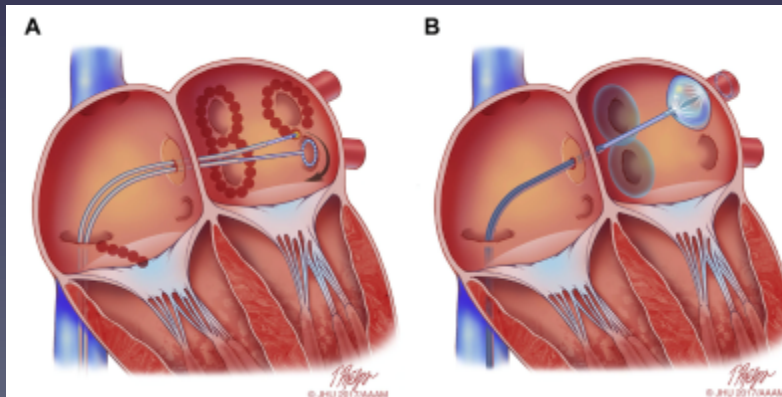


Ablation de la FA



What's new ?



Ablation de FA

- FA et dysfonction VG
- FA asymptomatique
- Nouvelles technologies

Ablation FA
et
dysfonction VG

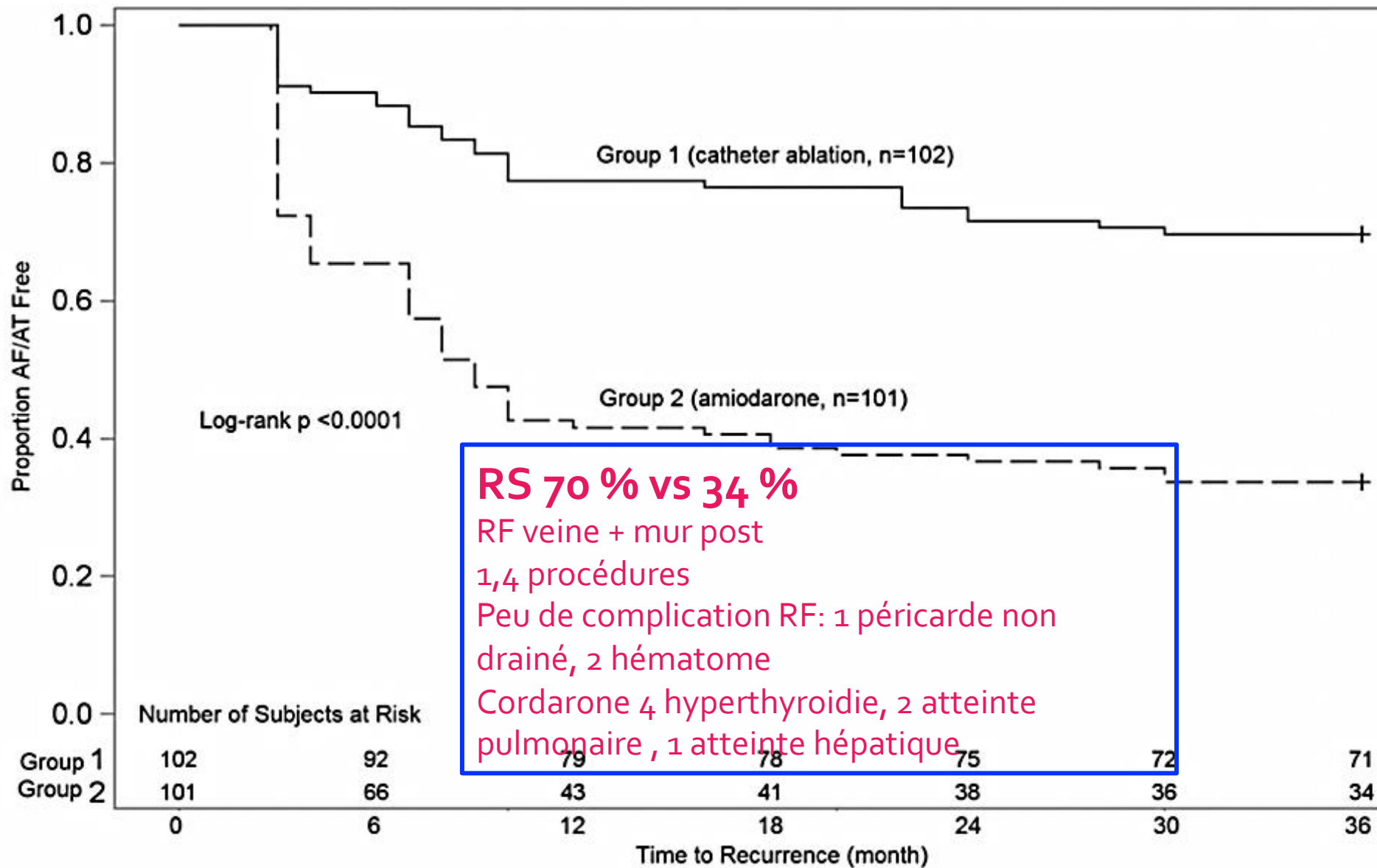
Ablation Versus Amiodarone for Treatment of Persistent Atrial Fibrillation in Patients With Congestive Heart Failure and an Implanted Device

Results From the AATAC Multicenter Randomized Trial

- Multicenter RC study
- FA persistante , ICD ou CRTD, FE < 40 %
- 102 Ablation vs 101 Amiodarone Suivi > 24 mois
- Objectif primaire: récidence FA
- Objectif secondaire: mortalité, hospitalisation IC, FE

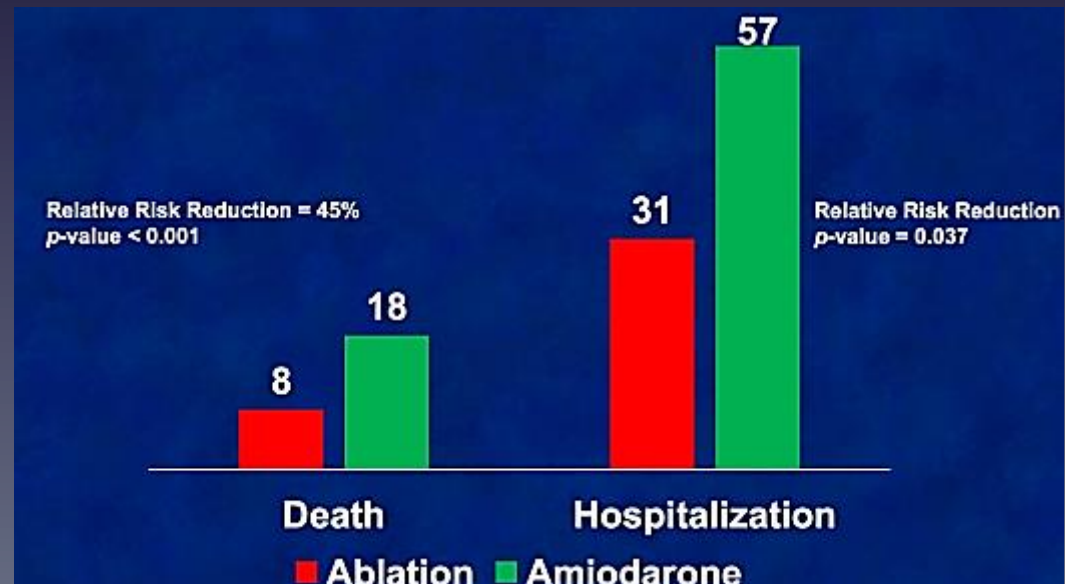
Di Biase and COL *Circulation*. 2016;133:1637-1644.

	Group 1 (Catheter Ablation, n=102)	Group 2 (Amiodarone, n=101)
Age, y	62±10	60±11
Male, n (%)	77 (75)	74 (73)
AF duration, mo	8.6±3.2	8.4±4.1
BMI, kg/m ²	30±8	29±4
Hypertension, n (%)	46 (45)	48 (48)
Diabetes mellitus, n (%)	22 (22)	24 (24)
Coronary artery disease, n (%)	63 (62)	66 (65)
LA diameter, mm	47±4.2	48±4.9
LVEF, %	29±5	30±8
6MWD, meters	348±111	350±130
MLHFQ Score	52±24	50±27
OSA, n (%)	46 (45)	48 (48)
ACEI or ARB, n (%)	94 (92)	89 (88)
Aldosterone antagonists, n (%)	46 (45)	51 (50)
β-Blockers, n (%)	78 (76)	81 (80)



Critères secondaires

- Hospitalisation RF 31 % vs A 57 % $p < 0,001$
- DC: 8 % vs 18 % $p = 0,037$
- Amélioration FE: 8,1 % vs 6,2 % $p = 0,02$



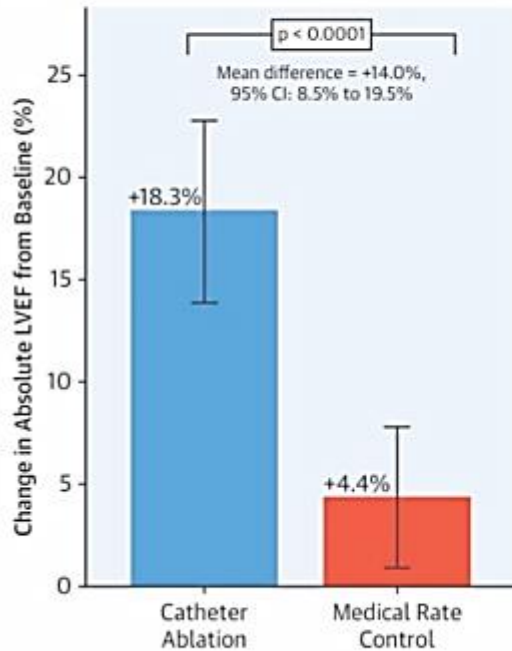
Catheter Ablation Versus Medical Rate Control in Atrial Fibrillation and Systolic Dysfunction: The CAMERA-MRI Study

(J Am Coll Cardiol 2017;70:1949-61)

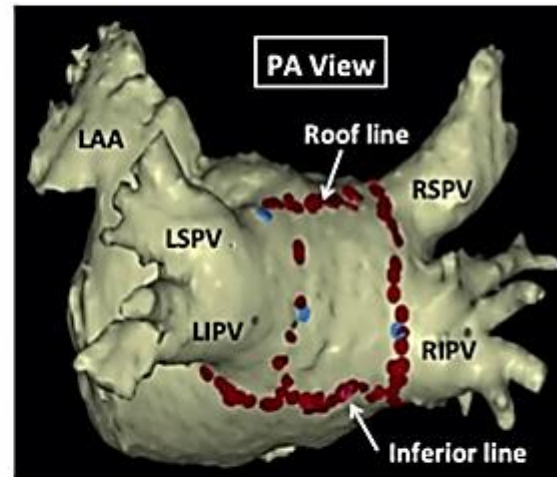
- RCT study
- 68 patients FA persistante , cardiopathie hypokinétique idiopathique, FE < 45 %.
- 33 CA, 33 tt med
- IRM cardiaque avant et à 6 mois post RF FA

CENTRAL ILLUSTRATION: Change in Absolute LVEF From Baseline According to Treatment Arm

A Primary Endpoint: Change in LVEF at Baseline and 6 Months by Treatment Arm



B Catheter Ablation Lesion Set in Left Atrium: Pulmonary Vein and Posterior Wall Isolation



Normalisation FE > 50 %
après CA

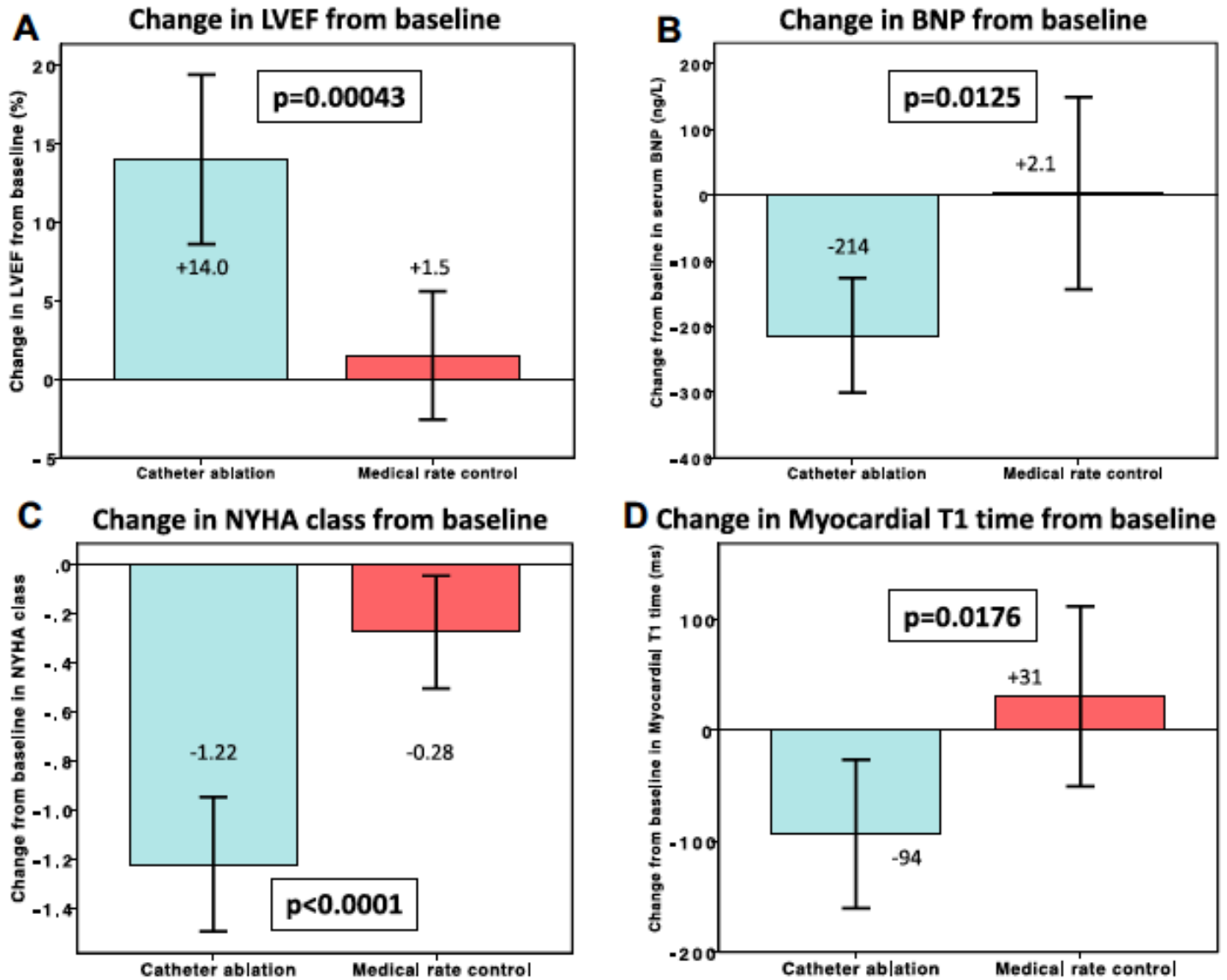
58 % vs 9 %

Prabhu, S. et al. J Am Coll Cardiol. 2017;70(16):1949-61.

	Catheter Ablation (n = 33)		Medical Rate Control (n = 33)		Comparison Between Treatment Arms	
	Baseline	6 Months	Baseline	6 Months	Mean Difference	p Value*
Primary endpoint						
LVEF (MRI), %	31.8 ± 9.4	50.1 ± 11†	34.1 ± 7.8	38.5 ± 8.7‡	14.0 (8.5 to 19.5)	<0.0001

FIGURE 1 Comparison of 6-Month Outcomes by Treatment Arm

Ventricular remodeling and diffuse fibrosis – Comparison between treatment arms



CASTLE AF Trial

Avec cardiopathie, insuffisance cardiaque

The NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

FEBRUARY 1, 2018

VOL. 378 NO. 5

Catheter Ablation for Atrial Fibrillation with Heart Failure

Nassir F. Marrouche, M.D., Johannes Brachmann, M.D., Dietrich Andresen, M.D., Jürgen Siebels, M.D., Lucas Boersma, M.D., Luc Jordaens, M.D., Béla Merkely, M.D., Evgeny Pokushalov, M.D., Prashanthan Sanders, M.D., Jochen Proff, B.S., Heribert Schunkert, M.D., Hildegard Christ, M.D., Jürgen Vogt, M.D., and Dietmar Bänsch, M.D., for the CASTLE-AF Investigators*

Catheter Ablation for Atrial Fibrillation with Heart Failure

Etude multcentrique, randomisée, contrôlée

3013 → **397 patients**
suivi 60 mois

- FA symptomatique
- R ou intolérant au TT med
- NYHA 2-4
- FEVG <35%
- Indication ou présence d'un Défibrillateur avec télécadiologie

Age 64, FA persistante 70 %,
NYHA II 60 %, FE m 32 %,
Traitement AA 30 % (amiod)

R
1:1

Ablation (179 p) 26 co

- Isolation des VP obligatoire
- Autres traitements d'ablation possibles (51,7 %)
- Redo 24,5 %

Médical (184 p) 18 co

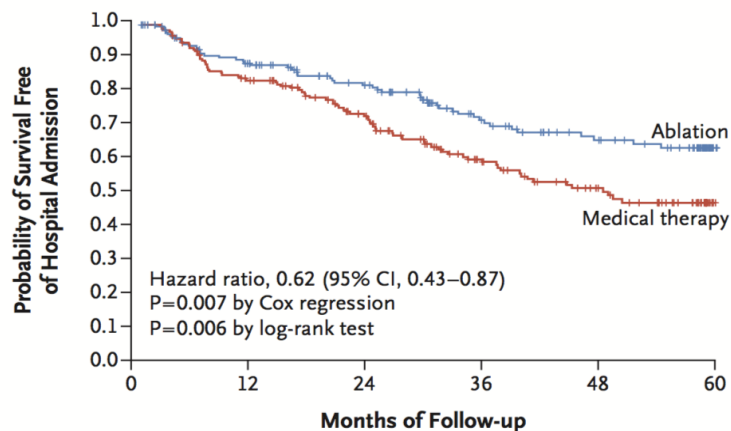
- Tentative de maintien RS (30 %)
- Contrôle de fréquence
 - 60-80/min repos
 - 90-115/min effort

Critère de jugement principal : Mortalité ou hospitalisation pour insuffisance cardiaque

Table 2. Primary and Secondary Clinical End Points.*

End Point	Ablation (N = 179)	Medical Therapy (N = 184)	Hazard Ratio (95% CI)	P Value	
				Cox Regression	Log-Rank Test
	<i>number (percent)</i>				
Primary†	51 (28.5)	82 (44.6)	0.62 (0.43–0.87)	0.007	0.006
Secondary					
Death from any cause	24 (13.4)	46 (25.0)	0.53 (0.32–0.86)	0.01	0.009
Heart-failure hospitalization	37 (20.7)	66 (35.9)	0.56 (0.37–0.83)	0.004	0.004
Cardiovascular death	20 (11.2)	41 (22.3)	0.49 (0.29–0.84)	0.009	0.008
Cardiovascular hospitalization	64 (35.8)	89 (48.4)	0.72 (0.52–0.99)	0.04	0.04
Hospitalization for any cause	114 (63.7)	122 (66.3)	0.99 (0.77–1.28)	0.96	0.96
Cerebrovascular accident	5 (2.8)	11 (6.0)	0.46 (0.16–1.33)	0.15	0.14

A Death or Hospitalization for Worsening Heart Failure



No. at Risk

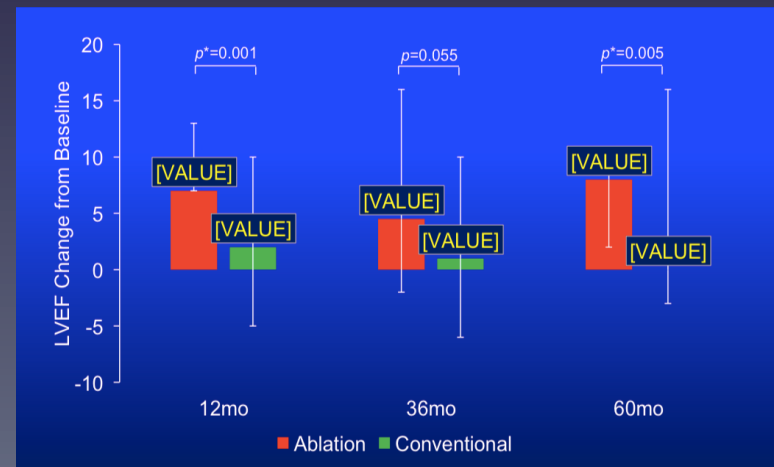
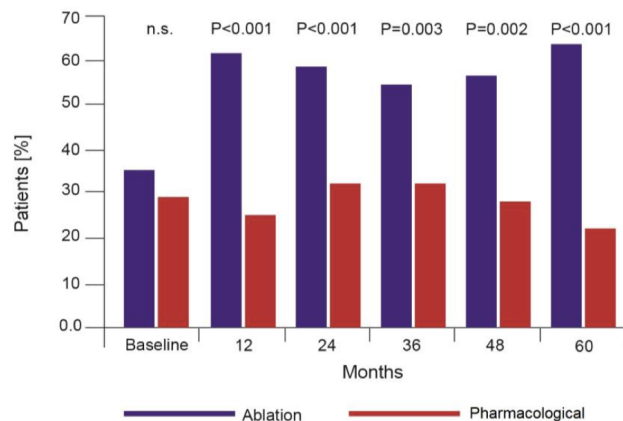
	0	12	24	36	48	60
Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

- Diminution de 38% du critère primaire
- 8 patients à traiter pour éviter un évènement
- NB: Entresto (PARADIGM-HF) 21 patients à traiter pour éviter un évènement !

Résultats secondaires

- Amélioration de **8% de la FEVG** vs 0 % ($p=0,005$) : remodelage inverse de la FEVG
- **64% des patients sont en rythme sinusal** à 60 mois vs 22 % ($p<0,001$)
- **Test de marche de 6 minutes** augmentation de **53m** vs **7m** en faveur du groupe ablation

Maintenance of Sinus Rhythm



Conclusions de CASTLE-AF

Ablation de la FA dans l'insuffisance cardiaque permet:

- Amélioration de la **Survie**: DC 13 % vs 25 %
- Diminution des **Hospitalisations pour IC**: 20 % vs 35 %
- Amélioration de la **FEVG**: + 8 %
- Amélioration de la qualité de vie
- Diminution de la **charge en FA**: RS 64 vs 22 % (24 % 2 procédures)

Résultats meilleurs quand FE > 25 %, age < 65 ans, NYHA 2
Critiques: étude ouverte

**L'ablation de la FA peut être réalisée à visée
PRONOSTIQUE chez un patient insuffisant cardiaque
(CASTLE-AF).**

Sujet agé ?

Ablation de FA du Sujet Agé

Summary of atrial fibrillation catheter ablation studies in the elderly.

Studies	Number of patients	Techniques	AF Type	Compared age groups	Success rate	Major complications in the elderly
Zado, <i>et al.</i> [15]	32	PVI plus ablation of focal sources	PAF PersAF	< 65 yrs 65–74 yrs <u>> 75 yrs</u>	89% 84% 86%	2.9%
Bhargara, <i>et al.</i> [16]	103	PVI	PAF PersAF PermAF	> 60 yrs 51–60 yrs < 50 yrs	82% 83% 85%	3%
Kusumoto, <i>et al.</i> [17]	61	PVI	PAF PersAF	> 75 yrs 65–75 yrs	61% 84%	0%
Tan, <i>et al.</i> [18]	49	PVAI		<u>> 80 yrs</u> 70–79 yrs 60–69 yrs	70% 72% 74%	0.04%
Bunch, <i>et al.</i> [19]	35	PVAI plus linear lesions	PAF PersAF	<u>> 80 yrs</u> < 80 yrs	75% 78%	0.057%
Liu, <i>et al.</i> [20]	2970	PVAI	PAF PersAF PermAF	> 60 yrs > 60 yrs	77% 79%	4.53%
Present study	95	PVAI	PAF	≥ 65 yrs < 65 yrs	58% 67%	3.2%

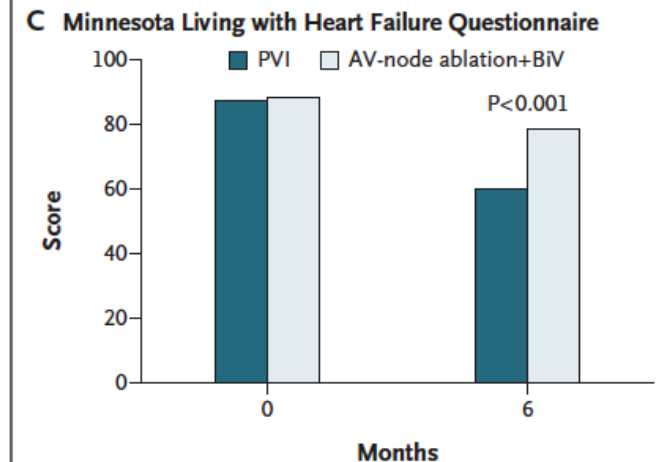
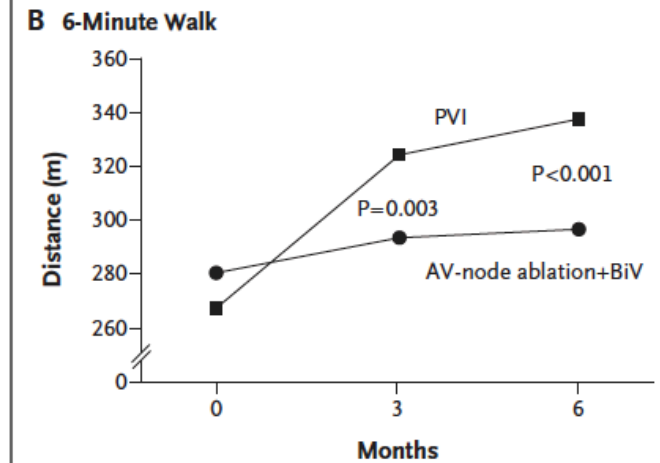
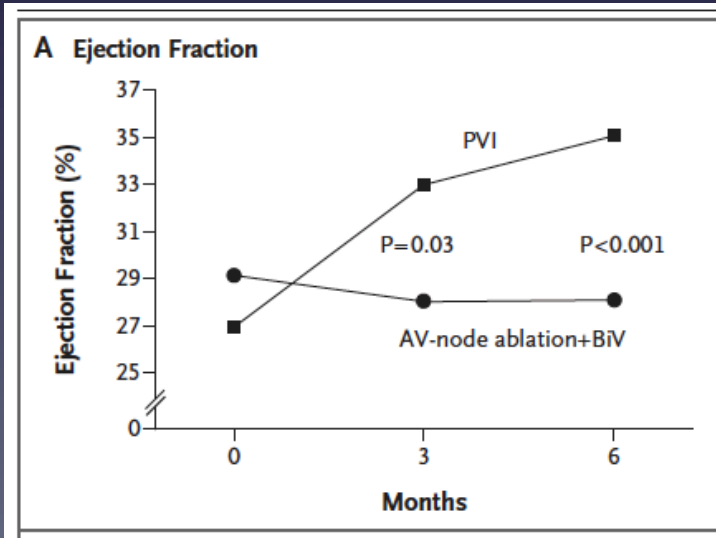
PAF: paroxysmal atrial fibrillation; PermAF: permanent atrial fibrillation; PersAF: persistent atrial fibrillation; PVAI: pulmonary vein antral isolation; PVI: pulmonary vein isolation.

ORIGINAL ARTICLE

Pulmonary-Vein Isolation for Atrial Fibrillation in Patients with Heart Failure

Mohammed N. Khan, M.D., Pierre Jaïs, M.D., Jennifer Cummings, M.D., Luigi Di Biase, M.D., Prashanthan Sanders, M.D., David O. Martin, M.D., Josef Kautzner, M.D., Steven Hao, M.D., Sakis Themistoclakis, M.D., Raffaele Fanelli, M.D., Domenico Potenza, M.D., Raimondo Massaro, M.D., Oussama Wazni, M.D., Robert Schweikert, M.D., Walid Saliba, M.D., Paul Wang, M.D., Amin Al-Ahmad, M.D., Salwa Beheiry, M.D., Pietro Santarelli, M.D., Randall C. Starling, M.D., Antonio Dello Russo, M.D., Gemma Pelargonio, M.D., Johannes Brachmann, M.D., Volker Schibgilla, M.D., Aldo Bonso, M.D., Michela Casella, M.D., Antonio Raviele, M.D., Michel Haïssaguerre, M.D., and Andrea Natale, M.D., for the PABA-CHF Investigators*

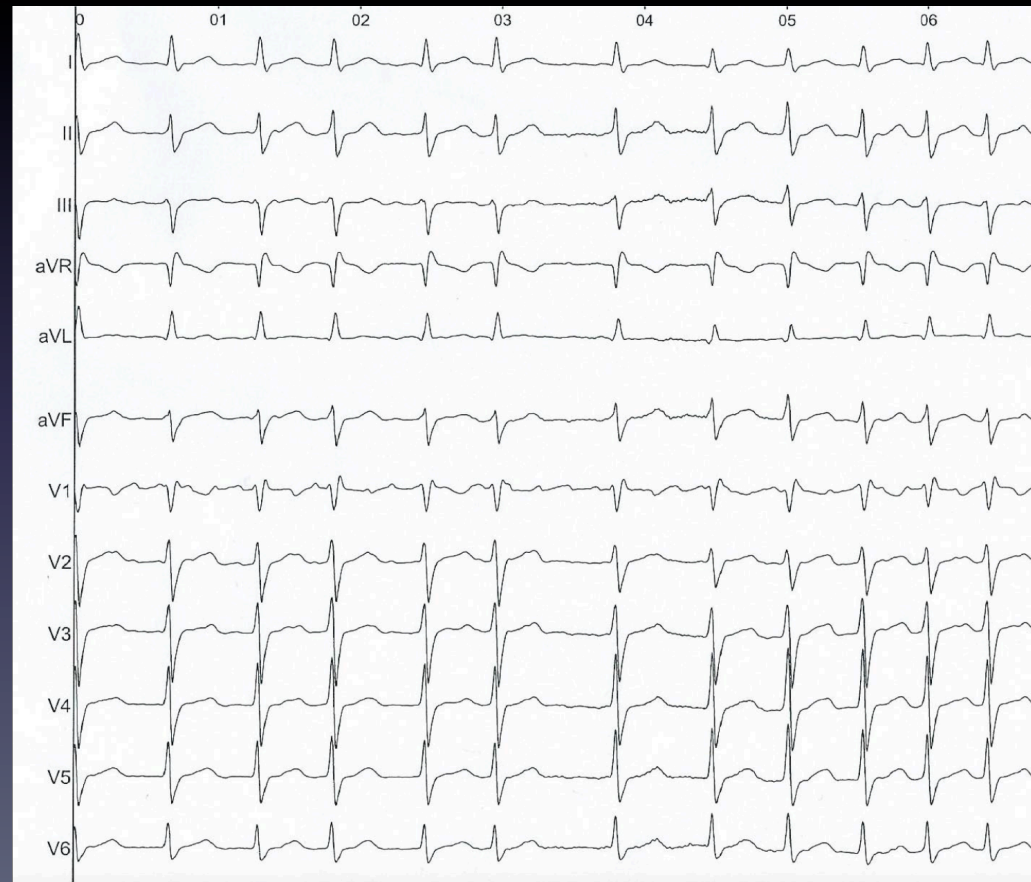
FA et FE Vg < 40% Randomisation Ablation FA vs NAV plus BiV



Ablation de FA
du
Sujet Asymptomatique

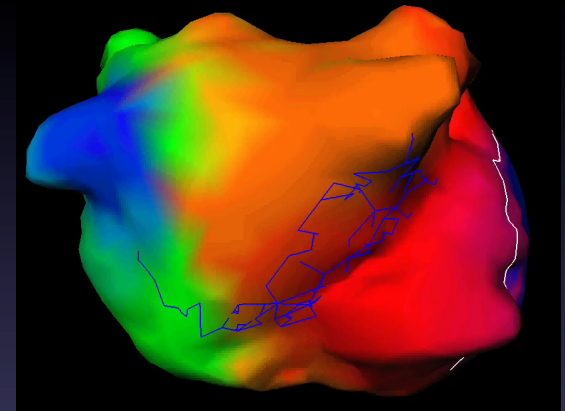
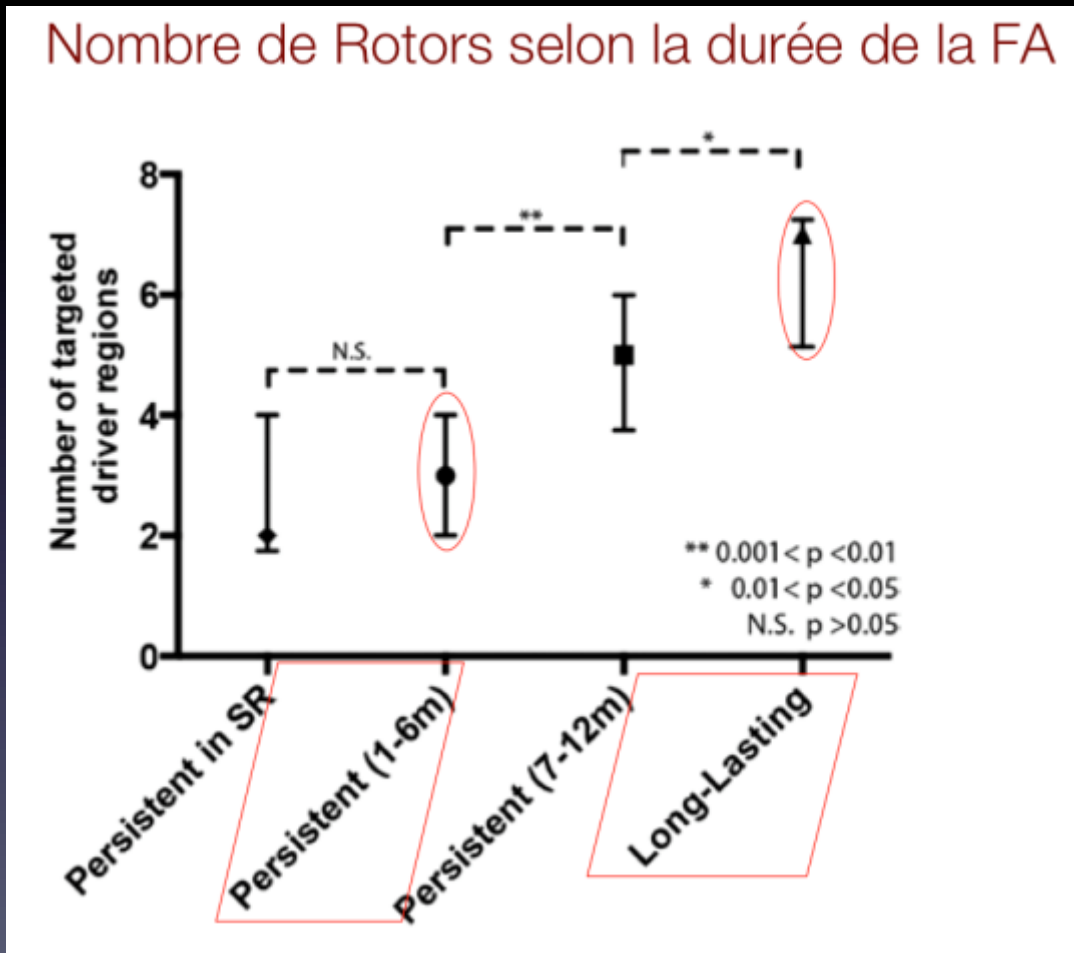
H , asymptomatique ,
decouverte d'une FA
en préop d'une arthroscopie
Echo : FEVG 53 %,

Que proposez vous ?



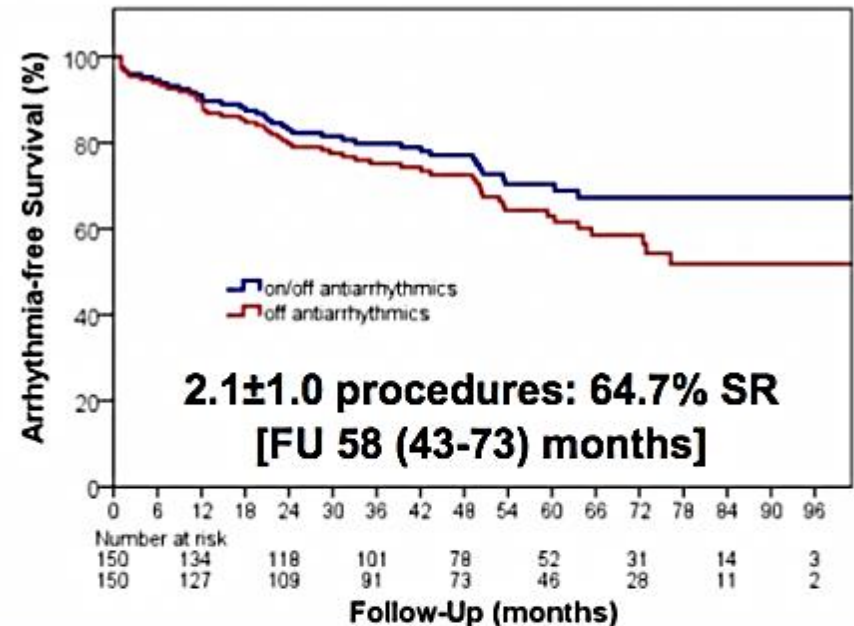
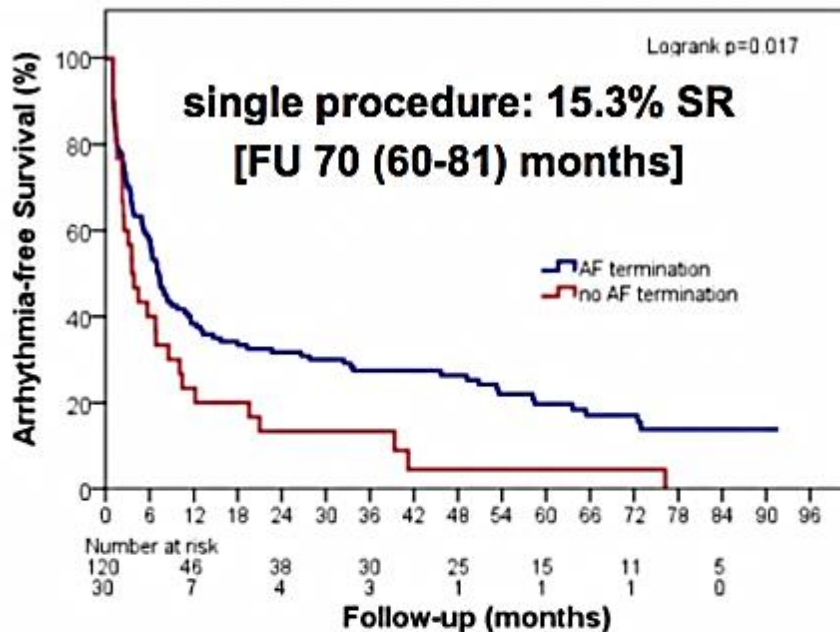
Peux t' on attendre qu 'il
devienne éventuellement
symptomatique ?

Ne pas attendre si la FA devient persistante



FA persistante

Facteurs influençant le résultat de l'ablation



Multi-procedure predictors of failure

HR

95% CI

P Value

AF non-termination during 1st procedure

3.831

2.070 - 7.143

<0.001

LA diameter ≥50mm

2.083

1.078 - 4.016

0.03

continuous AF duration ≥18 months

1.984

1.024 - 3.846

0.04

structural heart disease

1.874

1.037 - 3.388

0.04

FA asymptomatique

EHRA 2019 consensus

Atrial fibrillation

- Is the AF truly asymptomatic?
- Should cardioversion be attempted?
- The need for anticoagulation?
- Is rate control needed?
- Life style changes should be recommended
- Catheter ablation?

Consensus statements	Symbol	References
Patients with asymptomatic AF should be anticoagulated, according to their calculated risk of stroke, equal to patients with overt AF.		47,66-68
Consideration should be given to screening high-risk individuals e.g. patients with a CHA ₂ DS ₂ -VASc score > 2 for AF.		Expert opinion
Lifestyle changes should be advised in patients with asymptomatic AF, as in patients with overt AF.		47,66-68
Cardioversion of persistent AF in asymptomatic patients may be advised to differentiate between truly asymptomatic patients or those adapted to AF-related symptoms.		77,137
Rate control drugs should be prescribed to patients with asymptomatic AF with fast AV conduction in order to attempt to decrease risk of tachycardia-induced cardiomyopathy.		93,94
Ablation might be proposed to selected patients with asymptomatic AF, based on patient's preferences, after detailed informed consent.		77, Expert opinion

AF, atrial fibrillation; AV, atrioventricular.

EHRA₂₀₁₉

Anticoag/CHADS, traiter FDR, choc pour voir si vraiment asymptomatique, ralentir pour éviter cardiopathie rythmique, **ABLATION** peut être proposée après information selon choix du patient.

Event	Association with AF
Death	Increased mortality, especially cardiovascular mortality due to sudden death, heart failure or stroke.
Stroke	20–30% of all strokes are due to AF. A growing number of patients with stroke are diagnosed with 'silent', paroxysmal AF.
Hospitalizations	10–40% of AF patients are hospitalized every year.
Quality of life	Quality of life is impaired in AF patients independent of other cardiovascular conditions.
Left ventricular dysfunction and heart failure	Left ventricular dysfunction is found in 20–30% of all AF patients. AF causes or aggravates LV dysfunction in many AF patients, while others have completely preserved LV function despite long-standing AF.
Cognitive decline and vascular dementia	Cognitive decline and vascular dementia can develop even in anticoagulated AF patients. Brain white matter lesions are more common in AF patients than in patients without AF.

Homme x 1,5
 Femme x 2
 Facteur indépendant

X 5
 + grave
 quand FA

Mieux vaut ne
 pas avoir de FA

AVC

CHA ₂ DS ₂ -VASc criteria	Score	Total score	Patients (n=7329)	Adjusted stroke rate (%/year)*
Congestive heart failure/ left ventricular dysfunction	1	0	1	0.0
Hypertension	1	1	422	1.3
Age ≥75 yrs	2	2	1230	2.2
Diabetes mellitus	1	3	1730	3.2
Stroke/transient ischaemic attack/thromboembolism	1	4	1718	4.0
Vascular disease (prior myocardial infarction, peripheral artery disease or aortic plaque)	2	5	1159	6.7
Age 65–74 yrs	1	6	679	9.8
		7	294	9.6
		8	82	6.7
		9	14	15.2

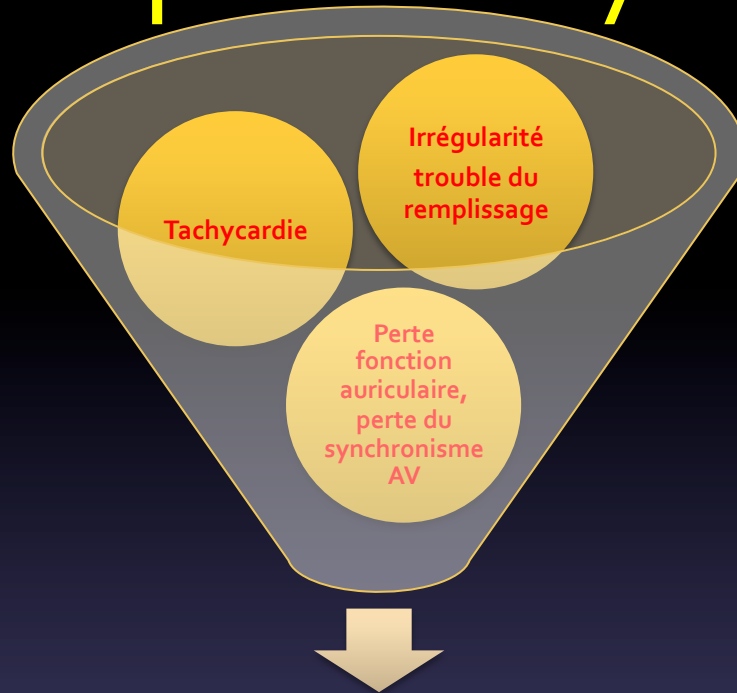
*Theoretical rates without therapy; assuming

AVC + sévère : mortalité doublée et handicap plus important.

Wolf PA *et al.* Atrial fibrillation as an independent risk factor for stroke : the Framingham Study. Stroke 1991 ; 22 : 983-8.

Risque annuel patient décoagulé: AVC 1,5 %,

Cardiopathie rythmique



Incidence = **25 %** (8 à 34 %)

REVERSIBLE.

++ si $Fc > 100$ et charge $> 15\%$ /jour

Délai de survenue variable progressive, insidieuse quelques mois le + souvent

Remodelage C et extra C, dysfonction canaux calciques




J Arrhythm. 2018 Aug; 34(4): 376–383

Cardiopathie rythmique

EHRA 2019 consensus

Table 12 Elements for the diagnosis of TICMP

- (1) No other cause of cardiomyopathy (myocardial infarction, valve disease, hypertension, alcohol or drug use, stress etc.)
- (2) Absence of left ventricular hypertrophy
- (3) No major increase in LV dimensions (LV end-diastolic dimension <6.5 cm)
- (4) Recovery of LV function after control of tachycardia (by rate control, cardioversion, or radiofrequency ablation) within a time frame of 1–6 months.
- (5) Rapid decline in LVEF following recurrence of tachycardia in a patient with recovered LV function after previous control of tachycardia.

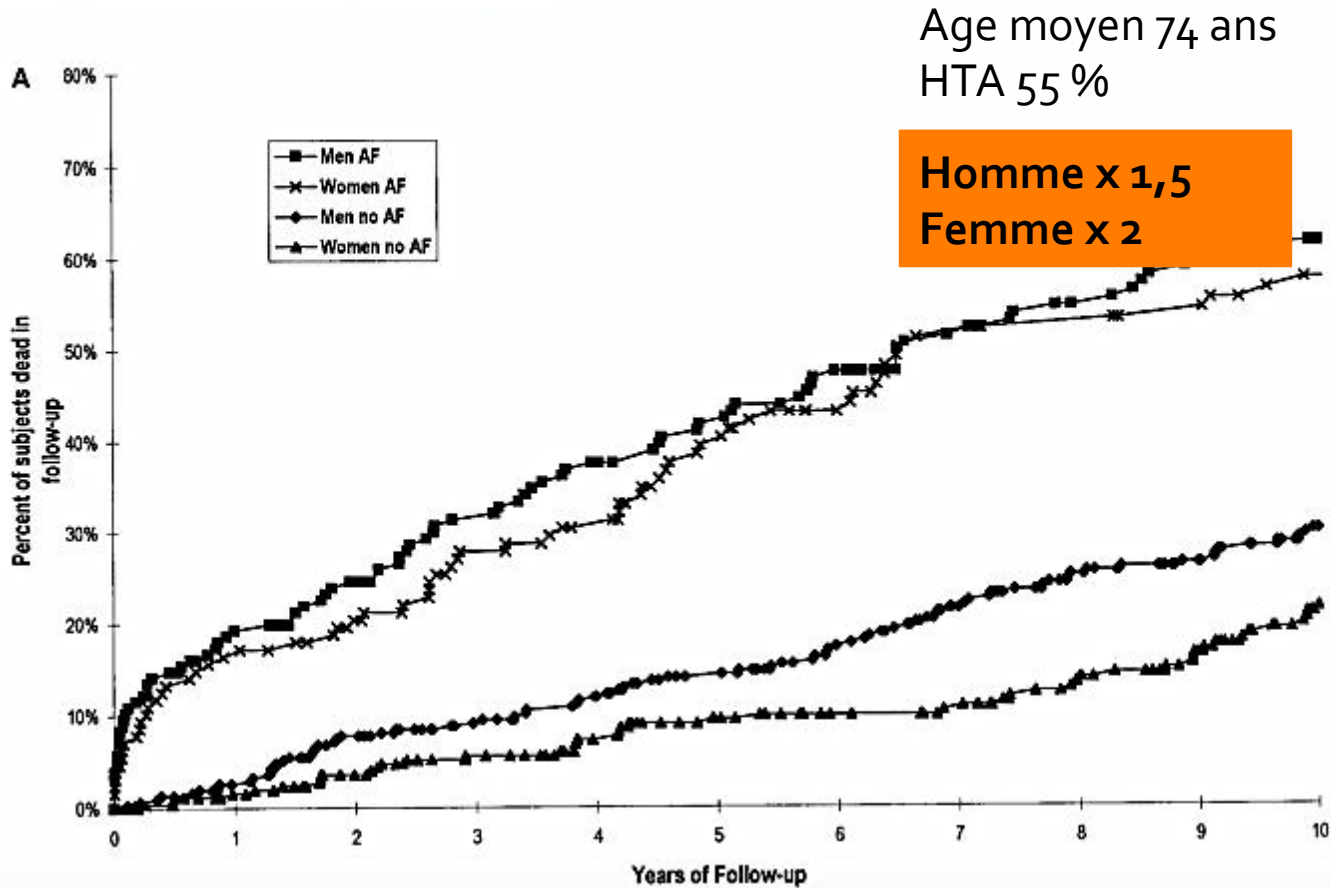
Consensus statements	Symbol	References
Other causes of cardiomyopathy (myocardial infarction, valve disease, hypertension, alcohol or drug use, stress, etc.) should be eliminated before considering a diagnosis of tachycardia-induced cardiomyopathy (TICMP).		191,232
Management of TICMP should involve drug treatment for heart failure, rate control in the case of atrial fibrillation (AF) when rhythm control is not feasible and rhythm control for the specific arrhythmia (including AF) causing TICMP.		191,230–232
Ablation may be preferred for rhythm control of persistent or repetitive atrial or ventricular arrhythmia, even when asymptomatic, in suspected TICMP cases.		231,232

Eliminer autre cause cardiopathie,
si récupération après RS= cardiopathie
rythmique,
Ablation préférée même si asymptomatique.

Décès

AVC
Insufisance cardiaque
Mort subite

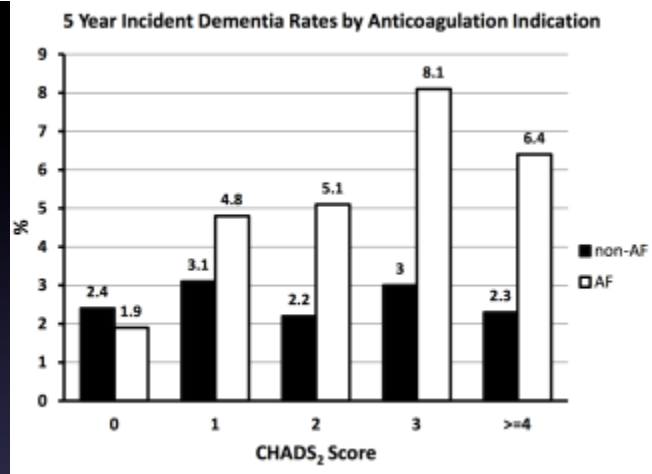
948 Atrial Fibrillation and Risk of Death



Impact of Atrial Fibrillation on the Risk of Death The Framingham Heart Study , Circulation 1998

Atrial fibrillation incrementally increases dementia risk across all CHADS₂ and CHA₂DS₂-VASc strata in patients receiving long-term warfarin.

Graves KG¹, May HT¹, Jacobs V¹, Bair TL¹, Stevens SM¹, Woller SC¹, Crandall BG¹, Cutler MJ¹, Day JD¹, Mallender C¹, Osborn JS¹, Peter Weiss J¹, Jared Bunch T².



6030 pts M 69 ans

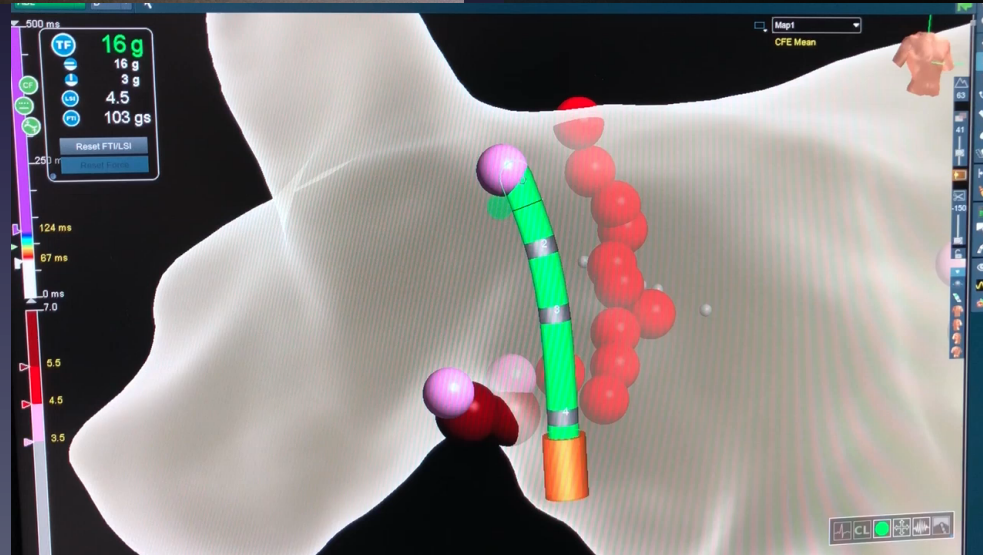
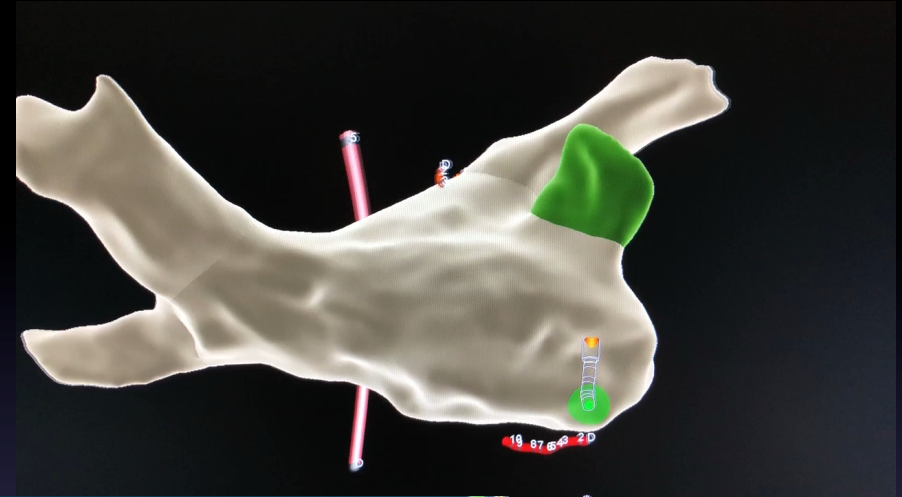
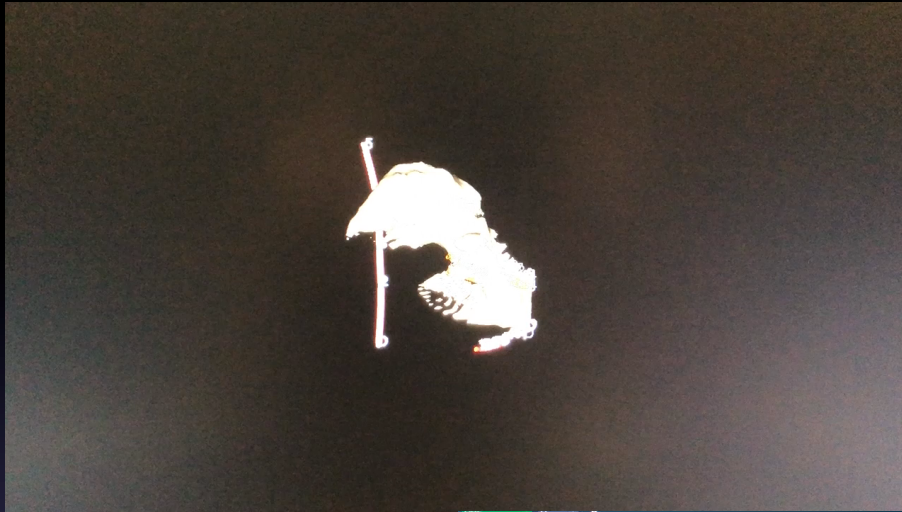
Démence = 5,2 % pts FA AVK (vs 2,6 % non FA)

Durée 7,7 ans

Swiss af trial ESC 2018

- Etude prospective observationnelle, 1389 pts sans ATCD AVC et FA (89 % anticoagulés). Age 72 ans. Scanner cérébral. **41 % ont lésions cérébrales** (infarctie, microbleed ou lacunes).
Conclusion : **lésions silencieuses pouvant entraîner déclin cognitif, ceci malgré traitement anticoagulant.**

L'ablation technique plus simple



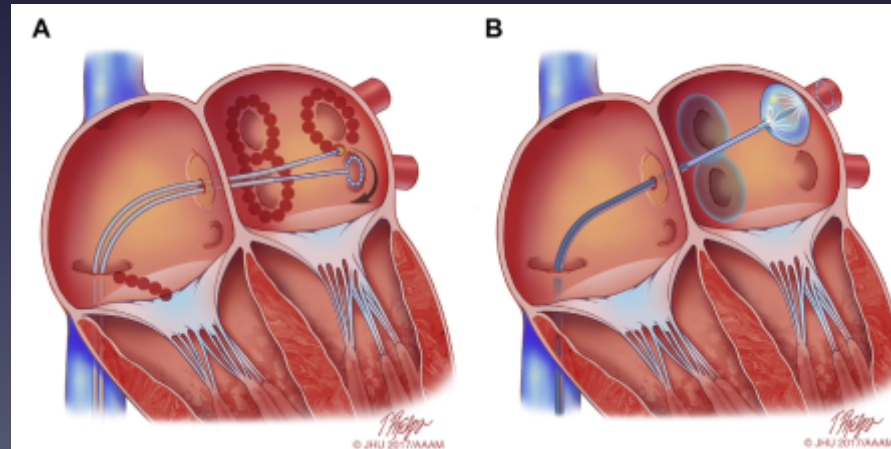
75-80 % succès
10 -40 %
complément

FA parox 1 h-1h30
FA pers 2h

Sortie J1

Activité ADRIS : 1200 Abl FA en 2018, 1400 en 2019

Les études récentes de morbidimortalité en faveur de l'ablation



CAABL-AF (California Study of Ablation for Atrial Fibrillation)

Mortality and Stroke, 2005 to 2013

- 4169 pts > 1 hospitalisation pour FA puis CA
- 4169 pts FA contrôle (non randomisé)
- FA non valvulaire , suivi 3,6 ans +/- 0,9
- 50-79 ans 82 %, I cardiaque 11 %, HTA 53 %
ATCD AVC 4,5 %.

Bénéfice ablation

	Ablation FA	Controle	P
Décès	0,9 %	1,9 %	< 0,0001
AVC ischémique	0,37	0,59	0,04
AVC hémorragique	0,11	0,35	0,001



Catheter Ablation vs Antiarrhythmic Drug Therapy in Atrial Fibrillation (CABANA**) Trial**

Sans cardiopathie

**Douglas L. Packer MD, Kerry L. Lee PhD,
Daniel B. Mark MD, MPH, Richard A. Robb PhD
for the CABANA Investigators**

**Mayo Clinic Rochester
Duke Clinical Research Institute
National Heart, Lung, and Blood Institute**

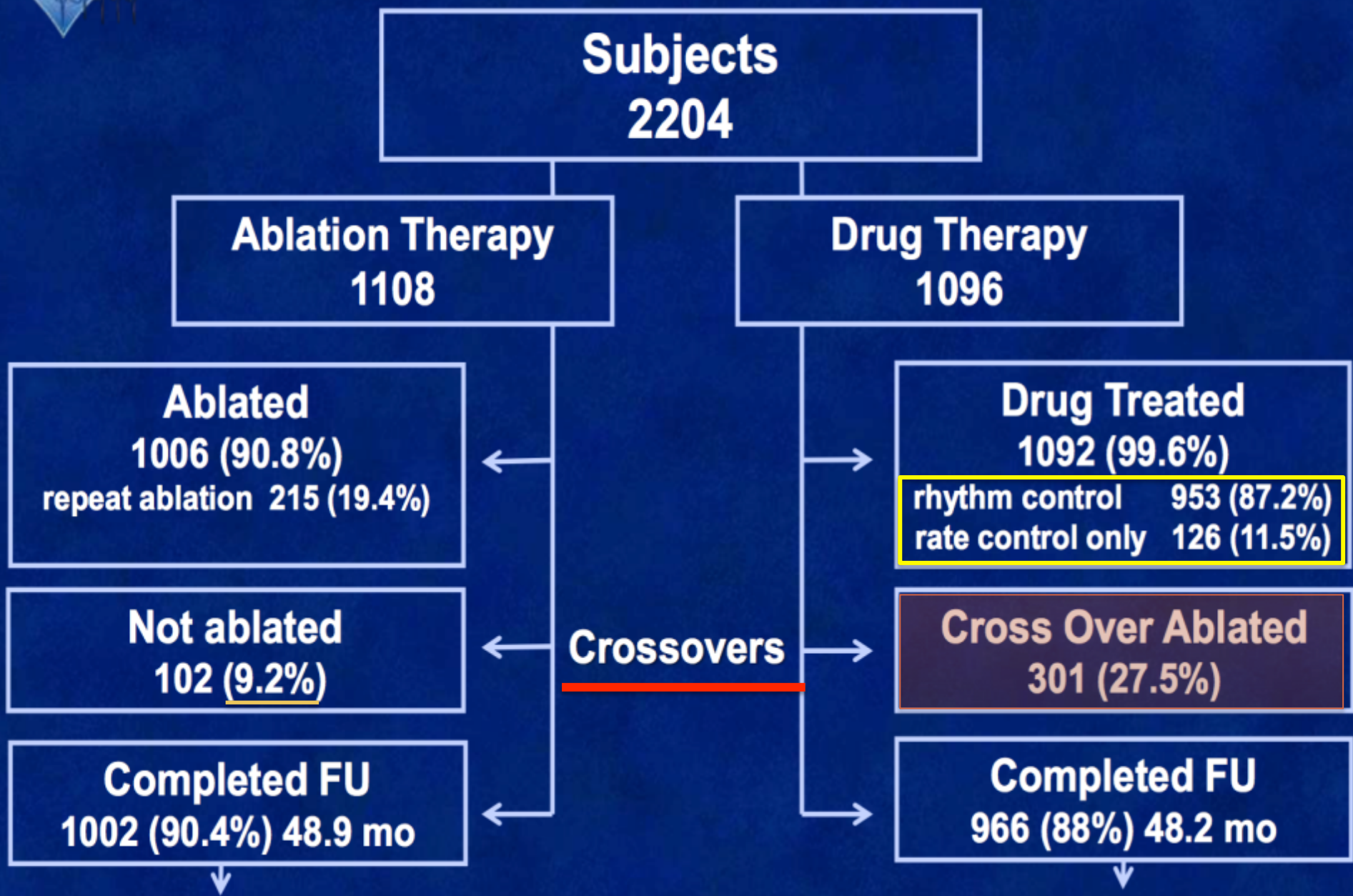
CABANA Trial

non publiée

- 140 centres. Etude randomisée contrôlée
- RF FA 1108 vs TT 1096 pts.
- Age moyen 67,5 ans, suivi 5 ans.
- Tous type de FA , 50 % persistante
- Critère primaire composite: Mortalité totale, AVC invalidant, Saignements majeurs, arrêts cardiaques.
- Critère secondaire: mortalité, hospitalisation CV.
- Intention de traiter

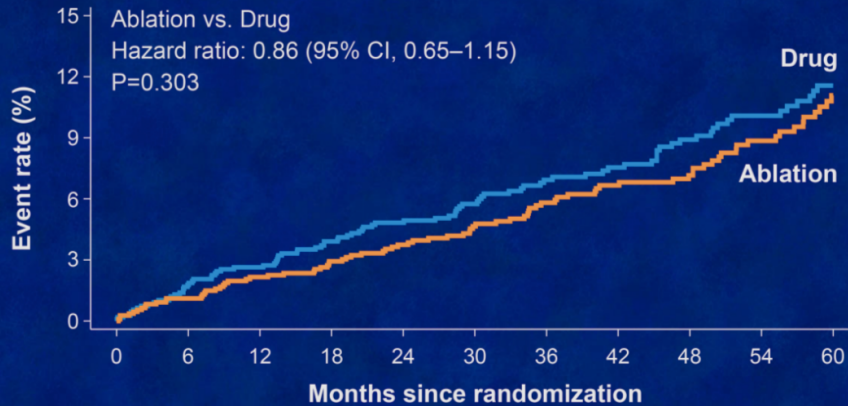


Patient Randomization

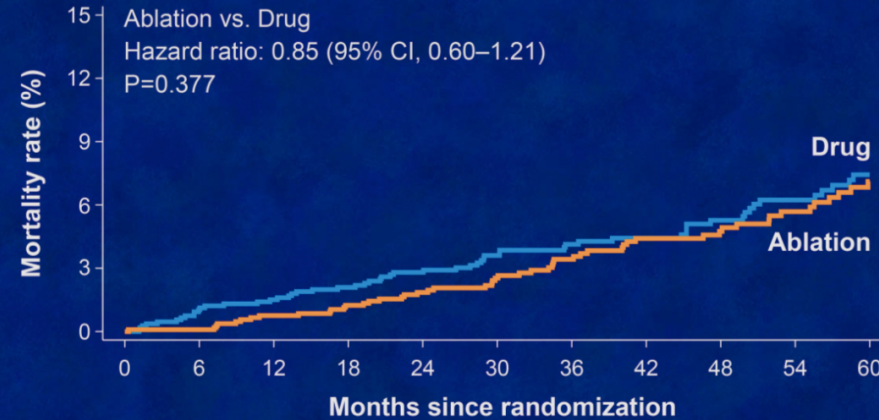




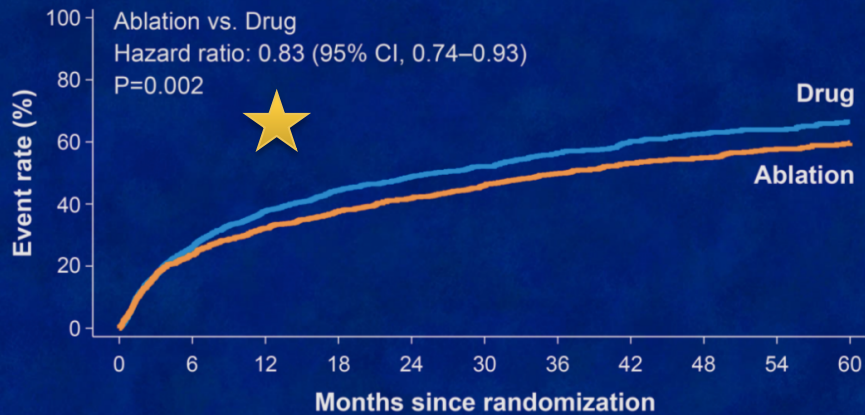
Primary Endpoint (Death, Disabling Stroke, Serious Bleeding, or Cardiac Arrest) (ITT)



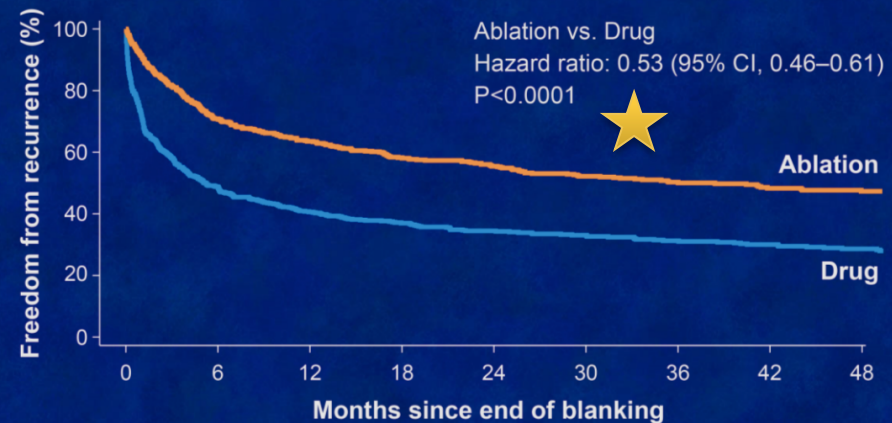
Estimates of All-Cause Mortality Risk (ITT)



All-Cause Mortality or Cardiovascular Hospitalization (ITT)



First Recurrence AF – Post Blanking* (ITT)





Primary and Secondary Outcomes (Treatment Received)*

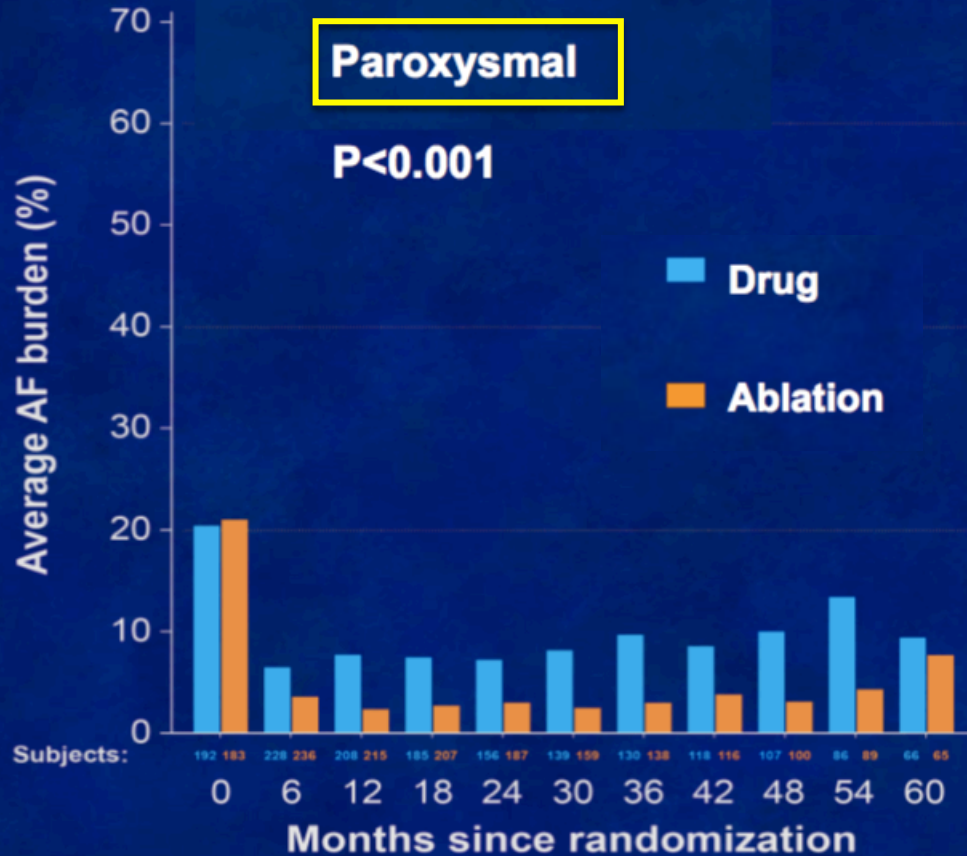
	Ablation (N = 1307)	Drug (N = 897)	Hazard Ratio (95% CI)	P- Value
Primary Outcome	92 (7.0%)	98 (10.9%)	0.67 (0.50, 0.89)	0.006
Secondary Outcomes				
All-cause mortality	58 (4.4%)	67 (7.5%)	0.60 (0.42, 0.86)	0.005
Death or CV hospitalization	538 (41.2%)	672 (74.9%)	0.83 (0.74, 0.94)	0.002

Percent AF Burden Holter Analysis by Baseline Pattern of AF

Paroxysmal

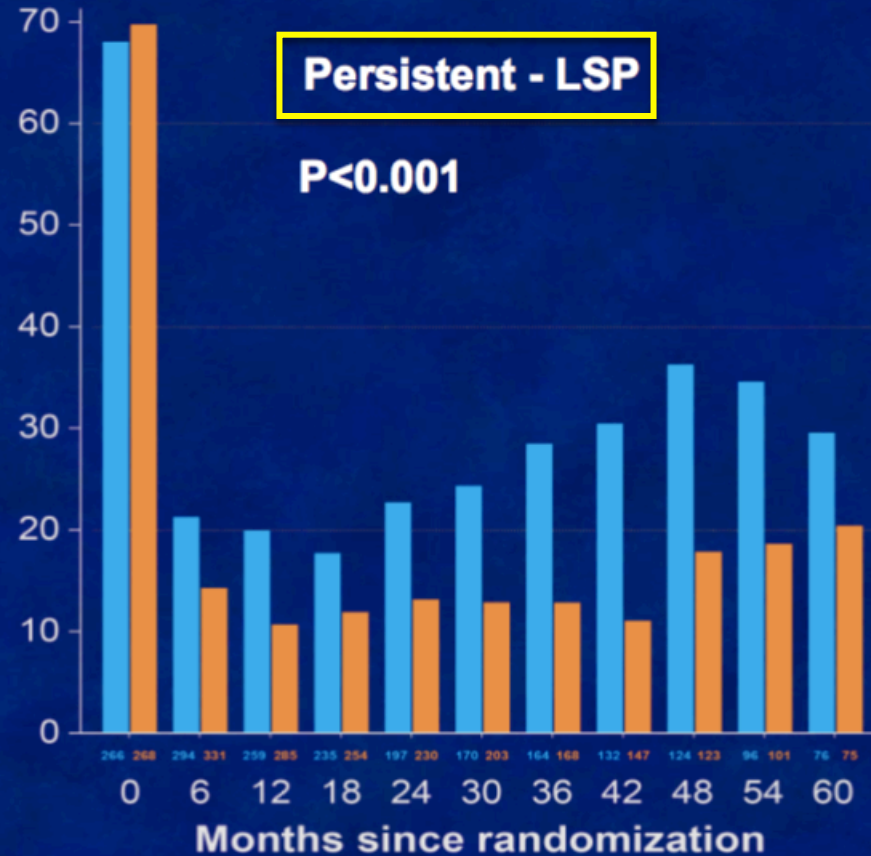
P<0.001

Drug
Ablation



Persistent - LSP

P<0.001



Complications

	Ablation n = 1006
Event	n (%)*
Catheter Insertion	39 (3.9)
Hematoma	23 (2.3)
Pseudo aneurysm	11 (1.1)
Atrial venous fistula	4 (0.4)
Pneumothorax	1 (0.1)
Sepsis	1 (0.1)
DVT	0
Pulmonary embolus	0
Catheter Manipulation Within the Heart	34 (3.4)
Pericardial effusion not requiring intervention	22 (2.2)
<u>Cardiac tamponade with perforation</u>	8 (0.8)
<u>TIA</u>	3 (0.3)
Coronary occlusion	0
Myocardial infarction	1 (0.1)
Complete heart block	0
Valvular damage	0
Ablation-related Events	18 (1.8)
Severe pericardial chest pain	11 (1.1)
Esophageal ulcer	5 (0.5)
<u>Pulmonary Vein Stenosis > 75%</u>	1 (0.1)
Phrenic nerve injury	1 (0.1)
<u>Atrial esophageal fistula</u>	0
Medication-related Events	0
Heparin induced bleeding	0

	Pts Receiving Drug n = 1092
Event	n (%)*
<u>Hyper- or hypothyroidism</u>	17 (1.6)
Hypotension	3 (0.3)
<u>Major proarrhythmic event (VT,VF)</u>	9 (0.8)
Torsades des pointes	0
Atrial proarrhythmic event	1 (0.1)
Heart failure	0
Allergic reaction	7 (0.6)
Gastrointestinal abnormality	3 (0.3)
Moderate or severe diarrhea	0
Liver injury/failure	3 (0.3)
Pulmonary toxicity	1 (0.1)
Blindness	0
Kidney damage	0
Renal failure	0
Severe headache	0

* n (%) = number (percent) of patients who reported drug-related adverse event
Percent is calculated among all patients that have received drug.

Conclusions de CABANA

- **Résultats neutres** pour le critère de jugement principal (décès toutes causes, AVC déficitaire, saignement grave, arrêt cardiaque) ou décès de toutes causes. MAIS
- Problème de **cross-over** et d'évènements moins fréquents que prévus
- **Diminution du critère mortalité et hospitalisation de 17%** vs traitement médical
- **Diminution du risque de FA de 47%** à 4 ans vs traitement médical
- **Amélioration de la qualité de vie** surtout chez pts symptomatiques
- En « groupe traitement reçu » **diminution de 33% du critère principal et 40% mortalité en faveur de l'ablation.**
- **L'ablation est une stratégie à faible risque**

Messages

L'ablation de la FA sans cardiopathie

- devrait être bénéfique pour vous car

Diminution des hospitalisations, tendance à éviter les événements graves.

- Technique à faible risque.

Ne pas oublier de traiter les pathologies associées: FDR de FA

HTA

Poids

SAS

Exercice
physique

Thyroïde,
Alcool,
Diabète..

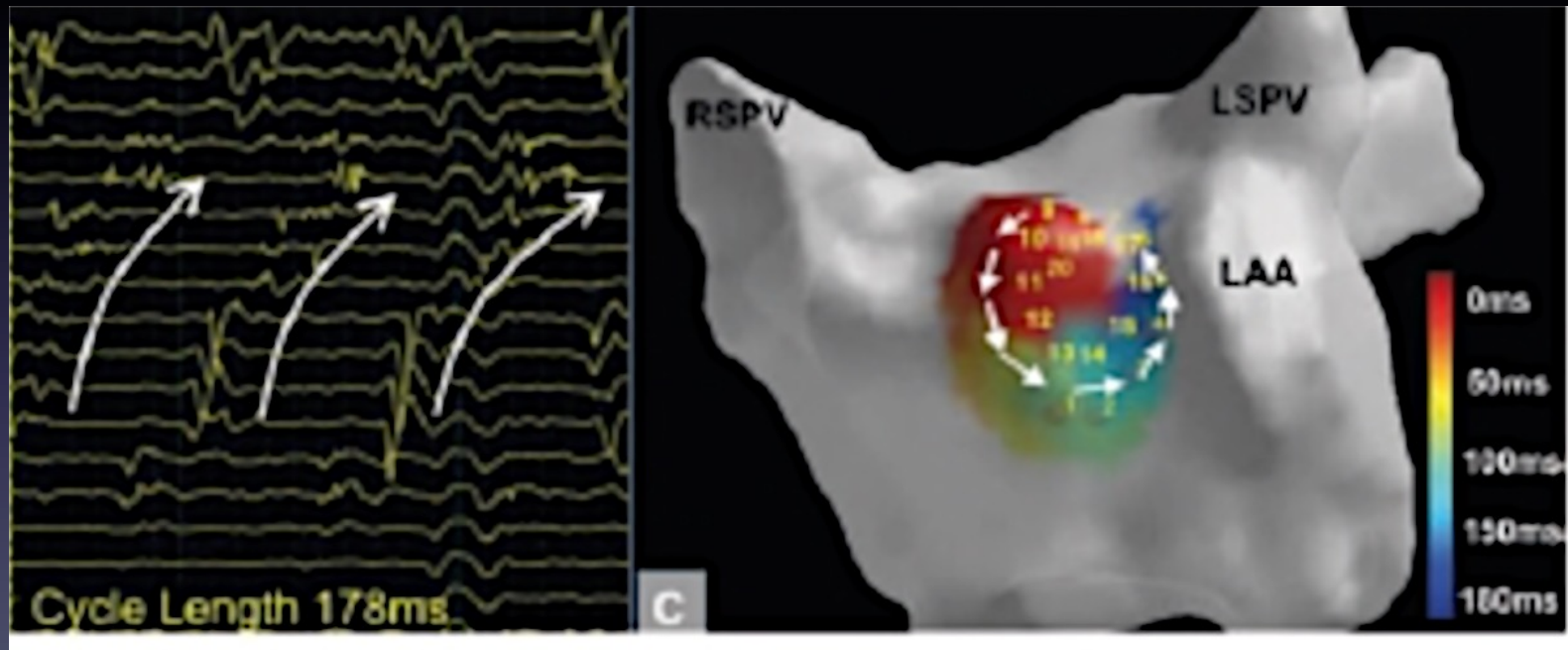
Obésité: Risque de FA augmente de 3 à 7% par unité de IMC, Risque de récurrence post ablation augmente de 3%/unité IMC

Exercice : inactif 5x, athlète 5x plus de FA.

Nouvelles Technologies

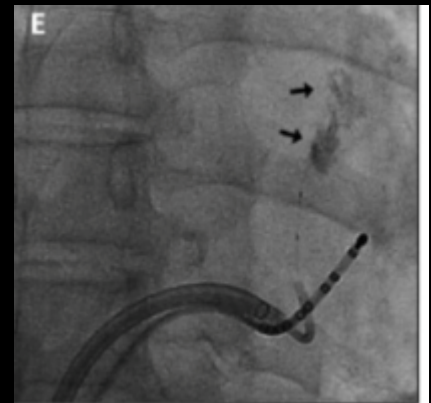
FA persistente

logiciel d'analyse de la dispersion spatio-temporelle des signaux (Système VOLTA) Fragmentation et activité régionale rotatoire



Traitement de la FA sur mesure, 95 % retour en RS,
meilleurs résultats dans la FA persistante > 80 % RS à 18 mois
1,4 procédures, diminution temps de RF.

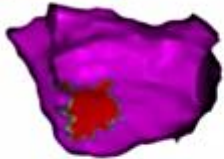
Nouveau Protocole de Bordeaux



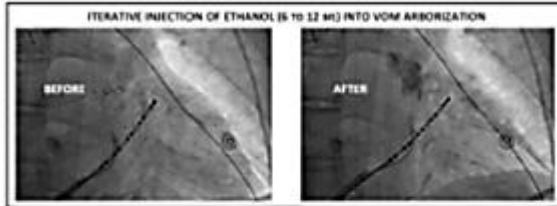
PROCEDURE STEPS

LOCAL ENDPOINTS

VOM ETHANOL INFUSION



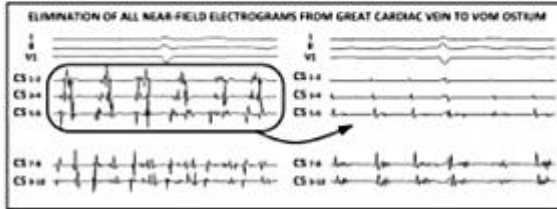
STEP 1



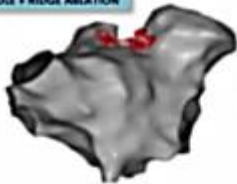
CORONARY SINUS ABLATION



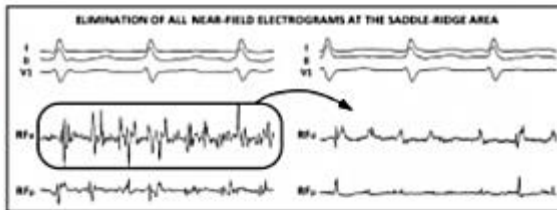
STEP 1



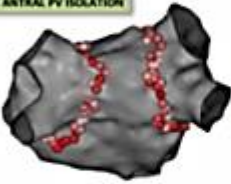
SADDLE + RIDGE ABLATION



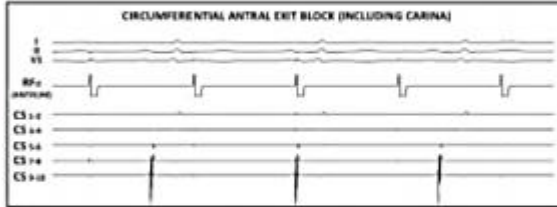
STEP 1



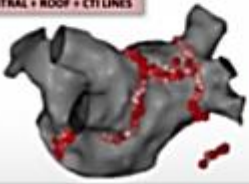
WIDE ANTRAL PV ISOLATION



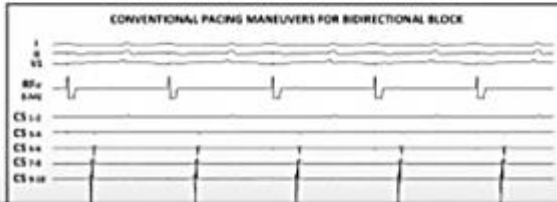
STEP 2



MITRAL + ROOF + CTI LINES



STEP 3



Thomas Pambrun ORCID iD: 0000-0001-6763-2350

MARSHALL bundles elimination, Pulmonary veins isolation and Lines completion for ANatomical ablation of persistent atrial fibrillation: MARSHALL-PLAN case series.

Thomas Pambrun, MD^{*}; Arnaud Denis, MD^{*}; Josselin Duchateau, MD^{*}; Frédéric

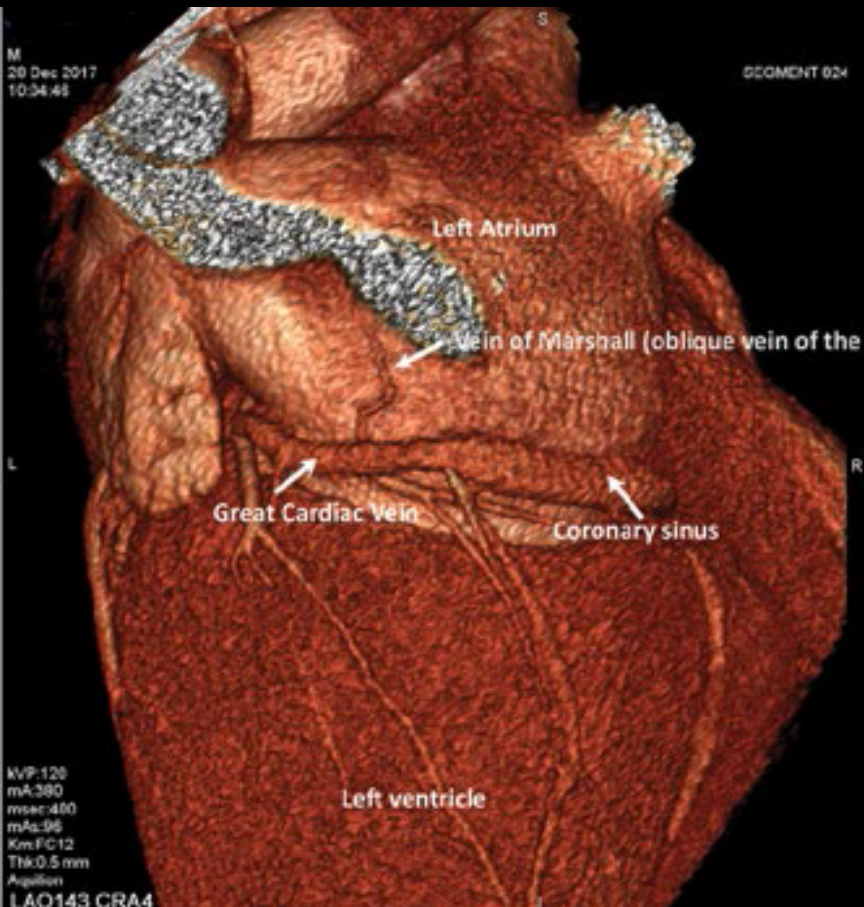
Sacher, MD, PhD^{*}; Méléze Hocini, MD^{*}; Pierre Jaïs, MD, PhD^{*}; Michel

Haïssaguerre, MD^{*}; Nicolas Derval, MD^{*}

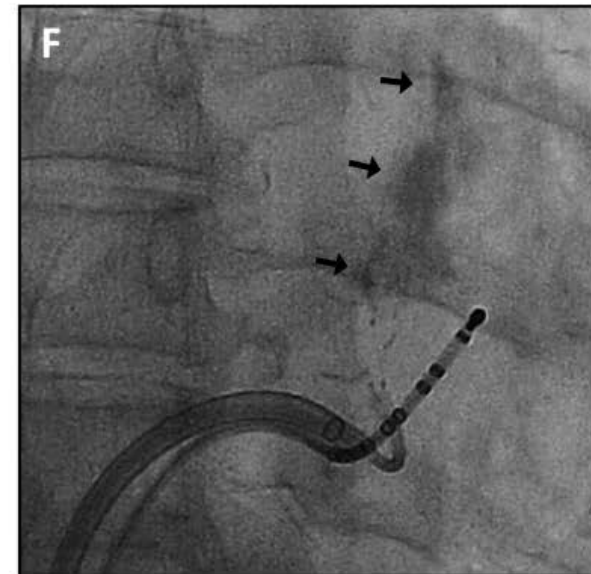
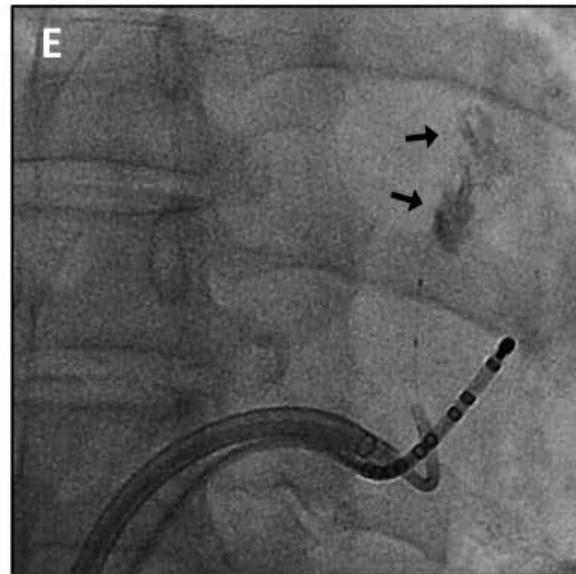
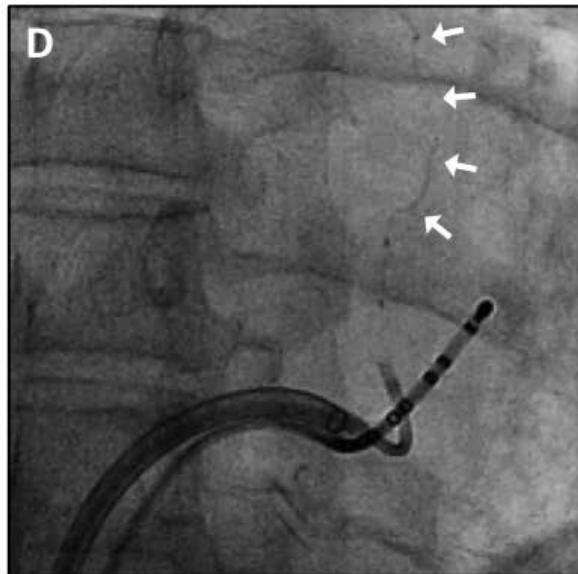
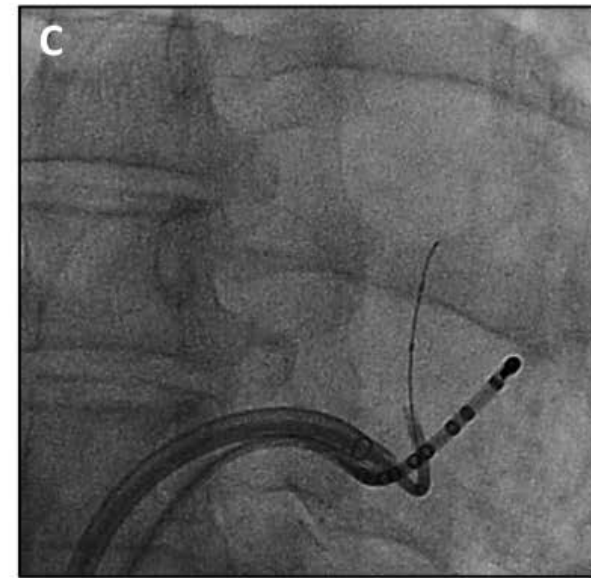
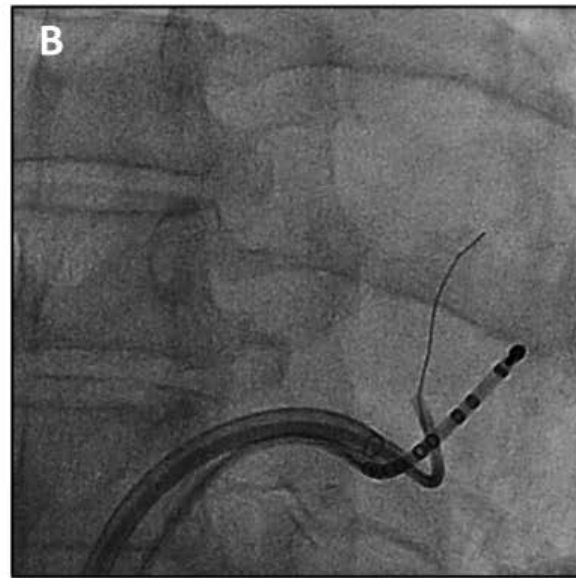
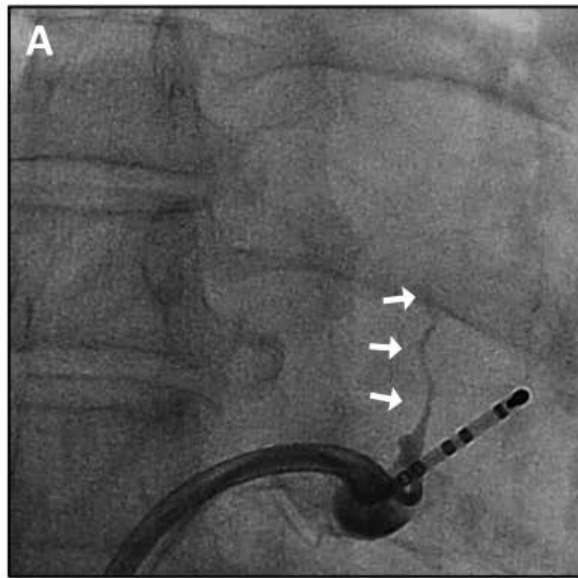
From: ^{*}Hôpital Cardiologique du Haut-Lévêque, CHU Bordeaux,

L'Institut de Rythmologie et modélisation Cardiaque (LIRYC),

Université Bordeaux, France.

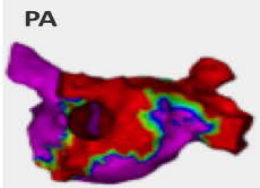
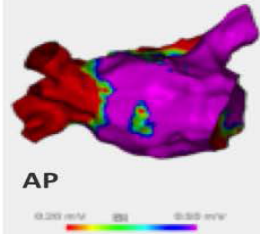


Alcoolisation de la Veine de Marshal



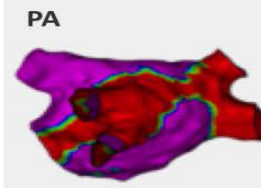
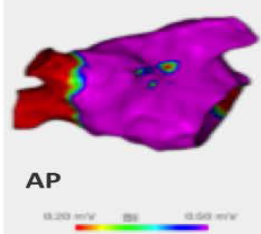
FINAL LESION SET

PATIENT 1



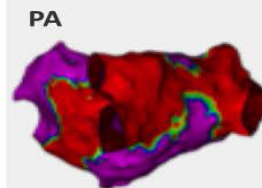
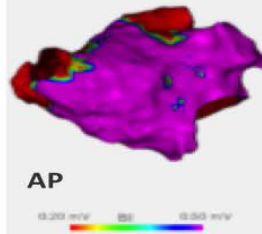
LA VOLUME 200 ML

PATIENT 2



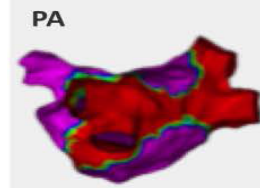
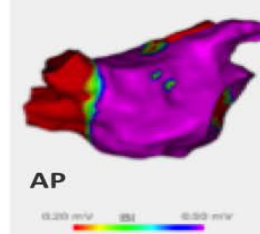
LA VOLUME 193 ML

PATIENT 3



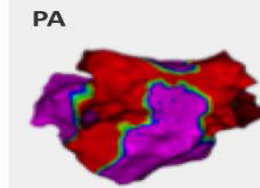
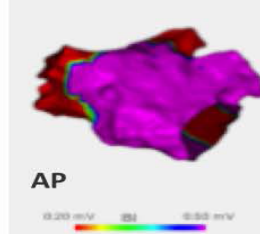
LA VOLUME 280 ML

PATIENT 4



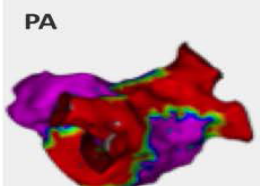
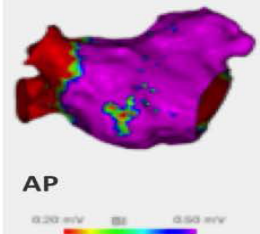
LA VOLUME 191 ML

PATIENT 5



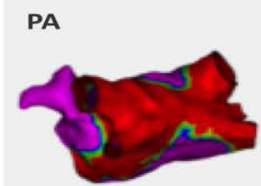
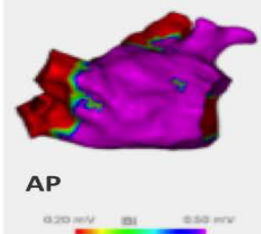
LA VOLUME 158 ML

PATIENT 6



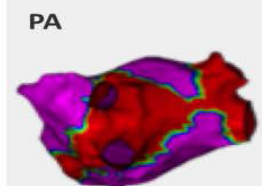
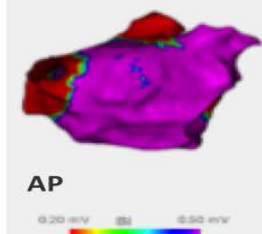
LA VOLUME 183 ML

PATIENT 7



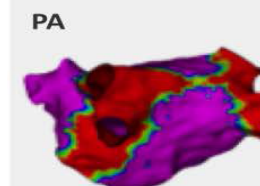
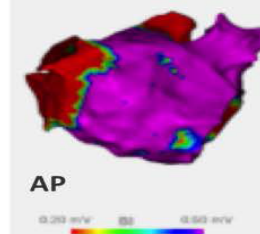
LA VOLUME 180 ML

PATIENT 8



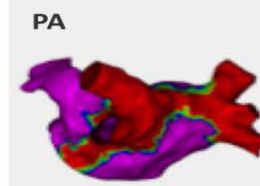
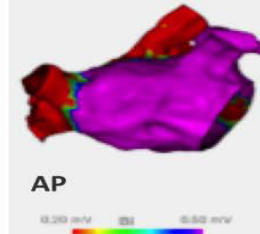
LA VOLUME 214 ML

PATIENT 9



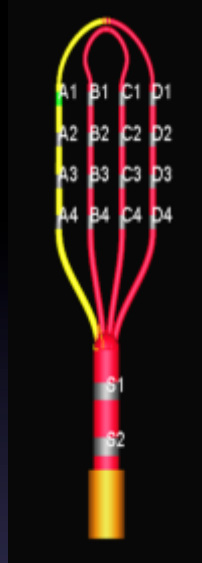
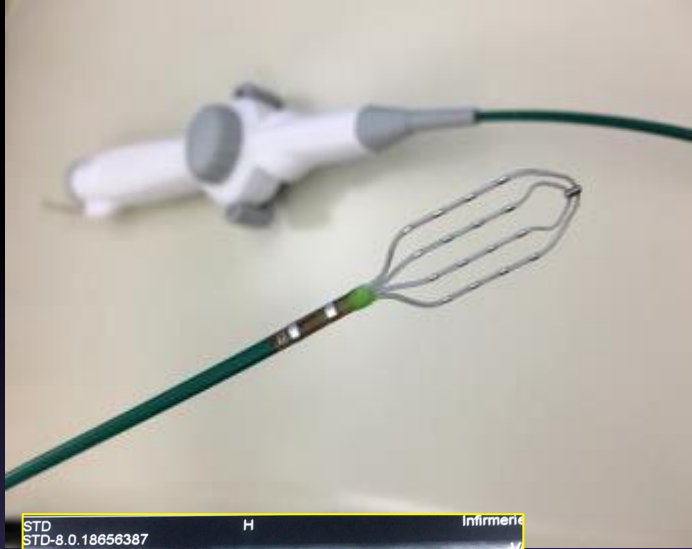
LA VOLUME 313 ML

PATIENT 10



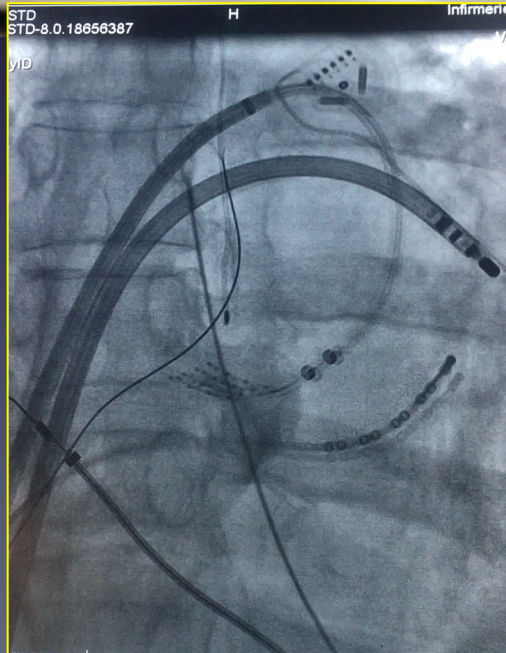
LA VOLUME 168 ML

HD GRID

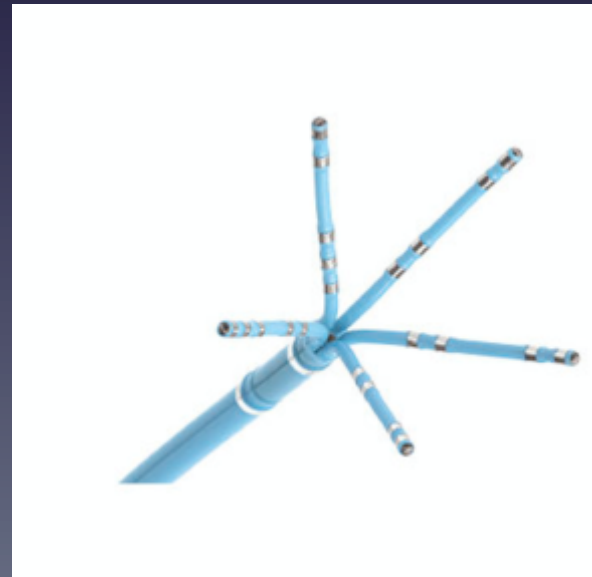


Signal Omnipolaire
Front d'activation, vitesse de conduction,
carte haute densité

Catheter multipolaire HD
16 pôles réparties sur 4 branches de 3Fr
Espacement 3mm et électrodes 1mm

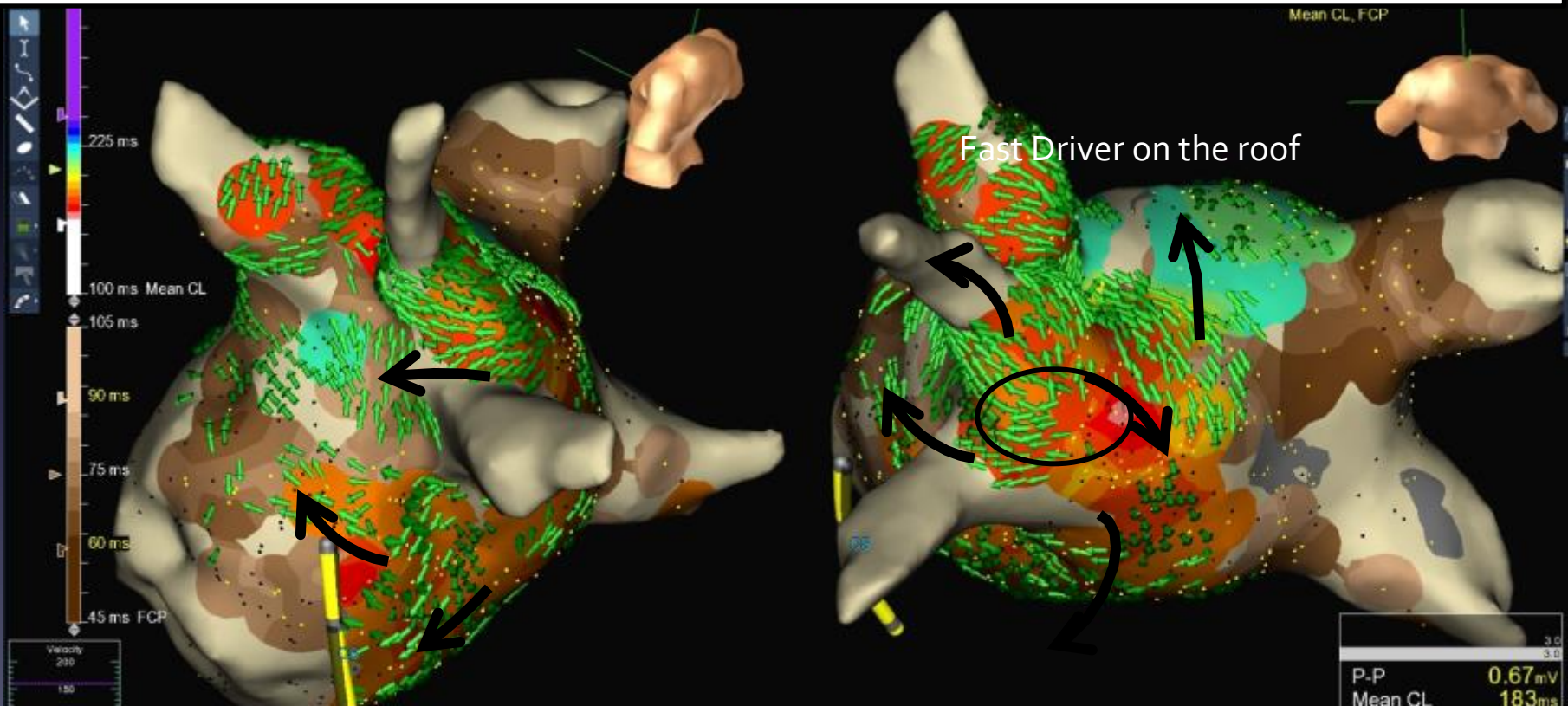


PENTARAY



Cartographie intégrée

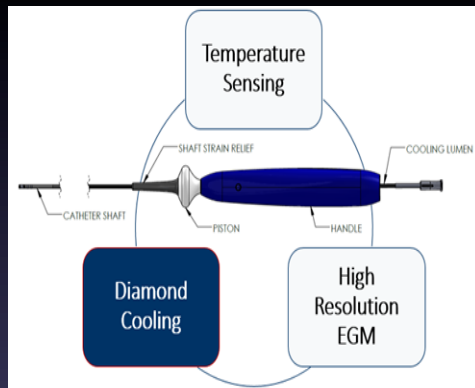
- Spectre de couleur: carte des cycles réguliers (Rouge: Rapide ; Bleu: lent).
- Spectre marron: EGMs fractionnés (darker brown)
- Spectre gris: Fibrose;
- Flèche verte : Chemin constant du front de dépolarisation



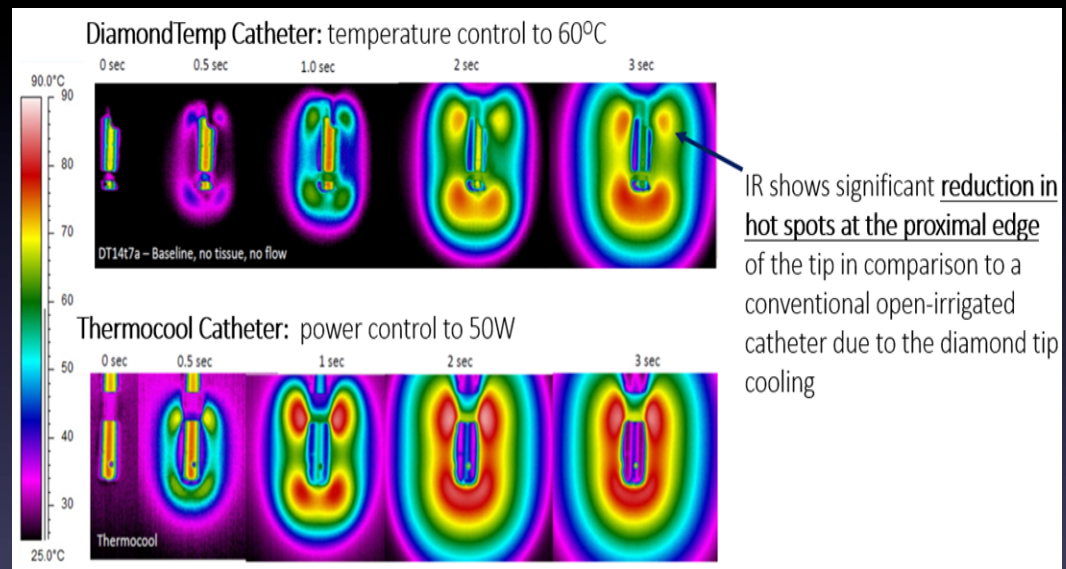
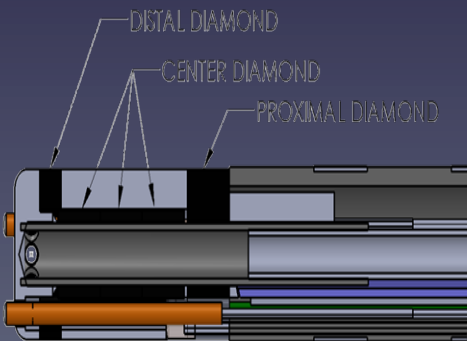
FA Paroxystique

les nouveaux outils
vers un
« Ablation rapide »

Cathéter Diamond + efficacité 6 sec, meilleur signal, moins d'irrigation



Cross Section of Catheter Tip



- Electrode distale en diamant– diffusion thermique rapide, lésion locale en 6 sec
- Ablation par encerclement antral des VP

Ablation « one shot »

Table 1 Comparison of different energy sources for ablation

	Radiofrequency	Cryothermal
Contact	Dependent	Dependent
Potential for collateral damage	+++	++
Thrombus	++	+
Tissue specificity	-	-
Reversibility potential	-	++

Laser	PEF (DC energy) *
Dependent	Independent
+++	+ [†]
+++	-
-	+++
-	+++



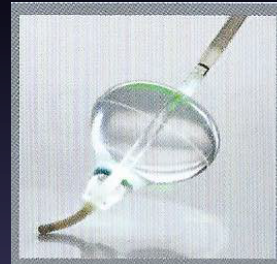
LUMINIZE (Boston)



PVAC GOLD (Medtronic)



ARTIC FRONT ADVANCE cryoballon (Medtronic)



HEARTLIGHT X3 (Cardiofocus)



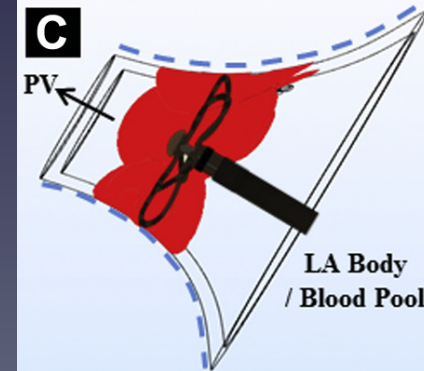
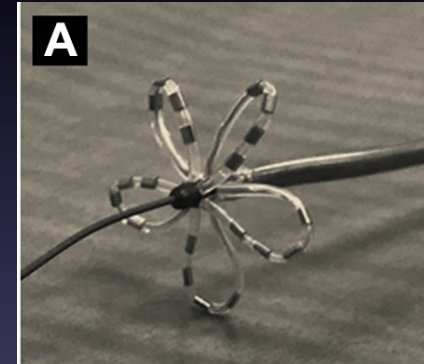
HELIOSTAR (Biosense)



GLOBE (Kardium)

- **Nouvelle technologie EvenCool^{MC} Cryo**, optimisant l'administration de produit réfrigérant à l'intérieur du ballonnet.
- **Refroidissement homogène** de l'ensemble de l'hémisphère distal.
- **Surface de congélation plus importante** : déconnexion veineuse plus facile et rapide.

- 3^e génération de ballon **Laser** compliant.
- Visualisation directe de la lésion par **endoscope**.
- Optimisation du contact avec les veines et l'antré.
- Ballon s'inflant progressivement, s'adaptant à toutes les anatomies.



Electroporation = Nouvelle Energie

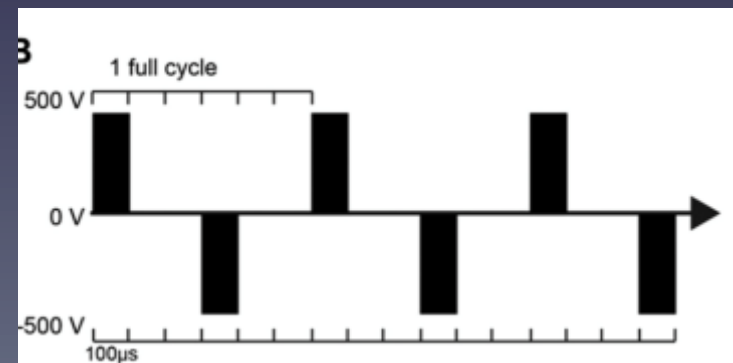
- Champs électrique pulsé

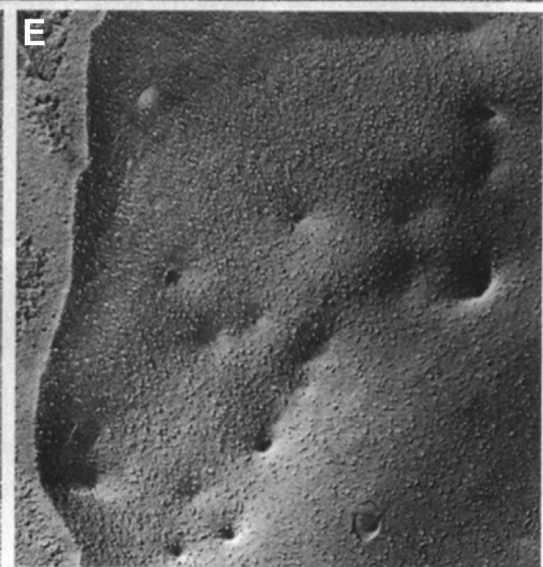
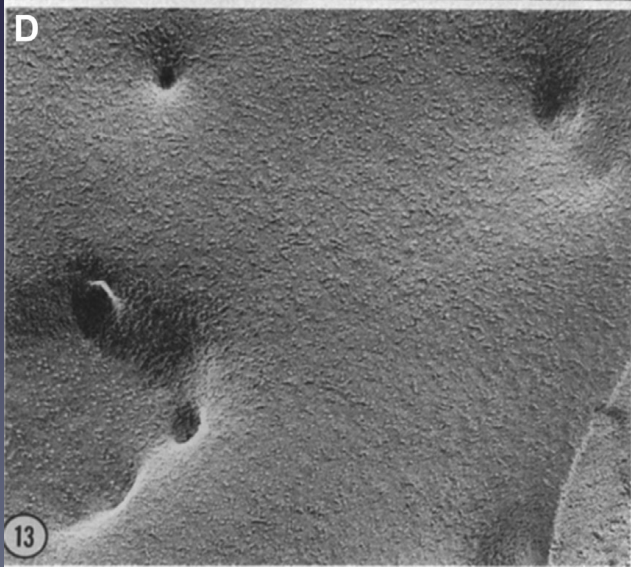
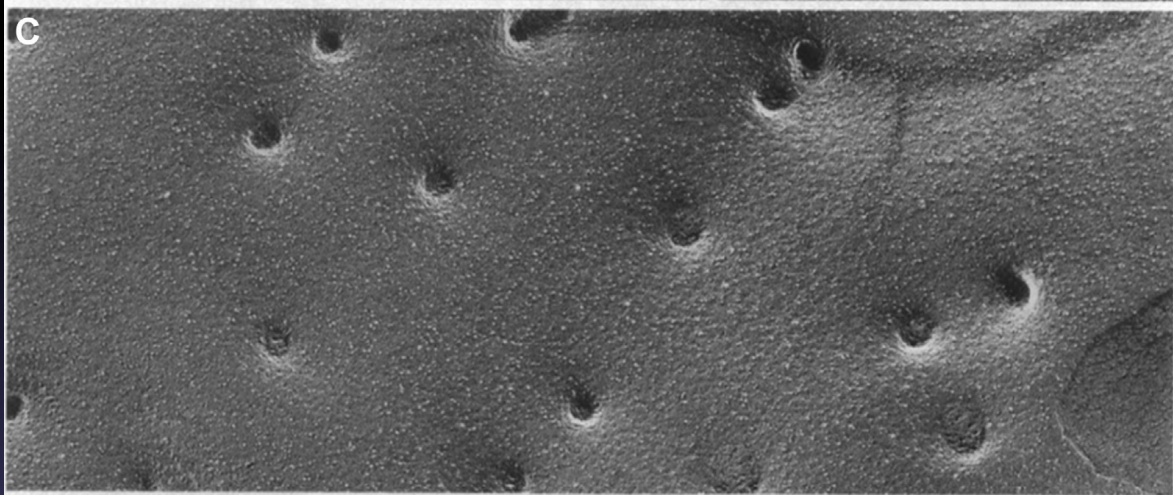
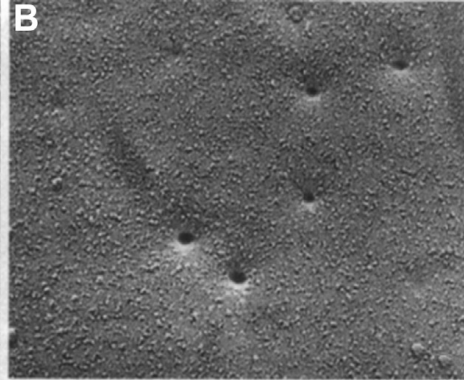
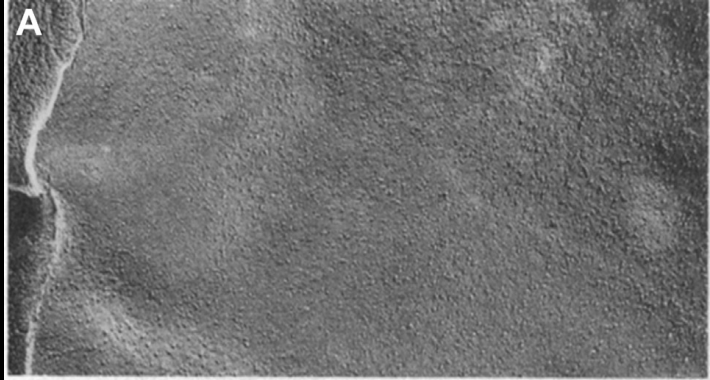
= micro-choc altère mb cellulaire en créant des micropores
et mort cardiomyocyte (T plus sensible)

Pas de dégats des autres tissus (pas de sténose VP, ni atteinte
oesophagienne ou phrénique)

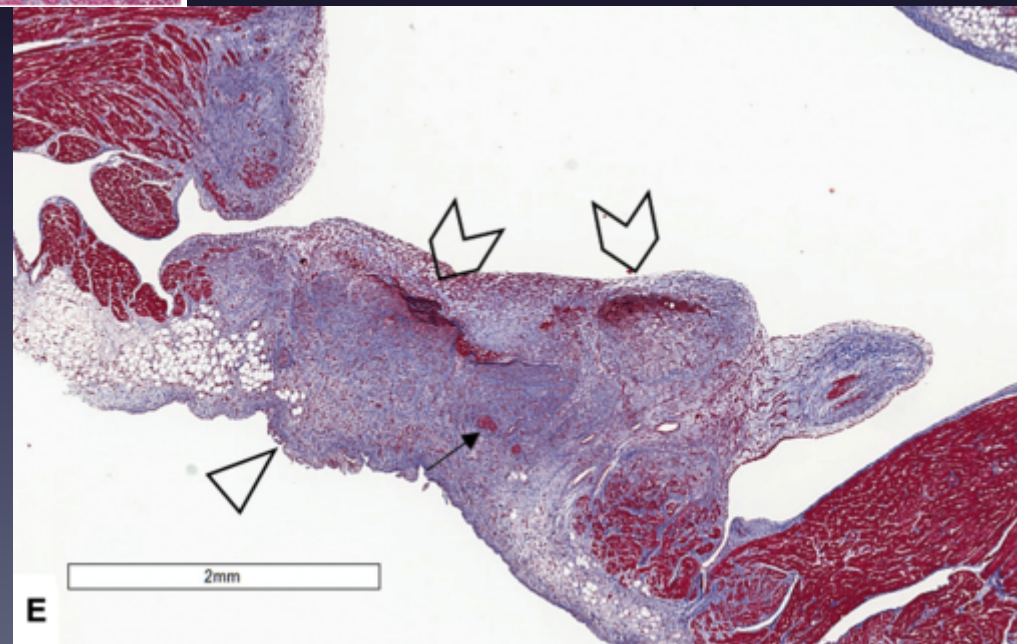
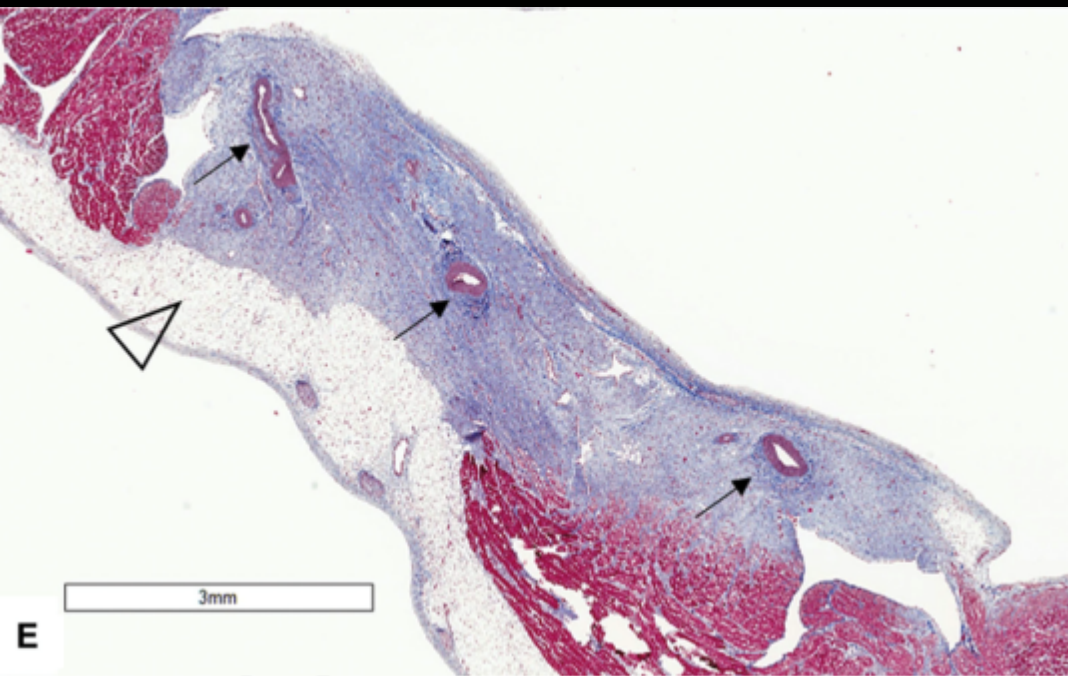
4 tirs de 1 sec

Etudes animales

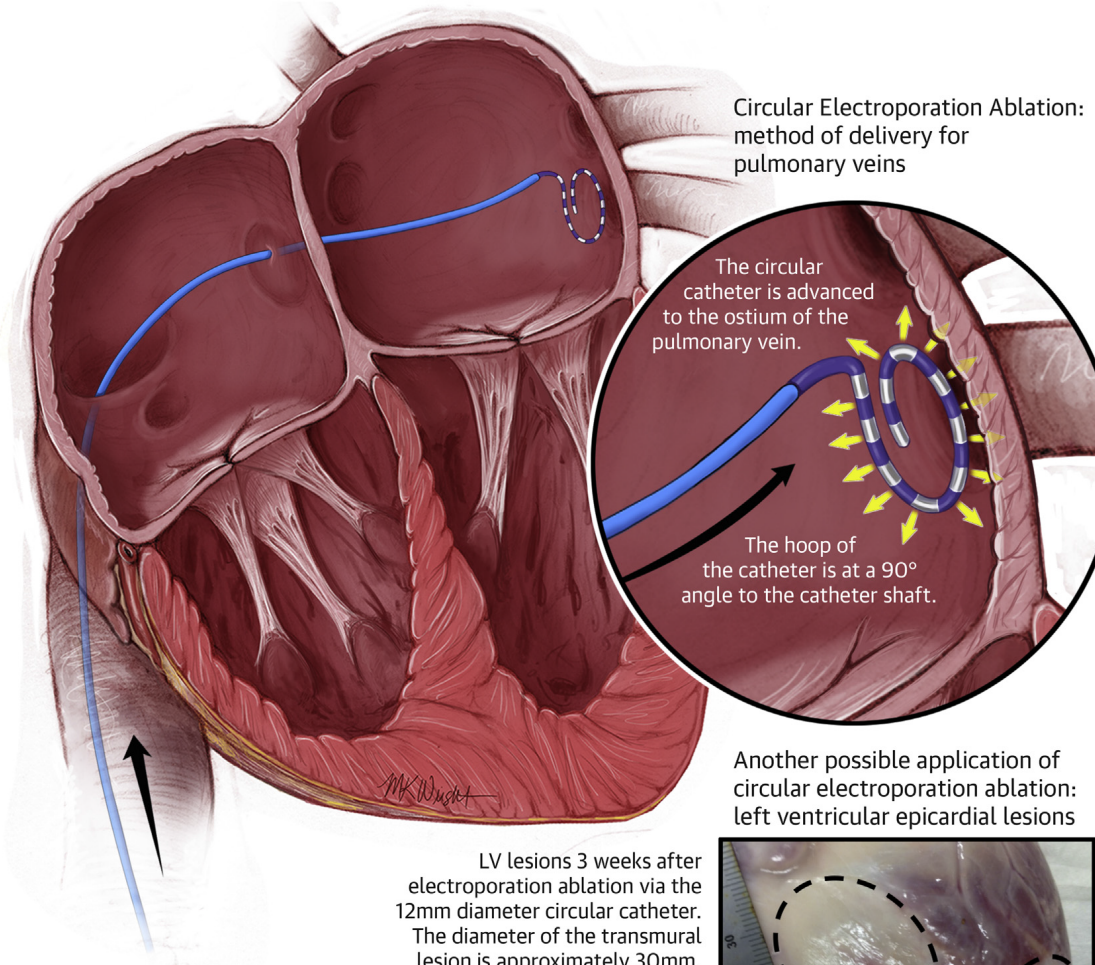




Electroporation



RF



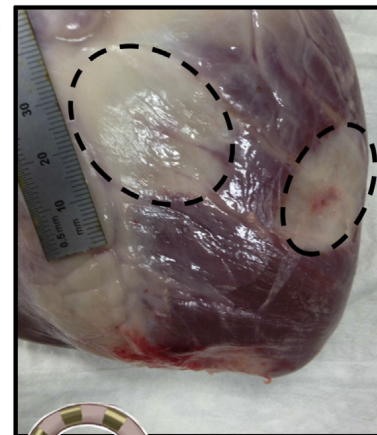
Circular Electroporation Ablation: method of delivery for pulmonary veins

The circular catheter is advanced to the ostium of the pulmonary vein.

The hoop of the catheter is at a 90° angle to the catheter shaft.

Another possible application of circular electroporation ablation: left ventricular epicardial lesions

LV lesions 3 weeks after electroporation ablation via the 12mm diameter circular catheter. The diameter of the transmural lesion is approximately 30mm.



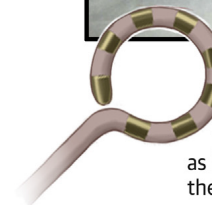
Circular Electroporation Ablation

Advantages

- Ultra fast
- Great lesion depth
- Non-thermal
- Myocardial specificity:
 - No nerve damage
 - No coronary damage
 - No PV stenosis
 - Esophageal fistulas unlikely
- LV transmuralty with pericardial ablation

Disadvantages

- No power titration:
 - Not suitable for AVNRT
- Large lesions:
 - Not 1st choice for focal arrhythmias
- Myocardial stunning:
 - Endpoint misleading
- High voltage:
 - Technical catheter challenge
- Tiny gas bubbles



The hoop of the custom catheter used in this application is in the same plane as the catheter shaft, as it is intended for use in the pericardial space.

Ablation of Atrial Fibrillation With Pulsed Electric Fields



An Ultra-Rapid, Tissue-Selective Modality for Cardiac Ablation

Vivek Y. Reddy, MD,^{a,b} Jacob Koruth, MD,^a Pierre Jais, MD,^c Jan Petru, MD,^b Ferdinand Timko, MD,^d Ivo Skalsky, MD,^d Robert Hebler, MD,^e Louis Labrousse, MD,^f Laurent Barandon, MD,^f Stepan Kralovec,^b Moritoshi Funosako, MD,^b Boochi Babu Mannuva, MD,^b Lucie Sediva, MD,^b Petr Neuzil, MD, PhD^b

ABSTRACT

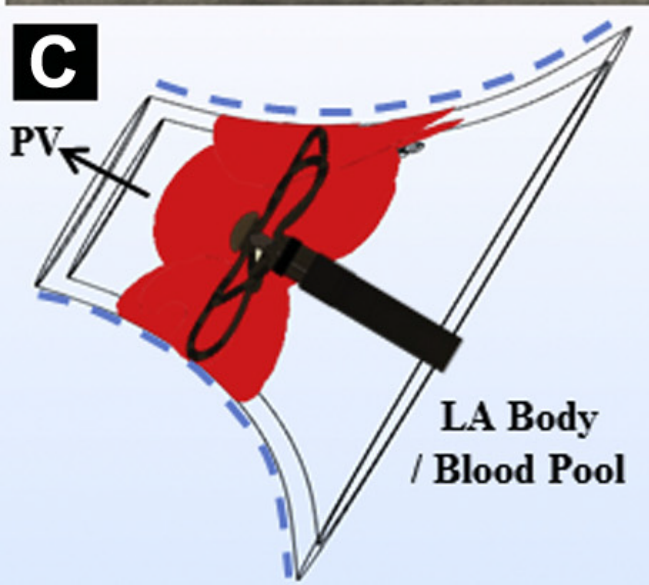
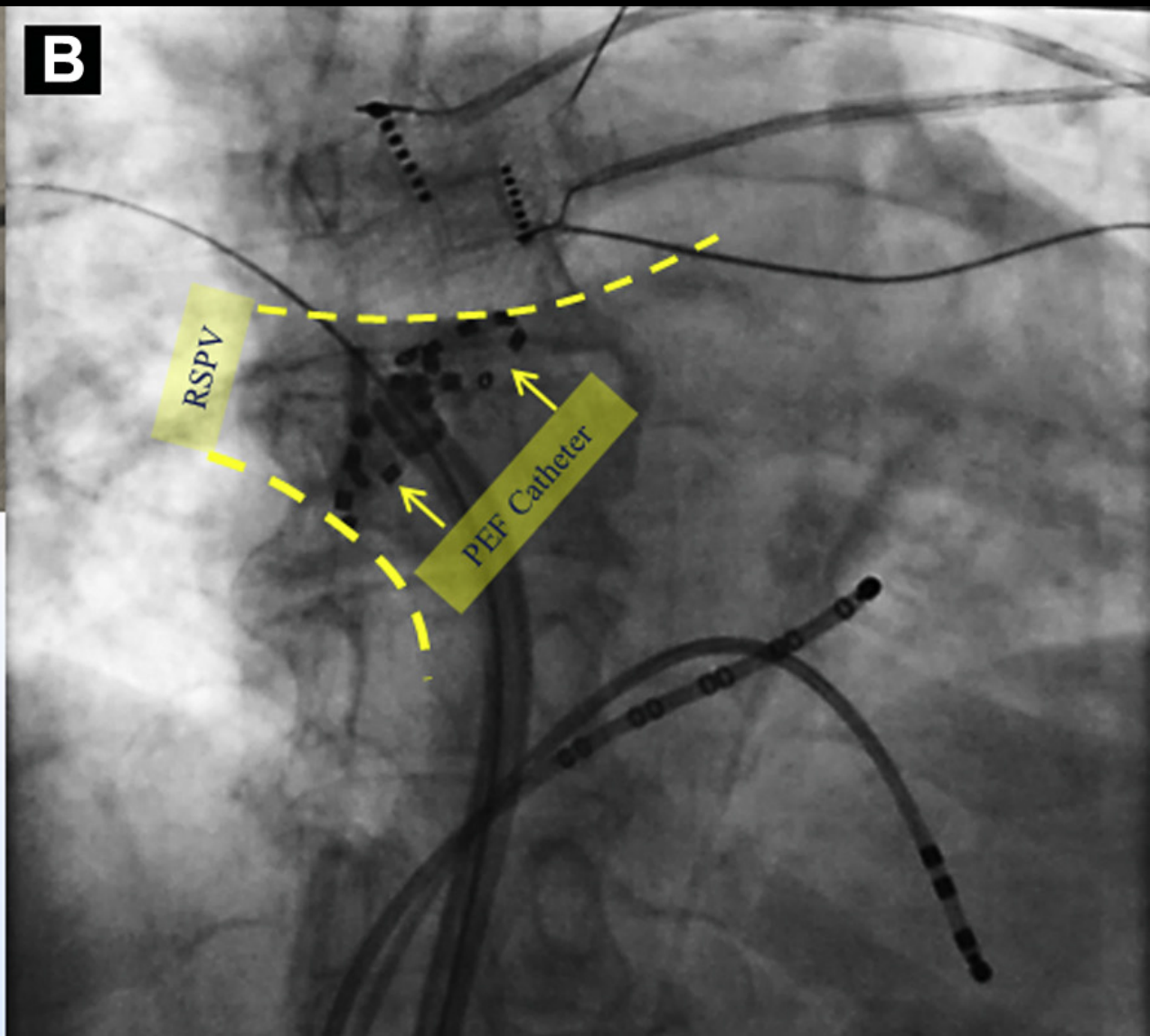
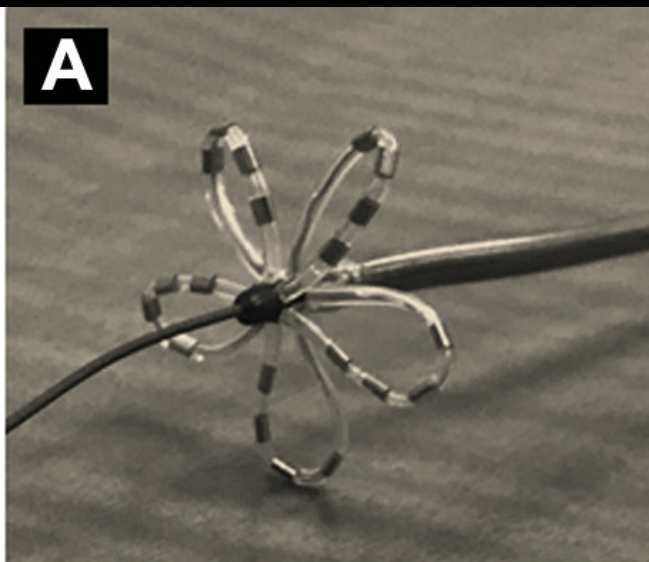
OBJECTIVES The authors report the first acute clinical experience of atrial fibrillation ablation with PEF—both epicardial box lesions during cardiac surgery, and catheter-based PV isolation.

BACKGROUND Standard energy sources rely on time-dependent conductive heating/cooling and ablate all tissue types indiscriminately. Pulsed electric field (PEF) energy ablates nonthermally by creating nanoscale pores in cell membranes. Potential advantages for atrial fibrillation ablation include: 1) cardiomyocytes have among the lowest sensitivity of any tissue to PEF—allowing tissue selectivity, thereby minimizing ablation of nontarget collateral tissue; 2) PEF is delivered rapidly over a few seconds; and 3) the absence of coagulative necrosis obviates the risk of pulmonary vein (PV) stenosis.

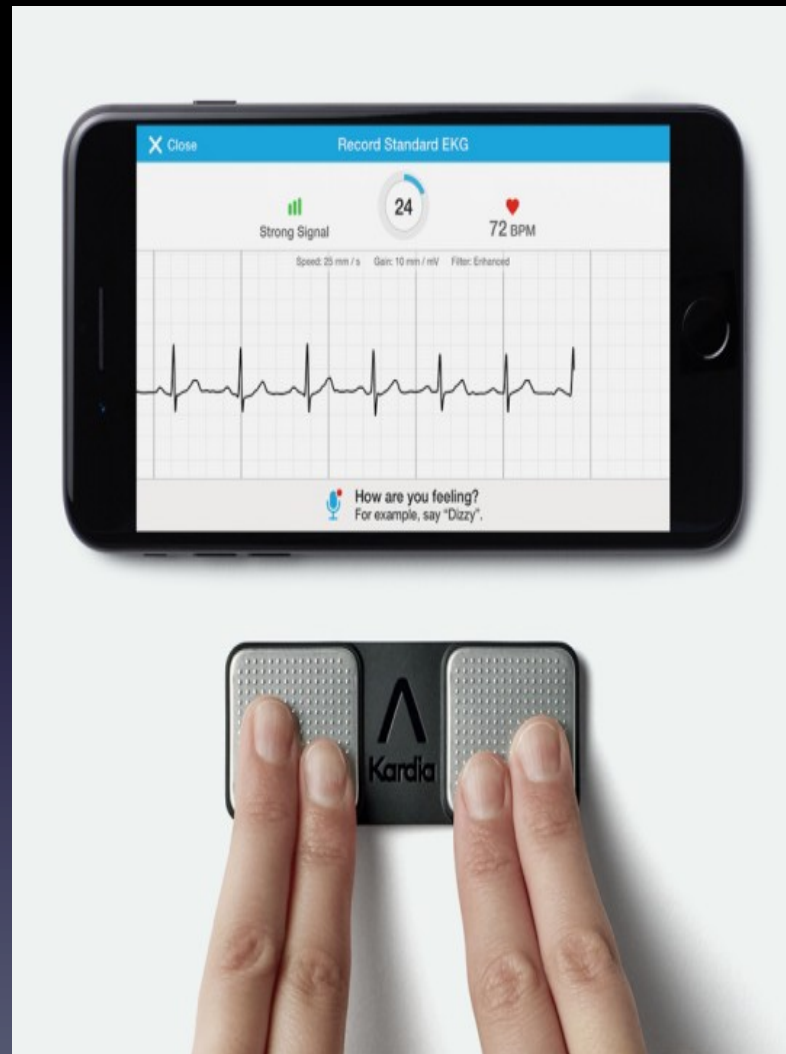
METHODS PEF ablation was performed using a custom over-the-wire endocardial catheter for percutaneous transseptal PV isolation, and a linear catheter for encircling the PVs and posterior left atrium during concomitant cardiac surgery. Endocardial voltage maps were created pre- and post-ablation. Continuous and categorical data are summarized and presented as mean \pm SD and frequencies.

RESULTS At 2 centers, 22 patients underwent ablation under general anesthesia: 15 endocardial and 7 epicardial. Catheter PV isolation was successful in all 57 PVs in 15 patients (100%) using 3.26 ± 0.5 lesions/PV: procedure time 67 ± 10.5 min, catheter time (PEF catheter entry to exit) 19 ± 2.5 min, total PEF energy delivery time <60 s/patient, and fluoroscopy time 12 ± 4.0 min. Surgical box lesions were successful in 6 of 7 patients (86%) using 2 lesions/patient. The catheter time for epicardial ablation was 50.7 ± 19.5 min. There were no complications.

CONCLUSIONS These data usher in a new era of tissue-specific, ultrarapid ablation of atrial fibrillation. (J Am Coll Cardiol EP 2018;4:987-95) © 2018 by the American College of Cardiology Foundation.



AliveCor Kardia Mobile



Kardia Band Smartwatch, Apple watch 4



FA diagnostic
Sensibilité 93 %
Spécificité 84 %

DISPONIBLE aux EU , 200 E + 400

KARDIA BAND

Automated Atrial Fibrillation Detection Algorithm Using Smartwatch Technology

Joseph M. Bumgarner MD^a, Cameron T. Lambert MD^a, Ayman A. Hussein MD^a, Daniel J. Cantillon MD^a, Bryan Baranowski MD^a, Kathy Wolski MPH^b, Bruce D. Lindsay MD^a, Oussama M. Wazni MD MBA^a, Khaldoun G. Tarakji MD MPH^a

JACC 2018

- Capacité du système à différencier FA du RS via un algorithme (régularité, onde P).
- 100 patients avec cardioversion
- ECG et KB avant et après

Automated Atrial Fibrillation Detection Algorithm Using Smartwatch Technology

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JACC 2018

- 169 tracés ECG et KB
- KB sensibilité/spécificité: 93 %/84 % vs 99/ 83 % par médecin
- Conclusion: KB algorithme détection FA, bon outil, peut aider détection FA.
- MAIS Apple Watch

Merci de votre attention!

HAS Mai 2018

Lors de l'instauration du traitement anticoagulant, **un AVK ou un AOD peut être prescrit en première intention.**

Si la prescription d'un AVK est envisagée, un AVK de la famille des coumariniques (warfarine ou acénocoumarol) doit être privilégiée, en notant que la warfarine est l'AVK le mieux évalué. La fluindione ne doit être envisagée qu'en dernière intention au regard du risque d'atteintes immuno-allergiques, souvent sévères, apparaissant dans les 6 premiers mois et plus fréquemment observées qu'avec les autres AVK.

Chez les patients traités par fluindione au long cours (plus de 6 mois), bien équilibrés et avec une bonne tolérance au traitement, il n'y a pas de raison de modifier le traitement. Chez les patients ayant récemment débuté un traitement par fluindione, la fonction rénale doit être surveillée régulièrement ainsi que tout signe pouvant évoquer un effet indésirable immuno-allergique de type cutané, hépatique ou hématologique.

L'apixaban a le meilleur niveau de preuve dans la démonstration de son intérêt versus warfarine.

Il n'existe à l'heure actuelle aucun argument scientifique pour remplacer un traitement par un anticoagulant oral efficace et bien toléré par un autre.

When oral anticoagulation is initiated in a patient with AF who is eligible for a NOAC (apixaban, dabigatran, edoxaban, or rivaroxaban), a NOAC is recommended in preference to a Vitamin K antagonist.	I	A
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ESC 2016

Traitement anticoagulant ?

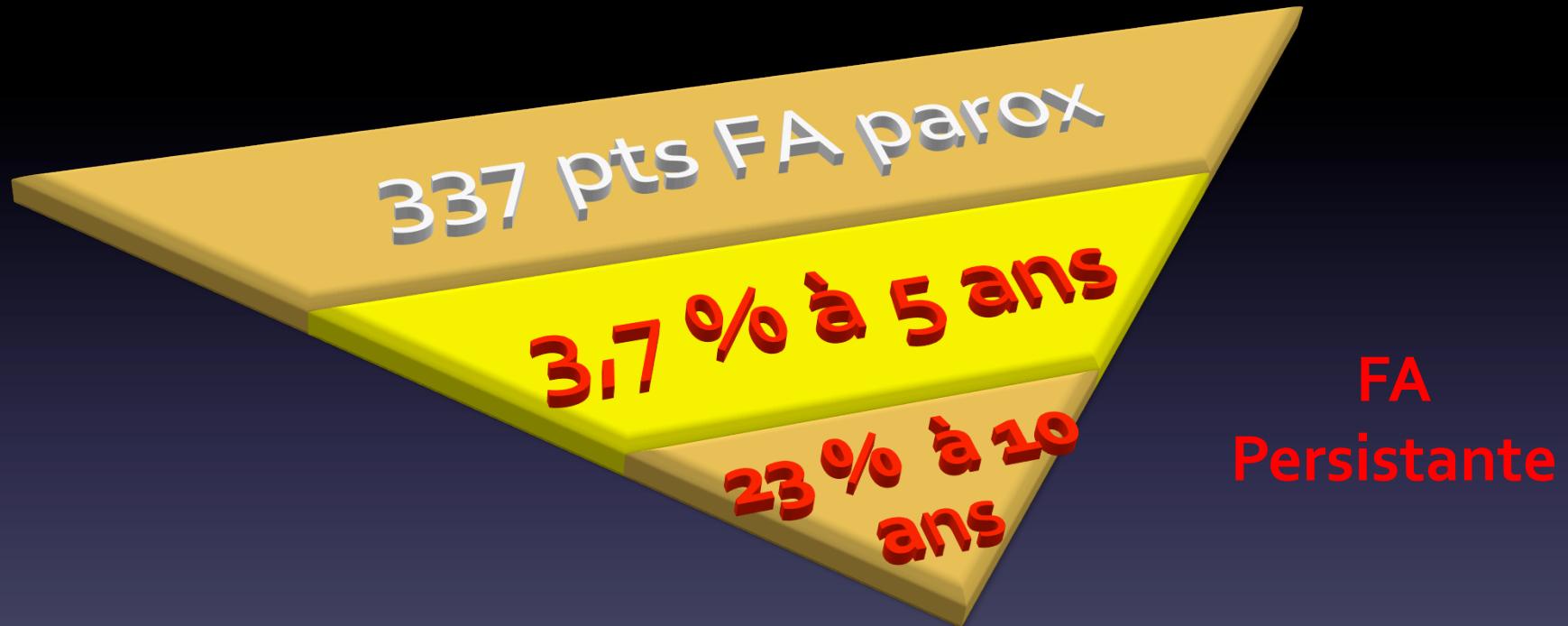
Saignements majeurs /Eliquis	2,13 %/an
AVC ischémique, hemor, TE	1,27%/an
Mortalité	3,52 % an

Suivi 1,8 ans, 18 000 patients, age M 70 ans, ChADS 2,1

Antiplatelet monotherapy is not recommended for stroke prevention in AF patients.

Apixaban versus Warfarin in Patients with Atrial Fibrillation NEJM 2011

Evolution ?



Facteurs prédictifs indépendants: âge, taille OG (50 mm ++), FE.

Pacing Clin Electrophysiol. 2014 Mar;37(3):345-55. doi: 10.1111/pace.12264. Epub 2013 Nov 14.

Evaluation of time course and predicting factors of progression of paroxysmal or persistent atrial fibrillation to permanent atrial fibrillation.

Anticoagulant post ablation ?

- 2 mois min après la procédure
- Pas de données scientifiques fortes après.
- Recommendations : au long cours si CHA₂DS₂

Vasc à partir de 2, discutable si 1, rien si à 0

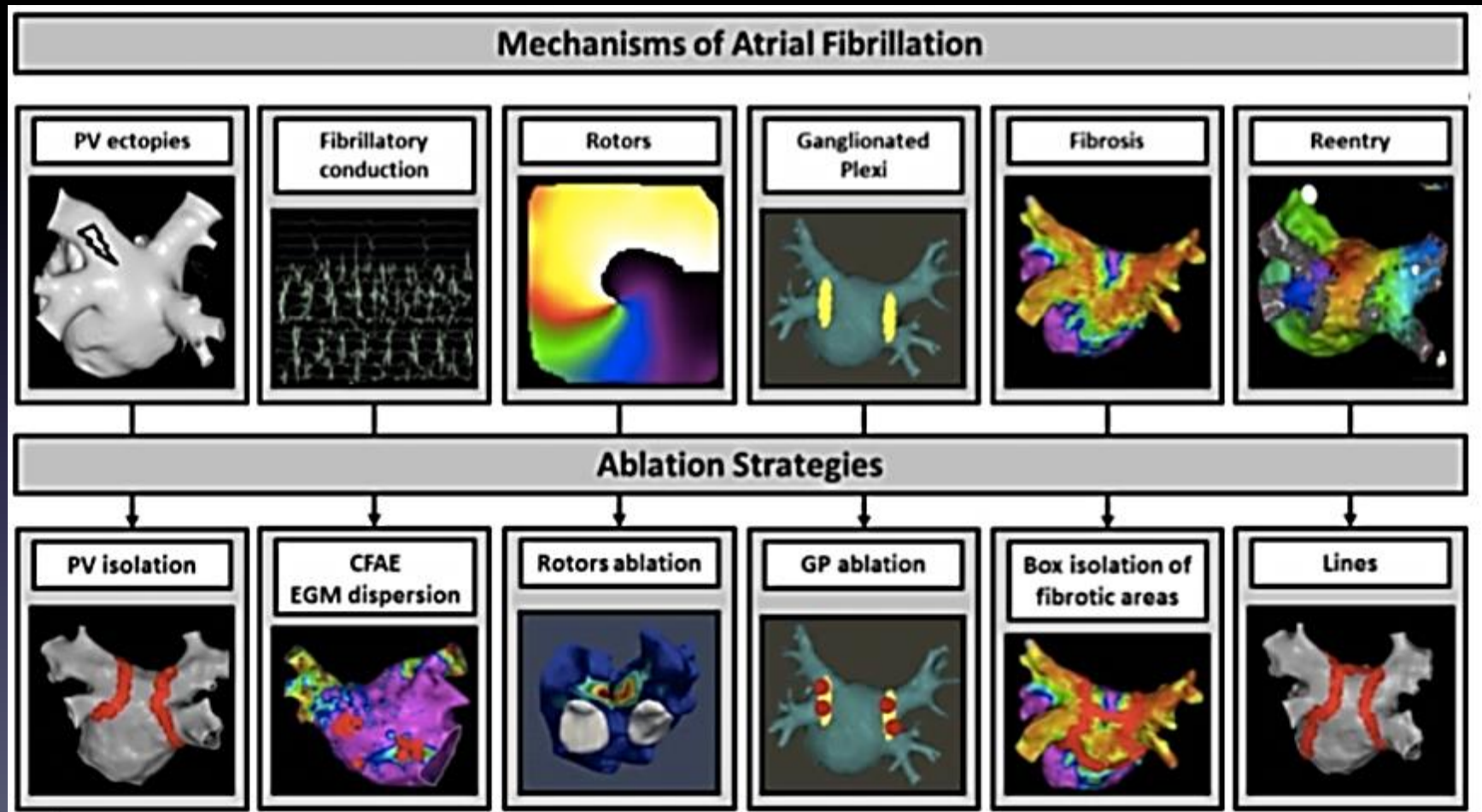
The Optimal Anti-Coagulation for Enhanced-Risk Patients Post-Catheter Ablation for Atrial Fibrillation (OCEAN) trial.



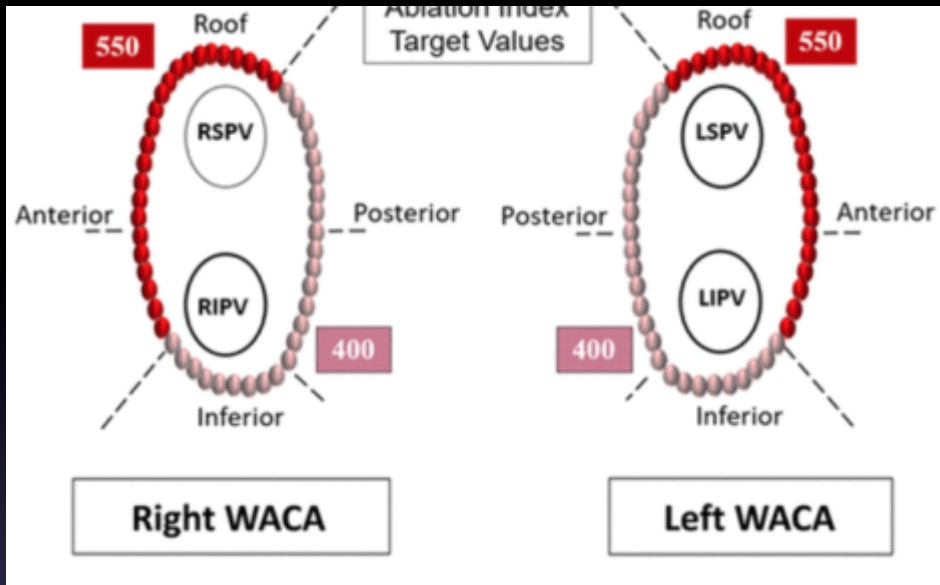
Primary and Secondary Outcomes as Randomized (ITT)

	Ablation N = 1108	Drug N = 1096	Hazard Ratio (95% CI)	P- Value
<i>Primary Outcome</i>				
Composite:	89 (8.0%)	101 (9.2%)	0.86 (0.65, 1.15)	0.30
Death	58 (5.2%)	67 (6.1%)	0.85 (0.60, 1.21)	0.38
Disabling stroke	3 (0.3%)	7 (0.6%)	0.42 (0.11, 1.62)	0.19
Serious bleeding	36 (3.2%)	36 (3.3%)	0.98 (0.62, 1.56)	0.93
Cardiac arrest	7 (0.6%)	11 (1.0%)	0.62 (0.24, 1.61)	0.33
<i>Secondary Outcomes</i>				
All-cause mortality	58 (5.2%)	67 (6.1%)	0.85 (0.60, 1.21)	0.38
Death or CV hospitalization	573 (51.7%)	637 (58.1%)	0.83 (0.74, 0.93)	0.001

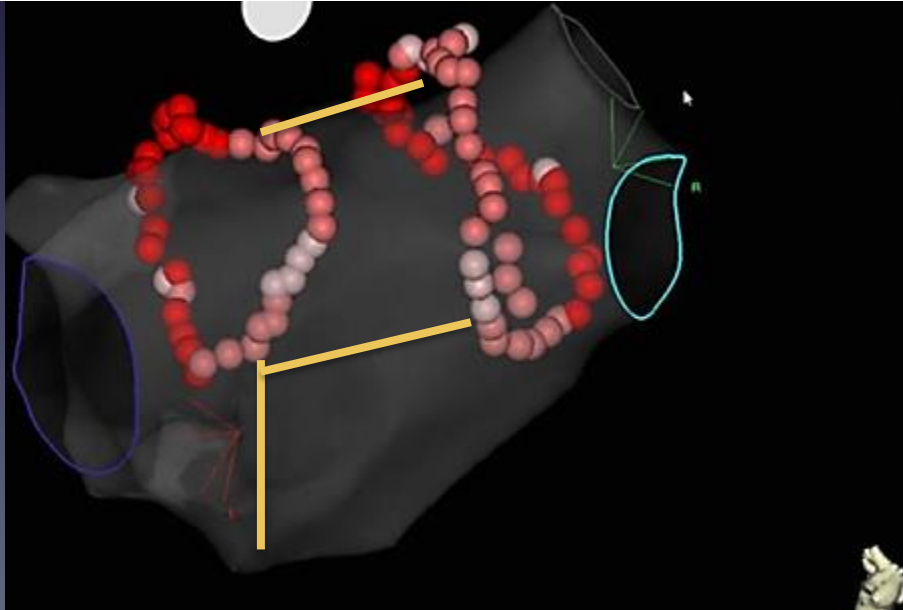
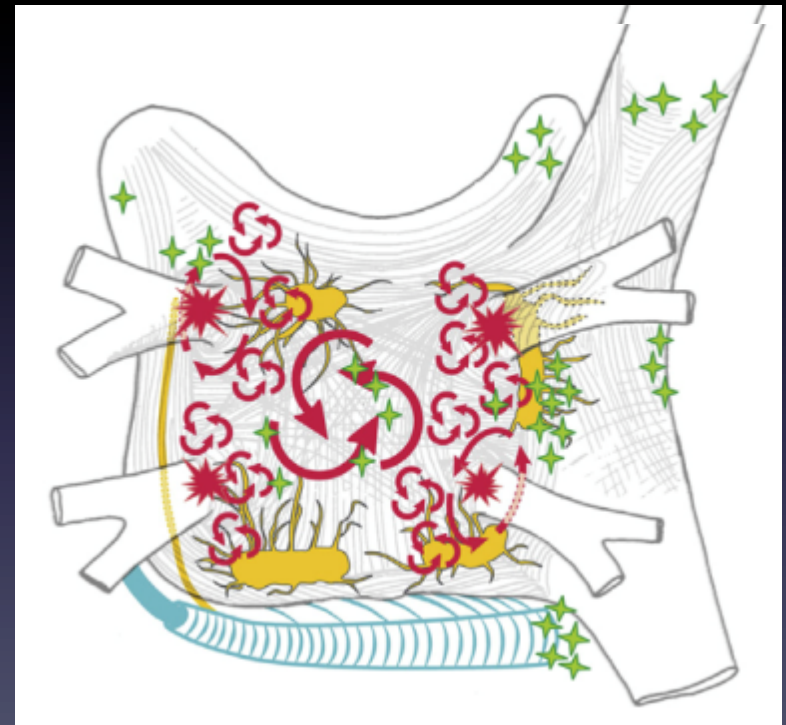
Quelle Cible dans la FA persistante ?



Tendance FA persistante



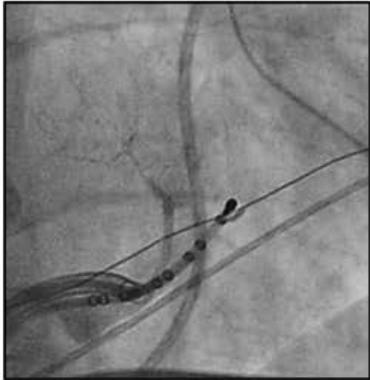
CORNER STONE



Données de démographie en intention de traiter

	Ablation N=1108	Médical N=1096
Age, median (Q1-Q3)	68 (62-72)	67 (72-72)
BMI	30	30
FA parox	42,4 %	43,5 %
FA persistante	47,3 %	47,3 %
FA persistant longue durée	10,3 %	1,1 %
Durée (années) de la FA avant randomisation	1,1 [0,3-4,1]	1,1 [0,3-3,9]
Cardiopathie	8,9 %	11,2 %
Insuffisance cardiaque	15,7 %	14,9 %

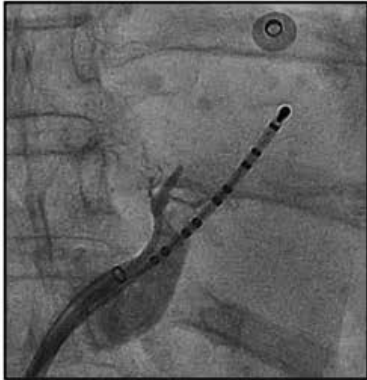
PATIENT 1



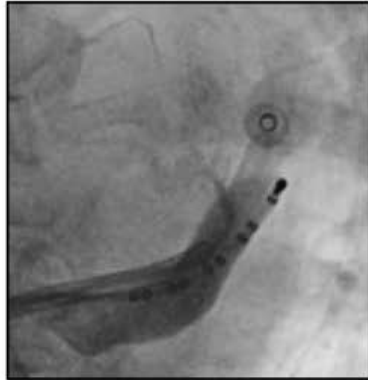
PATIENT 2



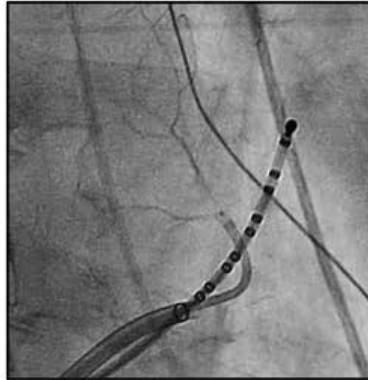
PATIENT 3



PATIENT 4



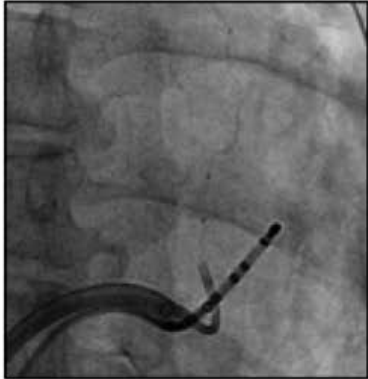
PATIENT 5



PATIENT 6



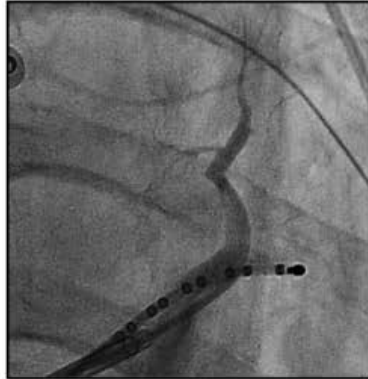
PATIENT 7



PATIENT 8



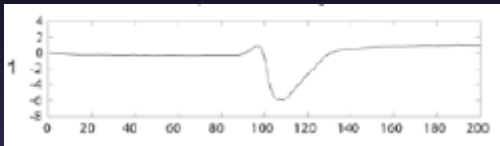
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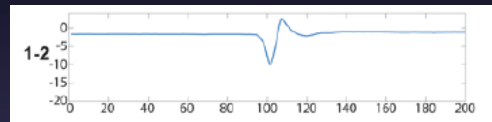
PATIENT 10



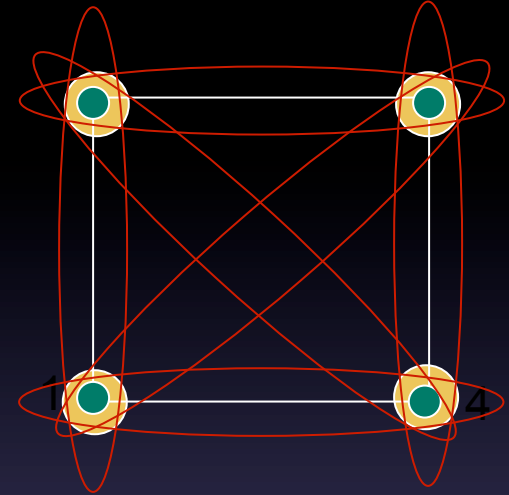
Le signal omnipolaire



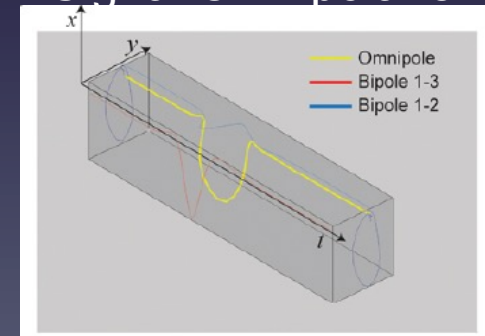
Signal Unipolaire



Signal Bipolaire



Signal Omnipolaire



Front d'activation, vitesse de conduction, carte haute densite