2017 춘계심혈관 통합학술대회
AF Summit: Atrial Fibrillation
Apr.21(Fri) 14:40-16:10 Rm.300B
15:00-15:10

Outcomes of AF Ablation

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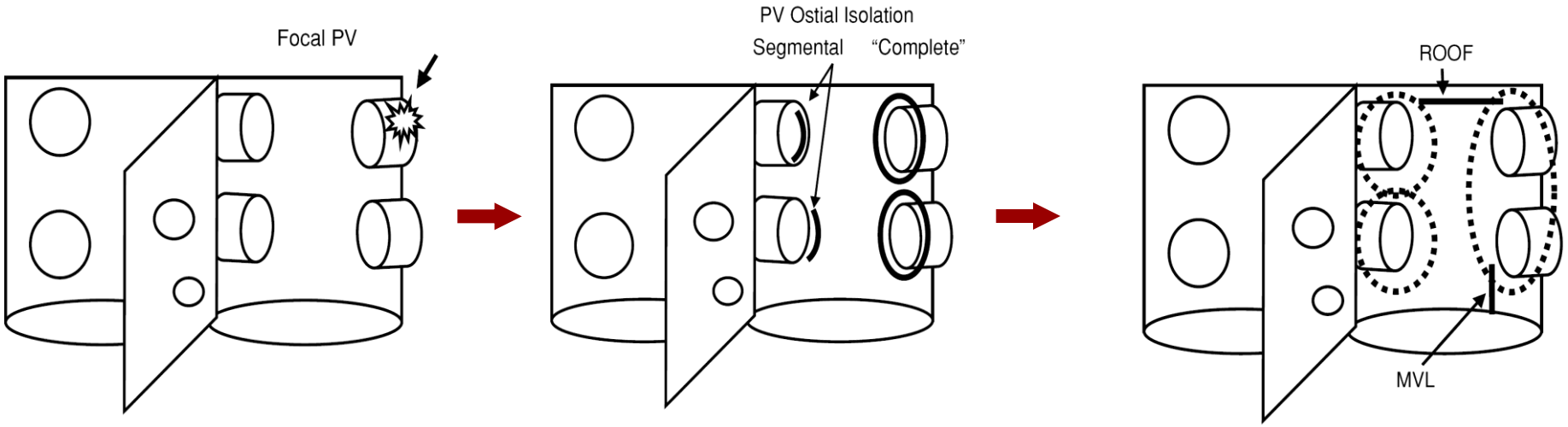
2017 Annual Spring Scientific Conference of the KSC
in conjunction with KHRS, KSIC, KSE, and KSoLA

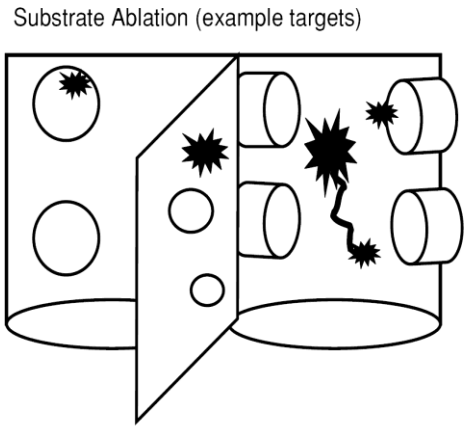
The Korean Society of Cardiology
COI Disclosure

Name of First Author: Gi-Byoung Nam MD

The authors have no financial conflicts of interest to disclose concerning the presentation

Evolution of Ablation Strategy





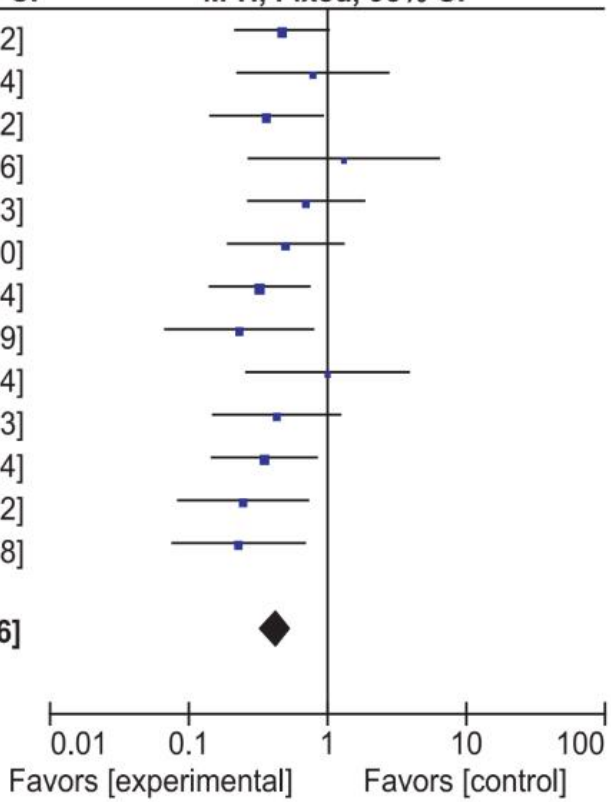
Atrial Fibrillation Ablation: Reaching the Mainstream
JOHN D. FISHER, *PACE 2006; 29:523–537*

Comparative Effectiveness of Wide Antral Versus Ostial Pulmonary Vein Isolation

Study or Subgroup	wide antral PVI Events	Total	ostial PVI Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Arentz T	18	55	28	55	12.2%	0.47 [0.22, 1.02]
Fiala M	5	56	6	54	3.6%	0.78 [0.22, 2.74]
Hwang HJ	12	45	18	36	9.5%	0.36 [0.14, 0.92]
Li-Wei Lo	3	27	4	46	1.7%	1.31 [0.27, 6.36]
Liu X	9	55	12	55	6.5%	0.70 [0.27, 1.83]
Mansour M	10	40	16	40	7.8%	0.50 [0.19, 1.30]
Nilsson B	20	46	38	54	12.9%	0.32 [0.14, 0.74]
Oral H	4	40	13	40	7.6%	0.23 [0.07, 0.79]
Sawhney	5	33	5	33	2.8%	1.00 [0.26, 3.84]
Tan HB	7	45	12	40	7.0%	0.43 [0.15, 1.23]
Yamada	11	51	22	50	11.3%	0.35 [0.15, 0.84]
Yamane T*	6	79	11	44	8.5%	0.25 [0.08, 0.72]
Yamane T**	8	38	14	26	8.5%	0.23 [0.08, 0.68]
Total (95% CI)		**610**		**573**	**100.0%**	**0.42 [0.32, 0.56]**
Total events	118		199			

Heterogeneity: Chi² = 9.54, df = 12 (P = 0.66); I² = 0%

Test for overall effect: Z = 6.03 (P < 0.00001)



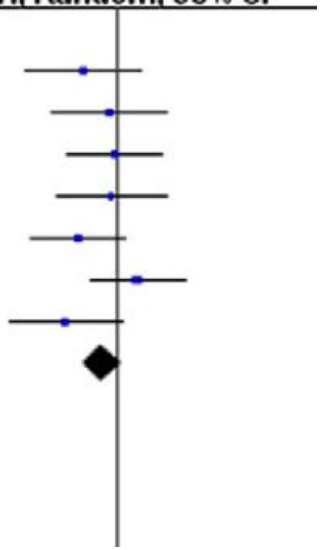
Circ Arrhythm Electrophysiol 2014;7:39-45

Benefits and risks of additional ablation of CFE in pAF

Study or Subgroup	PVI+CFAE Events	Total	PVI alone Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
1.1.1 PAF							
Oral 2004	6	30	10	30	5.2%	0.60 [0.25, 1.44]	2004
Verma 2007-A	8	60	9	60	5.1%	0.89 [0.37, 2.15]	2007
Deisenhofer 2009	12	50	12	48	7.7%	0.96 [0.48, 1.92]	2009
Di Biase 2009	8	34	9	35	5.7%	0.92 [0.40, 2.09]	2009
Verma 2010-A	7	22	12	21	7.3%	0.56 [0.27, 1.14]	2010
Chen 2011	18	58	8	35	7.3%	1.36 [0.66, 2.79]	2011
Gi-Byoung Nam2012	6	35	13	35	5.5%	0.46 [0.20, 1.08]	2012
Subtotal (95% CI)		**289**		**264**	**43.8%**	**0.79 [0.59, 1.06]**	
Total events	65		73				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 5.52$, df = 6 (P = 0.48); $I^2 = 0\%$

Test for overall effect: Z = 1.55 (P = 0.12)



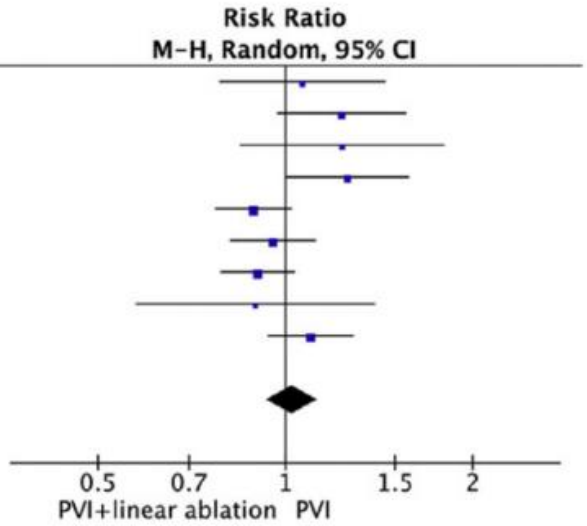
S. Wu et al. / International Journal of Cardiology 169 (2013) 35–43

Is there still a role for additional linear ablation in patients with pAF? An Updated Meta-analysis of RCTs

* sinus rhythm maintenance

Study or Subgroup	PVI+linear ablation Events	Total	PVI Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Arbelo 2014	35	59	34	61	7.0%	1.06 [0.78, 1.45]
Fassini 2005	48	63	39	63	10.0%	1.23 [0.97, 1.56]
Gaita 2008	48	84	19	41	5.1%	1.23 [0.85, 1.80]
Hocini 2005	39	45	31	45	10.5%	1.26 [1.00, 1.58]
Kim 2013	108	153	81	102	16.4%	0.89 [0.77, 1.02]
Kim 2014	42	50	44	50	15.1%	0.95 [0.81, 1.12]
Mun 2012	83	104	46	52	16.8%	0.90 [0.79, 1.04]
Sawhney 2010	17	33	19	33	4.0%	0.89 [0.58, 1.39]
Sheikh 2006	45	50	41	50	15.0%	1.10 [0.94, 1.29]
Total (95% CI)		**641**		**497**	**100.0%**	**1.03 [0.93, 1.13]**
Total events	465		354			

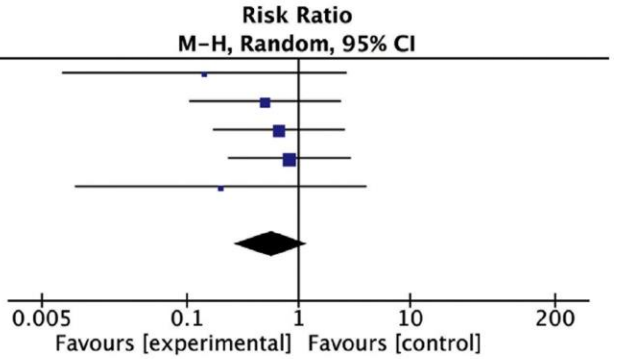
Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 15.22$, df = 8 (P = 0.06); $I^2 = 47\%$
Test for overall effect: Z = 0.53 (P = 0.60)



* risks for complications

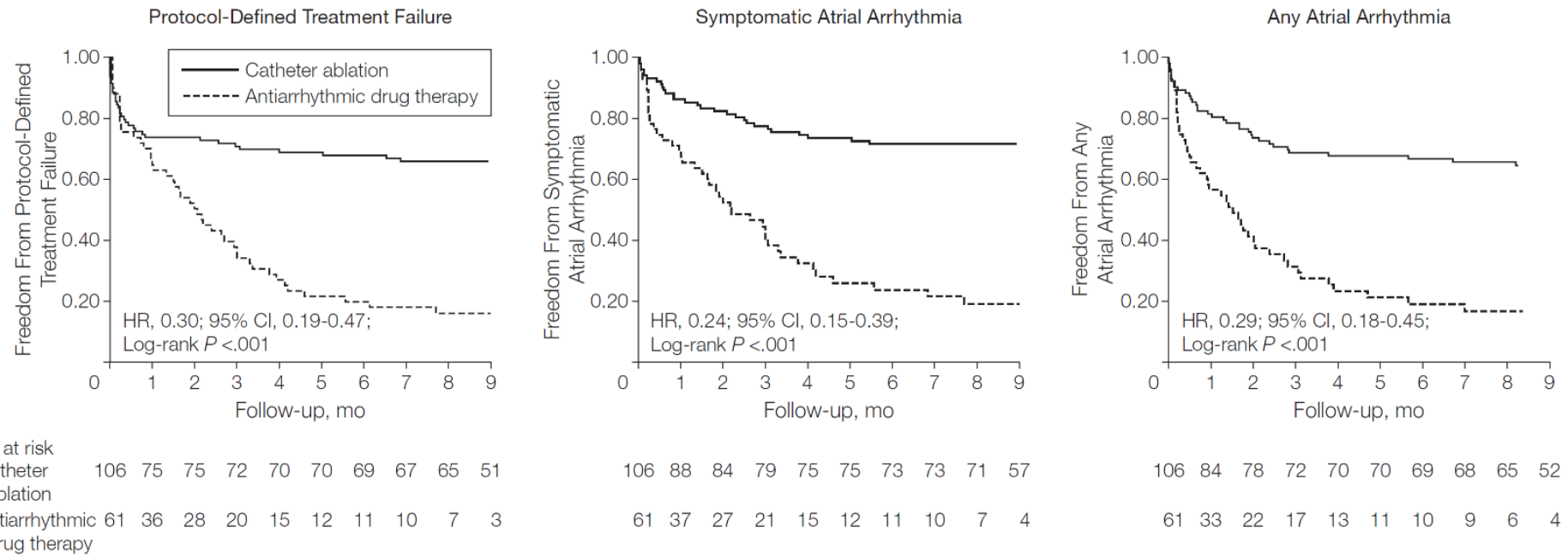
Study or Subgroup	PVI+linear ablation Events	Total	PVI Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Sheikh 2006	0	50	3	50	6.4%	0.14 [0.01, 2.70]	2006
Mun 2012	3	104	3	52	22.7%	0.50 [0.10, 2.39]	2012
Kim 2013	4	153	4	102	29.9%	0.67 [0.17, 2.61]	2013
Arbelo 2014	4	59	5	61	34.8%	0.83 [0.23, 2.93]	2014
Kim 2014	0	50	2	50	6.1%	0.20 [0.01, 4.06]	2014
Total (95% CI)		**416**		**315**	**100.0%**	**0.57 [0.27, 1.19]**	
Total events	11		17				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.78$, df = 4 (P = 0.78); $I^2 = 0\%$
Test for overall effect: Z = 1.50 (P = 0.13)



International Journal of Cardiology 209 (2016) 266–274

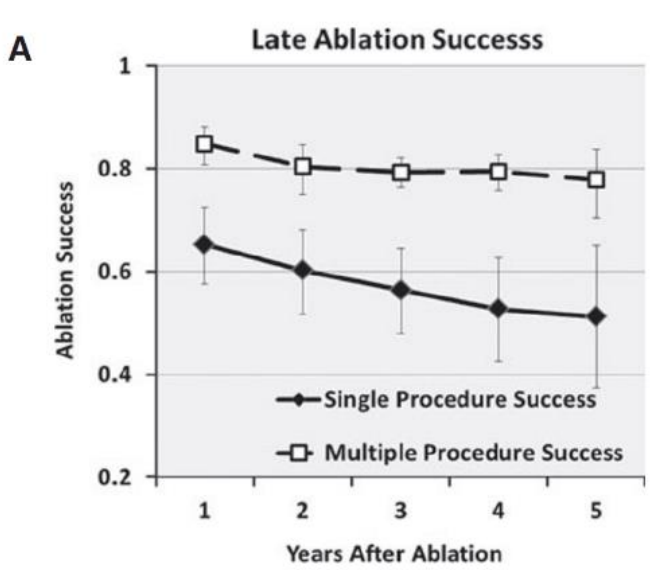
Comparison with AAD

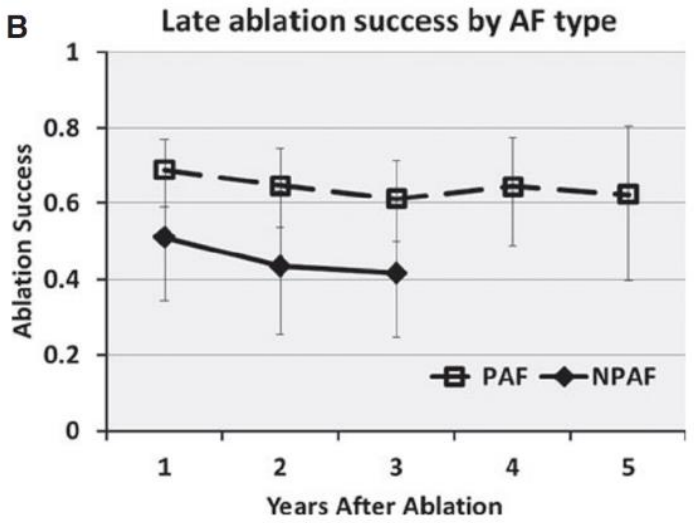


Among patients with paroxysmal AF who had not responded to at least 1 antiarrhythmic drug, the use of catheter ablation compared with ADT resulted in a longer time to treatment failure during the 9-month follow-up period.

JAMA. 2010;303(4):333-340

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





Years After Ablation	1	2	3	4	5
Single (number of studies)	17	17	17	10	6
Multiple (number of studies)	9	9	9	9	4

Years After Ablation	1	2	3	4	5
PAF (number of studies)	10	10	10	5	3
NPAF (number of studies)	6	6	6	2	1

J Am Heart Assoc. 2013;2:e004549

Procedure Success: meta analysis

	pAF	NPAF
12 month single procedure	**66.6% (95% CI: 58.2%-74.2%)**	**51.9% (95% CI: 33.8%-69.5%)**
Late outcome single procedure	**54.1% (95% CI:44.463.4%)**	**41.8% (95% CI: 25.2-60.5%)**
Late multiple procedure	**79.0% (95% CI: 67.6%-87.1%)**	**77.8% (95% CI: 68.7-84.9%)**

(1) a single ablation procedure may be sufficient to achieve freedom from atrial arrhythmia in 50% of patients, (2) multiple procedures will be required to achieve control of AF in many patients, but 80% of patients will achieve long-term freedom from atrial arrhythmia; and (3) Although there is an incidence of late recurrence in initially successfully ablated patients, there is relative stability of arrhythmia-free survival at late-term follow-up of 5 years.

J Am Heart Assoc. 2013;2:e004549

Discerning the Incidence of Sx and Asx Episodes of AF Before and After Catheter Ablation (DISCERN AF)

Before and after ablation, a greater proportion of AF/AFL/AT duration was asymptomatic. In total, 69.0% of all episodes, or 56.0% of the total AF/AFL/AT duration, were considered asymptomatic.

Atrial arrhythmia burden decreased by 86%, from 2.0 to 0.3 hrs/pt/day.

Episodes of AF became shorter from a median of 22 to 6 minutes, less irregular, and more likely to be asymptomatic (from 52% before to 79% after ablation; P=.002).

The success rate of AF ablation: 58% by Sx, 46% w ILR at 18 months.
(Six patients (12%) exclusively ASx recurrences)

JAMA Intern Med. 2013;173(2):149-156

Catheter Ablation Versus AAD Therapy for AF (CABANA) Trial

catheter ablation vs. current pharmacologic therapy (either rate control or rhythm control drugs)

primary endpoint - total mortality
secondary endpoint - composite endpoint of total mortality, disabling stroke, serious bleeding and cardiac arrest. Additional secondary endpoints will include AF recurrence and quality of life and cost effectiveness.

The EAST (Early treatment of AF for Stroke prevention Trial)

recent onset AF at risk for stroke (CHA_2DS_2VASc score ≥2)
guideline-mandated usual care (anticoagulation, therapy of underlying heart disease, and rate control) or to usual care plus early rhythm control therapy (antiarrhythmic drugs, catheter ablation)

primary outcome of cardiovascular death, stroke, worsening of heart failure, and myocardial infarction.
secondary outcomes include cognitive function and quality of life.

Durable PVI

Adenosine

Pacing

Contact force

Simple PVI

Cryo-balloon
Laser-balloon
Hot-balloon

PVAC-gold

Adenosine-guided PV isolation for the Tx of pAF : ADVICE trial

Adenosine unmasked dormant PV conduction in 284/534 pts (53%).

Additional adenosine-guided ablation - an absolute risk reduction of 27·1% and a hazard ratio of 0·44 (95% CI 0·31–0·64; p<0·0001).

Occurrences of serious adverse events were similar in each group.

Conclusion: Adenosine testing to identify and target dormant PV conduction during catheter ablation of AF is a safe and highly effective strategy to improve arrhythmia-free survival in patients with pAF. This approach should be considered for incorporation into routine clinical practice.

Lancet 2015; 386: 672–79

pAF Catheter Ablation with a CF Sensing Catheter Results of the Prospective, Multicenter SMART-AF Trial

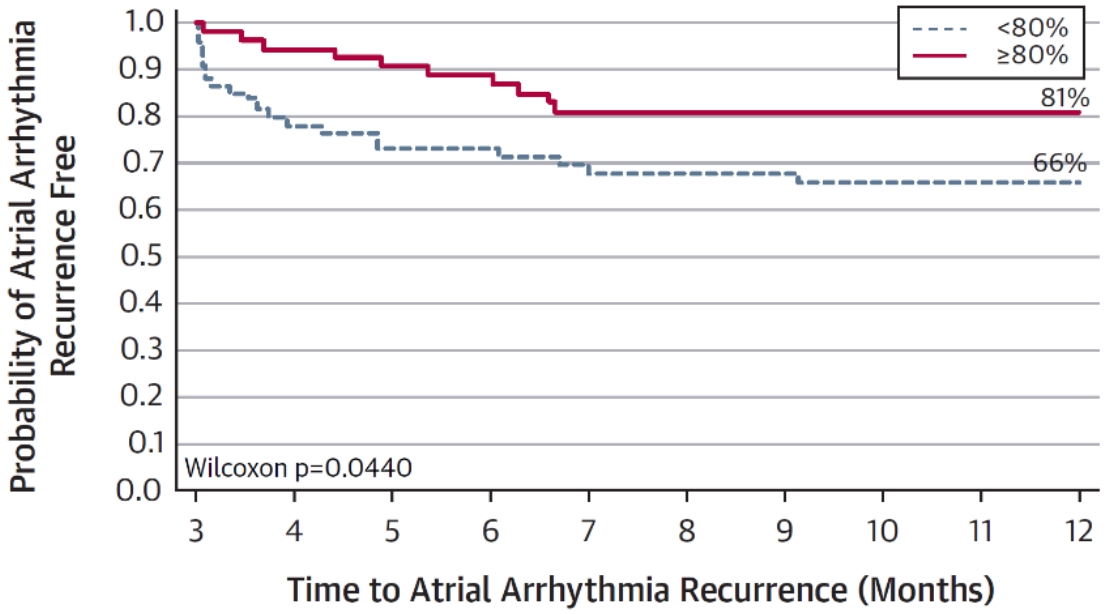
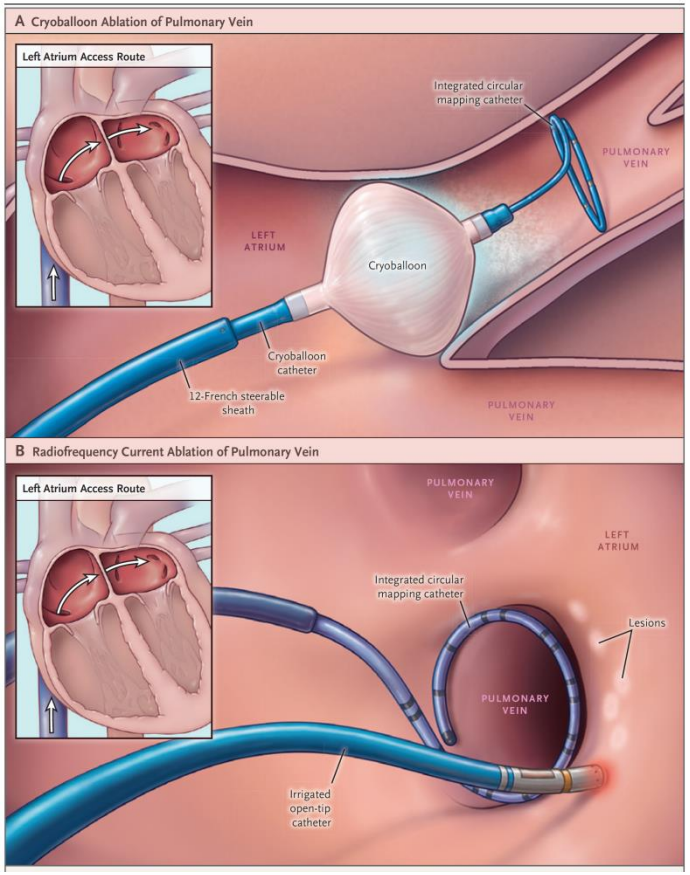


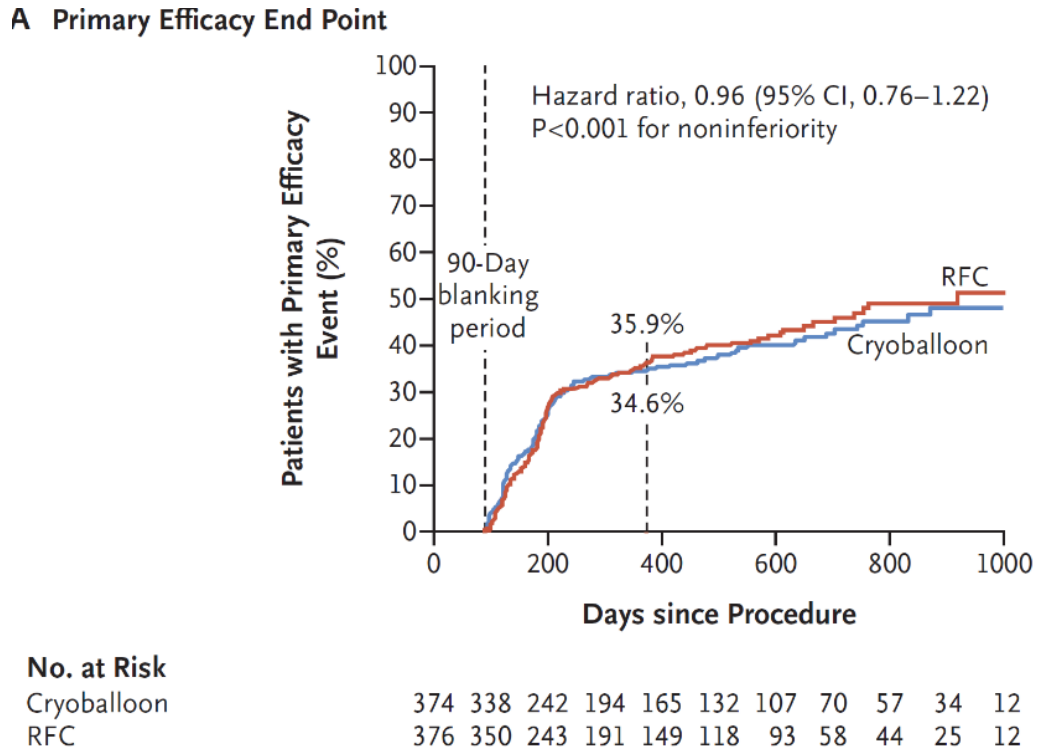
FIGURE 5 Kaplan-Meier Curve of Time to First Atrial Fibrillation/Atrial Flutter/Atrial Tachycardia Recurrence Through 12 Months

Investigators working in their selected ranges ≥80% of the time during radiofrequency application demonstrated a significant increase of 15% in the effectiveness success at 12 months compared to those working in their selected ranges <80% of the time (effectiveness cohort, n = 122).

J Am Coll Cardiol 2014;64:647–56

Cryoballoon or RF Ablation for Paroxysmal AF

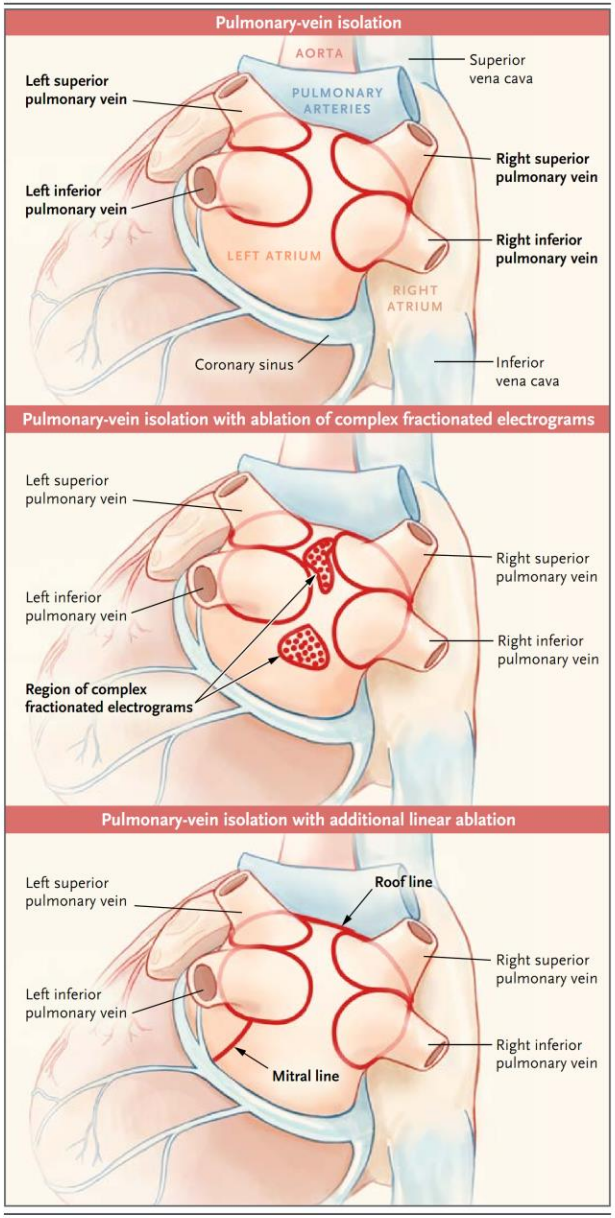


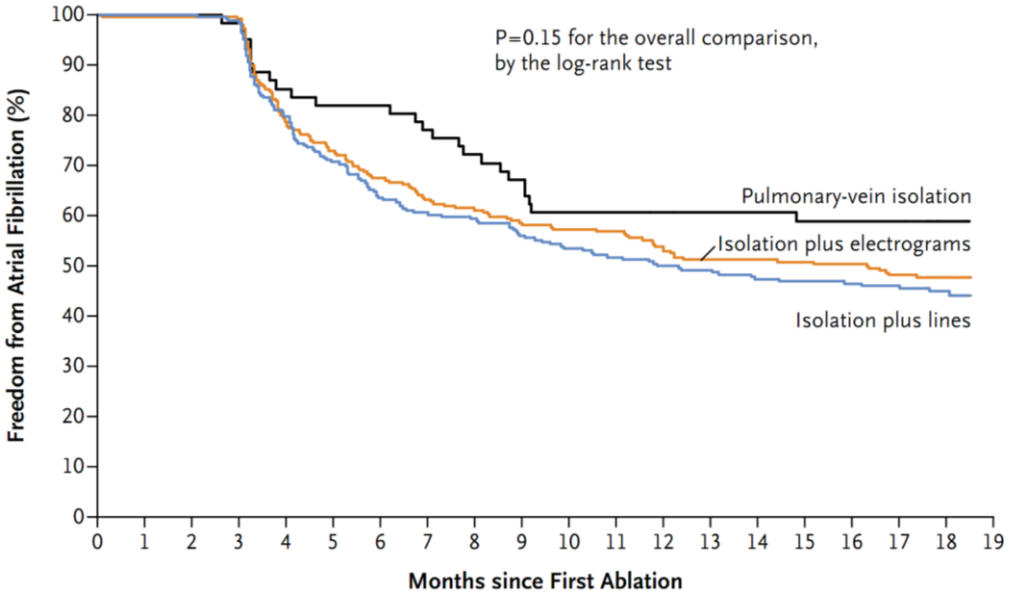


Cryoballoon ablation was noninferior to RF ablation with respect to efficacy for the Tx of patients with pAF, and there was no significant difference between the 2 methods with regard to overall safety.

Persistent AF

Approaches to Catheter Ablation for Persistent AF





N Engl J Med 2015;372:1812-22.

The impact of adjunctive CFE ablation and linear lesions on outcomes in persistent AF: a meta-analysis

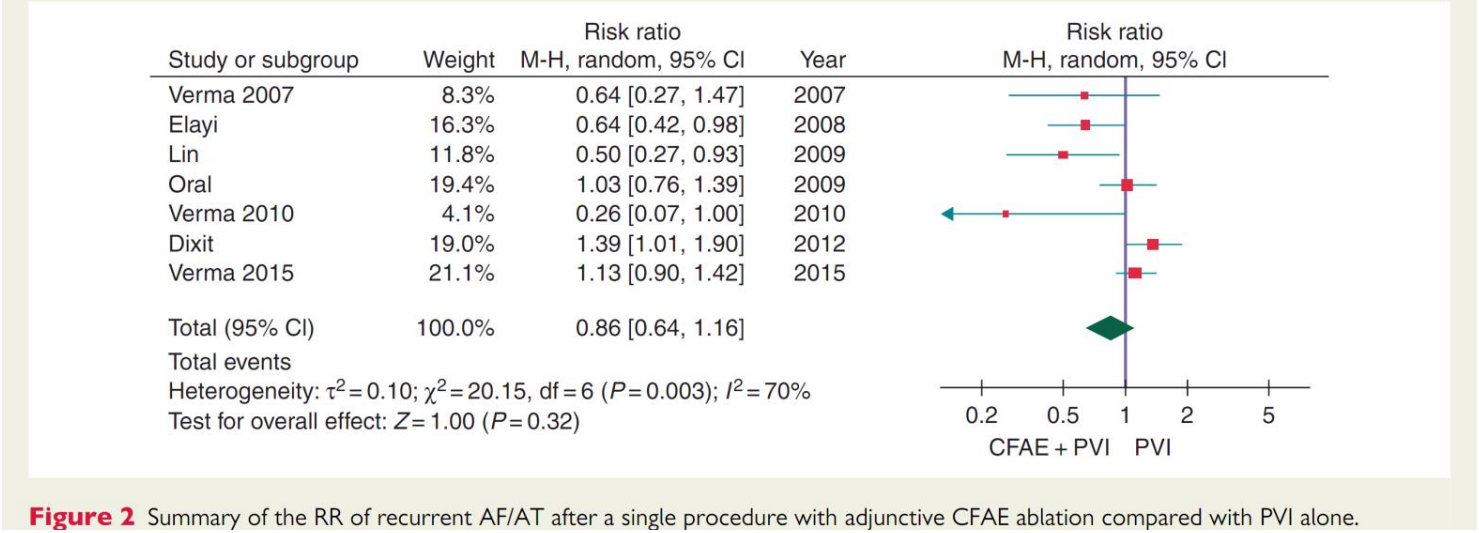


Figure 2 Summary of the RR of recurrent AF/AT after a single procedure with adjunctive CFAE ablation compared with PVI alone.

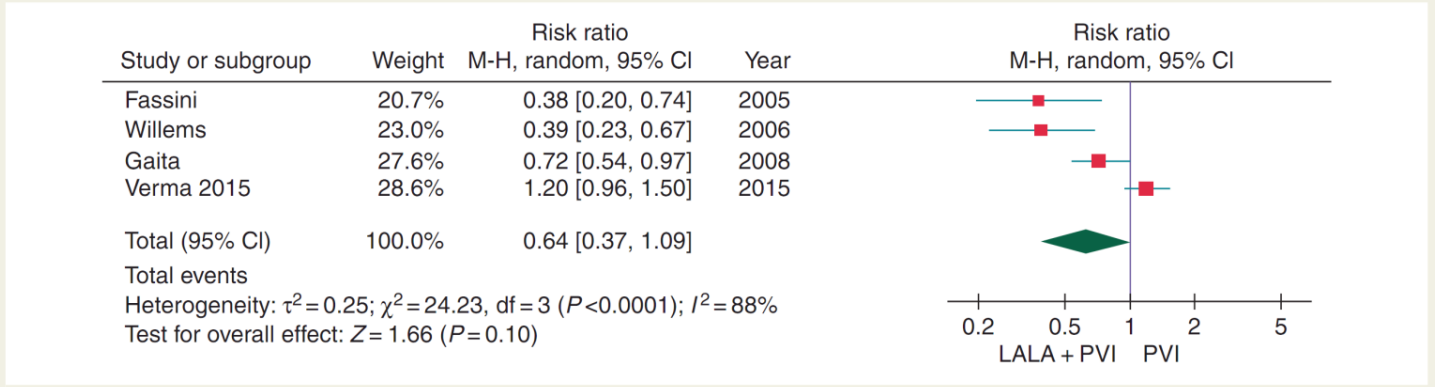
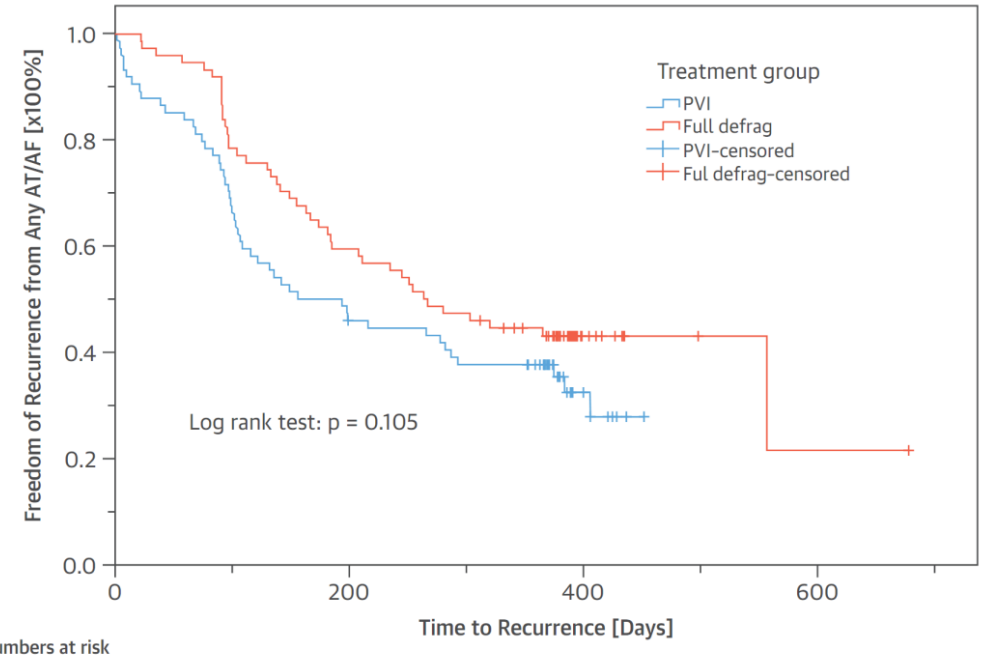


Figure 4 Summary of the RR of recurrent AF/AT after a single procedure with adjunctive LALA compared with PVI alone.

Europace (2016) 18, 359–367

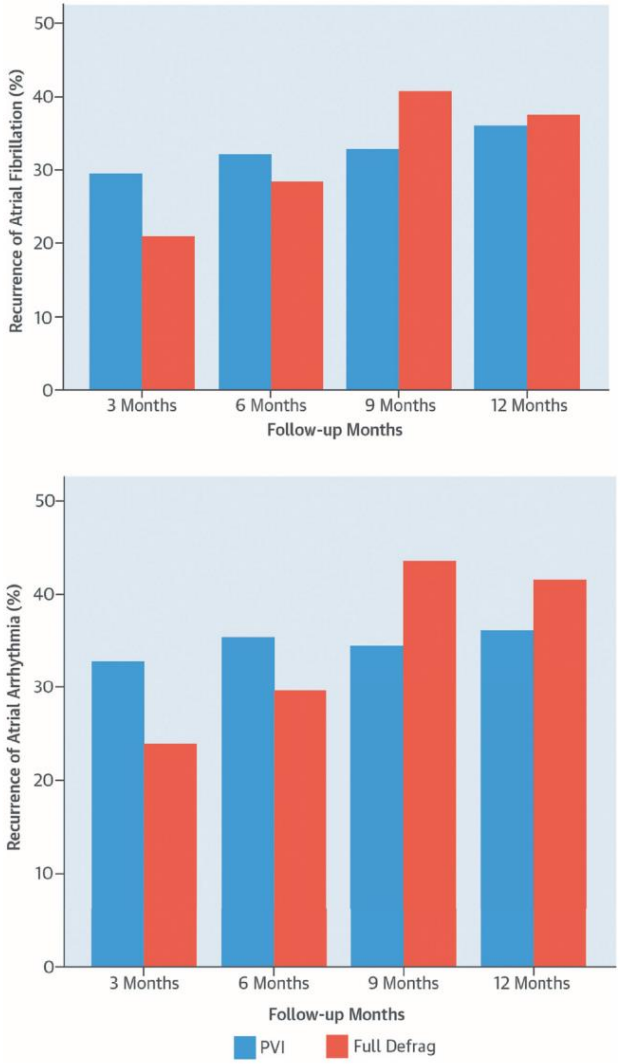
PVI vs stepwise approach: CHASE AF trial



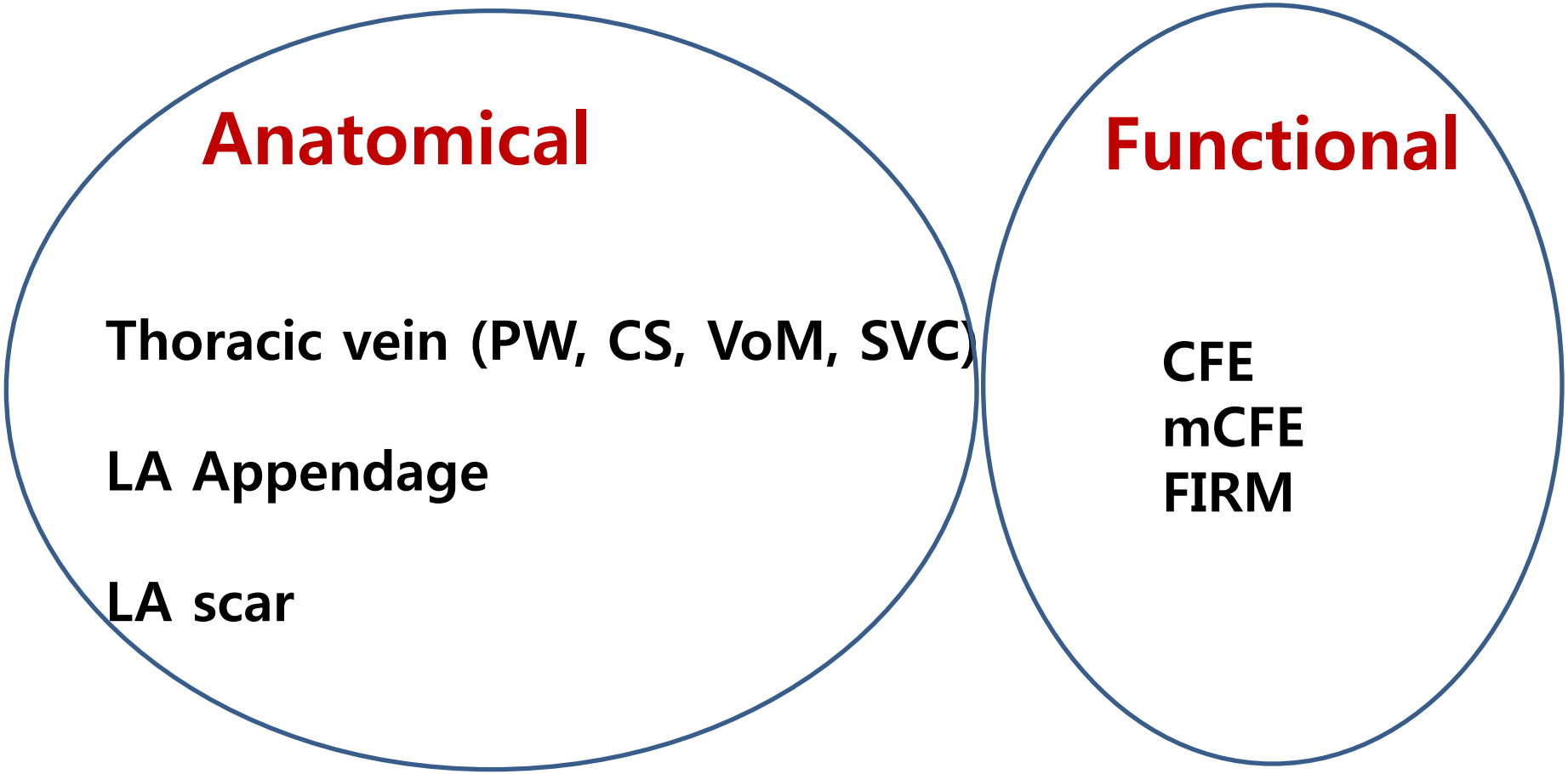
Numbers at risk

PVI	74	49	33	27	7	0	0
Full defrag	74	58	44	35	9	2	1

J Am Coll Cardiol 2015;66:2743–52



A stepwise approach aimed at AF termination does not seem to provide additional benefit over PVI alone in patients with peAF, but it is associated with significantly longer procedural and fluoroscopic duration as well as RF application time.



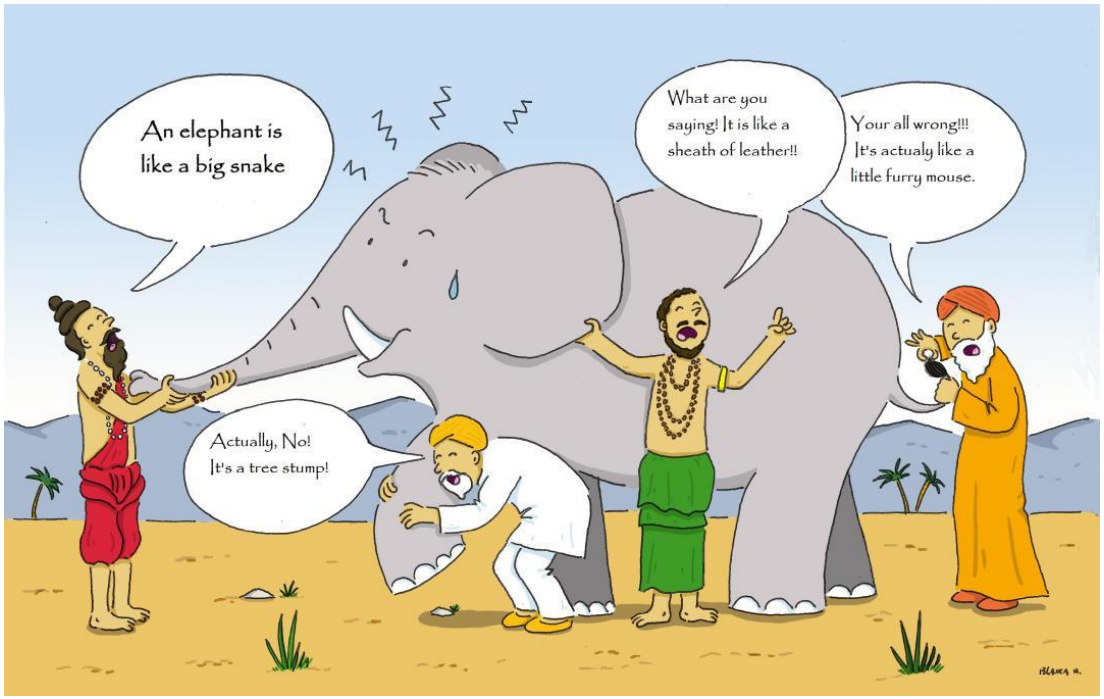
Common target?

Individualized?

pAF **PeAF** **LS PeAF**

Trigger(PV)

Substrate



https://www.google.co.kr/search?q=elephant+blind+man+story&tbm=isch&imgil=ozQEG2iwX6qRNM%253A%253BMKURXxelorKV7M%253Bhttp%25253A%25252F%25252Fwww.philipchircop.com%25252Fpost%25252F25783275888%25252Fseeing-the-full-elephant-its-a-tree-its-a&source=iu&pf=m&fir=ozQEG2iwX6qRNM%253A%252CMKURXxelorKV7M%252C_&usg=__W1DIInuZ2COOunlDhNXW1IRxXO0%3D&biw=1423&bih=696&ved=0ahUKEwi8ruWXo6vTAhUBN5QKHdaYCbkQyjcIPQ&ei=6Zf0WPyVCYHu0ATWsabICw#imgrc=V9yW51ShYcj1UM:&spf=25

Conclusions

1. 심방세동의 도자절제술은 동율동 조절에 있어 약물치료보다 우월한 효과.
2. **3**년 이상의 장기 효과는 단일 시술 시 **50%,** 반복 시술 시 약 **80%** 효과.
3. 발작성 심방세동은 폐정맥 주위 심근 고립술로 (완벽하지는 않으나) 어느 정도 만족스러운 결과.
4. 재발의 주요 원인이 불완전한 폐정맥 고립술에 기인한다는 점에서 좀더 완벽한 폐정맥 고립술을 이루기 위한 방법으로 연구가 진행되고 있으며, 동시에 폐정맥 고립술을 더욱 간편하게 수행하기 위한 연구도 진행 중.
5. 지속성 심방세동에서는 폐정맥 고립술 만으로는 부족하나, 추가 시술의 효과가 정립되지 않음.