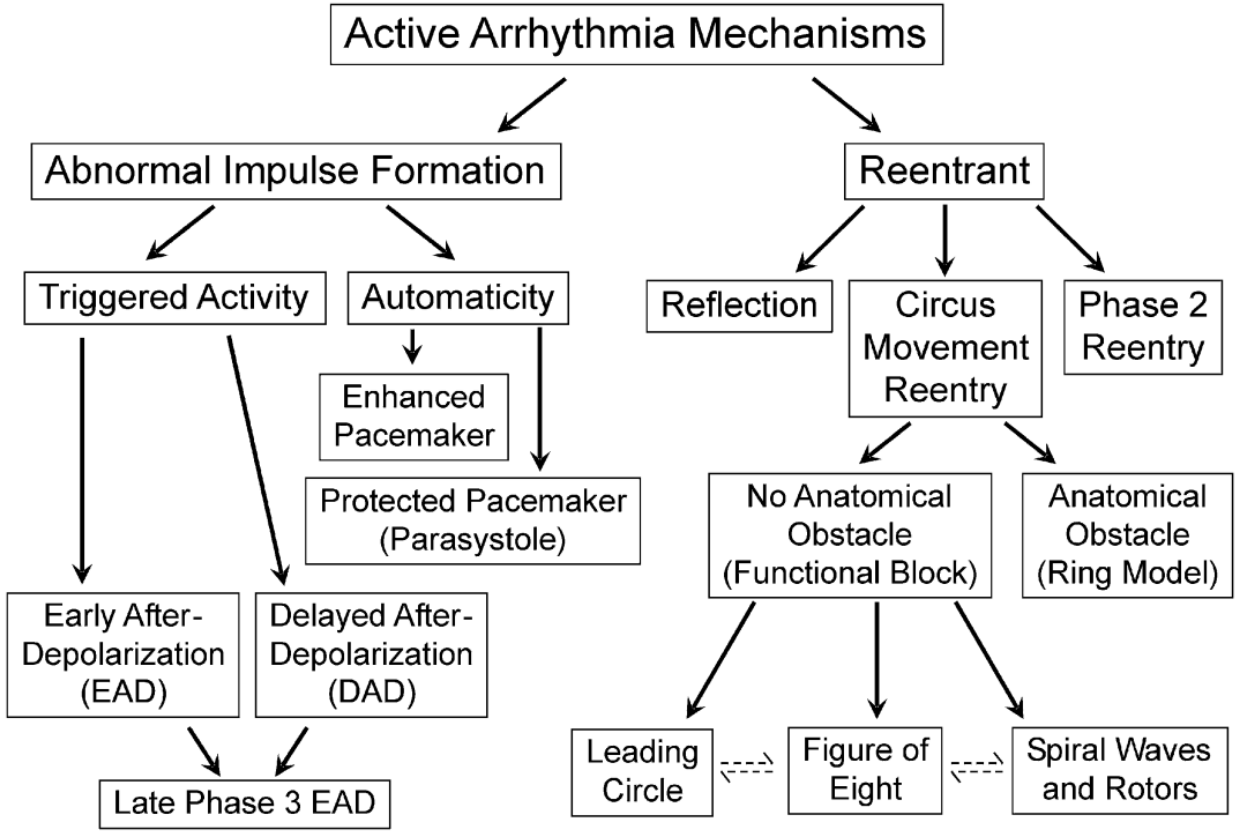
Définition des principaux troubles du rythme cardiaque

Grégoire Massoullié le 3 octobre 2018

CARDIOLOGIE
• CHU •
CLERMONT
FERRAND

Mécanismes principaux



Antzelevitch, Card Electrophysiology Clin 2011

Automatisme

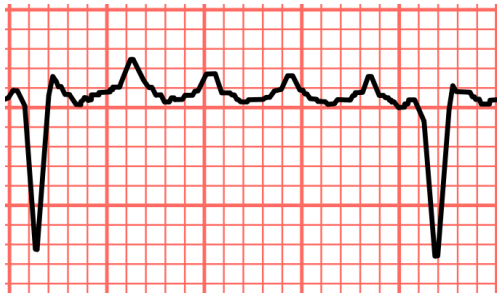
vs.

Activité reentrante

Mécanismes principaux

AUTOMATISME

REENTREE



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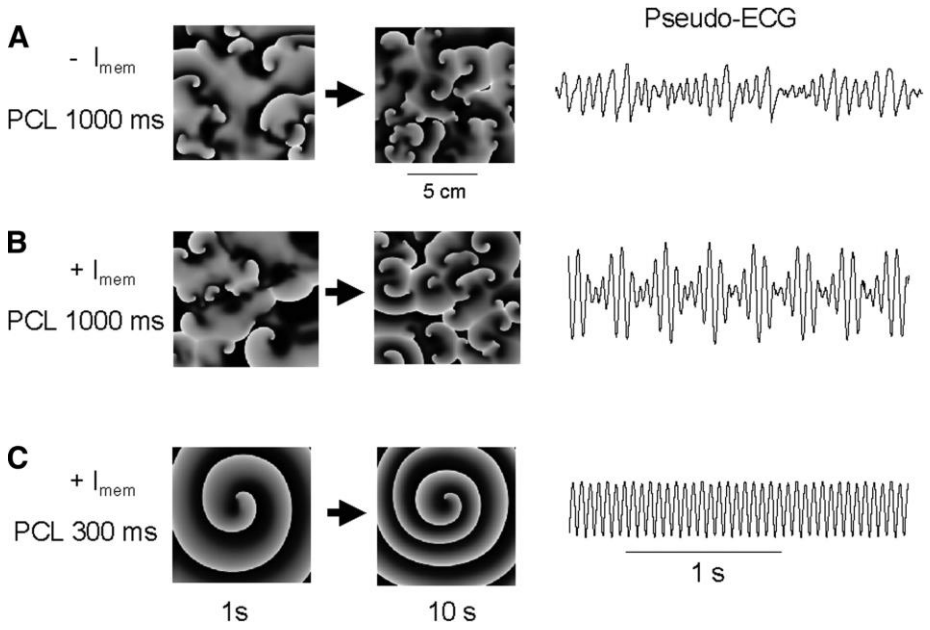


Principaux troubles du rythme

Arythmies de l'oreillettes

Flutter

Fibrillation atriale

Tachycardie atriale focale

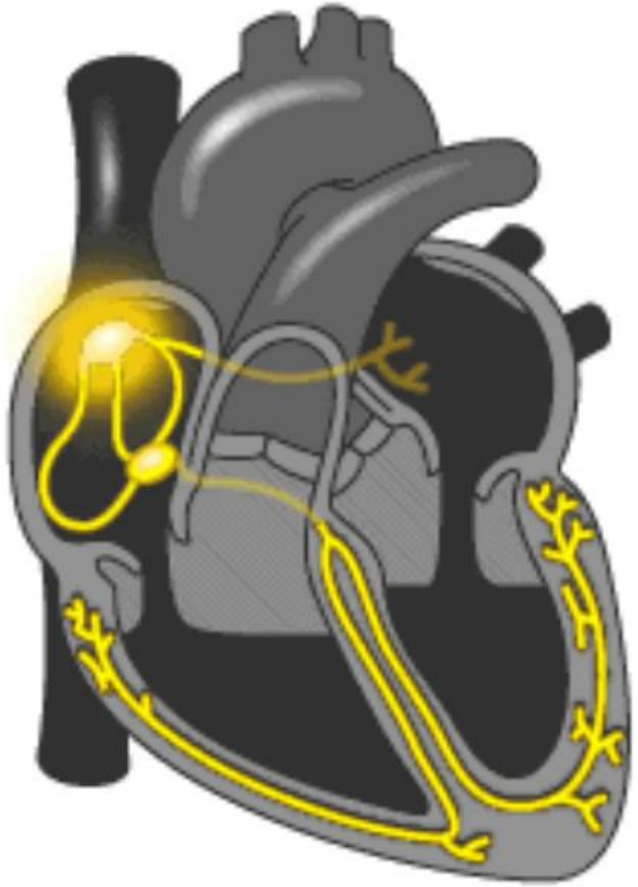
Tachycardies jonctionnelles

Arythmies du ventricules

Tachycardie ventriculaire

Extrasystoles ventriculaire

Fibrillation ventriculaire



Principaux troubles du rythme

A

A

Descriptions

Physiopathologique
Clinique
Electrique

Prise en charge

Médicamenteuses
Interventionnelles

Extrasystoles ventriculaire

OREILLETTE: caractéristiques communes

Fréquentes
Souvent bénin
Symptômes variables
Cœur sain

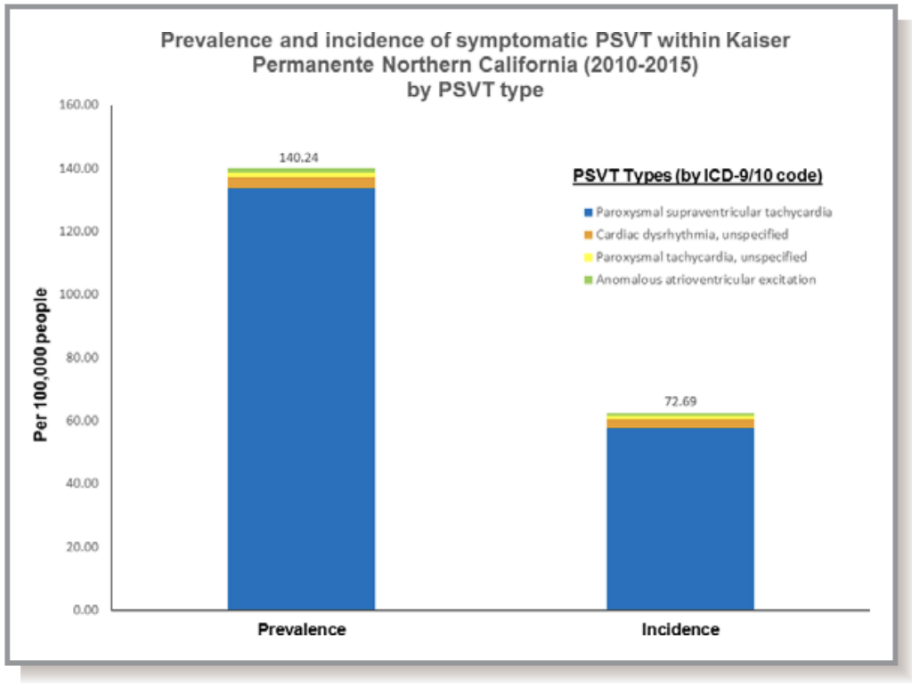


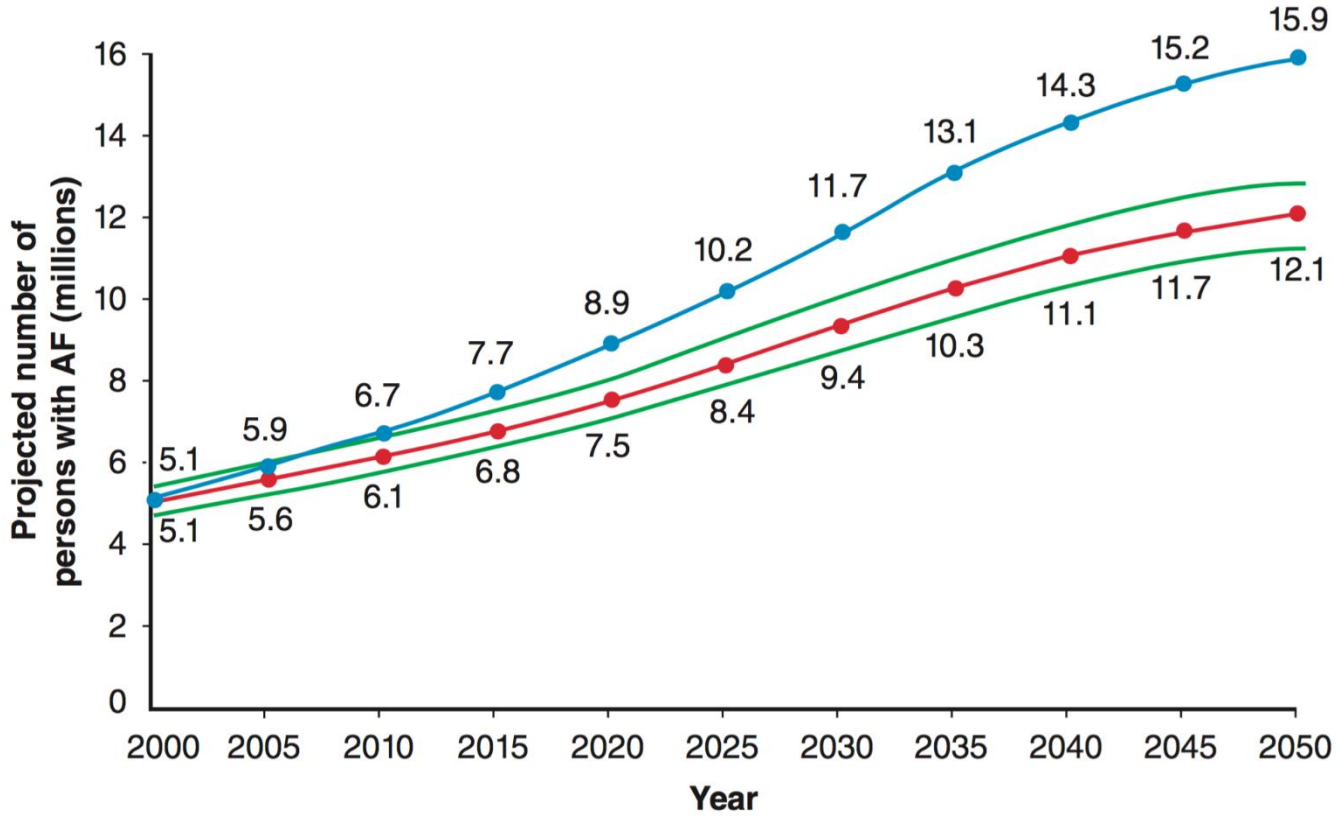
Figure. Prevalence and incidence of symptomatic paroxysmal supraventricular tachycardia (other than atrial fibrillation or atrial flutter) within Kaiser Permanente Northern California (2010–2015).

AS JAHA 2018

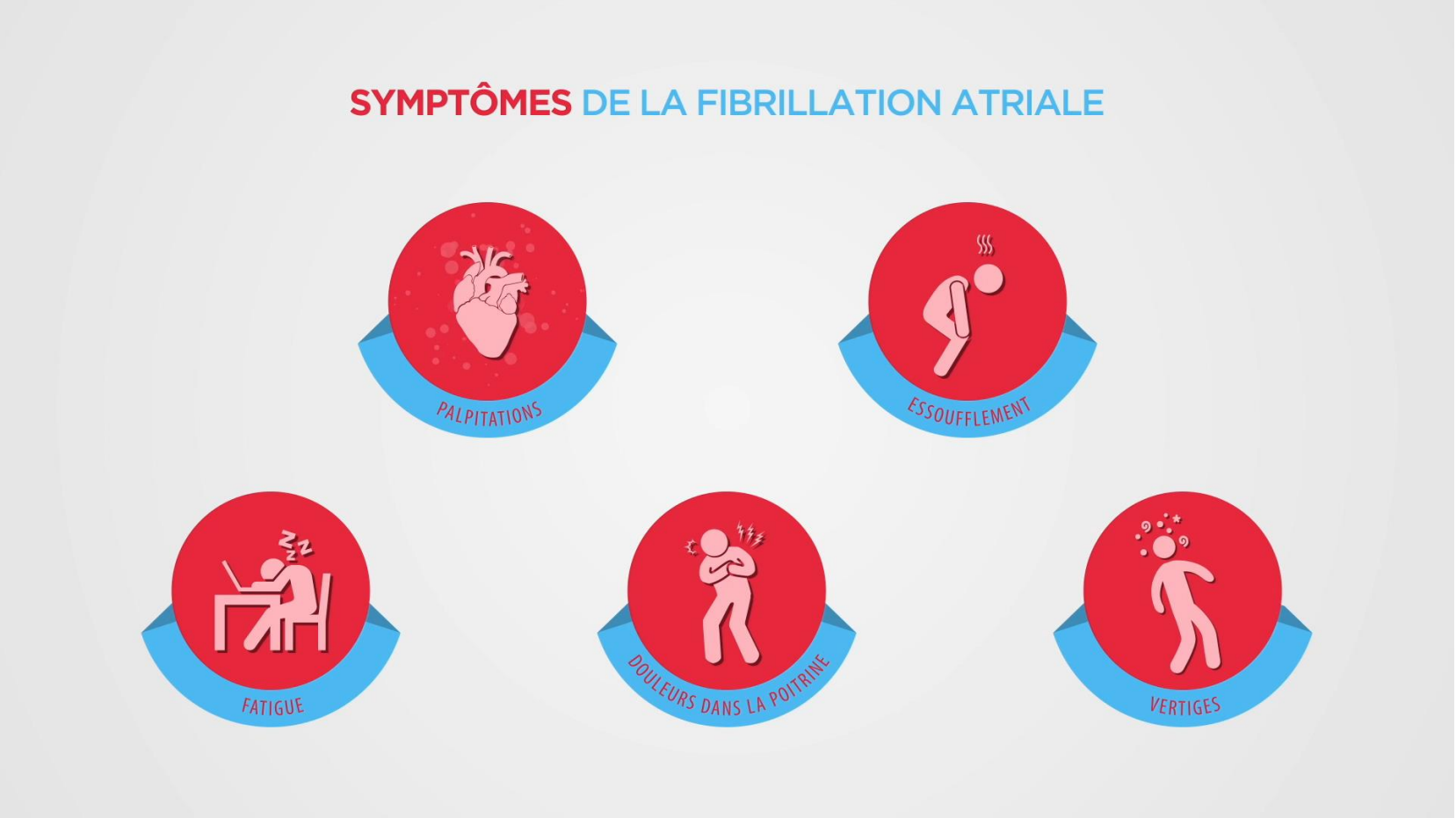
OREILLETTE : Flutter/FA épidemiologie

Principale arythmie chez l'homme
6 millions de personnes en Europe

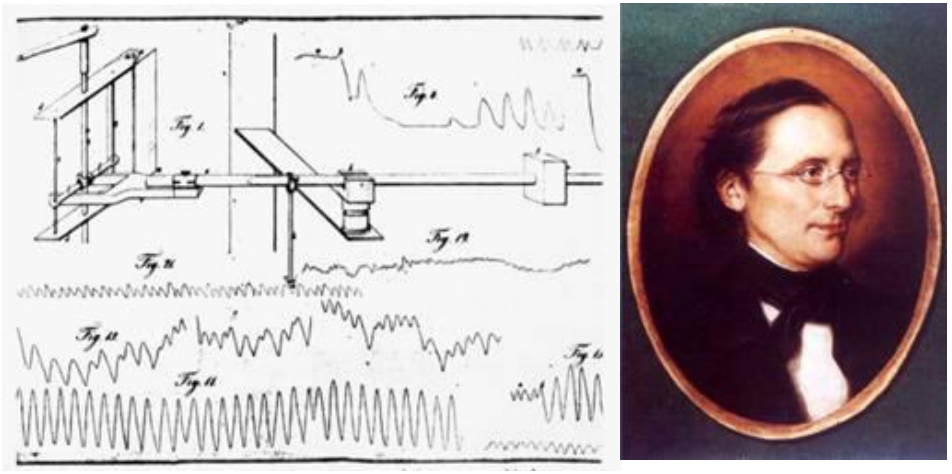
FA/Flutter
1% de la population
Risque AVC
Insuffisance cardiaque



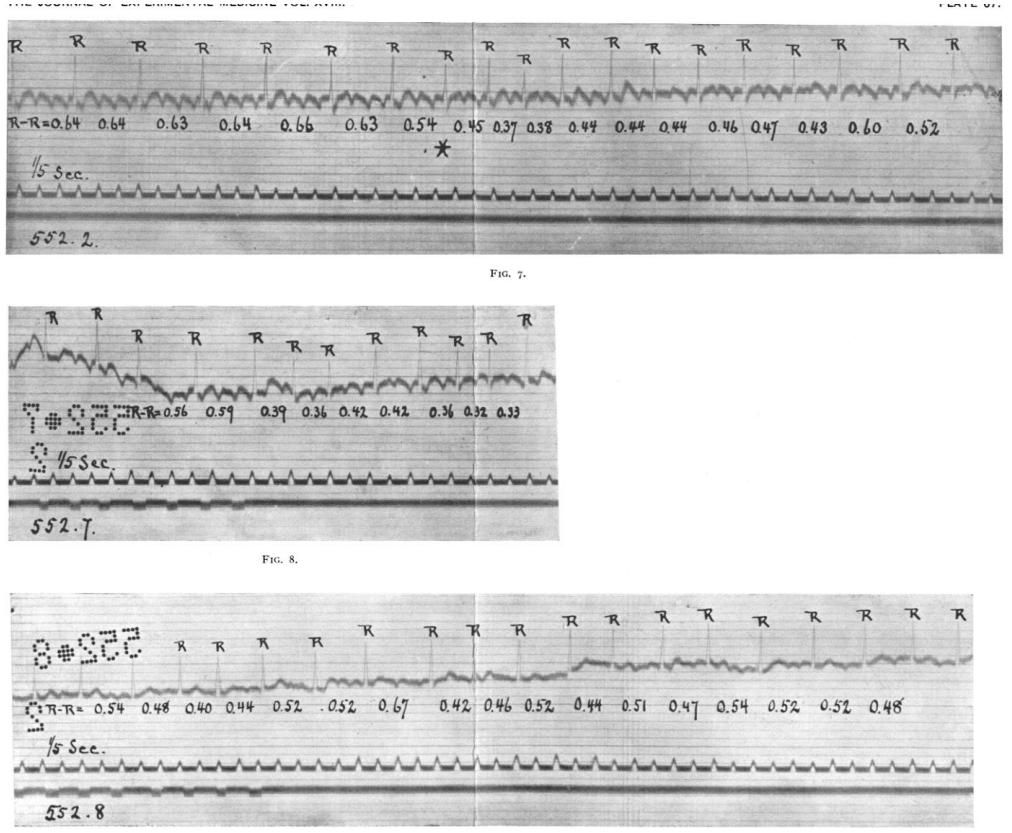
OREILLETTE: Flutter/FA principes généraux



OREILLETTES : Flutter commun



Ludwig/Hoffa 1848



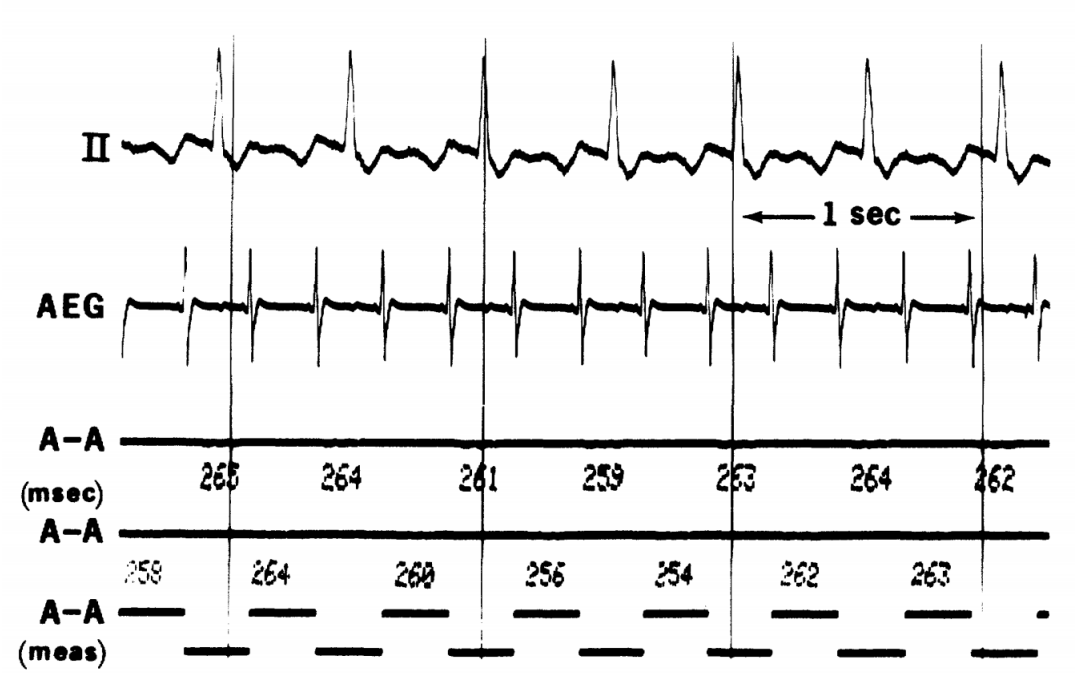
Robinson 1913

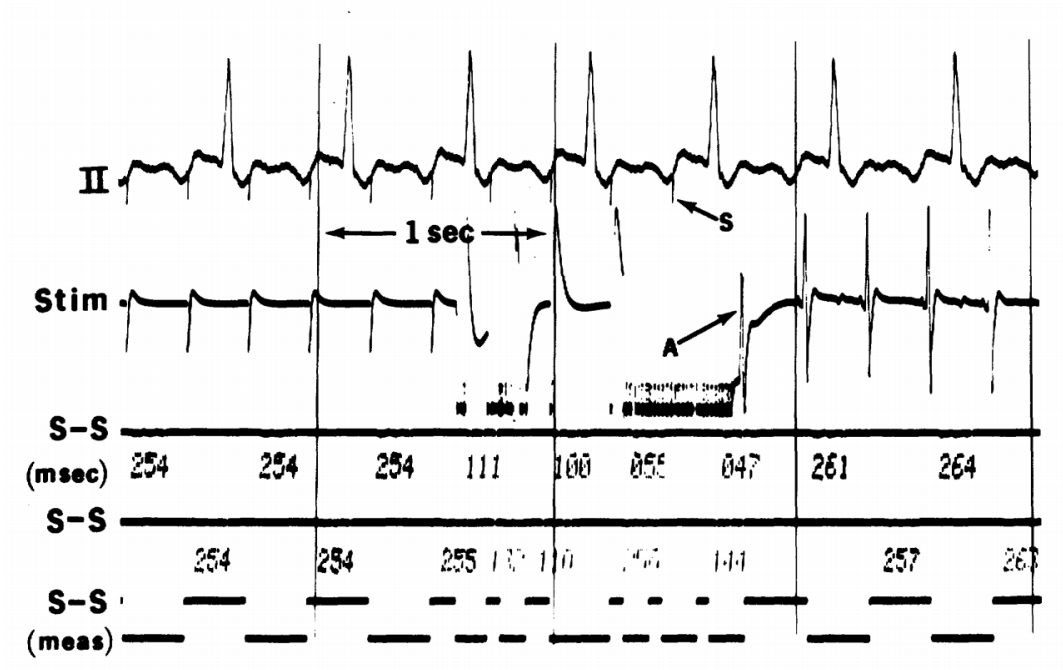
Waldo, Circulation 1977

Entrainment and Interruption of Atrial Flutter with Atrial Pacing

Studies in Man Following Open Heart Surgery

ALBERT L. WALDO, M.D., WILLIAM A. H. MACLEAN, M.D., ROBERT B. KARP, M.D., NICHOLAS T. KOUCHOUKOS, M.D., AND THOMAS N. JAMES, M.D.





Mécanisme reentrant = un entrainement est possible

OREILLETTES : Flutter commun

Boucle électrique
Autour de l'anneau tricuspide
Isthme critique : isthme cavotricuspide

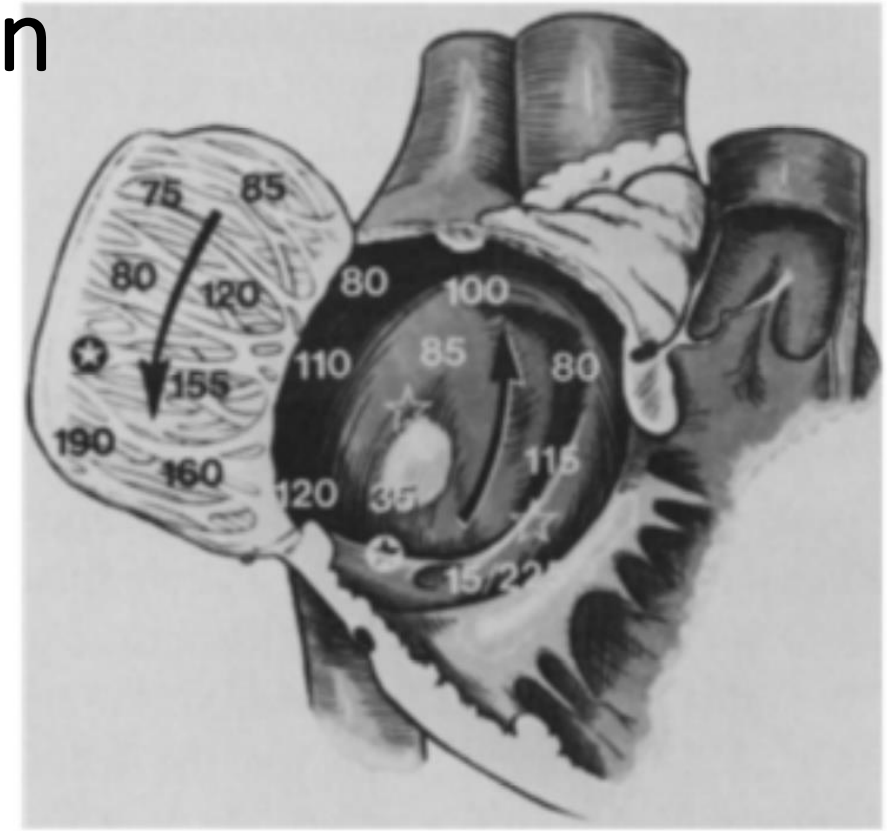
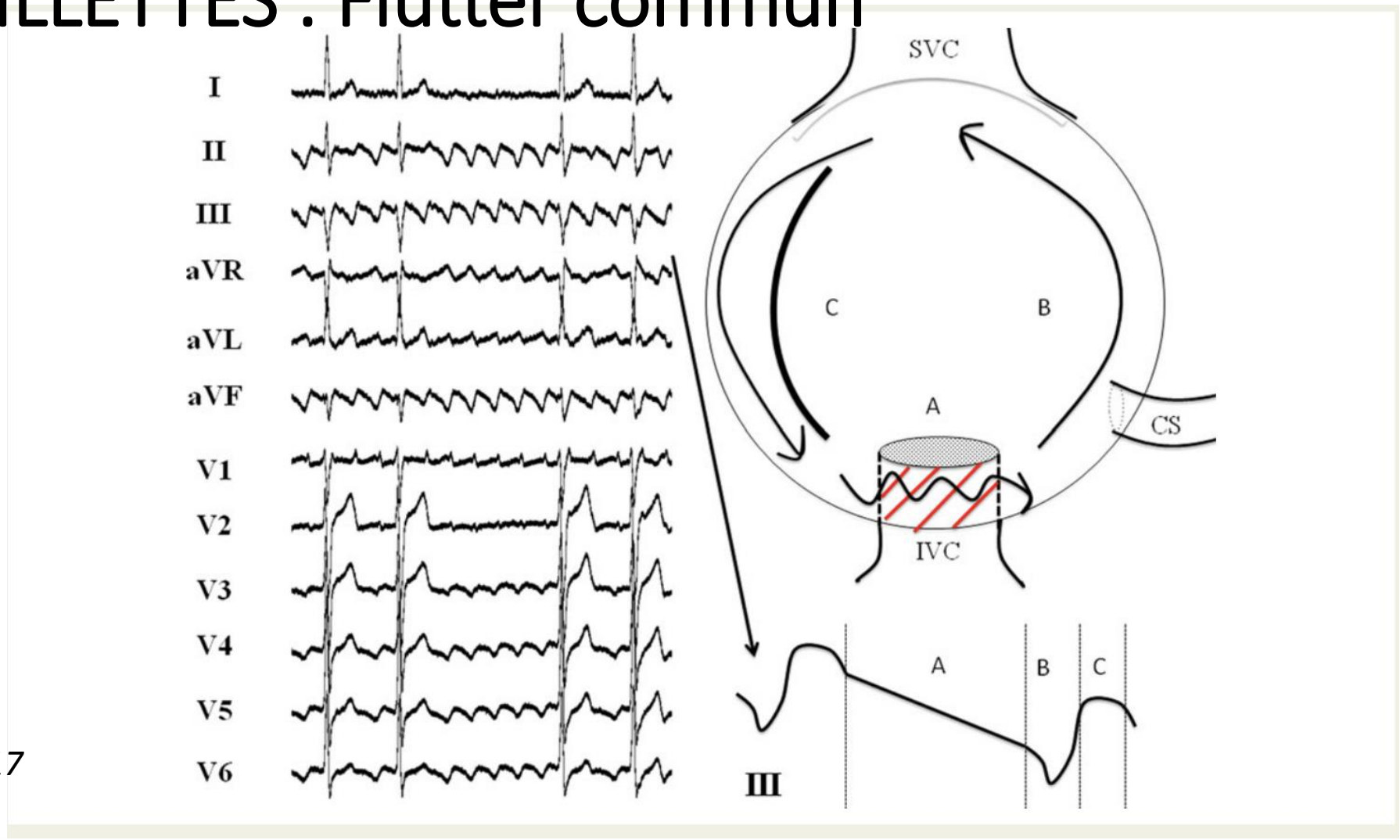


Figure 5. Sequential atrial activation map recorded during atrial flutter (cycle length 240 ms). Double potentials (star) and fraction-

OLSHANSKY ET AL.
SLOW CONDUCTION IN ATRIAL FLUTTER

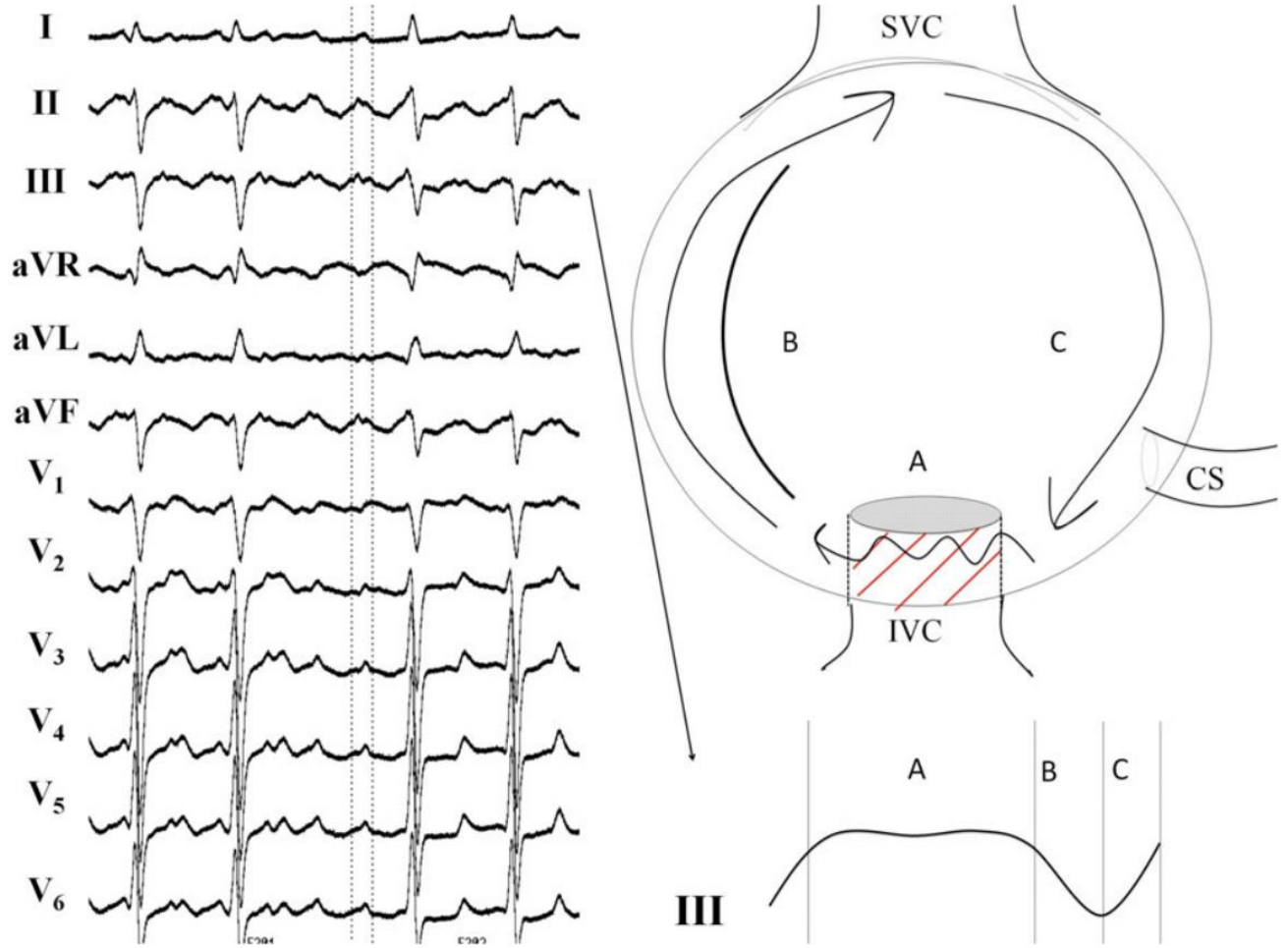
JACC Vol. 16, No. 7
December 1990:1639–48

OREILLETTES : Flutter commun

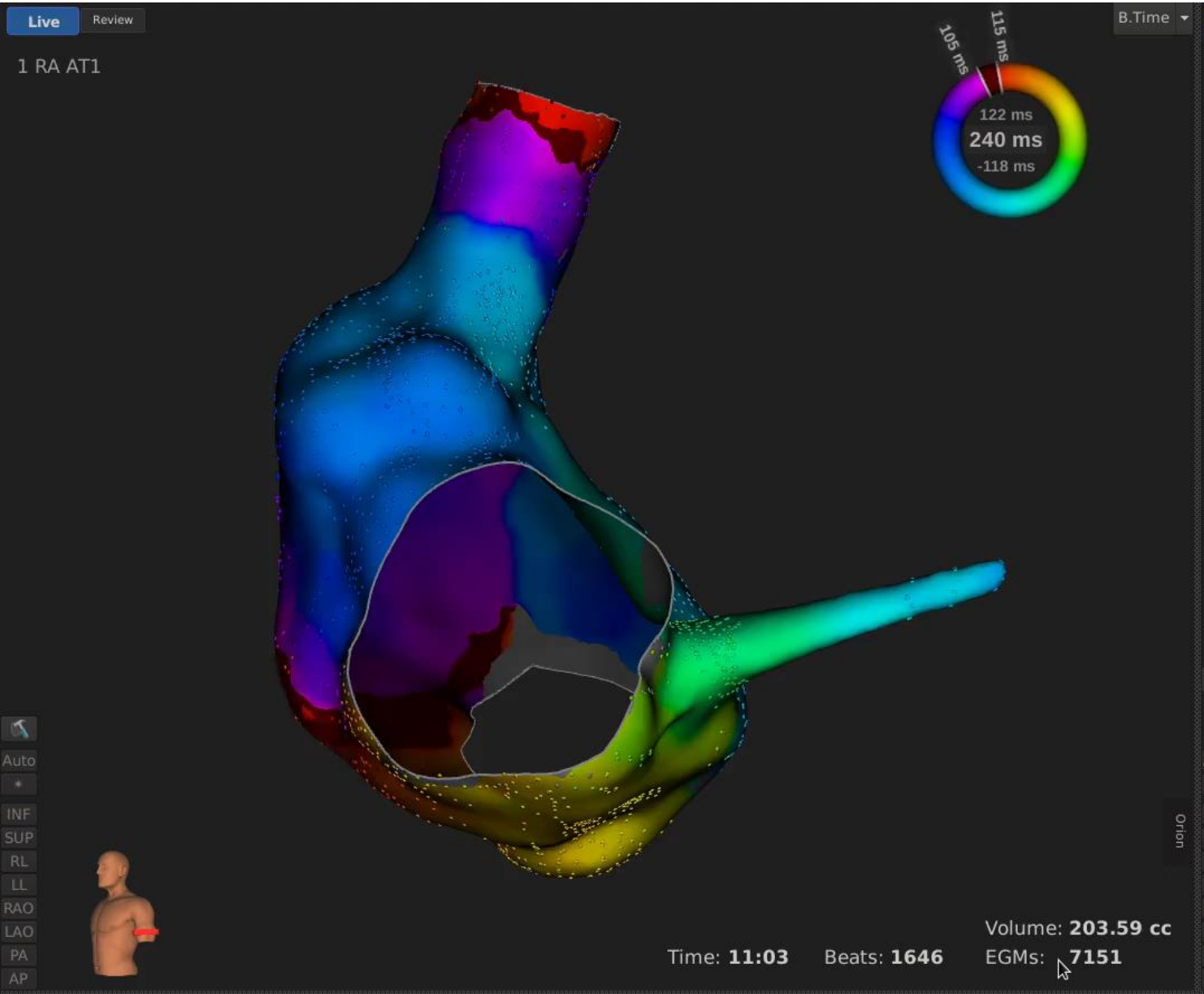


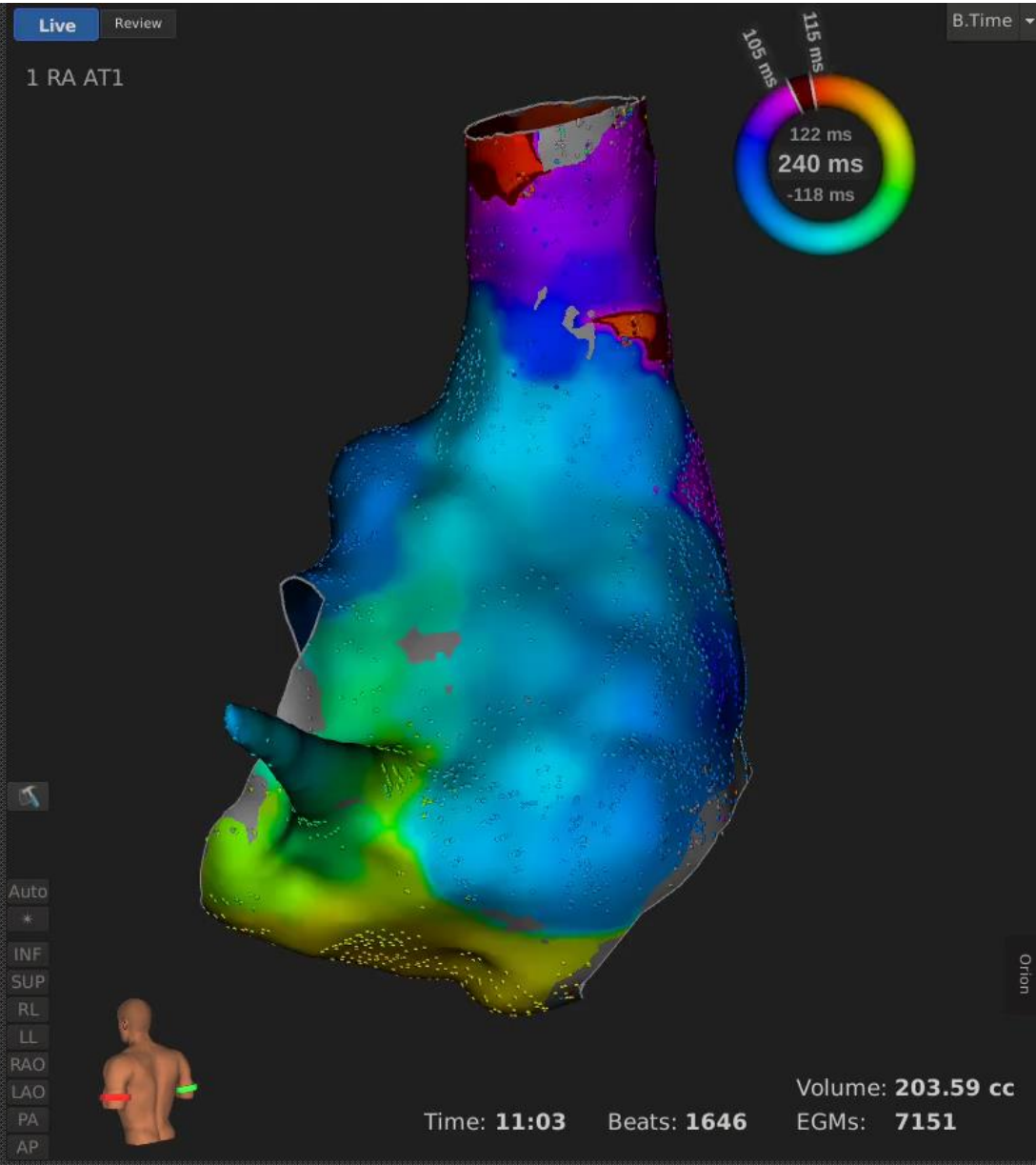
Bun, EHJ 2017

OREILLETTES : Flutter commun



Bun, EHJ 2017


Live
Review
B.Time
1 RA AT1
105 ms
115 ms
122 ms
240 ms
-118 ms
Auto
INF
SUP
RL
LL
RAO
LAO
PA
AP
Orion
Volume: 203.59 cc
Time: 11:03
Beats: 1646
EGMs: 7151


Live
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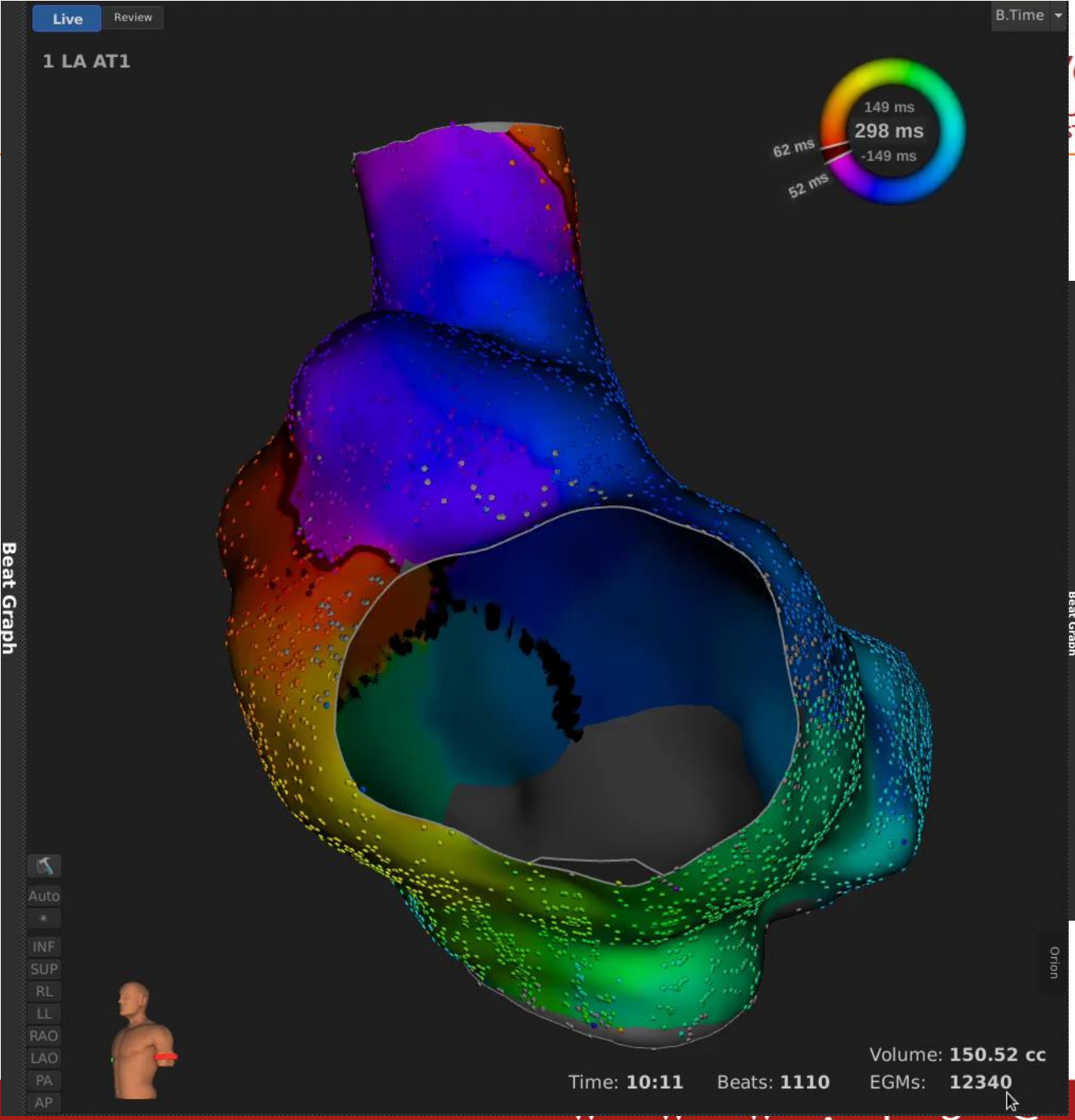
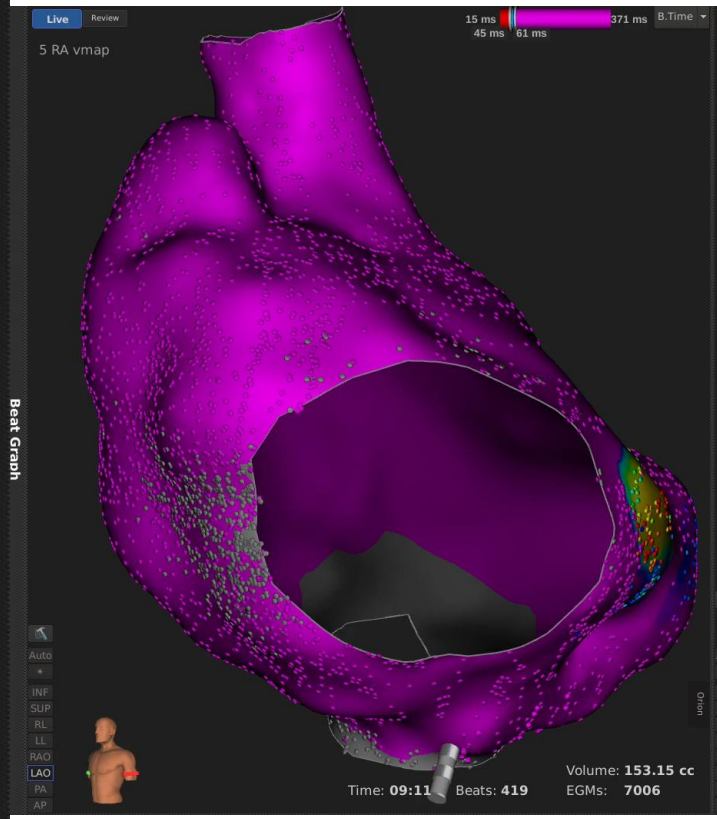
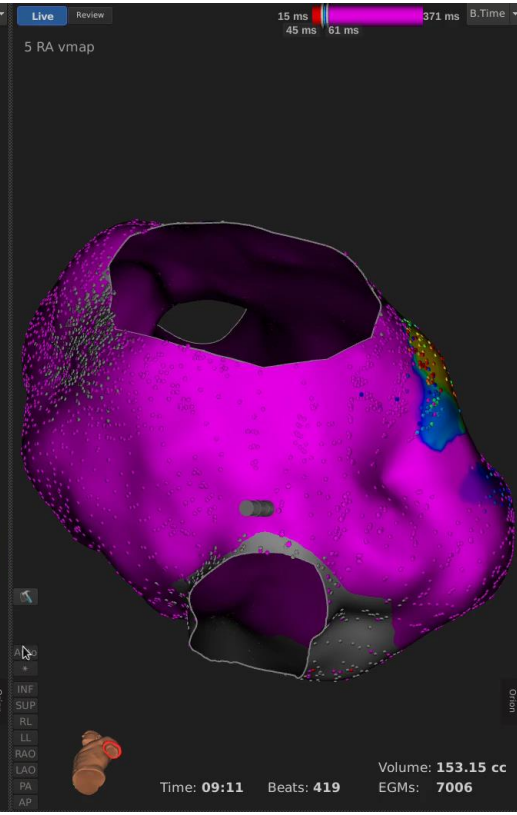


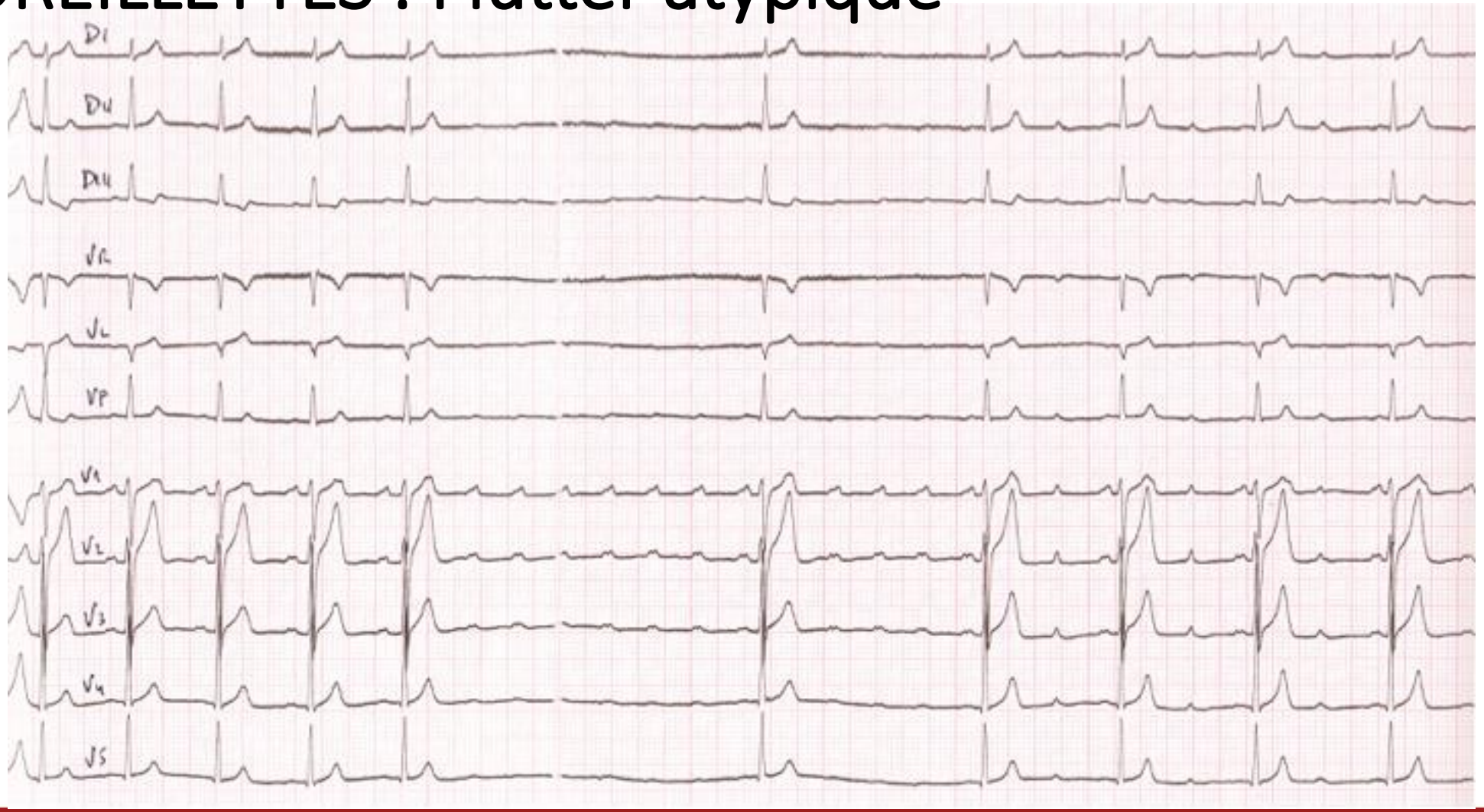
TOBER
05 2018 PARIS
URNÉES DE TRAVAIL DU GROUPE DE RYTHMOLOGIE
STIMULATION CARDIAQUE





A T . N E T

OREILLETTES : Flutter atypique



OREILLETTES : Flutter atypique

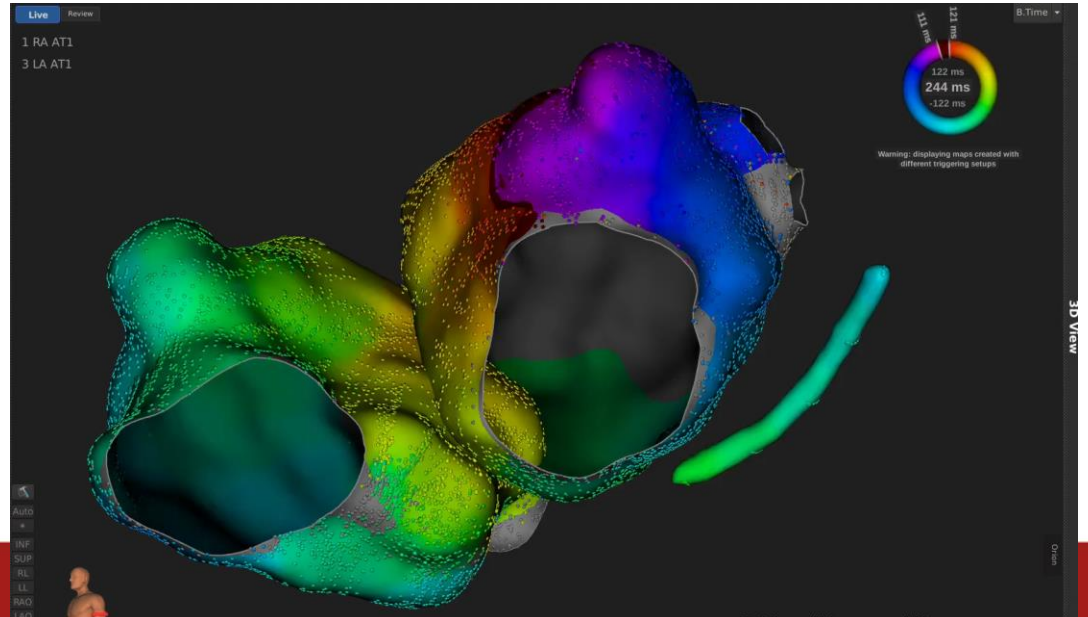
Au dépend d'une zone cicatricielle:

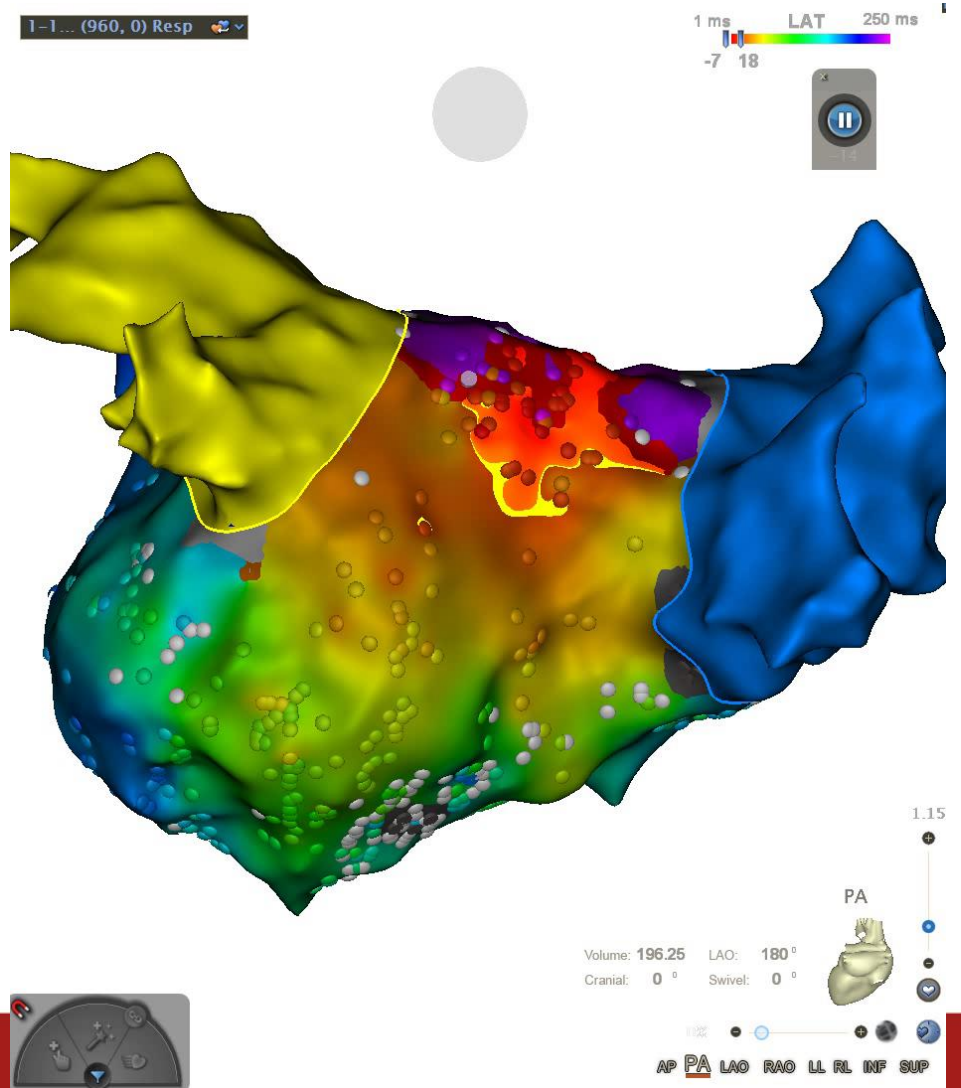
Post-ablation

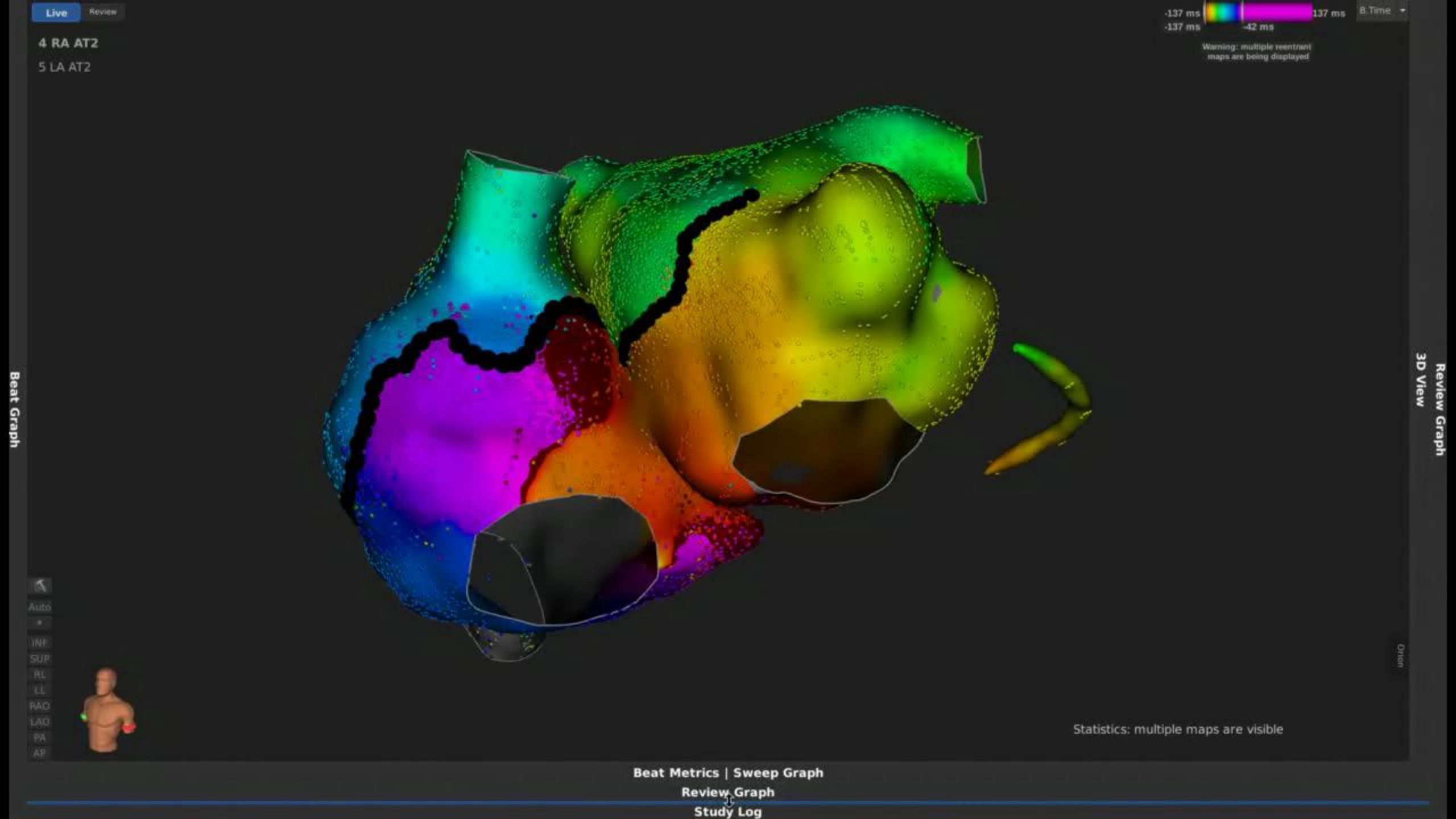
Chirurgicale

« spontanée »

Ou d'une structure anatomique






Live
Review
4 RA AT2
5 LA AT2
-137 ms
-137 ms
137 ms
-42 ms
8 Time
Warning: multiple reentrant maps are being displayed
Beat Graph
Review Graph
3D View
Auto
INF
SUP
RL
LL
RAO
LAO
PA
AP
Statistics: multiple maps are visible
Beat Metrics | Sweep Graph
Review Graph
Study Log

Fibrillation atriale

Plus fréquente des arythmies cardiaque
(1% pop générale)

Prévalence augmente avec l'age
10% après 80 ans
< 1% avant 65 ans

Premiere cause d'AVC
- Perte de la contraction de l'oreillette

Dyspnée/insuffisance cardiaque
- Diminution de 20% du remplissage ventriculaire
- Perte de l'adaptation de la FC à l'effort

CAS

OREILLETTES : Fibrillation atriale

Absence d'onde P

Rythme irrégulier

Désorganisation de l'activité de l'oreillette

Fréquence de l'oreillette > 400/minutes

OREILLETTES : Fibrillation atriale

Paroxystique

- Durée inférieure à 24-48h
- Récidivante

Persistante

- Evolution fréquente de la FA paroxystique
- Durée > 7 jours

OREILLETTES : Fibrillation atriale

Long duré

Permanen

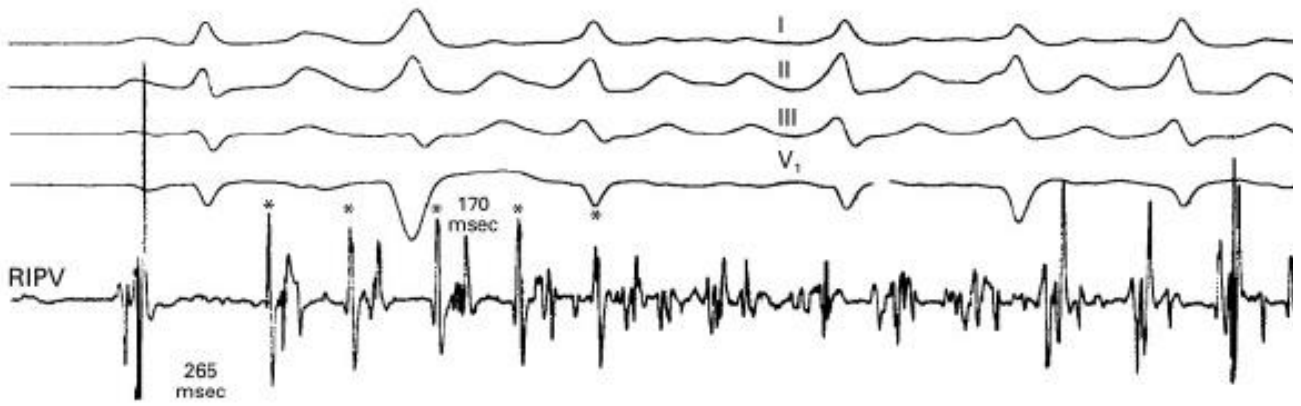
AF pattern	Definition
First diagnosed AF	AF that has not been diagnosed before, irrespective of the duration of the arrhythmia or the presence and severity of AF-related symptoms.
Paroxysmal AF	Self-terminating, in most cases within 48 hours. Some AF paroxysms may continue for up to 7 days.[a] AF episodes that are cardioverted within 7 days should be considered paroxysmal.[a]
Persistent AF	AF that lasts longer than 7 days, including episodes that are terminated by cardioversion, either with drugs or by direct current cardioversion, after 7 days or more.
Long-standing persistent AF	Continuous AF lasting for ≥1 year when it is decided to adopt a rhythm control strategy.
Permanent AF	AF that is accepted by the patient (and physician). Hence, rhythm control interventions are, by definition, not pursued in patients with permanent AF. Should a rhythm control strategy be adopted, the arrhythmia would be re-classified as 'long-standing persistent AF'.

retour en

me

OREILLETTES : Fibrillation atriale

Haïssaguerre M, Jais P *et al.*
N Engl J Med. (1998) 339: 695-666.



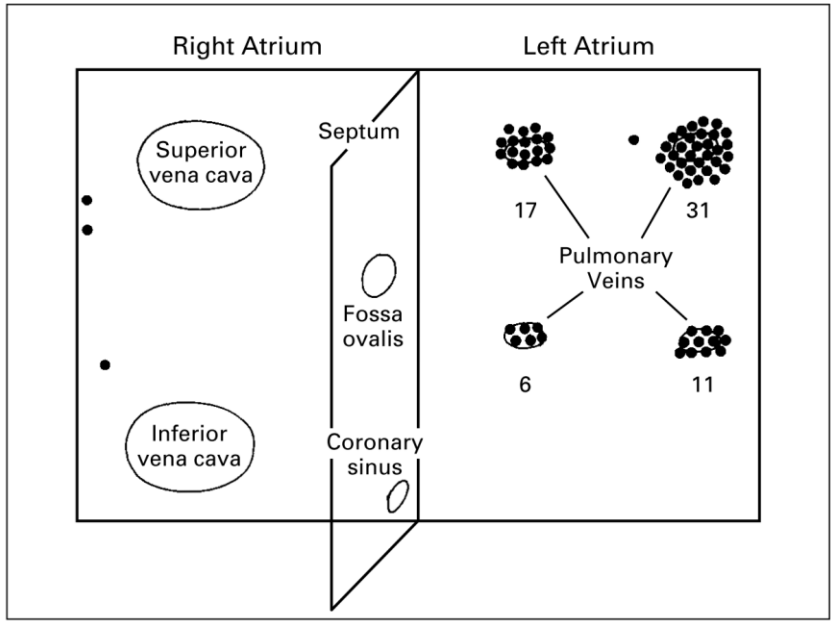
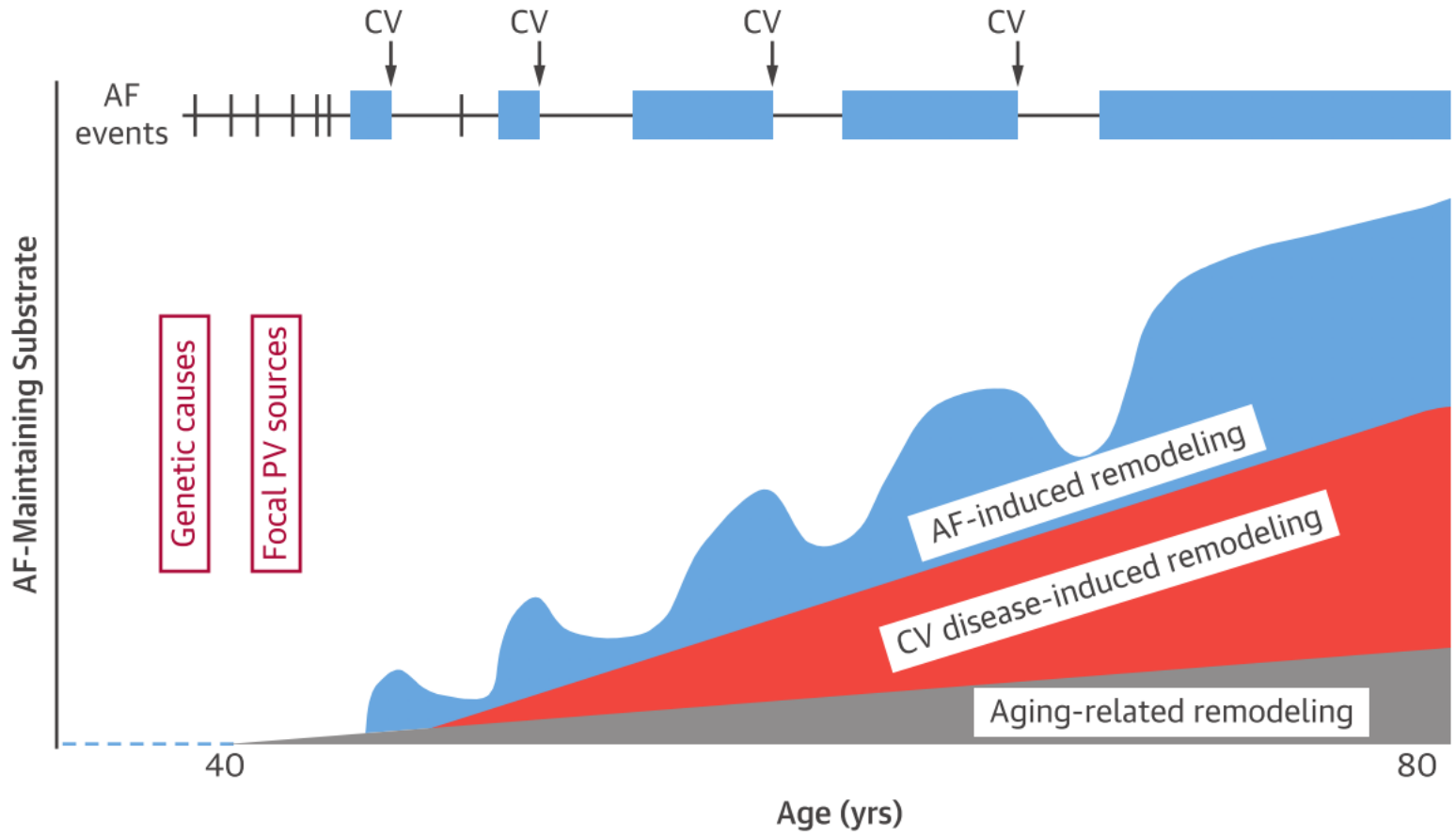


Figure 1. Diagram of the Sites of 69 Foci Triggering Atrial Fibrillation in 45 Patients.
Note the clustering in the pulmonary veins, particularly in both superior pulmonary veins. Numbers indicate the distribution of foci in the pulmonary veins.

FIGURE 2 **A Schematic Representation of the Natural History of AF**

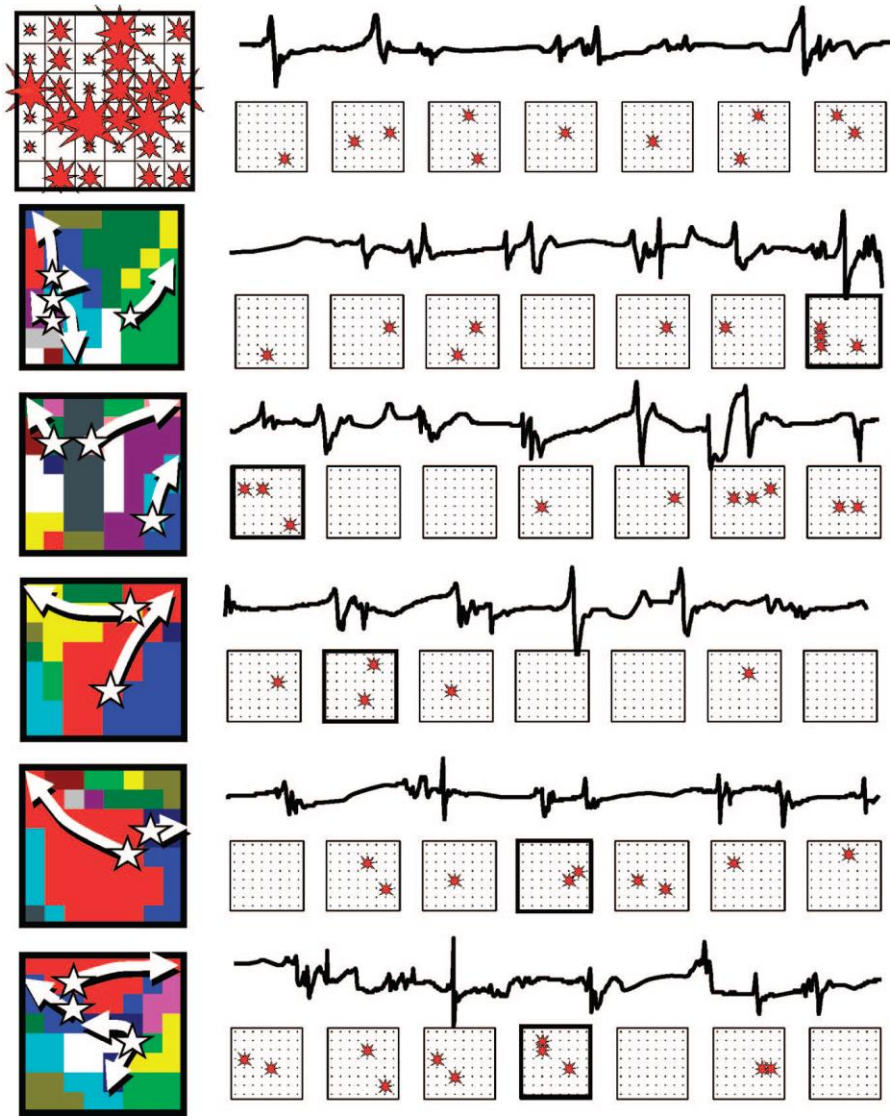


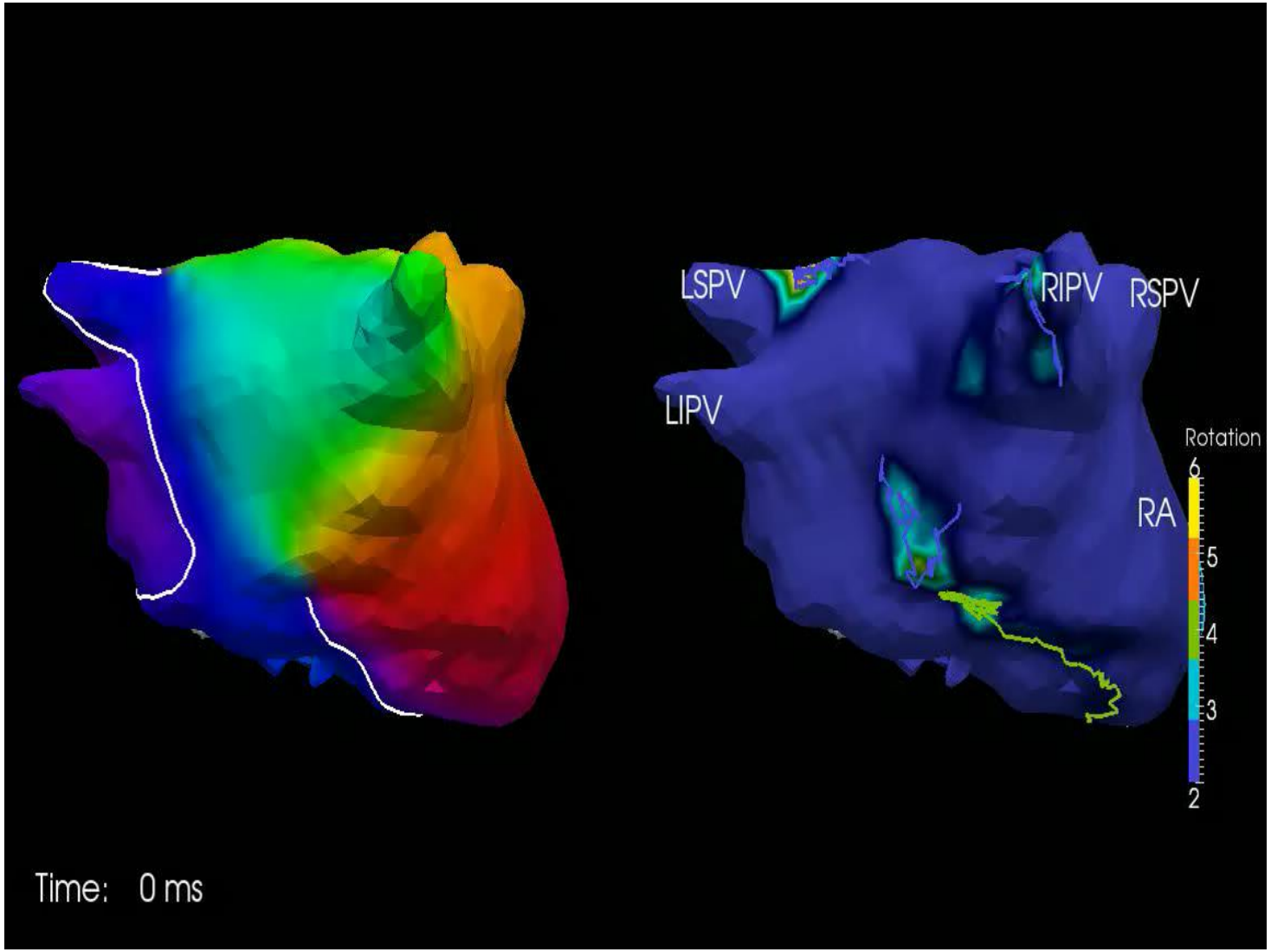
Atrial fibrillation (AF) often begins as short-lasting episodes, but becomes more long lasting over time as the AF-maintaining substrate progresses because of cumulative remodeling. Each AF episode that lasts for more than 24 h causes atrial remodeling, which reverses (but not necessarily completely) when AF terminates. In addition to AF-induced remodeling, remodeling due to intercurrent cardiac disease, as well as the normal aging process, contributes to the AF substrate. The remodeling processes cause atrial cardiomyopathic changes.
CV = cardiovascular; PV = pulmonary vein.

With the courtesy of Dr Josselin DUCHATEAU, IHU Bordeaux

Multiple wavelet hypothesis

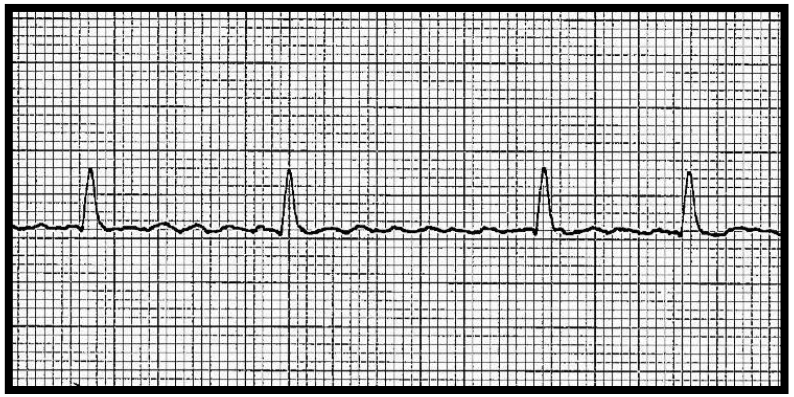
Surgical patients, structural cardiomyopathy
Long standing persistent AF
Very *complex activation patterns* …
… on a very *small scale*
Little room for focused ablation





Bordeaux University Hospital

Cardioinsight® (Medtronic)



Prise en charge de la FA

Gestion du rythme ⟷ **Risque thrombo-embolique**

EUROPEAN SOCIETY OF CARDIOLOGY®

European Heart Journal (2016) **37**, 2893–2962
doi:10.1093/eurheartj/ehw210

ESC GUIDELINES

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

The Task Force for the management of atrial fibrillation of the European Society of Cardiology (ESC)

Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC

Traitement	Objectif	Bénéfice
Contrôle immédiat du rythme	Stabilité hémodynamique	Améliorer l'espérance de vie
Gestion des facteurs favorisants — Hygiène de vie, contrôle des facteurs favorisants	Réduction du risques cardiovasculaire	
Risque thrombo-embolique — Anticoagulation selon le risques embolique	Prévention AVC	
Contrôler la fréquence cardiaque — Traitements bradycardisants	Améliorer les symptômes et la fonction ventriculaire gauche	Améliorer la qualité de vie, l'autonomie…
Réduire les symptômes — Antiarythmiques, cardioversion, ablation par radiofréquence	Améliorer les symptômes	

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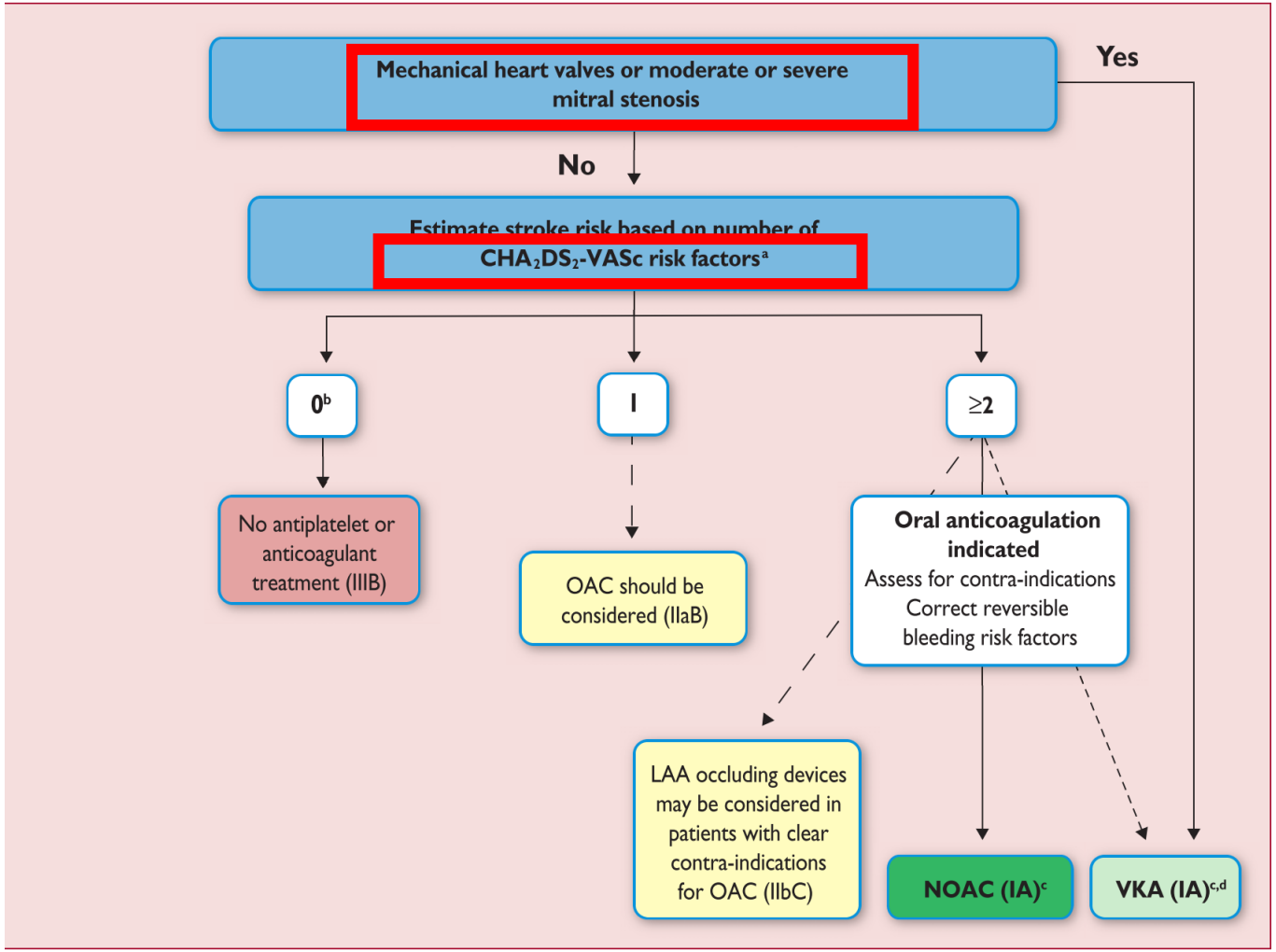


CHA_2DS_2-VASc risk factor	Points
Congestive heart failure Signs/symptoms of heart failure or objective evidence of reduced left ventricular ejection fraction	+1
Hypertension Resting blood pressure >140/90 mmHg on at least two occasions or current antihypertensive treatment	+1
Age 75 years or older	+2
Diabetes mellitus Fasting glucose >125 mg/dL (7 mmol/L) or treatment with oral hypoglycaemic agent and/or insulin	+1
Previous stroke, transient ischaemic attack, or thromboembolism	+2
Vascular disease Previous myocardial infarction, peripheral artery disease, or aortic plaque	+1
Age 65–74 years	+1
Sex category (female)	+1

ESC GUIDELINES - Kirschoff and al, EHJ 2016

Chadsvasc risk factors [click on present risk factors]

RISK FACTORS	SCORE
Congestive heart failure	1
Hypertension	1
Age ≥ 75	2
Age 65-74	1
Diabetes mellitus	1
Stroke/TIA/thrombo-embolism	2
Vascular disease	1
Sex Female	1
Your score	0

CHADSVASC clinical risk estimation. Adapted from Lip et al. See Van den Ham et al. below for actual risks in a larger population.

CHA_2DS_2VASc SCORE	PATIENTS (n=7329)	ADJUSTED STROKE RATE (% year)
0	1	0%
1	422	1,3%
2	1230	2,2%
3	1730	3,2%
4	1718	4,0%
5	1159	6,7%
6	679	9,8%
7	294	9,6%
8	82	6,7%
9	14	15,2%

Sécurisé | https://www.chadsvasc.org

CHA_2DS_2-VASc / HAS-BLED / EHRA atrial fibrillation risk score calculator

Please select CHADSVASC and HASBLED risk factors, EHRA score and click copy to clipboard to copy and paste in your electronic files

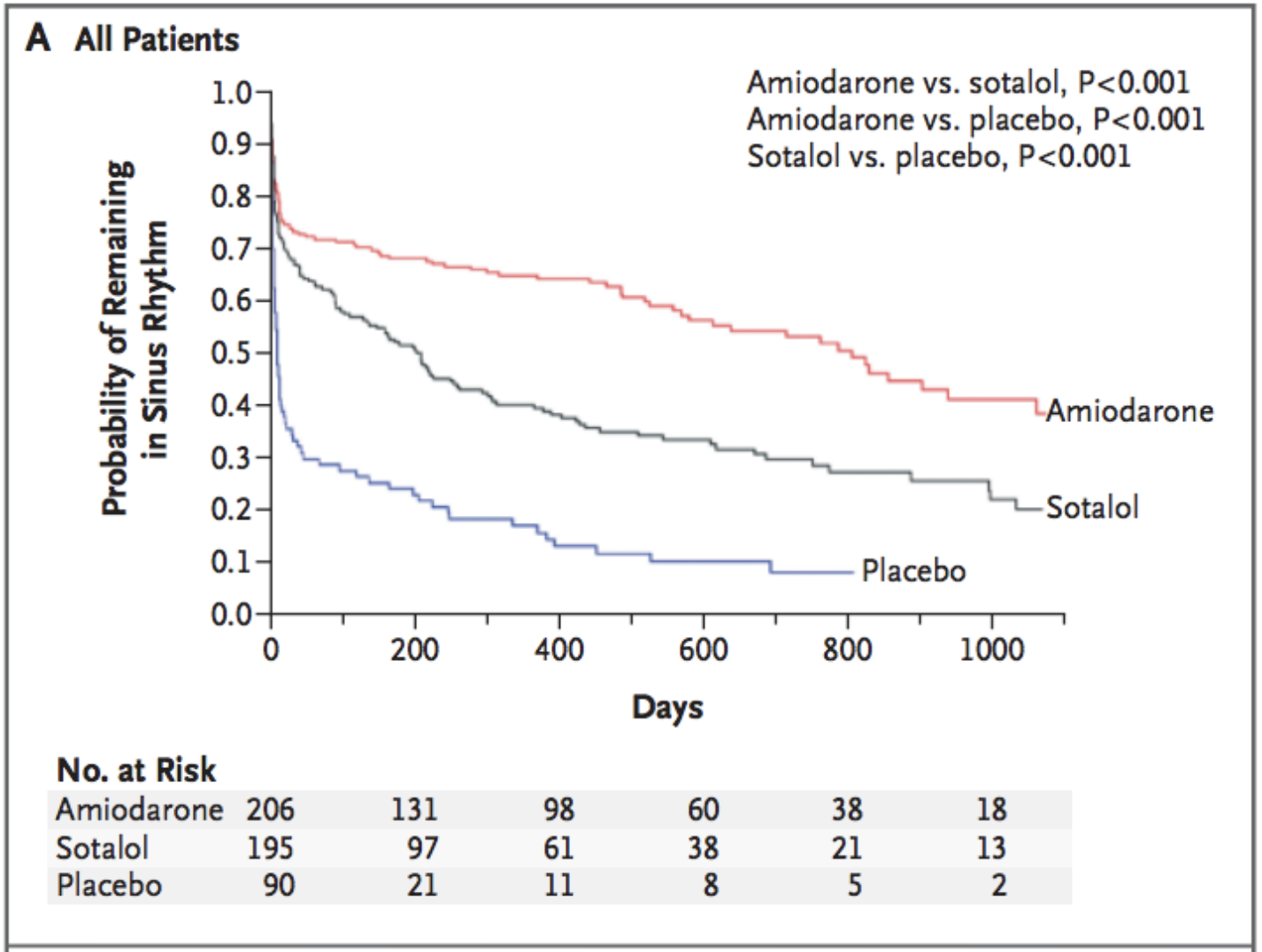
Antiarythmiques
Cordarone
Flécaine
Sotalol

ORIGINAL ARTICLE

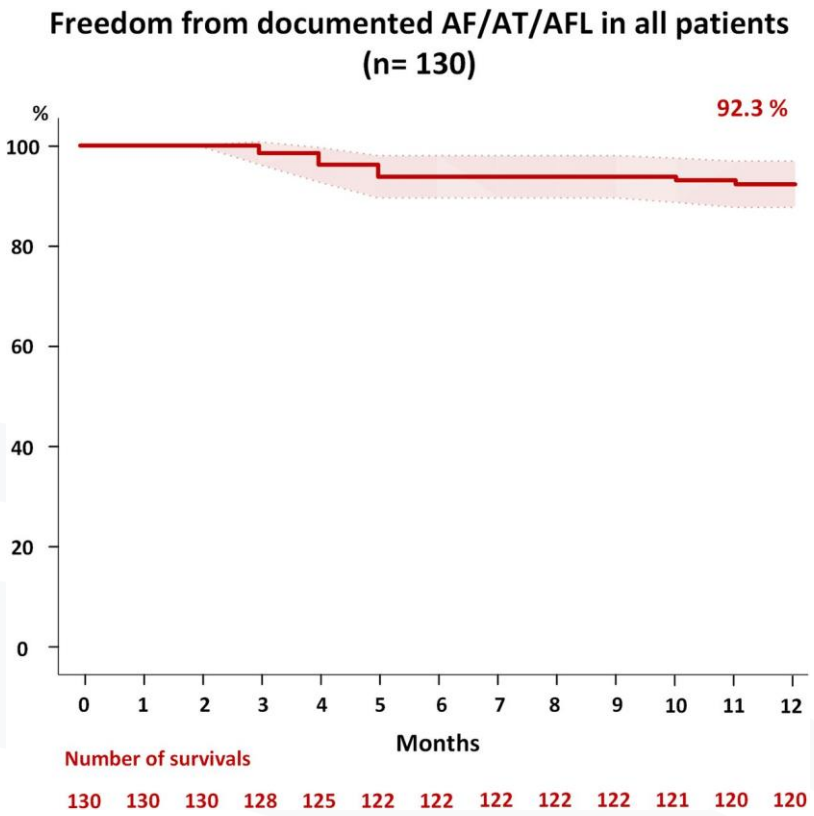
Amiodarone versus Sotalol for Atrial Fibrillation

Bramah N. Singh, M.D., D.Sc., Steven N. Singh, M.D., Domenic J. Reda, Ph.D., X. Charlene Tang, M.D., Ph.D., Becky Lopez, R.N., Crystal L. Harris, Pharm.D., Ross D. Fletcher, M.D., Satish C. Sharma, M.D., J. Edwin Atwood, M.D., Alan K. Jacobson, M.D., H. Daniel Lewis, Jr., M.D., Dennis W. Raisch, Ph.D., and Michael D. Ezekowitz, M.B., Ch.B., Ph.D., for the Sotalol Amiodarone Atrial Fibrillation Efficacy Trial (SAFE-T) Investigators*

ABSTRACT



FA paroxystique



Taghji et al, JACC EP 2017

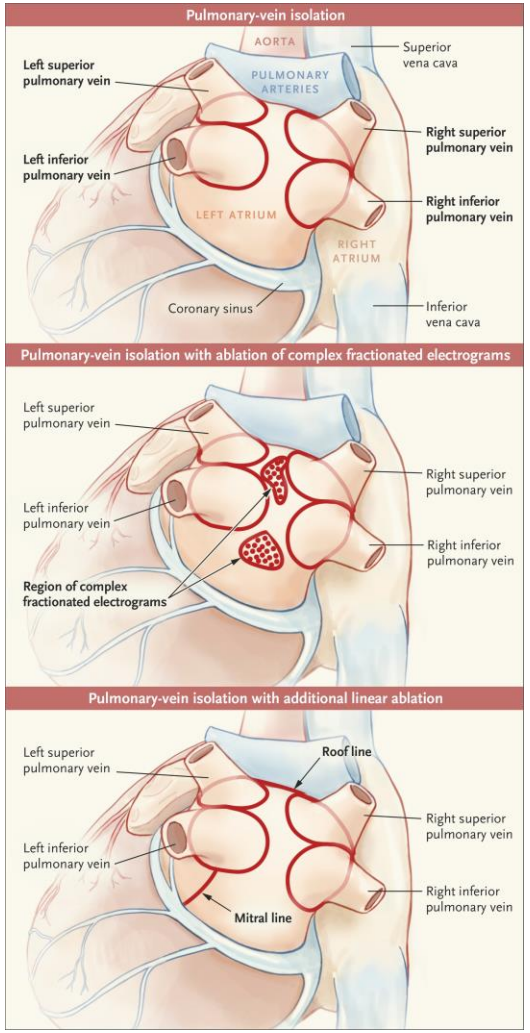
Complications

AVC : 0.2-0.5%

Vasculaire : 0.7-1%

Epanchement : 0.2-0.4%

FA persistante

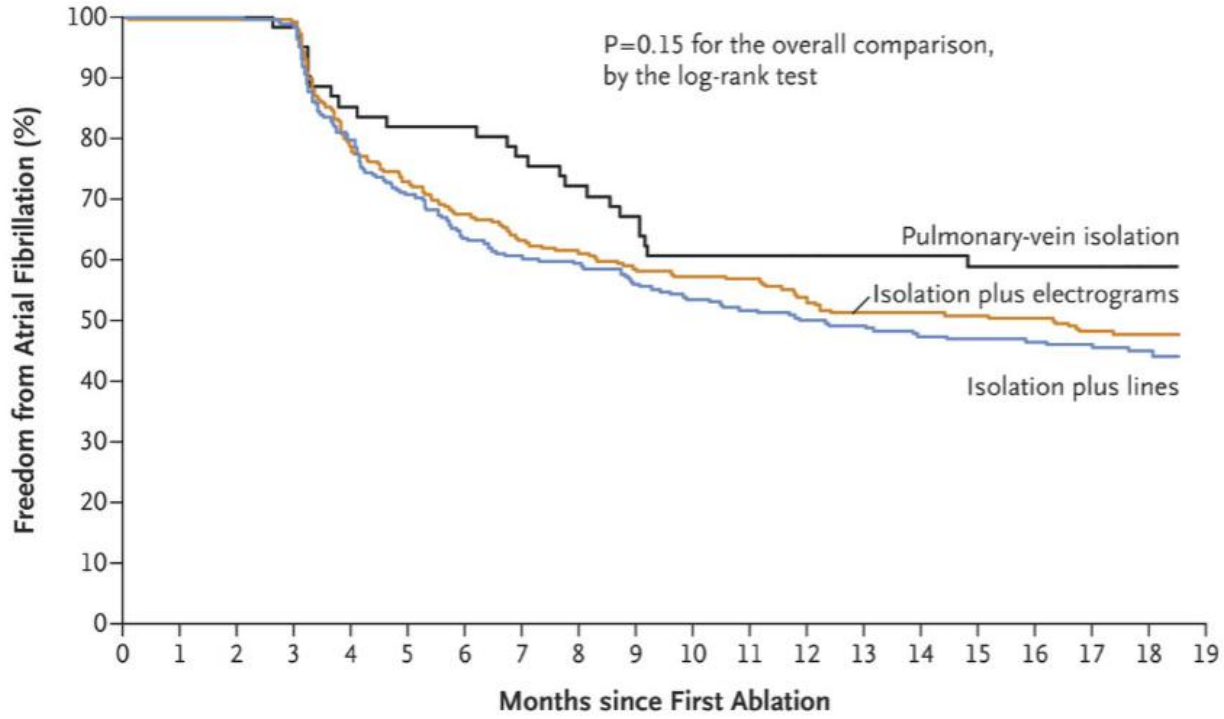


STAR-AF II

PVI vs. PVI+ CAFE vs. PVI+Line

59% vs. 49% vs. 46% AF free

Verma, NEJM 2015



Complications

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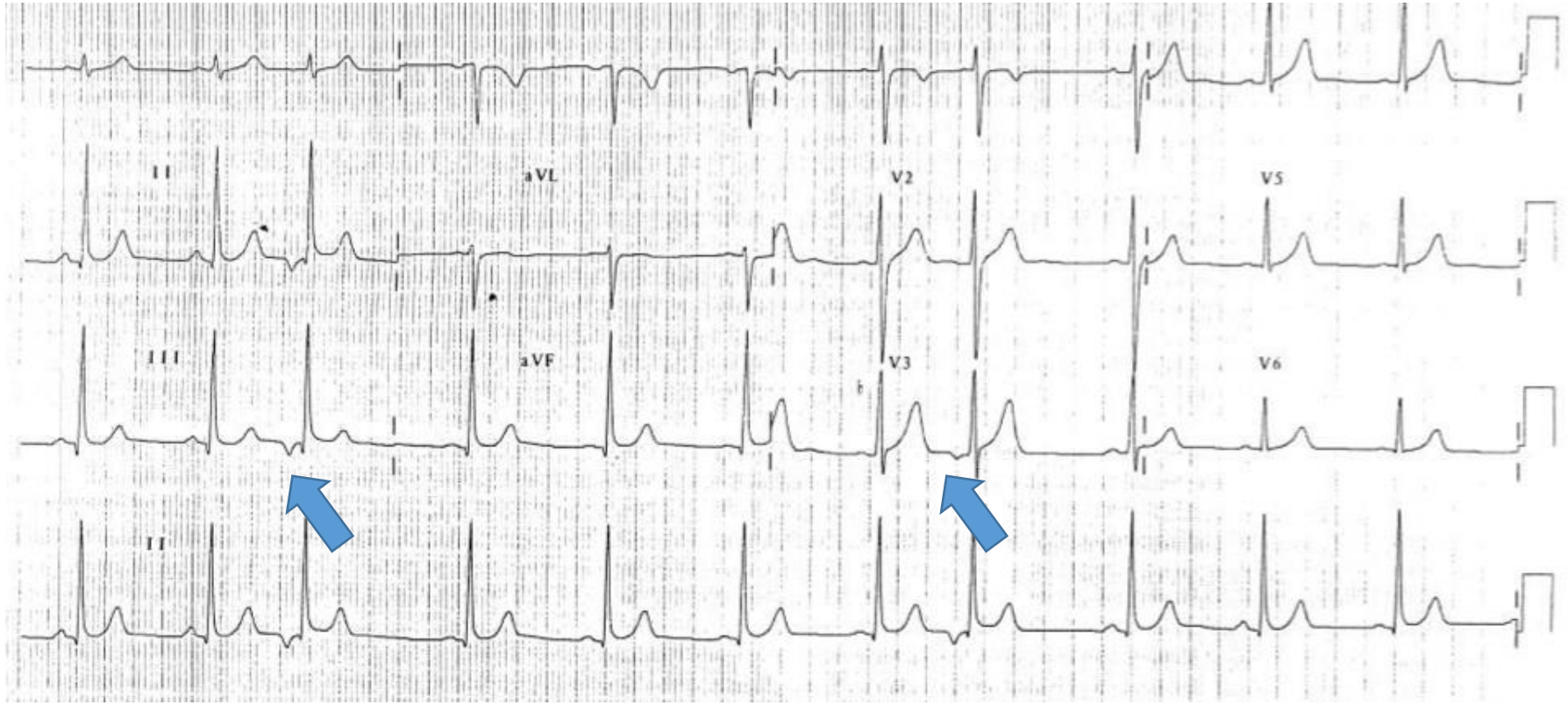
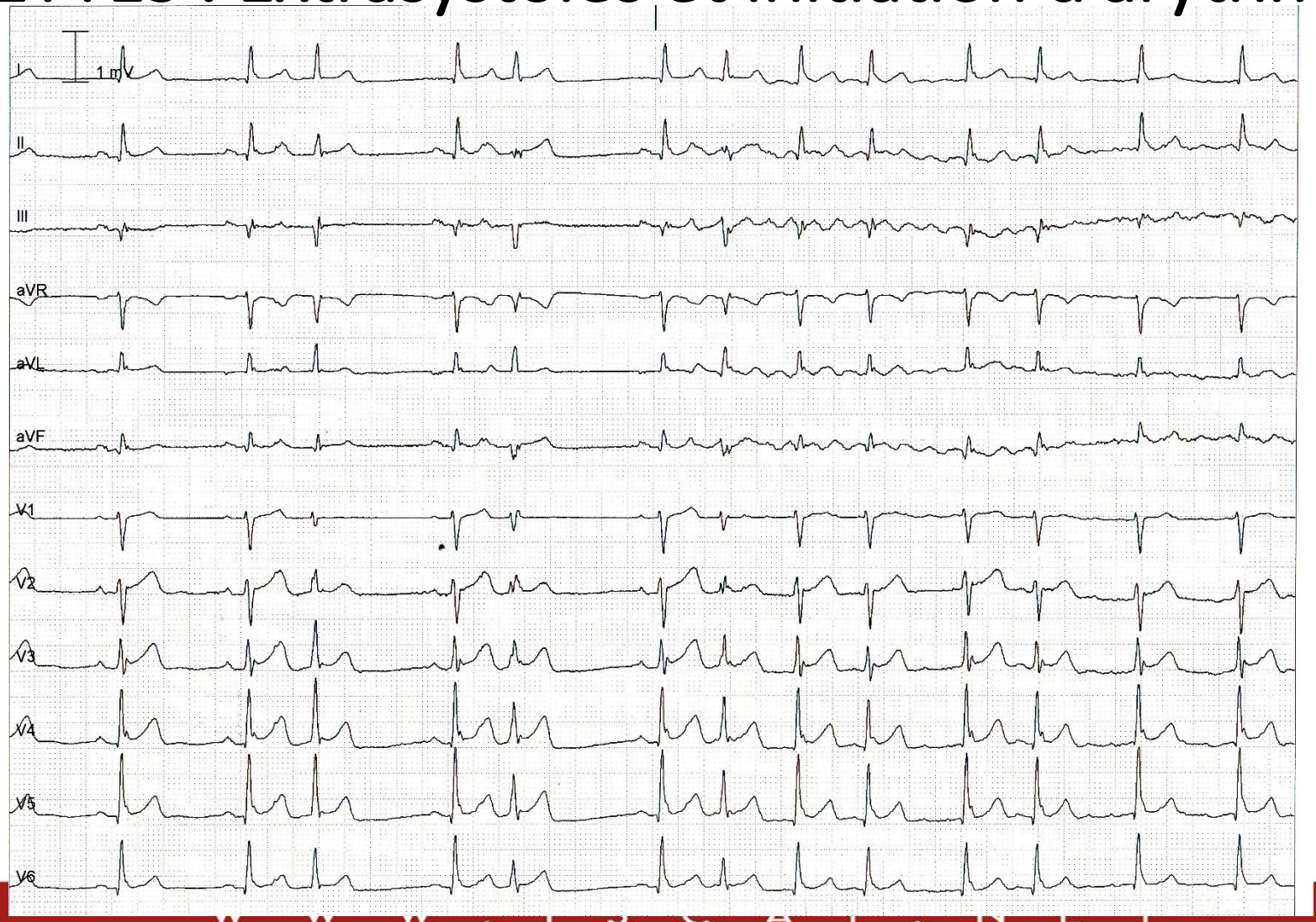
OREILLETTES : Extrasystoles



- Activité prématurée
- Ectopique
- En dehors du nœud sinusal
- Souvent isolée
- Très fréquente

OREILLETTES : Extrasystoles/TA focales

OREILLETTES : Extrasystoles et initiation d'arythmies



Tachycardies jonctionnelles

Deux types

Reentrées intranodales typiques ou atypiques

Faisceaux accessoires : tachycardie ortho/antidromique

Bénignes dans la majorité des cas

Invalidantes : palpitations, crises inattendues, anxiogenes

Cœur sain

De l'enfant au vieillard

Au repos, comme au stress ou à l'effort

Tachycardies jonctionnelles

C'est grave?

La plus fréquente = RIN

Majoritairement bénigne

Survient souvent sur cœur sain

Du nouveau né au vieillard

C'est comment?

Accès de palpitations

Début brusque, fin brutal

Souvent ancien

FC 160-200/minutes

Parfois associés à d'autre arythmies

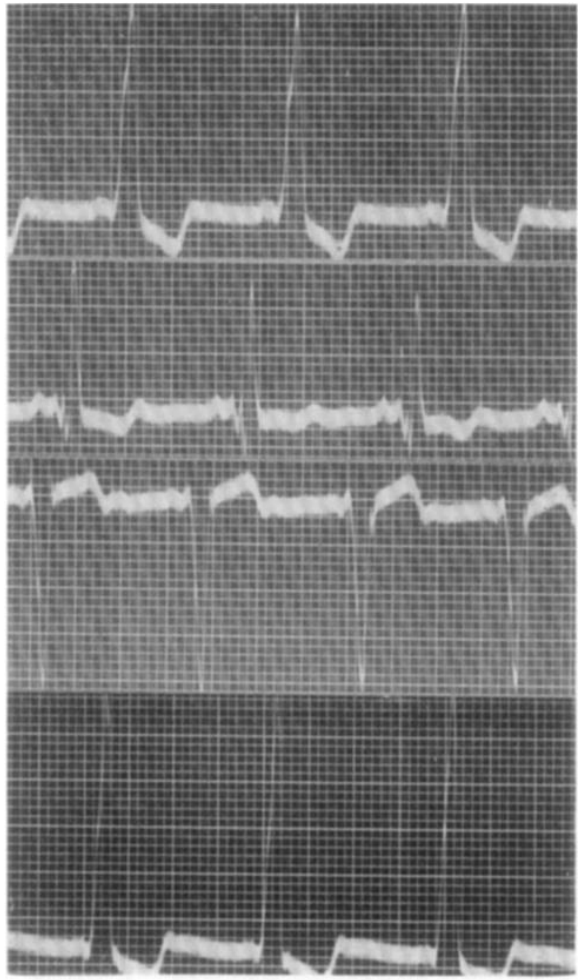
Que faire?

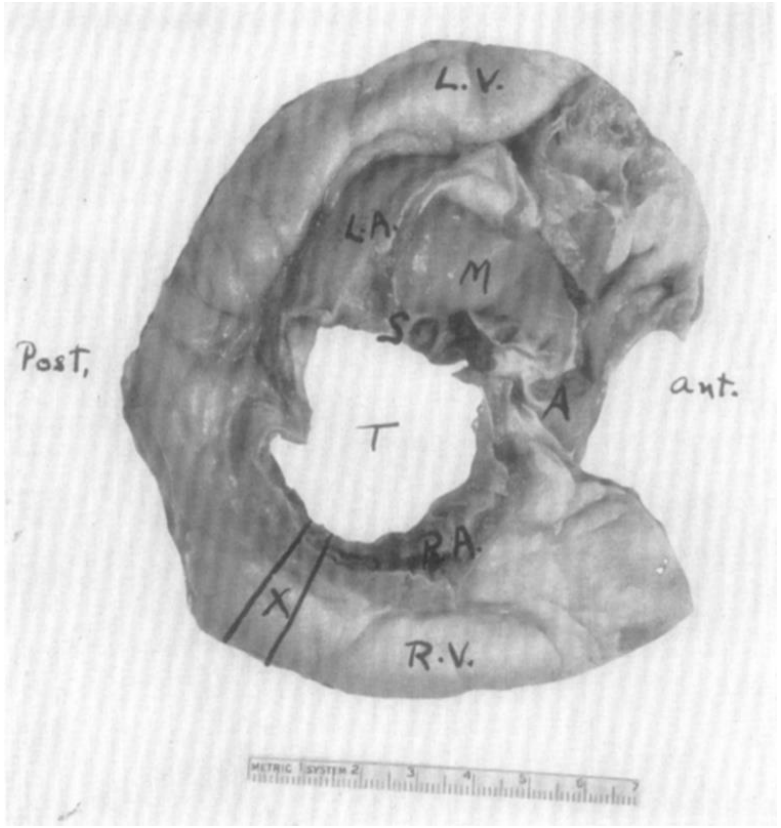
Rien

Traitements bradycardisants

Ablation

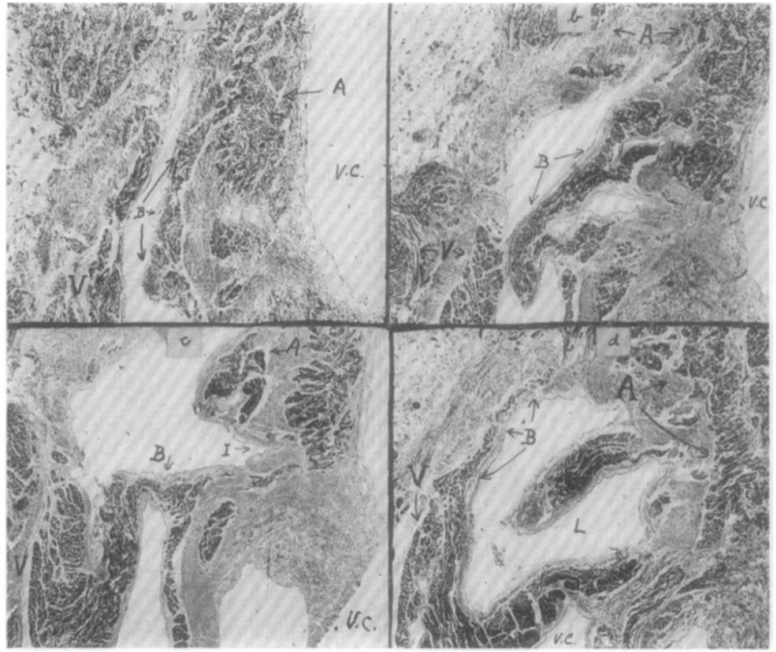
Tachycardies jonctionnelles: faisceau accessoire



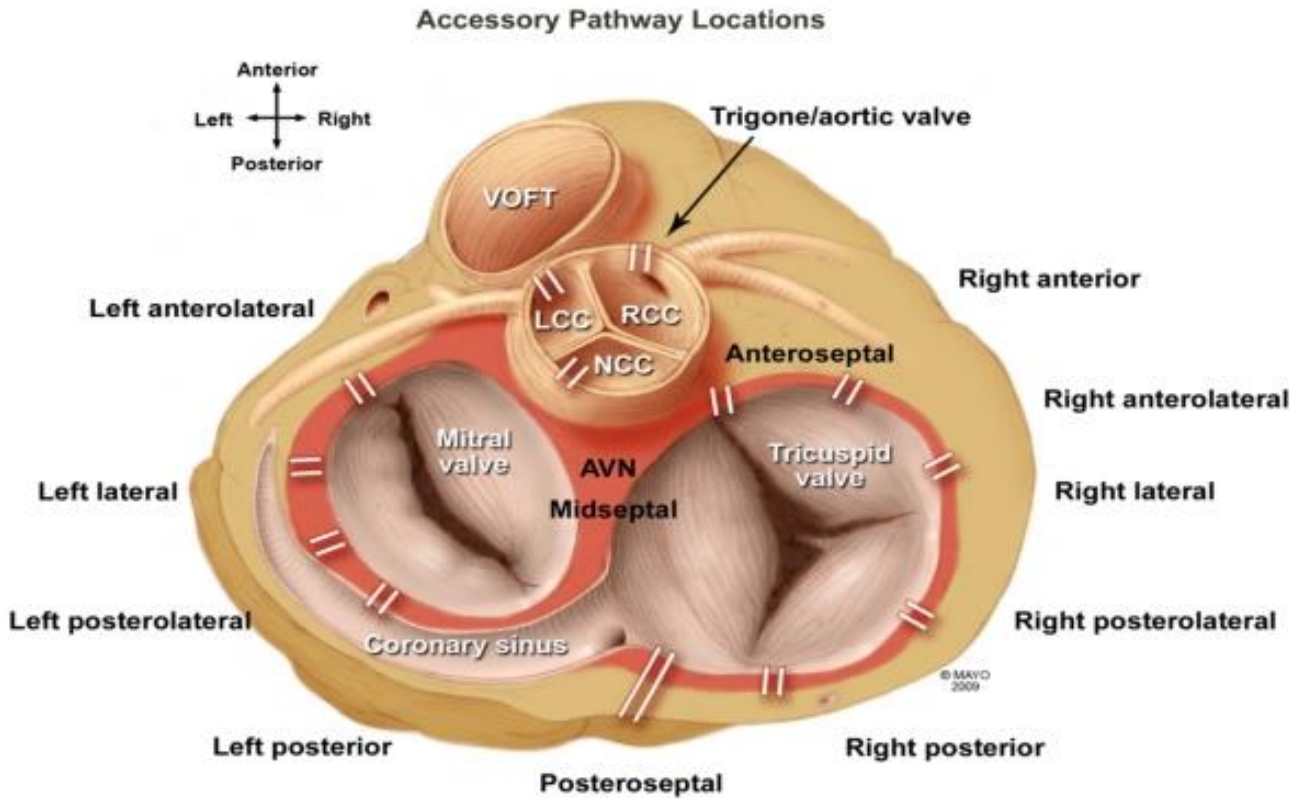


HISTOLOGIC DEMONSTRATION OF ACCESSORY MUSCULAR CONNECTIONS BETWEEN AURICLE AND VENTRICLE IN A CASE OF SHORT P-R INTERVAL AND PROLONGED QRS COMPLEX

FRANCIS CLARK WOOD,* M.D., CHARLES C. WOLFERTH, M.D., AND GEORGE D. GECKELER,† M.D.



Tachycardies jonctionnelles : Faisceau accessoire



Macedo, Indian pacing of electrophysiology Journal 2011

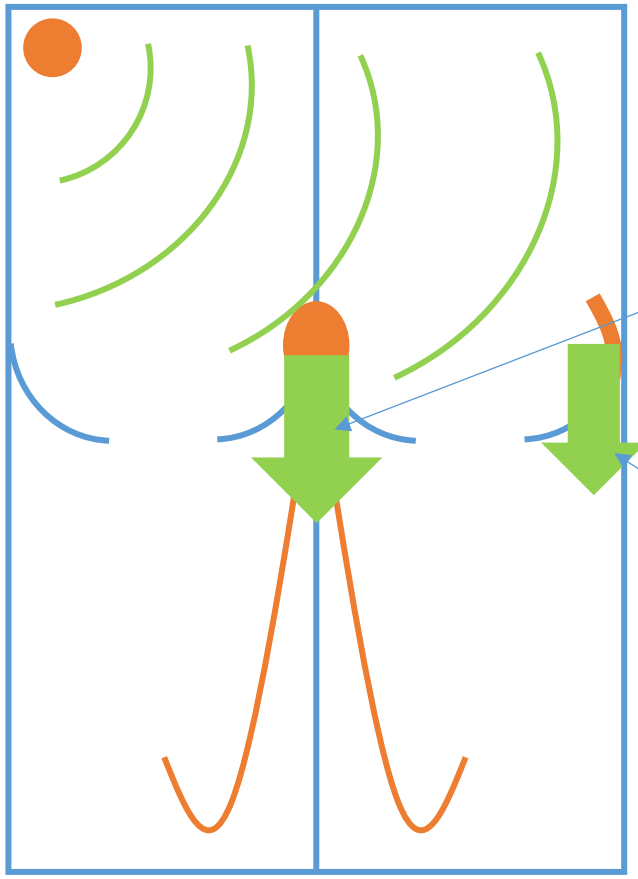
Faisceau électrique supplémentaire en pont entre oreillette et ventricule

Persiste depuis la naissance (1/1500 – 1/3000)

Capacité de conduction entre l'oreillette et le ventricule

Ne possède pas les propriétés de « filtre » du nœud AV

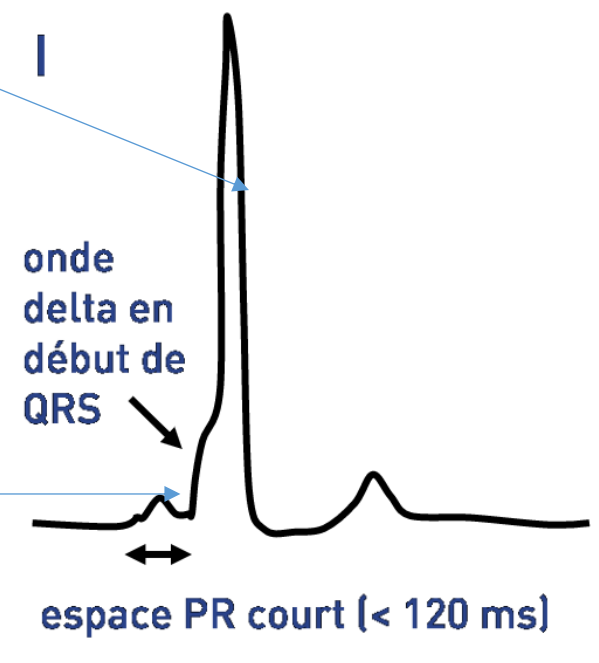
Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White

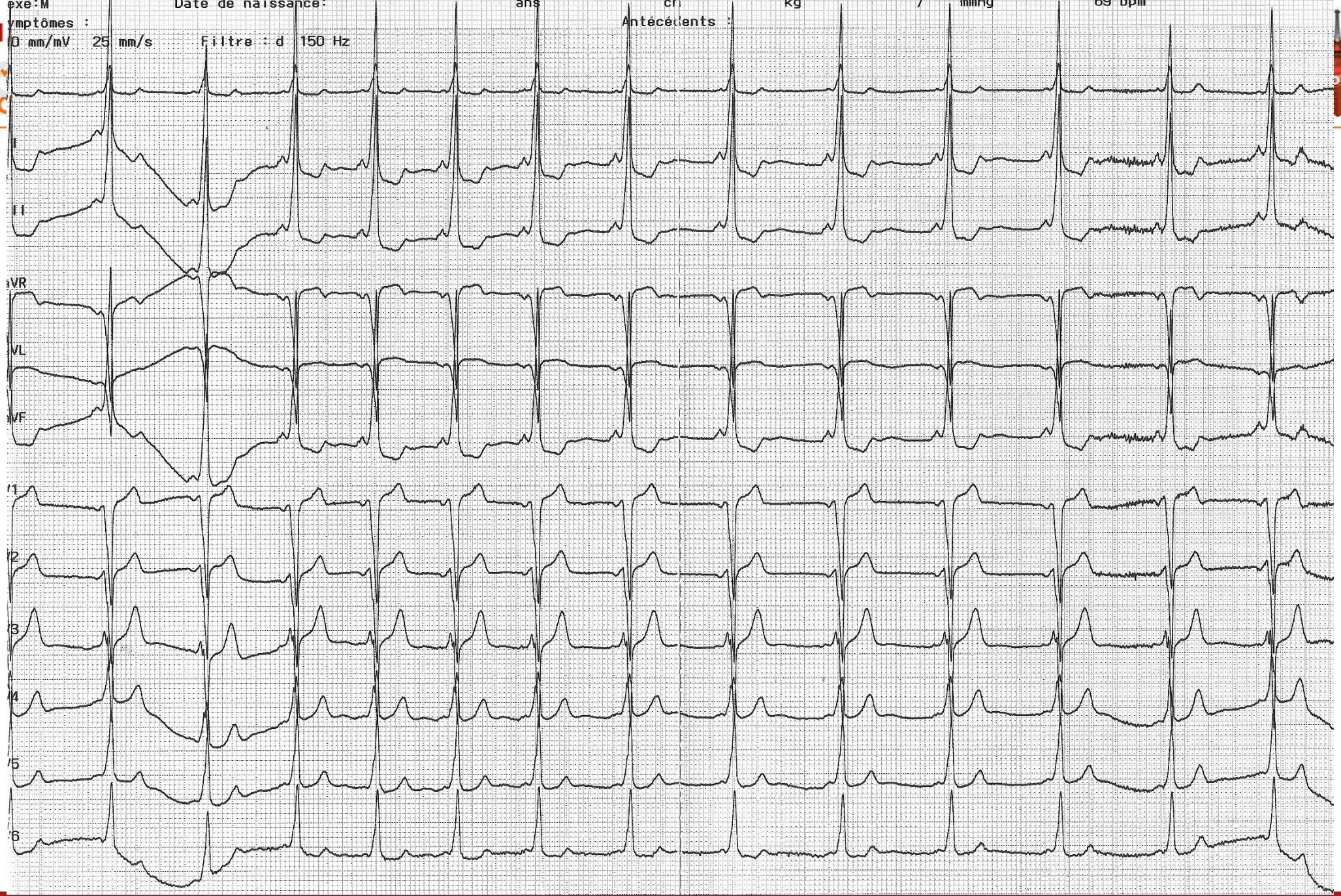


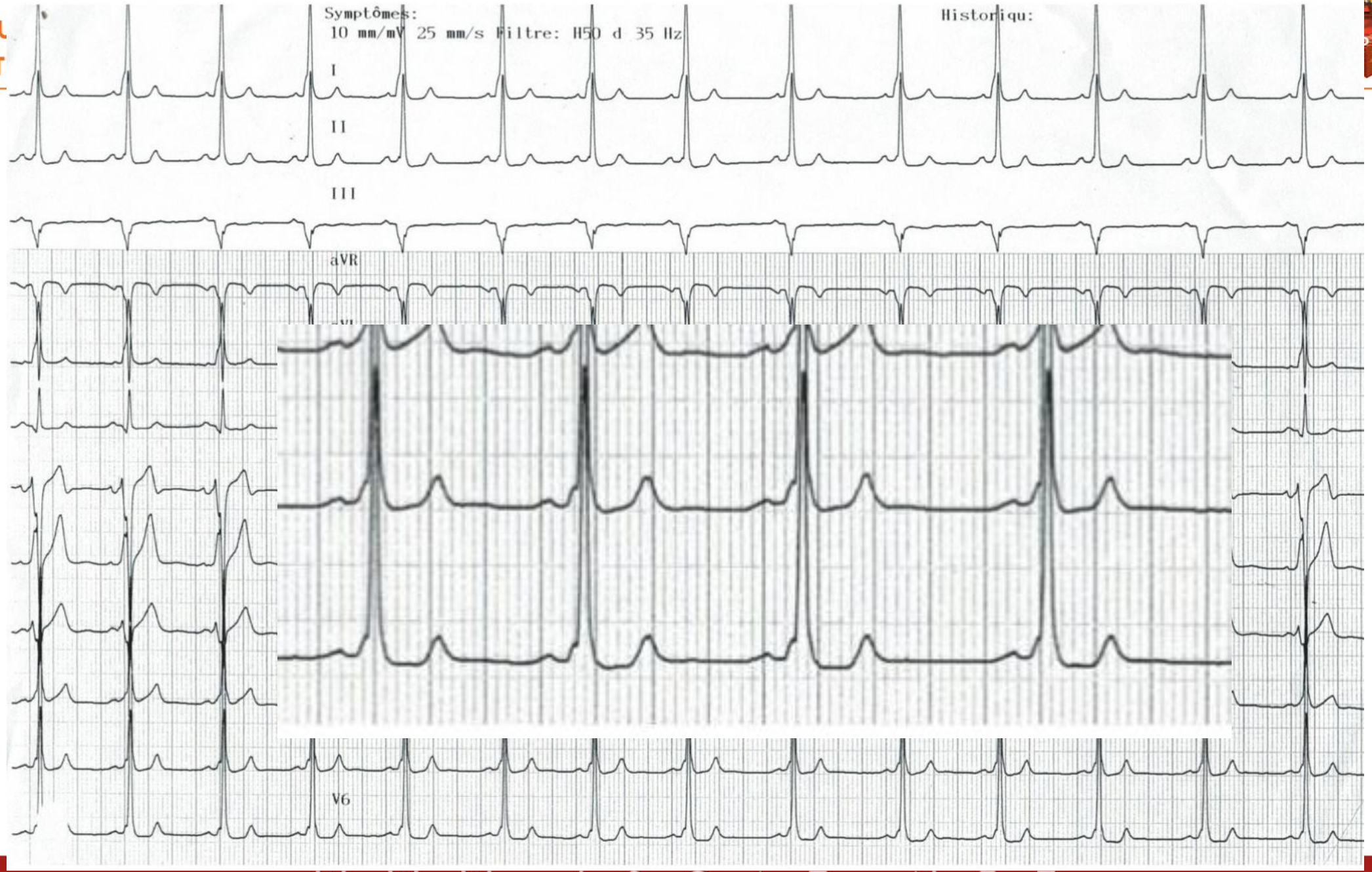
Conduction de l'oreillette au ventricule

Activation du ventricule par les voie de conduction naturelles

Activation du ventricule par le faisceau accessoire

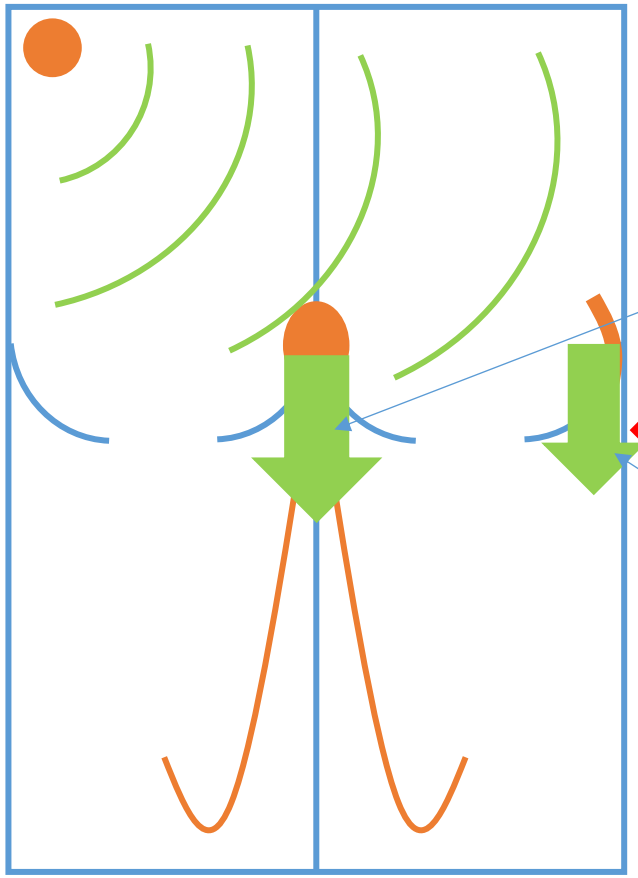



exe:M
Date de naissance:
ans
cm
kg
/ mmHg
69 bpm
ymptômes :
Antécédents :
0 mm/mV 25 mm/s Filtre : d 150 Hz
I
II
VR
VL
VF
V1
V2
V3
V4
V5
V6


Symptômes:
10 mm/mV 25 mm/s Filtre: H50 d 35 Hz
Historiqu:
I
II
III
aVR
V6


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

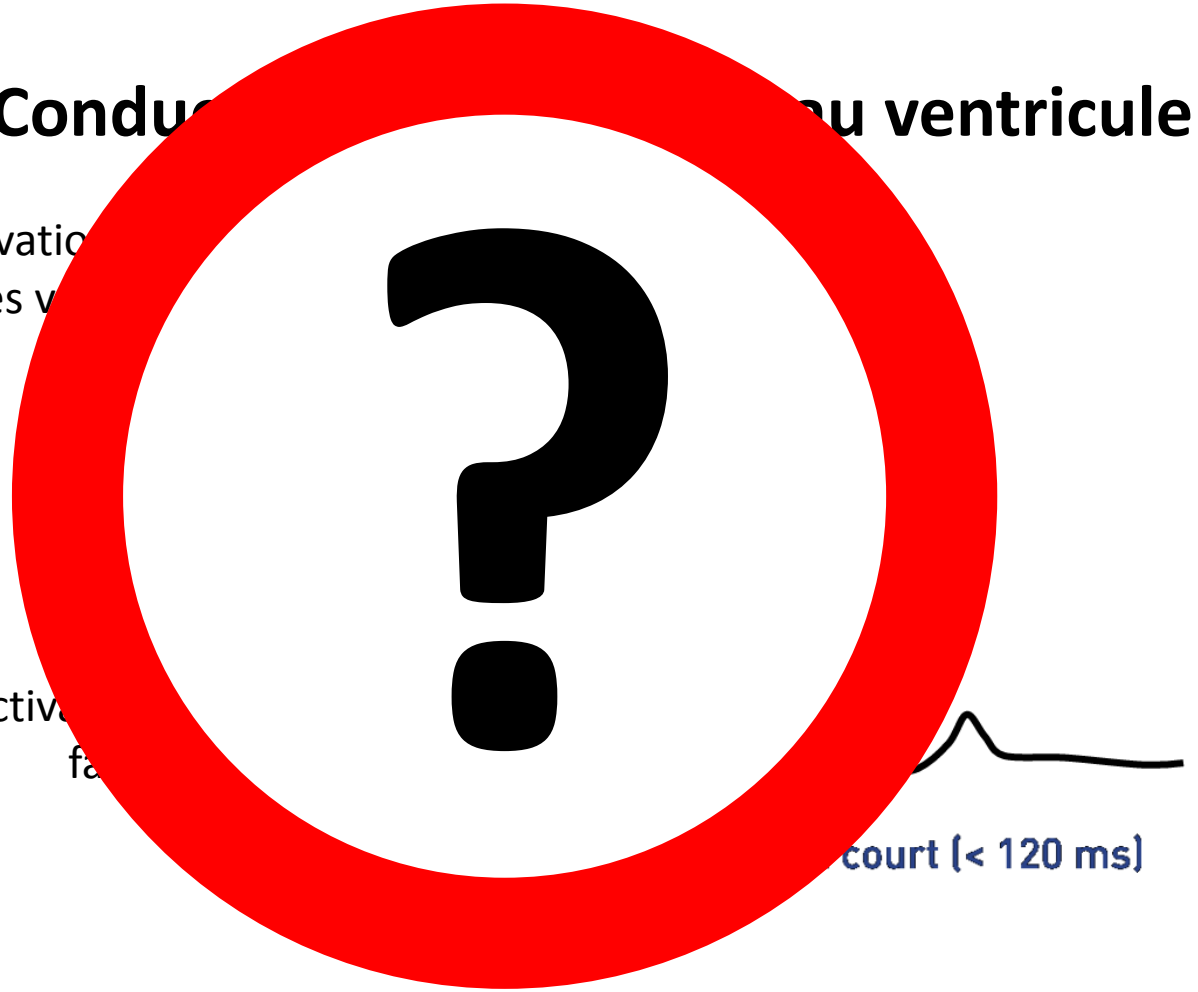
Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White



Conduc au ventricule

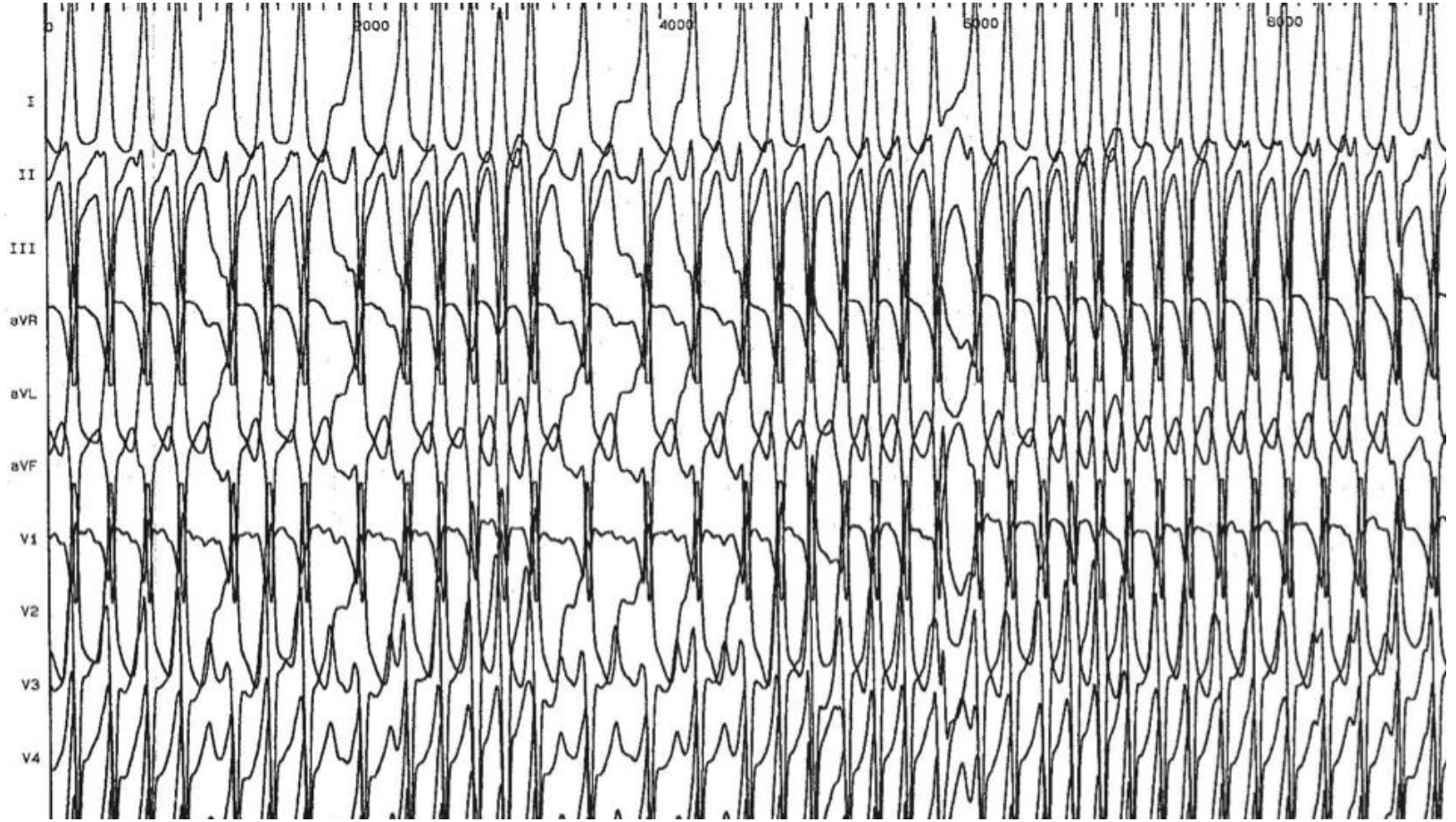
Activatio
les v

Activ
fa



court (< 120 ms)

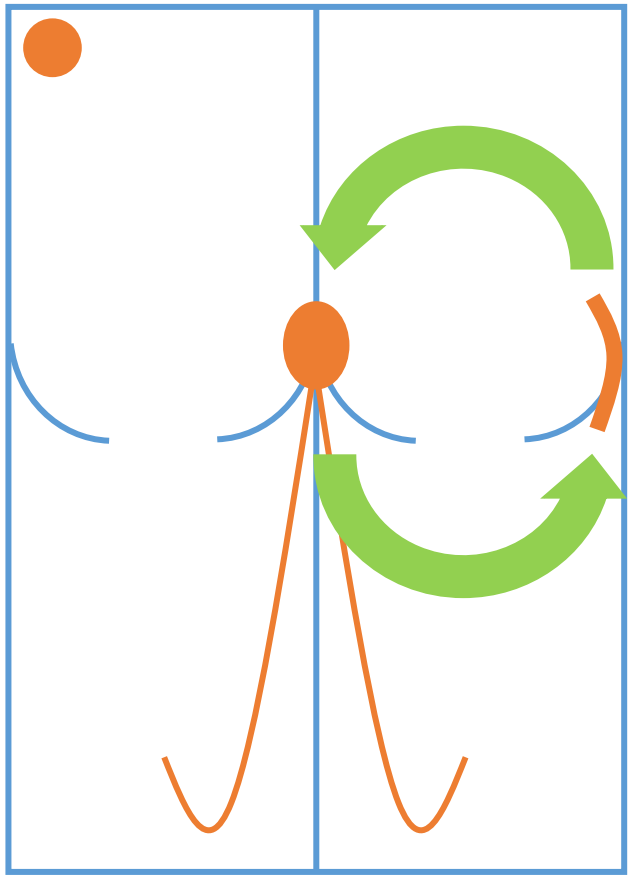
Tachycardies jonctionnelles : Faisceau accessoire



Le risque :
Passage en FA
« Superwolf »

Evaluation systématique

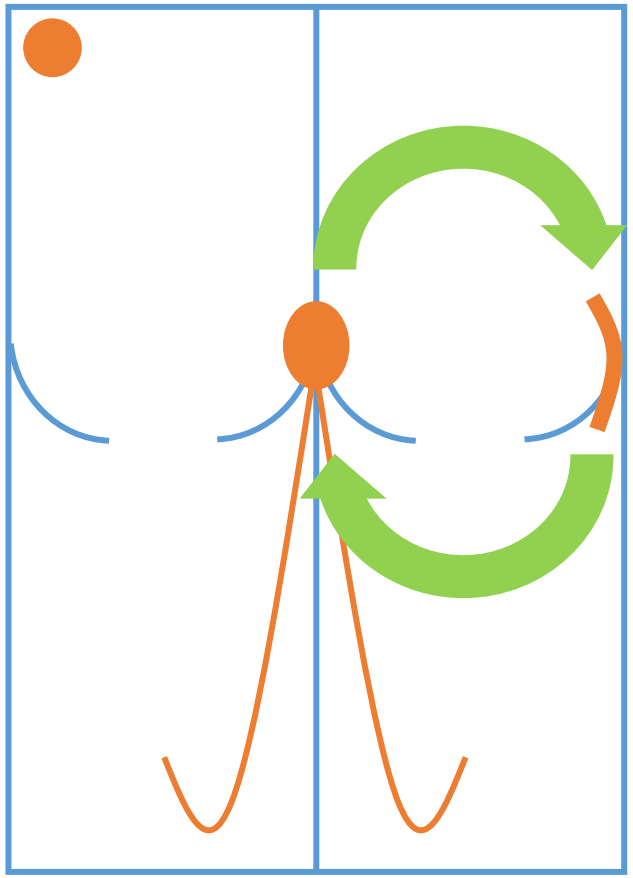
Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White



Possible reentrée électrique
Utilisant le faisceau accessoire

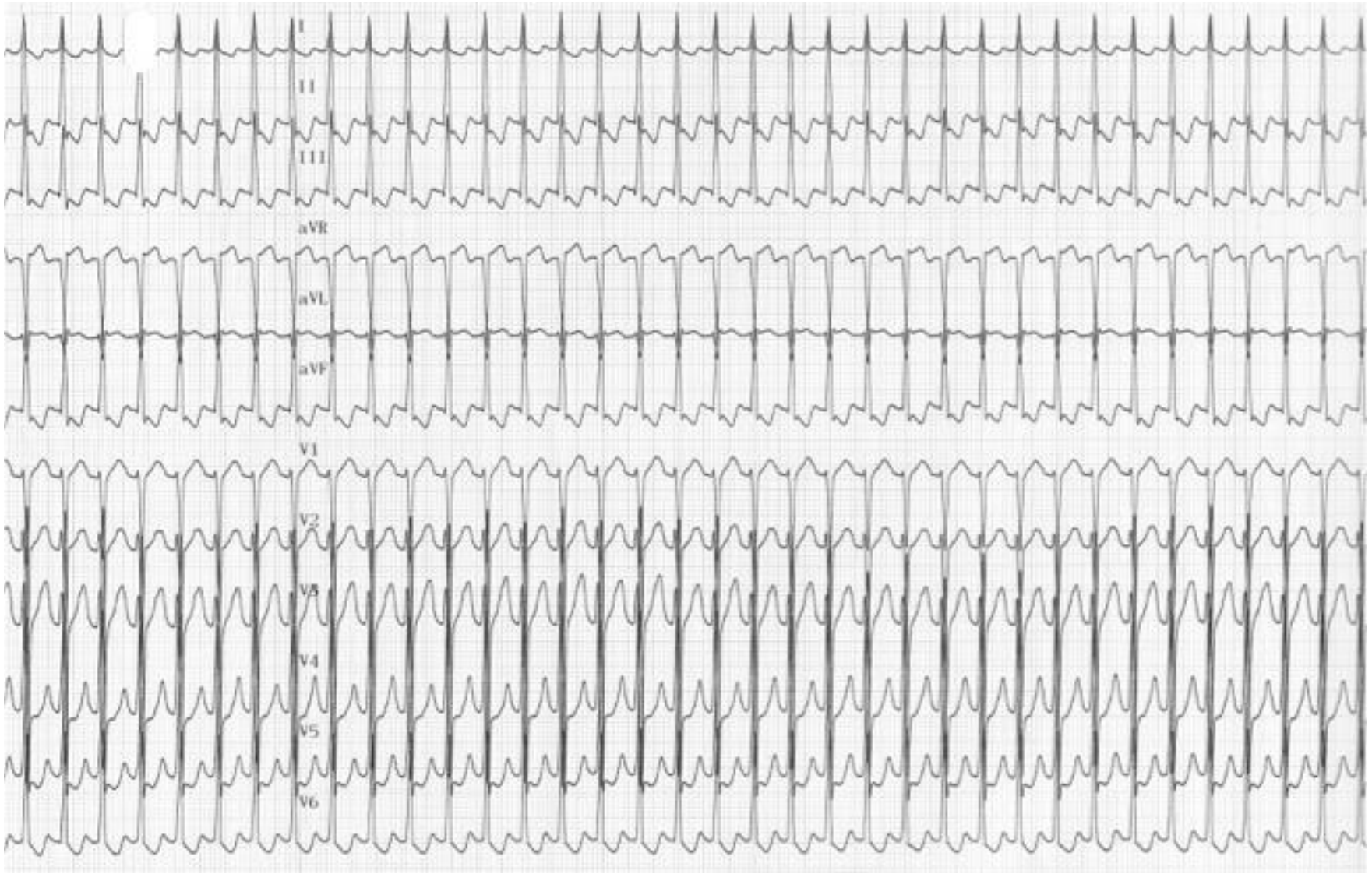
Tachycardie jonctionnelle orthodromique

Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White

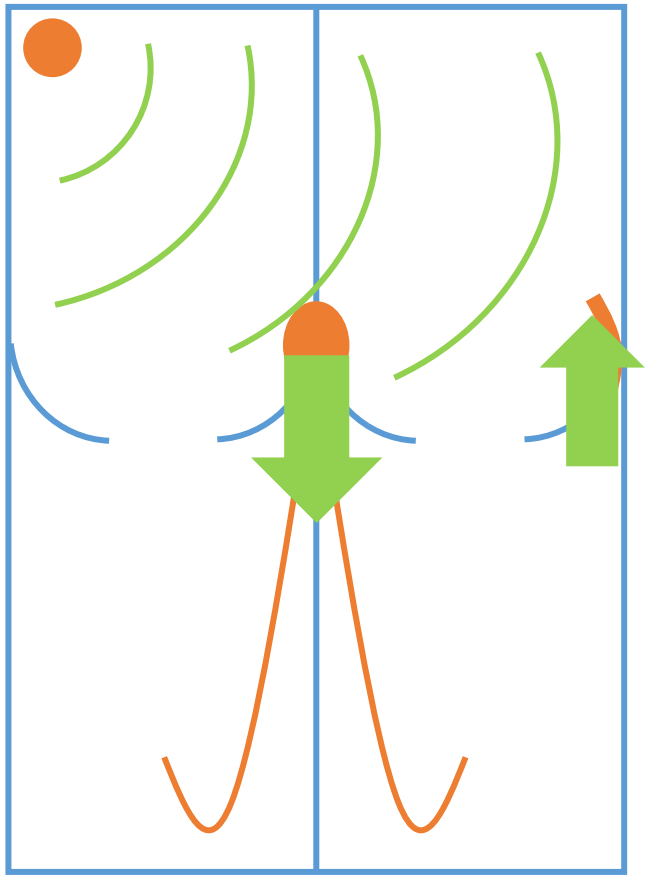


Possible reentrée électrique
Utilisant le faisceau accessoire

Tachycardie jonctionnelle ANTIdromique


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

Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White

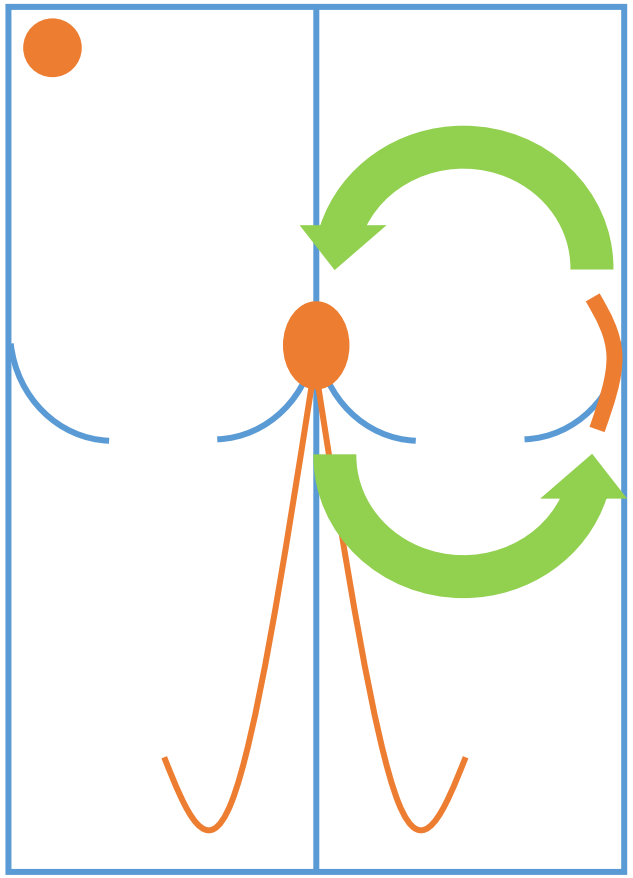


Caché

Faisceau accessoire à conduction retrograde
Du ventricule à l'oreillette

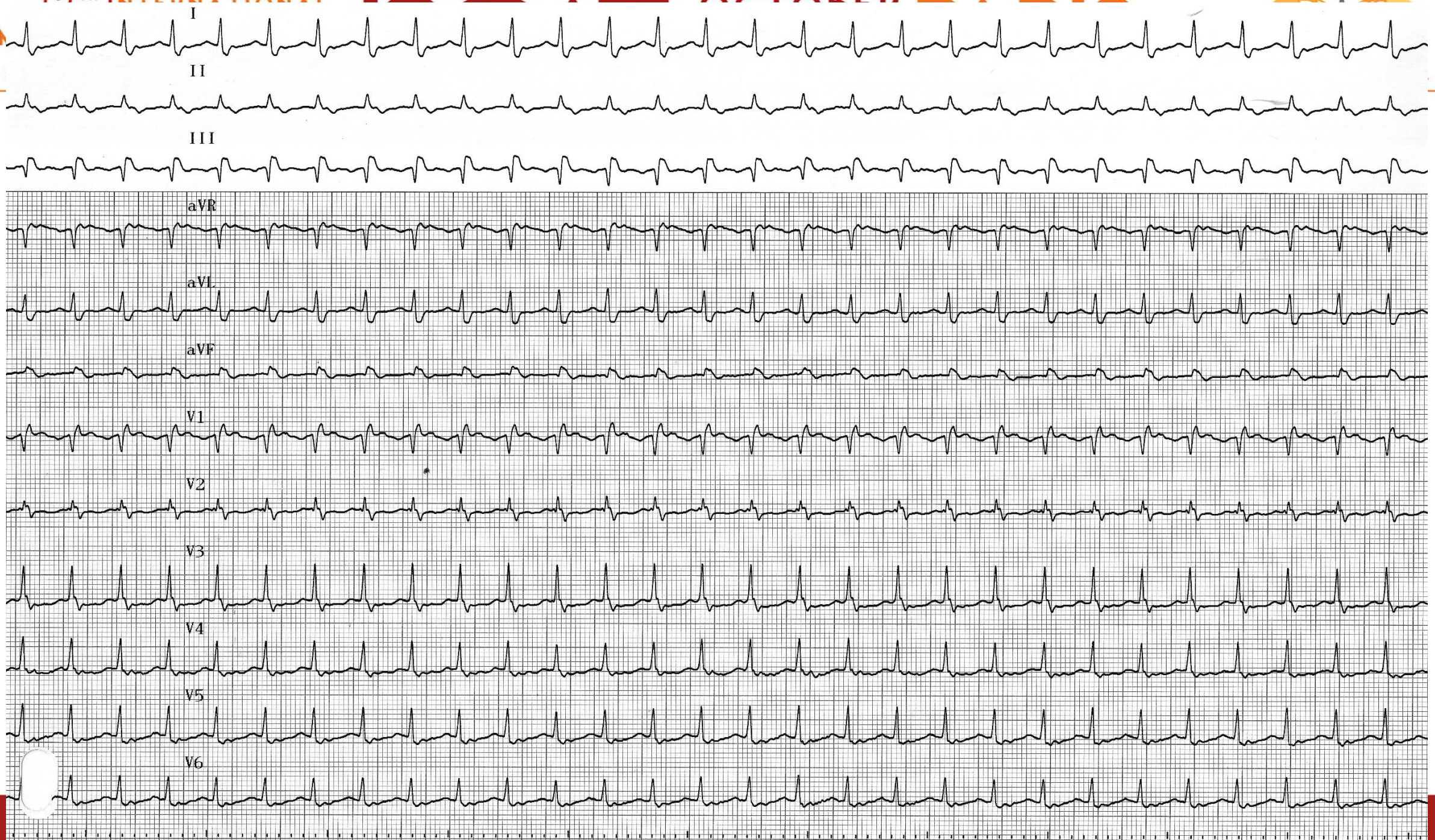
ECG : NORMAL !

Faisceau accessoire / Faisceau de Kent / Wolf Parkinson White



Possible reentrée électrique
Utilisant le faisceau accessoire

Tachycardie jonctionnelle orthodromique


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

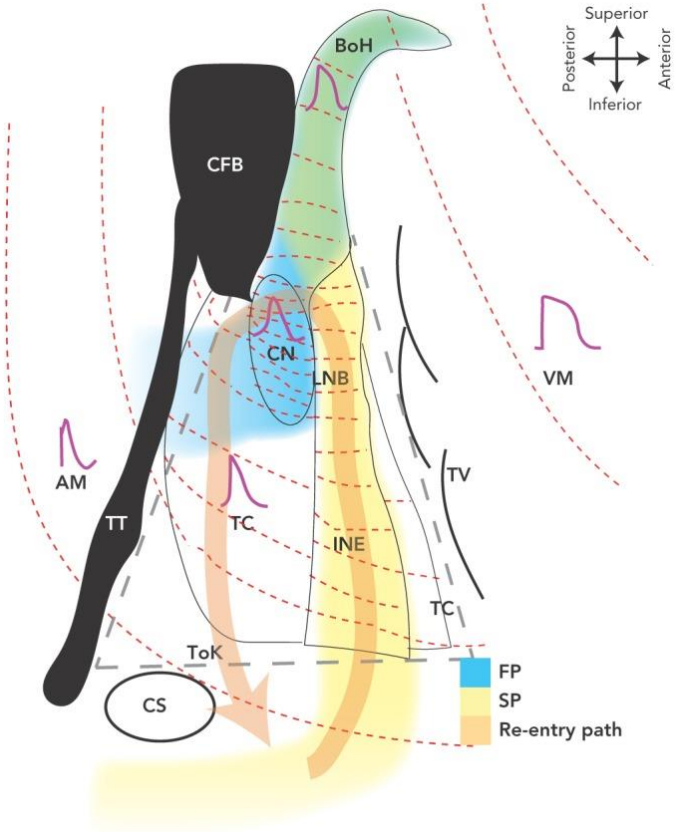
Tachycardies jonctionnelles : Reentrée intranodale

Tachycardie dépendante du nœud atrio ventriculaire

Concept de « Dualité nodale »

Présente pour 20% de la population

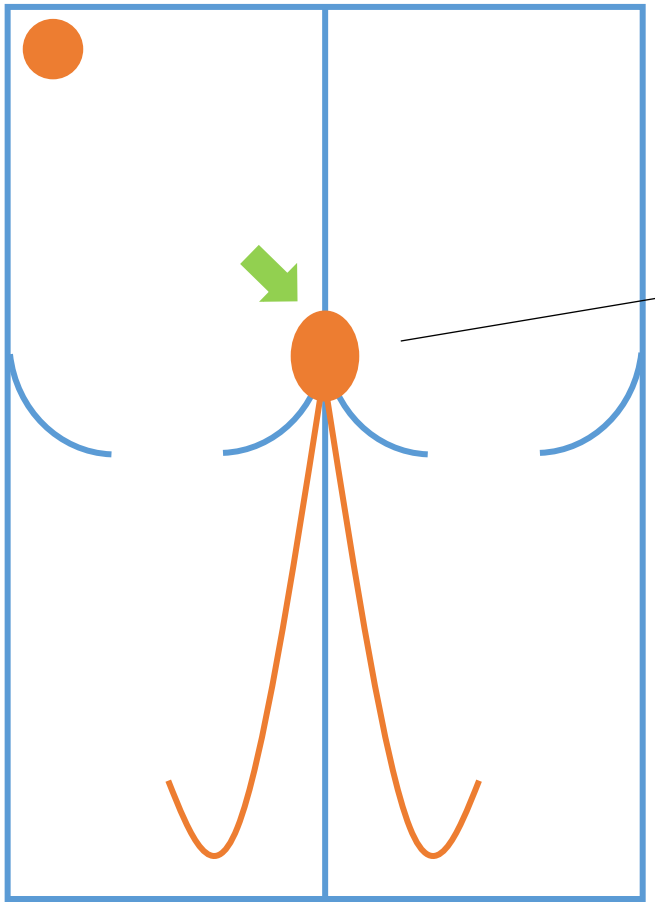
Historiquement décrite : Maladie de bouveret

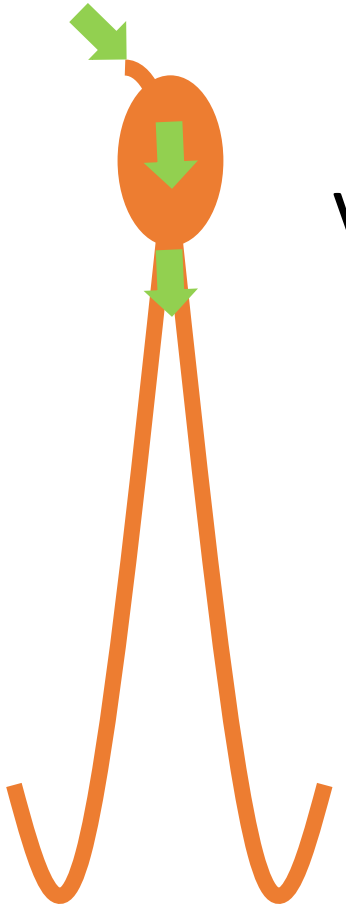


Georges, AER 2017

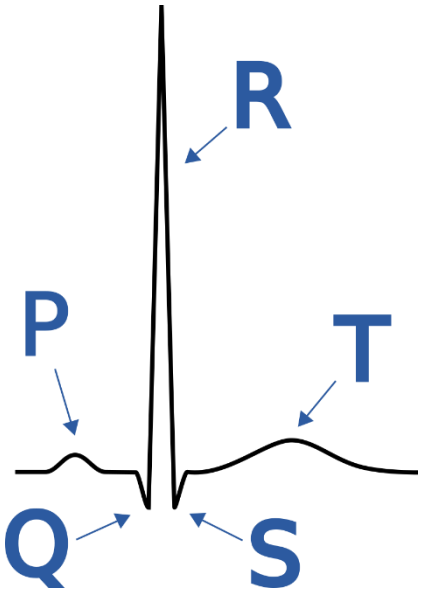
80% de la population

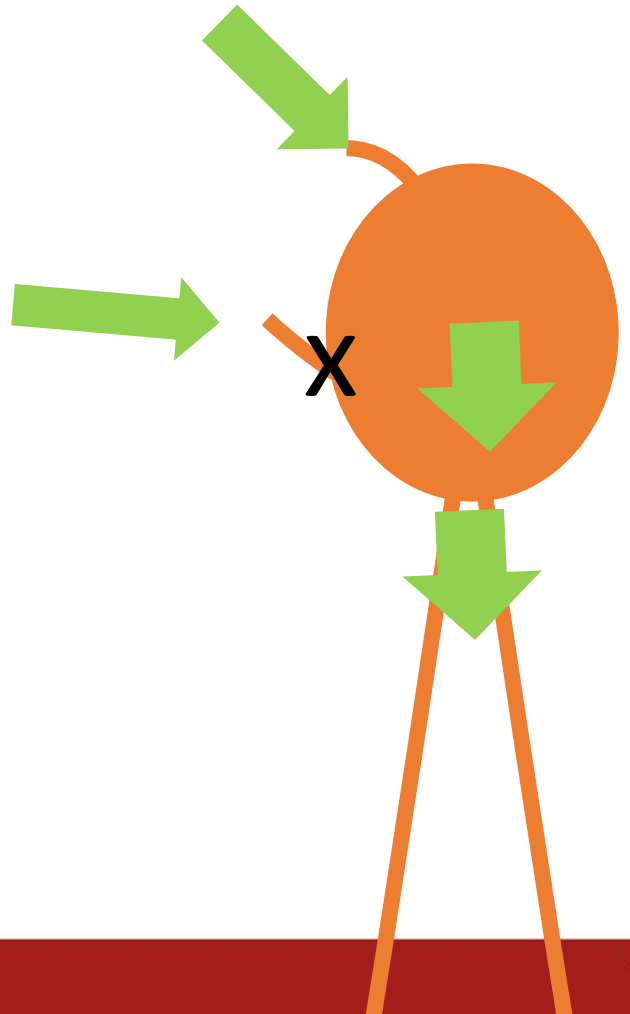
Une seule voie de passage dans le nœud AV





Voie « rapide »



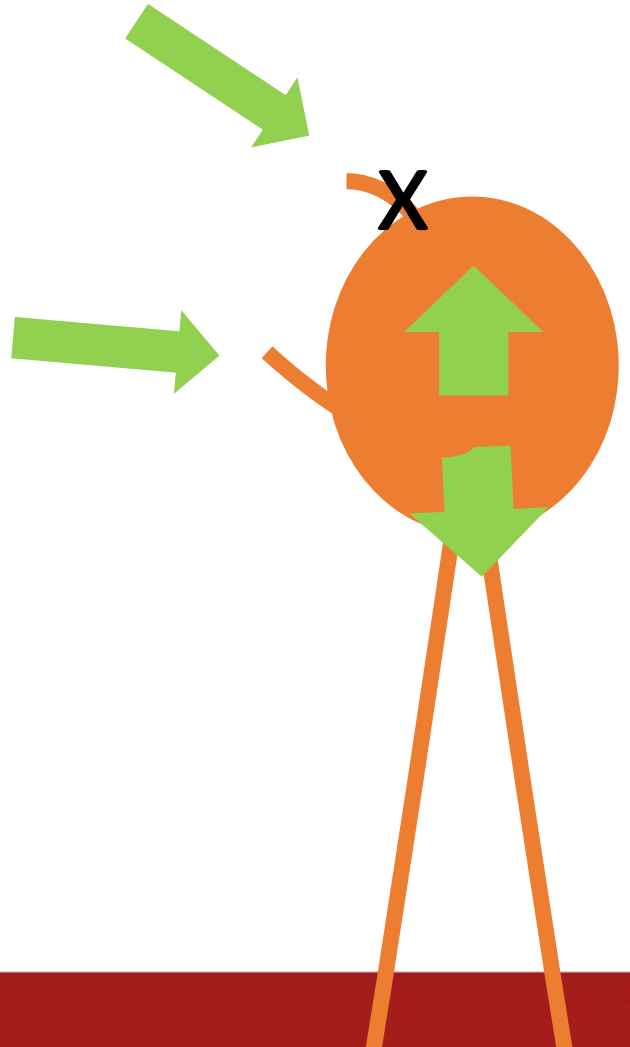


Voie « rapide »

- Période réfractaire longue
- Conduction rapide au His

Voie « lente »

- Période réfractaire courte
- Conduction lente
- Cachée au repos et n’accede pas au faiceau de His

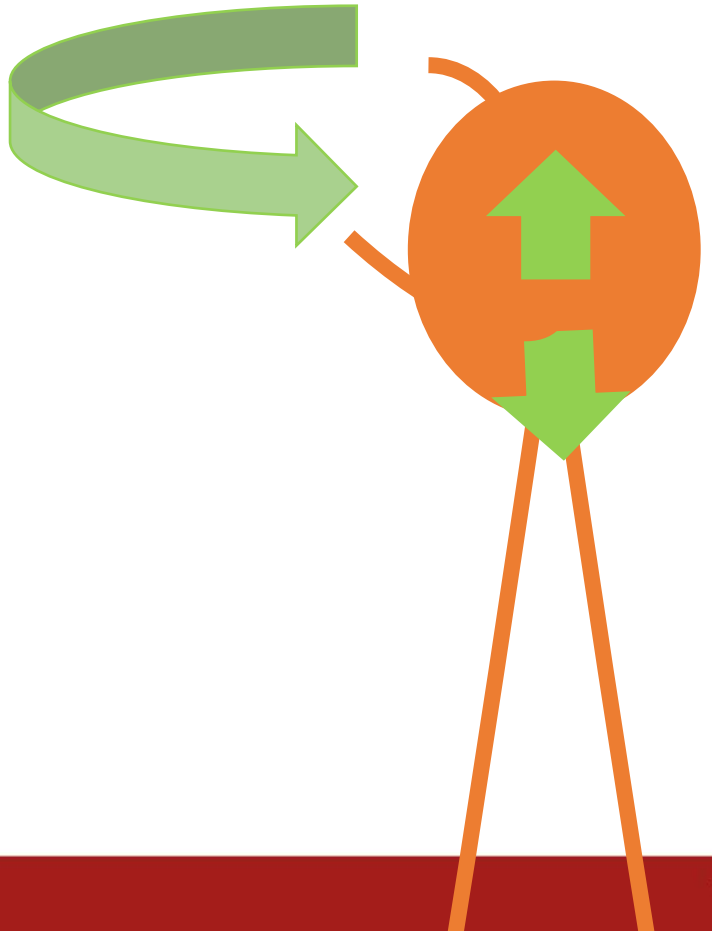


Voie « rapide »

- Période réfractaire longue
- Conduction rapide au His

Voie « lente »

- Période réfractaire courte
- Conduction lente
- Cachée au repos et n’accede pas au faiceau de His



Voie « rapide »

Période réfractaire longue

Conduction rapide au His

Voie « lente »

Période réfractaire courte

Conduction lente

Cachée au repos et n’accede pas au faiceau de His

Tachycardies jonctionnelles : reentrée intranodale

Tachycardies jonctionnelles

C'est grave?

La plus fréquente = RIN

Majoritairement bénigne

Survient souvent sur cœur sain

Du nouveau né au vieillard

C'est comment?

Accès de palpitations

Début brusque, fin brutal

Souvent ancien

FC 160-200/minutes

Parfois associés à d'autre arythmies

Que faire?

Rien

Traitements bradycardisants

Ablation de la voie lente

Principaux troubles du rythme

Arythmies de l'oreillettes

Flutter

Fibrillation atriale

Tachycardie atriale focale

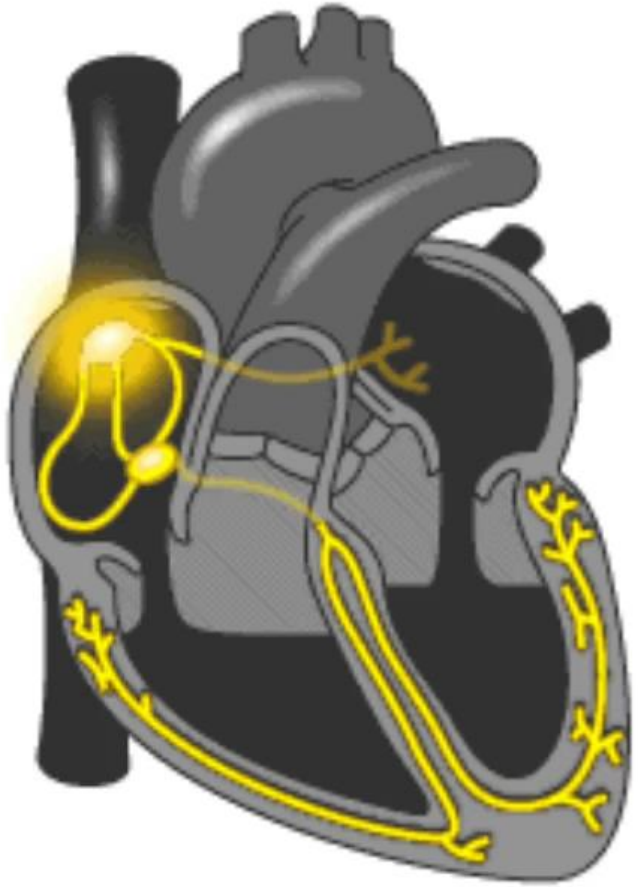
Tachycardies jonctionnelles

Arythmies du ventricules

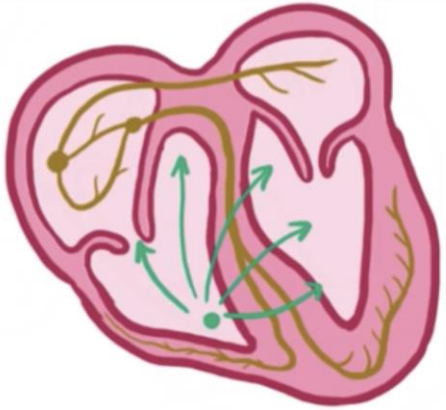
Tachycardie ventriculaire

Extrasystoles ventriculaire

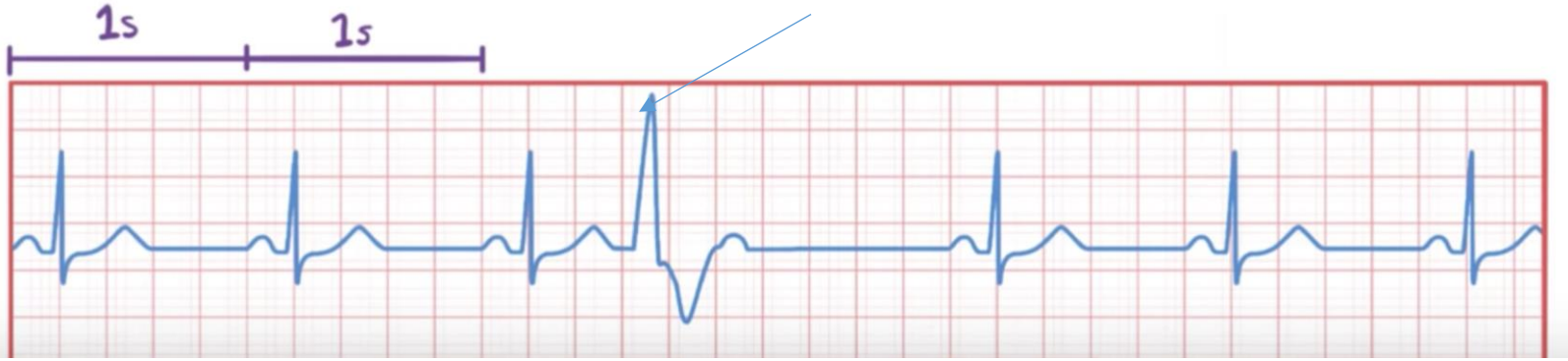
Fibrillation ventriculaire



Extrasystoles ventriculaires



QRS large
Non précédé d'une onde P
Isolée
Couplage long

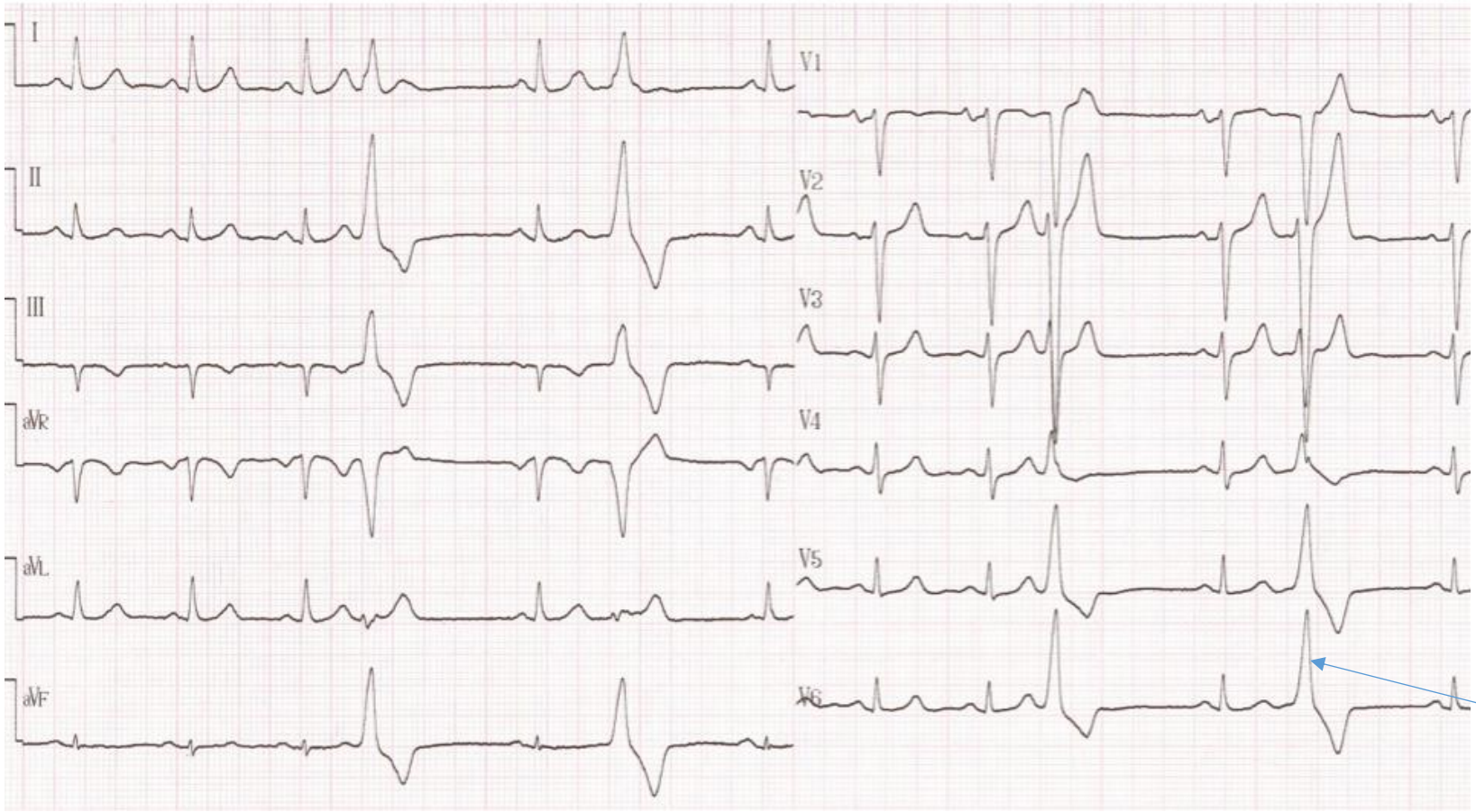


Fréquent ++

Majorité sur cœur sain
Bénin
Asymptomatique/palpitations

Si fréquente risque de cardiopathie rythmique (>15% des battements cardiaques)

Extrasystoles ventriculaires



Fréquent ++

Majorité sur cœur sain
Bénin
Asymptomatique/palpitations

Si fréquente risque de cardiopathie rythmique (>15% des battements cardiaques)

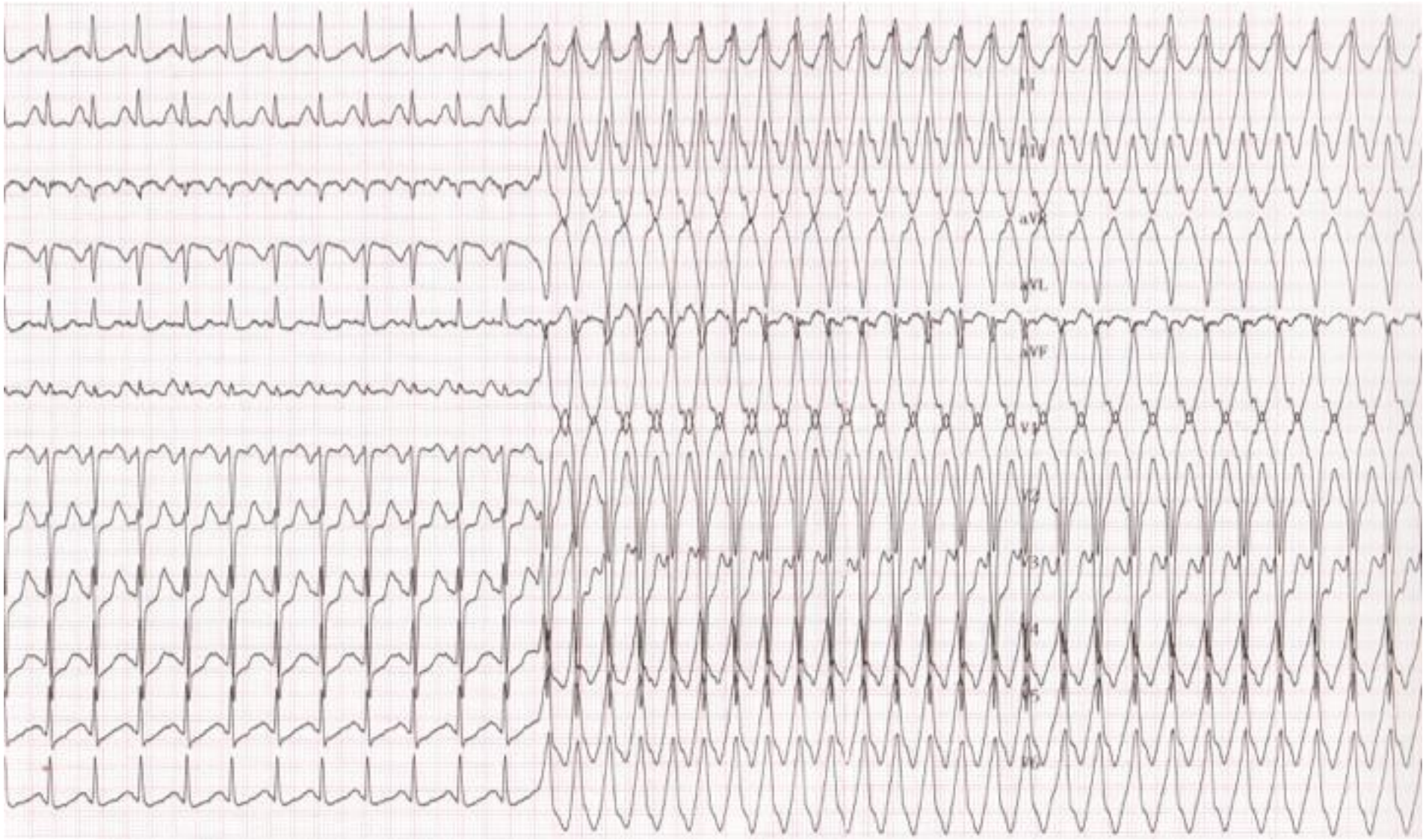
QRS large
Non précédé d'une onde P
Isolée
Monomorphe
Couplage long

Extrasystoles ventriculaires

Peut survenir sur cardiopathie

Risque d'induction arythmie ventriculaire

Evaluation systématique du risque et de la présence d'une cardiopathie sous jacente en cas d'ESV



Tachycardies ventriculaires sur cardiopathie structurelle

La succession de plus de 3 extrasystoles ventriculaires
Soutenue si > 30 secondes, non-soutenue si < 30 secondes

Majorité des tachycardies ventriculaires
Urgence diagnostic

Etiologies

Ischémique +++
CMD
CMH
Myocardites
…

Risques

Syncopes
Mort subite

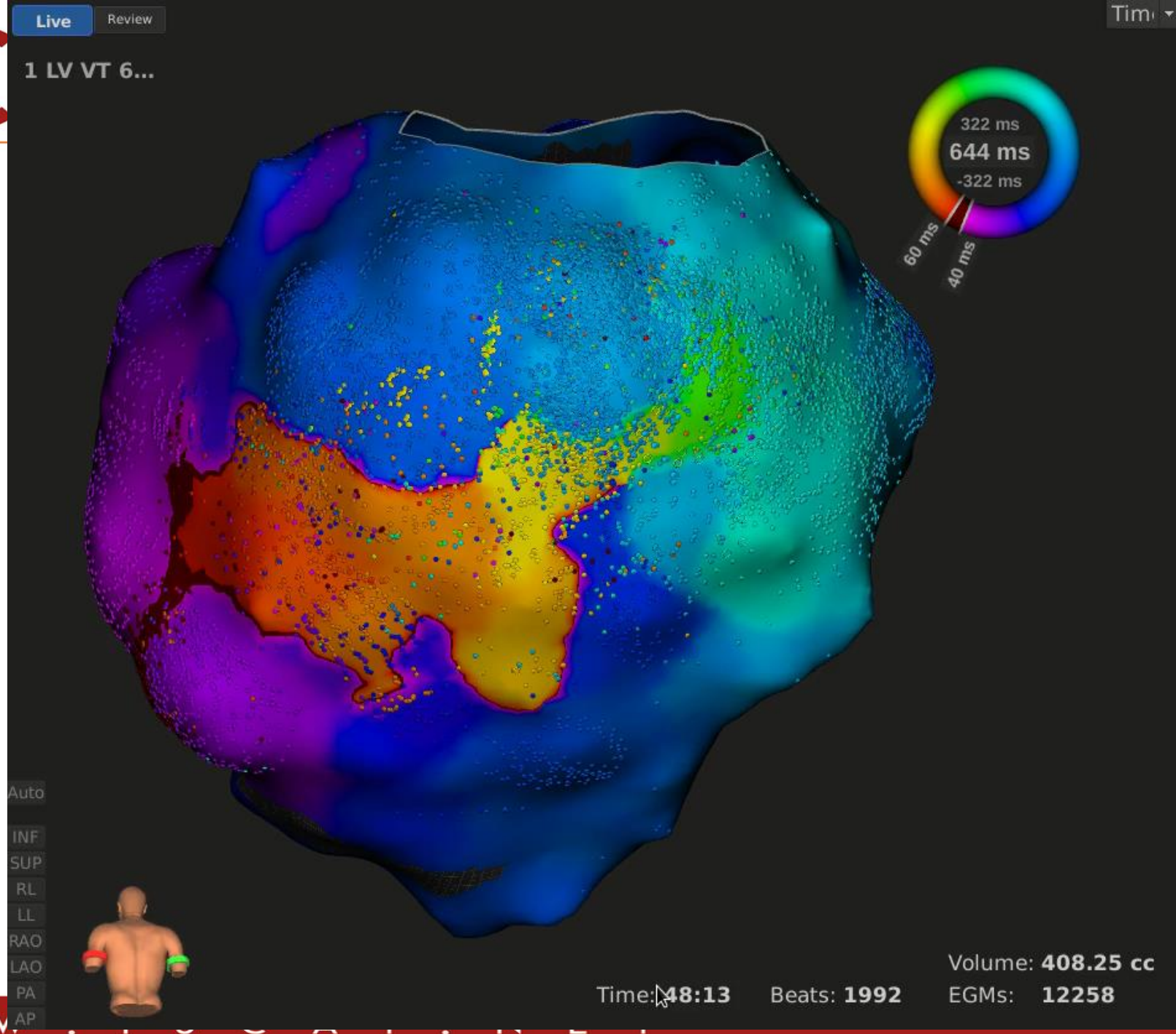
Dépends de la fréquence et la maladie sous jacente

Prise en charge

Défibrillation
Antiarythmiques
Ablation


Antécédents :
10 mm/mV 25 mm/s Filtre : H50 d 100 Hz
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

Macroreentrée
Dépendante d'un isthme critique
Souvent cicatriciel

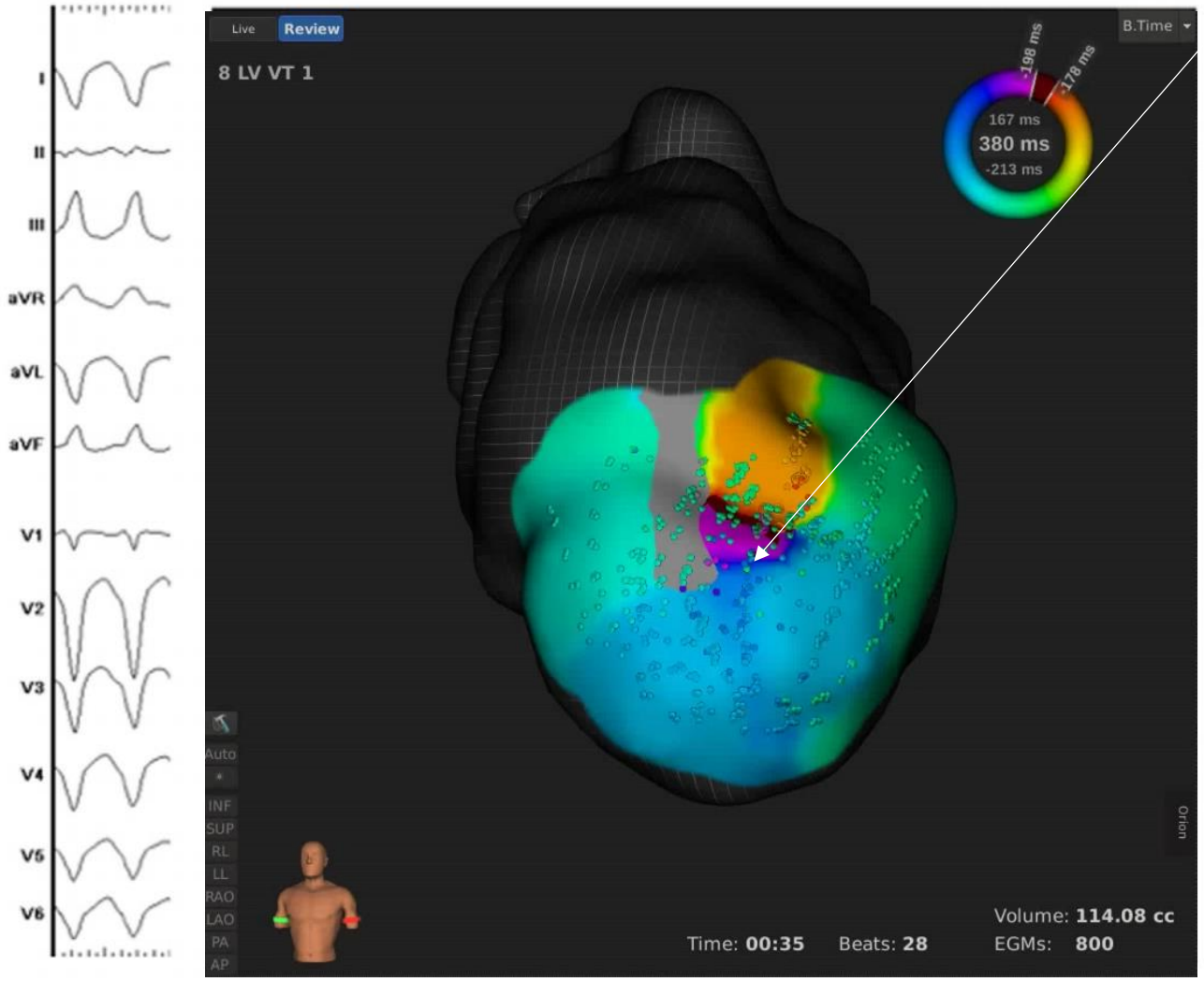


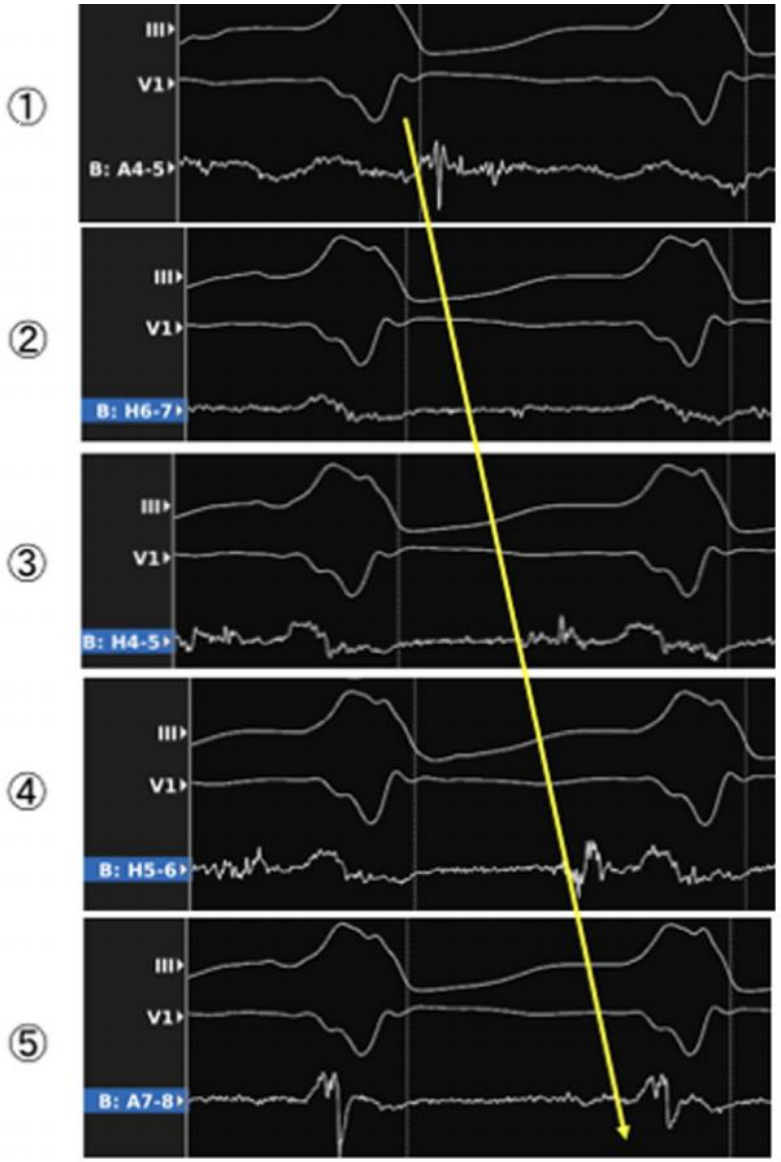
With the courtesy of Bordeaux University Hospital

Case Report

The electrical circuit of a hemodynamically unstable and recurrent ventricular tachycardia diagnosed in 35 s with the Rhythmia mapping system

Masateru Takigawa [a,*], Antonio Frontera [a], Nathaniel Thompson [a], Stefano Capellino [b], Pierre Jais [a], Frederic Sacher [a]





Tachycardies ventriculaires : cœur sain

20% des TV

Infundibulaire majoritairement « sensible à l'adénosine »

Fasciculaire « sensible au vérapamil »

Femme> hommes

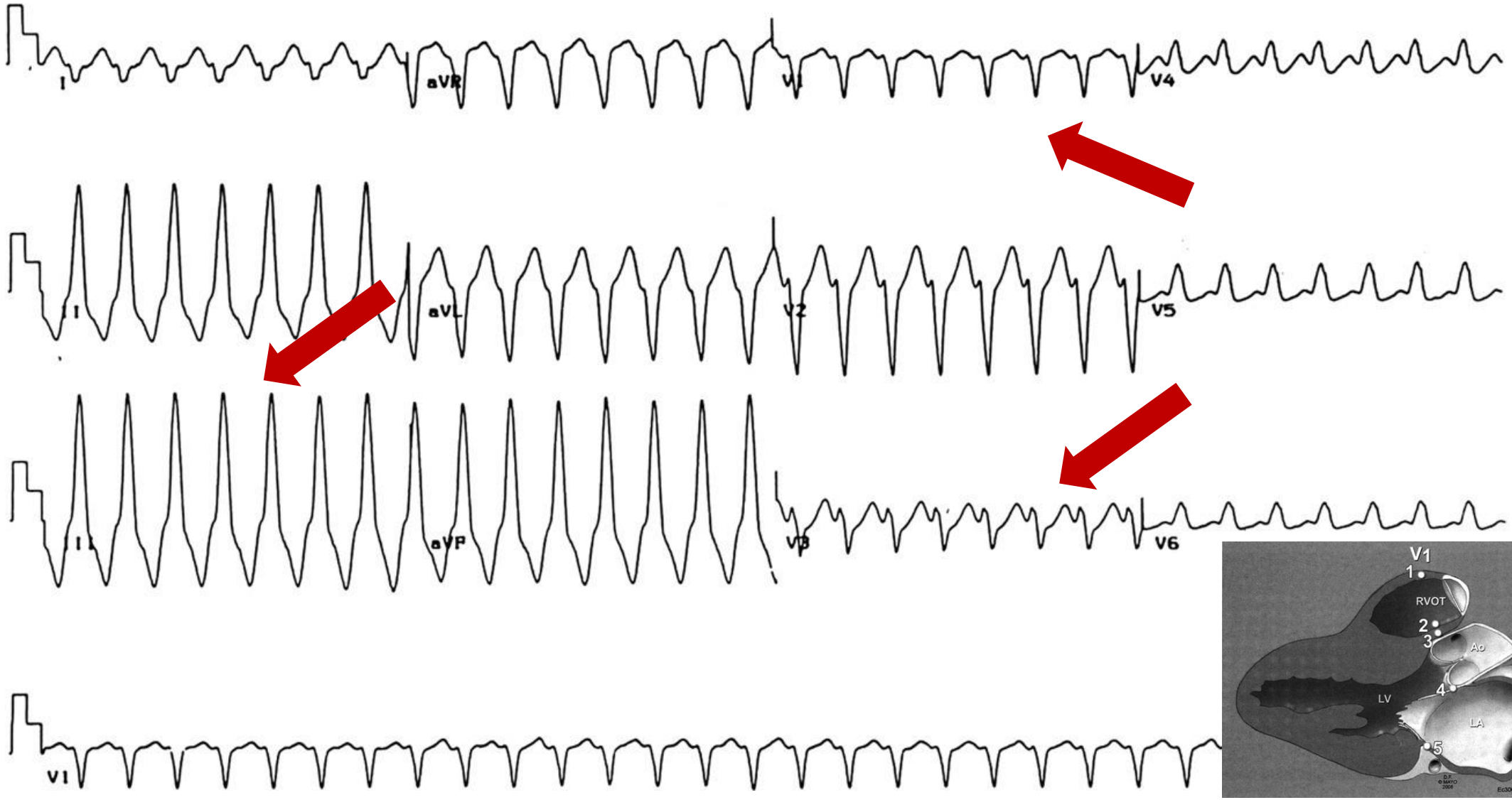
20 à 50 ans

Symptômes: Palpitations (# 80%) - Lipothymies (# 50%) - Syncope rarement

Repos > effort

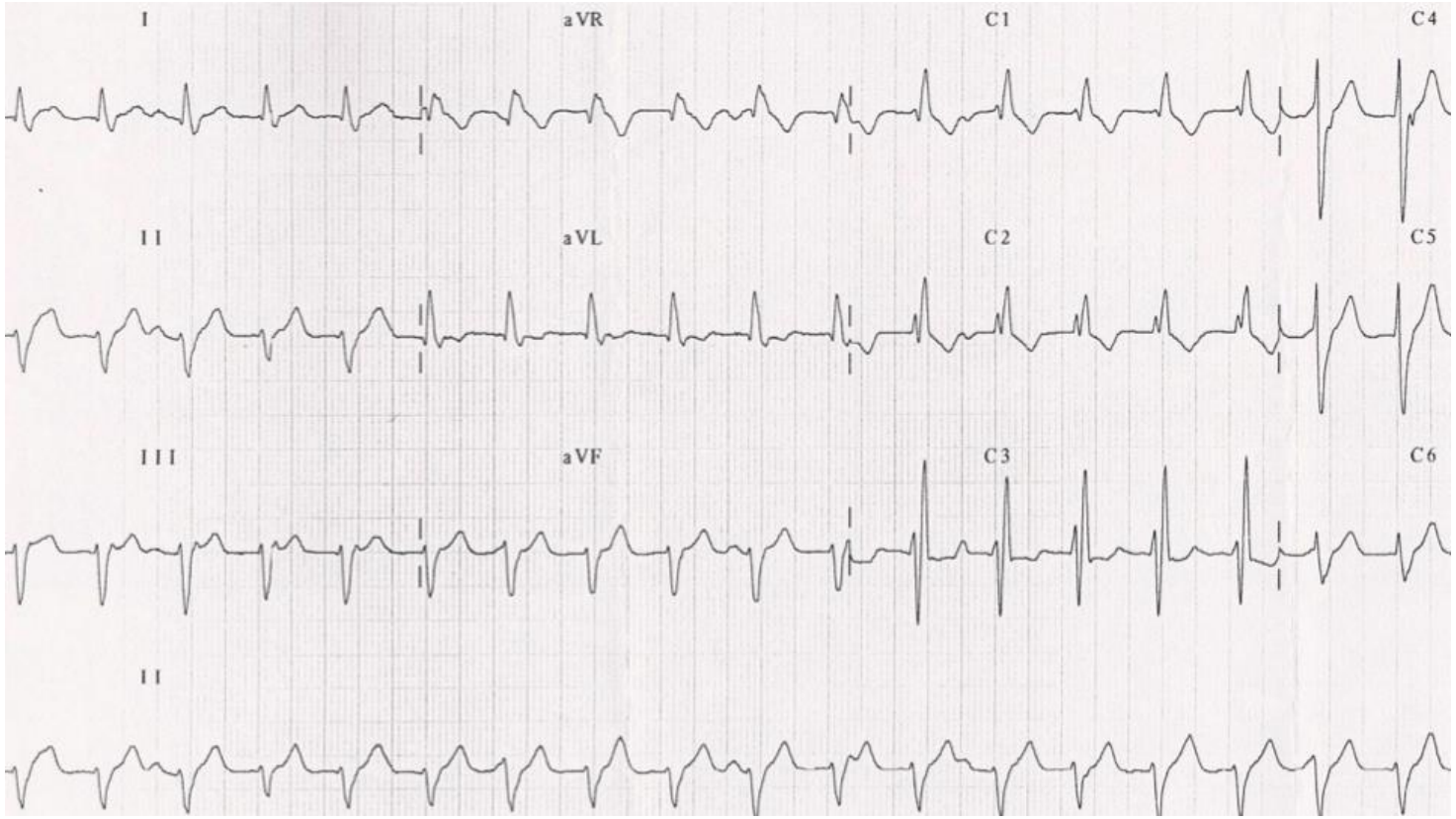
Pronostic en général excellent

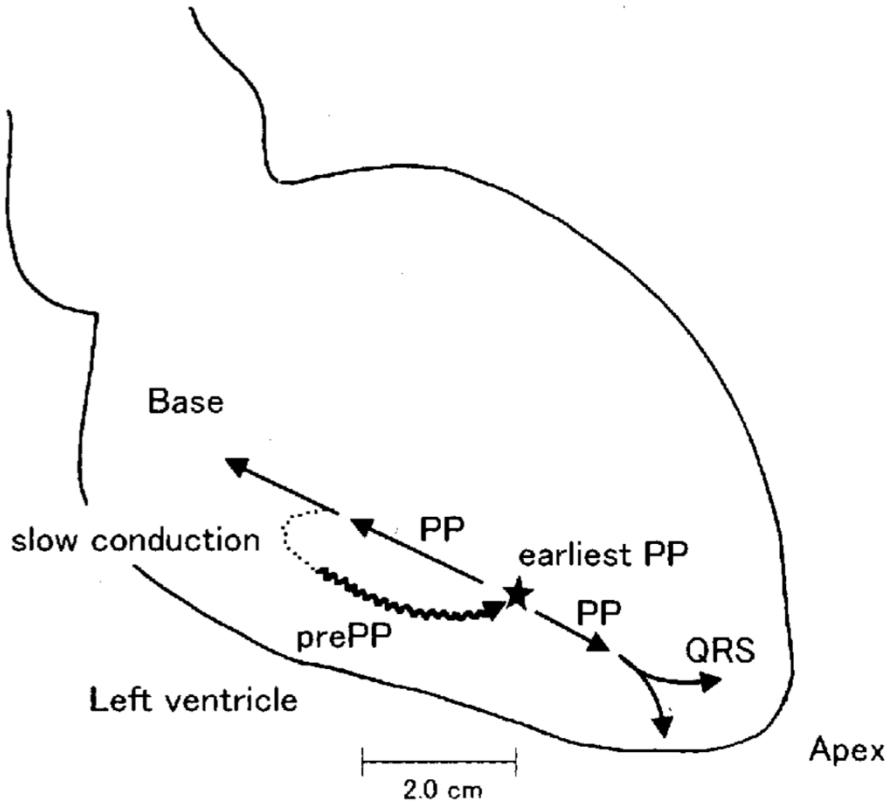
Rémission spontanée possible


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

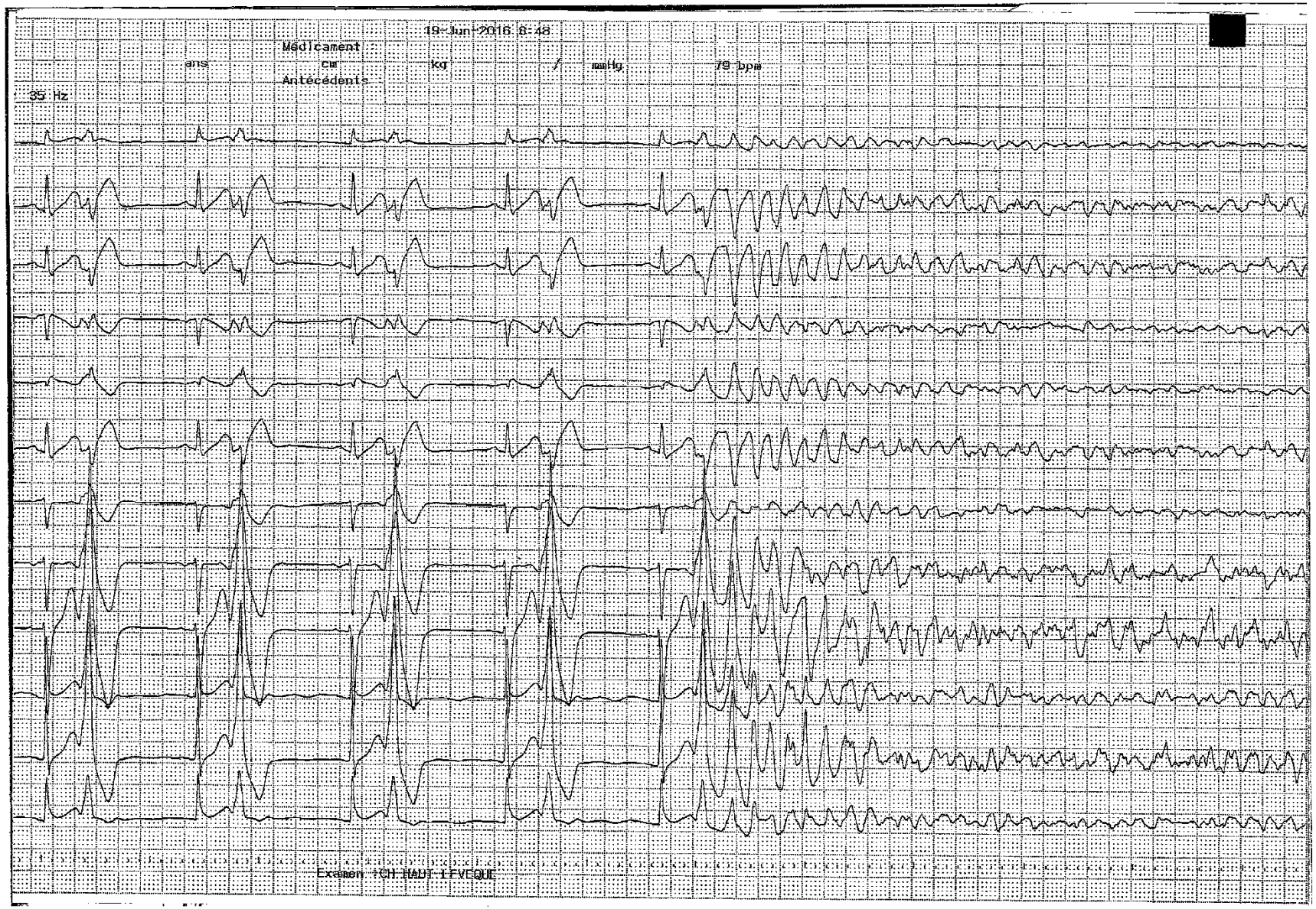
V1
1
RVOT
2
3
Ao
4
LV
LA
5
1
2
3
4
5

Tachycardies ventriculaires : TV fasciculaires





Nogami et al 2011



Fibrillation ventriculaire

Contraction rapide, désorganisée et inefficace

=

Arret cardiorespiratoire

Fibrillation ventriculaire

Cause de mort subite

40 000 cas / an en France
20%-25% de la mortalité
Concerne une population « jeune »

Présence de cardiopathie
Ischémique ++
Hypertrophique
Dilatée
DAVD
…

Absence de cardiopathie
Syndrome du QT long
Syndrome de Brugada
Repolarisation précoce
Anomalies électrolytes
…

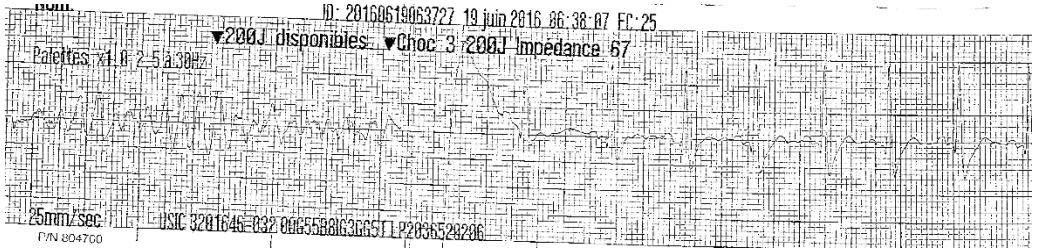
Fibrillation ventriculaire

Mécanismes complexes

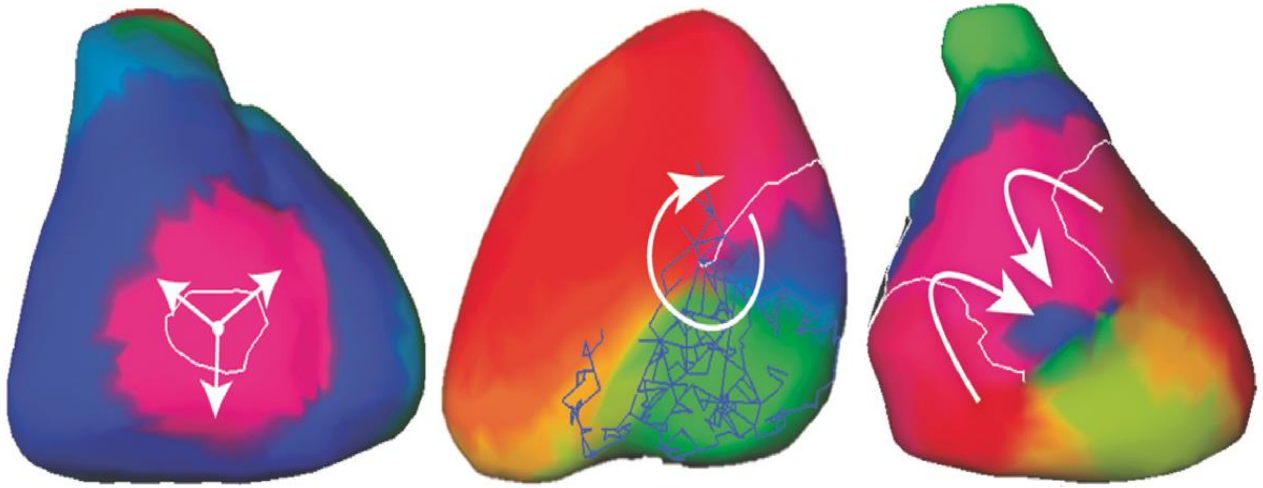
Traitements :

Défibrillation

Supprimer l'ESV initiatrice



Foci | **Rotational activity** | **Figure of eight**



Massoullié, HRS 2016

Principaux troubles du rythme

Arythmies de l'oreillettes

Flutter

Fibrillation atriale

Tachycardie atriale focale

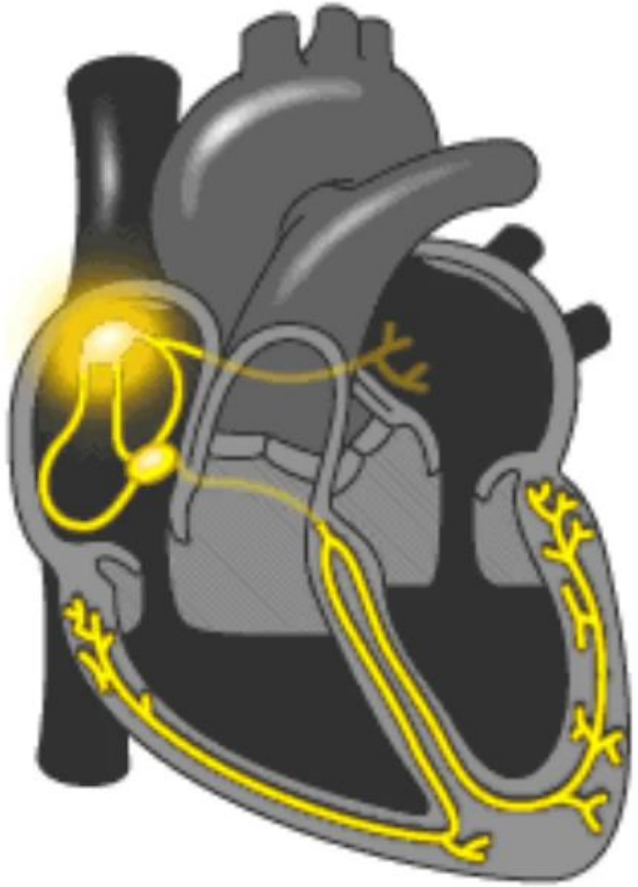
Tachycardies jonctionnelles

Arythmies du ventricules

Tachycardie ventriculaire

Extrasystoles ventriculaire

Fibrillation ventriculaire



Cardiocases

SE CONNECTER

Pacing & Defibrillation ECG EPcases La Librairie

ECG

Se former aux ECG, du basique à l'expert

SE FORMER | S'ÉVALUER | TROUVER UN TRACÉ | ECG POUR L'ECN | COMMANDER UN LIVRE

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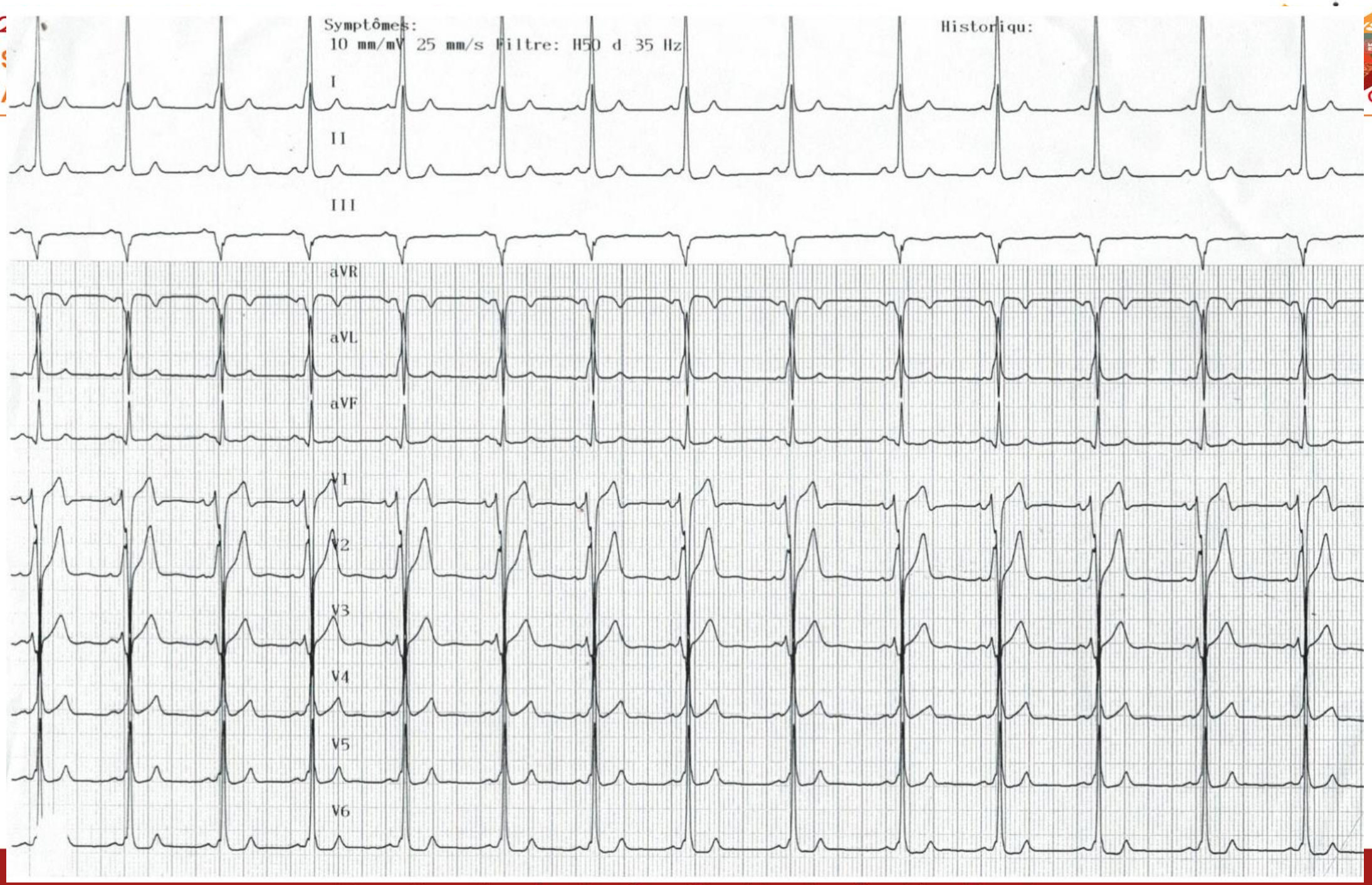
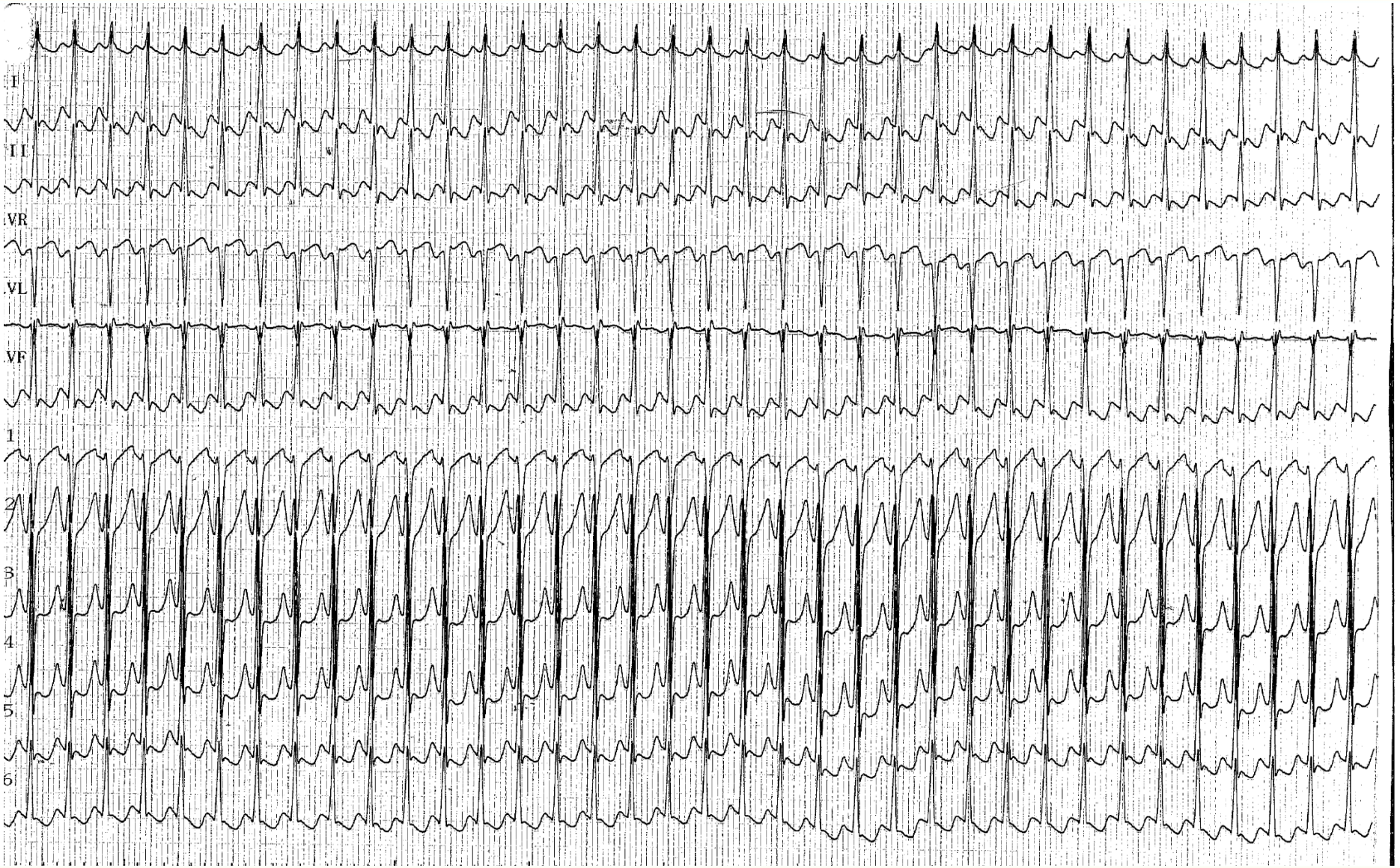
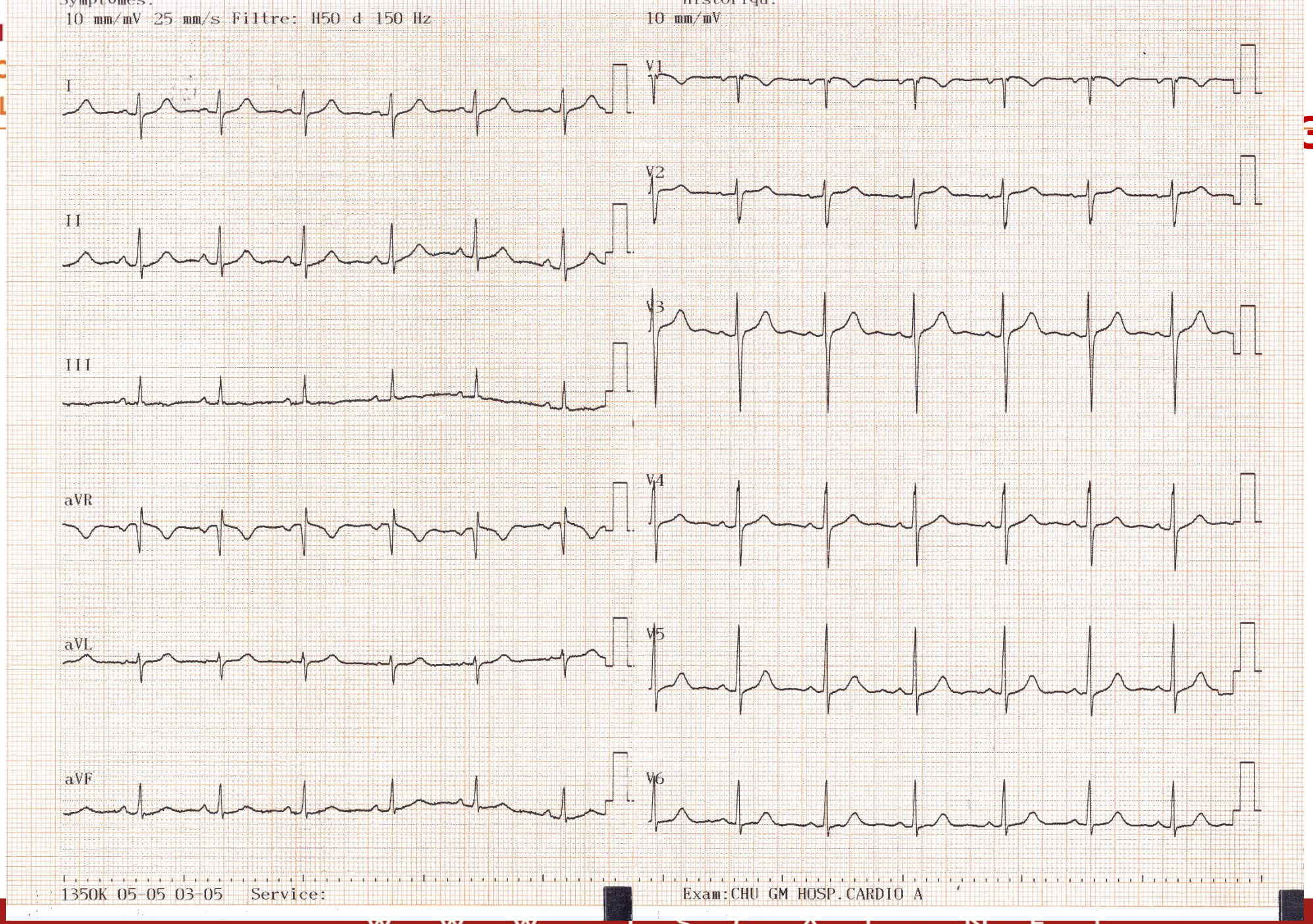
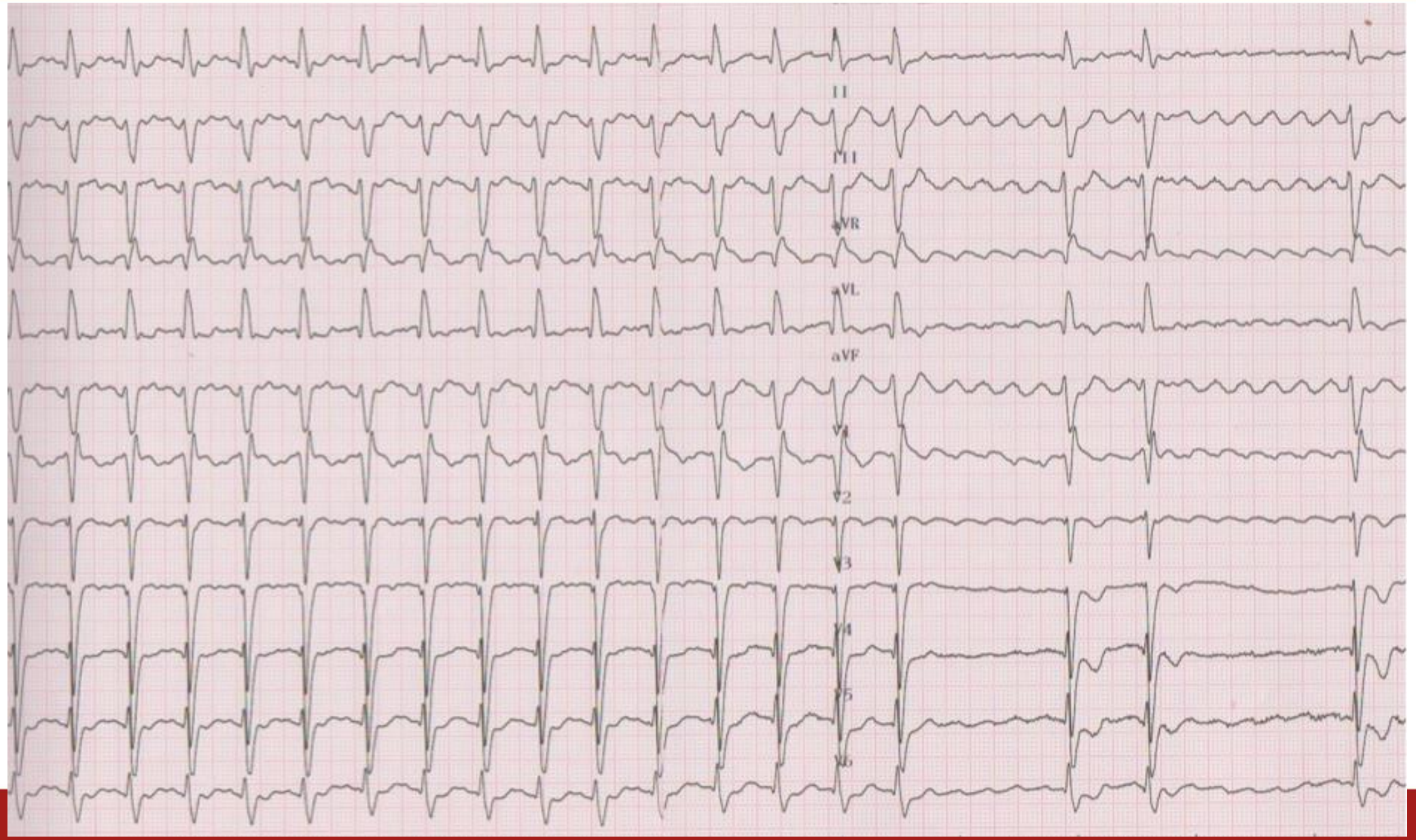

Symptômes:
10 mm/mV 25 mm/s Filtre: H50 d 35 Hz
Historiqu:
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


I
II
VR
VL
VF
1
2
3
4
5
6


10 mm/mV 25 mm/s Filtre: H50 d 150 Hz
10 mm/mV
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
1350K 05-05 03-05 Service:
Exam:CHU GM HOSP.CARDIO A

G NORMAL


II
III
VR
aVL
aVF
V1
V2
V3
V4
V5
V6