



Radiofrequency ablation in newborn and infants in the presence of medications restricted choice: Single-center experience.

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Thessalonici/ Greece, 2017

Disclosure



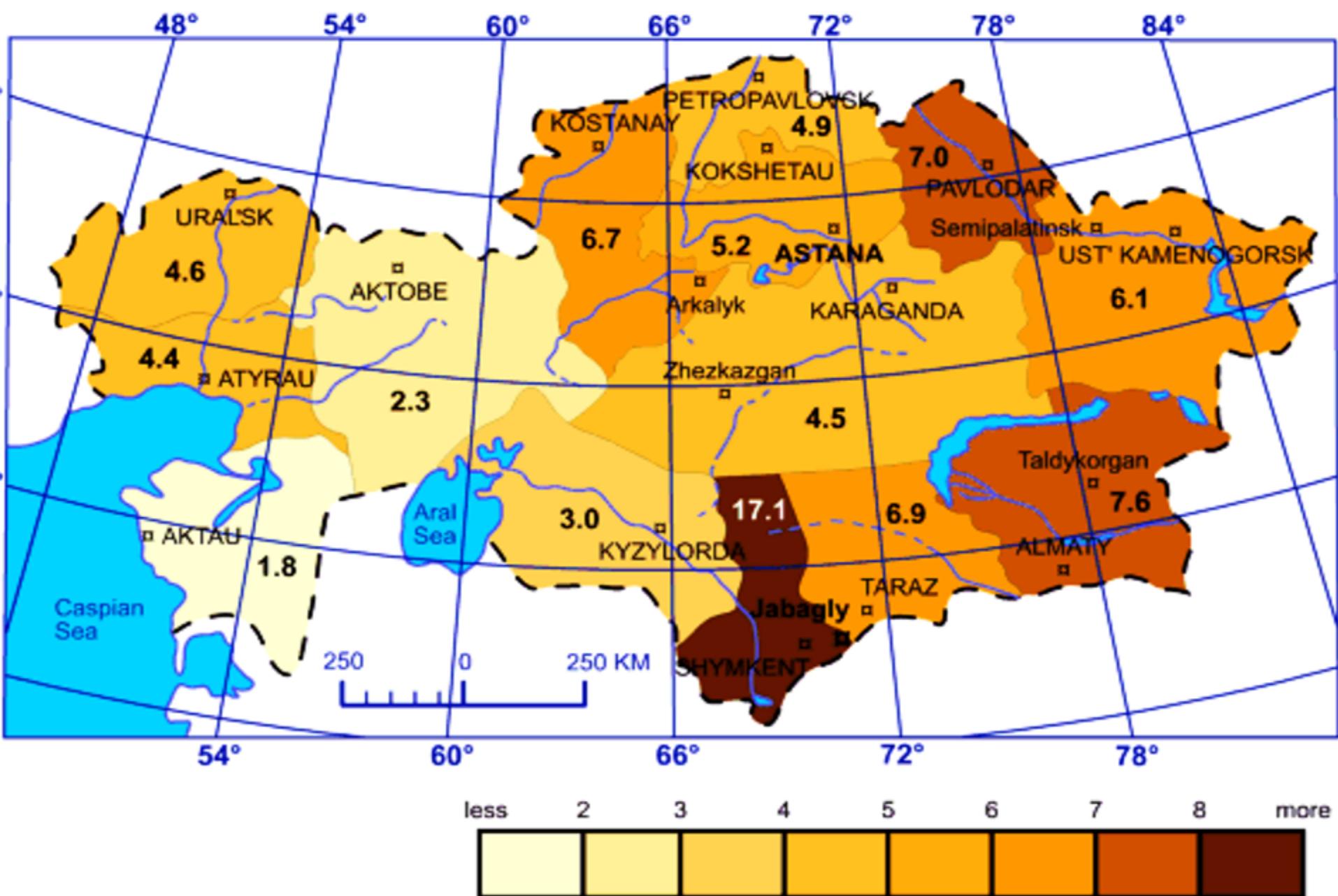
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✓ no conflict of interests

KEY FACTS ABOUT KAZAKHSTAN

- Kazakhstan is the 9th large territory in the world (2,7 millions sq.km) with 17,6 million population
- The capital is Astana city established in 1998
- Became independent in 1991, 16th of December
- More than 150 nations and ethnics live in Kazakhstan with Kazakhs (66%), Russians (21%), Uzbeks (3%), Ukrainians (1,7%), Uigurs (1,4%), etc.
- Kazakh is the state language, Russian has a status of official
- Contains rich oil resources with 1.6 million barrels per day production, minerals (ferrous and non-ferrous metals)
- GNI per capita is \$11,7 millions (2014, Worldbank.org)
- GDP per capita is \$12,4 millions (2014, Worldbank.org)

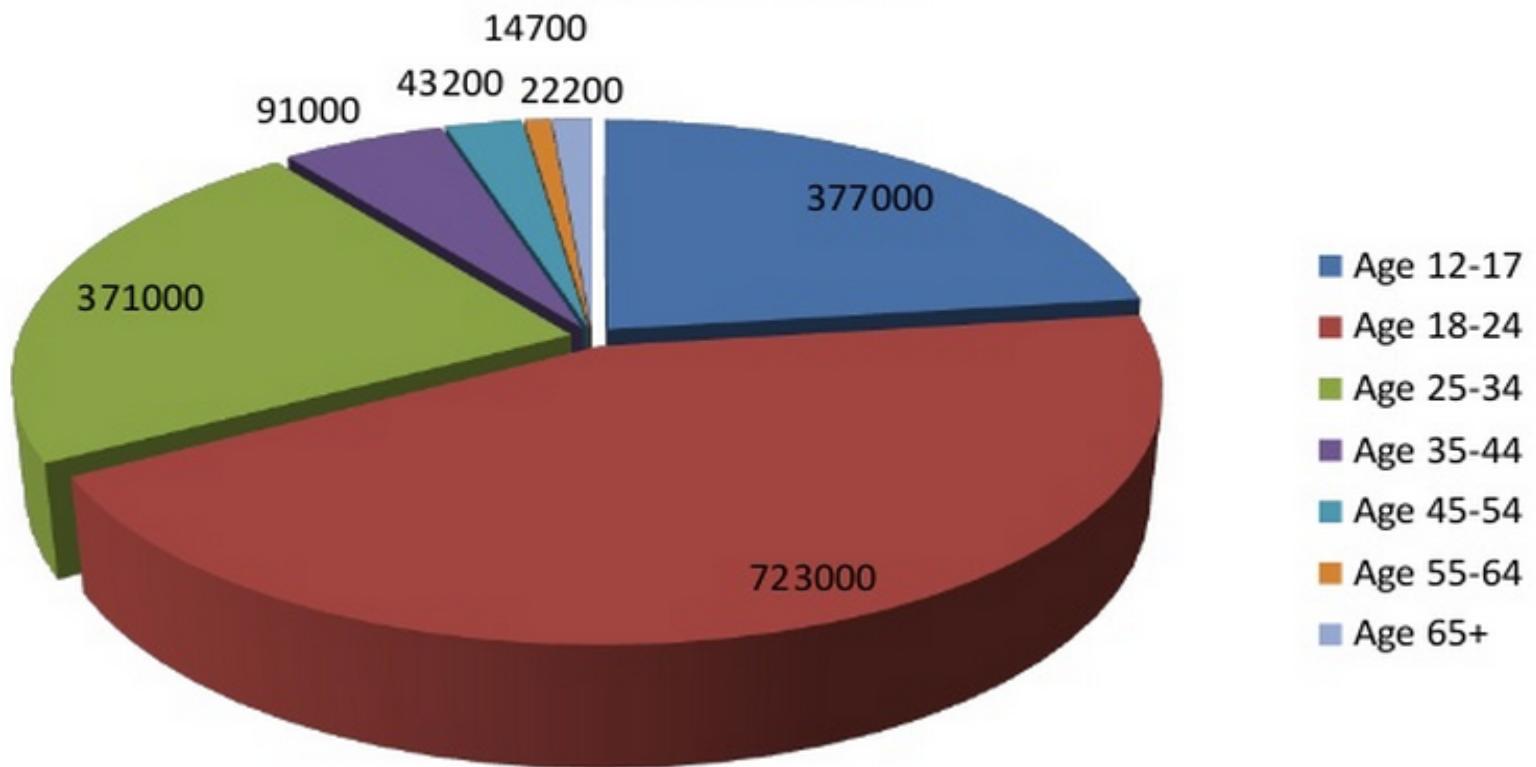
KAZAKHSTAN – POPULATION DENSITY





Kazakhstan

Age distribution*



Background



November 18th 1958
– **First cardiac surgery** performed in Kazakhstan (**Almaty**)



1967 - 2004
~ 200 surgeries per year



April 7th 2004
– **First cardiac surgery** performed in new capital (**Astana**)



August 8th 2012
– **First heart transplantation in Kazakhstan** performed in the JSC “National Research Cardiac Surgery Center”



December 11th 2015
– **First lung transplantation in Kazakhstan** performed in the JSC “National Research Cardiac Surgery Center”

Cardiac surgery in Kazakhstan



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- ★ Republican cardiac surgery centers
- ★ Cardiac surgery centers
- ★ Cardiology centers
- ★ Cardiac surgery units
- ★ Cardiac surgery beds

675 cardiac surgery beds in total, of which:
150 pediatric beds;
10 beds at the Medical Center of President's Affairs Administration;
64 beds in Private Medical Centers, including 10 pediatric beds.



History of arrhythmology



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In 1980 years
– *first implantation of IPG in Kazakhstan (Alma-Aty)*



1989- 2002y
~ 30-50 implantation per year
Republic. Arrhythmol. center (Almaty)



2002 y.
– *first RFA accessory pathway in new capital (Astana)*



The 15 November 2014y was created
«Kazakh society of arrhythmologists»



- Every capital city of region (oblast) has angiograph (carried implantations).
- The total number of hospitals providing interventional arrhythmologycal treatment 27
- 12 hospitals has EP stations
- Over 45 specialists works in the field of interventional arrhythmology

Electrophysiology in Kazakhstan



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2014 y. – 7 EP labs;

2016y. – 12 EP labs.



Republic center



CS + EP lab



EP labs in general hospital



Private clinics



National Research Cardiac Surgery Center



**Cardiac Surgery
64 beds**

**Interventional
Cardiology
46 beds**

**Cardiology
90 beds**

Opened in **October 12 2011**

JCI accredited in 2014

The Center coordinates Cardiac Surgery Service across Kazakhstan

Total number of beds: **200** OR's: **6** Catheterization Labs: **4** ICU beds: **36**

November 2011: **"Surgical Treatment of End Stage Heart Failure – Implantation of Ventricular Assist Devices (LVAD)"**

August 8th, 2012: First heart transplantation in Kazakhstan performed at the Center (**39 transplants** in total, including September 2016)

December 11th, 2015: **First lung transplantation** in Kazakhstan performed at the Center

Participation in the **international multicenter clinical trial** on implantation of HeartMate III new generation VAD with the world's **5 leading clinics**

Total number of PCI (since opening, up to September 2016): **34 210**, of which: **26 018** interventional procedures and **8 192** open heart surgeries

Mechanical Circulatory Support



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2011

- 1st Short term VAD (Levitronix)
- 1st VAD Heart Mate II
- 1st VAD HVAD



2012

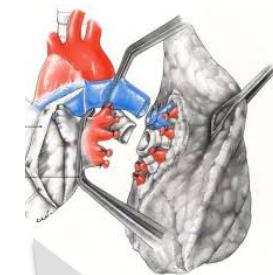
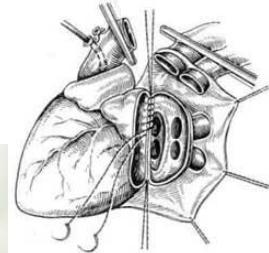
- 1st TAH and BiVAD
- 1st HTx

2013

- 1st HTx with OCS (TransMedics)

2014

- HMIII clinical trial
- 1st LTx



2015
non-investigational HMIII
1st LTx

Development stages



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2012

Pediatric
arrhythmias



2013

RFA in
newborns and
infants



2014

AF
cryoablation



2016

Focal
cryoablation



Peacemaker implantation

ICD

CRT

RFA in all types of arrhythmias

Focal cryoablation in children

Application of cryoablation in atrial fibrillation

Lead extraction

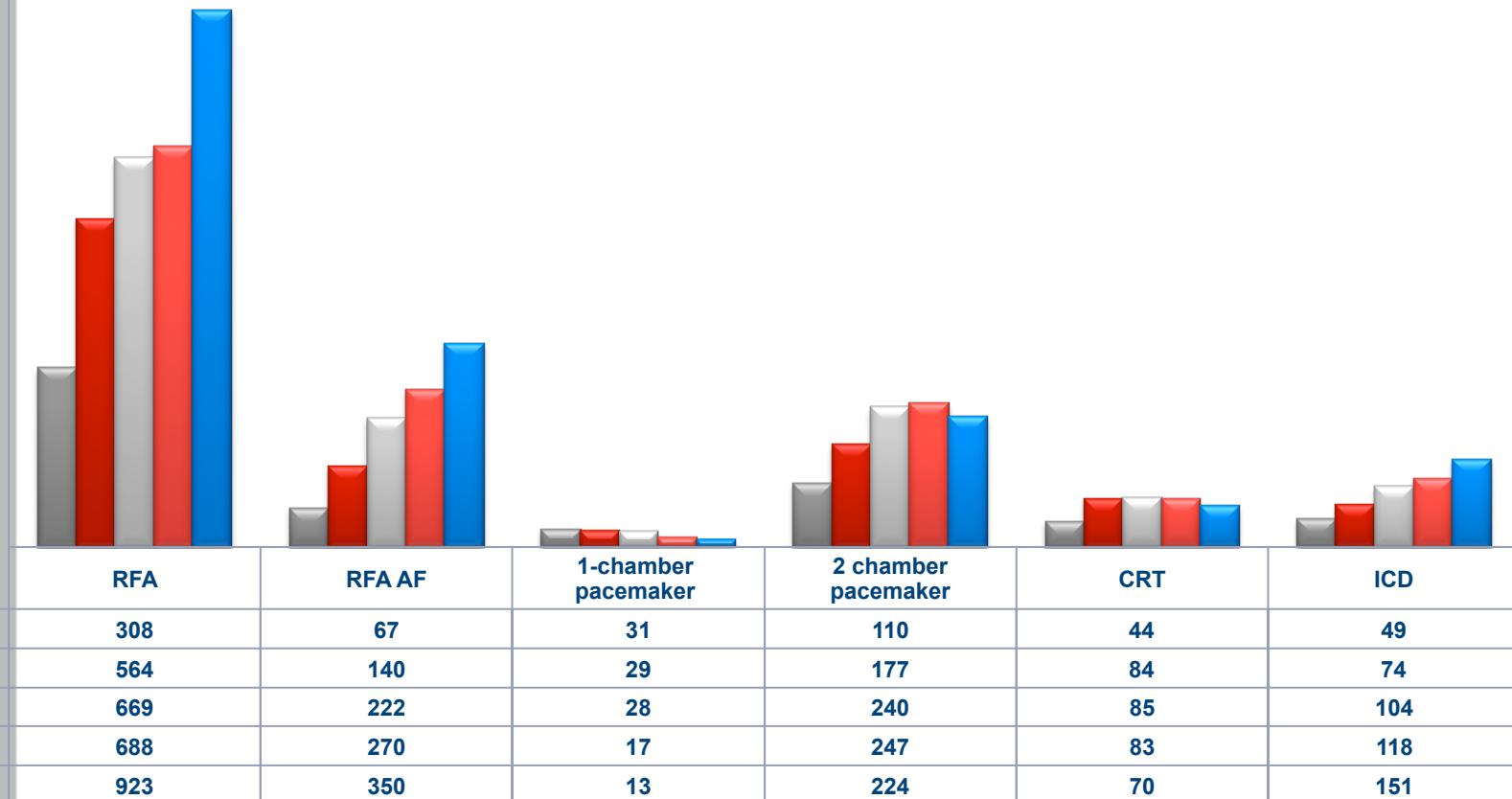
Transcatheter closure of LA appendage

Loop-recorder implantation, home-monitoring

Procedures in Kazakhstan

| No. | Procedures | Years (for 1 mill.) | | | | Benchmarking <u>EHRA white book</u> For 1 000 000 |
|-----|-------------|---------------------|---------------|---------------|---------------|---|
| | | 2013 | 2014 | 2015 | 2016 | |
| 1 | RFA | 1488 (88) | 2018 (119) | 2456 (144) | 2983 (175) | 259 |
| 2 | AF ablation | 262 (15) | 524 (31) | 766 (45) | 1059 (62) | 96 |
| 3 | Pacemaker | 1477 (87) | 1657 (97) | 1801 (105) | 1964 (115) | 623 |
| 4 | CRT | 198 (12) | 262 (15) | 314 (18) | 414 (24) | 82 |
| 5 | ICD | 214 (13) | 402 (24) | 527 (31) | 791 (46) | 102 |
| 6 | Total | 3377 | 4339 | 5463 | 7134 | |

Interventional Procedures



Pediatric procedure NRCSC, Astana

| N | procedures | years | | | | |
|---|-----------------|-------|------|------|------|------|
| | | 2012 | 2013 | 2014 | 2015 | 2016 |
| 1 | RFA | 30 | 51 | 58 | 62 | 100 |
| 2 | EP | 6 | 11 | 4 | - | 19 |
| 3 | Pacemaker | 3 | 20 | 15 | 22 | 27 |
| | Endocardial | | 10 | 4 | 7 | 13 |
| | Epicardial | | 10 | 11 | 15 | 14 |
| 4 | CRT | 0 | 1 | 1 | - | - |
| 5 | ICD | 0 | 1 | 0 | - | 4 |
| 6 | Reveal | 0 | 1 | 0 | 5 | 10 |
| 7 | Lead extraction | - | - | - | 2 | 2 |
| 7 | Total | 39 | 85 | 78 | 89 | 162 |

Epidemiology



- ✓ Approximately 5% of emergency hospitalization;
- ✓ AVRT – 82% (prevalence 0,1 – 0,15%);
- ✓ AVNRT – 5%;
- ✓ Ectopic atrial thachycardia – 15%;

Andrew D Blaufox, Indian Pacing
electrophysiology J, 2005

RFA vs medical treatment



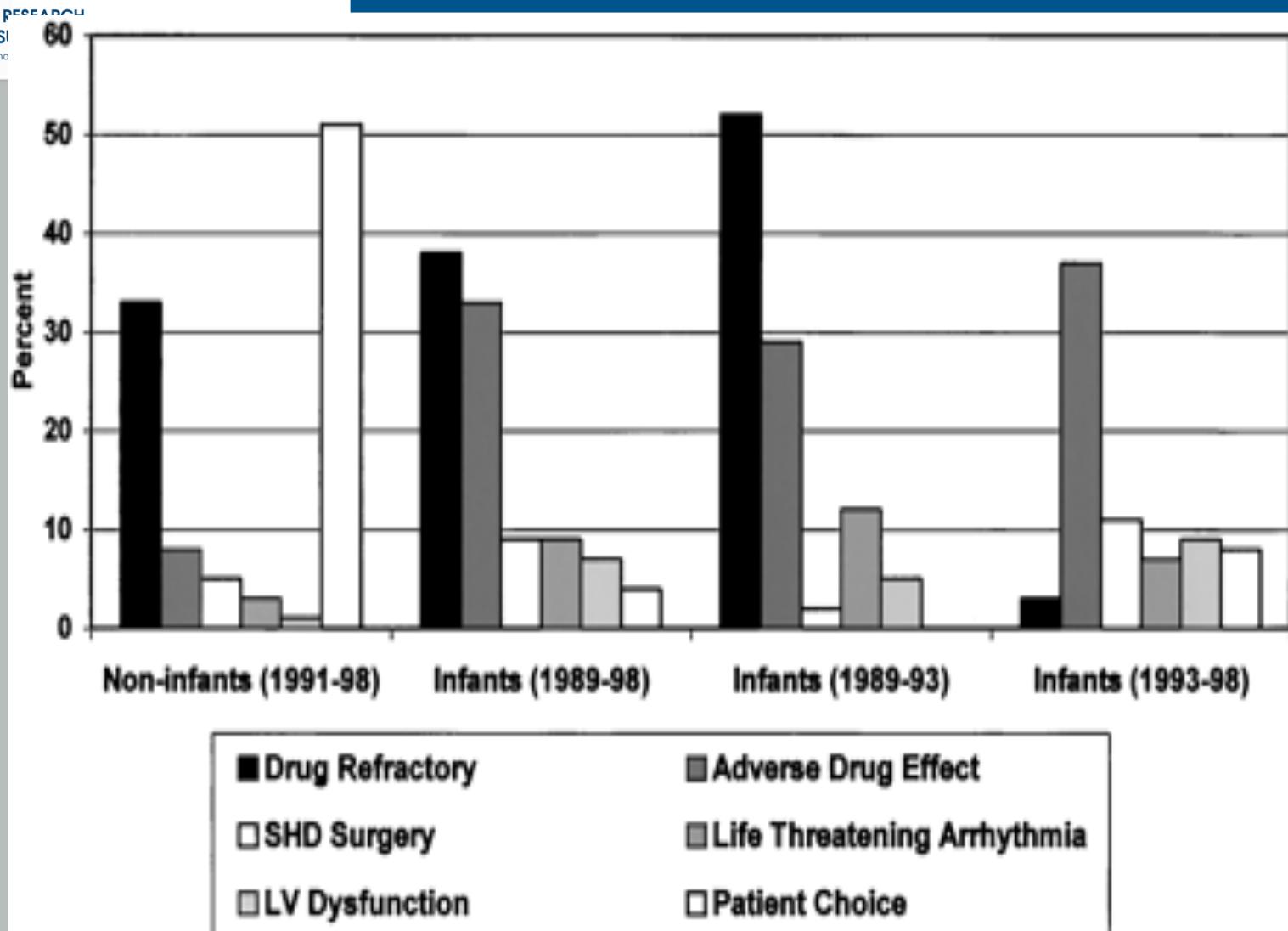
- ✓ No controlled studies;
- ✓ Success rate (digoxin, beta-blockers, class I, class III) – 50-60%;
- ✓ High toxicity;
- ✓ Restricted medication choice;

- ✓ Technical issues (small heart);
- ✓ Unknown long-term effect;
- ✓ Risk of complications;
- ✓ Unknown influence on immature myocard;



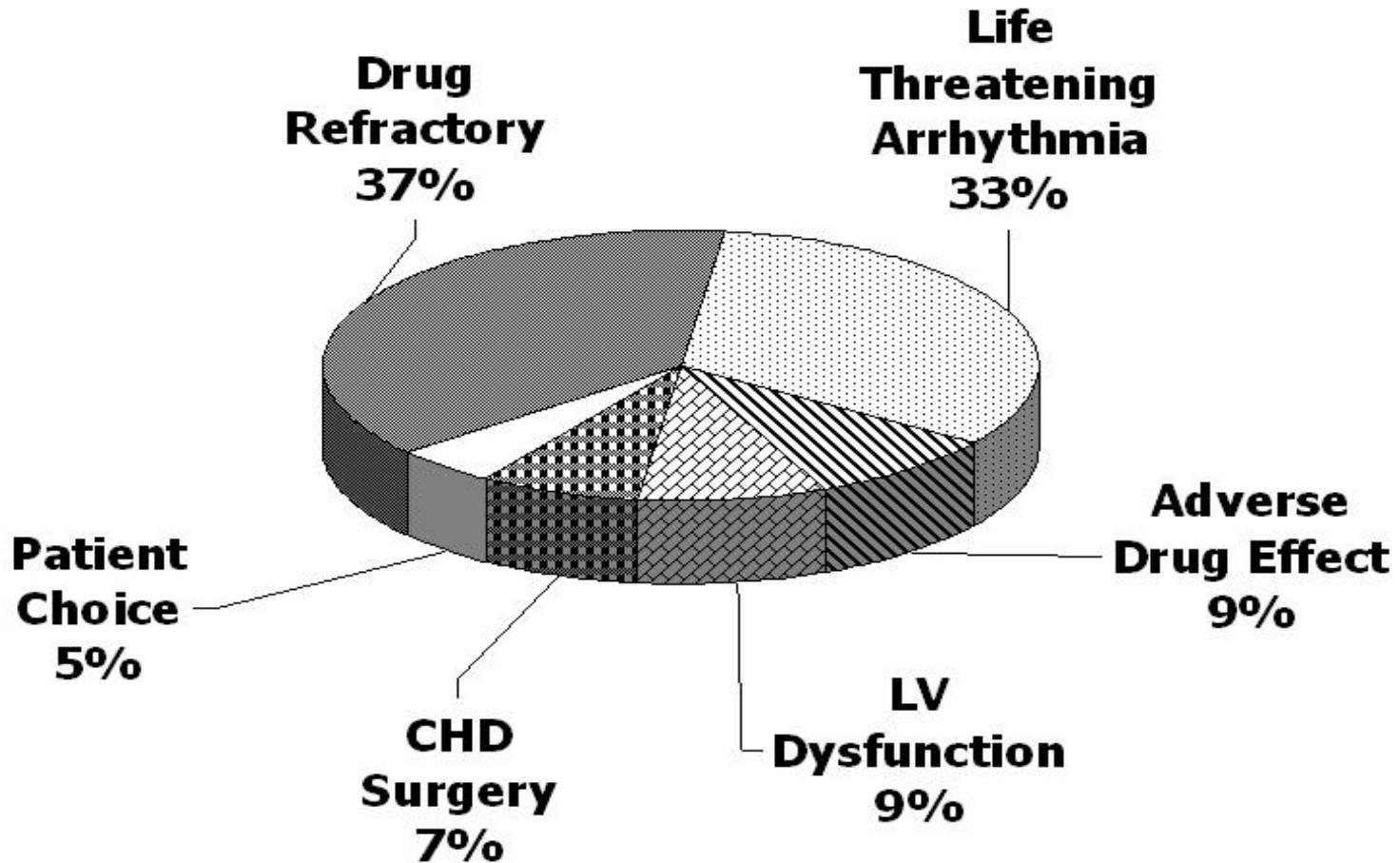
Andrew D Blaufox, Indian Pacing
electrophysiology J, 2005

Indications for RFA infants vs noninfants



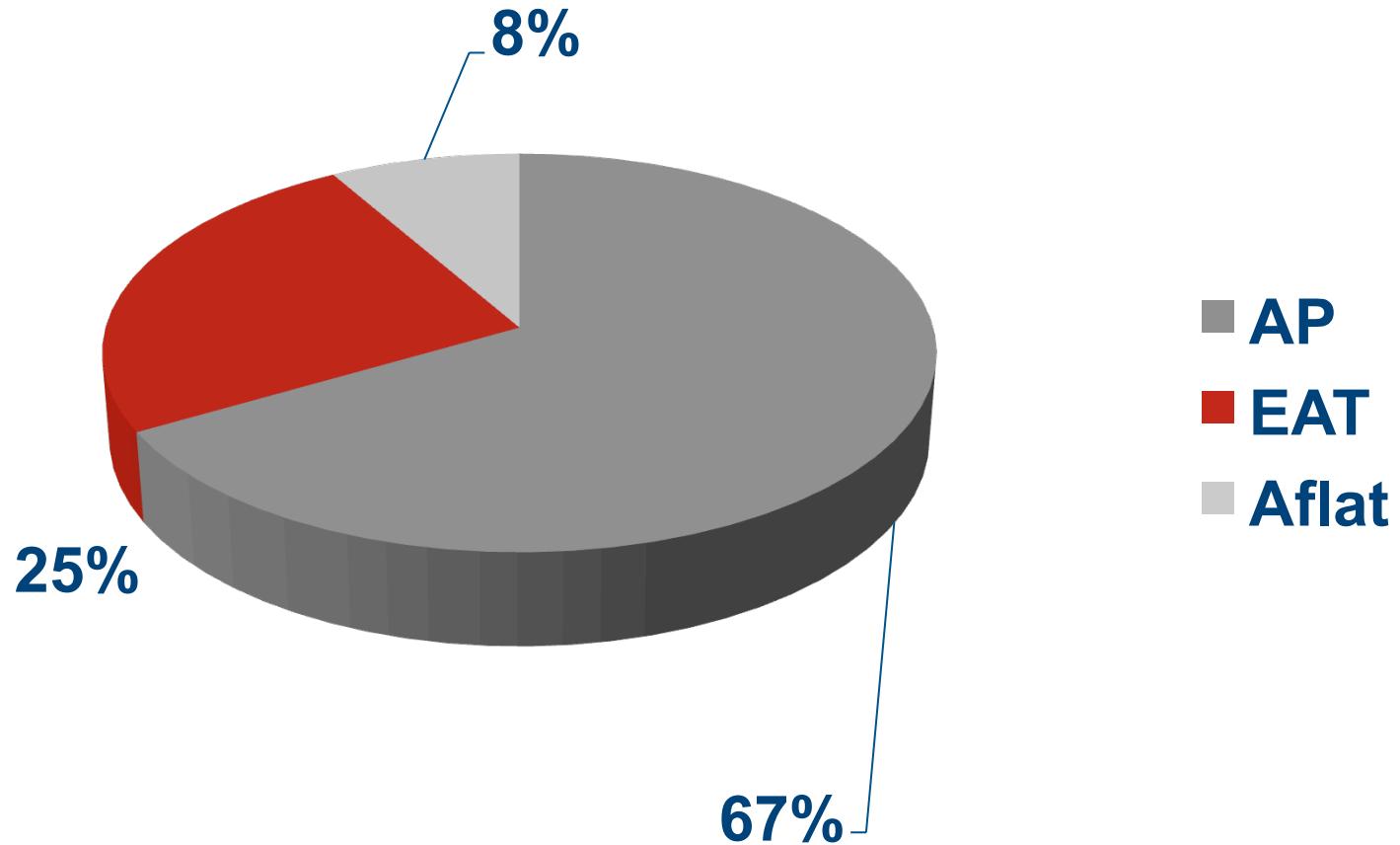
Andrew D. Blaufox, Gary L. Felix,
Circulation, 2001

Indications for RFA in infants



Pediatric RFA registry, 2005

Distribution of arrhythmias substrate



Selected patients characteristics



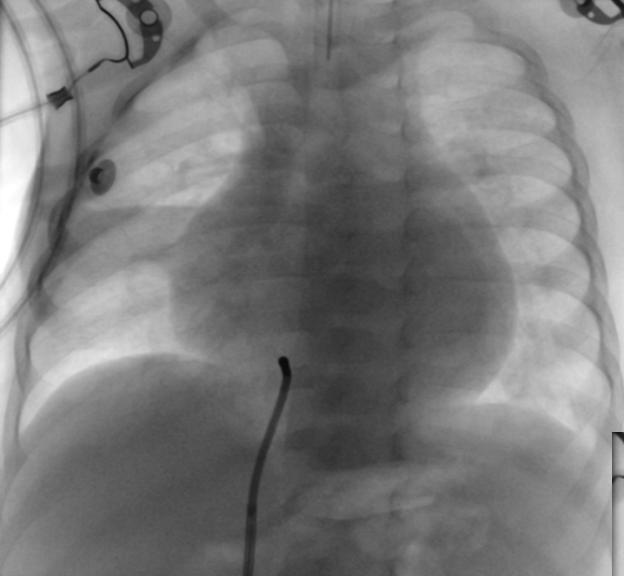
| Parameters | Mean ± standart deviation | Range |
|------------|---------------------------|-------------------|
| Age | $4,2 \pm 1,8$ | 40 days – 7 month |
| Weight | $5,5 \pm 2,2$ | 2,8 kg – 8,5 kg |
| Height | $62,4 \pm 5,8$ | 52 – 78 cm |

Selected patients characteristics

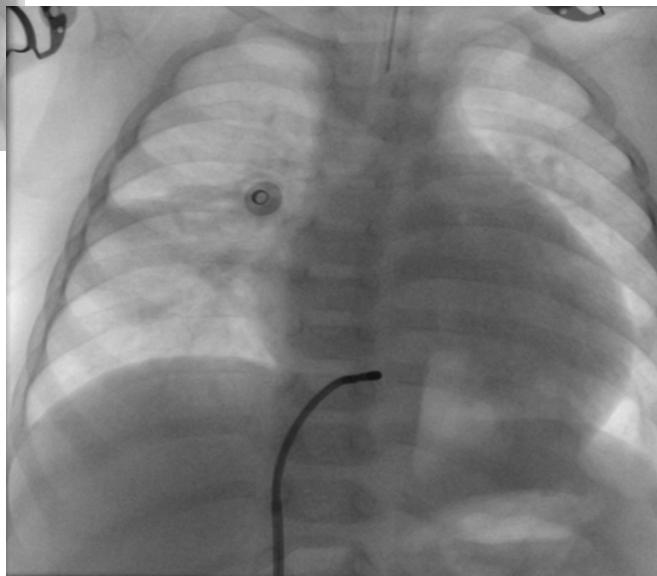


- ✓ Heart failure – III – IV class (NYHA, Ross):
 - ✓ 7 patients – III class HF;
 - ✓ 4 patients – IV class HF;
- ✓ Drug refractory arrhythmia;
- ✓ Progressive deterioration.

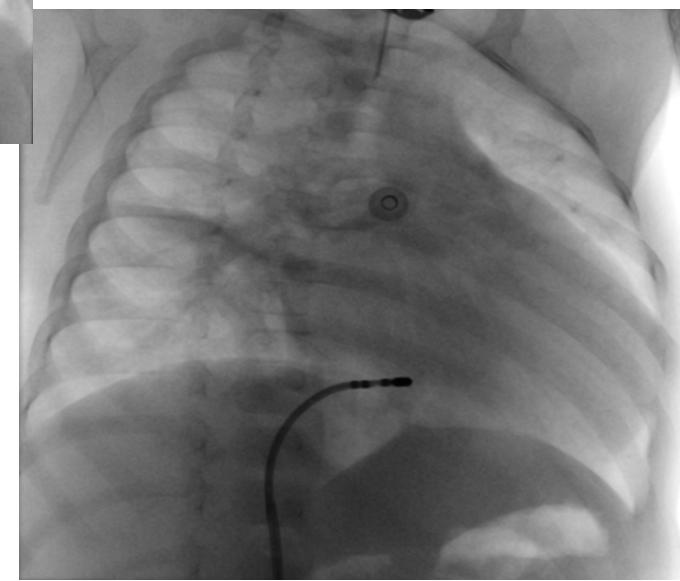
RFA procedure



LAO 30°



AP



RAO 30°

Atrial flutter



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SIEMENS

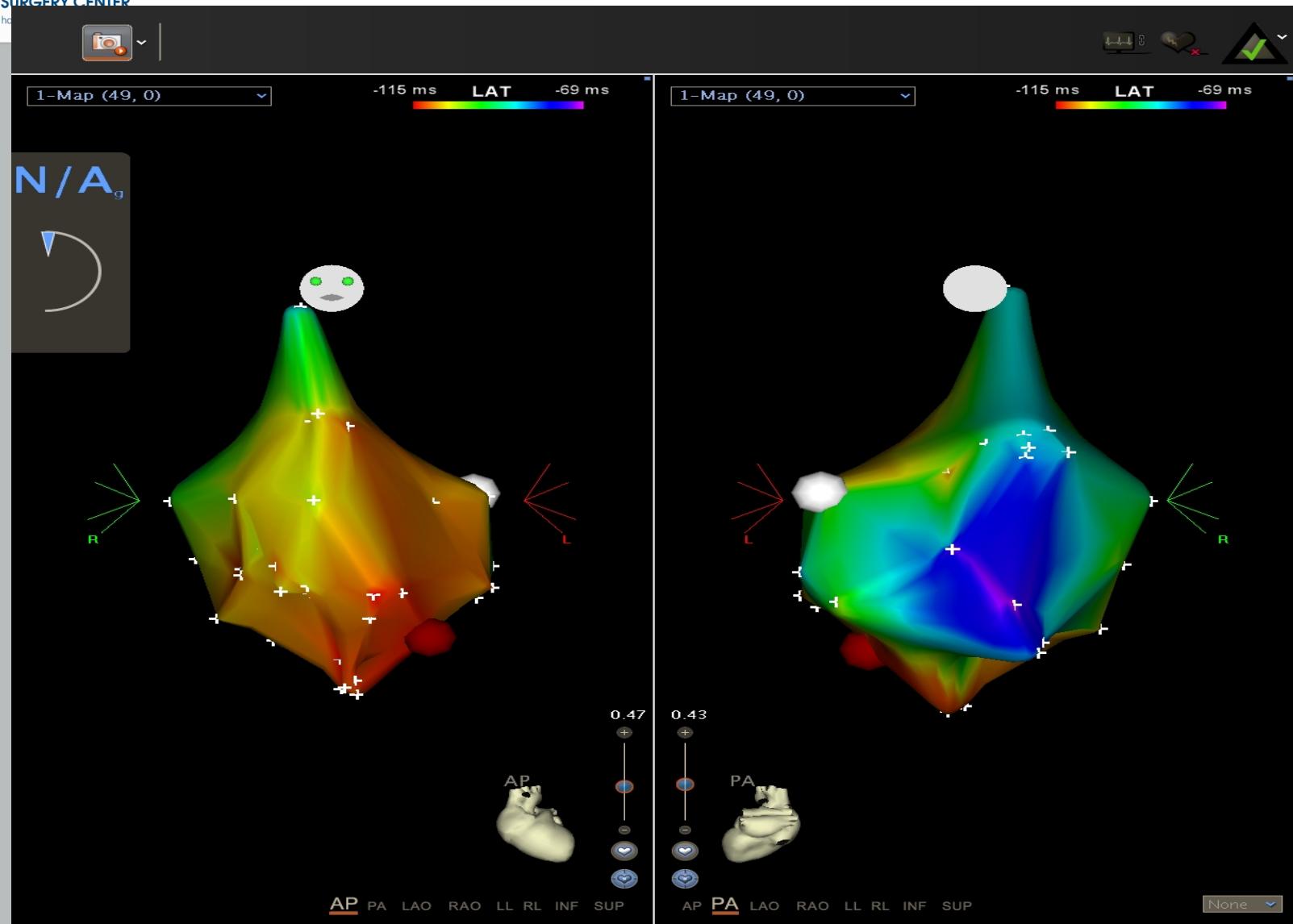


E.A. Shamgan , 4700

Study: Electrophysiology^Ele...

Date: 24.10.2012

Right atrial ectopic tachycardia



Left atrial ectopic tachycardia



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SIEMENS

1. Baseline:Printout 10:26:10

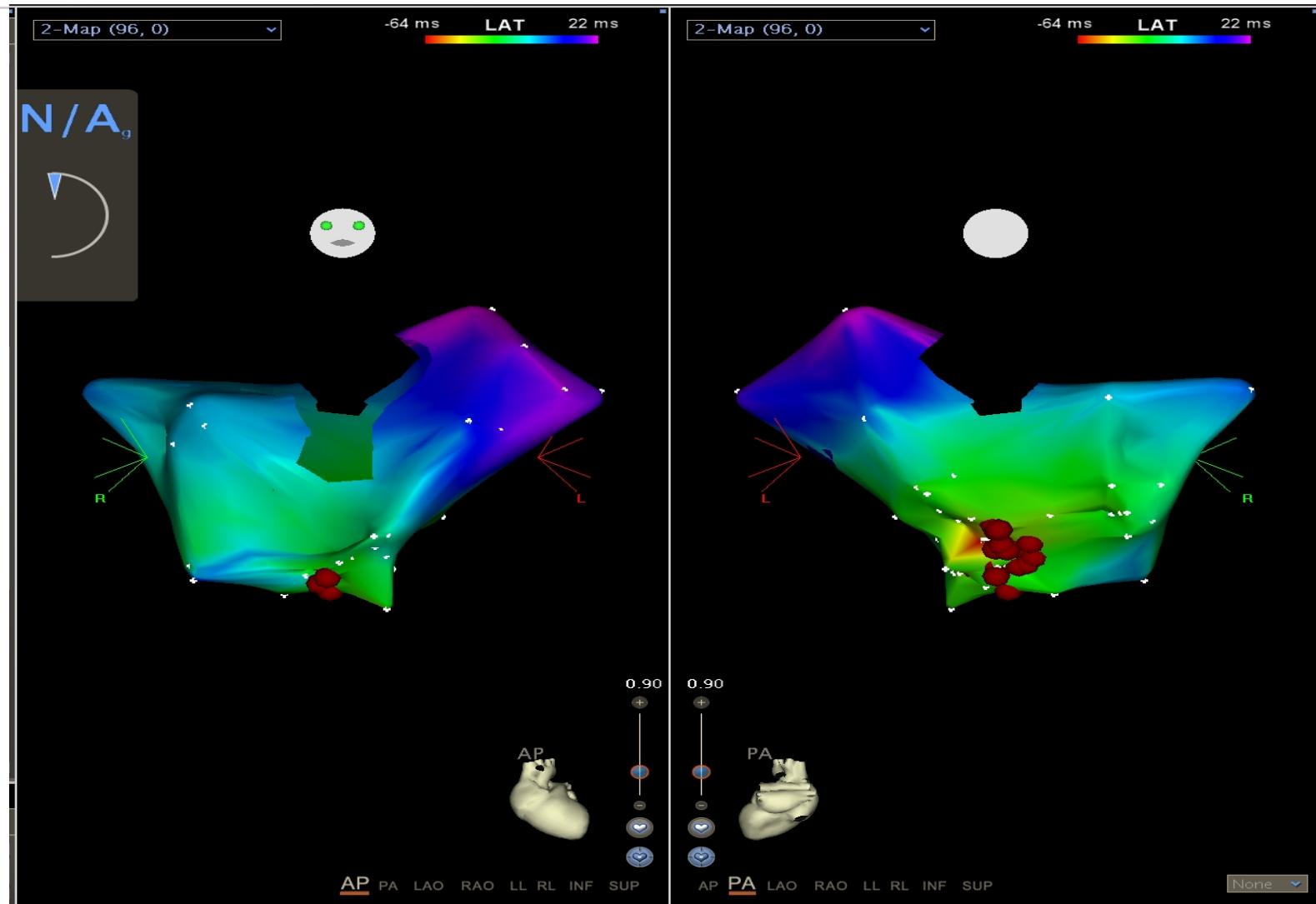
AXIOM Sensis XP VC10B



Left atrial ectopic tachycardia



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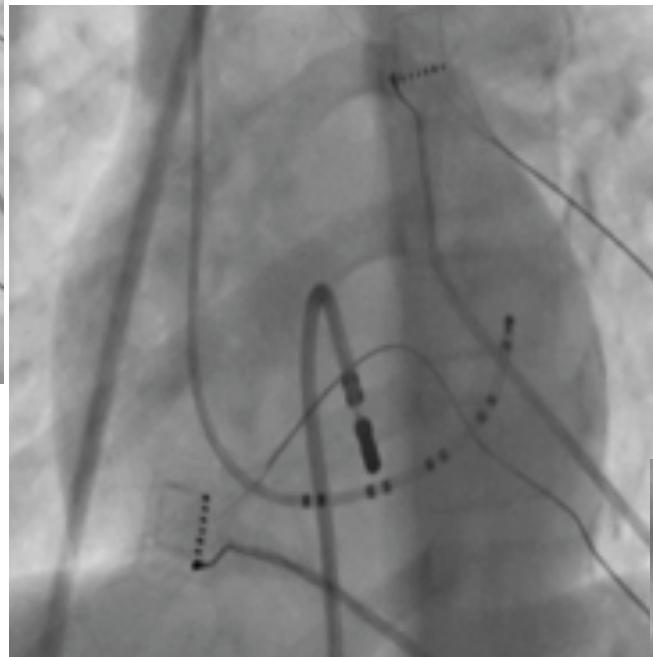
X-Ray



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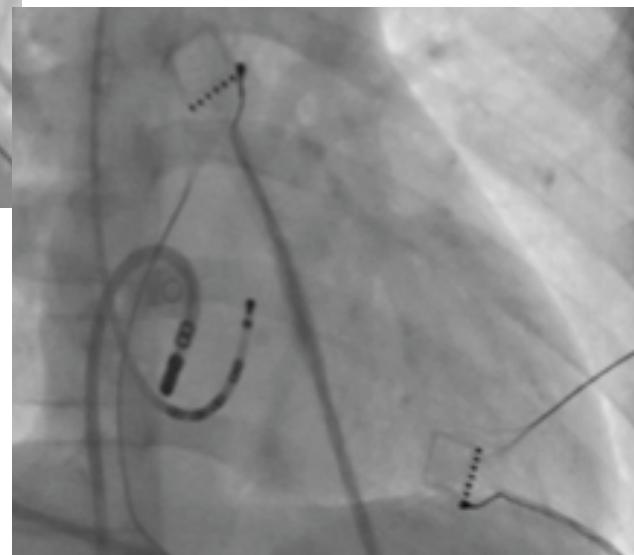
AP



RAO 30°



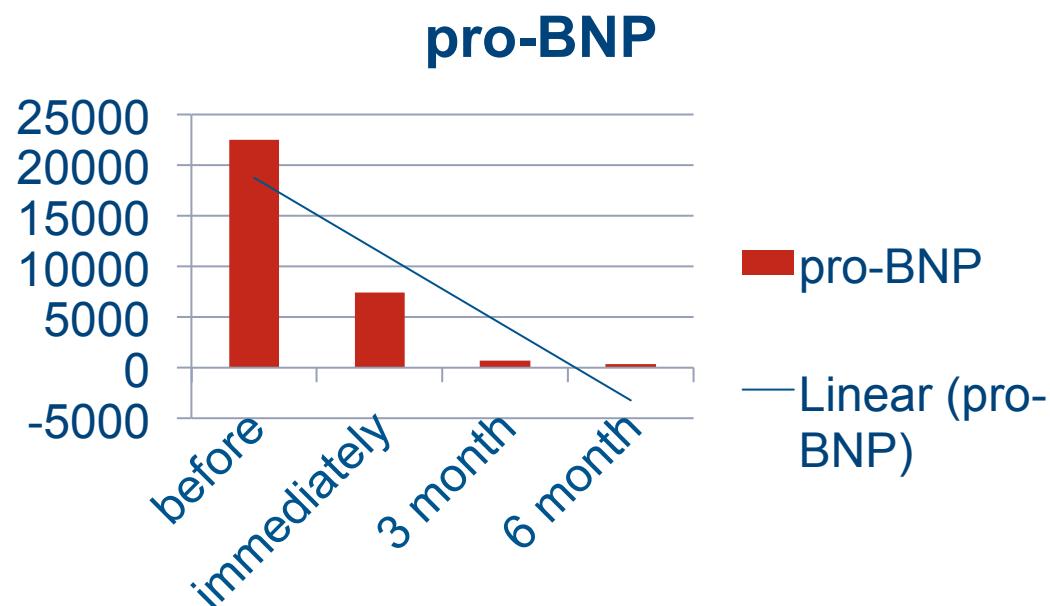
LAO 30°



Patients dates



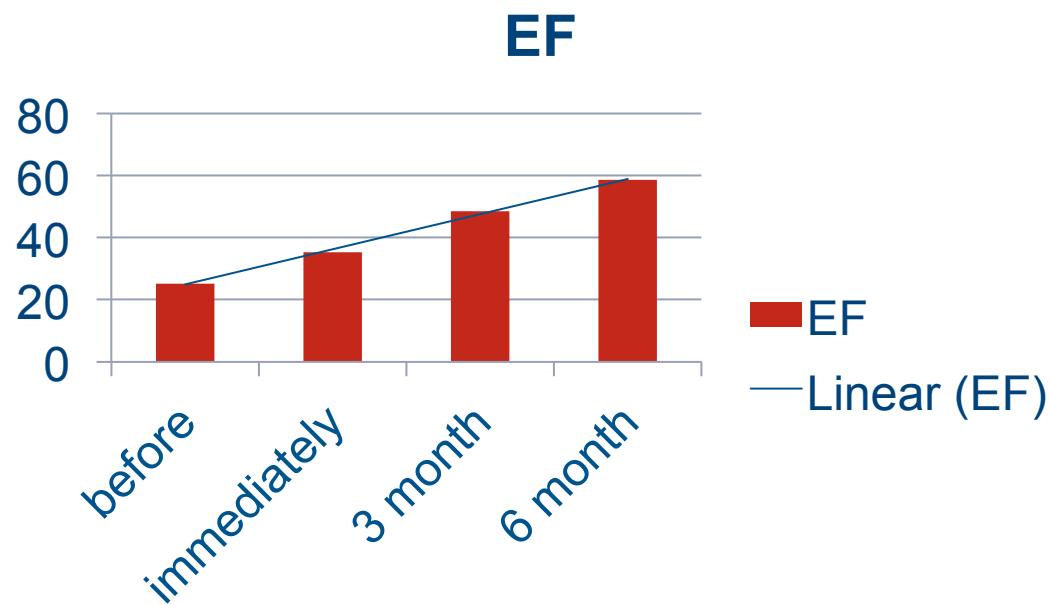
| | Before | Immediately after | 3 month | 6 month |
|------------------|------------|-------------------|------------------|--------------------|
| Pro-BNP pg/ml | 22534±3560 | 7450±1280 | 743±35 | 345±45 |
| P-value | - | 0,002 | 0,001 < 0,001 | < 0,001 < 0,001 |



Patients dates



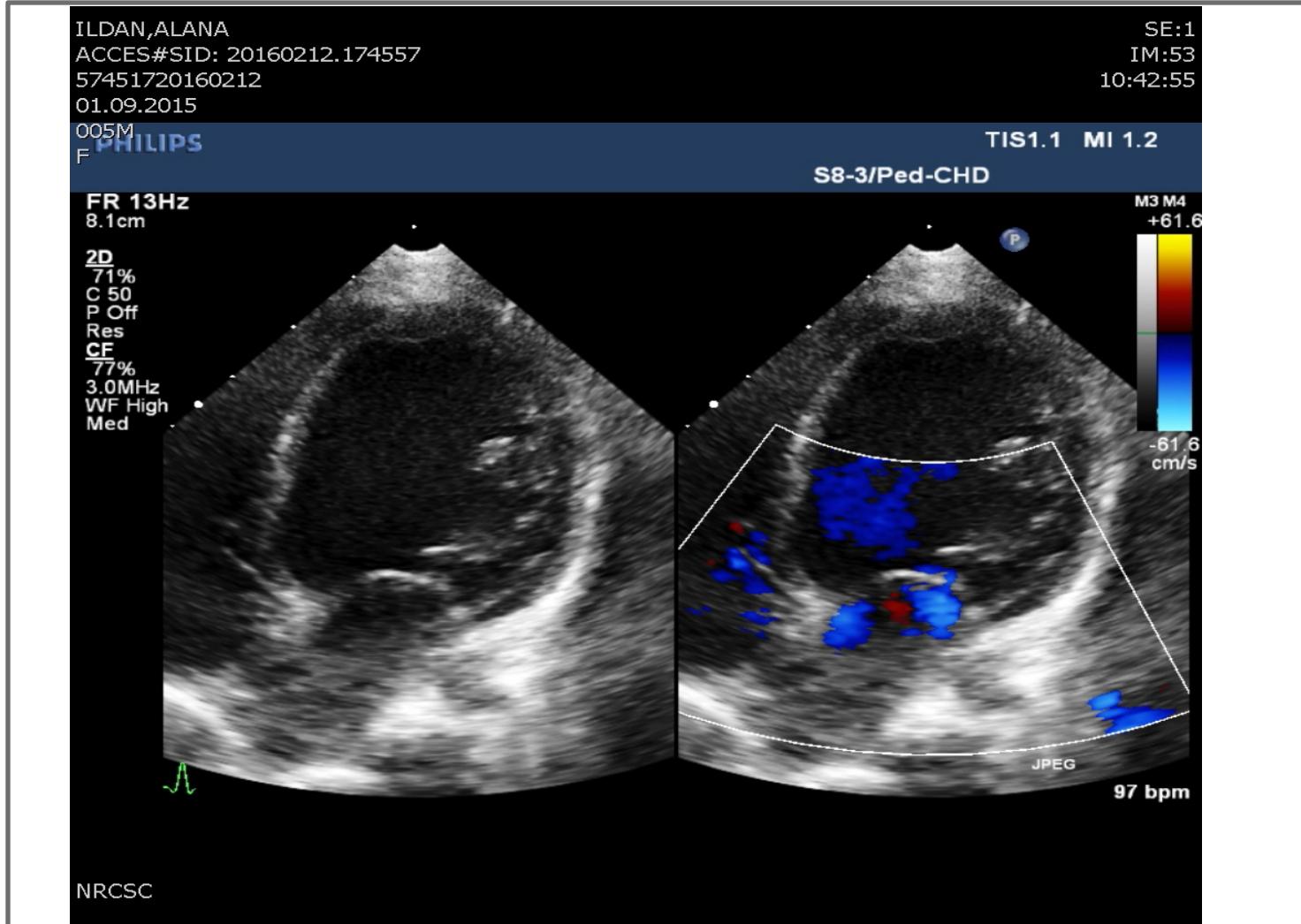
| | Before | Immediately after | 3 month | 6 month |
|---------|----------------|-------------------|----------------|----------------|
| EF | $25,3 \pm 5,7$ | $32,4 \pm 5,6$ | $48,4 \pm 4,3$ | $58,7 \pm 3,4$ |
| P-value | - | <0,05 | <0,05 | <0,05 |



Girl, A. 4 m., before RFA



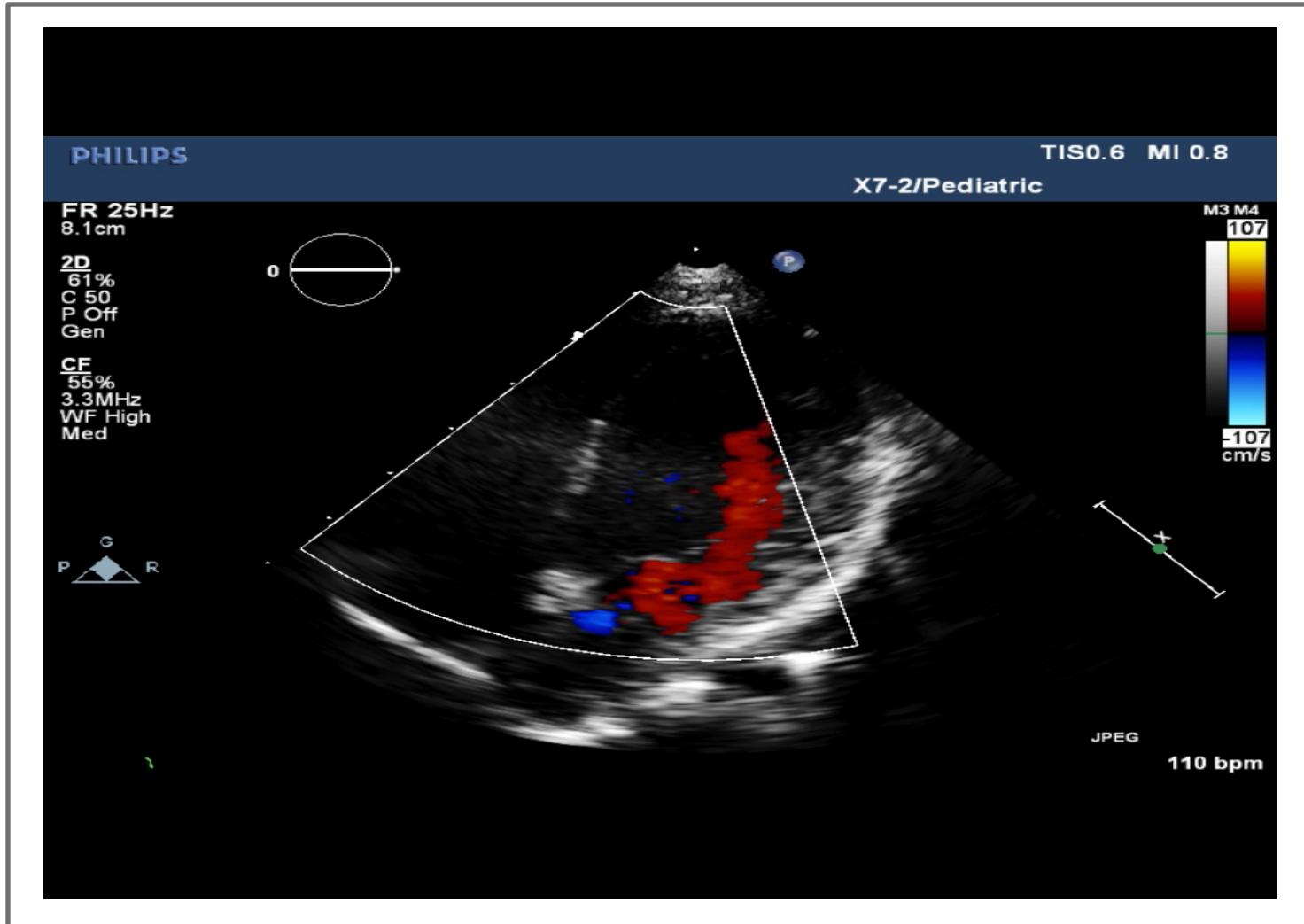
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Girl, A. 6 month after RFA



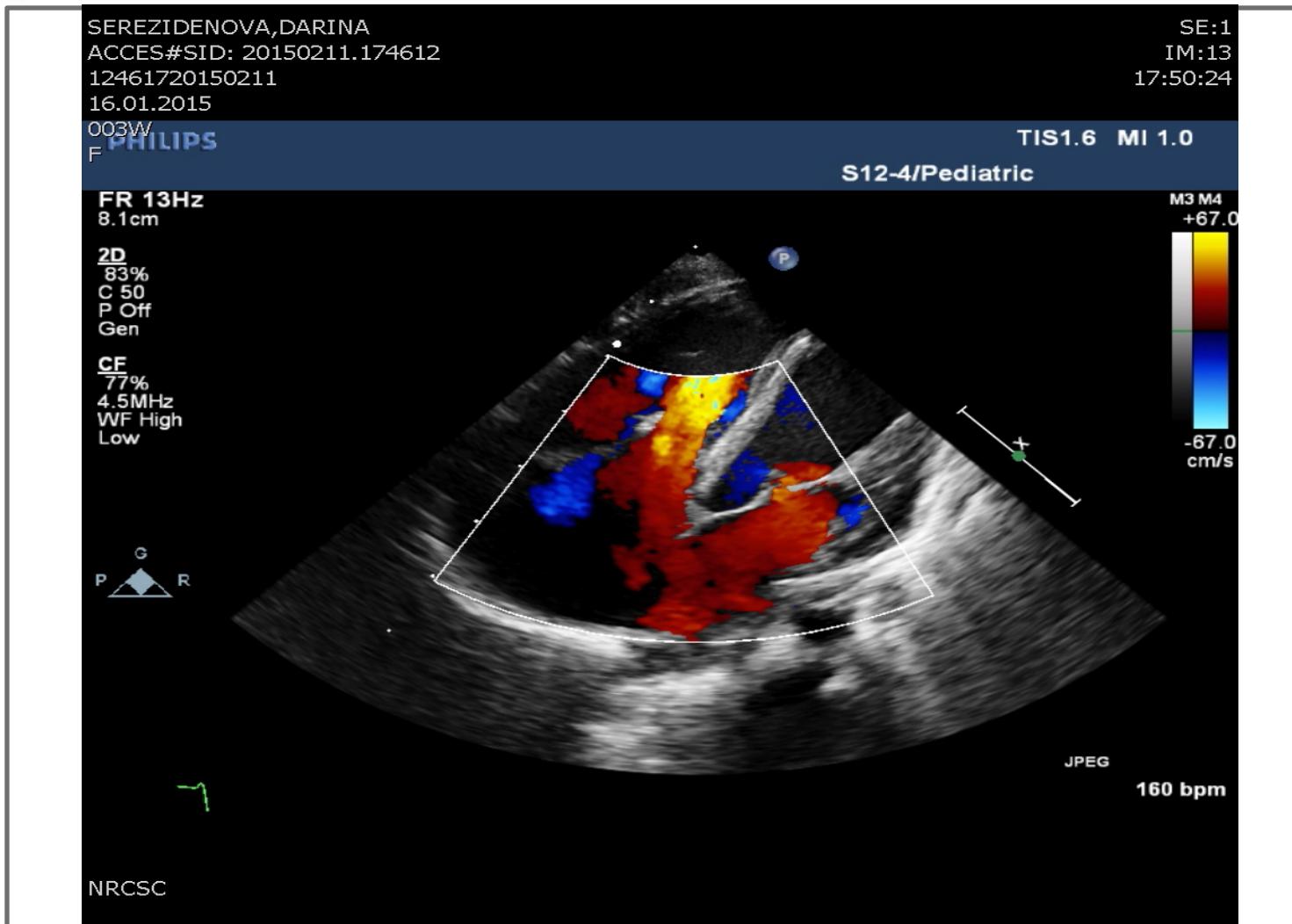
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Girl D., 40 days, 2.8 kg, before RFA



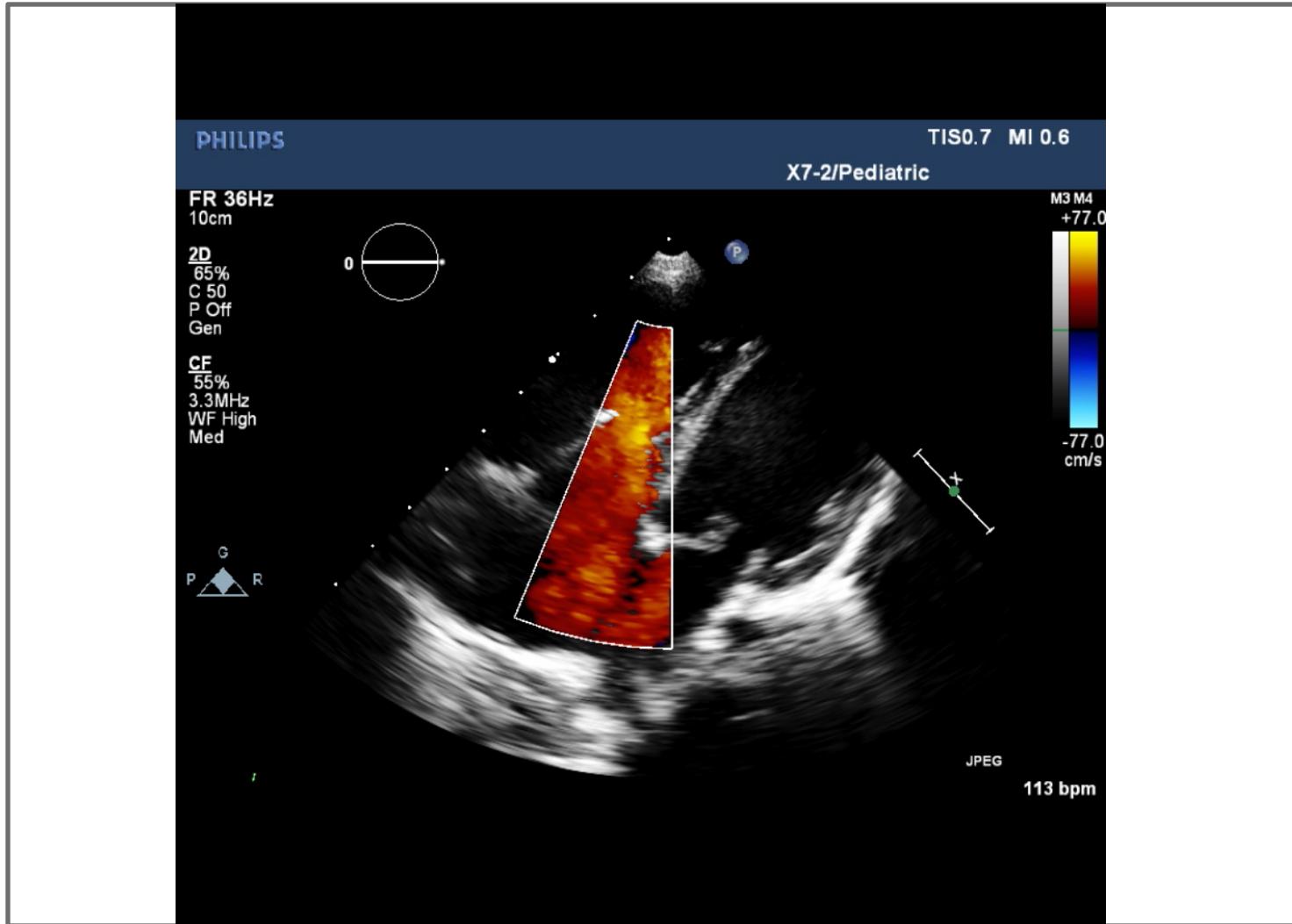
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Girl D., 6 month after RFA

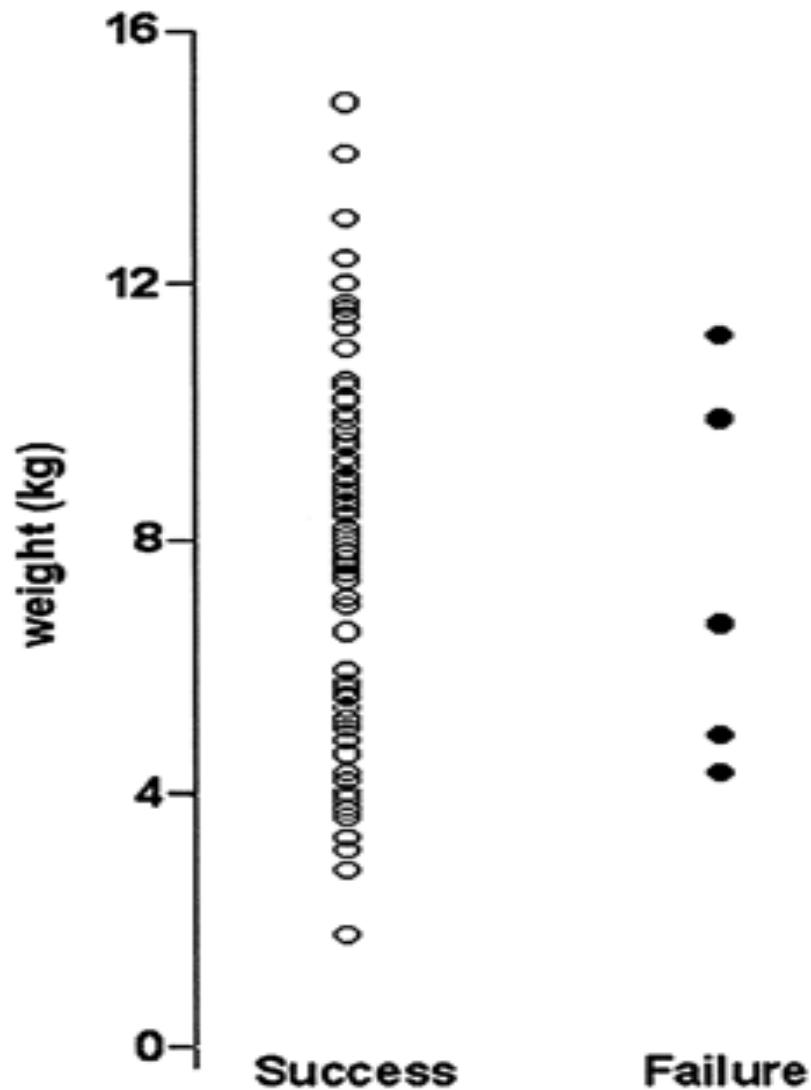


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AP Outcome



Andrew D. Blaufox, Gary L.
Felix, Circulation, 2001

Our results:



- ✓ 1 case AP – AV-boke III + PM VVI;
- ✓ No recurrence;
- ✓ Normal heart function.

Conclusions

- ✓ RFA is safe and effective procedure;
- ✓ RFA might be recommended as method of choice for treatment newborns and infants with life threatening drug resistant arrhythmias especially in condition of restrictive medication choice.



Thank you! Welcome to Kazakhstan!



**World Congress of WSCTS
Astana 2017**

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