

VENICE 2015 ARRHYTHMIAS

Venice, Italy, October 16-18 2015

14th Edition



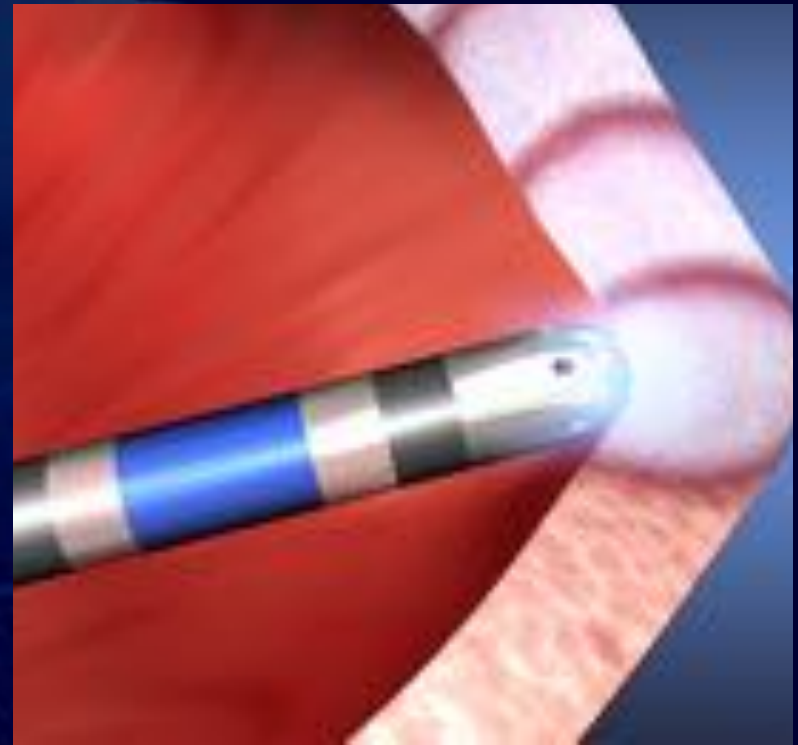
USE OF ELECTRICAL COUPLING INDEX IN TYPICAL ATRIAL FLUTTER ABLATION

Dott. Massimiliano Maines

Venice, October 17 2015

BACKGROUND

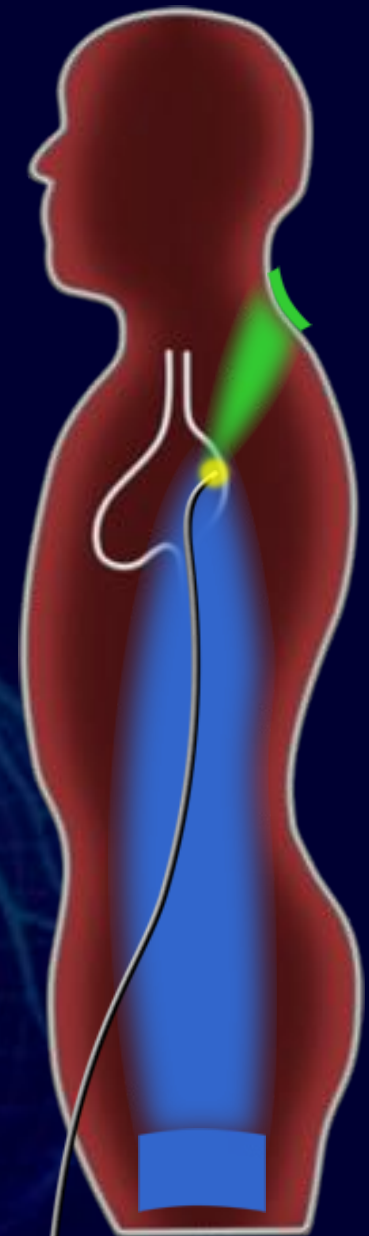
Contact with
cardiac tissue is
a determinant
of lesion
efficacy during
ablation



BACKGROUND

The electrical coupling index (ECI) from the EnSite Contact™ system (St. Jude Medical, MN) is based on the calculation of the real-time complex impedance specific to the catheter tip-to-tissue interface using a three-terminal model.

$$\text{blue dot} + \text{green dot} = \text{yellow dot}$$



BACKGROUND

IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, VOL. 61, NO. 3, MARCH 2014

Measurement of Electrical Coupling Between Cardiac Ablation Catheters and Tissue

D. Curtis Deno*, *Member, IEEE*, Haris J. Sih, Stephan P. Miller, Liane R. Teplitsky, and Russ Kuenzi

ECI is a tip specific, robust, correlate with contact and ablation efficacy, and can potentially add to clinical interpretation of electrical coupling during electrophysiology procedures.

First in Human Validation of Impedance-Based Catheter Tip-to-Tissue Contact Assessment in the Left Atrium

CHRISTOPHER PIORKOWSKI, M.D.,* HARIS SIH, Ph.D.,† PHILIPP SOMMER, M.D.,*
STEPHAN P. MILLER, B.S.,† THOMAS GASPAR, M.D.,* LIANE TEPLITSKY, M.S.,†
and GERHARD HINDRICKS, M.D., Ph.D.*

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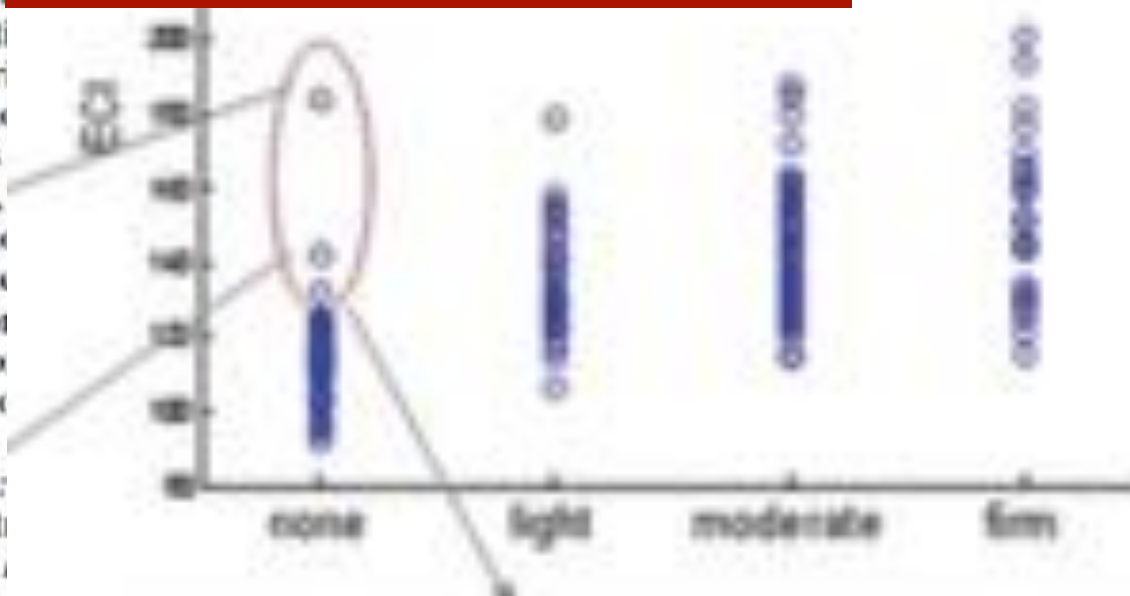
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Conclusion:
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(*J Cardiovasc*)

The electrical coupling index (ECI) has been validated as an indicator of tissue contact.



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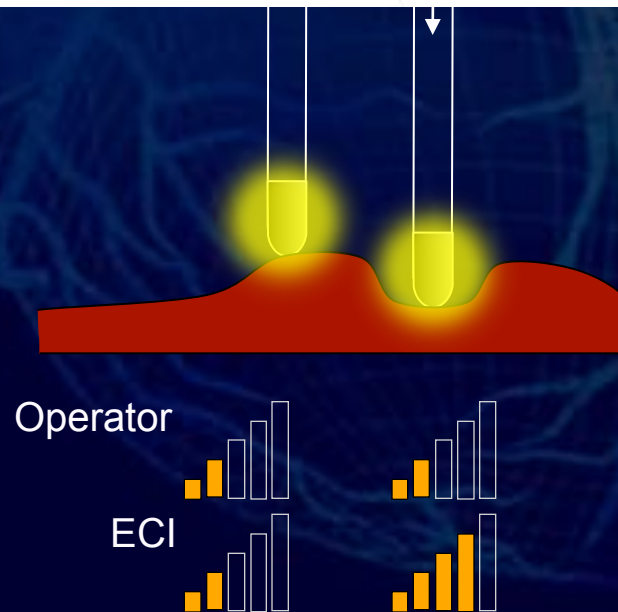
reproducibly
ter ablation.

BACKGROUND

Contact Sensing Provides a Highly Accurate Means to Titrate Radiofrequency Ablation Lesion Depth

DOUGLAS HOLMES, M.D.,* JEFFREY M. FISH, D.V.M.,† ISRAEL A. BYRD, Ph.D.,†
JEREMY D. DANDO, B.S.,† STEVEN J. FOWLER, M.D.,* HONG CAO, Ph.D.,†
JAMES A. JENSEN, Ph.D.,† HARRY A. PURYEAR, Ph.D.,† and LARRY A. CHINITZ, M.D.*

Conclusion: Use of ECI as a factor in a lesion depth algorithm may provide clinically valuable information regarding the efficacy of intracardiac RF ablation lesions. (*J Cardiovasc Electrophysiol*, Vol. pp. 1-7)



The benefit of tissue contact monitoring with an electrical coupling index during ablation of typical atrial flutter—a prospective randomised control trial

Michael A. Jones • David Webster • Kelvin C.K. Wong •
Christopher Hayes • Norman Qureshi • Kim Rajappan •
Yaver Bashir • Timothy R. Betts

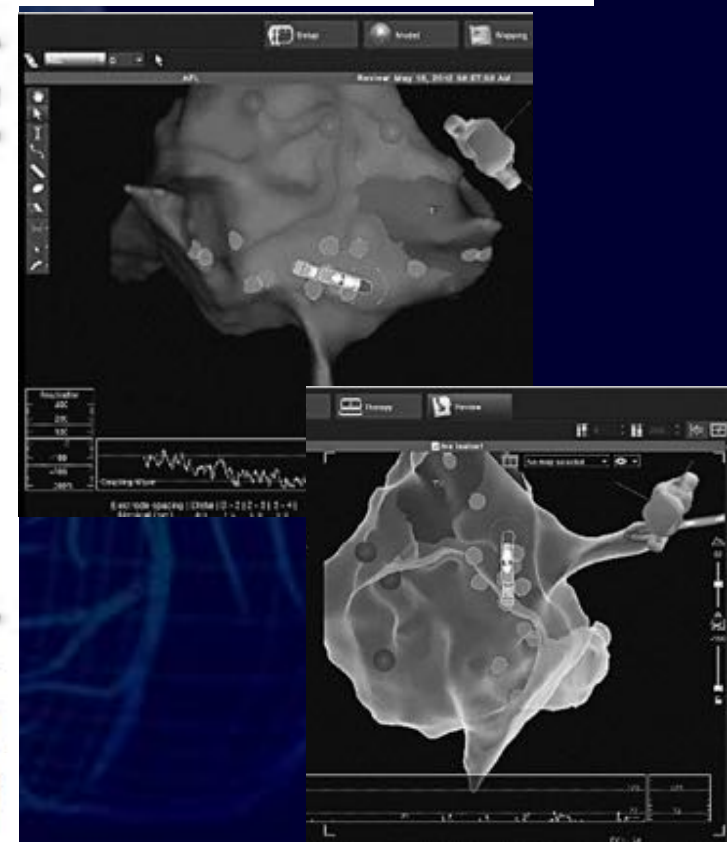
J Interv Card Electrophysiol (2014) 41:237–244
DOI 10.1007/s10840-014-9943-6

Table 2 Acute results

	ECI-guided	Control	P value
RF time (s)	580 (312)	574 (287)	0.11
Lesion number required	11.5 (5.6)	11.4 (5.3)	0.44
Fluoroscopy time (s)	718 (577)	721 (583)	0.78
Fluoroscopy dose ($\mu\text{Gy}\cdot\text{m}^2$)	676 (840)	683 (851)	0.13
Procedure duration (min)	62.7 (33)	62.3 (33)	0.92
First pass conduction block (N, %)	36 (72)	30 (59)	0.16
Re-conduction across CTI at 20 min (N, %)	5 (10)	12 (24)	0.07

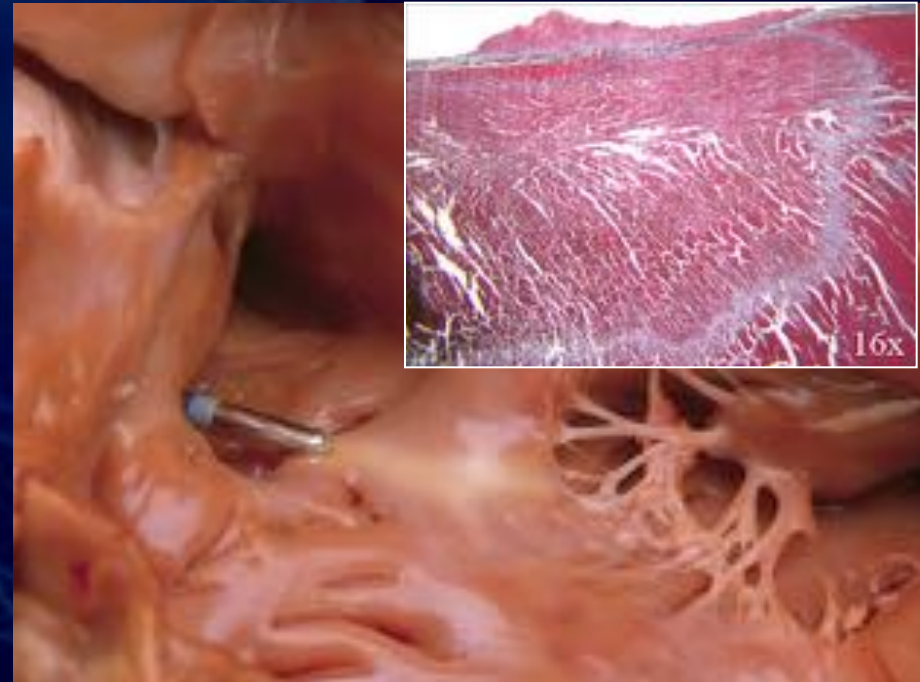
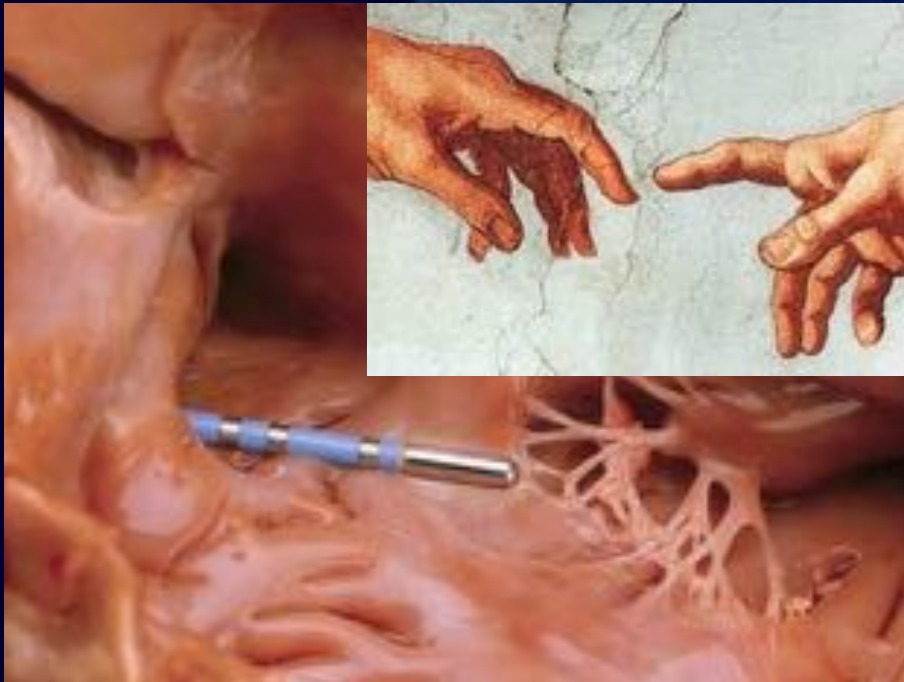
Conclusions ECI-guided CTI ablation demonstrated a non-statistically significant reduction in late recurrence of atrial flutter, at no cost to procedural time, radiation exposure or RF requirement.

Division of Cardiology, S. Maria del Carmine Hospital – Rovereto - Italy



AIM

Evaluate if this index could also give an indication about ablation lesion efficacy in clinical practice

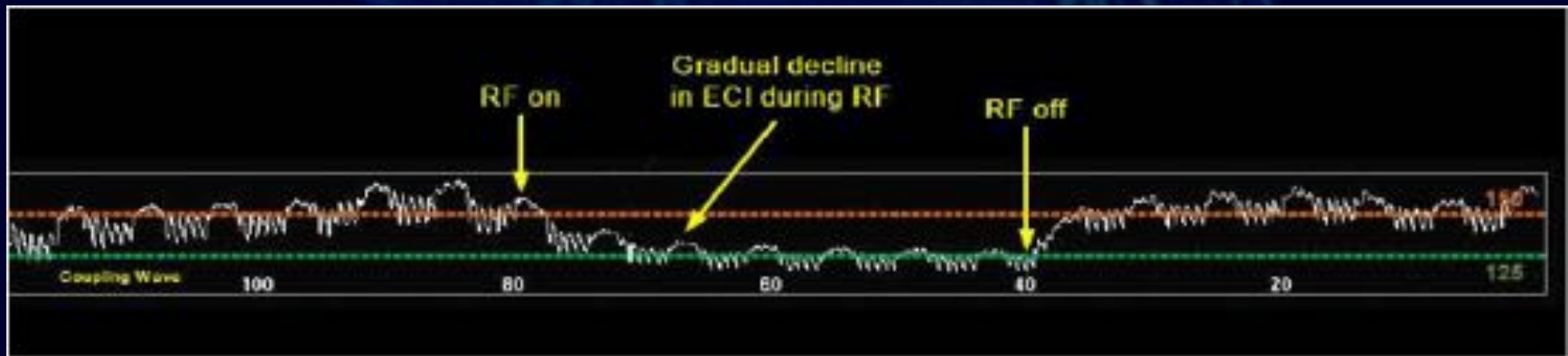


METHODS

Patients undergoing typical right atrial flutter ablation, we compared the values of the ECI

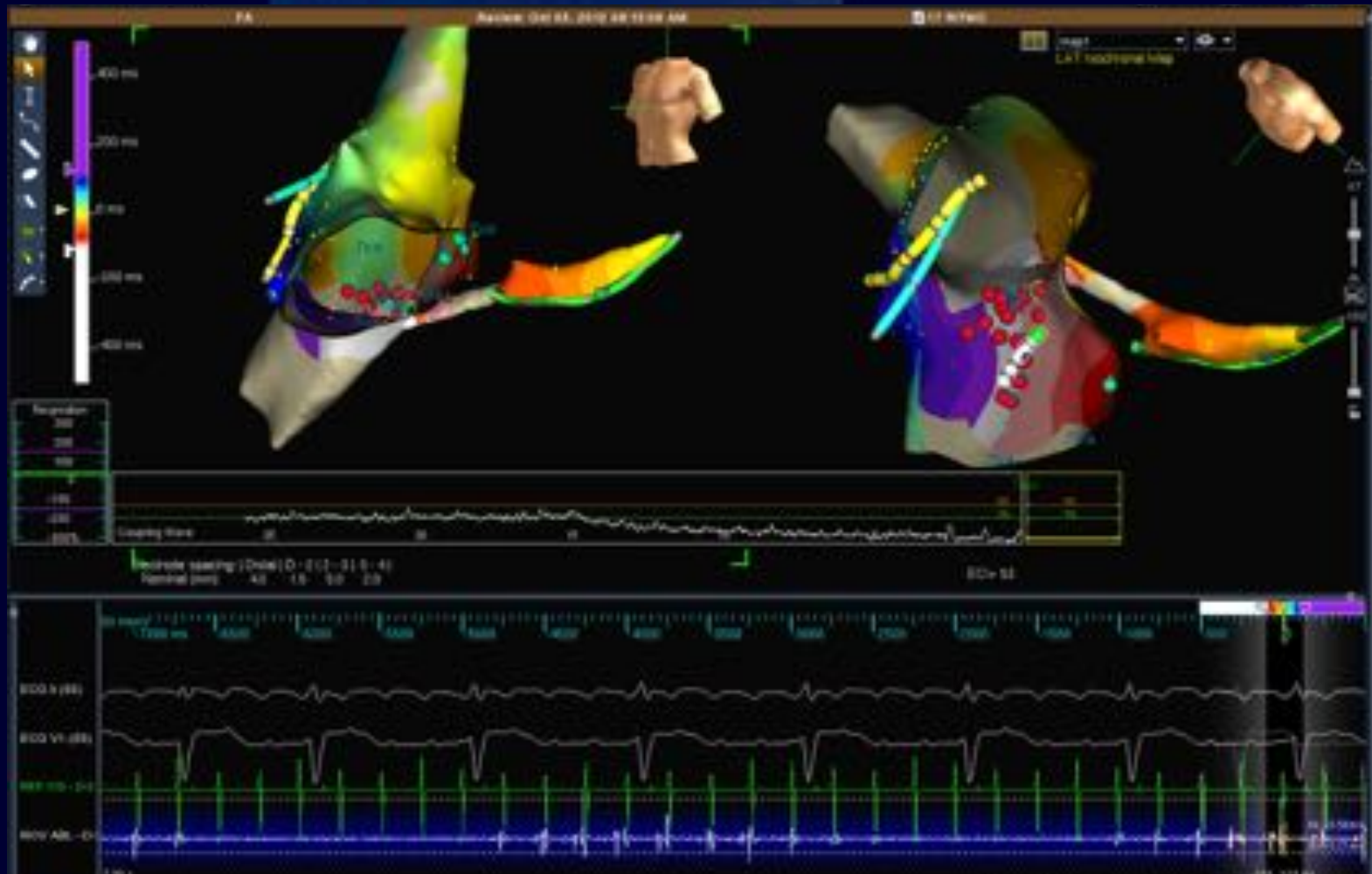
- before
- during (at the plateau)
- after

isthmus ablation



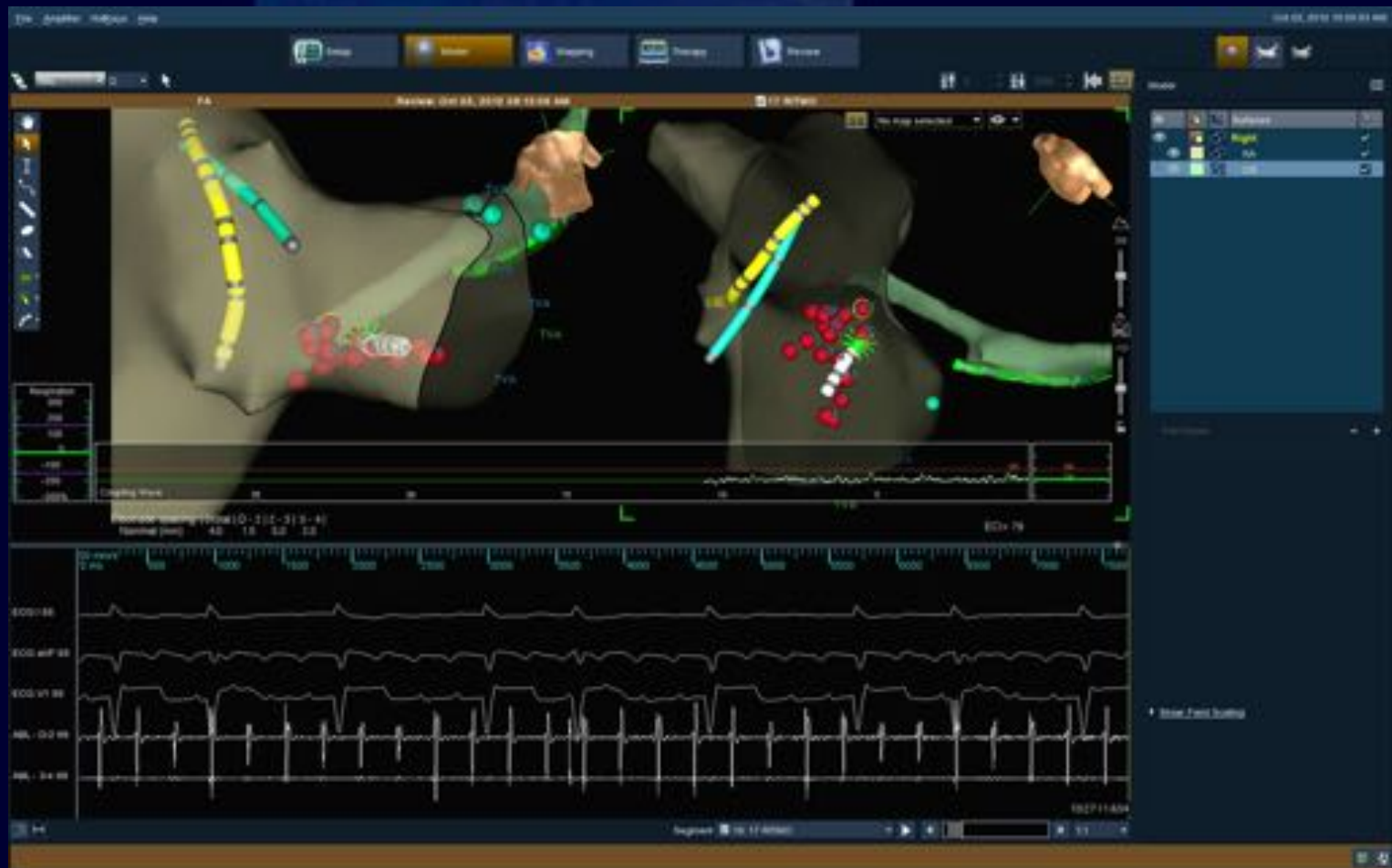
METHODS

ECI reduction stable for at least 10 seconds



METHODS

ECI stable for at least 10 seconds



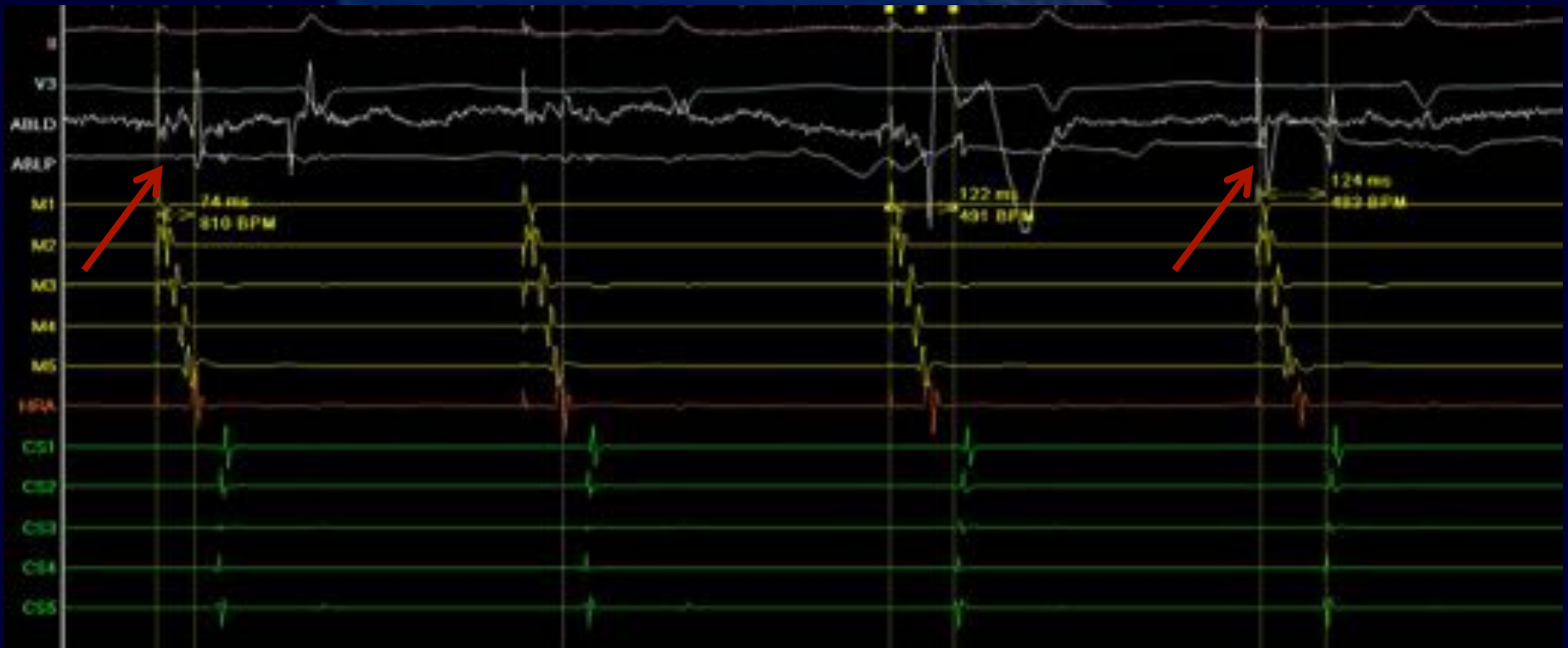
METHODS

Permanent tissue damage or ablation lesion efficacy was defined as the reduction in the local potential > 90% or as potential split in 2 separate signals. In absence of these endpoints, lesions were deemed ineffective



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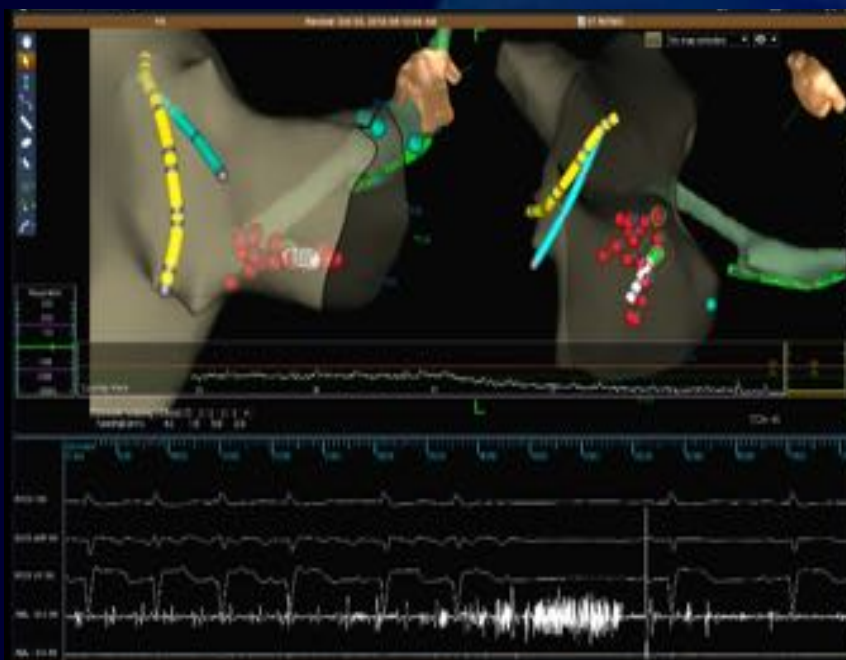


RESULTS: Patient (15) baseline characteristics

Age in years (\pm SD)	69.3 \pm 11.4
Male (n, %)	11 (73%)
CHA2DS2-VASc score (median)	2
LVEF (\pm SD)	56.6% \pm 13.3
LA diameter (\pm SD)	43.2 \pm 5.8
Class I AAD (n (%))	2 (13)
Class III AAD	4 (27)
Beta blocker	7 (47)
Calcium channel	3 (20)
Digoxin	1 (7)
ACE/ARB	4 (27)
Heart failure	2 (13)
Prior PPM/ICD	1 (7)
Atrial fibrillation	5 (33)

RESULTS: Procedural characteristics

Ablation with ContactTM TherapyTM Cool PathTM Cardiac Ablation System in conjunction with EnSiteTM Velocity ContactTM technology



Number of RF applications (n)

**10.8±6.7
(range 6-28)**

RF time (seconds)

330.3±177.5

Procedural time (min)

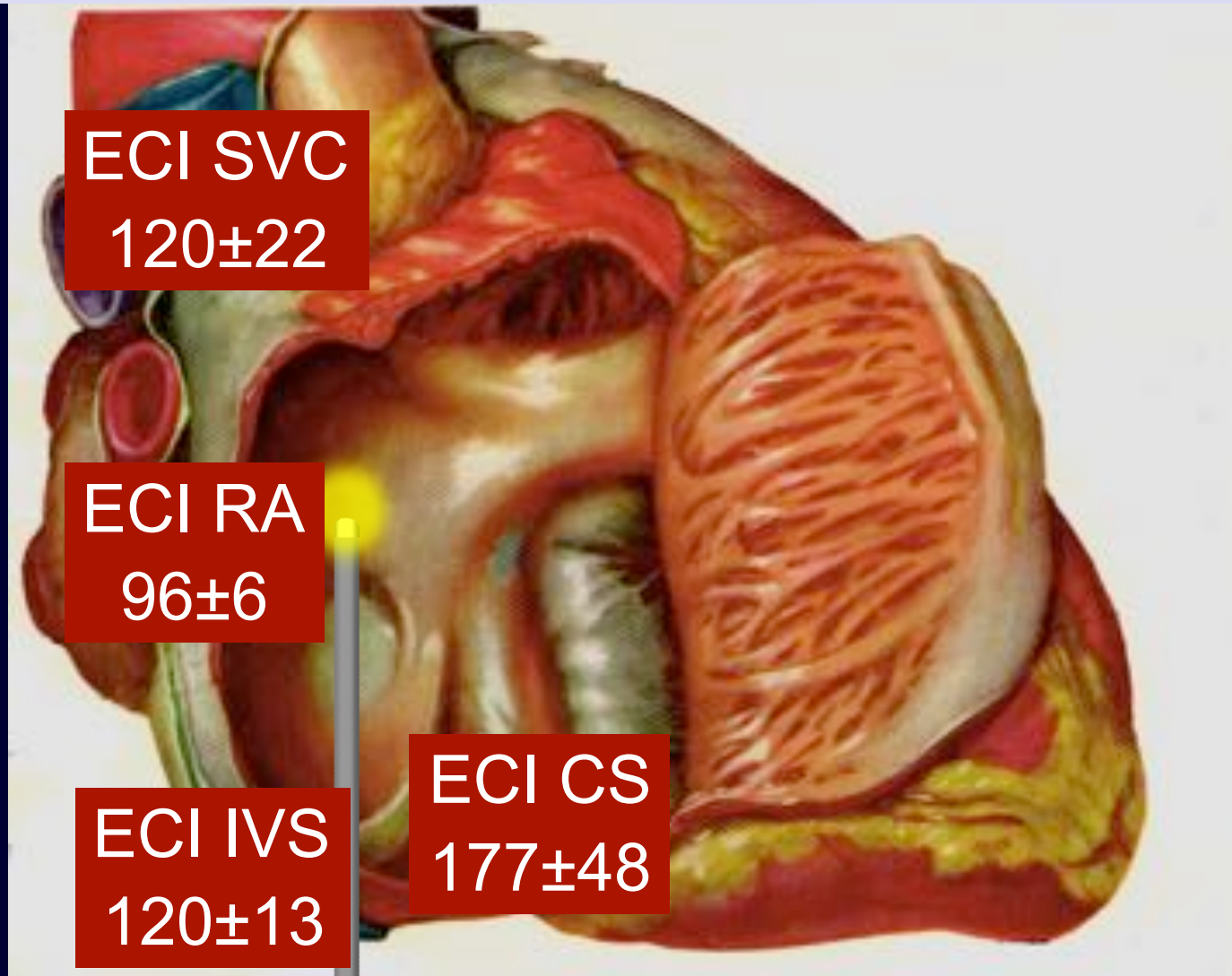
108.2±18

Fluoroscopy time (min)

5.9±3.4

All the procedures were successful, without complications.

RESULTS: basal ECI



First in Human Validation of Impedance-Based Catheter Tip-to-Tissue Contact Assessment in the Left Atrium

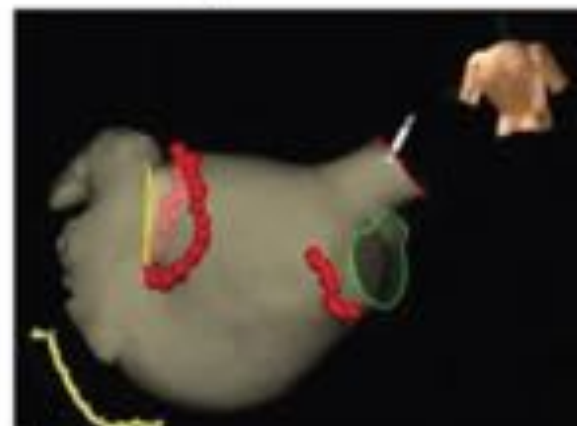
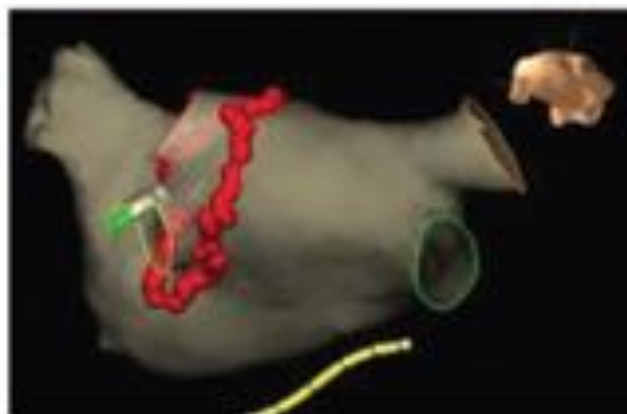
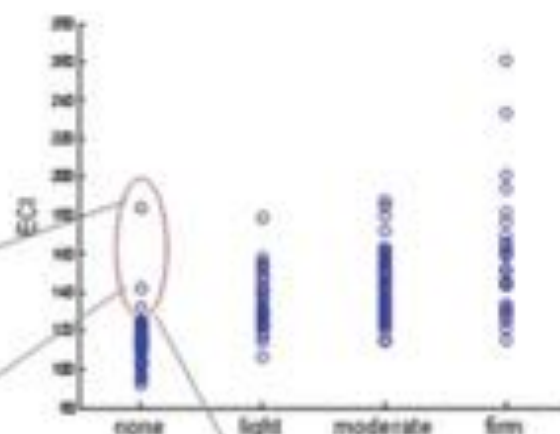
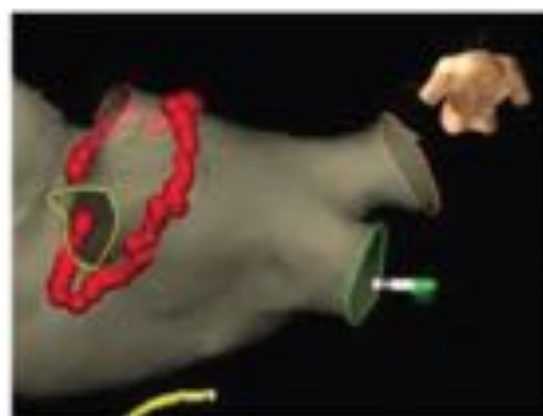
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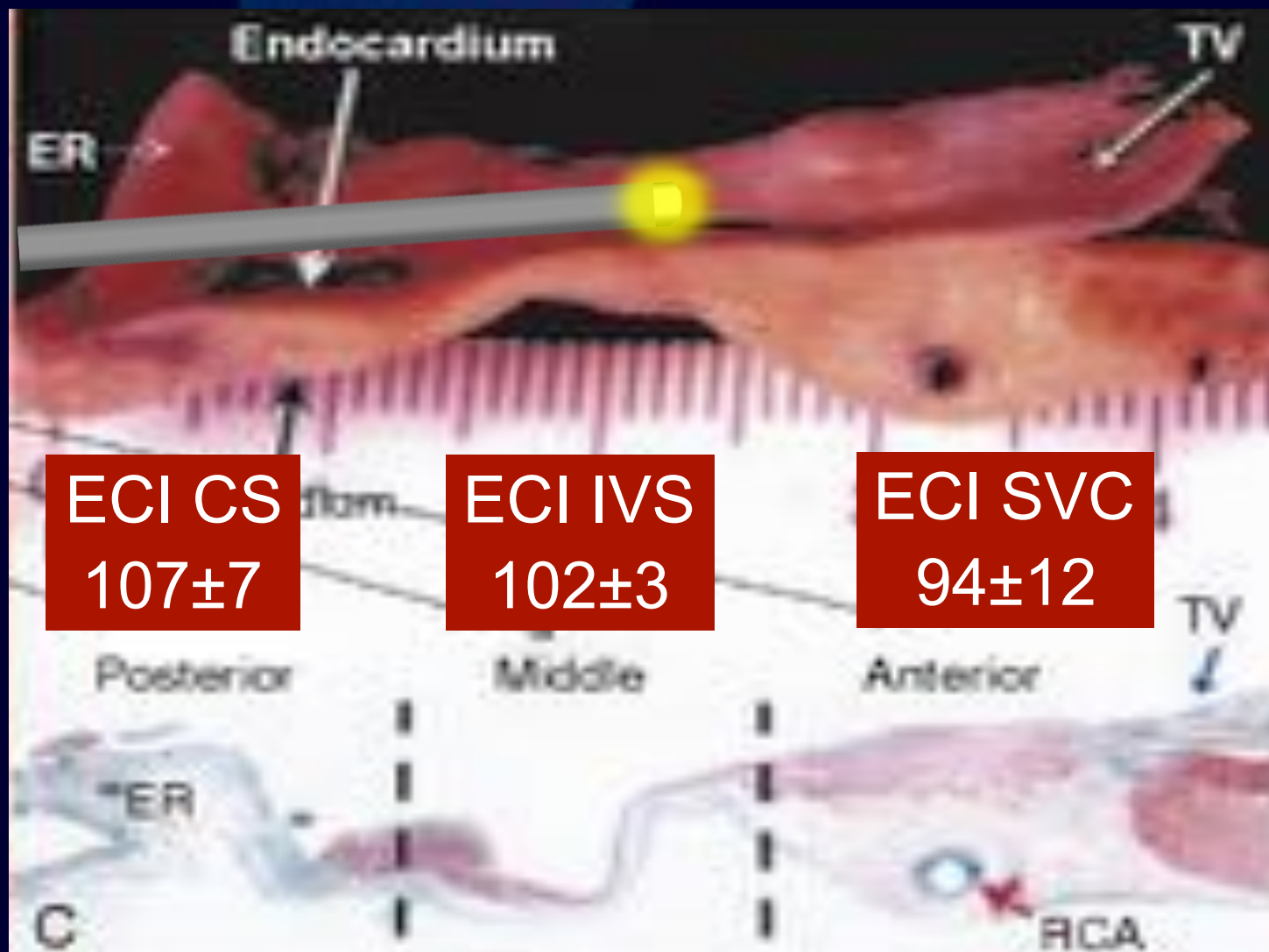
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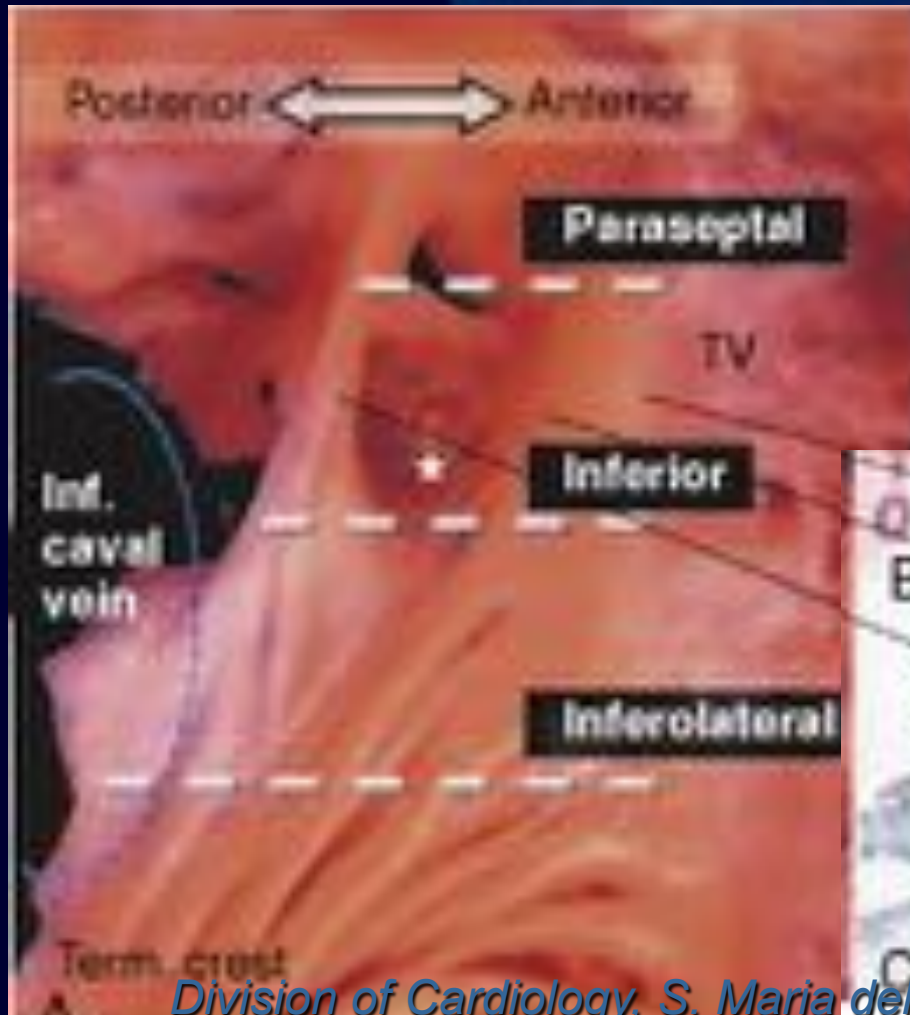
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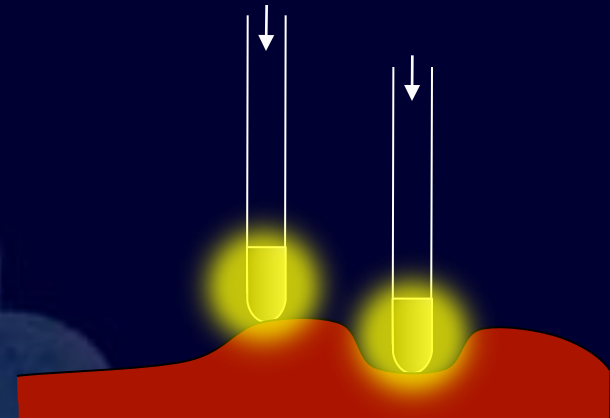
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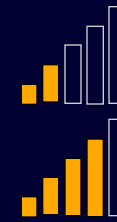
ECI in trebeculated tissue



Operator



ECI



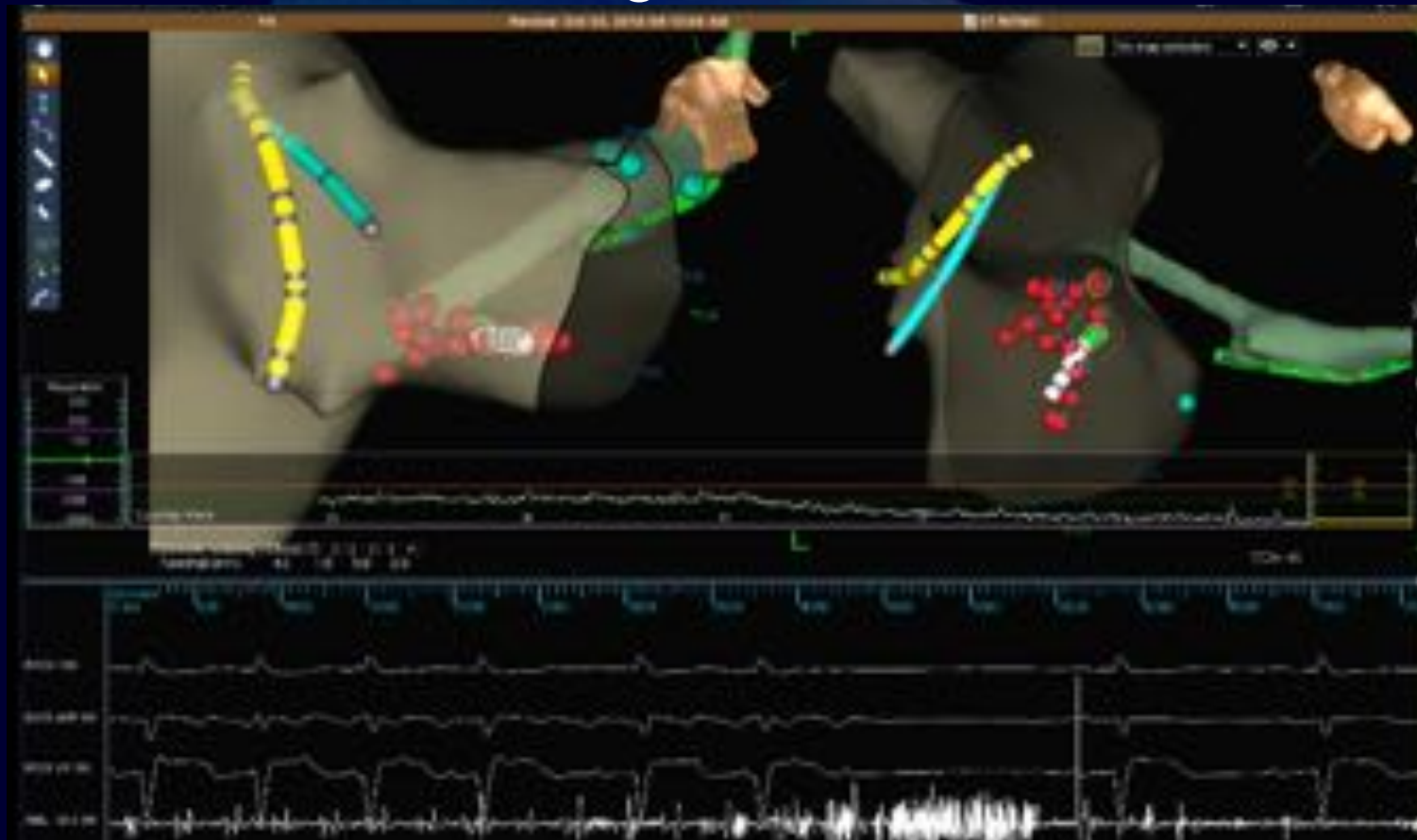
RESULTS

	Overall	RF effective shots	RF ineffective shots	p *
RF Duration (s)	31.7±3.7	31.4±3.9	36.1±4.5	0.02
ECI pre ablation	100.1±10.5	101.6±10.8	104.8±19.3	ns
min ECI during RF (plateau)	56.3±9.6	55.8±9.7	68±20.1	ns
ECI post ablation	81.0±9.6	79.6±10.9	95.4±16.9	0.03
delta ECI (pre-post ablation)	19.1±5	22±3.6	9.4±2.5	<0.001
delta% ECI (pre-post ablation)	18.5±4.2	21.0±3.6	8.8±1.2	<0.001

* Student t-test

RESULTS

13% cut-off value in the ECI variation could be considered as the target for an effective ablation

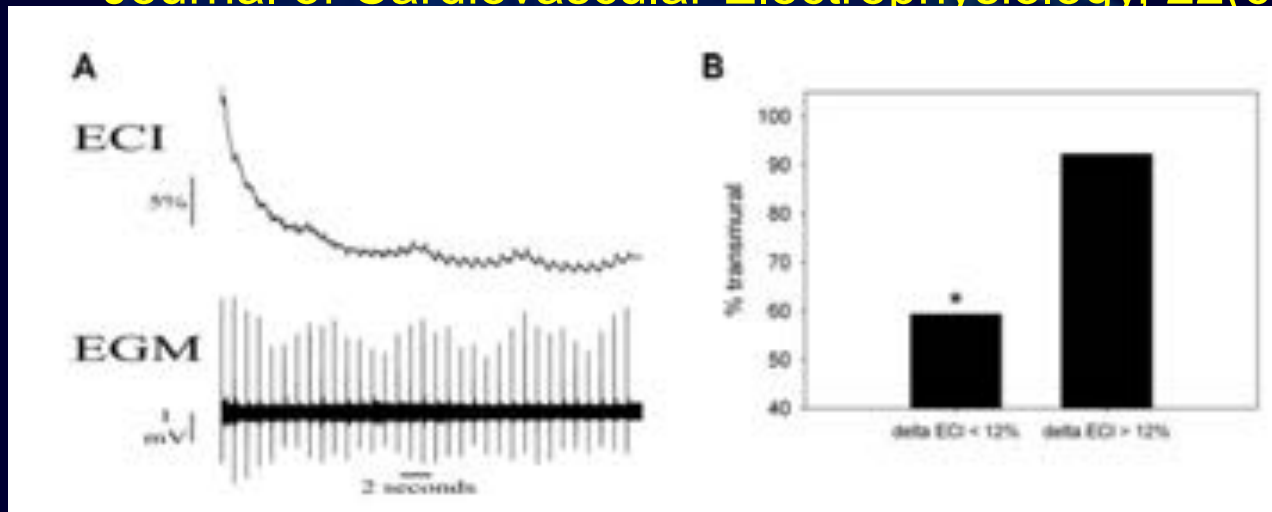


BACKGROUND

Contact Sensing Provides a Highly Accurate Means to Titrate Radiofrequency Ablation Lesion Depth

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Journal of Cardiovascular Electrophysiology, 22(6), 684–690.



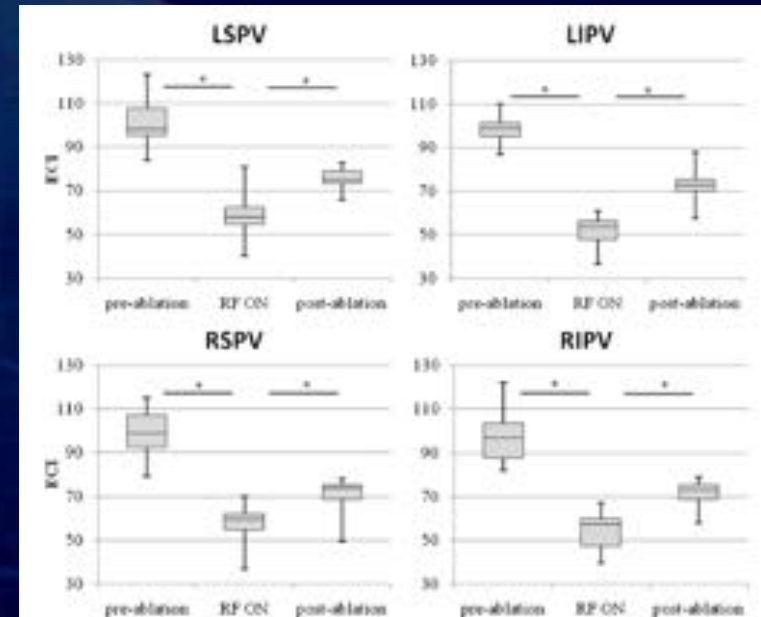
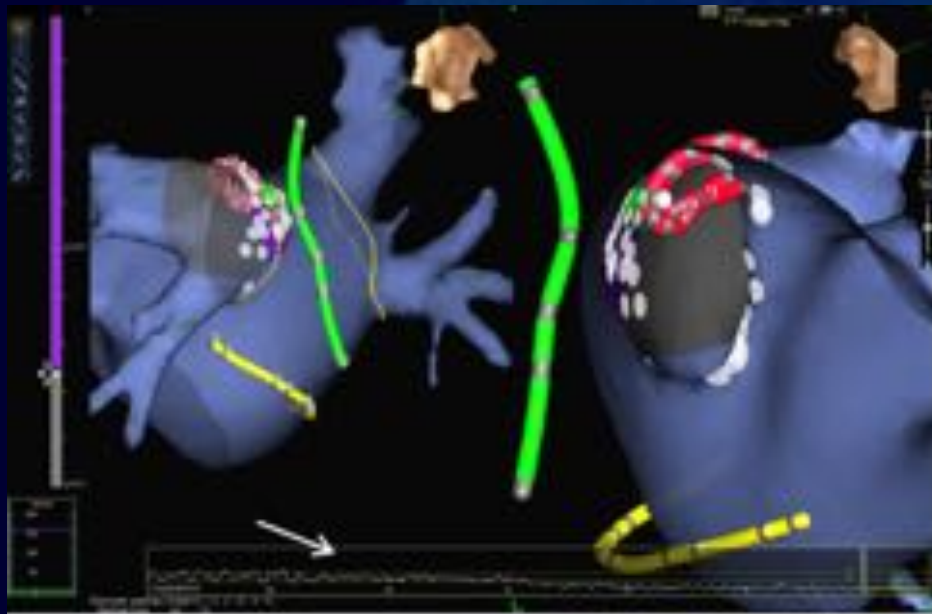
Intracardiac, lesions with $\geq 12\%$ reduction in ECI were more likely to be transmural

Division of Cardiology, S. Maria del Carmine Hospital – Rovereto - Italy

Simultaneous assessment of contact pressure and local electrical coupling index using robotic navigation

Antonio Dello Russo • Gaetano Fassini • Michela Casella • Fabrizio Bologna • Osama Al-Nono • Daniele Colombo • Viviana Biagioli • Pasquale Santangeli • Luigi Di Biase • Martina Zucchetti • Benedetta Majocchi • Vittoria Marino • Joseph J. Gallinghouse • Andrea Natale • Claudio Tondo

J Interv Card Electrophysiol (2014) 40:23–31
DOI 10.1007/s10840-014-9882-2



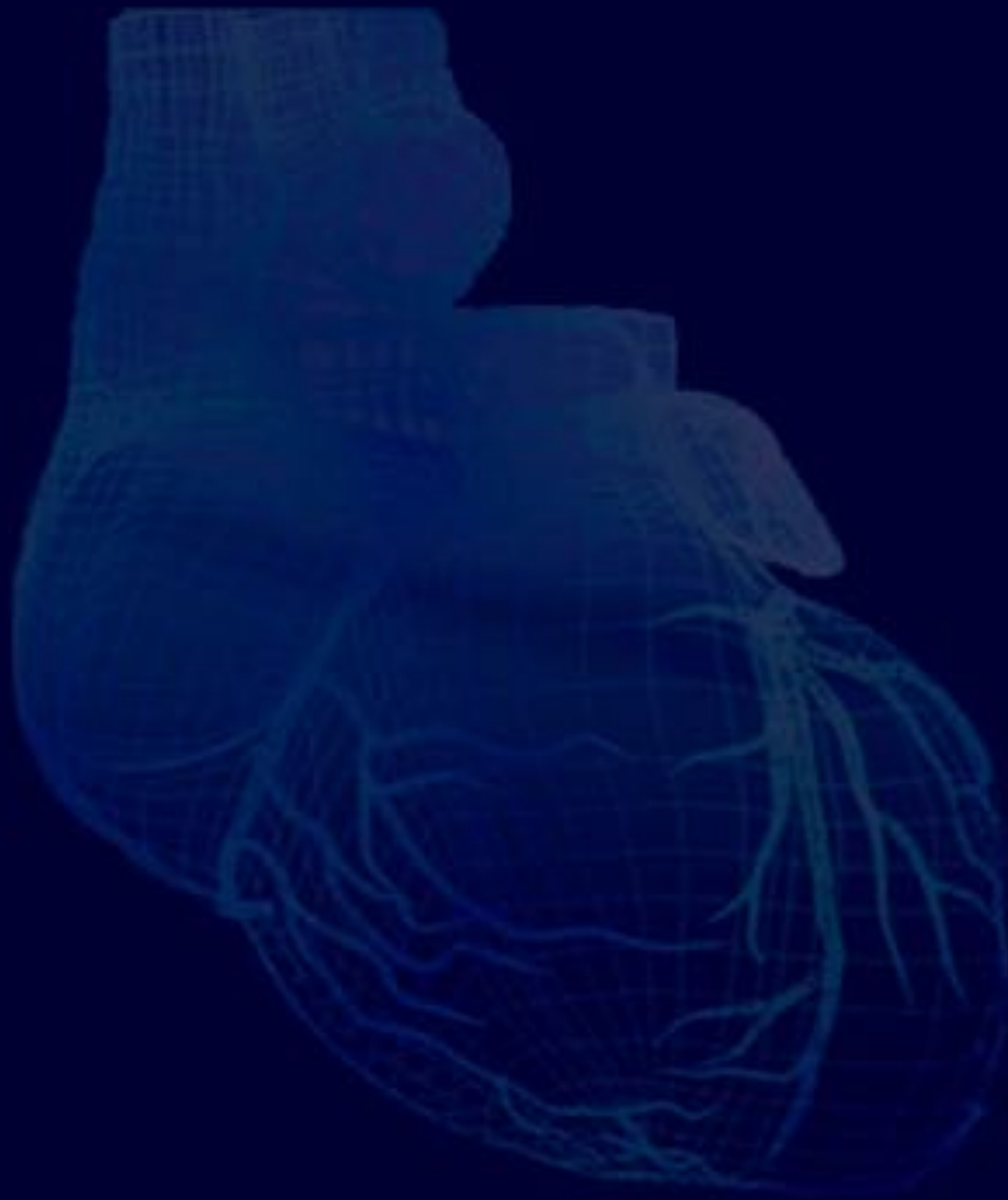
Conclusions Successful PV isolation is associated with a significant decrease in ECI of at least 20 %. This may be used as a surrogate marker of effective lesion in AF ablation.

Division of Cardiology, S. Maria del Carmine Hospital – Rovereto - Italy

CONCLUSION

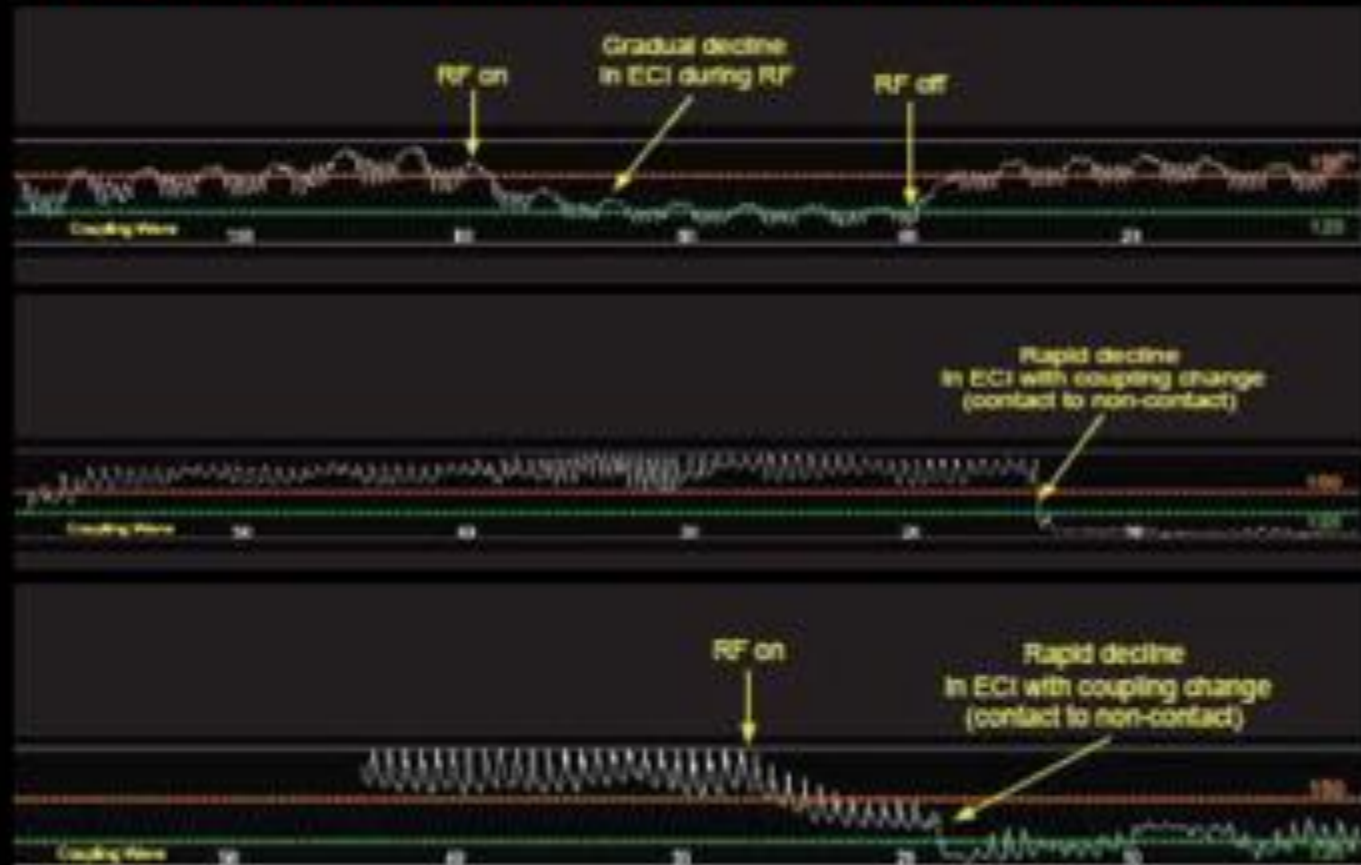
The Electrical Coupling Index can be used as a marker of ablation lesion efficacy in the the ablation of typical right atrial flutter





Division of Cardiology, S. Maria del Carmine Hospital – Rovereto - Italy

Electrical Contact (ECI) versus Non Contact



Tissue Heating (top) versus loss of contact (middle) versus loss of contact during