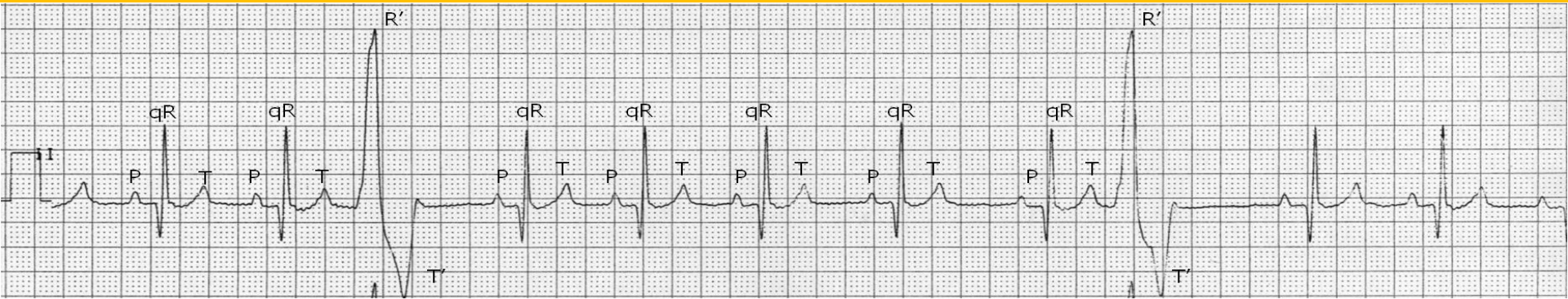




# Ablation d'extrasystoles ventriculaires Antoine de Meester 2023

# Que faire avec des extrasystoles ventriculaires ?

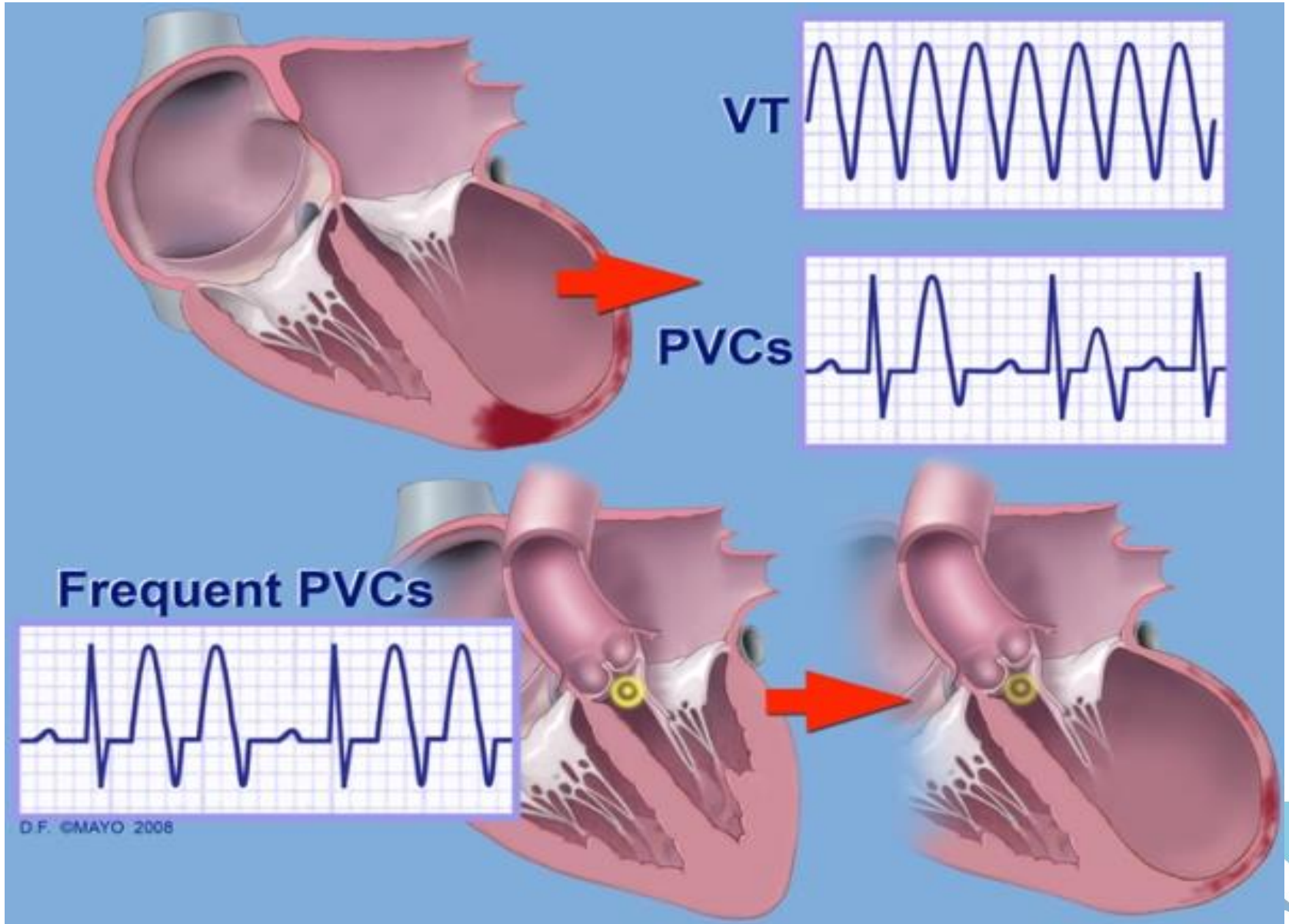


- Contractions cardiaques prématurées, d'origine ventriculaire, liée à l'hyperexcitabilité d'un foyer ectopique ( $\neq$  réentrée).
- ESV le plus souvent « bénigne » (TV idiopathique) ... Voir l' ECG
  - ESV monomorphe, à couplage fixe et long
  - Aspect typique
    - ESV avec retard G - axe D ou vertical (ESV RVOT)
    - ESV < 120 msec avec retard D axe hyper-G (fasciculaire)
  - Disparaissent à l'effort
- ESV sur cœur « sain » ( $\neq$  infarctus, ni cardiomyopathie)

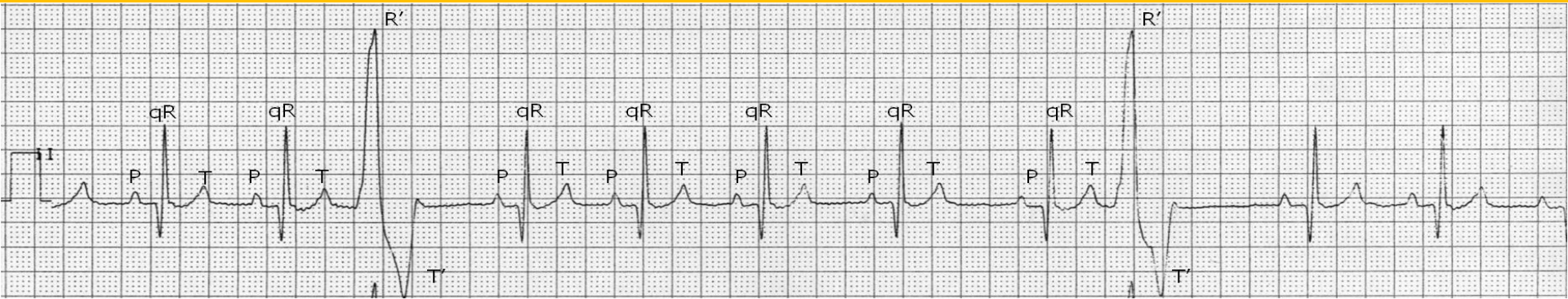


© Daily Mail





# Que faire avec des extrasystoles ventriculaires ?

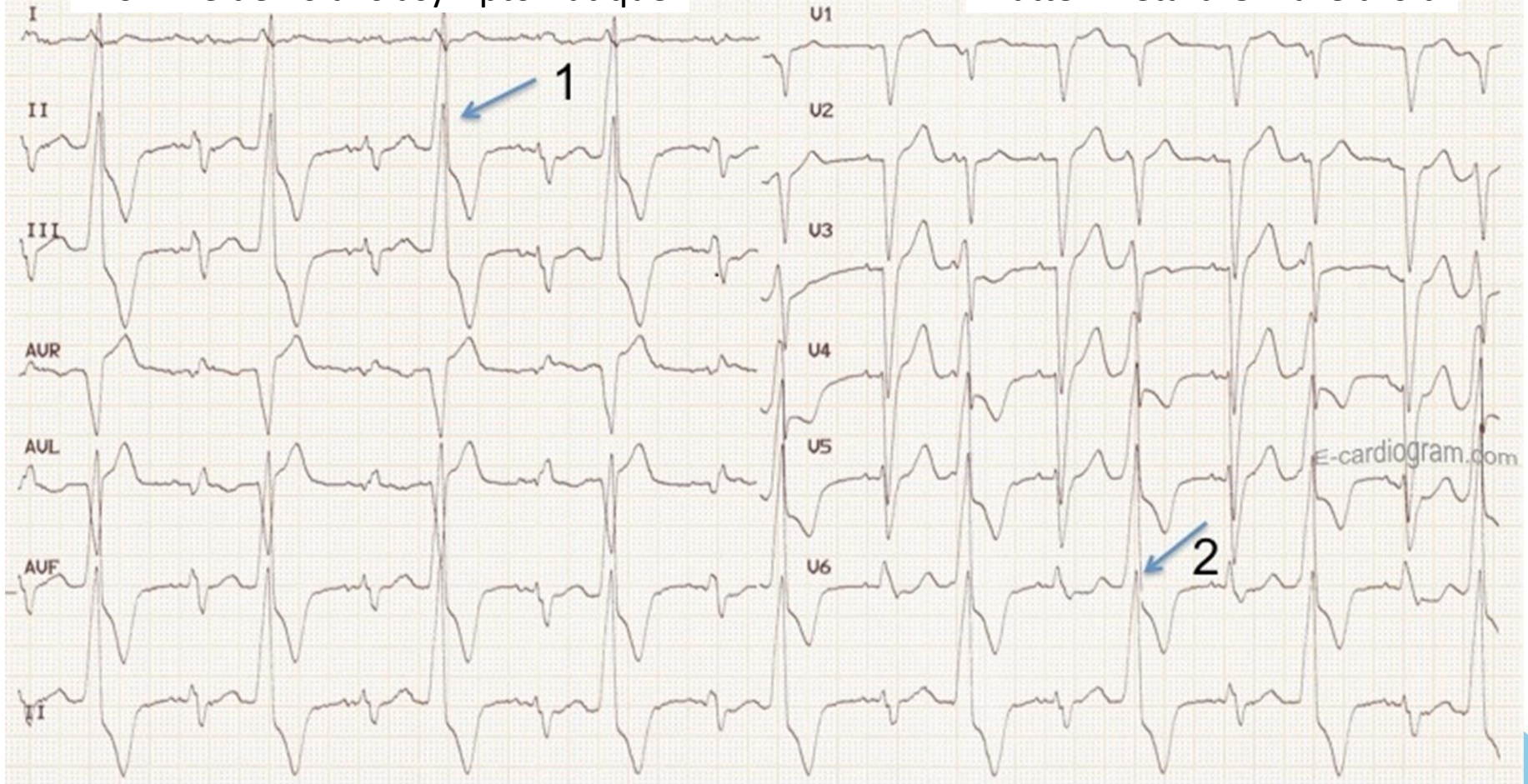


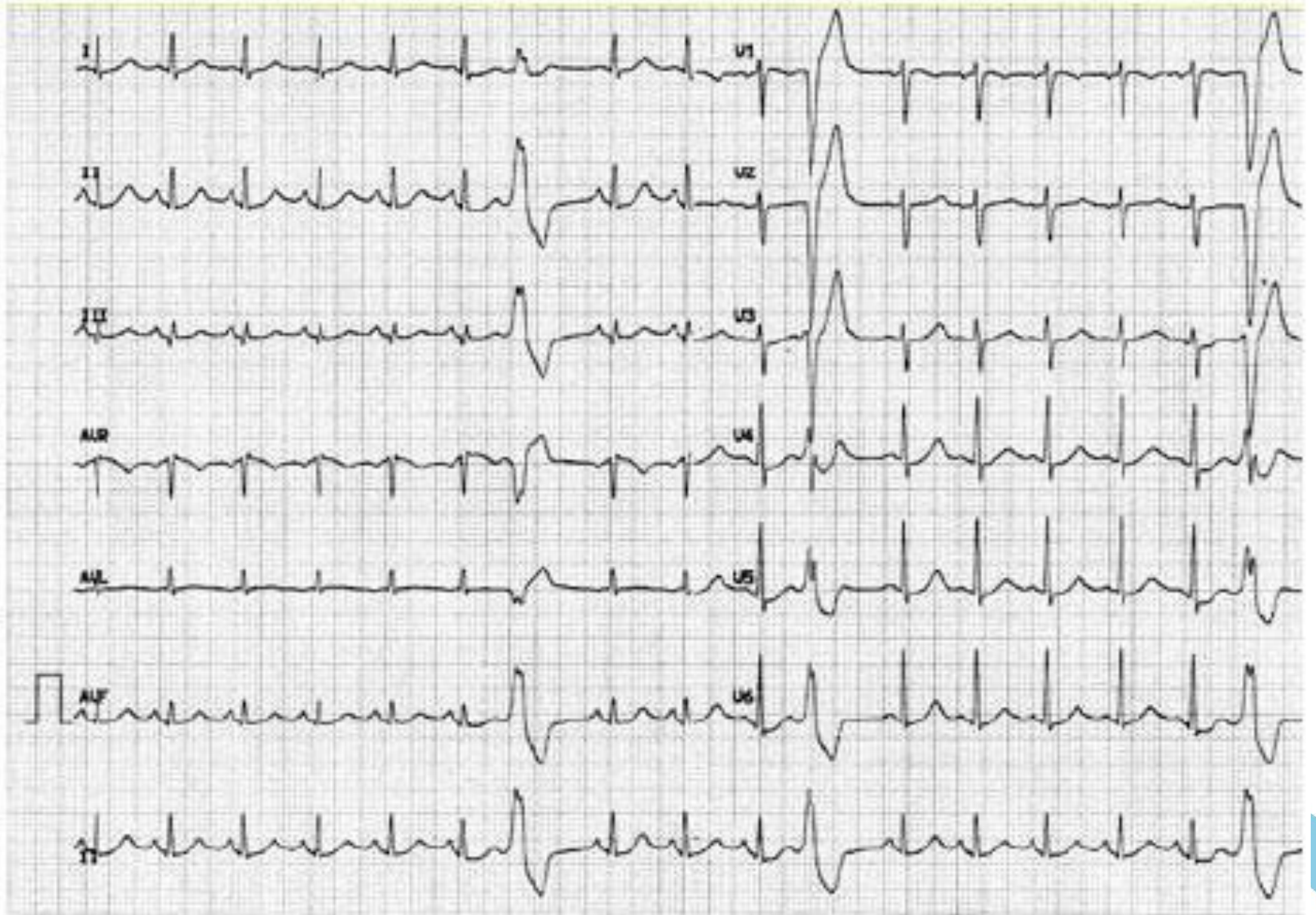
- Contractions cardiaques prématurées, d'origine ventriculaire, liée à l'hyperexcitabilité d'un foyer ectopique ( $\neq$  réentrée).
- ESV le plus souvent « bénigne » (TV idiopathique) ... Voir l' ECG
  - ESV monomorphe, à couplage fixe et long
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    - ESV avec retard G - axe D ou vertical (ESV RVOT)
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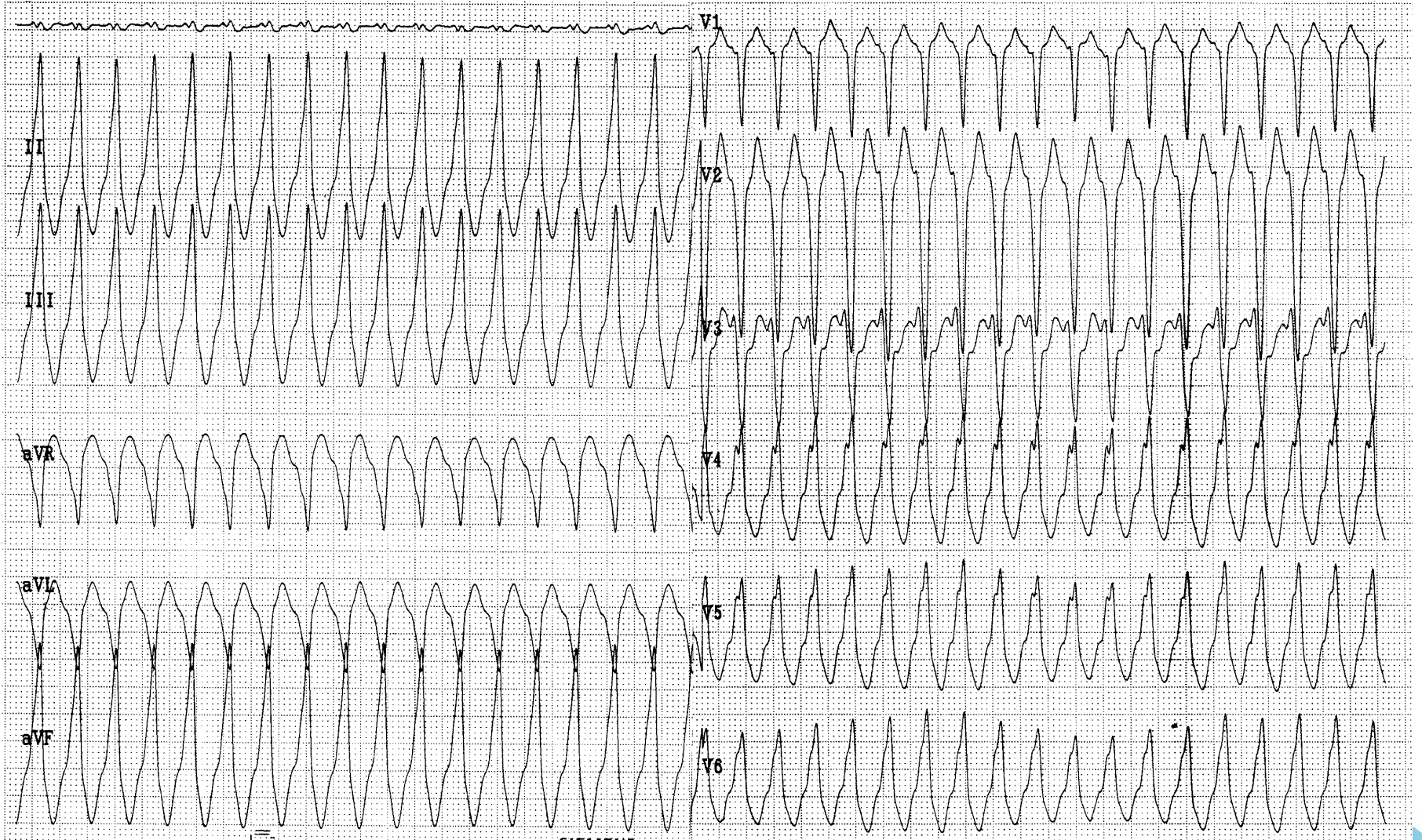
# ESV bénigne (RVOT)

Homme de 40 ans asymptomatique

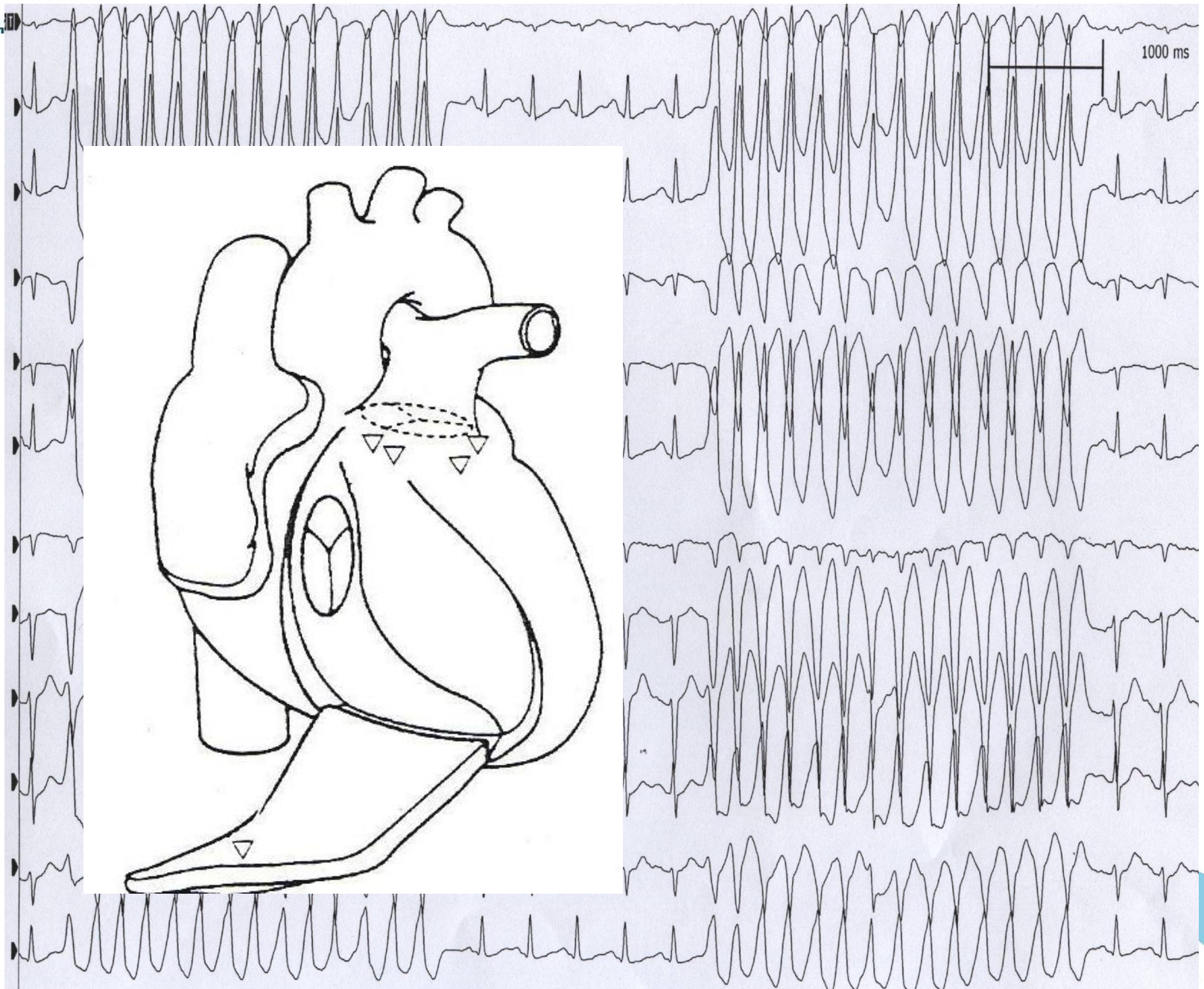
Pattern retard G – axe droit



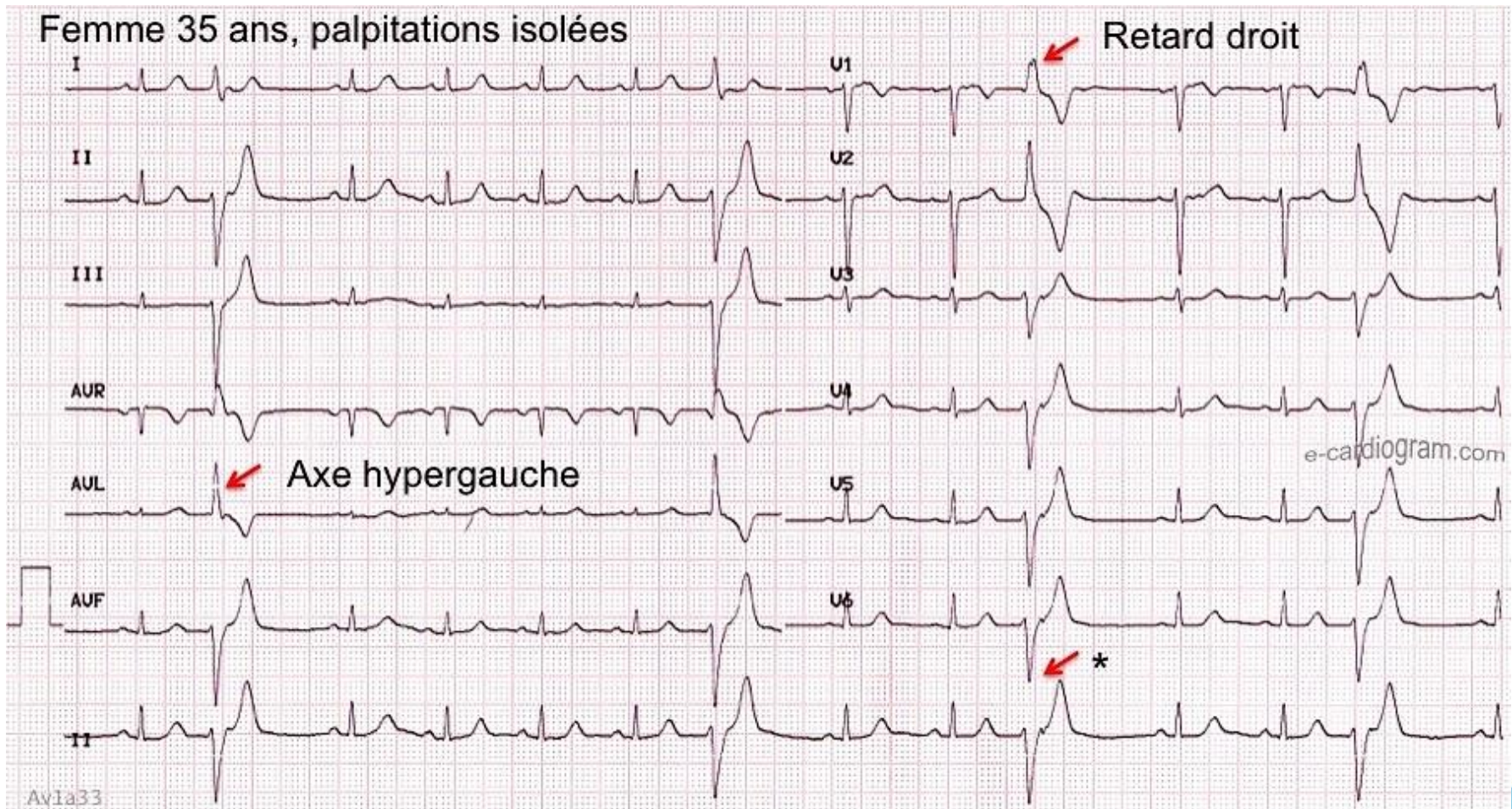








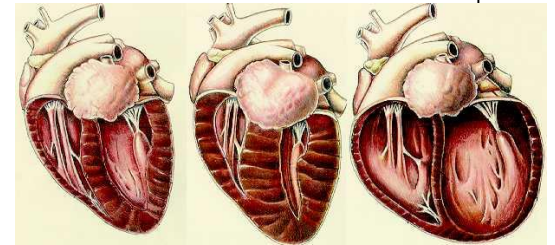
# ESV fasciculaires (QRS peu large, < 130 msec)



# Que faire avec des extrasystoles ventriculaires ?

## ESV bénignes ou malignes ???

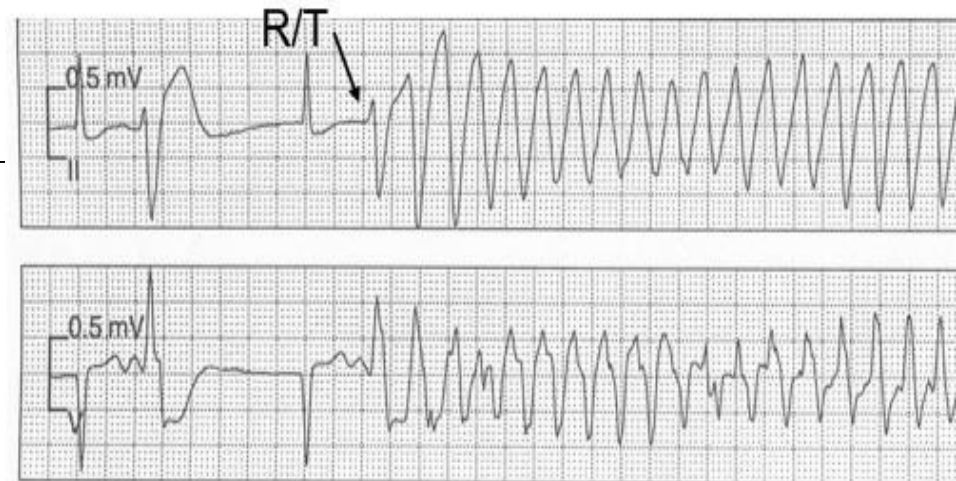
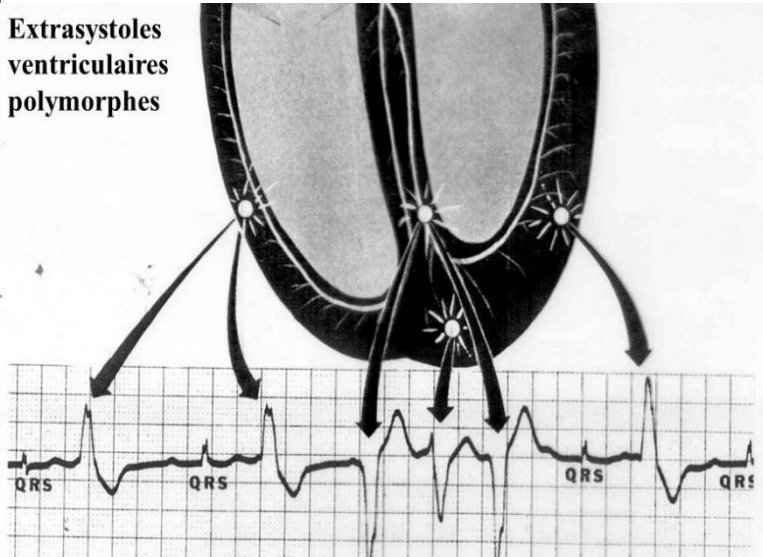
- Cardiopathie sous-jacente (Infarctus, DAVD)
- Histoire de syncope (SCD), TV > 220 bpm



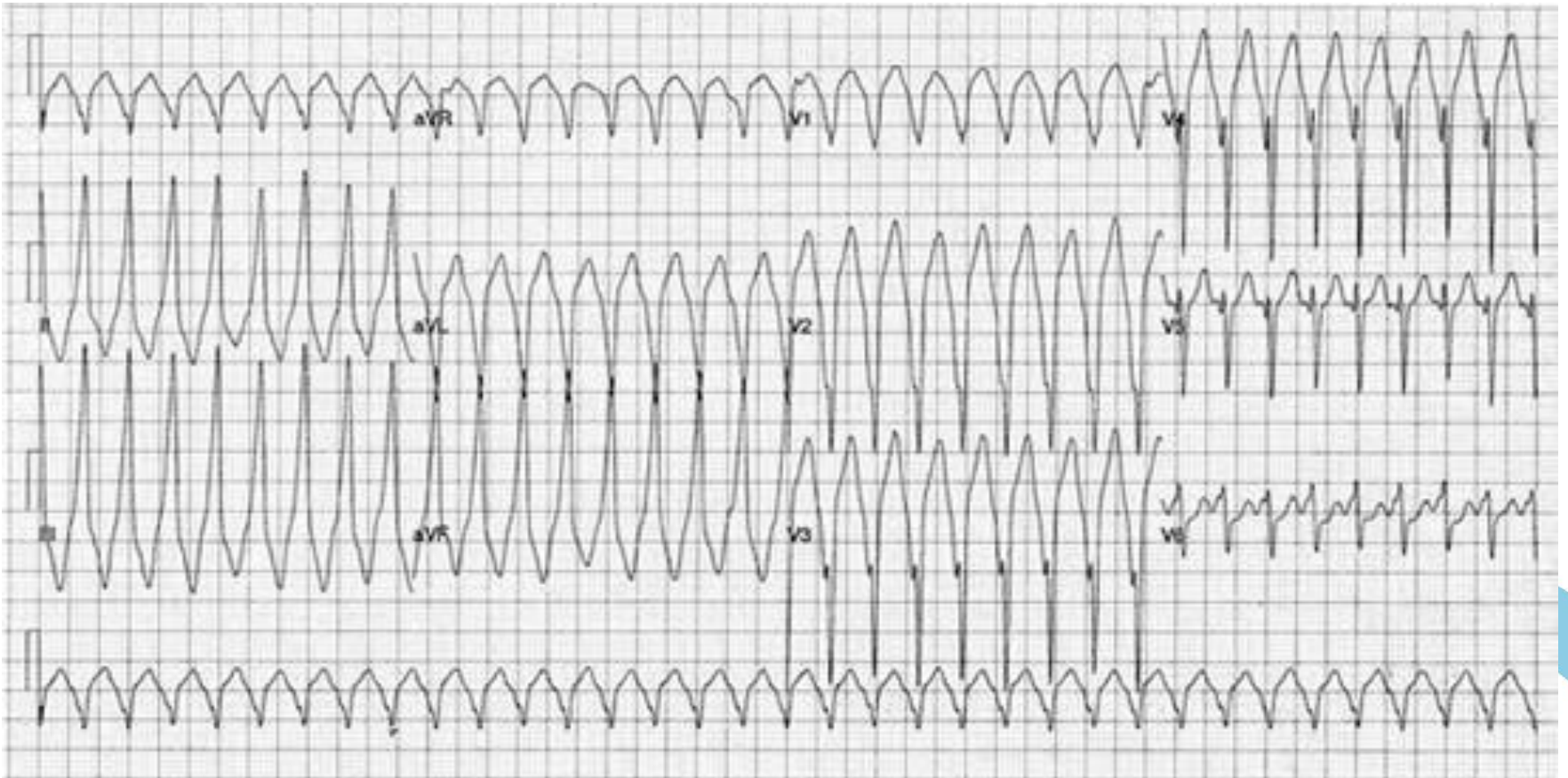
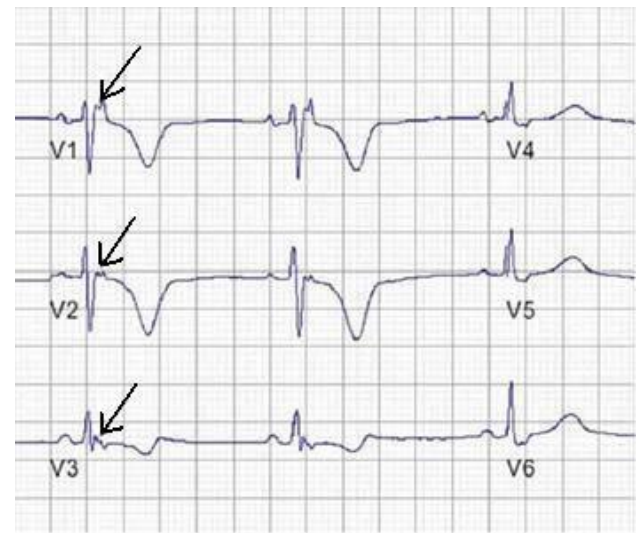
## Morphologie sur ECG 12-dérivations

- ESV polymorphes ... ou à couplages court
- ESV + pattern BBG et axe supérieur (apex/ paroi inférieur du VD)

Extrasystoles  
ventriculaires  
polymorphes



# Et la dysplasie arythmogène du VD



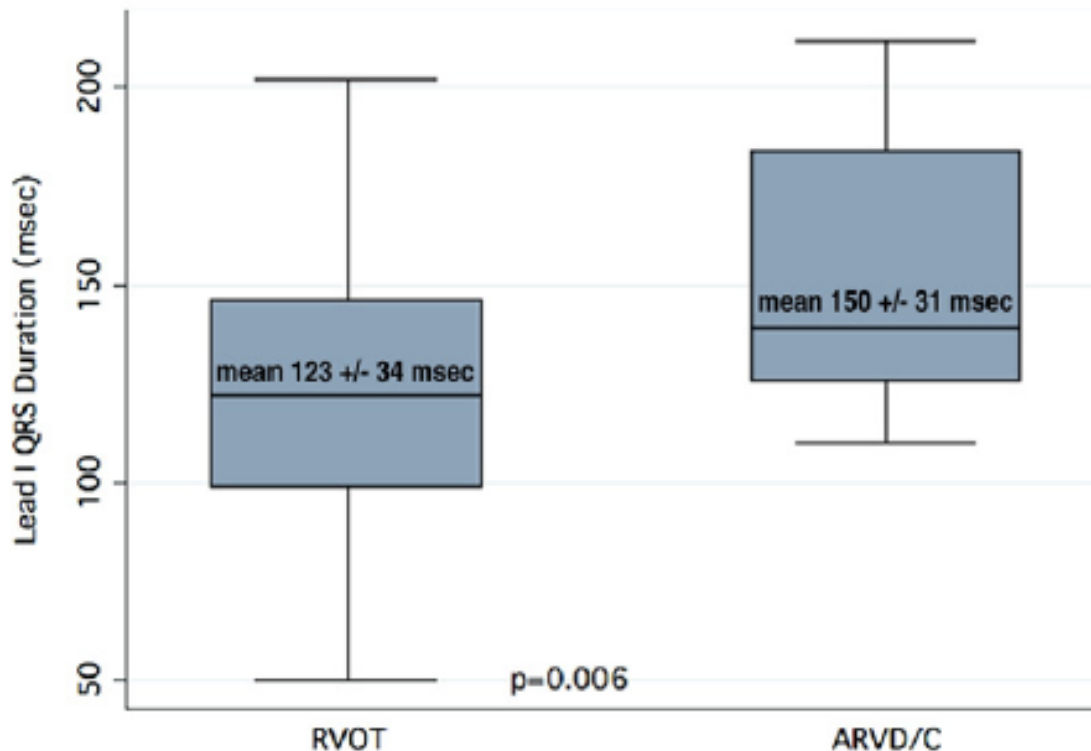
# Electrocardiographic Comparison of Ventricular Arrhythmias in Patients With Arrhythmogenic Right Ventricular Cardiomyopathy and Right Ventricular Outflow Tract Tachycardia

JACC 2011

Kurt S. Hoffmayer, MD,\* Orlando N. Machado, MD,\* Gregory M. Marcus, MD, MAS,\*

Vincent V. Di Biase, MD

Dr. D. +

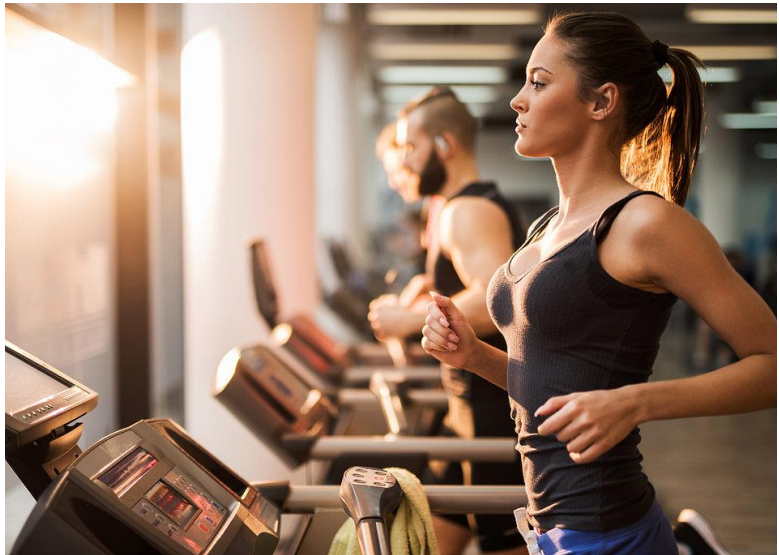
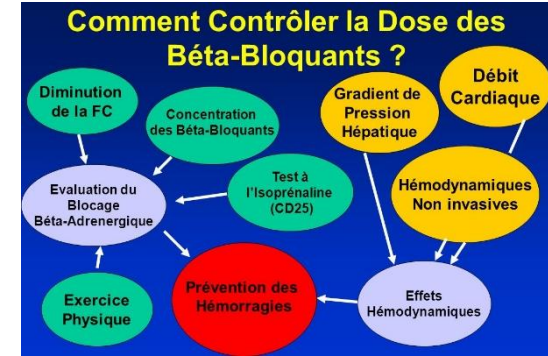


**TABLE 1. Task Force Criteria for Diagnosis of Arrhythmogenic Right Ventricular Dysplasia. (McKenna et al<sup>17</sup>)**

	Major Criteria	Minor Criteria
Family history	Familial disease confirmed at necroscopy or surgery	Familial history of premature sudden death (35 years of age) due to suspected ARVD. Family history (clinical diagnosis based on present criteria)
ECG abnormalities	Epsilon waves or localized prolongation (<110 ms) of QRS complex in right precordial leads (V1-V3)	Late potential on signal averaged ECG. Inverted T waves in right precordial leads (V2-V3) in subjects >12 years of age and in the absence of right bundle branch block
Arrhythmias	Sustained or nonsustained LBBB-like ventricular tachycardia documented on ECG or Holter monitoring or during exercise testing. Frequent ventricular extrasystoles (1000/24 h) on Holter	
Global or Regional dysfunction and structural abnormalities	Severe dilatation and reduction of RV ejection fraction with no or mild LV involvement. Localized RV aneurysms (akinetic or dyskinetic areas with diastolic bulgings). Severe segmental dilatation of RV.	Mild global RV dilatation or ejection fraction reduction with normal LV. Mild segmental dilatation of RV. Regional RV hypokinesia
Tissue characteristics of walls	Fibro-fatty replacement of myocardium on endomyocardial biopsy	

ARVD indicates arrhythmogenic right ventricular dysplasia; LBBB, left bundle branch block; LV, left ventricle; RV, right ventricle.

# Traitement d'ESV



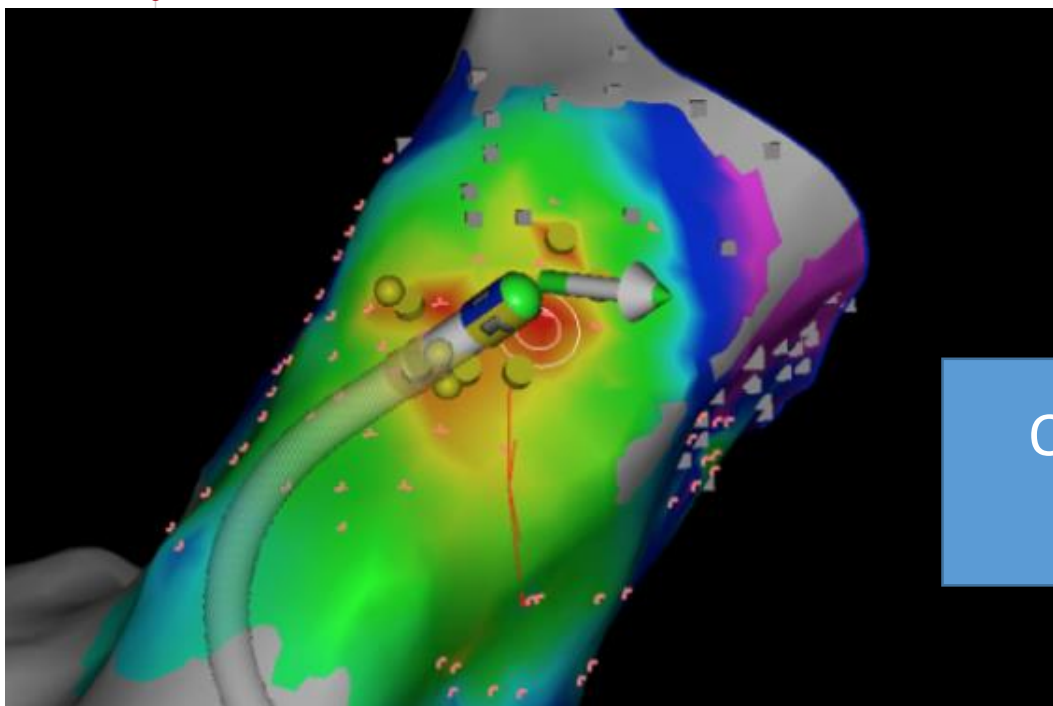
**Tambocor™**  
100mg Tablets

Flecainide acetate  
For oral administration  
60 tablets



# 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Official ESC Guidelines slide set



Quand ablater le  
foyer d'ESV ?



# Et pour les ESV/TV sans cardiopathie ?

**Table 9** Summary of the recommendations for the treatment of patients with frequent idiopathic premature ventricular complexes/ventricular tachycardia or premature ventricular complex-induced cardiomyopathy

	Ablation	Beta-blocker	CCB	Flecainide	Amiodarone
RVOT/fascicular PVC/VT: Symptomatic, normal LV function	Class I	Class IIa	Class IIa	Class IIa	Class III
PVC/VT other than RVOT/fascicular: Symptomatic, normal LV function	Class IIa	Class I	Class I	Class IIa	Class III
RVOT/fascicular PVC/VT: LV dysfunction	Class I	Class IIa	Class III <sup>a</sup>	Class IIa <sup>b</sup>	Class IIa
PVC/VT other than RVOT/fascicular: LV dysfunction	Class I	Class IIa	Class III <sup>a</sup>	Class IIa <sup>b</sup>	Class IIa
PVC: Burden >20%, asymptomatic, normal LV function	Class IIb				Class III

# Ablation par radiofréquence

## Circuit de réentrée



- Flutter atrial
- TRNAV
- Faisceau accessoire WPW
- TV ischémique ou autre (DAVD, RBB)

## Foyer / Zone



- ESV / TV (RVOT)
- Tachycardie atriale
- FA (ES veines P)
- Nœud AV (HIS)
- Raretés (Brugada)

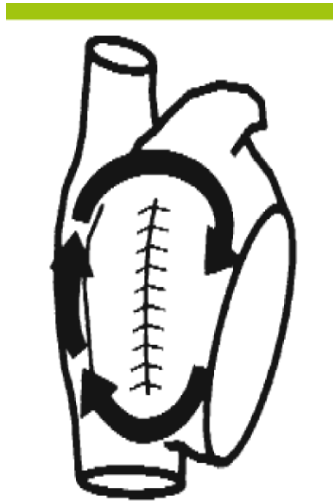
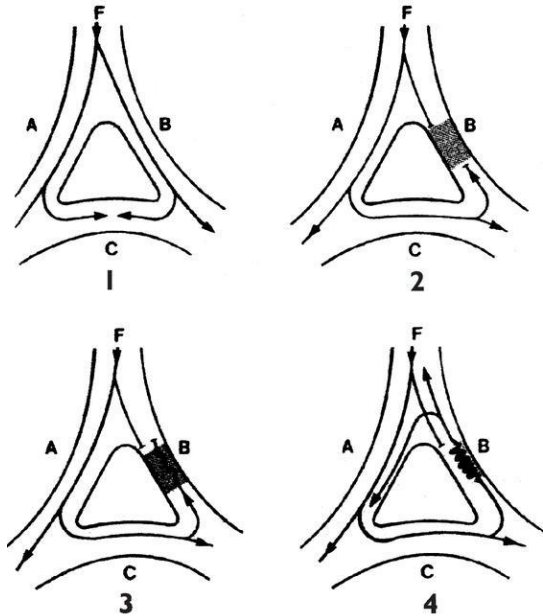
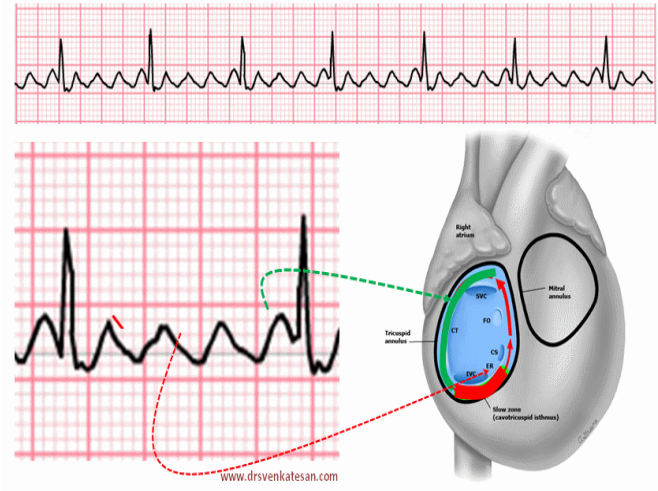
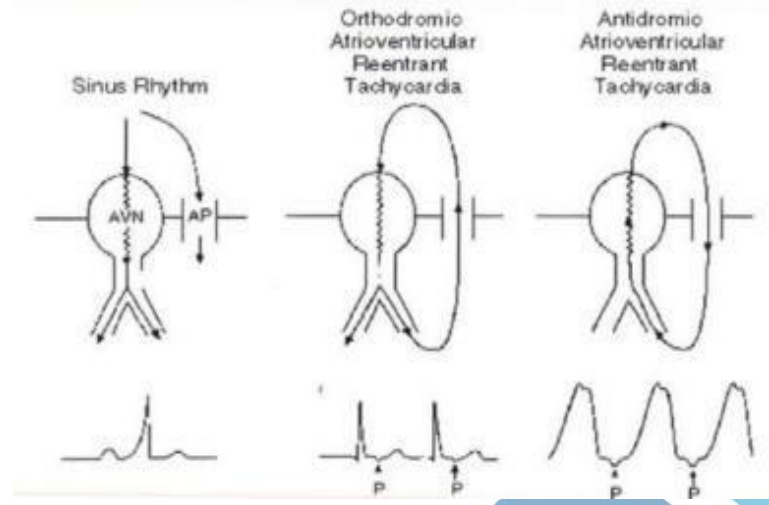
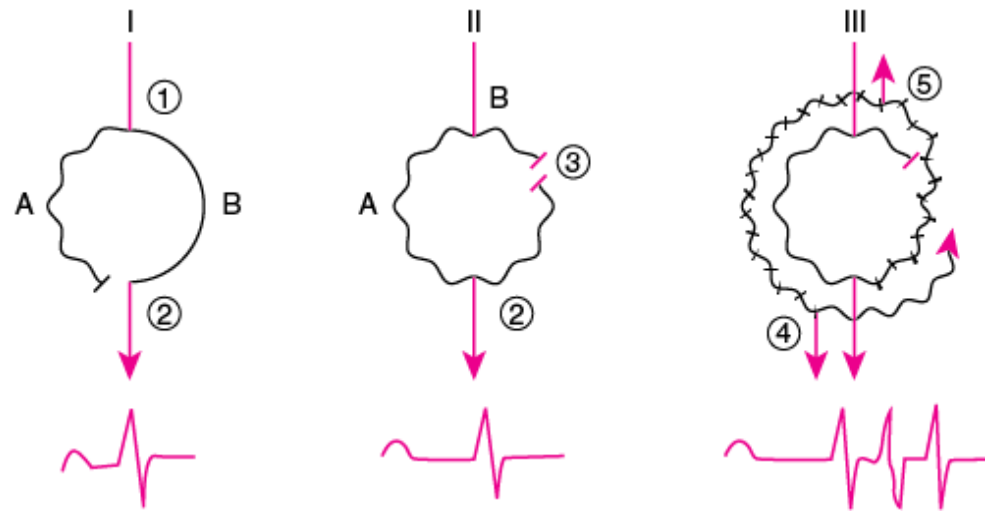


Figure 6. Exemple d'un circuit péritriatomie au niveau de l'OD après fermeture d'une CIA

Mechanism of Inverted flutter waves in 2,3,AVF, in Typical atrial flutter

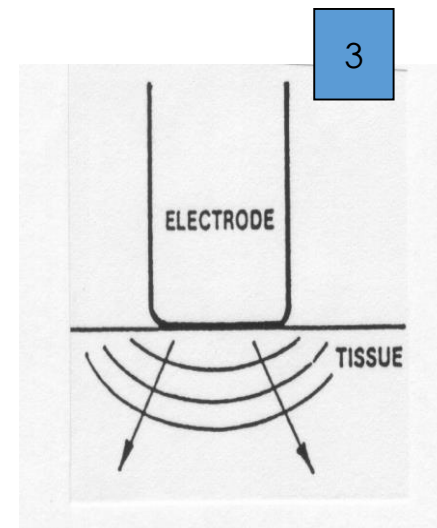
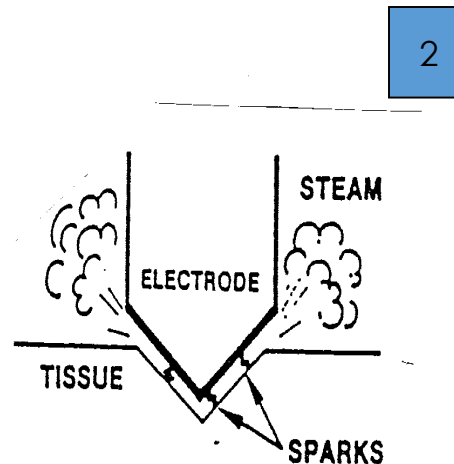
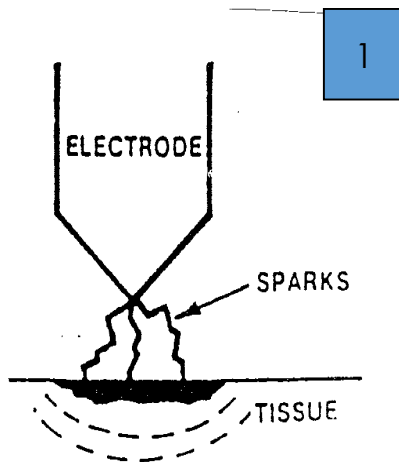


Flutter waves are identified with reference to the direction of the initial slow descend/ascend which defines the direction of flutter wave, it's negative in 2,3,AVF in classical /Type 1/ or common Atrial flutter. Note the initial circuit is *slow, counterclockwise, and ascends up in IAS* inscribing inverted F waves in inferior leads and *descends little faster in free wall of RA*. The opposite happens in reverse typical flutter. (Please note, currently reverse typical flutter is not considered as Atypical flutter)



# Ablation par radiofréquence

1. Lésions de fulguration : électrode loin du tissu - lésion = coagulation superficielle puis nécrose profonde (zone +++)
2. Scalpel électro-chirurgical : électrode près du tissu - lésion (+ vapeur), lésion moyenne
3. RF Ablation : électrode au contact du tissu - élévation thermique tissulaire + lésion minimale & cicatrisation rapide



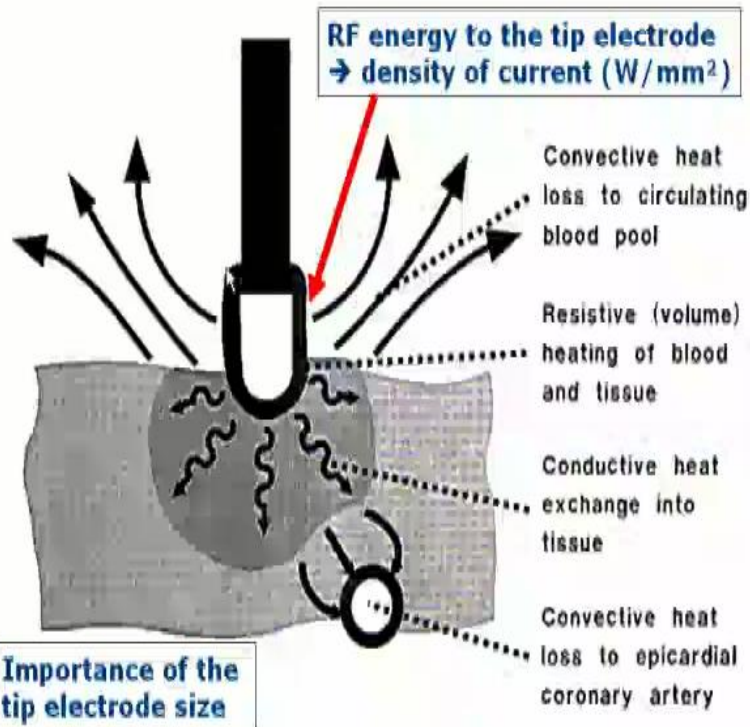
# Ablation ... Surveillance

## Energie (W), Température, Impédance

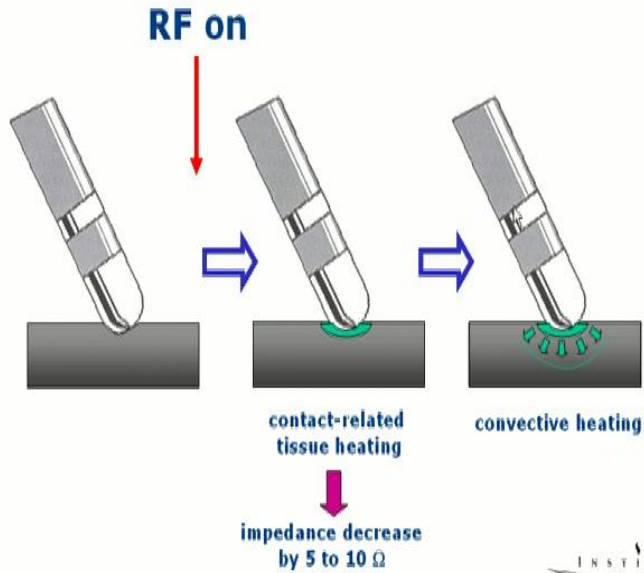
### EFFET THERMIQUE

LESIONS DES CELLULES EN FONCTION DE LA TEMPERATURE :

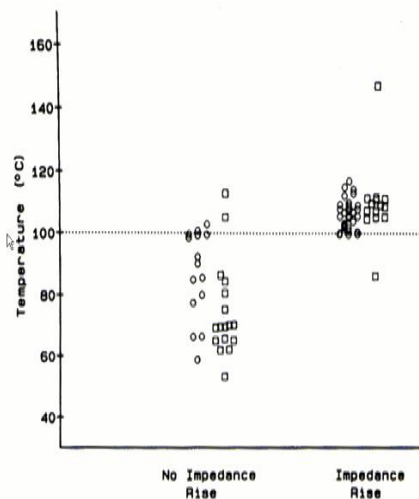
SI T° < 40°C	PAS DE LESION SIGNIFICATIVE
SI T° > 40°C	LESION REVERSIBLE, suivant durée d'exposition
SI T° > 49°C	LESION IRREVERSIBLE
SI T° > 70°C	COAGULATION DES TISSUS
SI T° > 100°C	DESSICCATION, FORME GAZEUSE
SI T° > 200°C	CARBONISATION DES TISSUS

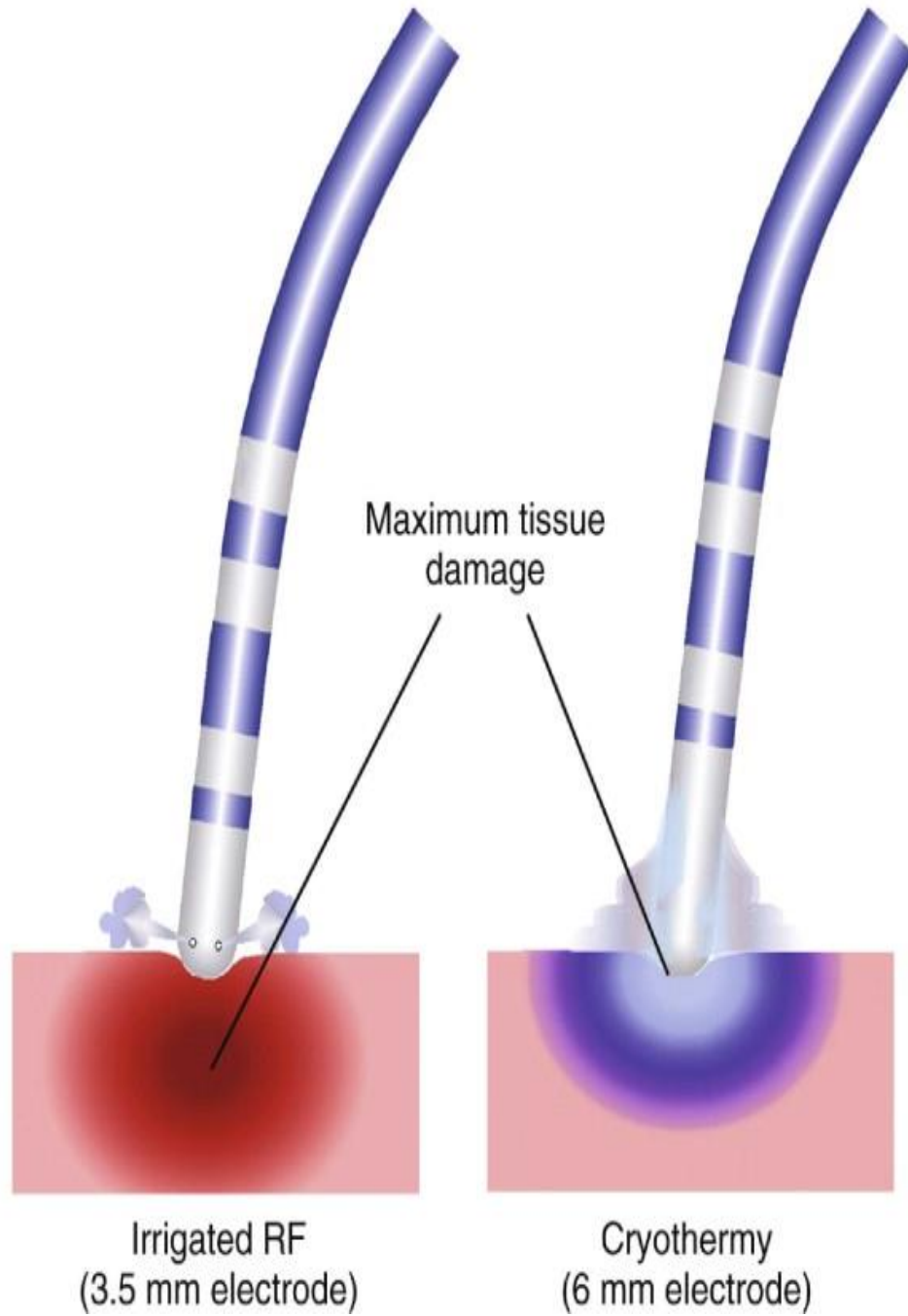


# Impédance électrique du circuit

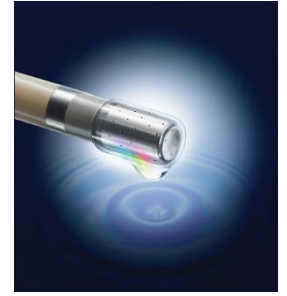


Temperature  $>100^\circ$   $\rightarrow$  electrode coagulum  
electrode coagulum//impedance rise





# Systeme de navigation : carto™










# Que faire avec des extrasystoles ventriculaires ?



Pourquoi  
(pour qui)  
l'ablation ?

- Patients symptomatiques (souvent jeunes 2-40 ans, actifs)
- Médications peu efficaces / + effets secondaires
- Complications = cardiomyopathie dilatée et FEVG ↓ ... si ESV très fréquentes > 10,000/ 24h)
- Ablation = examen peu invasif
- Localisation RVOT (80-90%)
- Succès 90% si RVOT/LVOT avec expérience / technique (Carto™)
- Risques à considérer au cas/cas

# Et pour les ESV/TV sans cardiopathie ?

**Table 9** Summary of the recommendations for the treatment of patients with frequent idiopathic premature ventricular complexes/ventricular tachycardia or premature ventricular complex-induced cardiomyopathy

	Ablation	Beta-blocker	CCB	Flecainide	Amiodarone
RVOT/fascicular PVC/VT: Symptomatic, normal LV function	Class I	Class IIa	Class IIa	Class IIa	Class III
PVC/VT other than RVOT/fascicular: Symptomatic, normal LV function	Class IIa	Class I	Class I	Class IIa	Class III
RVOT/fascicular PVC/VT: LV dysfunction	Class I	Class IIa	Class III <sup>a</sup>	Class IIa <sup>b</sup>	Class IIa
PVC/VT other than RVOT/fascicular: LV dysfunction	Class I	Class IIa	Class III <sup>a</sup>	Class IIa <sup>b</sup>	Class IIa
PVC: Burden >20%, asymptomatic, normal LV function	Class IIb				Class III

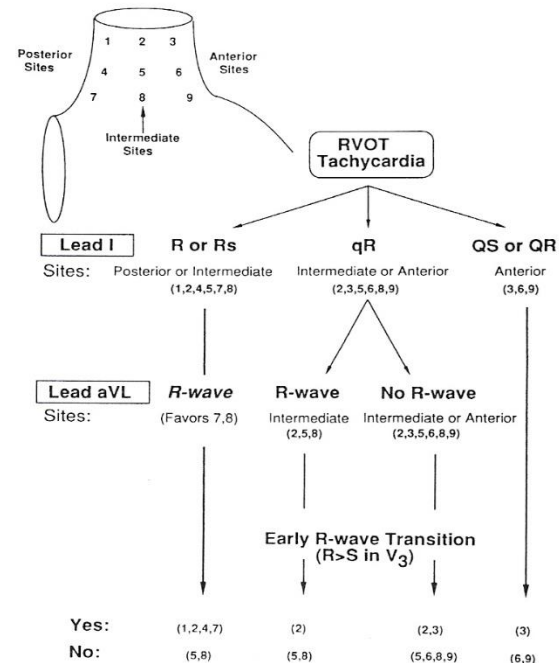
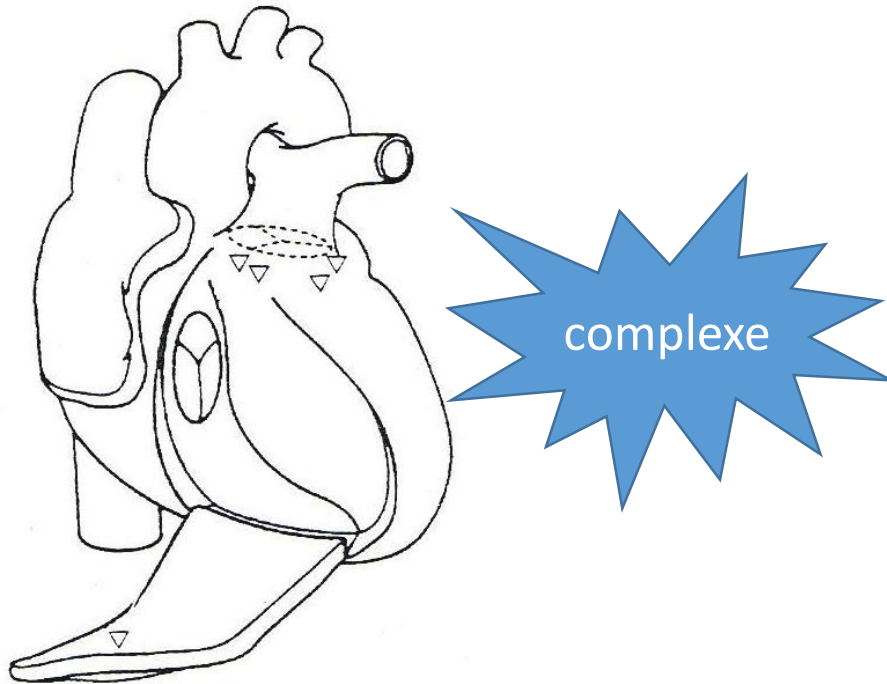
# Ablation d'extrasystoles ventriculaires

## Clés du succès : 1 = enregistrer un ECG

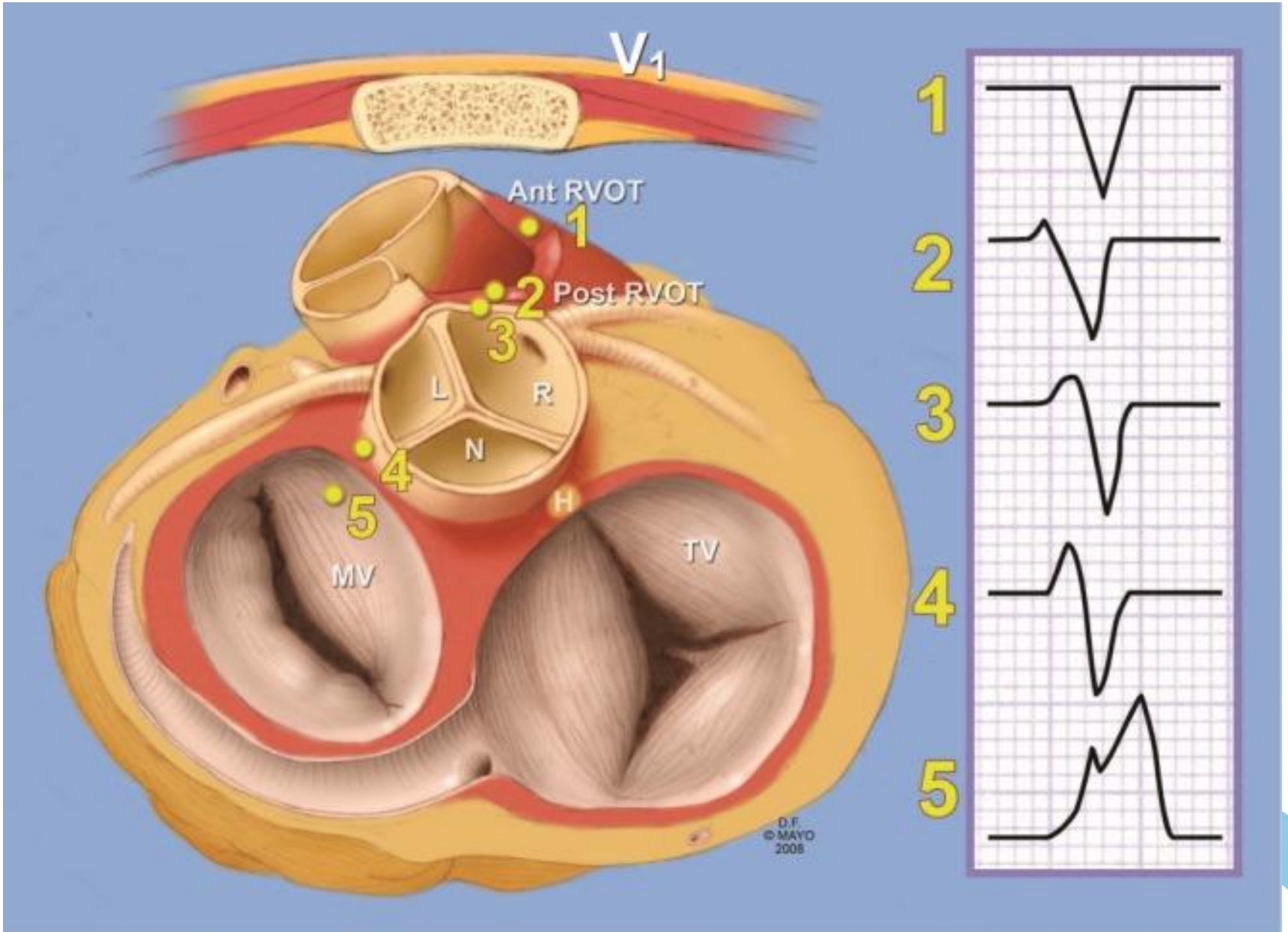
### 1. Enregistrer un ECG 12-dérivations : localisation (approximative) du foyer d'extrasystole ventriculaire

1112 Jadonath et al.

November 1995  
American Heart Journal

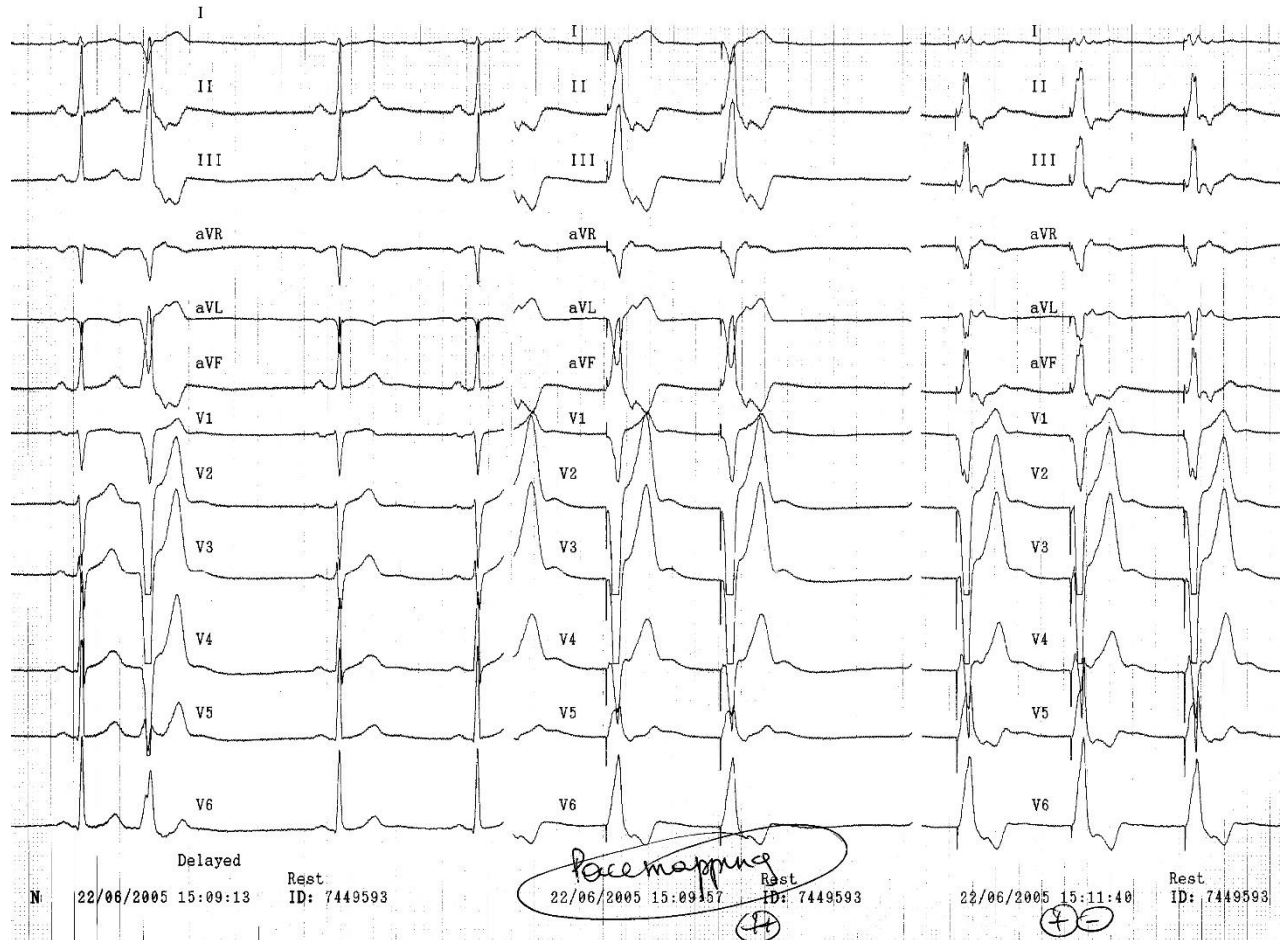


**Fig. 9.** Algorithm for identifying site of origin of repetitive monomorphic ventricular tachycardia originating from RVOT septum on the basis of the QRS characteristics observed in leads I, aVL, and V<sub>3</sub> ratio in the precordial leads. Presence of an early R-wave transition was said to favor a given site if frequency with which pacing at that site resulted in early precordial R-wave transition was  $\geq 55\%$ . Absence of early R-wave transition was said to favor a given site if incidence was  $\leq 20\%$ .



# Ablation d'extrasystoles ventriculaires

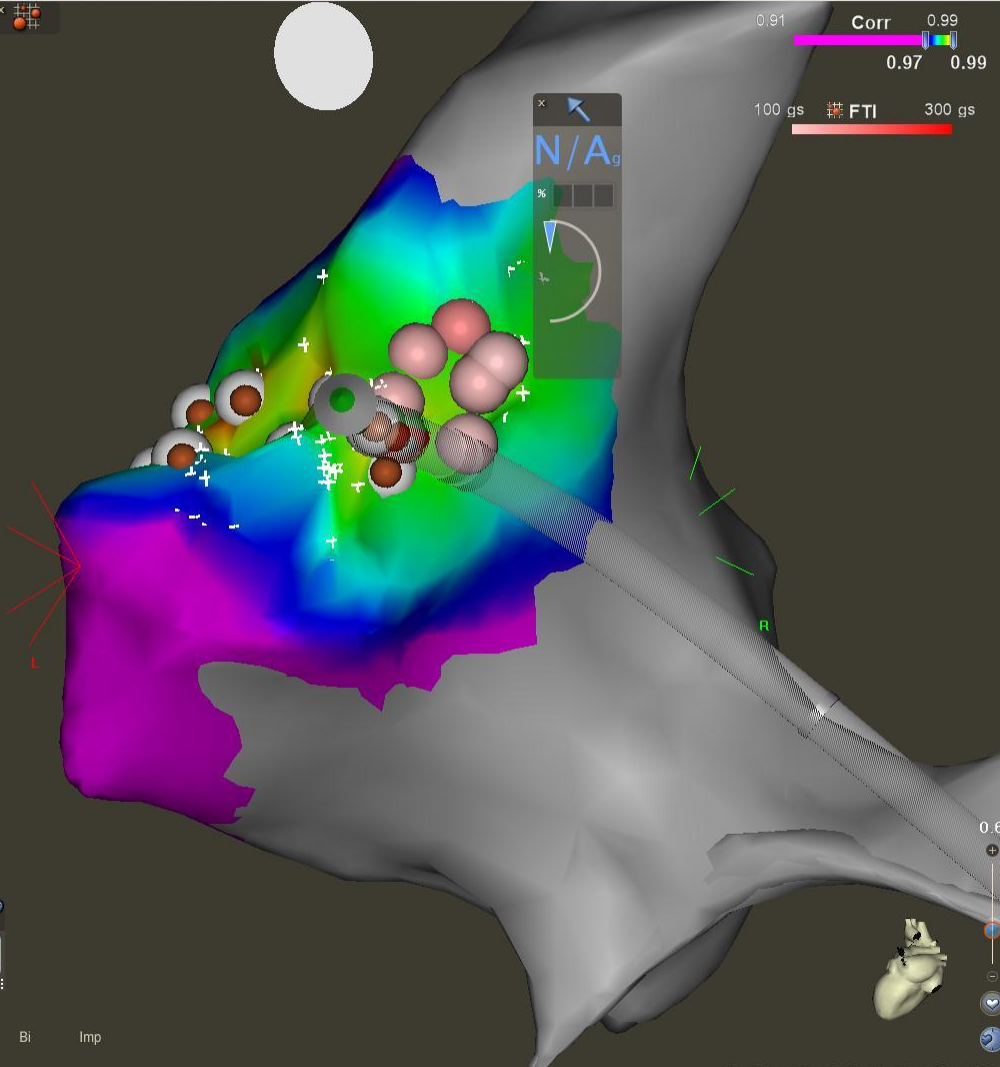
## Clés du succès : 2 = topostimulation



Study Map Point Catheter ECG Display Imaging Window Tools Help

Setup  
 HW Study Loc. Cath. Map FAM PaSo Prema IS [Icons] Routed channel: None

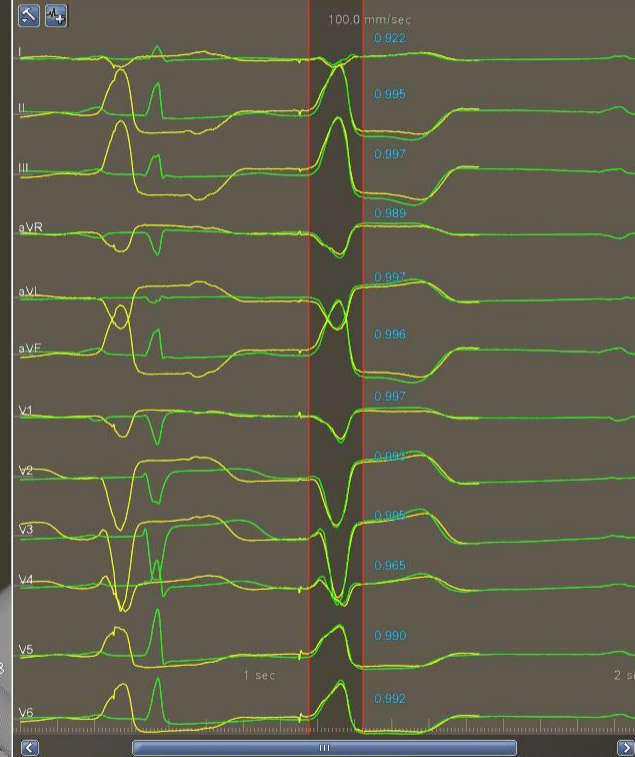
1-RV (77, 0) Resp  
 Correlations: Unmatched Matched



Acquisition Correlation

PM/IS Correlation Table

#	PM Name	IS:1
71	PM:17	<b>0.986</b>



10 [Icons]

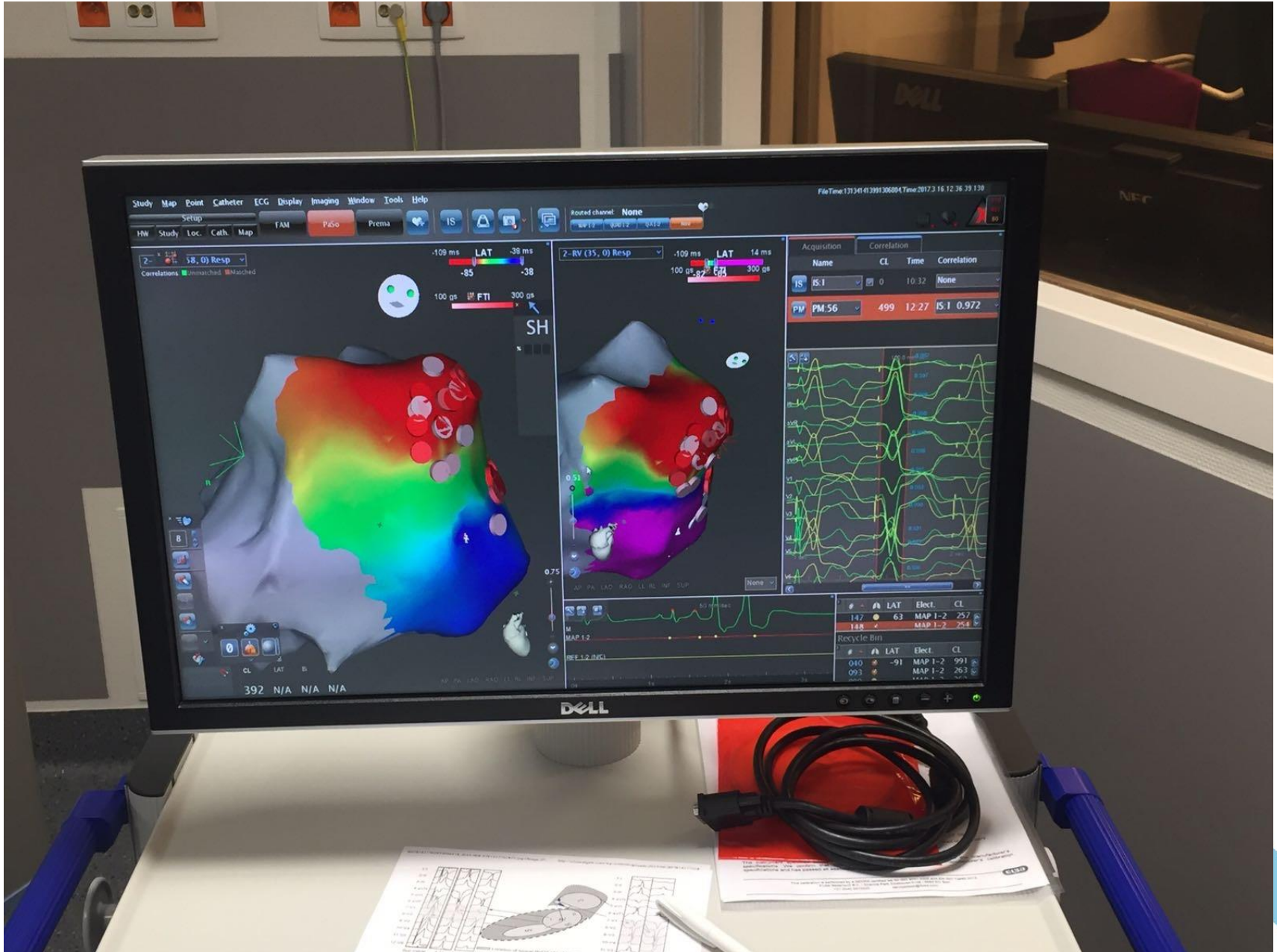
0 [Icons]

CL	LAT	Bi	Imp
200	N/A	N/A	N/A

AP PA LAO RAO LL RL INF SUP

#	Corr	Elect.	CL	Frc	PASO™
001	0.985	M	1-2	700	36-1-0-0.05
Recycle Bin					
#	Corr	E			
002		M			
004		M			
008		M			





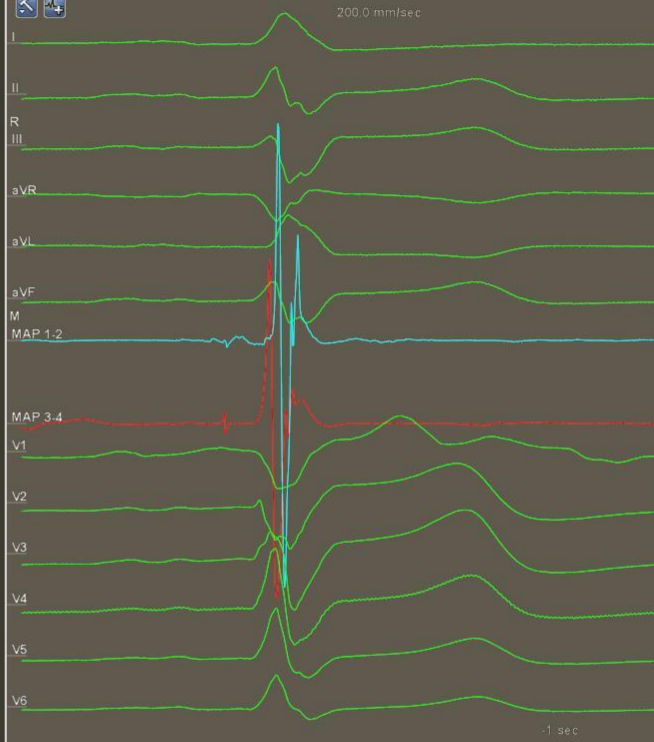
1-1-ReLV (219, 0)  
 Correlations: Unmatched Matched

-111 ms LAT -23 ms  
 400gs F7# 300 gs

218 -110 Loc 6.20 N/A 4  
 CL LAT (ms) Bi (mV) Imp (C) Force (g)

**Attention!**  
**DANGER!**

HIS



#	LAT	Elect.	CL	F
230	-111	MAP 1-2	279	
232	-110	MAP 1-2	218	
233	-109	MAP 1-2	314	
229	-108	MAP 1-2	236	
185	-95	MAP 1-2	500	
217	-91	MAP 1-2	443	

**Respiration Gating**

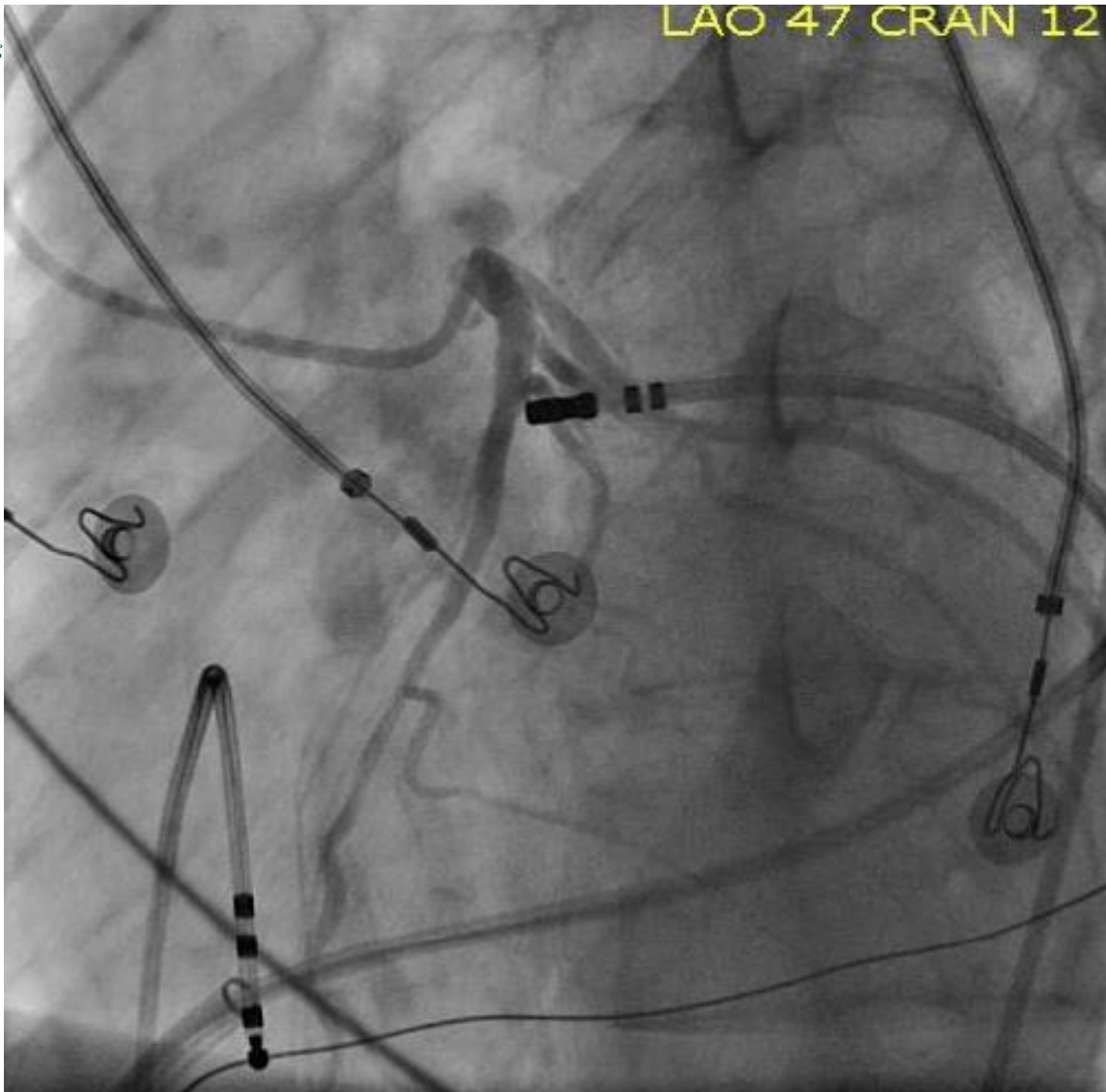
Mechanical ventilation

Connector: MAP

Start Training Training failed. Stabilize catheter and retrain.

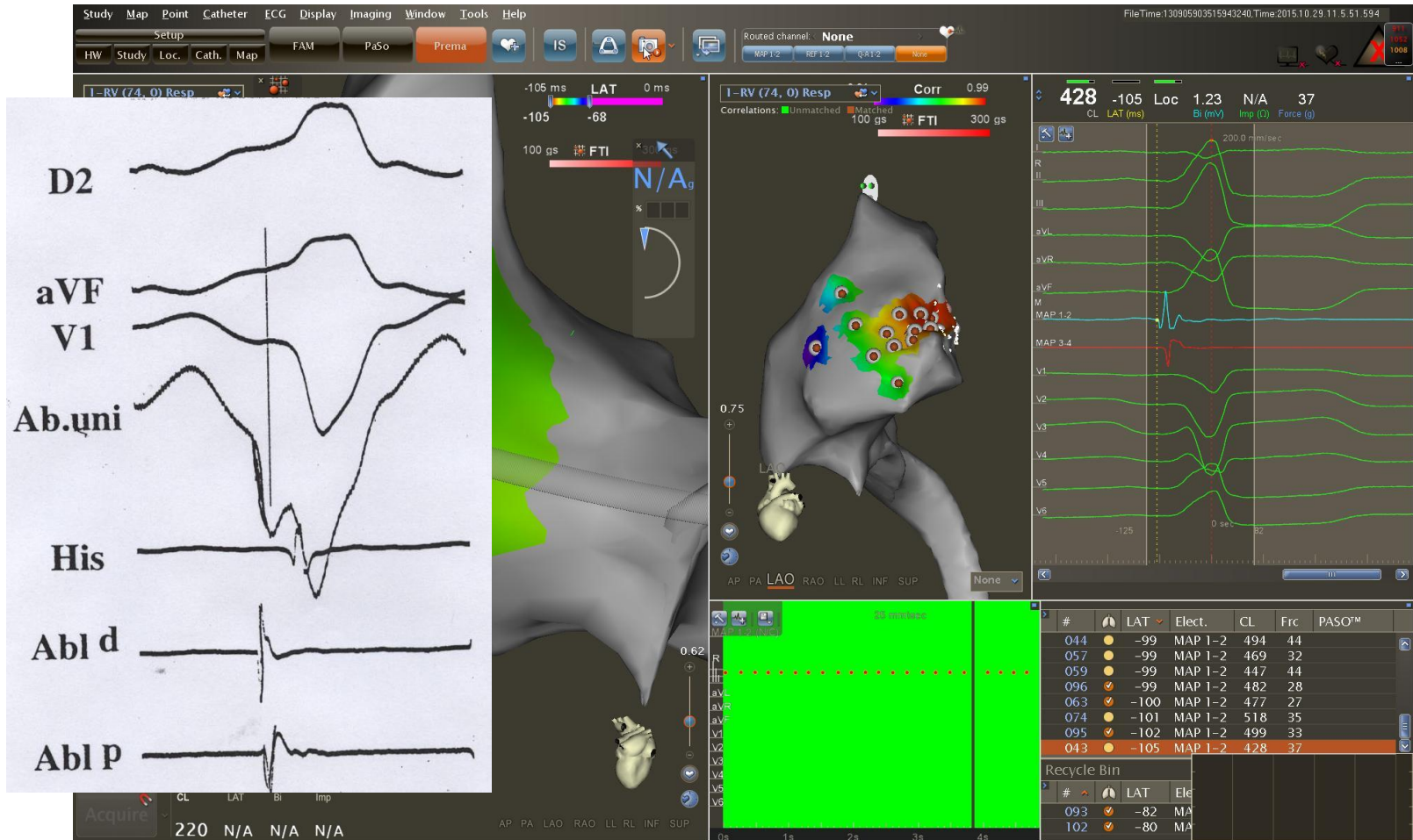
Acquire 143

AP PA LAO RAO LL RL INF SUP



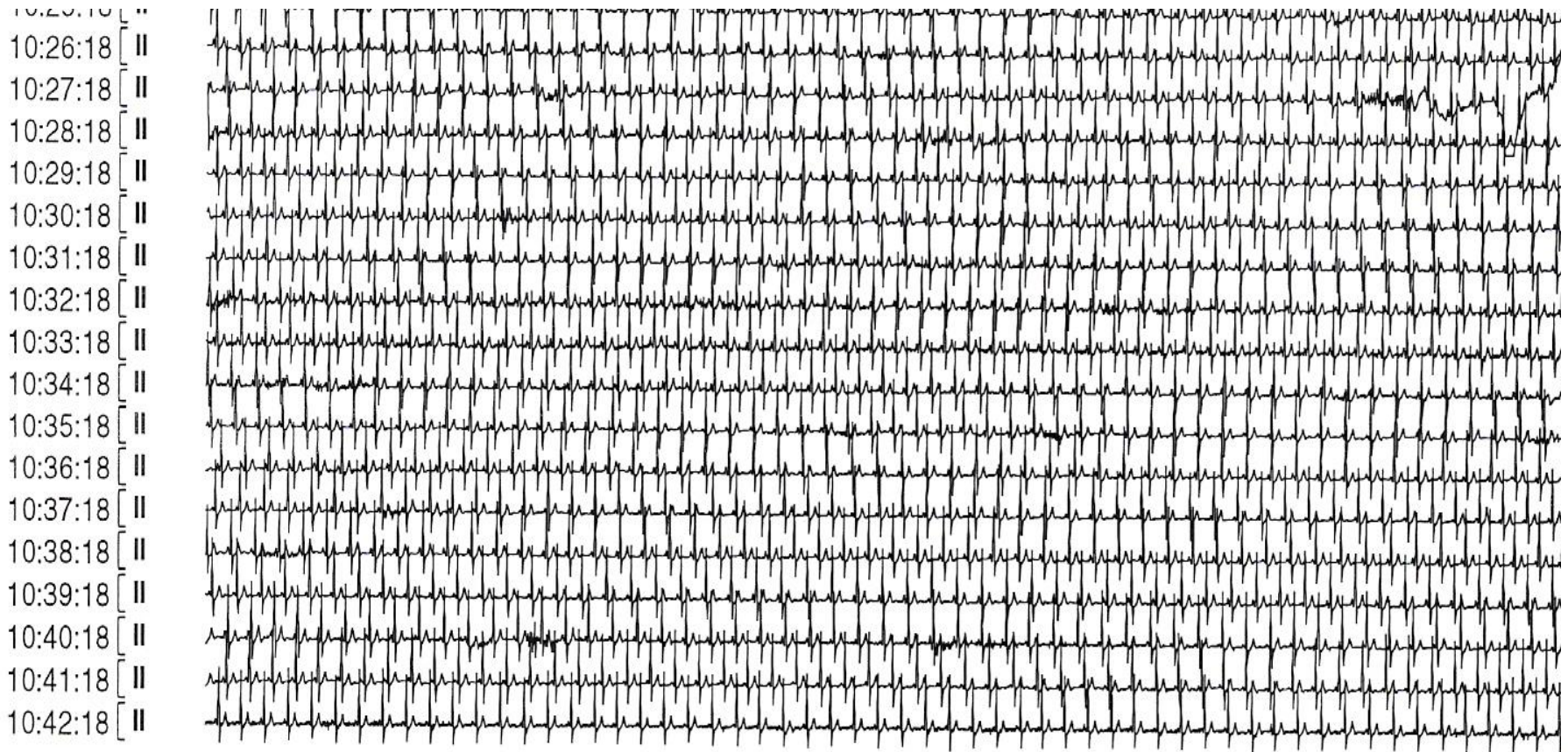
# Ablation d'extrasystoles ventriculaires

## Clés du succès : 3 = précocité (site d'activation)

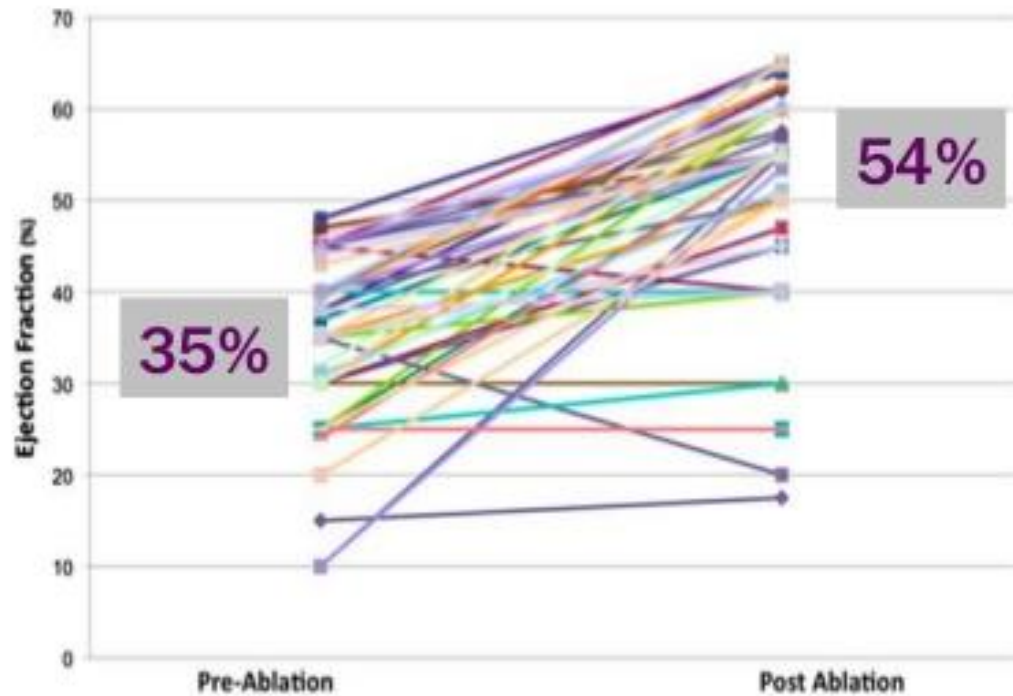
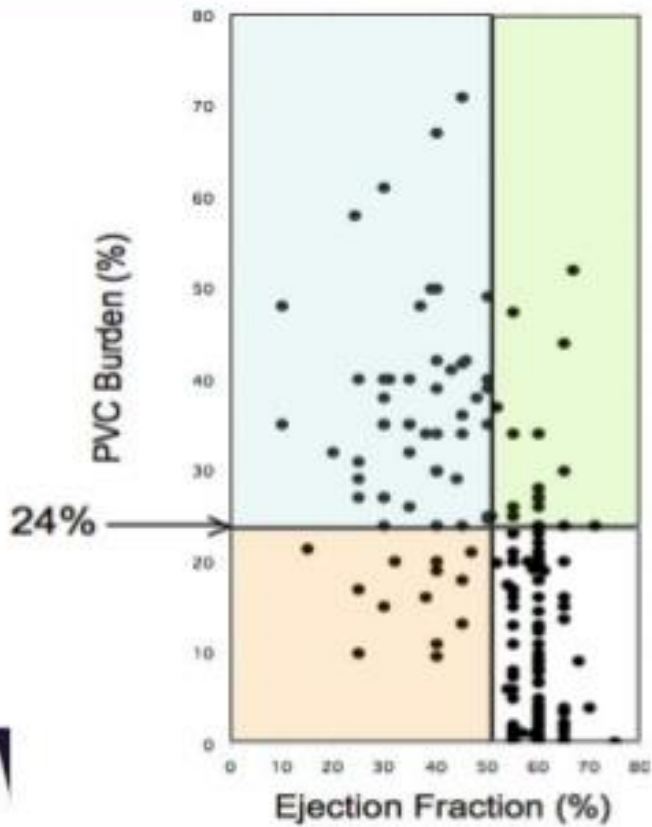




# Après les tirs d'ablation



# PVC INDUCED CARDIOMYOPATHY



Baman T, Heart Rhythm 2010;7:865

## Role of PVC ablation in associated cardiomyopathy



P. Maury  
maury@franciscience.fr

**Impact of radiofrequency ablation of frequent post-infarction premature ventricular complexes on left ventricular ejection fraction**  
J Cardiovasc Electrophysiol. 2010;21:1002

Jean-Francois Sarrasin, MD, Troy Labounty, MD, Michael Kuhne, MD, Thomas Crawford, MD, William F. Armstrong, MD, Benoit Desjardins, MD, Eric Good, DO, Krit Jongnarangsin, MD, Aman Chugh, MD, Hakan Oral, MD, Frank Pelosi, MD, Fred Morady, MD, Frank Bogun, MD

**more limited scar if frequent PVC**  
a sign of reversible CM ?  
PVC arose from scar areas

**EF increase from 38 to 51%**



Société  
Française de  
Cardiologie

Tapez ici et cliquez sur source message.

Participants actuels: 443

Traduire les commentaires

**Attention :** A la fin de la fenêtre pour vous reconnection sur la Chaîne

**El Hassan SAADOL**  
excellent topo

**Anne-Gaëlle ROTH**  
Topos très clairs mer

**Nachwan Ghanem**  
Peut on utiliser la fie la valeur mitrale

**Dalila Bennegadi**  
Merci

**Alice VILCAN**  
Merci

**Anne-Lise GUGENH**  
merci pour ces beau

**Karine CAUCINO-FI**  
Possible hypomagné



## Role of PVC ablation in associated cardiomyopathy

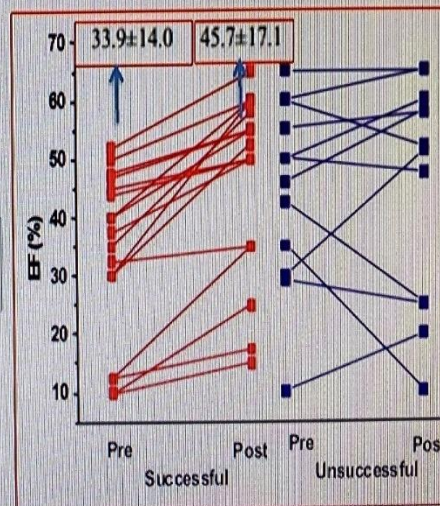
**30 patients with > 5% VPC and non ischemic CM (22 ±11 % VPC)**

- left ventricular scar by cardiac MRI (n=26)
- onset of cardiomyopathy before the occurrence of frequent PVCs (n=4)



60% success

**55%  
normalization EF**



El Kadri M, et al. Heart Rythm 2015;12:706-13

Tapez ici et cliquez sur le message.

Participants actuels: 4

Traduire les commentaires

**Attention :** A la fin de la session sur la Ch...

**El Hassan SA**  
excellent topo

**Anne-Gaëlle**  
Topos très clairs

**Nachwan Gh**  
Peut-on utiliser la valeur mitrale?

**Dalila Benneq**  
Merci

**Alice VILCAN**  
Merci

**Anne-Lise GL**  
merci pour ces


**Karine CAUC**  
Possible hypo

eJESFC

eurpagroup6connex.eu/event/ejesfc/fr-fr?shared=true#/sessions/n130805/c78945

Touch - Operations... Particuliers | BNP Par... La DH Biztax | SPF Finances Amazon.fr 75U/R7.be Amazon.fr: amazon...

**LIVE**



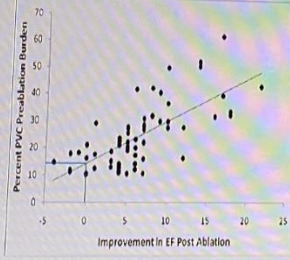
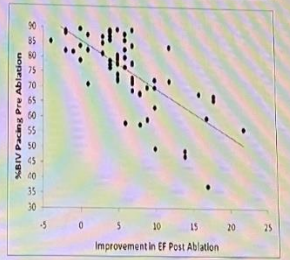
**P. Maury**  
Toulouse - FRA

## Role of PVC ablation in non responder to RCT

**65 pts with CRT considered as non-responder**  
due to frequent PVC (>10000) (13% of all non responder)

Lakkireddy D, et al. J Am Coll Cardiol 2012;60:1531

% RCT	76→12%	→ 88→2%
ER	26→5%	→ 33→7%
AVEDD	68±8 mm	→ 65±9 mm

**Société Française de Cardiologie**

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15:12 17-01-21

Tapez ici et cliquez sur soumettre pour envoyer un message

Participants actives: 443

Traduire les commentaires

**Attention:** A la fin de la session, merci de quitter la fenêtre pour vous rendre sur la prochaine session sur la Chaîne LIVE.

- El Hassan SAADOUNI** 01/17/2021 03:07 pm  
excellent topo
- Anne-Gaëlle ROTHÉ** 01/17/2021 03:06 pm  
Topos très clairs merci
- Nachwan Ghanem** 01/17/2021 03:05 pm  
Peut on utiliser la flecaine en cas de prolapsus vrai de la valvule mitrale
- Dalila Bennegadi** 01/17/2021 03:04 pm  
Merci
- Alice VILCAN** 01/17/2021 03:04 pm  
Merci
- Anne-Lise GUGENHEIM** 01/17/2021 03:03 pm  
merci pour ces beaux topos
- Karine CAUCINO-FLECHER** 01/17/2021 02:59 pm  
Possible hypomagnésémie sur un jeûne prolongé. Il

ASUS

Menu

Handwritten notes on paper:

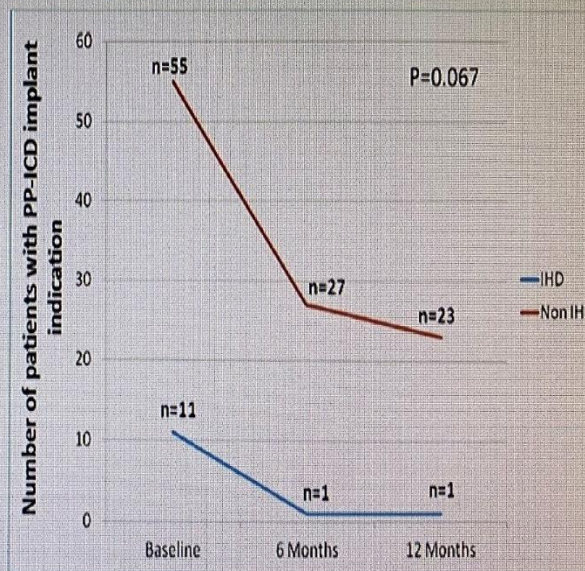
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- Tableaux de Pt
- Reunion de Pt
- Ecole des Pt
- Requis

## PVC ablation for avoiding « primary » ICD

ICD avoided in 2/3 of cases most at 6 months (w ou wo associated CM)

no successfully ablated patients with burden > 13% had this indication at 6 months

no malignant VA or SD  
at 6 months FU thereafter



Penala D, et al. Heart Rhythm 2015;12:2434-2442

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**Danie**  
Merci

**El Ha**  
excell

**Anne**  
Topos

**Nach**  
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**Dalila**  
Merci

**Alice**  
Merci

**Anne**  
merci

## Take home messages

- ◆ patients with unexplained dilated CM with altered EF and frequent PVC (how much?) should be treated for eliminating/decreasing VPC
- ◆ any structural heart disease with frequent PVC (how much ?) and altered EF should be treated for eliminating/decreasing VPC
- ◆ in case of doubt, testing with transient AA therapy may be proposed
- ◆ asymptomatic patients with frequent PVC (how much?) without any cardiac alteration should be monitored life-long
- ◆ asymptomatic patients with unfrequent PVC and no cardiac disease should be reassured
- ◆ future ? prophylactic ablation in special populations ?

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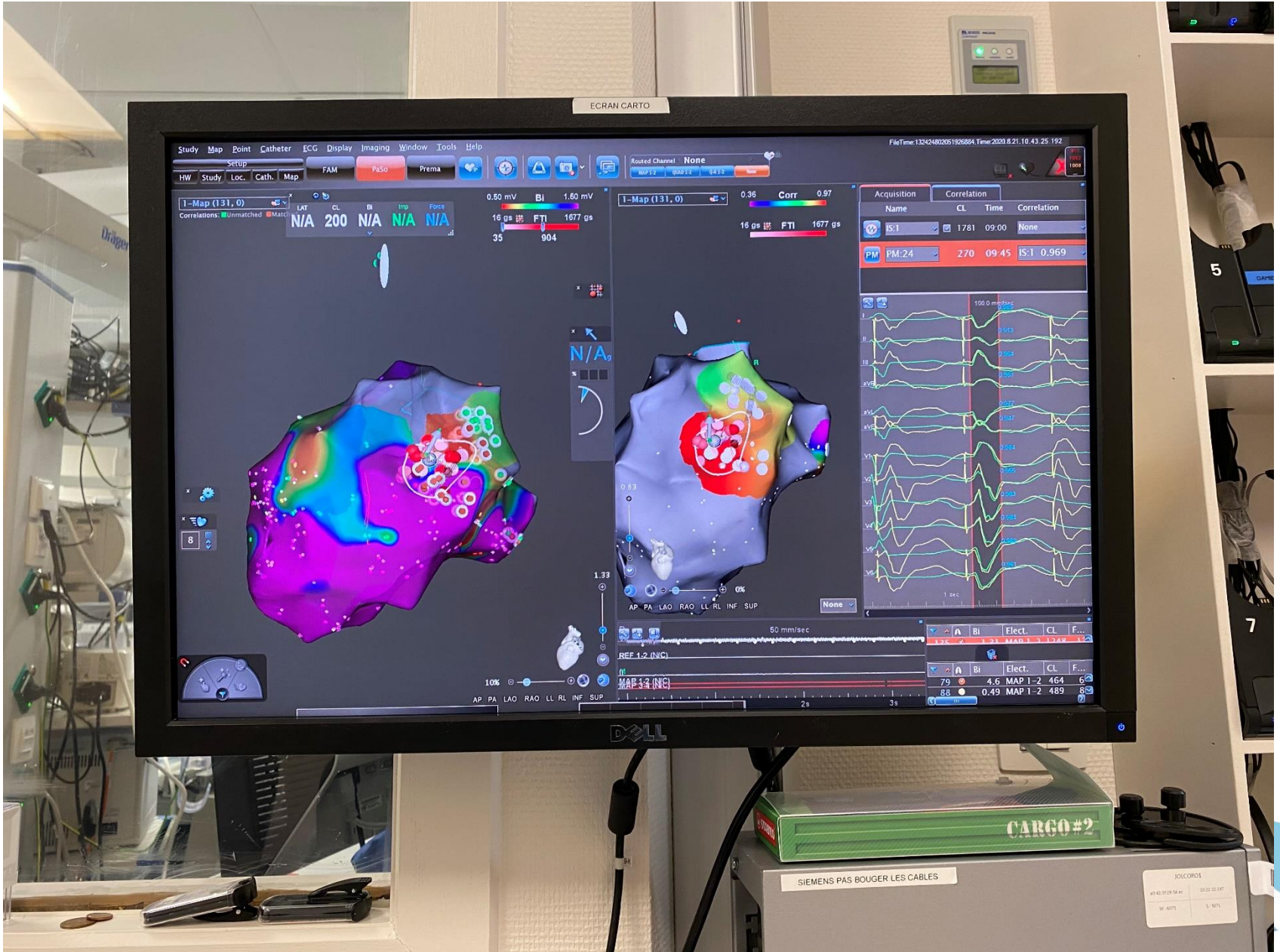
Ann  
merc

# Ablation d'ESV : causes d'echec ?

- Pas d'ESV spontanées lors de l'examen EEP ... même sous isuprel® (isoprotérenol)
- Origine inhabituelle de ESV
  - ESV LVOT < RVOT
  - Près du His ?
  - Près des coronaires ?
  - Au niveau de l'épicarde (12%)
- Expérience de l'opérateur
- Qualité de la cartographie (système PASO®)

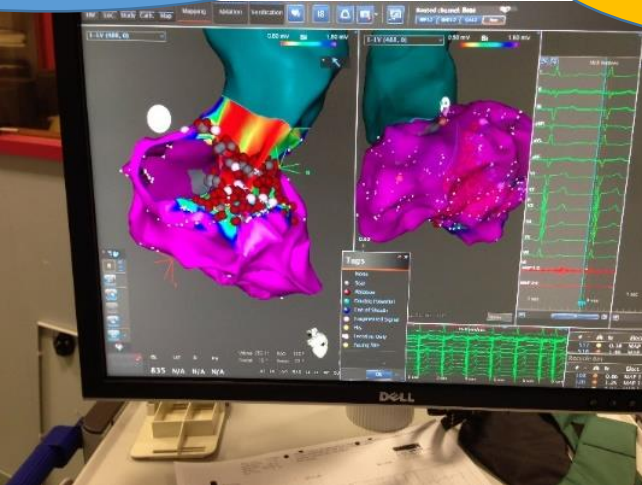
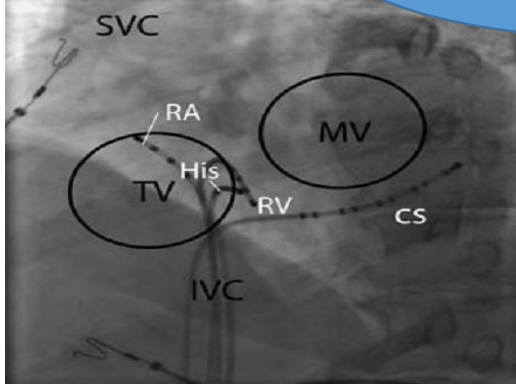
# Conclusions : que faire avec des ESV ?

- Les ESV sont le plus souvent bénignes / asymptomatiques
- ESV à enregistrer (tracé 12-dérivations) : > 10,000 / jour ??
- Profil de risque à voir (critères bénin/malin)
- Médications souvent peu efficaces (BB)
- Ablation = option possible à discuter chez les patients symptomatiques
- Expérience du cardiologue/matériel (système Carto™ ... est associé à une ↓ irradiation, ↑ succès
- Rares complications de la procédure

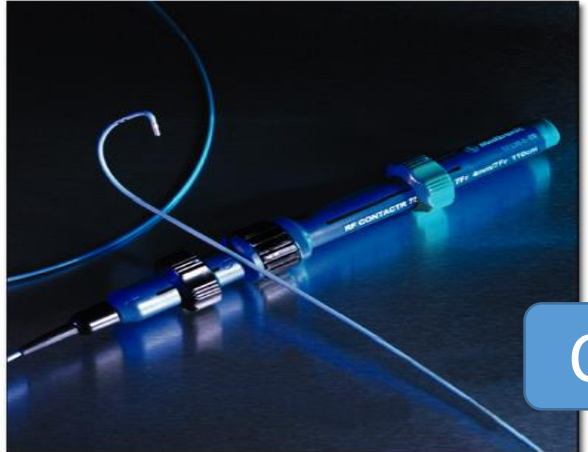
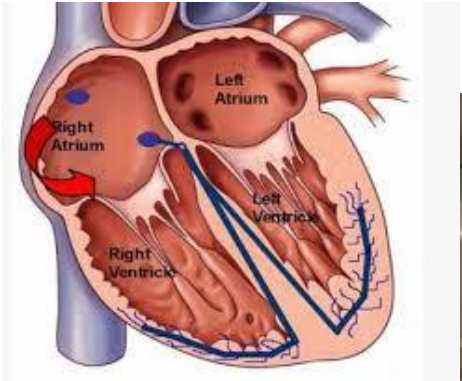


# Equipe

# Monitoring



CENTRES HOSPITALIERS  
JOLIMONT ASBL  
L'étude électrophysiologique  
et l'ablation  
Brochure d'information



# Clés du succès de la procédure



