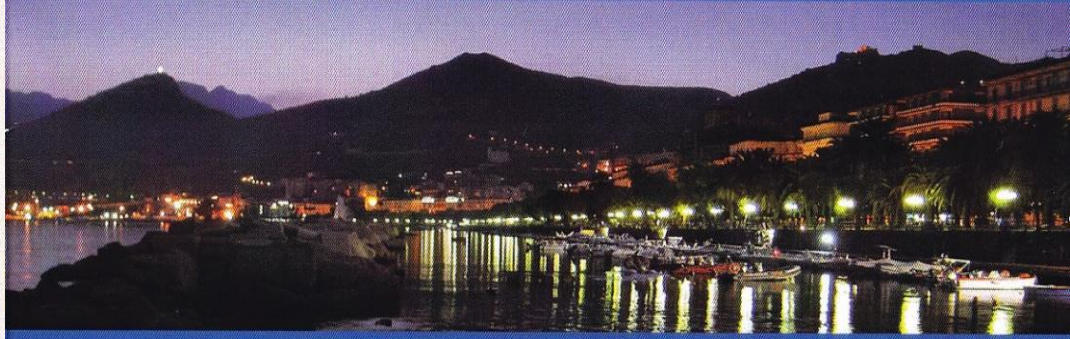
CONGRESSO REGIONALE
CAMPANIA 2014

AIAC

Associazione Italiana Aritmologia e Cardiostimolazione



14 - 15 Febbraio
Grand Hotel Salerno

Fibrillazione atriale: strategie ablative e nuove tecnologie

Francesco Solimene

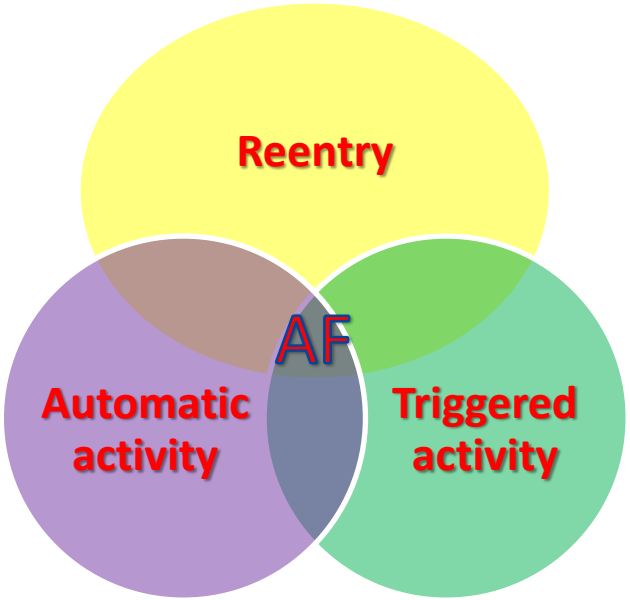
associazionearitmologica salernitana

Casa di Cura Villa del Sole Salerno

AF Mechanisms

Initiation:

PV Foci
Non PV triggers
Degeneration of other arrhythmias

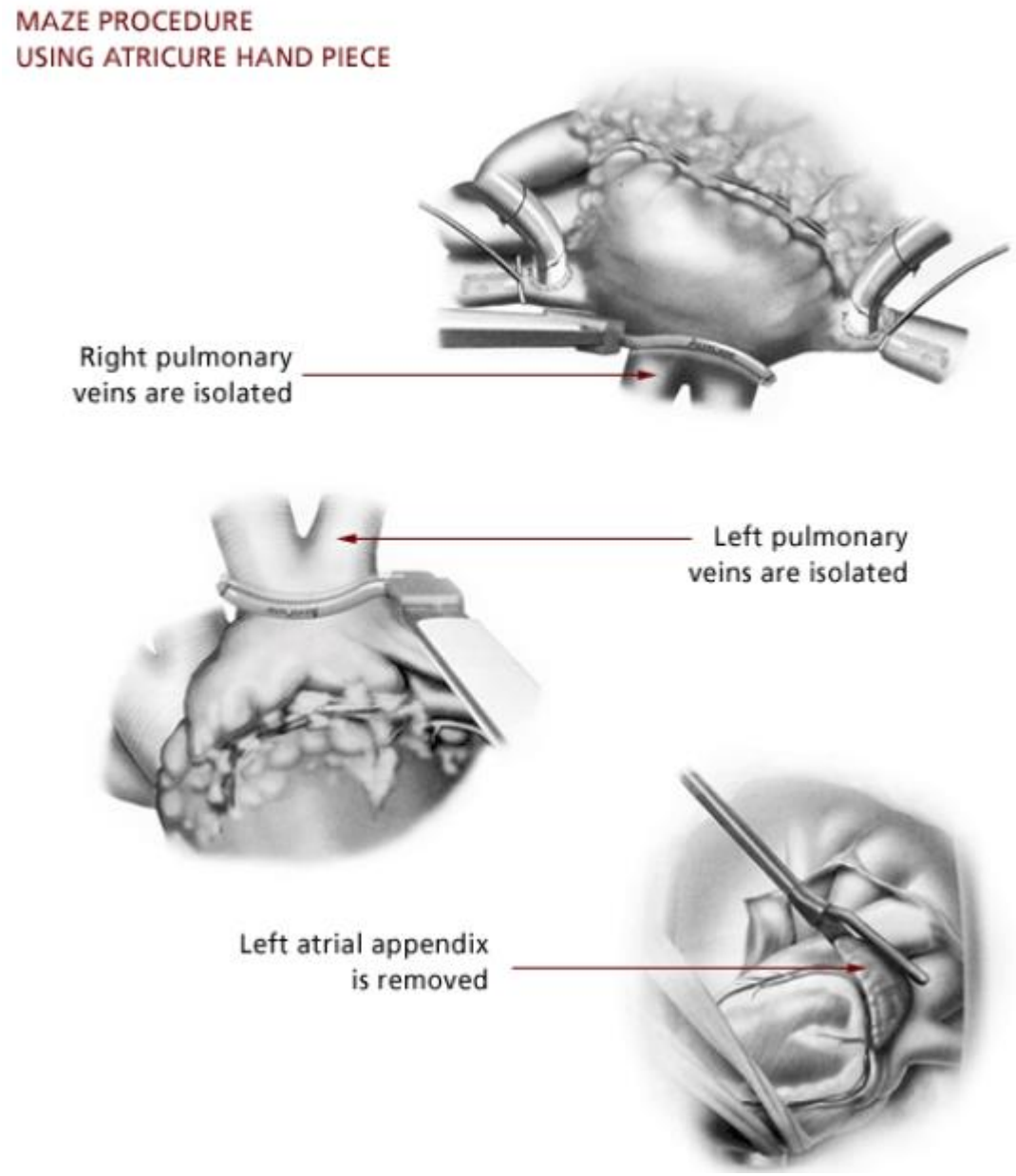


Mainteinence:

Anisotropy
Focal drivers
Rotors
Mother waves and Doughter Wavelets

Miscellanea:

Adrenergic stress
Vagal tone

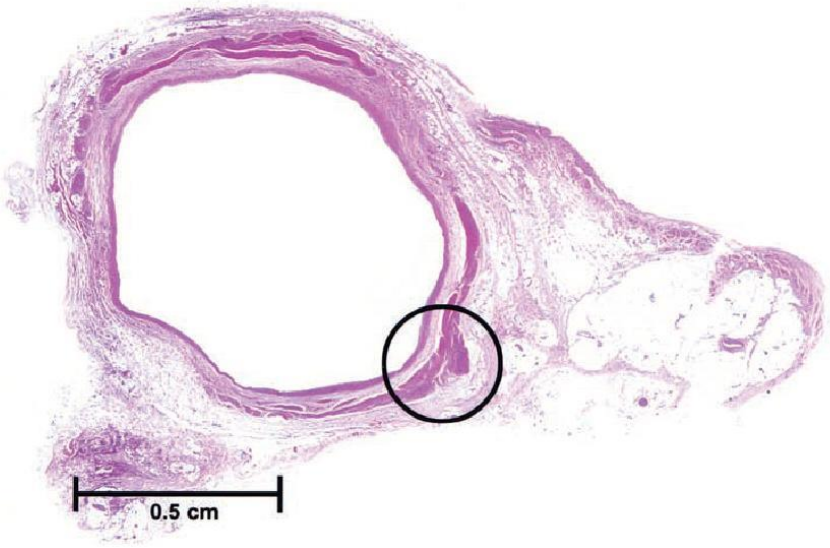


I primi tentativi di ablazione consistevano nell'eseguire lunghe linee mediante RF per riprodurre le linee della tecnica chirurgica Maze

AF Initiation

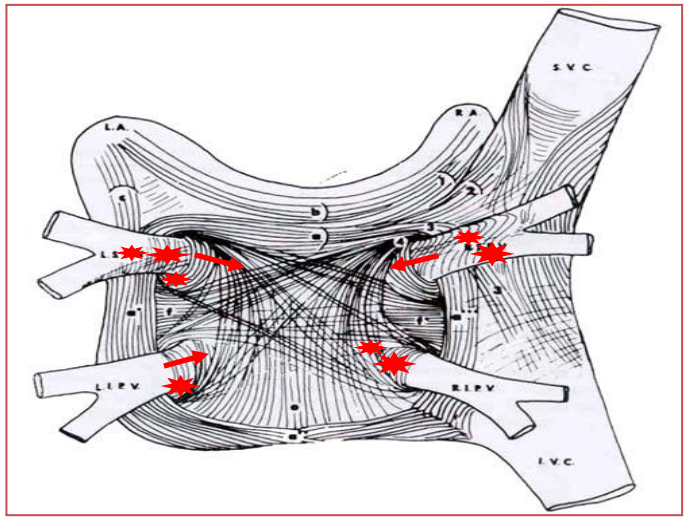
PV Foci

Pale Cells: AP with a conspicuous phase 4 depolarization and slow rate of phase 0

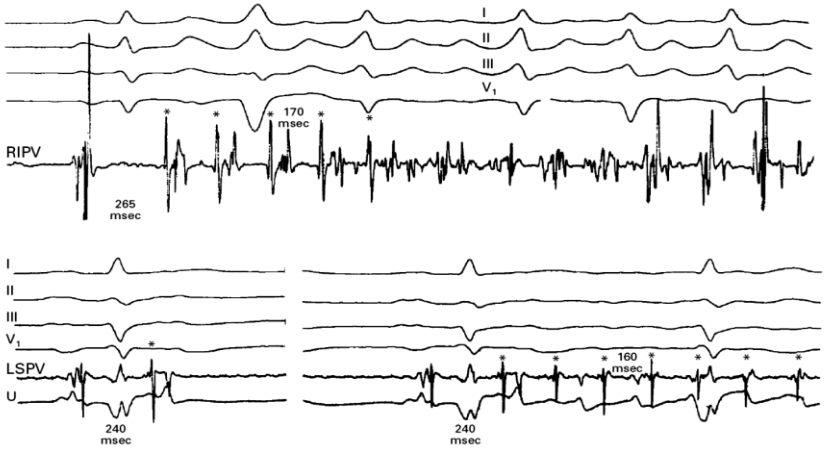


These cells are mostly present in PVs of AF subjects

Shih-Ann Chen
JCE 2003

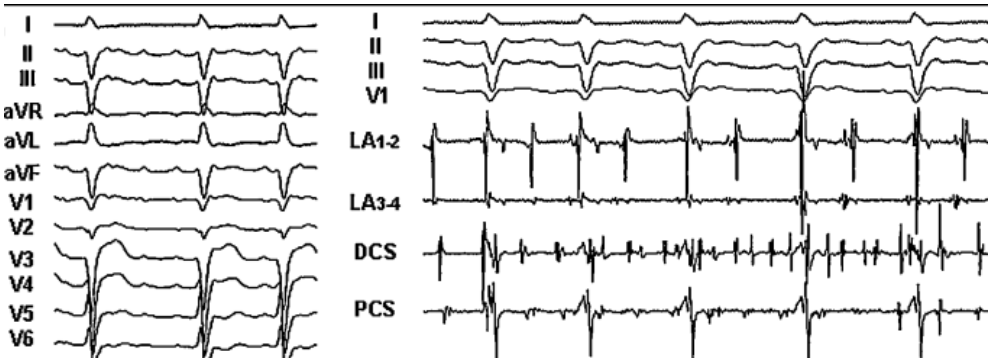


Haissaguerre
NEJM 1998

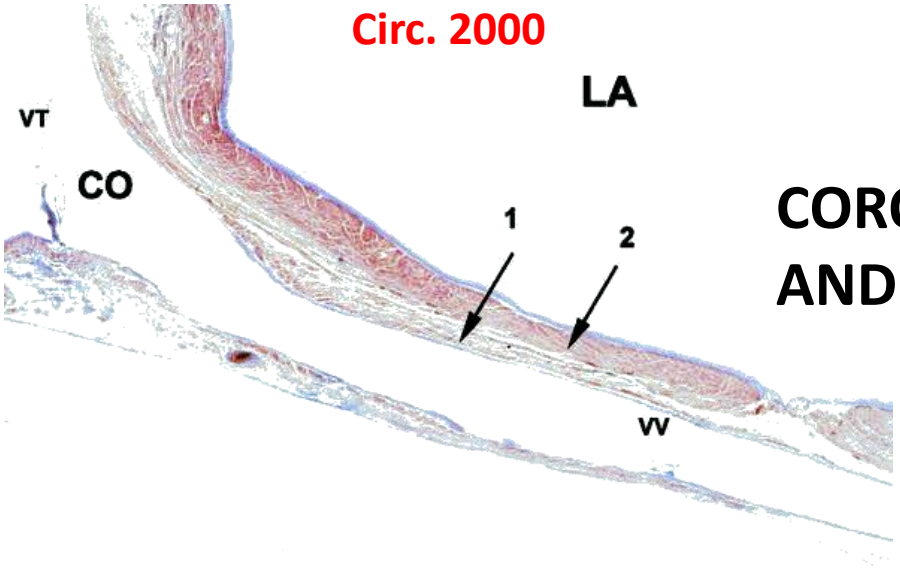


AF Initiation

NON PV Triggers



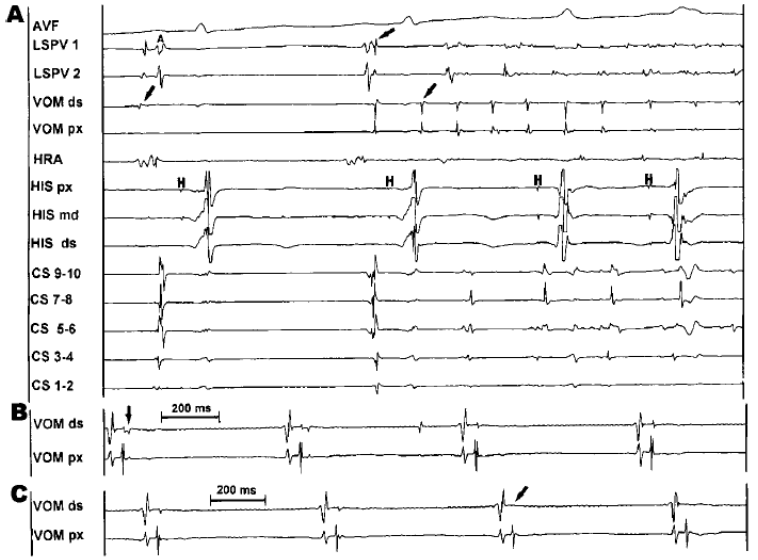
Chauvin M
Circ. 2000



SANDERS et Al. JCE 2004

CORONARY SINUS CONNECTIONS AND DRIVER ACTIVITY

MARSHALL LIGAMENT ROLE IN ATRIAL FIBRILLATION ONSET

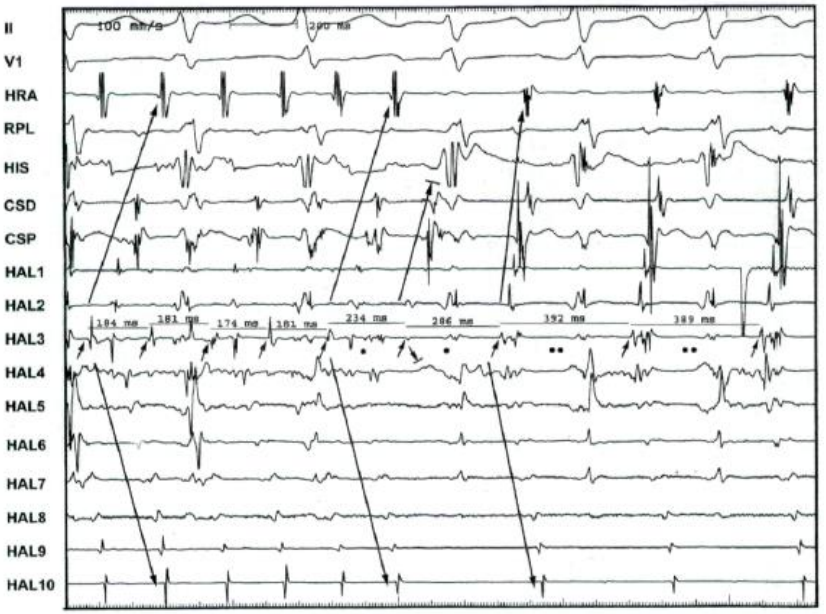


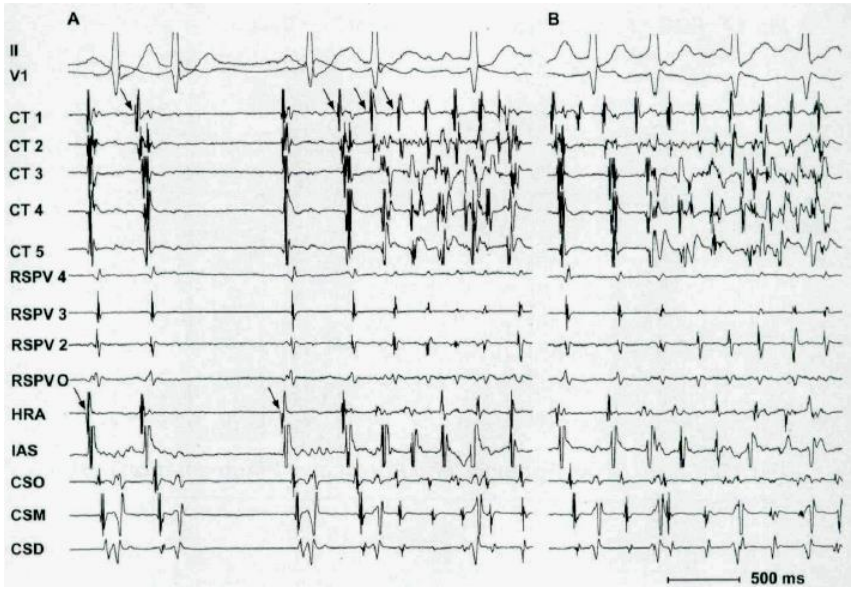
Hwang
Circulation 2000

AF Initiation

NON PV Triggers

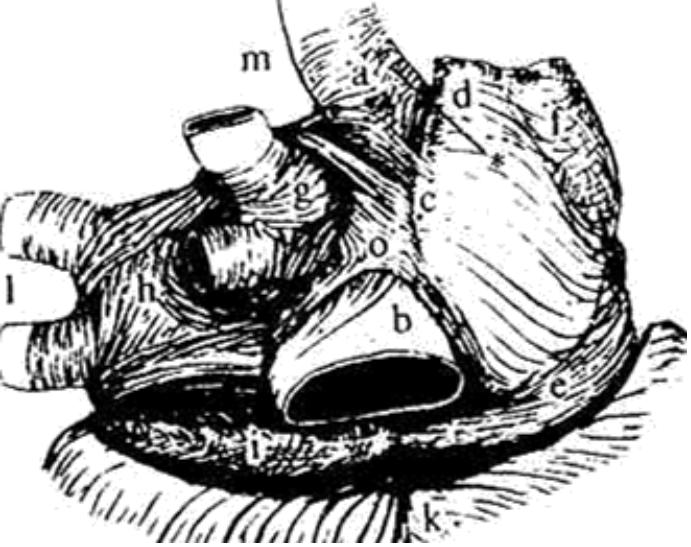
Right atrial trigger of Atrial fibrillation





*HAL - Halo catheter placed from the right atrial free wall (1) to interatrial septum (10) Hal 3 corresponds to the CT; CT - **Crista terminalis**; RSPV-0 — ostium of right superior pulmonary vein; RSPV-2, 3, 4 — the second, third, and fourth pair of electrodes in the RSP*

Chen, et al.
JCE 1997



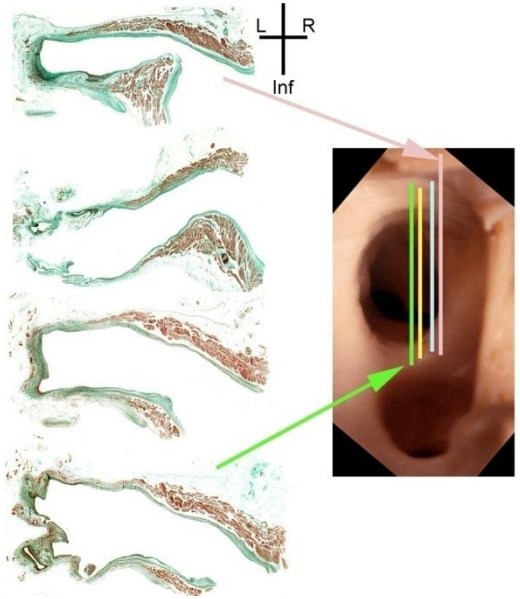
AF Maintenance

Muscular sleeves and Anisotropism

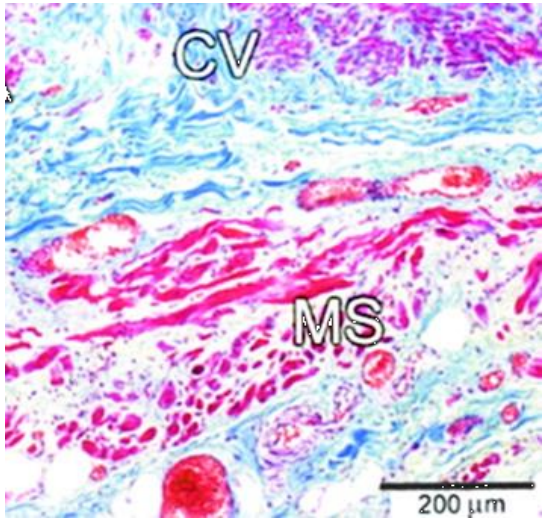
The form and nature of the muscular connections between the primary divisions of the vertebrate heart

A. Keith, M. Flack

J Anat Physiol. 1907;41:172-189



Myocardial Sleeves onto Left Atrial (PVs, CS, Marshall Ligament and IAS) and Right Atrial structures (SVC , IVC, Terminalis Crista and CS ostium)



Left Atrial Myocardial Extension onto Pulmonary Veins in Humans: Anatomic Observations Relevant for Atrial Arrhythmias

TSUKASA SAITO, M.D., KENJI WAKI, M.D., and ANTON E. BECKER, M.D.

Ivana Kholová and Josef Kautzner, Circulation 2004

SUBSTRATE MAPPING

Journal of the American College of Cardiology
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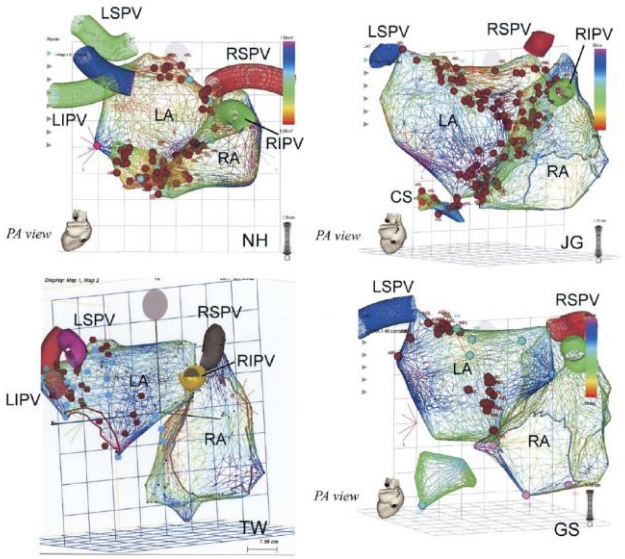
Vol. 43, No. 11, 2004
ISSN 0735-1097/04/$30.00
doi:10.1016/j.jacc.2003.12.054

Electrophysiology

A New Approach for Catheter Ablation of Atrial Fibrillation: Mapping of the Electrophysiologic Substrate

Koonlawee Nademanee, MD, FACC,* John McKenzie, MD,* Erol Kosar, MD,* Mark Schwab, MD,* Buncha Sunsaneewitayakul, MD,† Thaveekiat Vasavakul, MD,* Chotikorn Khunnawat, MD,* Tachapong Ngarmukos, MD‡

Inglewood, California; and Bangkok, Thailand

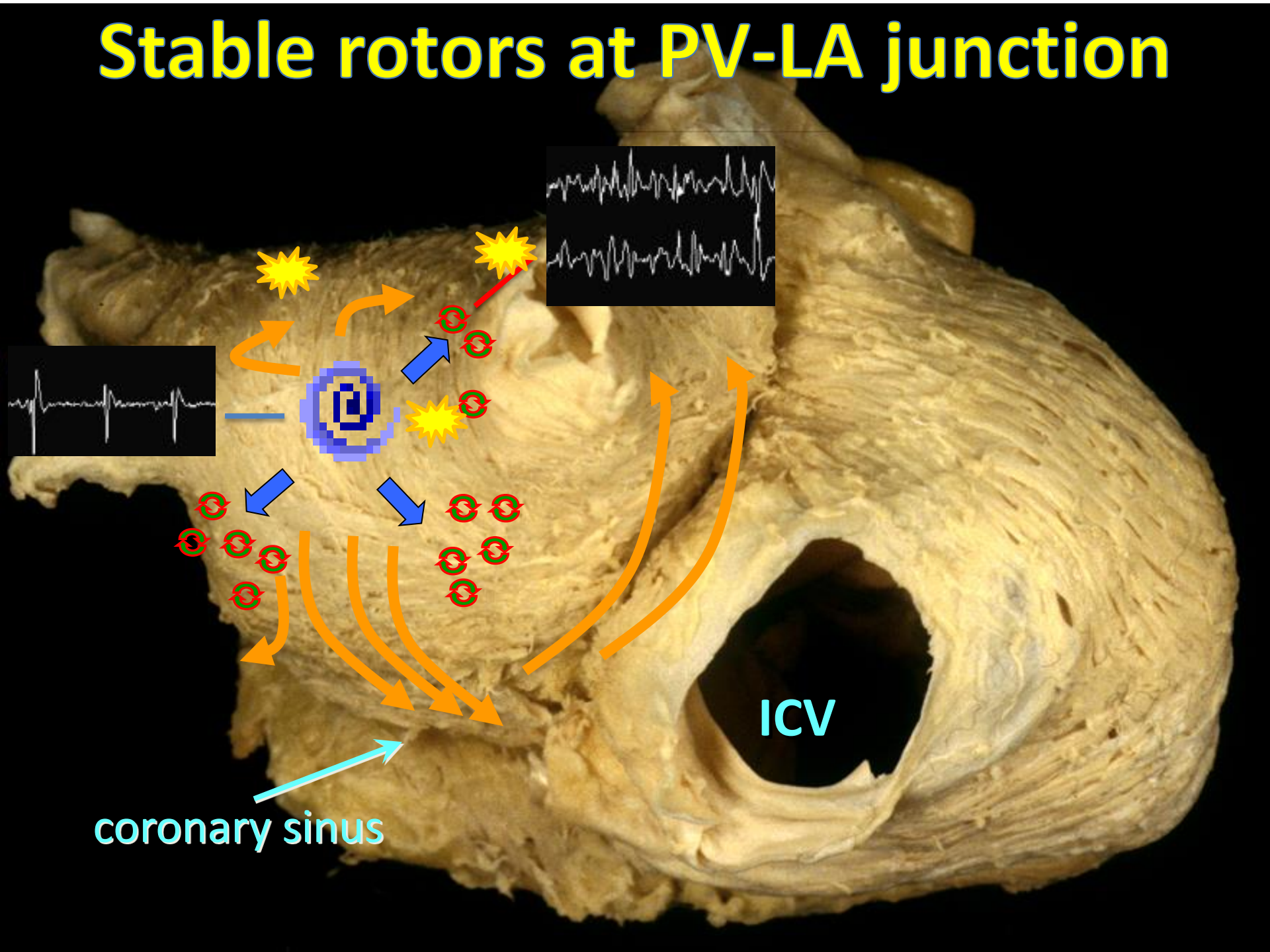


CAFE = ROTORS ?

Complex atrial fractionated electrograms (CAFE) were mainly confined to the interatrial septum, pulmonary veins, roof of left atrium, left postero-septal mitral annulus and coronary sinus ostium.

Nademanee, JACC, 2007

Stable rotors at PV-LA junction



CPVA-M a Modified Approach Enhances Successes

Pulmonary Vein Denervation Enhances Long-Term Benefit After Circumferential Ablation for Paroxysmal Atrial Fibrillation

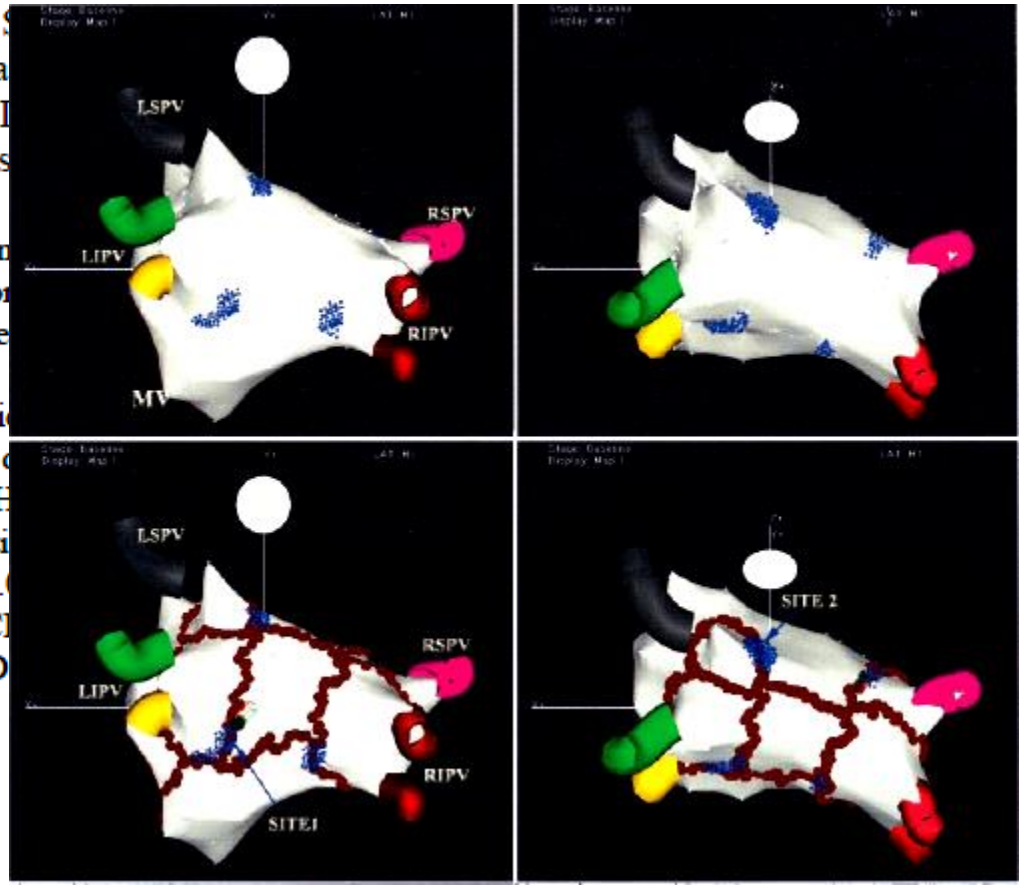
Carlo Pappone, PhD, MD; Vincenzo S
Gabriele Vicedomini, MD; Filippo Gugliotta
Valter Tortoriello, MD; Giovanni Landoni, MI
Takeshi Tomita, MD, PhD; Cézar Mesas

Background—There are no data to evaluate the relation
atrial fibrillation (AF) after circumferential pulmo
benefit of vagal denervation by radiofrequency in pre
for paroxysmal AF.

Methods and Results—Data were collected on 297 pati
vagal reflexes around all pulmonary vein ostia was
34.3% of patients. Follow-up ended at 12 months. H
was detectable for up to 3 months after CPVA, parti
have recurrent AF than those without reflexes ($P=0.$
and CVD were predictors of AF recurrence after C

Conclusions—This study suggests that adjunctive CVD

(*Circulation*. 2004;109:327-334.)



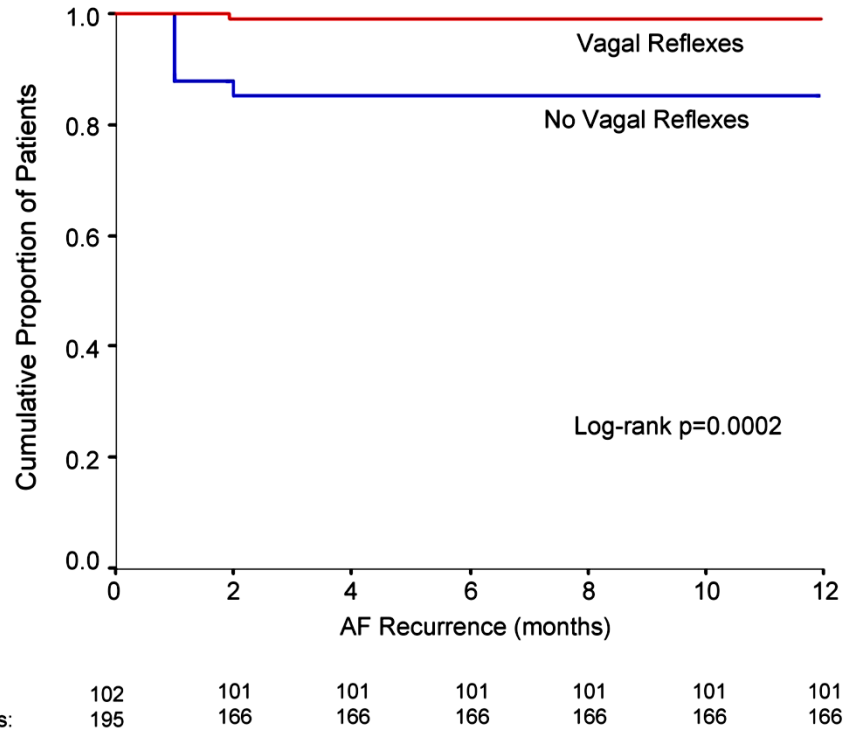
Vagal Denervation and substrate modification enhances CPVA success rate

- Better Long term outcome after Vagal denervation
- PV isolation is crucial for AF ablation

TABLE 3. Results of Cox Regression in the 297 Patients With Paroxysmal AF

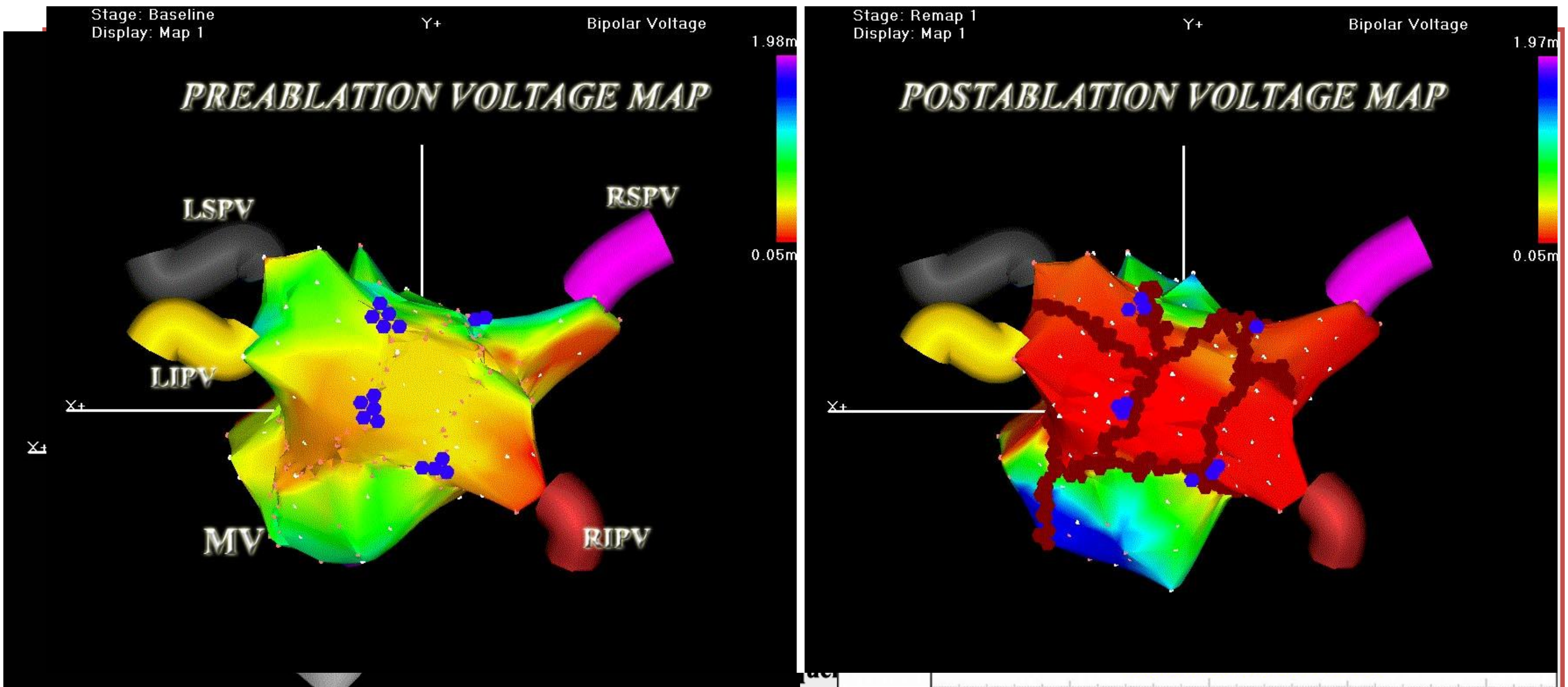
Covariates	Regression Coefficient	*P*	Adjusted Hazard Ratio	95% CI
Age	0.037	0.214	1.038	0.979–1.100
Gender (0/1=F/M)	−0.071	0.852	0.931	0.440–1.971
AF duration	−0.088	0.267	0.916	0.784–1.070
EF	0.034	0.488	1.035	0.940–1.139
LAD	0.108	0.100	1.114	0.980–1.266
% LA isolation	−0.324	<0.001	0.723	0.657–0.796
CVD (0/1=no/yes)	−2.289	0.025	0.101	0.014–0.750
SHD (0/1=no/yes)	−0.489	0.234	0.613	0.274–1.374

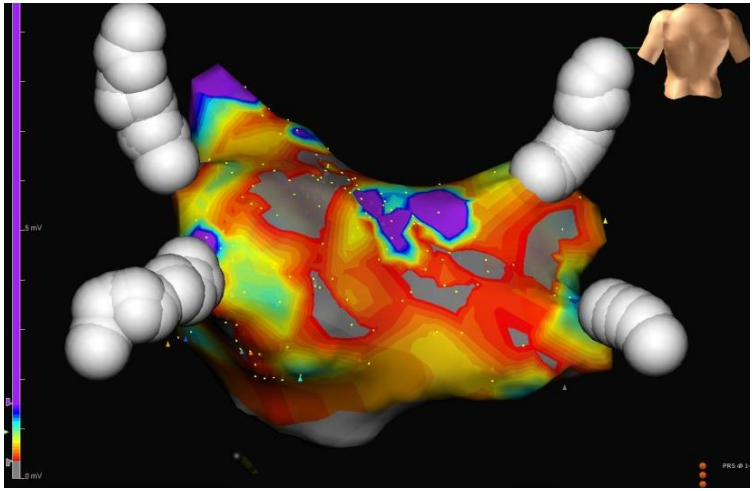
EF indicates ejection fraction; LAD, left atrium diameter; and SHD, structural heart disease.



Empirical observations

[illegible] after extensive ablation





CPVA-M

The Substrate Modification

CPVA only was not enough:

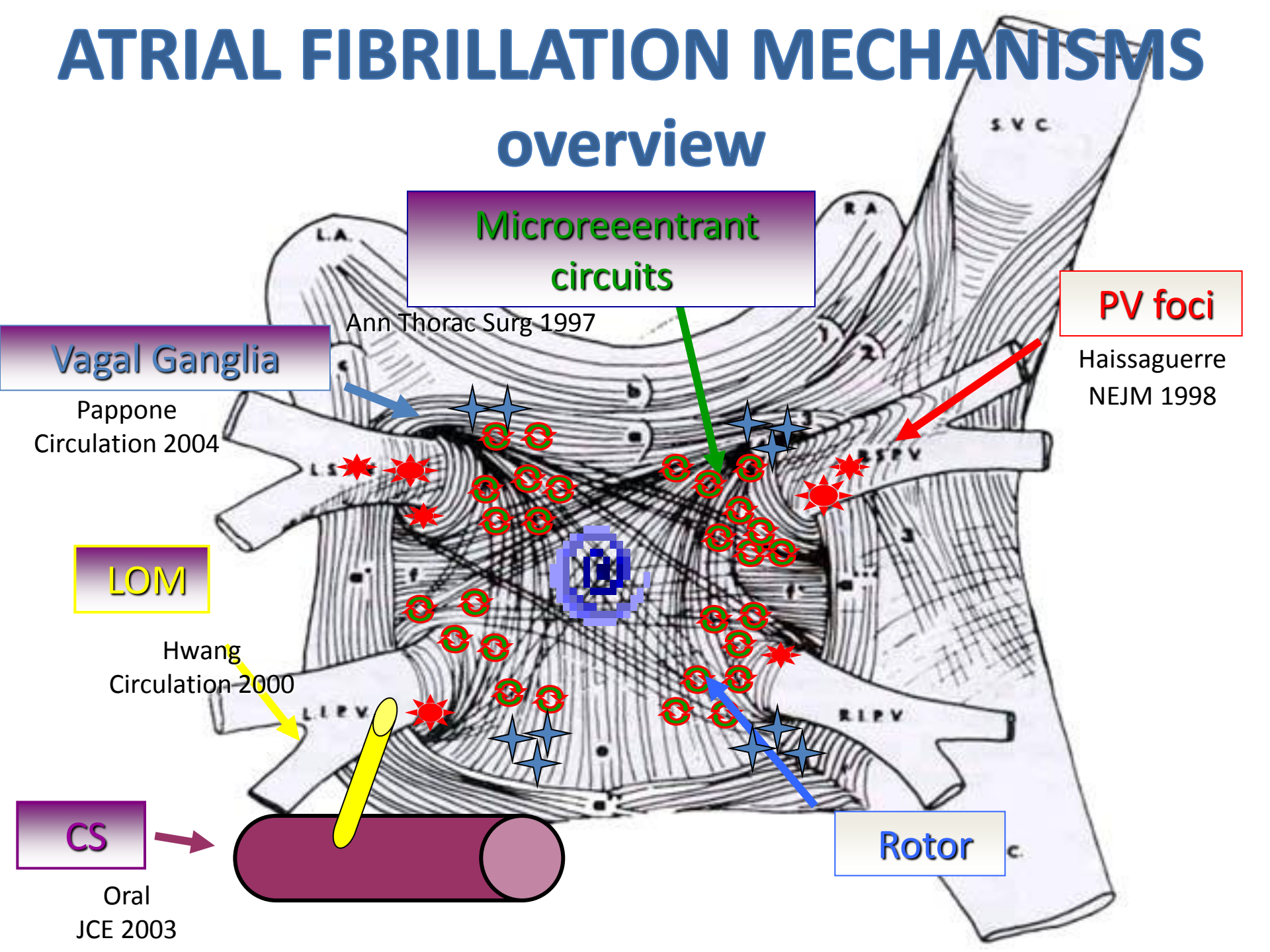
-AF is not a PV disease

-Electrophysiological targets are crucial for good outcomes

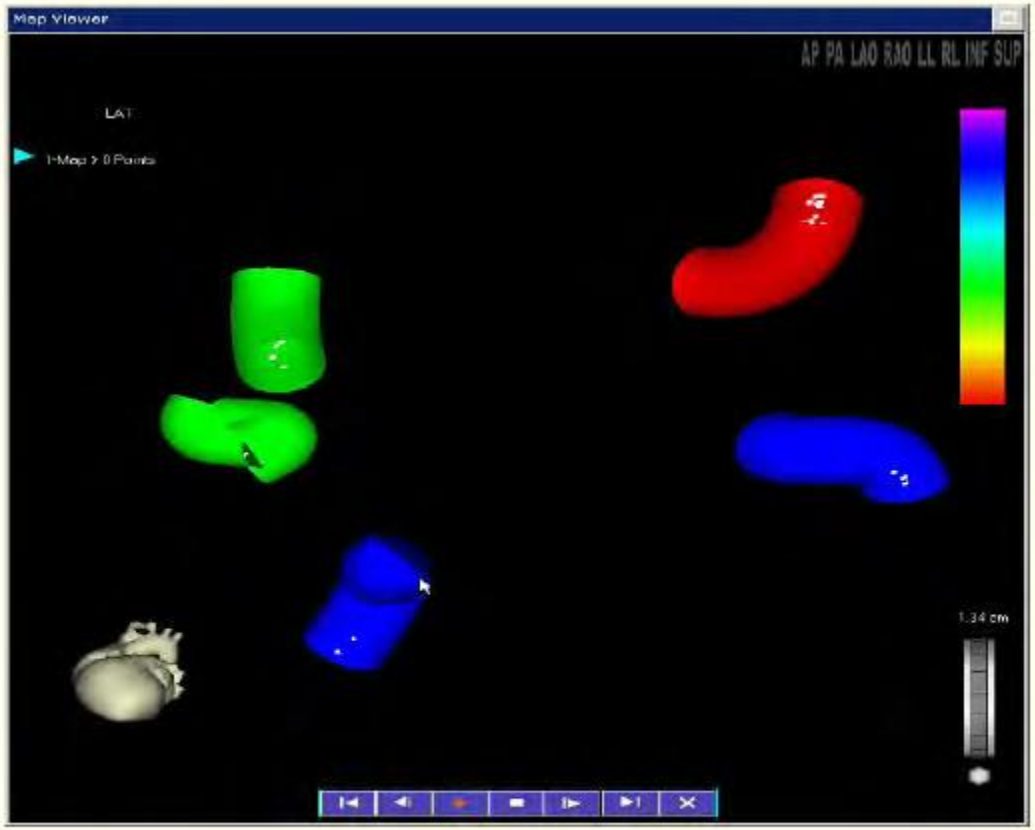
-Complex tailored strategies are needed to modify the natural history of the disease

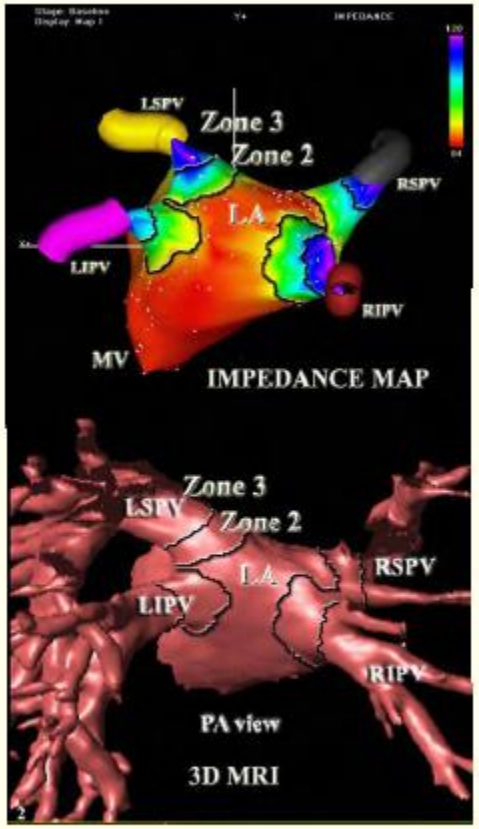
Even if not effective in acute sinus rhythm conversion CPVA is still useful for debulking and substrate elimination.

ATRIAL FIBRILLATION MECHANISMS overview



ABLATION STEP: 1 - ANATOMY

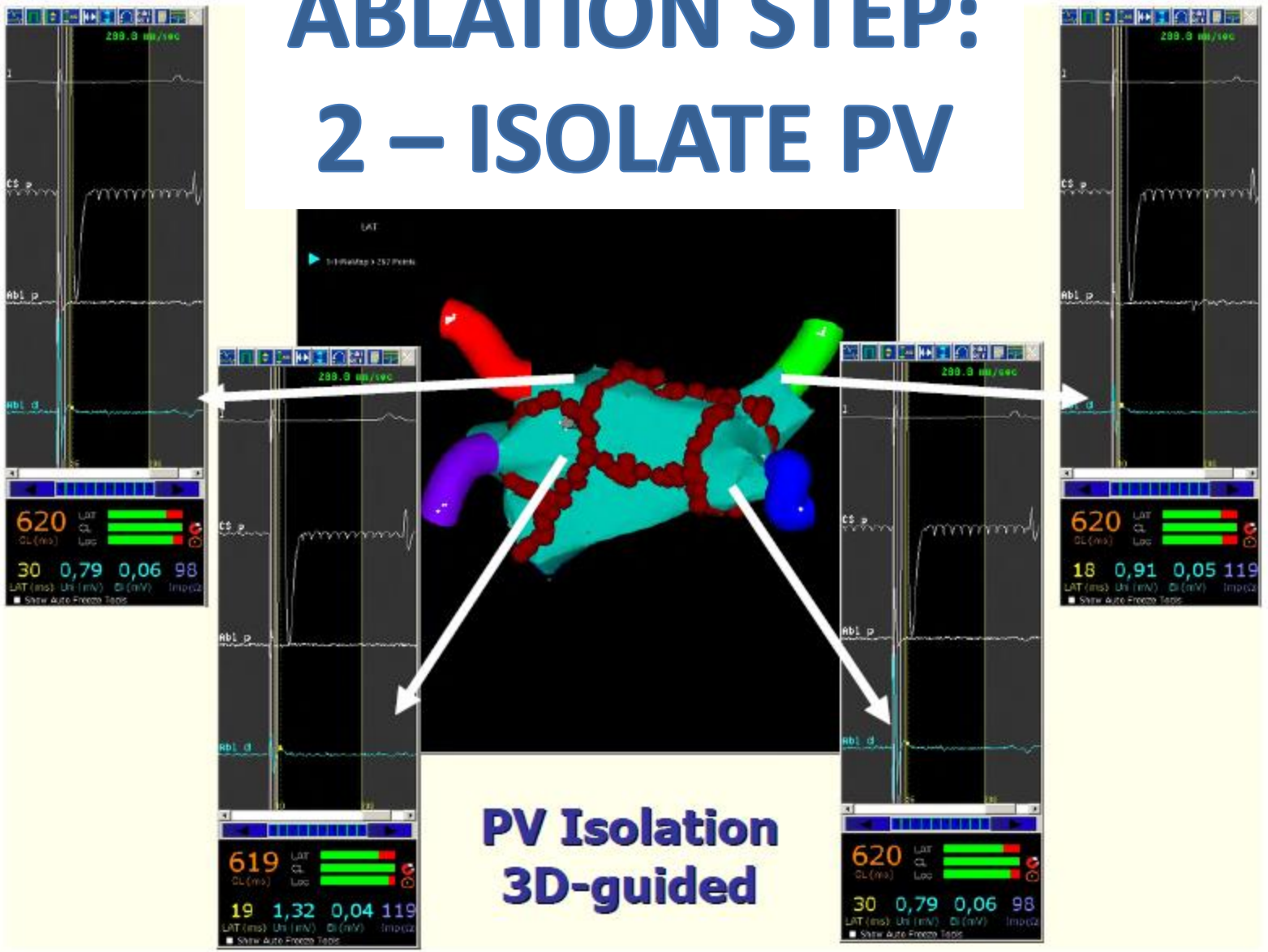




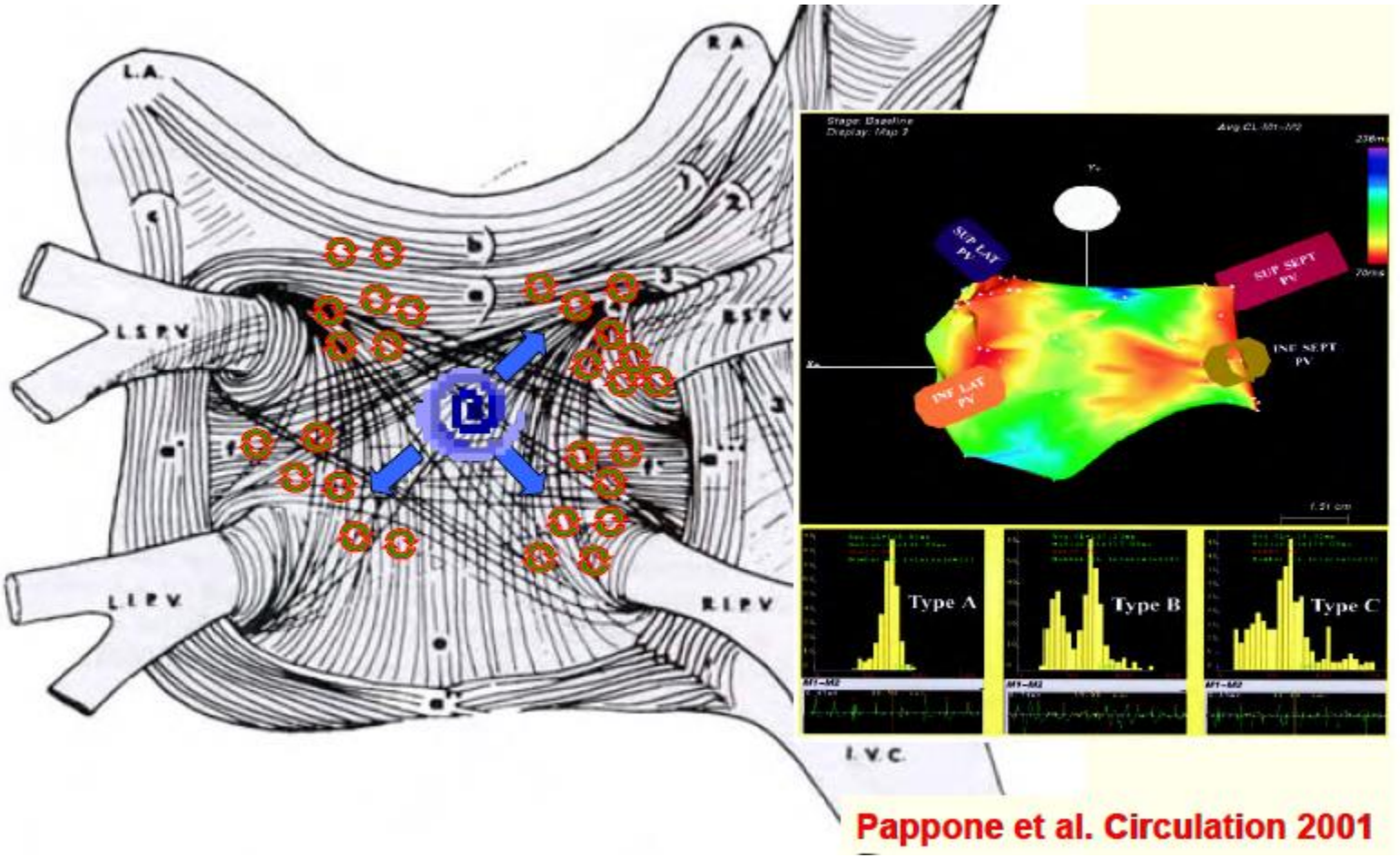
Pappone et al, Heart Rhythm 2006

Impedance map

ABLATION STEP: 2 – ISOLATE PV

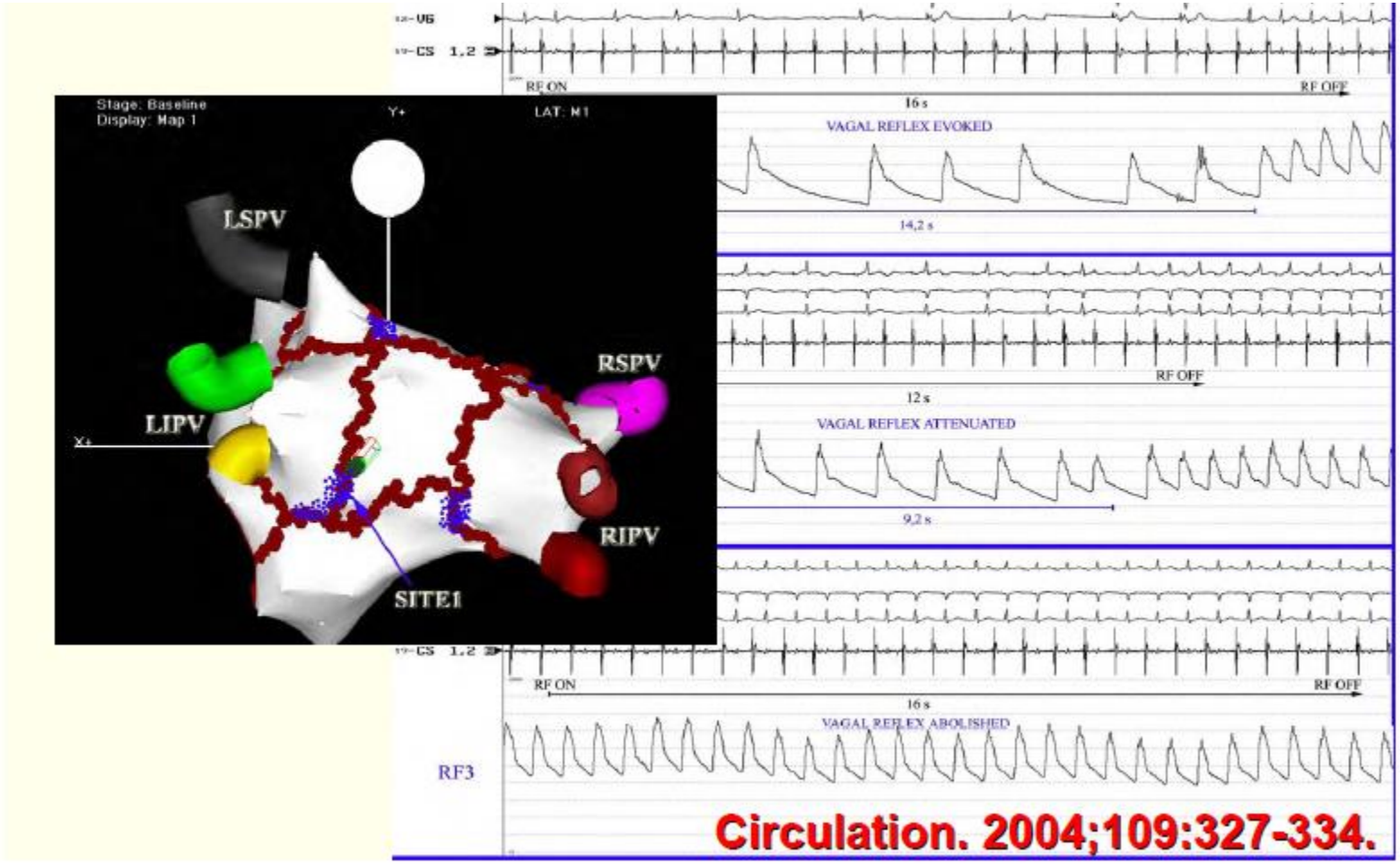


ABLATION STEP: 3 – MODIFY THE SUBSTRATE



Pappone et al. Circulation 2001

ABLATION STEP: 4 – DENERVATE WHEN POSSIBILE



ABLATION STEP: 5 – TEST YOUR JOB

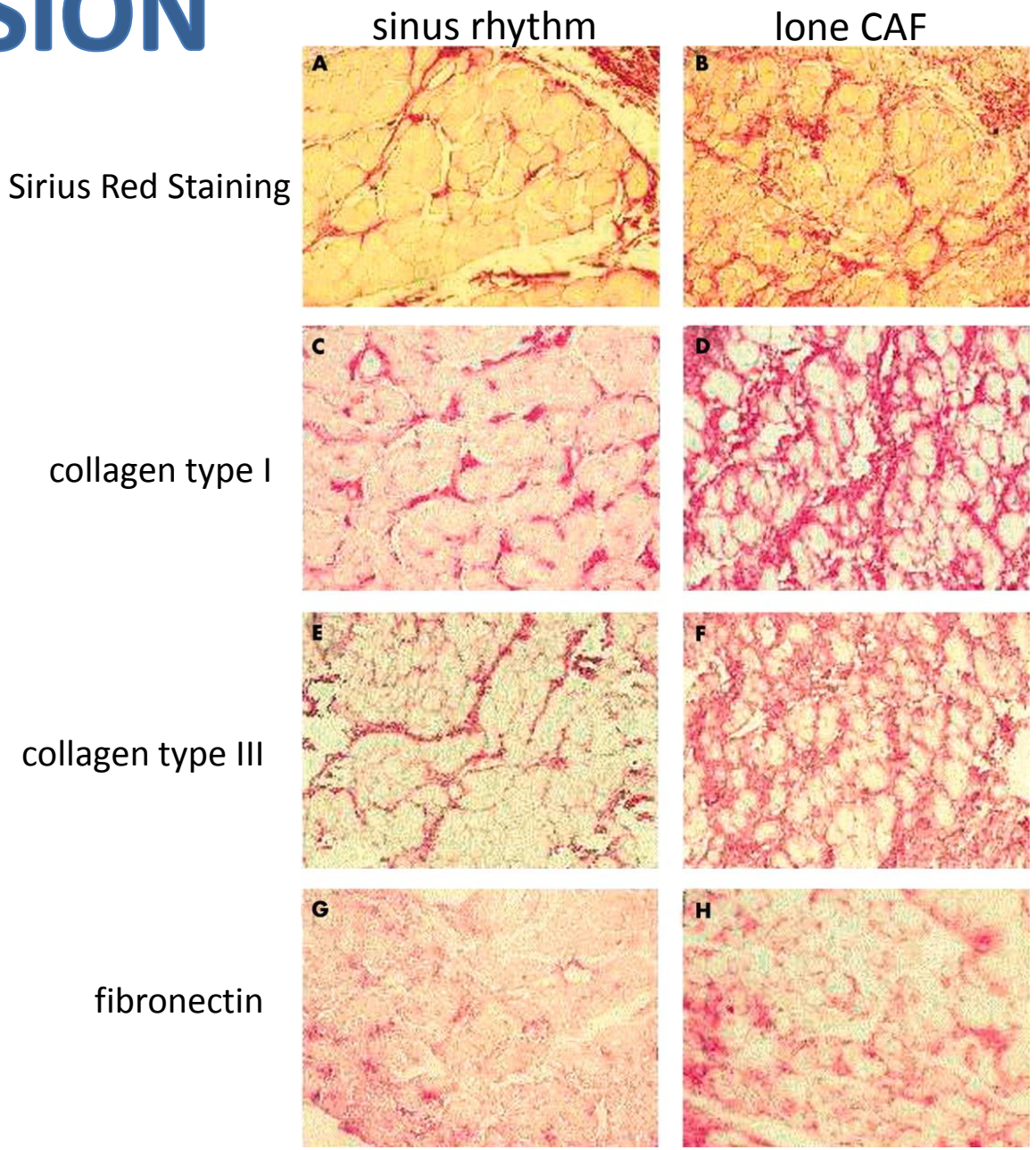
OUTCOMES

	No. Pts	F/u (mo.)	Efficacy
NATALE[1]	ablation drugs	12 12	87% 56%
FDA study[2]	ablation drugs	12 12	64% 26%
JAIS[3]	ablation drugs	12 12	89% 23%
NADEMANEE[4]	CFE ablation	12	91%
PAPPONE[1]	ablation drugs	60 60	87% 22%

[1] JAMA 2005; [2]JAMA 2010; [3]Circulation 2008; [4]JACC 2004; [5]JACC 2003

AF PROGRESSION

AF is associated with an increase of about 100% in collagen I, an increase of about 50% in collagen III (which was confined to MVD+AF), and a smaller non-significant increase in fibronectin in left atrial tissue samples .



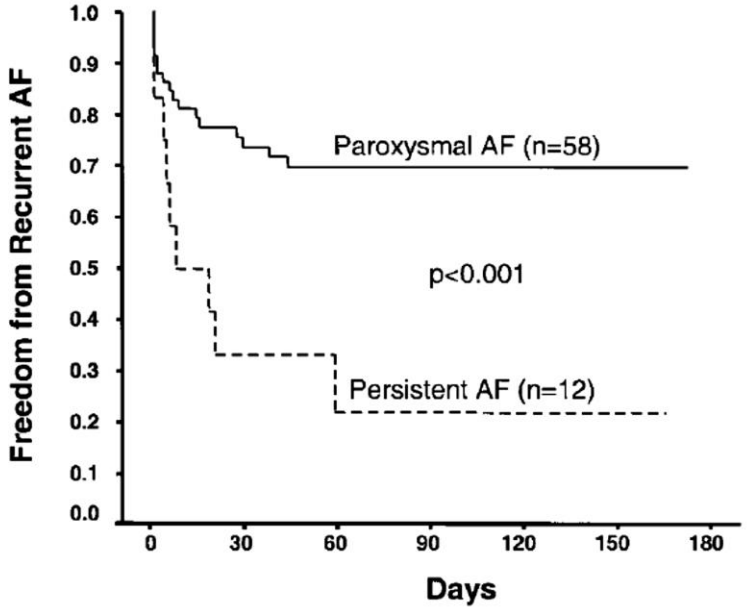
Boldt A et al. Heart 2004;90:400-405

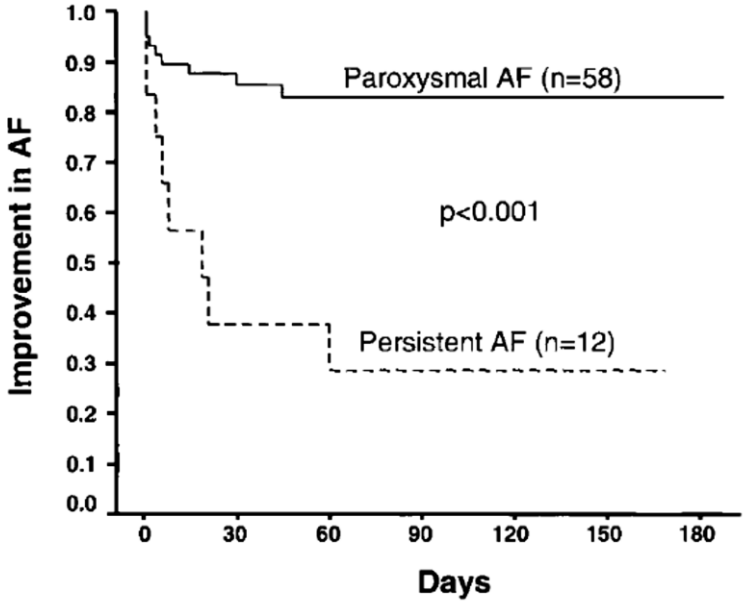
HEART

PVI IS NOT ENOUGH

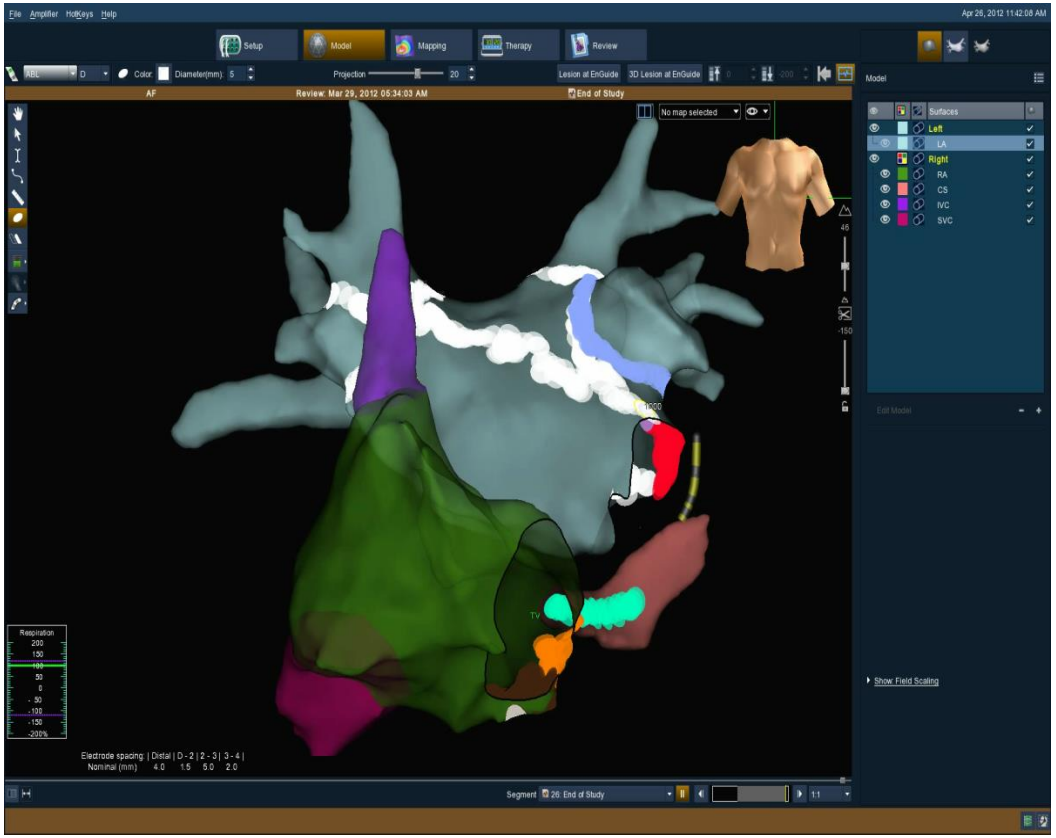
Pulmonary Vein Isolation for Paroxysmal and Persistent Atrial Fibrillation

Hakan Oral, MD; Bradley P. Knight, MD; Hiroshi Tada, MD; Mehmet Özaydın, MD; Aman Chugh, MD; Sohail Hassan, MD; Christoph Scharf, MD; Steve W.K. Lai, MD; Radmira Greenstein, MD; Frank Pelosi Jr, MD; S. Adam Strickberger, MD; Fred Morady, MD





PERSISTENT-PERMANENT AF ABLATION SCHEMA



ABLATION STEPS

1. *CPVA*
2. *ENDO CS*
3. *LEFT aspect of the IAS*
4. *LAA*
5. *EPI CS*
6. *RIGHT aspect of the IAS*
7. *CS OSTIUM*
8. *CFE*

WHAT IS SUBSTRATE MODIFICATION?

- Conversion to SR (55%)
  - *Direct FA to SR conversion (30%)*
  - *Intermediate AT (70%)*
- Atrial activity organization (45%)

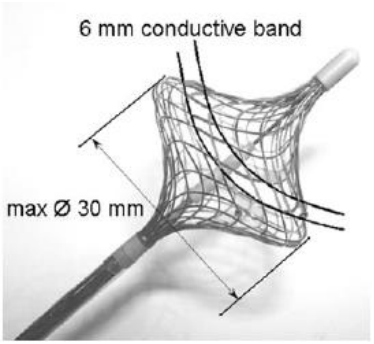
PERMANENT AF
SHORT- MID-TERM RESULTS

	No. Pts	F/u (mo.)	Efficacy
ORAL	CAFE[3]	12	33%
PAPPONE[1]	CPVA[4]	12	74%
HAISSAGUERRE[2]	PVI; CAFE; SVC and IVC ablation	12	60% after single abl 95% after repeated abl
NADEMANEE[3]	PVI CAFE	12	58%
PAPPONE[4]	Biatrial Ablation	36	87%

[1] *NEJM 2006*
[2] *JACC 2005*
[3] *JACC 2004*
[4] *In Press*

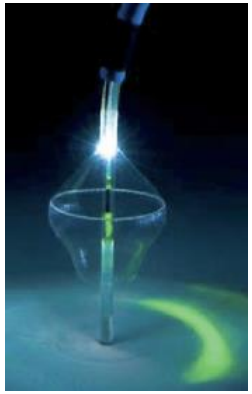
NEW TECHNOLOGIES

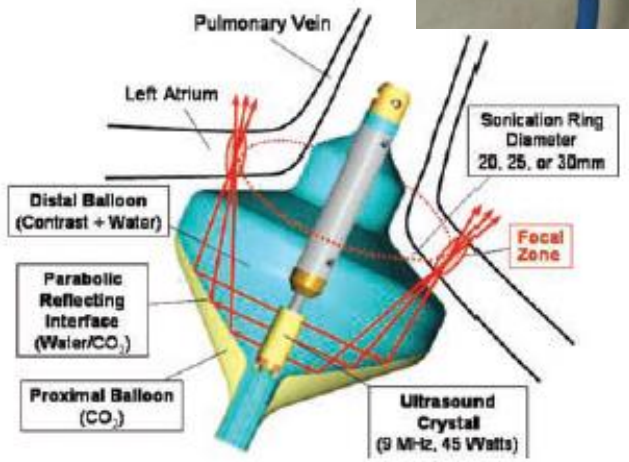
Despite advances in AF mechanisms comprehension preshaped catheters are considered as a new era in AF ablation



ARE THEY REALLY

EXPANDING YOUR POSSIBILITIES ?





Ablation Tools

DUTY-CYCLED RFA

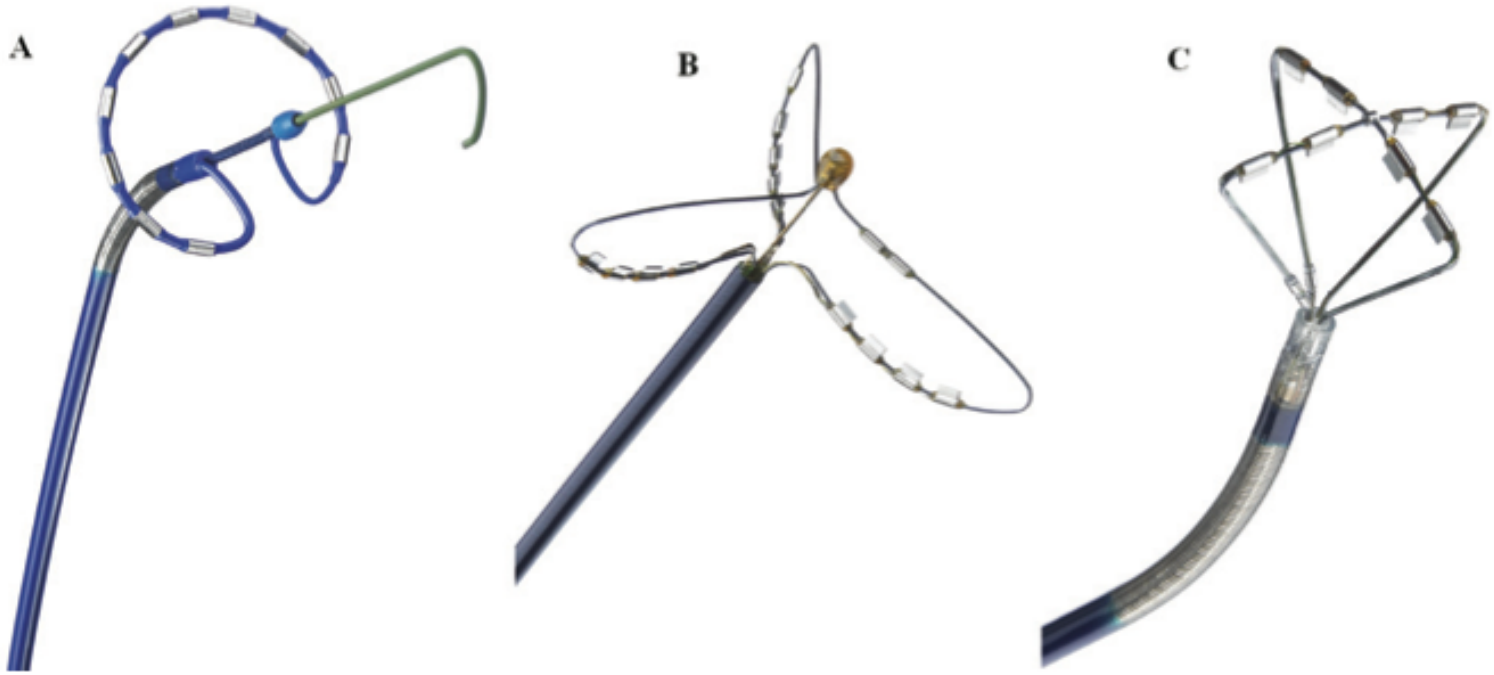
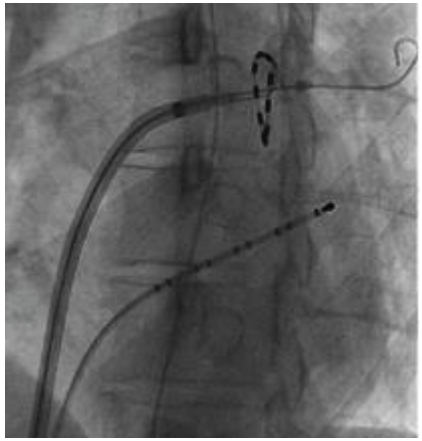
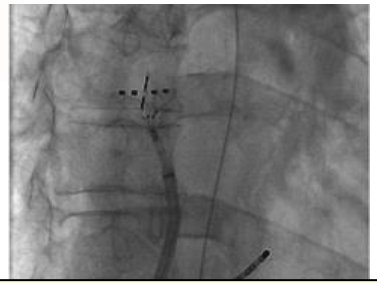


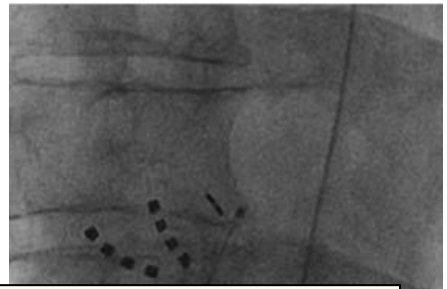
Figure 1. *Multi-electrode mapping and ablation catheters.* **(A)** *Pulmonary Vein Ablation Catheter (PVAC™).* **(B)** *Multi-Array Septal Catheter (MASC™);* **(C)** *Multi-Array Ablation Catheter (MAAC™). Reproduced with permission of Medtronic, Inc.*

Ablation Tools

DUTY-CYCLED RFA







Ablation of Persistent Atrial Fibrillation Using Multielectrode Catheters and Duty-Cycled Radiofrequency Energy

Heart Rhythm, No. 8, 2011

61% of long term success rate after PVI (Duty Cycled RF)

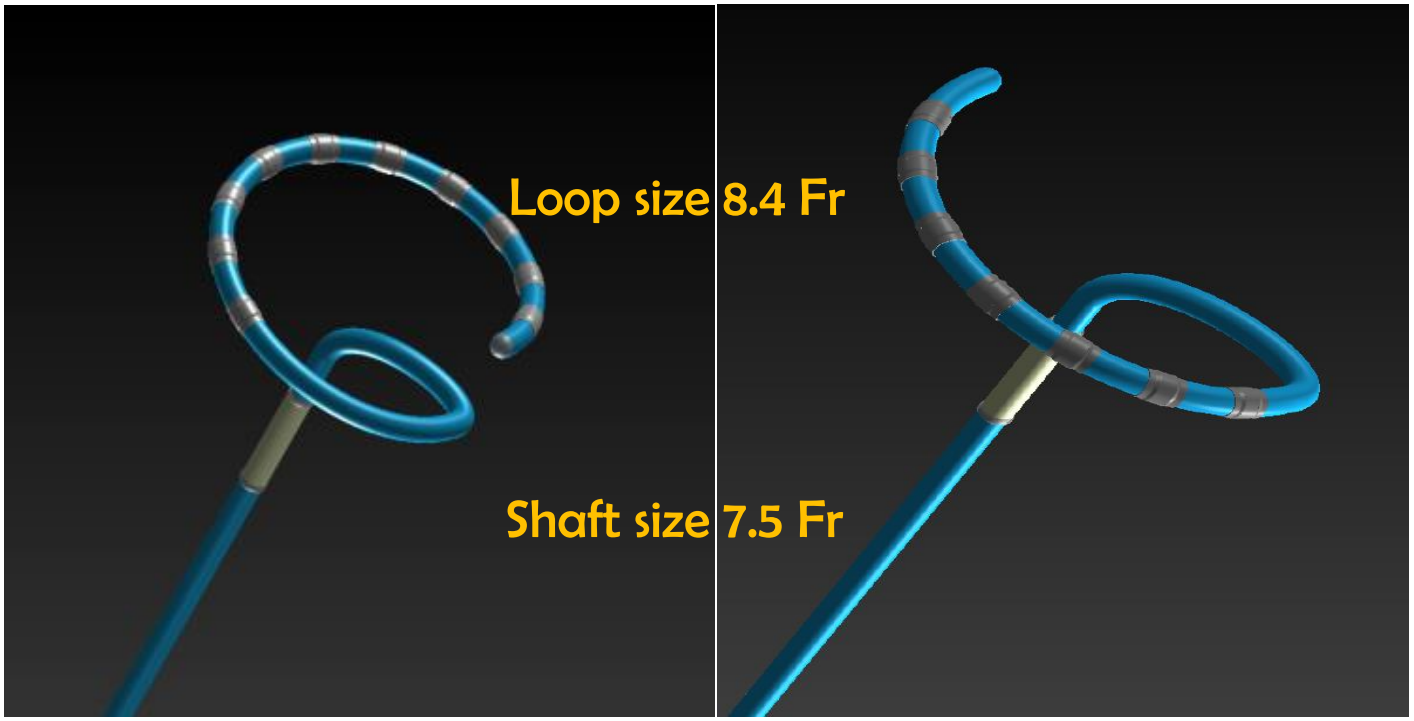
Christoph Scharf, MD,* Lucas Boersma, MD,† Wyn Davies, MD,‡ Prapa Kanagaratna
Nicholas S. Peters, MD,‡ Vince Paul, MD,§ Edward Rowland, MD,§ Andrew Grace,
Simon Fynn, MD,‖ Lam Dang, PHD,* Hakan Oral, MD,¶ Fred Morady, MD¶

Zurich, Switzerland; Nieuwegein, the Netherlands; London and Cambridge, United Kingdon
and Ann Arbor, Michigan

Ablation Tools

DUTY-CYCLED RFA

nMARQ™ - Product Overview



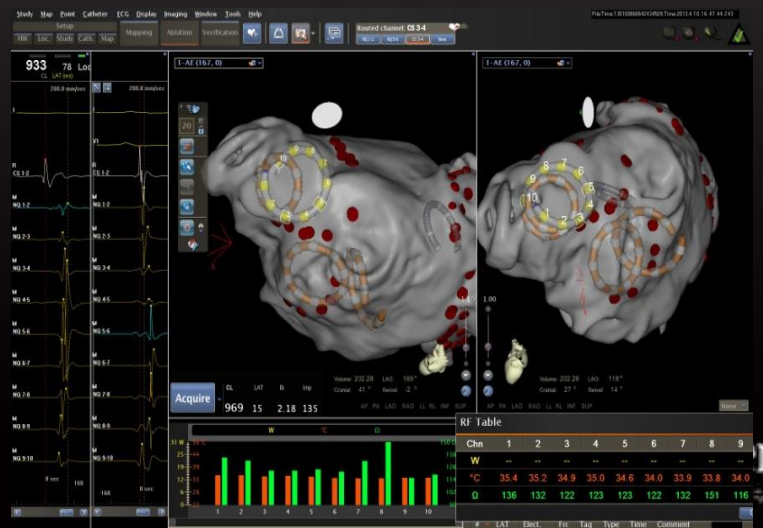
Circular Ablation Catheter

Crescent Ablation Catheter

Ablation Tools

DUTY-CYCLED RFA

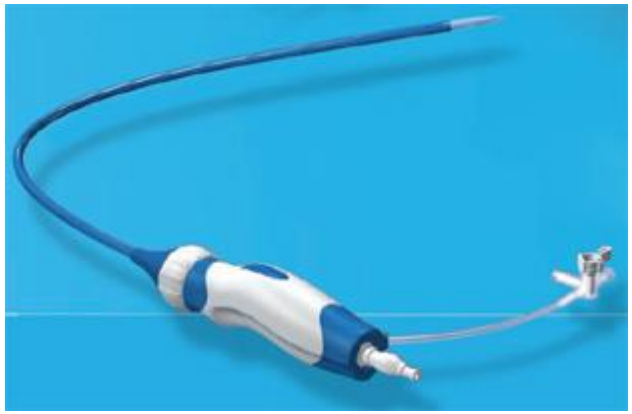
nMARQ™ System
is the only
Multi-Ablation Technology
combining
irrigation & navigation

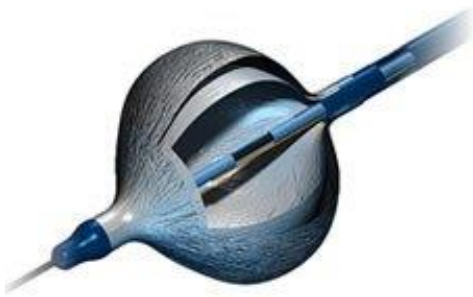


Ablation Tools

CryoBalloon

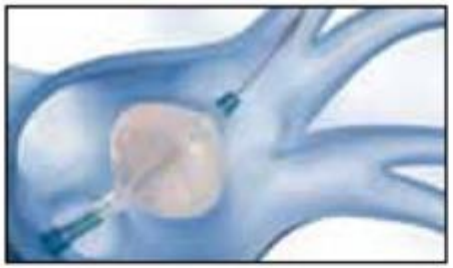
- Two balloon diameters: 23 mm and 28 mm
- Double balloon safety system
- Bi-directional deflection (45 degrees maximum)
- Compatible with 12F Steerable Sheath
- 102 cm working length



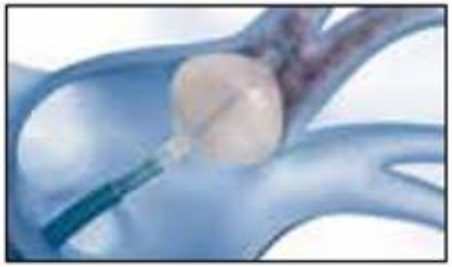


Ablation Tools

CryoBalloon

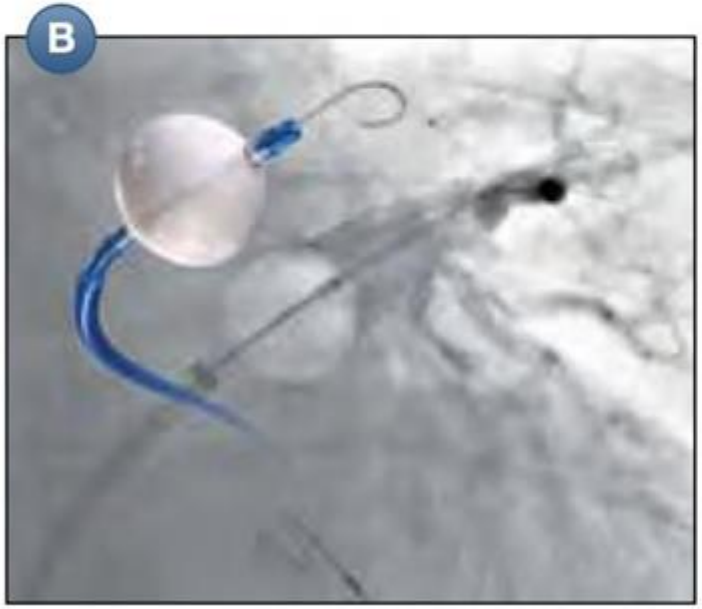


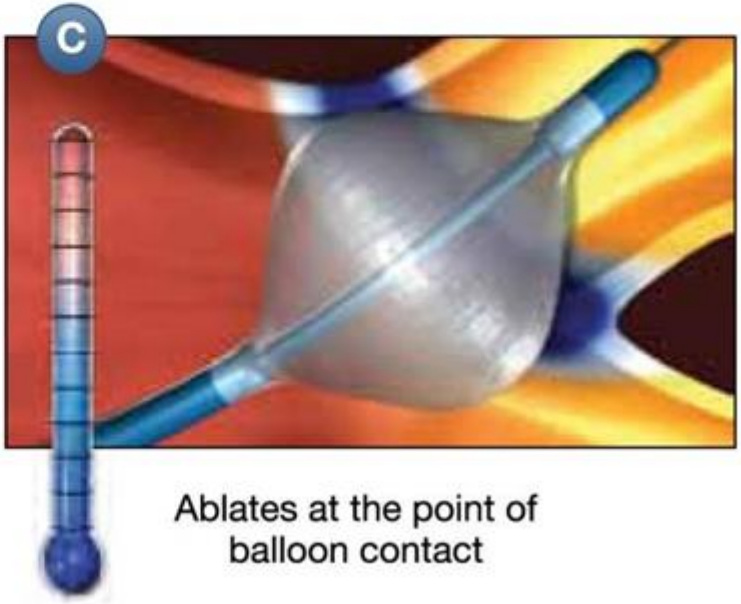
1. Wire Targeted Vein



2. Inflate and Position

3. Occlude and Albate



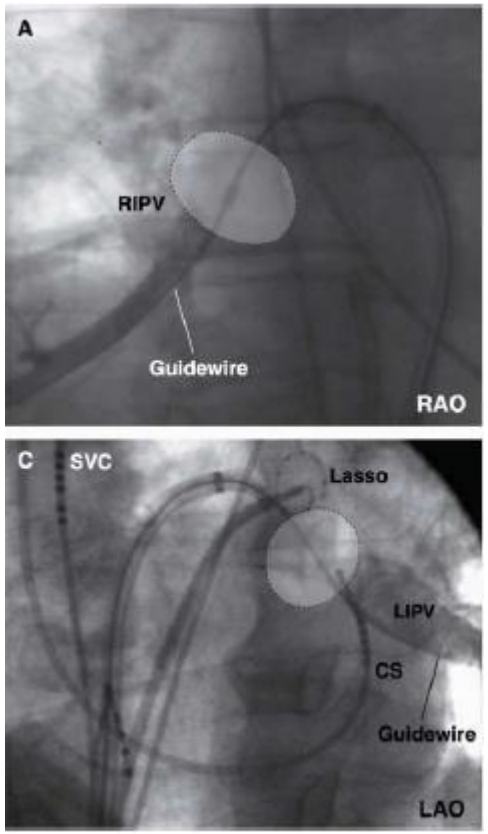


Ablates at the point of balloon contact

Ablation Tools

CryoBalloon

Circumferential Pulmonary Vein



Comparison of Cryoballoon and Radiofrequency Ablation of Pulmonary Veins in 40 Patients with Paroxysmal Atrial Fibrillation: A Case-Control Study

MARKUS LINHART, M.D., BARBARA BELLMANN, ERICA MITTMANN-BRAUN, M.D., JAN W. SCHRICKEL, M.D., ALEXANDER BITZEN, M.D., RENÉ ANDRIÉ, M.D., ALEXANDER YANG, M.D., GEORG NICKENIG, M.D., LARS LICKFETT, M.D., and THORSTEN LEWALTER, M.D.

From the Medizinische Klinik und Poliklinik II, University of Bonn, Bonn, Germany

Comparison of Cryoballoon and RF Ablation of PV. *Introduction:* Ablation of pulmo (PV) is an established therapeutic option for patients with symptomatic drug-refractory paroxys fibrillation (AF). Radiofrequency (RF) is currently the most widespread energy source for PV Cryothermal energy applied with a cryoballoon technique as an alternative has recently evolved

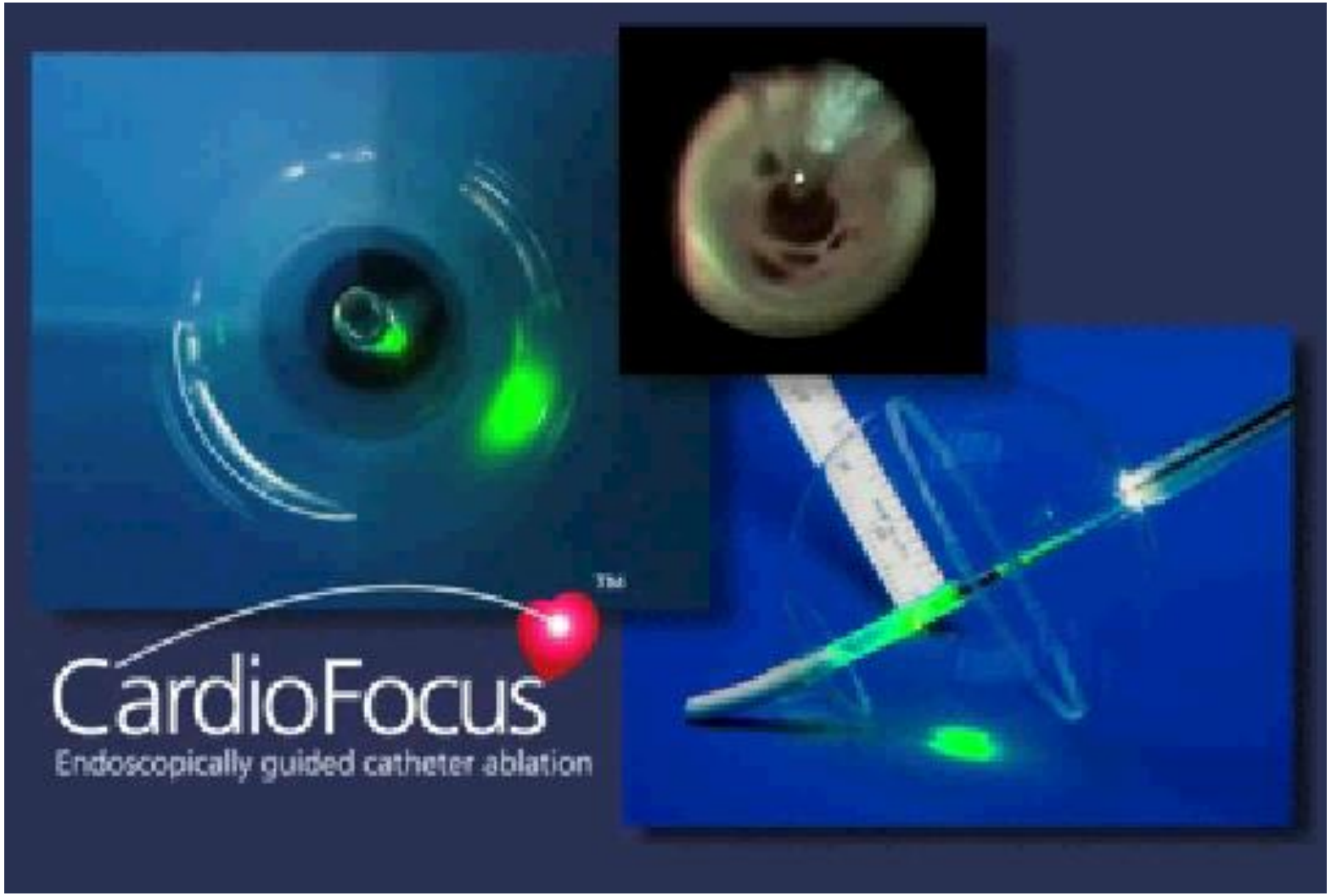
Methods and Results: In a case-control setting, we compared 20 patients with paroxysma underwent their first PV ablation with the cryoballoon technique to 20 matched patients with co RF ablation. In the case of persistent electrical potentials after cryoballoon ablation, it was coml ablation with a conventional cryocatheter. All patients performed daily event recording for 3 mo ablation pro pared. In the cryoballoon patients] and 66% in the c e burden was lower after cryoballoon ablation. There was no significant difference between cryoballoon and RF ablation regarding procedure parameters. In the cryoballoon group, 3 phrenic nerve palsies occurred using the 23 mm balloon that resolved spontaneously.

55% of success rate after 6 months

Conclusion: PV ablation with the cryoballoon technique is feasible and seems to have a similar success rate in comparison to RF ablation. Procedure- and fluoroscopy duration are not longer than in conventional RF ablation. *(J Cardiovasc Electrophysiol, Vol. 20, pp. 1343-1348, December 2009)*

Ablation Tools

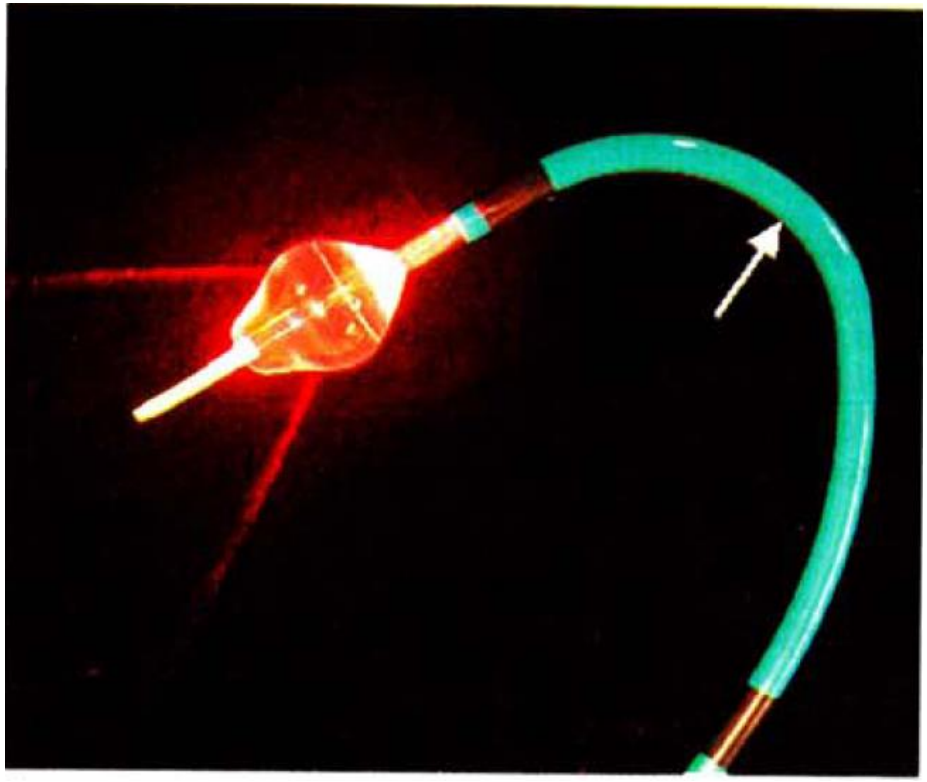
CardioFocus Balloon

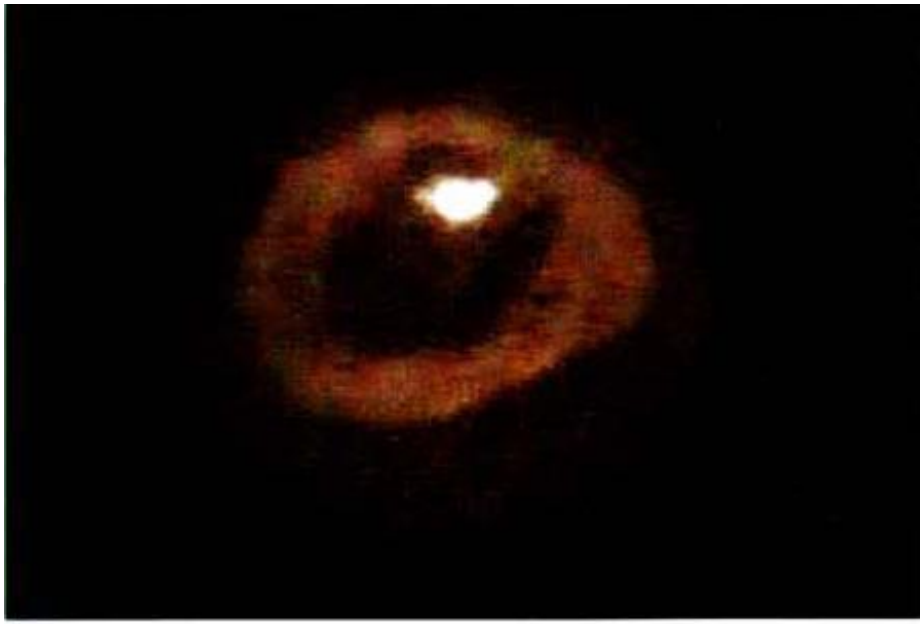


Ablation Tools

CardioFocus Balloon

Endoscopic light ring balloon catheter

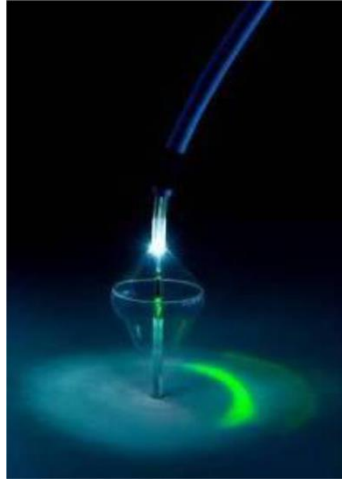




Tecnologia di ablazione che incorpora un endoscopio per la visualizzazione diretta e un catetere a palloncino regolabile e progettato per un migliore contatto con l'ostio delle VP

Ablation Tools

CardioFocus Balloon



JACC Vol. 54, No. 15, 2009

One-year clinical outcome after pulmonary vein isolation using the novel endoscopic ablation system in patients with paroxysmal atrial fibrillation

Andreas Metzner, MD, Boris Schmidt, MD, Alexander Fuernkranz, MD, Erik Wissner, MD, Roland R. Tilz, MD, K. R. Julian Chun, MD, Kars Neven, MD, Melanie Konstantinidou, MD, Andreas Rillig, MD, Yazuhiro Yoshiga, MD, Shibu Mathew, MD, Ilka Koester, MD, Feifan Ouyang, MD, Karl-Heinz Kuck, MD

From the Asklepios Klinik St. Georg, Department of Cardiology, Hamburg, Germany.

(99%) PVs were isolated successfully (RF exclusively)

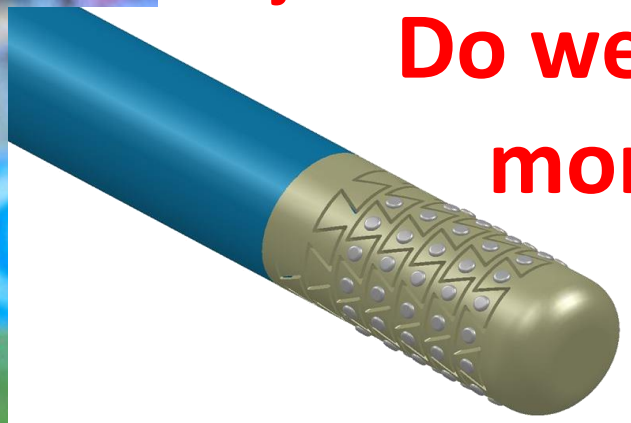
60% of long-term success rate after PVI (RF or Laser)

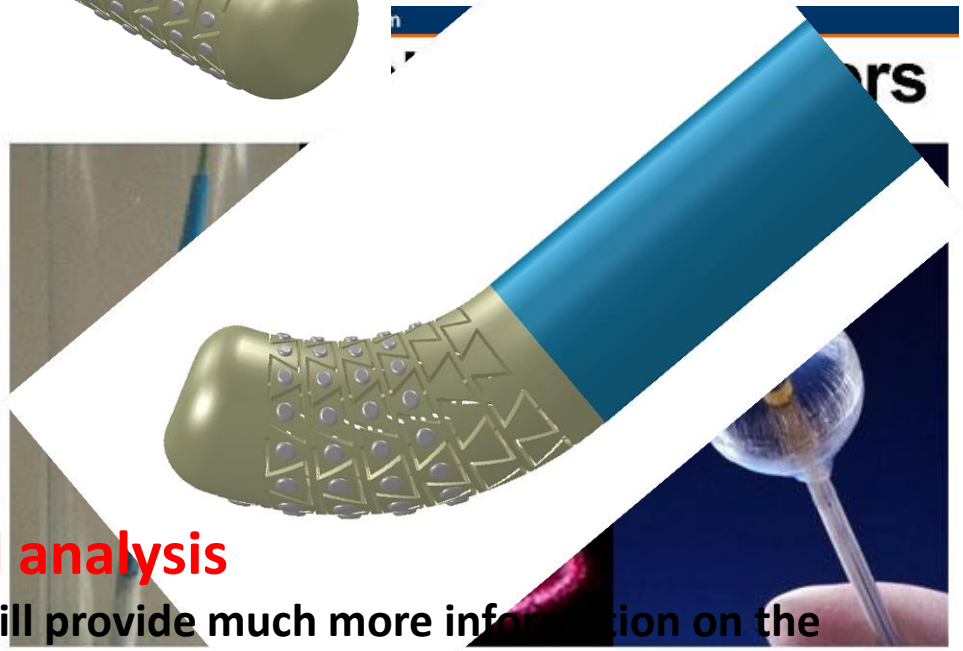
novel EAS.

Where are we running?

We just need accurate mapping of electrical activity

Do we really need more power?

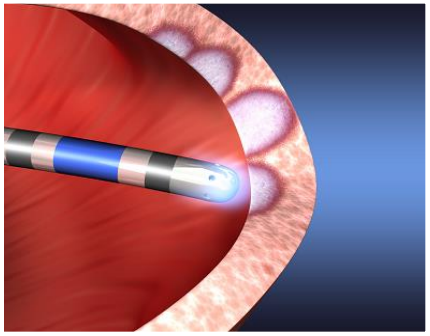


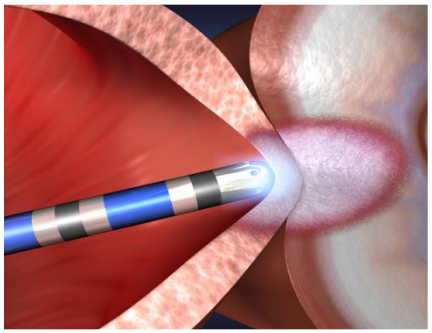


HD (High Density) electrical signal analysis

Made with multi micro electrode 7 Fr Cath will provide much more information on the Electrical activity of ROTORS and WAVELETS

Perchè misurare l'intensità del contatto?





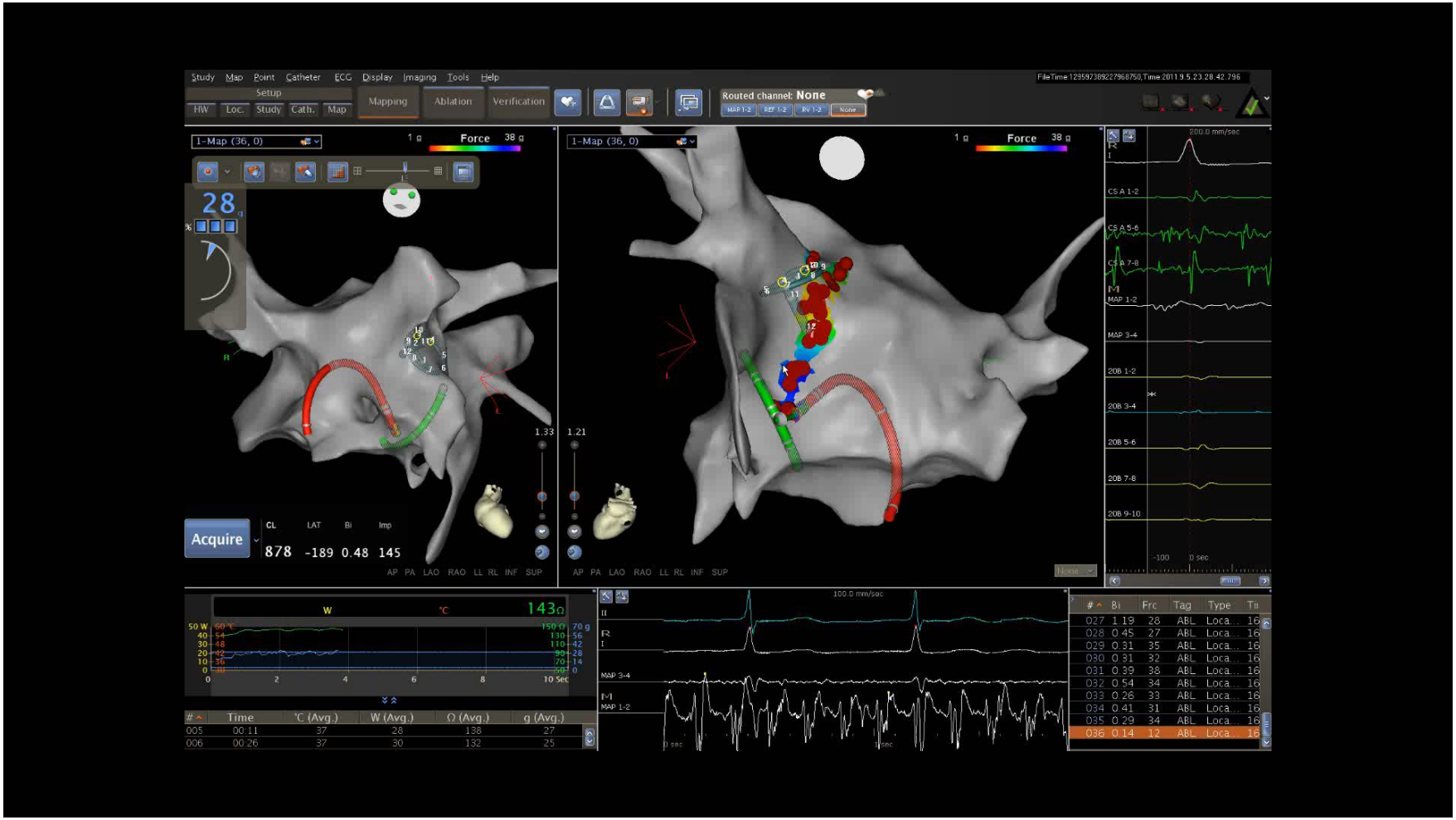
Contatto a volte Insufficiente

- *Mappaggio inaccurato*
- *Bassa Efficacia di Ablazione*
- *Tempi di procedura allungati*
- *Recidive*

Contatto Eccessivo

- *Mappaggio Inaccurato*
- *Rischio di Perforazione*
- *Danni a tessuti/organi adiacenti*

THERMOCOOL® SMARTTOUCH™ Catheter



Europace
doi:10.1093/europace/eut262

Catheter–tissue contact force for pulmonary veins isolation: a pilot multicentre study on effect on procedure and fluoroscopy time

Giuseppe Stabile[1]*, Francesco Solimene[2], Leonardo Calò[3], Matteo Anselmino[4], Antonello Castro[5], Claudio Pratola[6], Paolo Golia[7], Nicola Bottoni[8], Giuseppe Grandinetti[9], Antonio De Simone[10], Roberto De Ponti[11], Serena Dottori[12], and Emanuele Bertaglia[13]

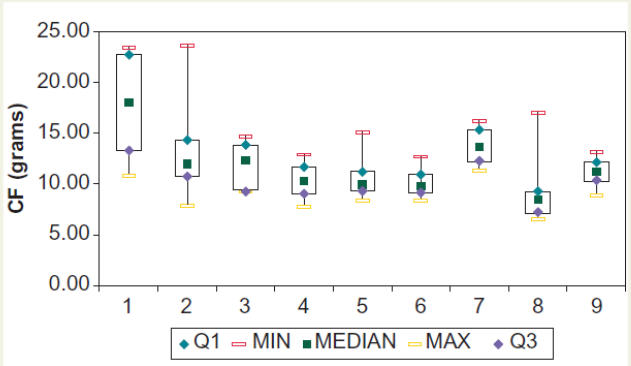


Figure 3 Box and whiskers plot of mean CF value during ablation in different centres.

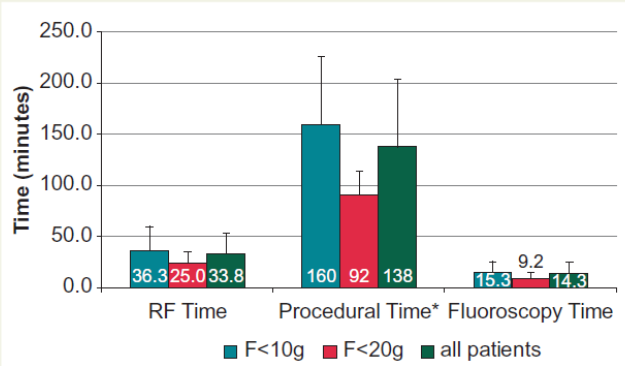
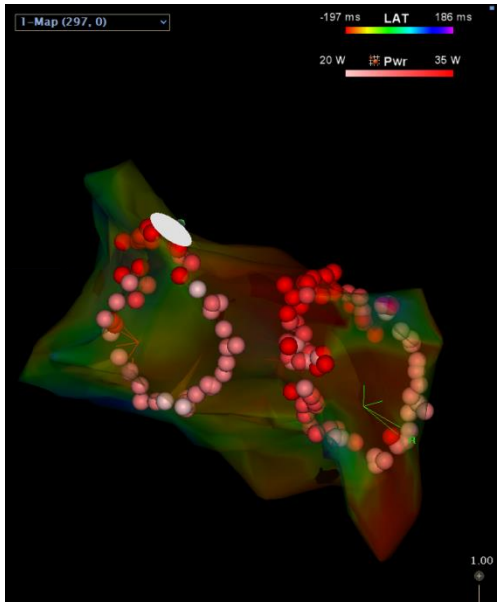


Figure 4 Radiofrequency (RF) time, fluoroscopy time, and procedural time in the overall population and in the two subgroups with CF $<$ 10 g and $>$20 g, respectively. *$P < 0.05$

SMARTTOUCH Approved Region Only

The Biosense-Webster Solution

THERMOCOOL® SMARTTOUCH ™ Catheter



CARTO® 3 System VISITAG™ Module

A Completely Seamless Integration within the CARTO® 3 System Environment

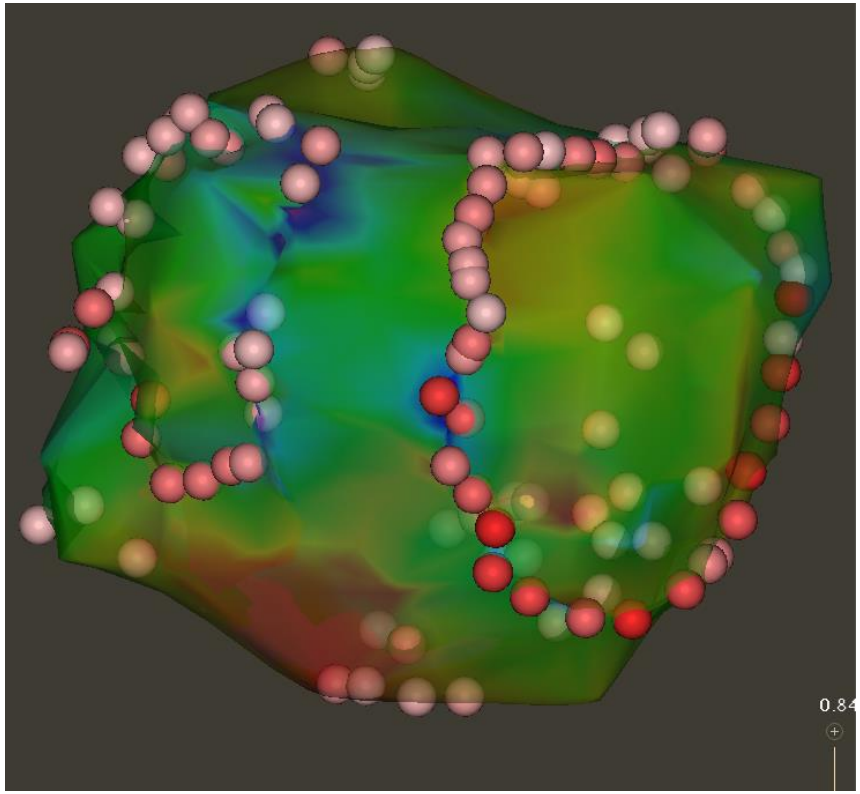
The VISITAG™ Module provides access to data collected during the application of RF energy. The data does not indicate the effectiveness of RF energy application.

*Where THERMOCOOL® SMARTTOUCH™ Catheter is approved

How the VISITAG™ Module Works

1. Insert desired RF Parameters
   - Location stability
   - Temperature
   - Impedance drop
   - Total time
   - Force time interval (FTI)
   - Force over time (FOT)

2. Automated RF Tag Display determined by parameters



Define the parameters

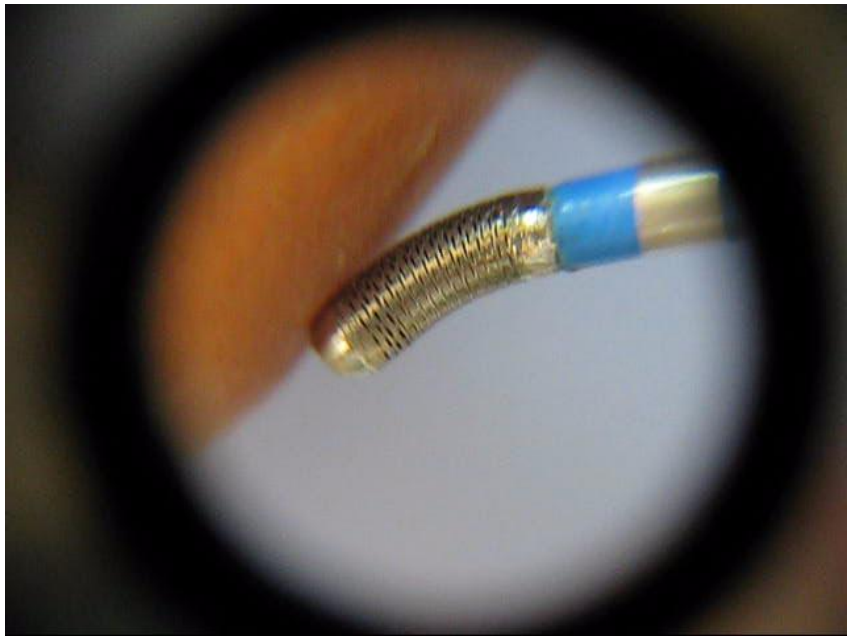
*Where THERMOCOOL® SMARTTOUCH™ Catheter is approved

Therapy™ Cool Flex™

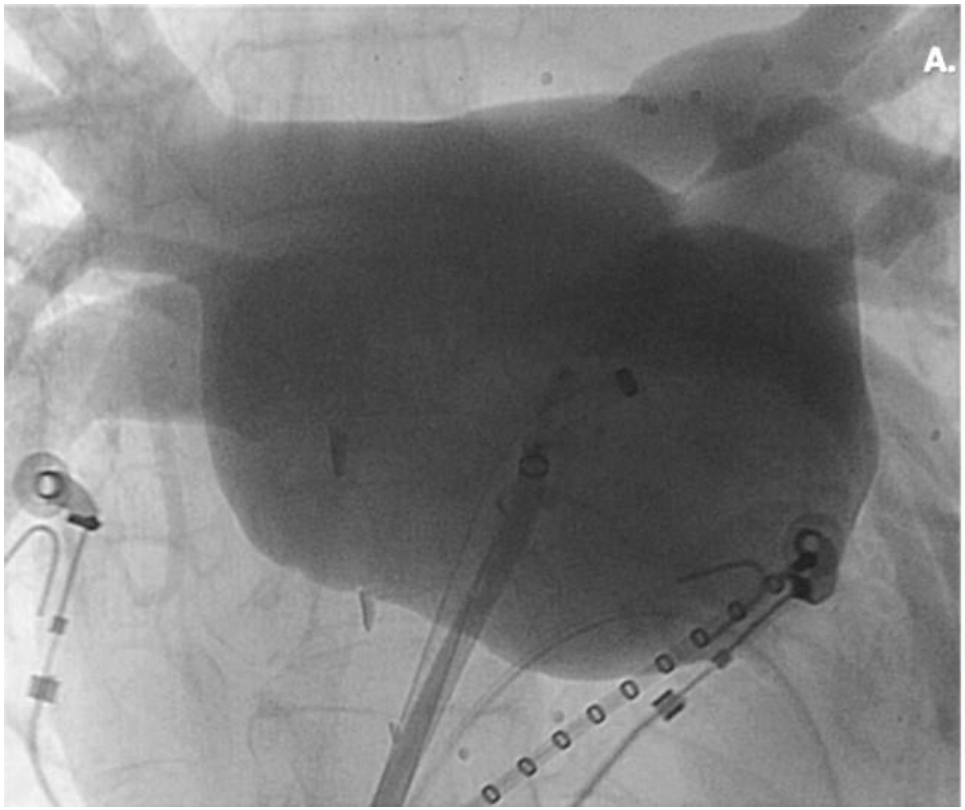
Flexible tip can reduce operator transmitted force into tissue

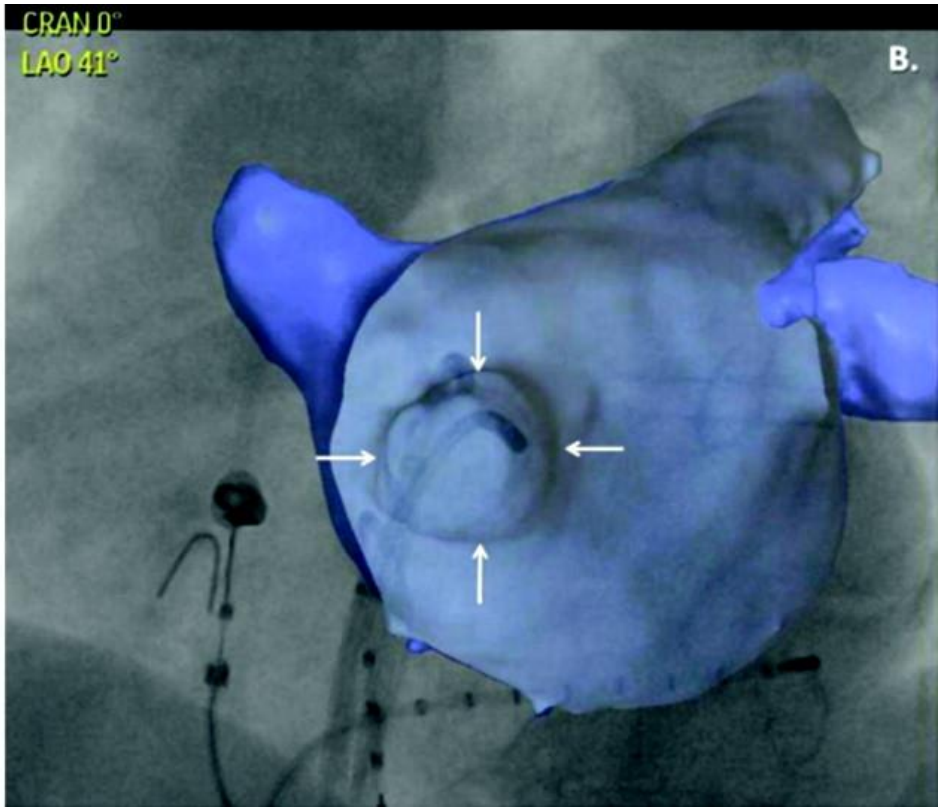
68% fewer Steam Pops and 50% Charring reduction

The Flexible tip improves flow distribution throughout the tissue

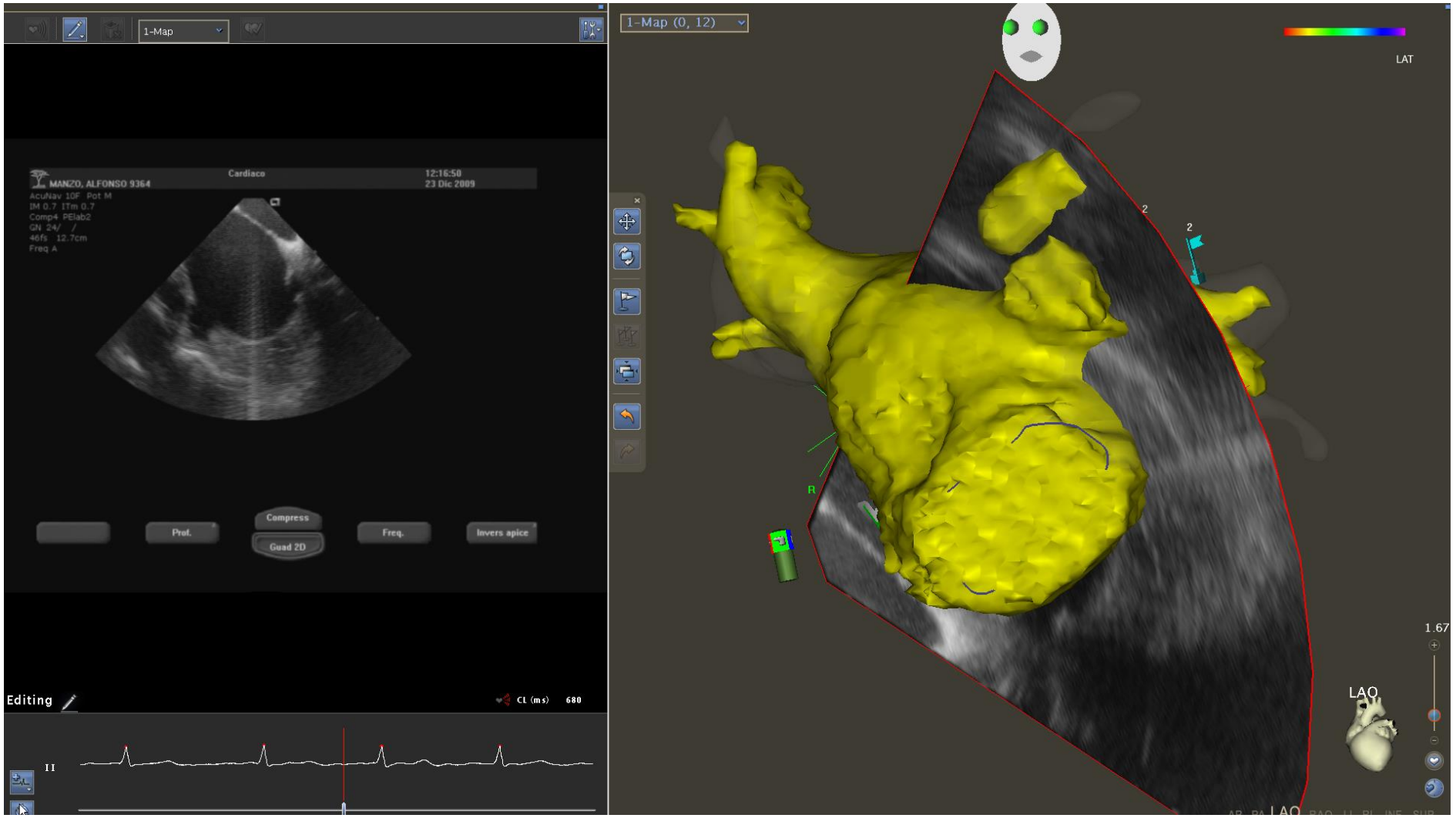


Angiografia rotazionale





CartoSound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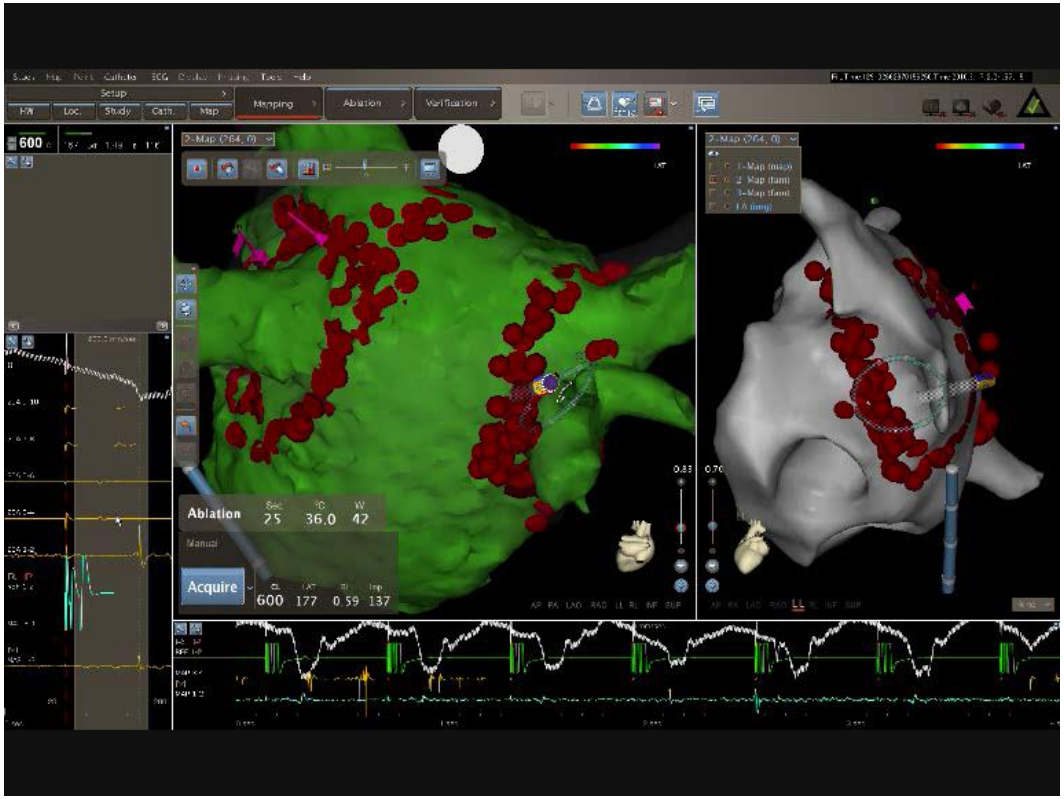
CartoMERGE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Ablation
Verification
Ablation
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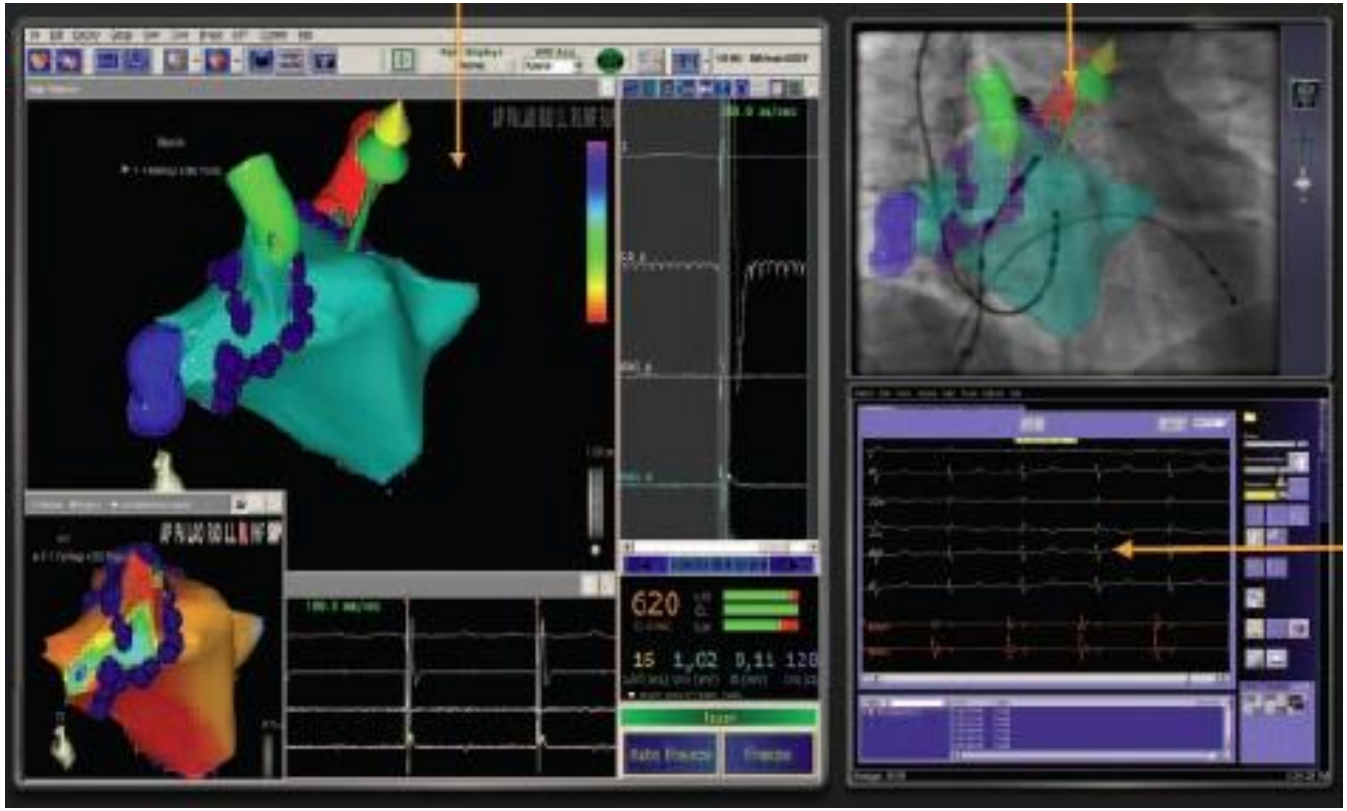
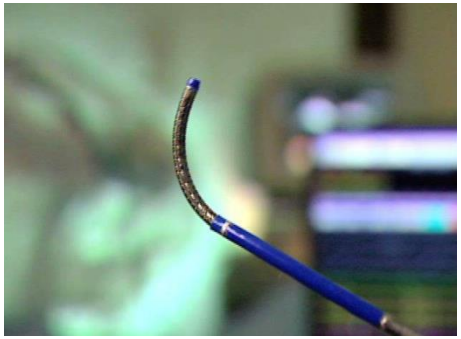
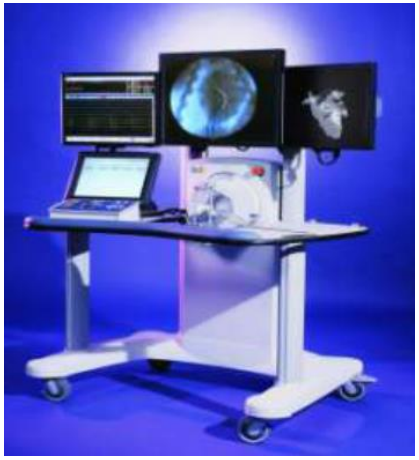
42
Acquire
600
177
0.59
137

Remote navigation: Stereotaxis



Robotic Catheter System™





Conclusioni

Le nuove tecnologie permettono di:

- Aumentare la sicurezza in molte fasi della procedura
- Aumentare l'efficacia e il successo
- Ridurre i tempi di scopia e procedurali

Qual'è la migliore?