Fibrilace síní

Prof. MUDr. Petr Neužil, CSc., FESC

Kardiocentrum Nemocnice Na Homolce
Praha

Konflikt zájmů

- Konzultant & podpora výzkumného grantu:

  - St Jude Medical Inc.
  - Medtronic Inc.
  - Biosense Webster
  - Boston Scientific Inc.
  - Acutus Inc.
  - ACT Medical Inc.
  - VytronUS Inc.
  - Abbott EP Inc

Fibrilace síní

- Prevalence 1,5-2%, za 10 let nárůst o 19%
- 33,5 milionů nemocných celosvětově; 5 mil ambulantních ošetření ročně.
- Počet pac. s FS v r. 2050 se zdvojnásobí
- Zvyšuje se s věkem - 10% nad 80let
- 84% všech nemocných s FS je ve věku nad 65 let
- V r 2005 přesáhly výdaje na FS 6,5 miliard dolarů ročně
- Náklady na ošetření ročně u jednoho nemocného:
  USA - 12 tis $; EU - 3 tis € ; Polsko - 1 tis €
- Parox.→ perzistentní FiS 15-30%/1-3 let

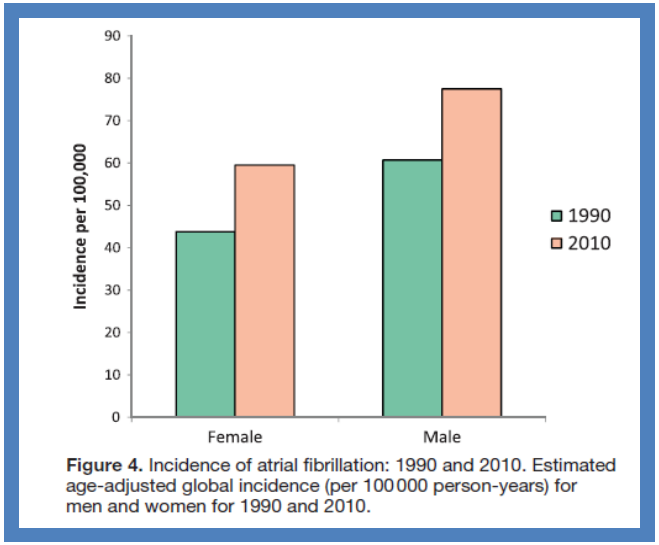
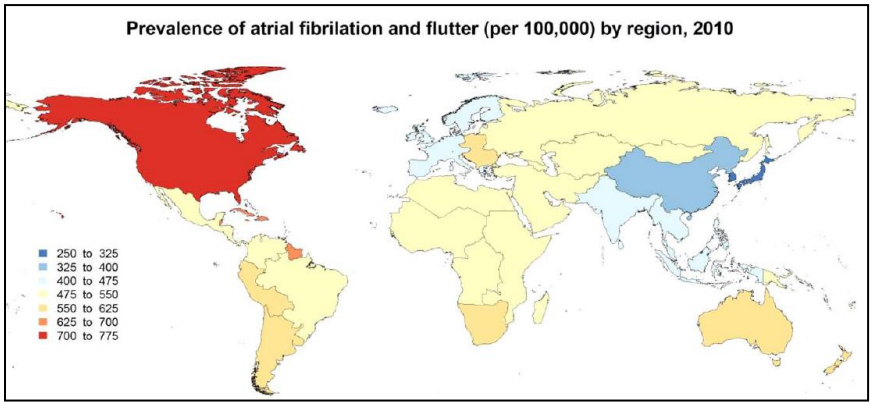


Figure 4. Incidence of atrial fibrillation: 1990 and 2010. Estimated age-adjusted global incidence (per 100 000 person-years) for men and women for 1990 and 2010.



Worldwide Epidemiology of AF: A Global Burden of Disease 2010 Study
Sumeet S Chugh et al., Circulation.2014:129:837-847

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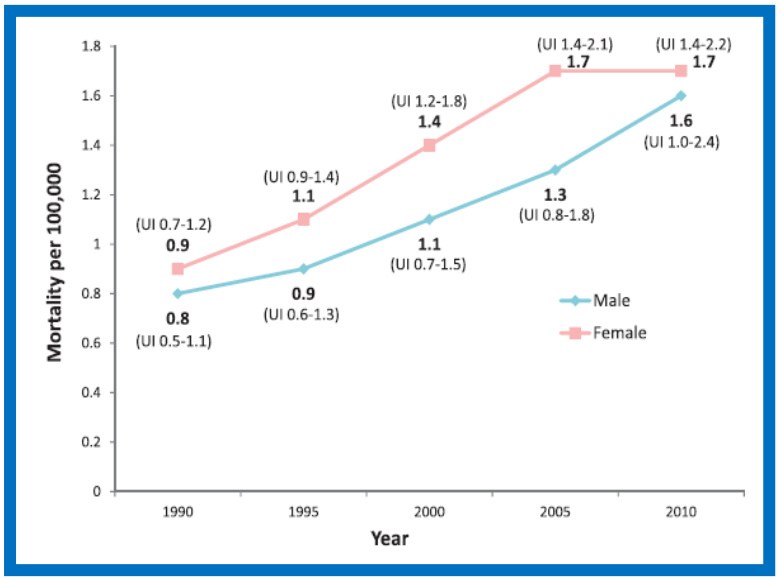
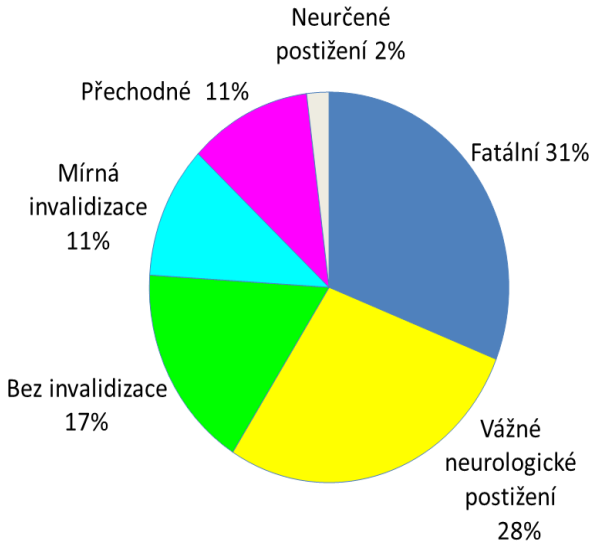
Fibrilace síní

- Důsledky:
  - morbidita – srdeční selhání 3x, CMP 5x
  - mortalita
  - snížení kvality života, demence 2x





Worldwide Epidemiology of AF: A Global Burden of Disease 2010 Study
Sumeet S Chugh et al., Circulation.2014:129:837-847

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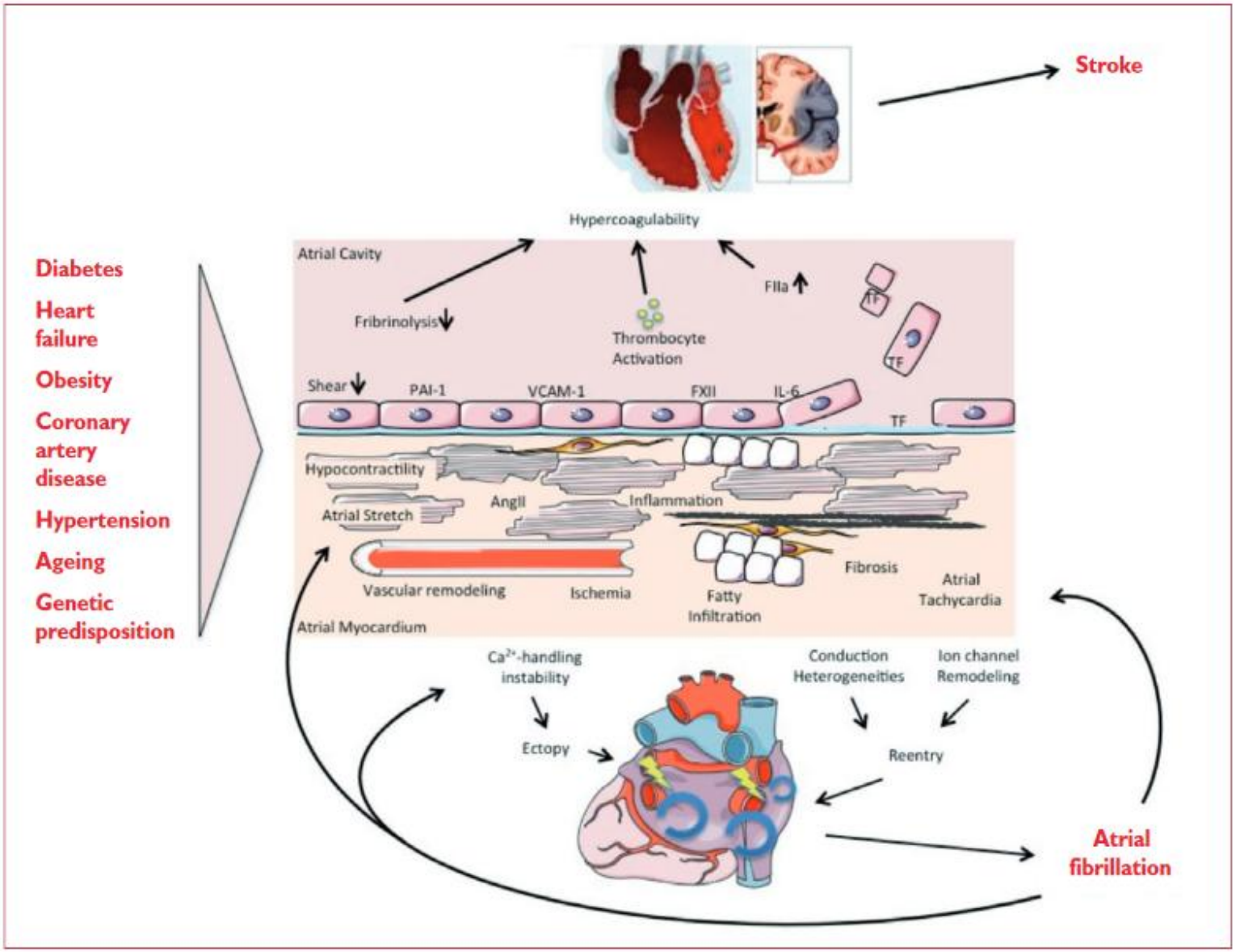
Faktory ovlivňující průběh FiS



Léčba fibrilace síní

Guidelines: ESC 2016, AHA/ACC/HRS 2014

Prevence CMP!!!!!

Kontrola rytmu x kontrola frekvence

* Antiarytmika

* Nefarmakologická léčba

- Katetrizační ablace – izolace plicních žil
- Neselektivní ablace AV uzlu (+ kardiostimulace)
- Kardiochirugie – MAZE
- Neuromodulační léčba

Indikace ke katetrizační ablaci fibrilace síní

(ESC guidelines, update 2016)

Katetrizační ablace fibrilace síní

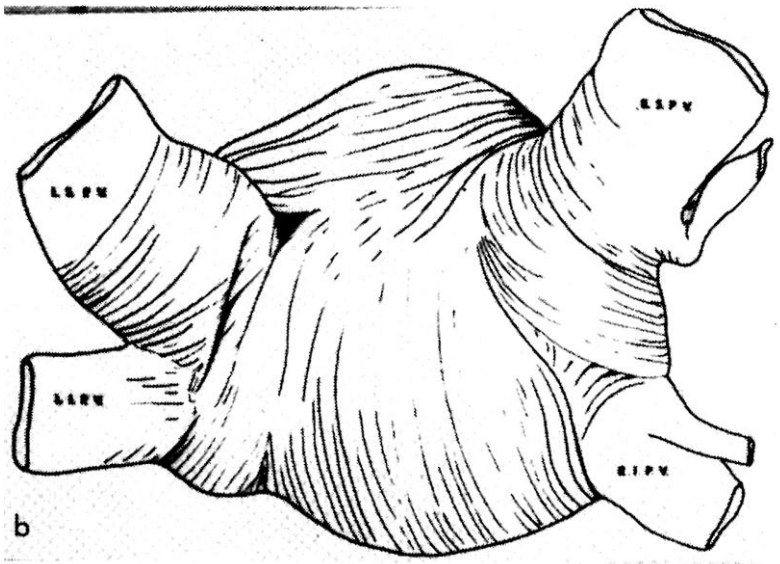
1. ablace (1995)
Michel Haissaguerre

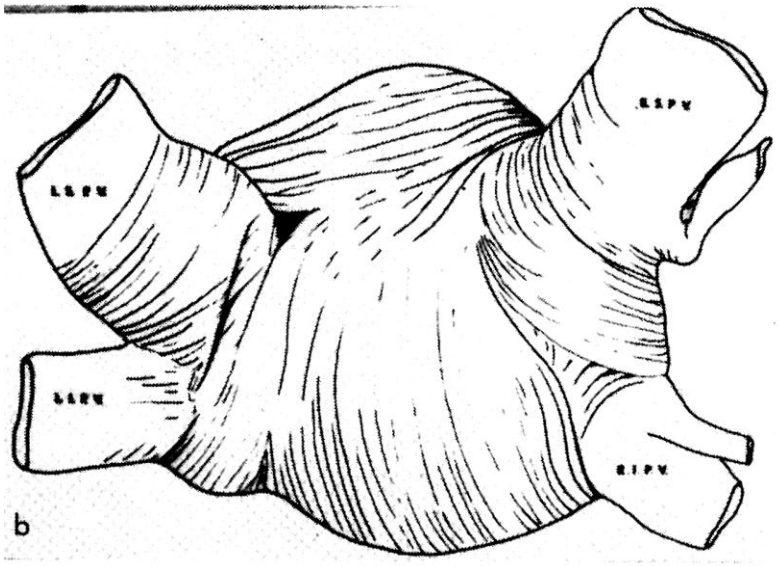
Right and Left Atrial Radiofrequency Catheter Therapy of Paroxysmal Atrial Fibrillation

MICHEL HAÏSSAGUERRE, M.D., PIERRE JAÏS, M.D., DIPEN C. SHAH, M.D., LAURENT GENCEL, M.D., VINCENT PRADEAU, M.D., STÉPHANE GARRIGUES, M.D.,* SALAH CHOUAIRI, M.D., MÉLÈZE HOCINI, M.D., PHILIPPE LE MÉTAYER, M.D., RAYMOND ROUDAUT, M.D., and JACQUES CLÉMENTY, M.D.

From the Service de Cardiologie, Hôpital Cardiologique, and *Laboratoire de Biostatistiques, Inserm U330, Université de Bordeaux II, Bordeaux, France

(J Cardiovasc Electrophysiol, Vol. 7, pp. 1132-1144, December 1996)





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Indikace ke katetrizační ablaci fibrilace síní

(ESC guidelines, update 2016)

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- **Paroxysmální** fibrilace síní
  - Symptomatická FS, po selhání AA **I/A** — jednoznačná indikace
  - Symptomatická FS, první volba — vhodná indikace
- **Perzistující** fibrilace síní
  - Symptomatická FS, po selhání AA **IIa/C** — vhodná indikace
- **Dlouhodobě perzistující** fibrilace síní
  - Symptomatická FS, po selhání AA **IIb/C** — má být zvážena

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Katetrizační ablace

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Kardiochirurgické přístupy

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Hybridní léčba: stimulace + ablace

Prevence, management RF

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Indikace ke katetrizační ablaci fibrilace síní

(ESC guidelines, update 2016)

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- **Paroxysmální** fibrilace síní
  - Symptomatická FS, po selhání AA — I/A

jednoznačná indikace

Stále se jedná „jen“ o ovlivnění symptomů.
Mortalitní data …..
Provedení ablace ve zkušeném centru!

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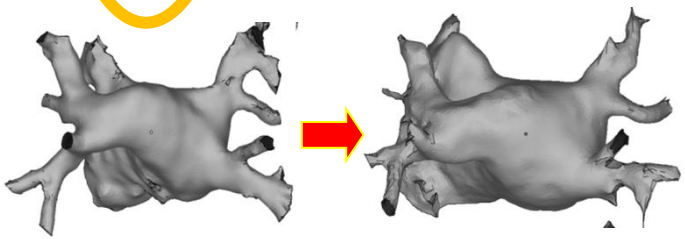
Proč to nefunguje?

Study	# pts	Progression
UK general practice, 2005	525 2.7 years	17%
Tokyo study, 1995	137 1 year	22%
CARAF, 2001	899 44 years	19%
CARAF, 2005	757 8 (2-1)1 years	25%
Danish study, 1986	426 9 years	33%
Parkinson, 1930	200 10 years	25%
Tokyo study, 2004	171 14 years	77%

- **Gapy – průniky v liniích**
  - reparace tkáně
  - tloušťka srd. stěny
  - kontakt při ablaci
  - použitá energie/typ katetru
  - zkušenost operatéra
- **Trigger mimo plicní žíly**
- **Progrese onemocnění**



Fibrilace síní a srdeční selhání

- Prevalence FS **stoupá** se stupněm CHSS:
  NYHA I → 5% vs. NYHA IV → 50%

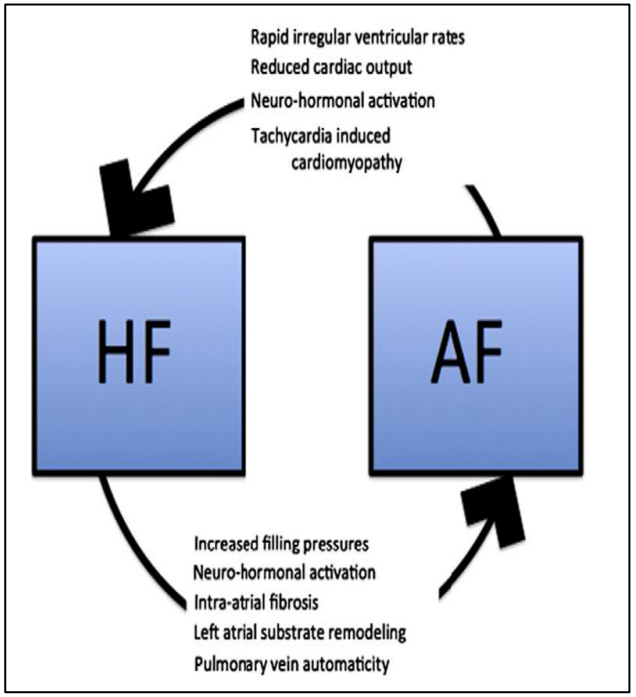
- Prevalence CHSS je u nemocných s FS
  vysoká : > 40%.

- **20-30%** pacientů s FS mám dysfunkci LK

- **Khazanie et al. (2014)** Retrospektivní analýza 27829 pac. se srdečním selháním hospitalizovaných ve 281 nemocnicích v USA, období 2006-2008:

  Přítomnost FS zvyšuje více než 3x riziko oproti pacientům bez FS:

  - celková mortalita (HR 1.14; 1.08–1.20)
  - rehospitalizace pro SS a CMP/TIA
  (HR: 1.15; 1.08–1.21)



Thihalolipavana S et al: Progress in Cardiovascular Diseases 58 (2015) 126-135

Studie AATAC-AF

Ablation vs. Amiodarone for Treatment of Atrial Fibrillation in Patients with Congestive Heart Failure and an Implanted ICD/CRTD

- Randomizovaná multicentrická studie
- **Perzistující FS** se srdečním selháním NYHA II-III, LV EF ≤40% a implantovaným ICD/CRTD
- **203 pac.:** 102 ablace x 101 amiodaron
- **Primární endpoint:** udržení sinusového rytmu
- **Sekundární endpoint:** celková mortalita, rehospitalizace pro FS nebo CHSS, EF LK, 6MWD, MLHFQ

Luigi Di Biase et al., Circulation 2016, 133:1637-44

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Studie AATAC-AF

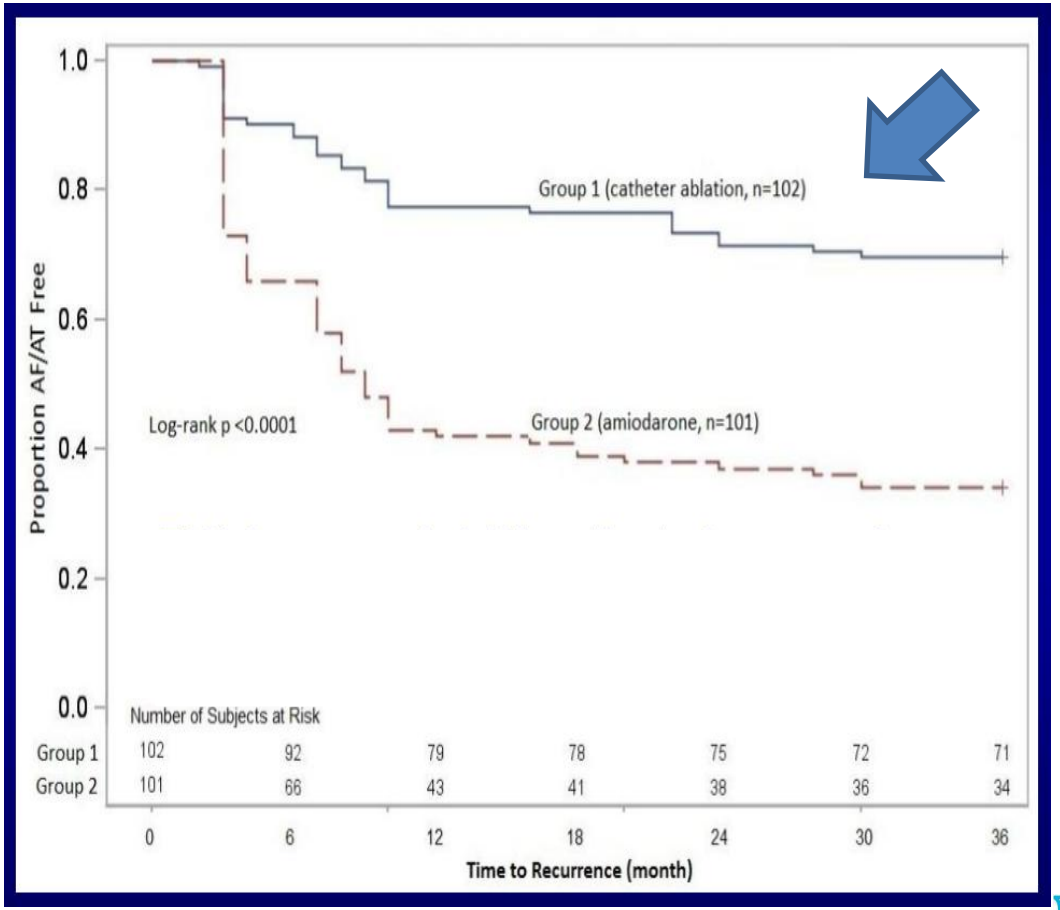
Ablation vs. Amiodarone for Treatment of Atrial Fibrillation in Patients with Congestive Heart Failure and an Implanted ICD/CRTD

-

Primární endpoint:

Group I: **70%**
Group II: 34%

(10% pac. muselo vysadit amiodaron pro nežádoucí účinky)



Luigi Di Biase et al., Circulation 2016, 133:1637-44

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Studie AATAC-AF

Ablation vs. Amiodarone for Treatment of Atrial Fibrillation in Patients with Congestive Heart Failure and an Implanted ICD/CRTD

Sekundární endpoint:

- EF LK zlepšení o 9.6±7.4% vs. 4.2±6.2%

  (p<0.001)
- 6MWD zlepšení o 27±38 vs. 8±42m *(p<0.001)*
- MLHFQ score sníženo 14±18 vs. 2.9±15

  (p<0.001)

Luigi Di Biase et al., Circulation 2016, 133:1637-44

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  - 6MWD zlepšení o 27±38 vs. 8±42m *(p<0.001)*
  - MLHFQ score sníženo 14±18 vs. 2.9±15 *(p<0.001)*

	ablation	amiodarone	p
rehospitalizace	32 [31%]	58 [57%]	<0.001
mortalita	8 [8%]	18 [18%]	0.037

Luigi Di Biase et al., Circulation 2016, 133:1637-44

Fibrilace síní a srdeční selhání

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AF ablation should be considered in symptomatic patients with AF and heart failure with reduced ejection fraction to improve symptoms and cardiac function when tachycardiomyopathy is suspected.	IIa	C

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Obezita

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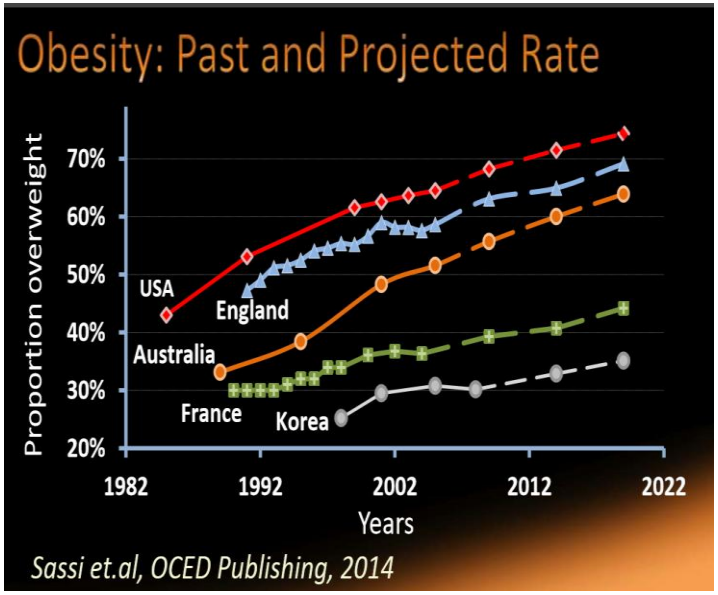
Obezita



…až 50% zvýšení rizika rozvoje FS*!!!!!

**Wanahita N, Messerli FH, et al. Am Heart J. 2008;155(2):310-315*

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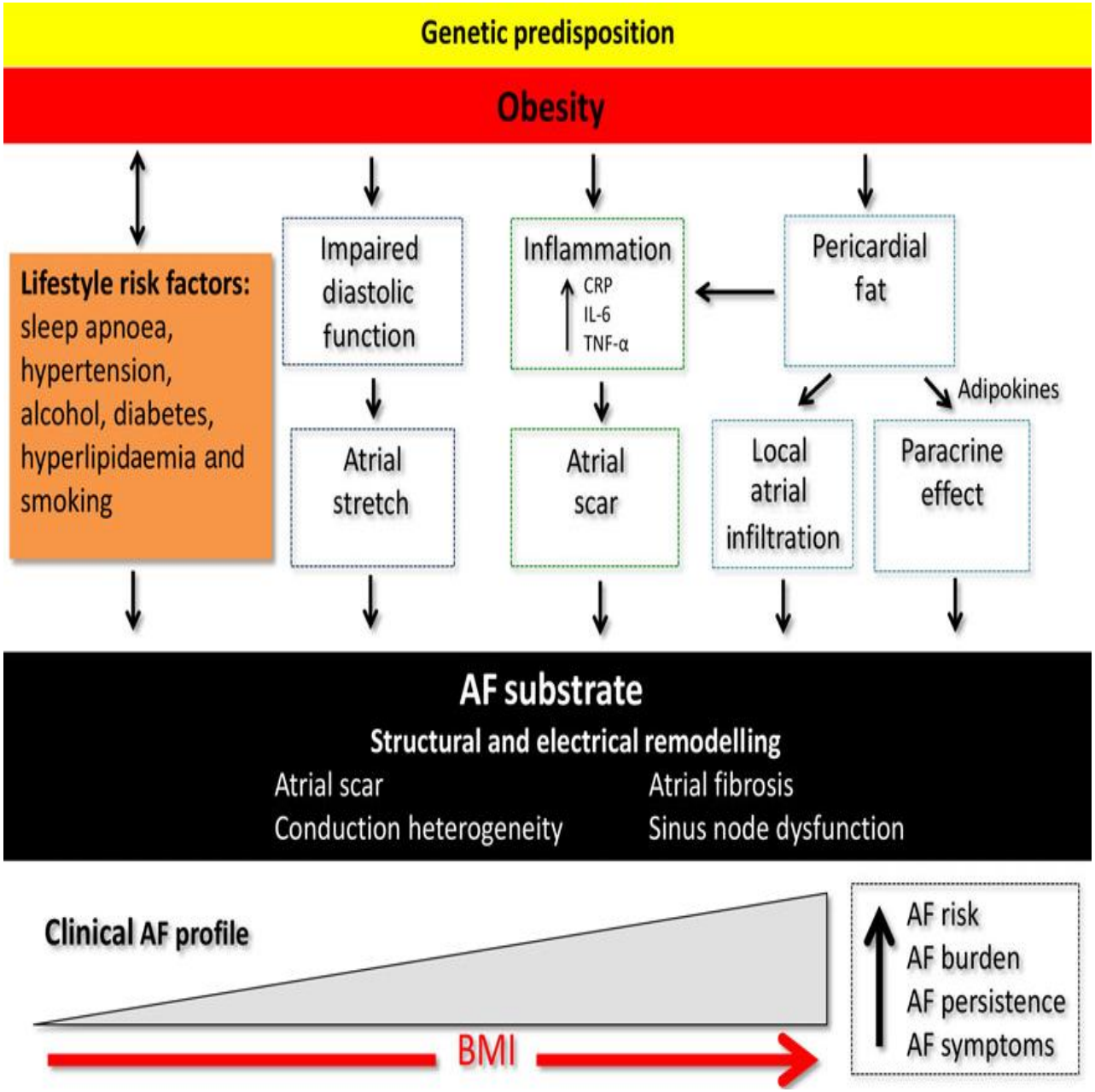
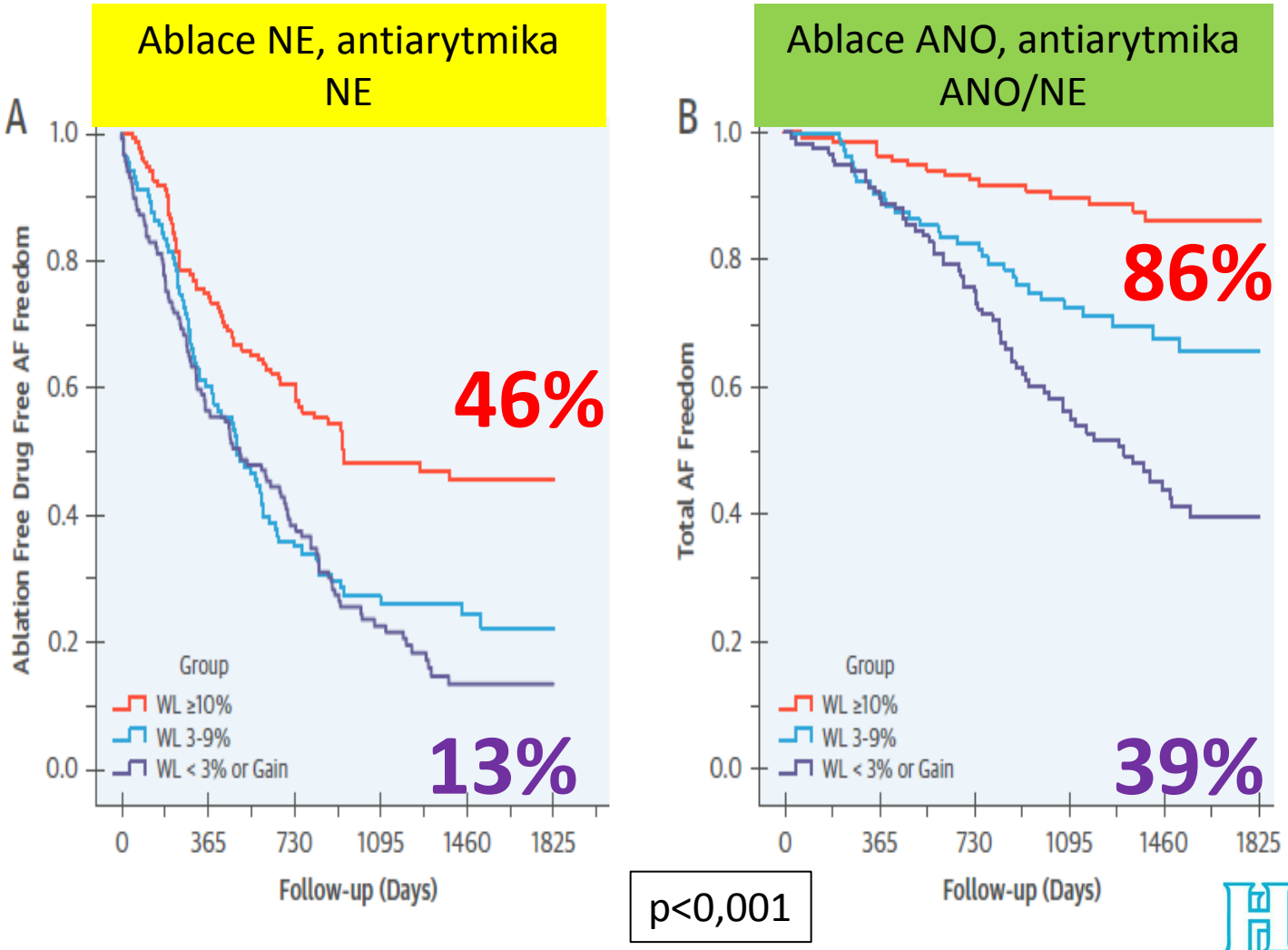


C.J. Nalliah et al. European Heart Journal , 2015

LEGACY hodnocení dlouhodobého efektu hubnutí a fluktuace váhy na kontrolu rytmu u obézních pac. s FS

- 355 pac.
- 5 let FU
- I. WL ≥ 10%
- II. WL 3-9%
- III. WL < 3%



p<0,001

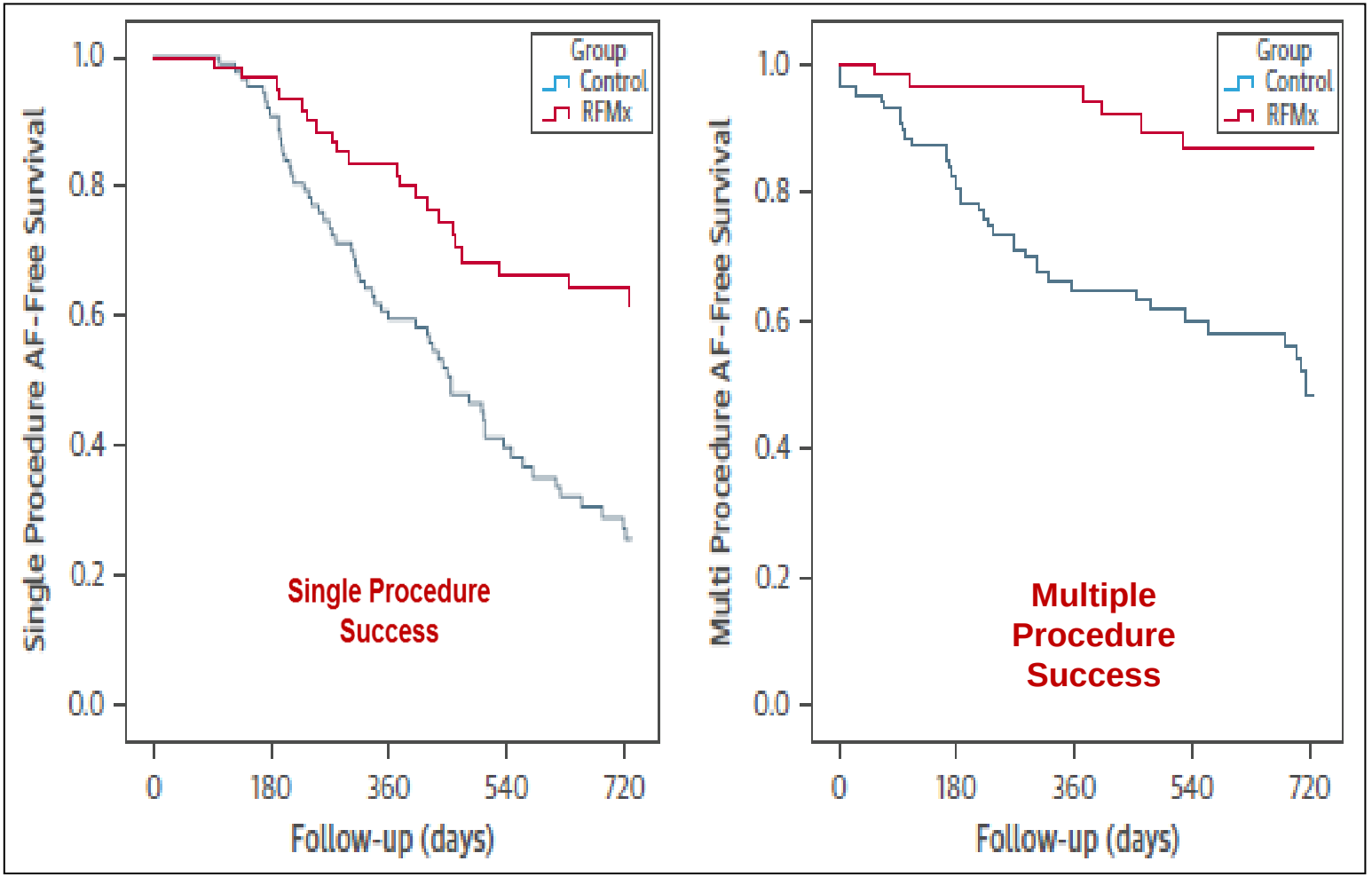
Rajeev K. Pathak, JACC, 2014 a 2015

ARREST-AF

- 149 pac. s parox./perzist. FS a BMI>27kg/m^2 podstoupilo ablaci FS
- **Randomizace:**
  - agresivní management RF x kontrolní skupina
- **Rizikové faktory:** obezita, korekce TK, fitness, omezení spotřeby alkoholu, kouření, korekce hyperlipidémie, hyperglykémie, OSA

Rajeev K. Pathak, JACC, 2014 a 2015

ARREST-AF



Rajeev K. Pathak, JACC, 2014 a 2015

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Obezita a FiS

- **Neléčit jen fibrilaci síní, ale celého pacienta komplexně!**

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Recommendations	Class	Level
In obese patients with AF, weight loss together with management of other risk factors should be considered to reduce AF burden and symptoms.	IIa	B

- **Odložit katetrizační ablaci po redukci hmotnosti, ….**

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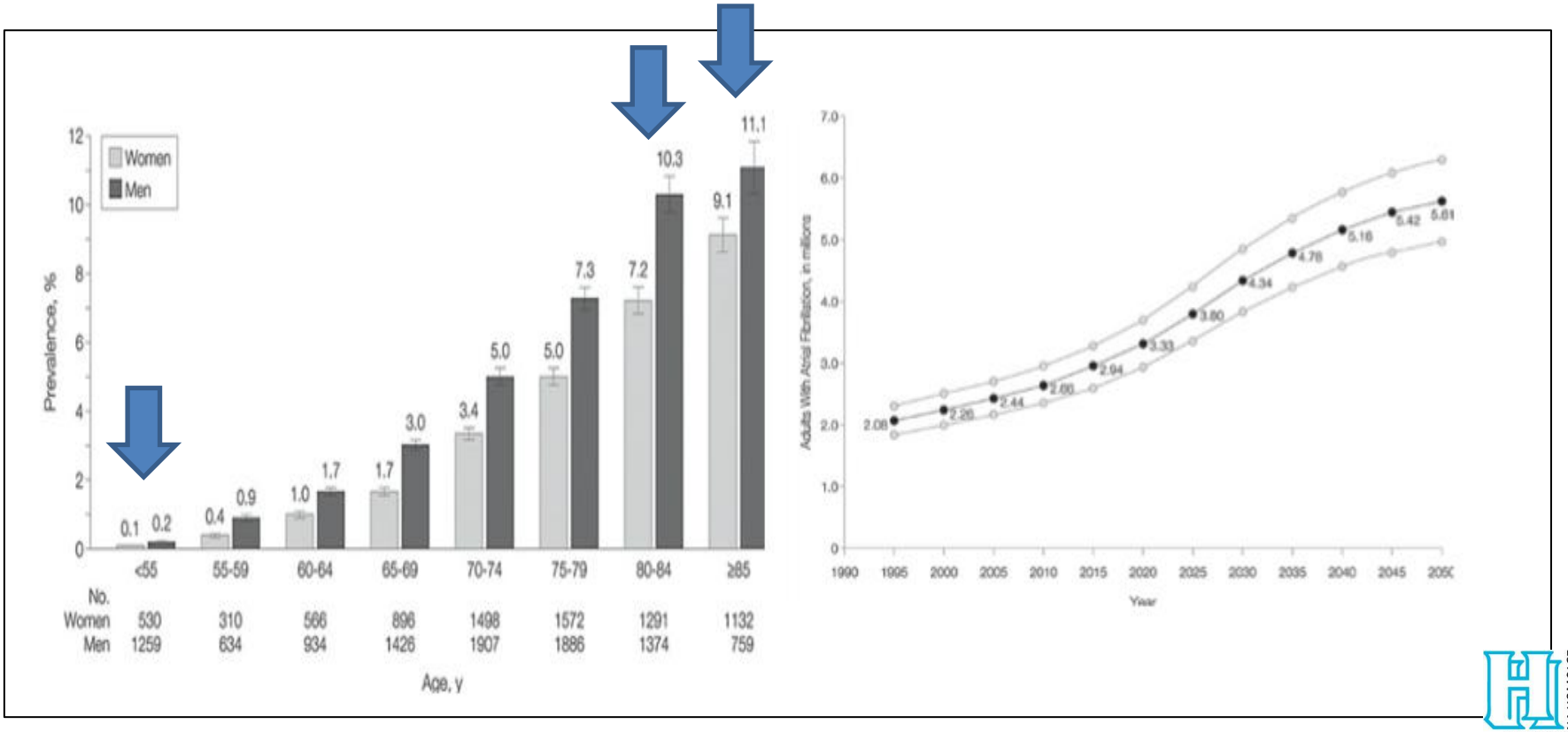
Prevalence FS se zvyšuje s narůstajícím věkem

- …. 0.1% u pac. < 55 let vs. 9% u pac > 80 let



White.et al :JAMA, Volume 285(18).May 9, 2001.2370-2375

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Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in the Elderly

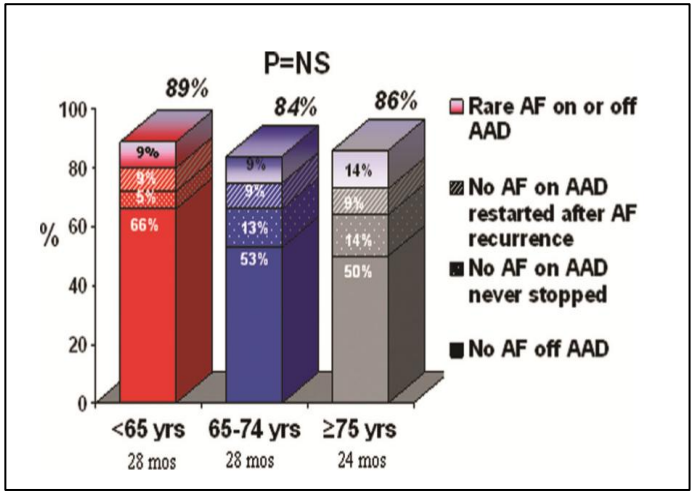
ERICA ZADO, P.A.-C., DAVID J. CALLANS, M.D., MICHAEL RILEY, M.D. PH.D., MATHEW HUTCHINSON, M.D.,FERMIN GARCIA, M.D., RUPA BALA, M.D., DAVID LIN, M.D., JOSHUA COOPER, M.D., RALPH VERDINO, M.D., ANDREA M. RUSSO, M.D., SANJAY DIXIT, M.D., EDWARD GERSTENFELD, M.D., and FRANCIS E. MARCHLINSKI, M.D.

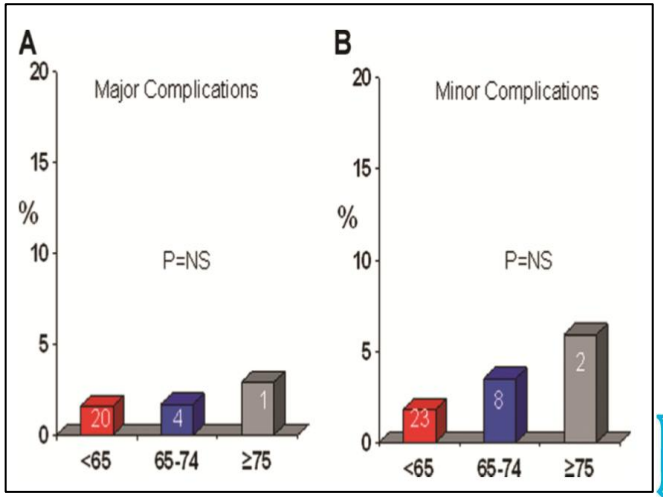
From the Cardiovascular Division, Department of Medicine, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, USA

<65 let	948 pac.
≥65 and <75 let	185 pac.
≥75 let	32 pac.

- 1165 pac./1506 ablací
- Periprocedurální komplikace: minimální/bez rozdílu mezi věkovými skupinami
- Follow up 24m:

Starší pacienti: ***méně často podstupovali reablace***
častěji po ablaci léčeni antiarytmiky (29 vs 37%, *p = 0.02*).





Journal of Cardiovascular Electrophysiology 2008;19

Přidružená onemocnění

	Total population				1:3 Propensity-score matched population			
	Group 1 (Age<55) n=675	Group 2 (55≤Age<75) n=1,041	Group 3 (Age≥75) n=109	†p-value	Group 1 (Age<55) n=327	Group 2 (55≤Age<75) n=327	Group 3 (Age≥75) n=109	†p-value
Age (years)	46.4±7.0	63.4±5.35	77.3 ± 2.7	**<0.001**	46.1±7.4	63.5±5.3	77.3±2.7	**<0.001**
Female, n (%)	117(17.3)	315(30.3)	39(35.8)	**<0.001**	117(35.8)	118(36.1)	39(35.8)	0.996
Persistent AF, n (%)	191(28.3)	325(31.2)	29(26.6)	**<0.001**	90(27.5)	88(26.9)	29(26.6)	0.976
BMI, kg/m2	25.2±3.4	24.6±2.7	23.8±2.7	**0.001**	24.9±3.8	24.9±2.7	23.8±2.8	**0.004**
HF, n (%)	50(7.4)	87(8.4)	20(18.3)	**0.001**	25(7.6)	22(6.7)	20(18.3)	**0.001**
Hypertension, n (%)	198(29.3)	560(53.8)	88(80.7)	**<0.001**	83(25.4)	173(52.9)	88(80.7)	**<0.001**
DM, n (%)	56(8.3)	168(16.1)	27(24.8)	**<0.001**	22(6.7)	51(15.6)	27(24.8)	**<0.001**
Stroke/TIA, n (%)	53(7.9)	143(13.7)	22(20.2)	**<0.001**	26(8.0)	36(11.0)	22(20.2)	**0.002**
$CHADS_2$ score	0.61±0.85	1.06±1.07	2.64±1.11	**<0.001**	0.56±0.80	0.97±1.00	2.64±1.11	**<0.001**
CHA_2DS_2-VASc score	0.84±0.97	1.96±1.48	4.40±1.38	**<0.001**	0.94±0.96	1.96±1.39	4.40±1.38	**<0.001**
Post-ABL medication								
ARB, n (%)	169(25.1)	390(37.5)	53(48.6)	**<0.001**	73(22.4)	122(37.4)	53(48.6)	**<0.001**
Beta blocker, n (%)	199(29.6)	327(31.5)	40(36.7)	0.302	106(32.5)	105(32.2)	40(36.7)	0.670
Statin, n(%)	118(17.5)	324(31.2)	49(45.0)	**<0.001**	56(17.2)	117(35.9)	49(45.0)	**<0.001**

Yong-Soo Baek, et al. ESC 2016

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Stáří (> 75 let) a ablace FiS

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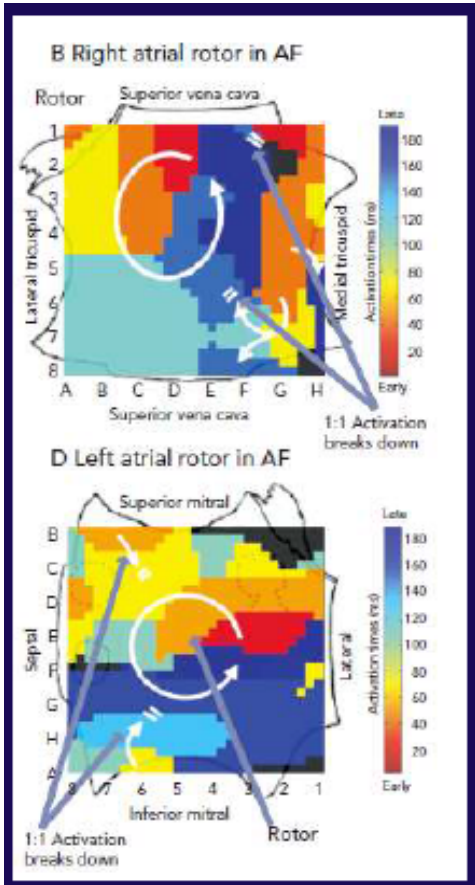
Závěr

- U ***všech*** (i „komplikovaných“) nemocných s FS zvažovat přínos katetrizační ablace.
- Ve správně indikovaných případech přináší ***lepší výsledky než farmakologická léčba*****.**
- Katetrizační ablace dominuje i v léčbě srdečního selhávání doprovázené fibrilací síní:
  - Zlepšuje kvalitu života, symptomy
  - Zvyšuje EF LK
  - Snižuje četnost rehospitalizací
  - Snižuje celkovou mortalitu

Závěr

- Jednoznačná indikace u tachykardické KMP
- U obézních nemocných nutnost hubnutí a zdravý životní styl!
- Léčba fibrilace síní
  (rate control x rhythm control x catheter ablation)
  u seniorů nemá být diskriminována věkem

FiRM

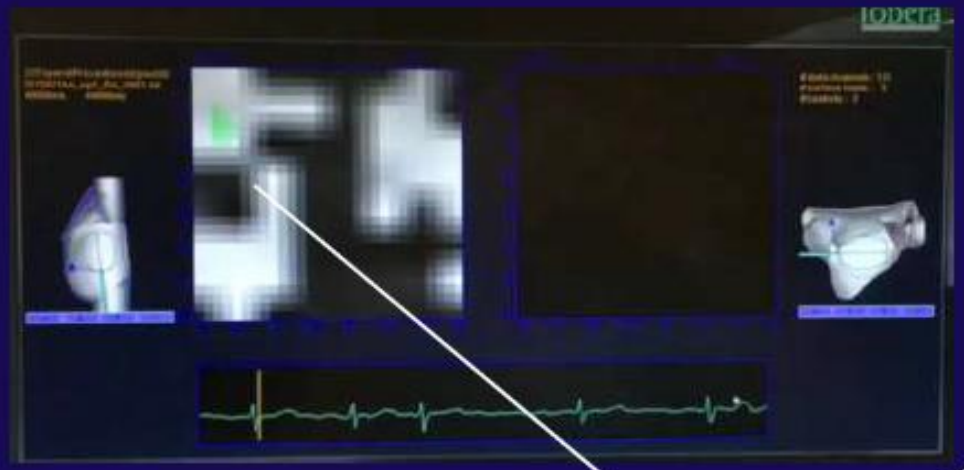


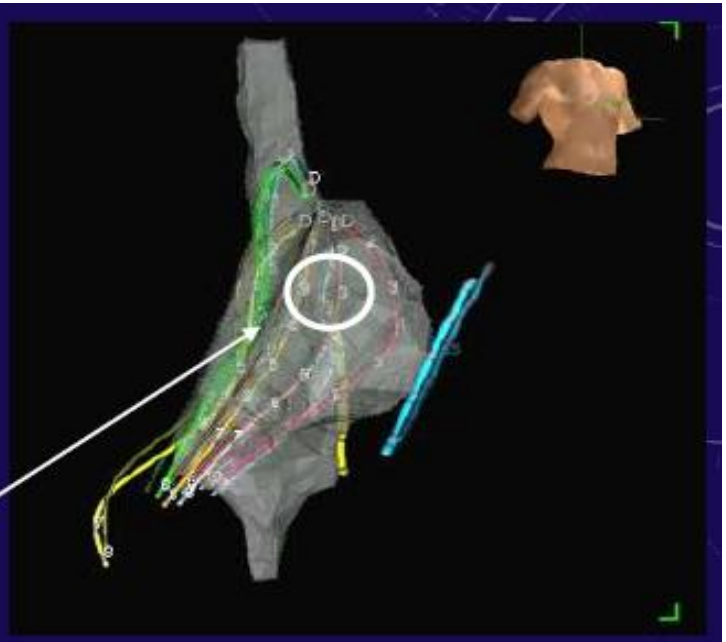
Author	Year	Study
Narayan et al CONFIRM	2012 2014	Case-control, single center, mid-term results Very long-term results
Miller et al	2014	Single arm, multicenter, long-term results
Tomassoni et al	2015	Single arm, single center, long-term results
Buch et al	2016	Single arm, multicenter, long-term results
Sommer et al	2016	Single arm, single center, mid-term results
Bernsten et al	2016	Single arm, single center, long-term results

All non-randomized studies

Narayan et al. J Am Coll Cardiol. 2012;60:628–36
Narayan et al. J Am Coll Cardiol. 2014;63:1761–8
Miller et al. J Cardiovasc Electrophysiol. 2014;25:921–9
Tommasoni et al. Journal of Innovations in Cardiac Rhythm Management 2015;6:2145–2151
Buch et al. Heart Rhythm 2016;13:636–641
Sommer et al. J Cardiovasc Electrophysiol. 2016;27:274–80
Bernsten et al. Heart Rhythm 2016;ePub ahead of print

FiRM - OASIS





A-B 2-3

FIRM mapping to identify AF sources* was repeated until:

- all rotors were identified and ablated
- AF organized into AT or converted to SR

*rotor: sustained clockwise or counterclockwise activation around a center of rotation

*focal impulse: centrifugal activation from an origin

< 1%

FIRM-only

FIRM+PVAI

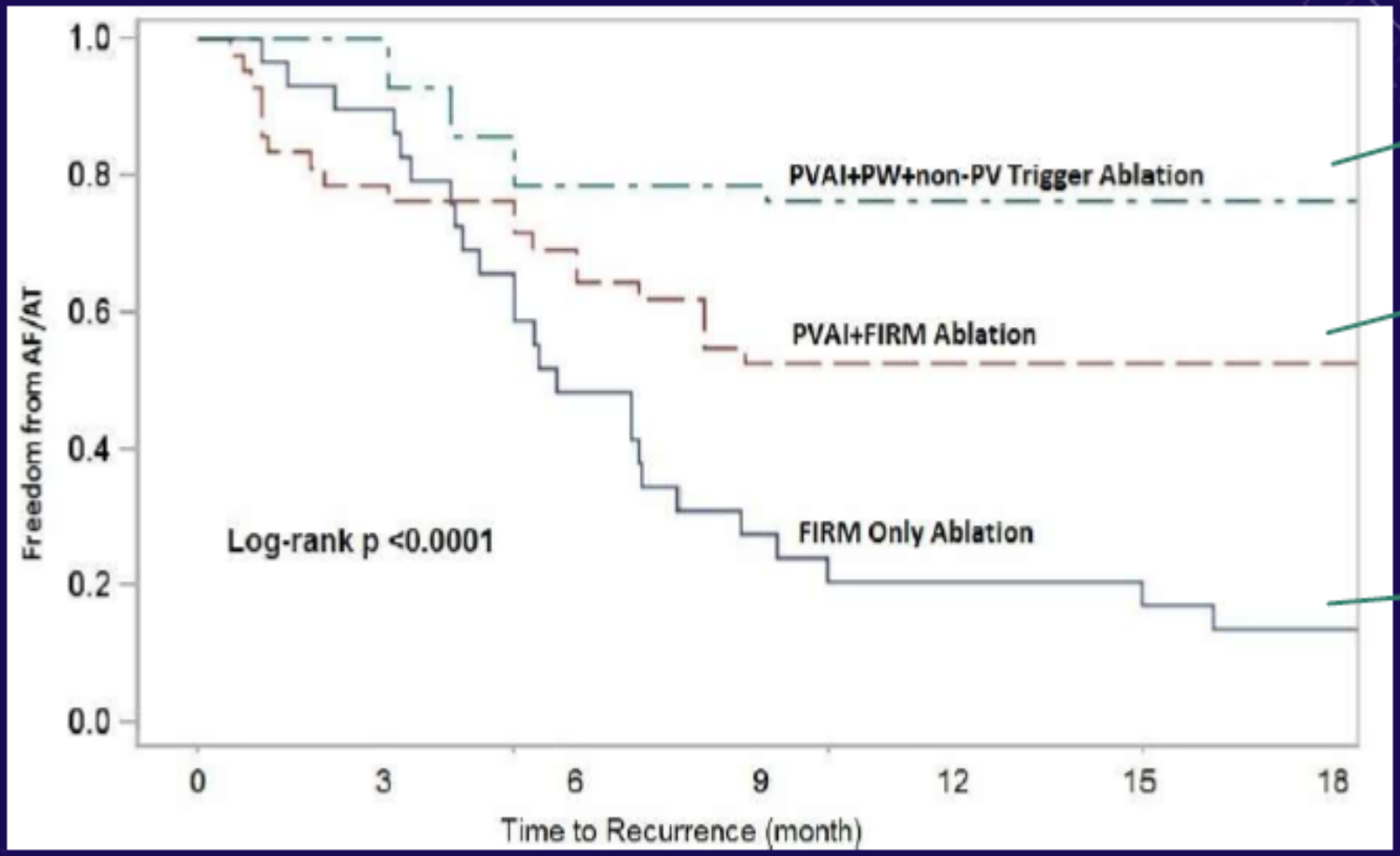
FiRM - OASIS

	FIRM-only *N = 29*	FIRM + PVAI N = 42	PVAI + PW + triggers N = 42	P
Patients with AF sources	*100%*	100%	-	
Number of AF sources	*116*	177	-	
per patient	*4.0 ± 1.2*	4.2 ± 1.7	-	
RA	*39%*	33%	-	
LA	*61%*	67%	-	
Procedural time (min)	*222 ± 49*	233 ± 48	131 ± 51	< 0.001
RF time (min)	*49 ± 17*	33 ± 21	29 ± 16	< 0.001
Complications	*0%*	4.8%	2.4%	NS

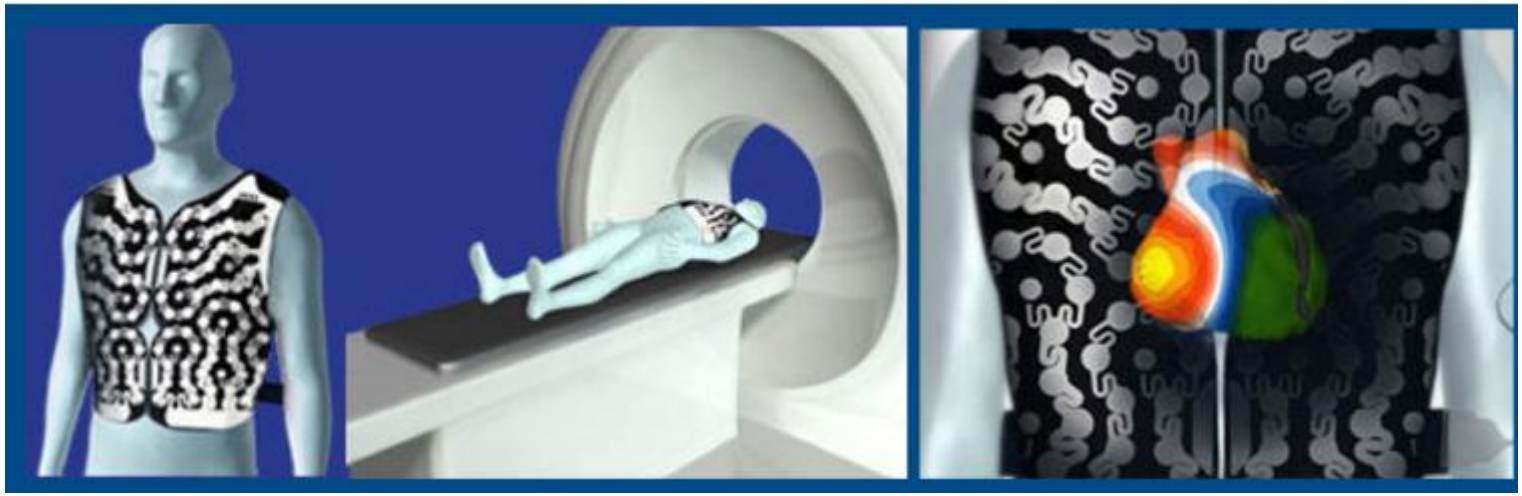
1 groin hematoma
1 small pericardial effusion

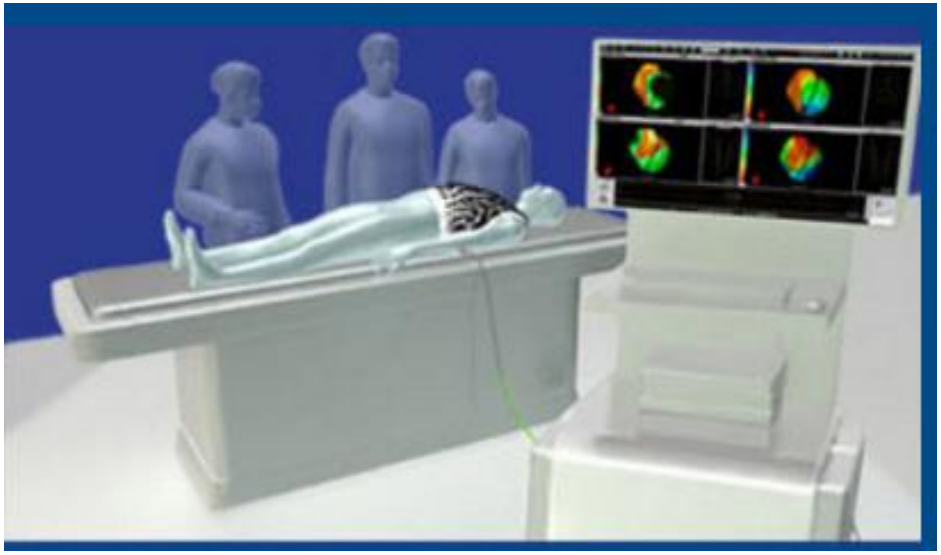
1 groin hematoma

FREEDOM FROM AT/AF
OFF AADs
(mean follow-up 12 ± 7 months)



CardioInsight – ECVUE Medtronic

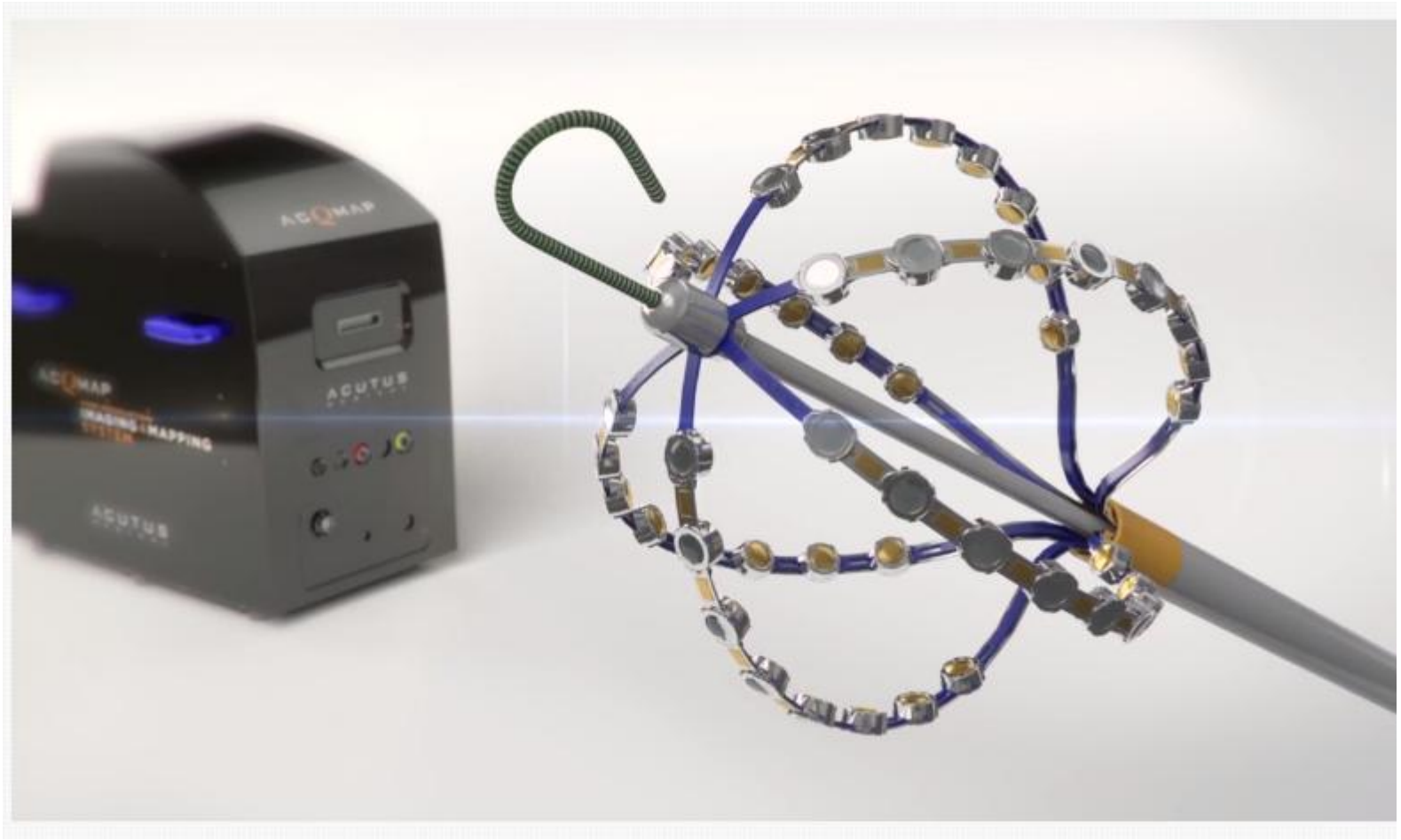




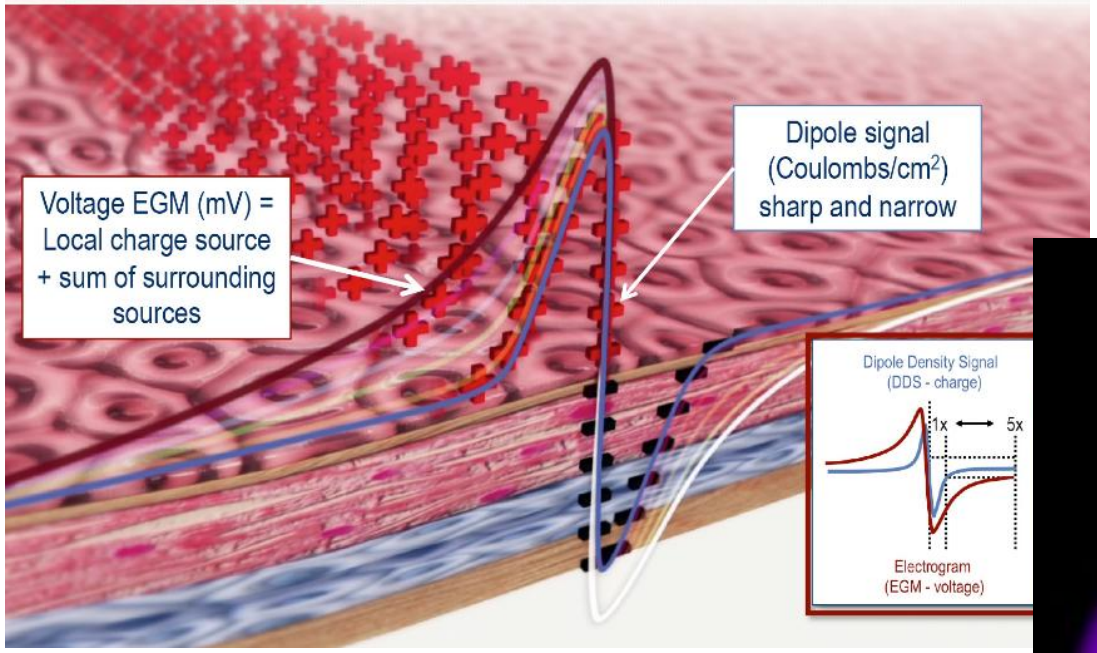
CardioInsight – ECVUE Medtronic studie AFACART

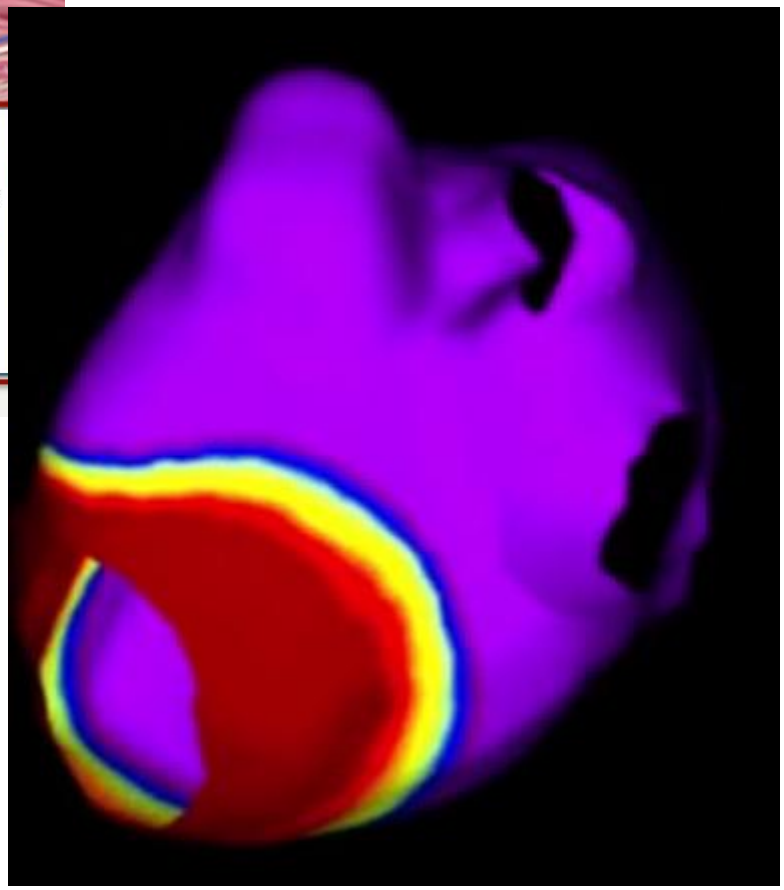
- **předb. výsledky prezentovány Orlando AF 2015, probíhá FUP**
- **Nerandomizovaná feasibility studie persist FiS**
- **8 evropských center bez předchozí zkušenosti**
- **Mapování – ablace rotorů a lokálních spouštěčů … PVI ….lin. Leze… elKV**
- **endpoint absence FiS/AT 12mo**

Acutus Medical



Acutus Medical





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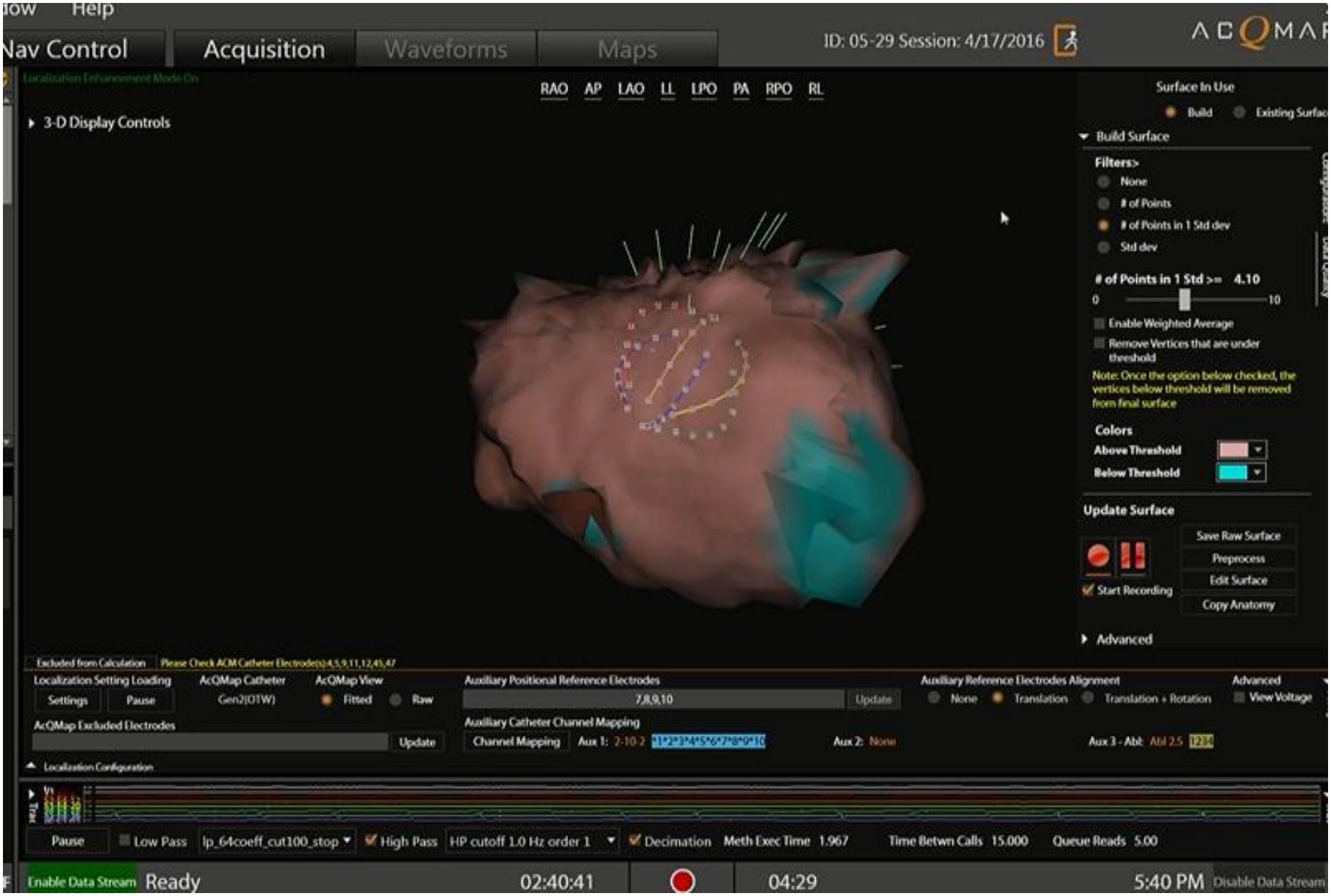
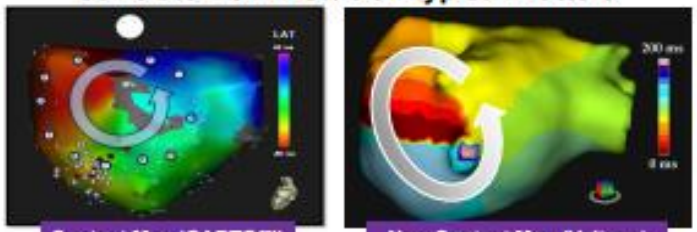


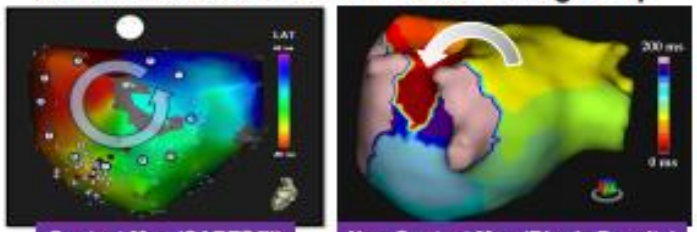
Acutus Medical Atypical Flutters

Conventional and Non-contact Voltage maps correlate well in Stable Atypical Flutters



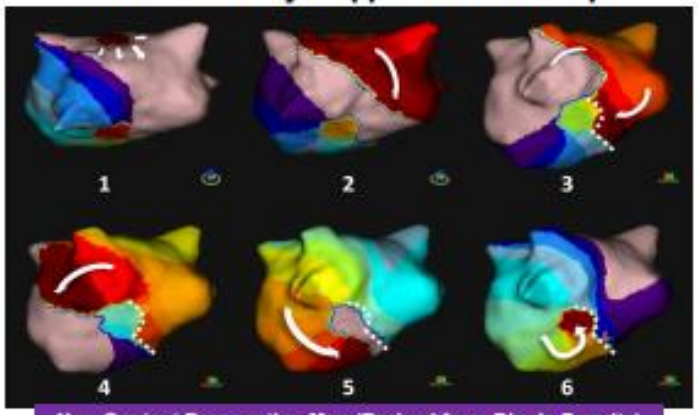
Contact Map (CARTO™) | Non-Contact Map (Voltage)

Non-contact Dipole Density mapping reveals details not seen in Conventional Voltage map



Contact Map (CARTO™) | Non-Contact Map (Dipole Density)

Example of a Complex, Atypical Flutter which was only mapped with AcQMap



Non-Contact Propagation Map (Derived from Dipole Density)

Results

Patient Demographics

N:	11 subjects	**Prior ablation:**	64%
Mean:	64.7 ± 5.8 years	**Hypertension:**	91%
Gender:	64% Male	**Dilated CM:**	27%
Left atrial size:	49.8 ± 3.5 mm	**Prior CVA:**	9%
AT/AF Duration:	4.7 ± 4.6 years	**Vascular Disease:**	9%

Procedural Rhythms

Atypical Flutter 100% (11/11) CL 312±84ms (range 206-567 ms)
22 Atypical Flutters

Atrial Fibrillation 91% (10/11)

Mapping Results

Patient Number	Rhythm Stability	Contact Mapping	Non-Contact Dipole Density Mapping
1 – 4	Stable atypical flutters*	100%	100%
5 – 11	Unstable atypical flutters; Multiple complex, irregular rhythms	13%	100%

* Good correlation between mapping systems

Conclusions

- In stable rhythm patterns, there was good agreement among all map types.
- In more complex, irregular rhythms, contact mapping was largely unsuccessful, whereas dipole density non-contact mapping successfully identified the pattern for atypical atrial flutters.

Neuzil, Reddy HRS 2016

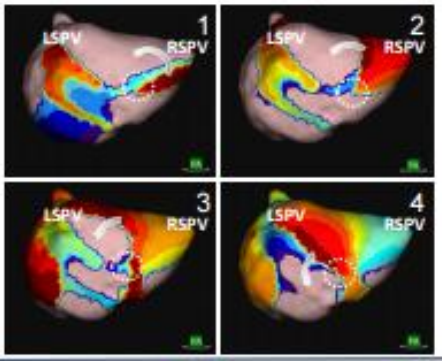
Acutus Medical Afib mapping

Results

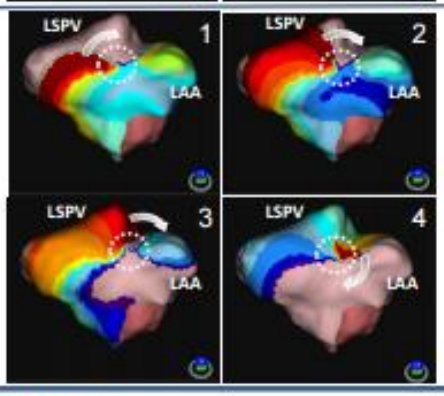
N:	12 subjects
Mean Age:	58 years (45-74)
BMI:	29 (25-39)
AF Duration:	4.6 years (2-10)

- A total of 112 sec of left atrial AF was mapped (42 maps: 1 to 3 seconds of AF per map)
- Multiple waves spread out from focal sites and short-lasting zones of rotation
- Higher complexity was observed in the septum and region between the antral junctions of the pulmonary veins, including irregular short-radius reentry and patient specific central paths of rotation

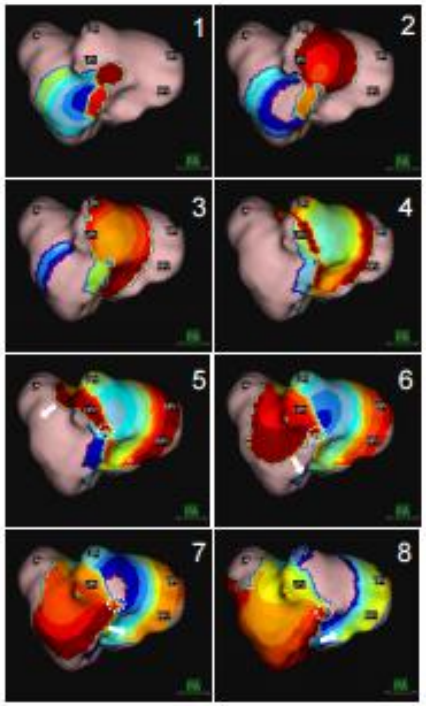
Examples of Activation Patterns and Locations in Atrial Fibrillation



Counterclockwise rotational activation on the posterior wall near the RIPV at four instances in time



Clockwise irregular-rotational conduction at the ridge between the LSPV and base of LAA



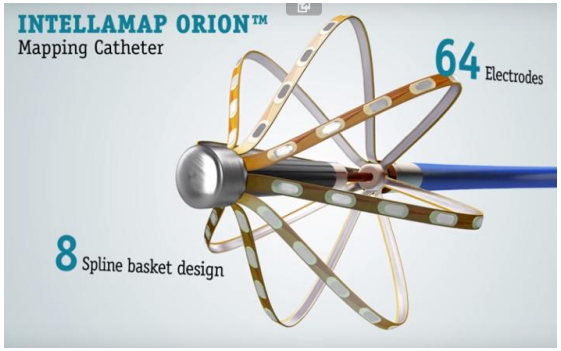
Focal activation on the posterior wall near the LIPV

Followed by counterclockwise rotational activation at the LIPV

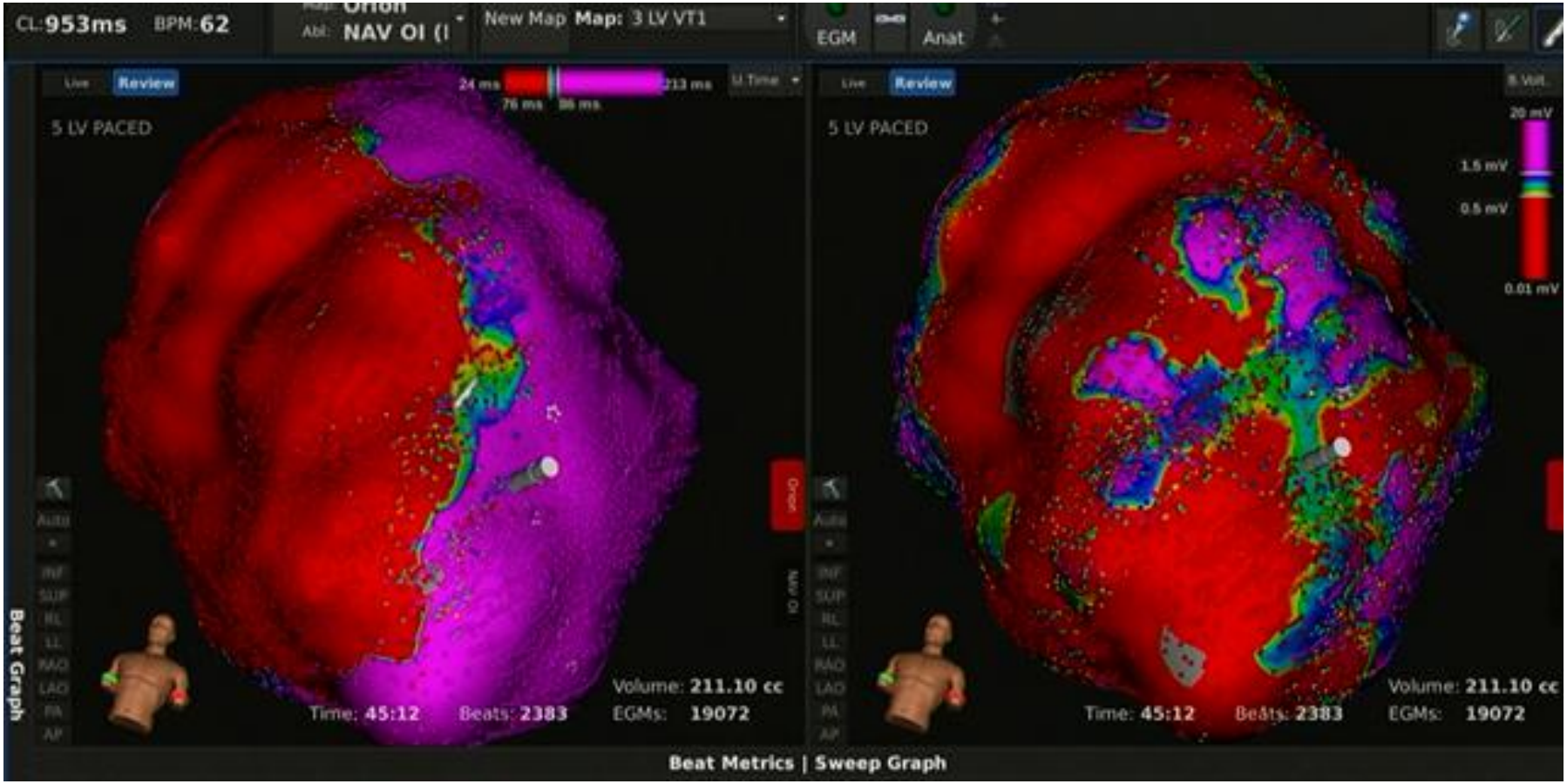
Conclusions

- Ultrasound-based imaging and dipole density mapping is feasible in persistent AF.
- It may enable more detailed visualization of propagation patterns and potential therapeutic targets.
- Further clinical studies are needed to determine clinical benefit

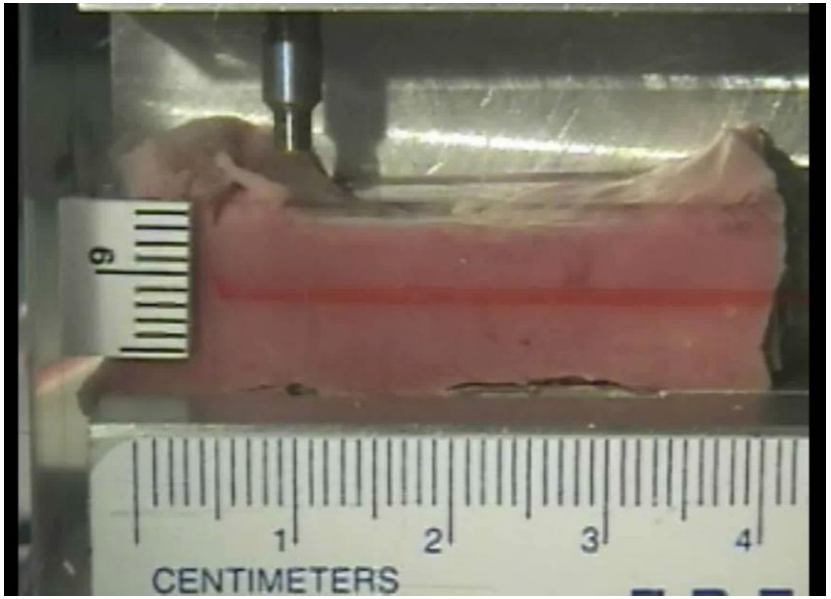
Moser et al, HRS 2016

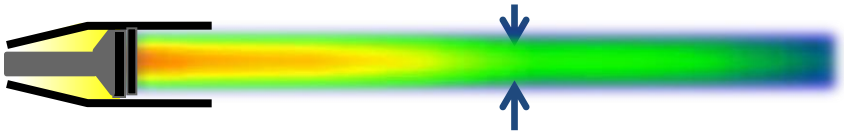


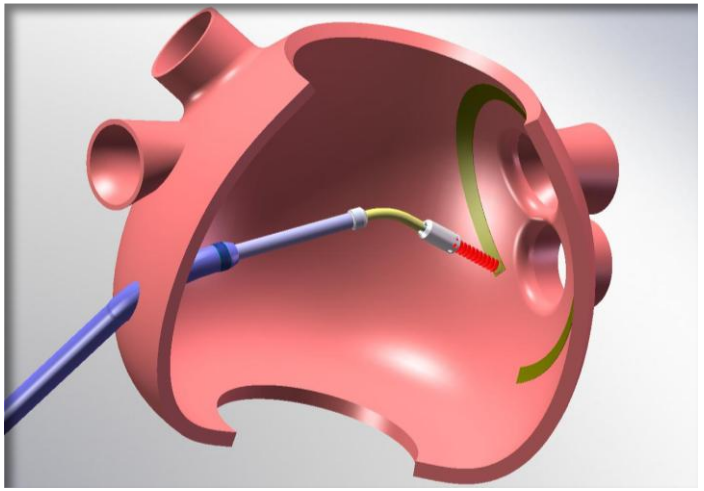
Rhythmia Boston Scientific



Low Intensity Collimated Ultrasound (LICU)





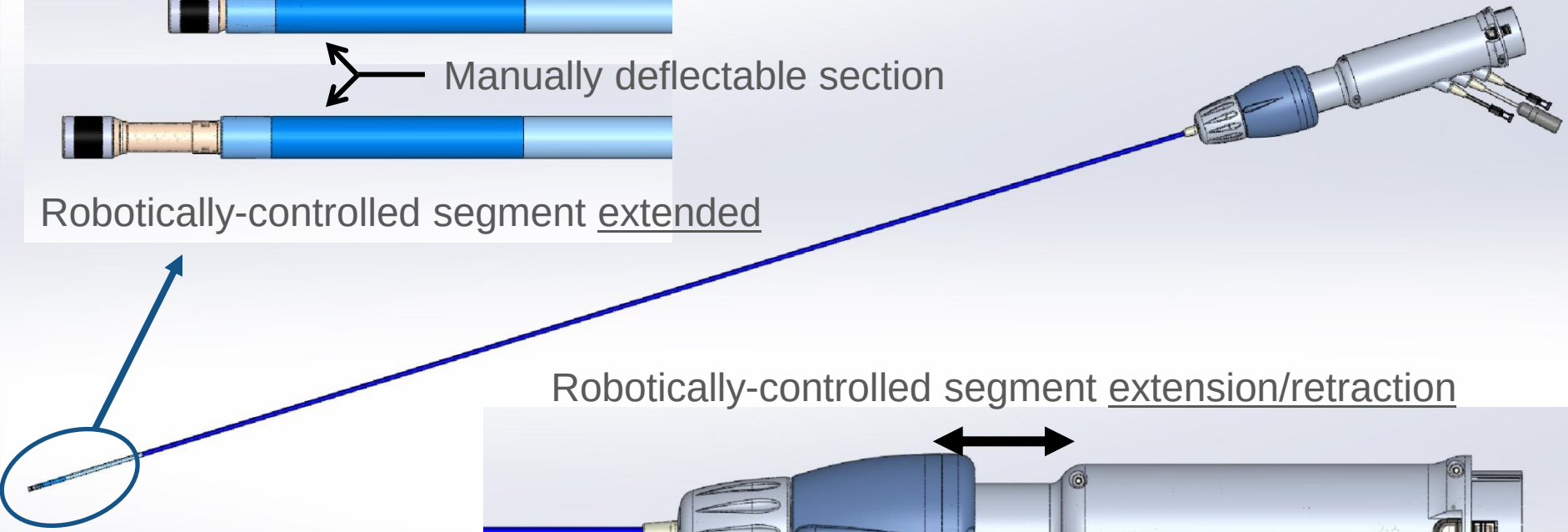


Low Intensity Collimated Ultrasound (LICU)

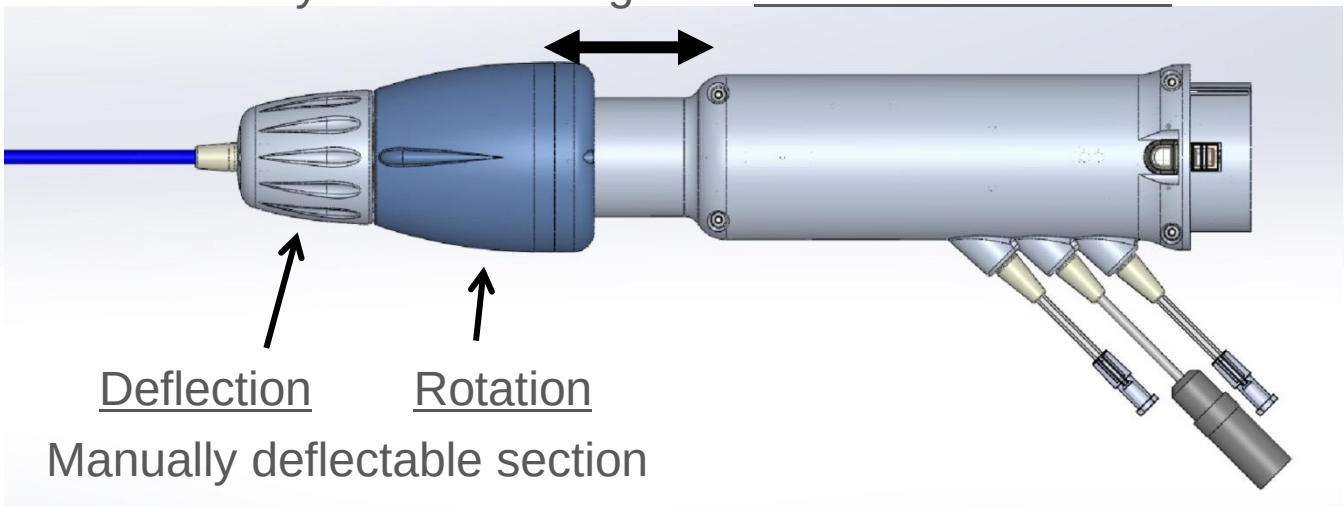
Robotically-controlled segment retracted

Manually deflectable section

Robotically-controlled segment extended



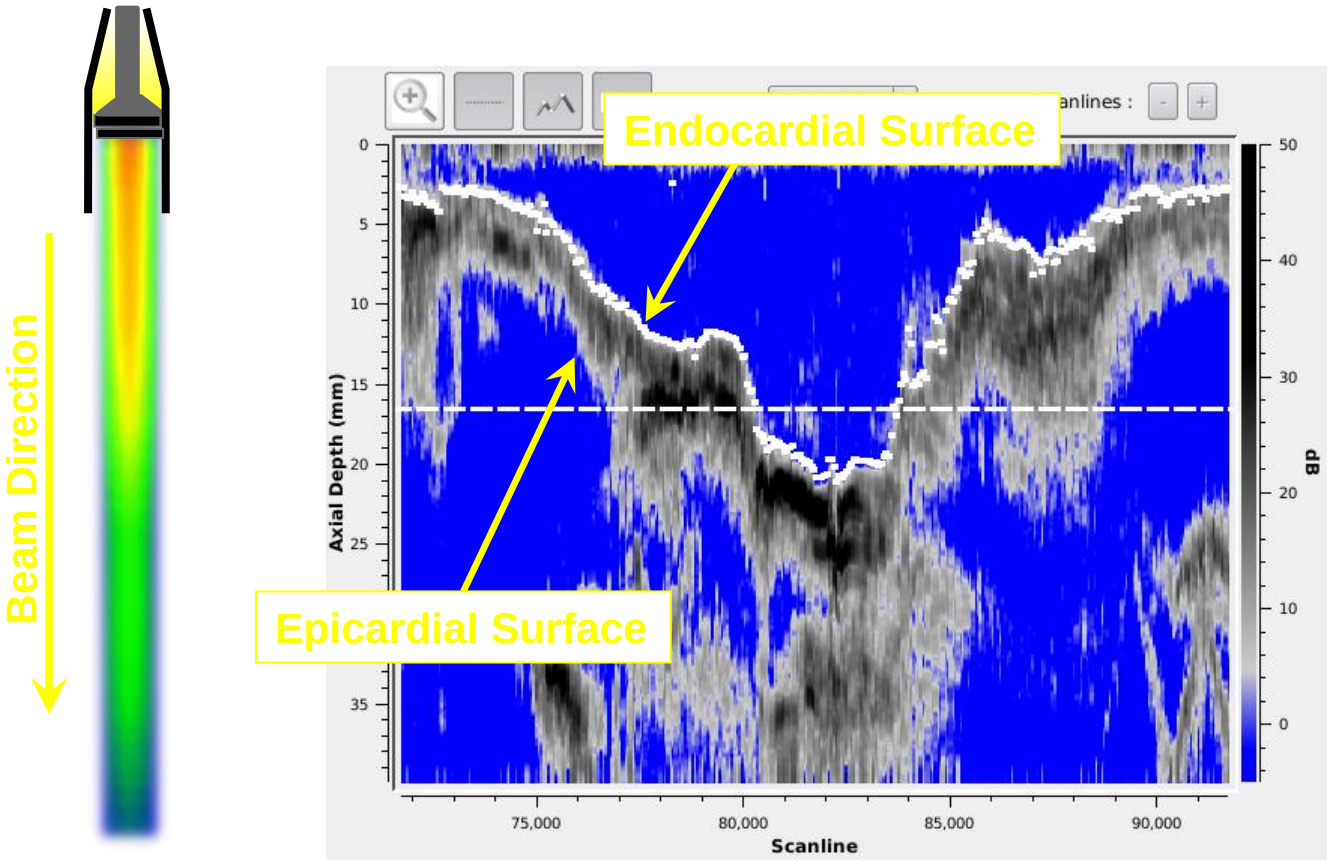
Robotically-controlled segment extension/retraction



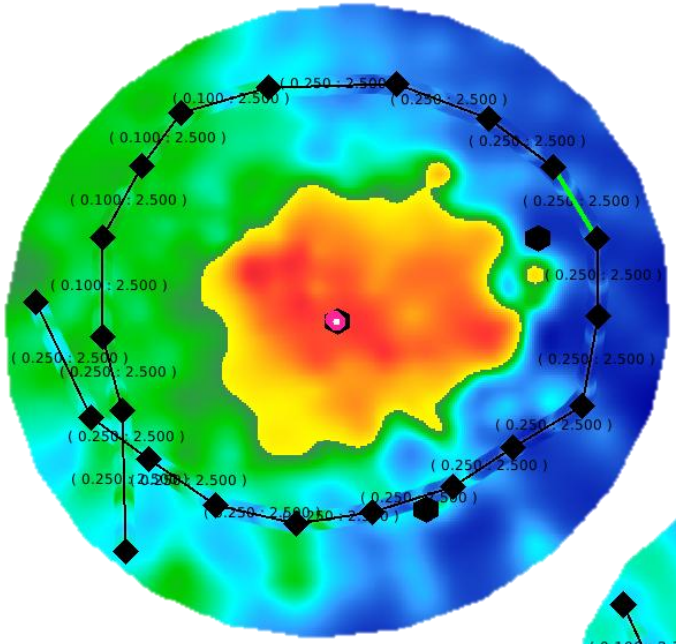
Deflection Rotation

Manually deflectable section

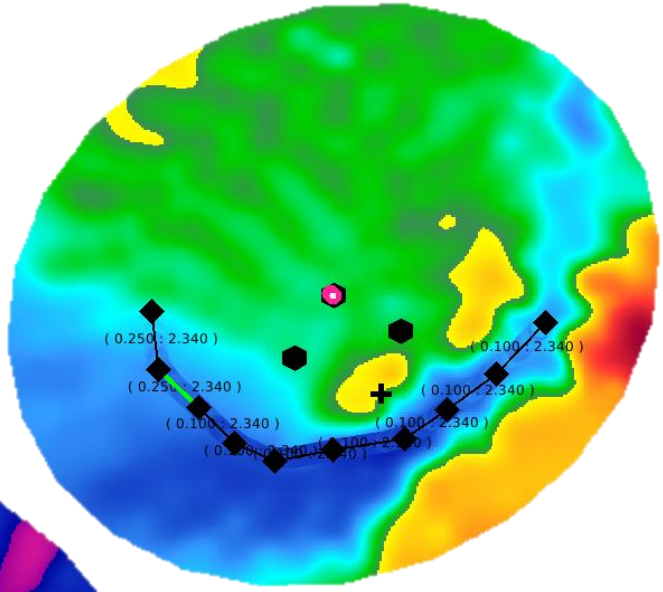
Low Intensity Collimated Ultrasound (LICU)



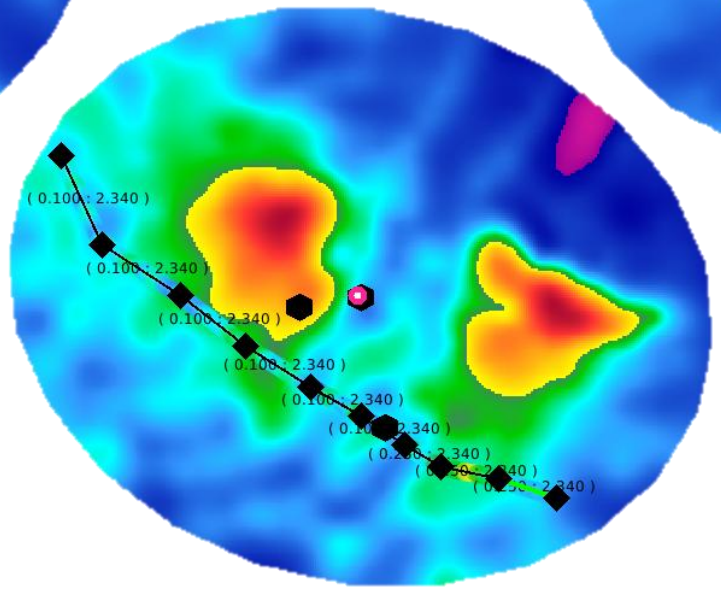
Low Intensity Collimated Ultrasound (LICU)



Circles

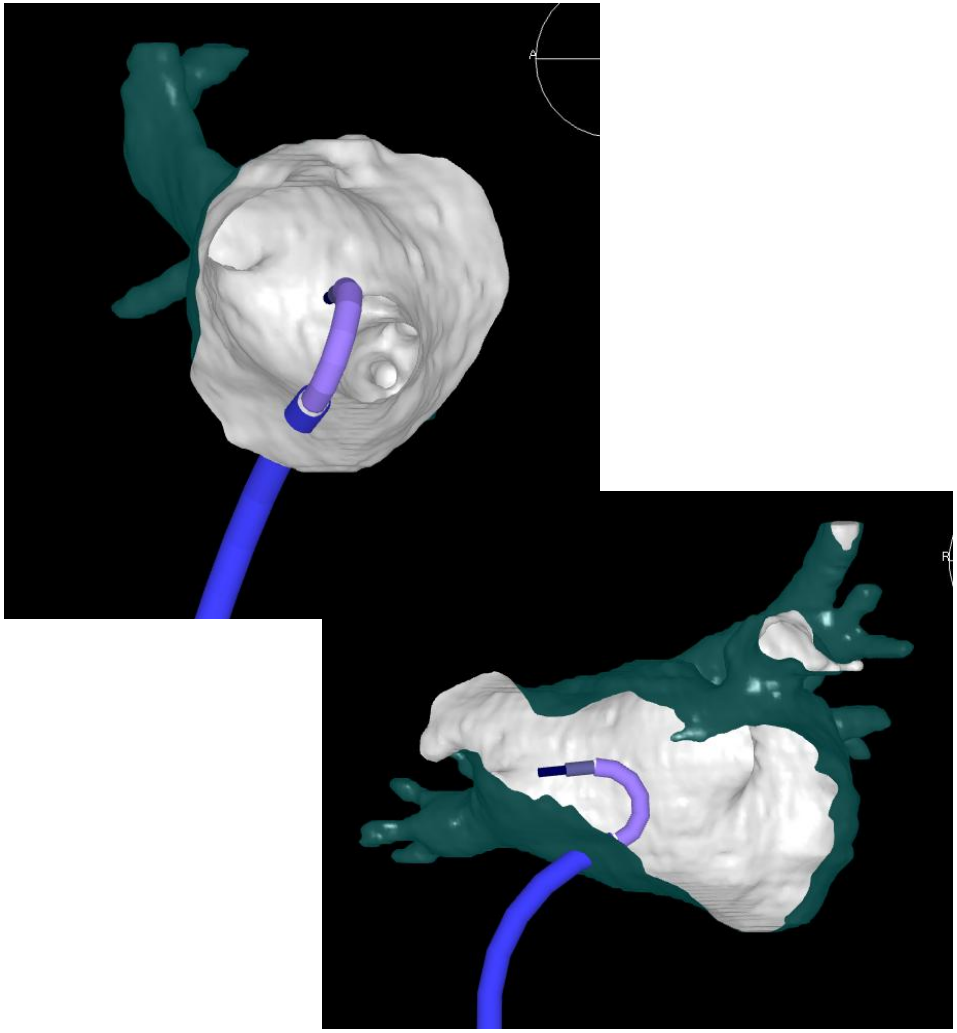


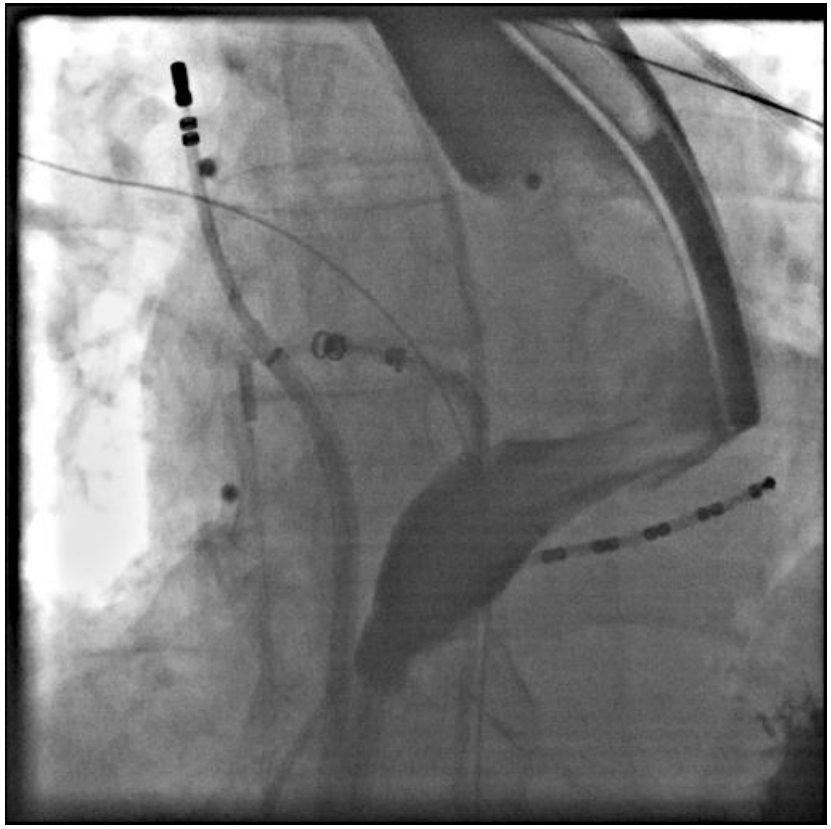
Arcs



Lines

LICU: Clinical Feasibility





LICU: Clinical Feasibility
Ablation Protocol

- Patient Population: Paroxysmal AF patients
- General Anesthesia
- Create Electroanatomical LA-PV Anatomy
- Introduce LICU ablation system
- Position LICU catheter to point at PV pair
  - Deviate esophagus in contralateral direction
- Create 2D/3D regional image
  - Sequential either LPVs or RPVs
- Plan ablation lesion set
- Automated ablation

Obezita