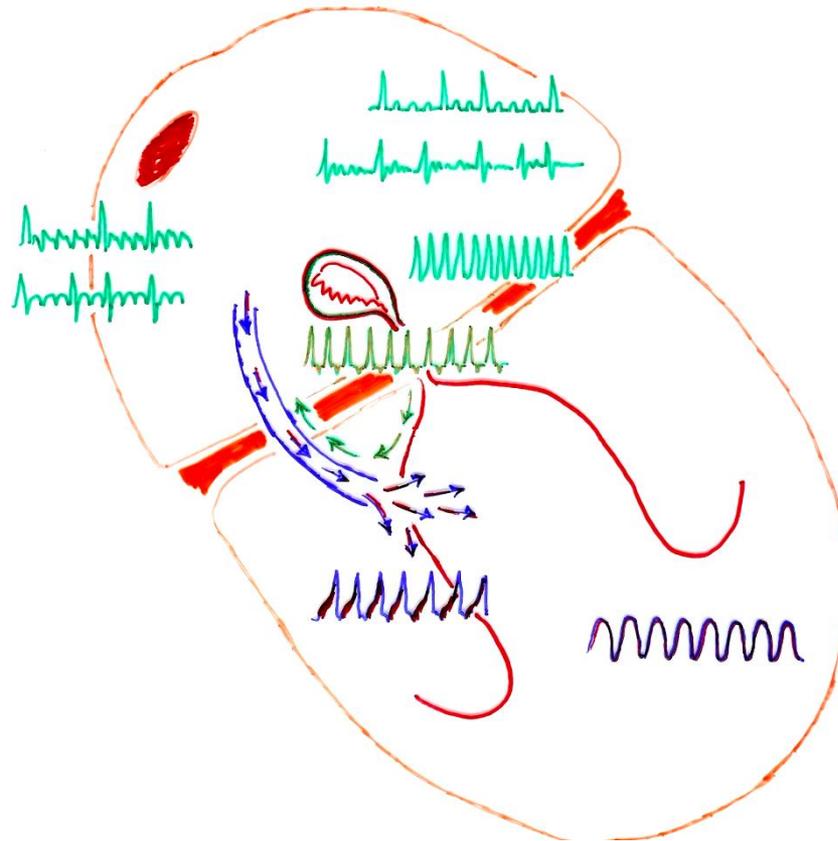
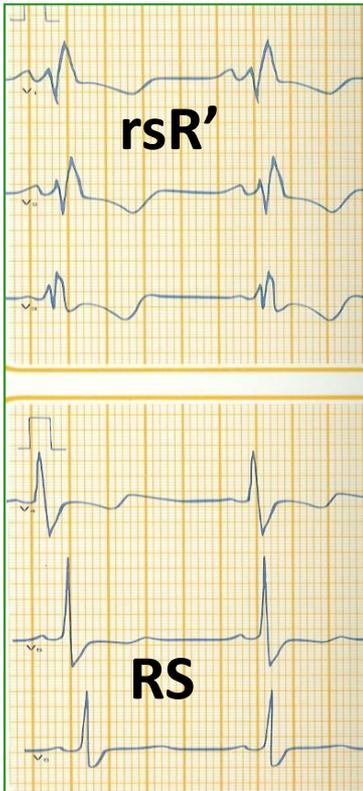
BBSx preesistente... durante flutter atriale parossistico



ma...non sempre è così semplice

cercare di riconoscere la morfologia dell'onda di attivazione ventricolare secondaria a blocco di branca

B.B. destra

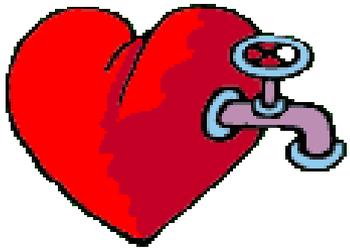


B.B. sinistra



Brugada in aiuto...

criteri morfologici nelle precordiali



morfologia tipo blocco di branca destra

ECTOPIA

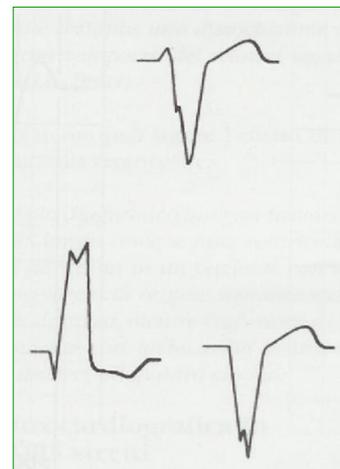


ABERRANZA

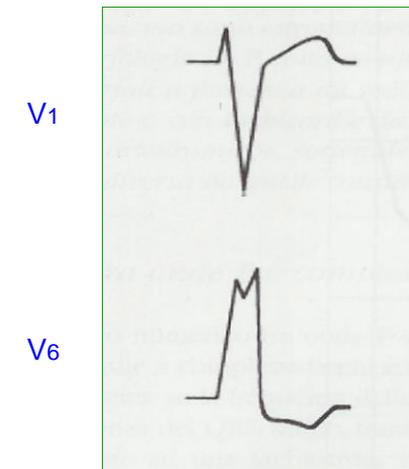


morfologia tipo blocco di branca sinistra

ECTOPIA



ABERRANZA





Key points

...tachicardia pre-eccitata

TACHICARDIA PREECCITATA

diagnosi di presunzione

per mancanza di segnali ECG diretti...



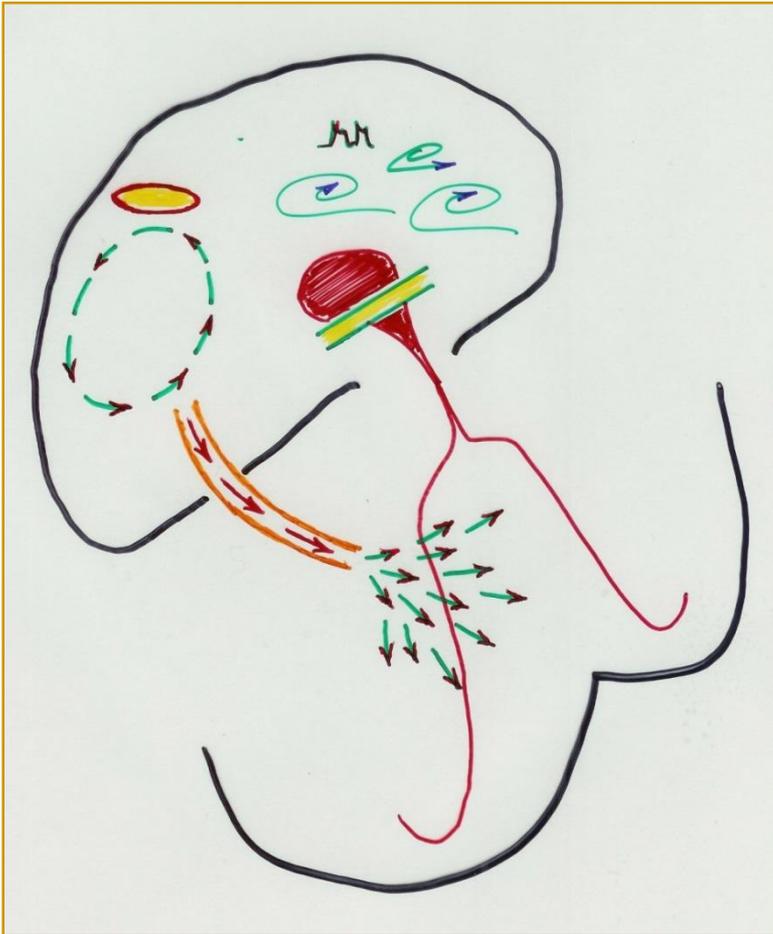
... alcune utili considerazioni



TACHICARDIA PREECCITATA

diagnosi di presunzione

per mancanza di segnali ECG diretti...

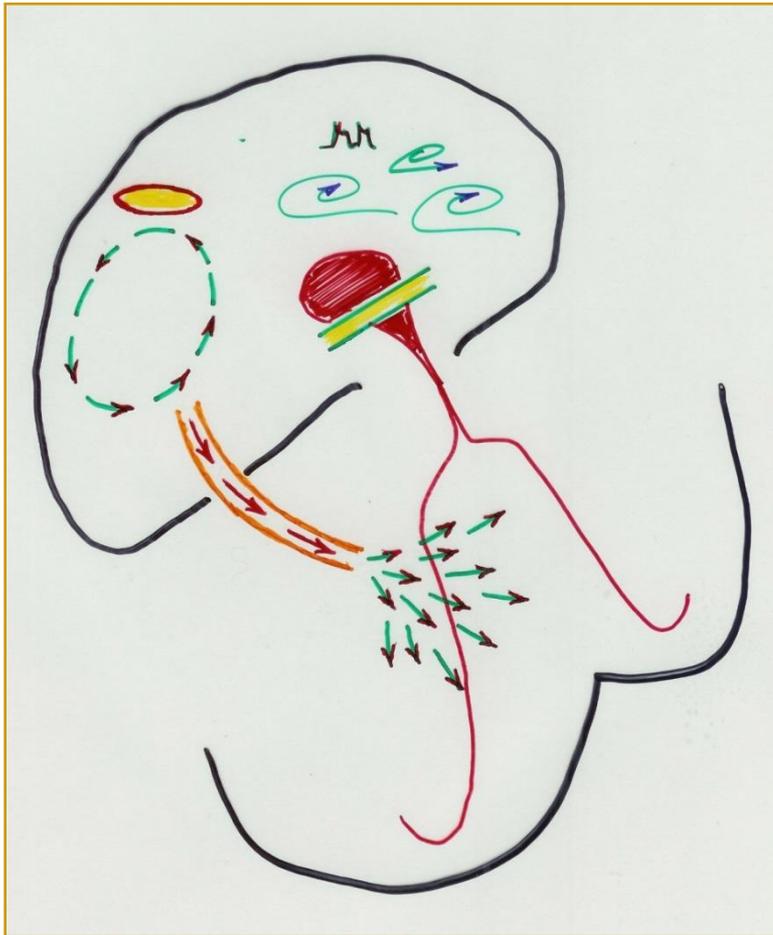


pazienti giovani...
senza cardiopatia nota

TACHICARDIA PREECCITATA

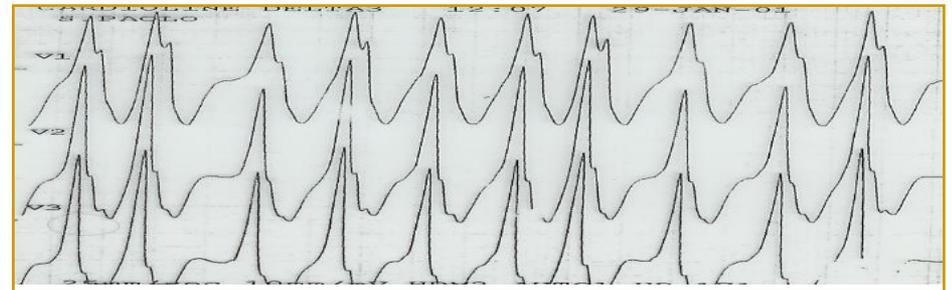
diagnosi di presunzione

per mancanza di segnali ECG diretti...



**i complessi QRS sono
onde delta**

**possibile diagnosi attraverso
lo studio dell'asse**



**...per lenta trasmissione muscolo-mediata
dell'impulso e lunghi tempi di attivazione ventricolare**

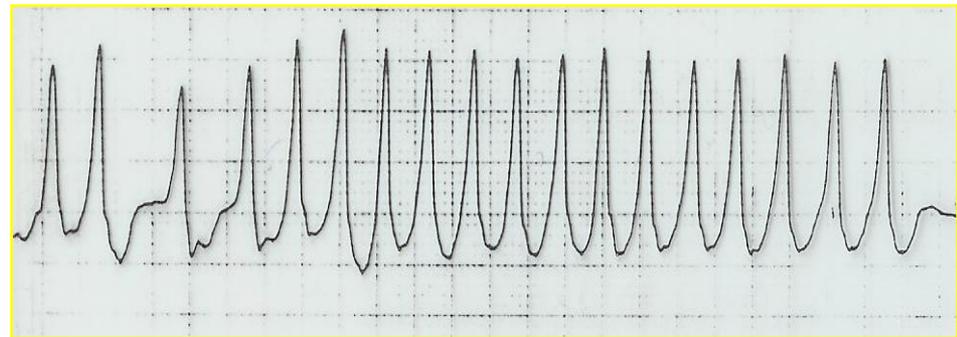
TACHICARDIA PREECCITATA

diagnosi di presunzione

per mancanza di segnali ECG diretti...



le onde delta risultano
sempre positive in V4 – V6



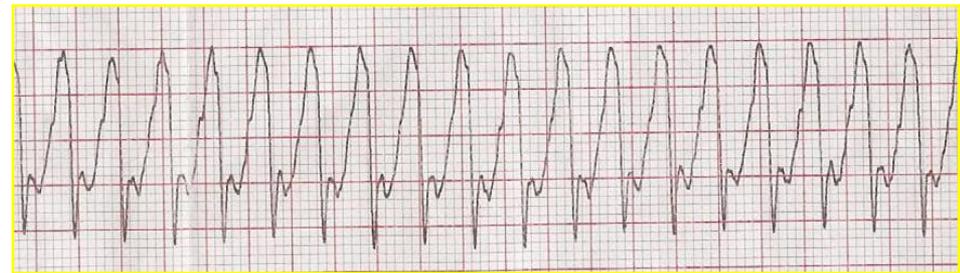
TACHICARDIA PREECCITATA

diagnosi di presunzione

per mancanza di segnali ECG diretti...

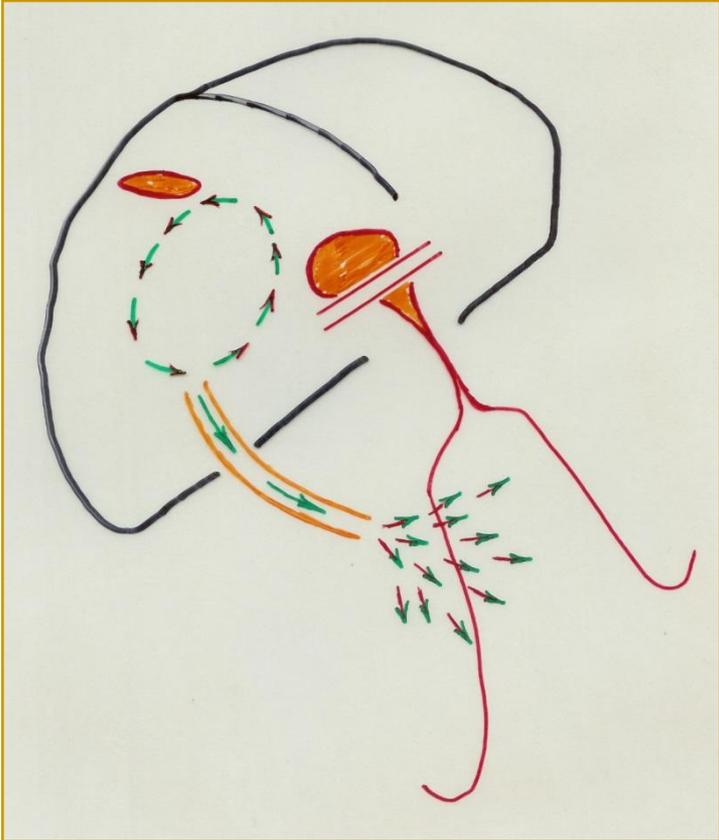


non esiste aritmia più veloce

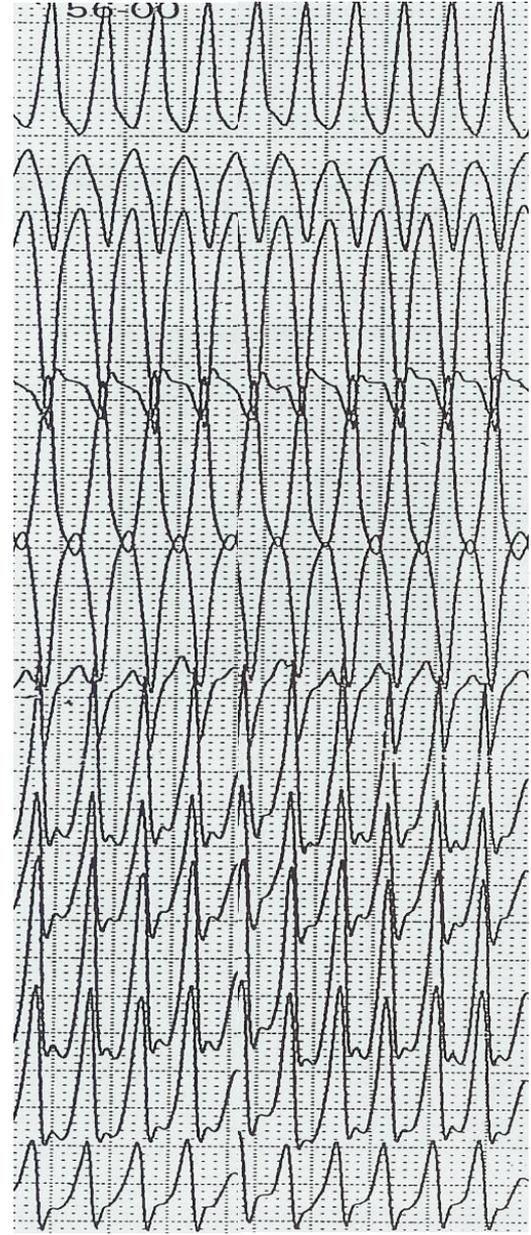


si raggiungono frequenze altissime per
...e per la possibile improvvisa conduzione 1:1
la rapida conduzione lungo il fascio anomalo...

...un probabile flutter atriale pre-eccitato



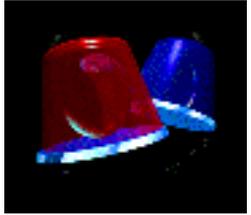
**Eleonora S. a 18
in P.S. per pre-sincope**



aritmia veloce...regolare

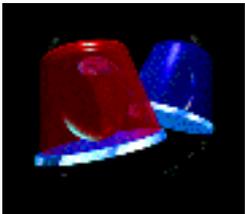
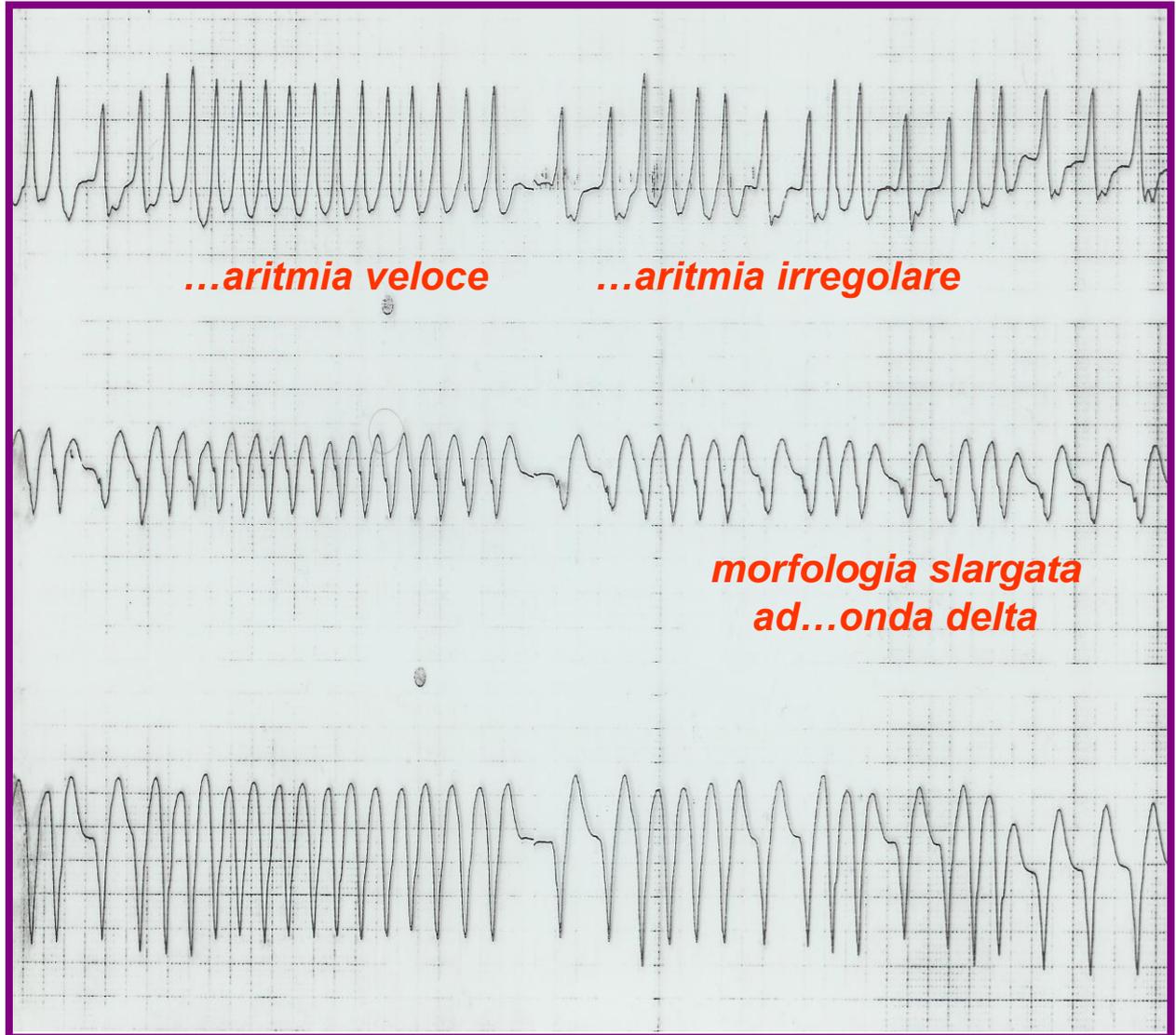
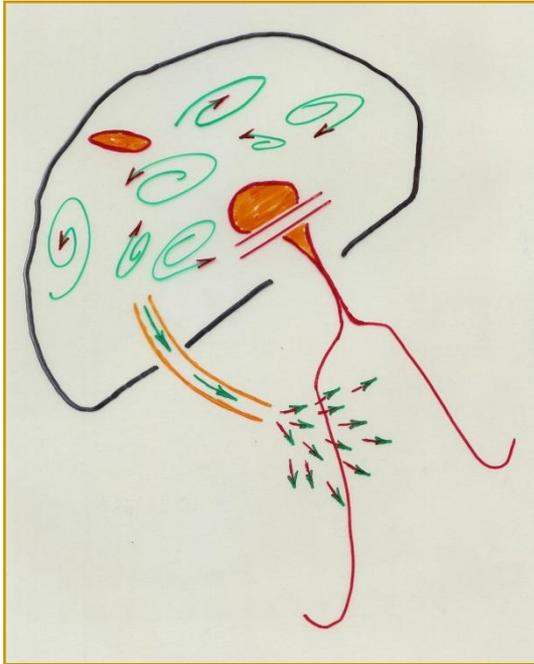
condotta 1:1

onde delta positive in V4-V6

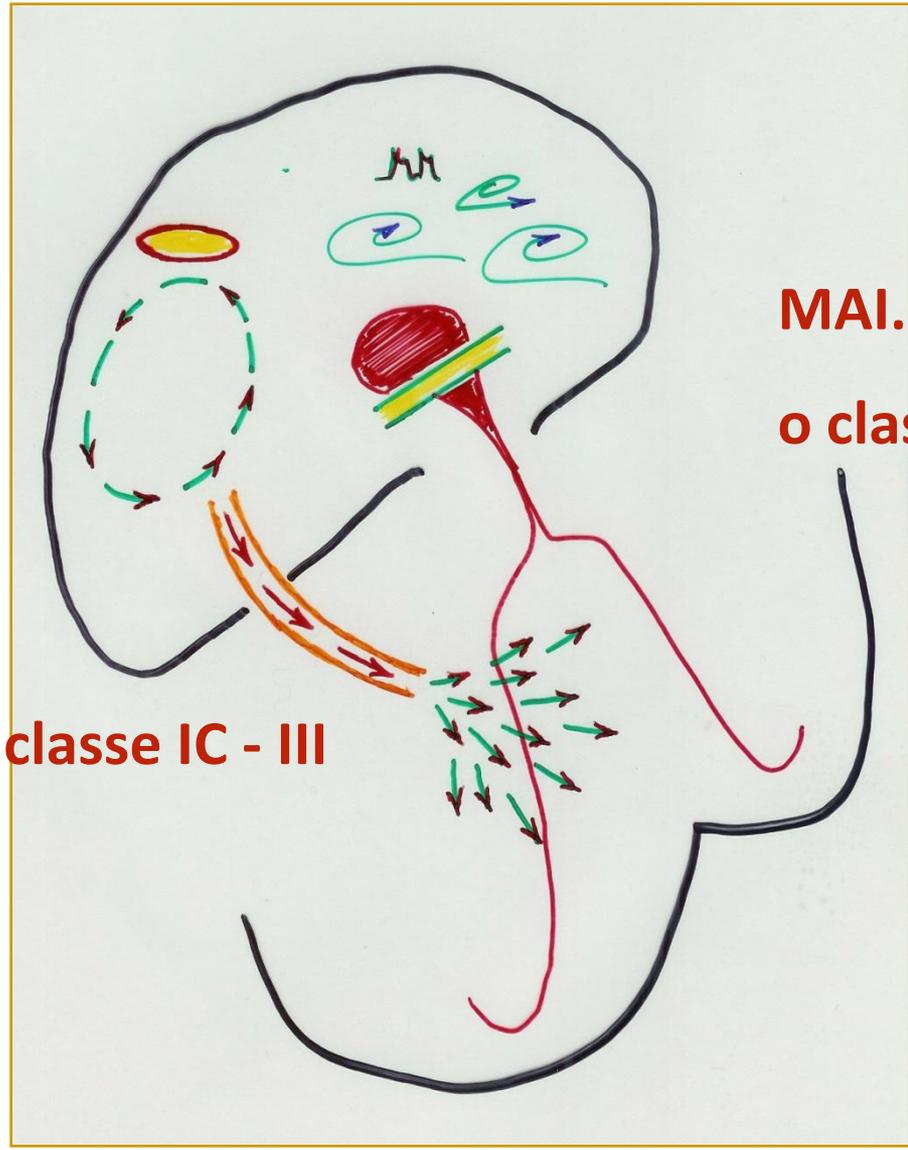


Giorgio D. a 21 in P.S. per cardiopalmo

...una probabile fibrillazione atriale pre-eccitata



esatta diagnosi
per adeguata terapia



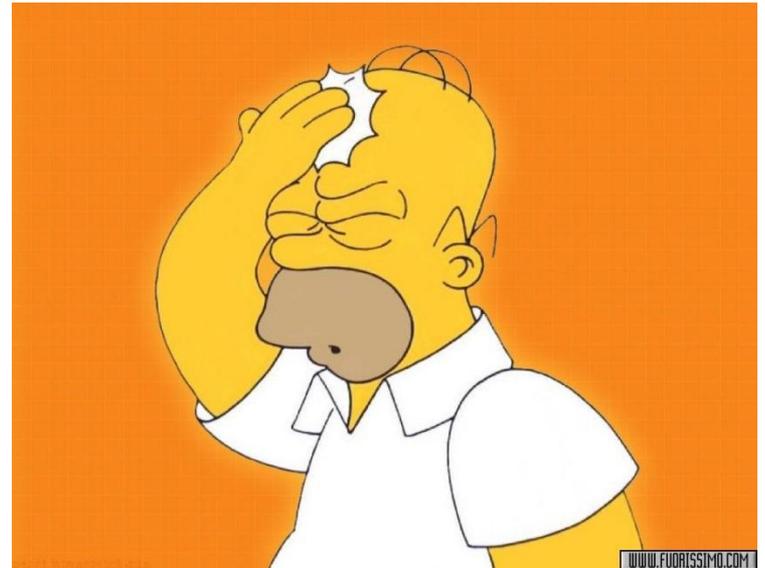
MAI...digitale
o classe II - IV

SI...classe IC - III

TACHICARDIA VENTRICOLARE

monomorfa sostenuta

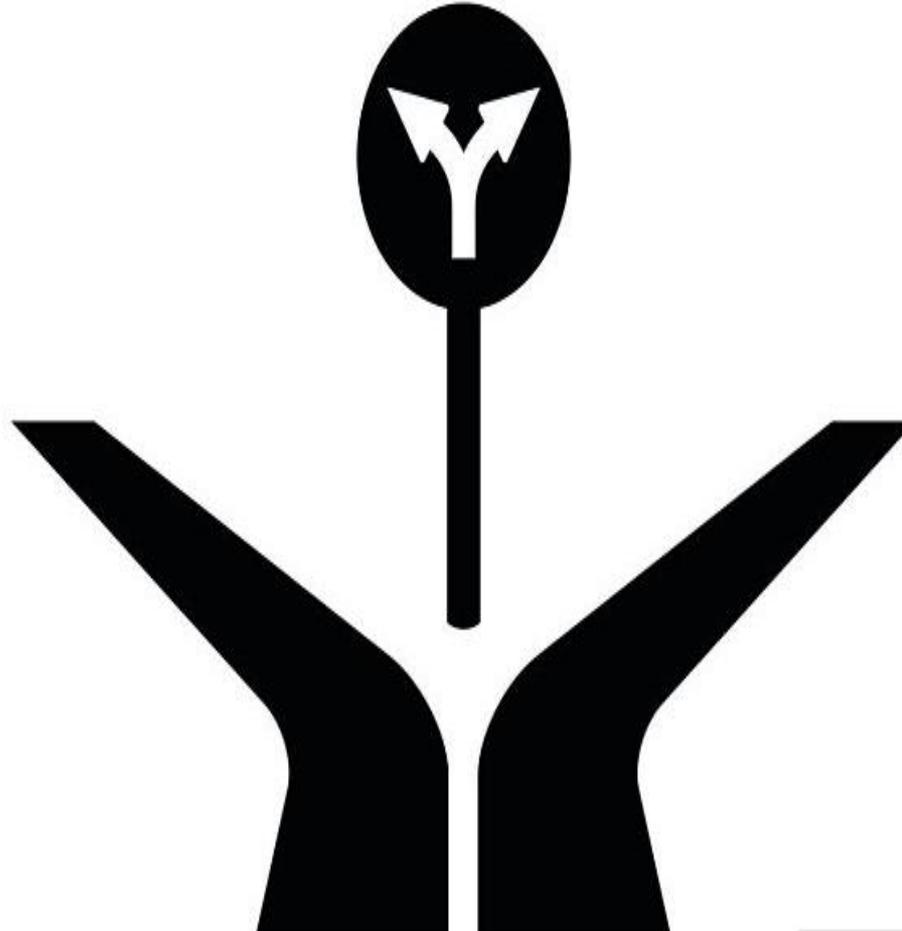
VERA EMERGENZA
importante rapida diagnosi!



TACHICARDIA VENTRICOLARE

**Iter diagnostico
tachicardia a complessi larghi**

CRITERI MAGGIORI



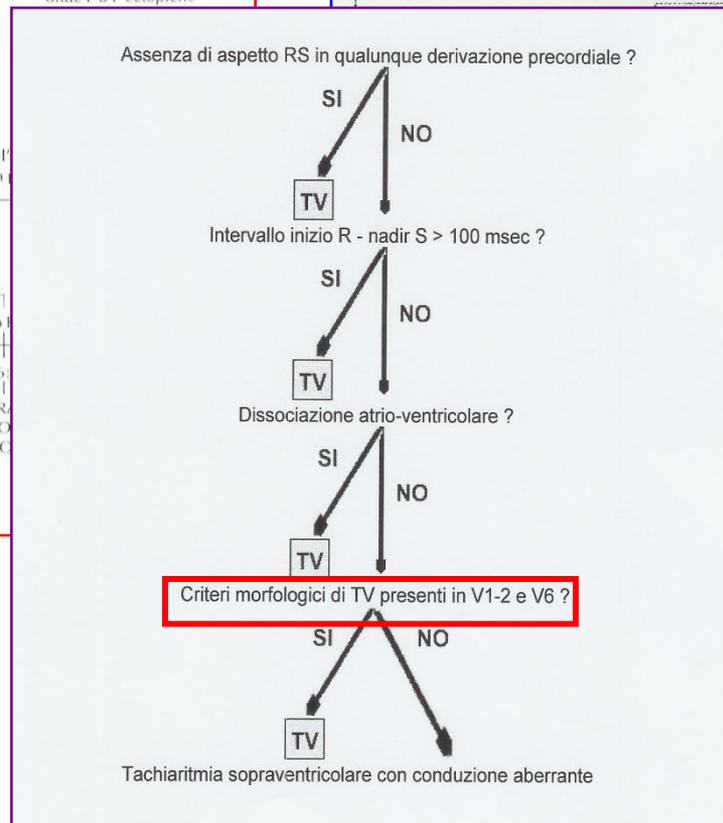
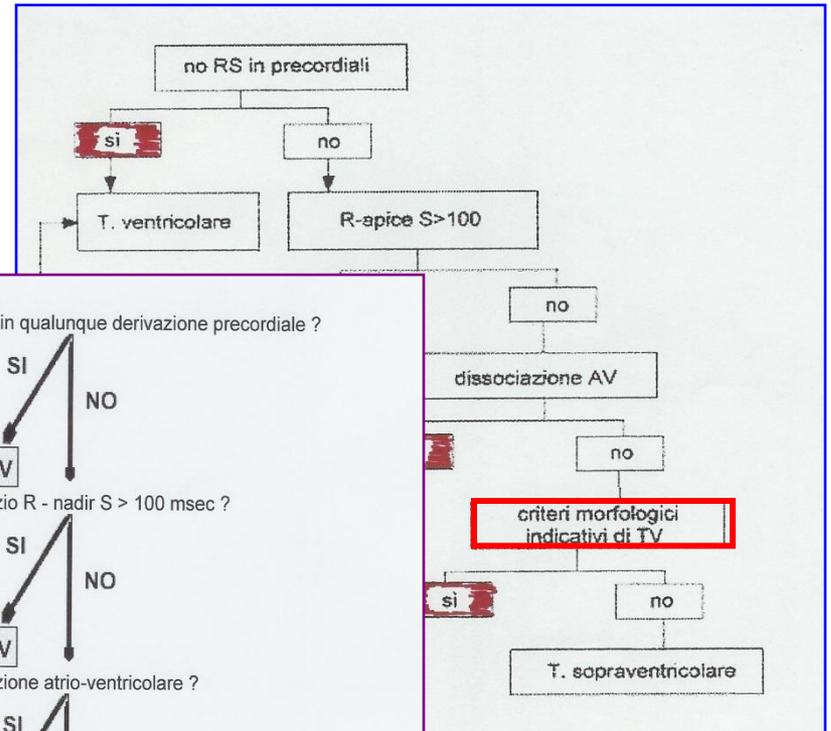
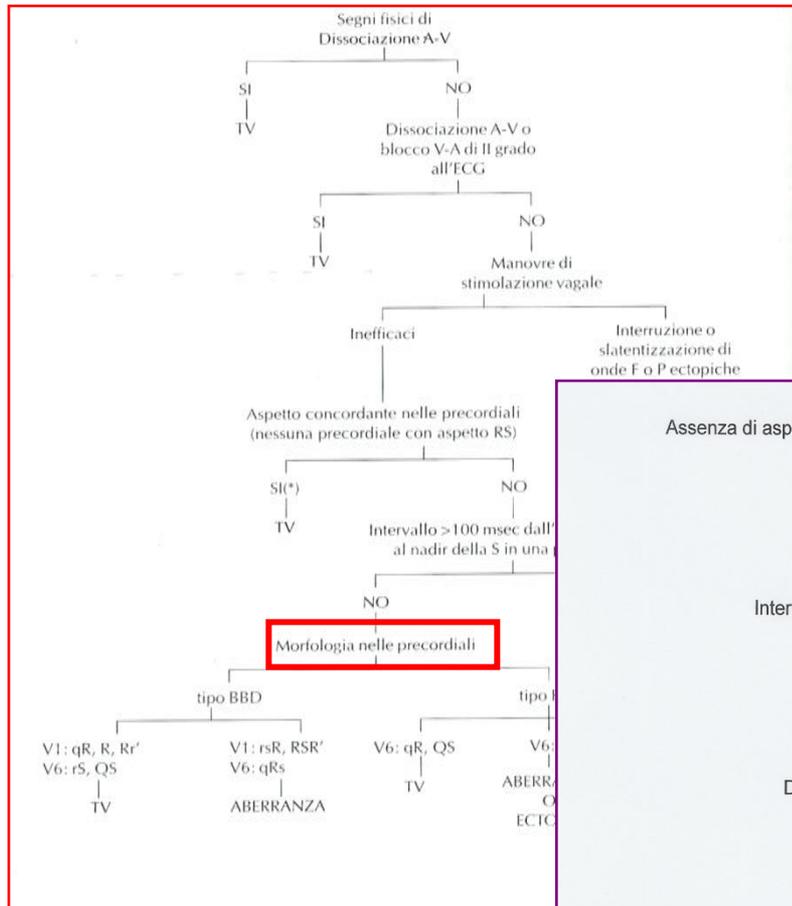
TACHICARDIA VENTRICOLARE

**Iter diagnostico
tachicardia a complessi larghi**

CRITERI MAGGIORI



Iter diagnostici nella Tachicardia a complessi larghi



...costruire diagrammi !

...seguire scalette !

...ricordare morfologie !

...costruire diagrammi !

...seguire scalette !



...ricordare morfologie !

TACHICARDIA VENTRICOLARE

**Iter diagnostici
tachicardia a complessi larghi**

**scalette
diagrammi
morfologie di onde**

CRITERI MAGGIORI



TACHICARDIA VENTRICOLARE

MONOMORFA SOSTENUTA

CRITERI MAGGIORI

SI
NO

Complessi di attivazione ventricolare esageratamente larghi

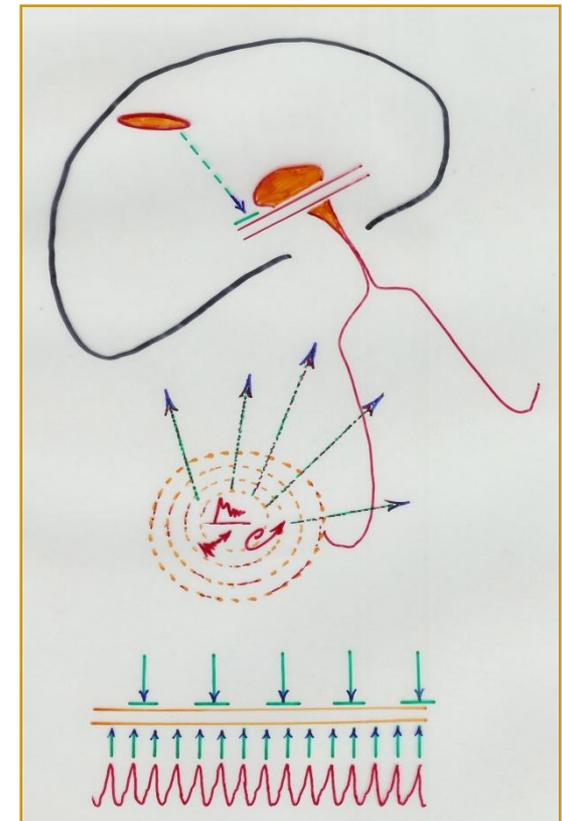
Battiti cattura
fusione

Concordanza positiva
negativa

Asse estrema destra -120 ± 180
con R in V1 \rightarrow assiale Sx
con QS in V1 \rightarrow assiale Dx

Criteria morfologici Vereckei in aVR

Criteria morfologici Brugada nelle precordiali



TACHICARDIA VENTRICOLARE

MONOMORFA SOSTENUTA

CRITERI MAGGIORI

SI
NO

Complessi di attivazione ventricolare esageratamente larghi

Battiti cattura
fusione

Concordanza positiva
negativa

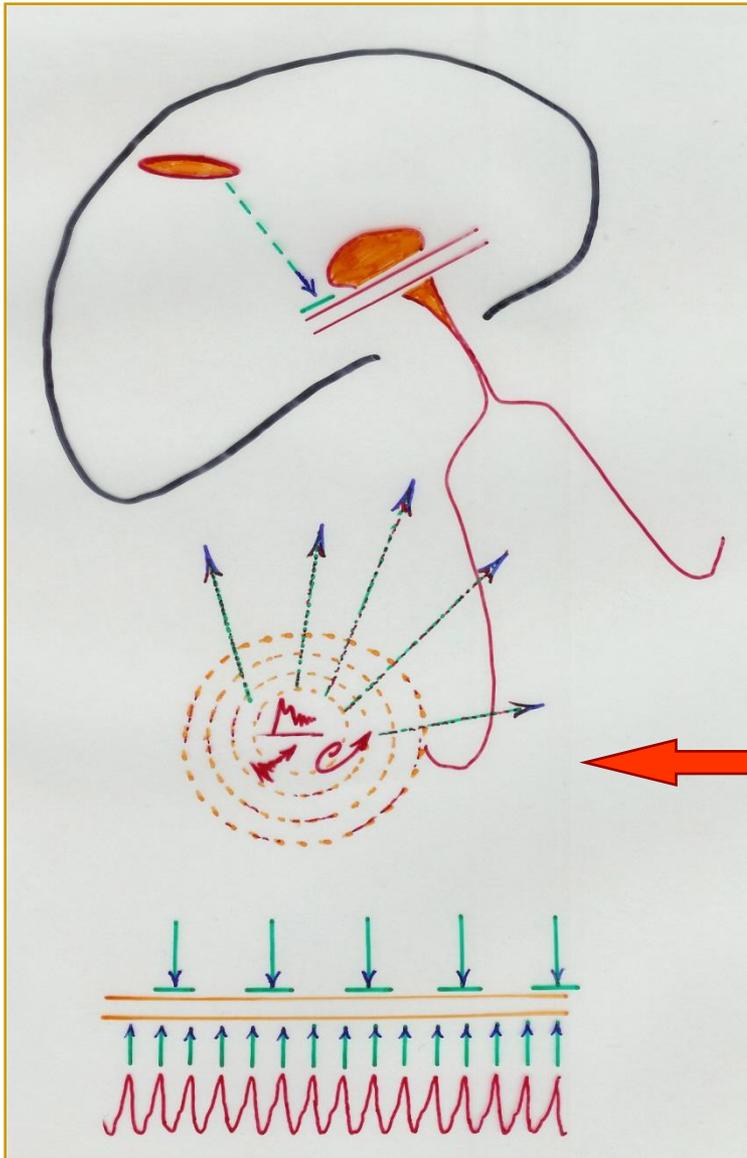
Asse estrema destra -120 ± 180
con R in V1 \rightarrow assiale Sx
con QS in V1 \rightarrow assiale Dx

Criteria morfologici Vereckei in aVR

Criteria morfologici Brugada nelle precordiali



CRITERIO MAGGIORE



complessi esageratamente larghi

...la trasmissione dell'impulso è lenta
perché muscolo-mediata

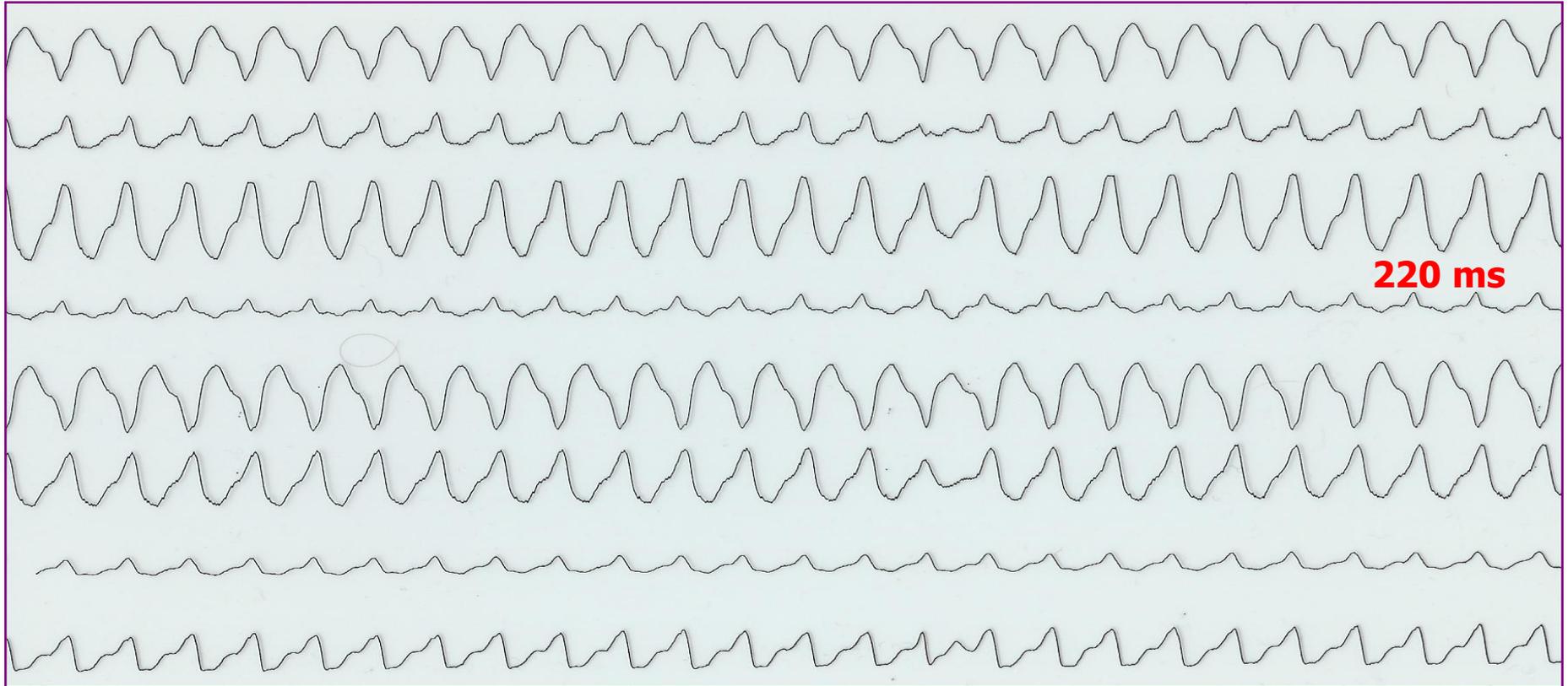
...pertanto l'attivazione ventricolare
si completa in tempi lunghi



complessi di attivazione ventricolare larghi ...esageratamente larghi

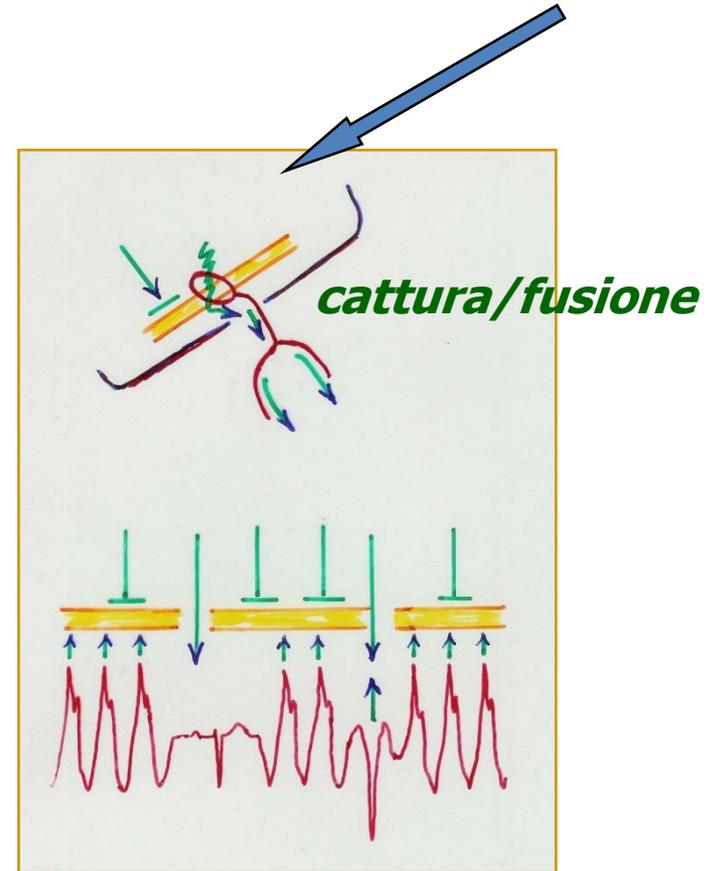
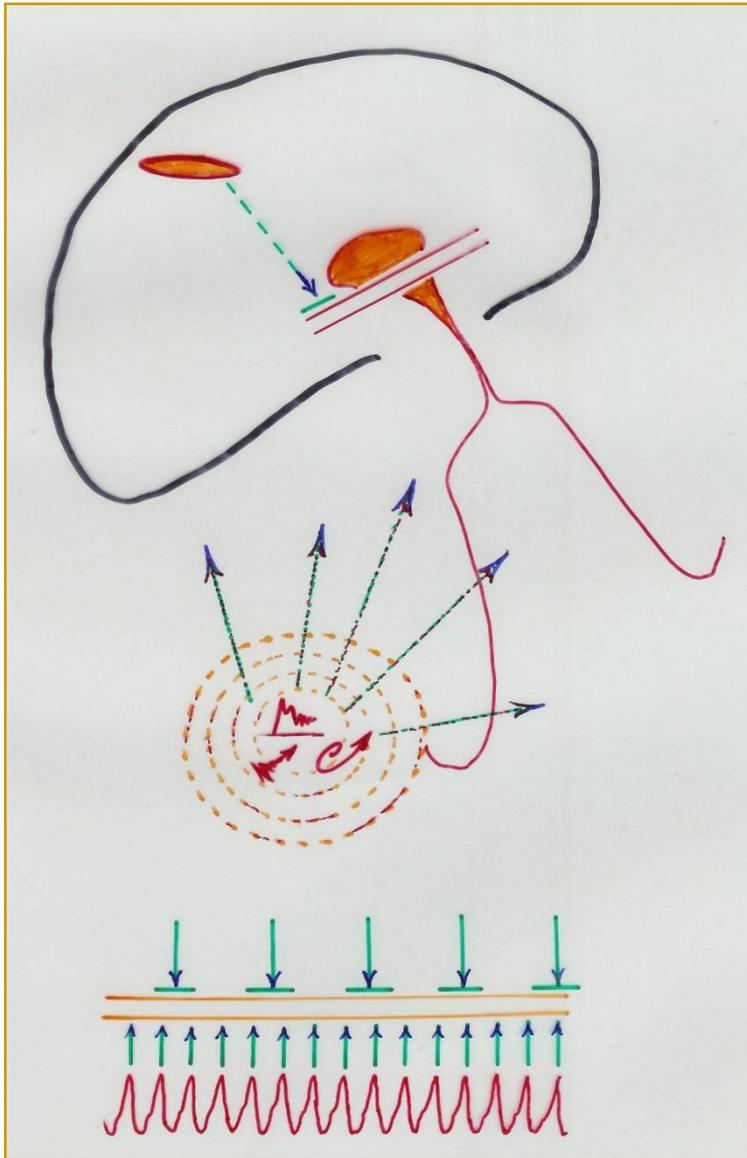
= 140 ms specificità 43-69%

> 160 ms specificità 97%



Drew BJ Scheinman MM ECG criteria to distinguish between aberrantly conducted supraventricular tachycardia and ventricular tachycardia: practical for the immediate care setting. *Pacing Clin. Electrophysiol* 1995; 18:2194-208

CRITERIO MAGGIORE

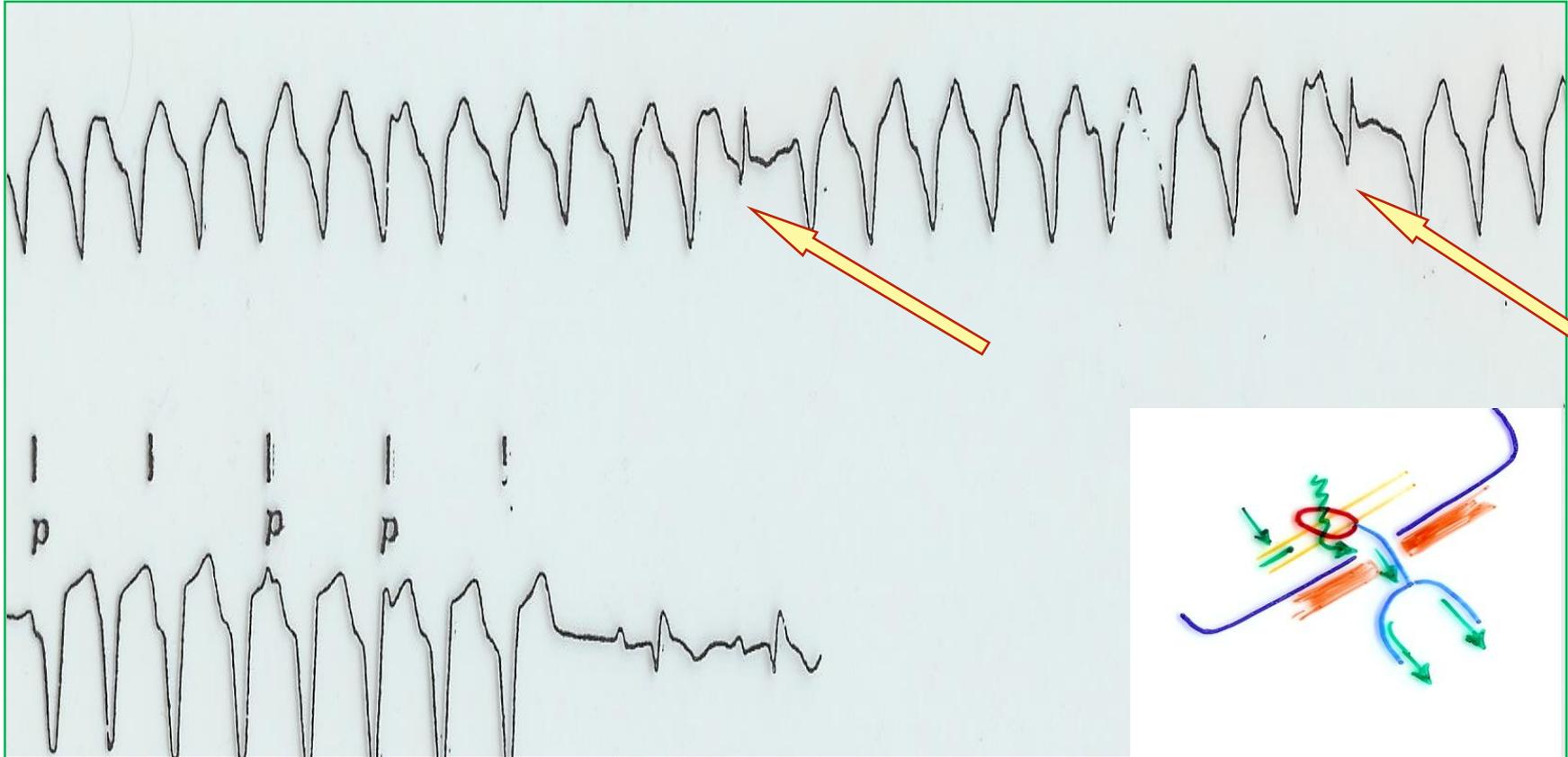


specificità 100%

eventi poco frequenti

...battiti di cattura

specificità 100%
evento poco frequente

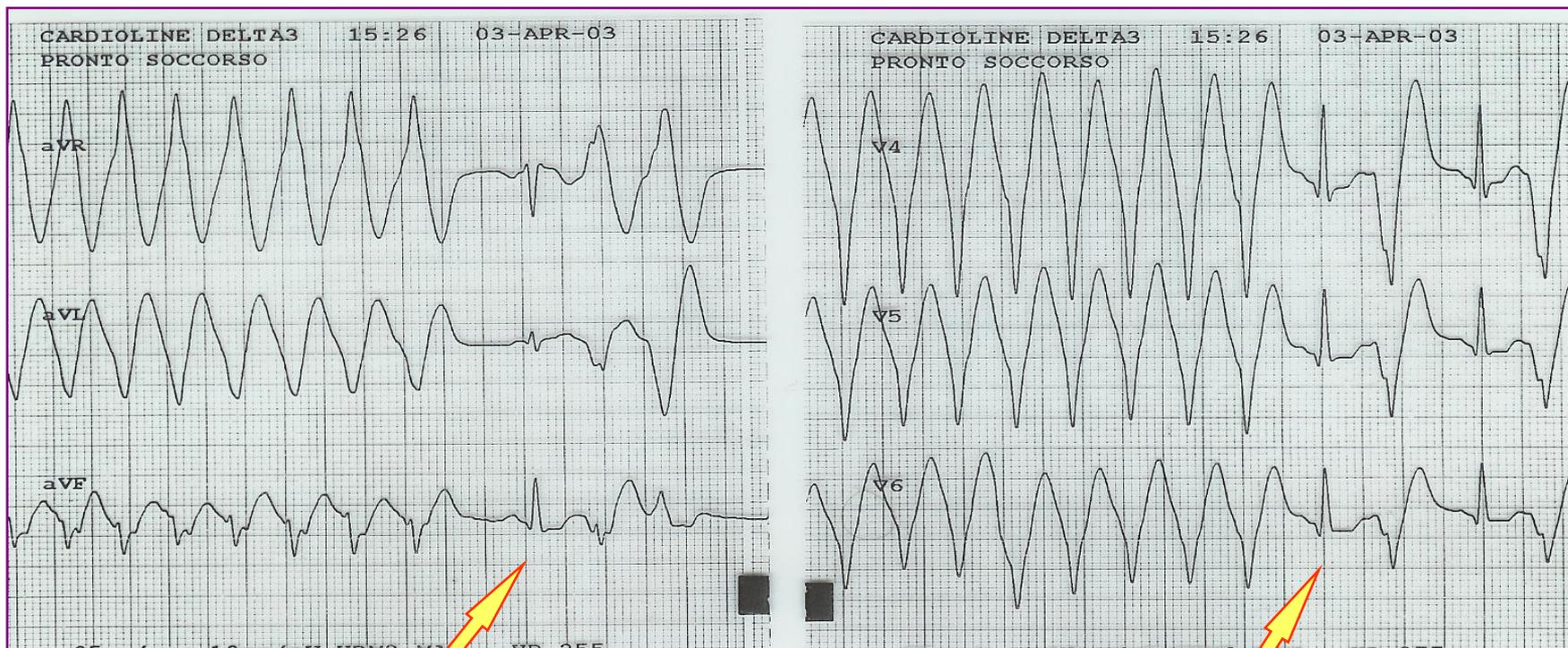


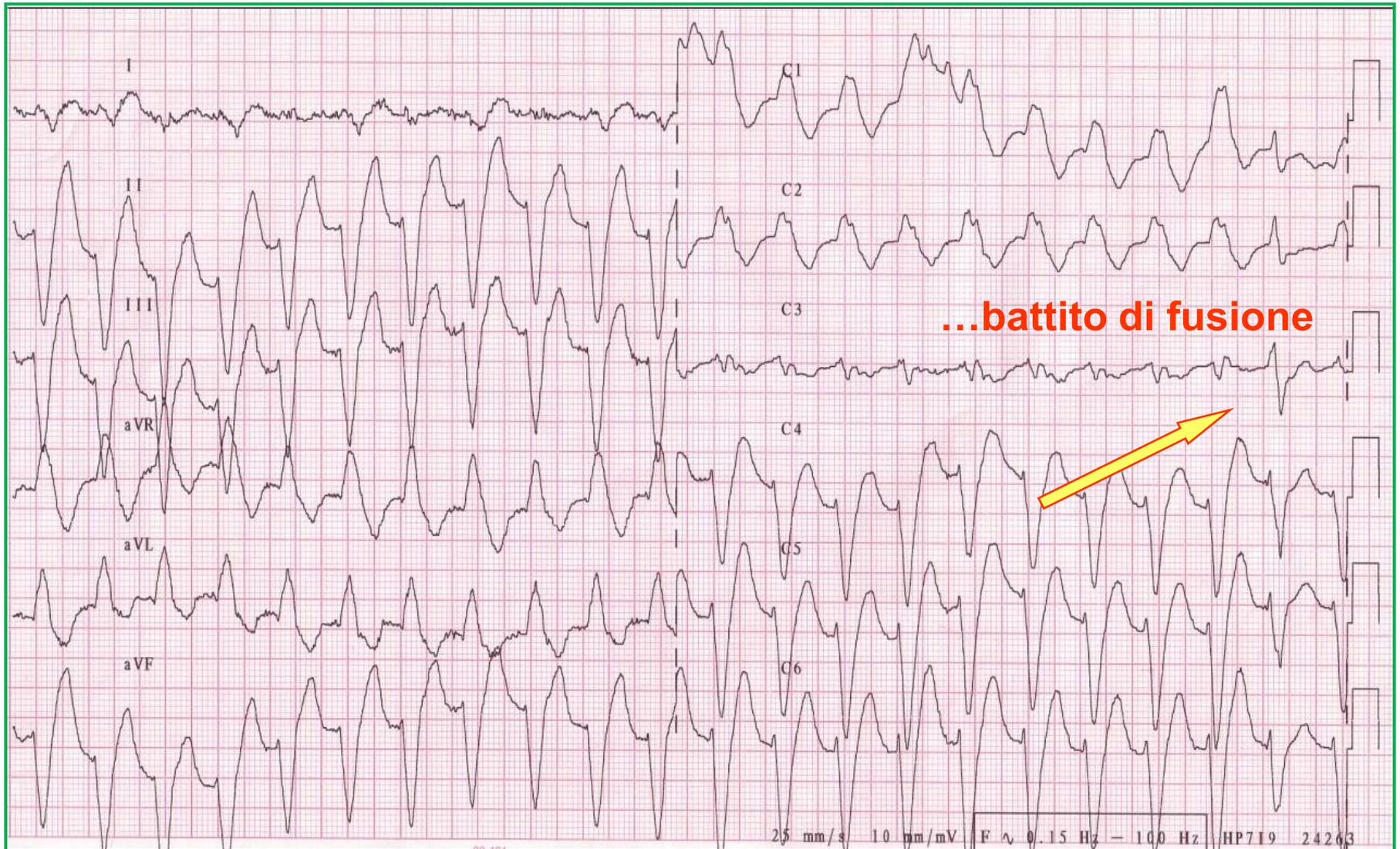
...battito di fusione

specificità 100%
evento poco frequente



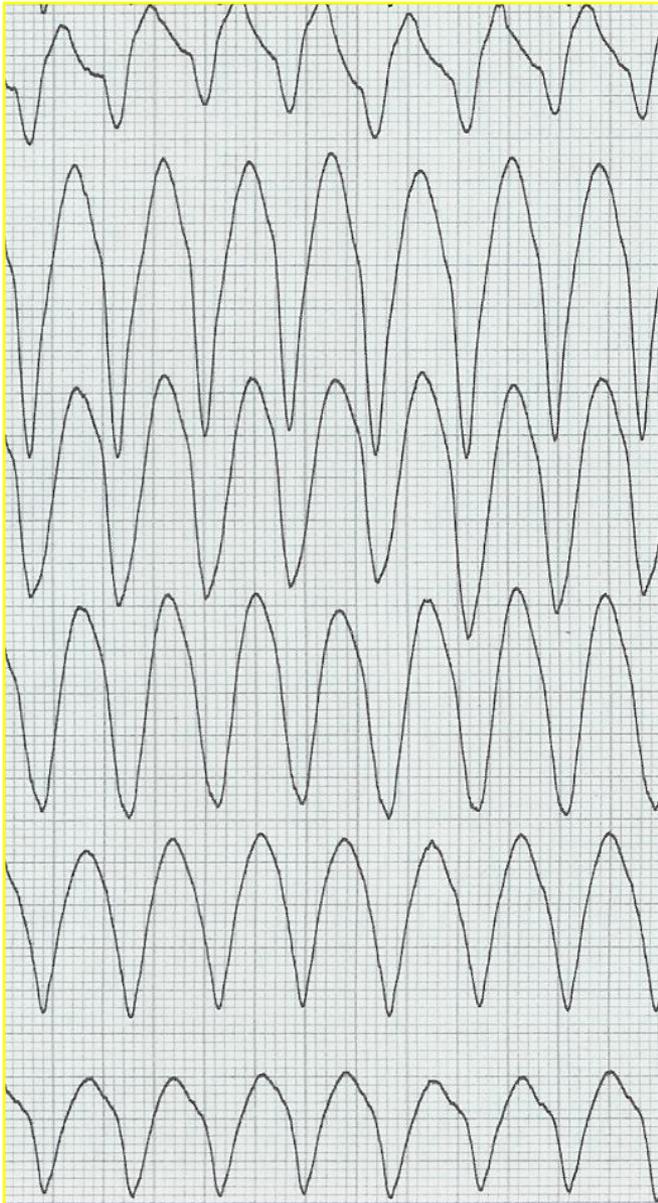
Marco F. anni 56





Piero P. anni 67

CRITERIO MAGGIORE



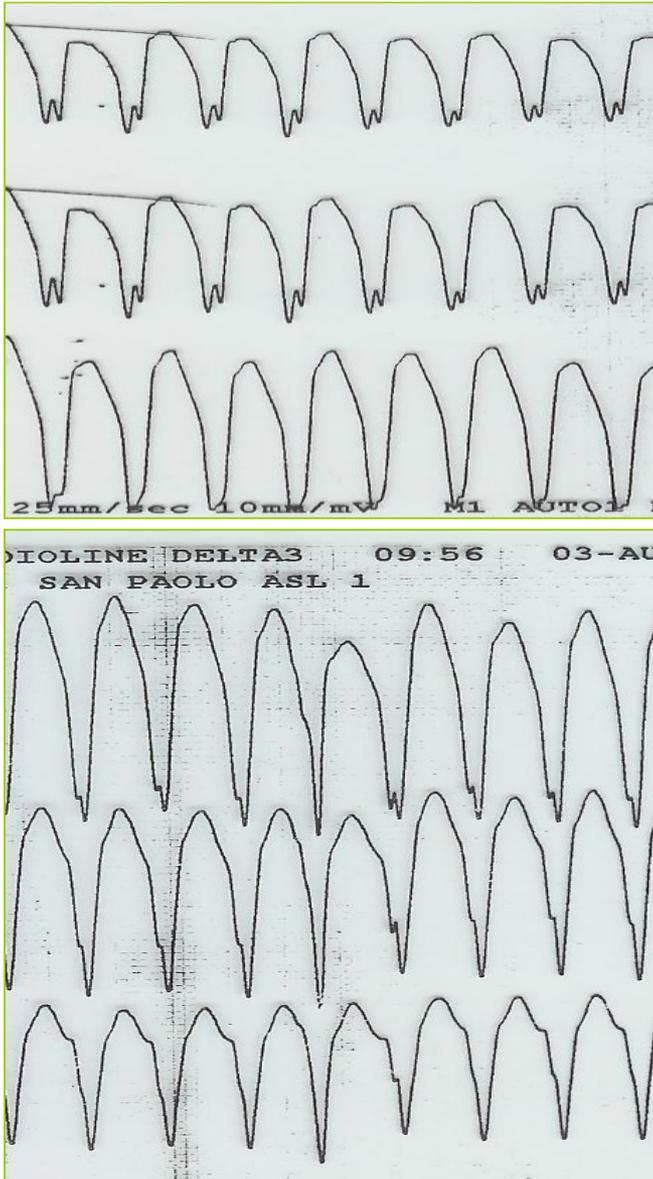
**CONCORDANZA
POSITIVA**



**presenza nelle precordiali di
complessi interamente positivi con
aspetto R MONOFASICO**

specificità 100 %

CRITERIO MAGGIORE



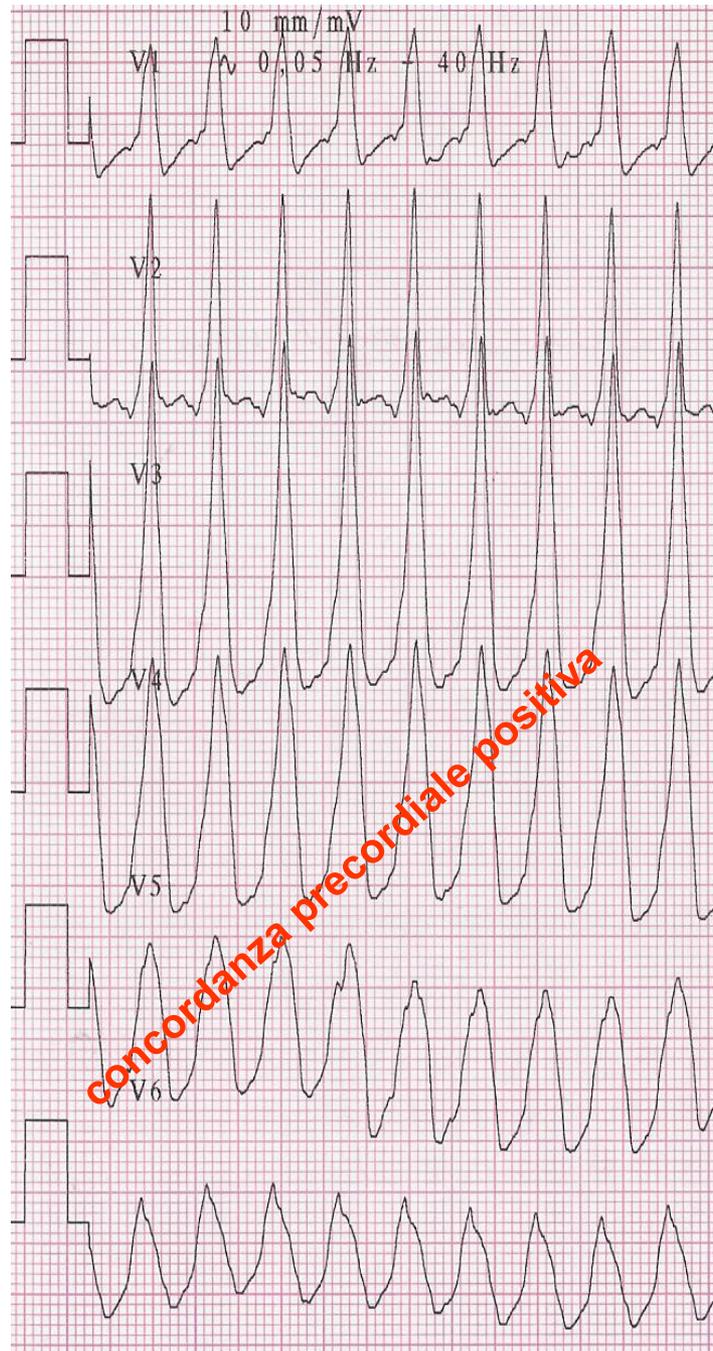
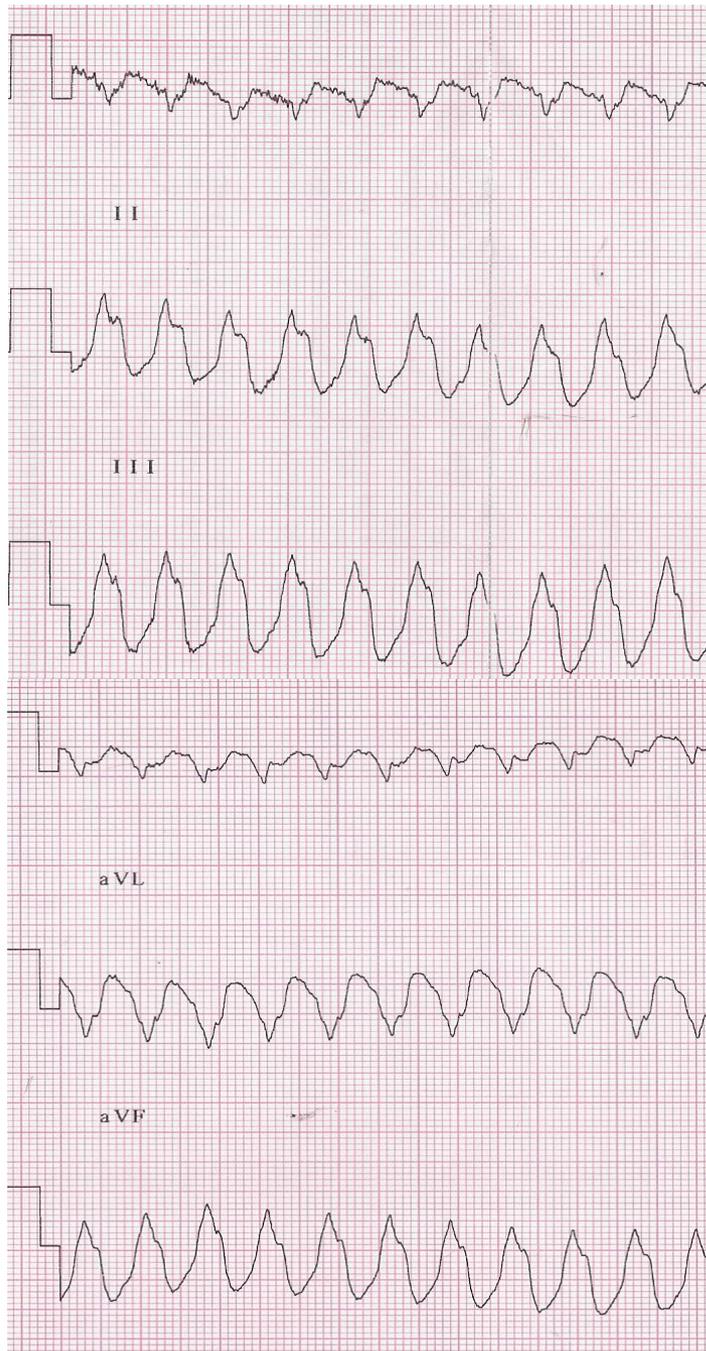
**CONCORDANZA
NEGATIVA**



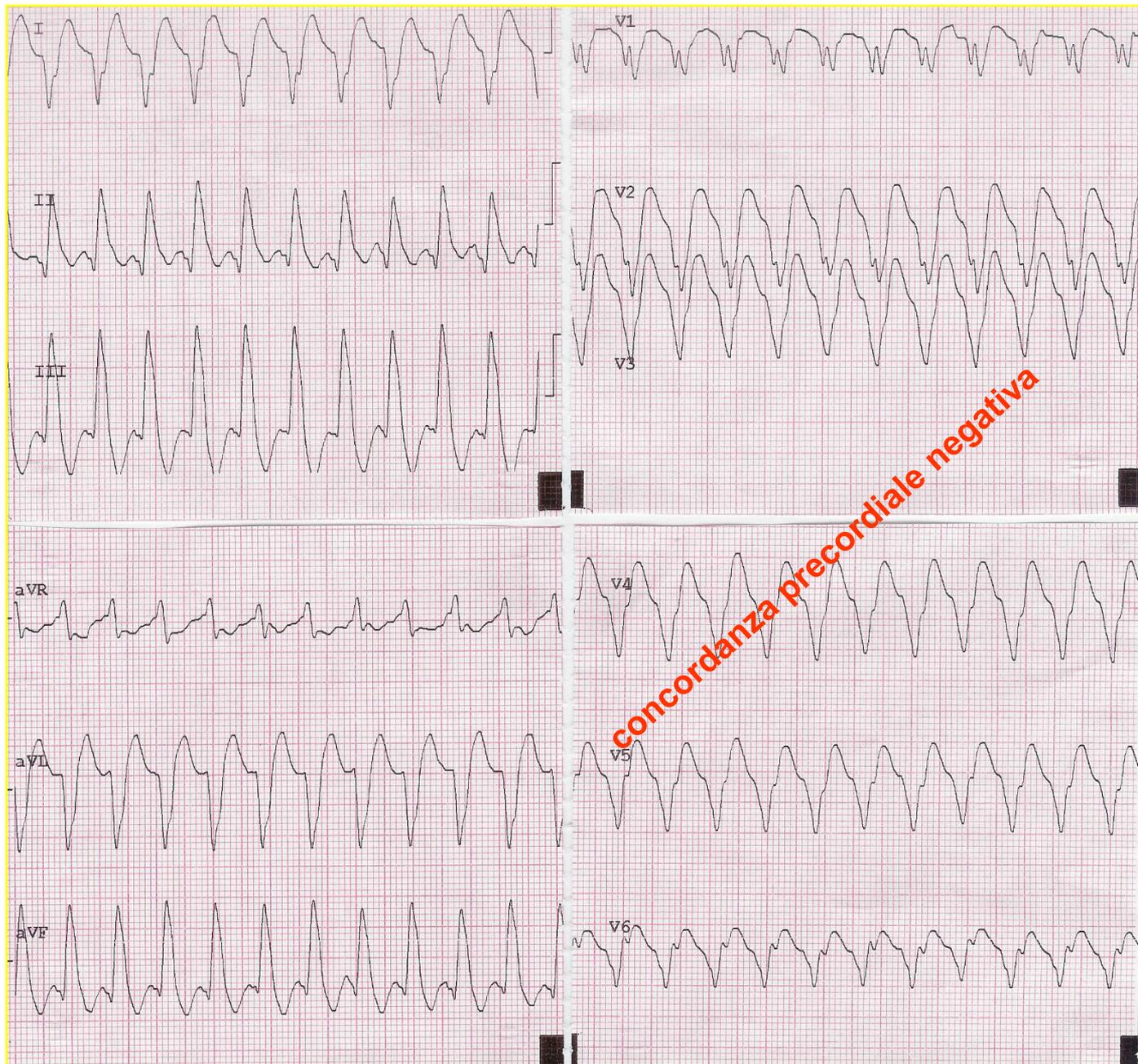
**presenza nelle precordiali di
complessi interamente negativi con
aspetto QS MONOFASICO**

specificità 100%

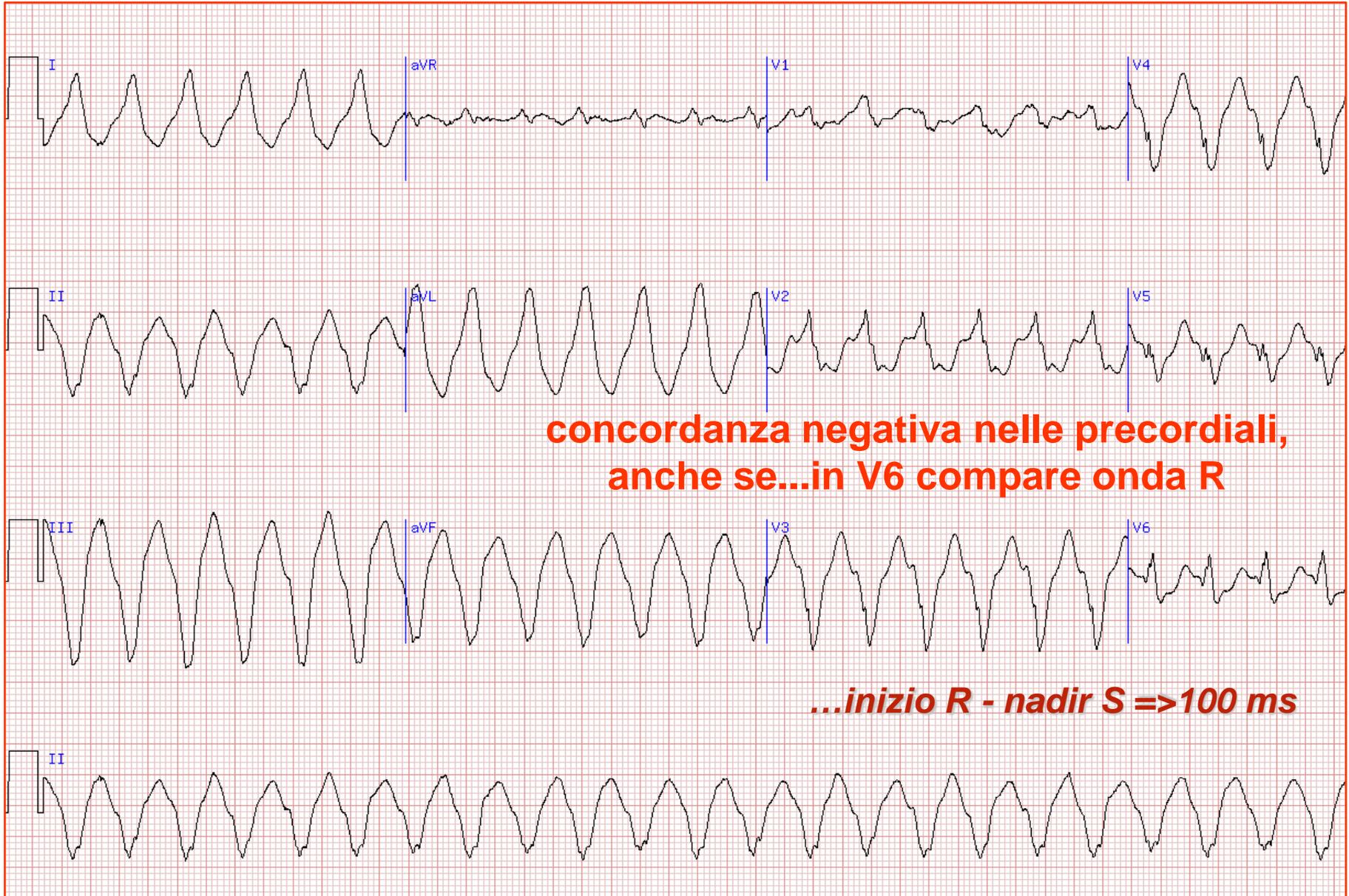
Pietro A
anni 74



Tina A
anni 83



Luca, anni 68



**concordanza negativa nelle precordiali,
anche se...in V6 compare onda R**

...inizio R - nadir S => 100 ms

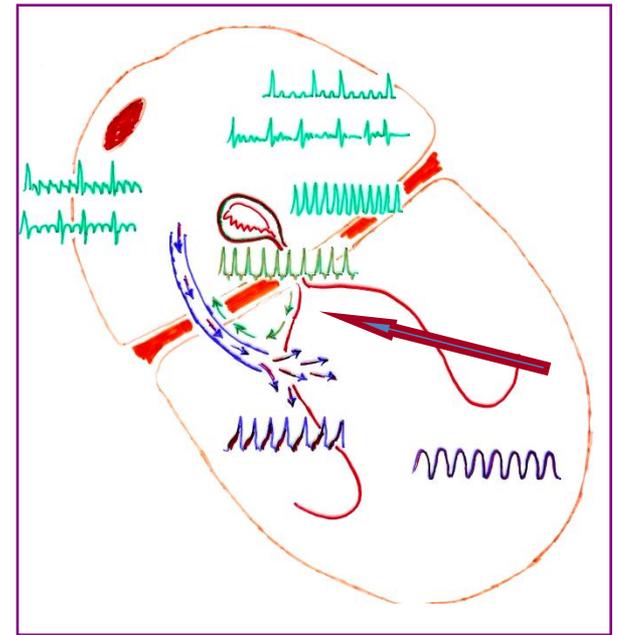
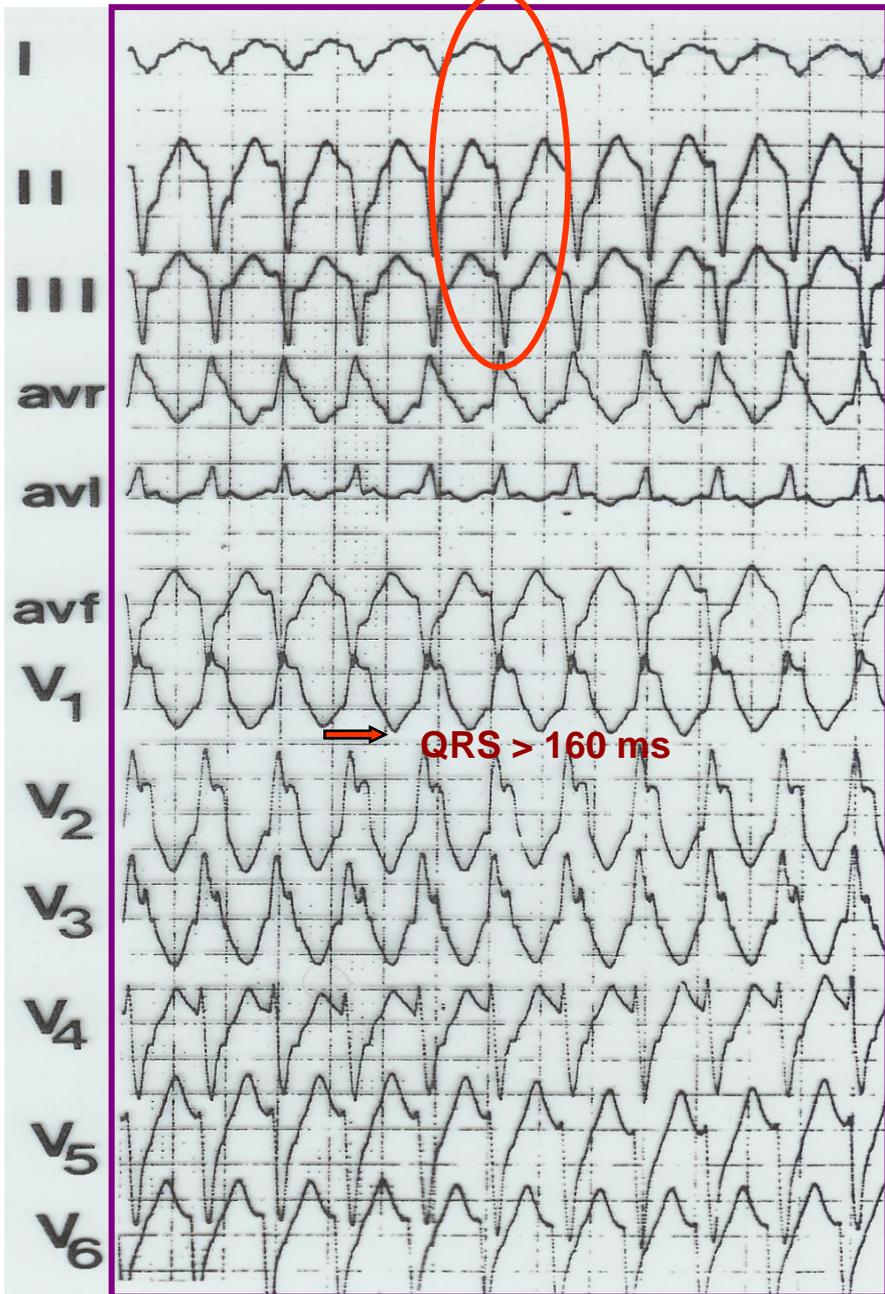
CRITERIO MAGGIORE

ASSE ELETTRICO ... e TV

MAI... *se asse compreso tra -15° e $+90^\circ$*

CERTA... *se deviazione assiale molto a dx tra -120° +/- 180*

concordanza negativa I-II-III

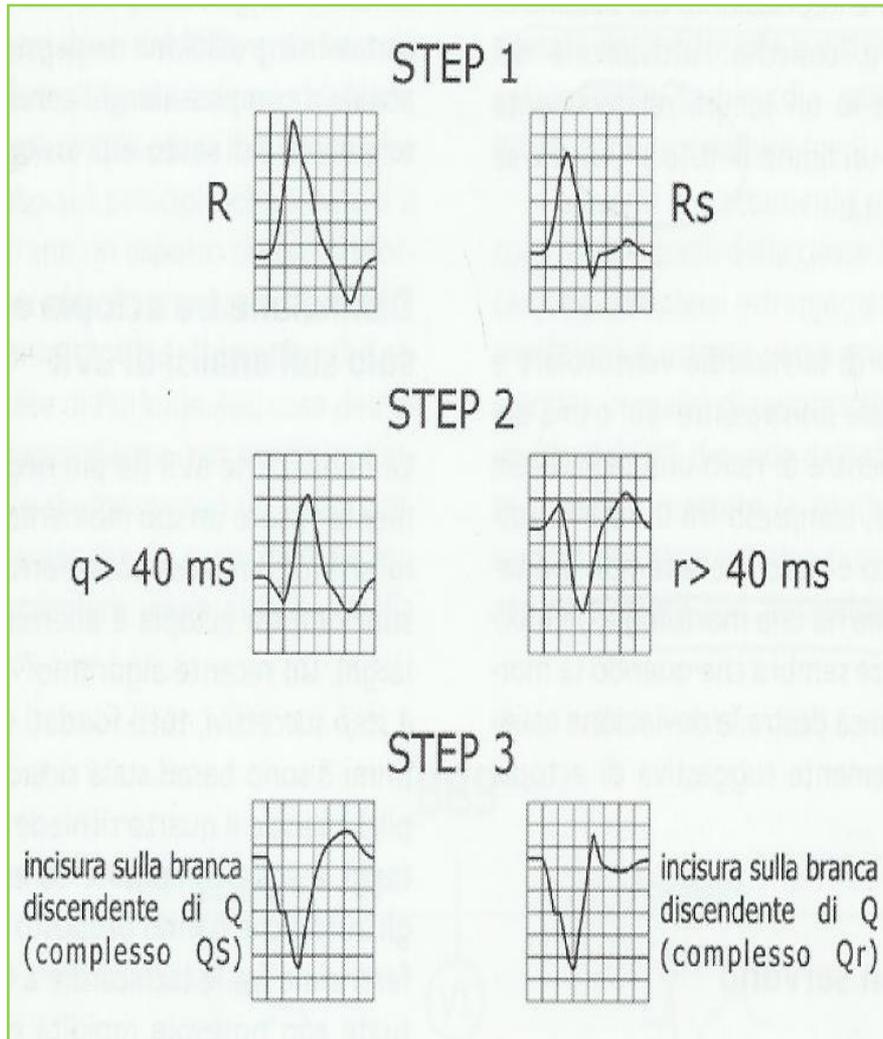


Sensibilità 36% Specificità 97%

Giulio anni 69

CRITERIO MAGGIORE

Algoritmo di Verecke ...analisi morfologica in aVR



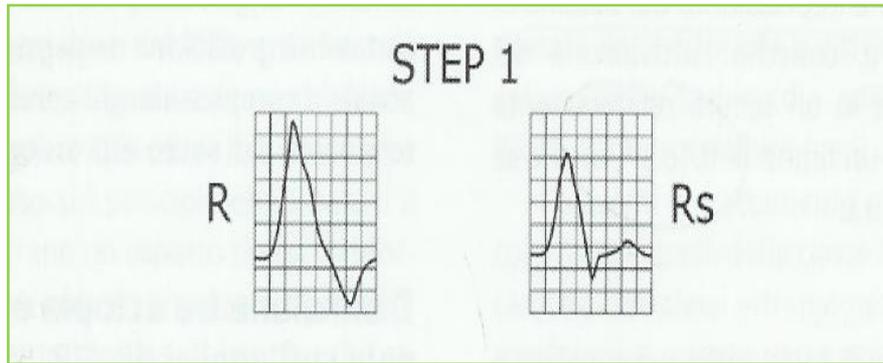
onda R iniziale dominante
sensibilità 38.9% specificità 98.2%

onda Q o R iniziale di durata >40ms
sensibilità 28.8% specificità 91.8%

incisura sulla branca discendente di onda QS o Qr
sensibilità 19.9% specificità 95.5%

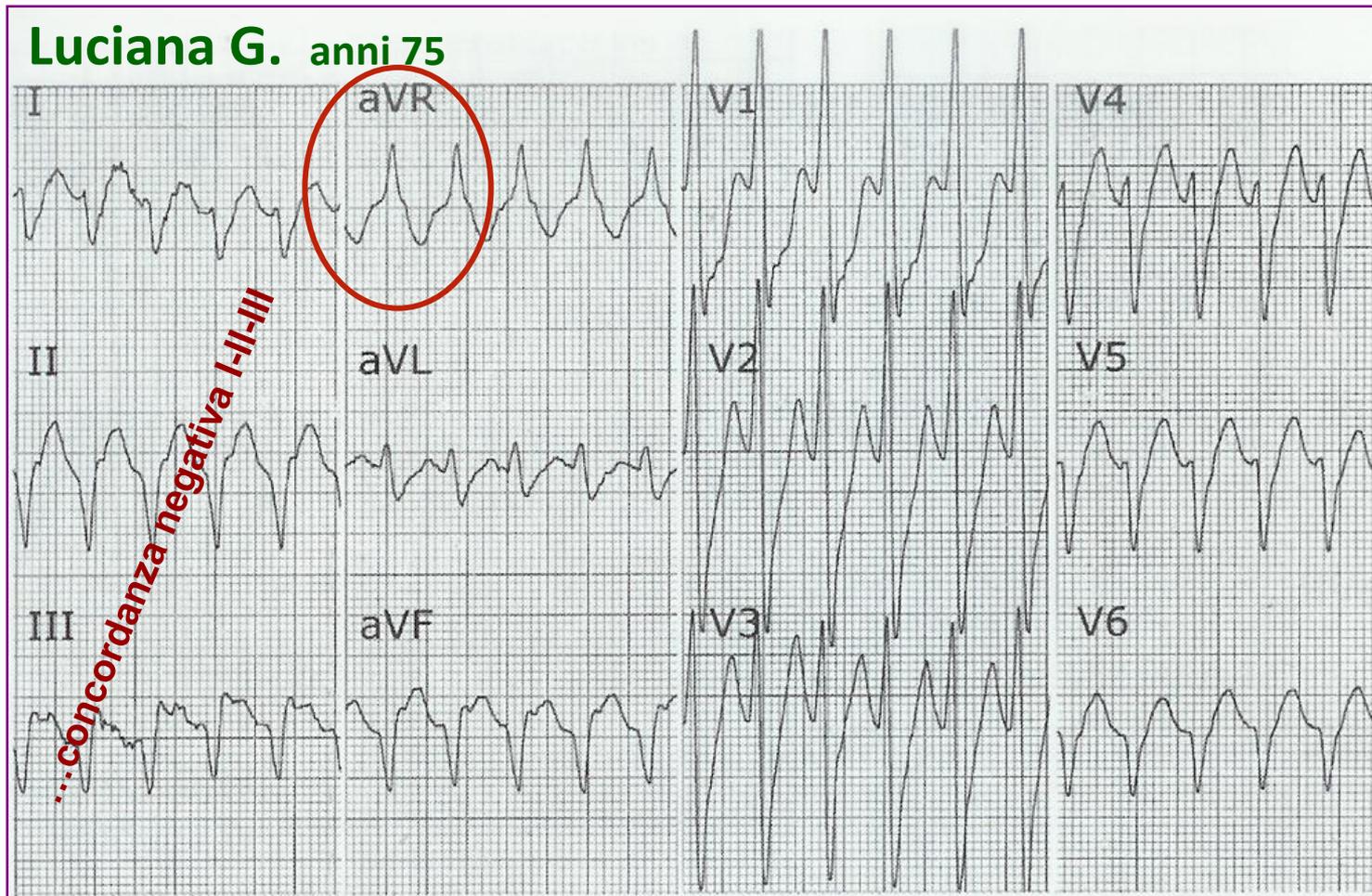
CRITERIO MAGGIORE

Algoritmo di Verecke ...analisi morfologica in aVR



onda R iniziale dominante
sensibilità 38.9% specificità 98.2%

... rispettato l' algoritmo di Vereckei
in aVR onda R iniziale dominante



CRITERIO MAGGIORE ...di Brugada

criteri morfologici nelle precordiali

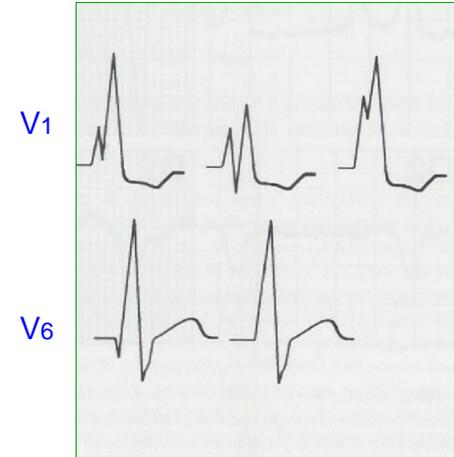
specificità 84-100%

morfologia tipo blocco di branca destra

ECTOPIA

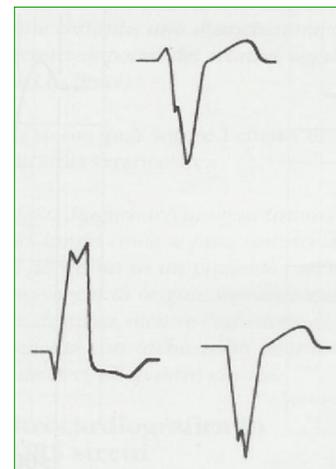


ABERRANZA

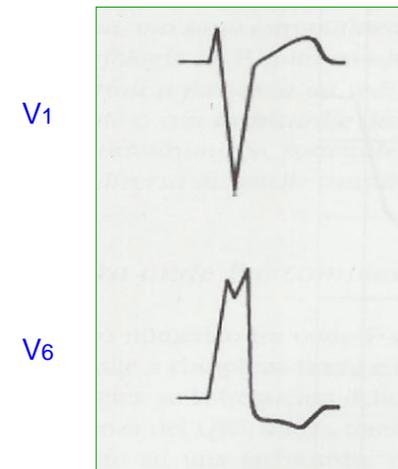


morfologia tipo blocco di branca sinistra

ECTOPIA



ABERRANZA



morfologia tipo blocco di branca destra

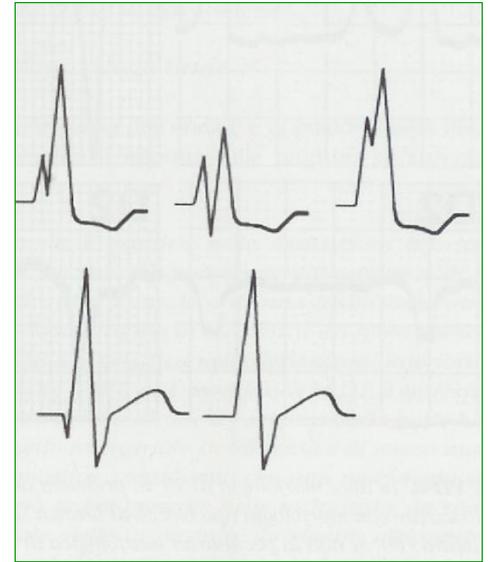
ECTOPIA

ABERRANZA



V1

V6



BBD
 $R < R'$

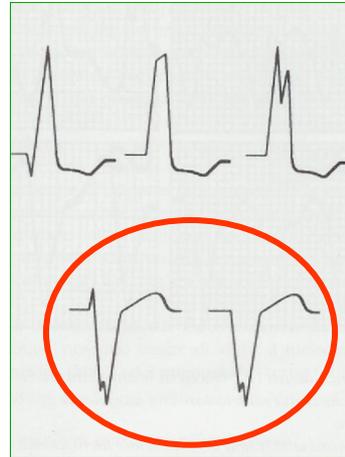
TSV e BBD
 $R < R'$

TV
 $R > R'$

The figure shows three ECG strips with rabbit images and arrows. The first strip (BBD) has a blue arrow pointing down to a rabbit image on the left. The second strip (TSV e BBD) has a red arrow pointing down to a rabbit image on the right. The third strip (TV) has a red arrow pointing down to a rabbit image on the right. The ECG strips show different QRS morphologies: BBD shows a small R and a large R', TSV e BBD shows a small R and a large R', and TV shows a large R and a small R'.

morfologia tipo blocco di branca destra

ECTOPIA

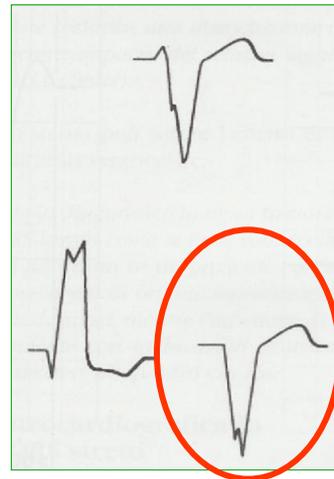


ABERRANZA

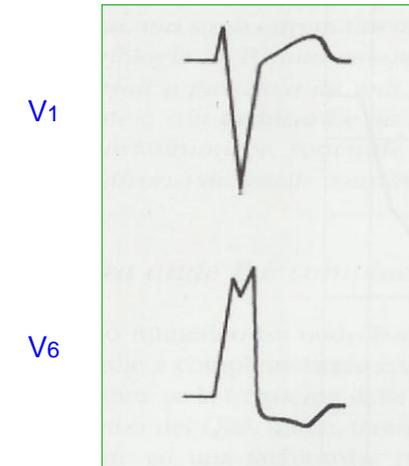


morfologia tipo blocco di branca sinistra

ECTOPIA



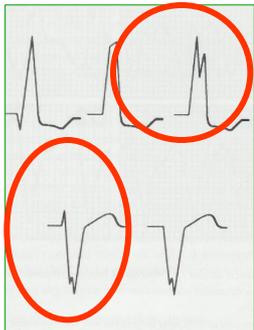
ABERRANZA



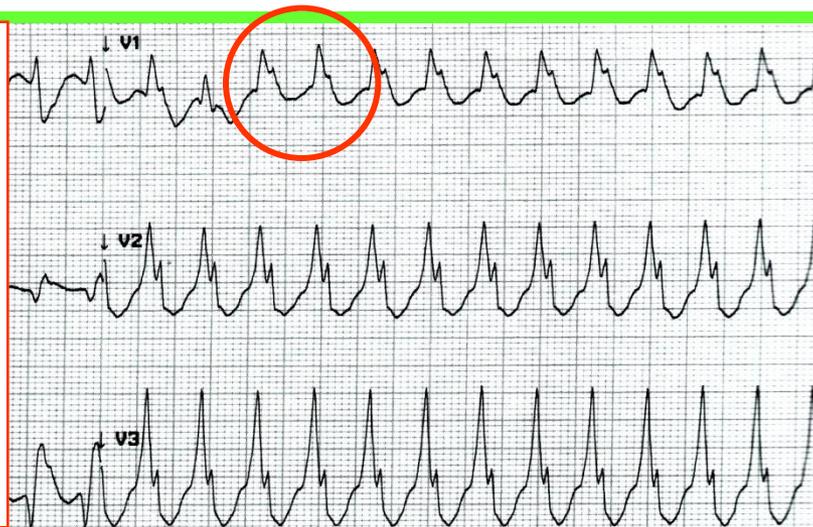
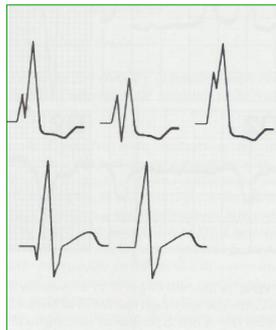
Cecilia anni 78 in P.S. per malessere generale
durante l'osservazione clinica improvvisa perdita di coscienza:

morfologia tipo blocco di branca destra

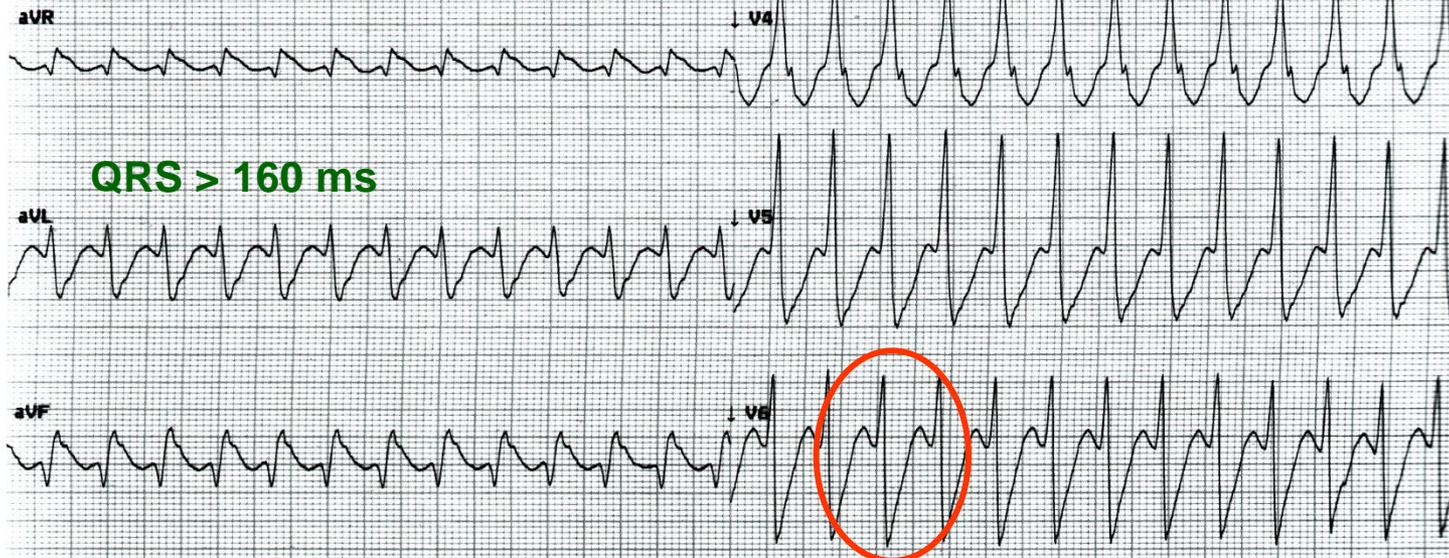
ECTOPIA



ABERRANZA

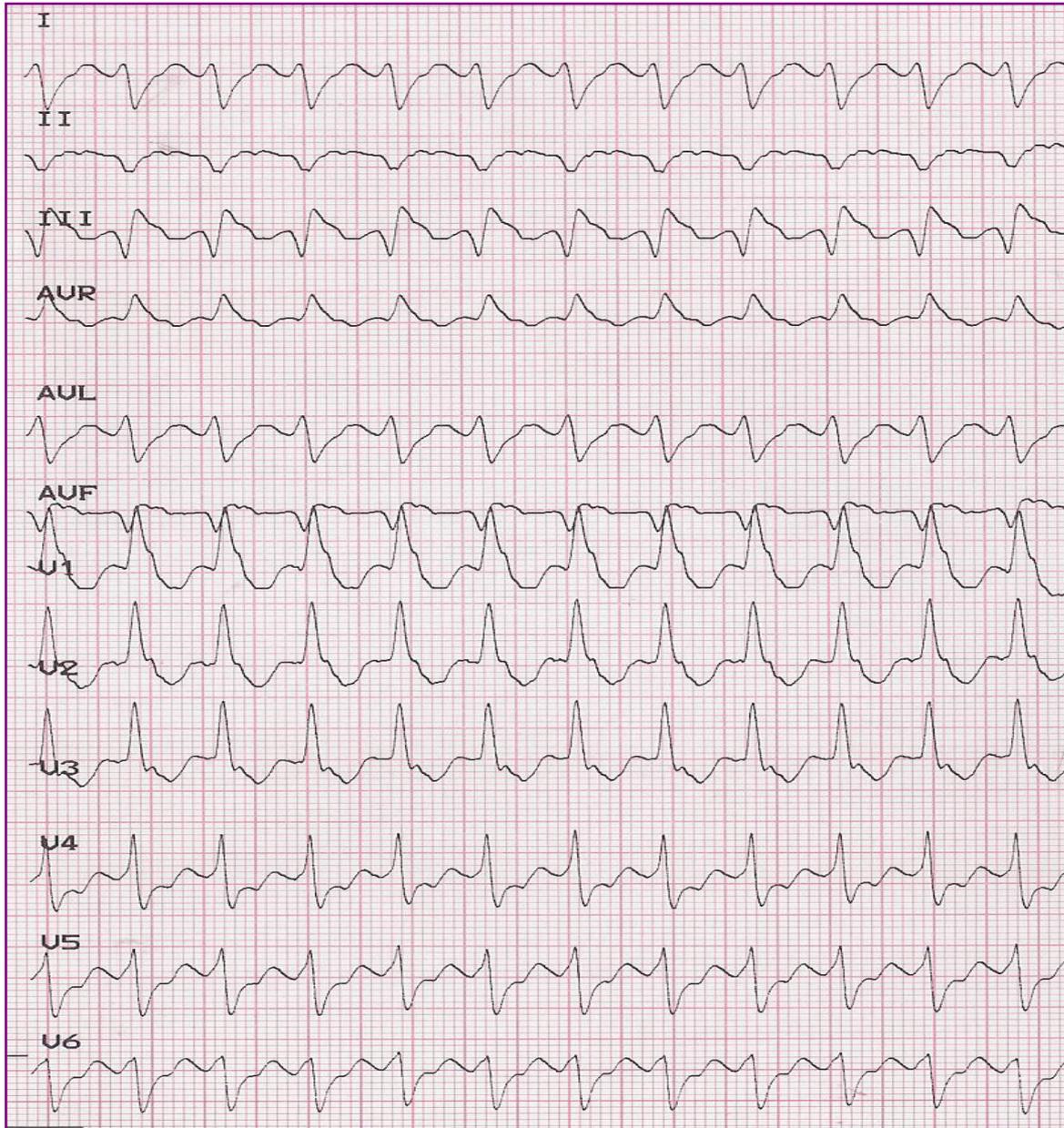


Brugada



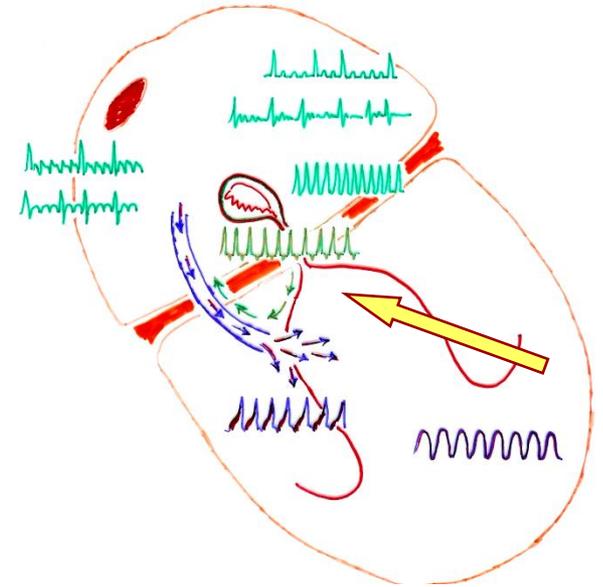
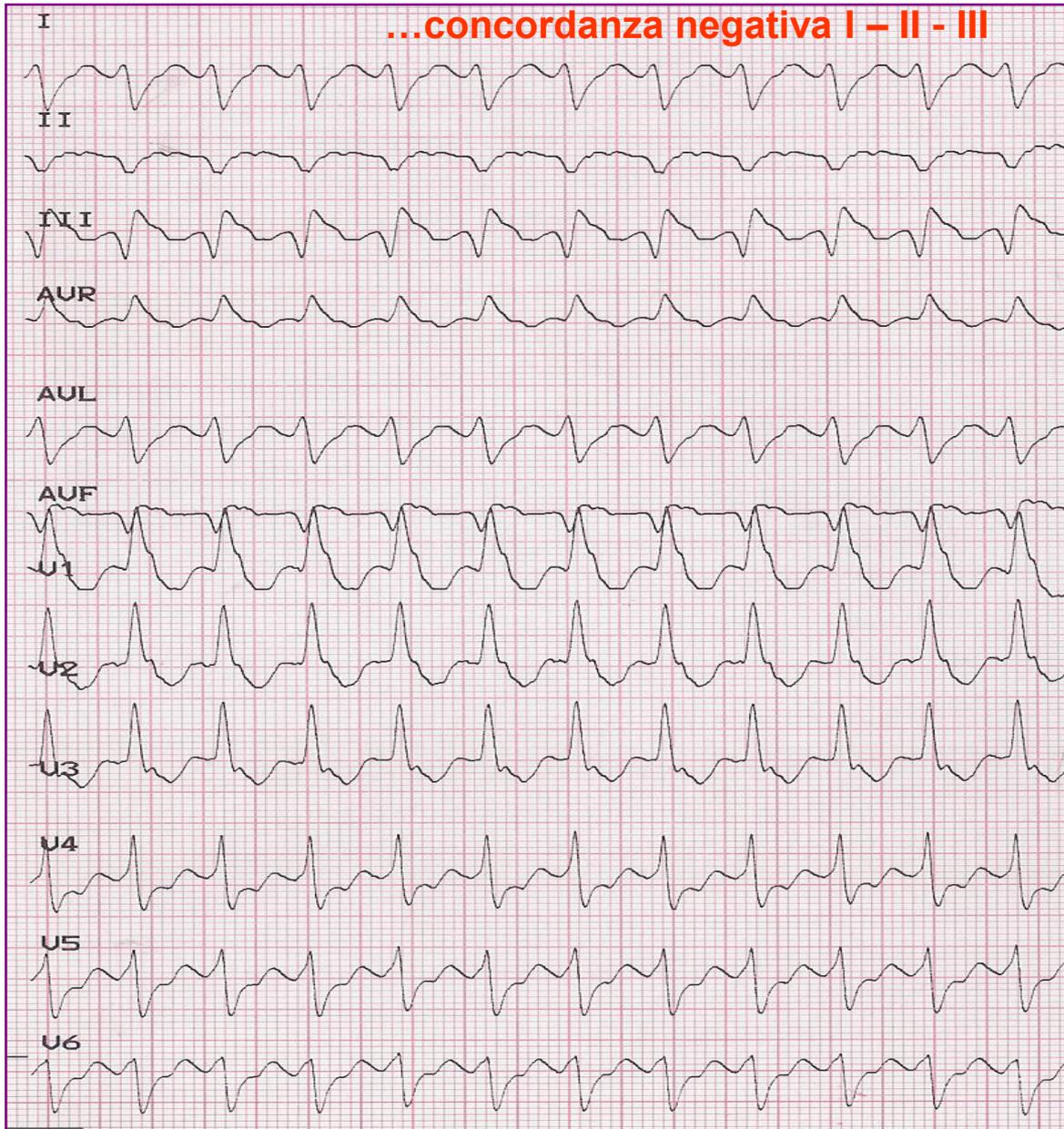
QRS > 160 ms

Roberto anni 67 durante NSTEMI

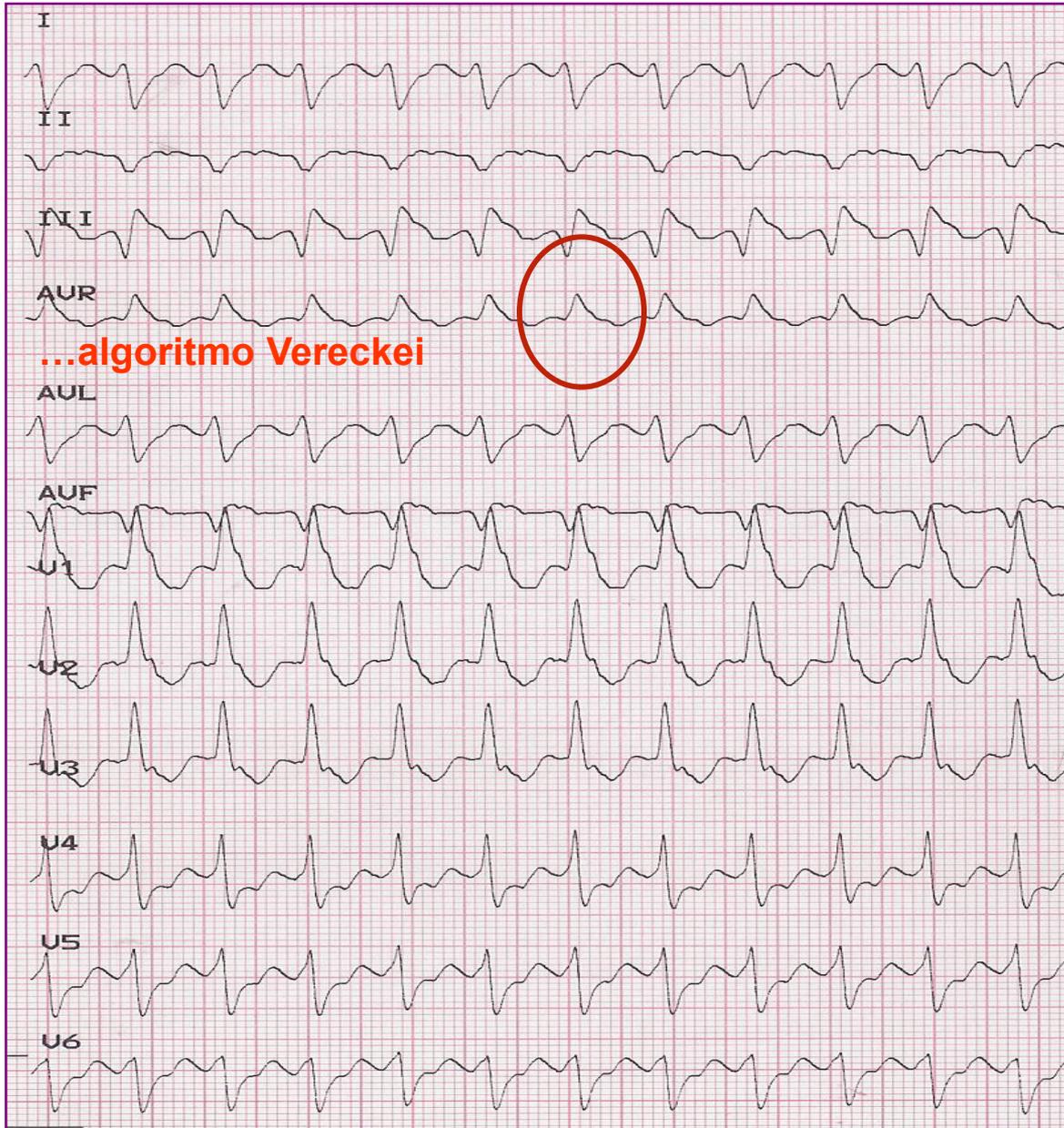


Pratica, senza benefici,
Verapamil 10 mg in vena poi
Adenosina 6 mg + 12 mg

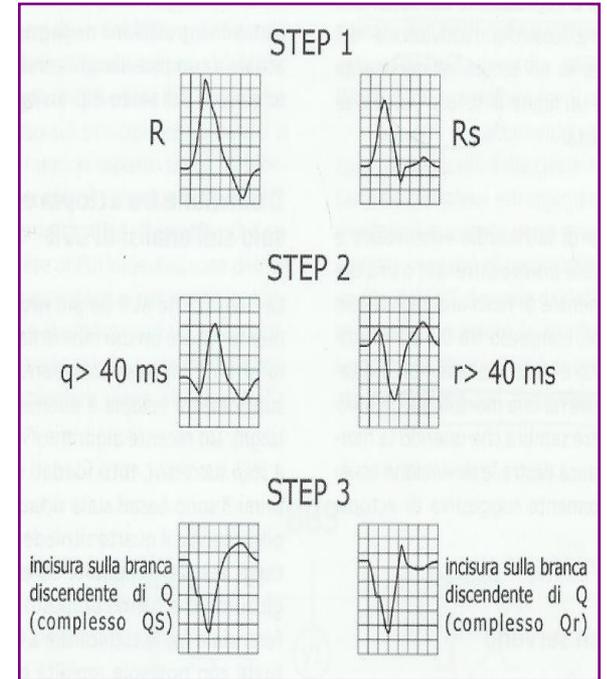
Roberto anni 67 durante NSTEMI



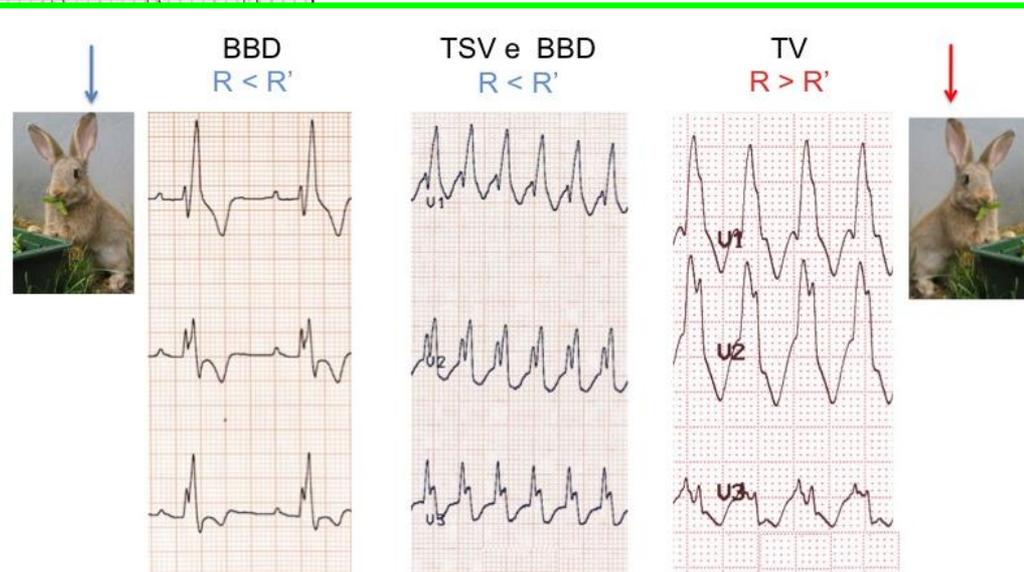
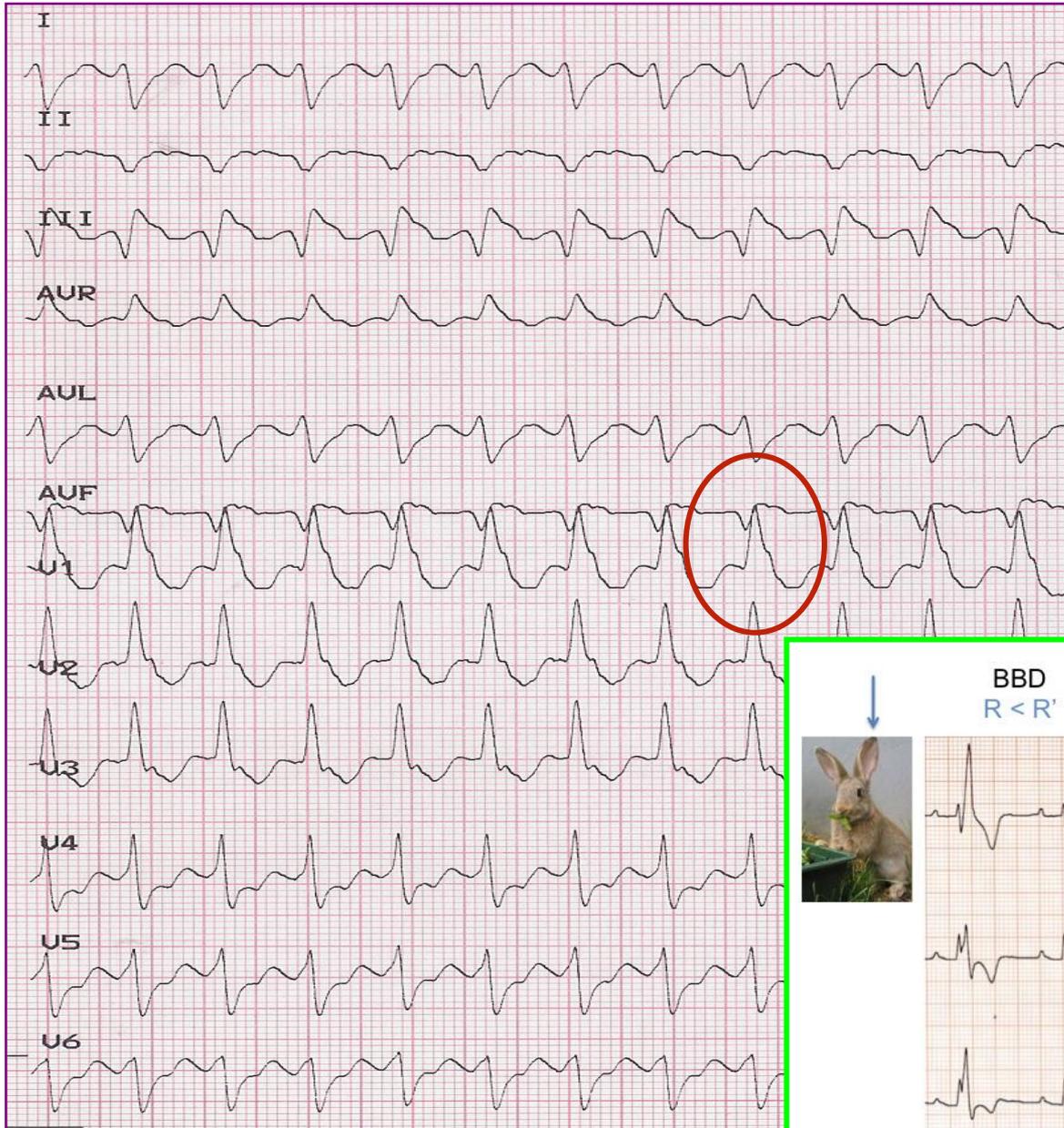
Roberto anni 67 durante NSTEMI



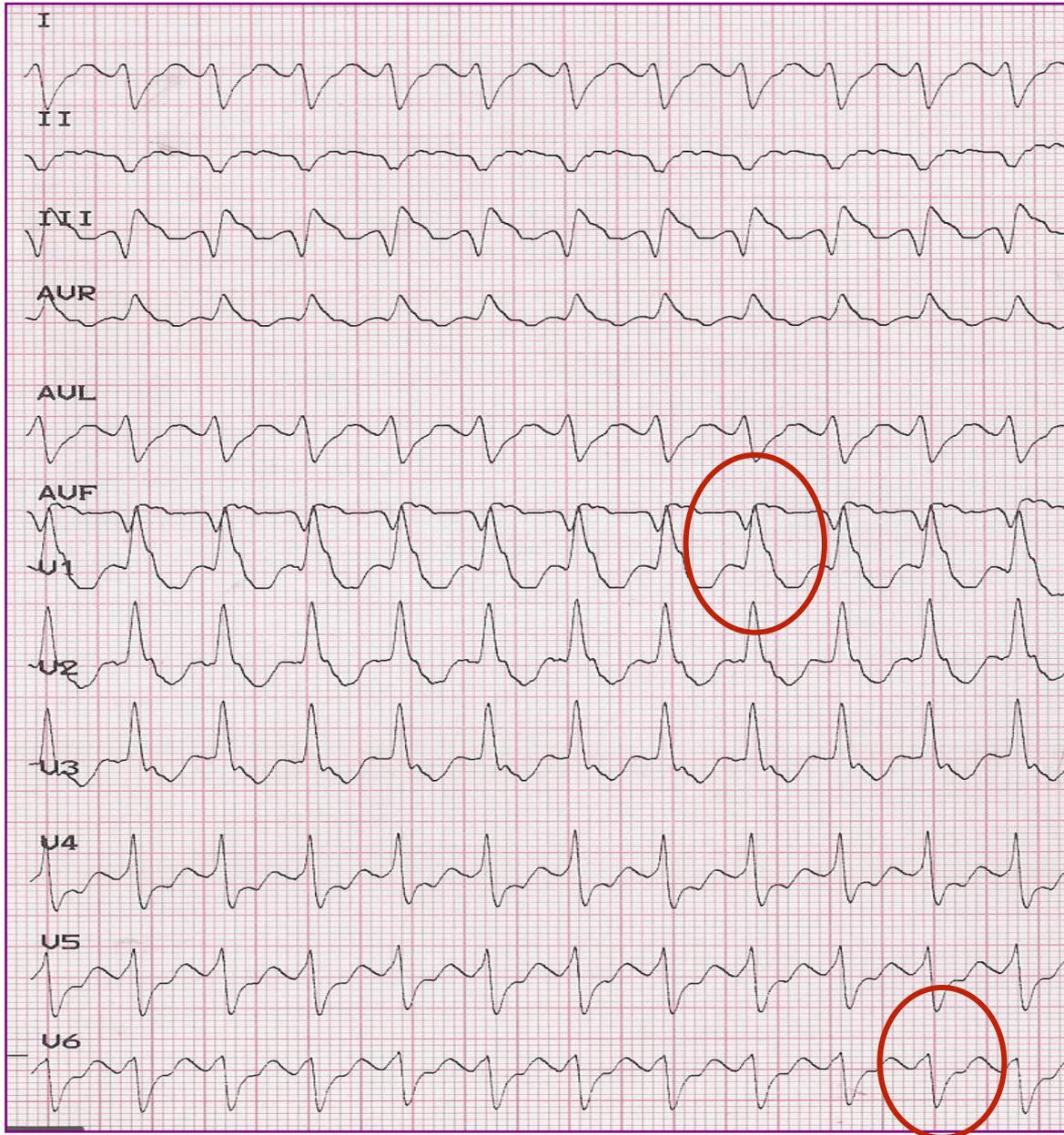
...algoritmo Verecke



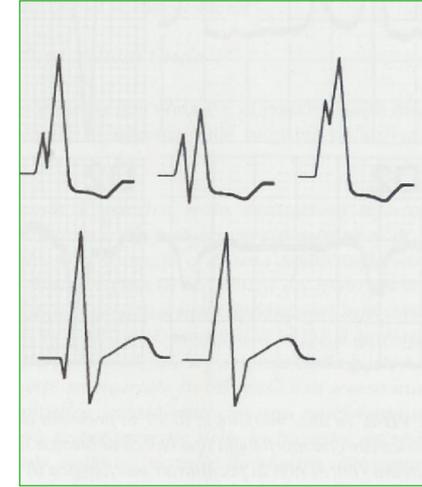
Roberto anni 67 durante NSTEMI



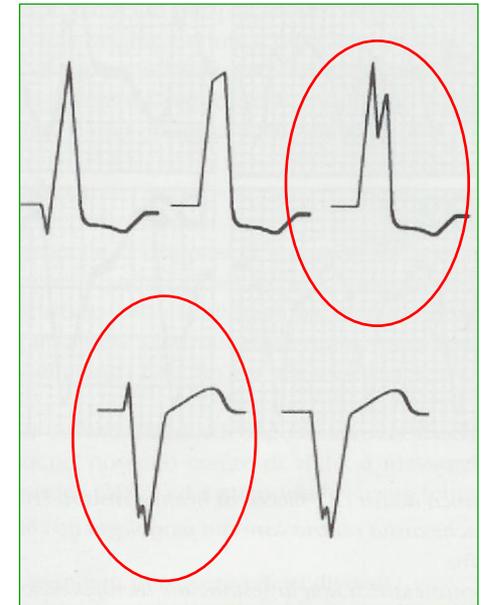
Roberto anni 67 durante NSTEMI



ABERRANZA



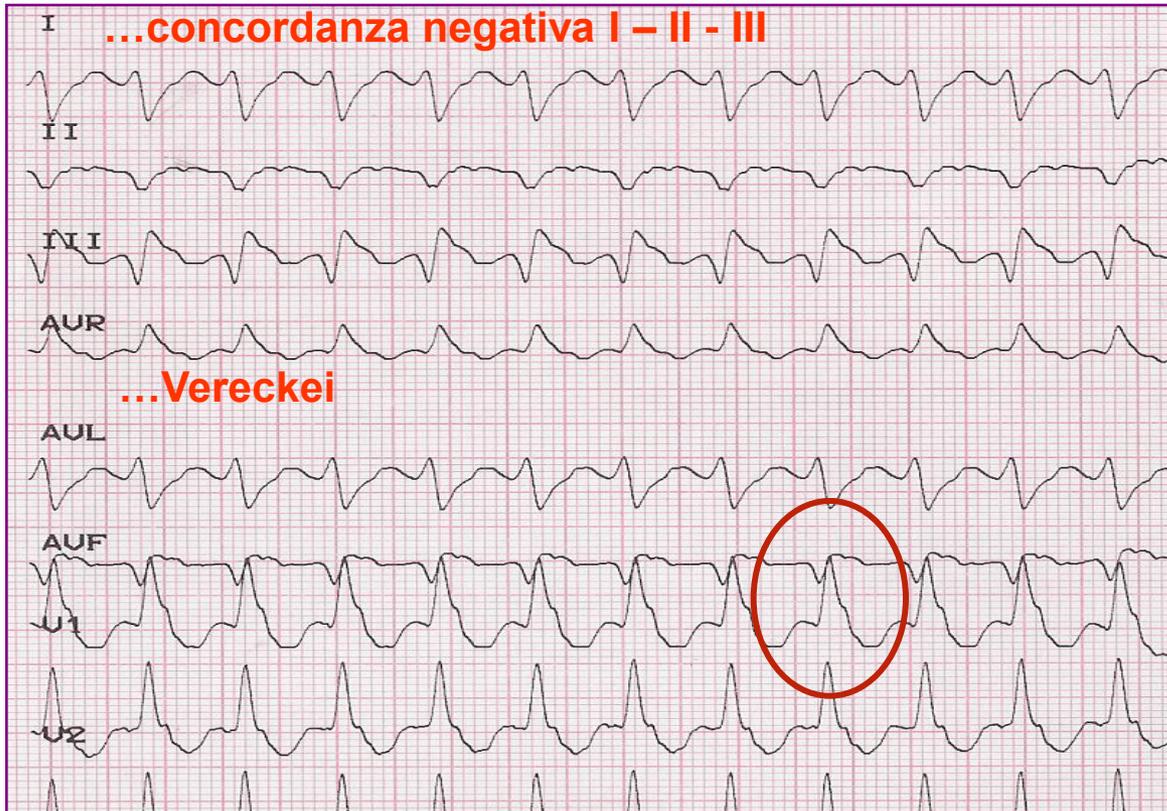
ECTOPIA



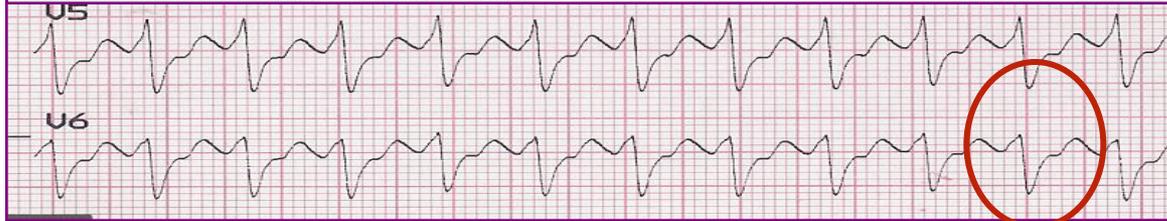
V1

V6

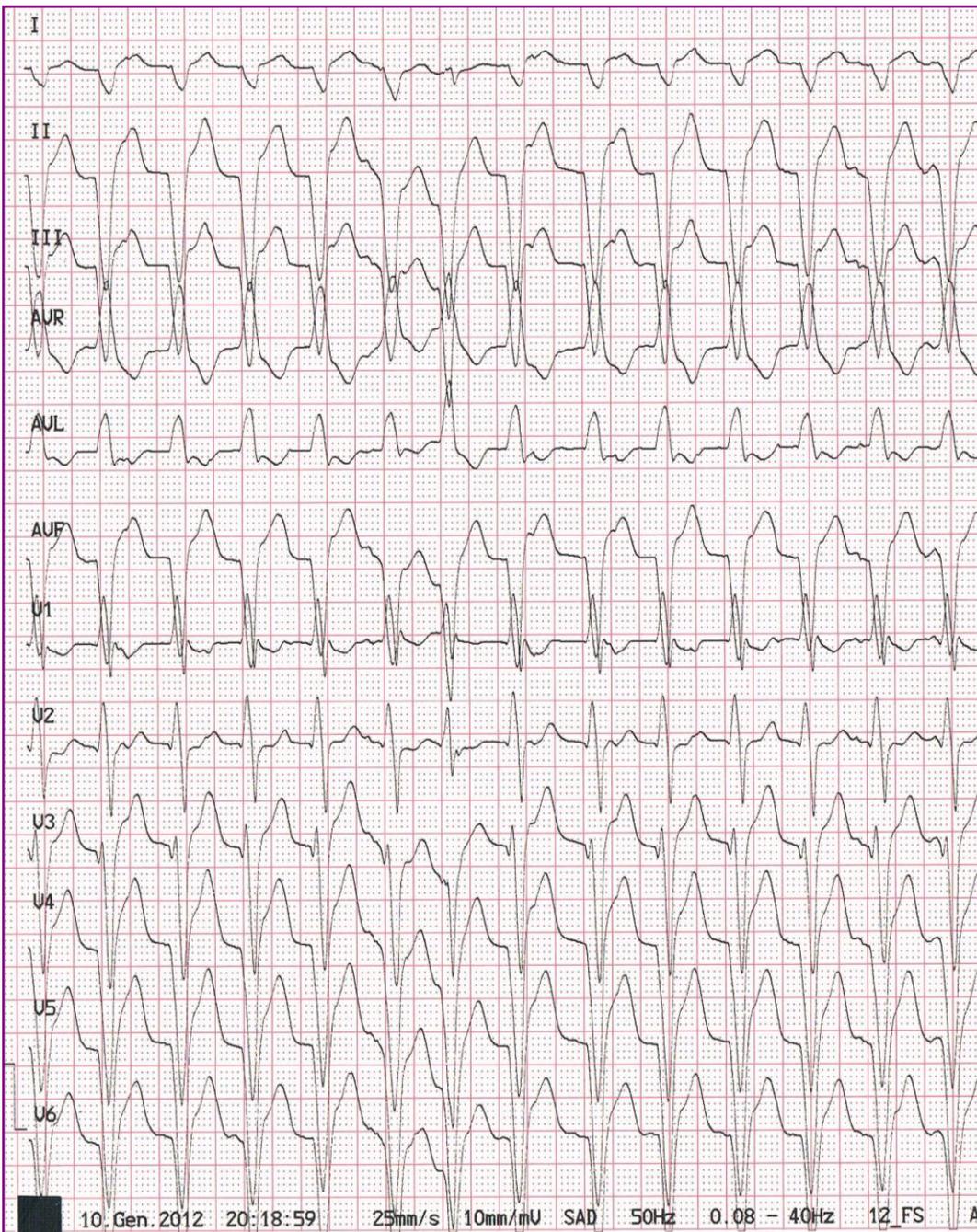
Roberto anni 67 durante NSTEMI



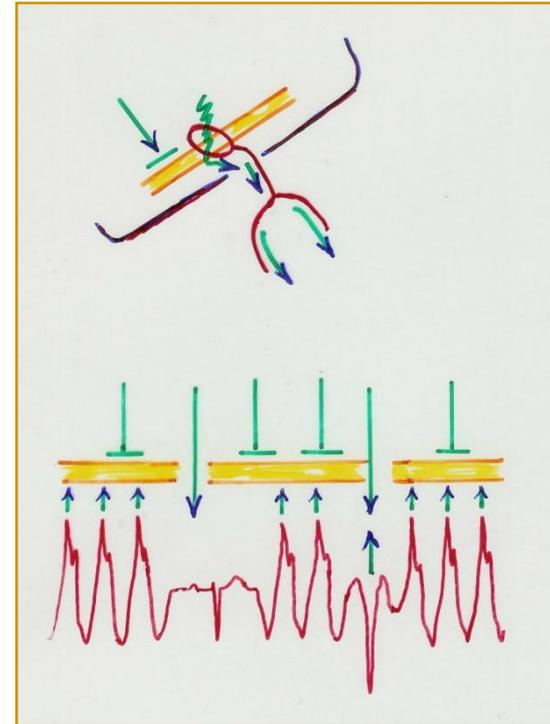
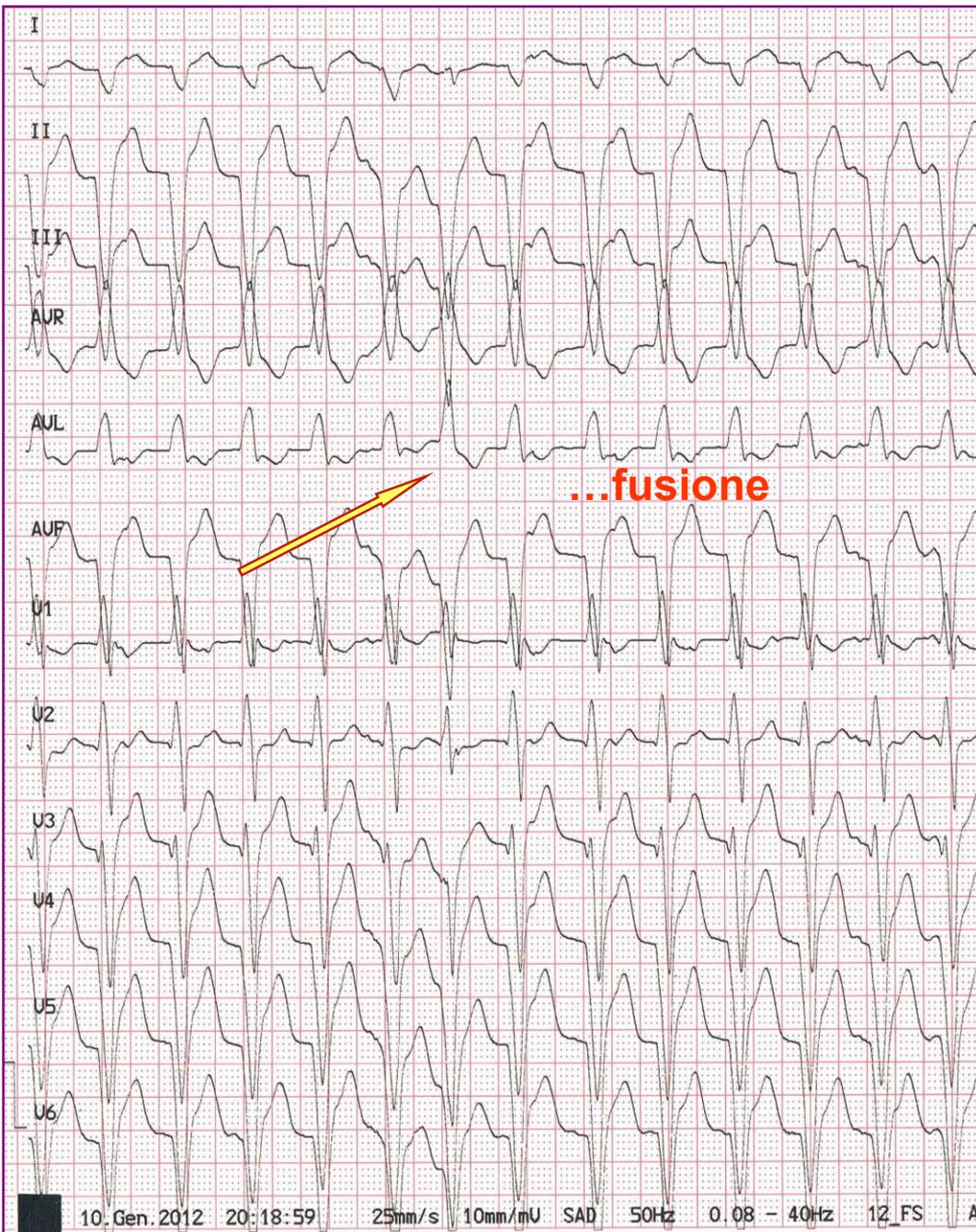
...è una TV !



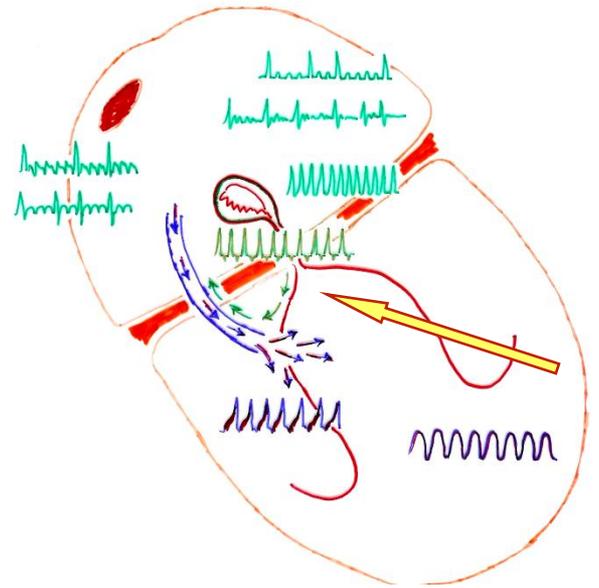
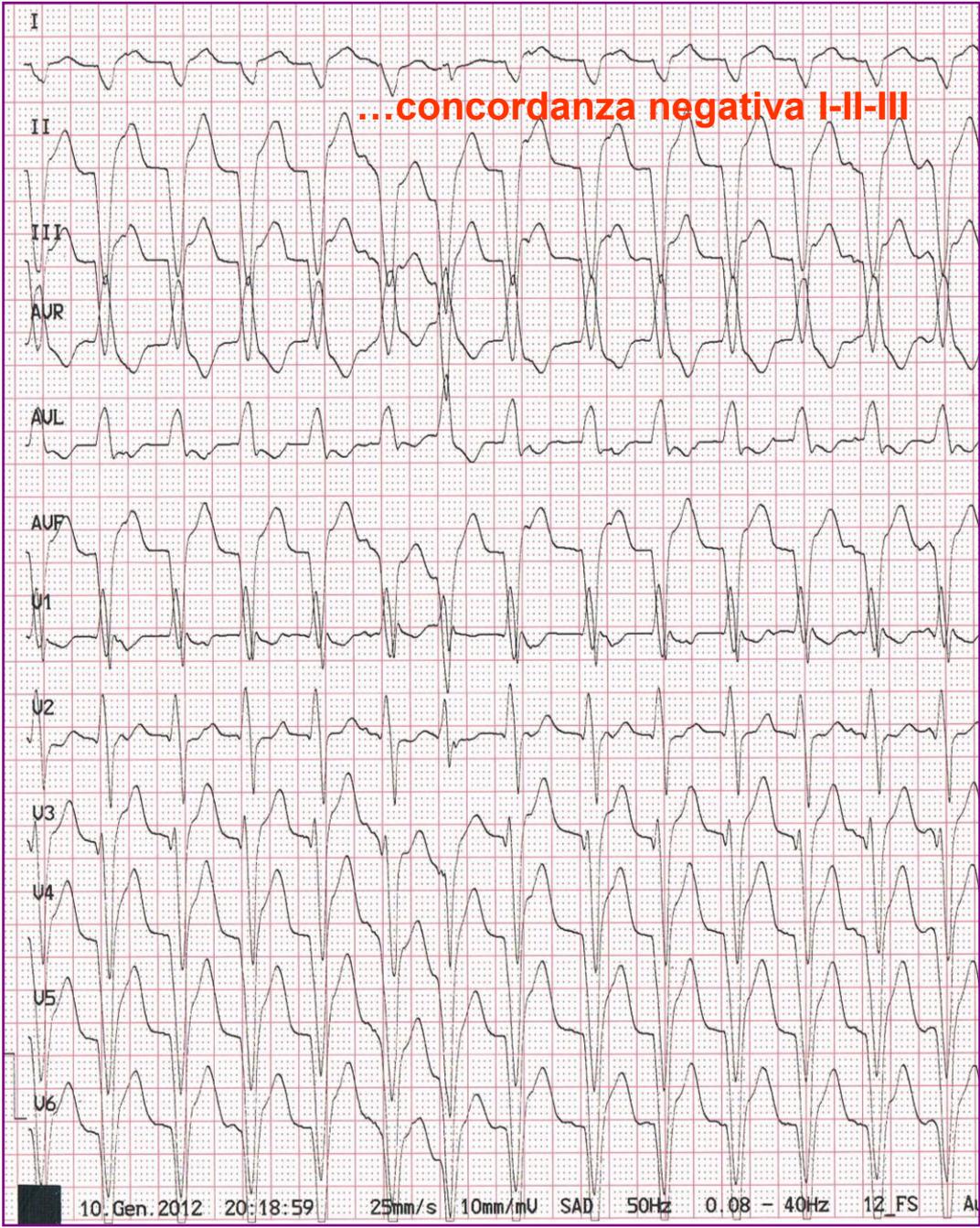
Sandra anni 73 pre-sincope

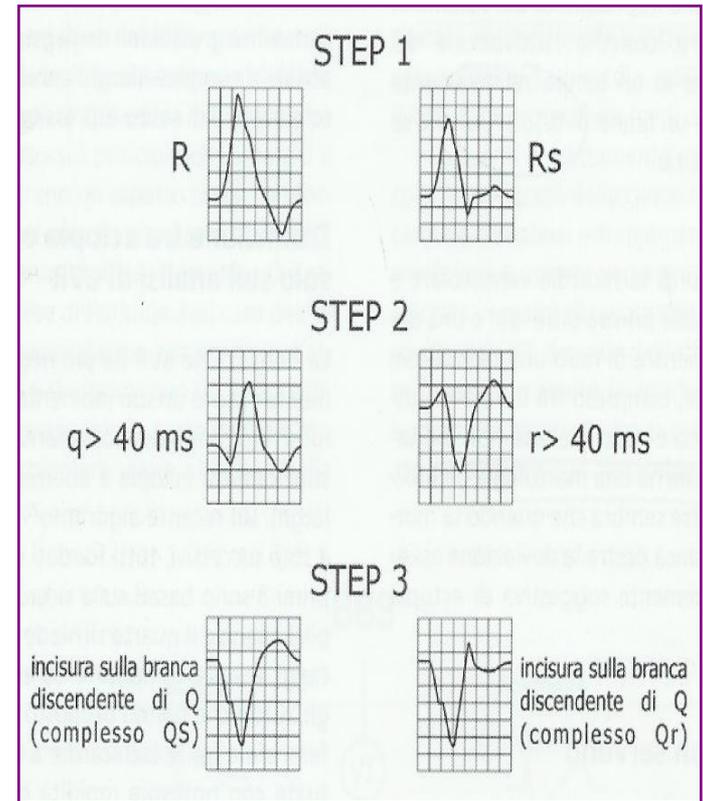
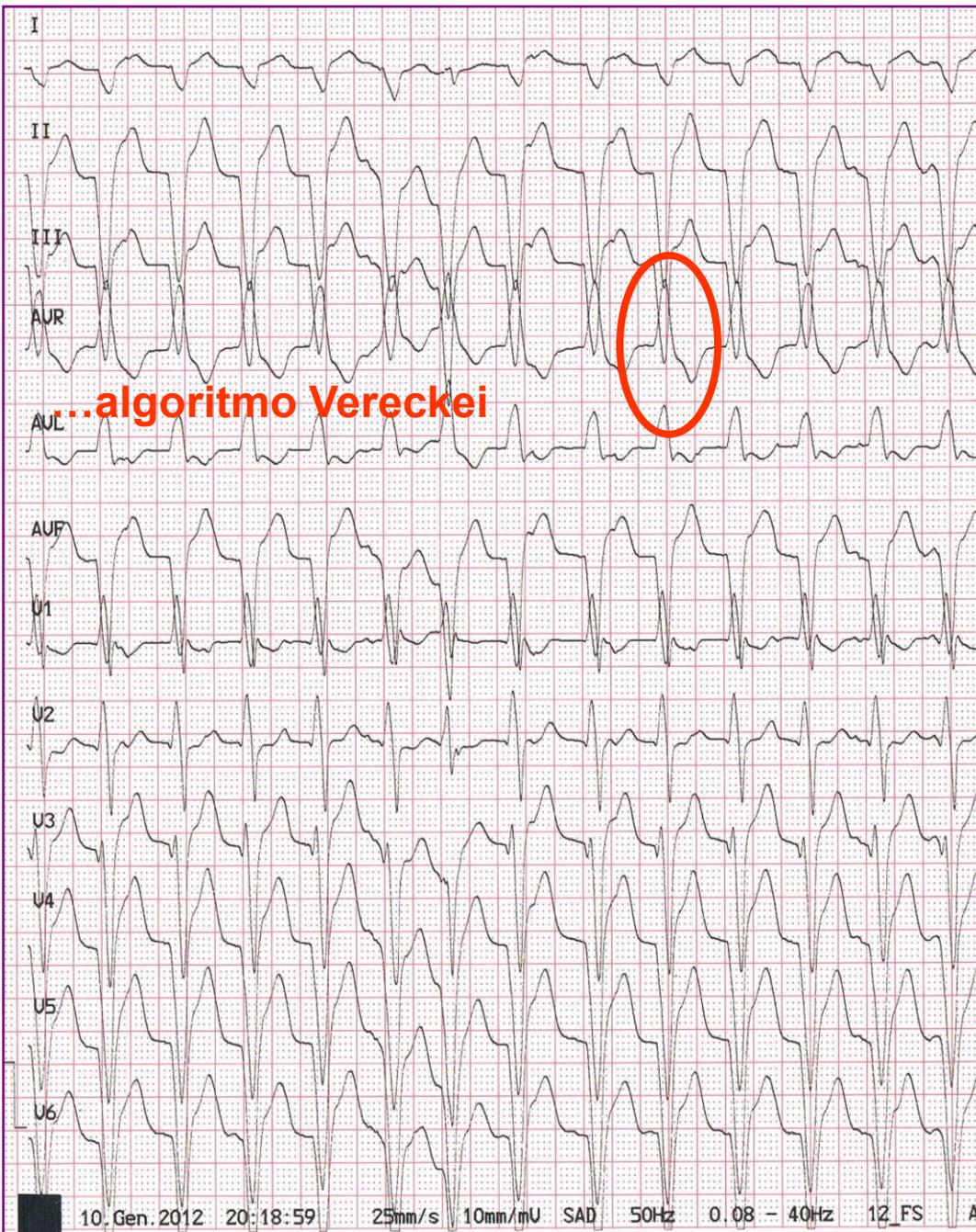


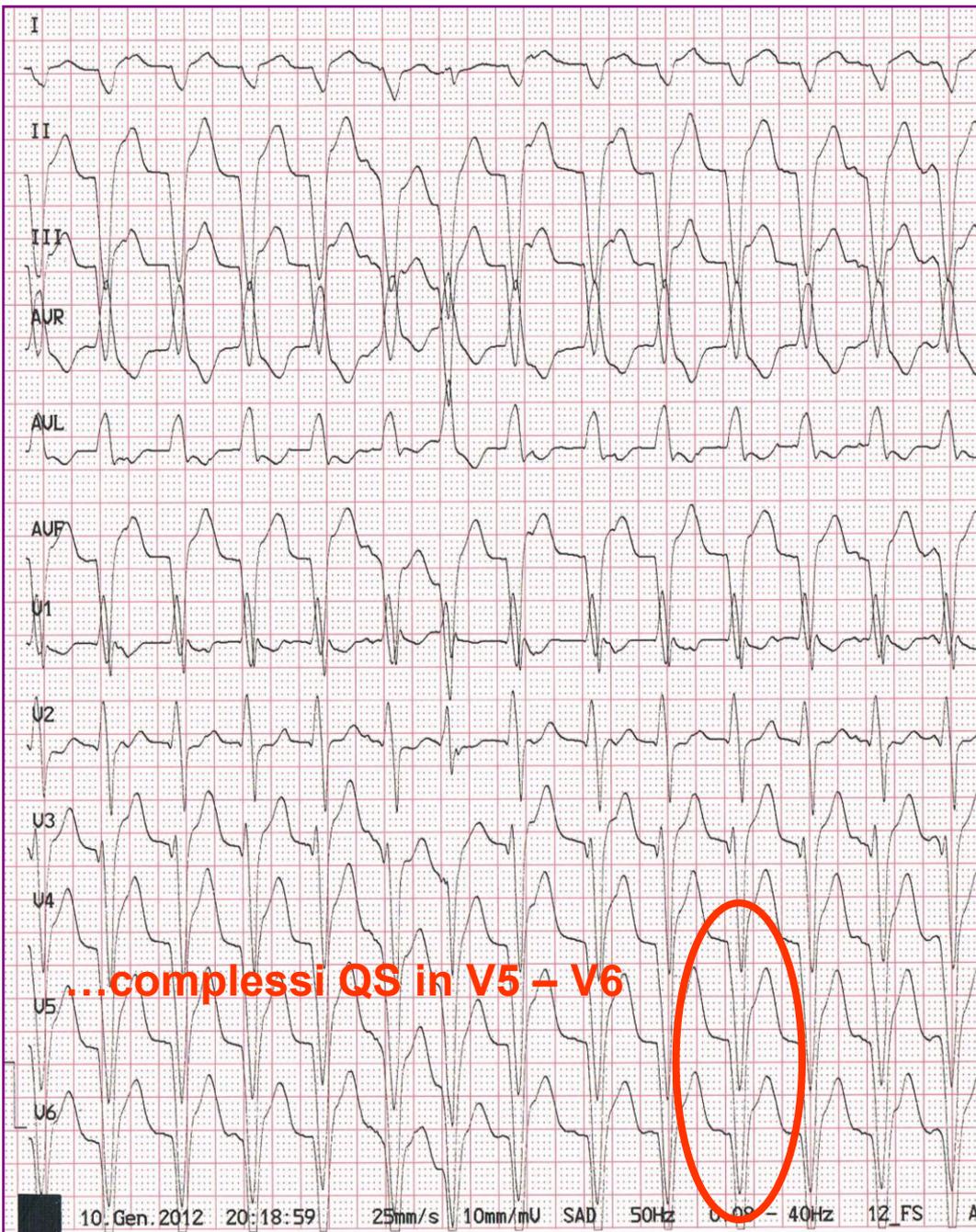
...può essere una TV
anche con
QRS 120 ms?



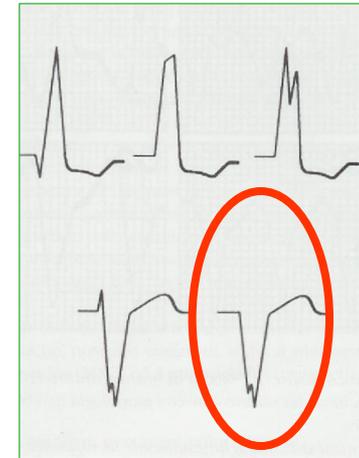
...concordanza negativa I-II-III







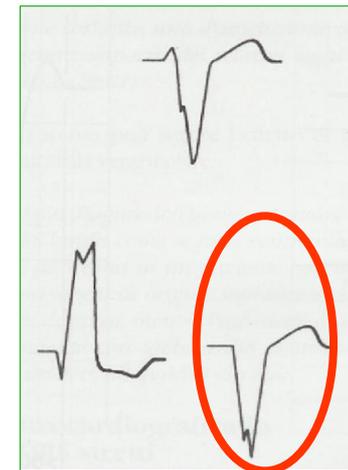
ECTOPIA



V1

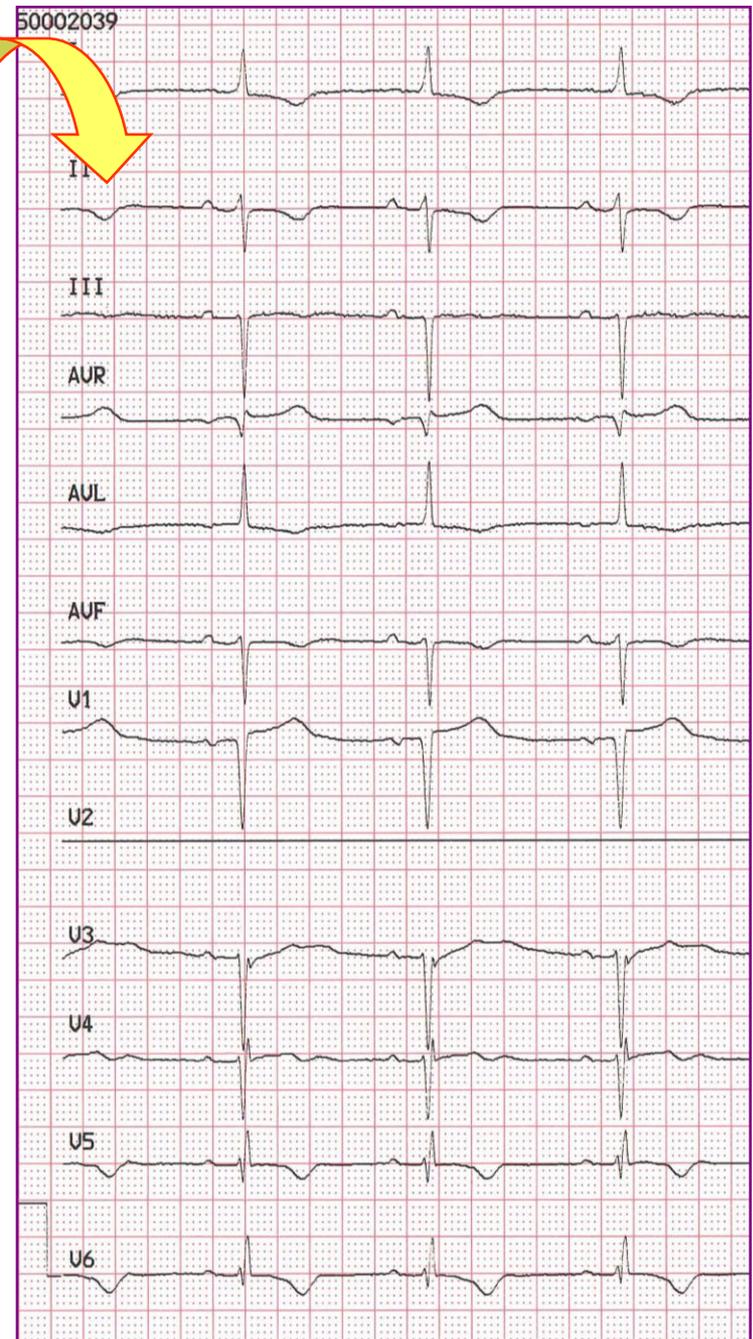
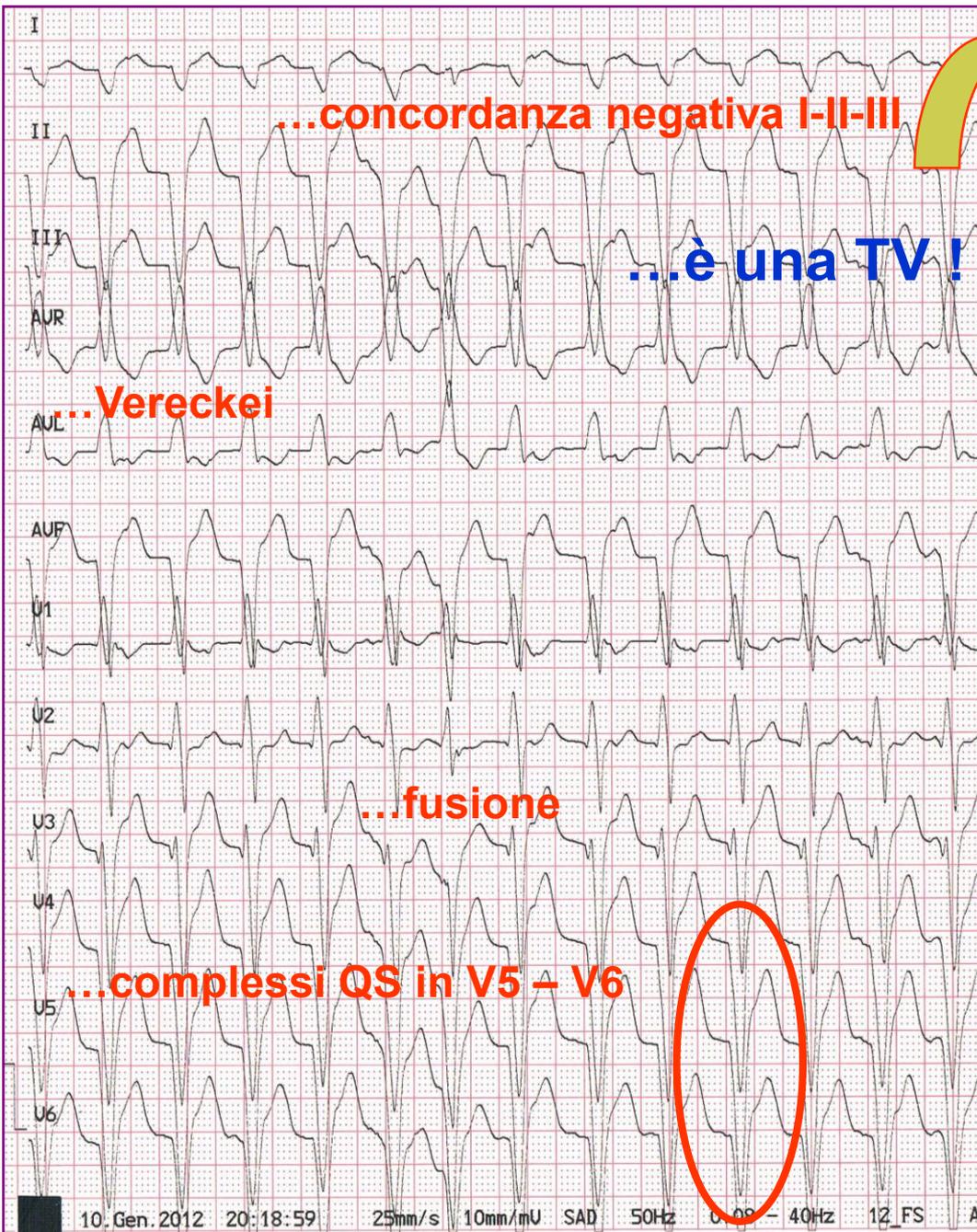
V6

ECTOPIA



V1

V6



TACHICARDIA VENTRICOLARE

MONOMORFA SOSTENUTA

CRITERI MAGGIORI

Dissociazione A/V

Complessi QRS larghi

Battiti cattura - fusione

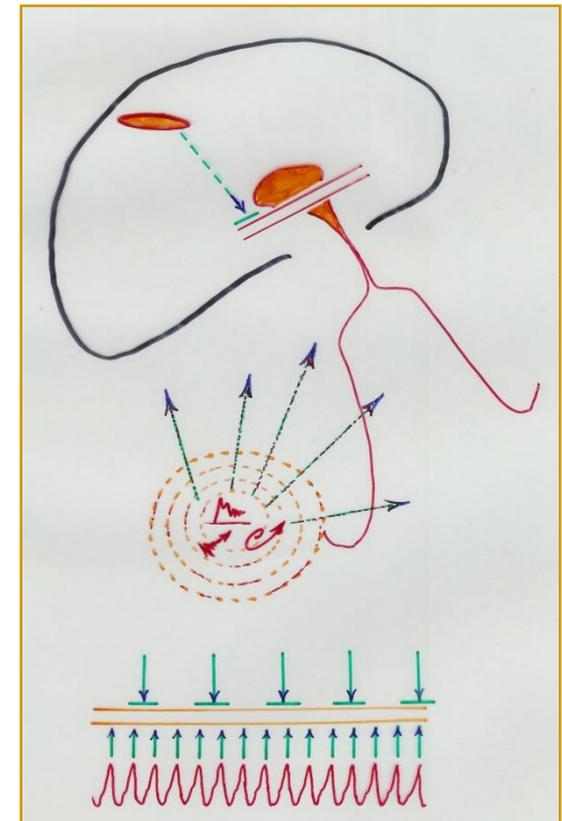
Concordanza

Asse

Criteria morfologici Vereckei in aVR

Criteria morfologici Brugada nelle precordiali

SI
NO



TACHICARDIA VENTRICOLARE

MONOMORFA SOSTENUTA

CRITERI MAGGIORI

Dissociazione A/V

Complessi QRS larghi

Battiti cattura - fusione

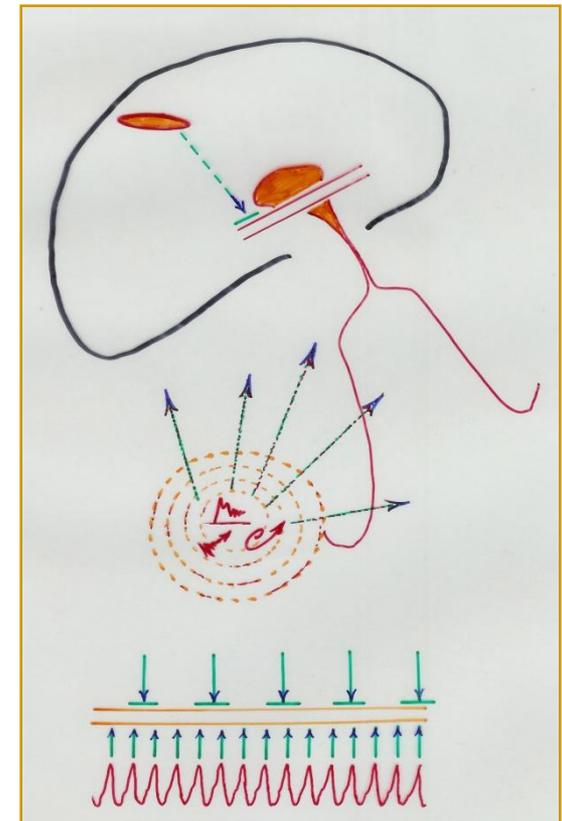
Concordanza

Asse

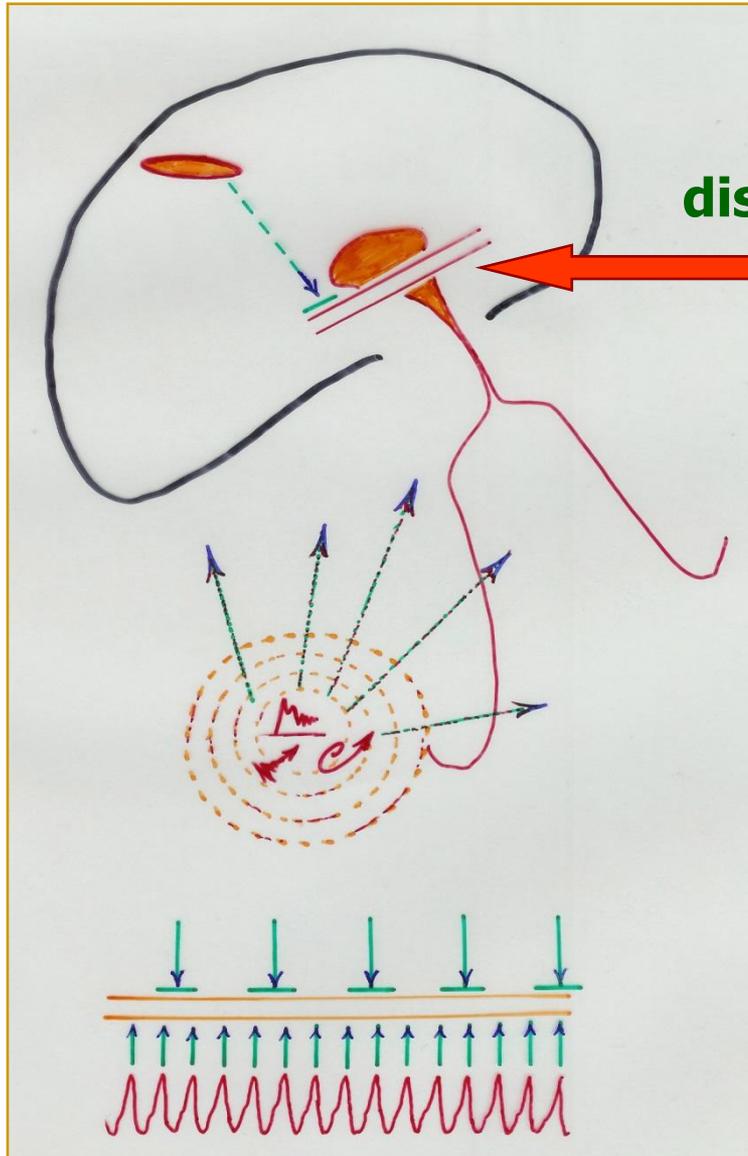
Criteria morfologici Vereckei in aVR

Criteria morfologici Brugada nelle precordiali

SI
NO



CRITERIO MAGGIORE...poco adeguato in area critica

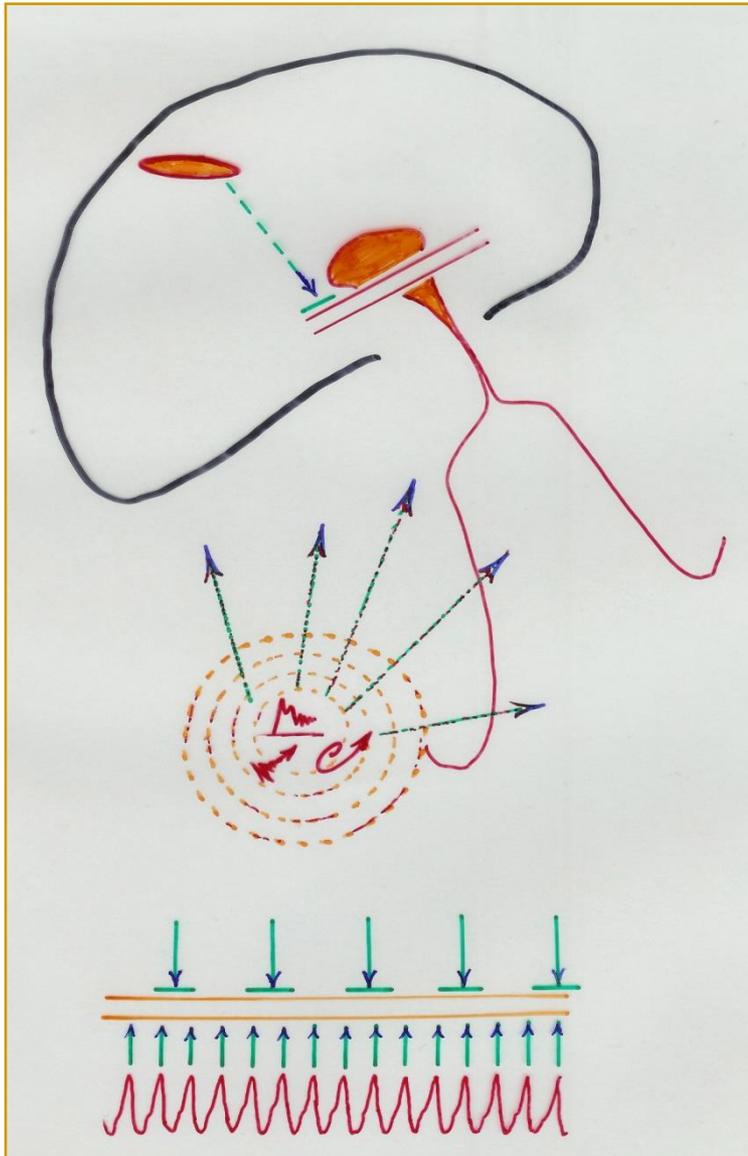


dissociazione A/V

specificità 100%

sensibilità 43-62%

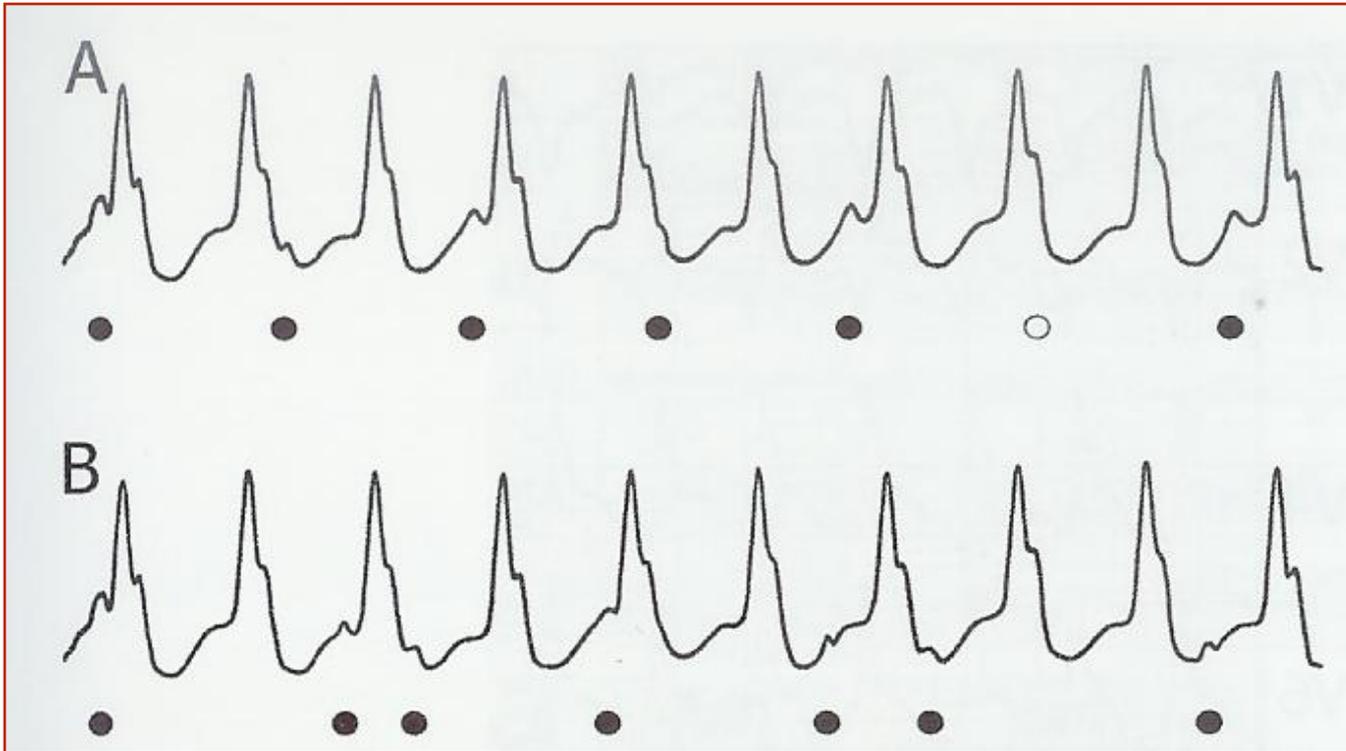
DISSOCIAZIONE A/V



**tachicardia veloce...
difficile dimostrare onde P**

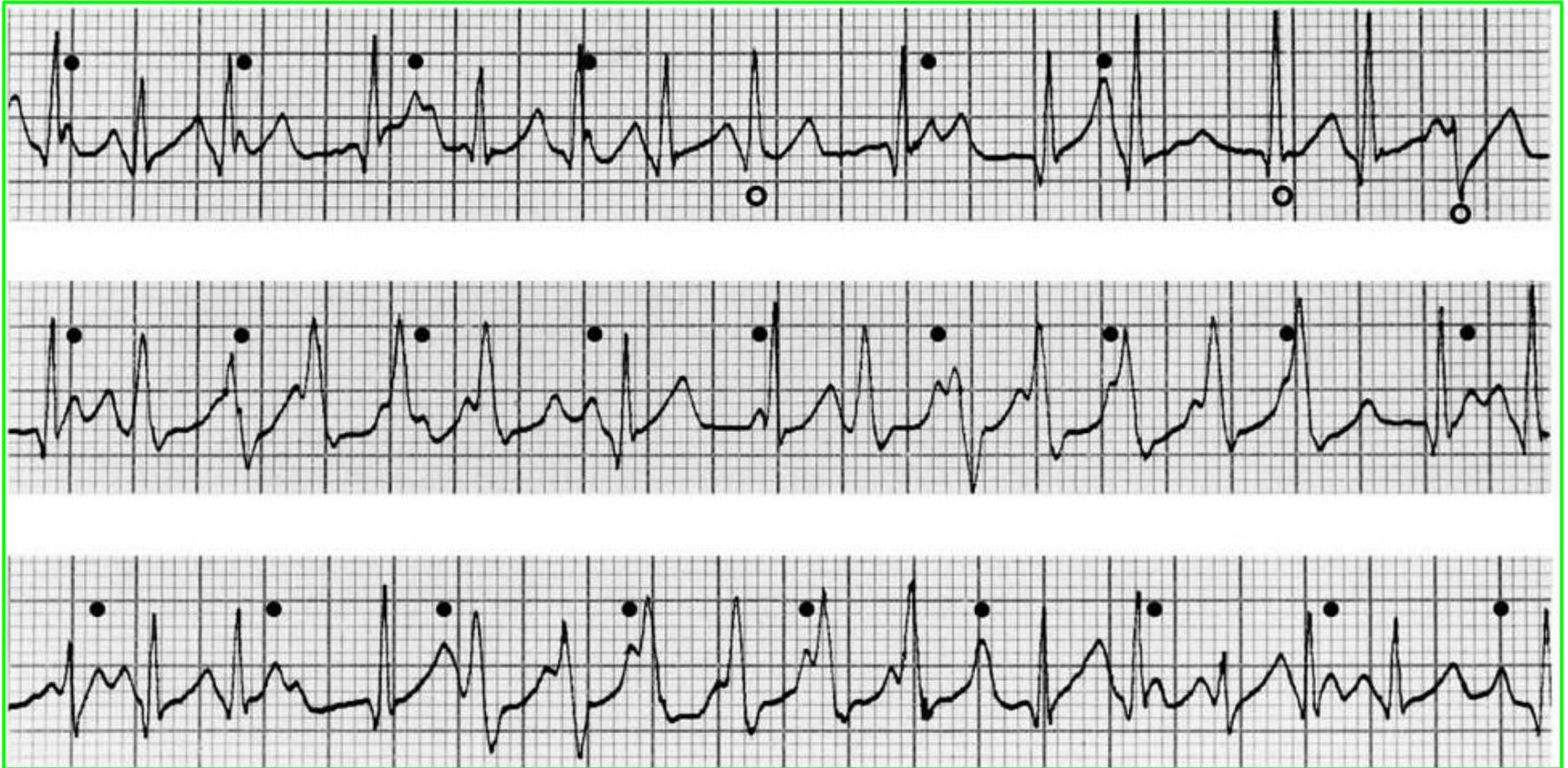
Brugada P, Mont L, Smeets J, A new approach to the differential diagnosis of a regular tachycardia with a wide QRS complex. Circulation 1991; 83: 1649-59

...facile confusione con artefatti

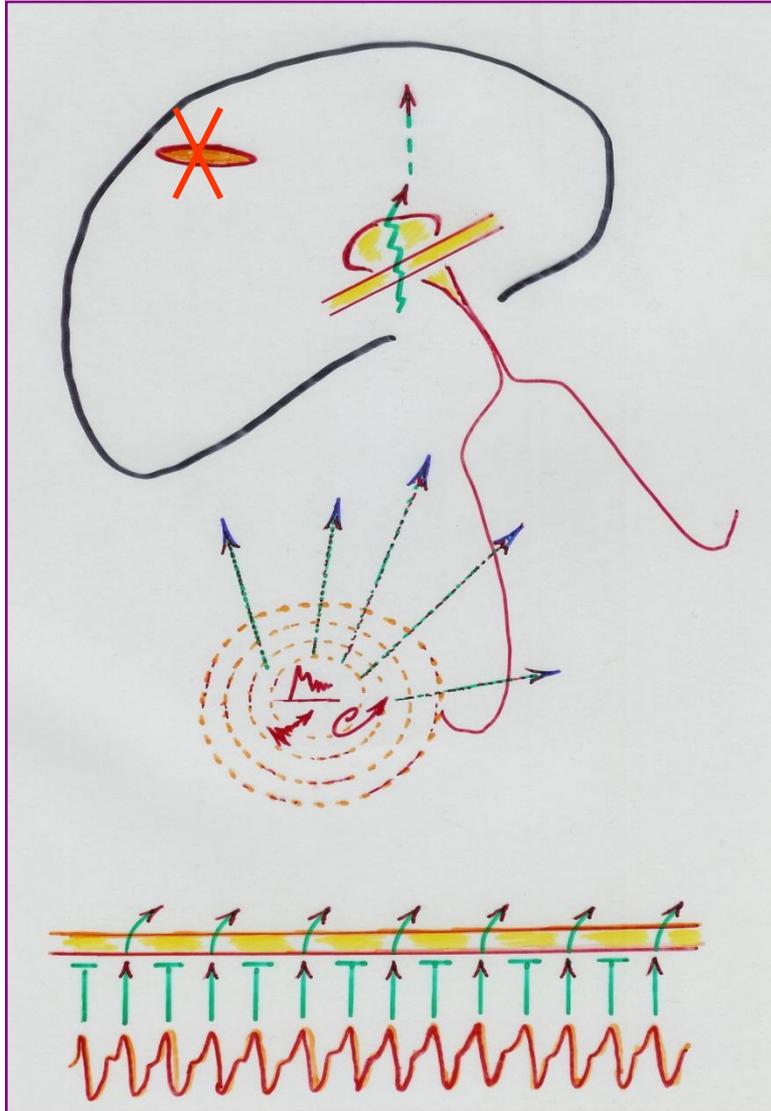


onde P

artefatti

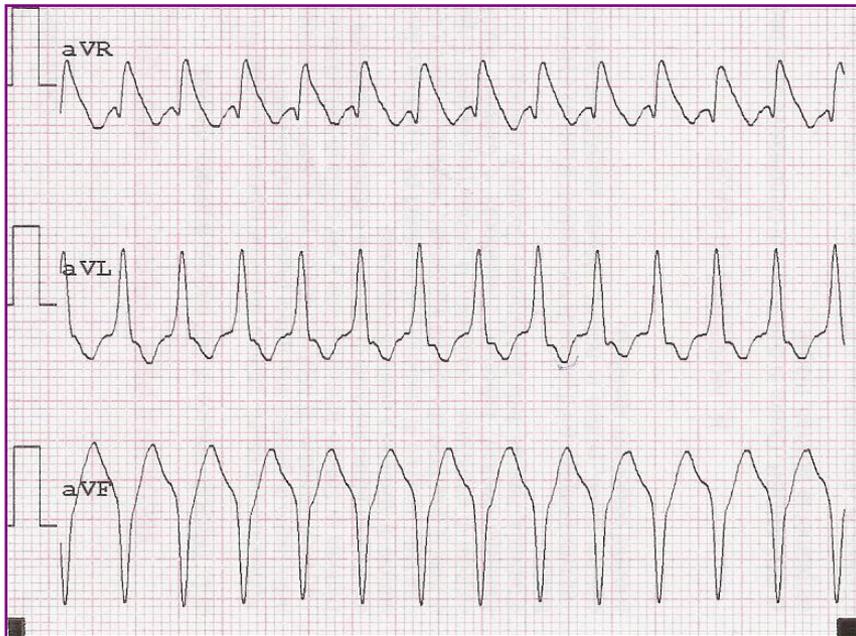
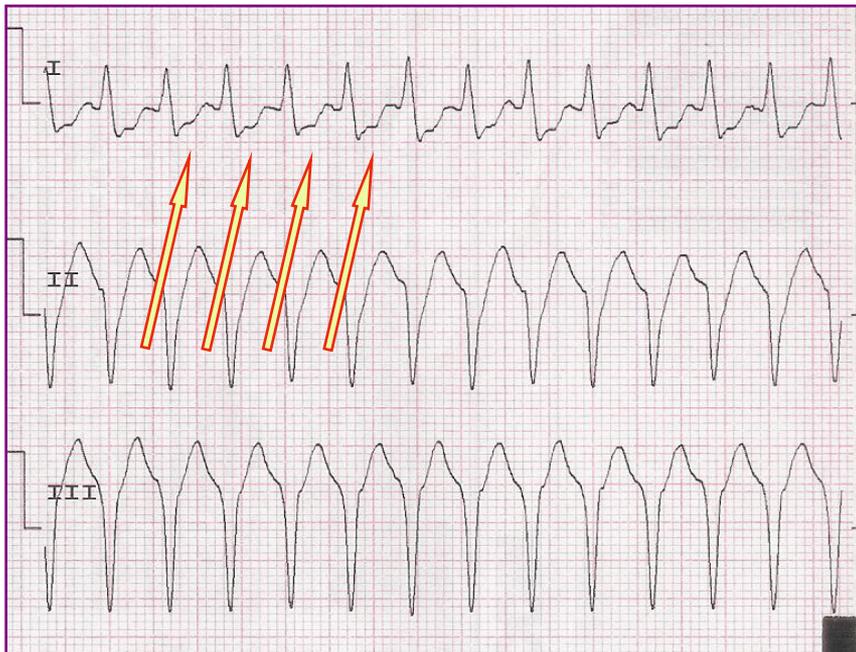


...onde P o artefatti?



**...retroconduzione in atrio
dell'impulso ectopico ventricolare**

associazione ventricolo-atriale 35-40%

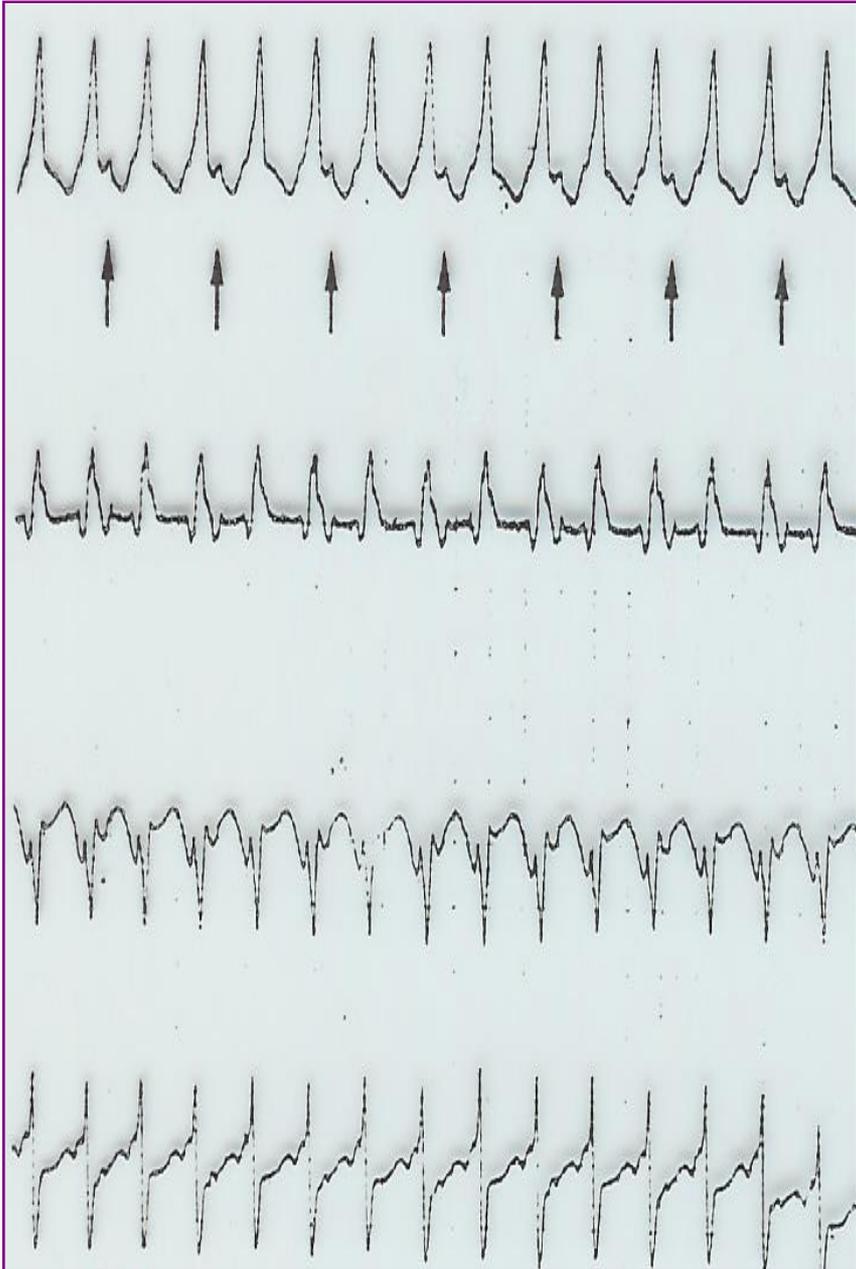


in genere...

conduzione ventricolo-atriale 1 : 1

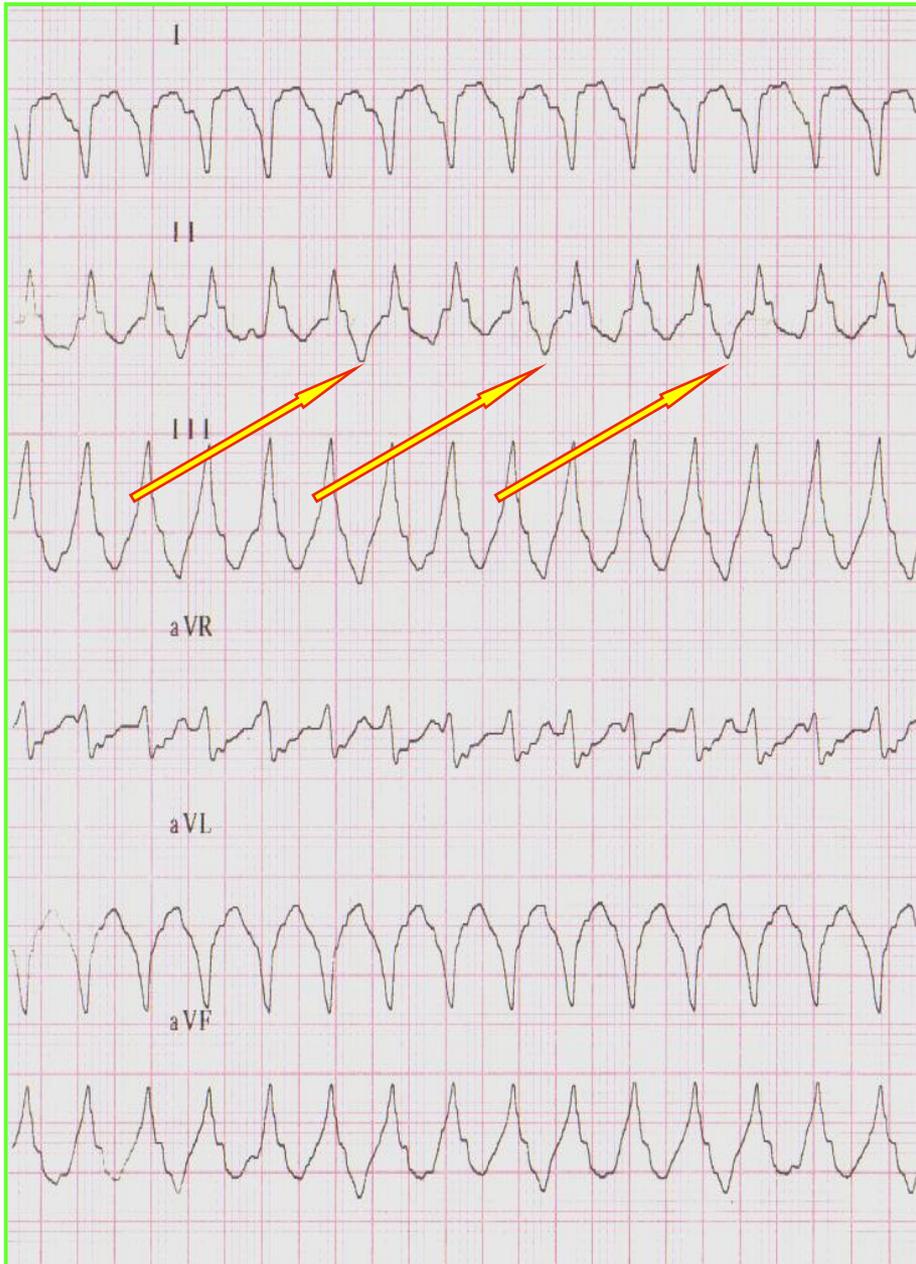
a volte...

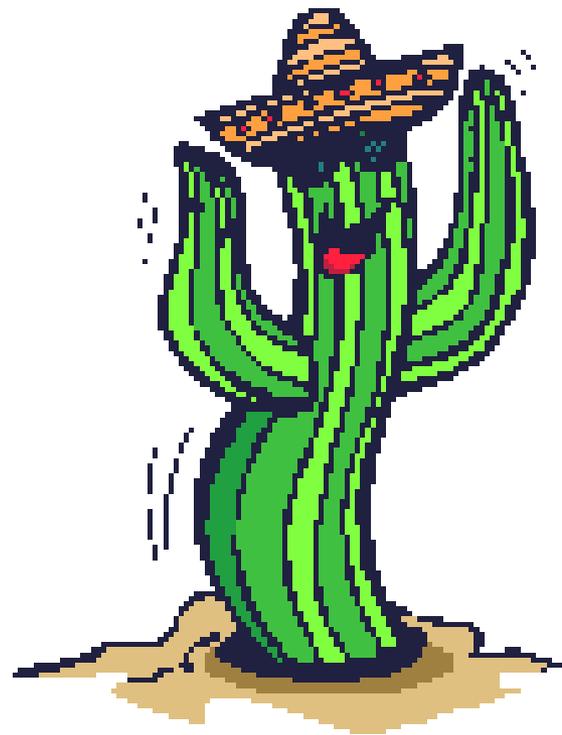
conduzione ventricolo-atriale 2 : 1



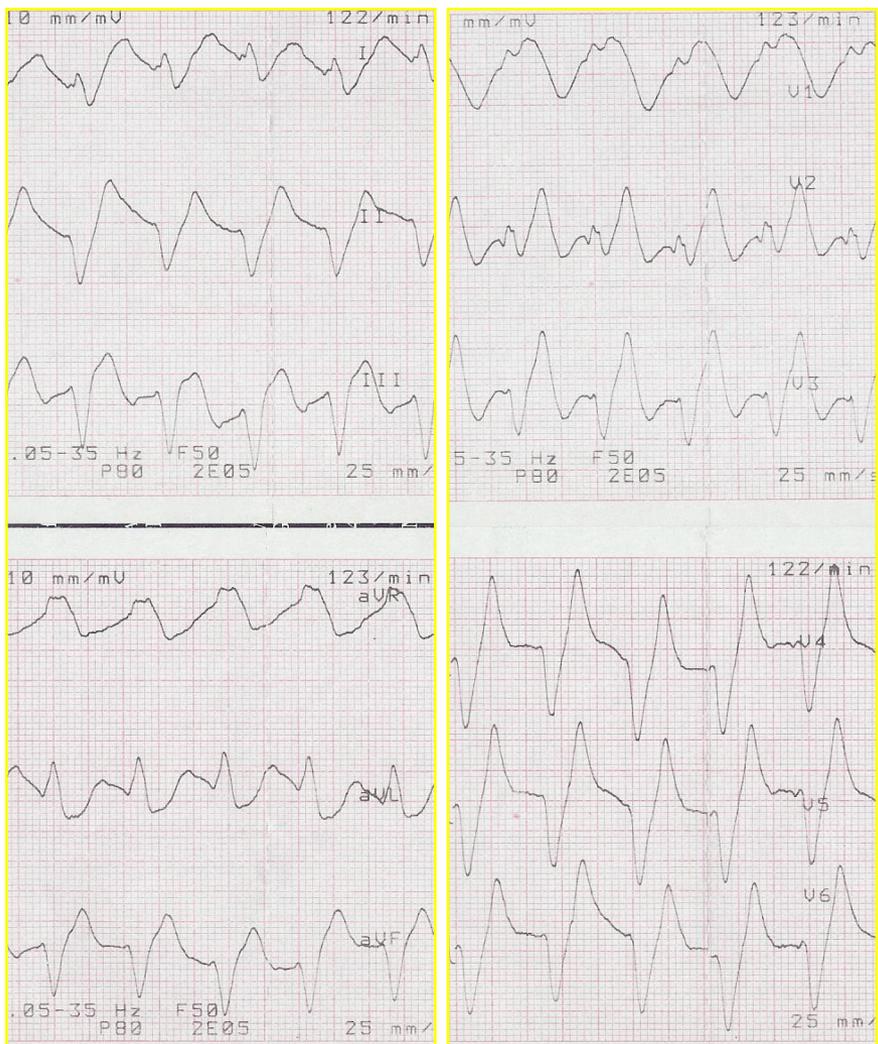
raramente...

conduzione ventricolo-atriale 3 : 1





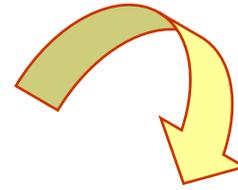
e...mai confundere !



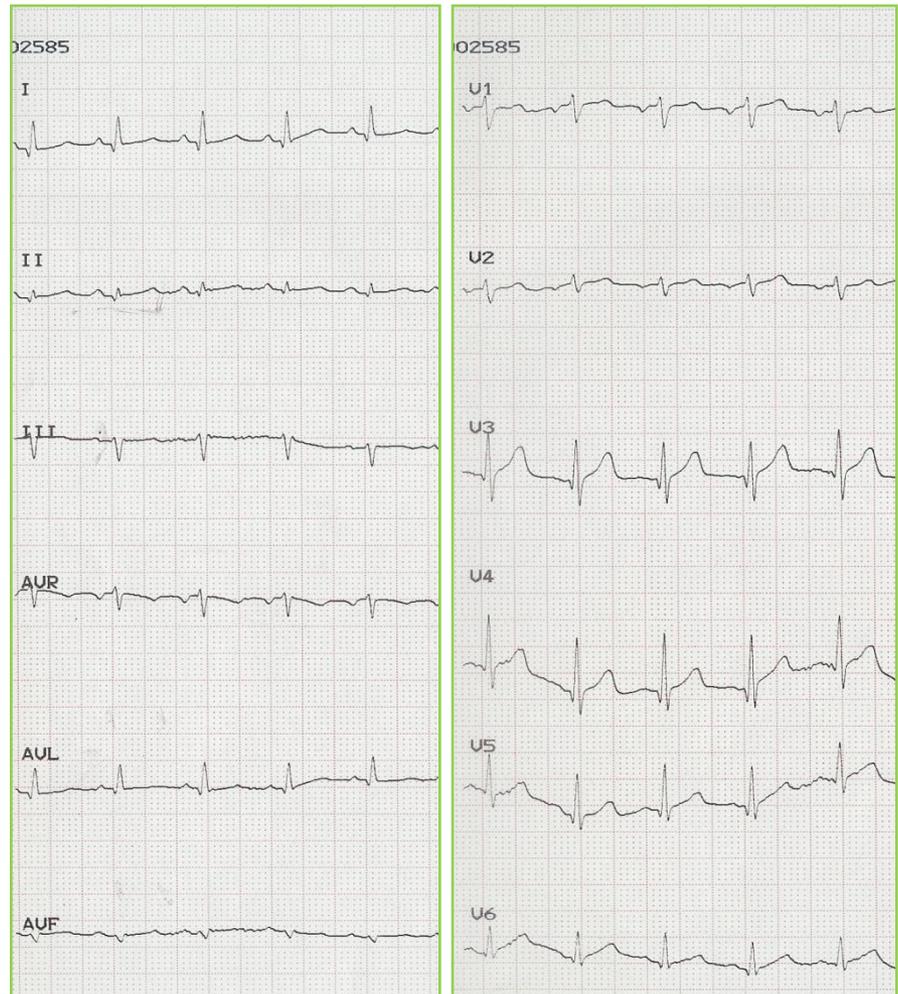
**tachicardia
ventricolare...?**



$K = 10.2 \text{ mEq/l}$



$K = 4.2 \text{ mEq/l}$

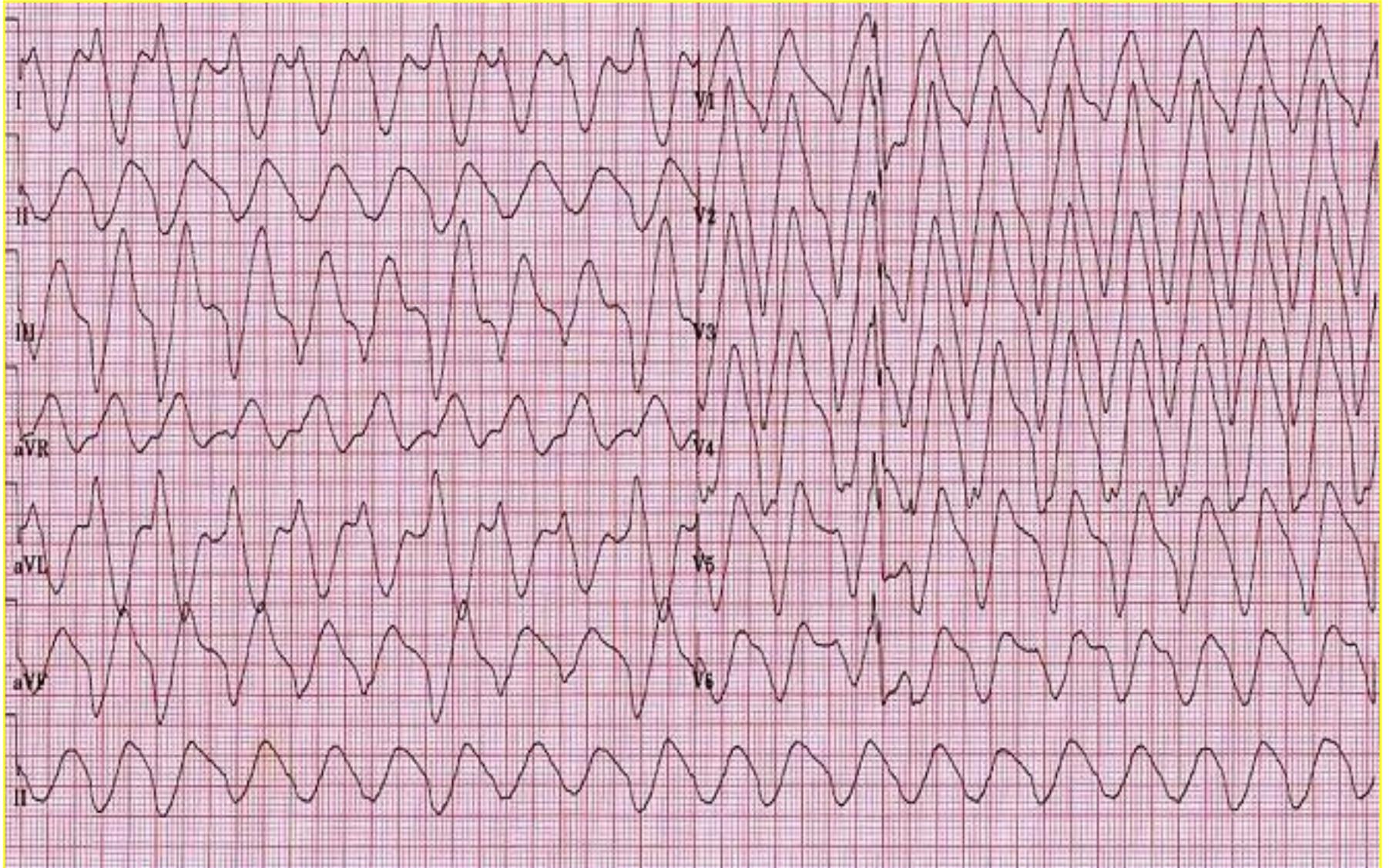


iperkaliemia !

**QRS largo QT corto T aguzza
alterata attivazione atriale**

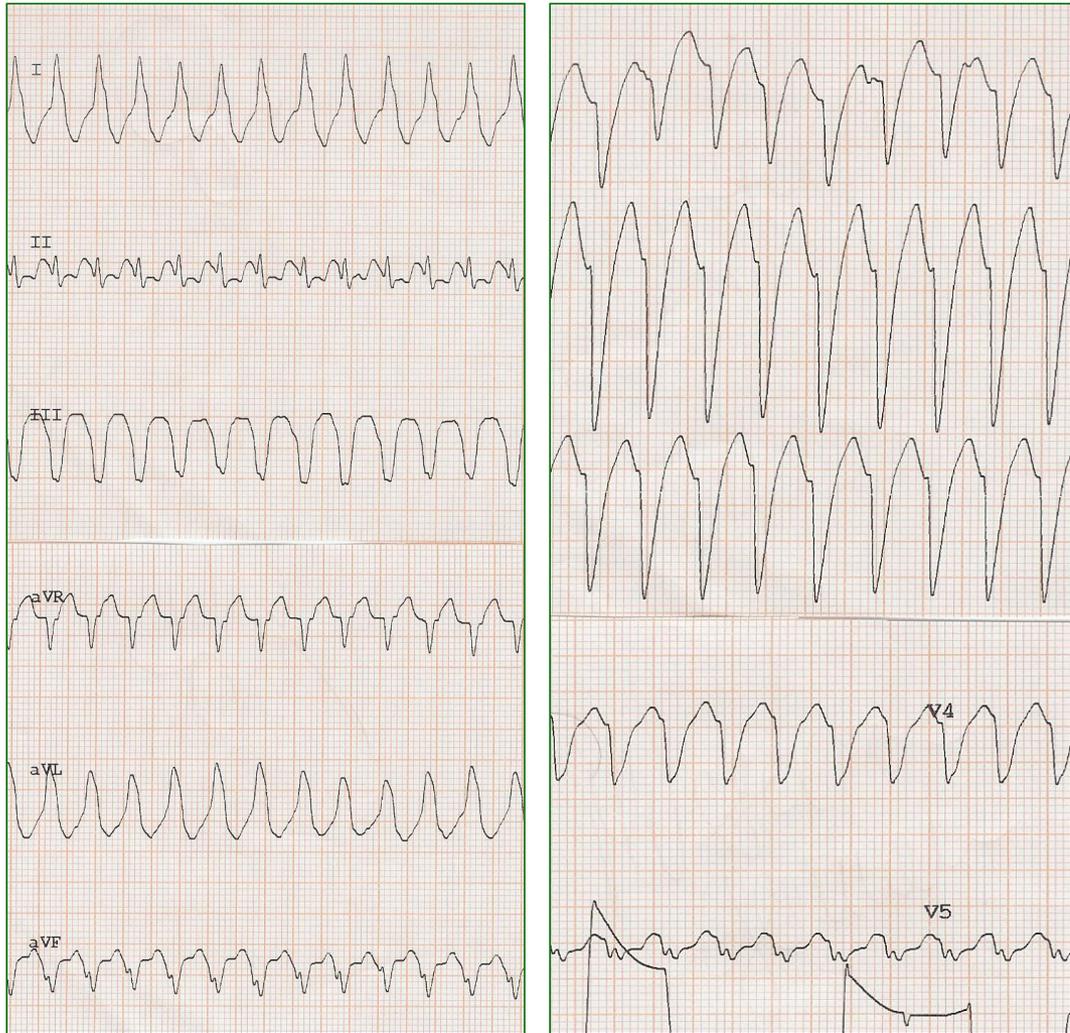
...la storia si ripete

K+ 10 mEq/l





**tachicardia
ventricolare...?**

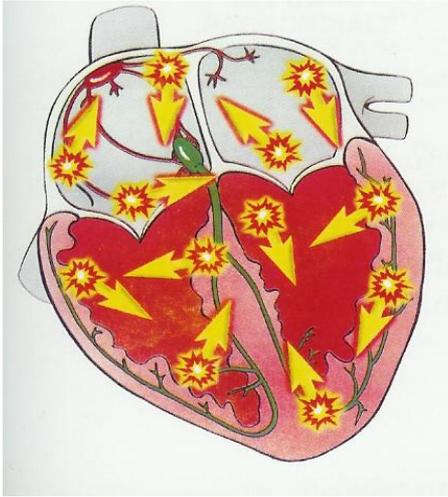


CUORE DILATATO

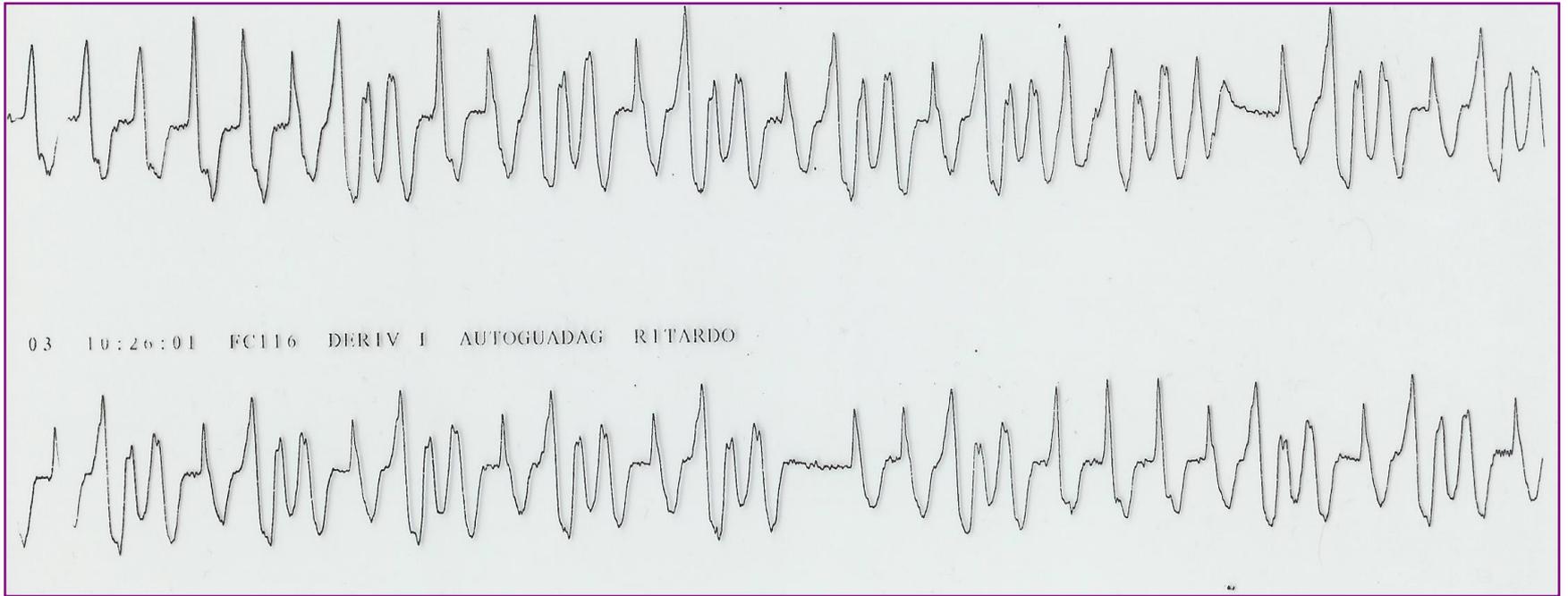
con disturbo della trasmissione tipo BLOCCO di BRANCA
in terapia con ANTIARITMICI di classe IC

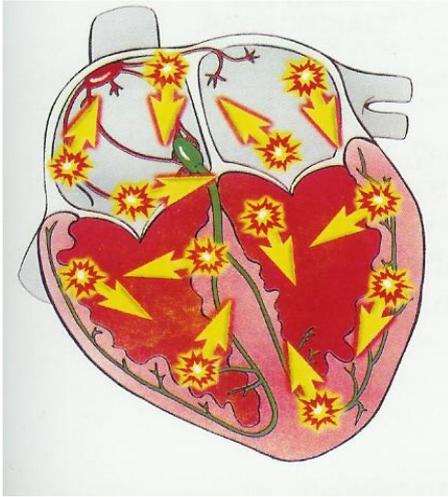


e...mai confondere !



fibrillazione ventricolare...?

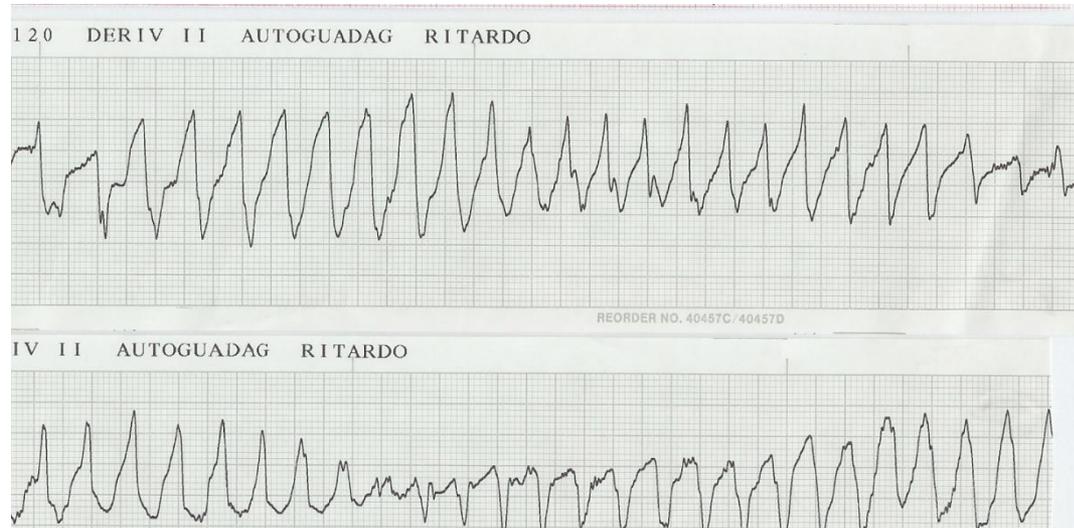




è aciclabilitazione del sistema di conduzione!



fibrillazione ventricolare... ?



ELETTROLITI

Na+	137.8
K+	2.64↓
Ca++	*****
Cl-	118↑
Gap Anionico	12.7

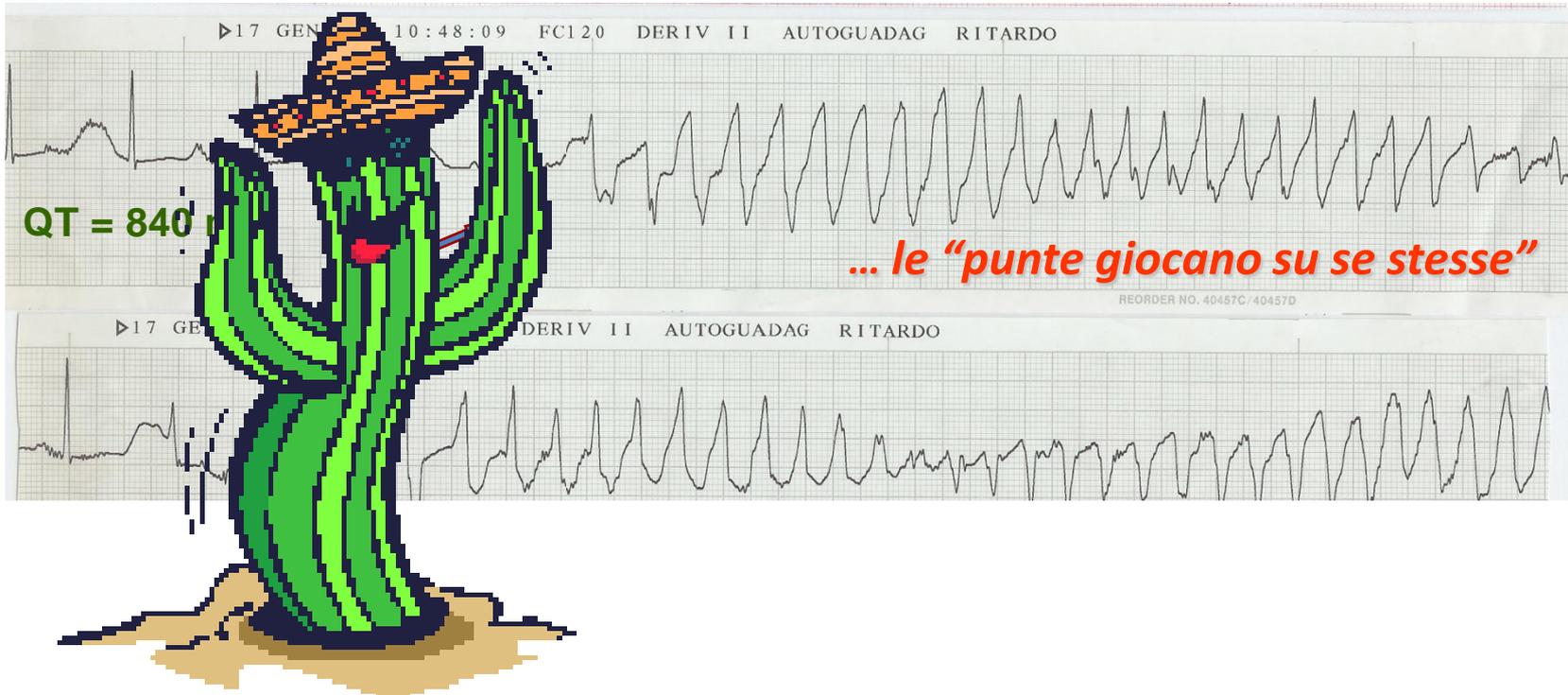
METABOLITI

Glu	194↑
Lat	0.89

pH	7.124↓
pCO2	30.4↓
pO2	84.9

ipokaliemia

torsione delle punte





alla fine...

*...se nonostante un corretto approccio diagnostico
il dilemma non risultasse risolto*

**SAREBBE NECESSARIO CONSIDERARE L'ARITMIA
COME SE FOSSE DI ORIGINE VENTRICOLARE**



CARDIOVERSIONE elettrica



**Tachicardia
Ventricolare**
con polso

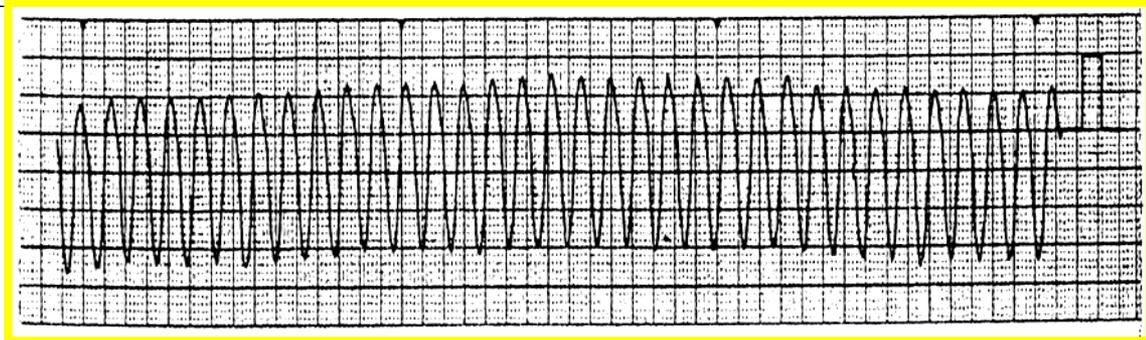
DEFIBRILLAZIONE

trans-toracica



Hmmm.....

**Tachicardia
Ventricolare**
senza polso

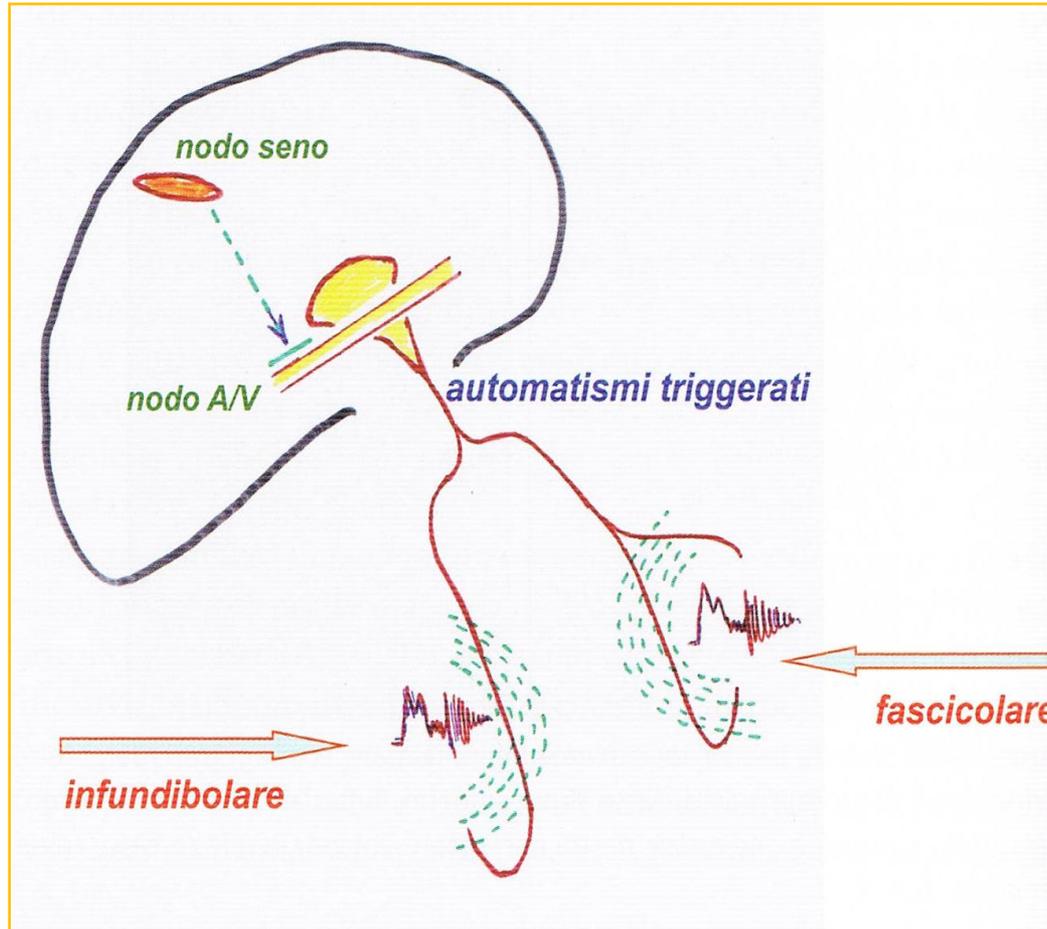


oh! ...il mio tempo
è scaduto



TACHICARDIA VENTRICOLARE IDIOPATICA

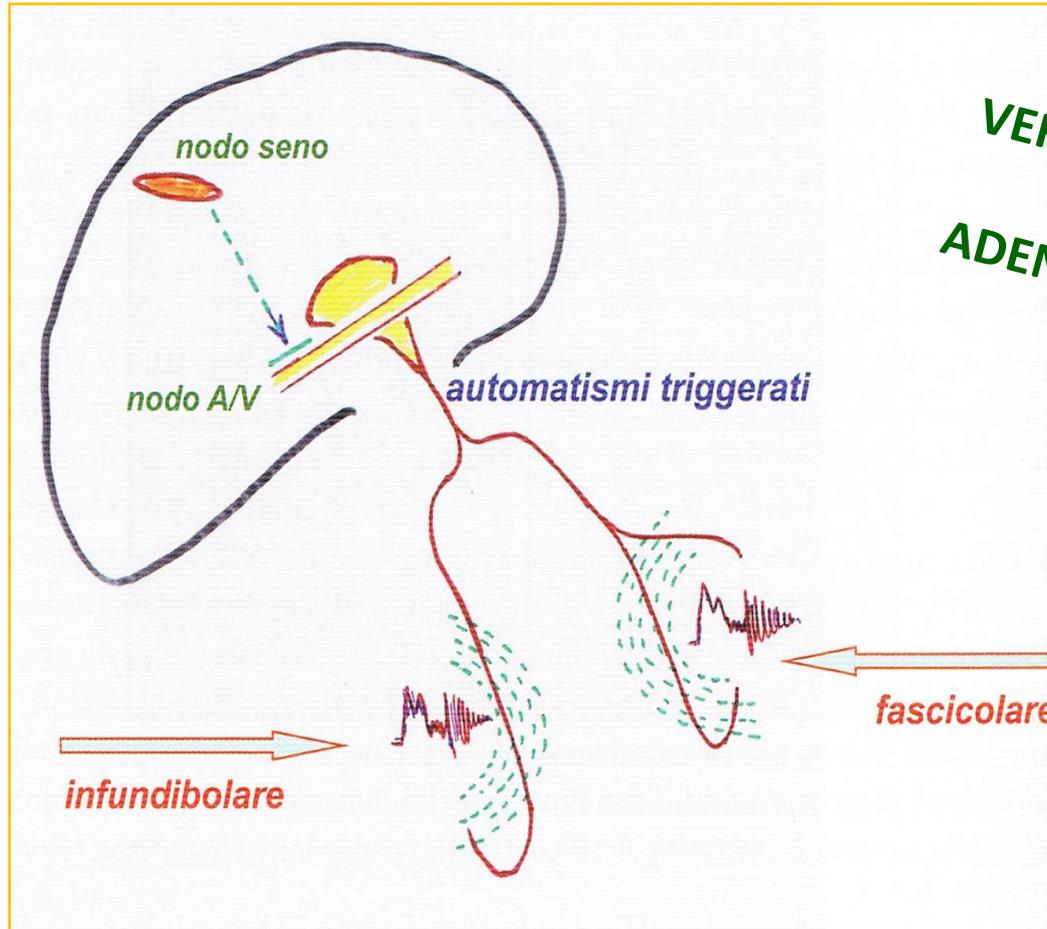
origina in prossimità sistema conduzione intraventricolare



QRS non molto larghi - 120 ms

TACHICARDIA VENTRICOLARE IDIOPATICA

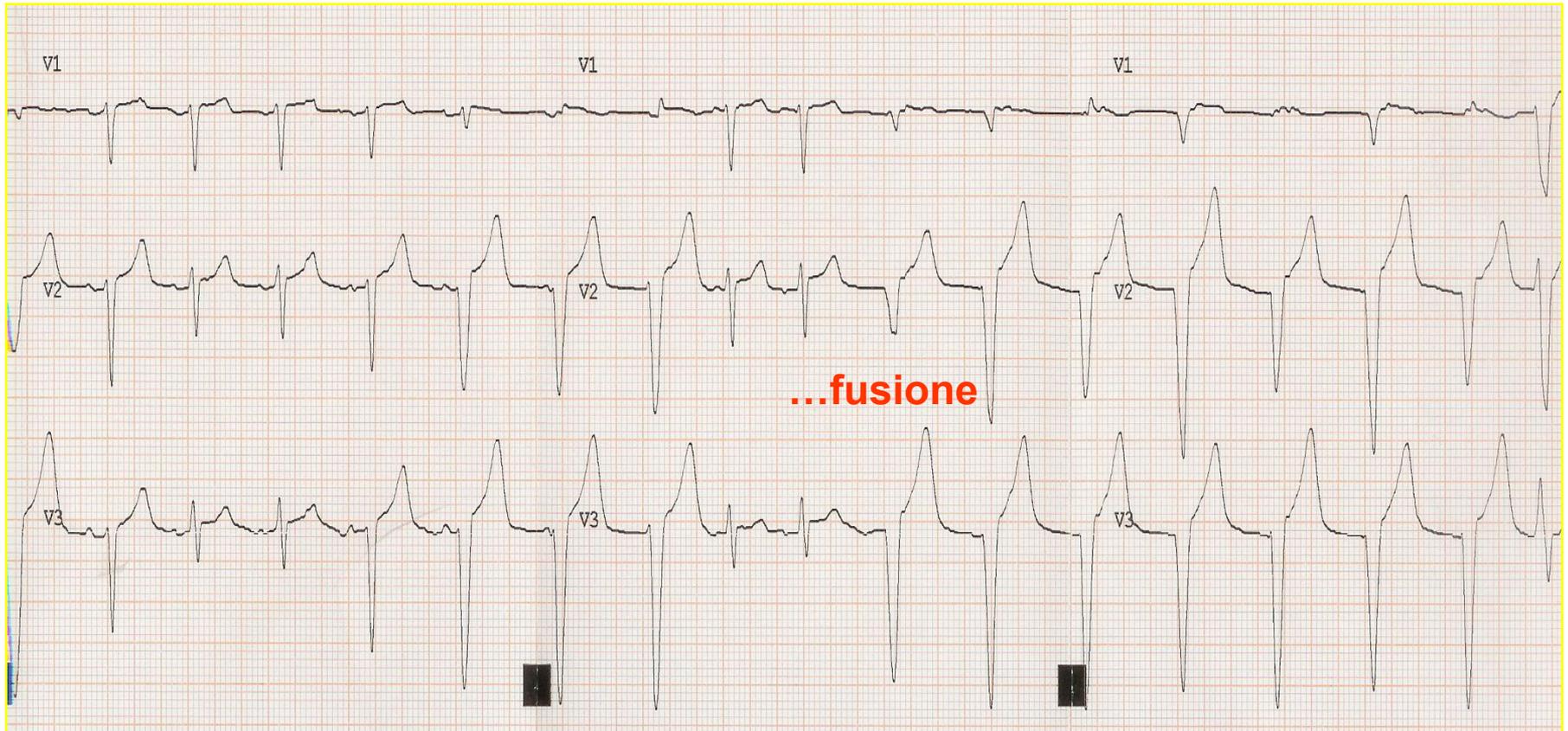
origina in prossimità sistema conduzione intraventricolare



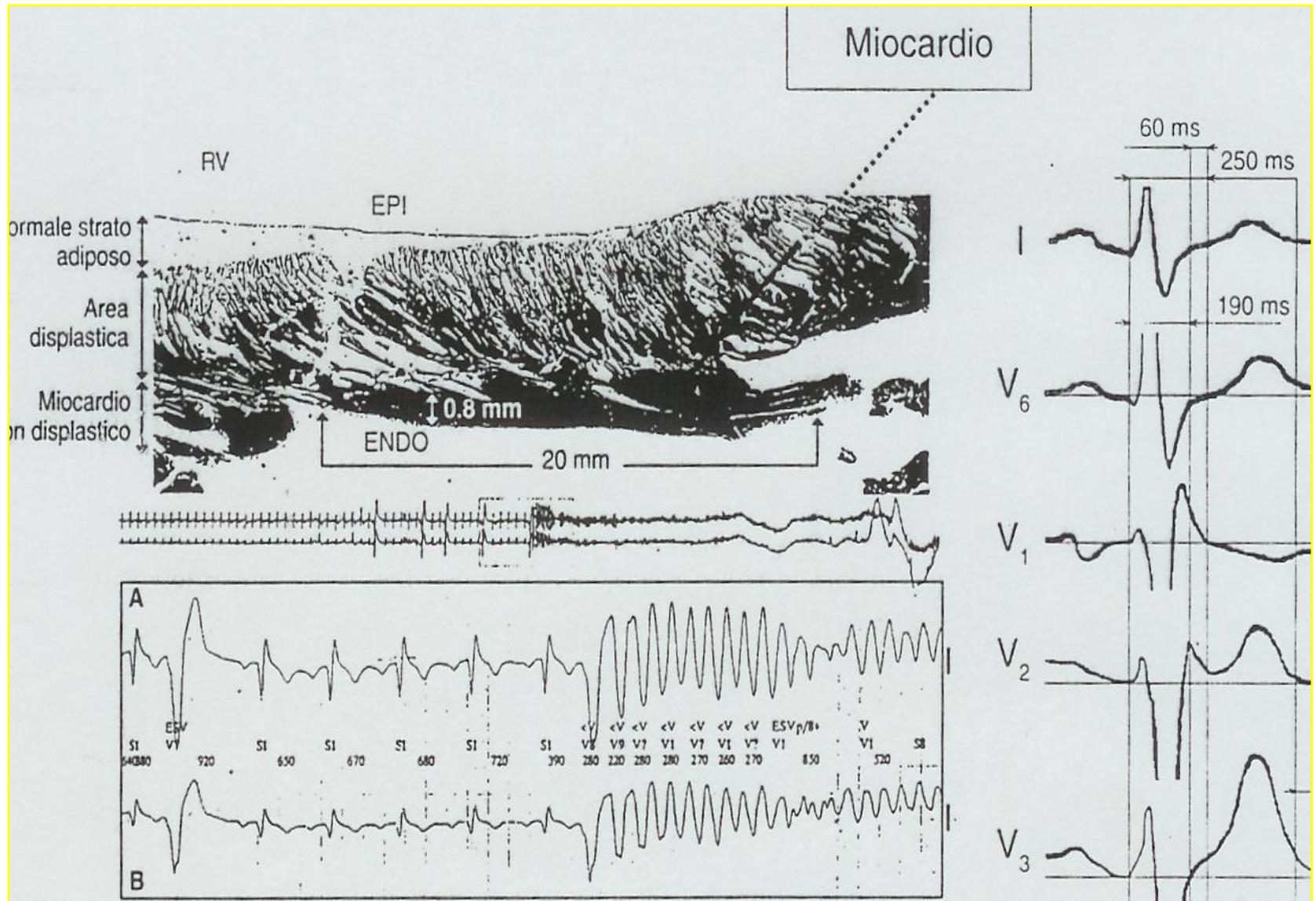
QRS non molto larghi - 120 ms

RIVA ...durante riperfusione

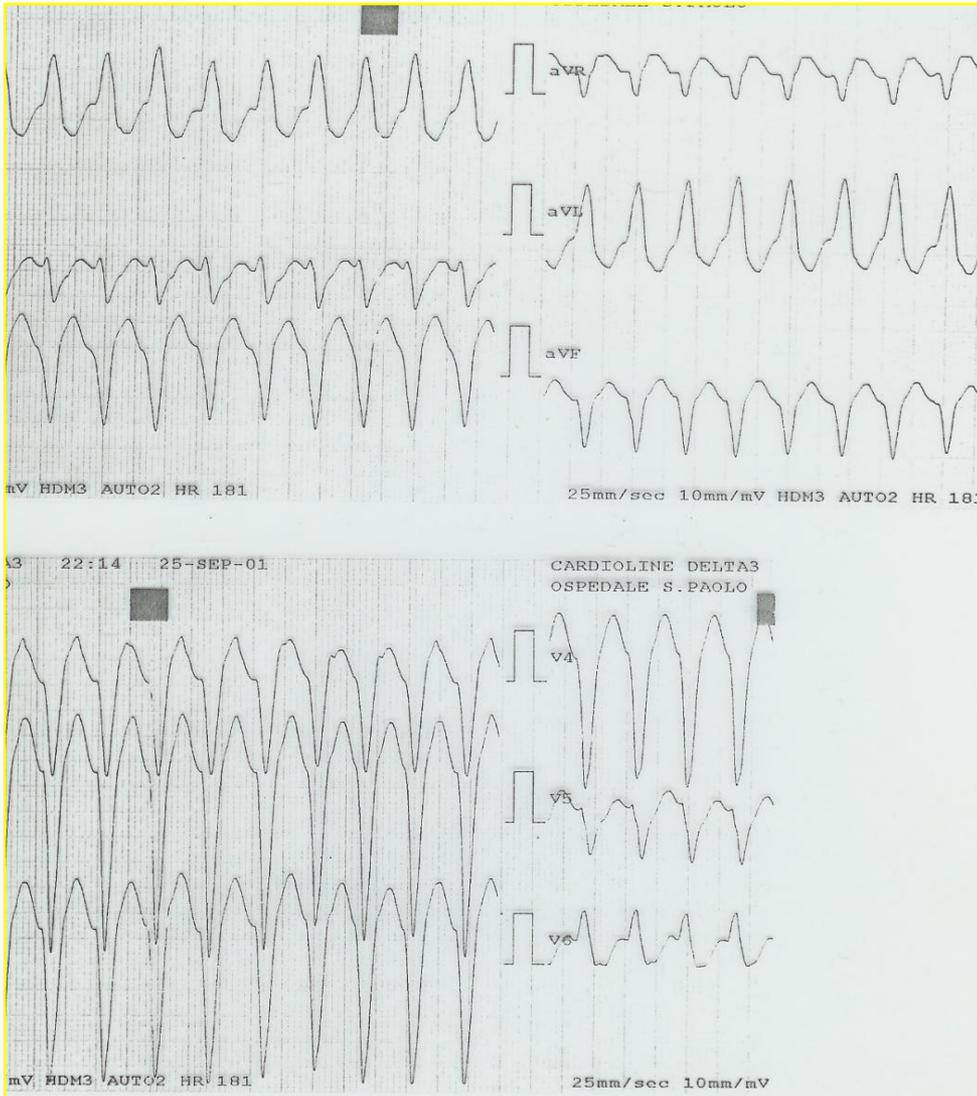
competizione continua tra
il nodo del seno e il focus “automatico”



TV nella Displasia Aritmogena del Ventricolo Destro

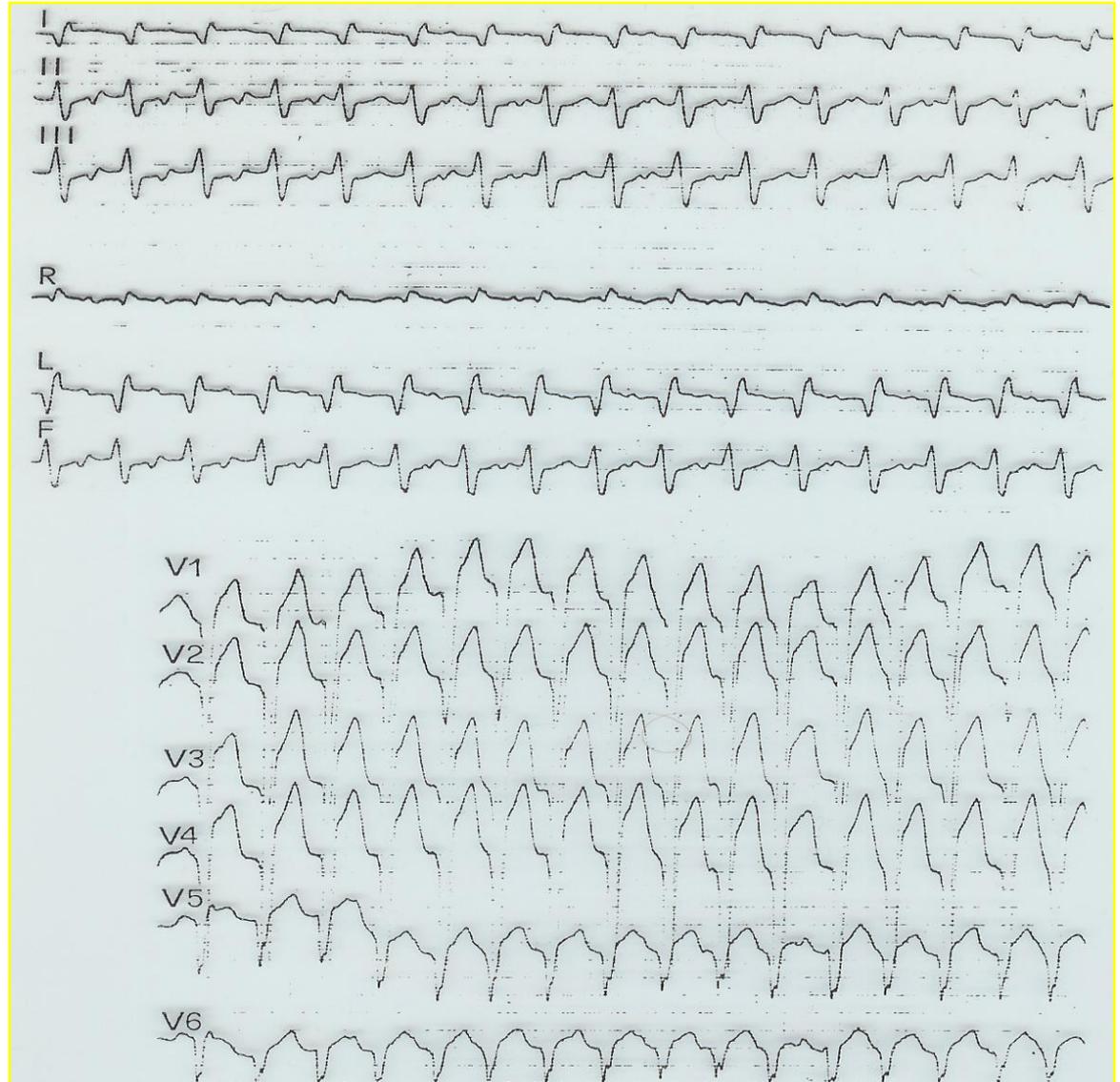


TV a immagine di blocco branca sinistra



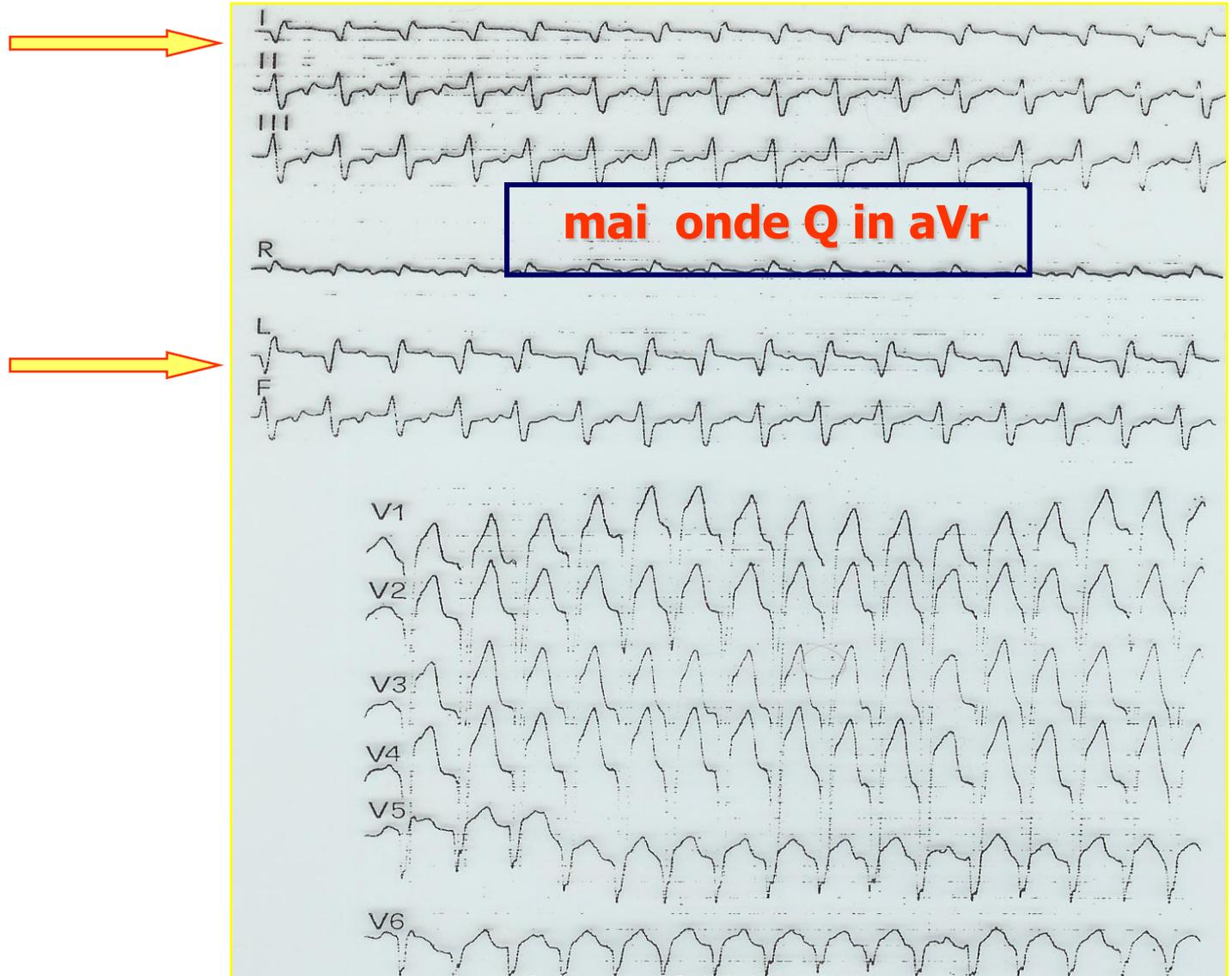
Brugada P, Mont L, Smeets J, A new approach to the differential diagnosis of a regular tachycardia with a wide QRS complex. Circulation 1991; 83: 1649-59

TV nel post-infarto



TV nel post-infarto

possibili **qR Qr QR** con durata > 40 ms



chiedo scusa se...

T. A/V antidromica

***tachicardia
in Mahaim***

parasistolia

alternanza elettrica

fasci poco manifesti

T.V. lenta

innesco tachicardie

fenomeno di Mobitz

BAV totale

rientro nelle branche

...riscaldamento

asse onda P

Kent non manifesto

Wenckebach

...quale il rischio?

...quale la diagnosi esatta?

quale la terapia... elettrica,
farmacologica?



per la cortese attenzione



GRAZIE

inizia il nostro viaggio...



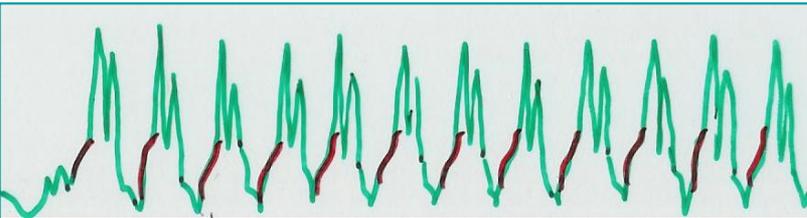
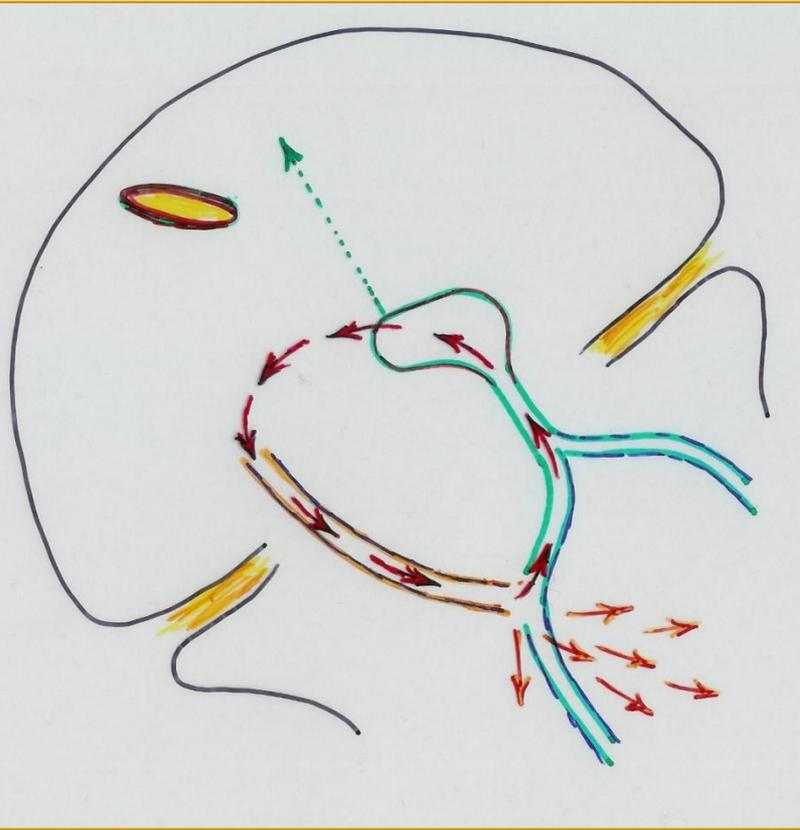
EVENTO RARO

0.6%dei casi

**Tachicardia A/V
antidromica**

*attivazione ventricolare
= onda delta*

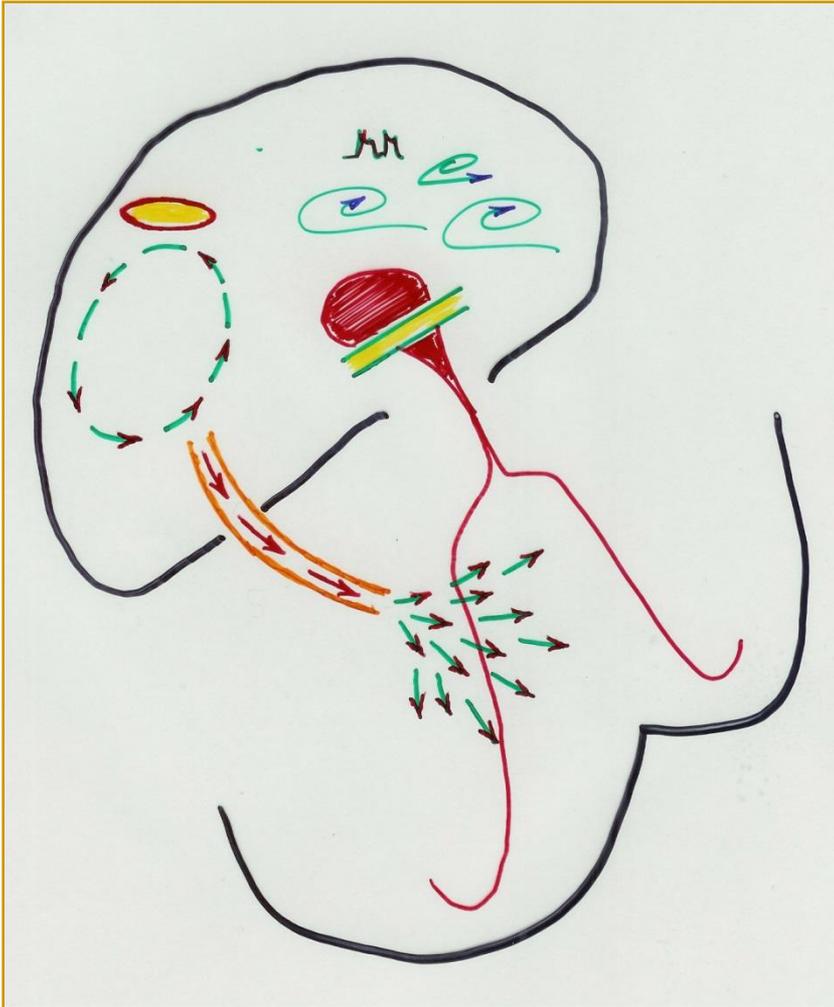
P retrocondotta : onda delta = 1 : 1



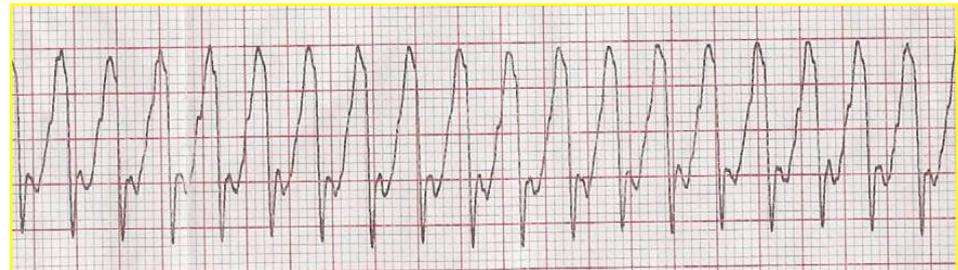
TACHICARDIA PREECCITATA

diagnosi di presunzione

per mancanza di segnali ECG diretti...

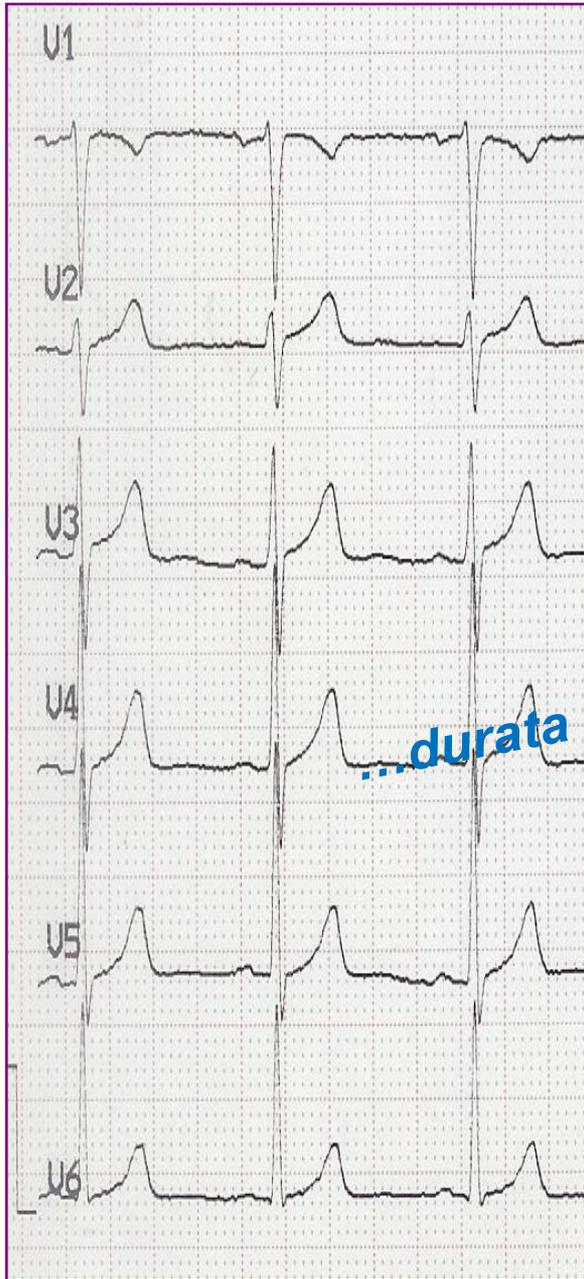


non esiste aritmia più veloce



...si raggiungono frequenze altissime per la veloce conduzione lungo il fascio anomalo

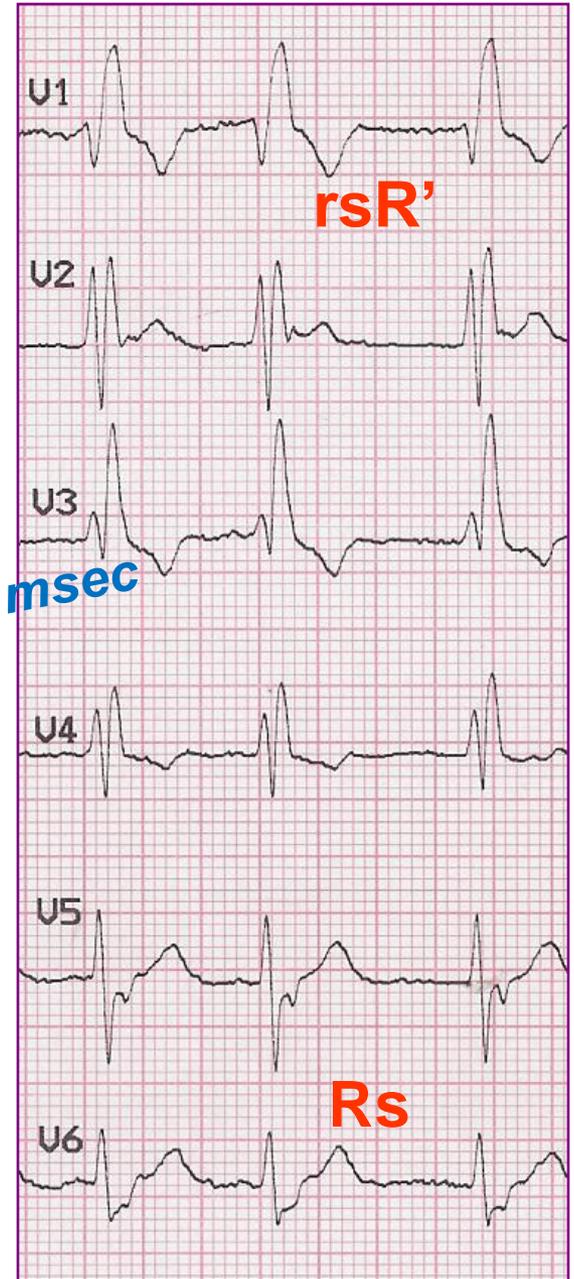
normale

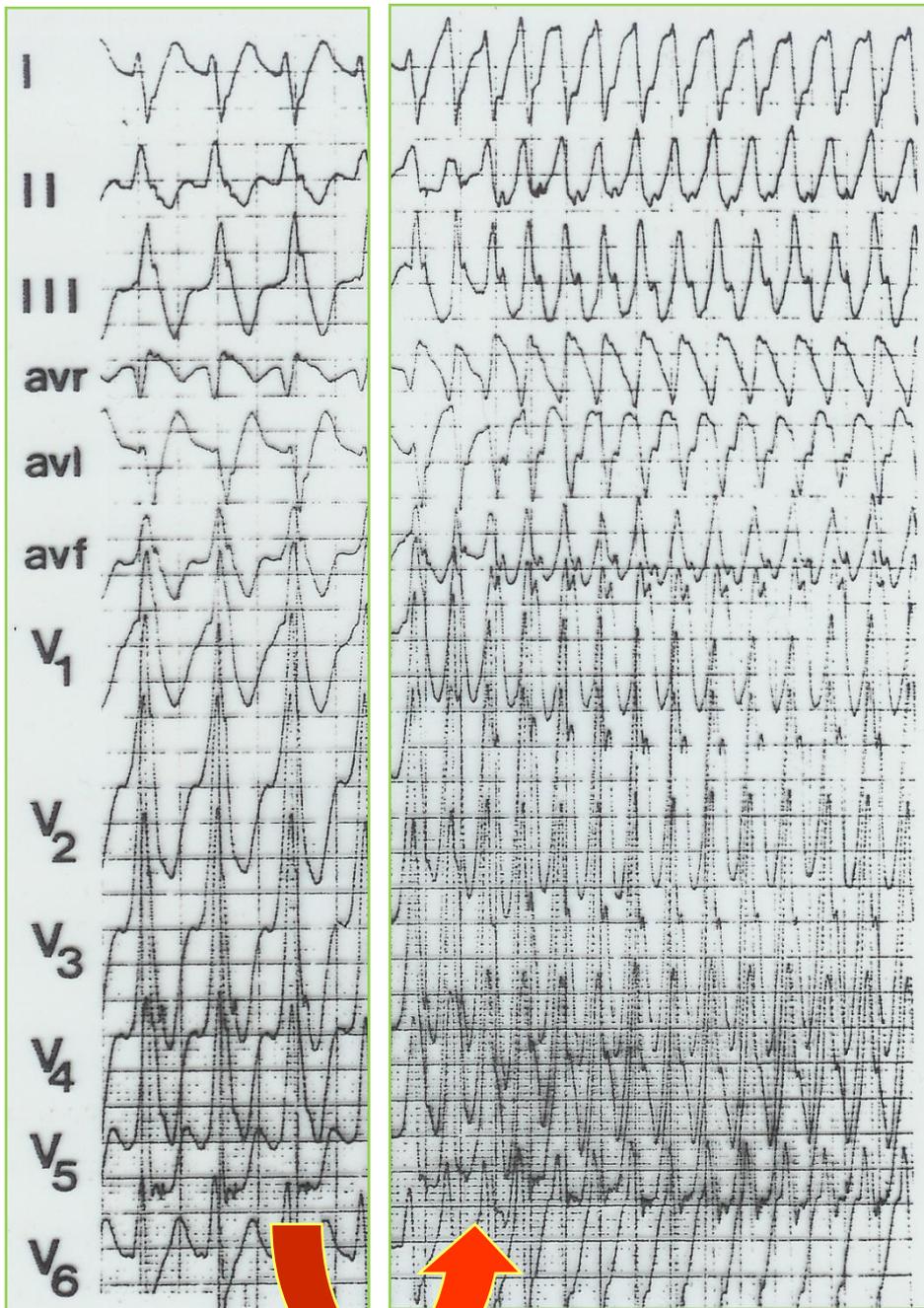


blocco branca Sx



blocco branca Dx

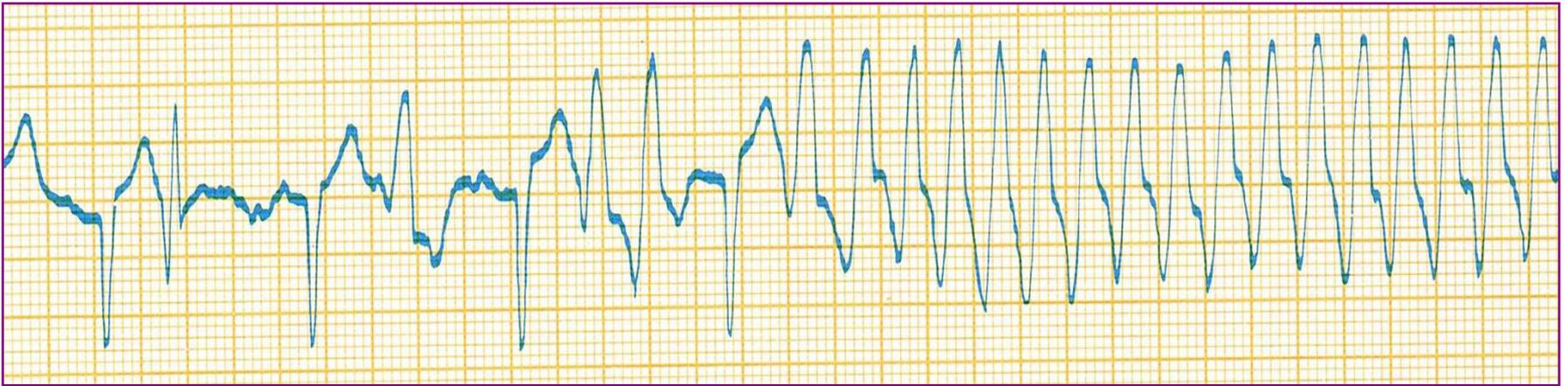




può diventare emergenza vera !

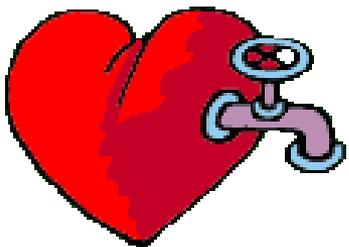
e per la possibile conduzione 1:1

SAREBBE FACILE



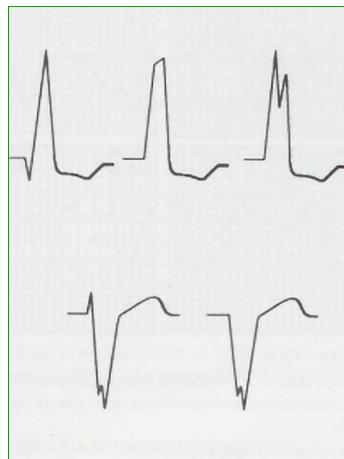
...se fosse sempre così

studio dei criteri morfologici nelle precordiali



morfologia tipo blocco di branca destra

ECTOPIA

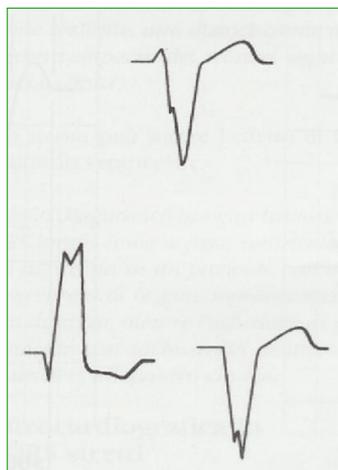


ABERRANZA

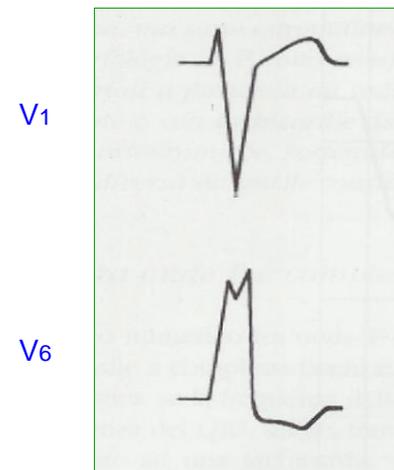


morfologia tipo blocco di branca sinistra

ECTOPIA

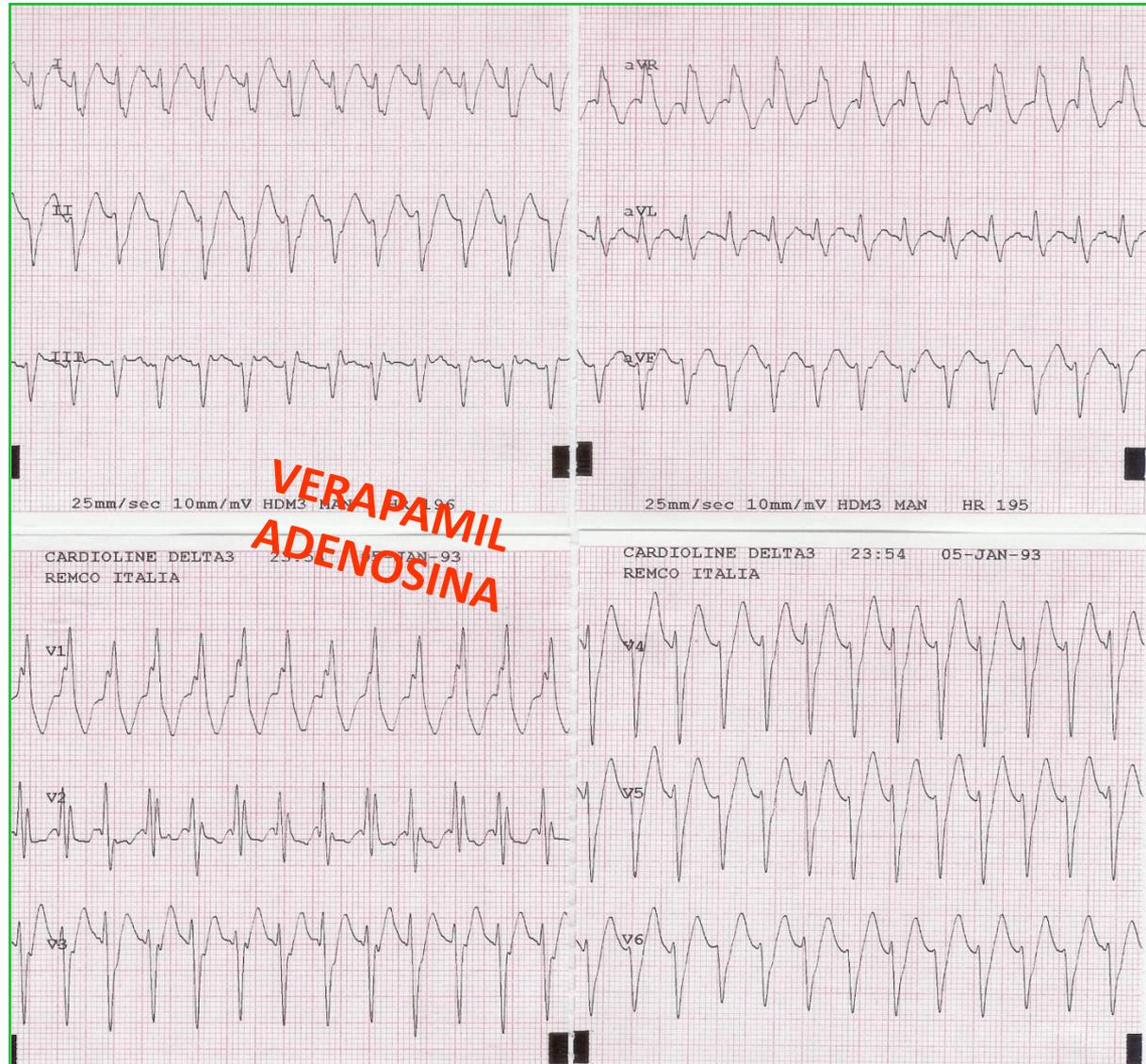


ABERRANZA



TACHICARDIA VENTRICOLARE idiopatica...fascicolare

QRS stretto
BBDx + EAs
120 ms



Sandro G. anni 28