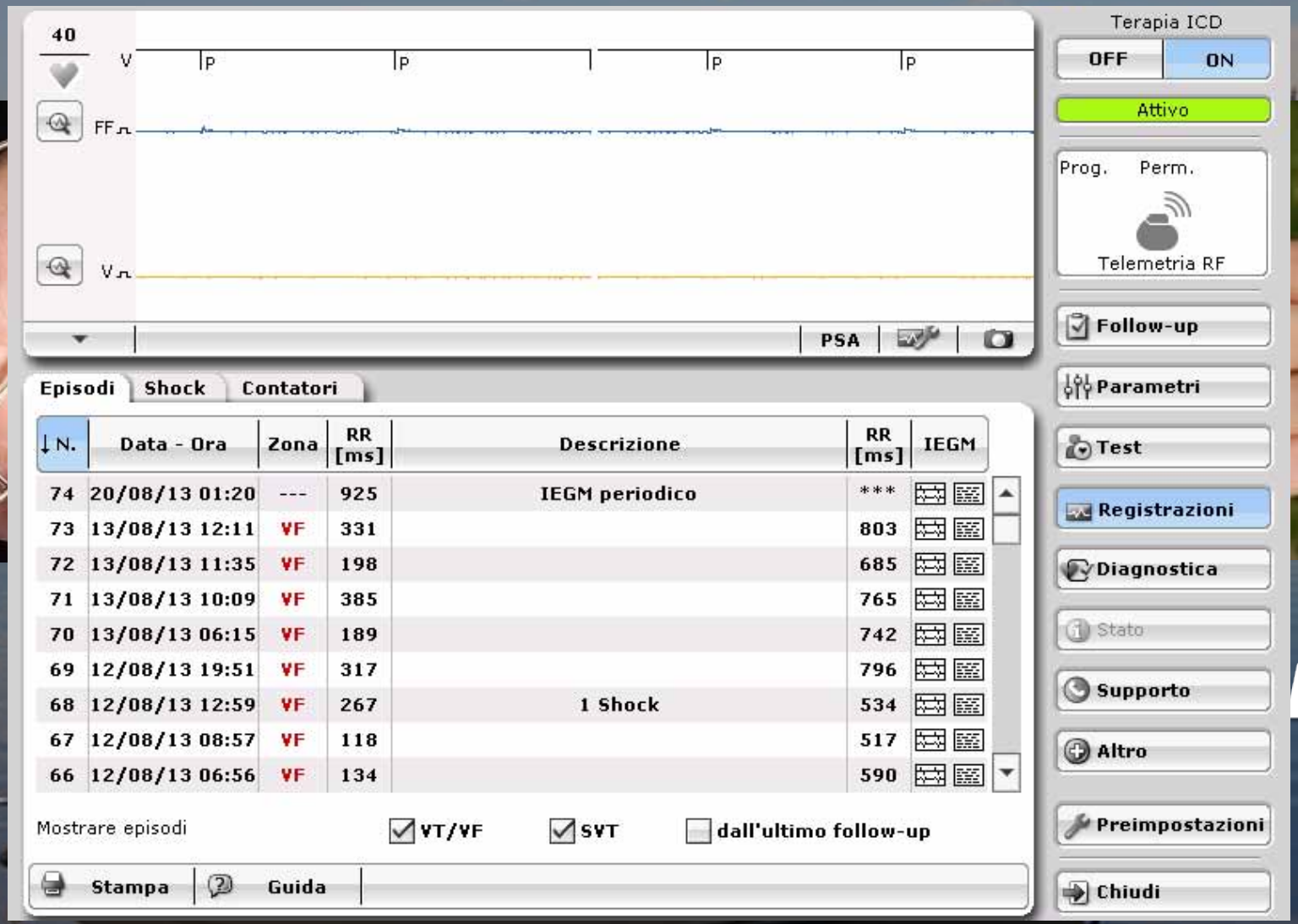
La sincope in pazienti portatori di devices

Emoclinic Symposium –
Sulle sponde del Ticino

Dr. NC. Dajelli Ermolli

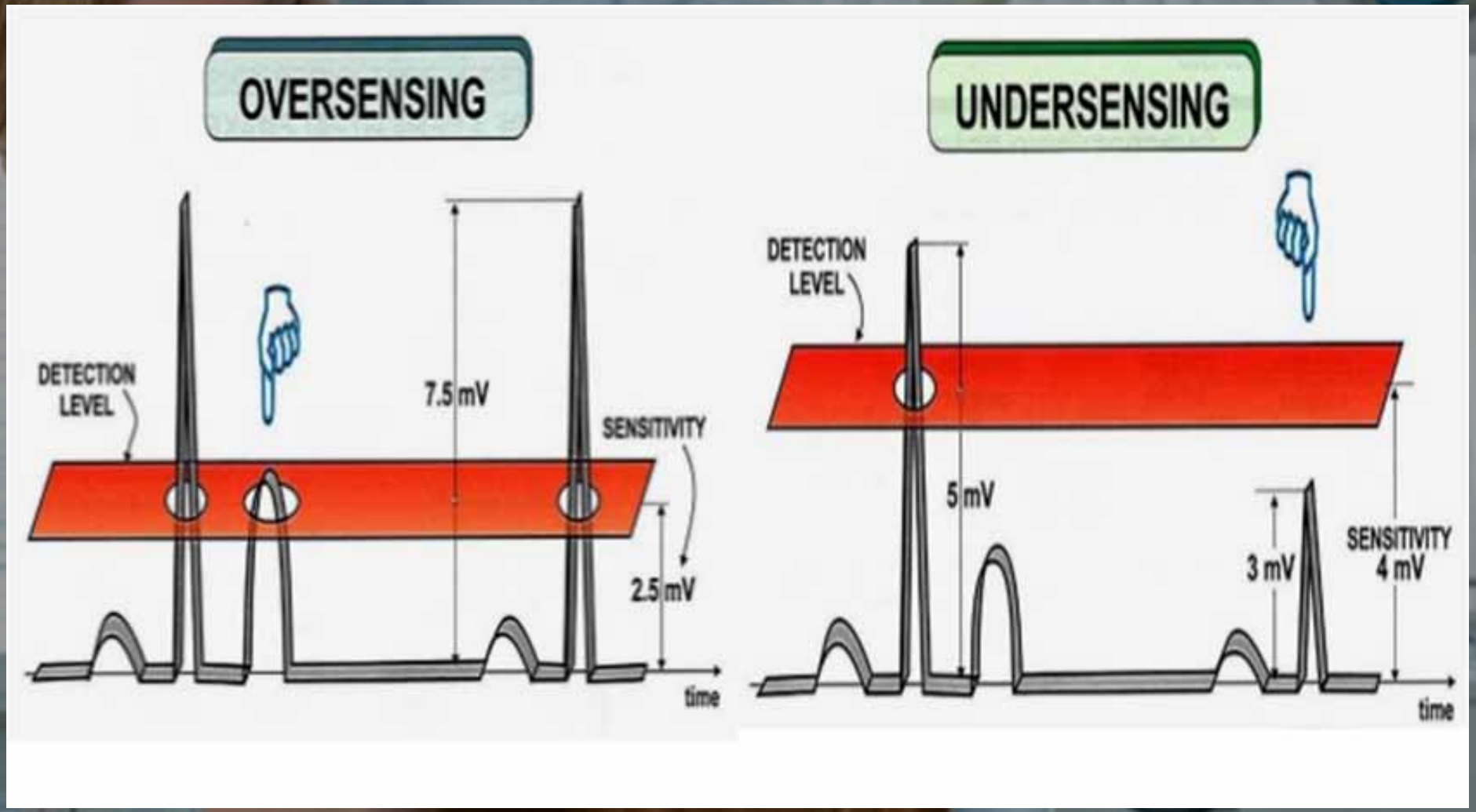
Tipi di device



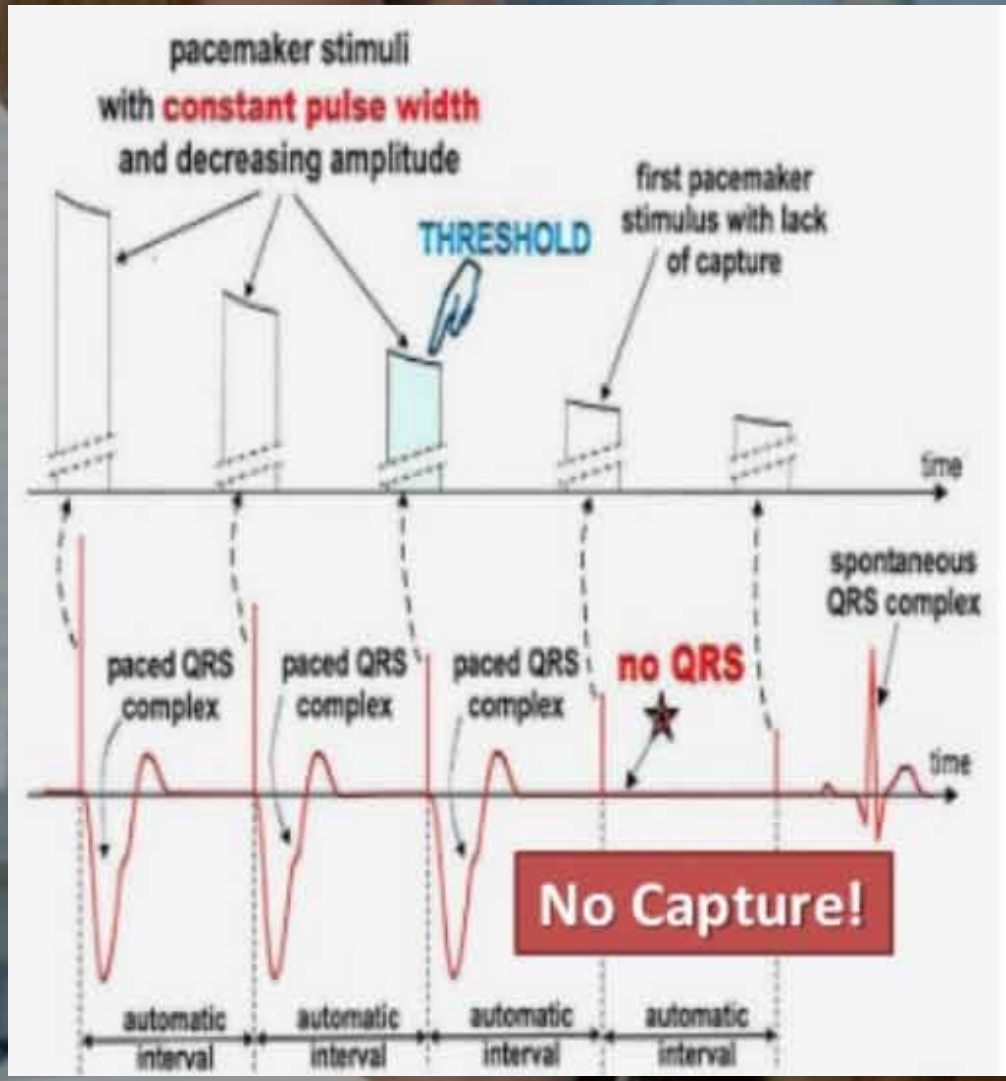
Come funziona l'elettrocatetere

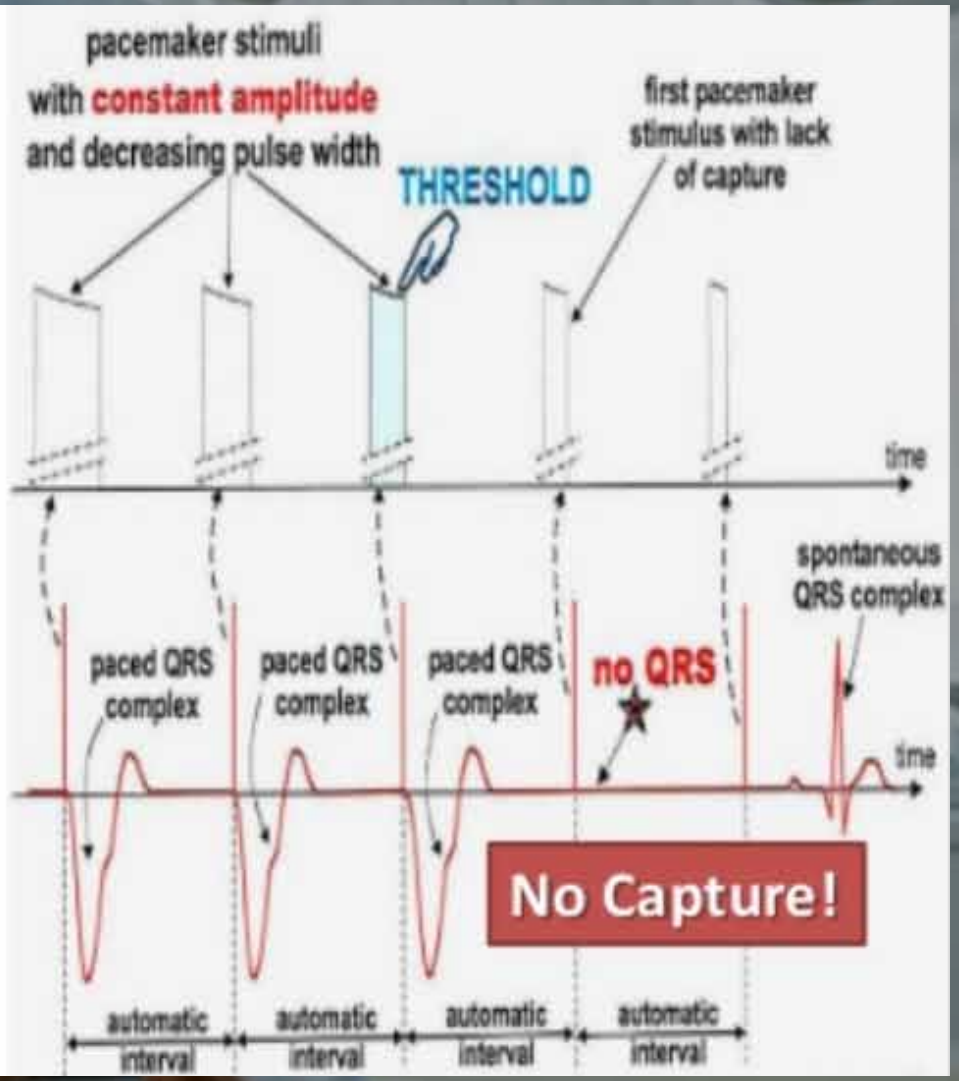
- ***Sensing***
- ***Pacing***
- ***Impedenza***

Sensing


OVERSENSING
DETECTION LEVEL
7.5 mV
SENSITIVITY
2.5 mV
time
UNDERSENSING
DETECTION LEVEL
5 mV
3 mV
SENSITIVITY 4 mV
time

Pacing


pacemaker stimuli
with constant pulse width
and decreasing amplitude
THRESHOLD
first pacemaker stimulus with lack of capture
time
spontaneous QRS complex
paced QRS complex
paced QRS complex
paced QRS complex
no QRS
time
No Capture!
automatic interval
automatic interval
automatic interval
automatic interval


pacemaker stimuli
with constant amplitude
and decreasing pulse width
THRESHOLD
first pacemaker stimulus with lack of capture
time
spontaneous QRS complex
paced QRS complex
paced QRS complex
paced QRS complex
no QRS
time
No Capture!
automatic interval
automatic interval
automatic interval
automatic interval

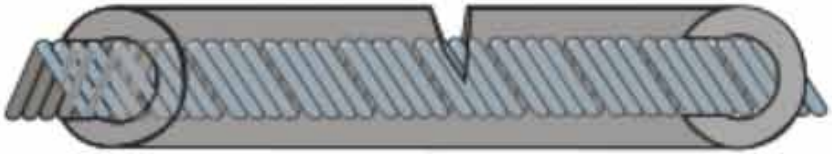
Impedenza

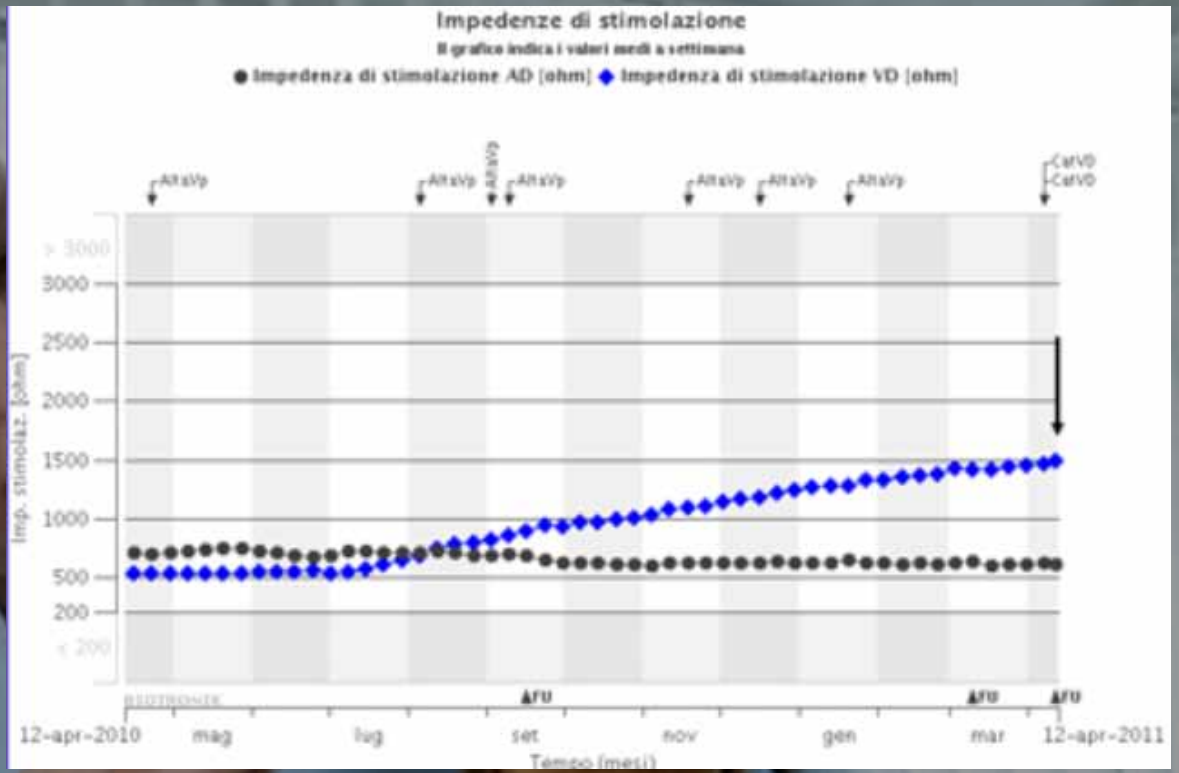
ALTA IMPEDENZA

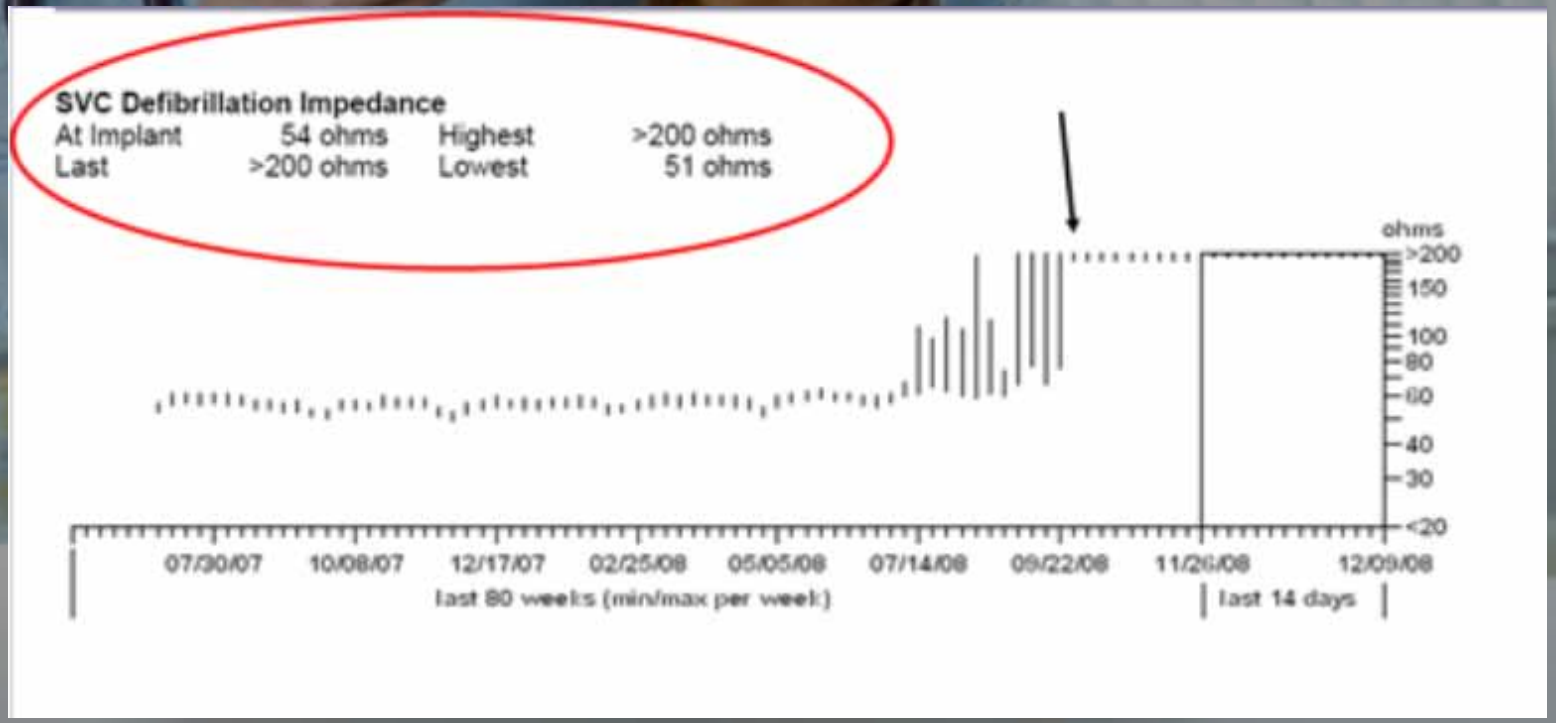
Conductor failure, impedance >2500 Ohm

BASSA IMPEDENZA

Insulation defect, Impedance <300 Ohm



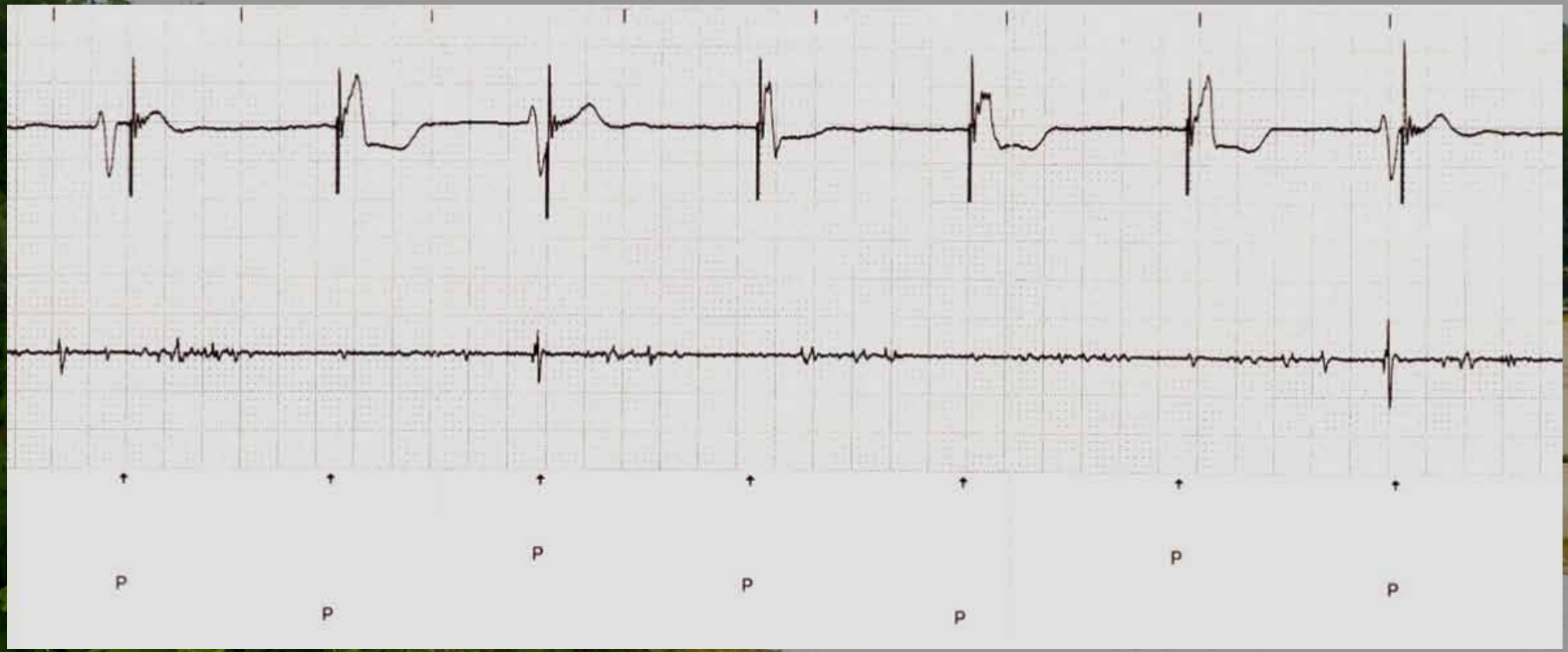

Impedenze di stimolazione
Il grafico indica i valori medi a settimana
Impedenza di stimolazione AD [ohm]
Impedenza di stimolazione VD [ohm]
Imp. stimolaz. [ohm]
> 3000
3000
2500
2000
1500
1000
500
200
< 200
12-apr-2010
mag
lug
set
nov
gen
mar
12-apr-2011
Tempo [mesi]


SVC Defibrillation Impedance
At Implant 54 ohms Highest >200 ohms
Last >200 ohms Lowest 51 ohms
ohms
>200
150
100
80
60
40
30
<20
07/30/07
10/08/07
12/17/07
02/25/08
05/05/08
07/14/08
09/22/08
11/26/08
12/09/08
last 80 weeks (min/max per week)
last 14 days

Cause di sincopi

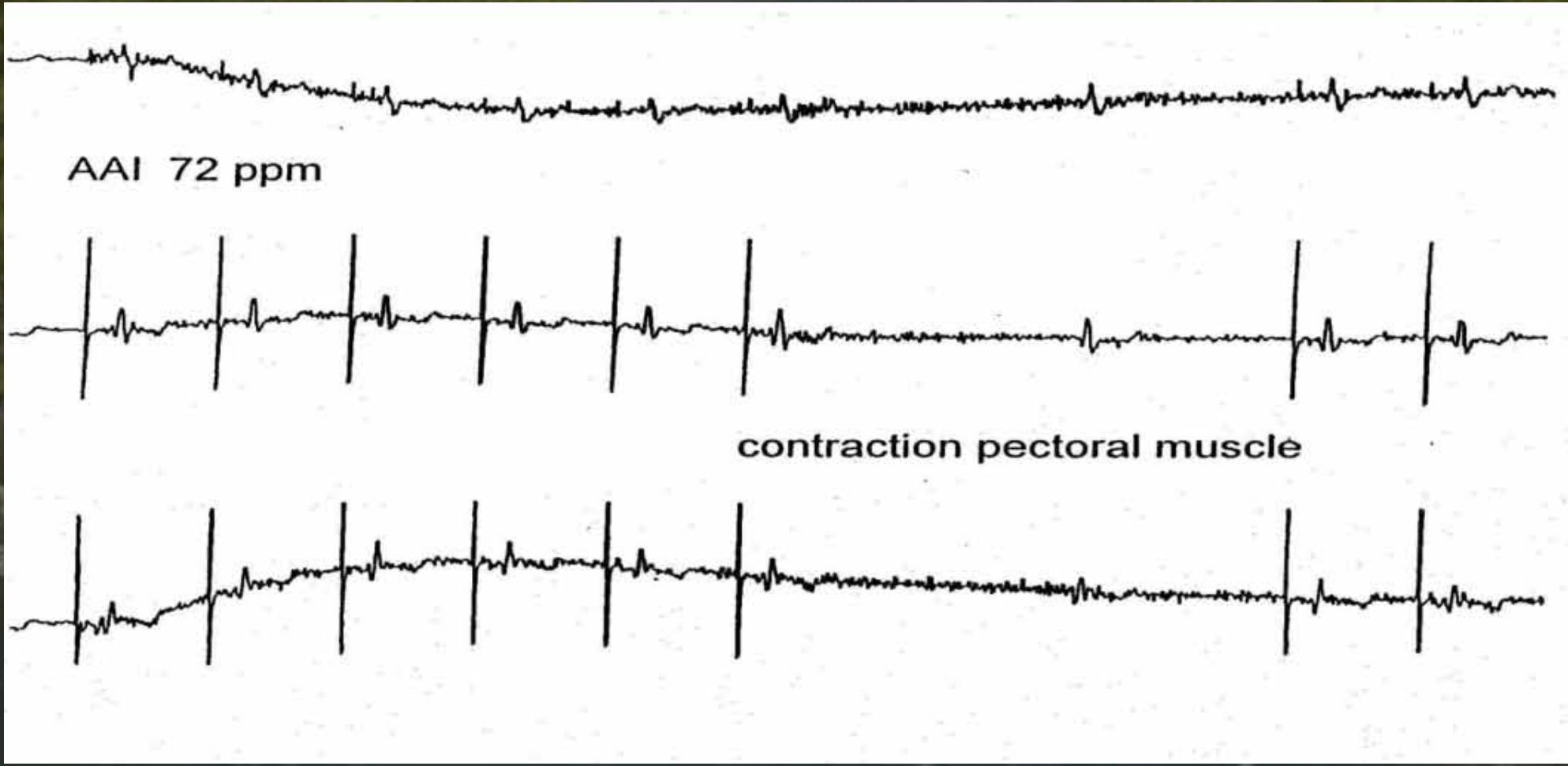
- Problemi di interpretazione (sensing)
- Problemi di cattura (pacing)
- Cause non device correlate
- Pseudomalfunzionamenti

Deficit di sensing

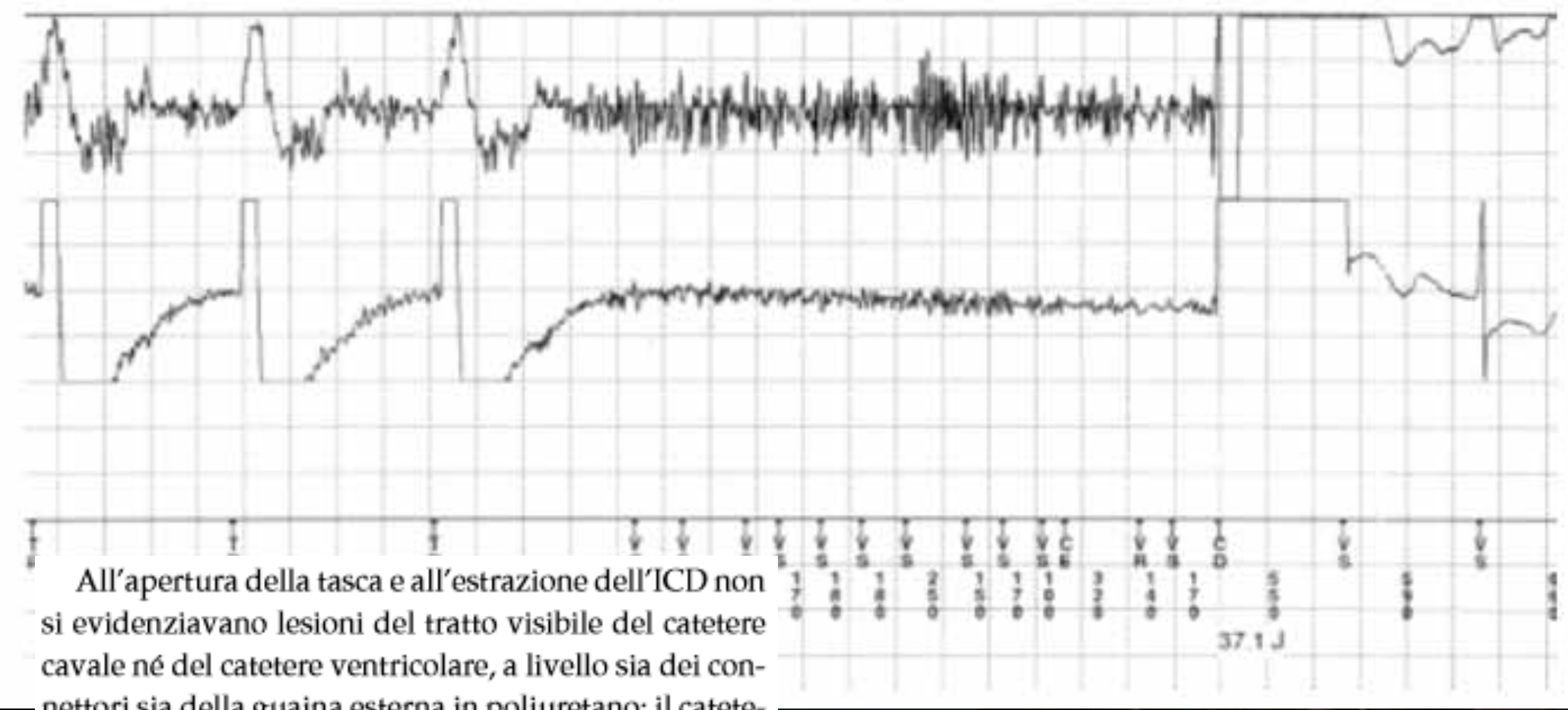


la situazione più delicata si realizza se l'attività evocata dal PM con problemi di "undersensing", coincide con un periodo di elevata vulnerabilità ventricolare: in questo caso è possibile il rischio d'induzione di tachiaritmie ventricolari sincopali

Oversensing

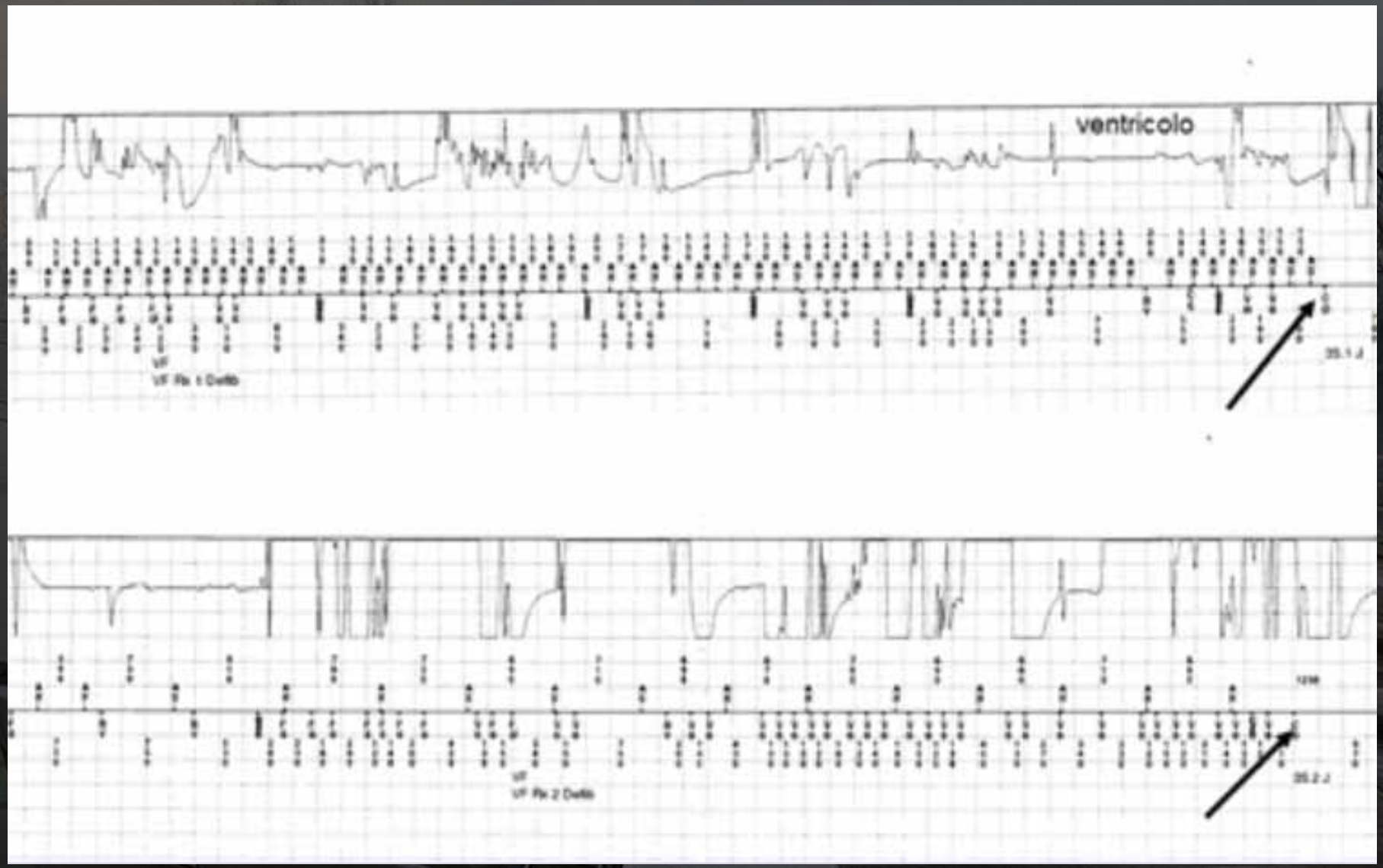


Oversensing con ICD



All'apertura della tasca e all'estrazione dell'ICD non si evidenziavano lesioni del tratto visibile del catetere cavale né del catetere ventricolare, a livello sia dei connettori sia della guaina esterna in poliuretano: il catetere ventricolare veniva, quindi, disconnesso e alle misurazioni elettriche si registrava una bassa impedenza di stimolazione tra anello e coil di defibrillazione, come da cattivo isolamento tra queste due strutture.

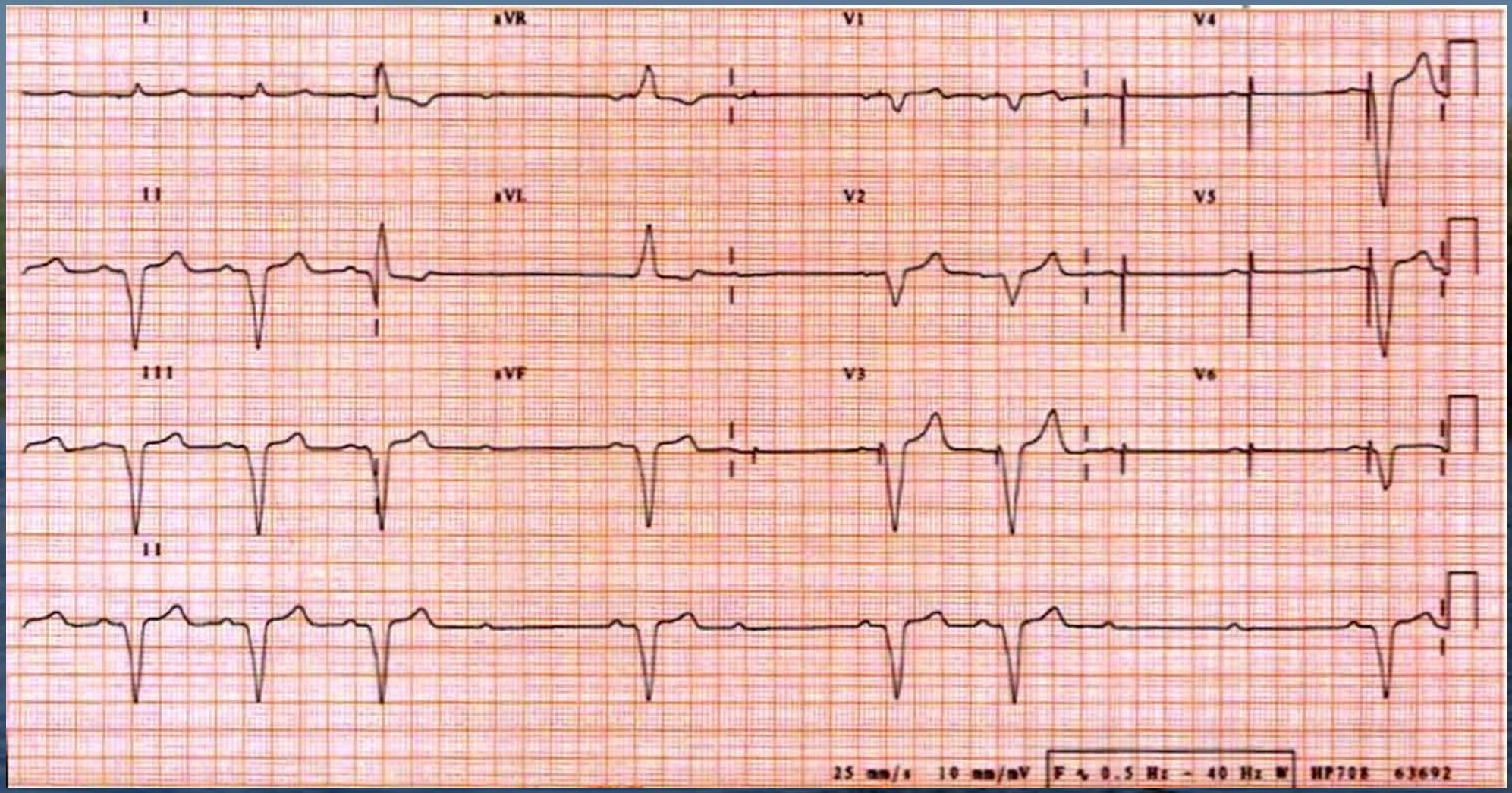
Frattura del coil di ICD



Cause di sincopi

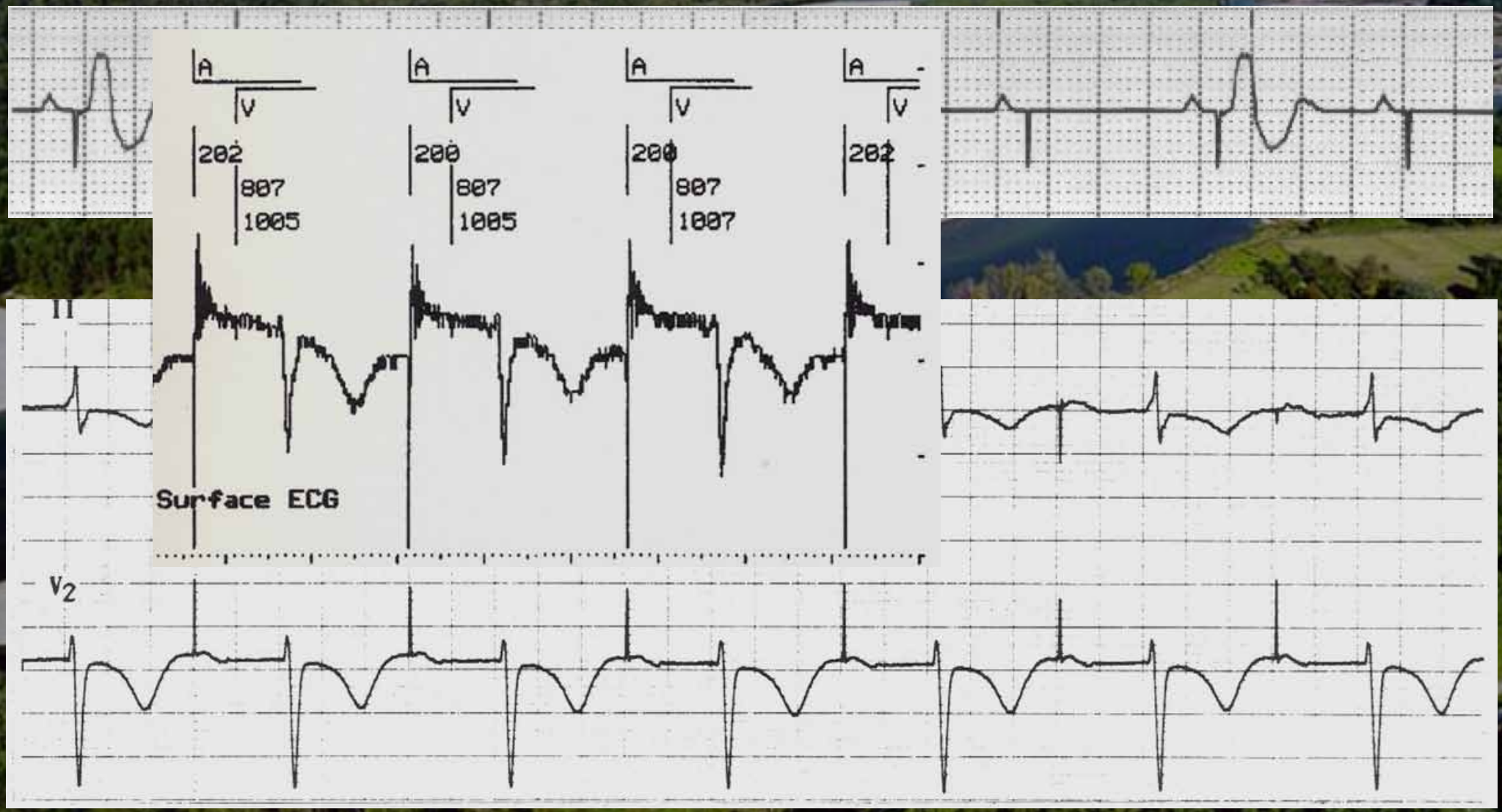
- Problemi di interpretazione (sensing)
- Problemi di cattura (pacing)
- Cause non device correlate
- Pseudomalfunzionamenti

Deficit di pacing



Molti fattori interferiscono sulla soglia di pacing: farmaci antiaritmici, attività fisica, postura, periodo della giornata e comorbilità

Deficit di pacing



Soglia pacing e farmaci

Vaughan Williams classification	Anti-arrhythmic drugs	Effect for pacing threshold
I a	qunidine	↑
	procainamide	↑~↑↑
	ajimaline	↑
	disopyramide	↑
	cibenzoline	↑↑
	pirmenol	↑~↑↑(?)
I b	aprindine	↑
	lidocaine	→
	phenytoin	→
	mexiletine	↑
I c	propafenone	↑↑↑
	pilsicainide	↑↑↑
	flecainide	↑↑↑
II	propranolol	→
III	amiodarone	→
	sotalol	→
IV	verapamil	→
—	digitalis	→~↓

↓: decrease, →: no change, ↑: increase

Figure 1 Effects of anti-arrhythmic drugs for pacing threshold

Table 1 Effects of anti-arrhythmic drugs for defibrillation threshold

increase	no change	decrease
amiodarone (chronic stage)	β blocker	amiodarone (acute stage)
atropine	disopyramide	sotalol
diltiazem	procainamide	nifekalant
verapamil	propafenone	
flecainide		

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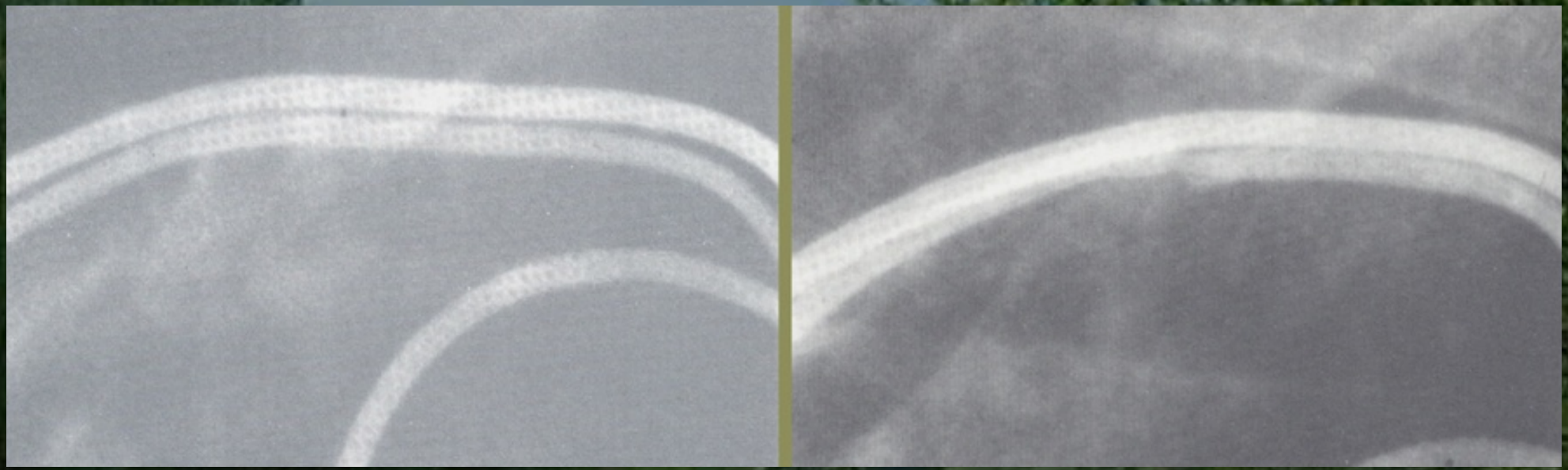
Alle origini del fiume Ticino

Deficit di pacing on-off



In taluni casi la riprogrammazione della modalità di stimolazione da bipolare in unipolare consente in genere una soluzione temporanea del problema

Per ovviare alla rottura definitiva dell'elettrocatetere è in genere necessario effettuare il reimpianto di nuovo elettrocatetere il prima possibile

Mono o bipolare?

Figura 5. Fissazione Attiva a Vite esposta.

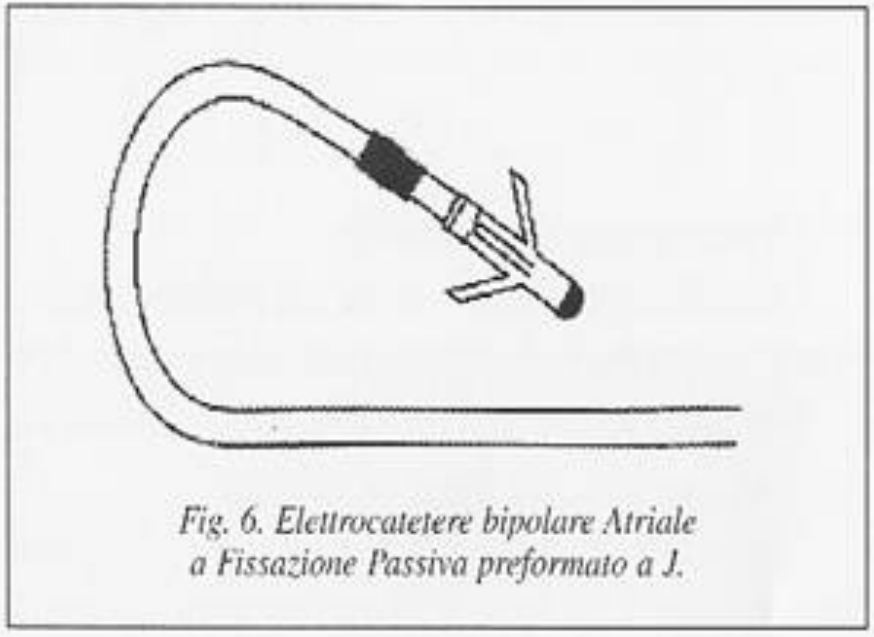
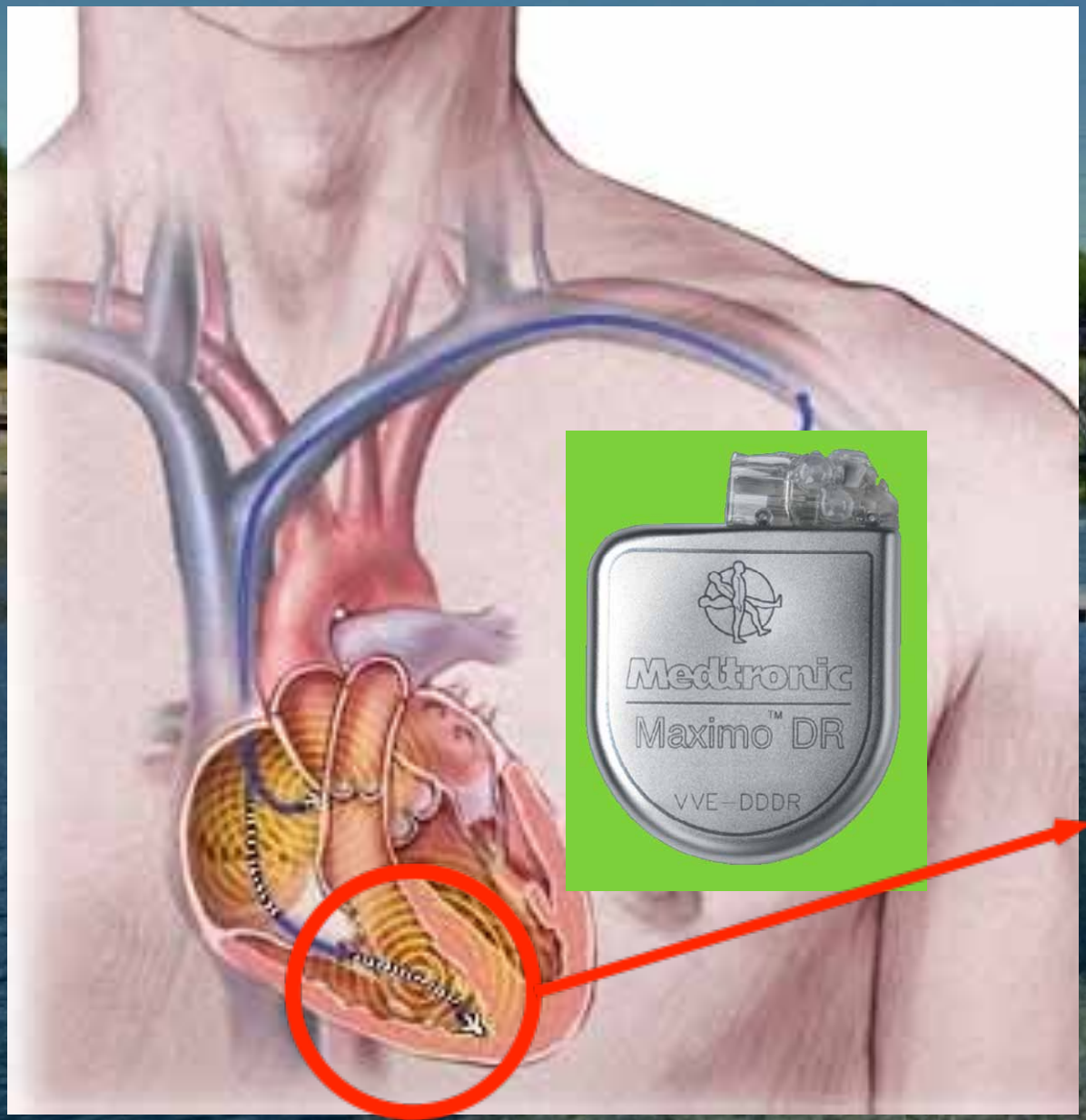


Fig. 6. Elettrocatetere bipolare Atriale a Fissazione Passiva preformato a J.

Unipolare ***Bipolare***

Pacemaker nuovo ma elettrodi?



Impianto nel 1990

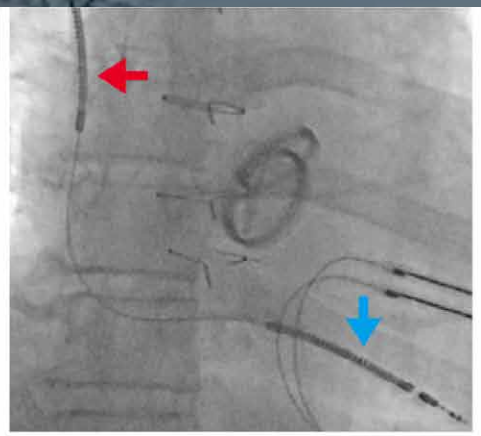
1a sostituzione nel 1998

2a sostituzione nel 2004

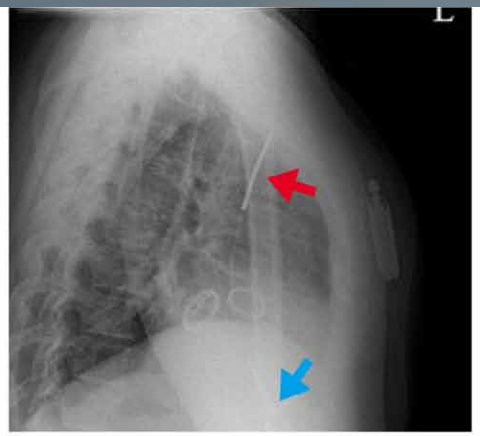
3a sostituzione nel 2010

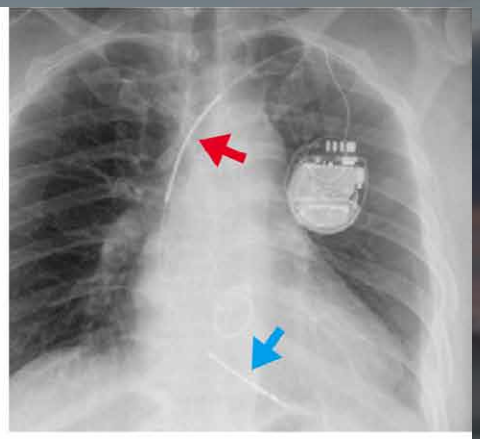
Gli elettrodi di che anno sono?

Twiddler's Syndrome

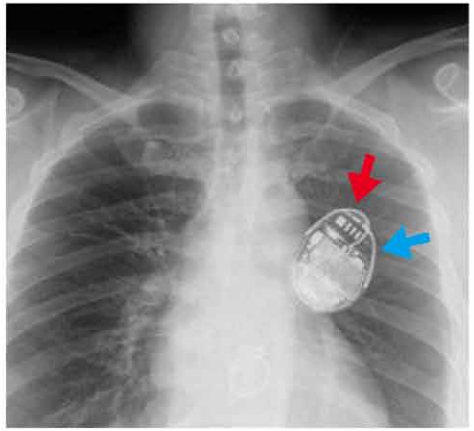


A. Fluoroscopy image during ICD implantation.

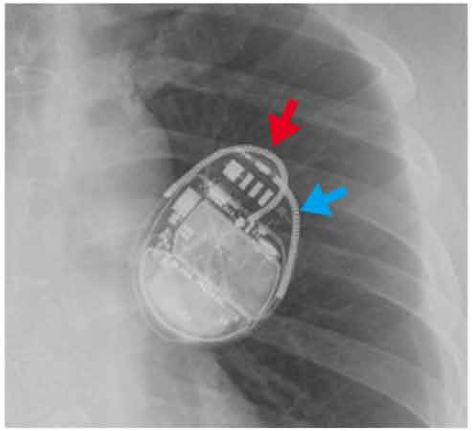


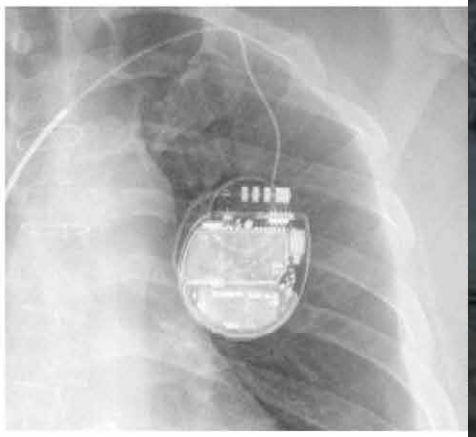


B and C. Chest radiograms obtained immediately after ICD implantation. Posteroanterior (C) and lateral (B) view.



D. Chest radiogram (posteroanterior view) shows displacement of the ventricular lead around the generator.

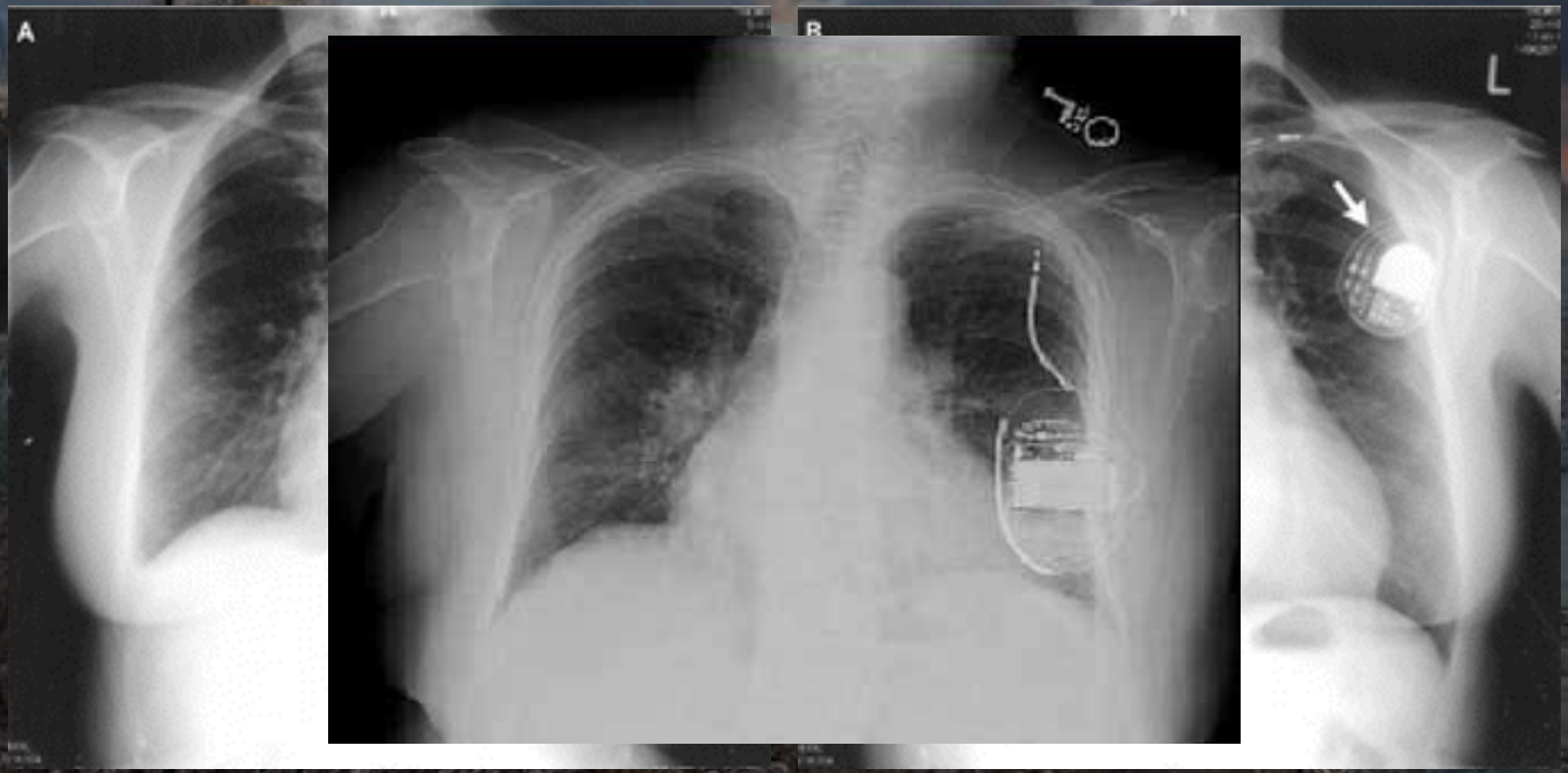




E and F. Magnified image focused on the generator, after lead displacement (E) and immediately after ICD implantation (F). Compared with panel F, there has been a reversal from left to right in panel E, which suggests extreme rotation and flipping-over of the generator. Red arrow indicates SVC coil and blue arrow indicates RV coil.

SVC coil RV coil

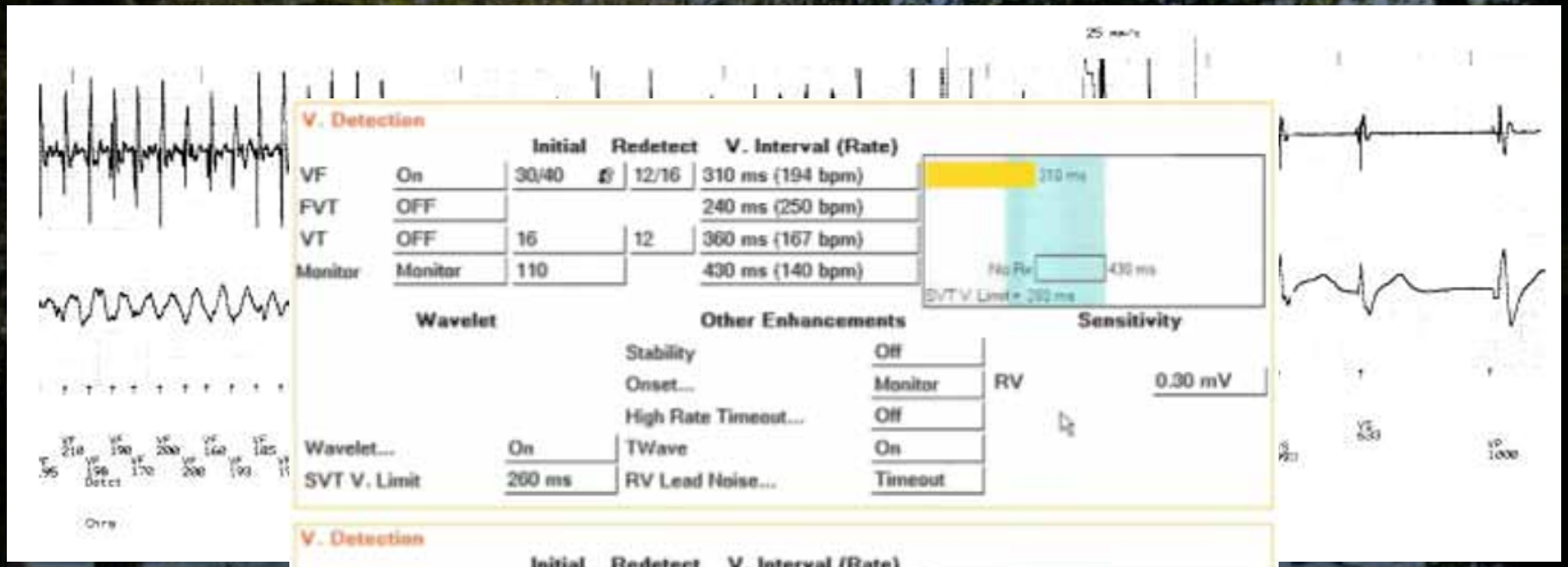
Twiddler's Syndrome

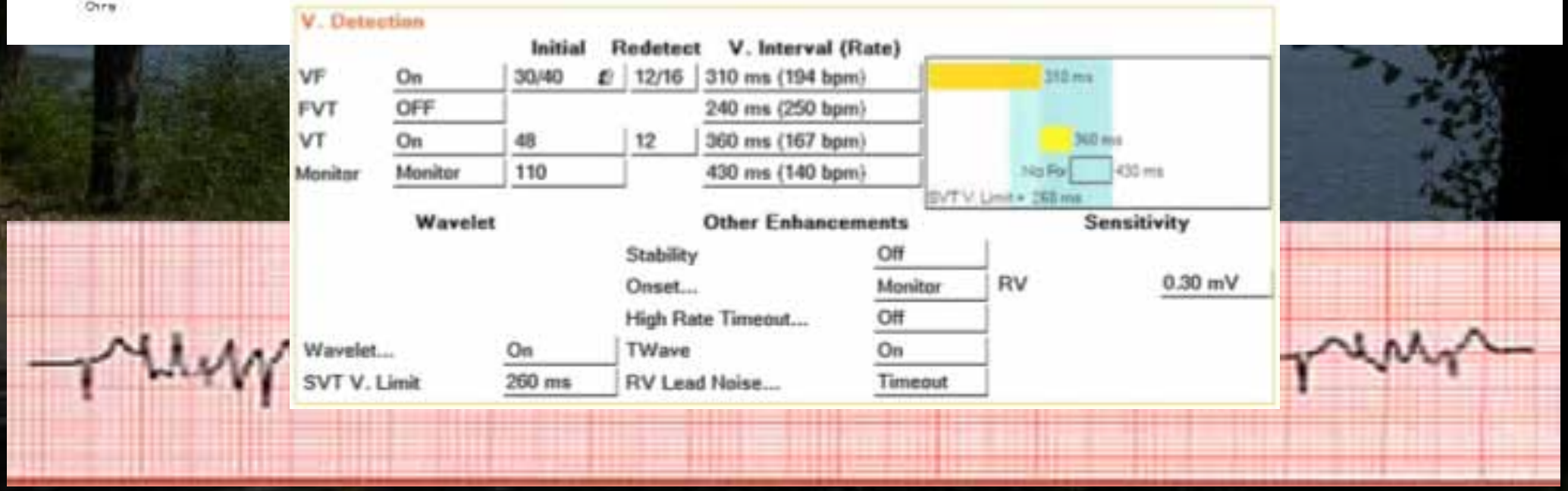


Cause di sincopi

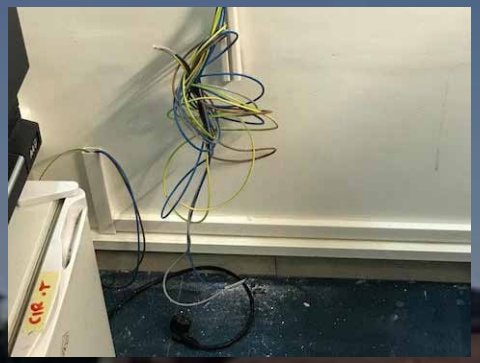
- Problemi di interpretazione (sensing)
- Problemi di cattura (pacing)
- Cause non device correlate
- Pseudomalfunzionamenti

Sincopi da tachiaritmie





Interferenze ambientali



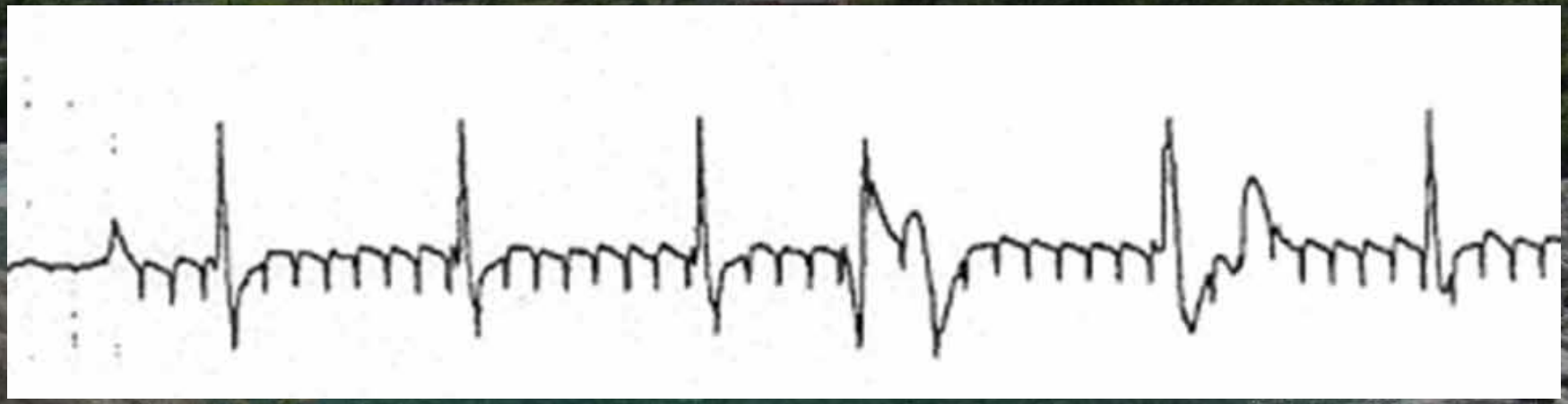
Interferenze domestiche

TABELLA I Intensità di campo magnetico per i comuni elettrodomestici espressa in funzione della distanza. Per ogni elettrodomestico sono indicati i valori a 3 cm, 30 cm e 100 cm di distanza

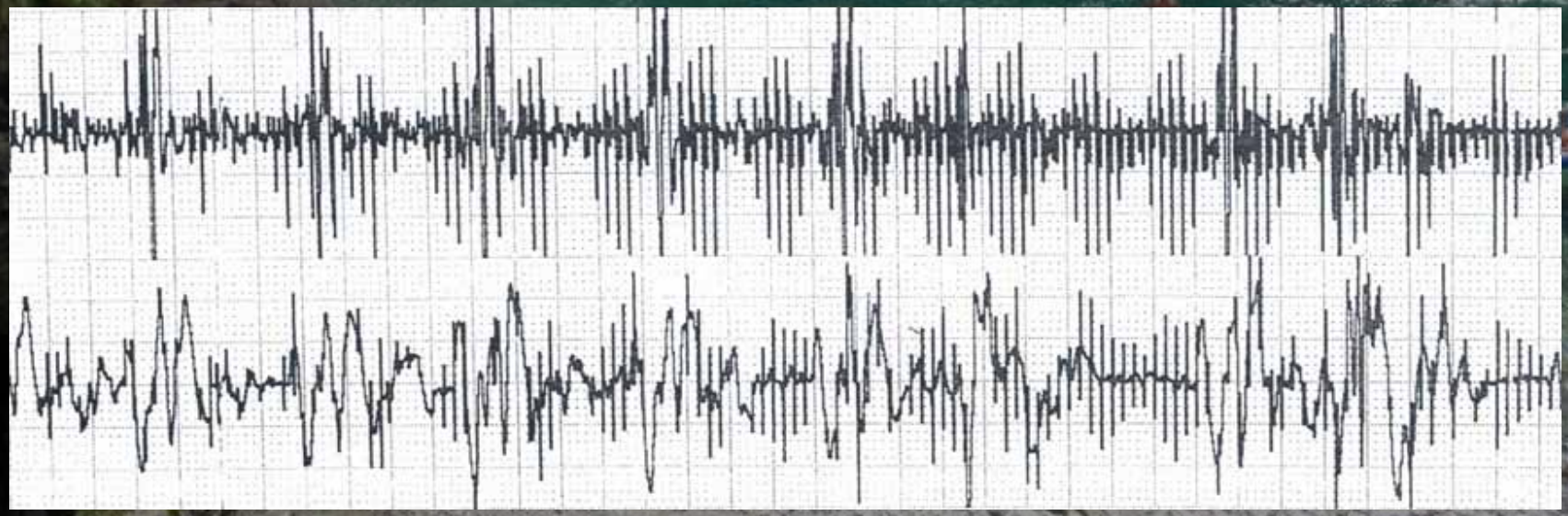
Elettrodomestici	3 cm	30 cm	100 cm
Lavatrice	0,8-50	0,15-3	0,01-0,15
Lavastoviglie	3,5-20	0,6-3	0,01-0,15
Trapano elettrico	400-800	2-3,5	0,08-0,2
Lampada da tavolo	40-400	0,5-2	0,02-0,25
Robot da cucina	60-700	0,6-10	0,02-0,25
Asciugacapelli	6-2000	<0,01-1	<0,01-0,3
Ferro da stiro	8-30	0,12-0,3	0,01-0,025
Forno a microonde	75-2000	4-5	0,25-0,6
Forno elettrico	1-50	0,15-0,5	0,01-0,04
Frigorifero	0,5-1,7	0,01-0,25	<0,01
Televisore	25-50	0,04-2	<0,01-0,15
Rasoio elettrico	15-1500	0,06-7	<0,01-0,3

Interferenze mediche

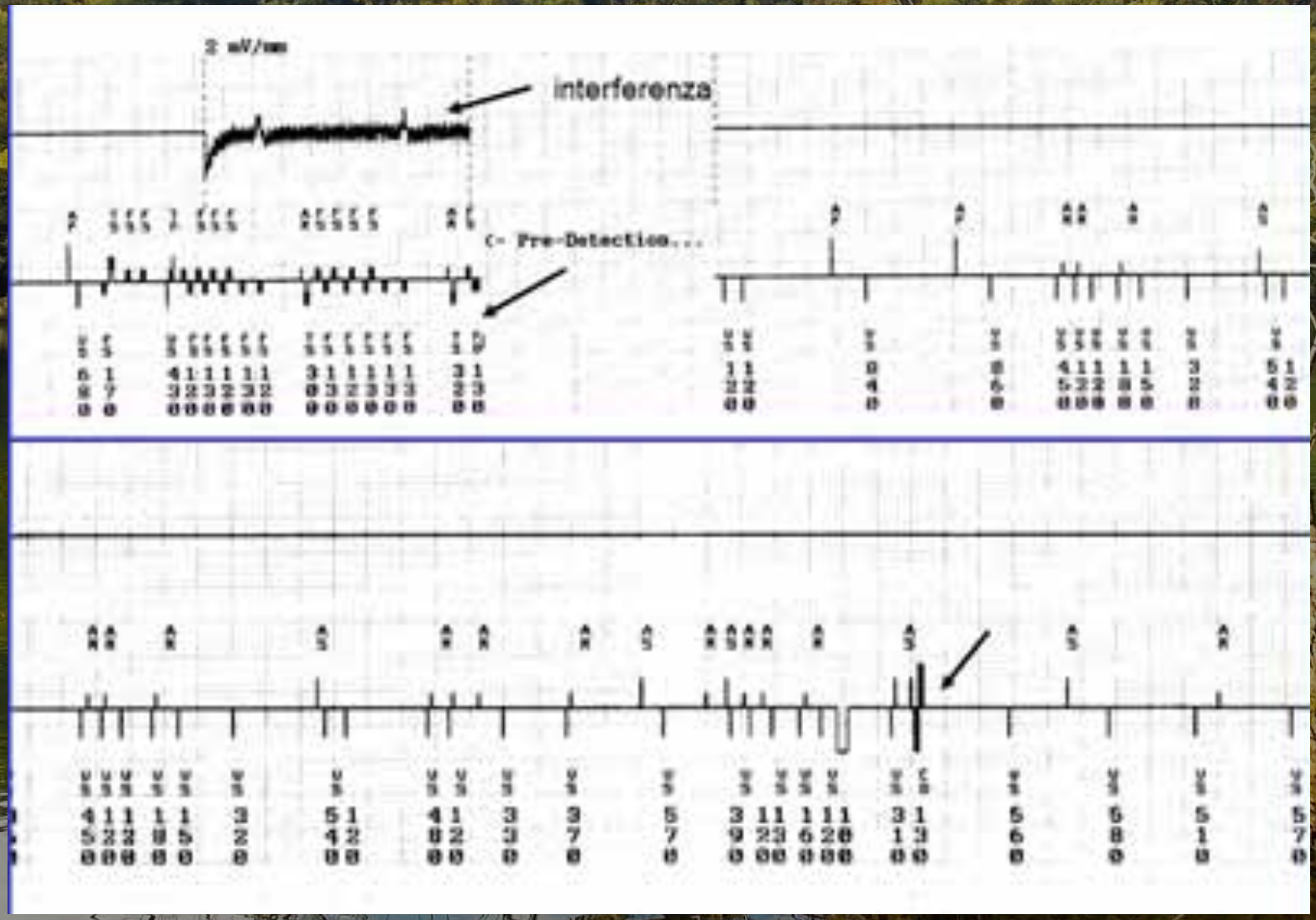
TENS



RMN



Ionoforesi



Interferenza da ionoforesi con riconoscimento inappropriato di FV ed erogazone di shock inappropriato

Cause di sincopi

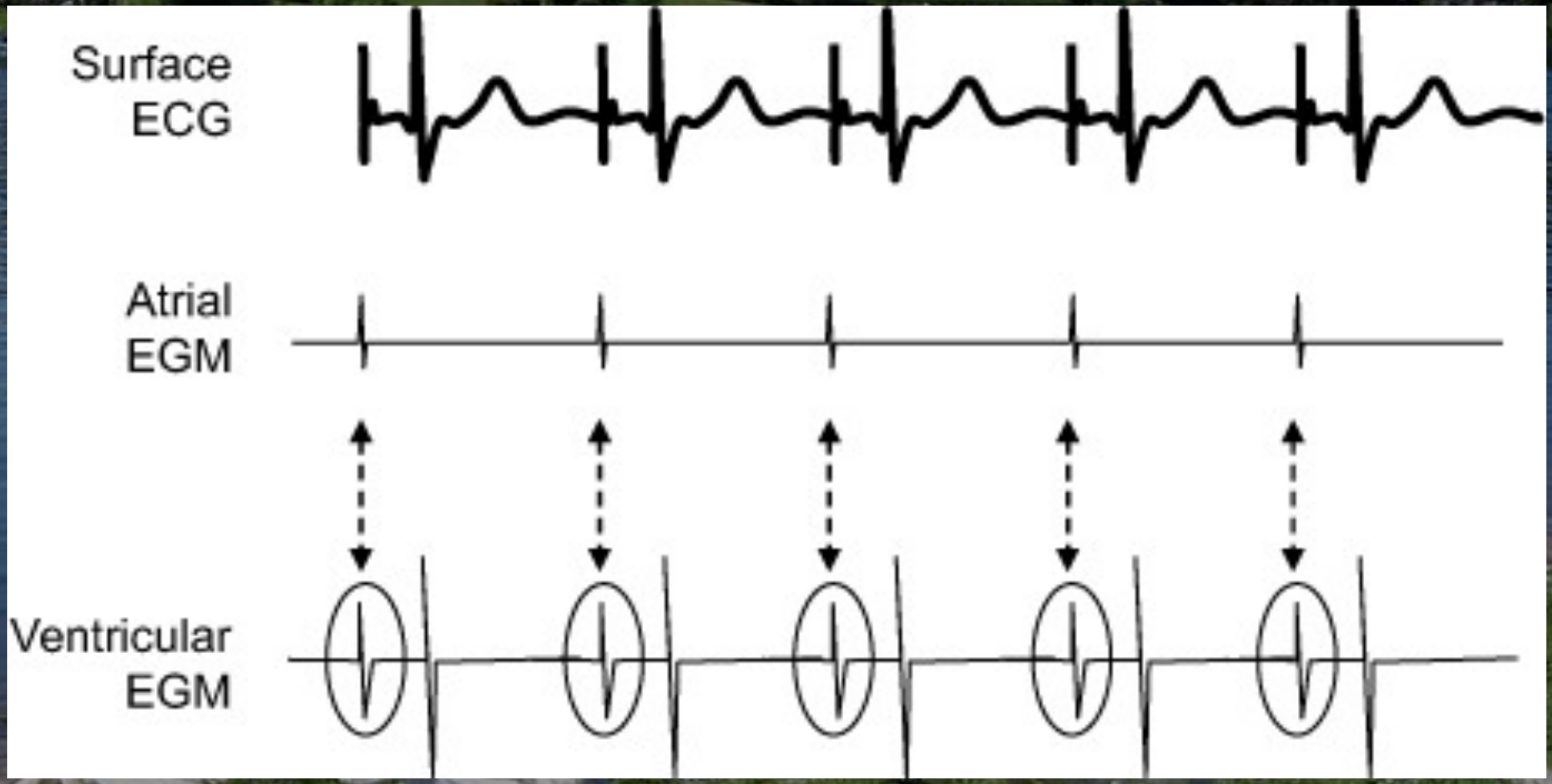
- Problemi di interpretazione (sensing)
- Problemi di cattura (pacing)
- Cause non device correlate
- Pseudomalfunzionamenti

Pseudomalfunzionamenti

- Crosstalking
- Runaway pacemaker
- Switch
- Sincopi da sforzo

Alle origini del fiume Ticino

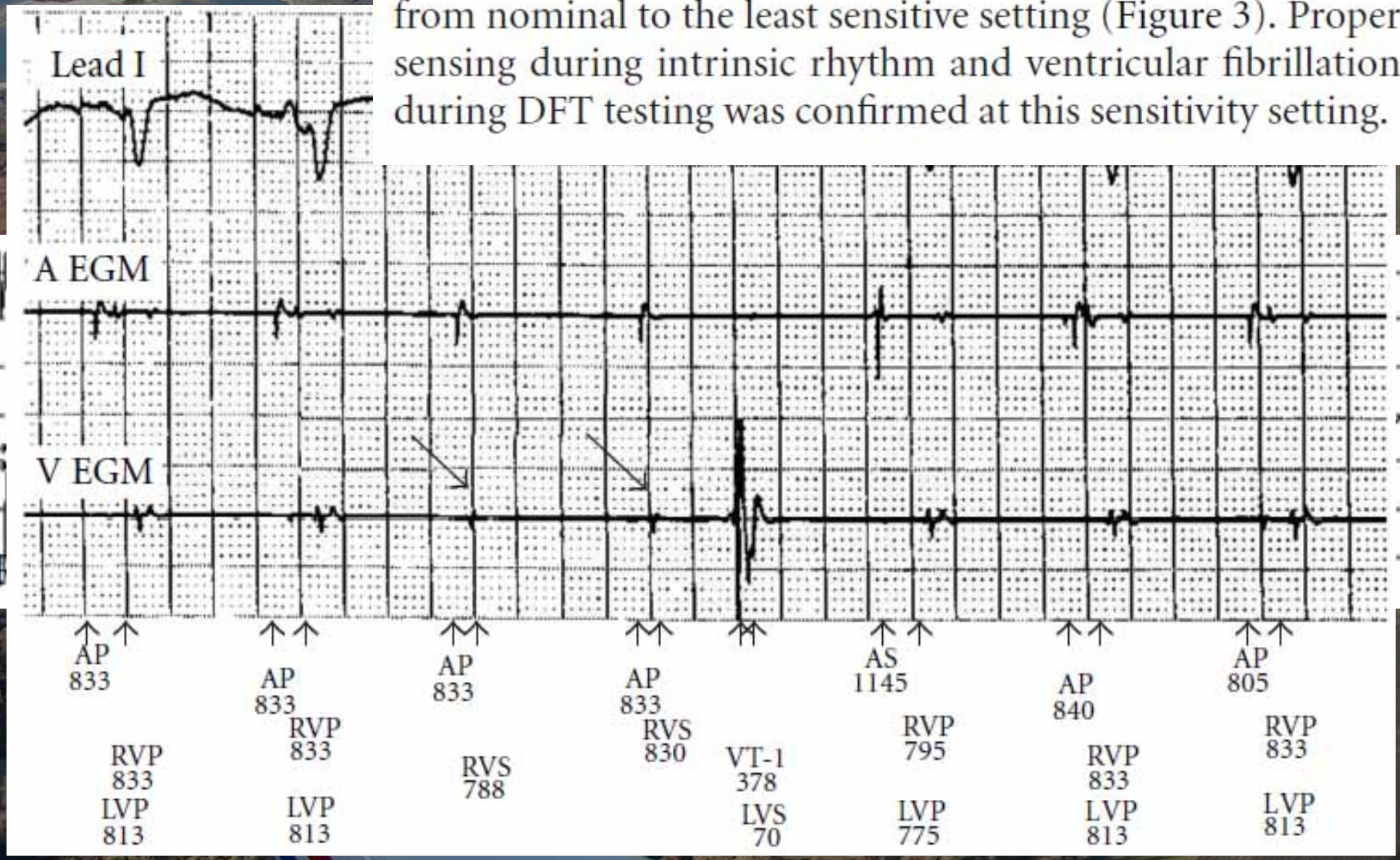
Cross-talking A-V



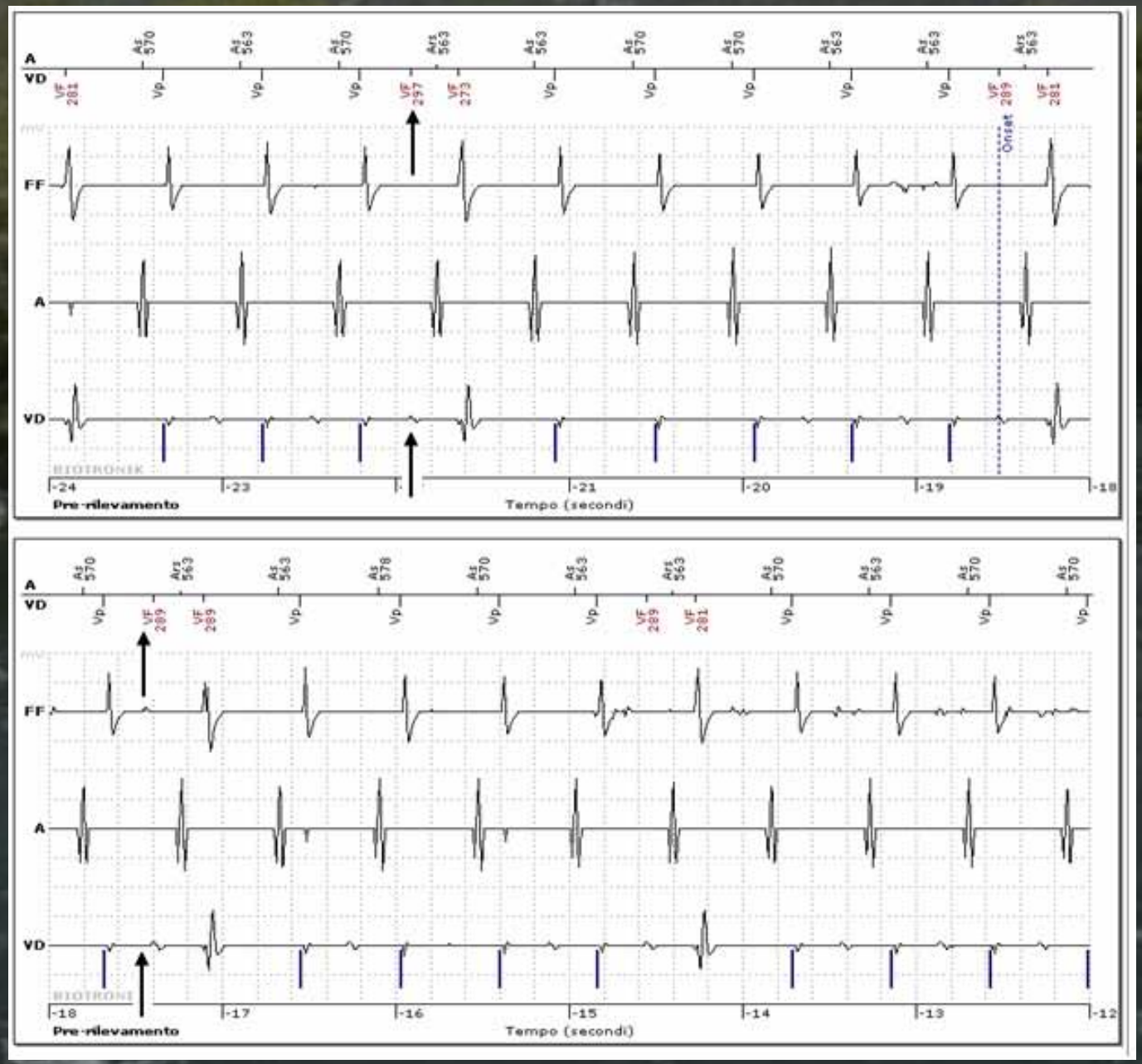
Case Report

Atrioventricular
Inhibition in a D

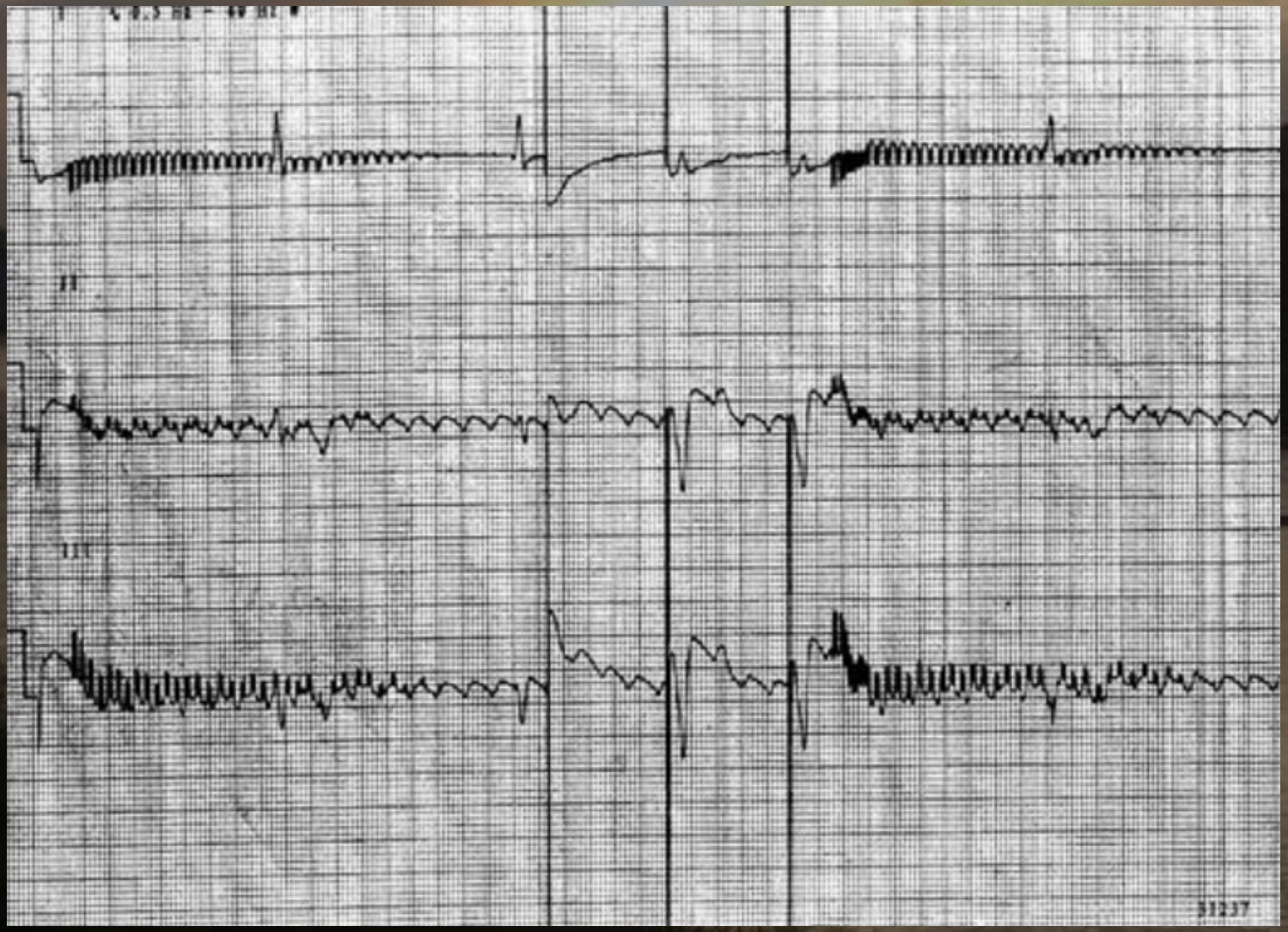
Neither prolongation of the ventricular blanking period to 85 ms nor decreasing atrial output to 1.0 V at 0.5 ms could eliminate cross-talk sensing [3]. Finally, cross-talk sensing disappeared after programming right-ventricular sensitivity from nominal to the least sensitive setting (Figure 3). Proper sensing during intrinsic rhythm and ventricular fibrillation during DFT testing was confirmed at this sensitivity setting.



Doppio conteggio

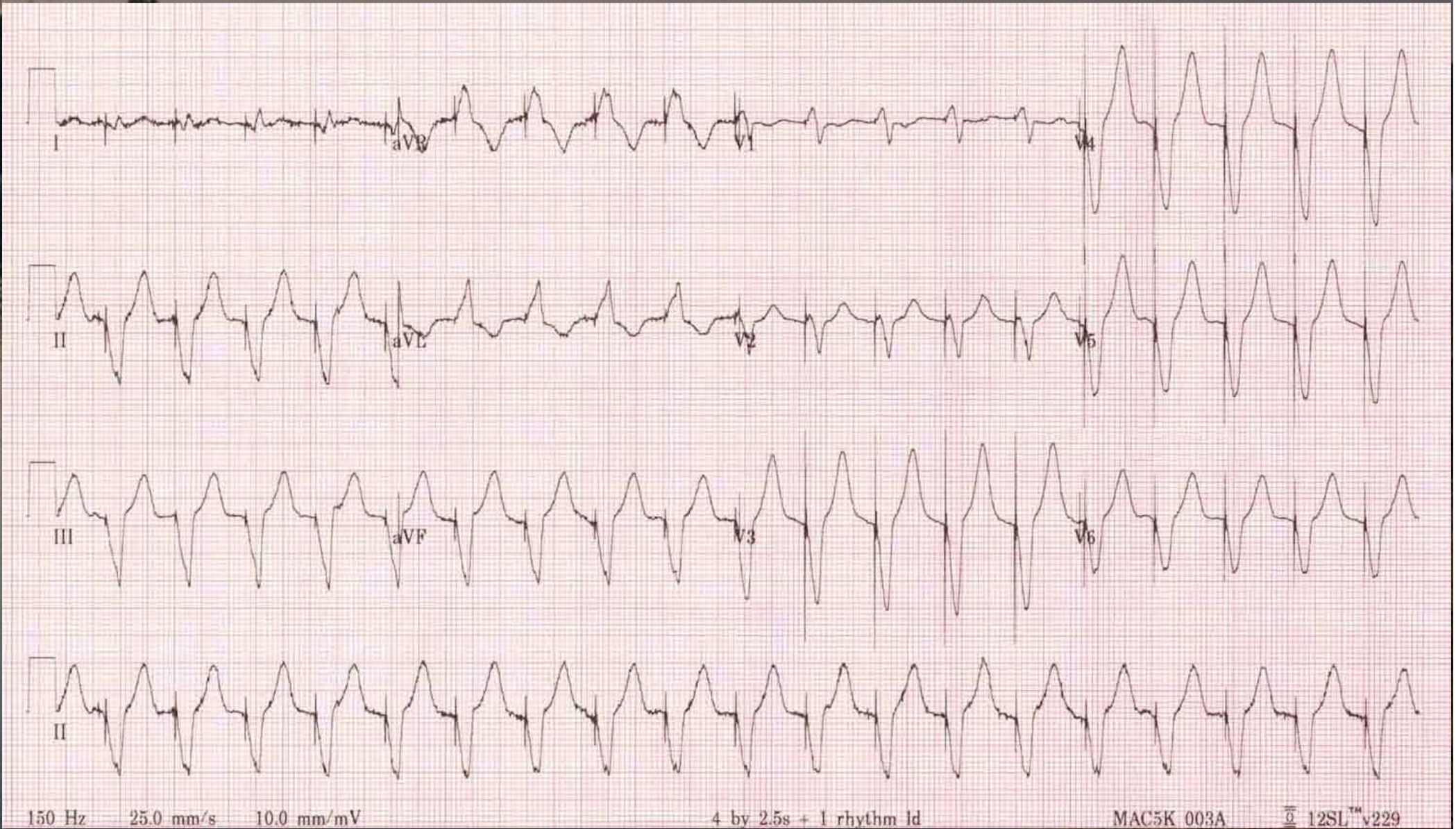


Runaway estinto…



Episodi di rapido pacing a 2000 bpm con ridotta intensità di pacing

Undersensing aritmie SV



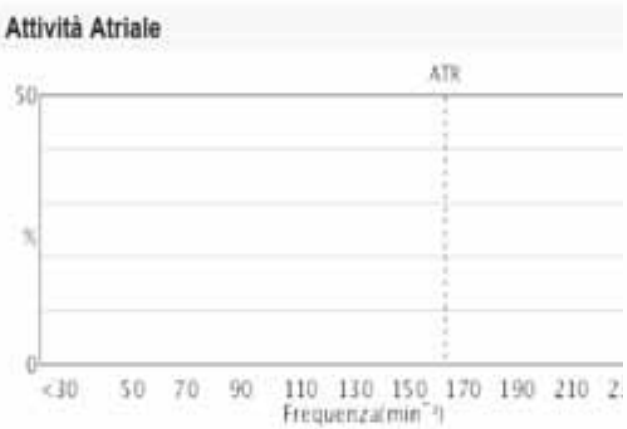
Undersensing aritmie SV

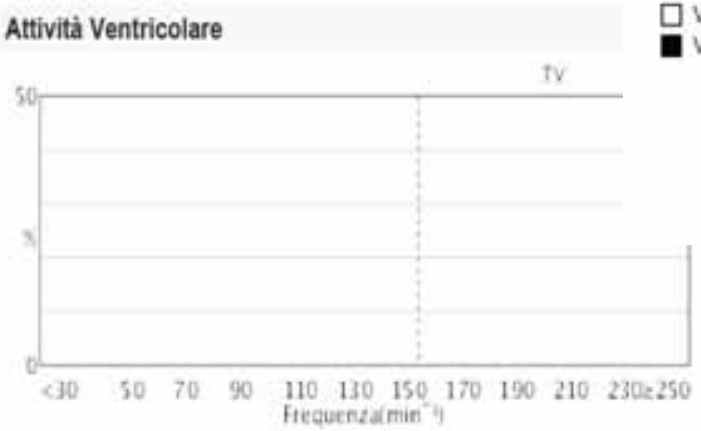
Sincope per:

- Cardiopatie che risentono della FC
- Upper-rate del device non adattato all'età e alla cardiopatia
- 130 bpm a 60 aa (81% FCMT)
  A 90 aa (144% FCMT)

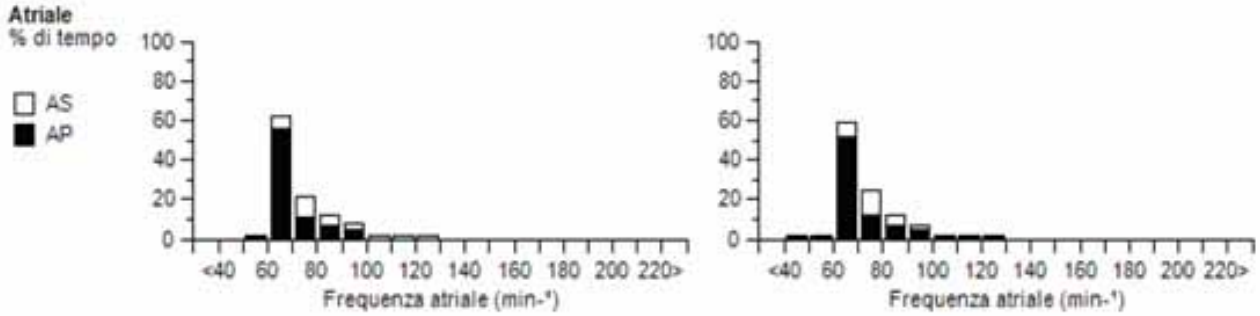
Inadeguato cronotropismo +/-

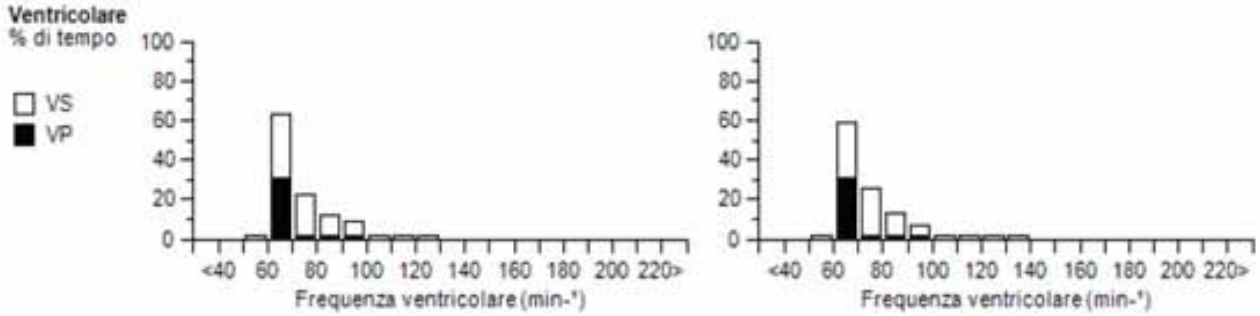
Penultimo azz.
N/R giorno(i)

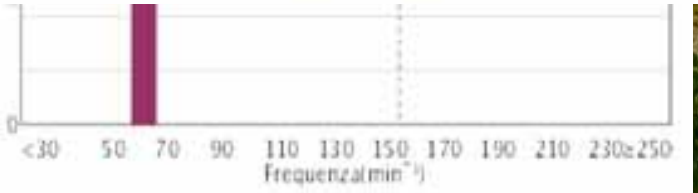




	Prima dell'ultima sessione dal 05-Dec-2014 al 09-Jan-2015 35 giorni	Da ult. sess. dal 09-Jan-2015 al 02-Jul-2015 6 mesi
% di tempo		
VP totale	31.9%	32.8%
AS-VS	22.7%	24.8%
AS-VP	< 0.1%	< 0.1%
AP-VS	45.3%	42.3%
AP-VP	31.9%	32.8%







Nei pressi di Pavia

Cross del medico

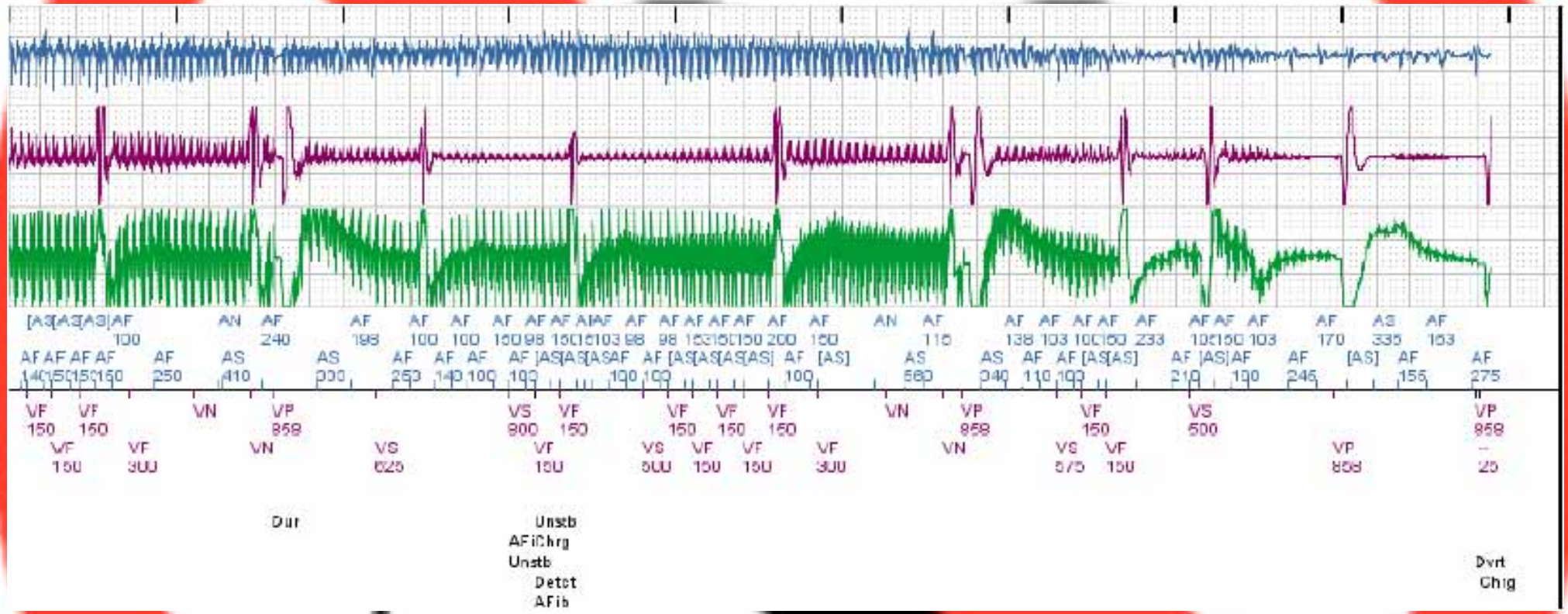
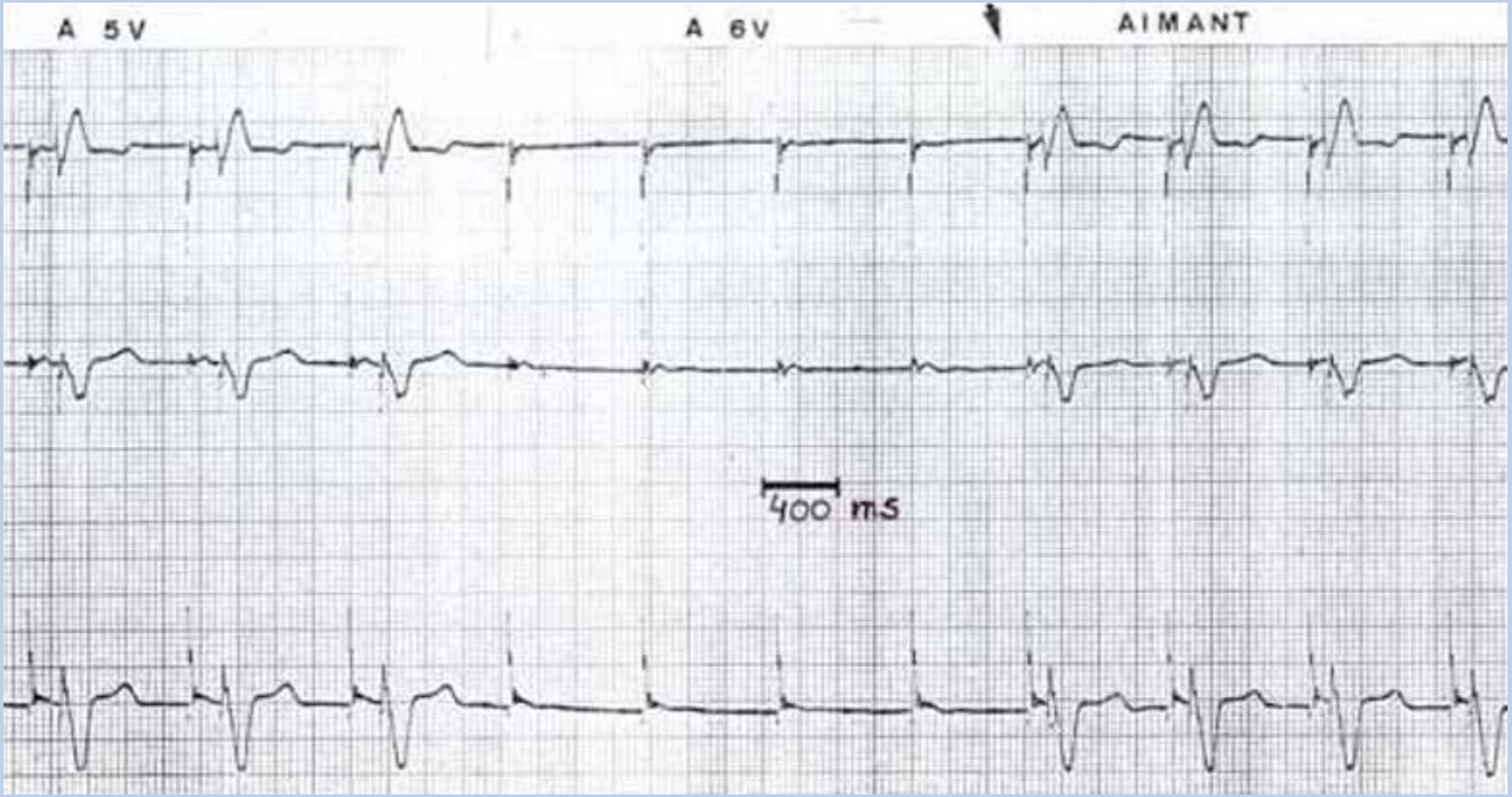
Non serve molto...

Serve la preparazione di un possessore di un Samsung

...

...e la pazienza di un giocatore di Risiko

Interferenze elettromagnetiche



Cross-talking A-V???