

# Mapping and ablation of ventricular tachycardia using dual-energy lattice-tip focal catheter: early feasibility and safety study

Petr Peichl, Dan Wichterle, Filip Schlosser, Predrag Stojadinovic, Eva Borisincova, Josef Marek, Peter Stiavnicky, Jana Haskova, Josef Kautzner



# Úvod

- Ablace komorových tachykardií u pacientů se strukturálním onemocněním srdce vede ke snížení počtu výbojů ICD, hospitalizací i je spojena s nižší mortalitou<sup>1</sup>
- Umístění arytmogenního substrátu v srdečních komorách může být variabilní a někdy pro konvenční katetry nedosažitelné

# Metody

- Affera (Medtronic)

### HexaPulse™ PF generator

Unipolar, biphasic PF energy delivery

### HexaMap™ CIU

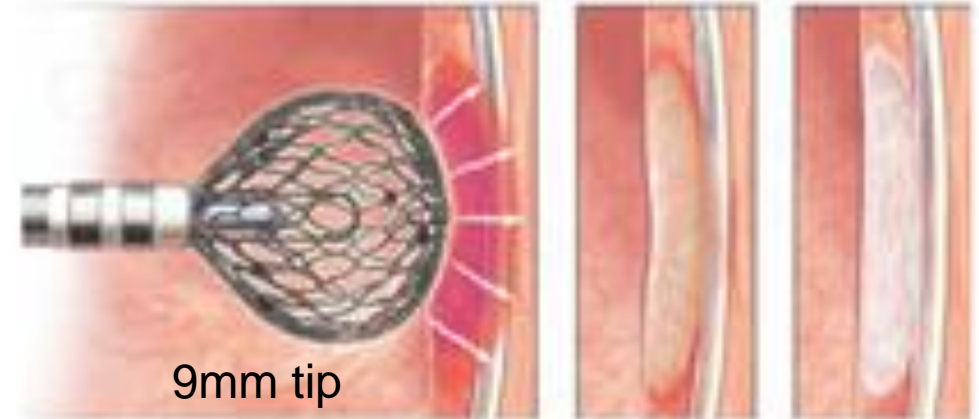
Magnetic navigation and map acquisition with intracardiac electrogram display, recording, and pacing

### HexaFlow™ irrigation pump

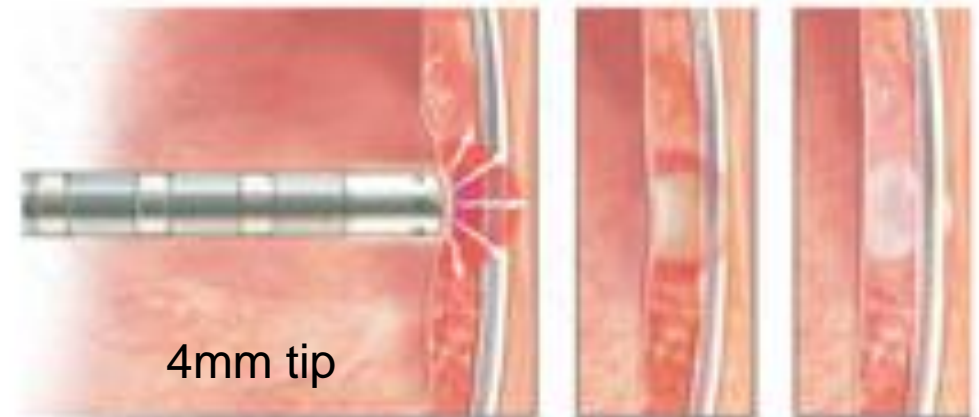
Responsive irrigation and bubble detection



Remote and foot pedal



9mm tip



4mm tip

Barkagan Circ EP 2019  
Yavin HD, Circ EP 2021

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KLINIKA KARDIOLOGIE

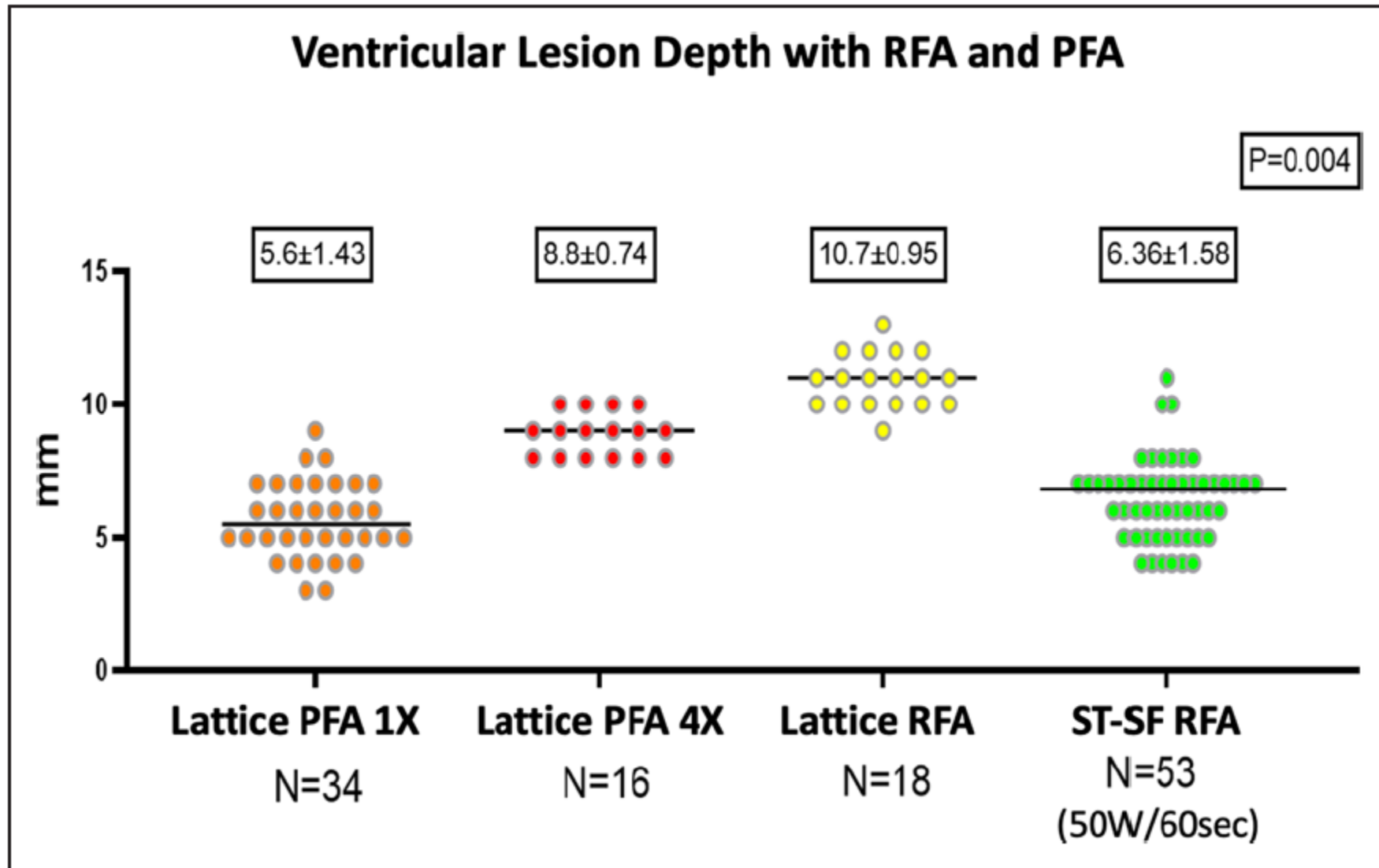


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M

# Pulse-field for VT ablation



PFA produces dimensions that



0.001

0.001

ium and lesion

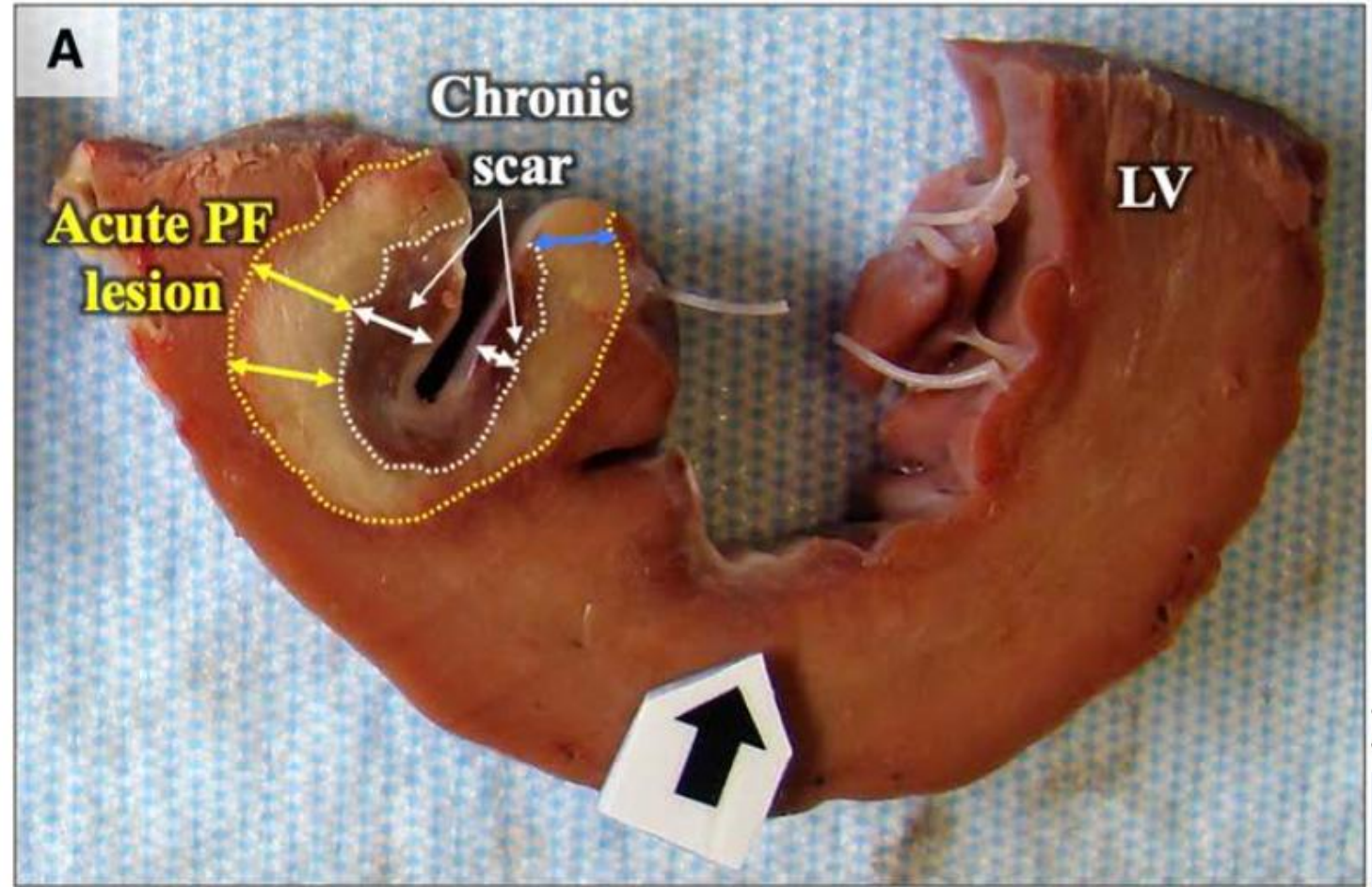
# What are the differences?

## RF vs PF for lesion creation

	<b>Radiofrequency</b>	<b>Pulsed-field</b>
<b>Thermal lesion</b>	<b>Yes</b>	<b>No</b>
<b>Factors for increasing lesion size</b>	<b>Power, time, CF</b>	<b>Repetition of applications (up to 4x per site)</b>
<b>Penetration through the preexisting scar</b>	<b>Limited</b>	<b>Better than RF</b>
<b>Risk of colateral damage</b>	<b>Well known</b>	<b>Myocardial stunning? Conduction system damage Spasm</b>
<b>Reversible lesion volume</b>	<b>Smaller</b>	<b>Larger Higher risk for recurrences? Potential for reversible pulses</b>

# PF works differently in scar tissue than RF

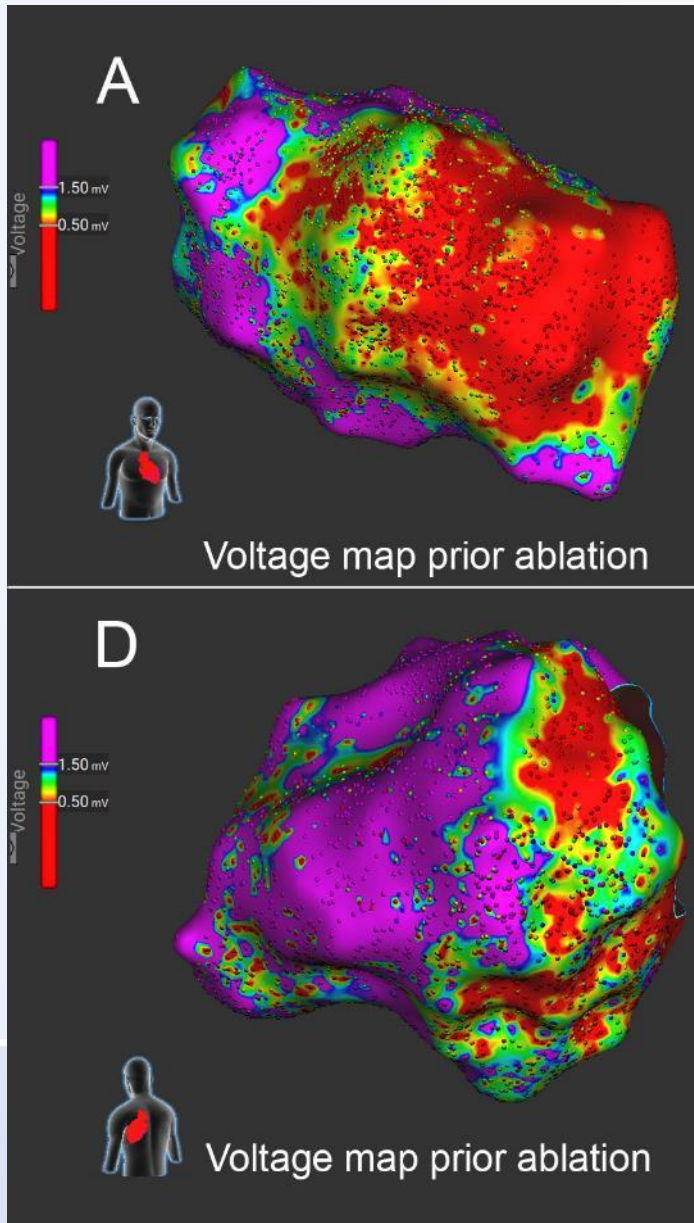
- Animal experiment
- Lattice tip catheter
- Repeat applications increase the lesion size
- Ablation in epicardium can penetrate ~4mm of fat
- Endocardial scarring did not impair subsequent PF ablation



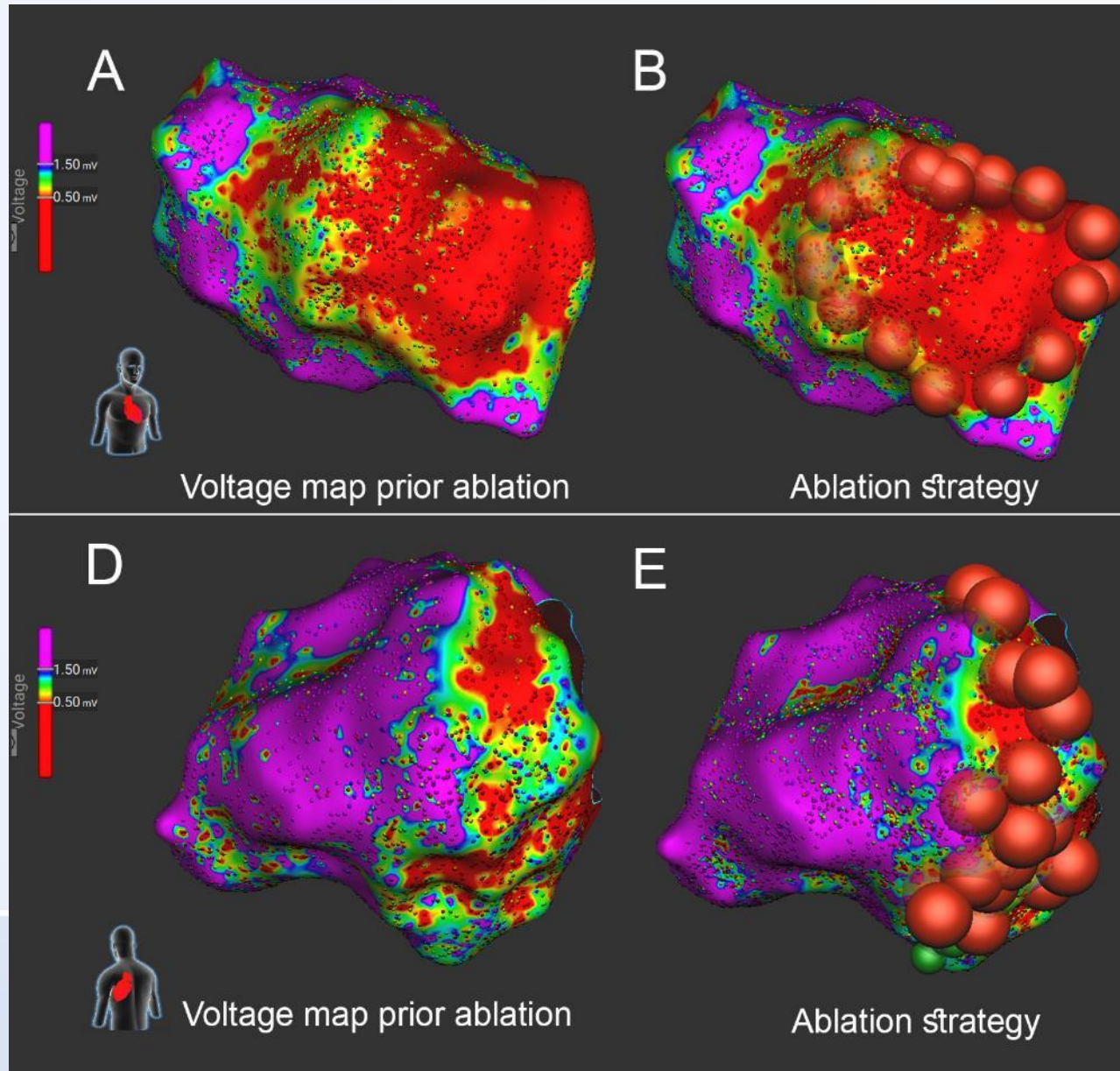
# Charakteristika souboru

	<b>N = 18</b>
.....	
Male sex (%)	94
Age (years)	55 ± 15
Body mass index (kg/m <sup>2</sup> )	29 ± 4
Diabetes mellitus (%)	28
Arterial hypertension (%)	67
History of atrial fibrillation (%)	44
Structural heart disease (%)	94
Coronary artery disease (%)	56
Left ventricular ejection fraction (%)	34 ± 10
Previous unsuccessful ablation (%)	67
Electric storm at the time of ablation (%)	22
Implantable cardioverter-defibrillator (%)	94

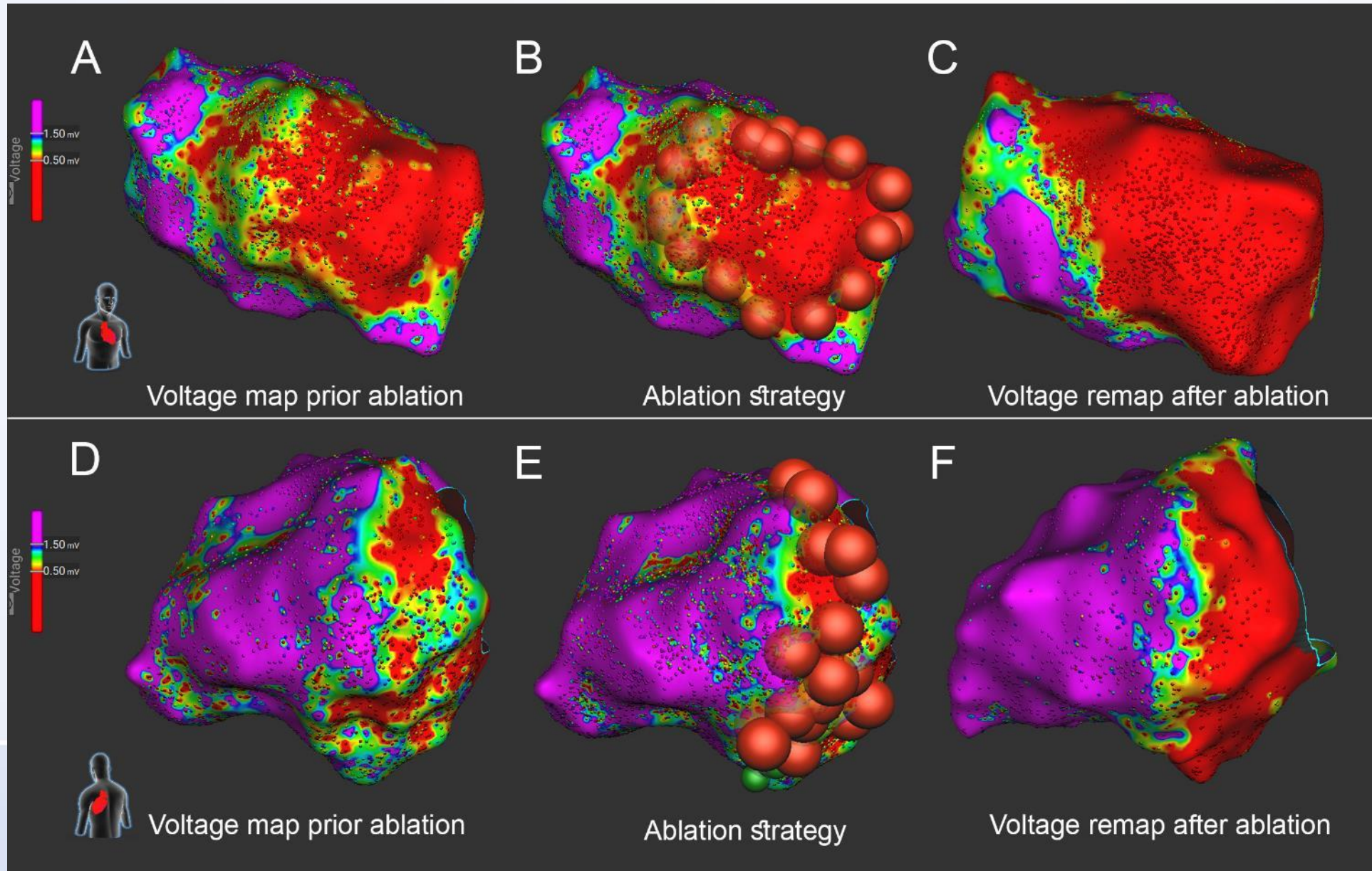
# Substrate modification by large tip



# Substrate modification by large tip

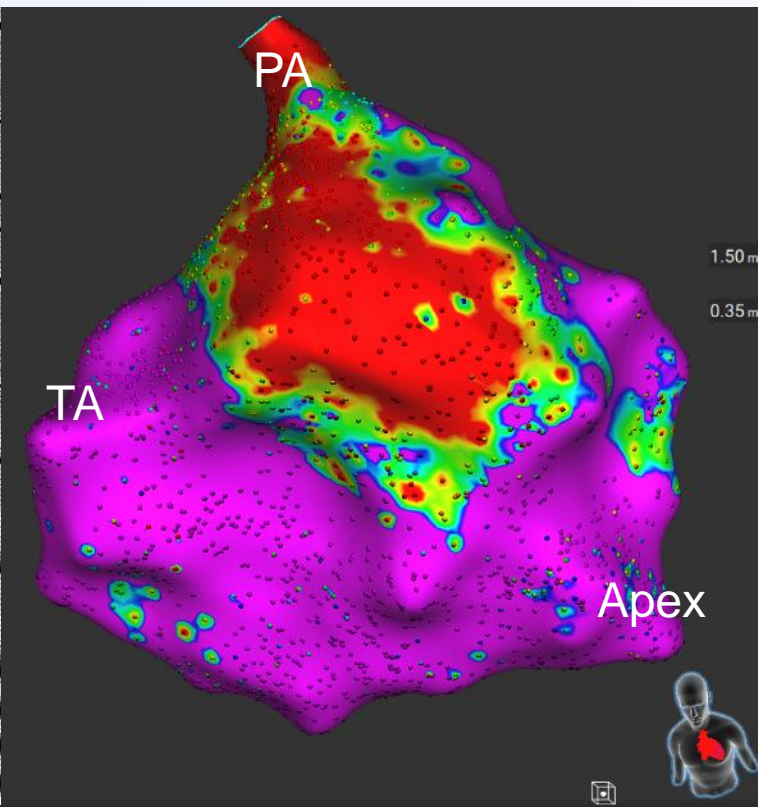
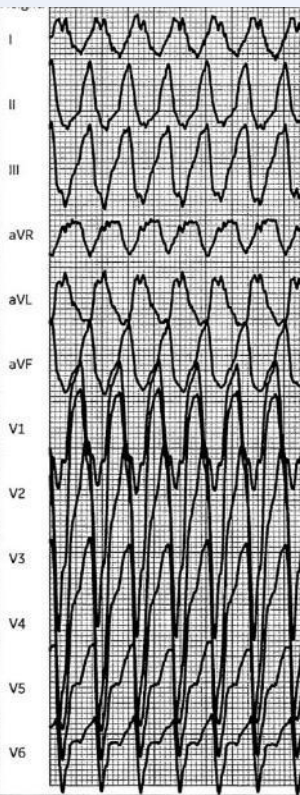


# Substrate modification by large tip



# Affera – PF illustrative case

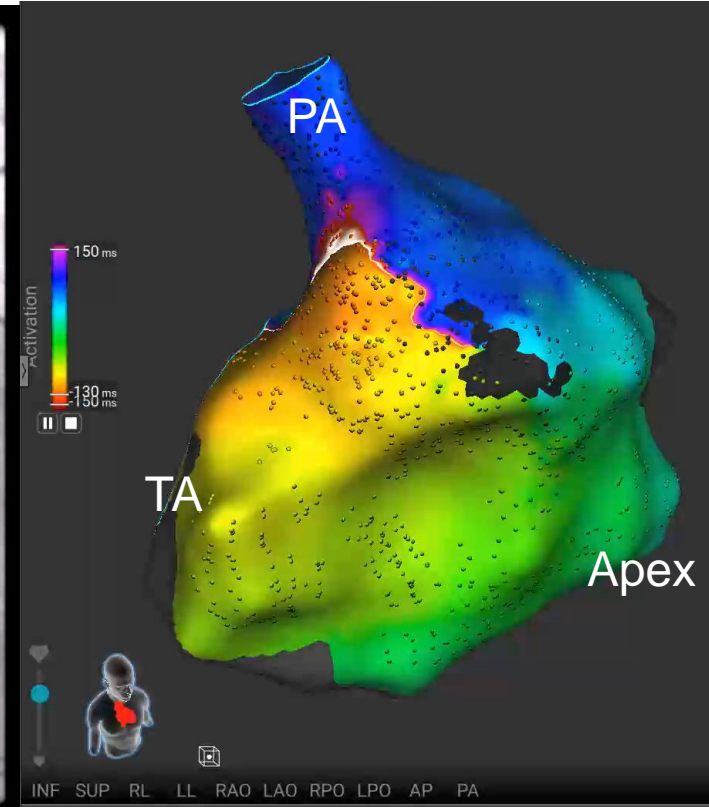
**GUCHD pt with VT after previously failed RF ablation**



Voltage map with scar over RVOT

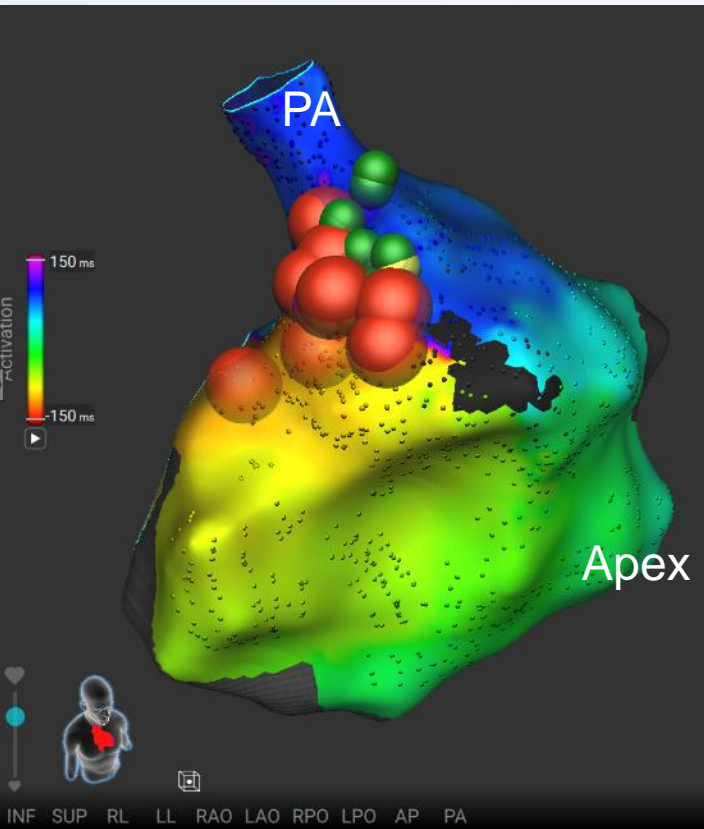


Transcatheter PV valve

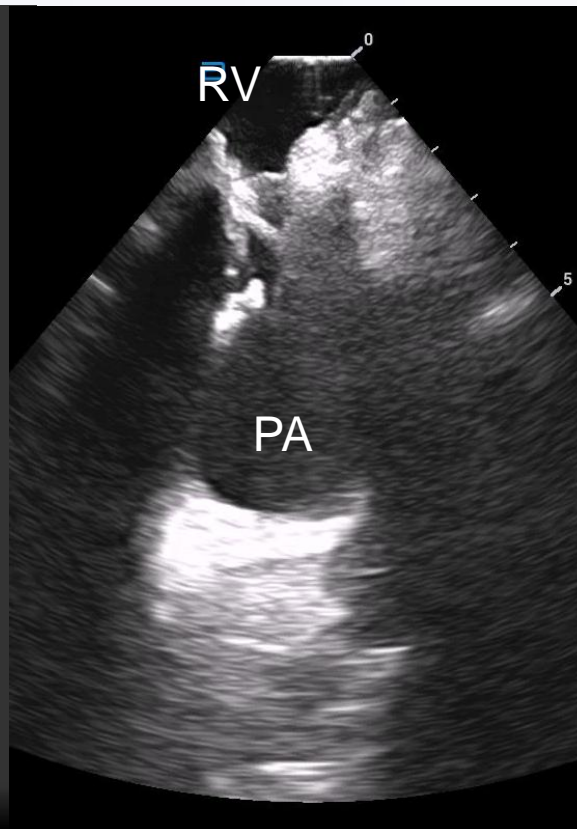


Activation during VT

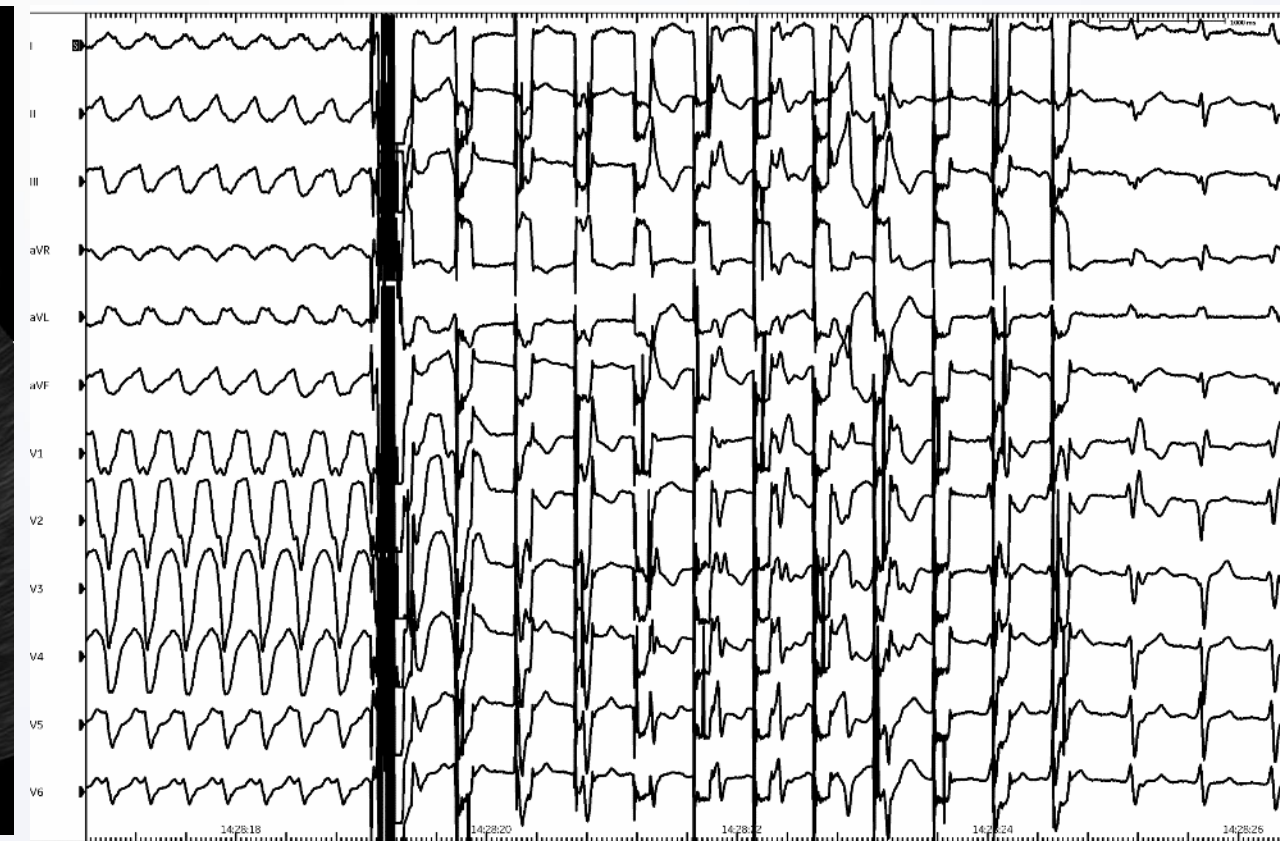
# VT termination only after multiple PF lesions



Ablation in the „channel“

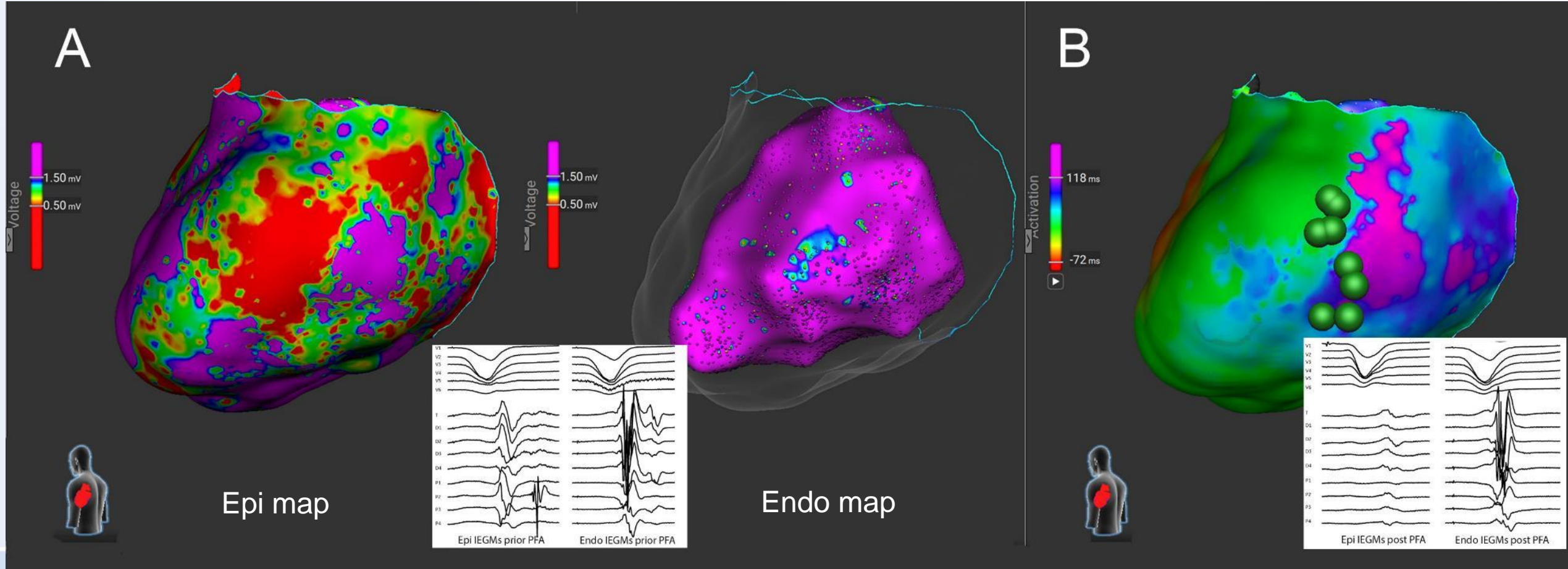
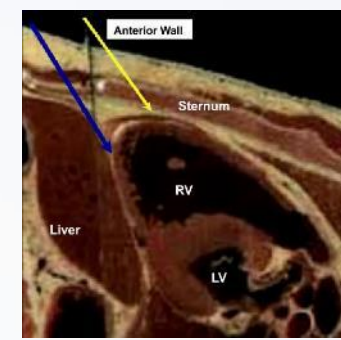


Sphere under the TPV



Termination with 3rd PF application

# Epicardial mapping/ablation



No phrenic nerve pulsus despite ablation in vicinity of left phrenic nerve

# Spasm after epi PF ablations (but no phrenic nerve pulsy)

A

Prior epi PF ablation

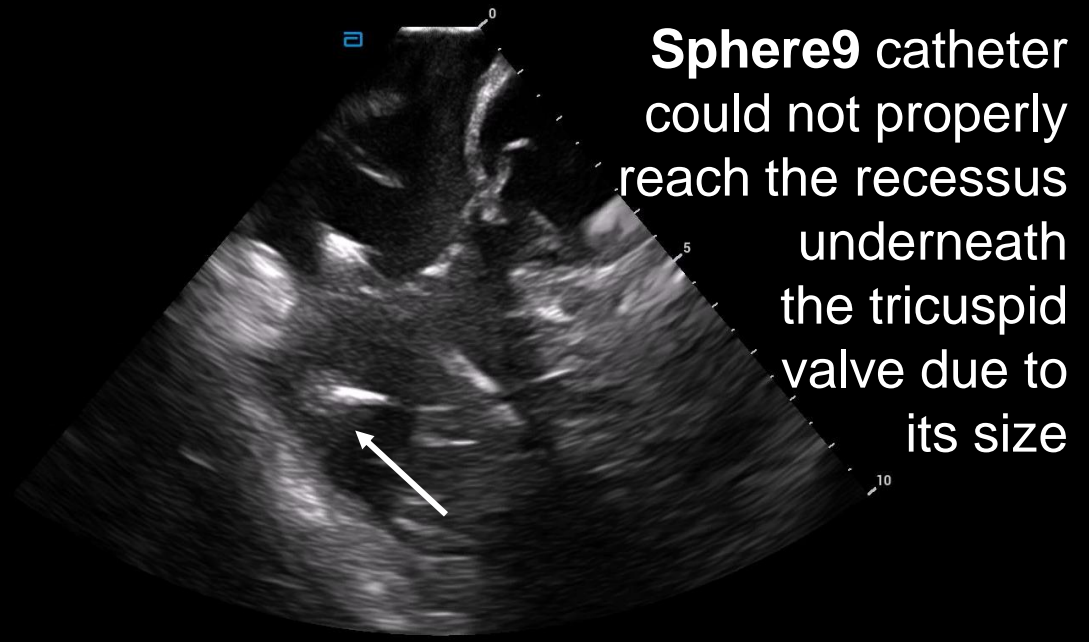
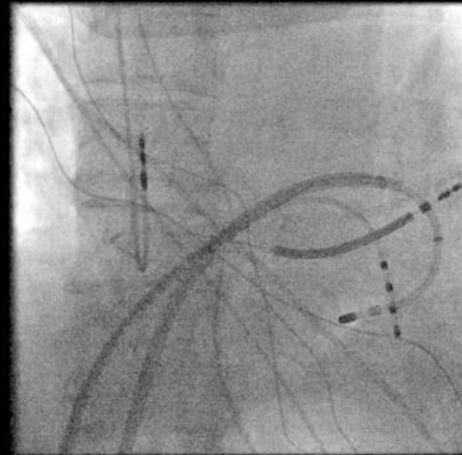
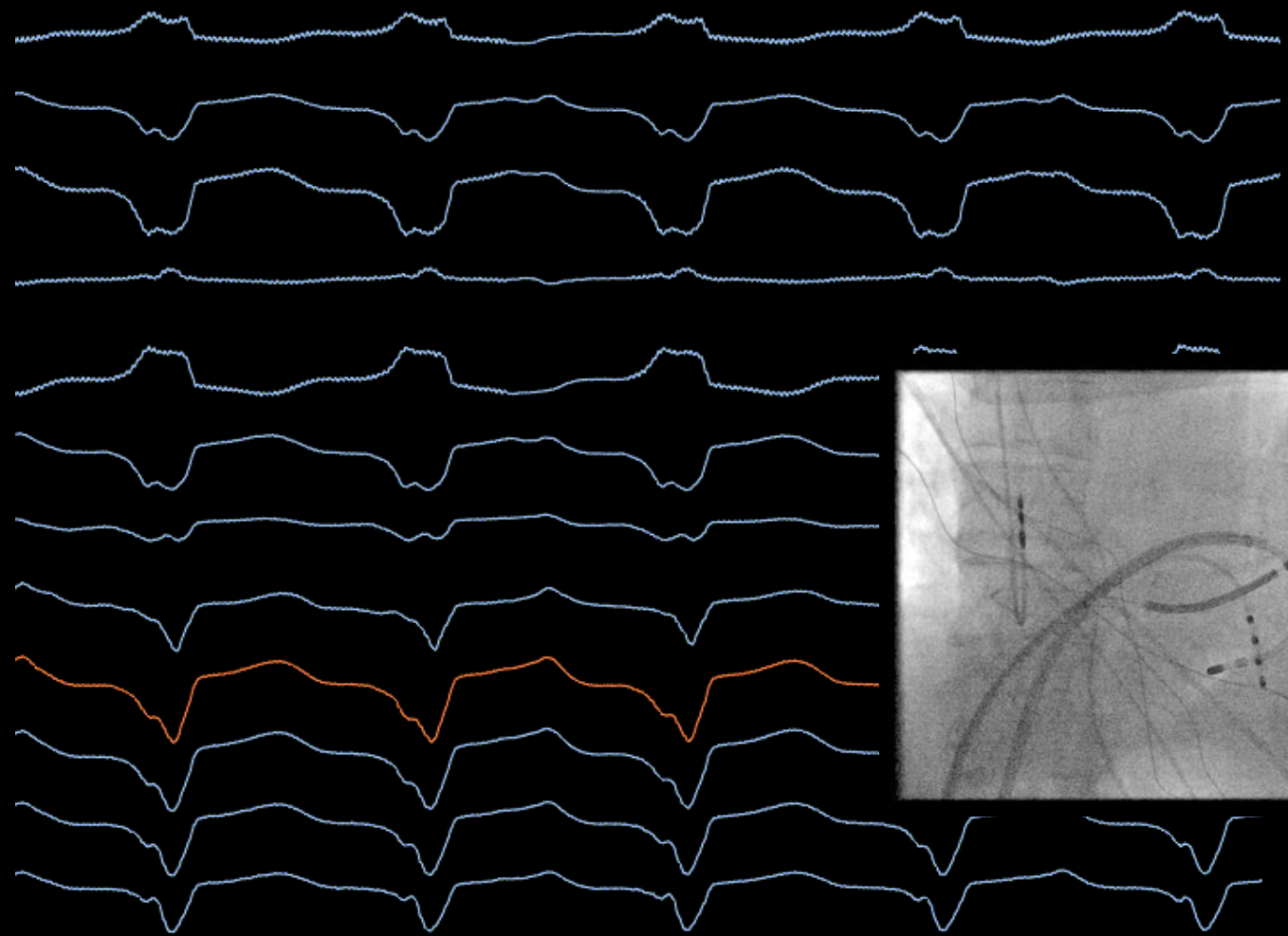
B

Spasm after PF application

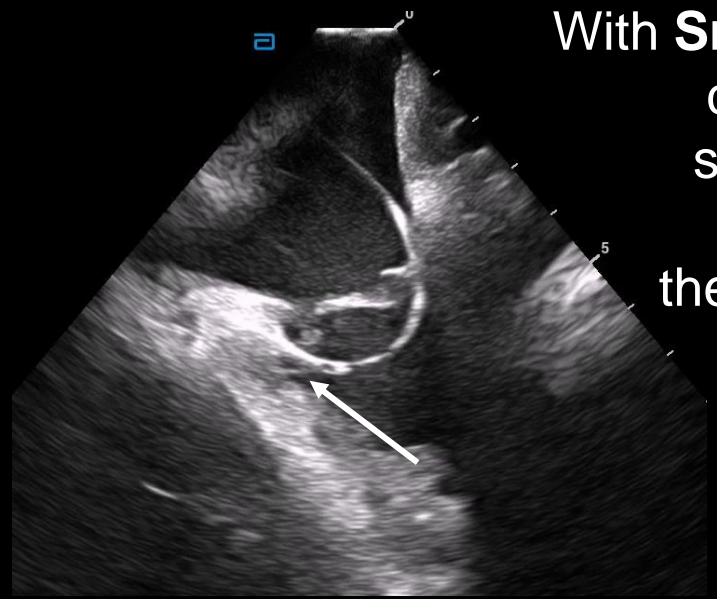
C

Resolution after nitrates

Despite acutely successful ablation, recurrence of very slow incessant VT 110 bpm was noted. Remapping with **CARTO** mapping system and 4mm tip located **middiastolic signal in recessus under the tricuspid valve**



**Sphere9** catheter could not properly reach the recessus underneath the tricuspid valve due to its size



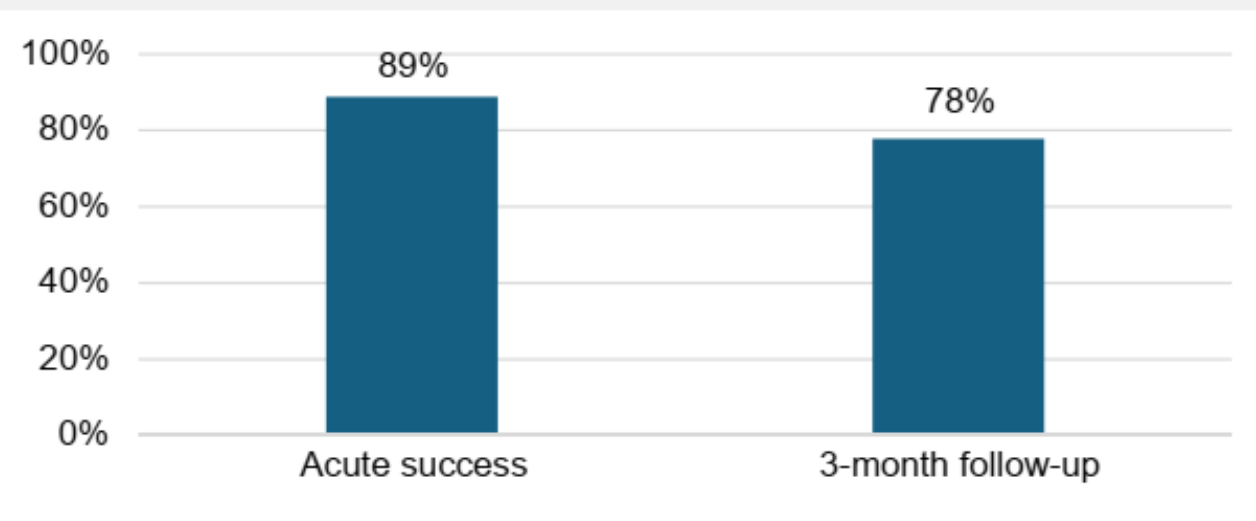
With **SmartTouch** catheter we successfully reached the target site

**Non-inducibility at the end and no recurrence since the procedure**

# Výsledky

	<b>N = 18</b>
.....	
Epicardial access (%)	22
Number of inducible ventricular tachycardia morphologies ( <i>n</i> )	1.4 ± 1.3
Procedural duration (min)	157 ± 31
Fluoroscopy time (min)	5.2 ± 4.0
Fluoroscopy dose (μGy m <sup>2</sup> )	4627 ± 9557
RF applications ( <i>n</i> )	12 ± 7
PF applications ( <i>n</i> )	8 ± 9
Post-ablation ventricular arrhythmia non-inducibility (%)	89
Ventricular-arrhythmia-free survival at 3 months (%)	78

## VT ablation outcome



# Diskuze

- Jedna z prvních publikací o použití mřížkového katetru na léčbu komorových tachykardií u strukturálního postižení srdce

## A large footprint focal catheter toggling between pulsed field and radiofrequency energy: first clinical experience for ventricular tachycardia ablation

Luigi Pannone <sup>1†</sup>, Ioannis Doundoulakis <sup>1†</sup>, María Cespón-Fernández <sup>1</sup>, Ivan Eltsov <sup>2</sup>, Gian Battista Chierchia <sup>1</sup>, Carlo de Asmundis <sup>1</sup>, and Andrea Sarkozy <sup>1\*</sup>

<sup>1</sup>Heart Rhythm Management Centre, Postgraduate Program in Cardiac Electrophysiology and Pacing, Universitair Ziekenhuis Brussel—Vrije Universiteit Brussel, European Reference Networks Guard-Heart, Laarbeeklaan 101, 1090 Brussels, Belgium; and <sup>2</sup>Cardiac Surgery Department, Universitair Ziekenhuis Brussel—Vrije Universiteit Brussel, Brussels, Belgium

Received 21 June 2024; accepted after revision 6 July 2024; online publish-ahead-of-print 9 July 2024

### IMAGES AND VIGNETTES IN CLINICAL ELECTROPHYSIOLOGY

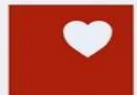
## Targeting the Left Ventricular Summit

### Pulsed Field Ablation for Refractory Premature Ventricular Complexes

Karim Benali, MD, PhD,<sup>a,b,c,\*</sup> Masaaki Yokoyama, MD,<sup>b,c,\*</sup> Konstantinos Vlachos, MD, PhD,<sup>b,c</sup> Kinan Kneizeh, MD,<sup>b,c</sup> Cinzia Monaco, MD,<sup>b,c,d</sup> Ruxandra Sava, MD,<sup>a</sup> Josselin Duchateau, MD, PhD,<sup>b,c</sup> Sylvain Ploux, MD, PhD,<sup>b,c</sup> Antoine Da Costa, MD, PhD,<sup>a</sup> Frederic Sacher, MD, PhD,<sup>b,c,e</sup> Michel Haissaguerre, MD, PhD,<sup>b,c</sup> Pierre Jais, MD, PhD,<sup>b,c</sup> Méléze Hocini, MD, PhD<sup>b,c</sup>

# Limitace práce

- Jedná se o iniciální zkušenosti s použitím nového systému
- Limitovaný počet pacientů v publikované kohortě
- Kombinace obou ablačních modalit (RF i PF) ve skupině nedovolila jejich přímé srovnání



# Závěry

- Mapování a ablace pomocí katetru s možností aplikace RF a PF energie je účinnou možností léčby komorových tachykardií
- Systém Affera umožňuje rychlé mapování a efektivní ovlivnění arytmogenního substrátu s příznivým výsledky během krátkodobého follow upu

