



Актуальные вопросы диагностики и лечения
фибрилляции предсердий, Москва, НМХЦ 2014

Эволюция катетерных методов лечения фибрилляции предсердий

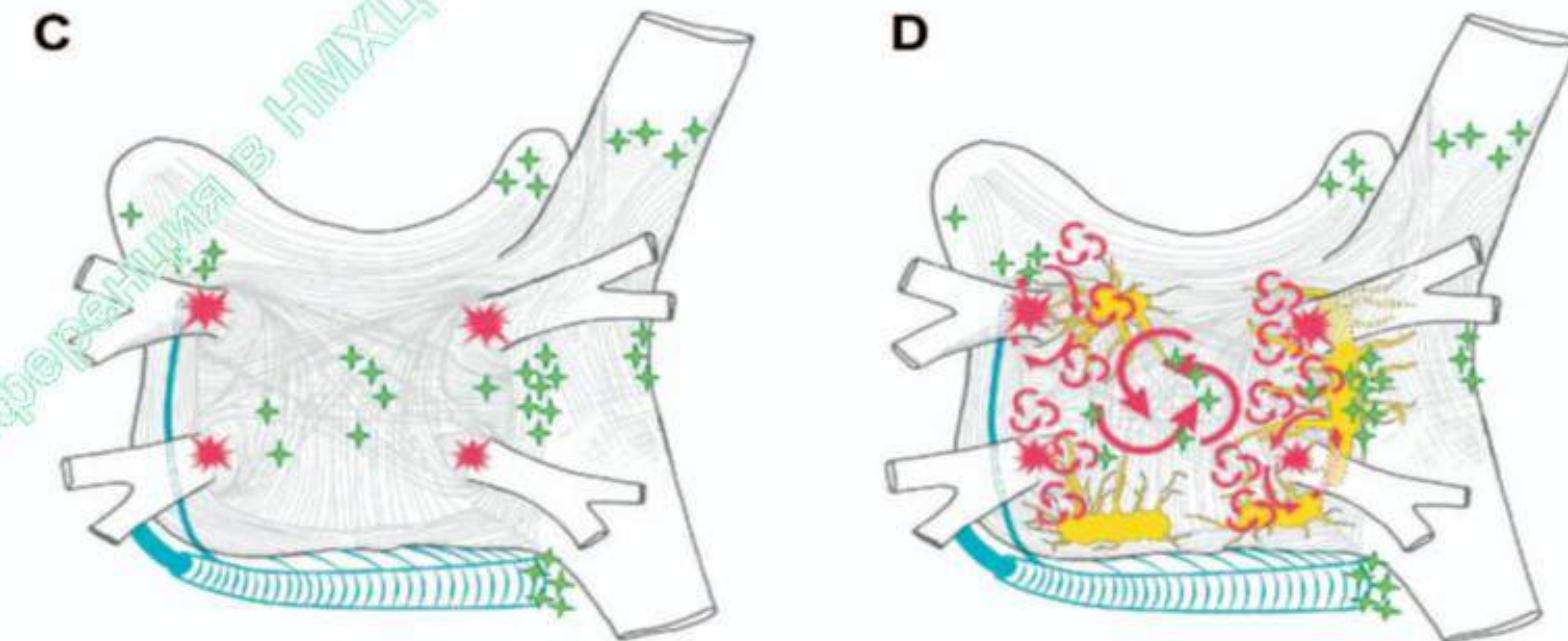
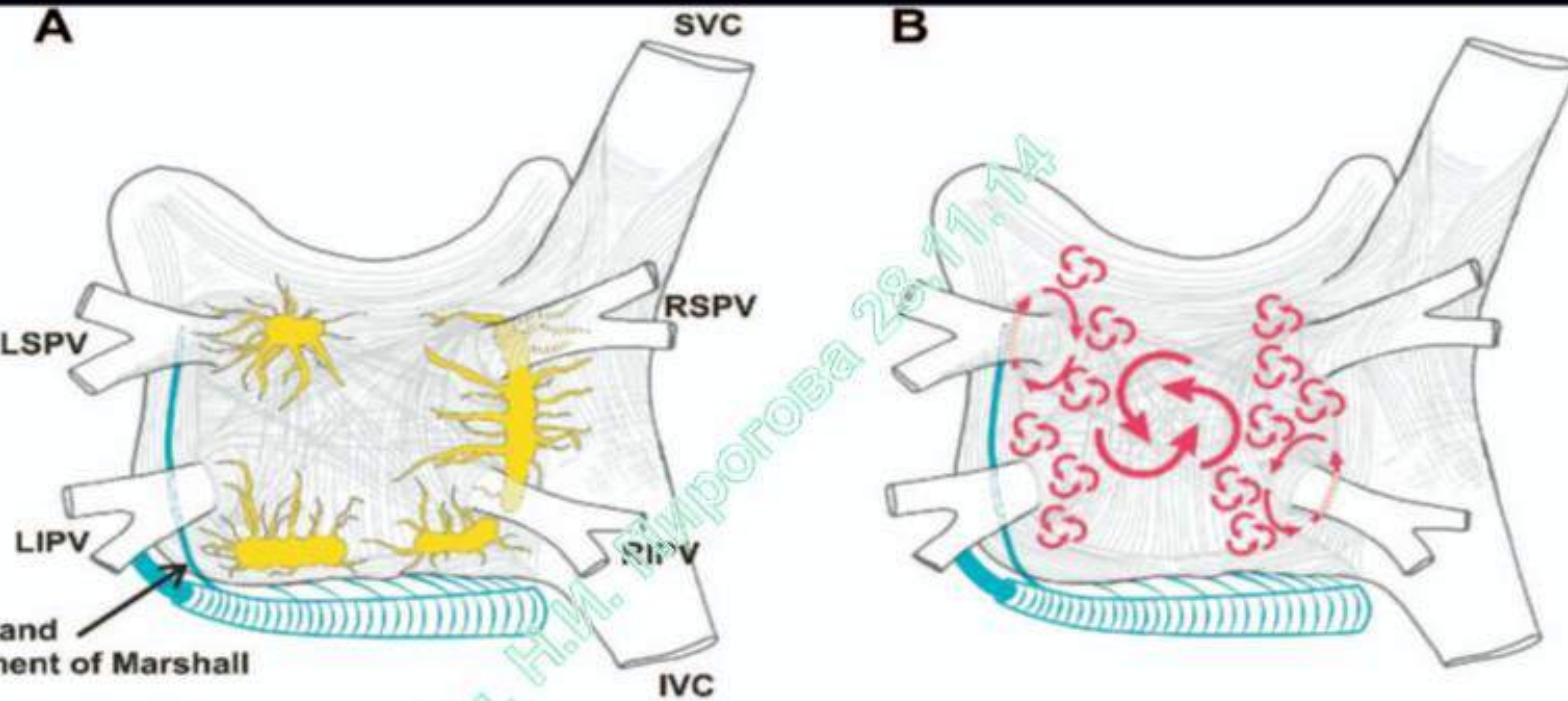
Ф.Г. Рзаев

НЦ ССХ им.А.Н.Бакулева, 2014

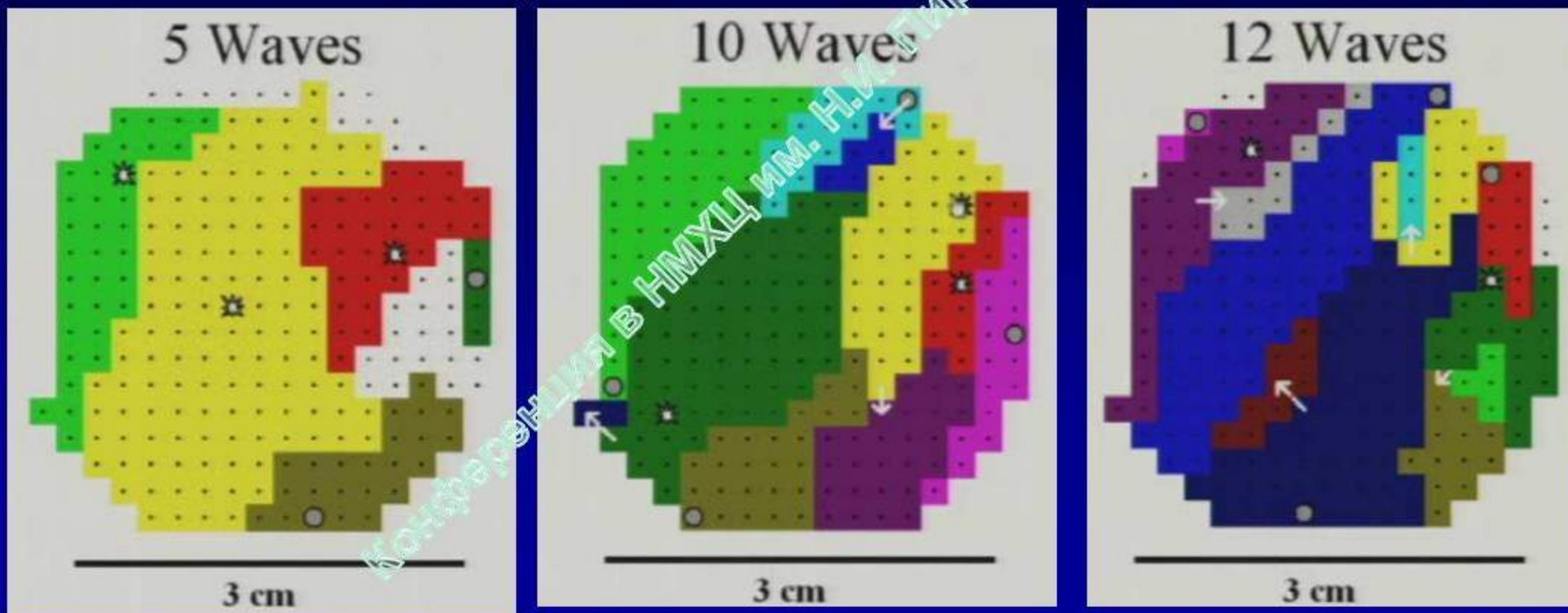
Механизмы ФП

-иницирующий фактор

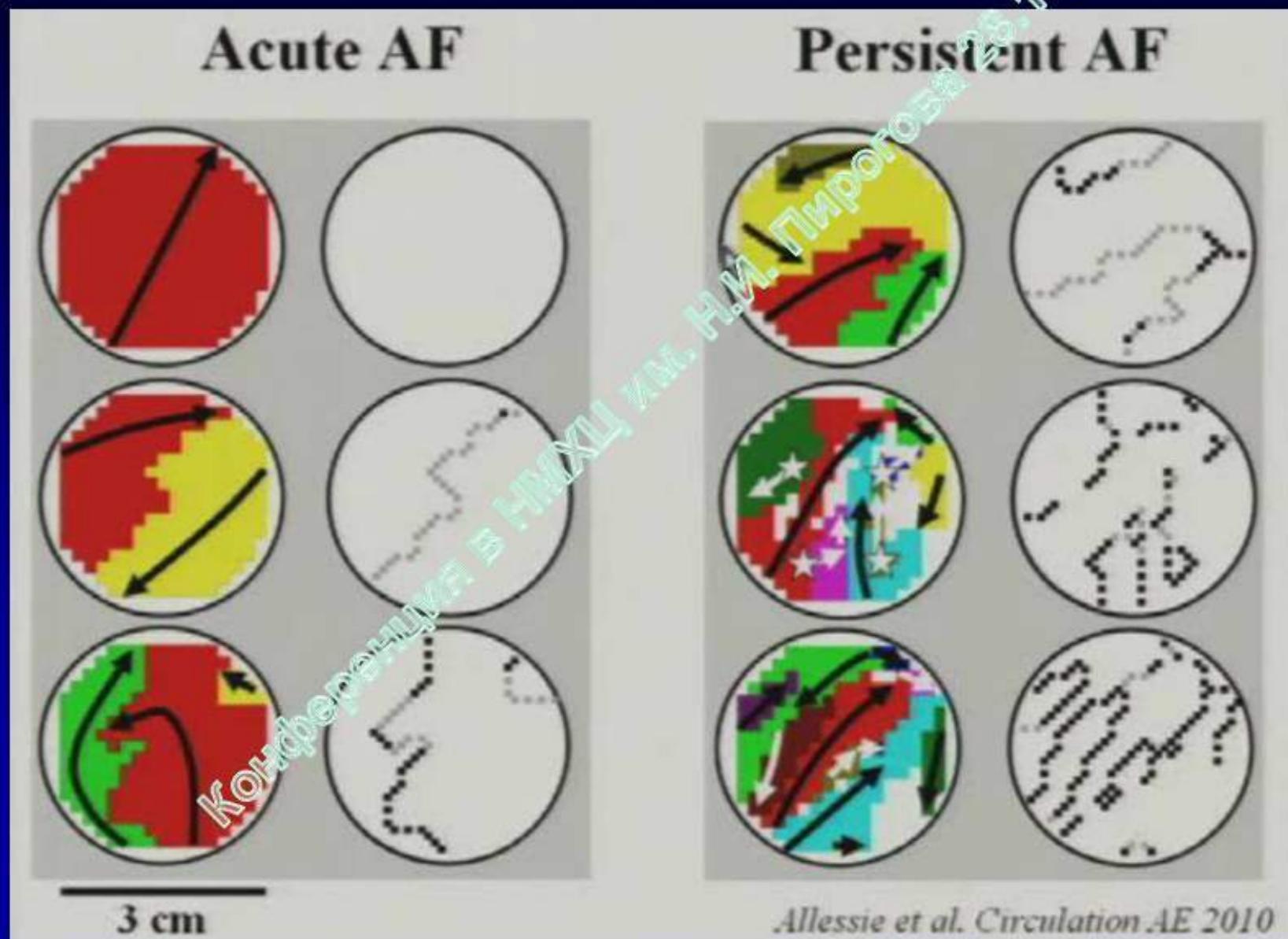
-поддерживающий фактор

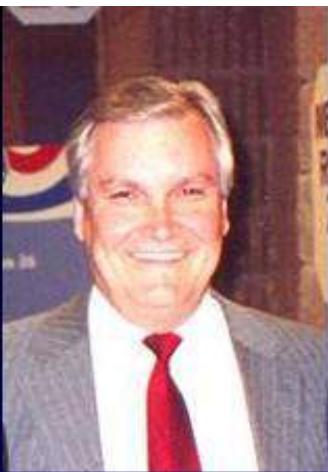


Количество волн в ПП при эпикардиальном картировании ФП (80-е годы)



Разница в количестве волн возбуждения при пароксизмальной и персистирующих формах ФП

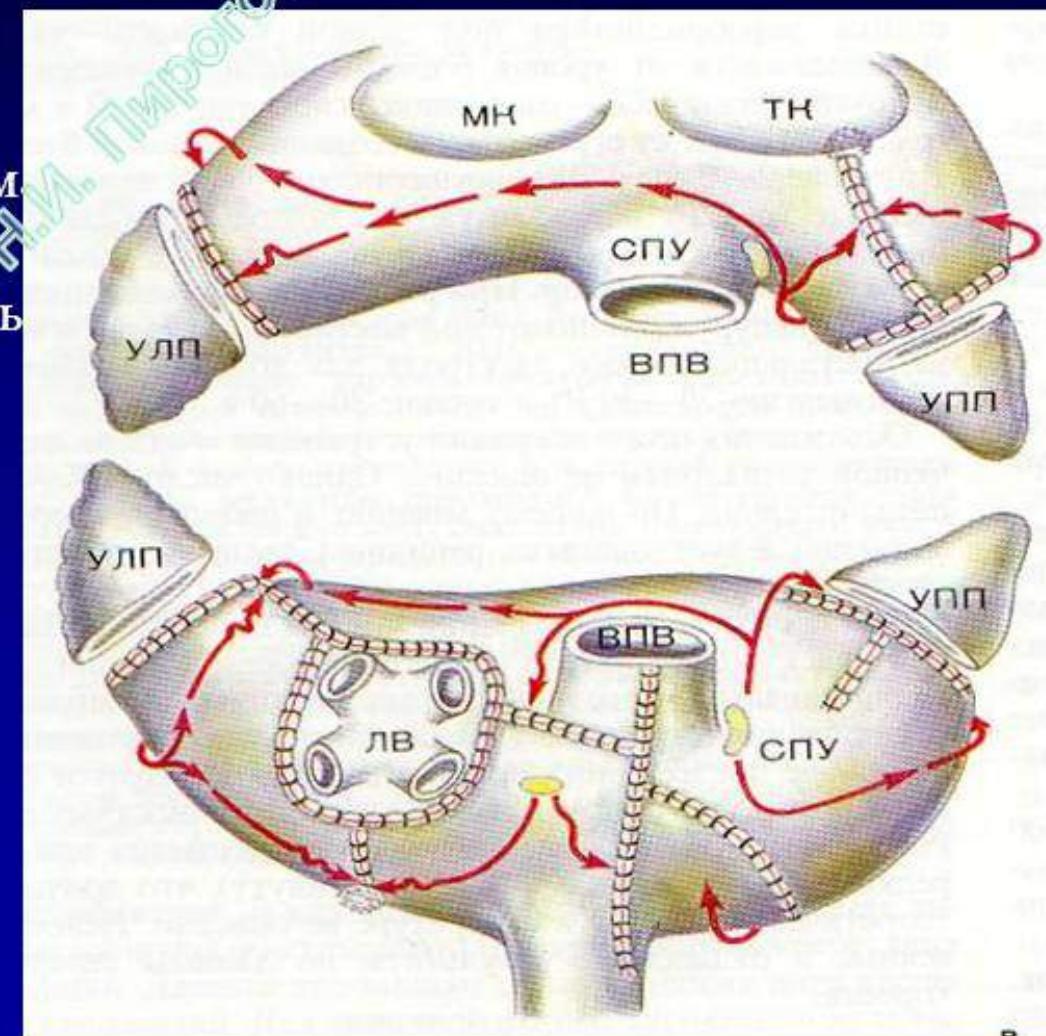




Хирургическое лечение ФП

Операция «Лабиринт III» (J. Cox, 1987)

".... было бы просто сказать, что трепетание предсердий - это аритмия, вызванная одиночным риентри контуром, как и ФП - вызвана множественными цепями риентри, так и казалось ранее. Принимая во внимание, что трепетание предсердий, всегда происходит на основе одиночного круга риентри, некоторые формы ФП могут быть также вызваны одиночными кругами риентри, но при этом **более сложные формы связаны с множественными цепями риентри**".



Результаты процедуры Maze при ФП



Результаты

- **Williams** (Ann Thorac Surg 2001;71:1939-44) **81%** SR at 4 months.
- **Raman** (Ann Thorac Surg 2001;72:S1096-9) Showed **95%** in SR at 6 months.
- **Pasic** (Ann Thorac Surg 2001;72:1484-91) Showed **92%** free from AF at 6 months.
- **Benussi** (Ann Thorac Surg 2002;74:1050-7) Showed **77%** SR at 3 years.
- **Mantovan** (J Cardiovasc Electrophysiol, Vol.14, pp.1289-1295, December 2003) Showed **81%** of treated group in SR and 11% of control group in SR at 1 year.

Результаты применения различных методик хирургического устраниния хронической ФП (n= 3686)

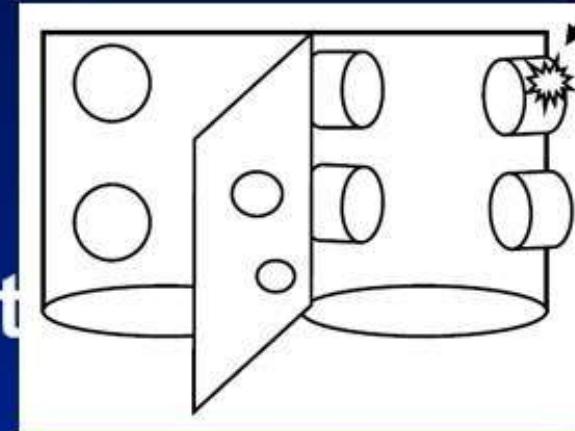
	Age (mean years)	Paroximal AF	Permanent AF	Lone AF	Non-mitral surgery	SR- rate (%)	30 day mortality	Pace-r
Group I – <i>RF,Cryo,</i> <i>MCW</i> (n=2249)	61,1	10,8% (222/2048)	89,2% (1826/2048)	3,5% (79/2241)	22,4 (503/2244)	78,1	3,8% (74/1935)	4,1% (85/2064)
Group II – <i>"Cut and Sew"</i> (n=1437)	55,3	20,7% (259/1252)	79,3% (993/1252)	21,4% (307/1436)	9,0% (129/1436)	83,8	1,9% (28/1437)	7,8% (112/1437)

Khargi K. et al., 2004

A Focal Source of Atrial Fibrillation Treated by Discrete Radiofrequency Ablation

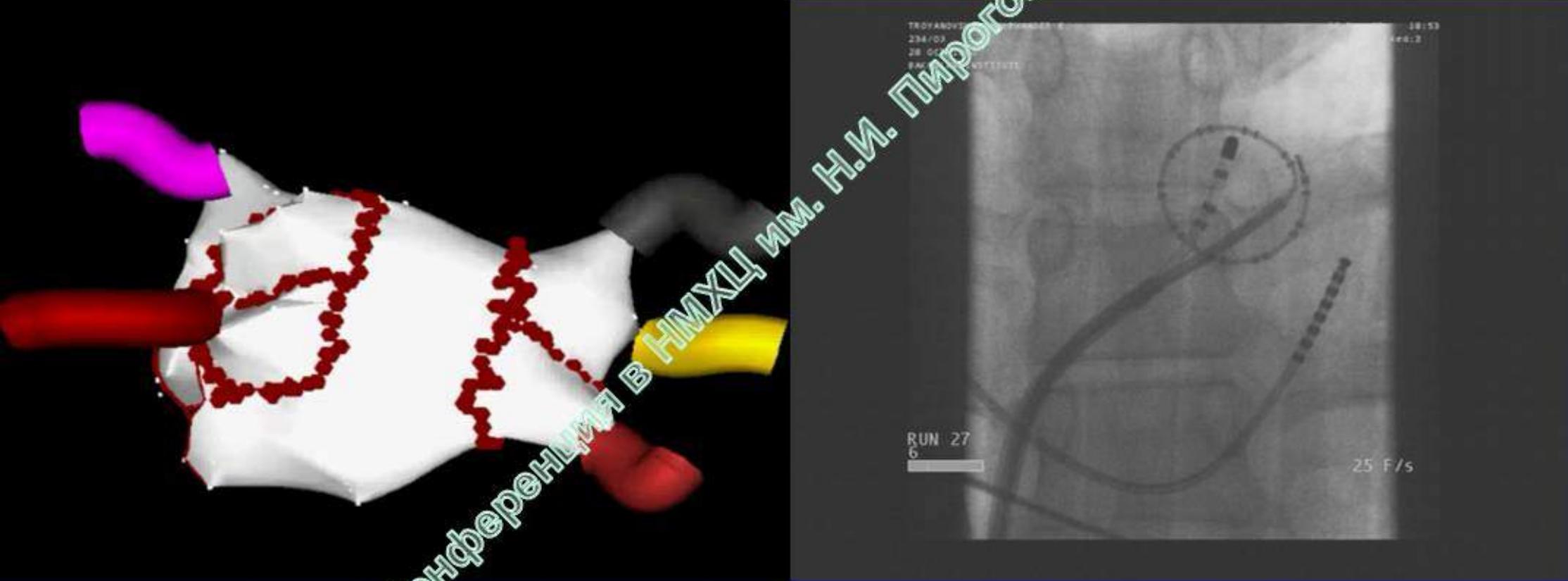
Pierre Jais, Michel Haissaguerre, Dipen Shah, Salah Chouairi,
Laurent Gencel, Meleze Hocini, Jacques Clementy

Circulation 1997; 85: 572-576.



- 9 pts, paroxysmal focal atrial fibrillation
- 38 ± 7 yrs
- no structural heart disease
- frequent atrial premature beats and runs of atrial tachycardia
- 3 right atrial foci, 6 left atrial foci (5 RSPV)
- success in 9/9 patients, 4 ± 4 RFs

Две методики изоляции ЛВ

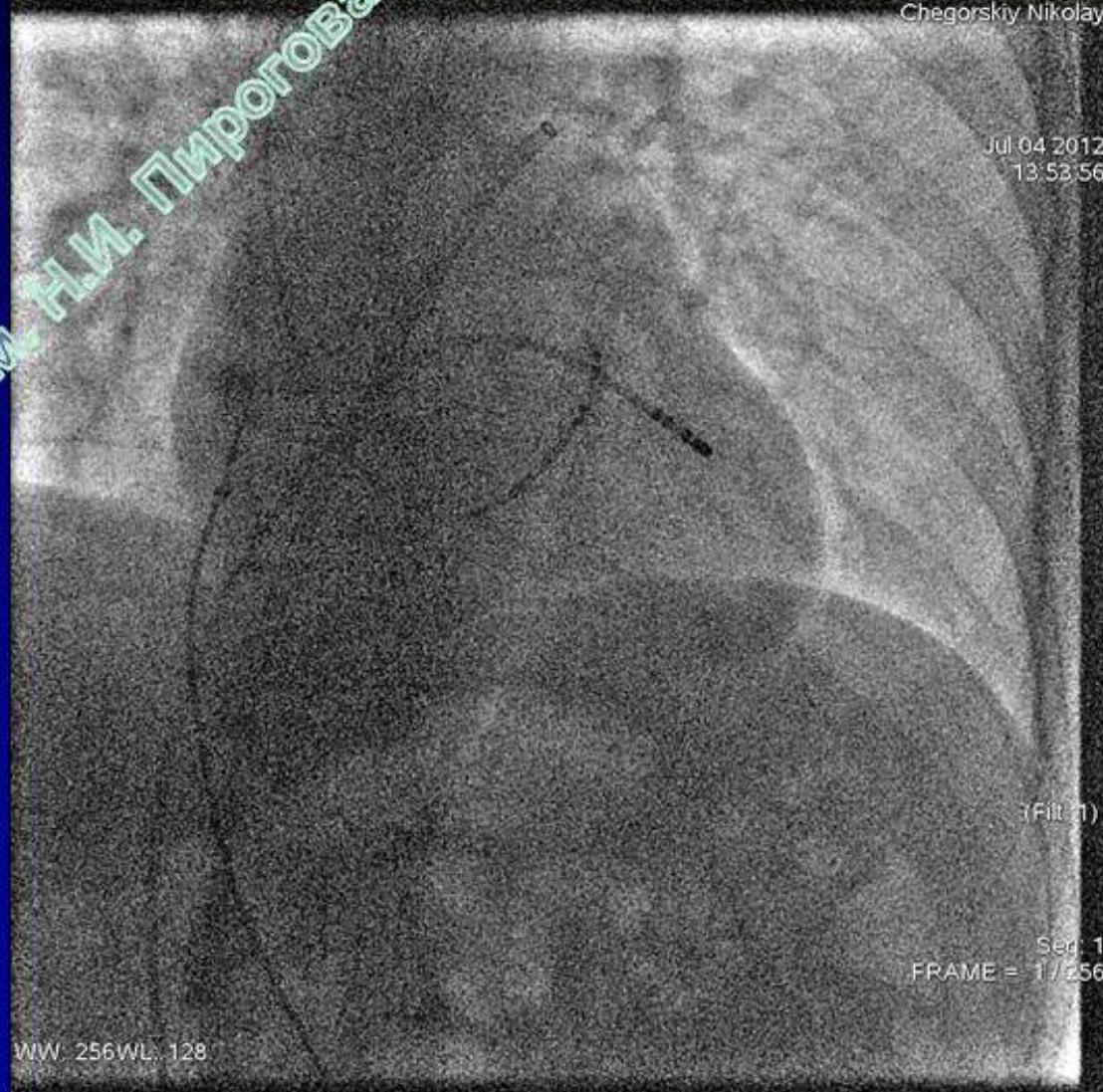


анатомическая
С.Rappone

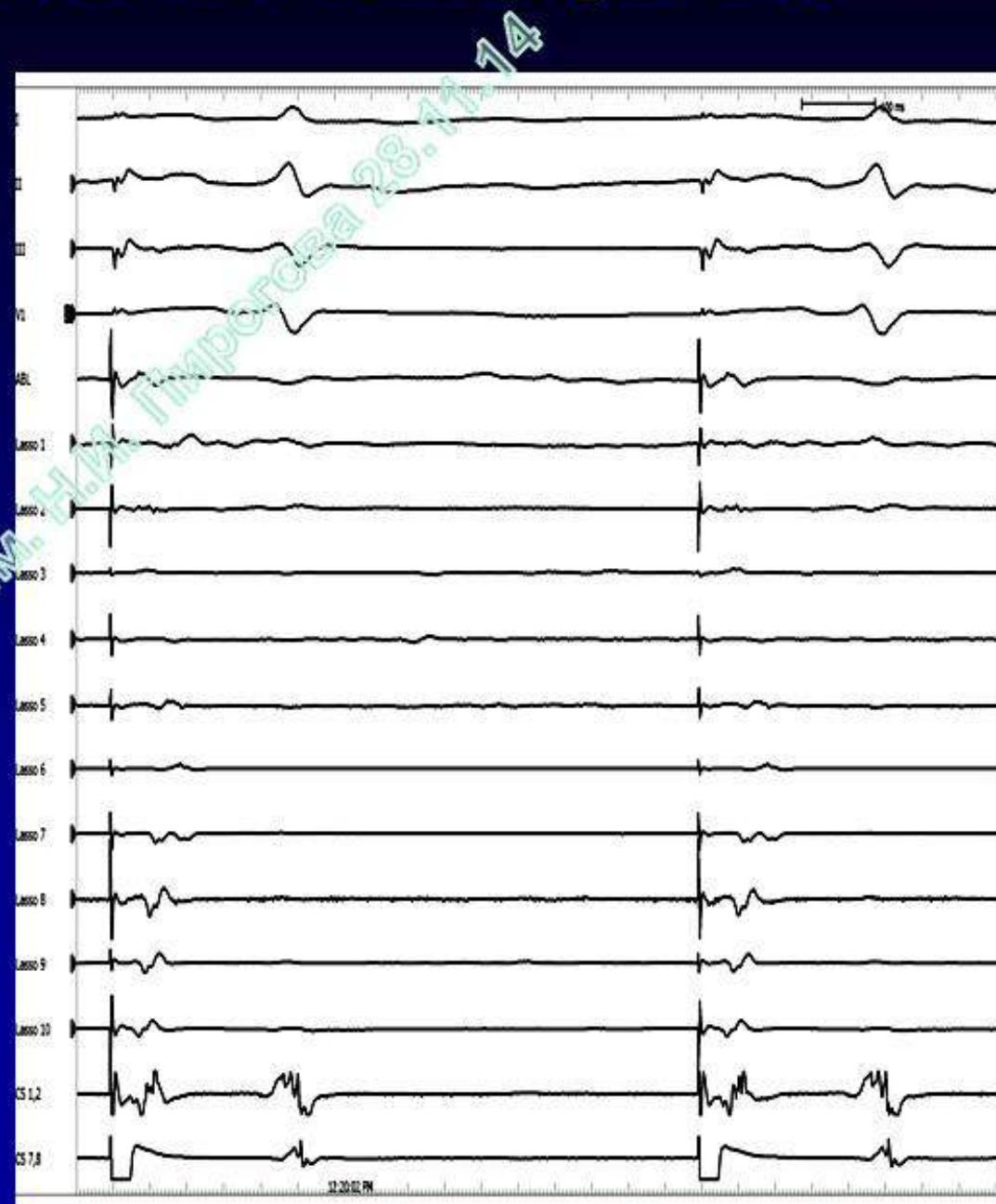
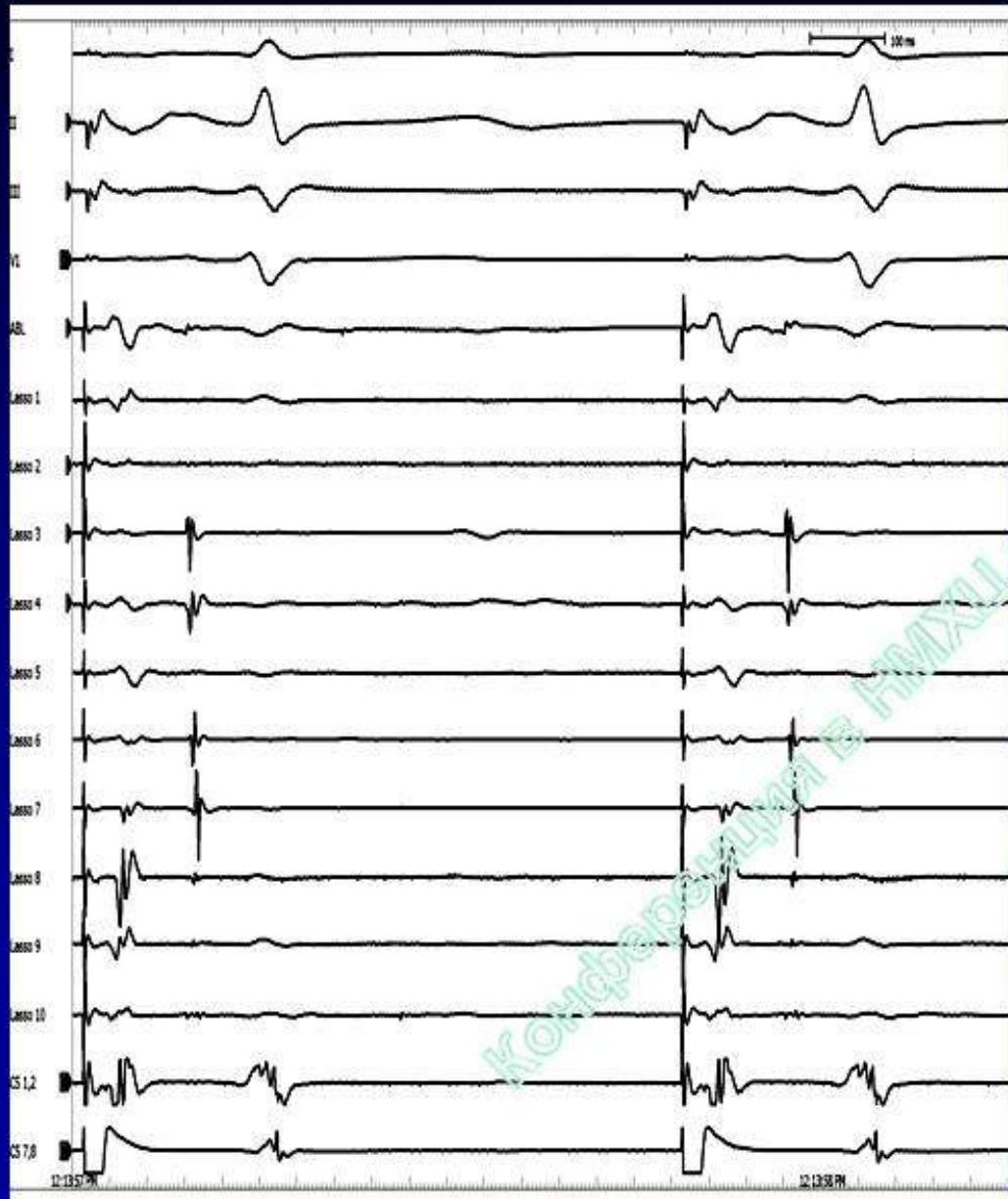
и

электрофизиологическая
M.Hissaguerre

Ангиография левого предсердия



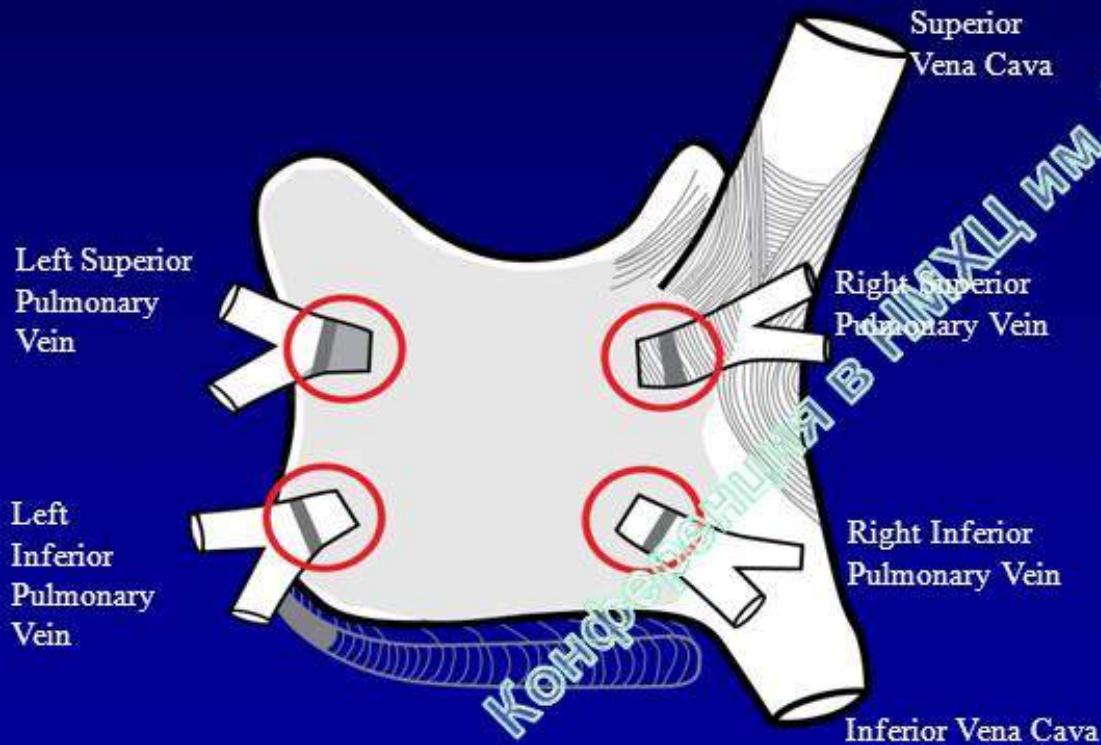
РЧА легочных вен с использованием катетера Lasso



Pulmonary Vein Isolation (PVI) is the Cornerstone of AF Ablation

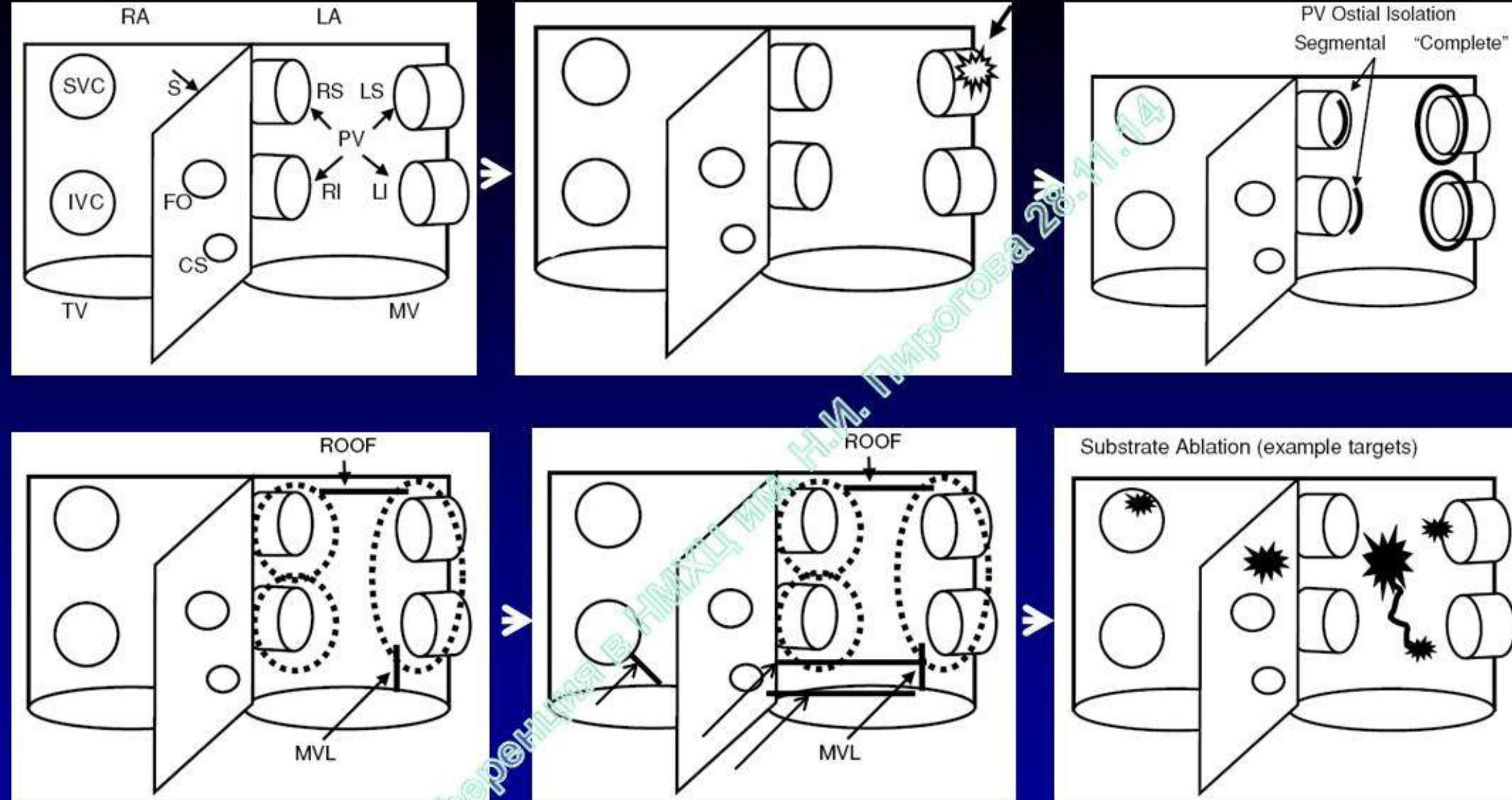
2007 HRS Consensus Statement

“Ablation strategies which target the PVs and/or PV antrum are the cornerstone for most AF ablation procedures.”



Complete electrical isolation should be the goal for targeted PVs and entrance and/or exit block should be demonstrated

Isolate each PV independently



Этапный подход к интервенционному лечению ФП

J.Fisher et al., PACE, Vol 9, 2012

Long-term Outcomes of Catheter Ablation of Atrial Fibrillation: A Systematic Review and Meta-analysis

Anand N. Ganesan, MBBS, PhD; Nicholas J. Shipp, PhD; Anthony G. Brooks, PhD; Pawel Kuklik, PhD; Dennis H. Lau, MBBS, PhD; Han S. Lim, MBBS, PhD; Thomas Sullivan, BMs, CompSc; Kurt C. Roberts-Thomson, MBBS, PhD; Prashanthan Sanders, MBBS, PhD

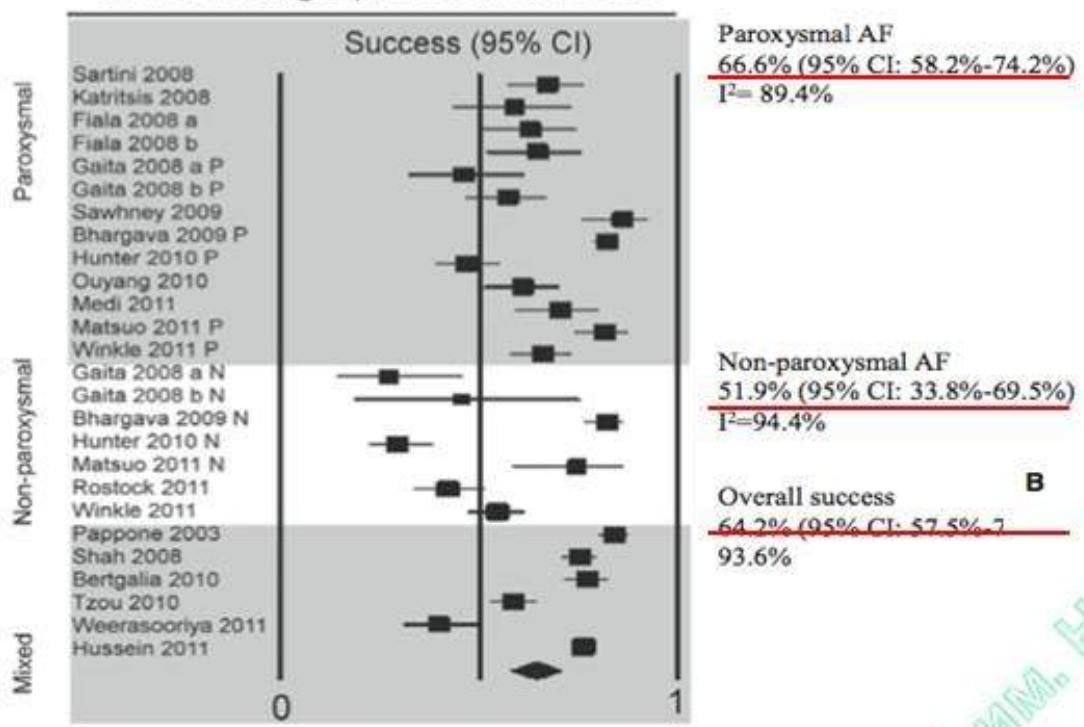
Background—In the past decade, catheter ablation has become an established therapy for symptomatic atrial fibrillation (AF). Until very recently, few data have been available to guide the clinical community on the outcomes of AF ablation at ≥ 3 years of follow-up. We aimed to systematically review the medical literature to evaluate the long-term outcomes of AF ablation.

Methods and Results—A structured electronic database search (PubMed, Embase, Web of Science, Cochrane) of the scientific literature was performed for studies describing outcomes at ≥ 3 years after AF ablation, with a mean follow-up of ≥ 24 months after the index procedure. The following data were extracted: (1) single-procedure success, (2) multiple-procedure success, and (3) requirement for repeat procedures. Data were extracted from 19 studies, including 6167 patients undergoing AF ablation. Single-procedure freedom from atrial arrhythmia at long-term follow-up was 53.1% (95% CI 46.2% to 60.0%) overall, 54.1% (95% CI 44.4% to 63.4%) in paroxysmal AF, and 41.6% (95% CI 25.2% to 60.5%) in nonparoxysmal AF. Substantial heterogeneity ($I^2 > 50\%$) was noted for single-procedure outcomes. With multiple procedures, the long-term success rate was 79.8% (95% CI 75.0% to 83.8%) overall, with significant heterogeneity ($I^2 > 50\%$). The average number of procedures per patient was 1.51 (95% CI 1.36 to 1.67).

Conclusions—Catheter ablation is an effective and durable long-term therapeutic strategy for some AF patients. Although significant heterogeneity is seen with single procedures, long-term freedom from atrial arrhythmia can be achieved in some patients, but multiple procedures may be required. (J Am Heart Assoc. 2013;2:e004549 doi: 10.1161/JAHHA.112.004549)

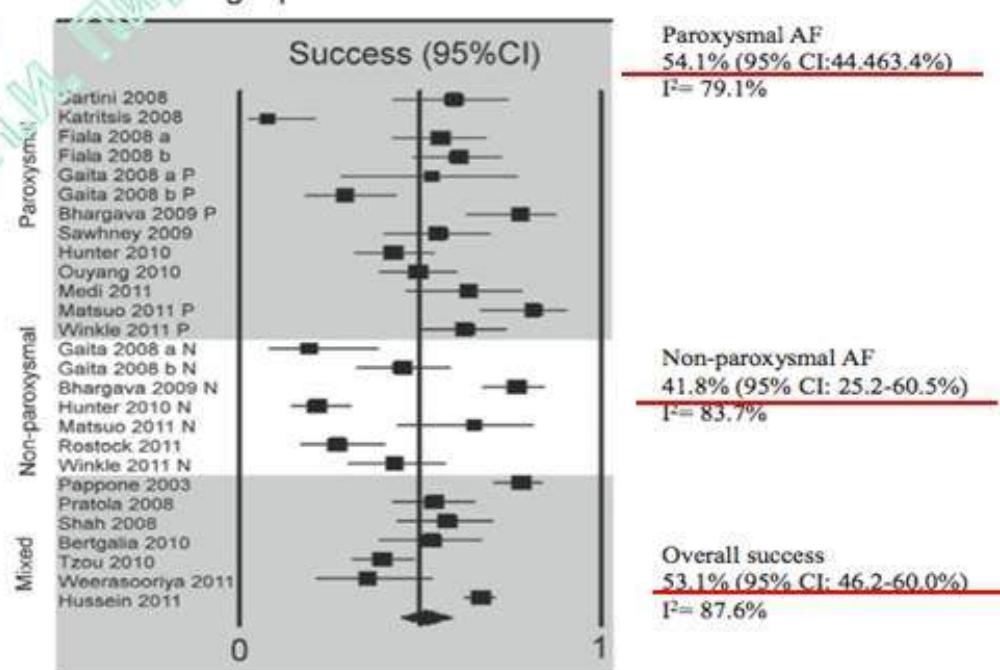
Для оценки результатов катетерного метода лечения ФП, был выполнен систематизированный мета анализ 19 исследований (6167 пациентов с различными формами ФП)

A 12 month single procedure success



Fiala 2008 a – segmental pulmonary vein isolation arm; Fiala 2008 b
Electroanatomic map guided ablation; Gaita 2009 a pulmonary vein
isolation; Gaita 2009 b pulmonary vein isolation plus linear ablation. P =
paroxysmal AF results for study. N = nonparoxysmal AF results for study.
Single procedure success data for Shah et al., Bertaglia et al., and Tzou et al.,
were recalculated against original cohort size.

B Late single procedure success



Fiala 2008 a – segmental pulmonary vein isolation arm; Fiala 2008 b
Electroanatomic map guided ablation; Gaita 2009 a pulmonary vein isolation;
Gaita 2009 b pulmonary vein isolation plus linear ablation. P = paroxysmal AF
results for study. N = nonparoxysmal AF results for study. Single procedure
success data for Shah et al., Bertaglia et al., and Tzou et al., were recalculated
against original cohort size.

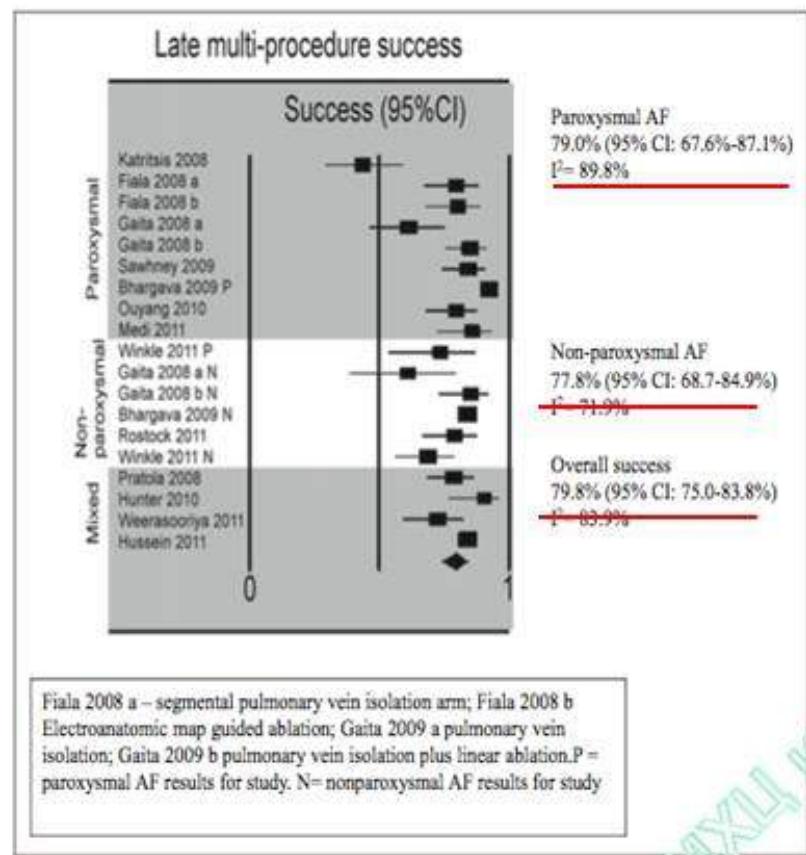
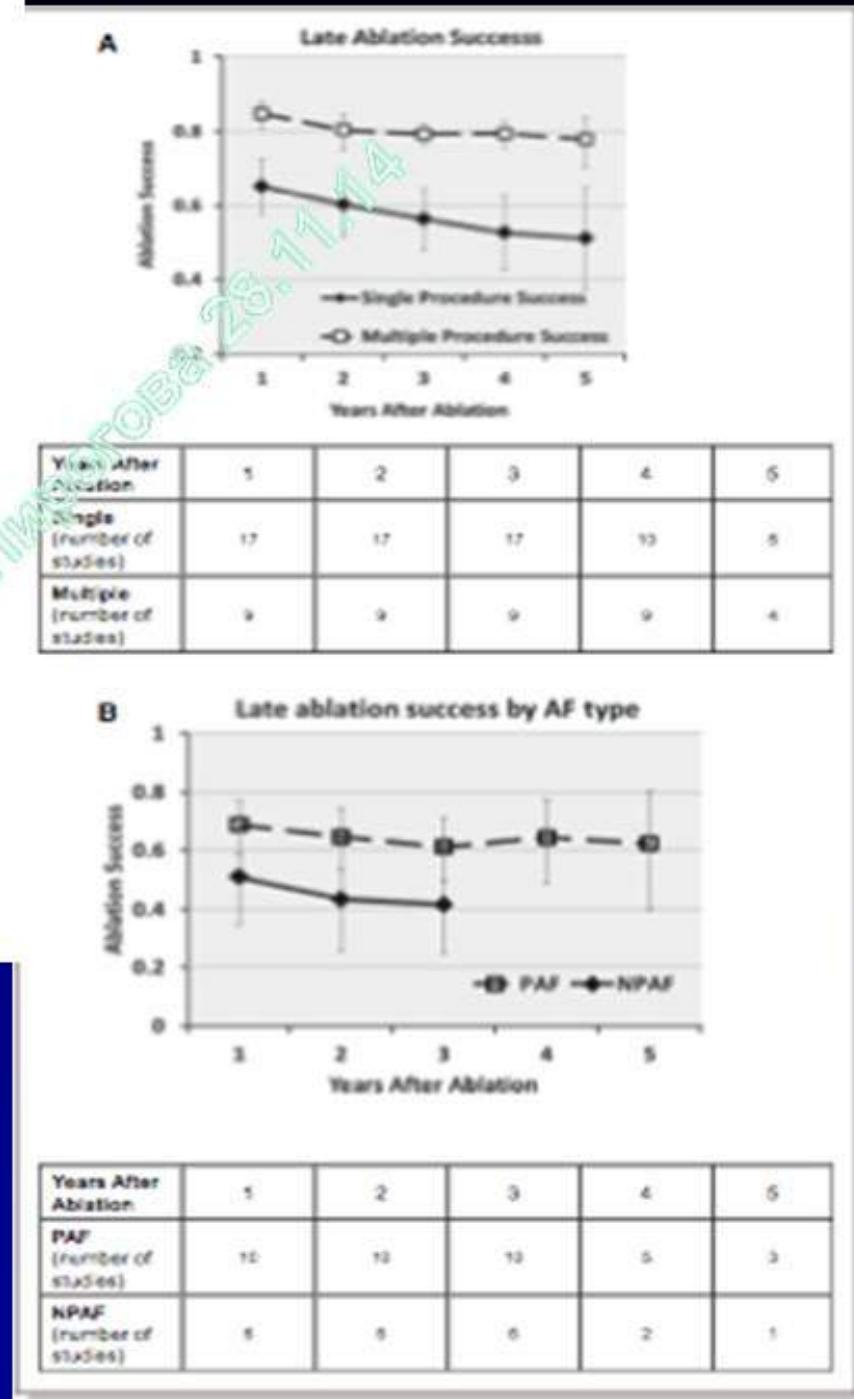


Figure 3. Multiple late procedure success, defined as the cumulative arrhythmia-free survival at ≥3 years. AF indicates atrial fibrillation.

(J Am Heart Assoc.
2013;10:1161)

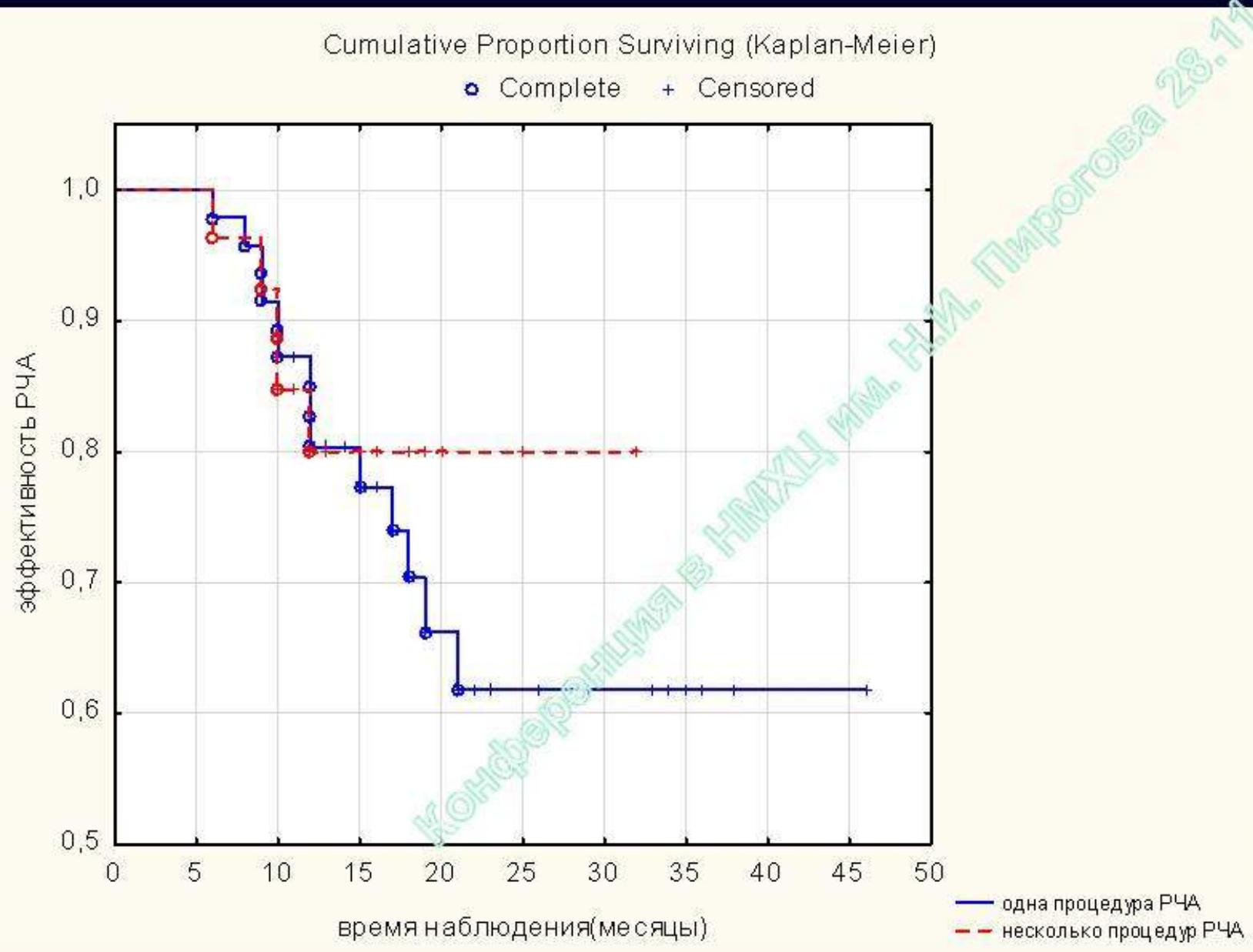


Исследование EFFICAS

(Relationship between contact force and AF recurrence)

- Средняя эфф-ть процедур после 1 процедуры – ≈60%
- Средняя эффективность после Σ -х процедур – ≈80%
 - 12% РЧ-воздействий происходит с низким контактом (менее 5 г)
 - Кол-во прыжков электрода во время изоляции ЛВ:
 - ✓ Менее 6 – эффективность изоляции более 80%
 - ✓ Более 10 – эффективность изоляции менее 30%

Результаты РЧА персистирующих форм ФП (n= 72)



Результаты крио-процедур

Background The novel cryoballoon Advance (CB-A) has proven to achieve significantly lower temperatures and faster pulmonary vein isolation (PVI) times in comparison with the first-generation device. Although acutely very effective, to the best of our knowledge, data on mid-term clinical follow-up is lacking.

Aims The aim of the study was to analyse the freedom from recurrence of atrial fibrillation (AF) on a 1-year follow-up period, in a series of consecutive patients having undergone PVI with the CB-A for paroxysmal AF (PAF).

Methods and results Forty-two patients [30 male (71%); mean age: 51.9 ± 21.1 years] were included. All patients underwent a procedure with the large 28 mm CB-A. A total 168 PVs were depicted on the pre-procedural computed tomography scan. All PVs (100%) could be isolated with the CB-A only. The freedom from AF off-antiarrhythmic drug treatment after a single procedure was 78% of patients at a mean 11.6 ± 2.0 months follow-up. If considering a blanking period (BP) of 3 months, success rate was 83%. Phrenic nerve palsy (PNP) was the most frequent complication occurring in 19% of individuals.

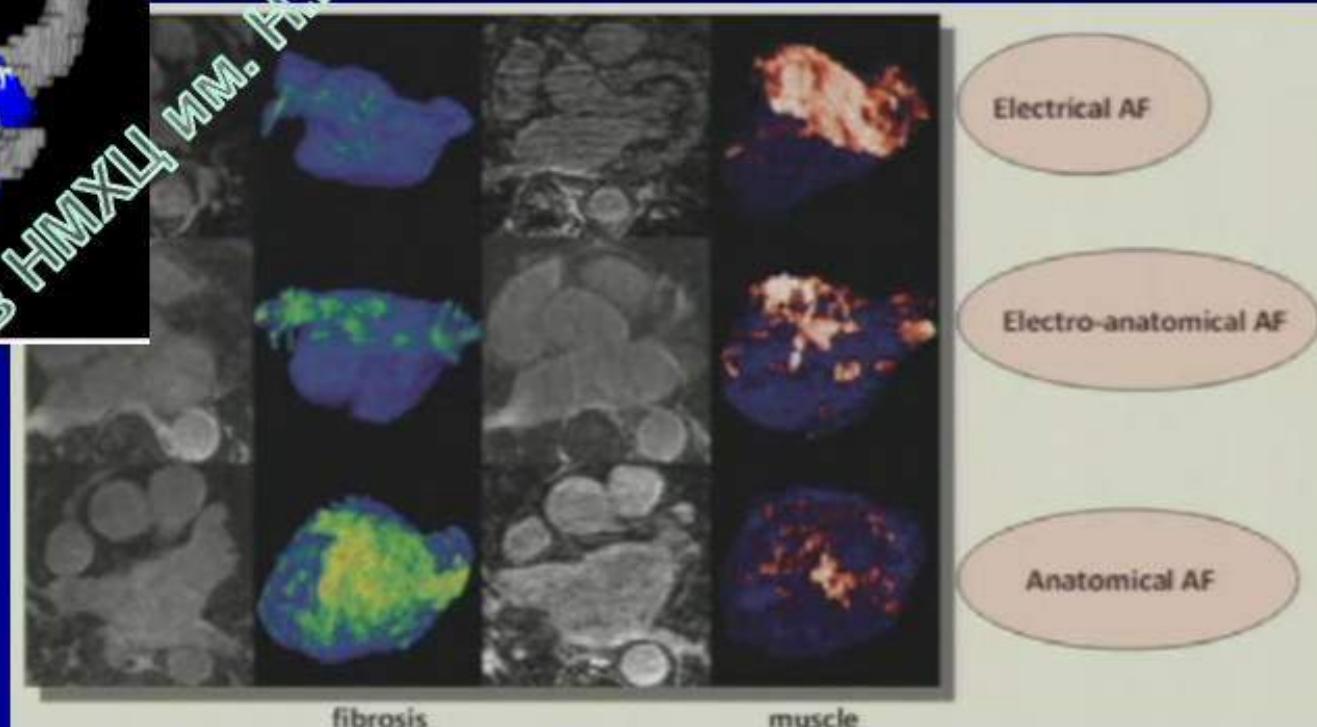
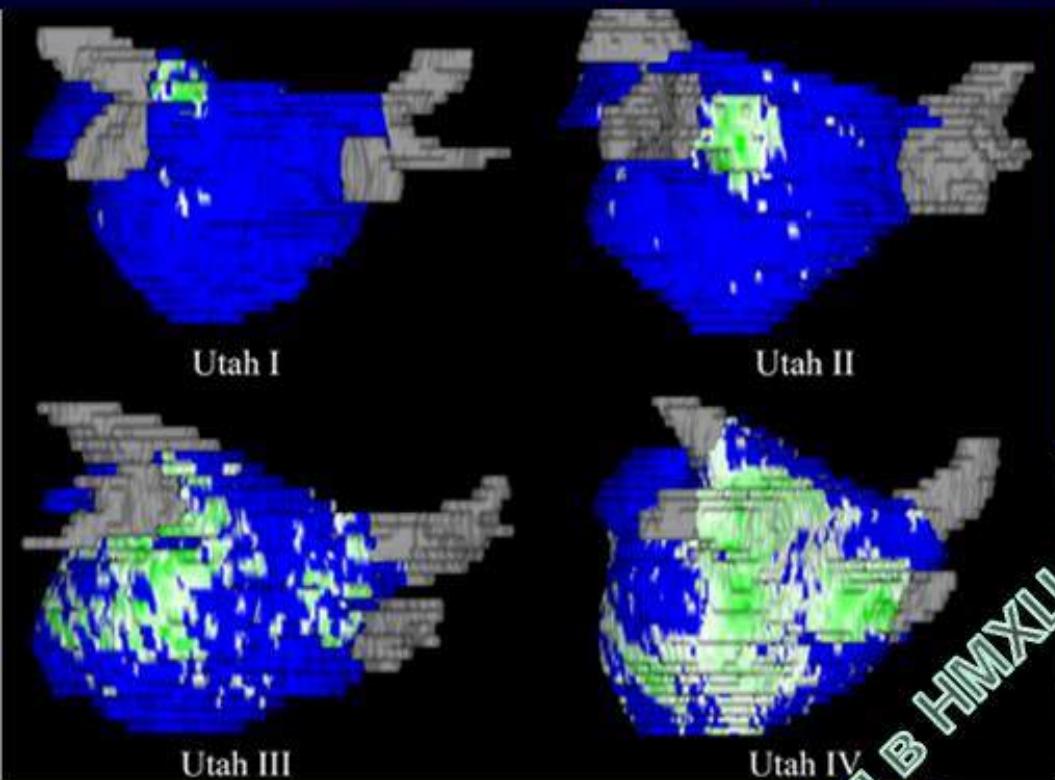
Conclusion The CB-A is very effective in producing PVI and affords freedom from AF at 12 months follow-up in 83% of patients affected by drug-resistant PAF following a 3-month BP. The most frequent complication observed was PNP which occurred in 19% of patients. All PNP reverted during follow-up.



Gian-Battista Chierchia, Giacomo D'Amico, Giovanni, Giuseppe Ciccone, Carlo de Asmundis, Giulio Conte, Juan Sieira-Moret, Moises Rodriguez-Mañero, Ruben Cañedo, Giannis Baltogiannis, Mehdi Namdar, Yukio Saitoh, Gaetano Paparella, Giacomo Mugnai, Pedro Brugada

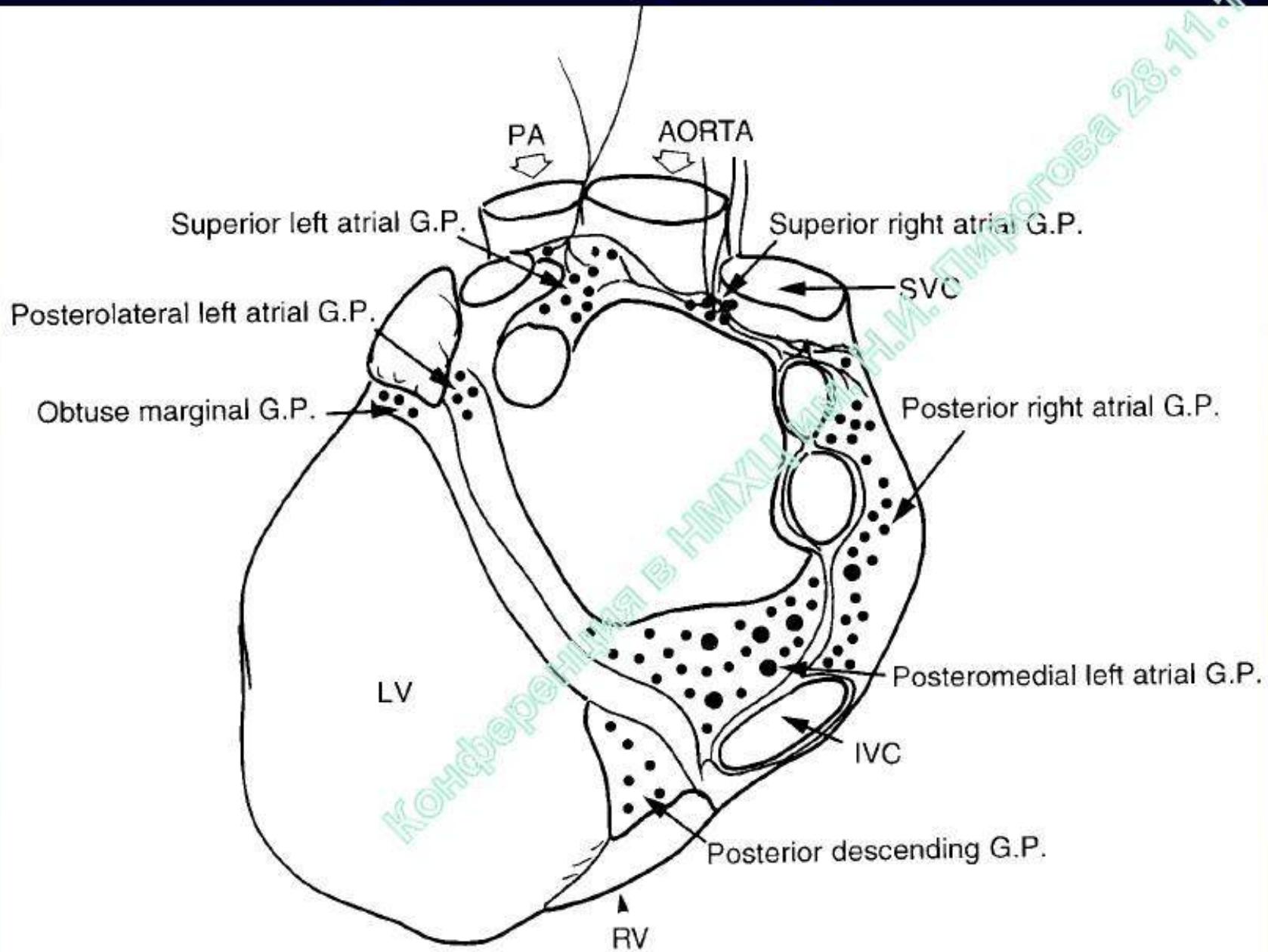
DisclosuresEuropace. 2014;16(5):639-644.

Классификация ФП при МРТ миокарда ЛП

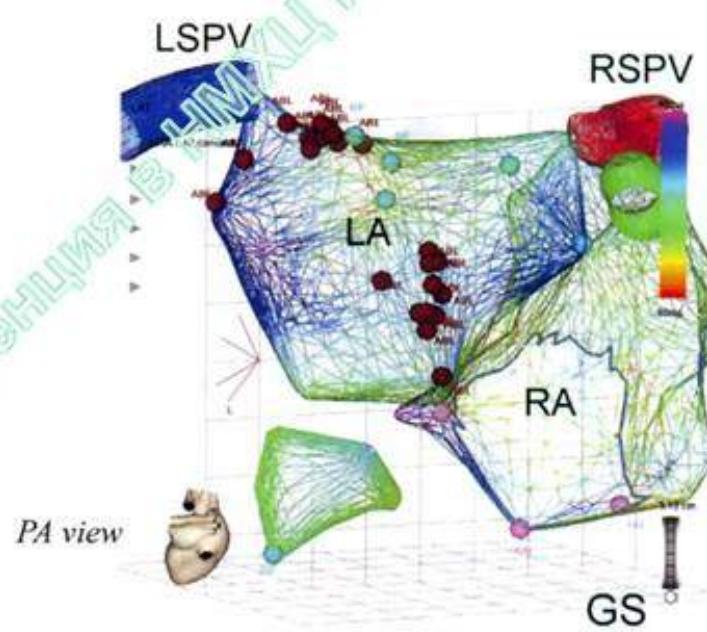
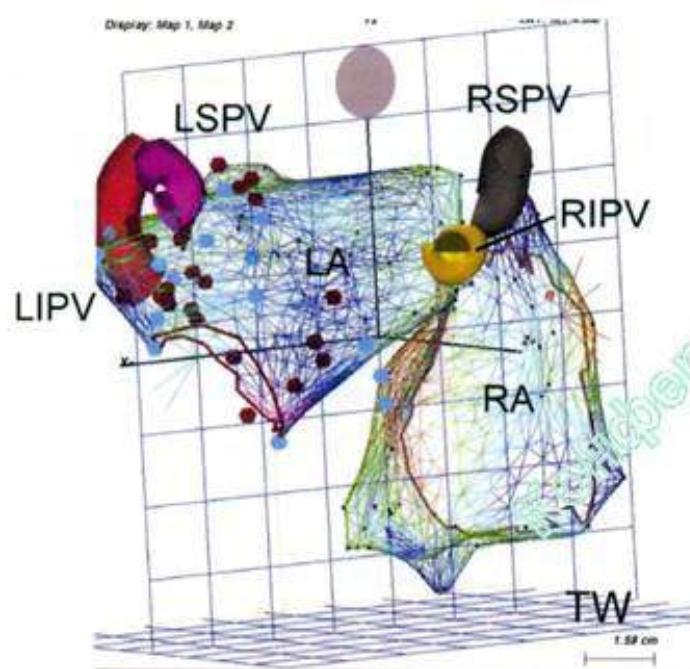
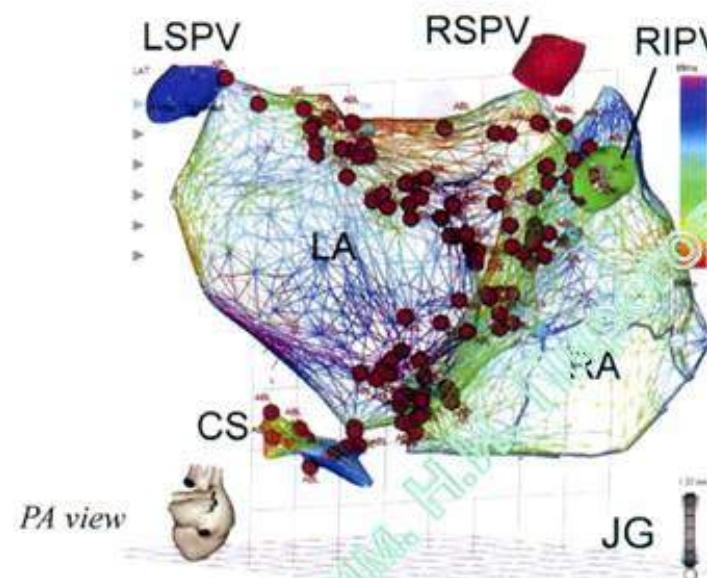
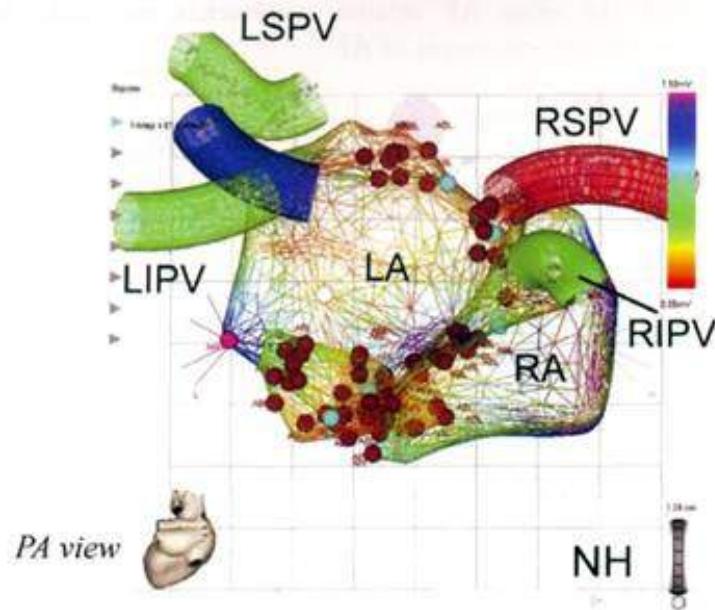


Mahnkopf et al, Heart Rhythm 2010

Нейрогенные факторы инициации ФП

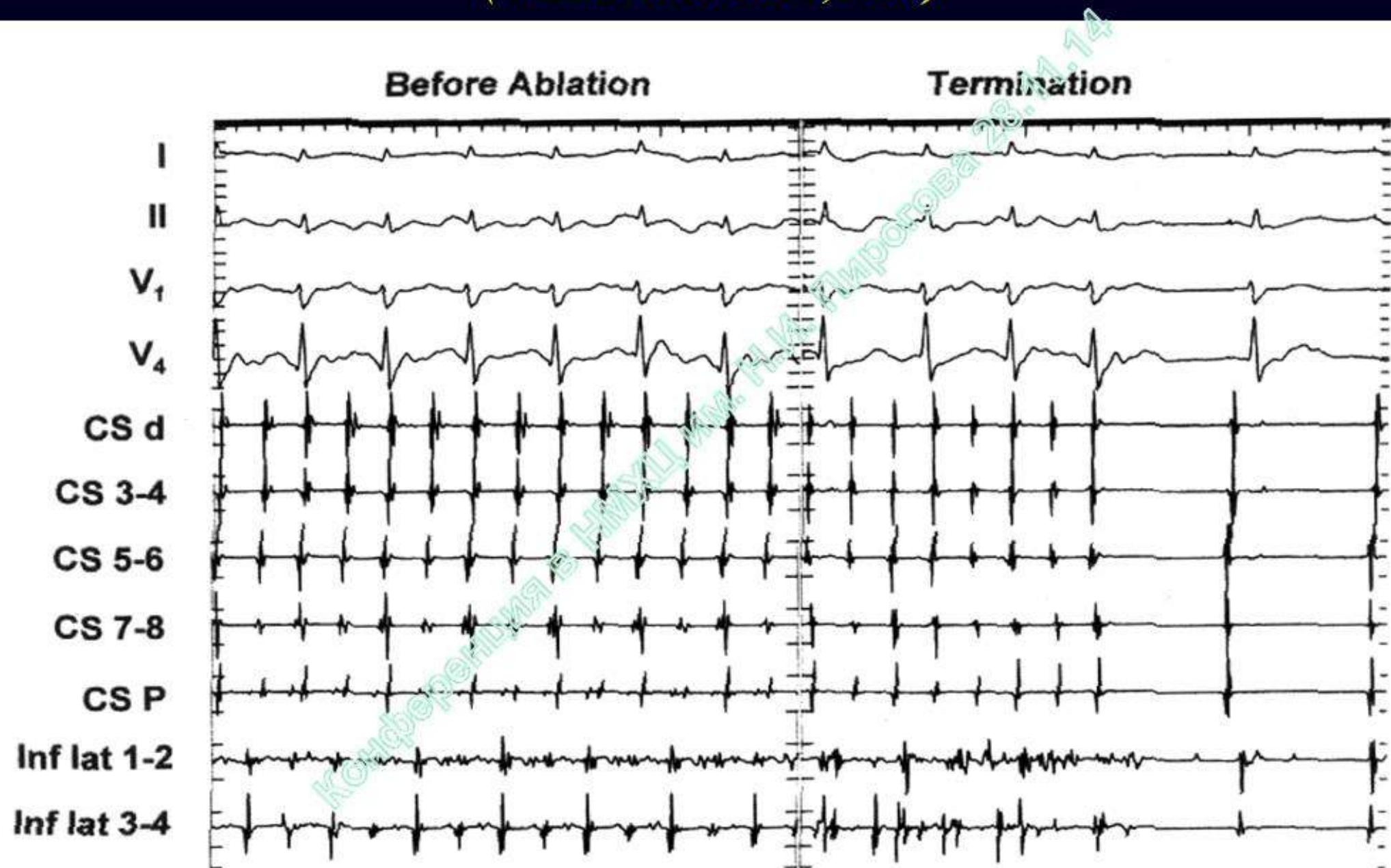


J.A. ARMOUR
ET AL., 1997

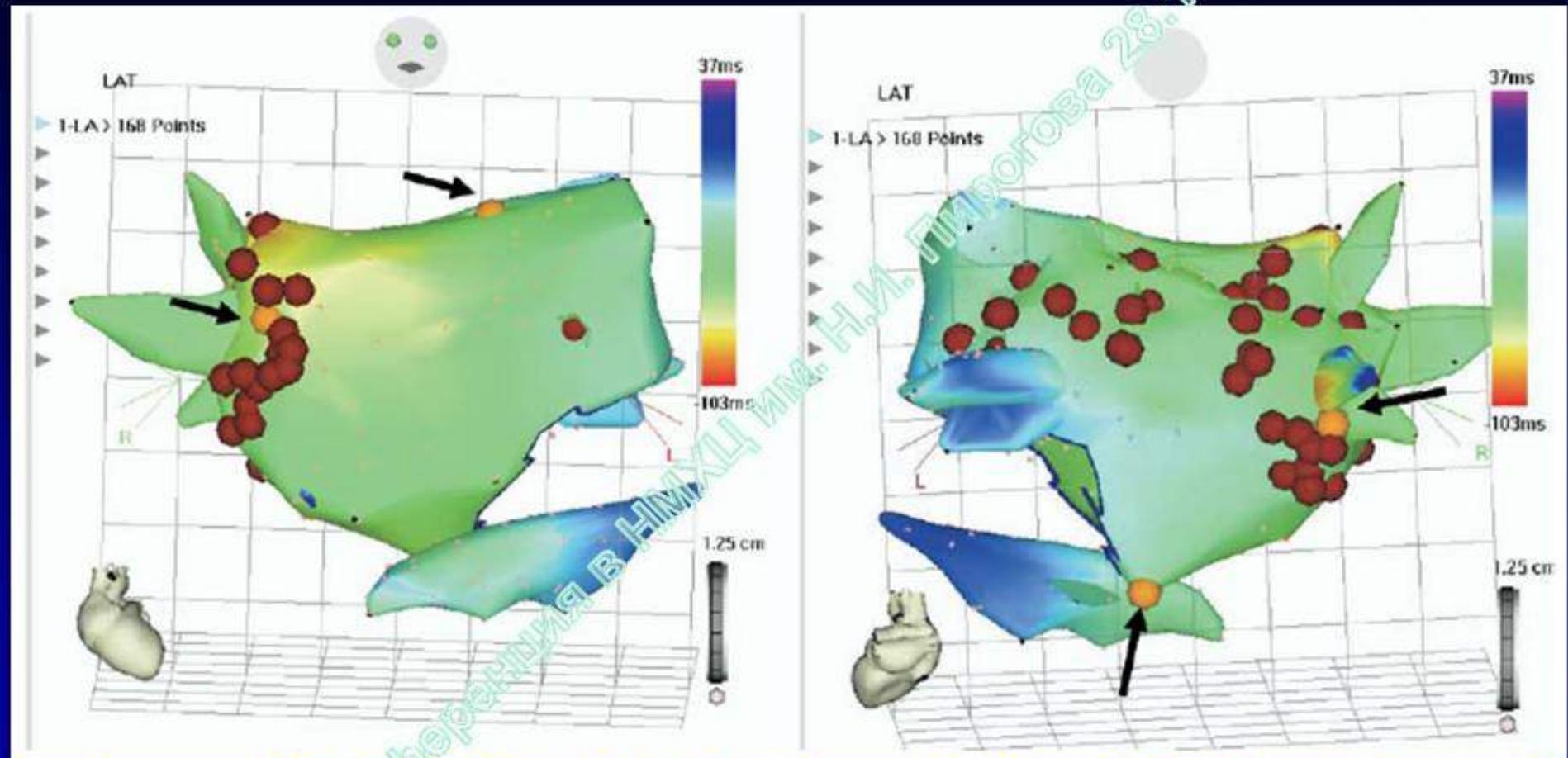


28.11.14
CAFE
критическая зона
для РЧА при
персистирующей
форме ФП
(Nademanee et al., 2004)

Критическая зона для РЧА при персистирующей форме ФП (Nademanee et al., 2004)

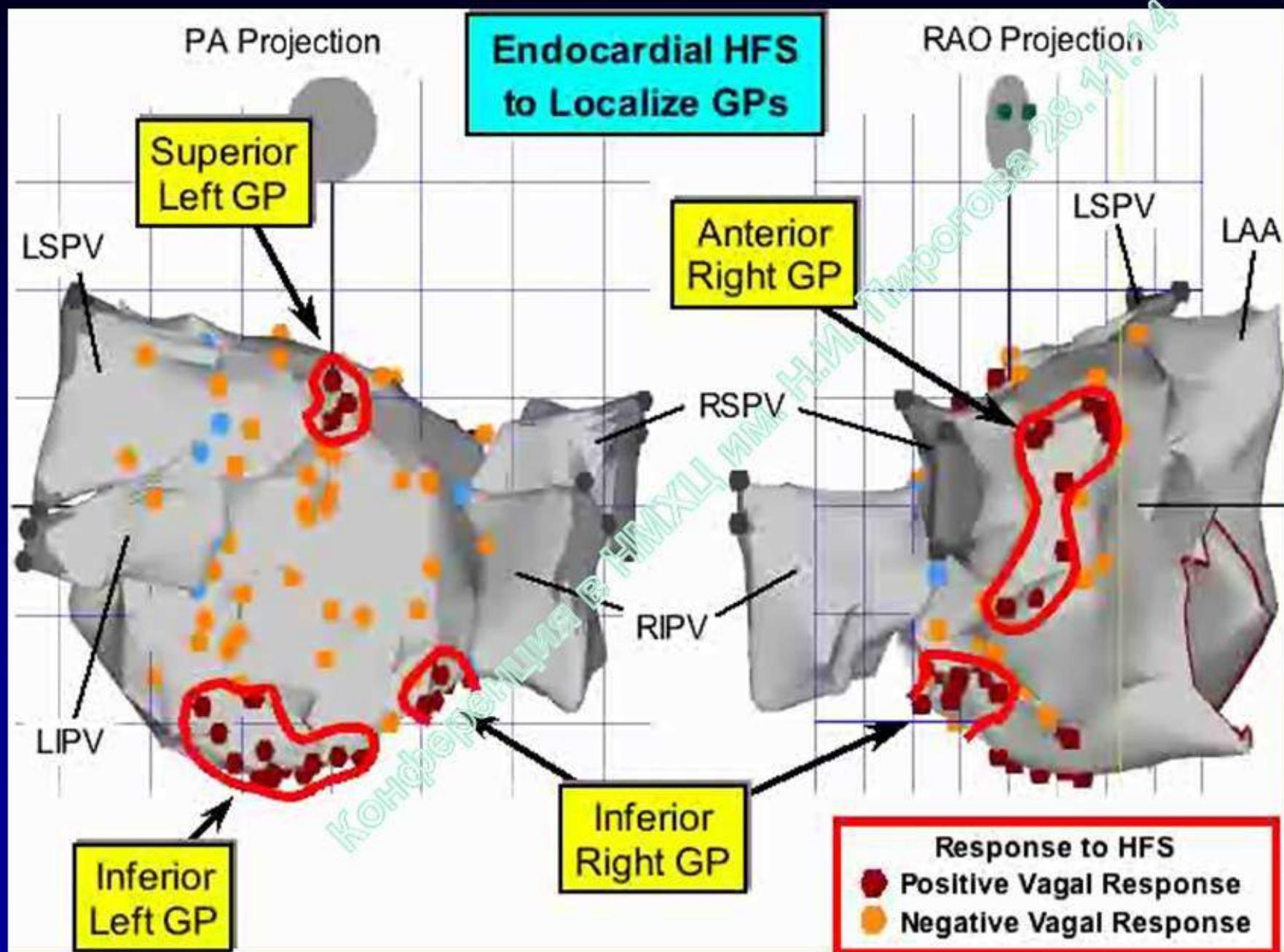


45 ± 20 applications of RF ablation.



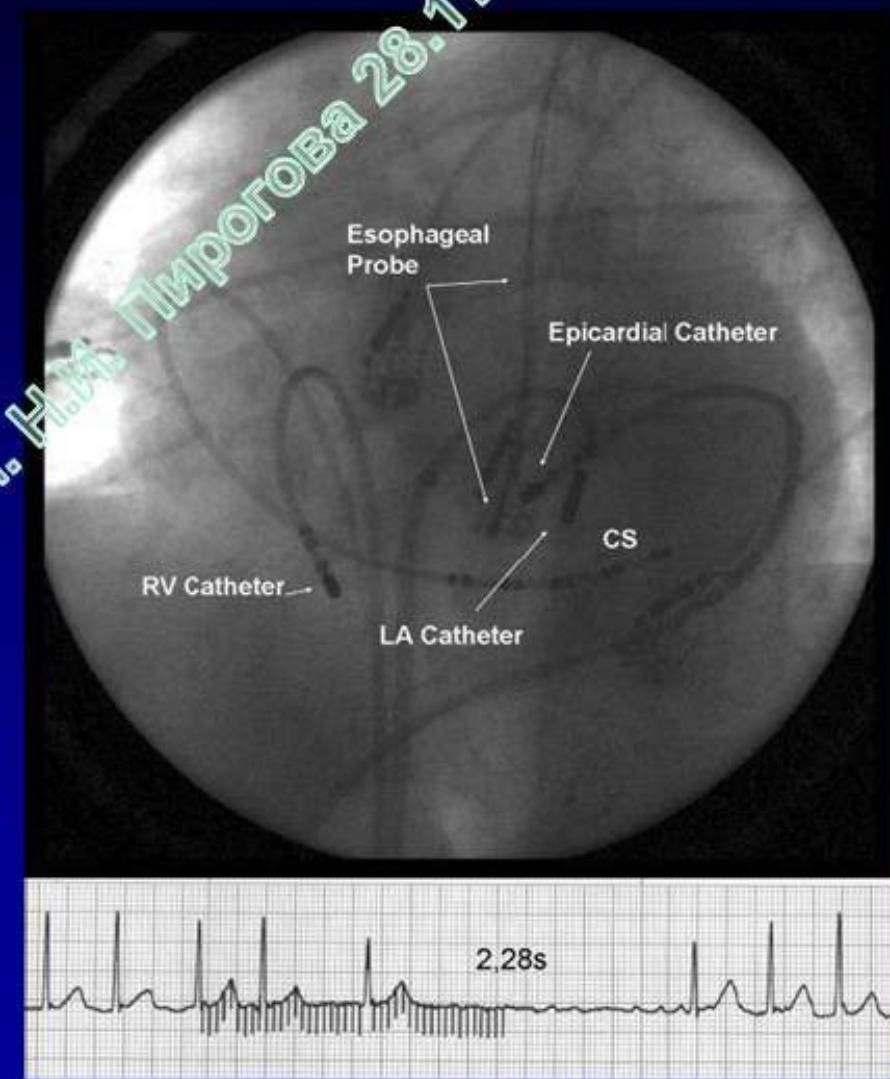
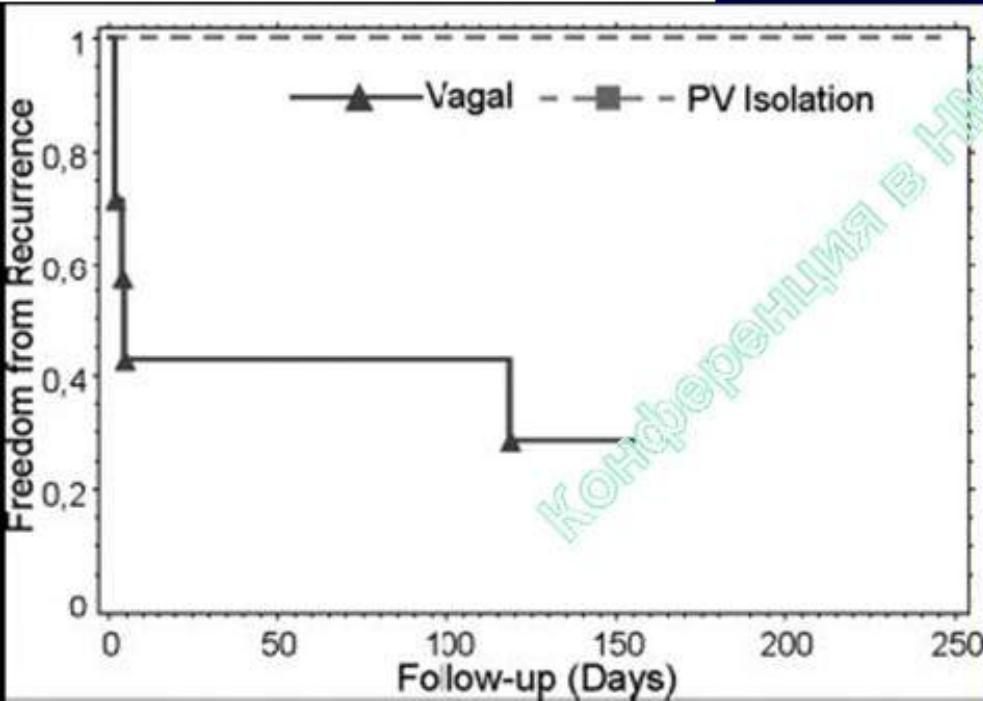
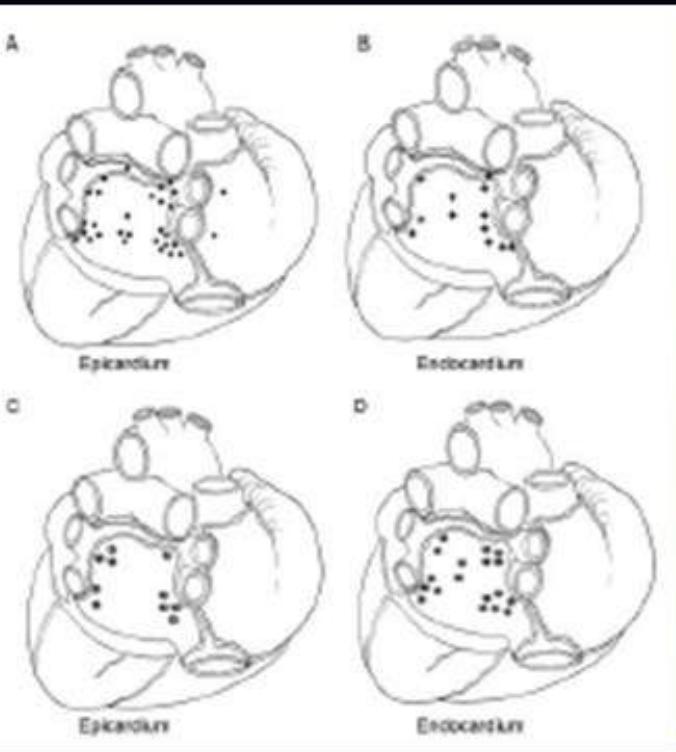
Robert Lemery, MD, David Birnie, MD, Anthony S.L. Tang, MD, Martin Green, MD,
Michael Gollob, MD <sup>From the Division of Cardiology, University of Ottawa Heart Institute,
Ottawa, Ontario, Canada, 2006</sup>

Локализация GP

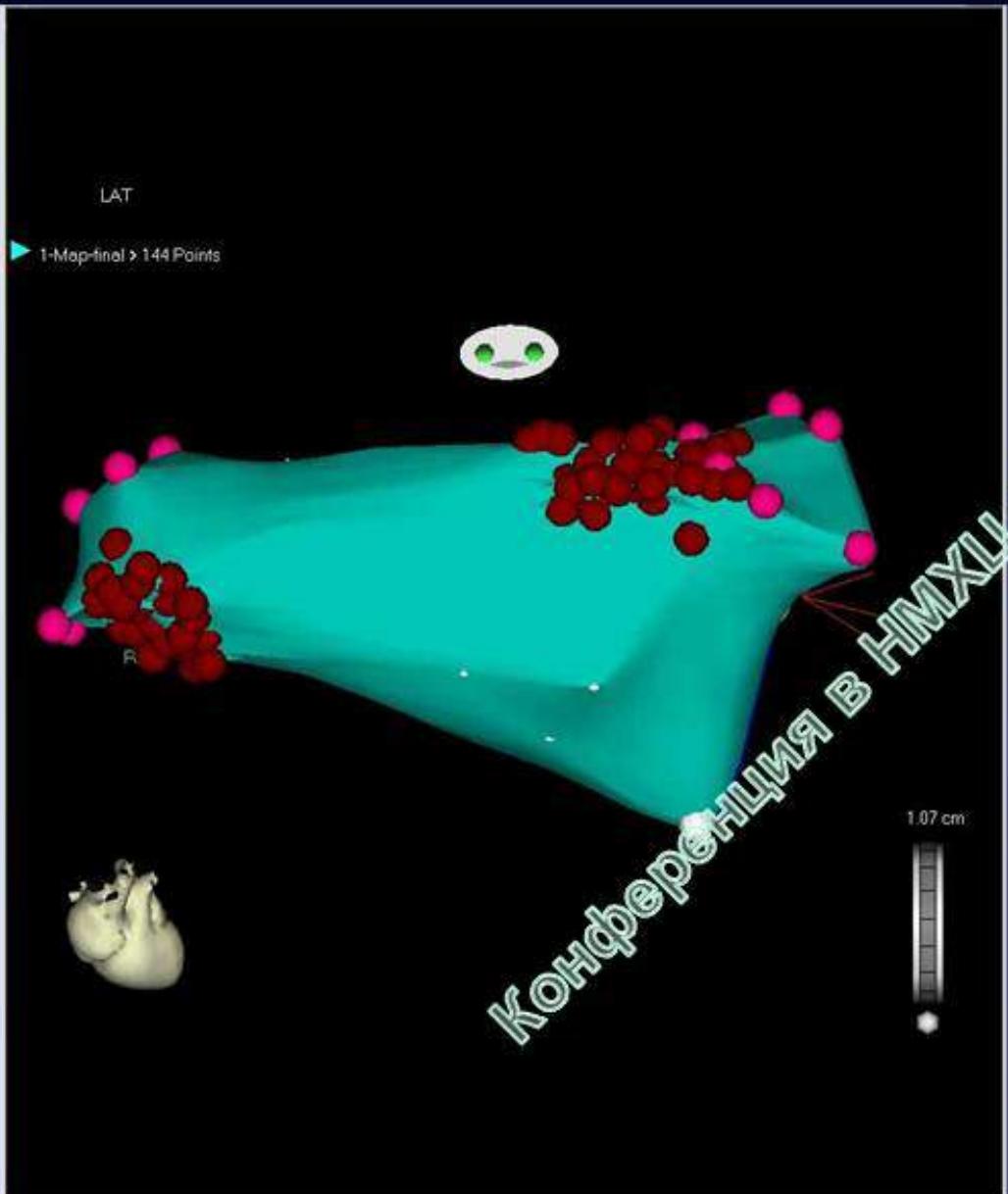


Jackman, 2007

Нейрогенные факторы инициации ФП

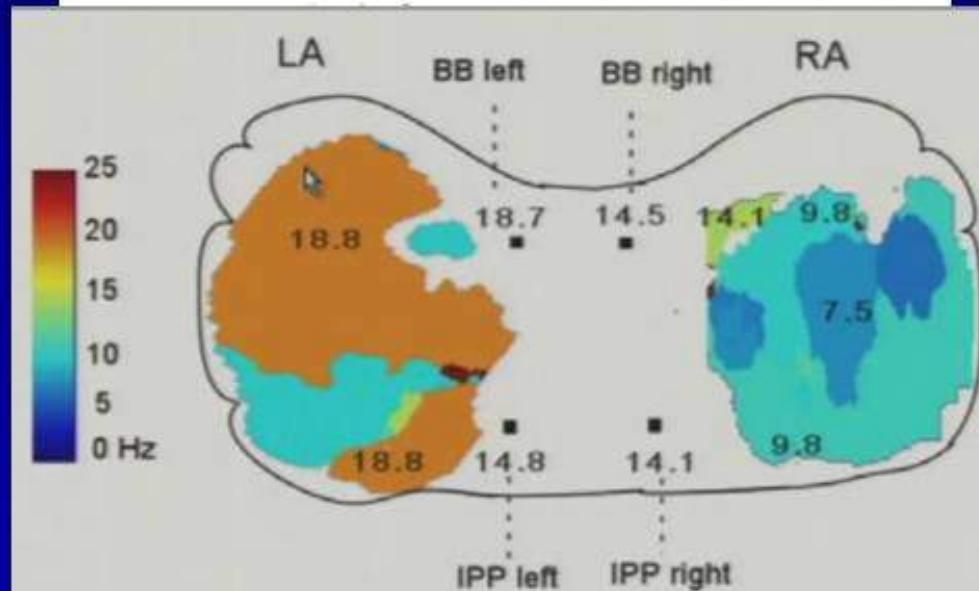
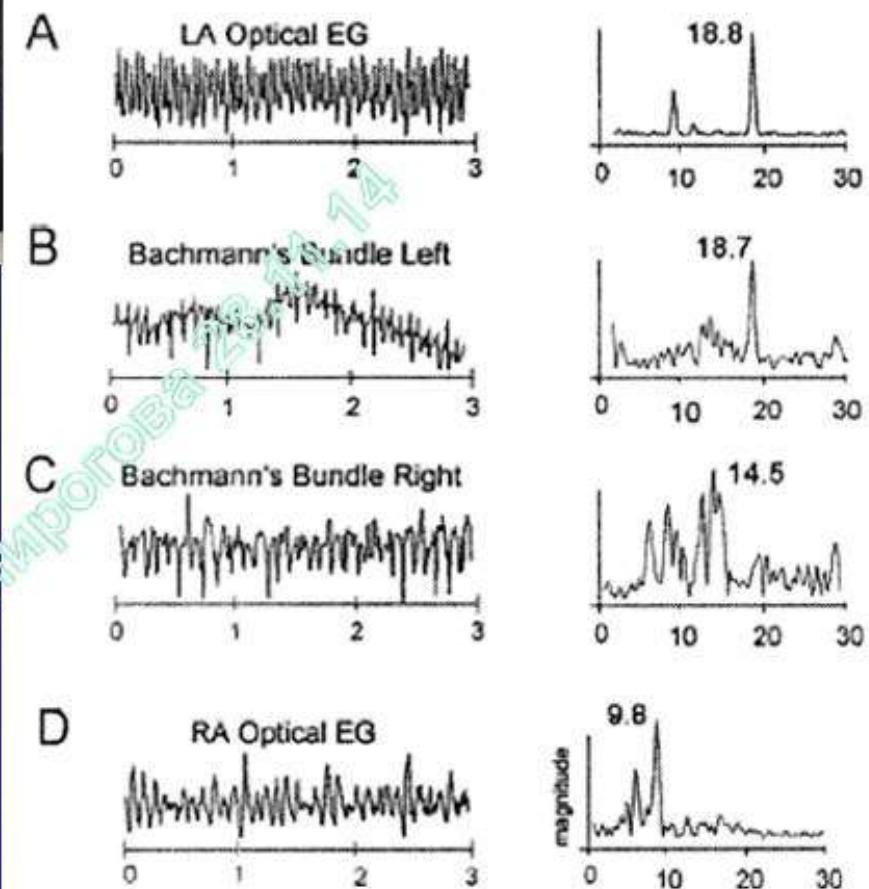
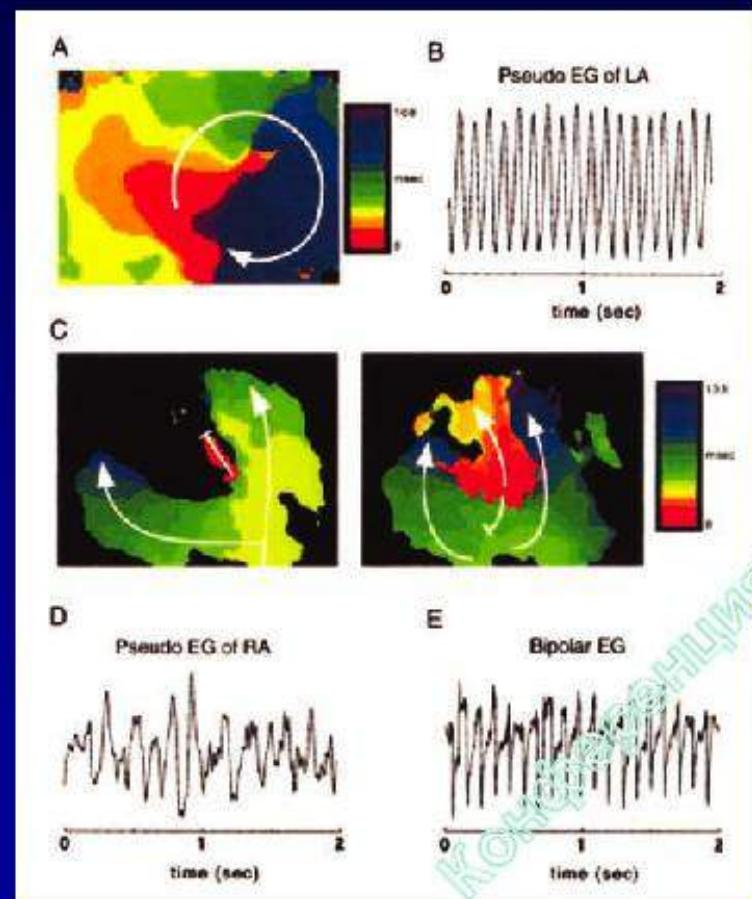


Анатомическая изоляция ганглионарных сплетений



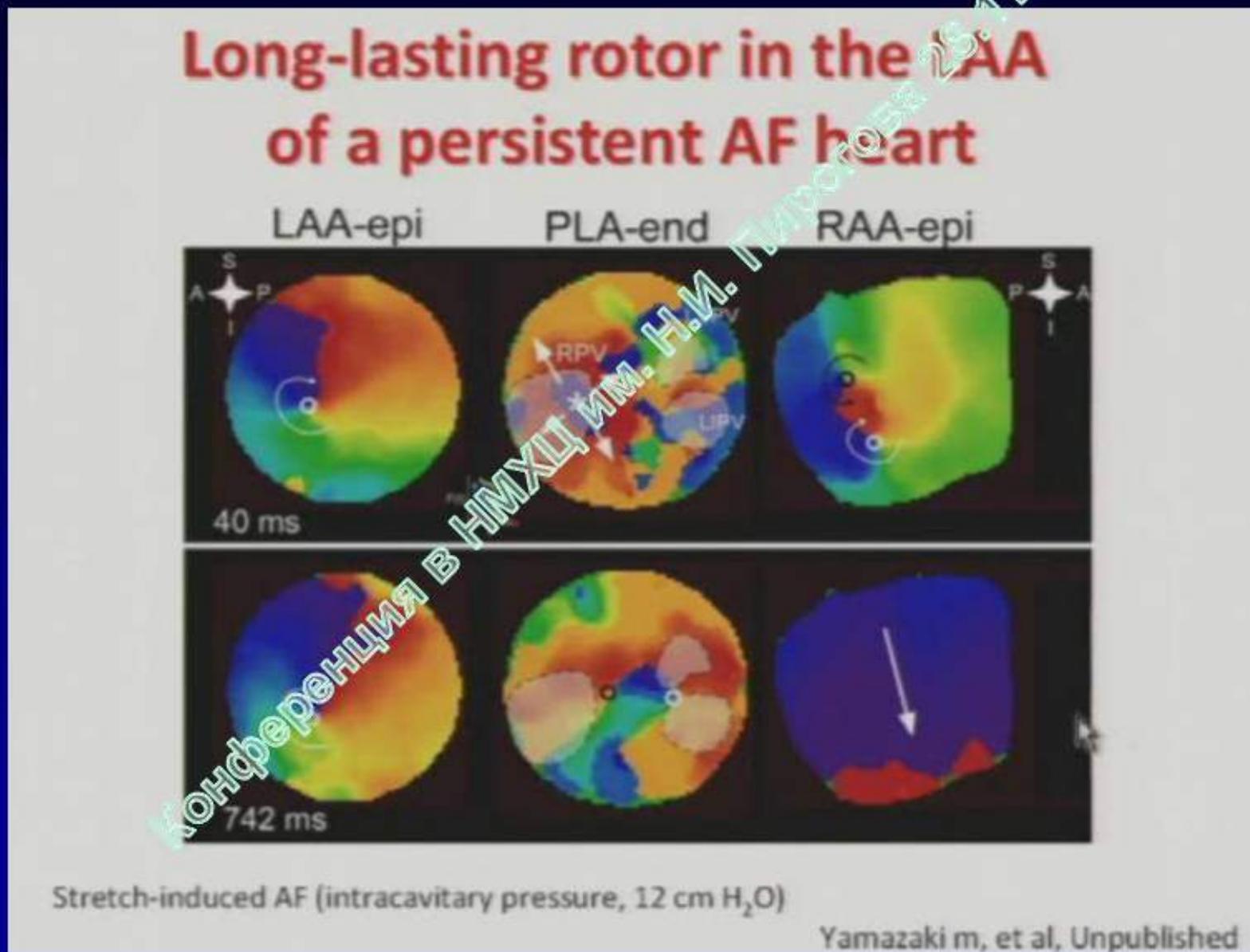
Покушалов Е.А., 2007

Оптическая электрограмма (EG) и частотный спектр сигналов с ЛП и ПП



J.Jalife et al, 2005

«Постоянный ротор» в УЛП при персистирующей форме ФП





Sanjiv Narayan, MD:
Electrophysiologist

Professor of Medicine

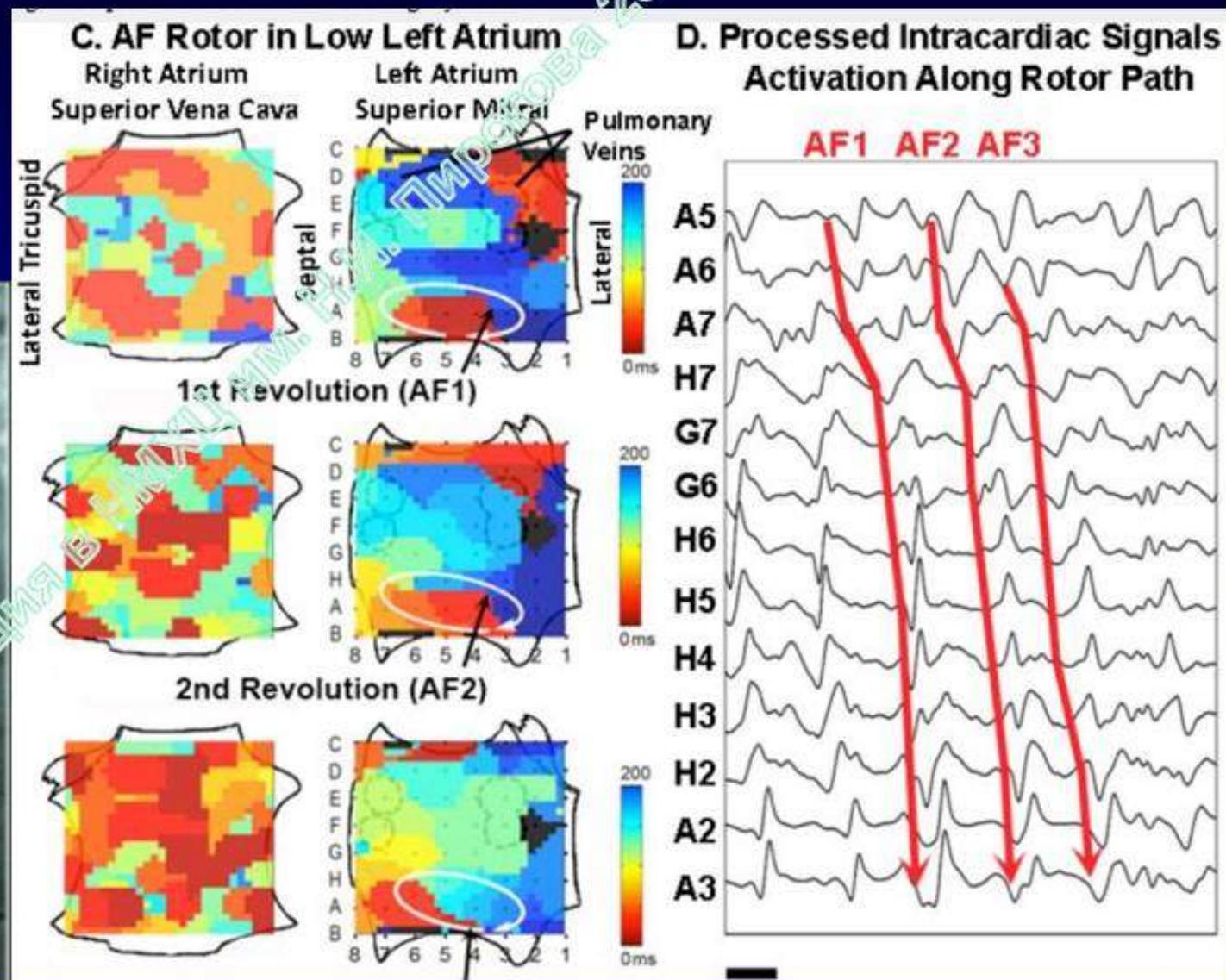
University of California at San Diego

Implanted ECG Monitor

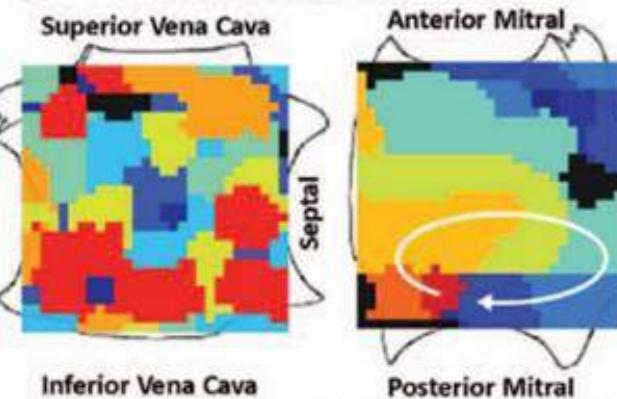
An endovascular image of the right atrium. A catheter with a circular basket at its distal tip is positioned within the atrial lumen. The image shows the internal structures of the heart chambers. A large, diagonal watermark reading "Конференция" (Conference) runs across the image. In the top right corner, the word "Basket" is printed vertically. In the bottom right corner, there is a technical data box:

FOV	20	cm
L	0	deg
LAO	25	deg
CAU	1	deg

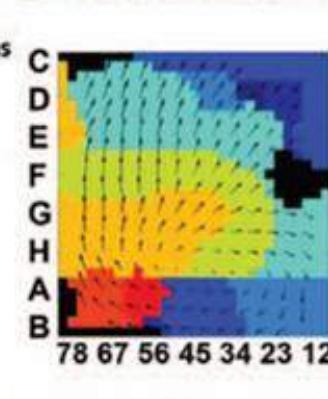
Что такое FIRM-абляция (Focal Impulse and Rotor Modulation) ?



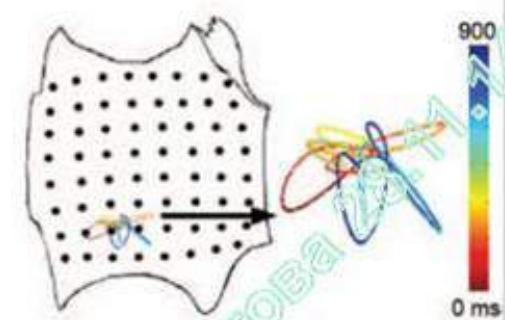
A Left Atrial CW Rotor in AF



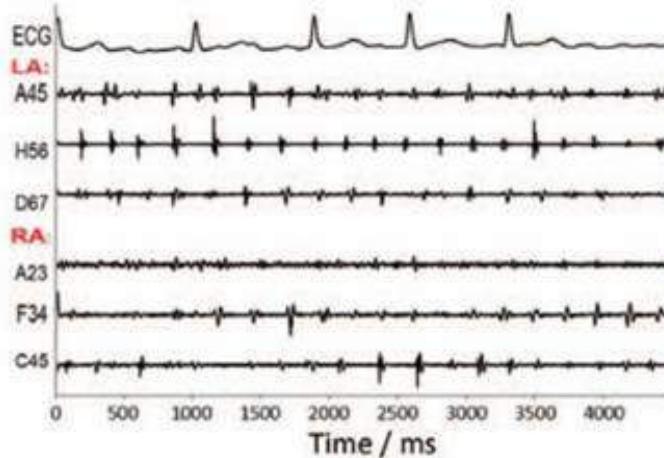
B Rotor Controls AF



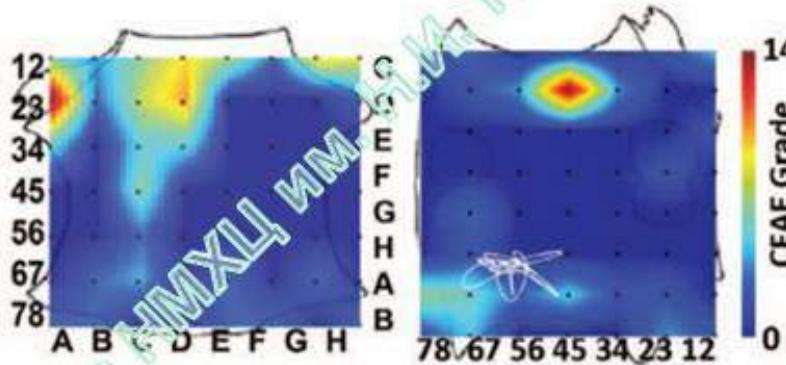
C Precession Locus of Rotor



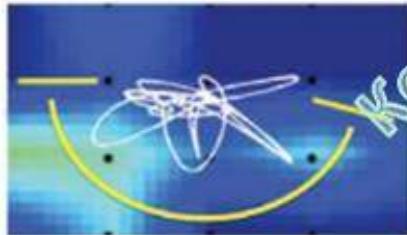
D Intracardiac Electrograms, Multisite



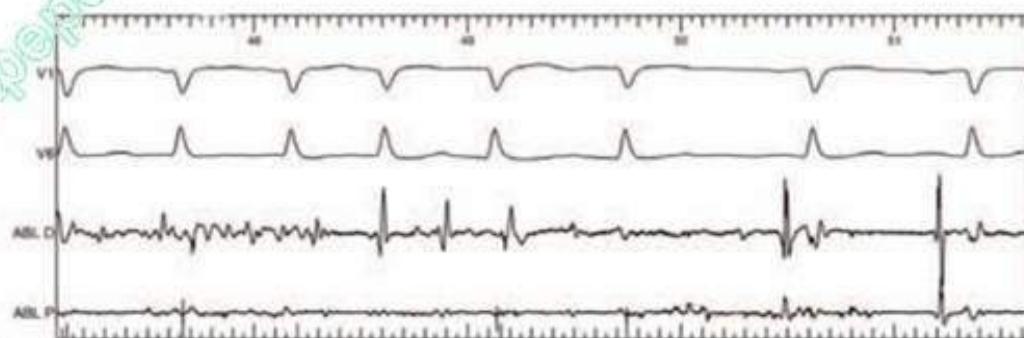
E Rotor Precession on Bi-atrial CFAE Map



F CFAE <180° Around Rotor



G Acute AF Termination to Sinus Rhythm By FIRM Ablation



S. Narayan et al., 2013

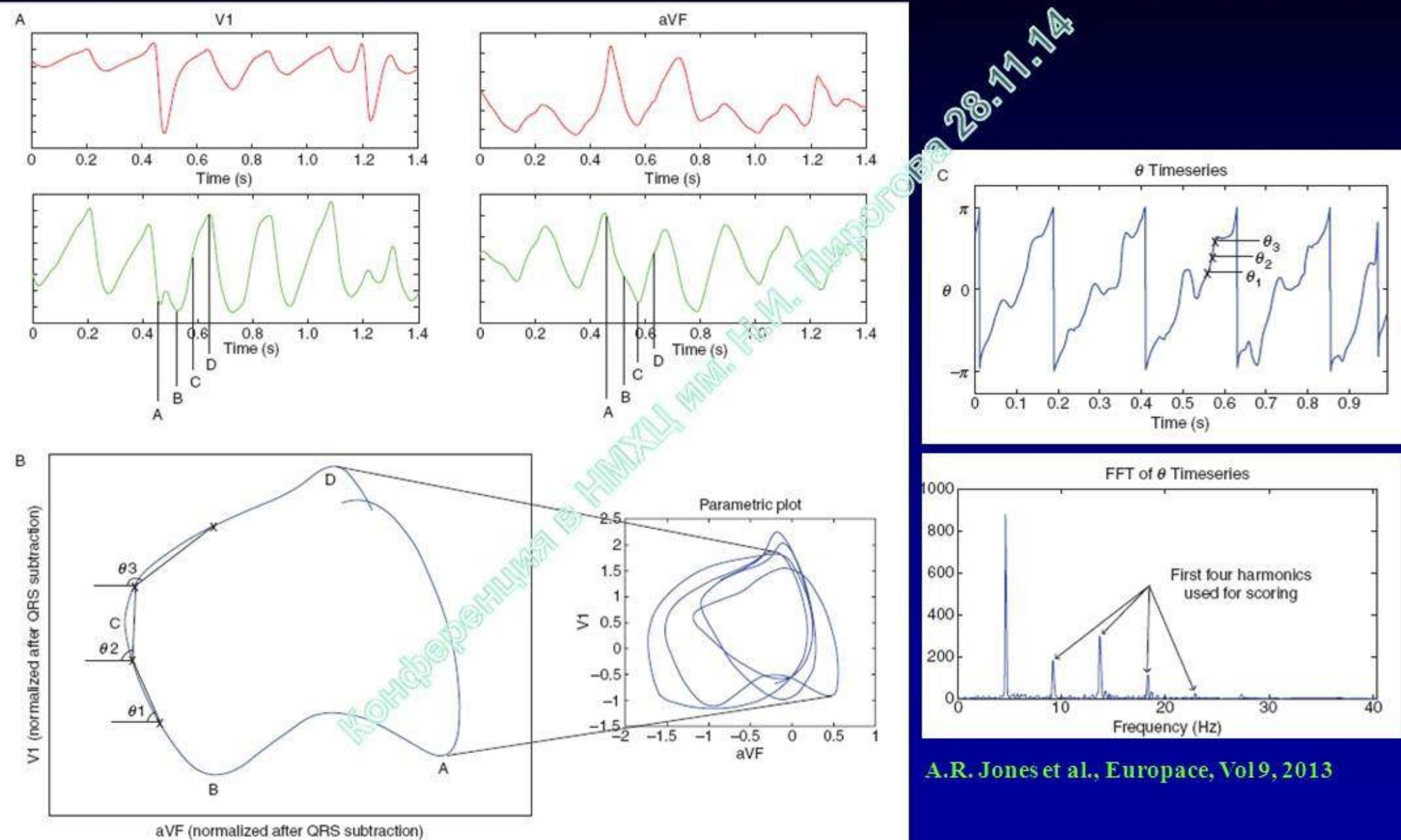
CONFIRM (Conventional Ablation for Atrial Fibrillation With or Without Focal Impulse and Rotor Modulation) trial

METHODS: 92 subjects during 107 consecutive ablation procedures for paroxysmal or persistent (72%) AF. Cases were prospectively treated, in a 2-arm 1:1 design, by ablation at sources (FIRM-guided) followed by conventional ablation ($n = 36$), or conventional ablation alone ($n = 71$; FIRM-blinded).

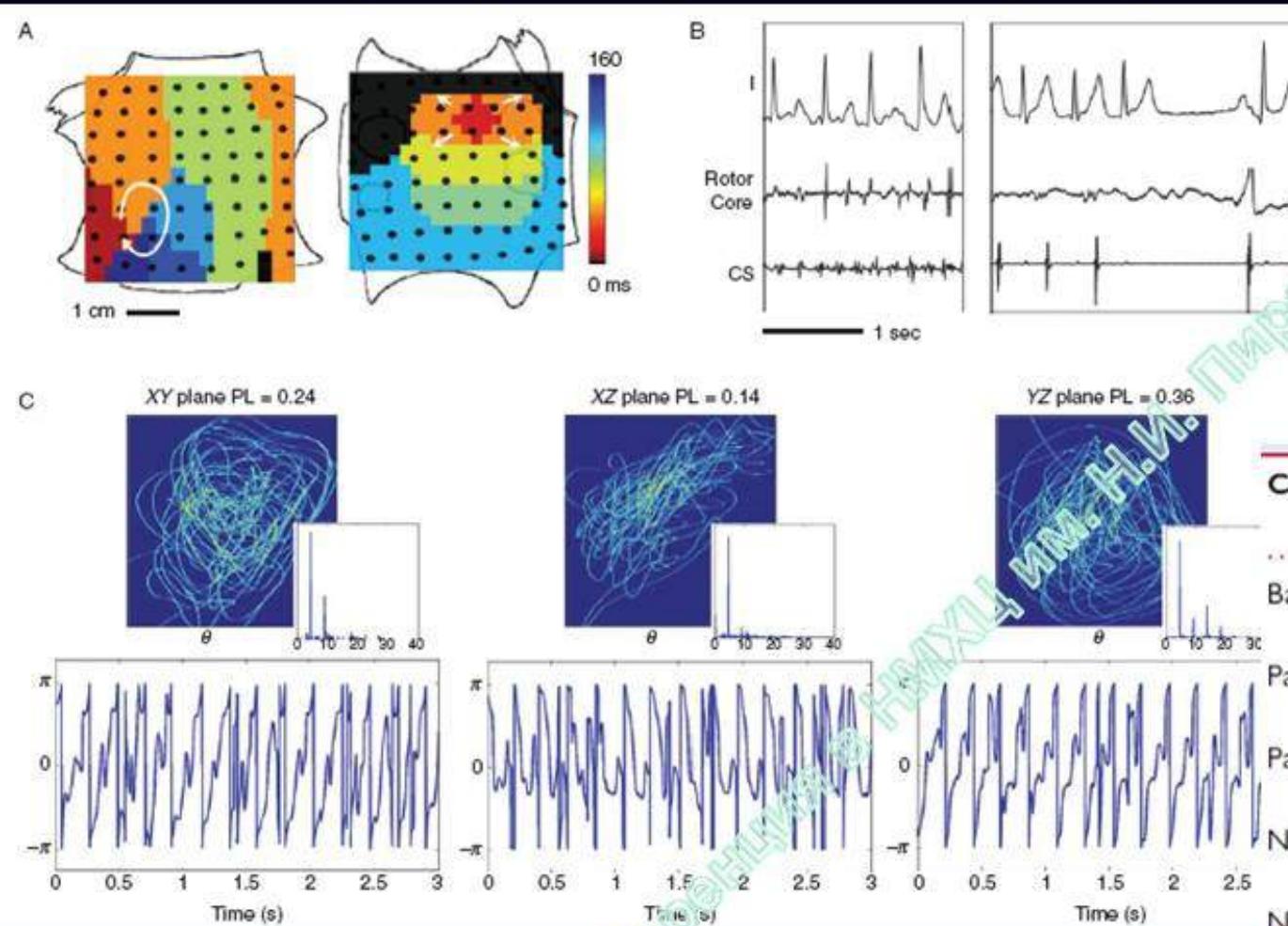
RESULTS:

Localized rotors or focal impulses were detected in 98 (97%) of 101 cases with sustained AF, each exhibiting 2.1 ± 1.0 sources. The acute endpoint (AF termination or consistent slowing) was achieved in 86% of FIRM-guided cases versus 20% of FIRM-blinded cases ($p < 0.001$). FIRM ablation alone at the primary source terminated AF in a median 2.5 min (interquartile range: 1.0 to 3.1 min). Total ablation time did not differ between groups (57.8 ± 22.8 min vs. 52.1 ± 17.8 min, $p = 0.16$). During a median 273 days (interquartile range: 132 to 681 days) after a single procedure, FIRM-guided cases had higher freedom from AF (82.4% vs. 44.9%; $p < 0.001$) after a single procedure than FIRM-blinded cases with rigorous, often implanted, electrocardiography monitoring. Adverse events did not differ between groups.

ЭКГ-критерии определения «роторов» и «фокусов» при ФП

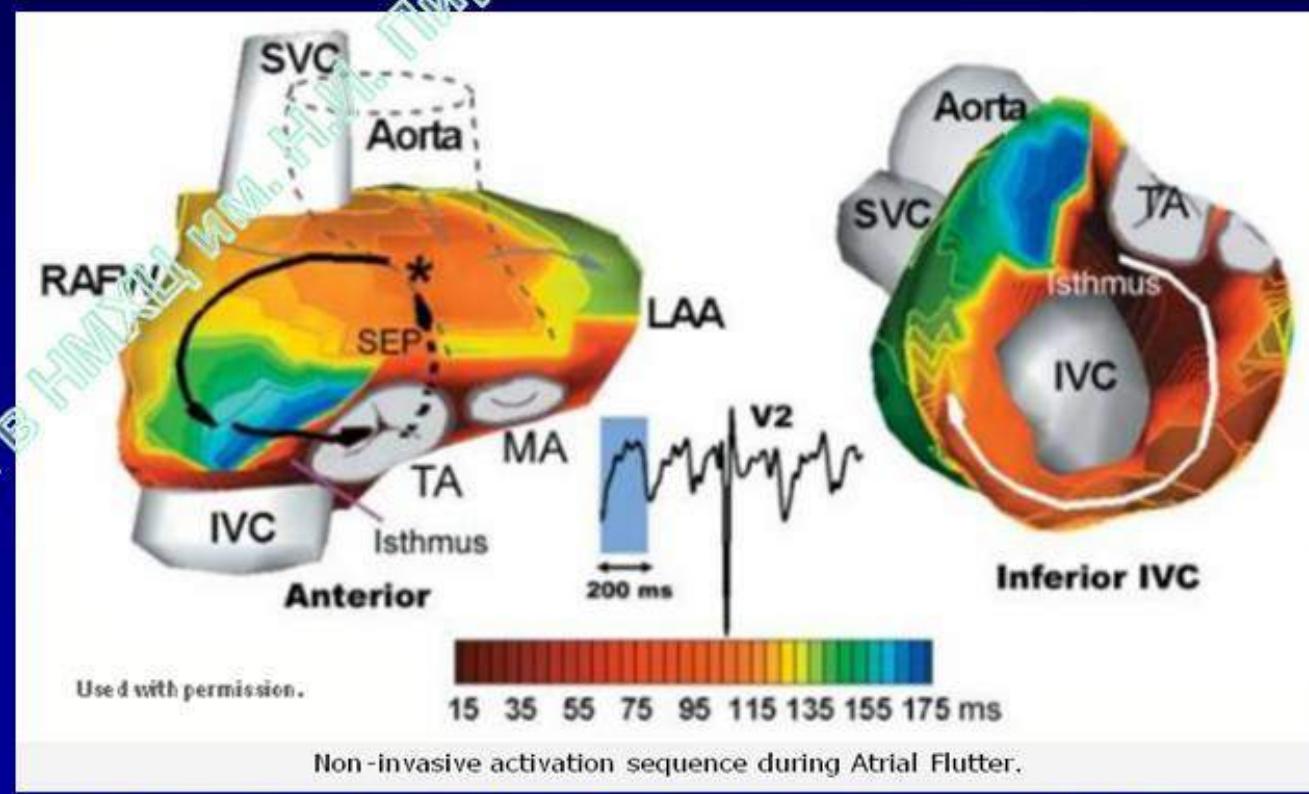
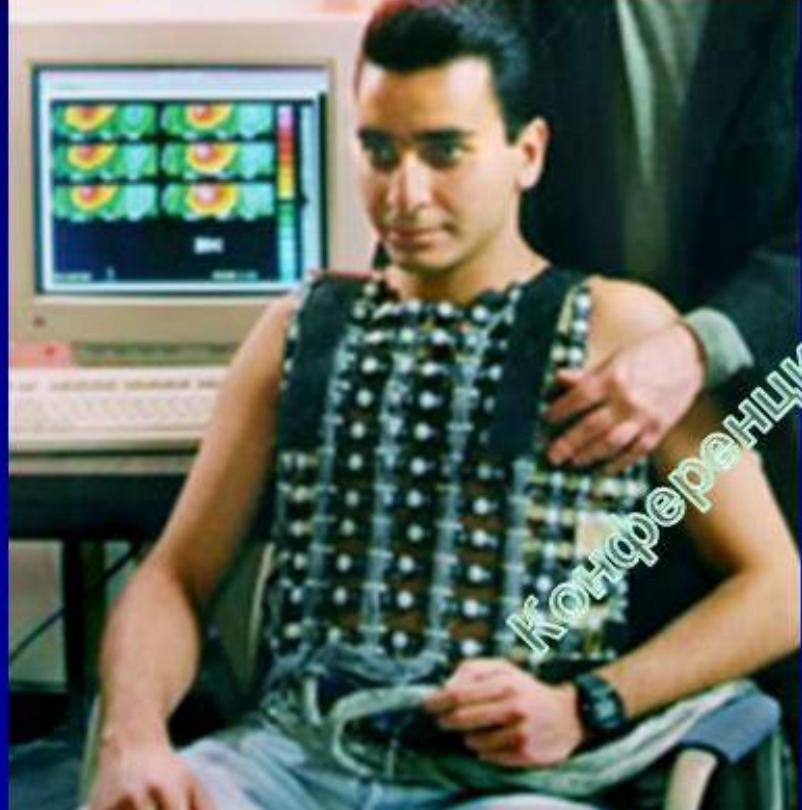


ЭКГ-критерии определения «роторов» и «фокусов» при ФП



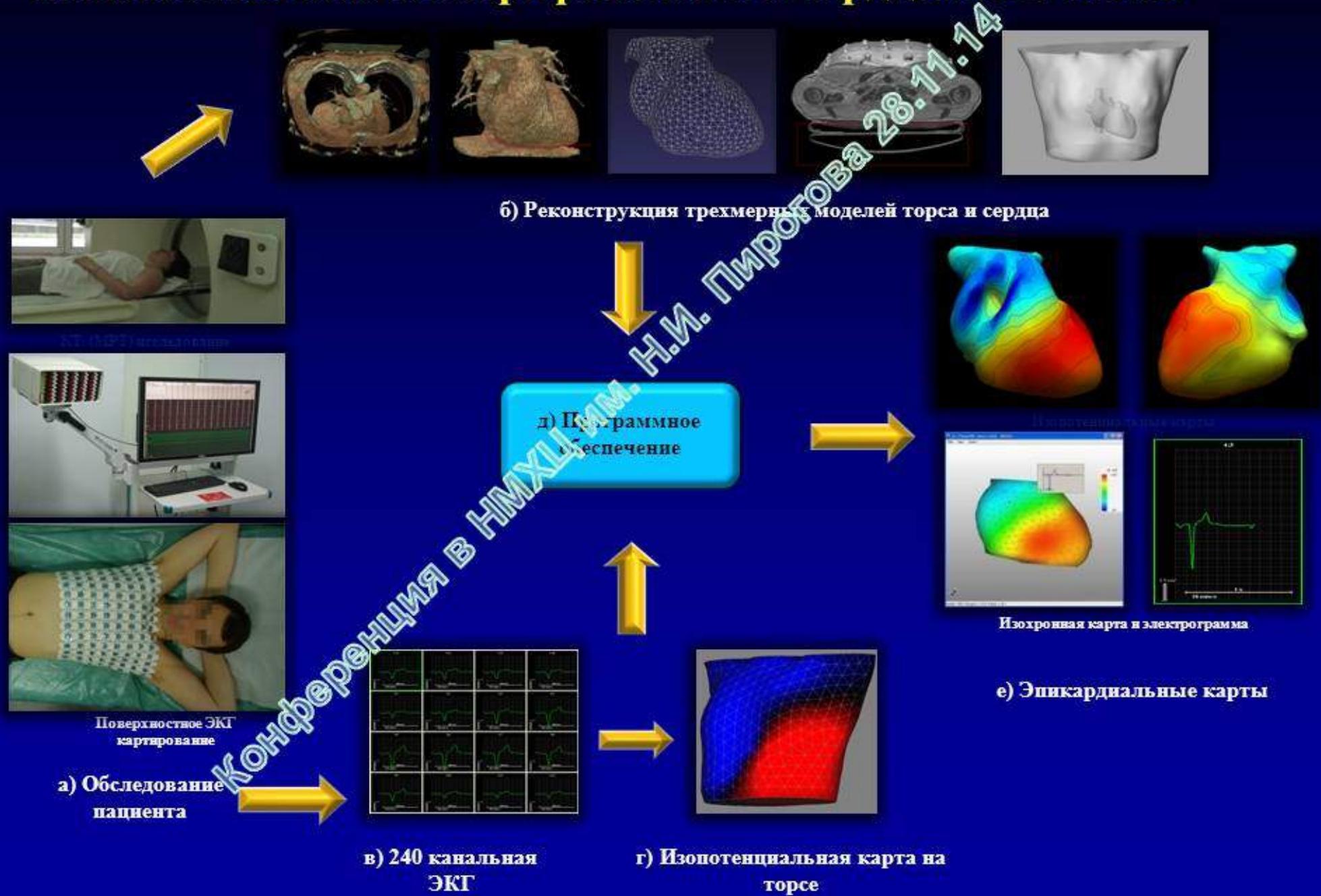
Characteristic	Persistent AF	Paroxysmal AF	P
Baseline AF cycle length (at coronary sinus), ms	170 ± 21	189 ± 13	0.03
Patients with detected sources	28/29 (97%)	7/7 (100%)	
Patients reaching acute endpoint	24/29 (82.8%)	7/7 (100%)	
No. of concurrent AF sources	2.4 ± 1.1	1.9 ± 0.7	0.23
No. of rotors, % ^a (LA/RA)	74.1% (29/14)	61.5% (6/2)	
No. of focal impulses, % ^a (LA/RA)	25.9% (15/0)	38.5% (5/0)	
FIRM time to AF termination, primary source/min	4.5 ± 7.3	3.9 ± 4.1	0.86
Total FIRM time, all sources/min	17.5 ± 10.5	7.7 ± 4.2	0.29

Неинвазивное поверхностное картирование «роторов»

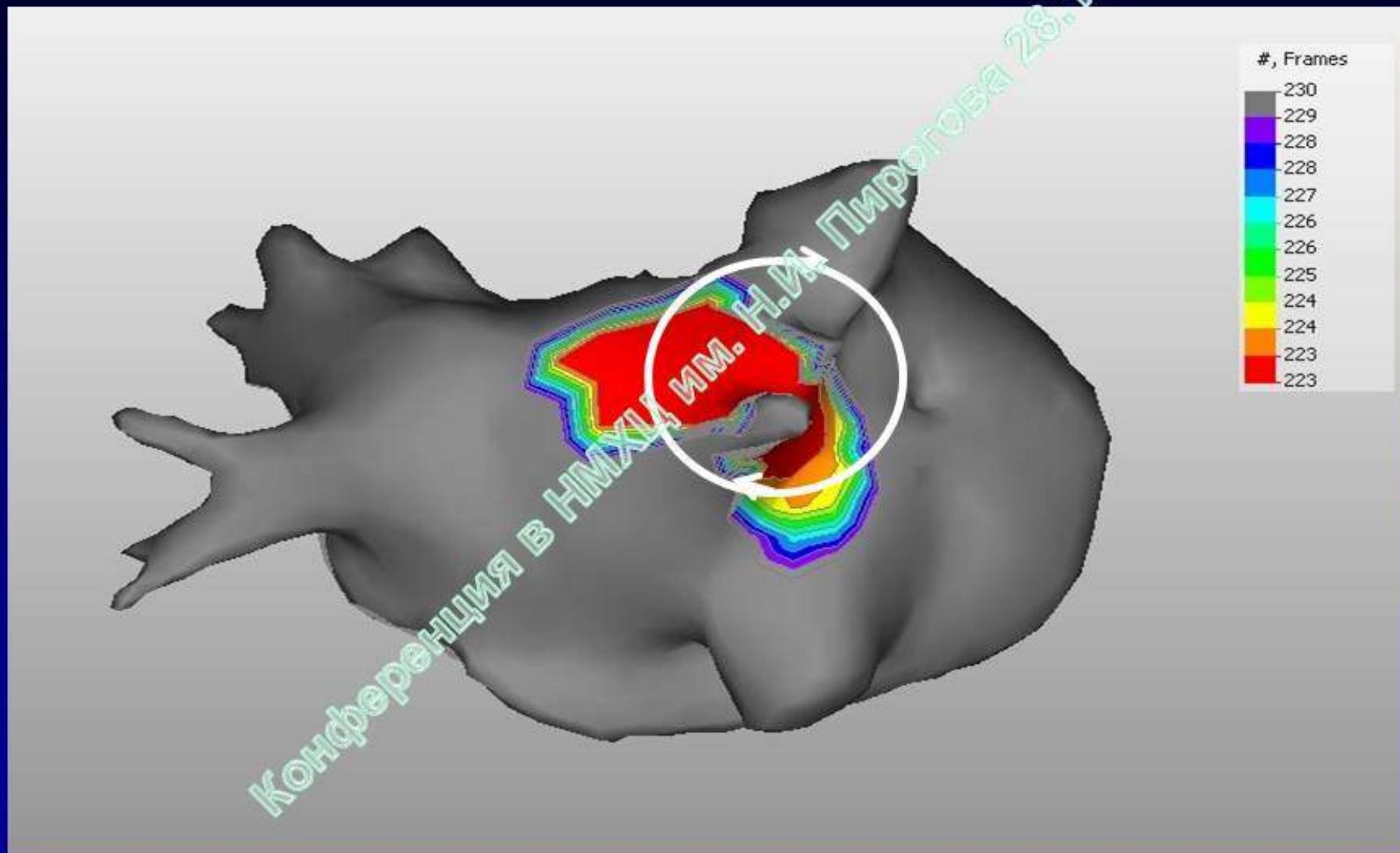


Of 58 persistent patients (the hardest to cure), he was able to terminate A-Fib in 51 (88% success rate) using the ECGI system.

Программно-аппаратный комплекс для вычислительной электрофизиологии сердца АМУCARD



Атипичное трепетание после РЧА ЛВ



Спасибо за внимание!

