

I, (Joachim Hebe) DO NOT have a financial interest/
arrangement or affiliation with one or more
organizations that could be perceived as a real or
apparent conflict of interest in the context of the subject
of this presentation.

Atrial Tachycardia and Fibrillation in ACHD Patients

Ablation

... Indication and Methods ...

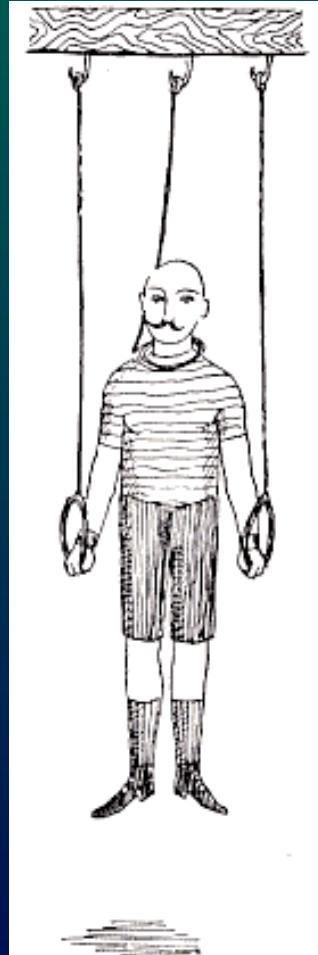
Atrial Tachycardia and Fibrillation in ACHD Patients

Ablation

... Indication and Methods ...

Atrial Tachycardia and Fibrillation in ACHD

- *medical treatment*

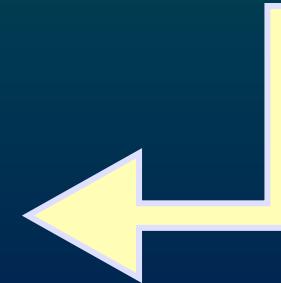


tachycardia
+
bradycardia
±
heart failure

Atrial Tachycardia and Fibrillation in ACHD

antiarrhythmic drugs -> often:

- not reliable
- side effects
- not attractive



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

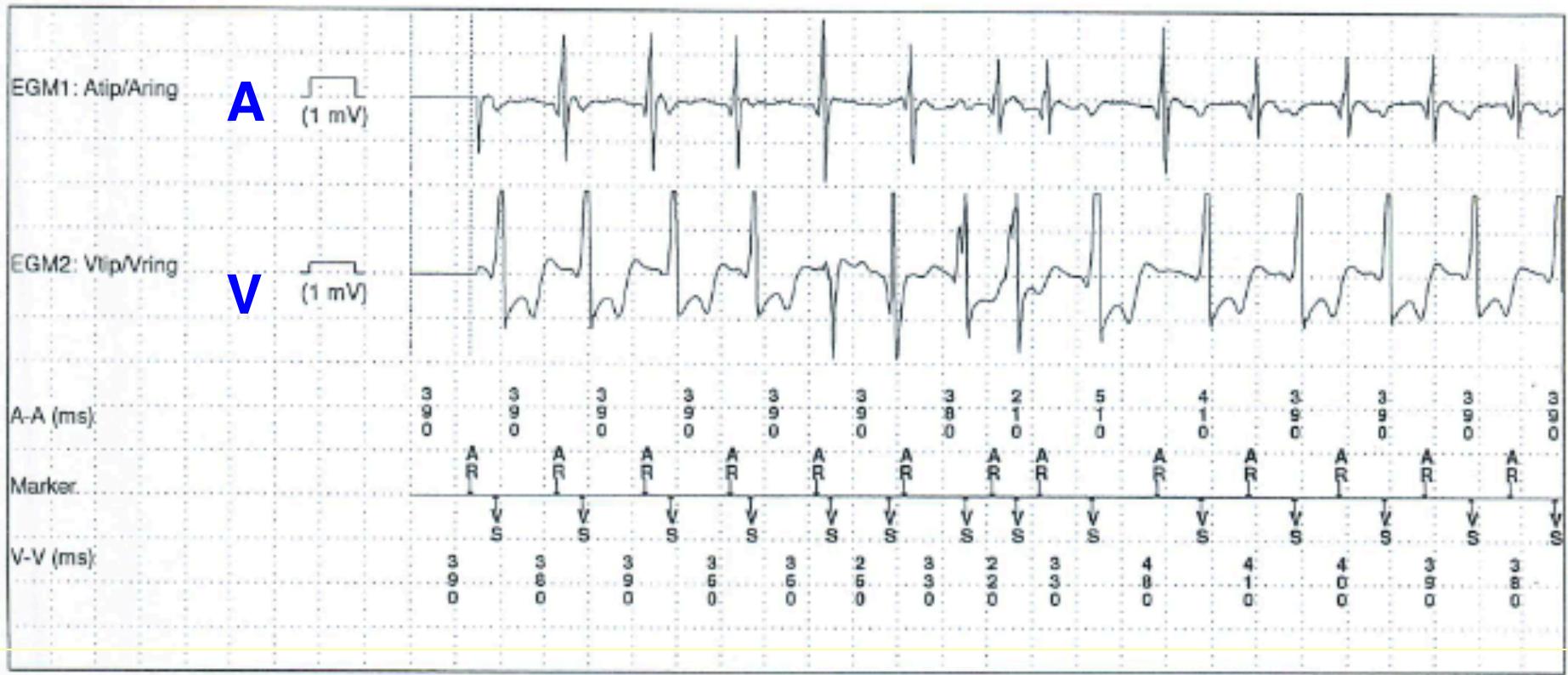
Schnelle A&V Episode Nr. 85

Gerät: EnRhythm P1501DR

Patient:

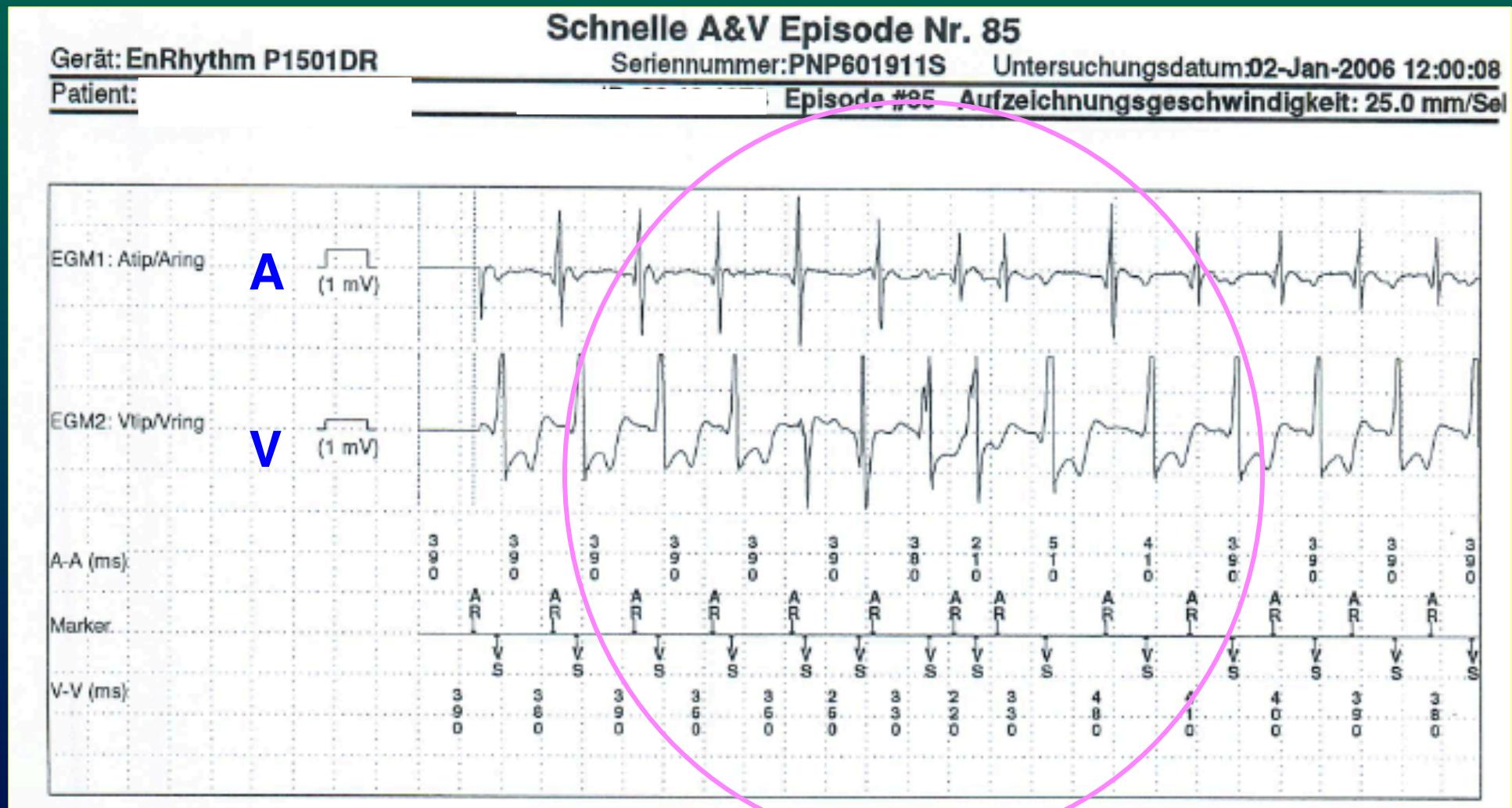
Seriennummer:PNP601911S Untersuchungsdatum:02-Jan-2006 12:00:08

Episode #85 Aufzeichnungsgeschwindigkeit: 25.0 mm/Sel



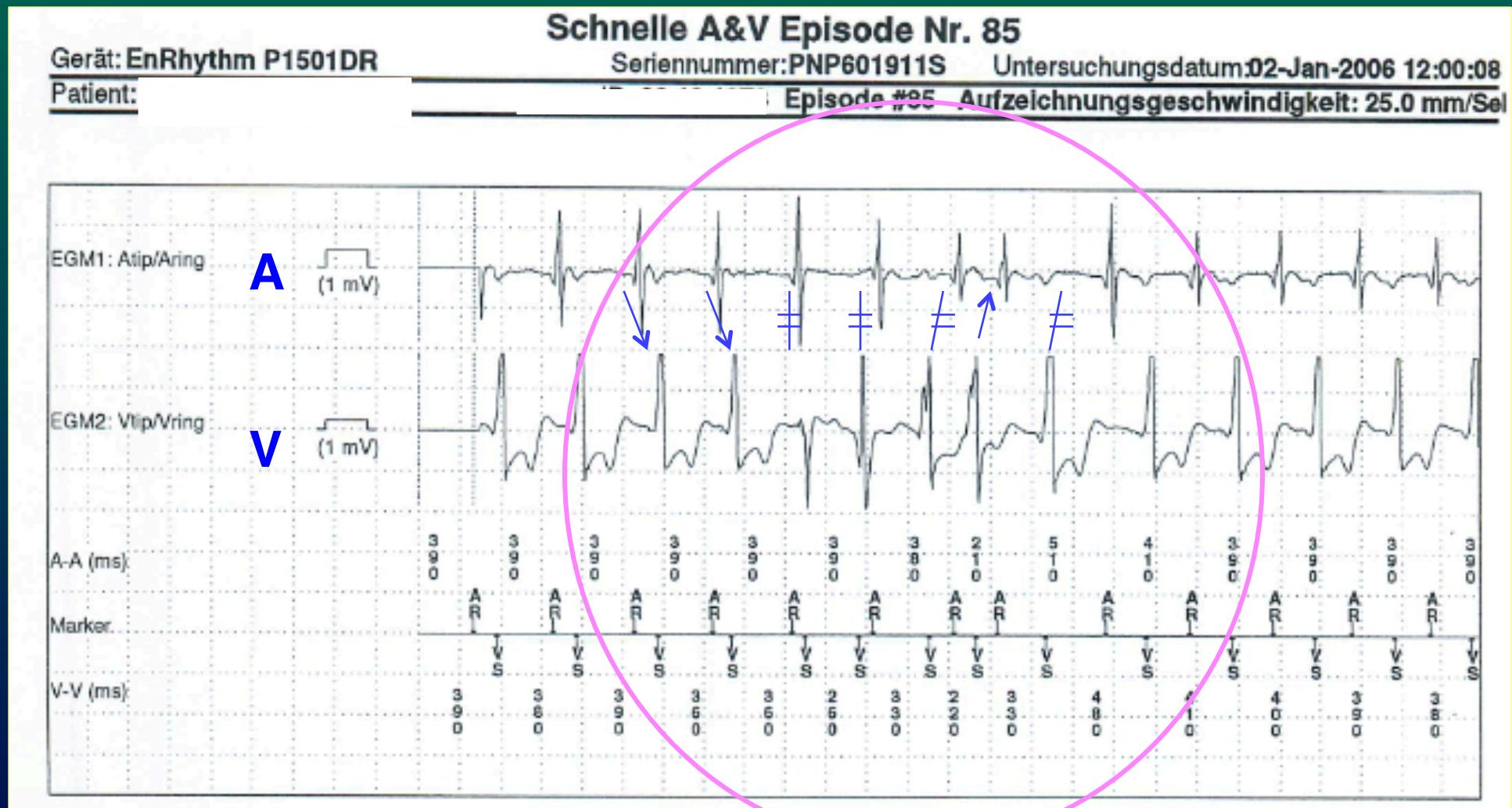
Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

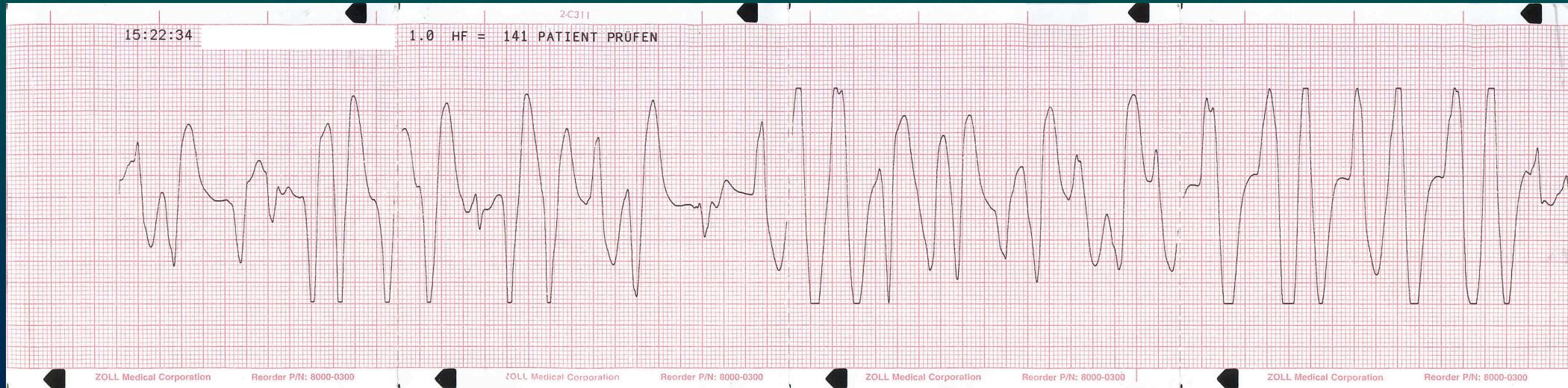
syncope while cycling -> haemodynamic collapse -> CPR

May 2013

Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR

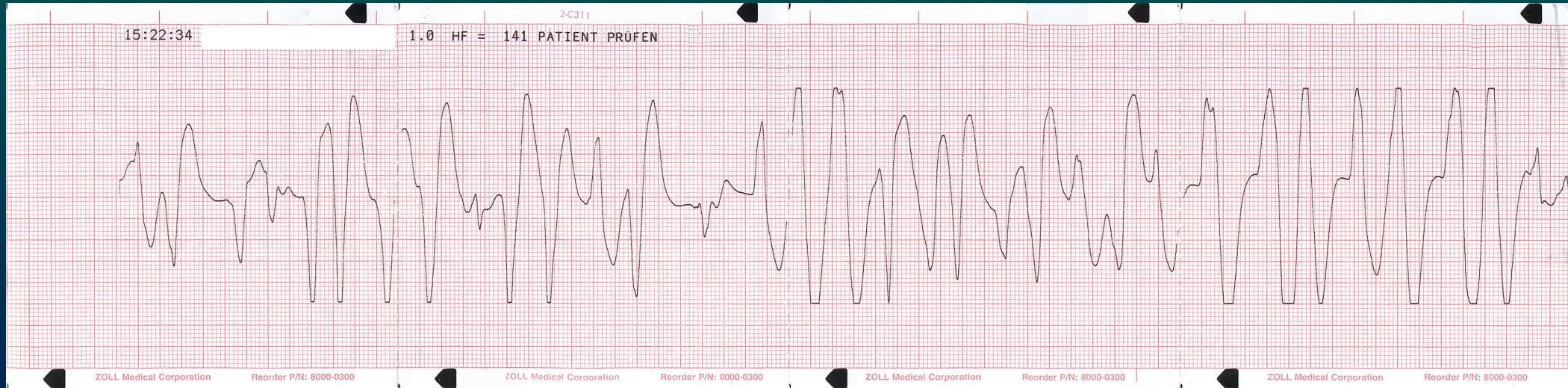


May 2013

Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



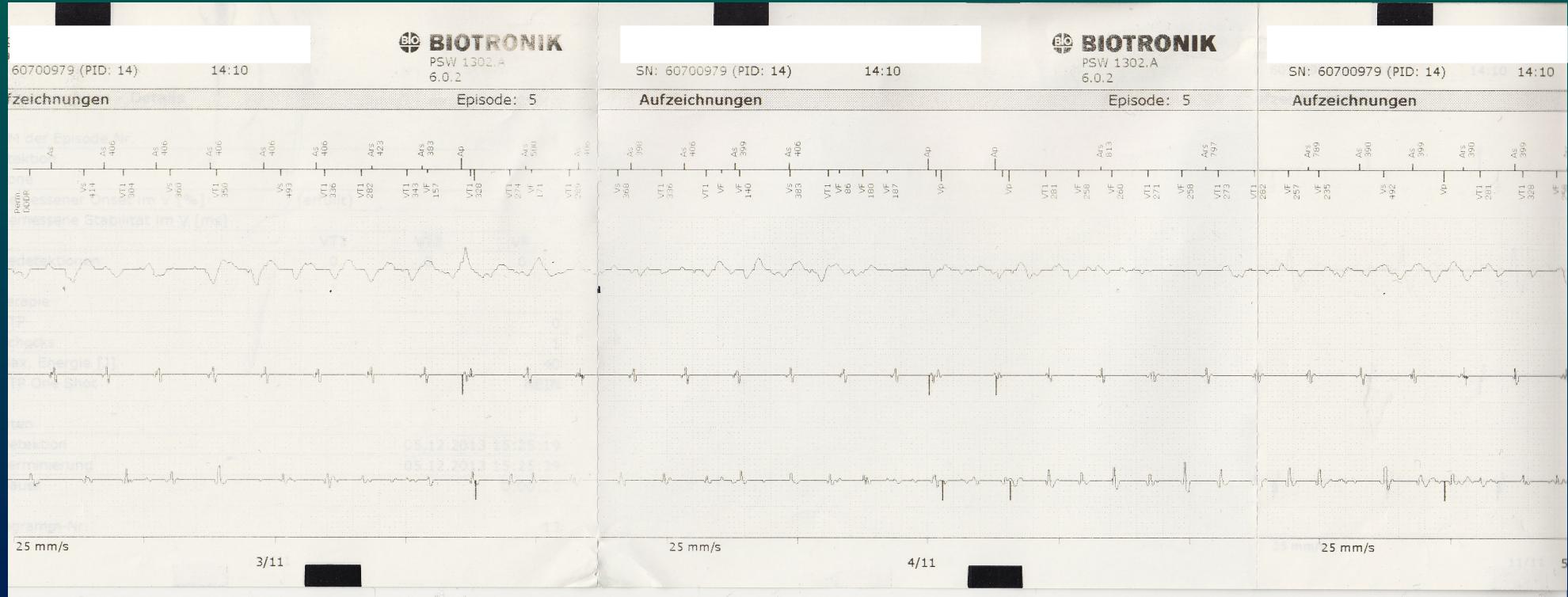
→ ICD - implant

May 2013

Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



???????



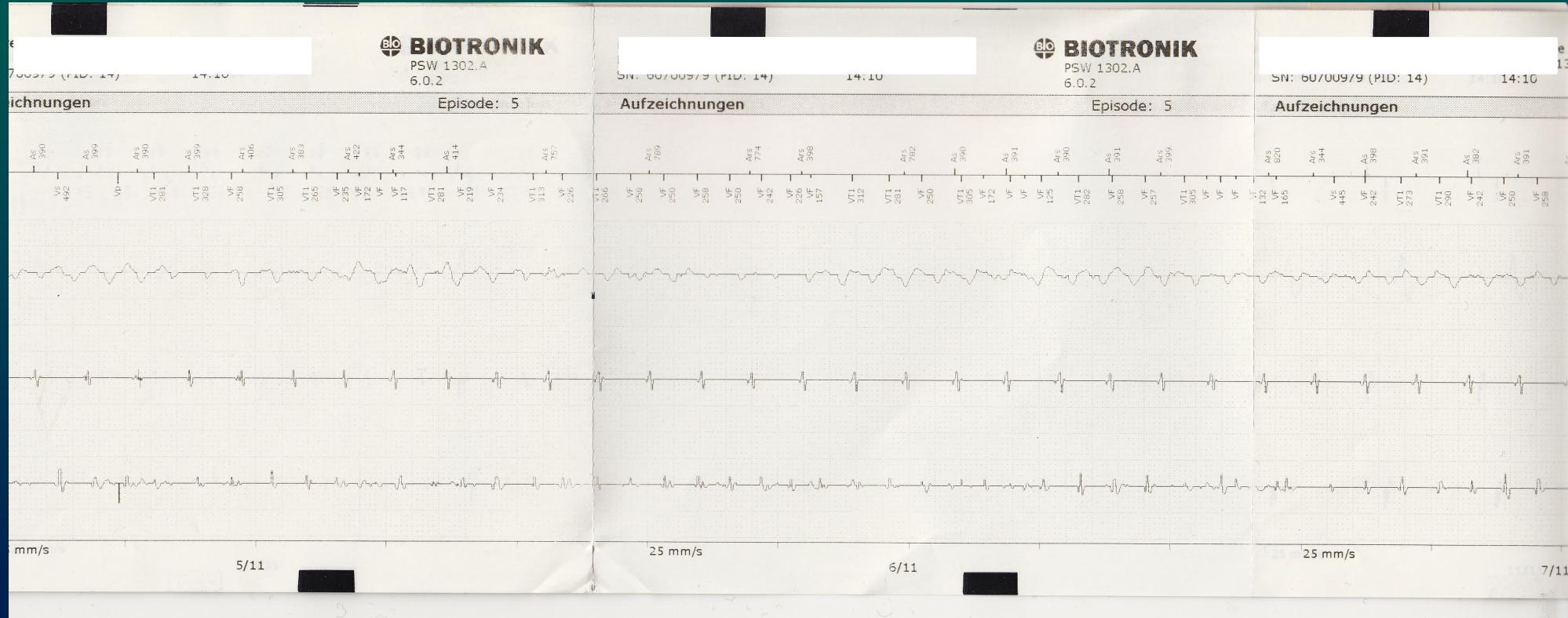
???????????????



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



???????????????



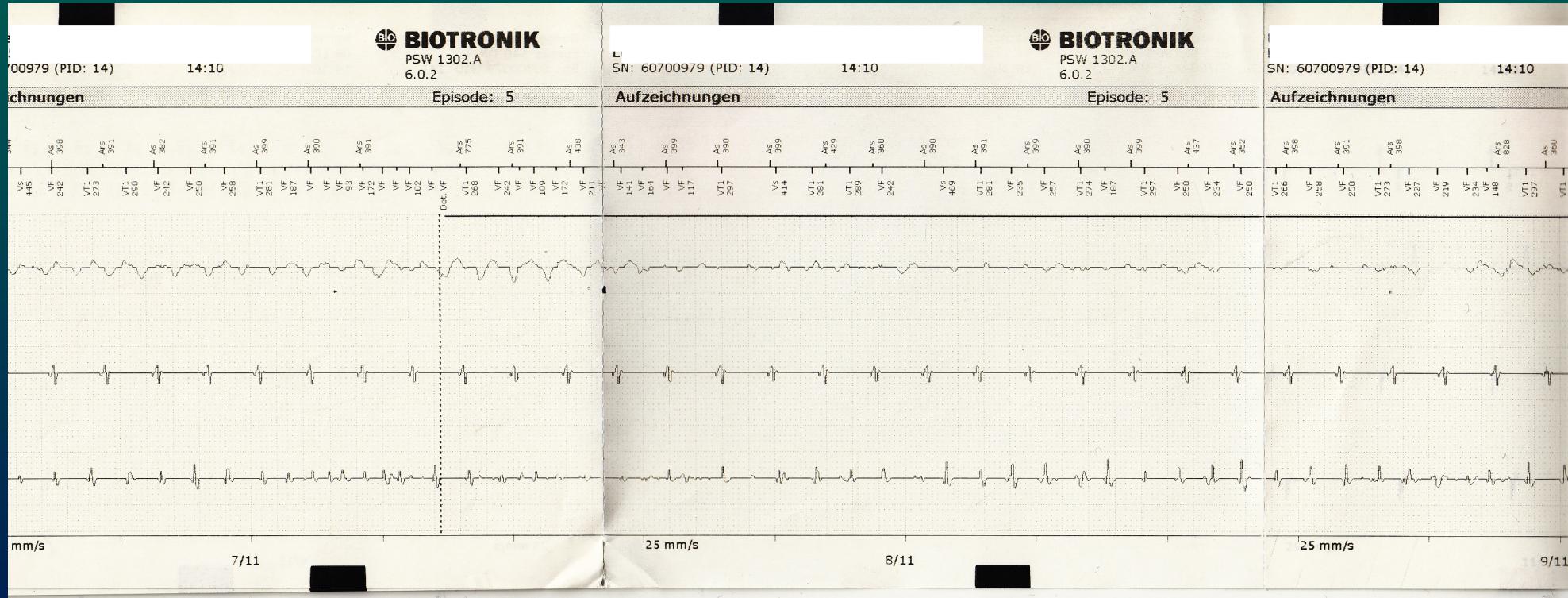
???????????????



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



?????????????



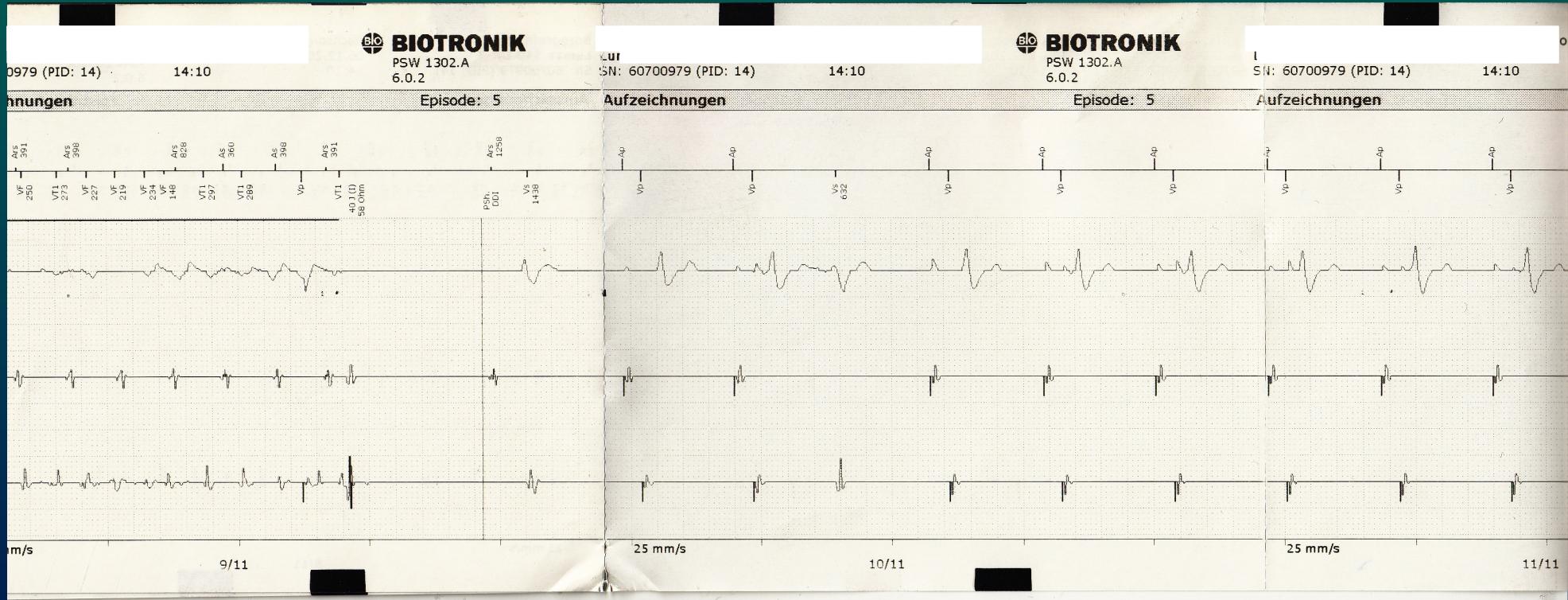
?????????????



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



?????

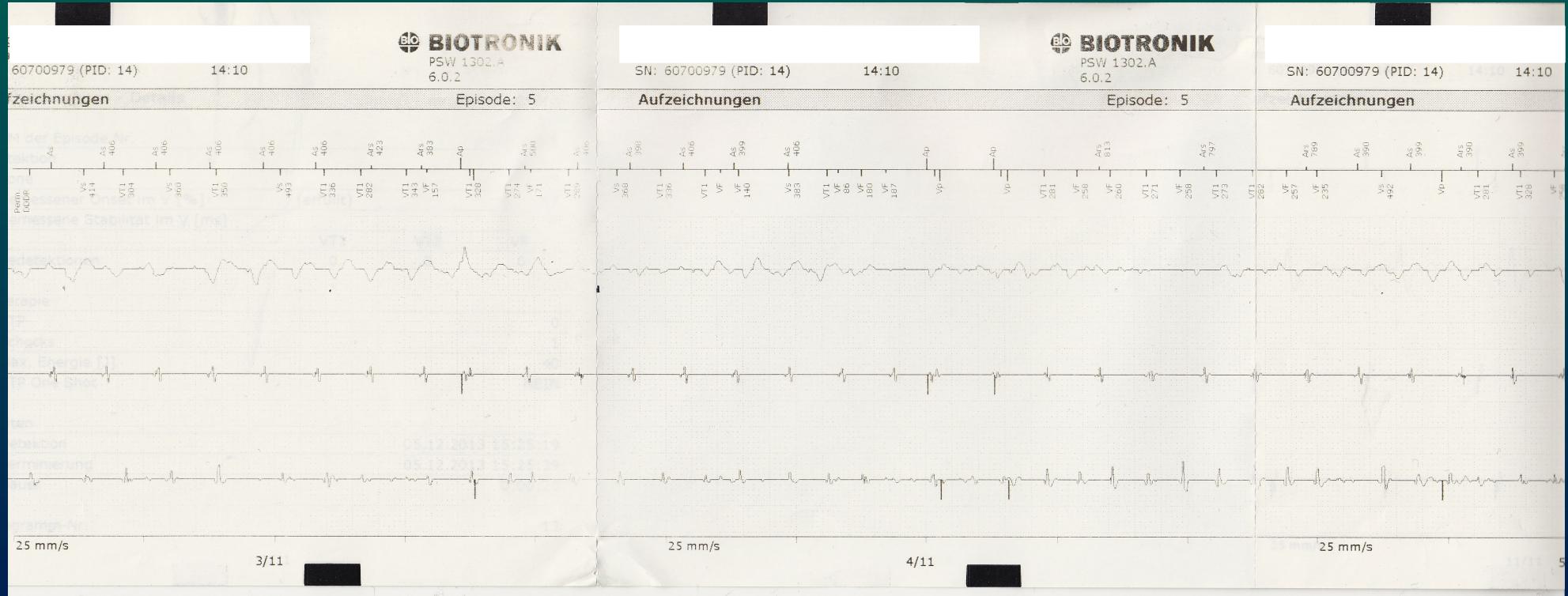


?????

Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



AT (CL 370-390 ms)



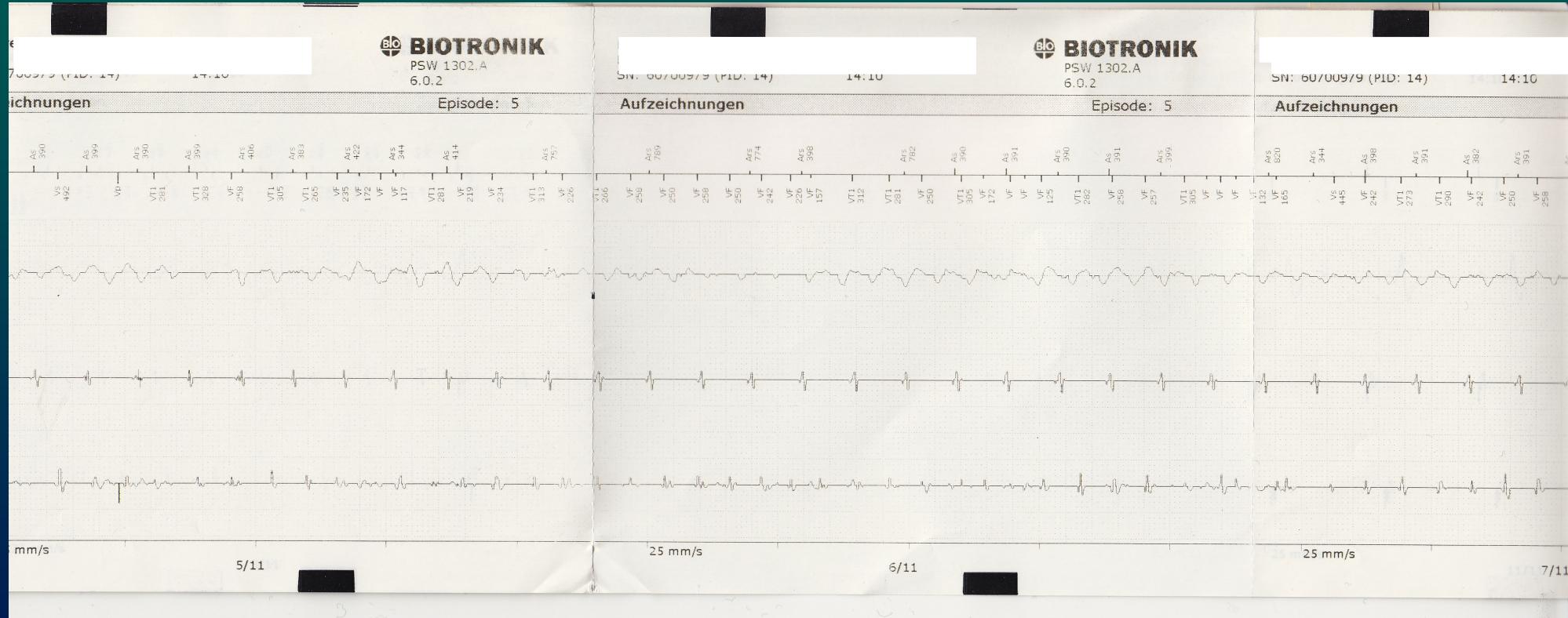
VT-Arrhythmia



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



V-Arrhythmia / VT



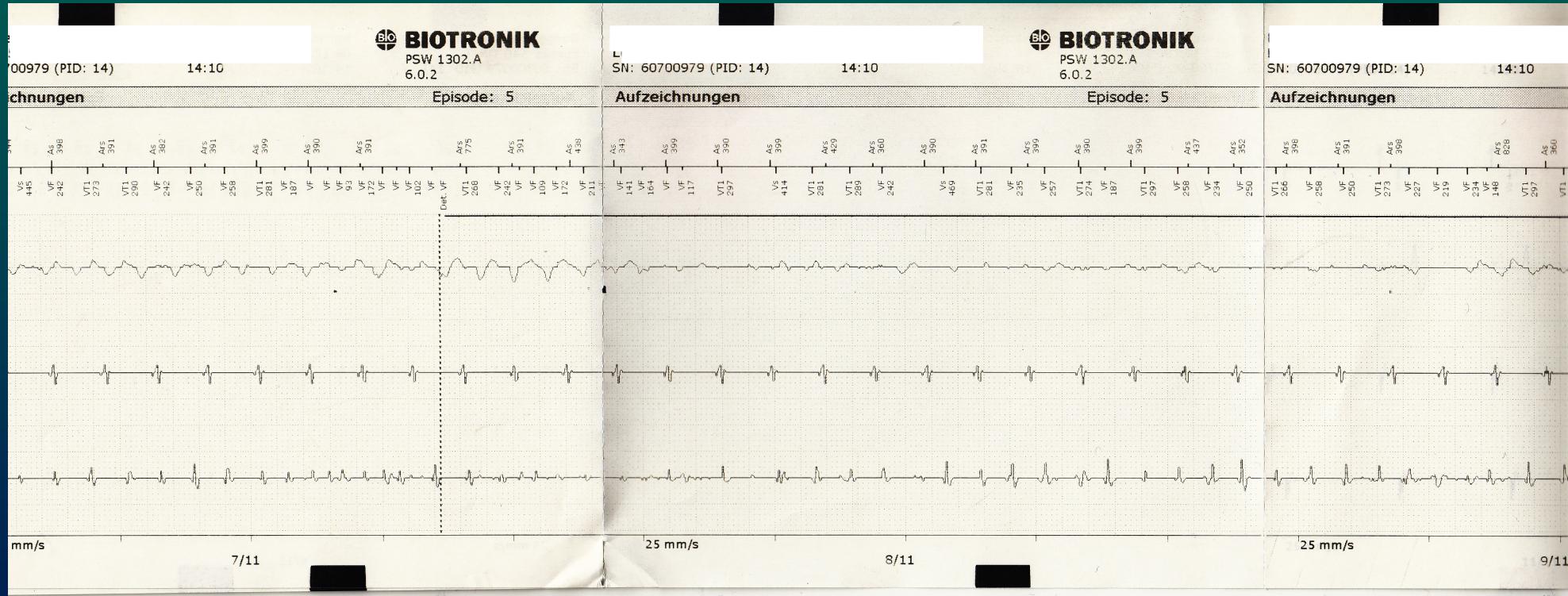
V-Arrhythmia / VT



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



V-fibrillation



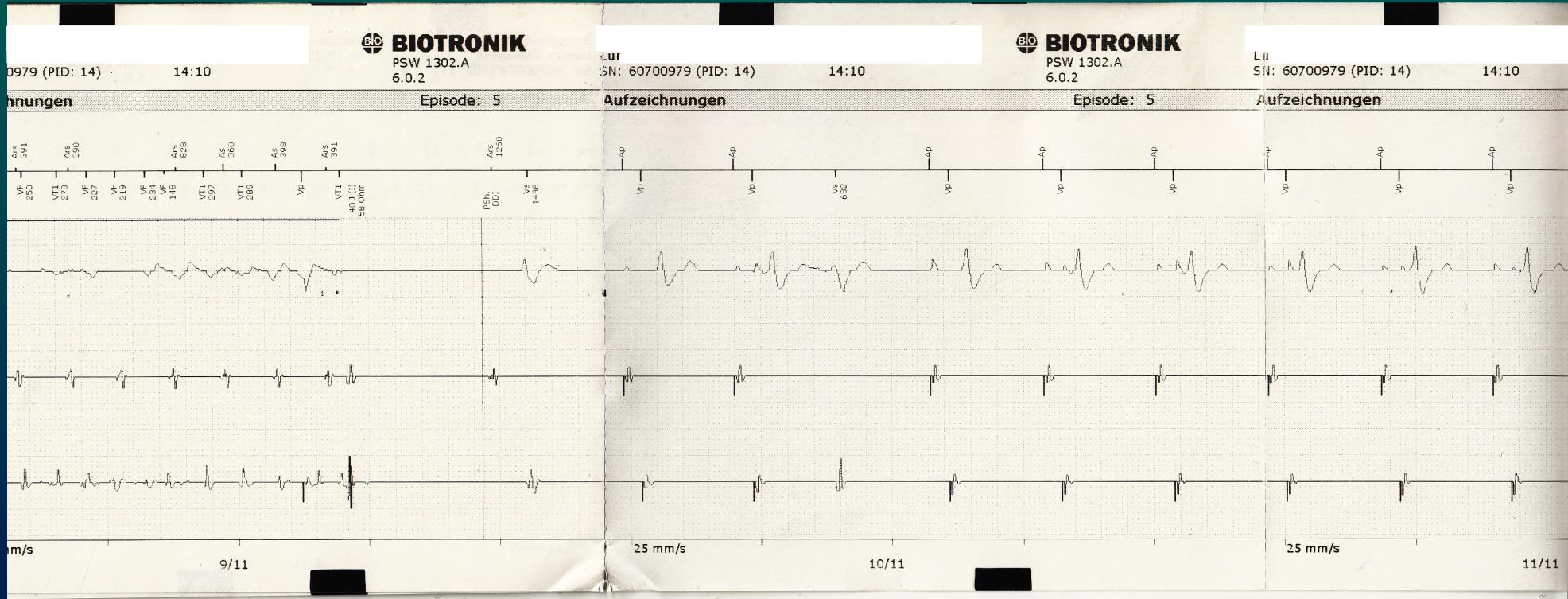
V-fibrillation



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



ICD

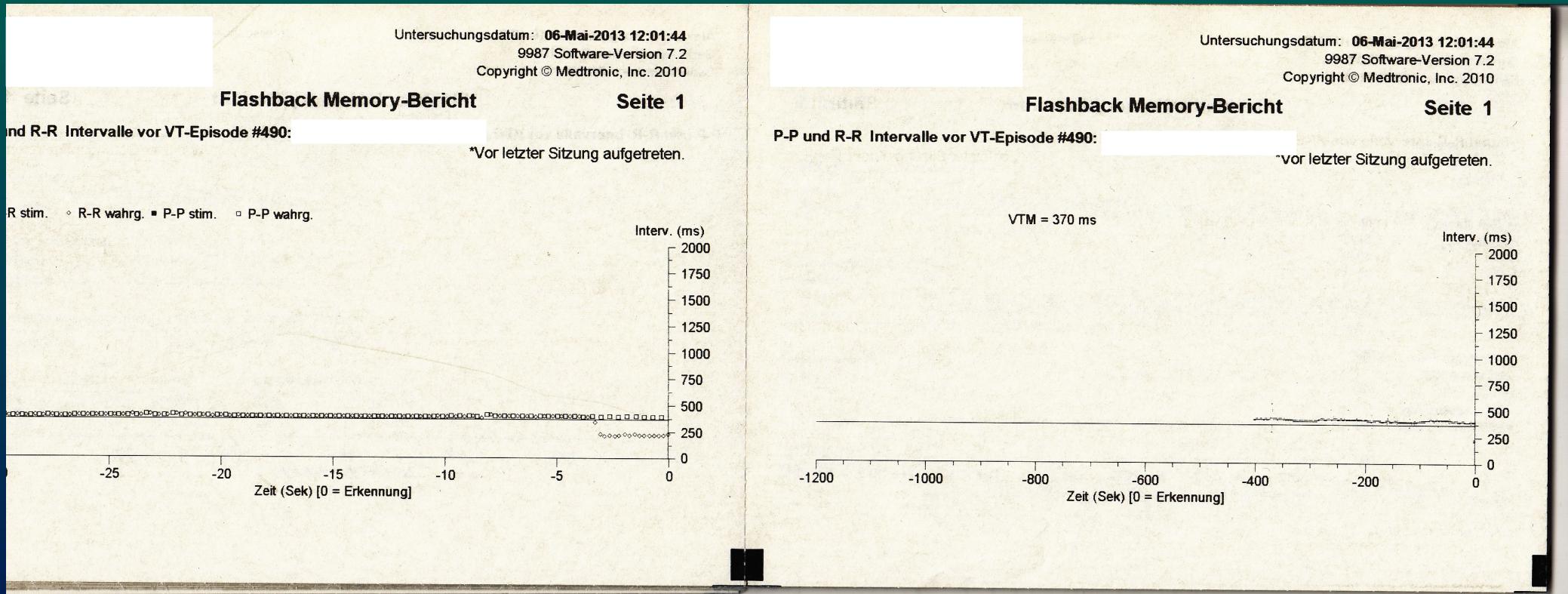


DDI - Pace

Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



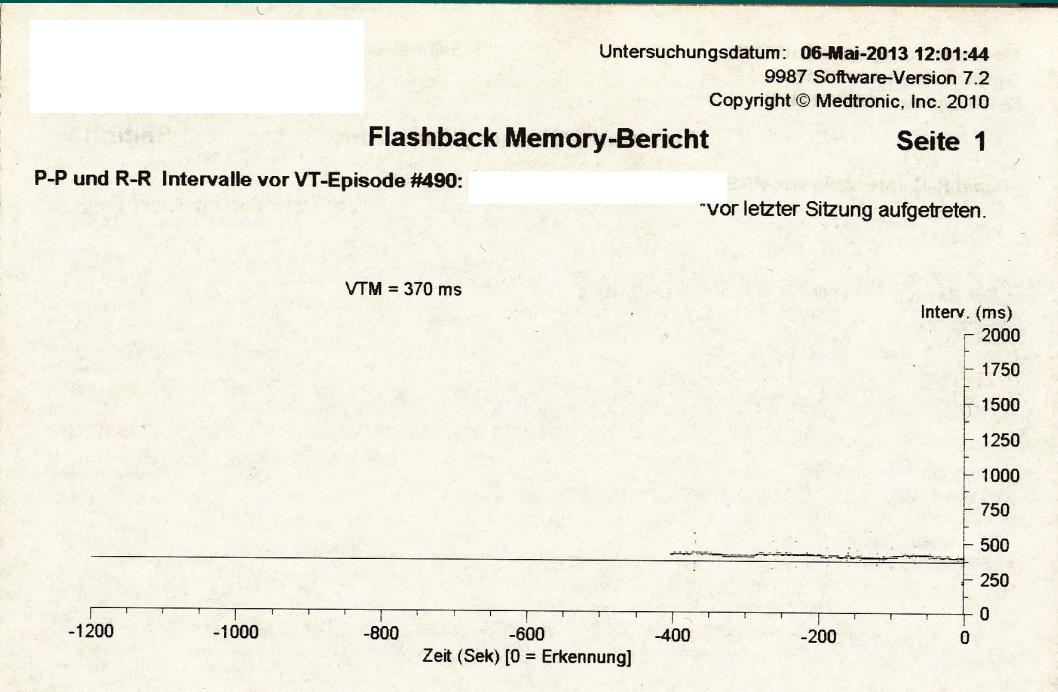
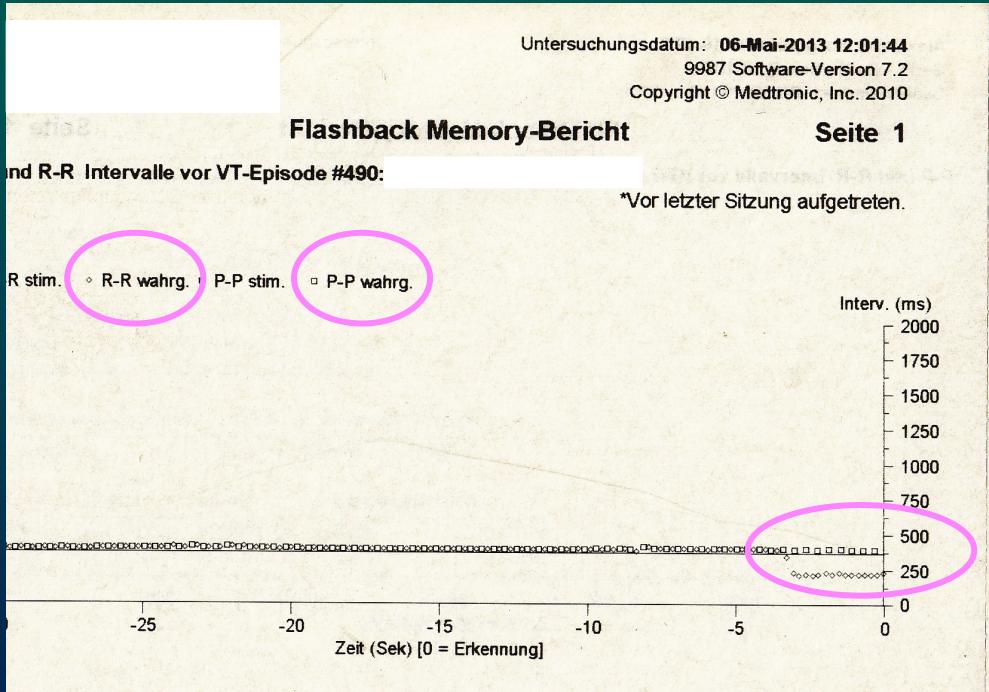
May 2013



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



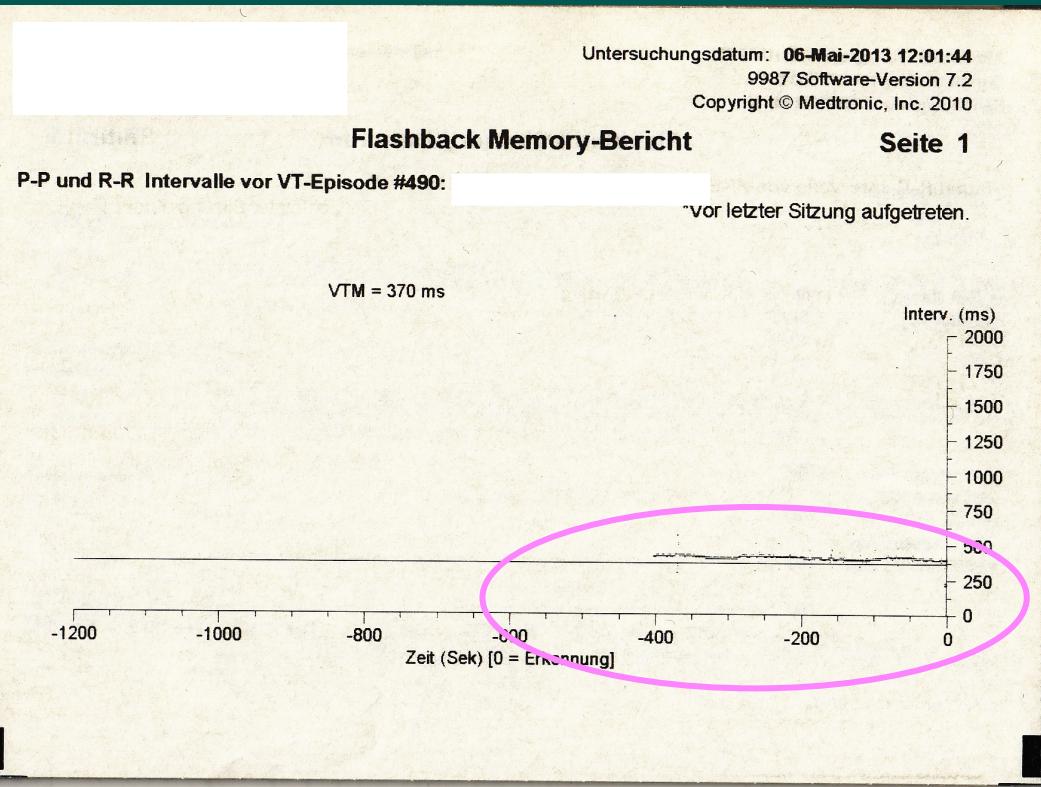
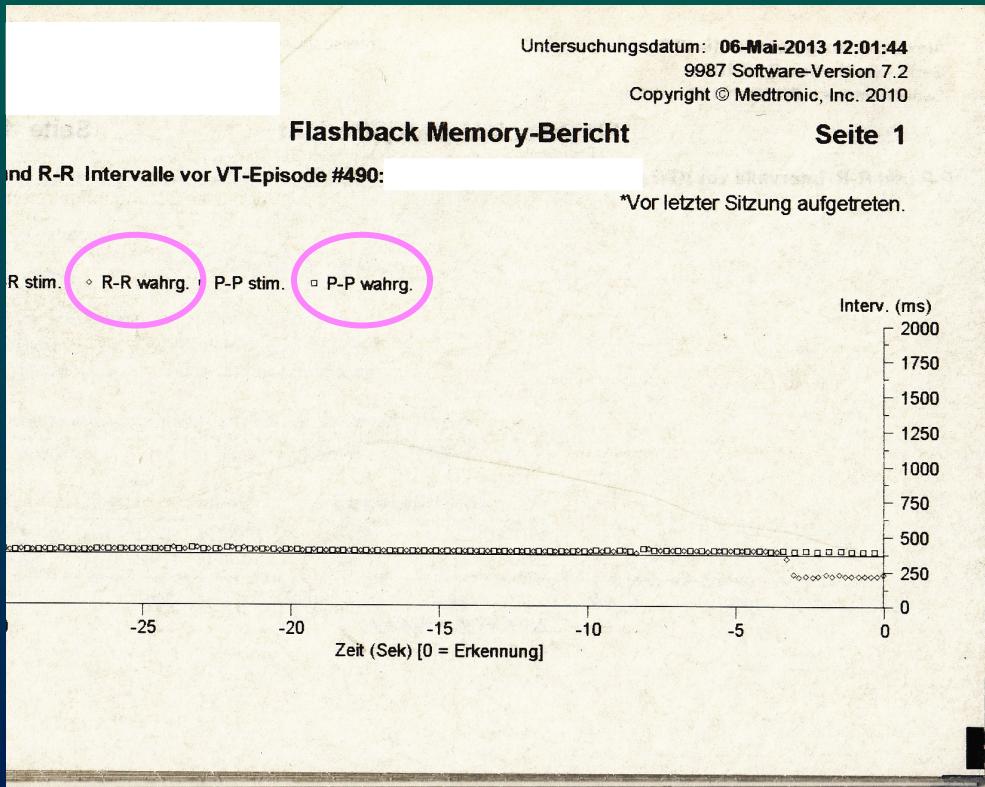
May 2013



Atrial Tachycardia and Fibrillation in ACHD

m, 46 yol, d-TGA, Mustard, rec. tachy, rec. syncope, SN-dysfx -> DDD-pace

syncope while cycling -> haemodynamic collapse -> CPR



May 2013



... DDD-IGM-protocol while syncope prior to ICD - implant

„Predictors of Sudden Cardiac Death After Mustard or Senning Repair for Transposition of the Great Arteries“

47 Pts with „sudden death“ (34 SD, 13 near-miss SD)

- 34 Pts (72%) documentation of arrhythmia (*mostly Aflutt/AFib*)
vrs. 47 / 93 Pts (51%) in control group (without SD-event)
 $p < 0.0001$

„... It is not possible to say whether AFL/AF directly contributes to SD or is merely a marker for it. ...“

„Outcomes Following Cardioverter Defibrillators Implantations for Primary Prevention in Transposition of the Great Arteries after Intra-Atrial Baffle Repair: a Single Center Experience“

18 pts (d-TGA -> M/S) with ICD (primary prevention)

→ 11 pts (61%) <-> in total 34 ICD shocks

→ „first shocks“: - 10/11 due to „non-VT/VF-events“

- 1/11 due to fast VT (CL 210 ms.) out of Aflut (CL 240ms)

„... A key observation made in that study, ... , was that inspection of ICD electrograms after device discharge revealed that many of the VT episodes were preceded or coexisted with atrial arrhythmias ... “

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

.... Medical Treatment of Atrial Tachycardia vrs. Ablation

6.1.2. Long-term management

Experience with chronic pharmacologic therapy for IART in adults with CHD has been discouraging, resulting in a growing preference for nonpharmacologic options in most centers. Nevertheless, long-term pharmacologic therapy is used in many instances, including for patients in whom catheter ablation is not feasible or unsuccessful. The optimal pharmacologic approach to managing IART and atrial fibrillation in adults with CHD is as yet undetermined. In

.....

7. Catheter ablation

7.1. General considerations for catheter ablation in adults with CHD

Decisions regarding catheter ablation for recurrent atrial, ventricular, and/or supraventricular tachycardias in adults with CHD depend, in part, on anticipated procedural success rates and associated risks, symptoms, and hemodynamic tolerance. Preprocedural evaluation should include docu-

.....

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

.... Indication for Ablation of Atrial Tachycardia

.....

of the underlying CHD and duration of follow-up. Atrial tachyarrhythmias may cause hemodynamic deterioration, thromboembolic complications, and even sudden cardiac death,^{26,33,46,248,251} and are associated with a 2-fold increased risk for mortality.^{26,251} Independent predictors for mortality include poor functional class, single ventricle physiology, pulmonary hypertension, and valvular heart disease.²⁵²

7.3.3. Mapping and ablation

Late postoperative atrial tachyarrhythmias in adults with CHD are most often due to cavotricuspid isthmus-dependent (counterclockwise or clockwise) flutter or scar-based macroreentry.^{44,266,268-273} Catheter ablation has proven to be safe and considerably effective.^{241,246,274,275} As a curative treatment modality, it is generally preferred over long-term pharmacologic management. Reported procedural success rates range

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

.... *Ablation of Atrial Fibrillation*

7.4.2. Catheter ablation

No specific recommendations regarding management of adults with CHD and atrial fibrillation have previously been proposed, perhaps due to lack of awareness or of data in this emerging group of patients.²⁹⁶ Extrapolating from adult

.....

.....

pacing are plausible treatment options. In the absence of other directive data, these interventions should be considered in conformance with recommendations for adults without CHD. Ablation (as an alternative to surgical Maze procedures) might be considered after failure of trials of cardioversion with pharmacologic rhythm control and in the context of adequate antithrombotic therapy.

Atrial Tachycardia and Fibrillation in ACHD

Ablation

... Indication and Methods...

Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

- automaticity (*triggered activity*)

- **A_{trial}E_{xtra}S_{ystoly}**

- **F_{ocal}A_{trial}T_{achycardia}**

-
- reentry

- **N_{on}A_{utomatic}F_{ocal}A_{trial}T_{achy}**

- **A_{trial}R_{eentry}T_{achycardia}**

-
- fibrillation

- **A_{trial}F_{ib}rillation**

Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

- automaticity (*triggered activity*)

- **A_{trial}E_{xtra}S_{yсты}oly**

„... no A-reentry or A.fibrillation without AES ...“

K.-H. Kuck, Key lecture DGK annual symposium 04/2013

Atrial Tachycardia and Fibrillation in ACHD

mechanism

- automaticity (*triggered activity*)

- reentry

- fibrillation

type

- **A_{trial}E_{xtra}S_{ystoly}**

- **F_{ocal}A_{trial}T_{achycardia}**

- **N_{on}A_{utomatic}F_{ocal}A_{trial}T_{achy}**

- **A_{trial}R_{eentry}T_{achycardia}**

- **A_{trial}Fib_{rillation}**

Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

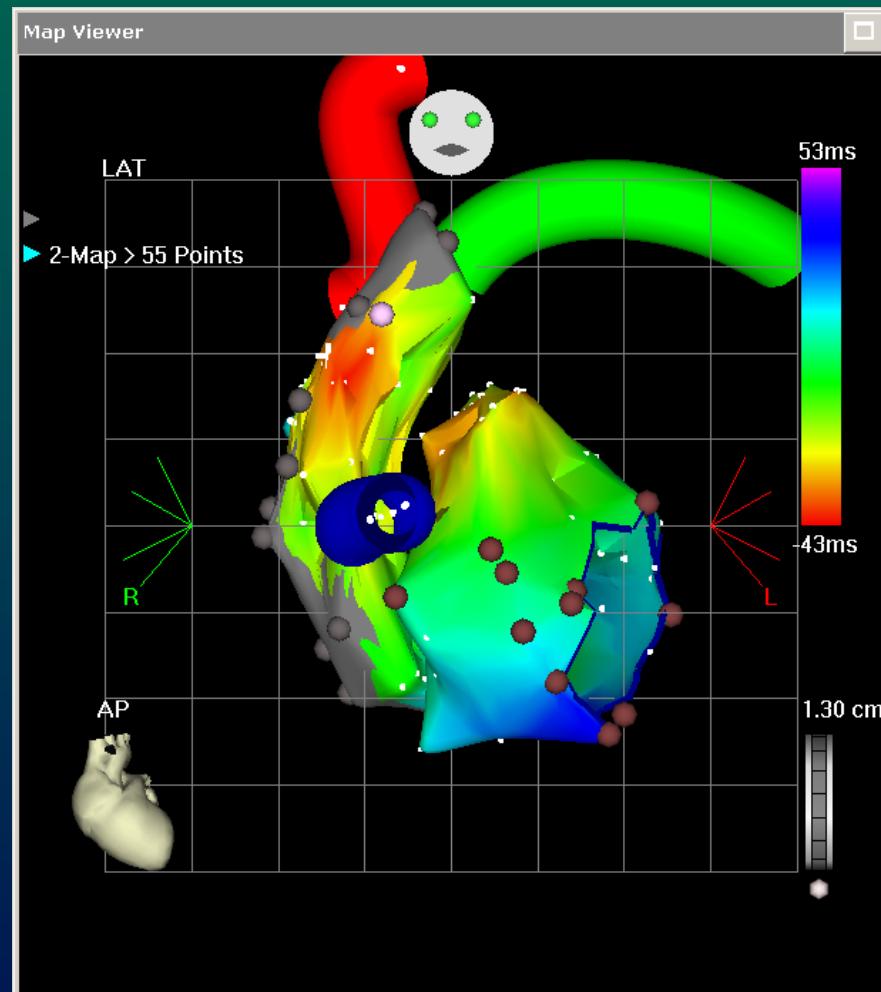
- **automaticity (triggered activity)**

- *focal origin*
- *spontaneous start*
- *“speeding up / cooling down”*
- *no inducibility with program. stimulation*
- *less likely in (po-op) CHD compared to reentry*

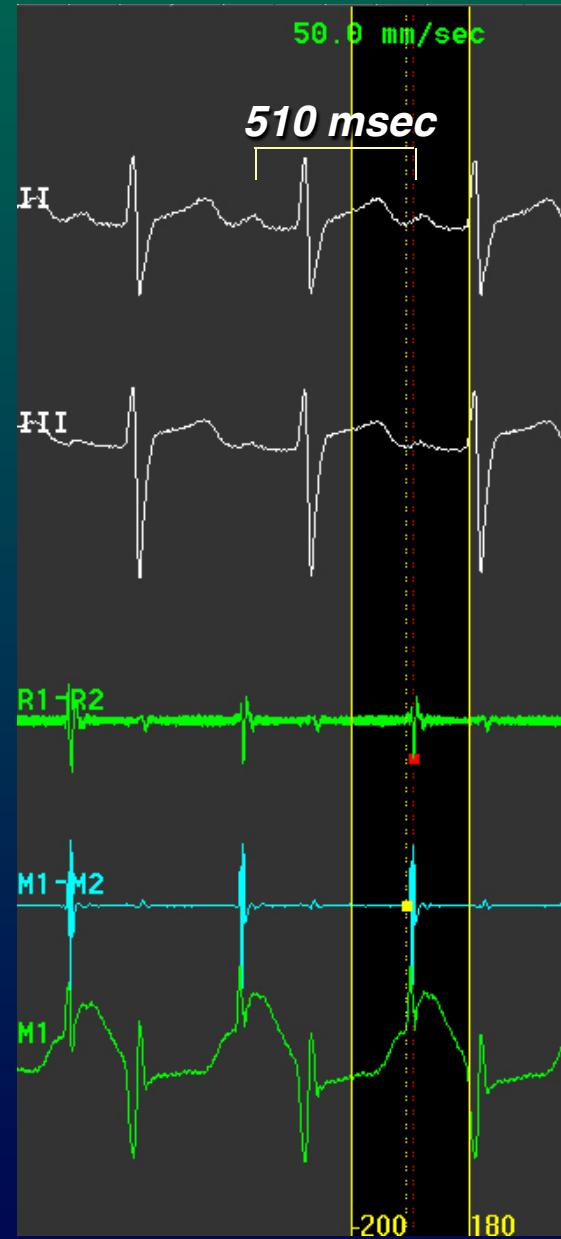
- **Atrial Extra Systole**

- **Focal Atrial Tachycardia**

Fenestrated Extratrial Tunnel + FAT



- FAT CL: 510 msec
- reconstr.
activation: 96 msec



Atrial Tachycardia and Fibrillation in ACHD

mechanism

- automaticity (*triggered activity*)

- reentry

- fibrillation

type

- Atrial Extra Systole

- Focal Atrial Tachycardia

- Non Automatic Focal Atrial Tachy

- Atrial Reentry Tachycardia

- Atrial Fibrillation

Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

- automaticity (*triggered activity*)

- Atrial Extra Systole

- reentry

- *initiation with ES*
- *sudden start / stop*
- *inducibility with program. stimulation*
- *focal origin only in NAFAT*
- *more likely in (po-op) CHD compared to FAT*

- Focal Atrial Tachycardia

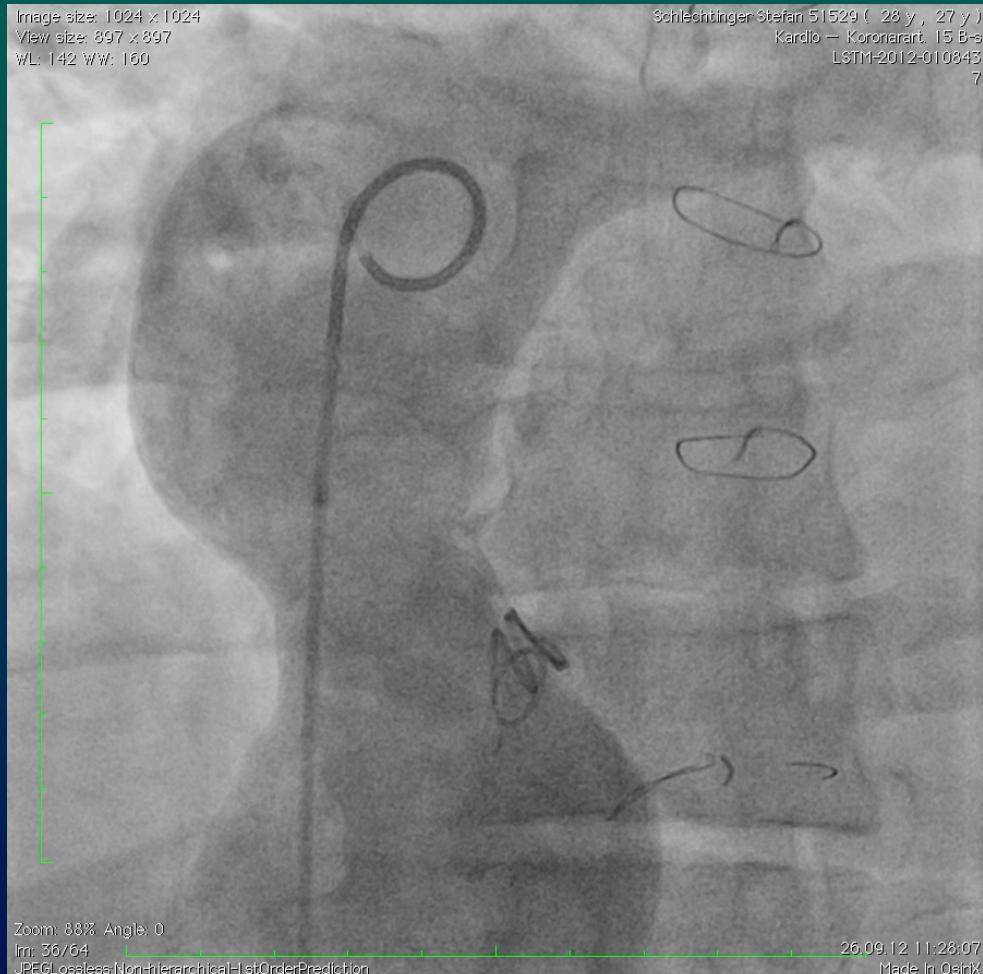
- Non Automatic Focal Atrial Tachy

- Atrial Reentry Tachycardia

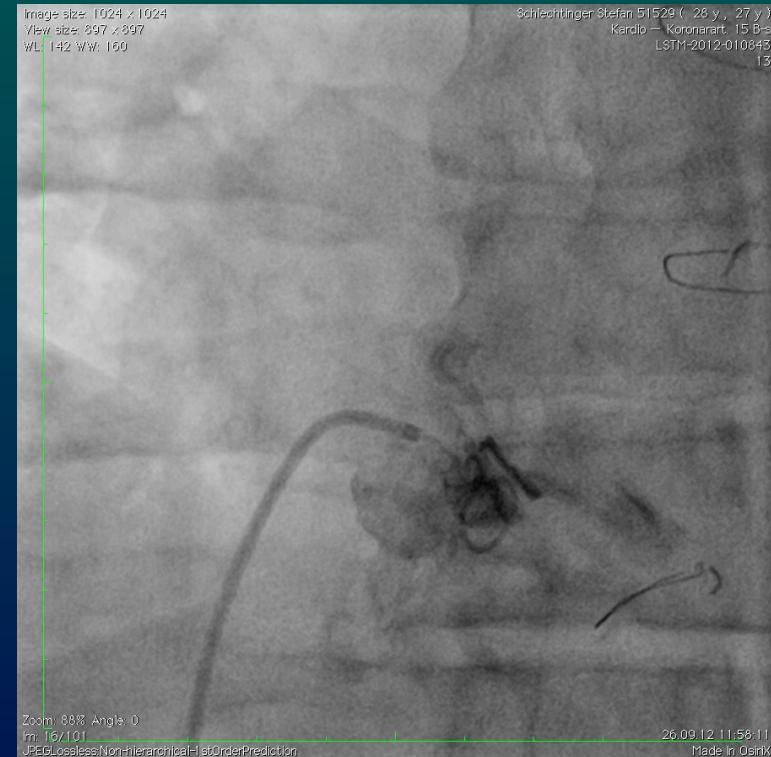




m, 19 yol, tricuspid atresia, modified Fontan, re-apert. fenestr. ; ART



AP



AP

Catheter Ablation of NAFAT

m, 19 yol

- tricuspid atresia lc
- modified Fontan (with fenestr. tunnel; St. Augustin '91)
- coil-occlusion of fenestration (St. Augustin '91)
- rec. atrial tachycardia – multiple overdrive termination
- intervent. re-aperture (10 mm stent f. preparing EPS; St. Aug.'12)

m, 19 yol, tricuspid atresia, modified Fontan, re-apert. fenestr. ; ART

Image size: 512 x 512
View size: 897 x 897
WL: 128 WW: 256

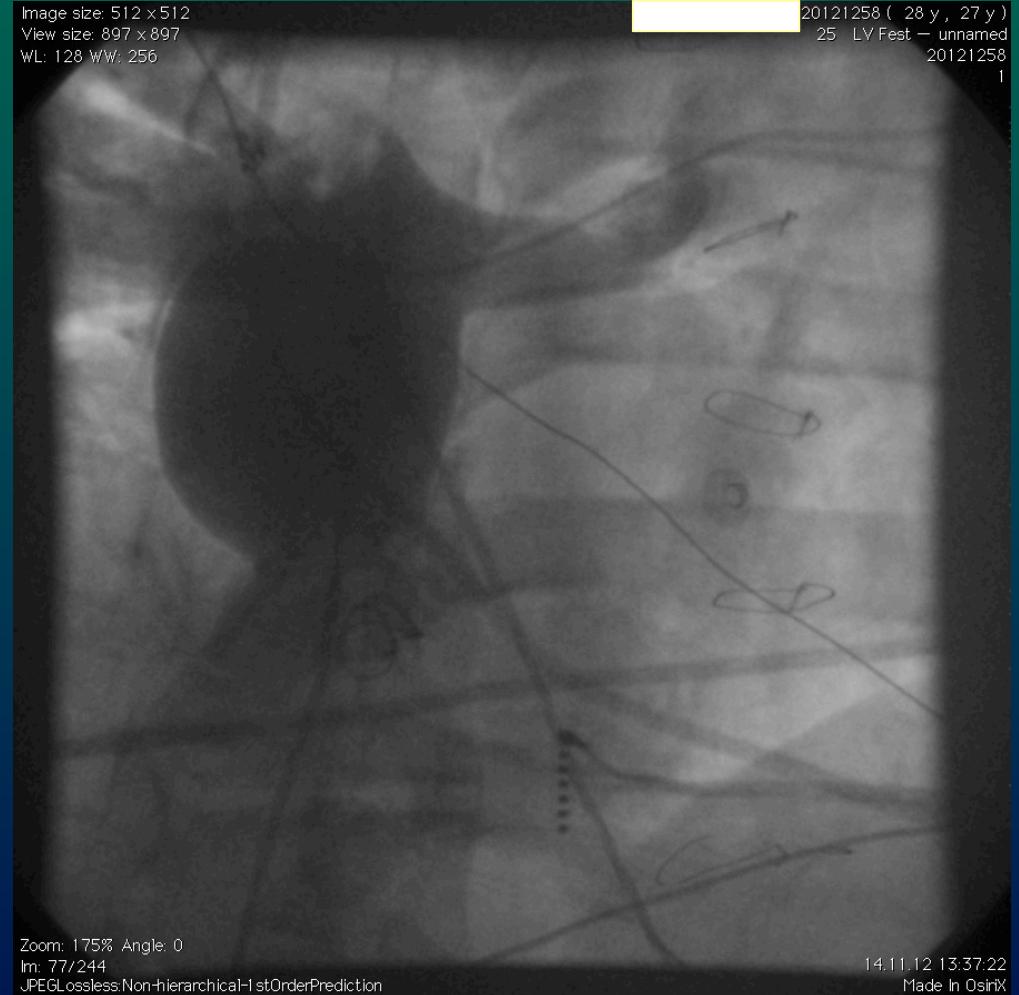
20121258 (28 y , 27 y)
25 LV Fest — unnamed
20121258
1



LAO

Image size: 512 x 512
View size: 897 x 897
WL: 128 WW: 256

20121258 (28 y , 27 y)
25 LV Fest — unnamed
20121258
1



RAO

m, 19 yol, tricuspid atresia, modified Fontan, re-apert. fenestr. ; ART

Image size: 512 x 512
View size: 897 x 897
WL: 128 WW: 256

20121258 (28 y , 27 y)
25 LV Fest — unnamed
20121258
1



LAO

Image size: 512 x 512
View size: 897 x 897
WL: 128 WW: 256

20121258 (28 y , 27 y)
25 LV Fest — unnamed
20121258
1



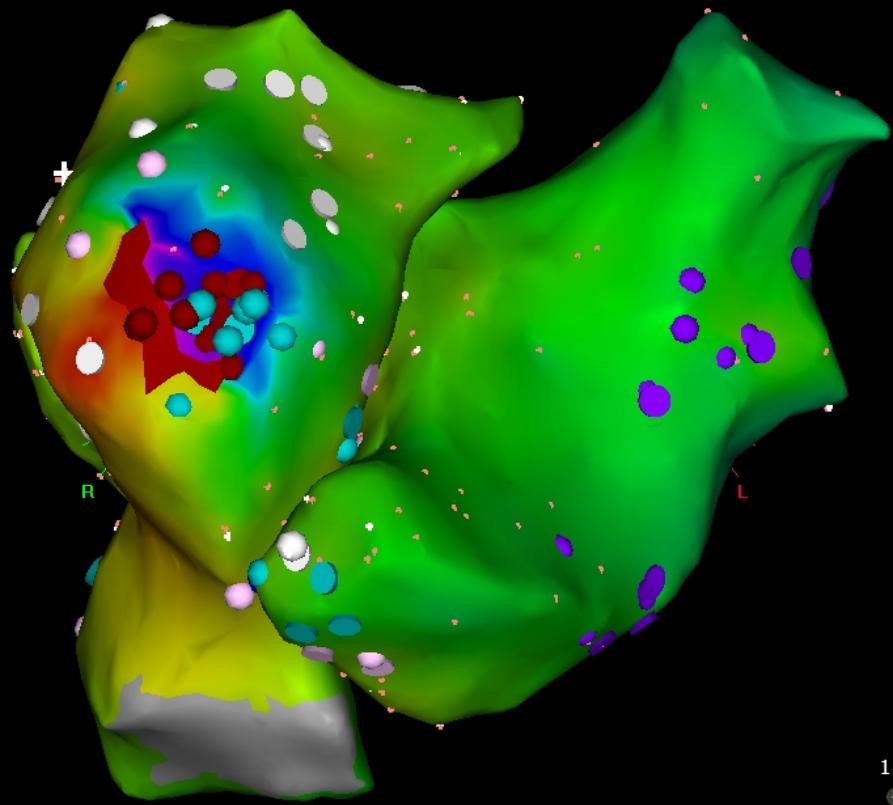
RAO

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms



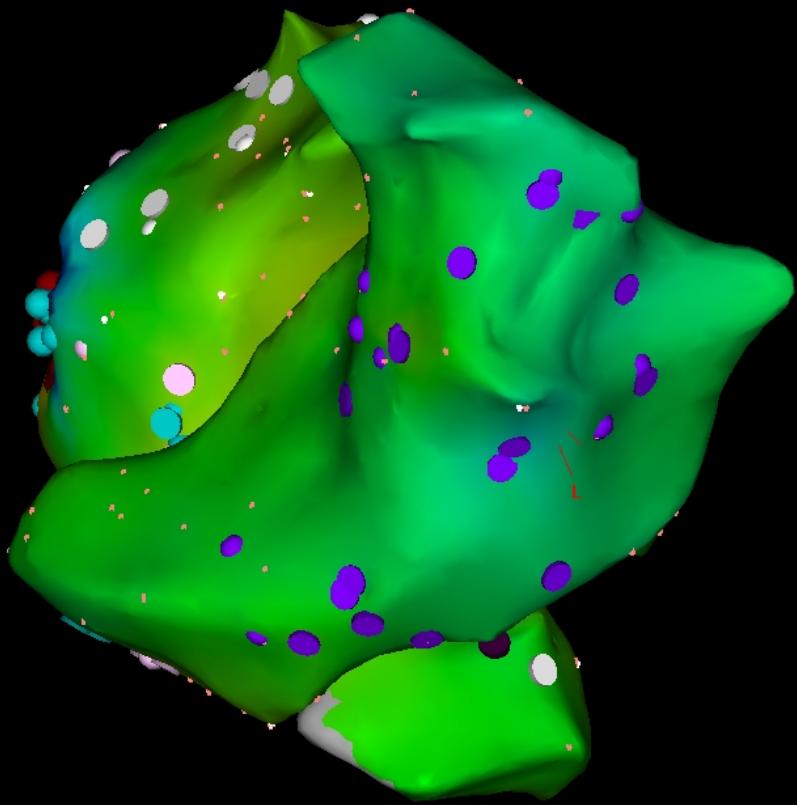
Lateral Tunnel + NAFAT



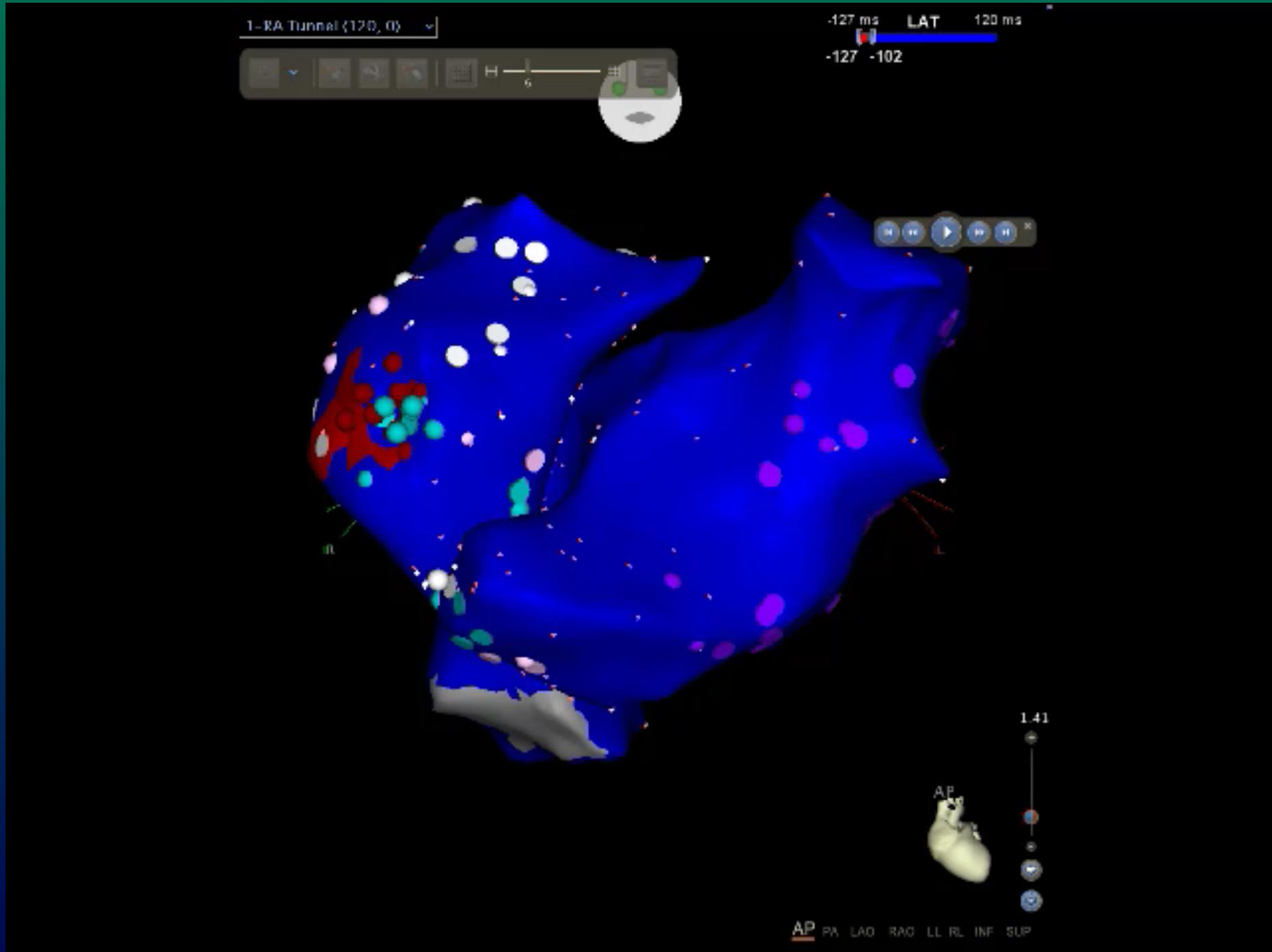
AP PA LAO RAO LL RL INF SUP

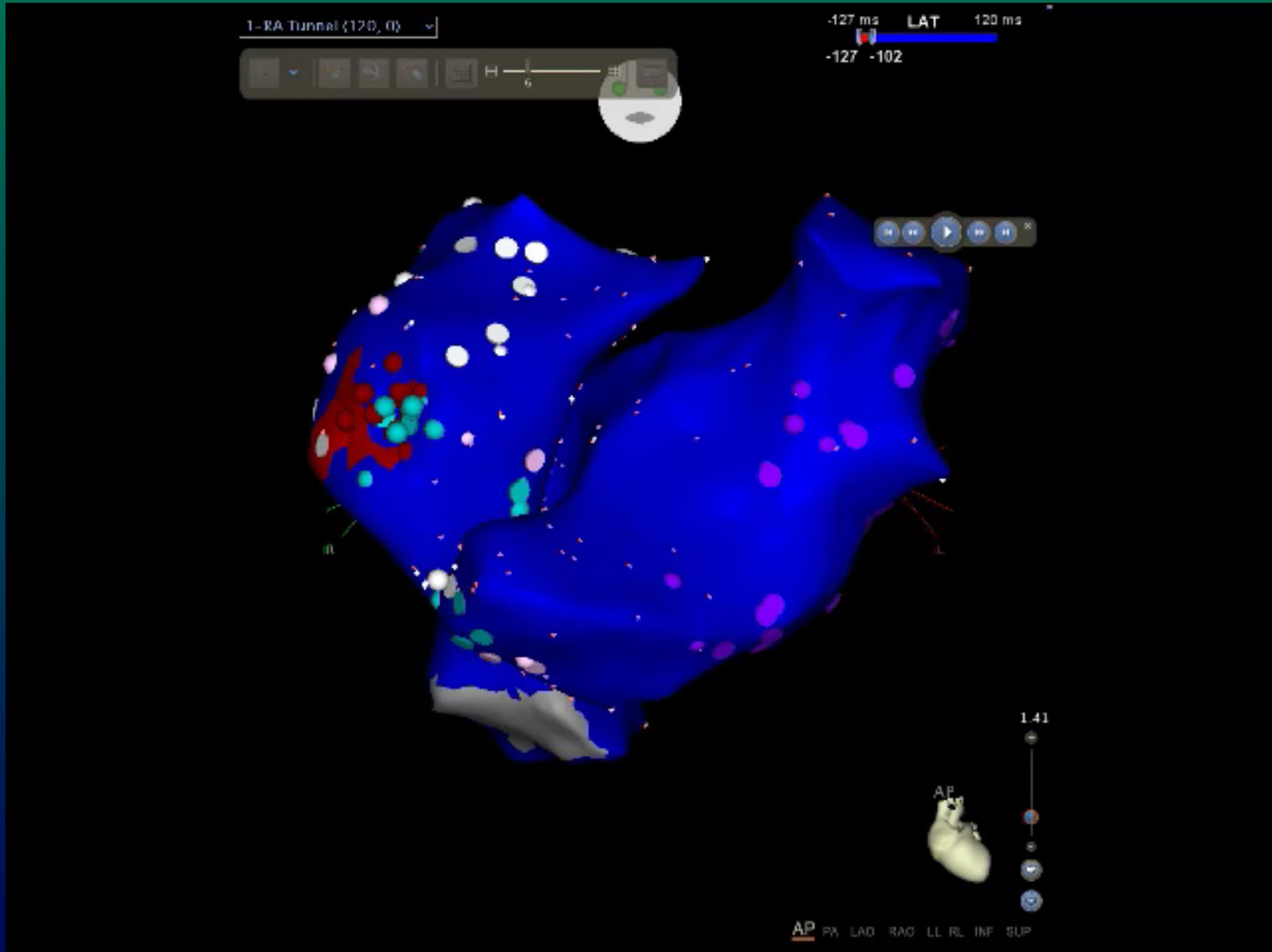
1-RA Tunnel (120, 0)

-127 ms LAT 120 ms



AP PA LAO RAO LL RL INF SUP

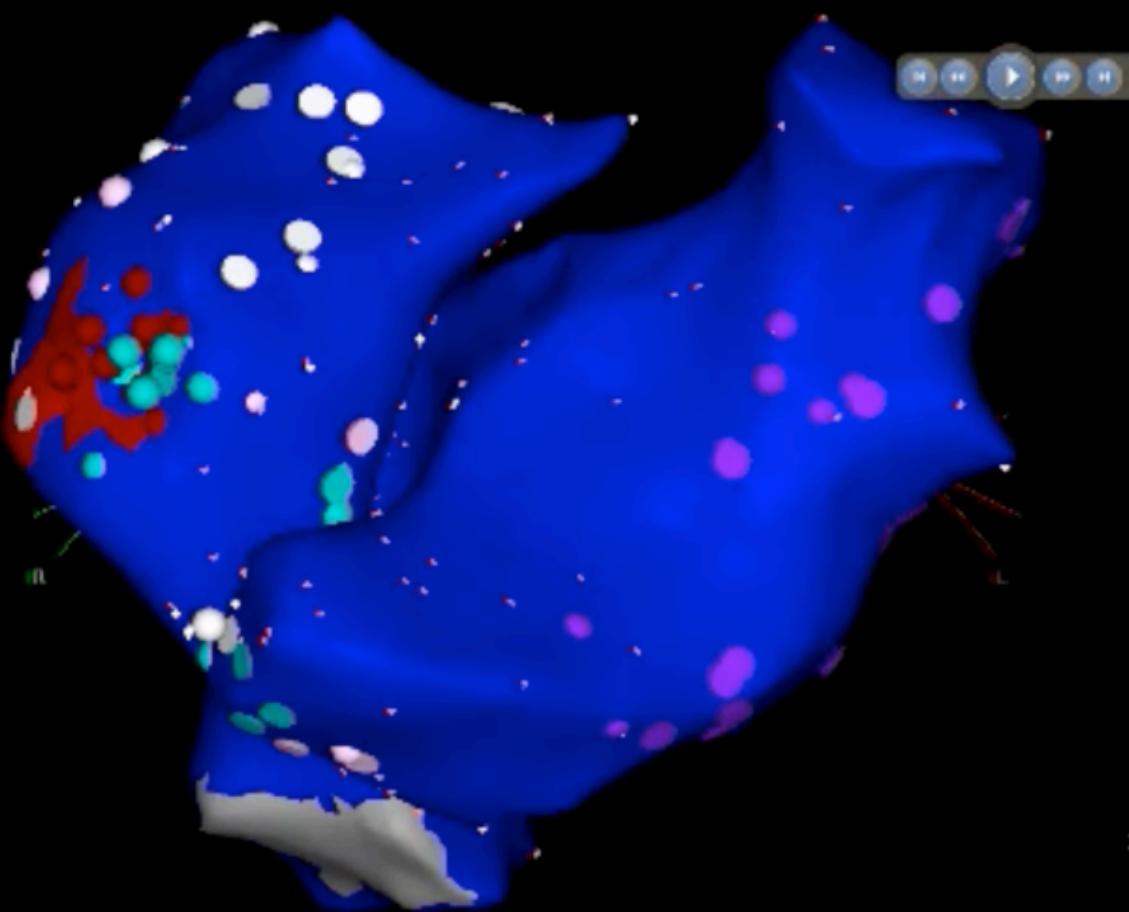




1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-127 -102



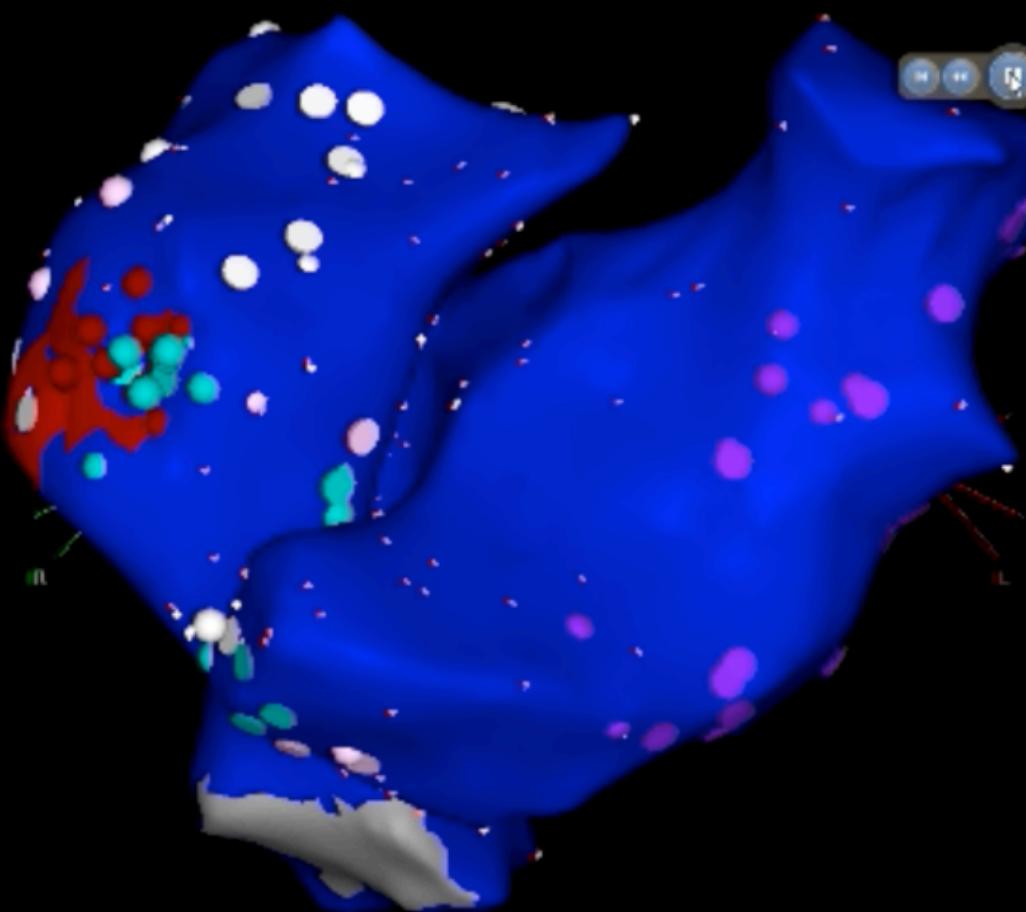
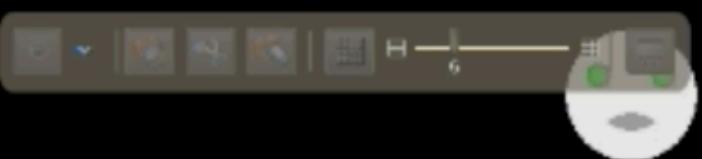
1.41

AP

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-118 -93



1.41

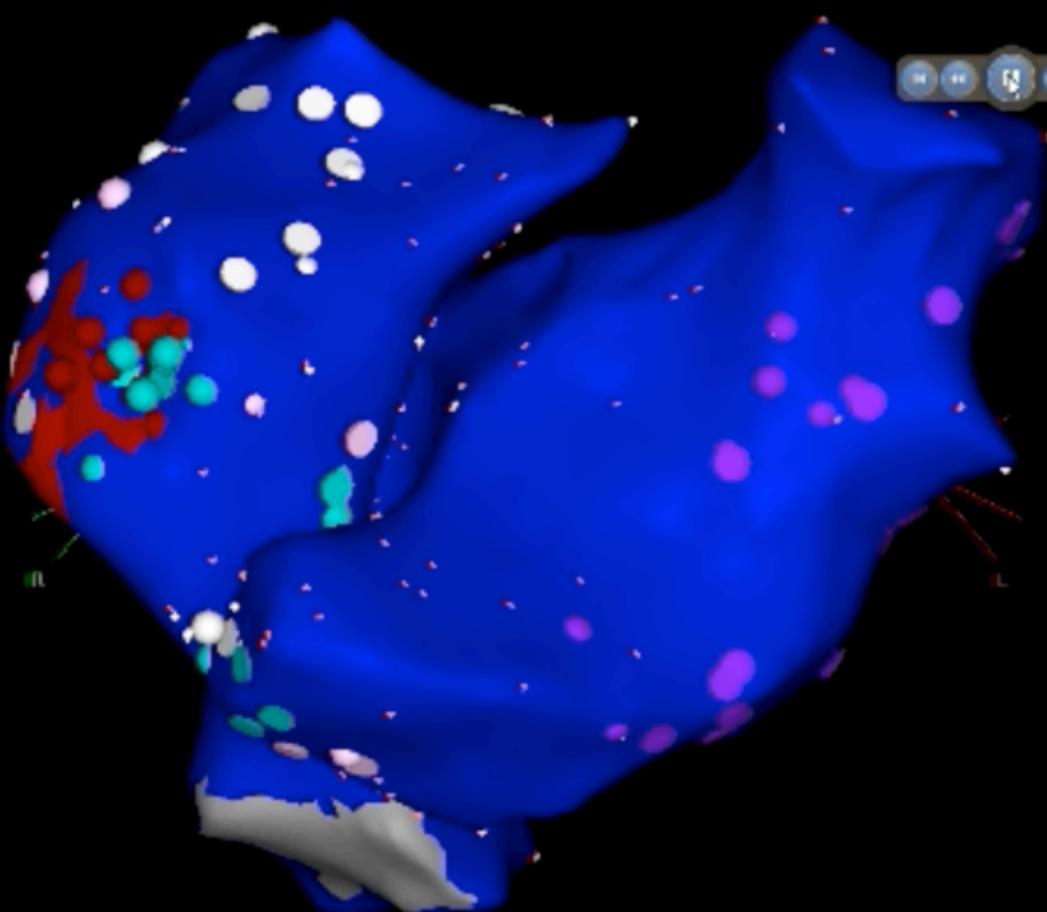


00:03,13

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-109 -84

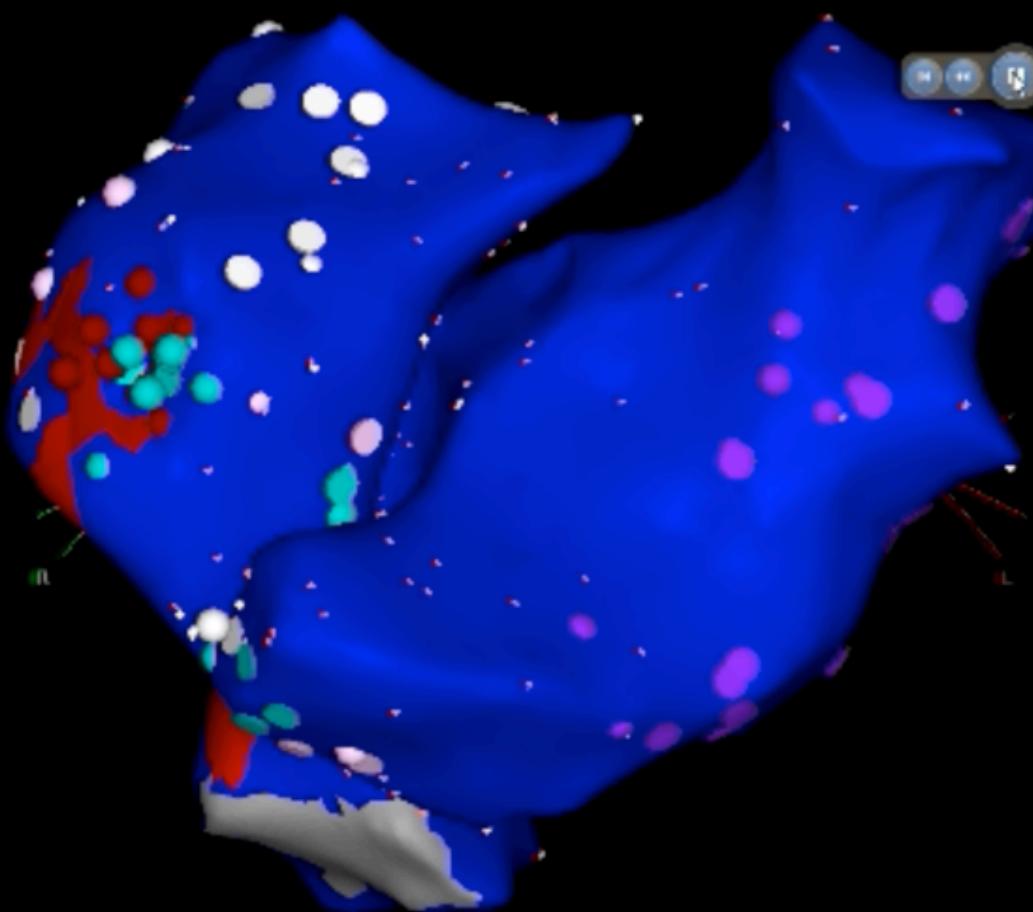
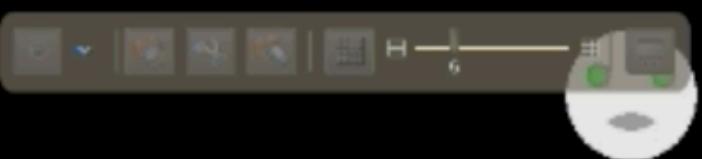


00:05,05

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-103 -78



1.41

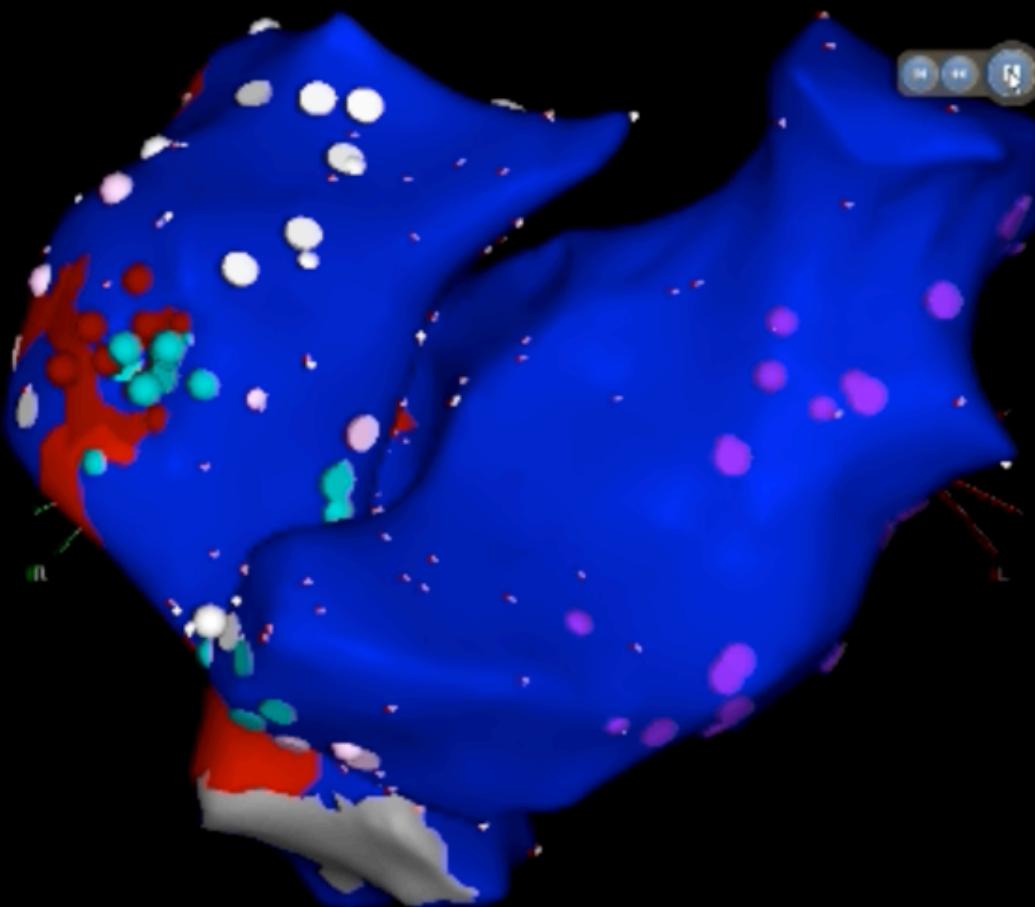
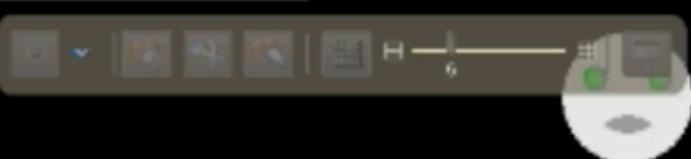


00:03,52

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-95 -70



1.41

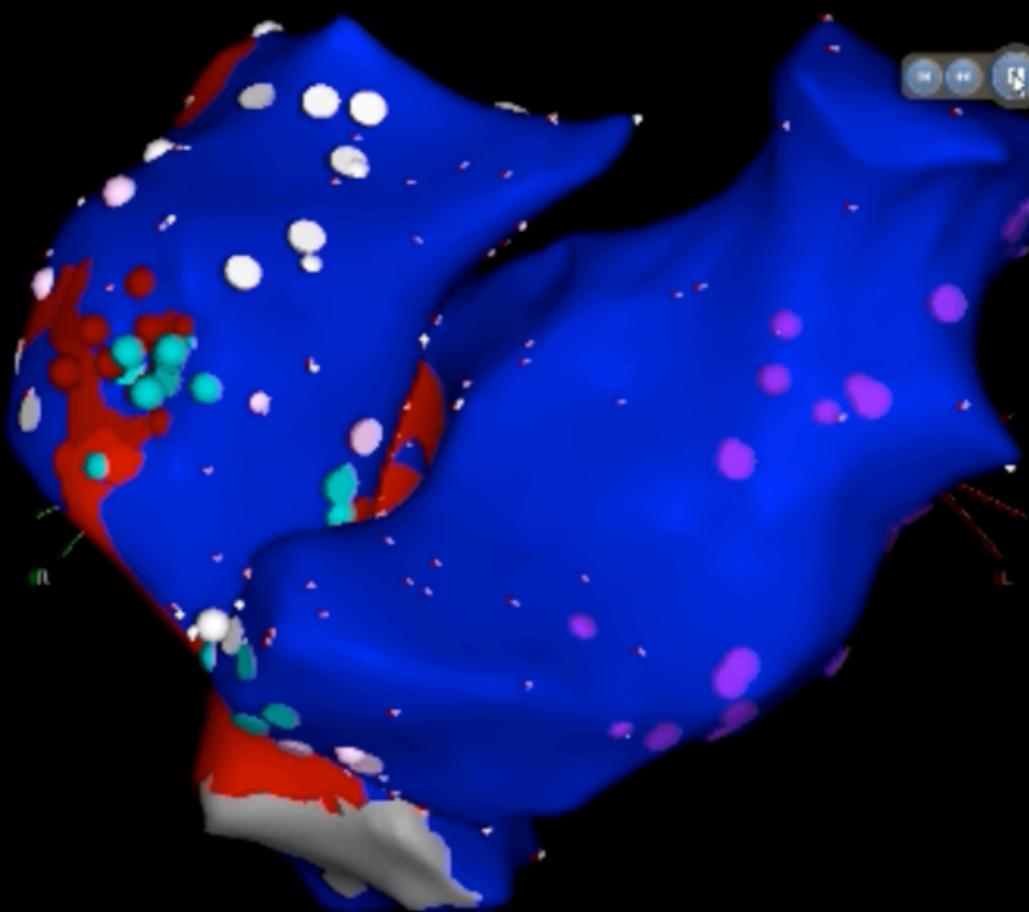
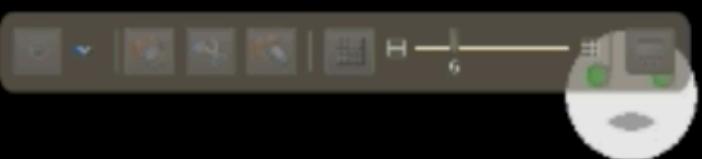


00:03,69

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-87 -62



1.41

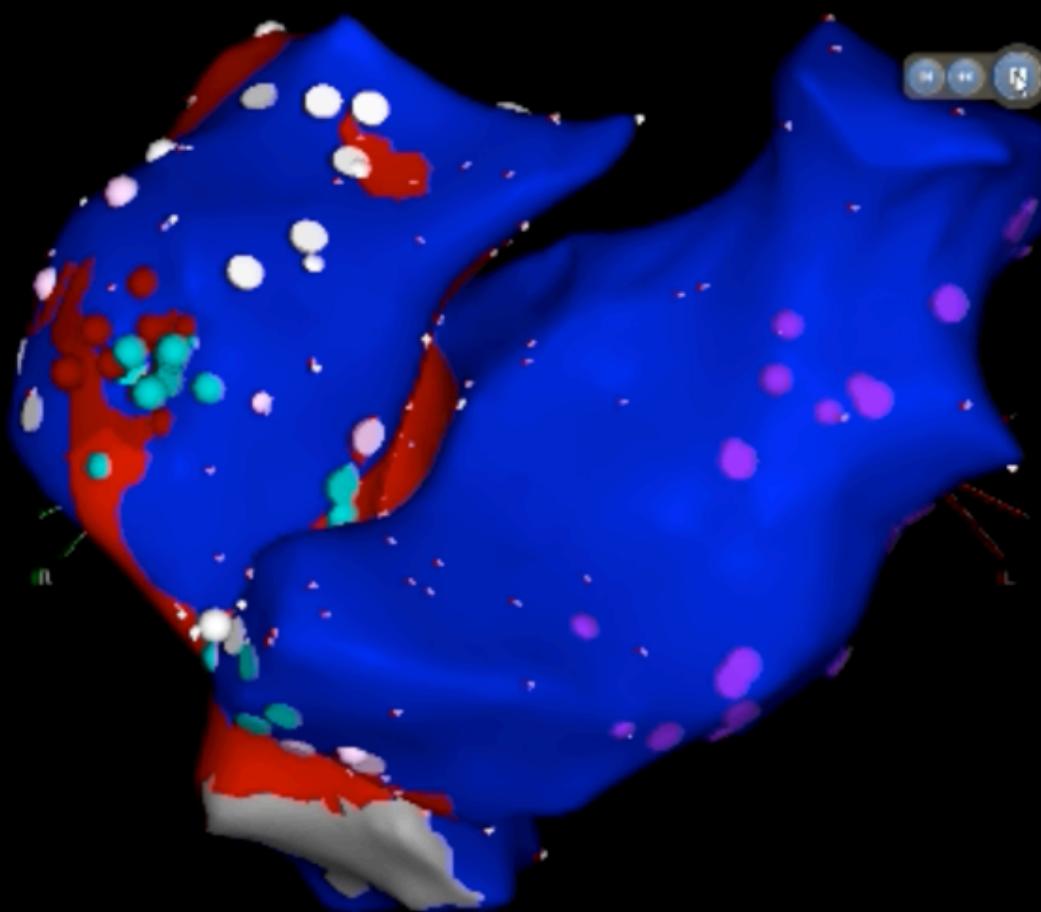
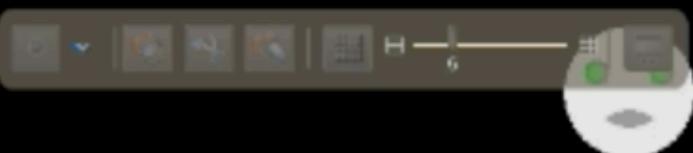


00:05,29

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-81 -56



1.41

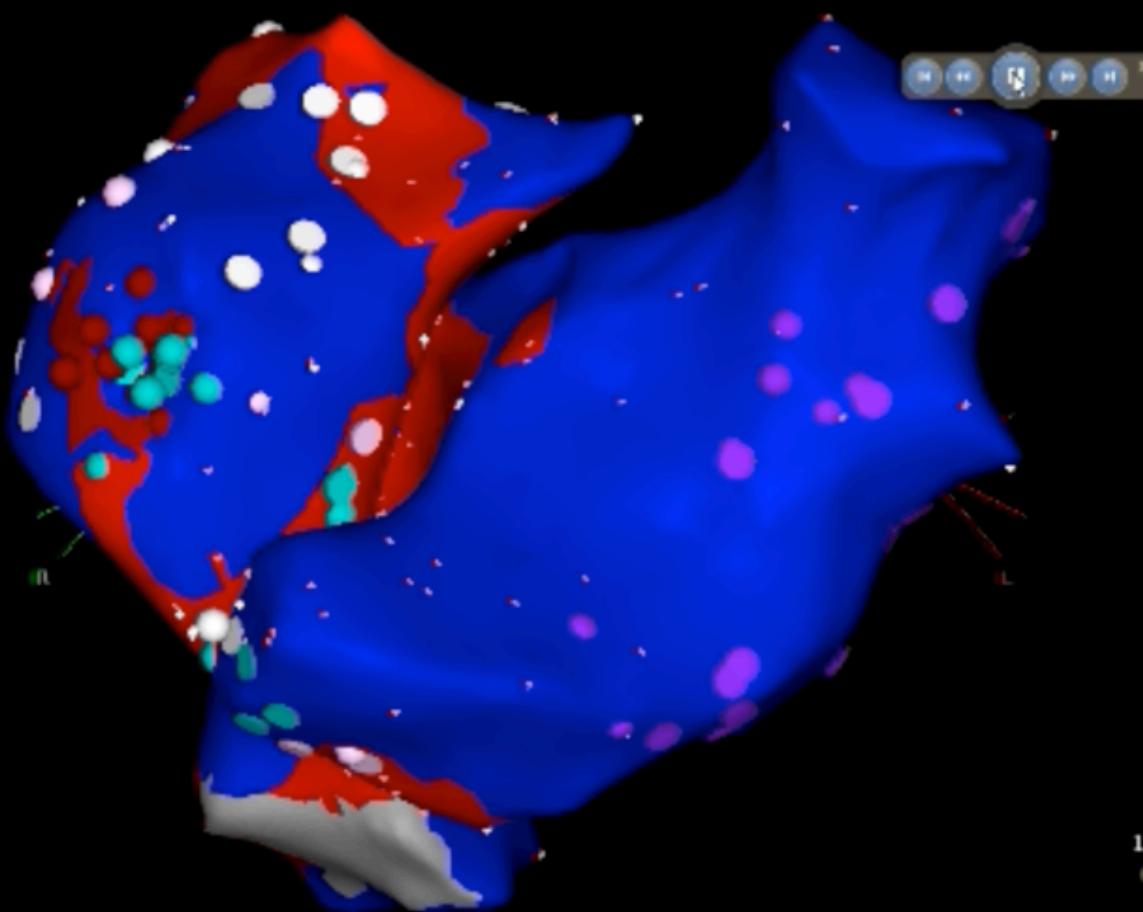
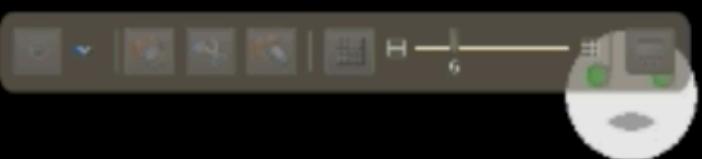


00:05,13

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-74 -49



1.41

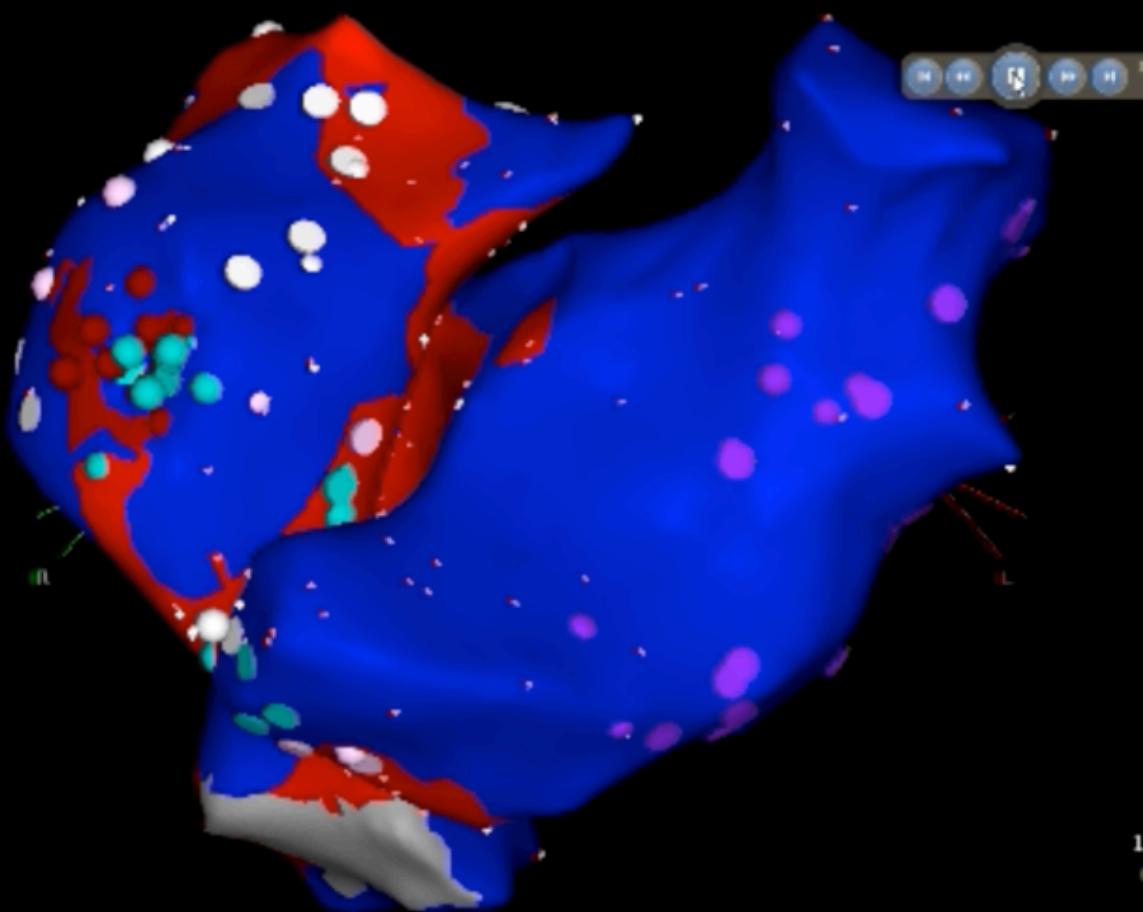
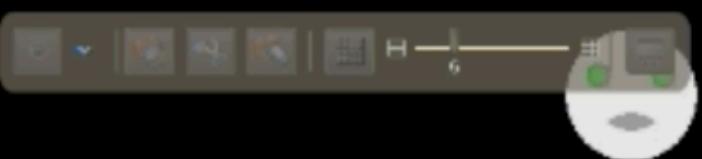


00:05,61

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-74 -49

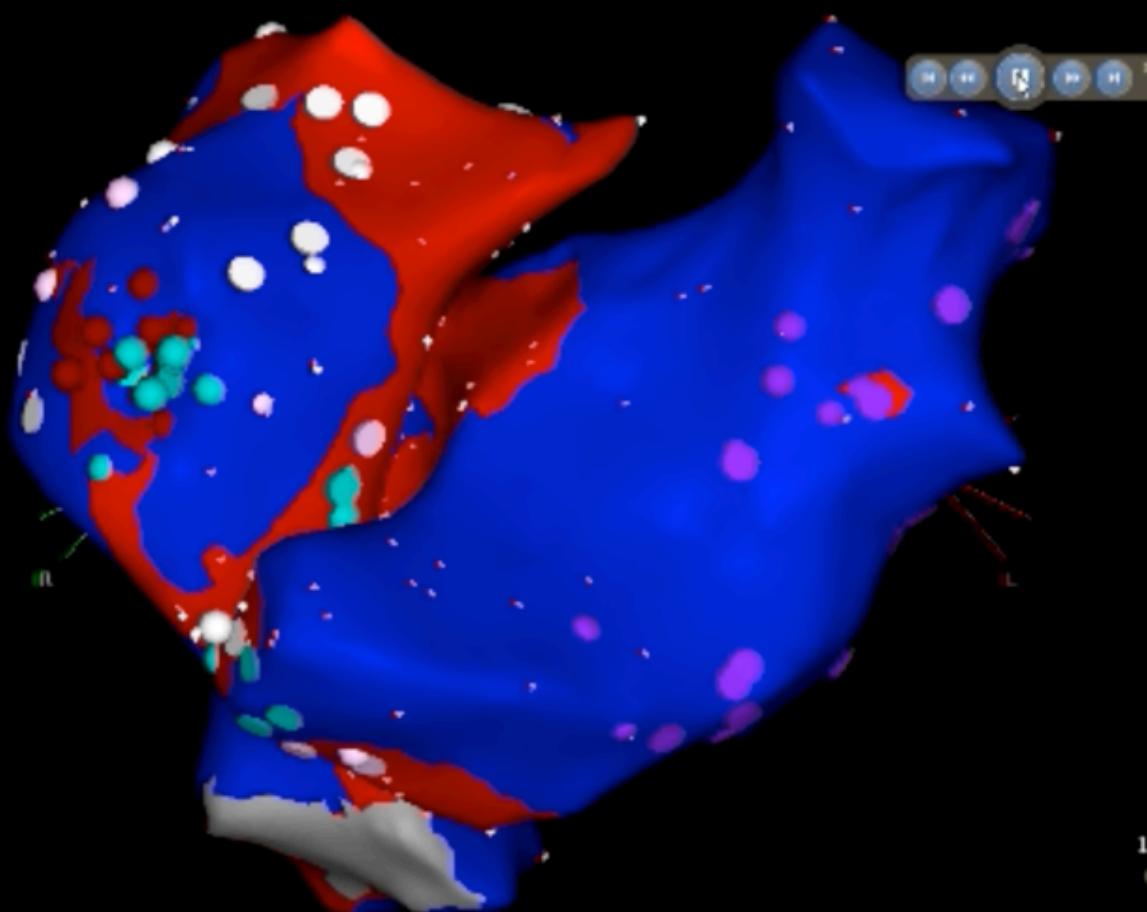
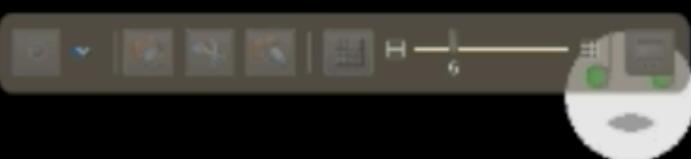


00:05,61

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-68 -43

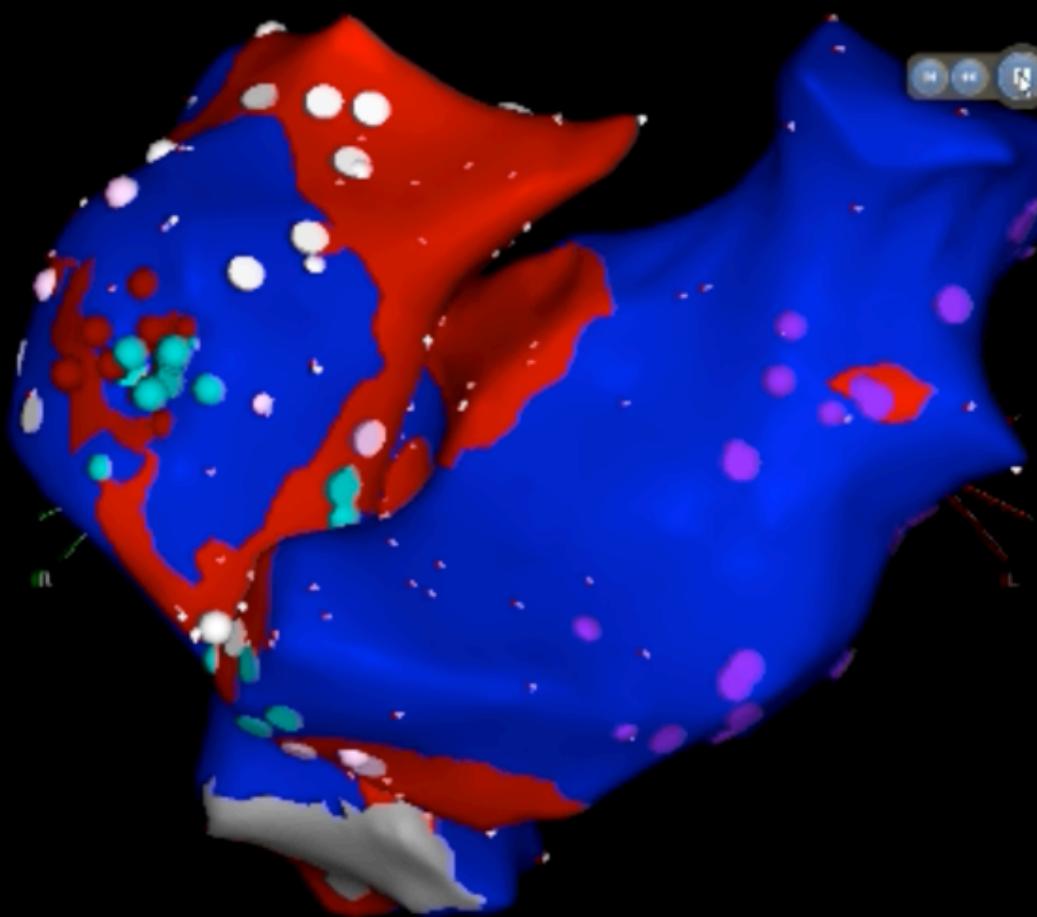


00:06,17

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-64 -39



1.41

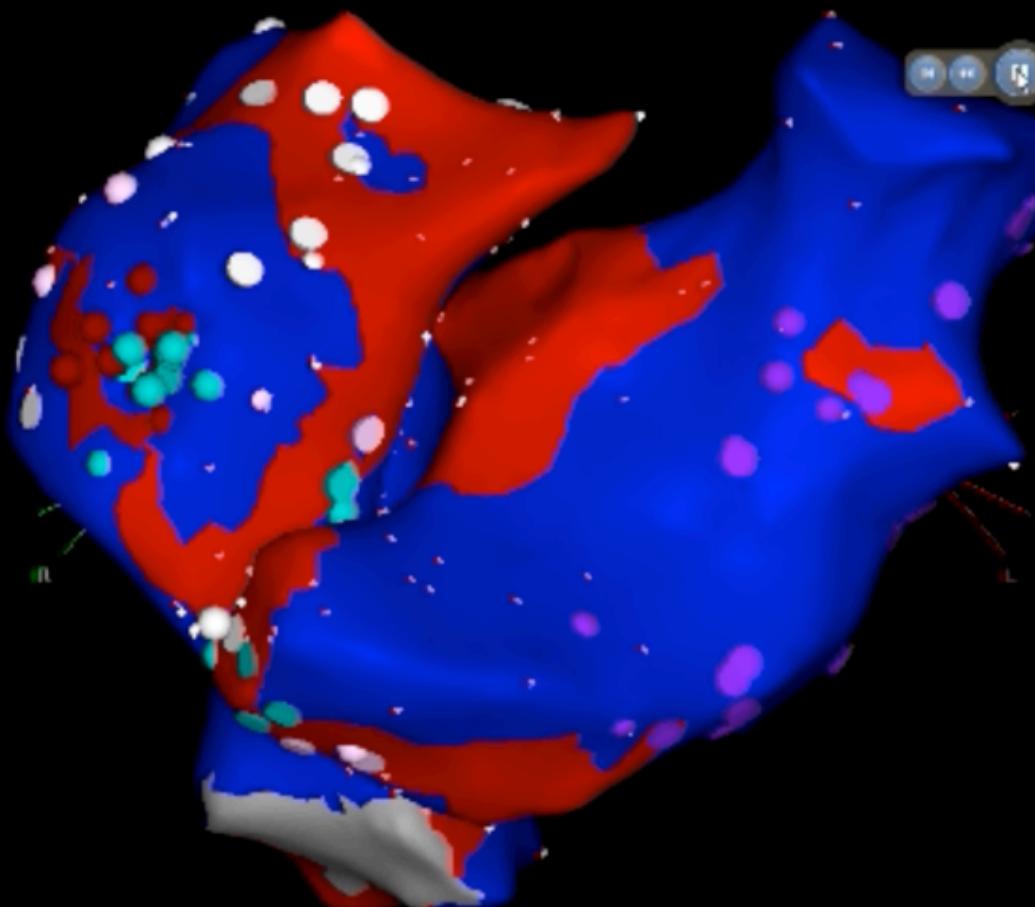
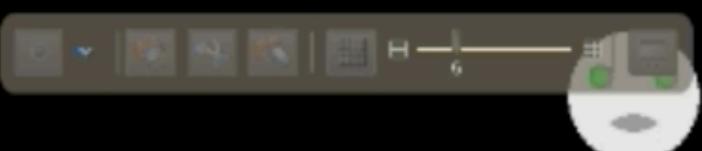


00:05,61

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-57 -32



1.41

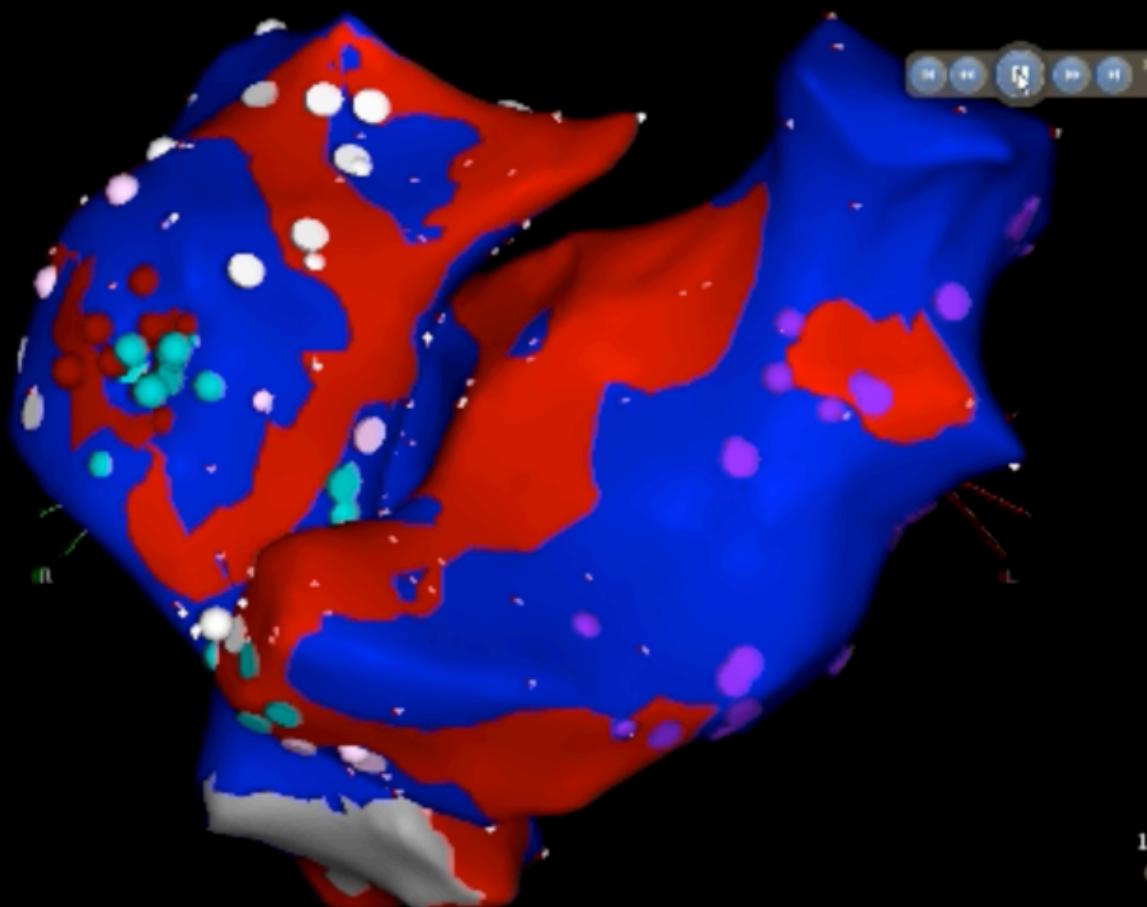
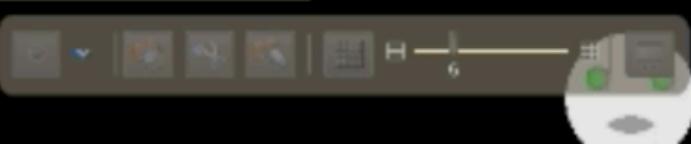


00:06,01

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-51 -26

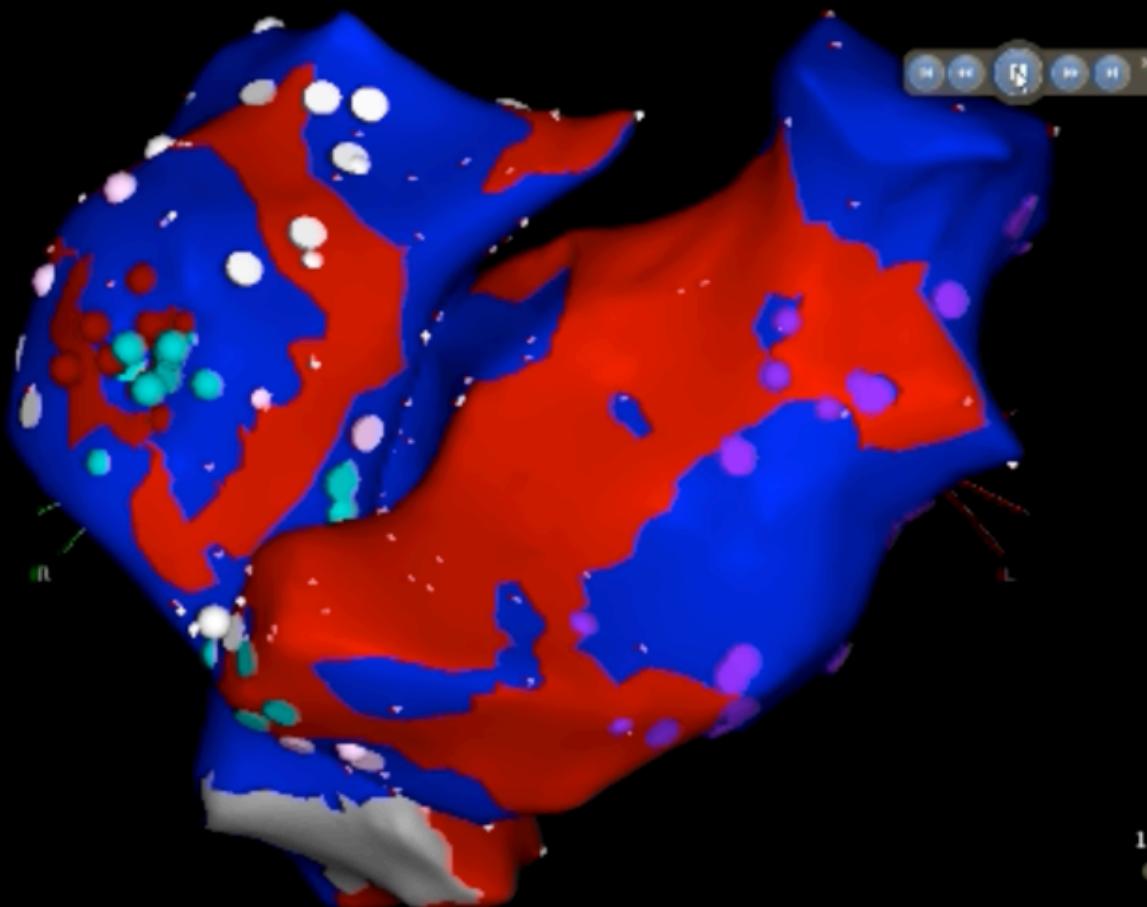
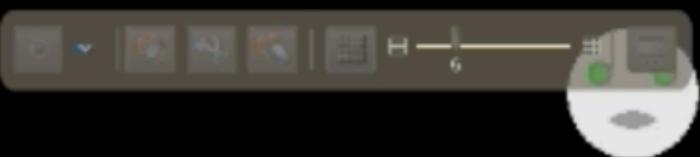


00:06.49

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-46 -21



1.41

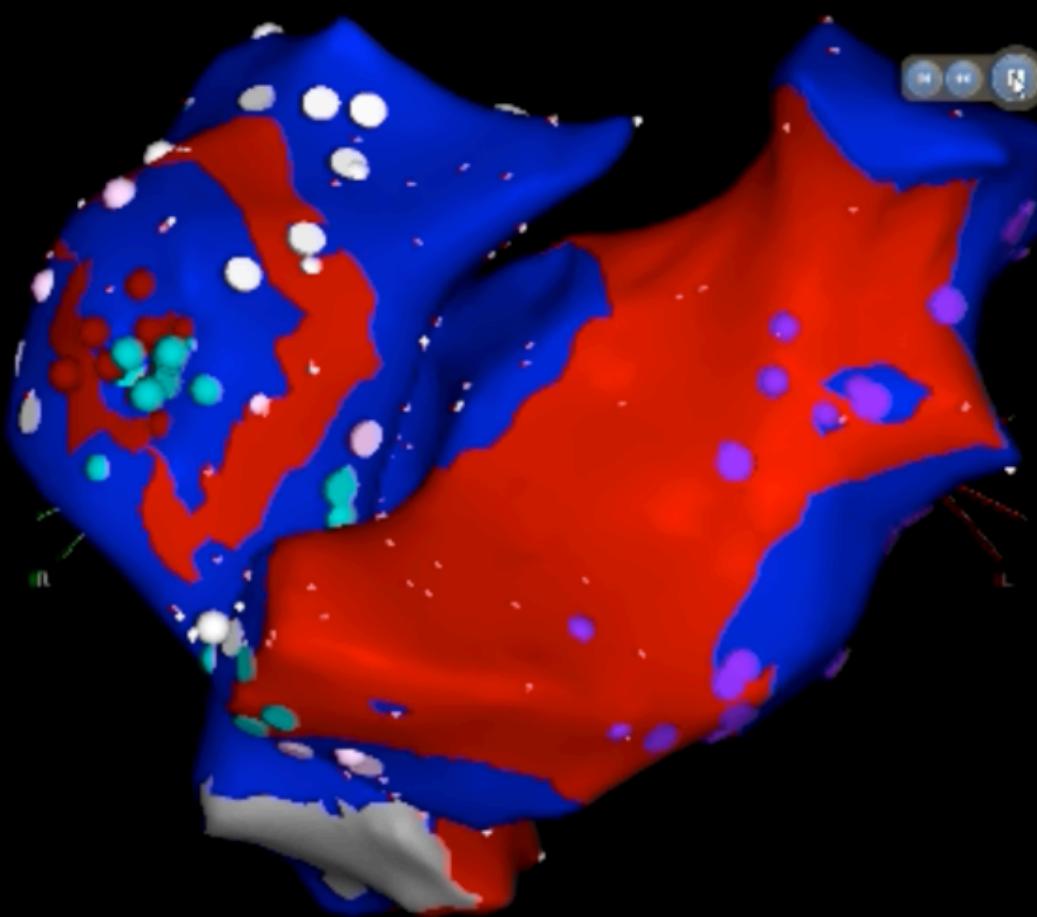
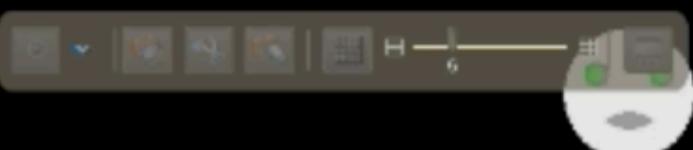


00:06,57

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-39 -14

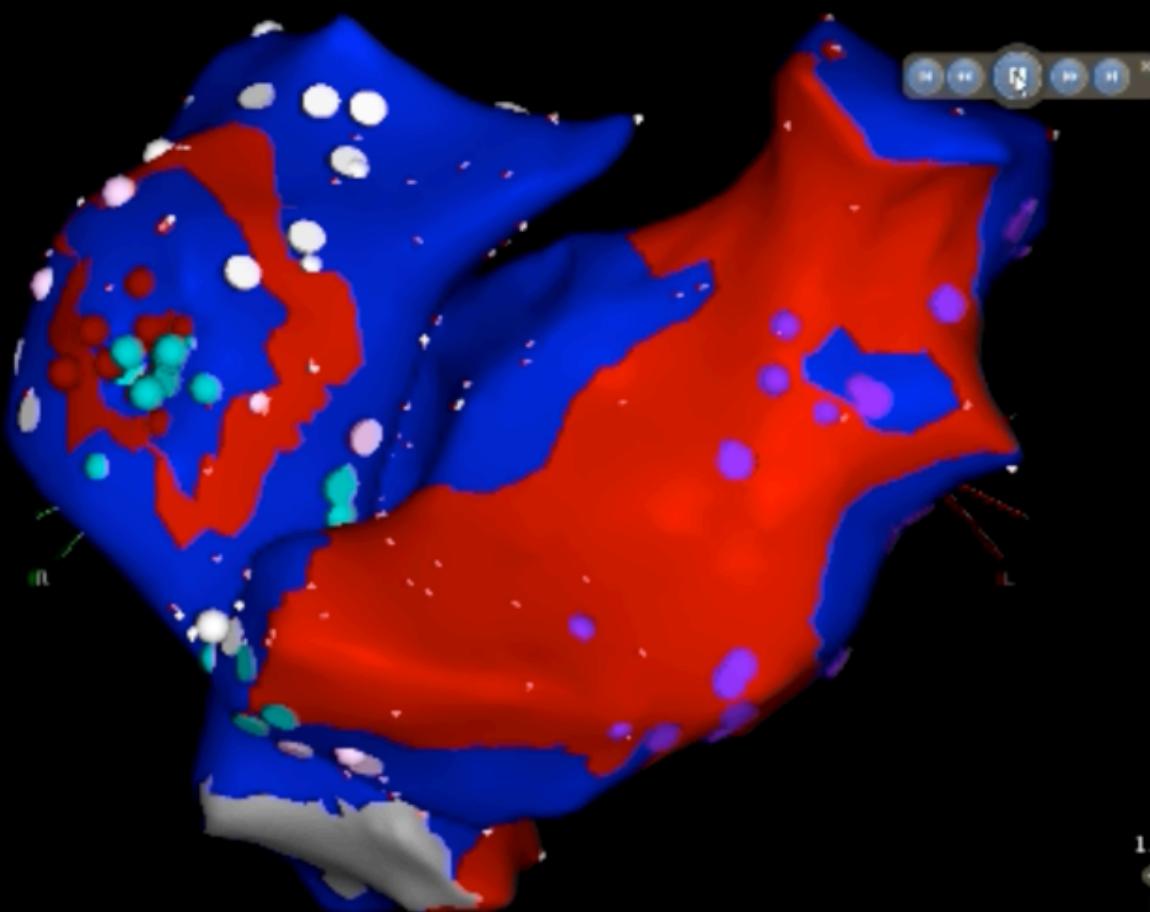


00:06.57

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-33 -8



1.41

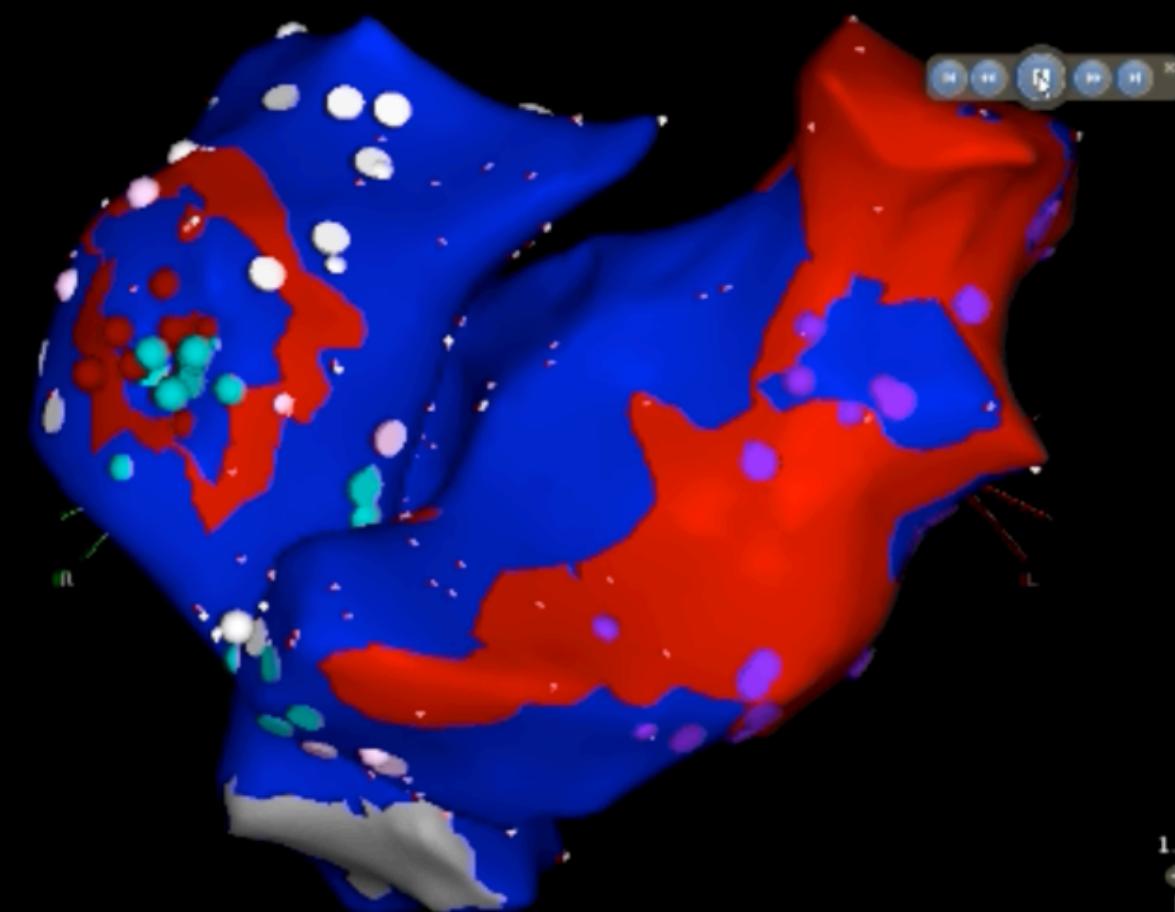


00:06,98

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-24 1



1.41

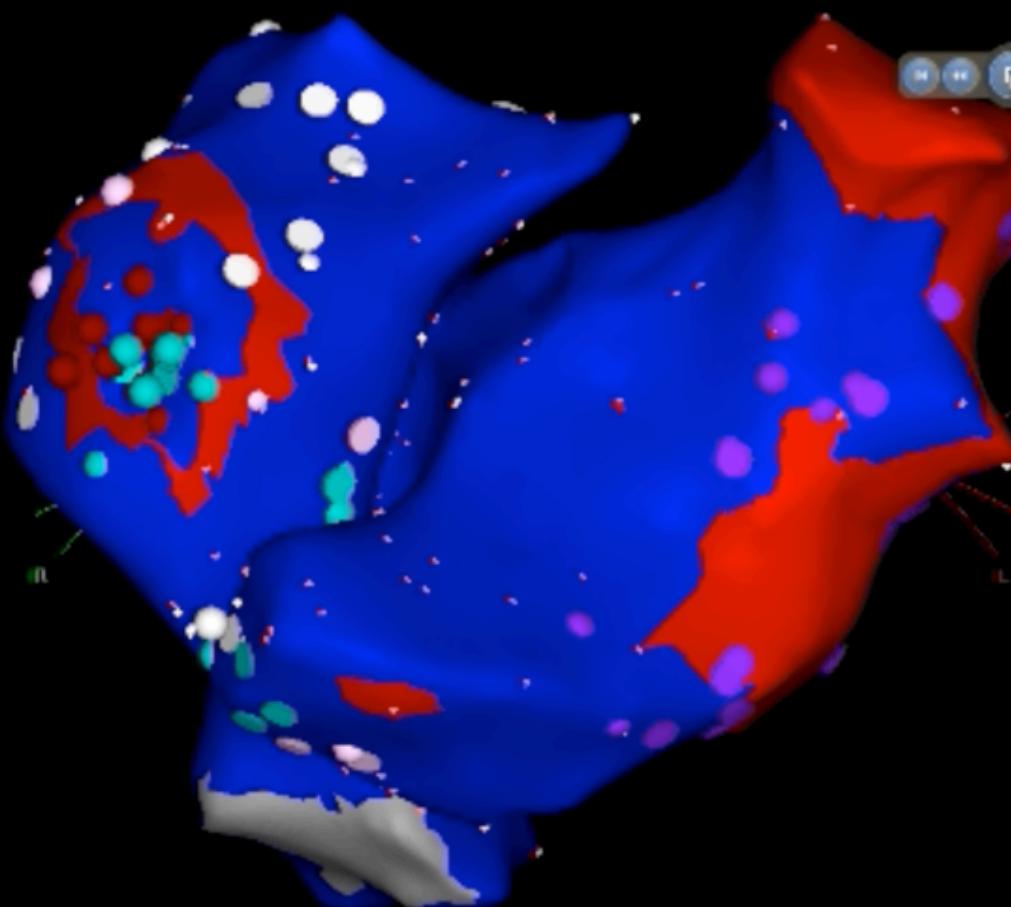
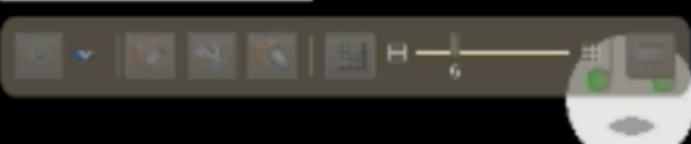
AB

00:07,86

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-18 7



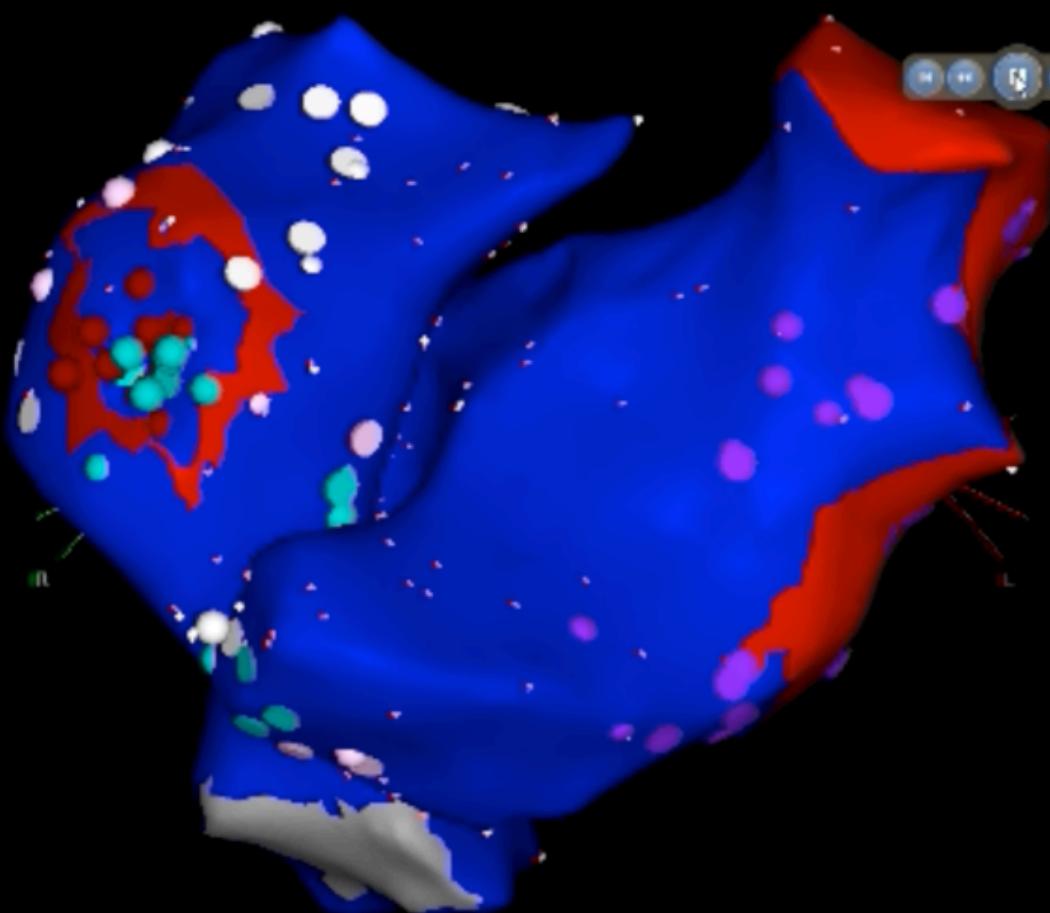
1.41



00:08,18

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms
-12 13



1.41

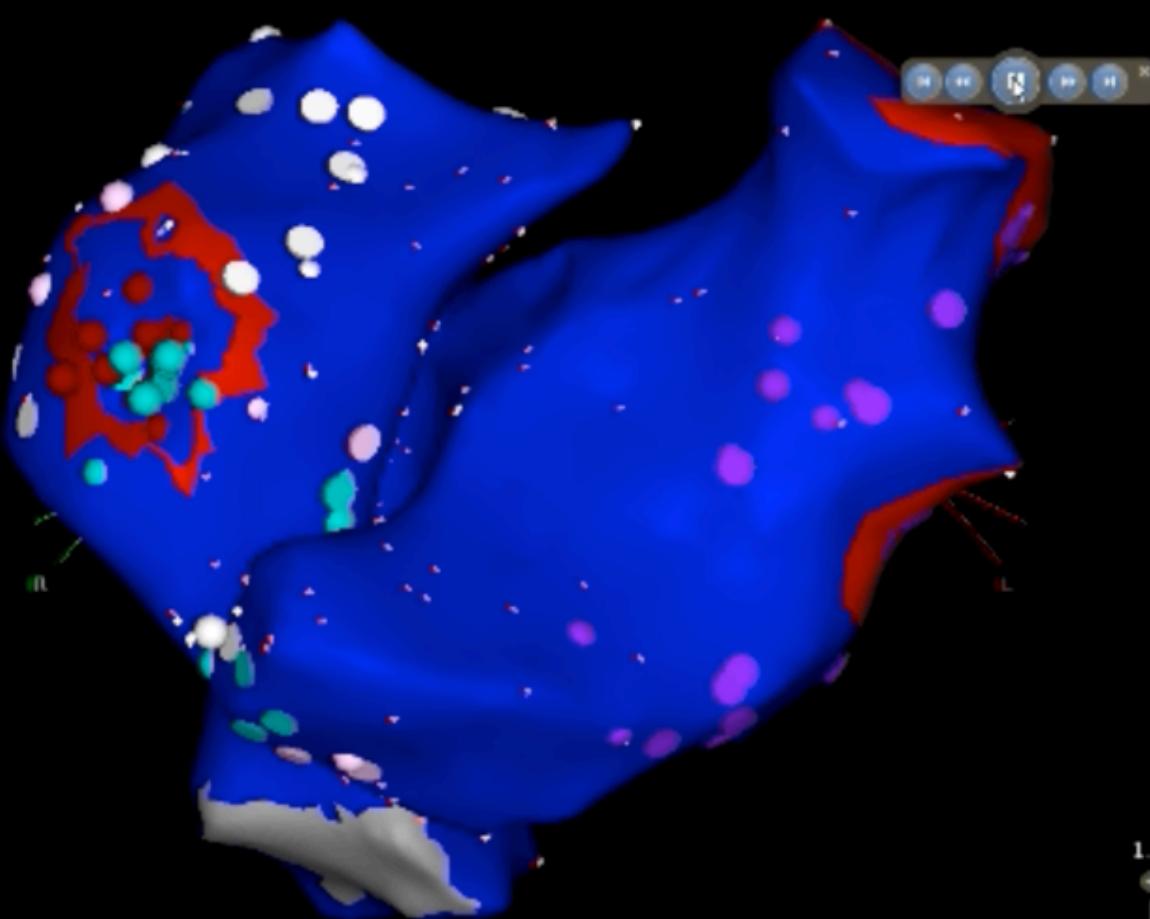


00:07,77

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-3 22



1.41

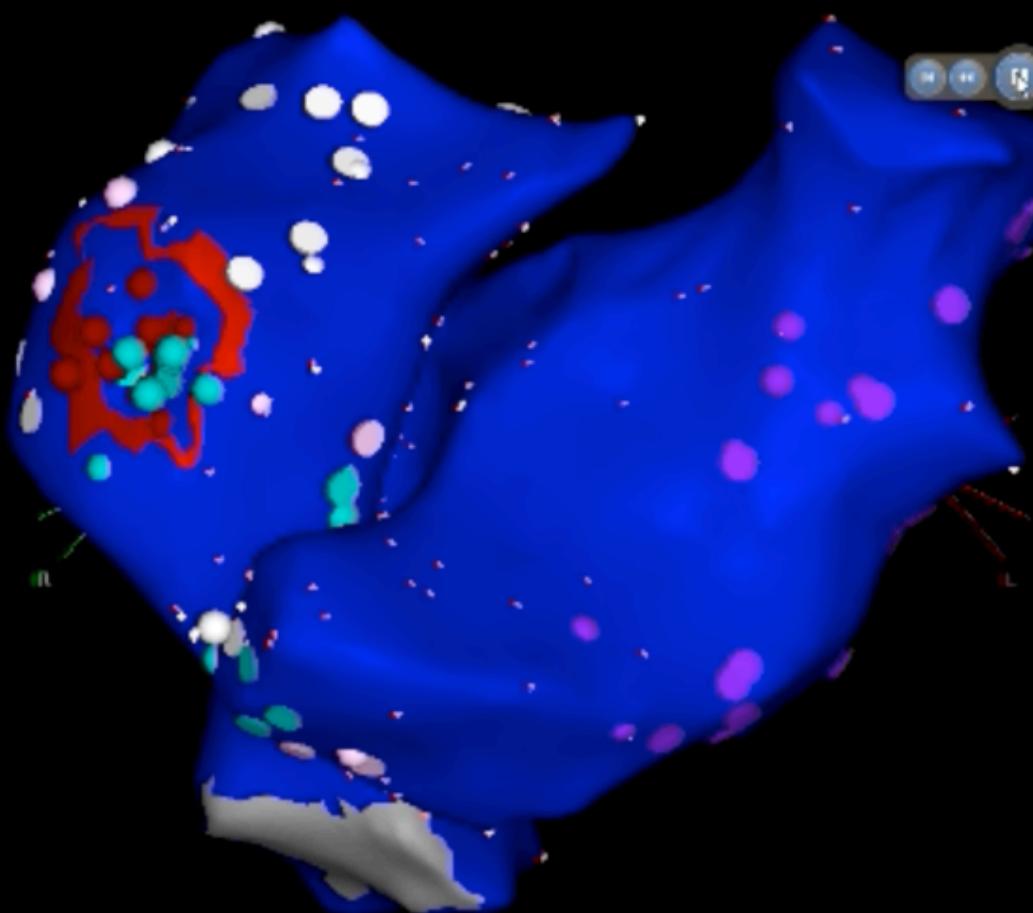
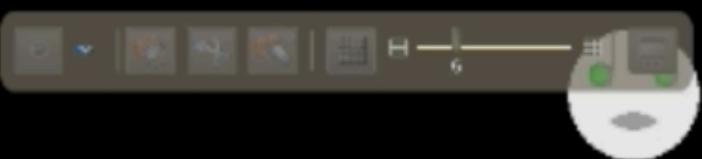


00:08,34

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

11 36



1.41

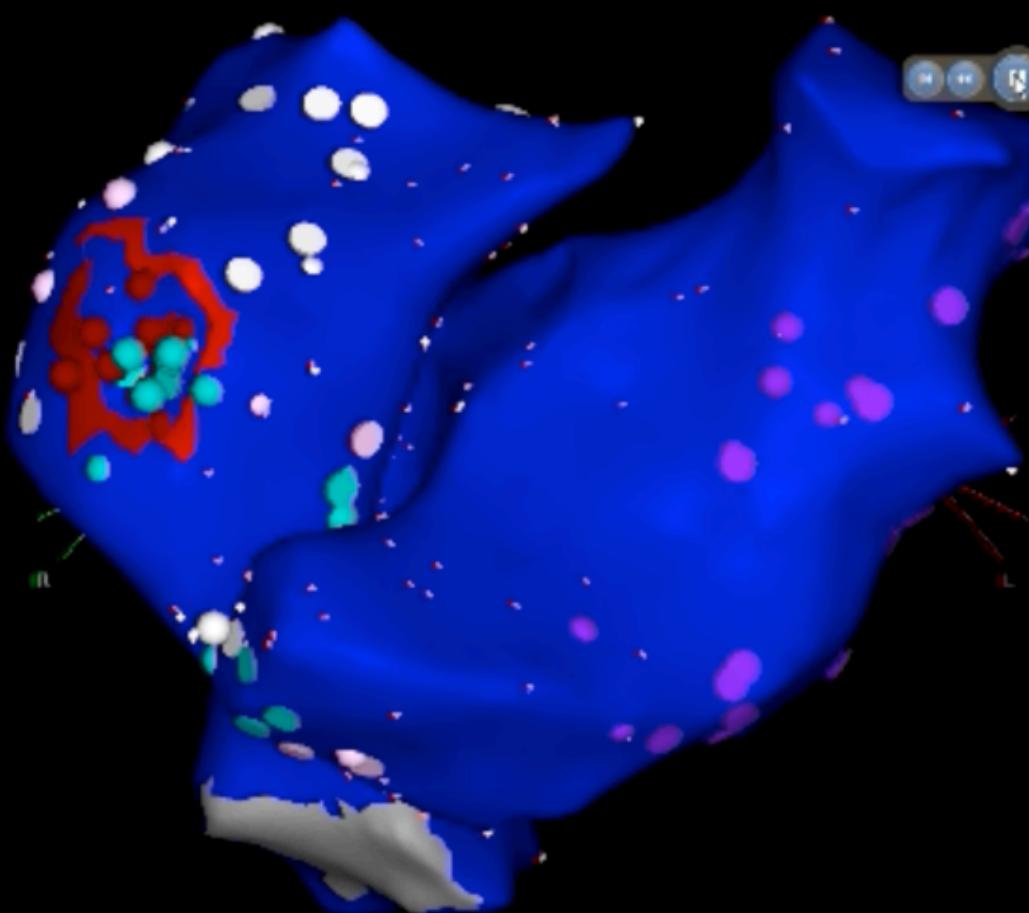
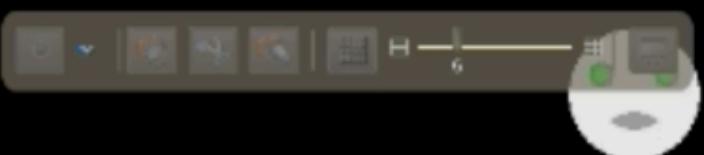


00:09,14

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

25 50



1.41

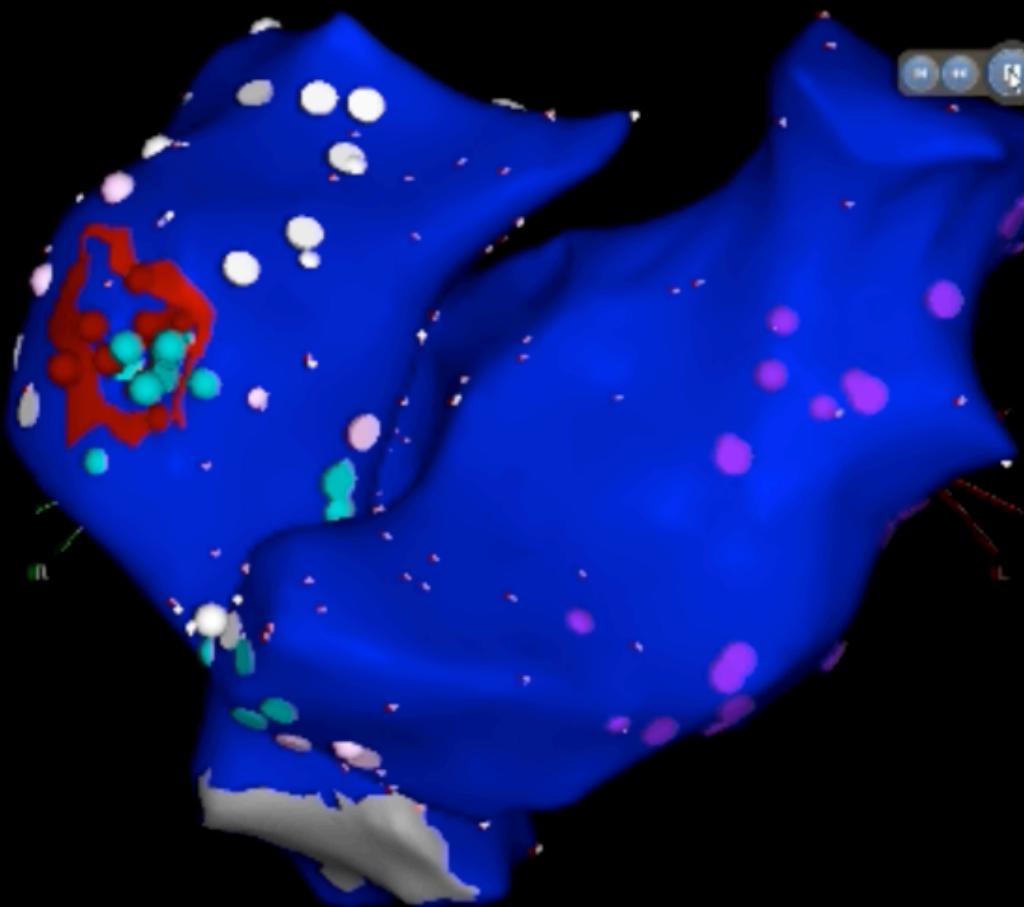
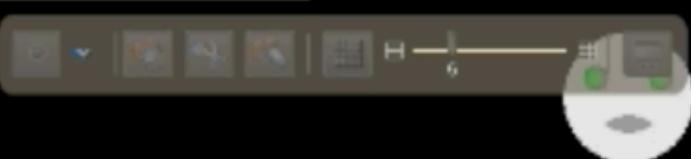


00:09,38

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

43 68



1.41

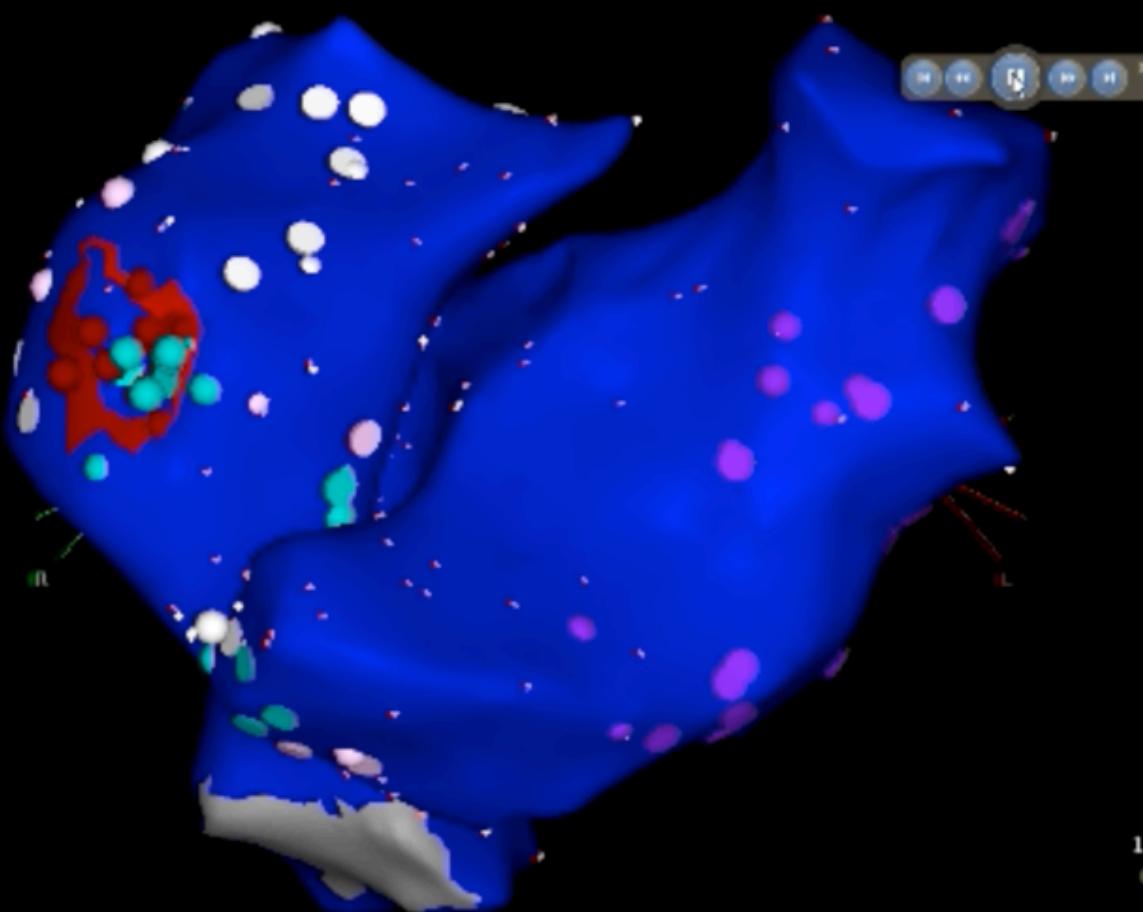


00:10,50

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

56 81



1.41

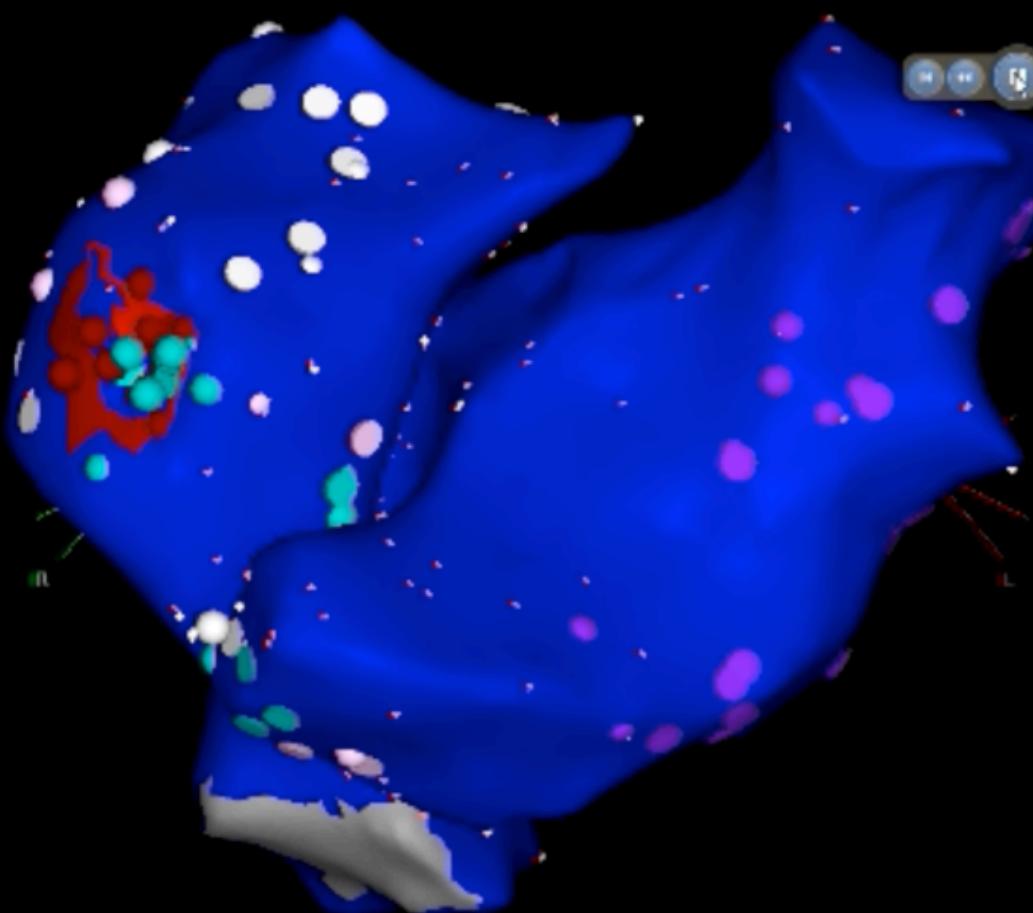
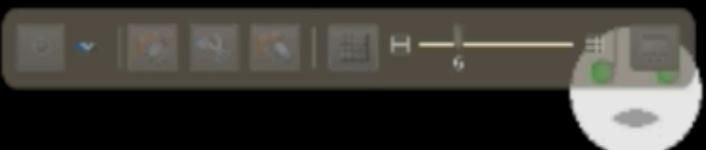


00:10,97

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

70 95



1.41

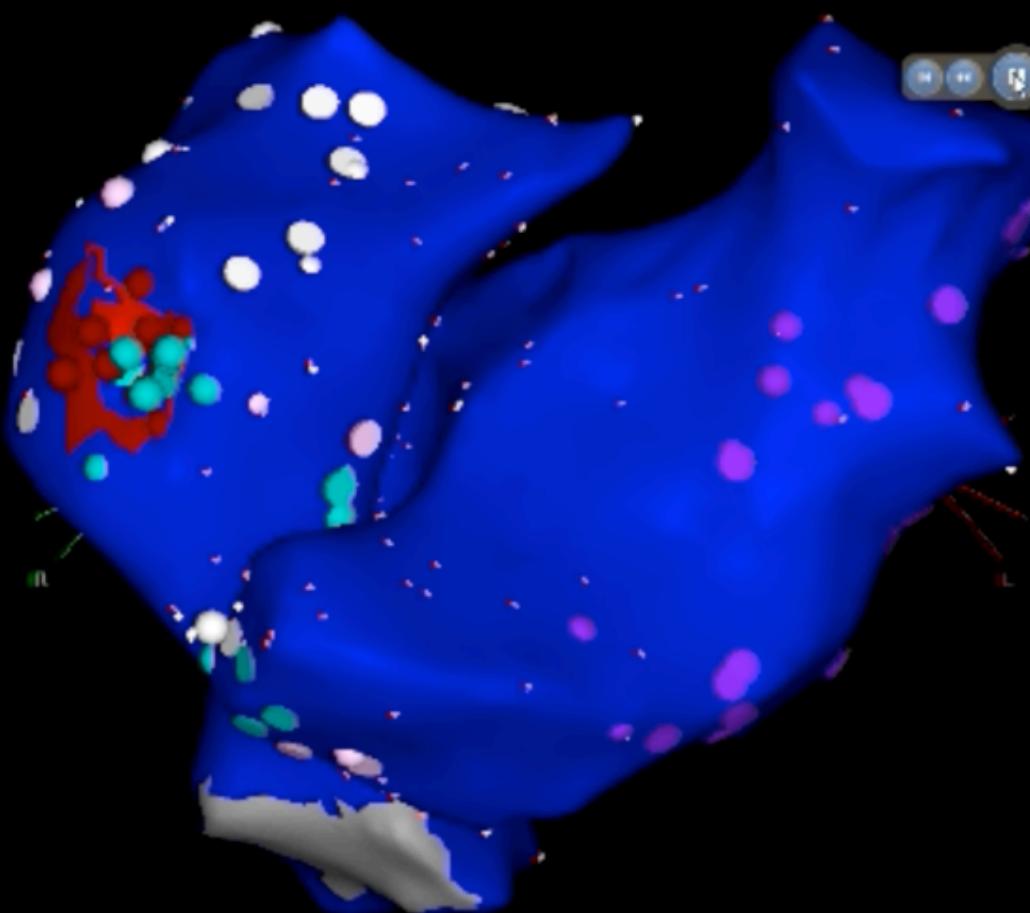
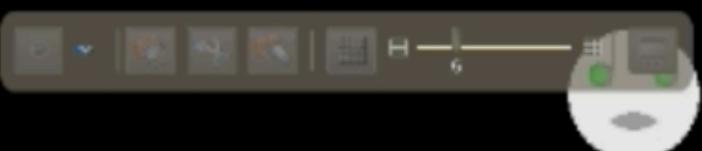


00:12,27

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

76 101



1.41

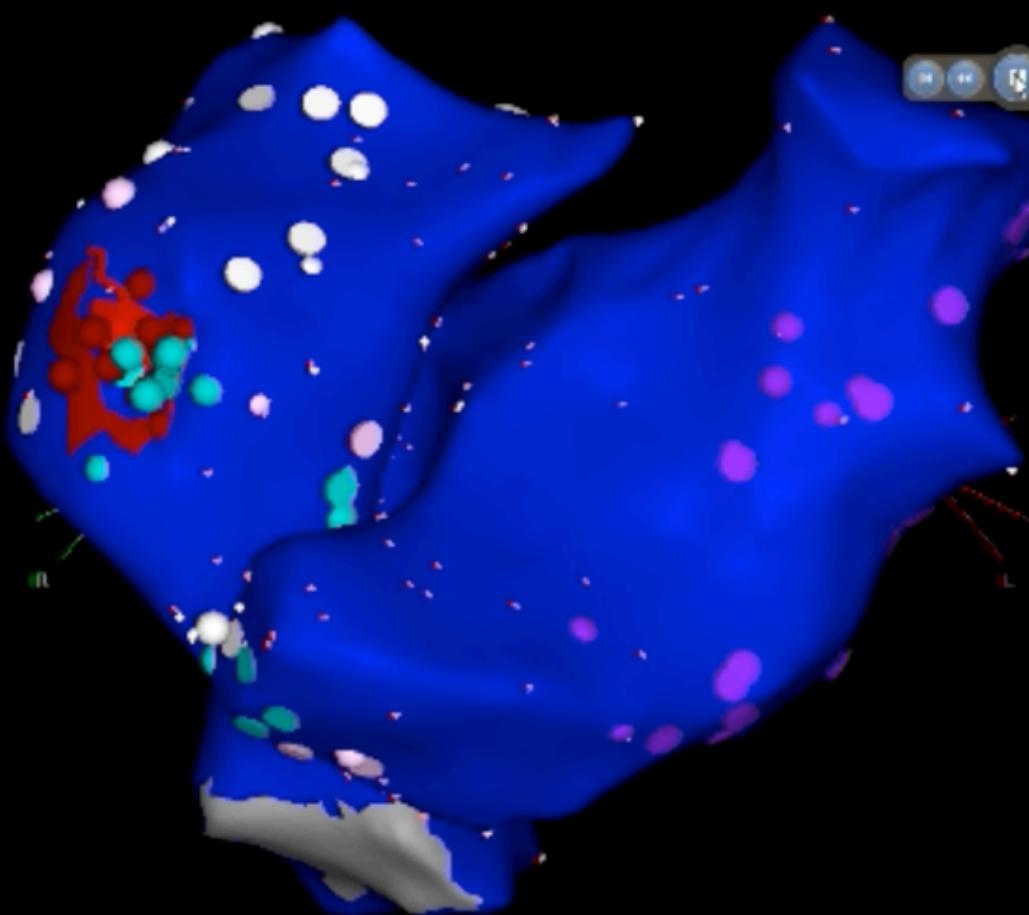


00:12,59

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

80 105



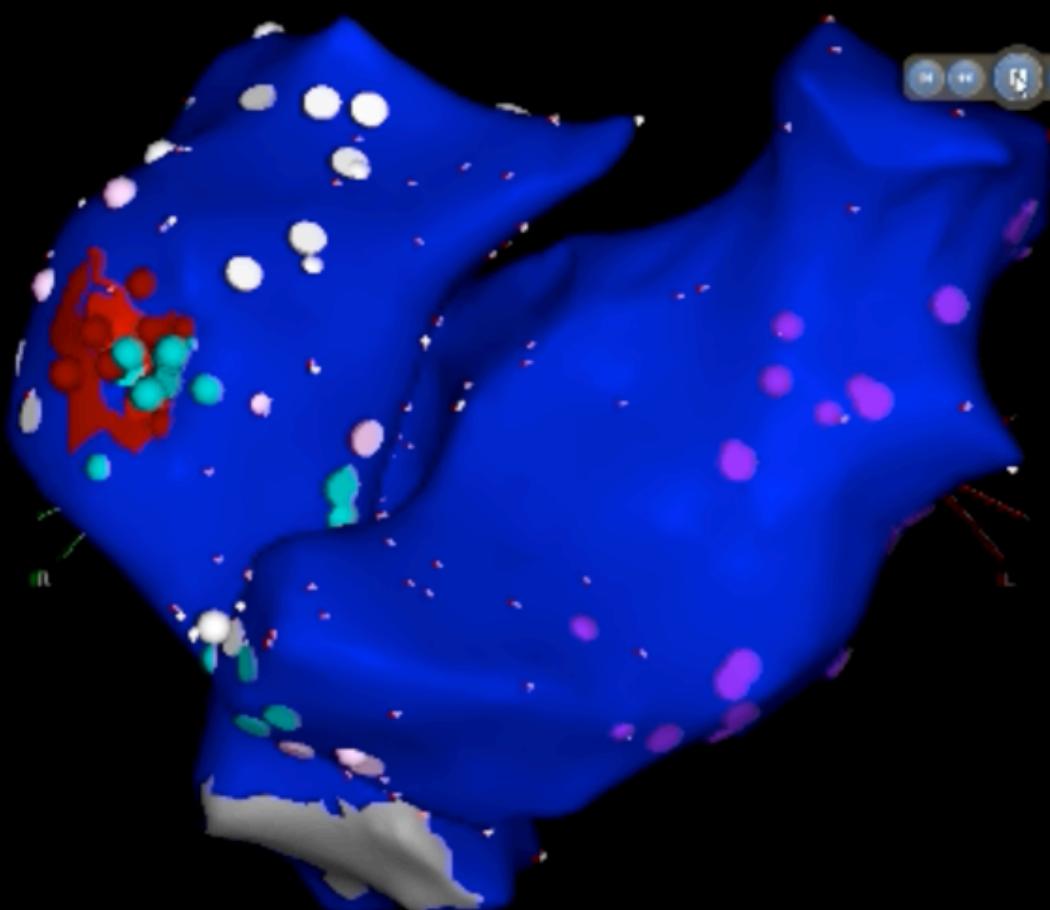
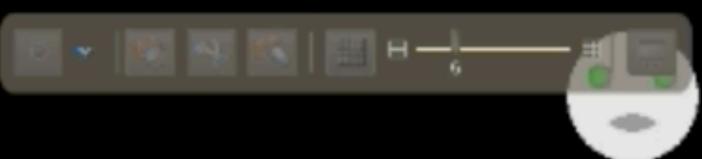
1.41



1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

87 112



1.41

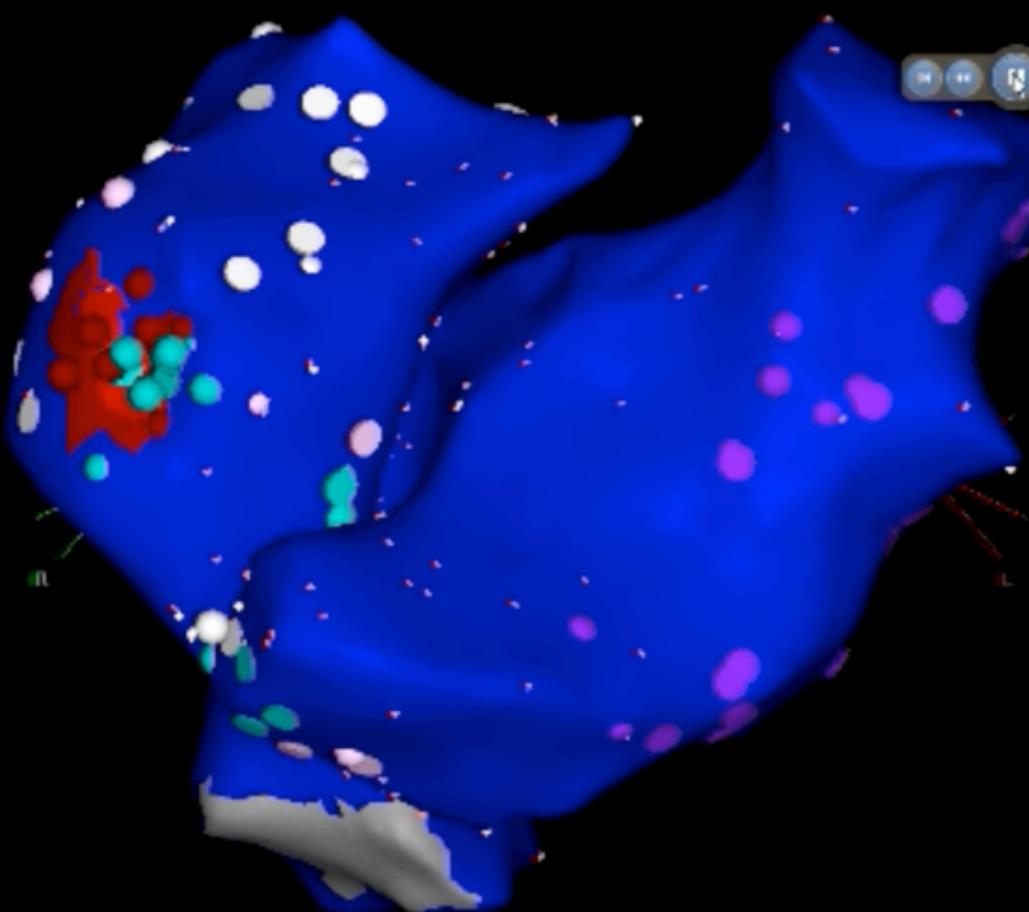
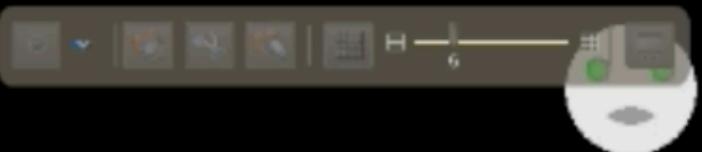


00:12,33

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

93 118



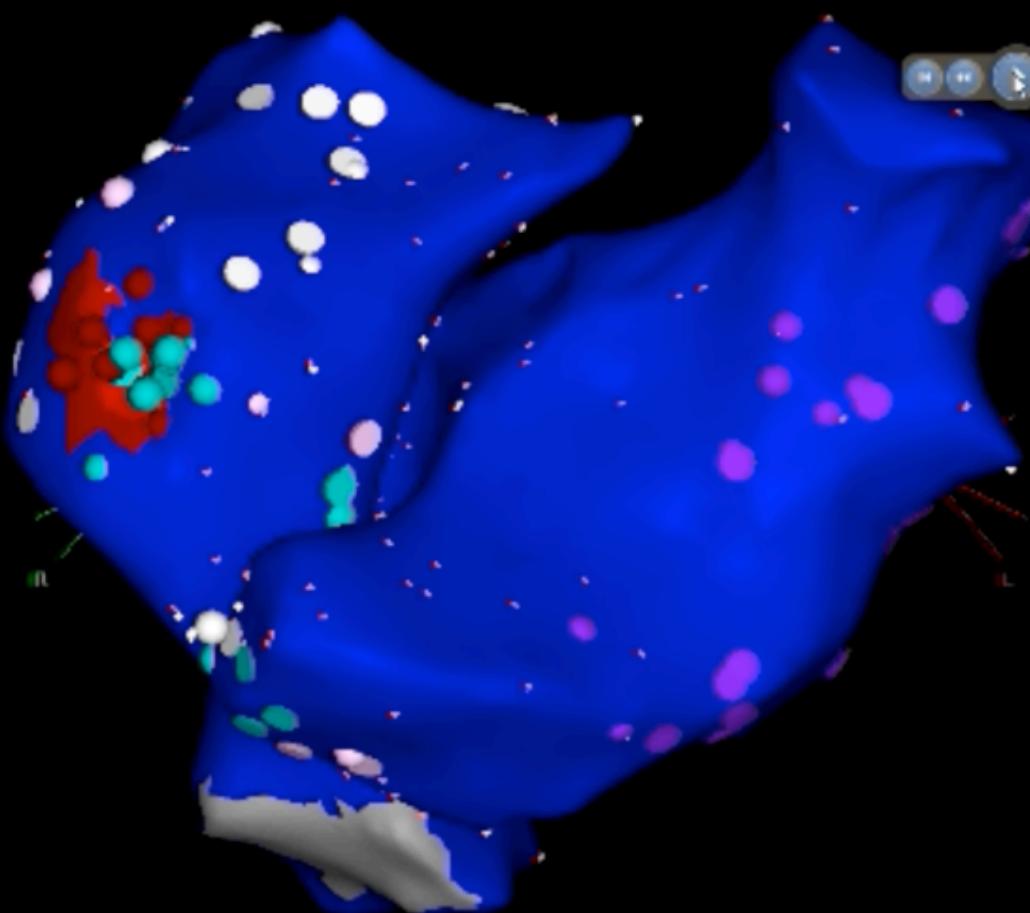
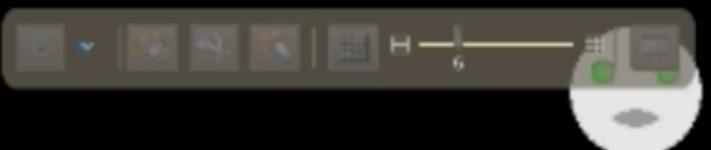
1.41



00:12,65

1-RA Tunnel (120, 0)

-127 ms LAT 120 ms
95 120



1.41



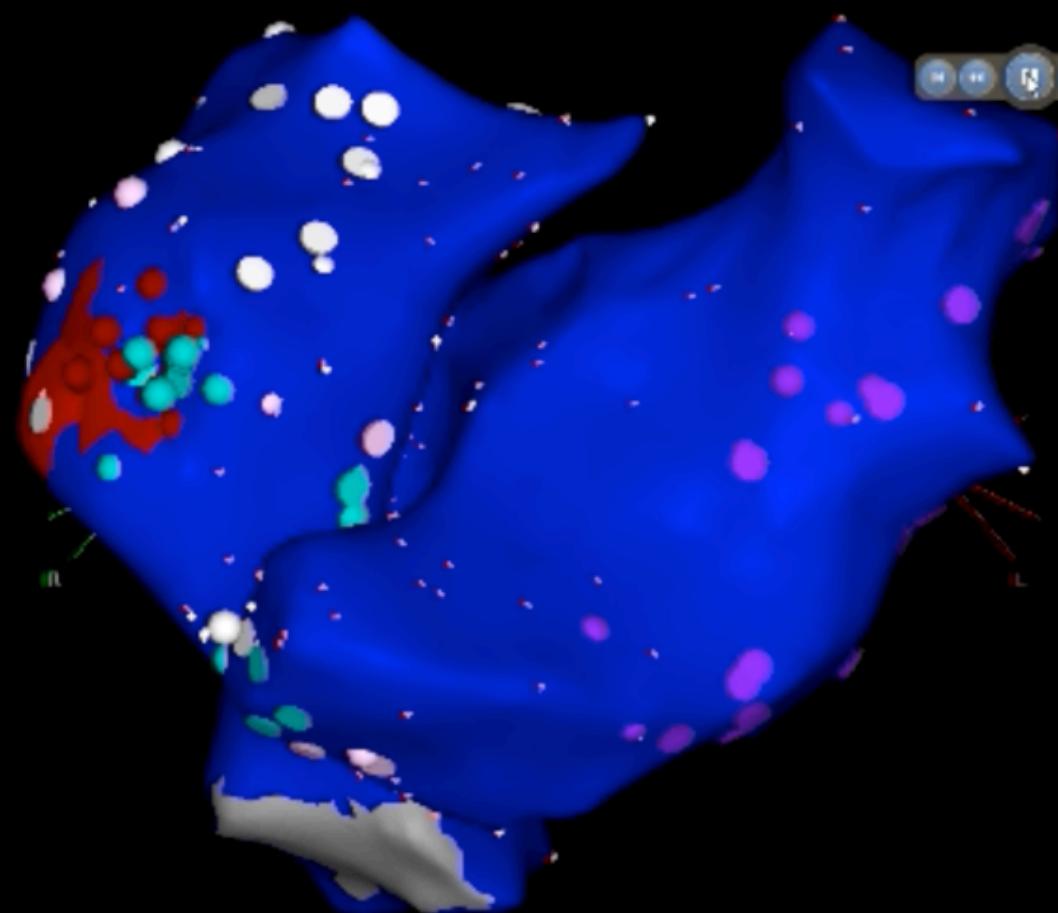
00:13,63

1-RA Tunnel {120, 0}

-127 ms LAT 120 ms

-124 -99

00:14,27



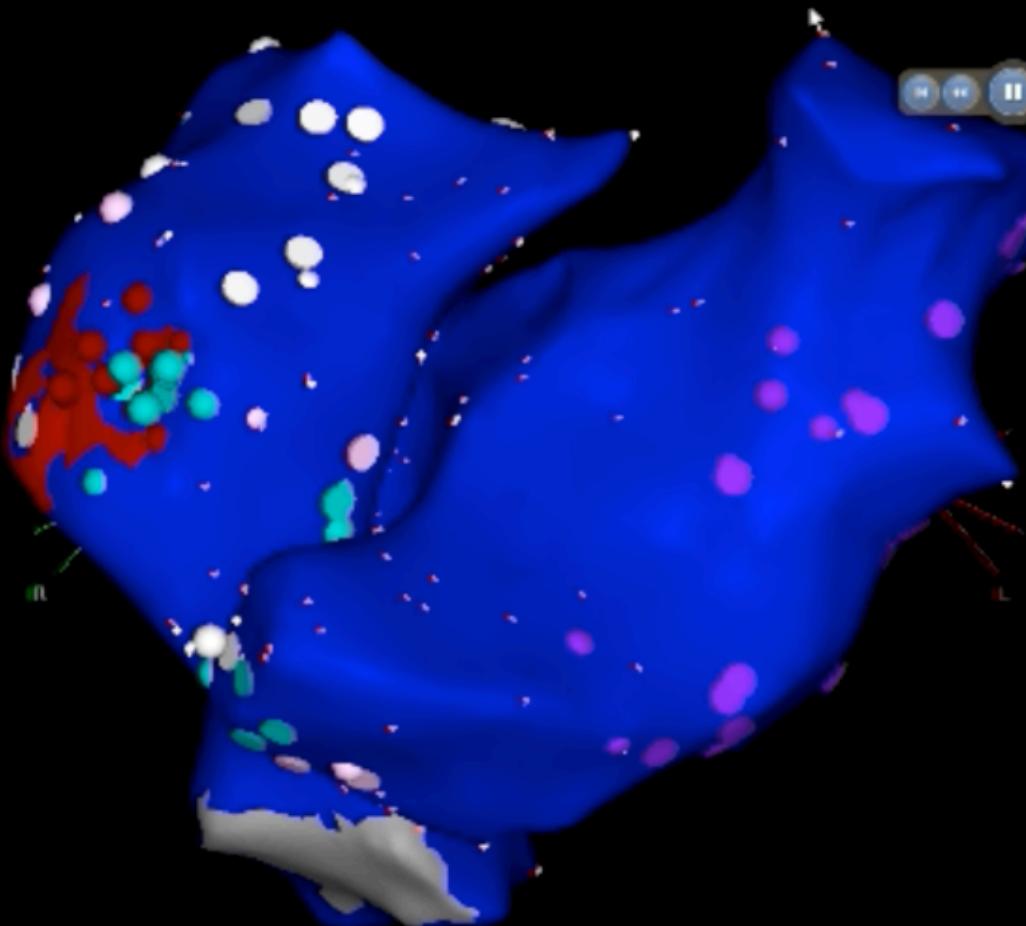
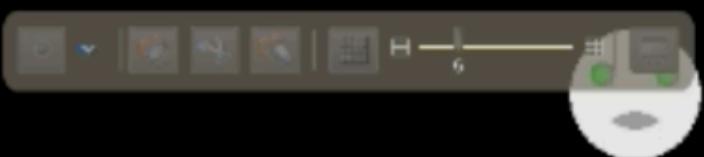
1.41



1-RA Tunnel (120, 0)

-127 ms LAT 120 ms

-115 -90

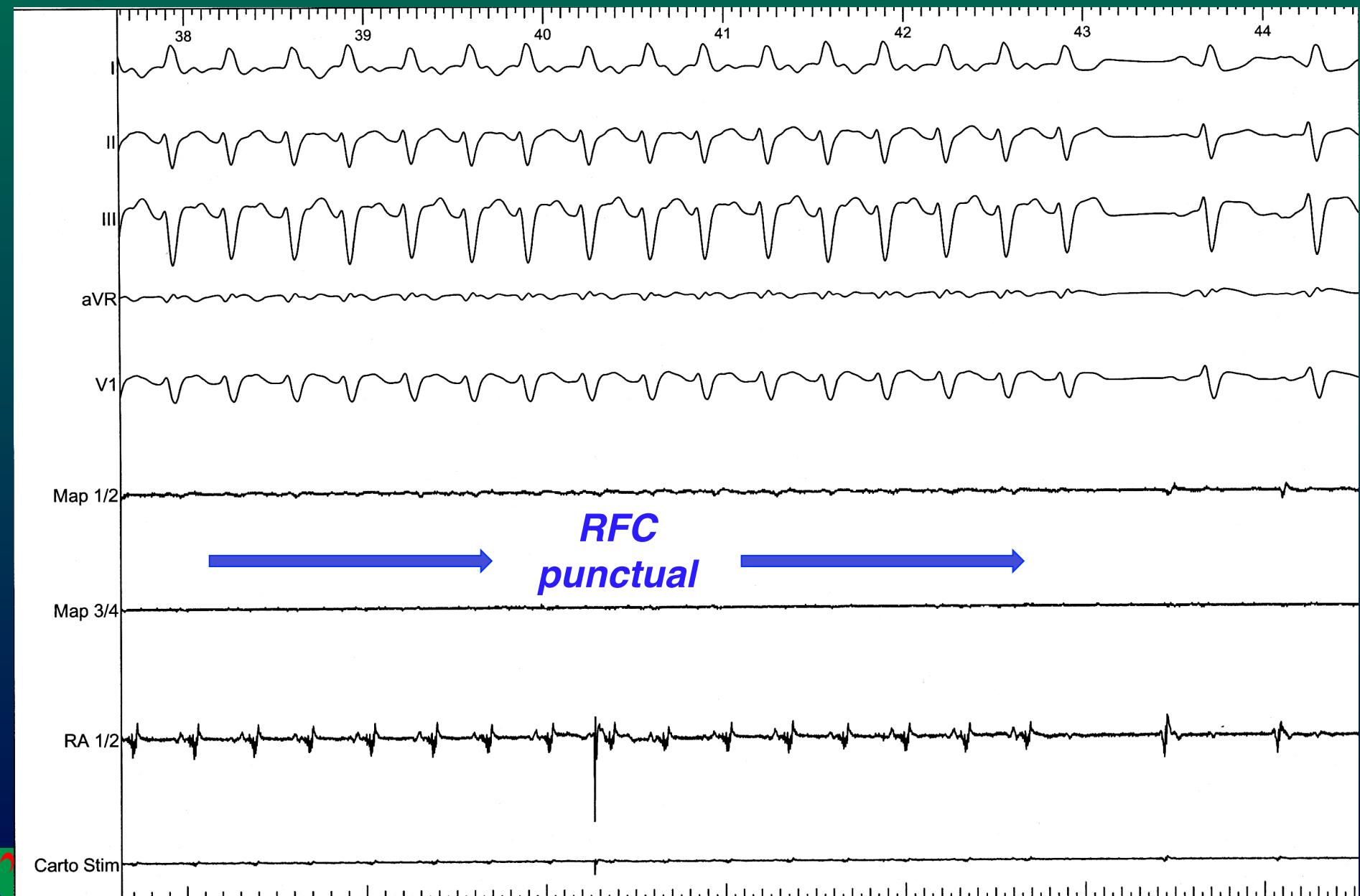


1.41



00:15,31

m, 19 yol, tricuspid atresia, modified Fontan, re-apert. fenestr. ; ART (CL 250 ms)



Atrial Arrhythmia in Postoperative CHD

Practical Approach: Catheter Ablation

Differential Diagnosis: FAT / ART

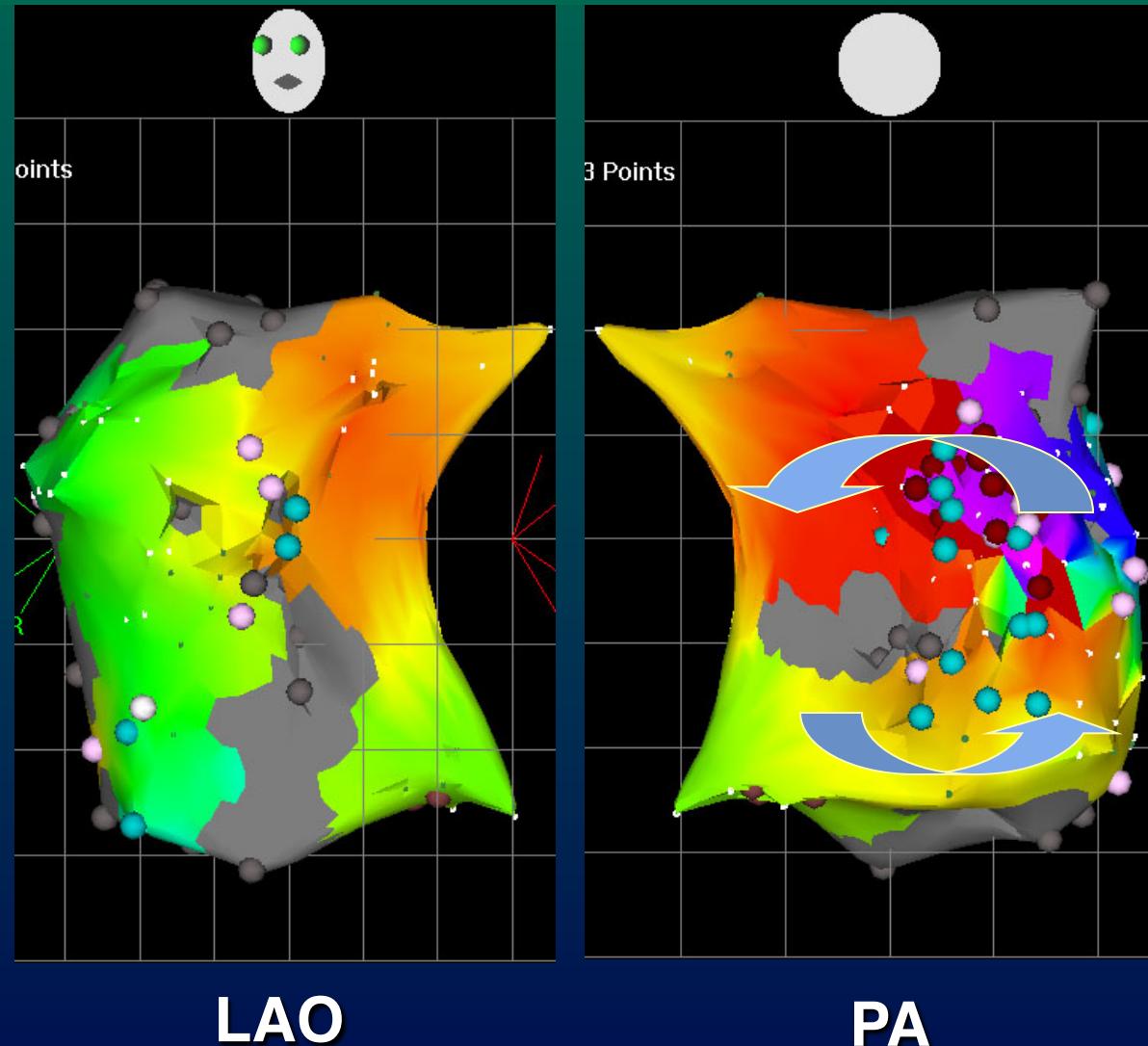
% of tachy CL represented by local EG

= P-P interval



- reentry - macro (micro)
- (*mapping correct chamber*)

Fontan, Atrial Makro-Reentry

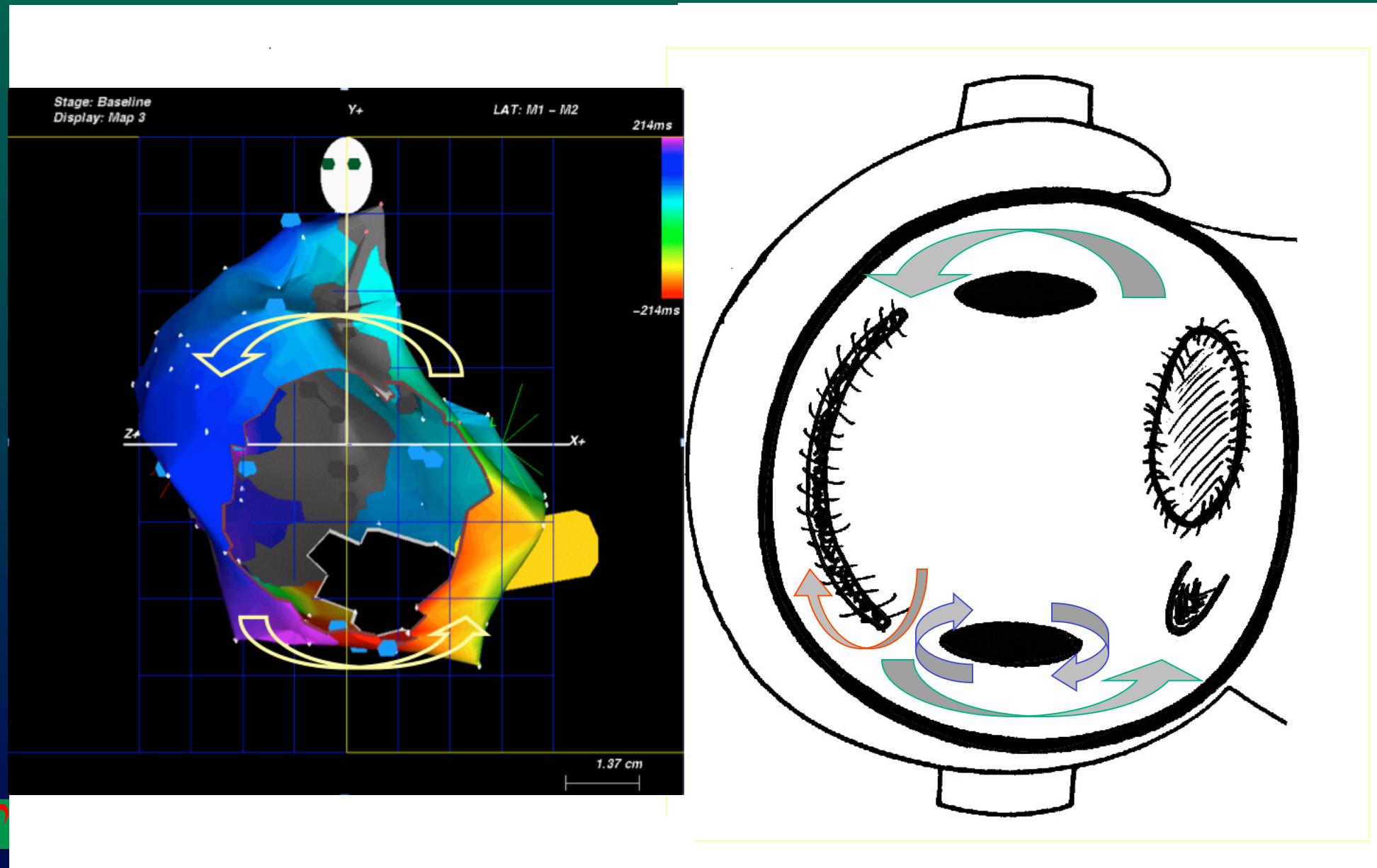


ART CL:
255 msec

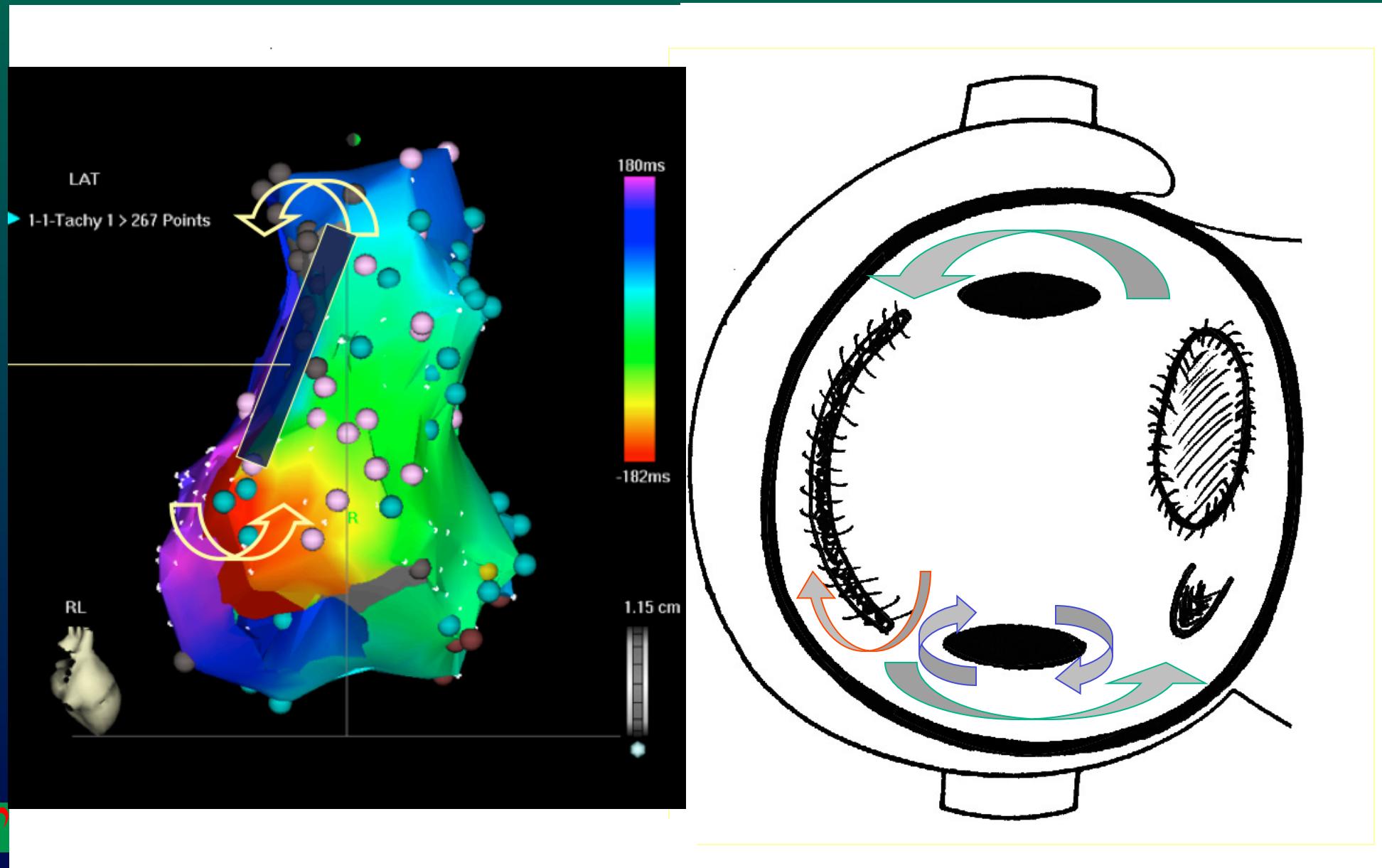
*reconstr.
activation:*
240 msec
(= WOI)

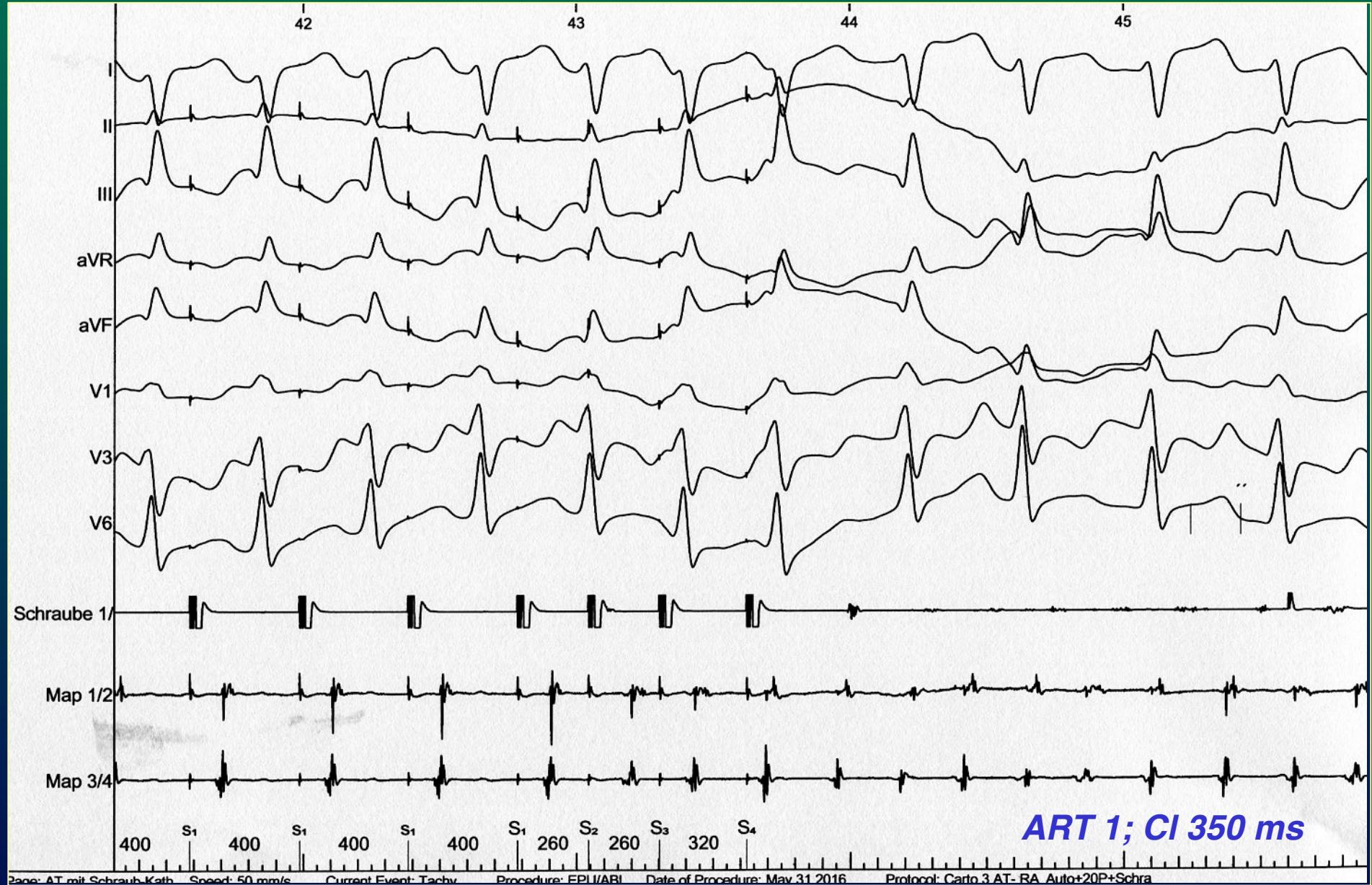


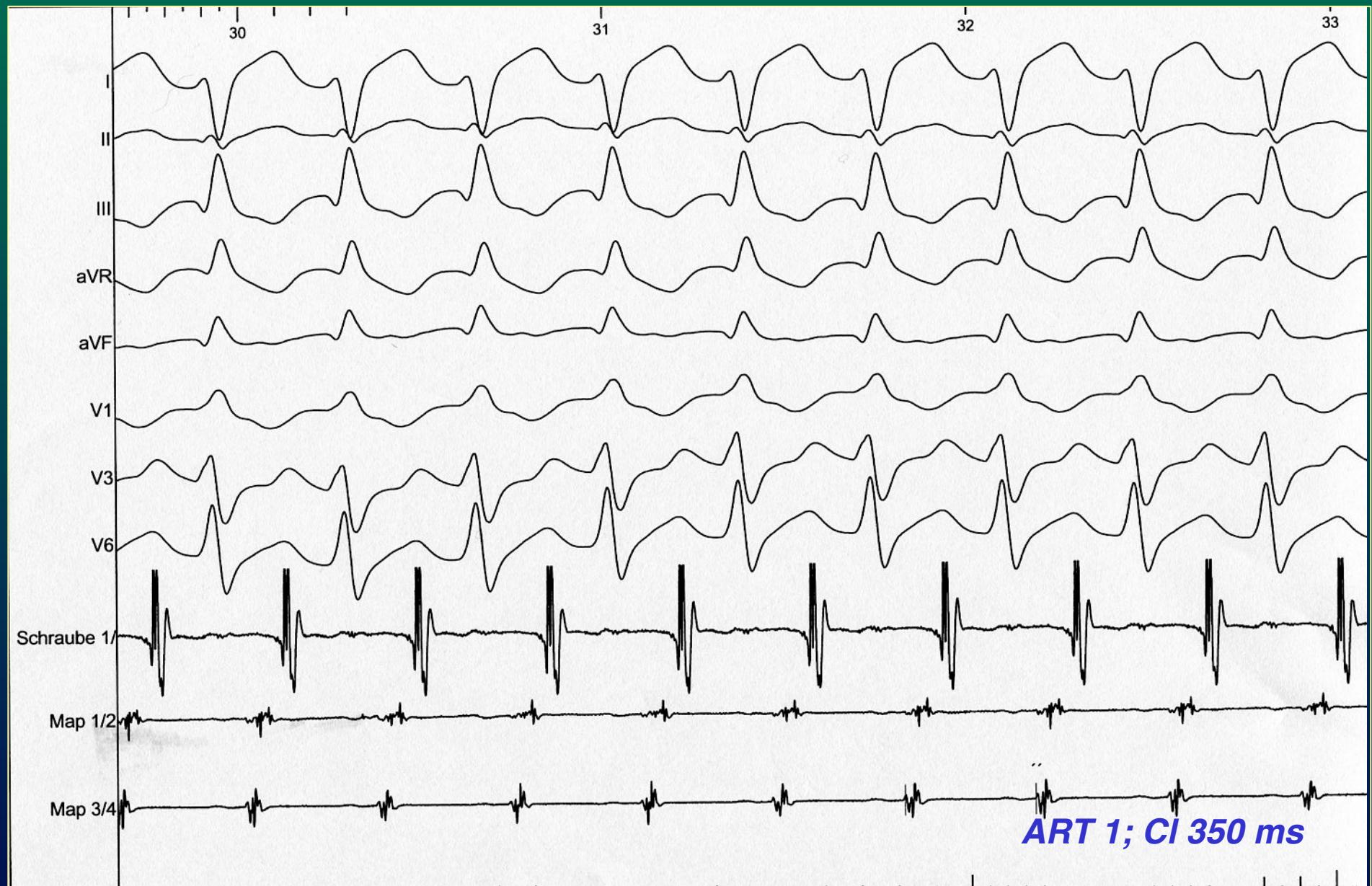
Atrial Reentry Tachycardia

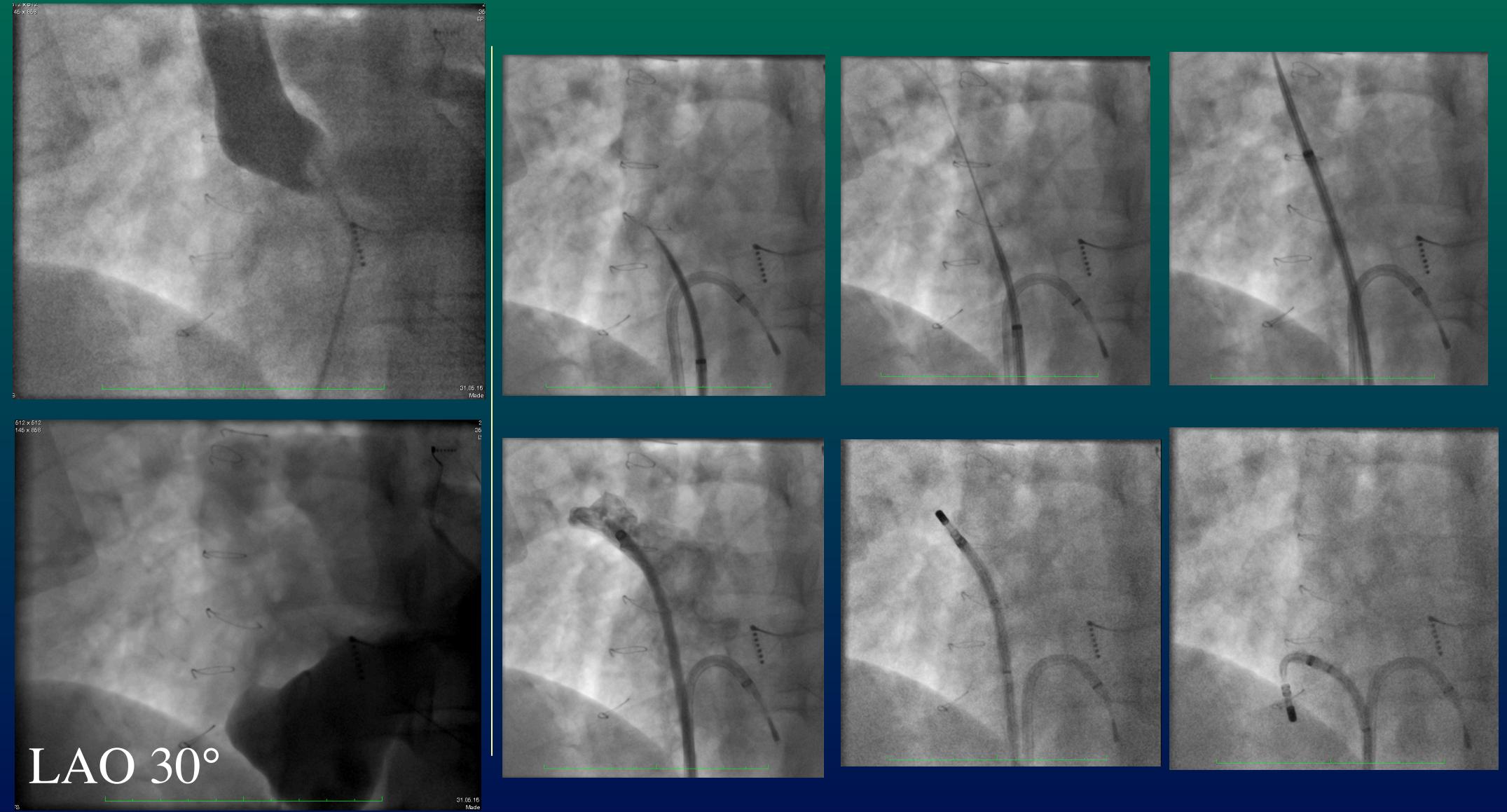


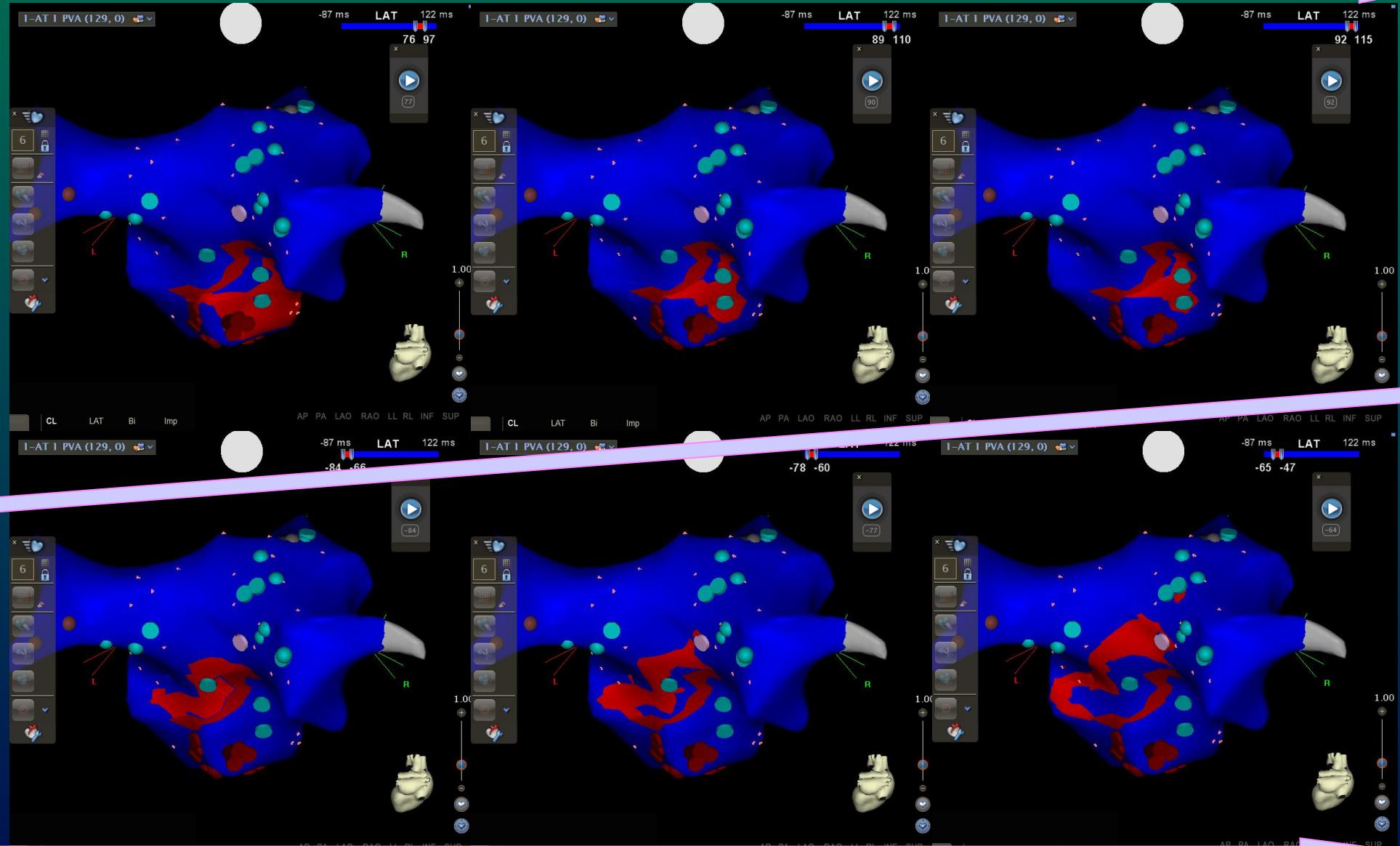
Atrial Reentry Tachycardia



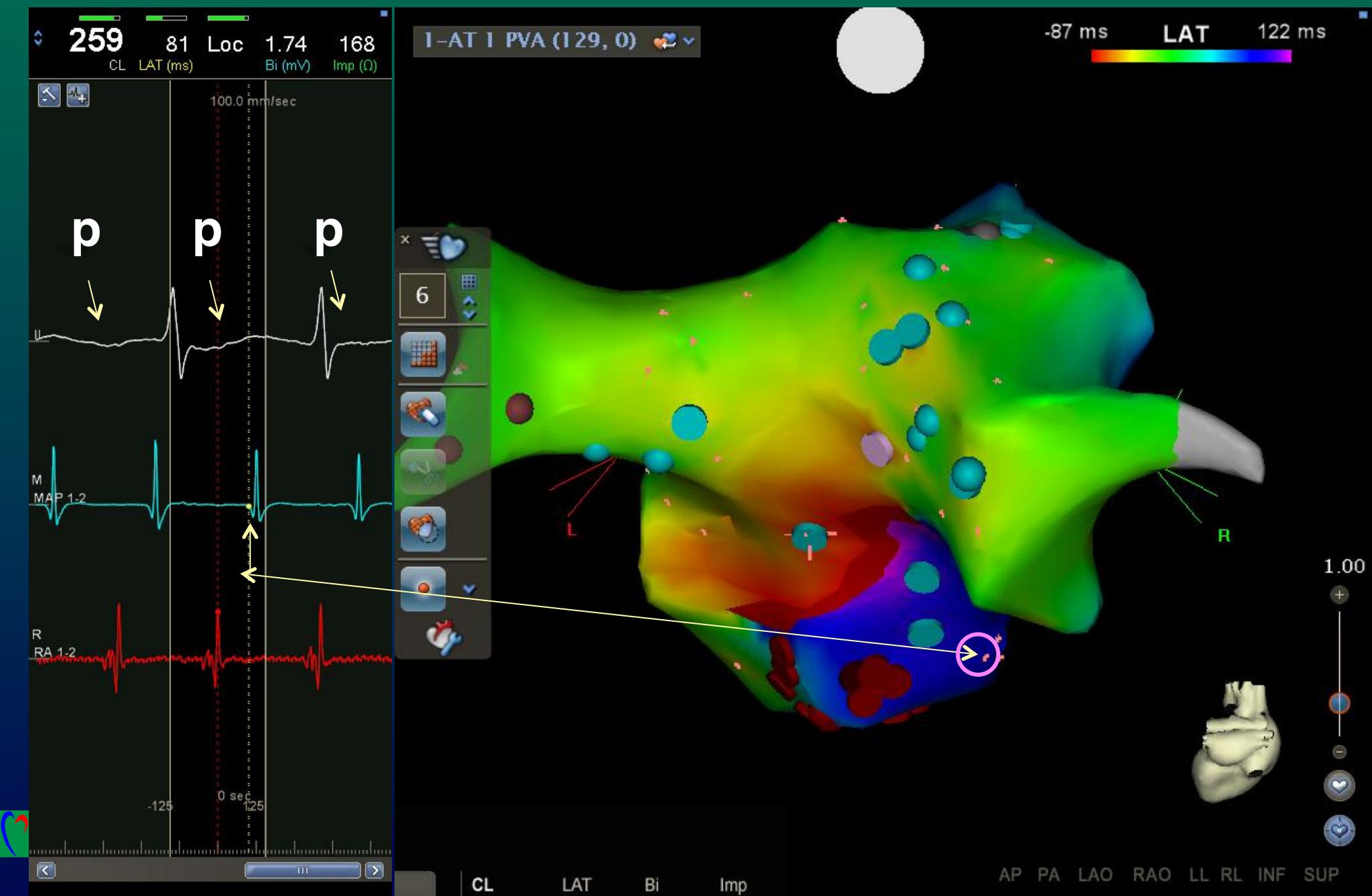




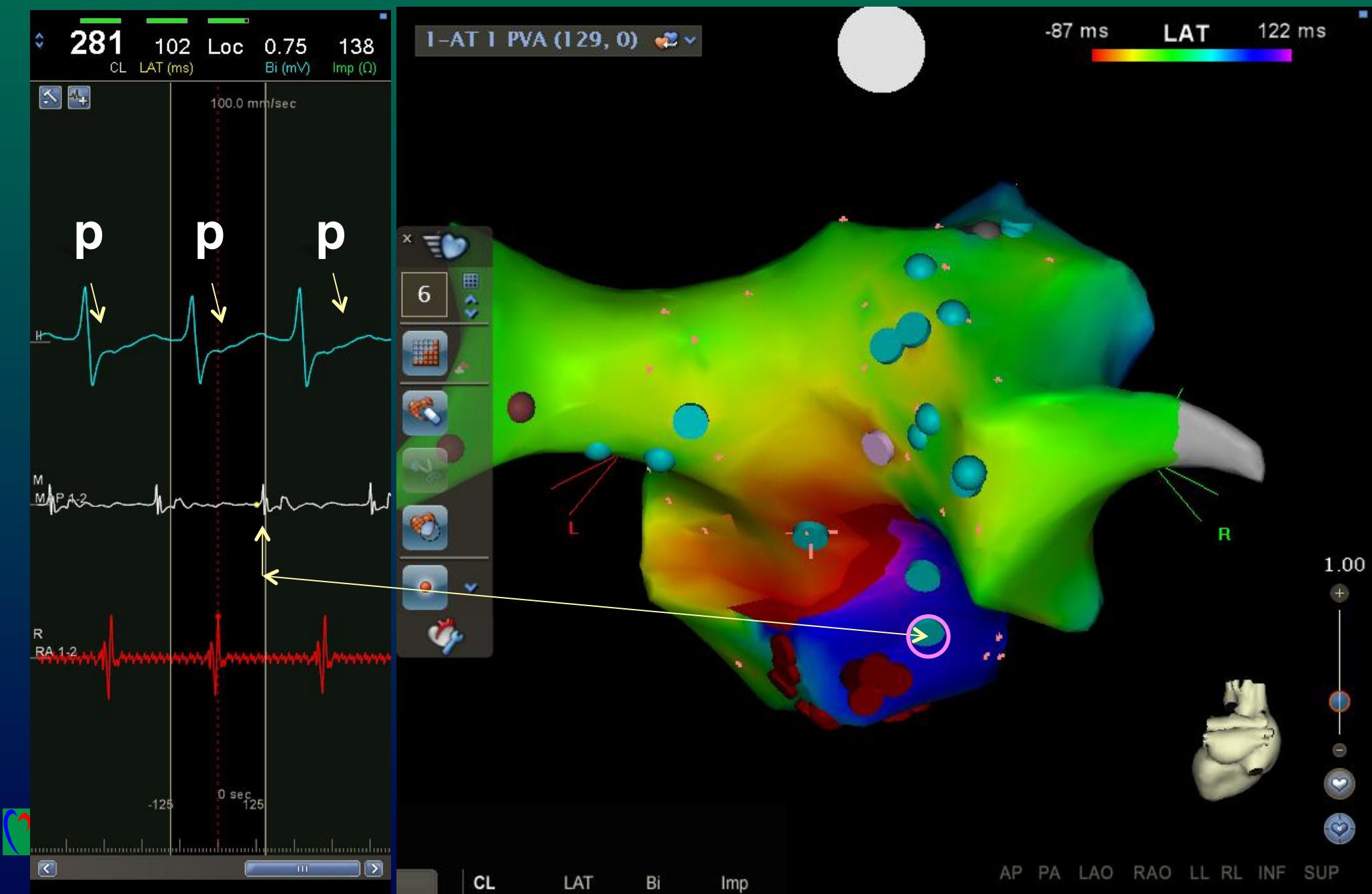




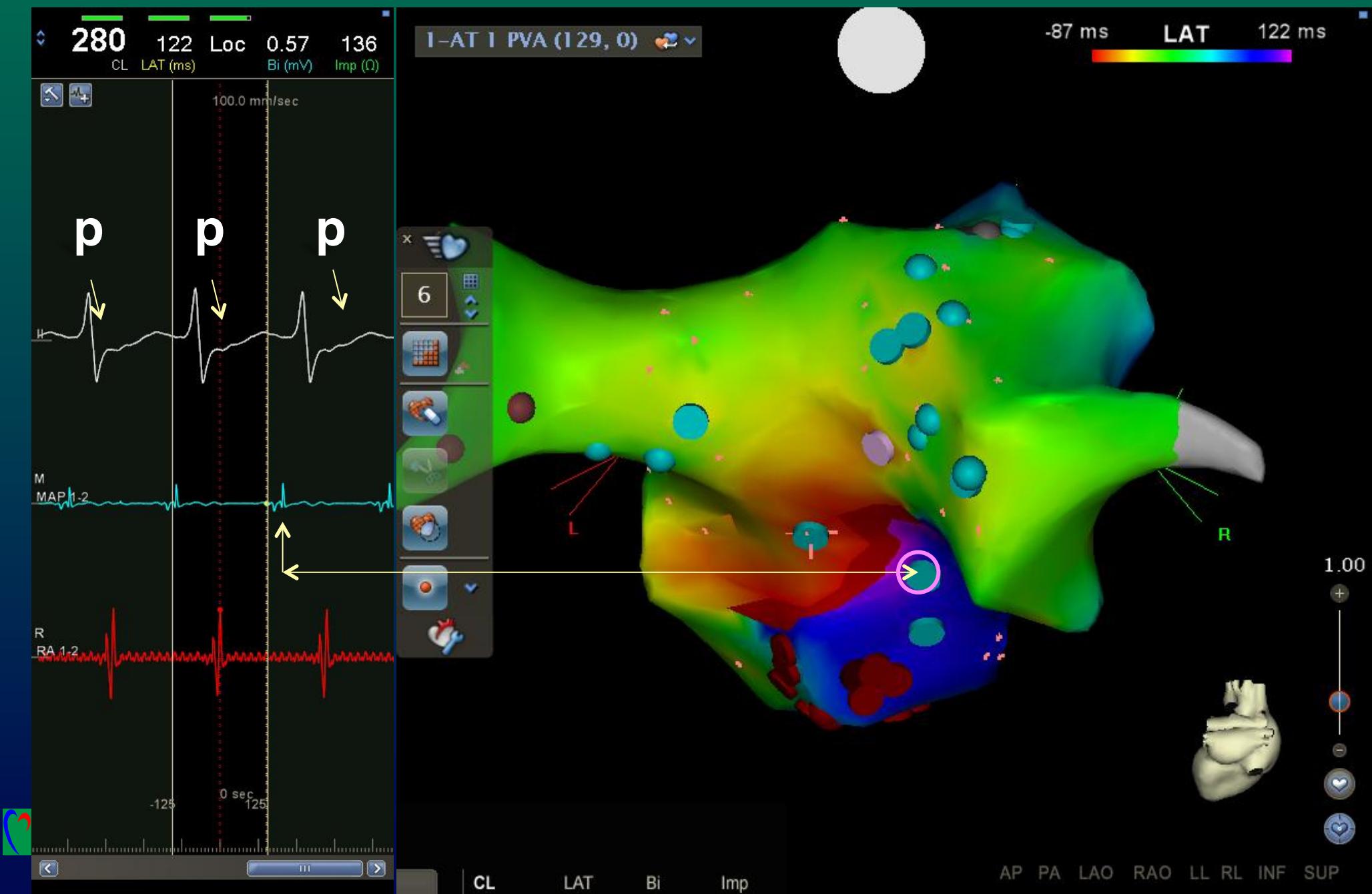
f, 27 yol - d-TGA – post Senning – atrial tachycardia



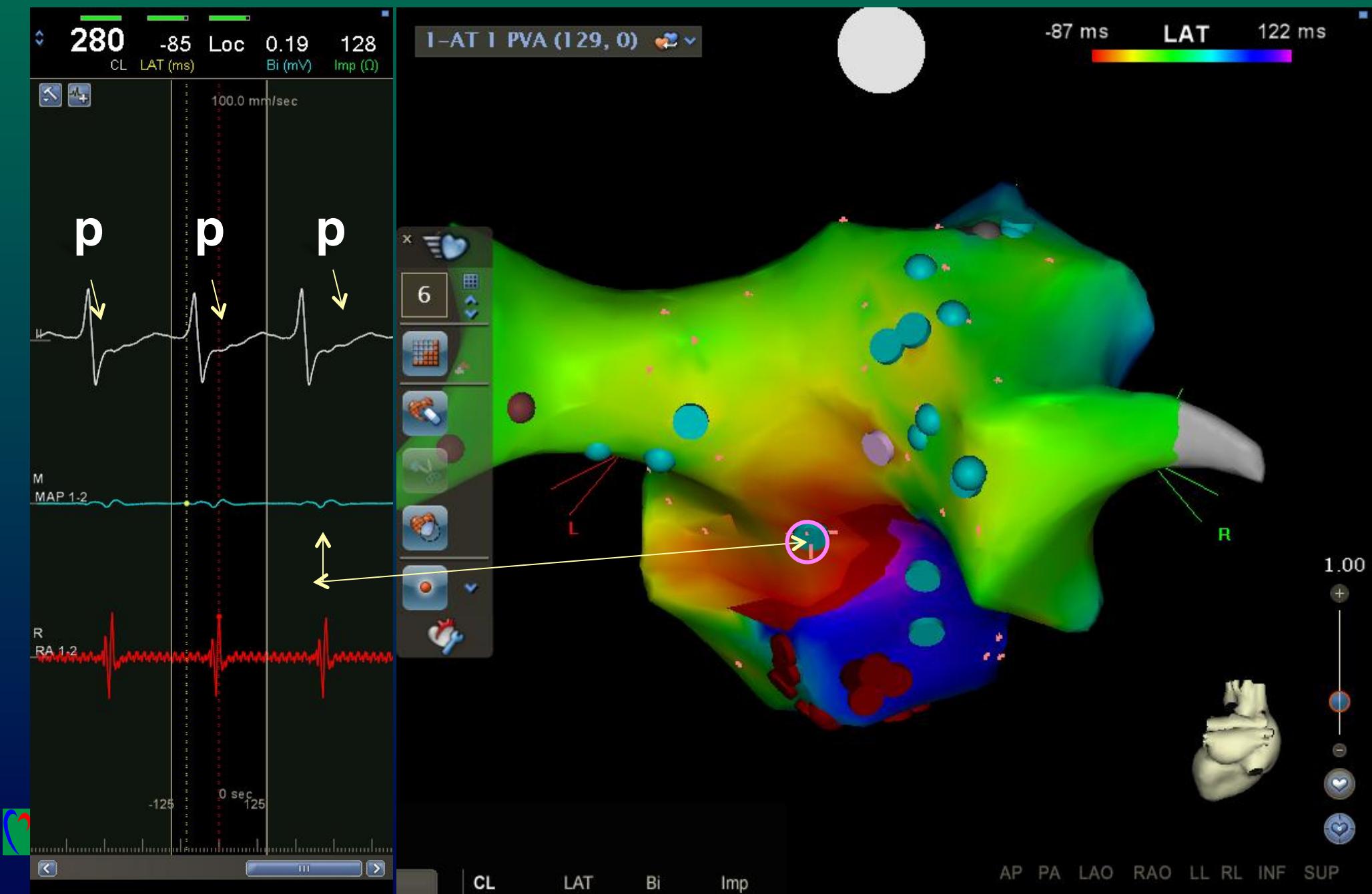
f, 27 yol - d-TGA – post Senning – atrial tachycardia



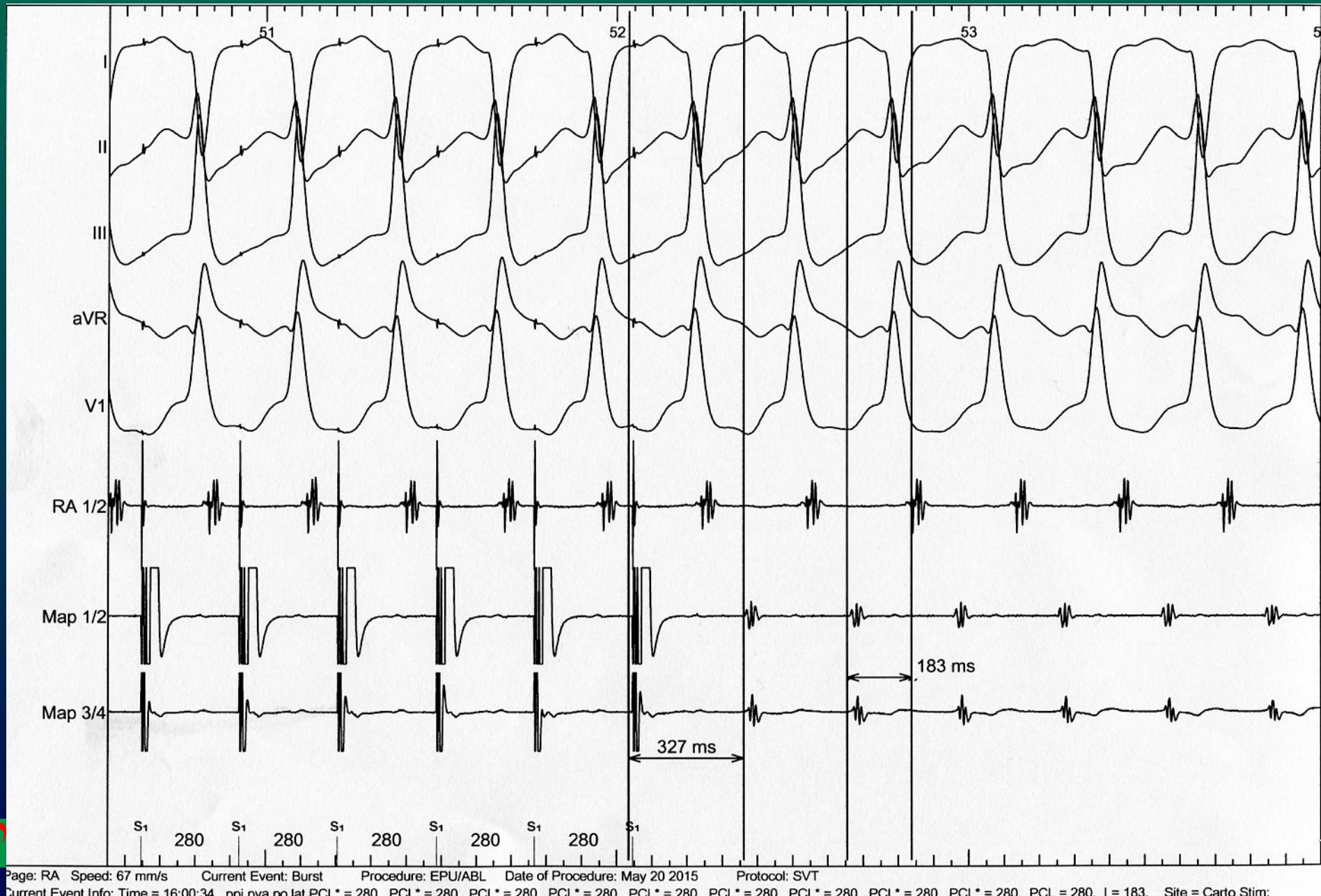
f, 27 yol - d-TGA – post Senning – atrial tachycardia



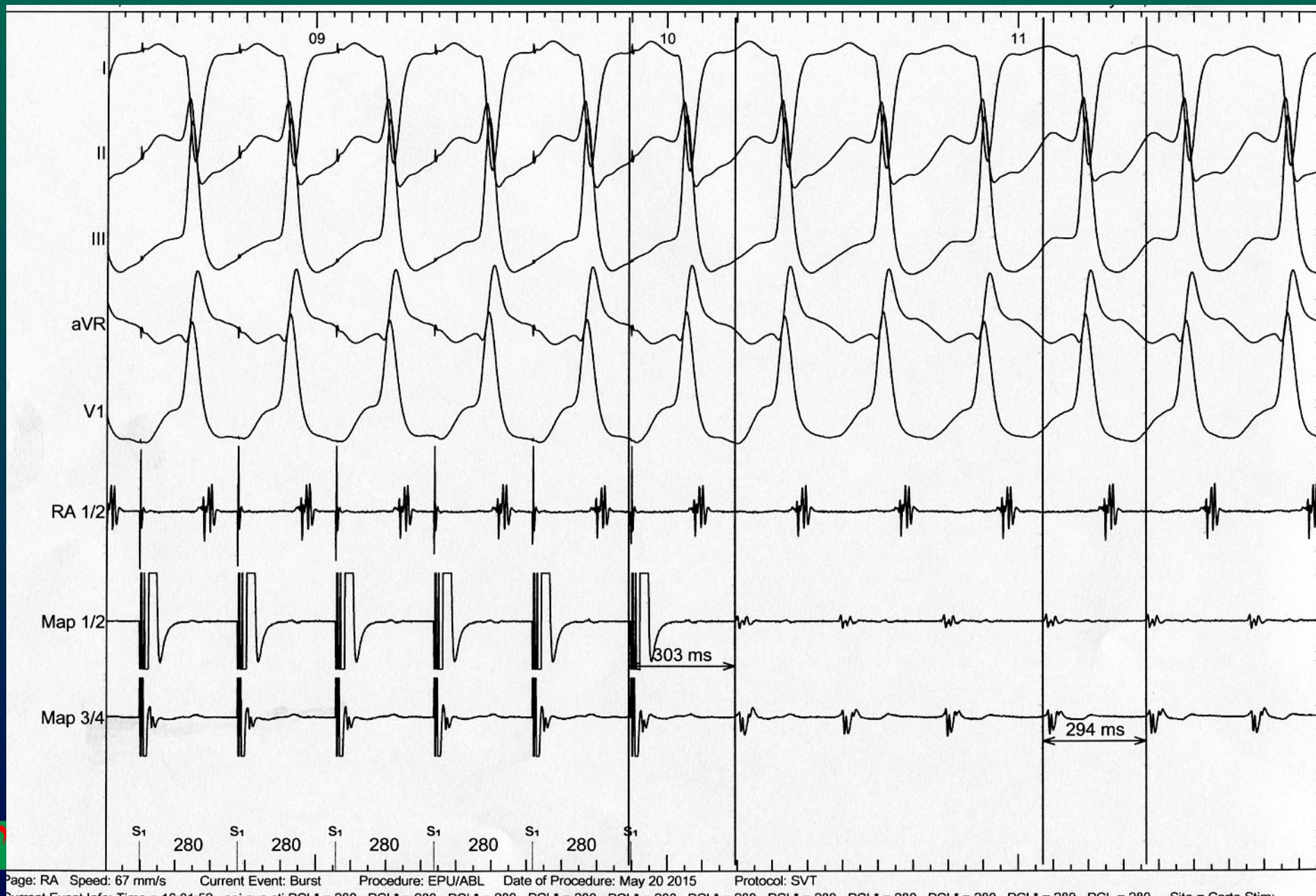
f, 27 yol - d-TGA – post Senning – atrial tachycardia



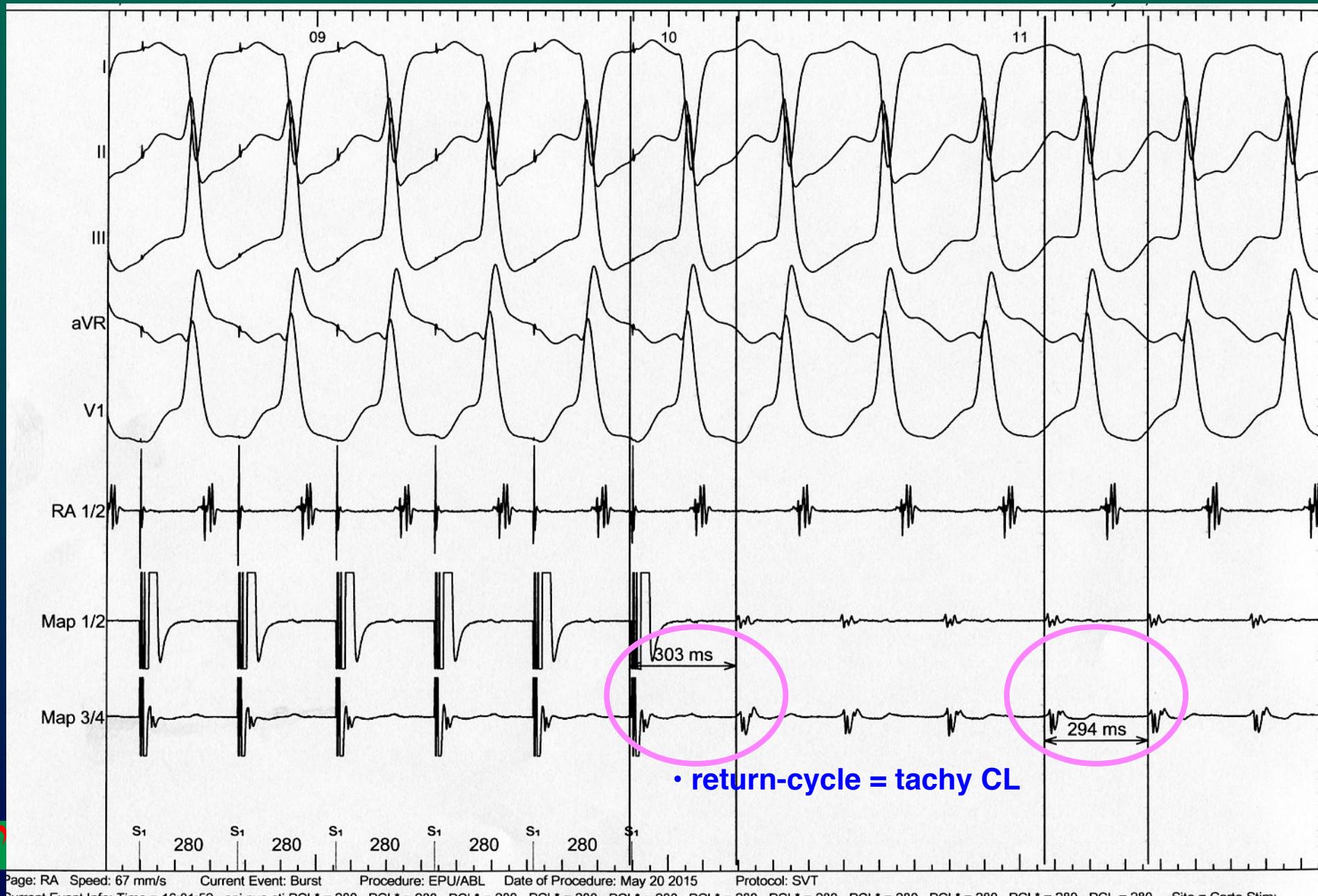
f, 27 yol - d-TGA – post Senning – atrial tachycardia



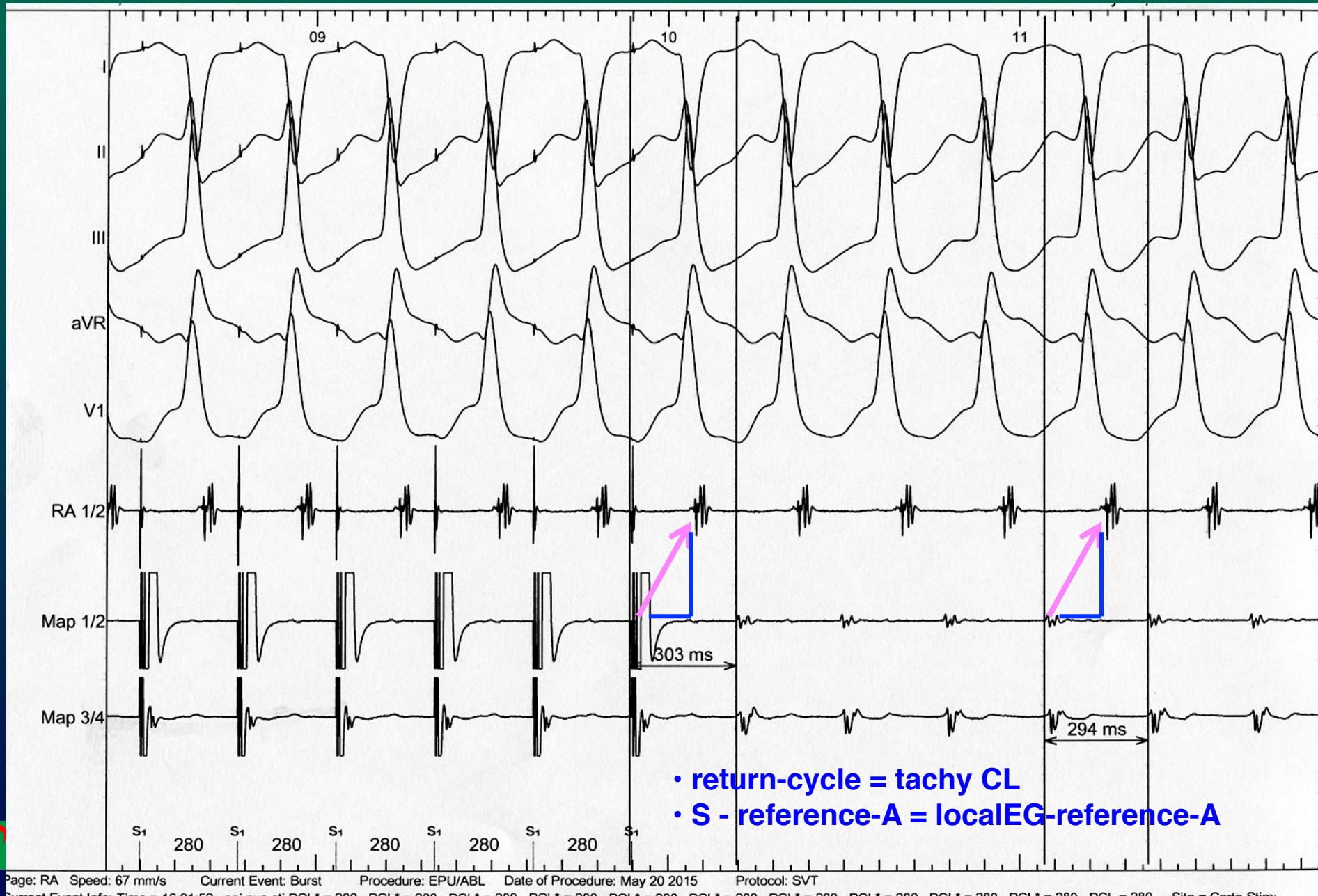
f, 27 yol - d-TGA – post Senning – atrial tachycardia



f, 27 yol - d-TGA – post Senning – atrial tachycardia



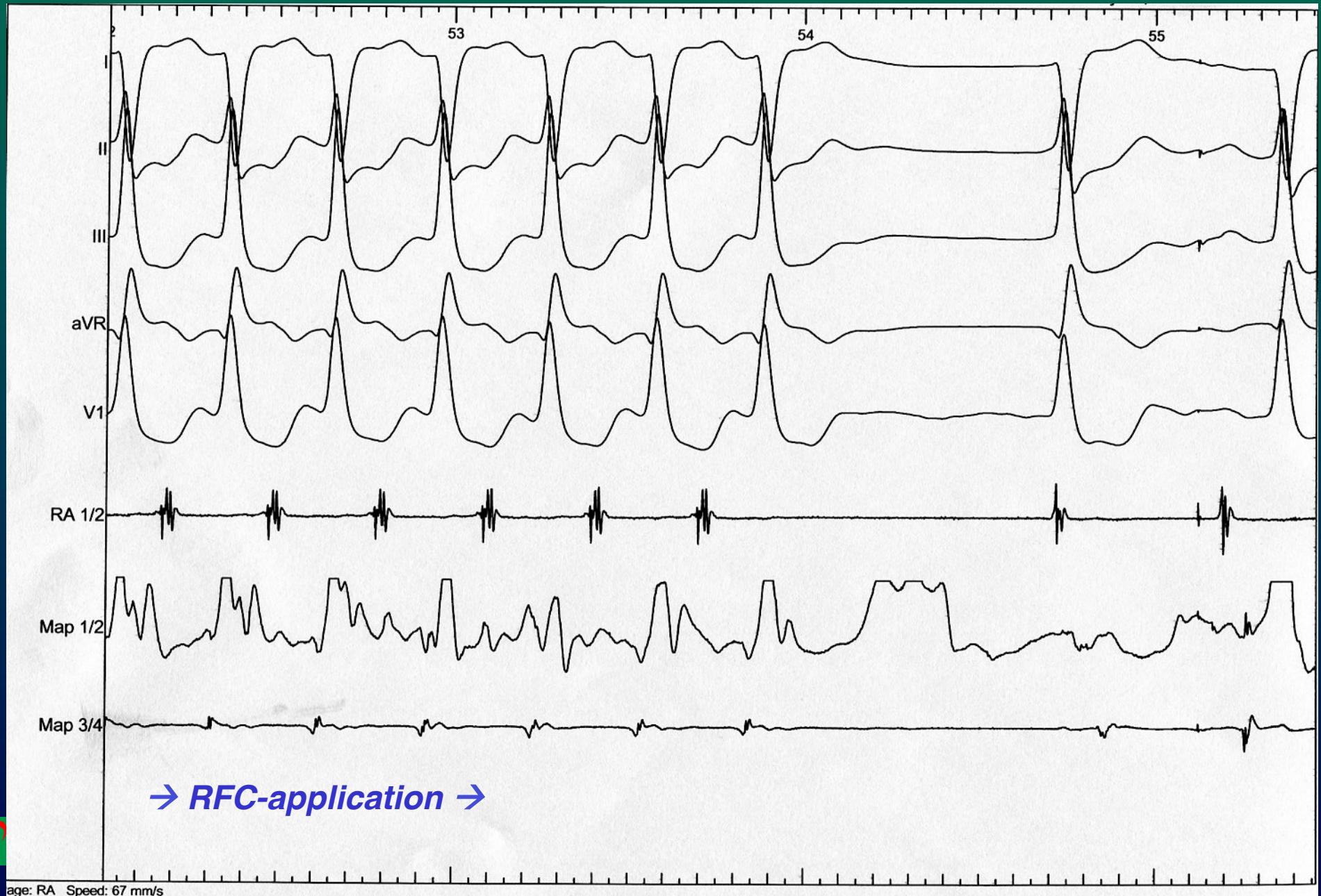
f, 27 yol - d-TGA – post Senning – atrial tachycardia

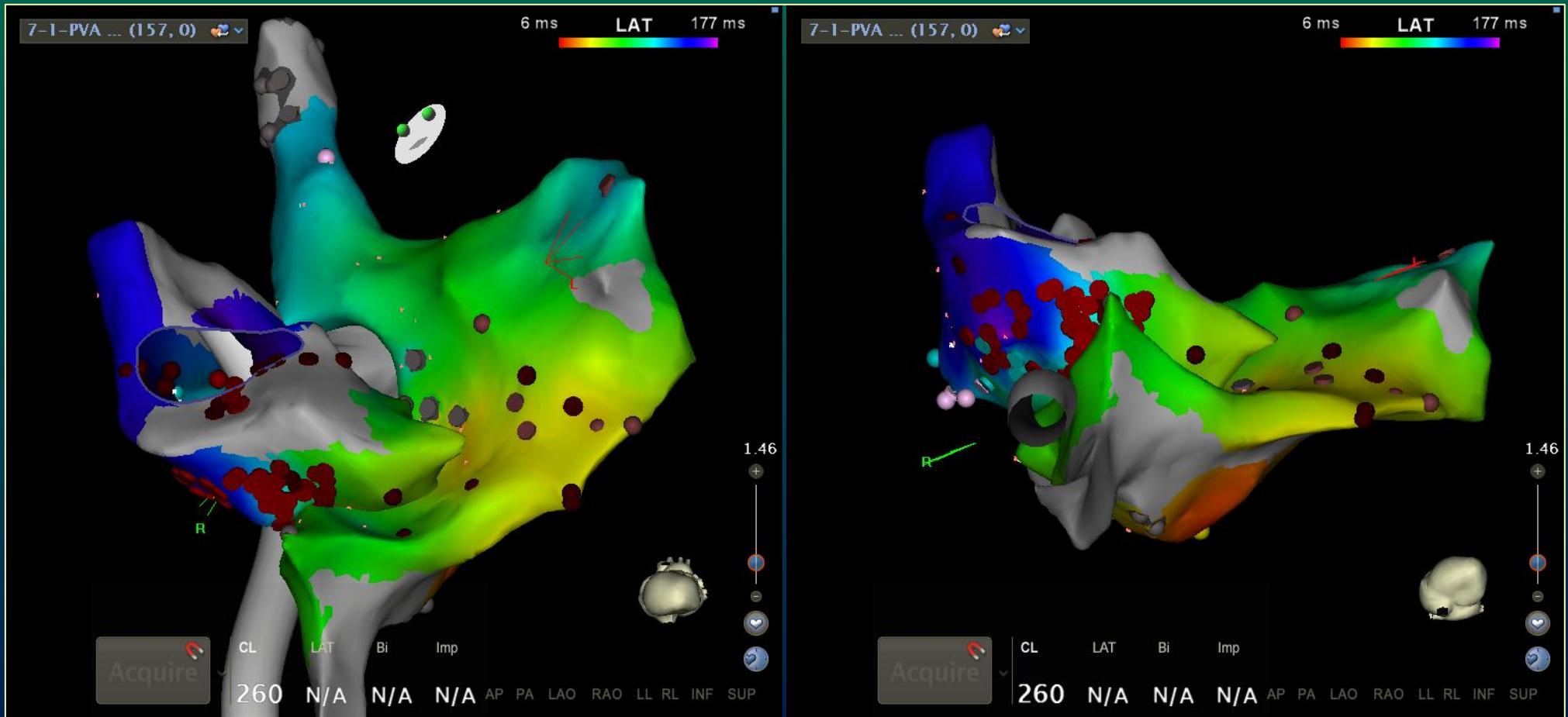


- **return-cycle = tachy CL**
- **S - reference-A = localEG-reference-A**

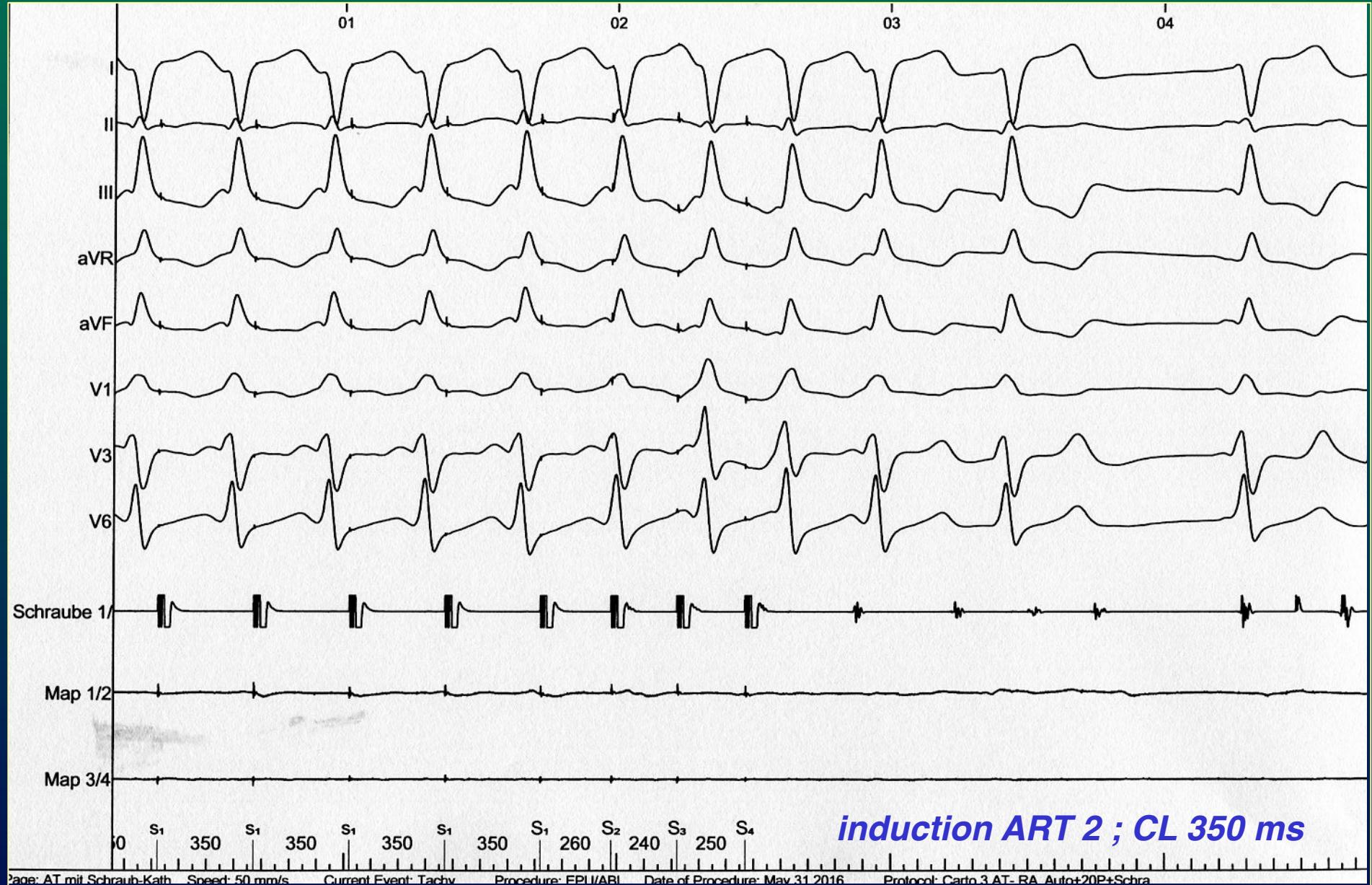
f, 27 yol - d-TGA – post Senning – atrial tachycardia

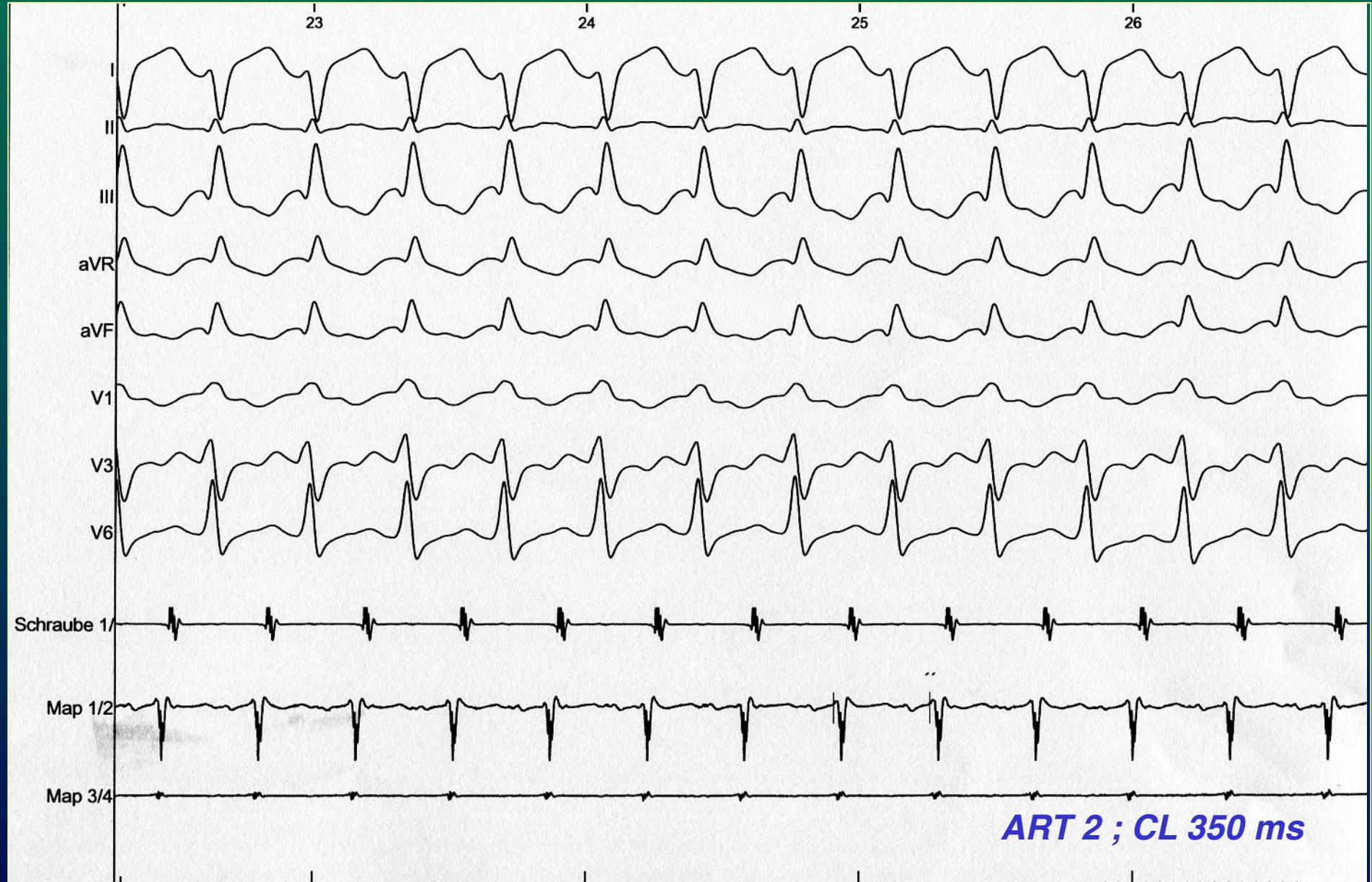






3-D-reconstruction after block CTI/PVA

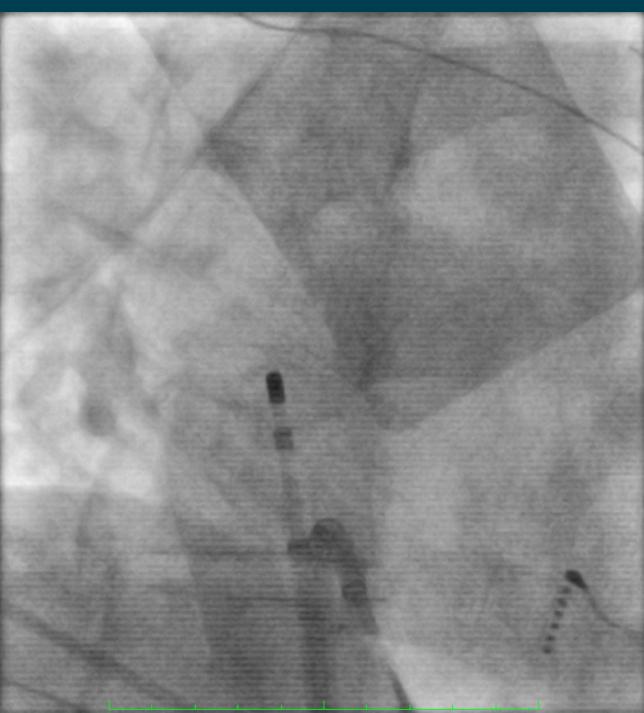
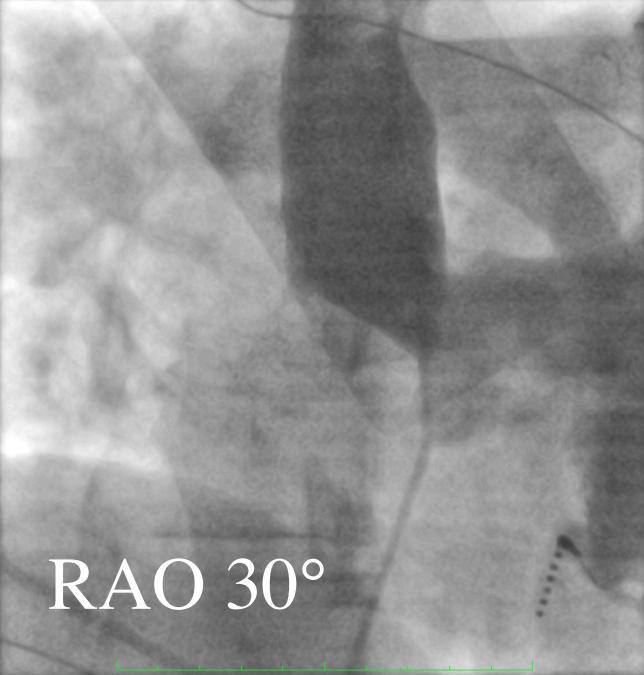


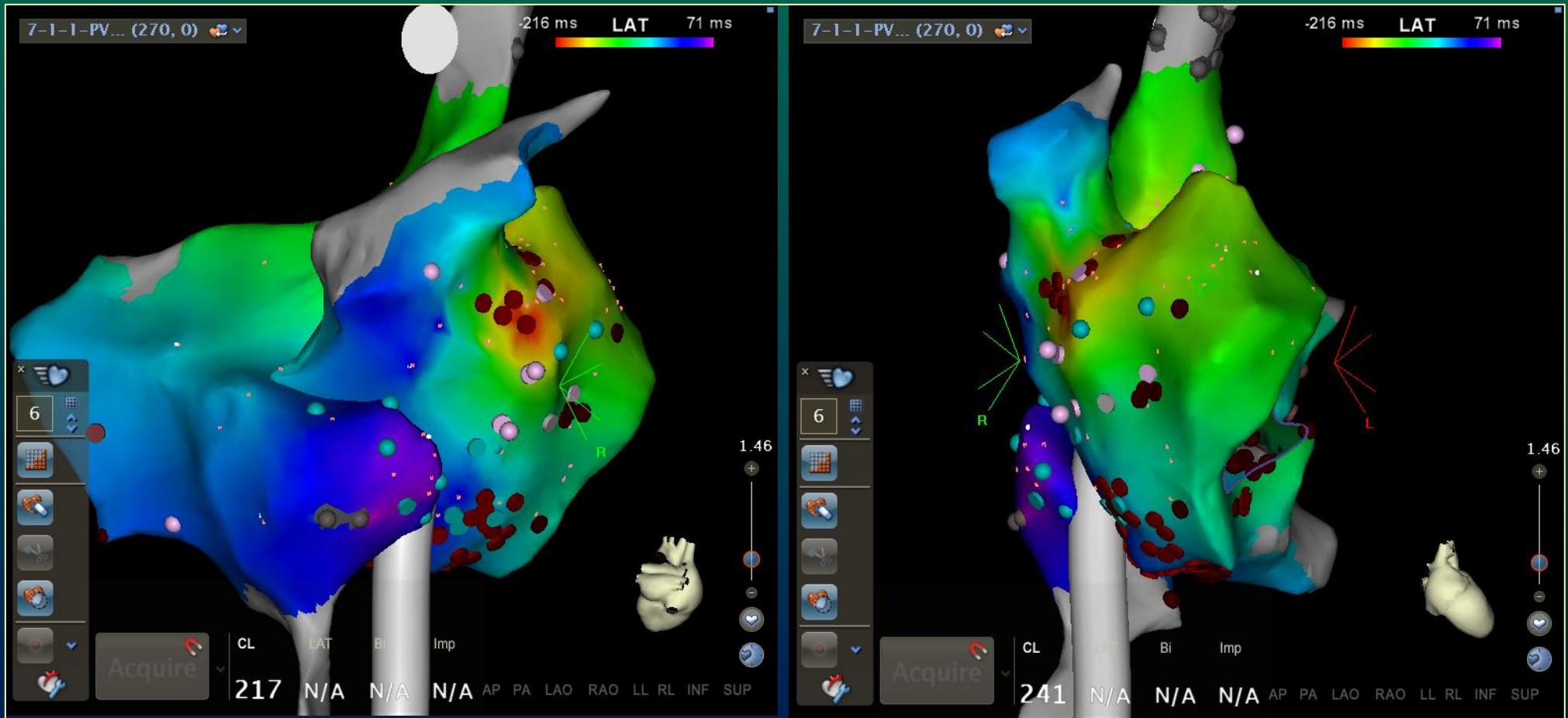


m, 34 yol, d-tga

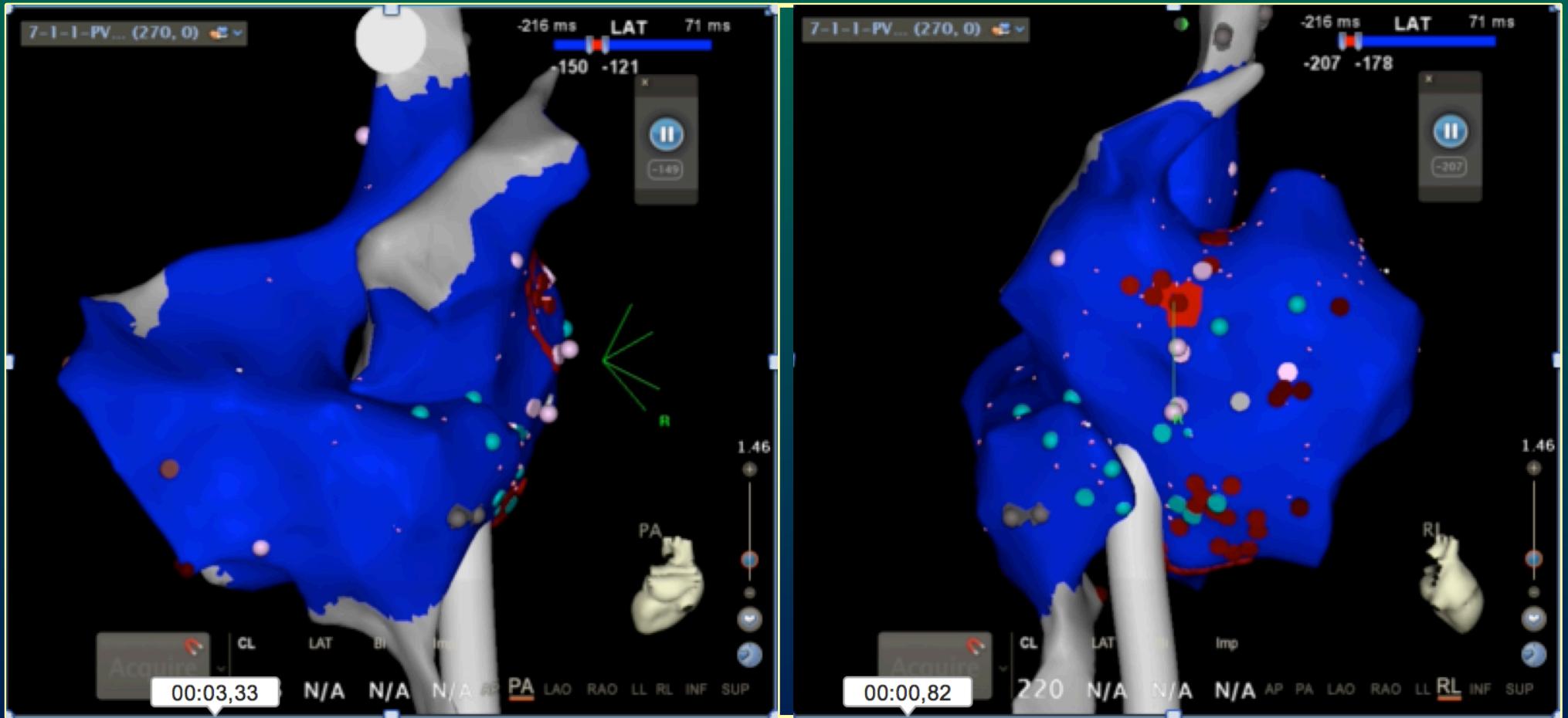
mustard

*recurrent
tachycardia*

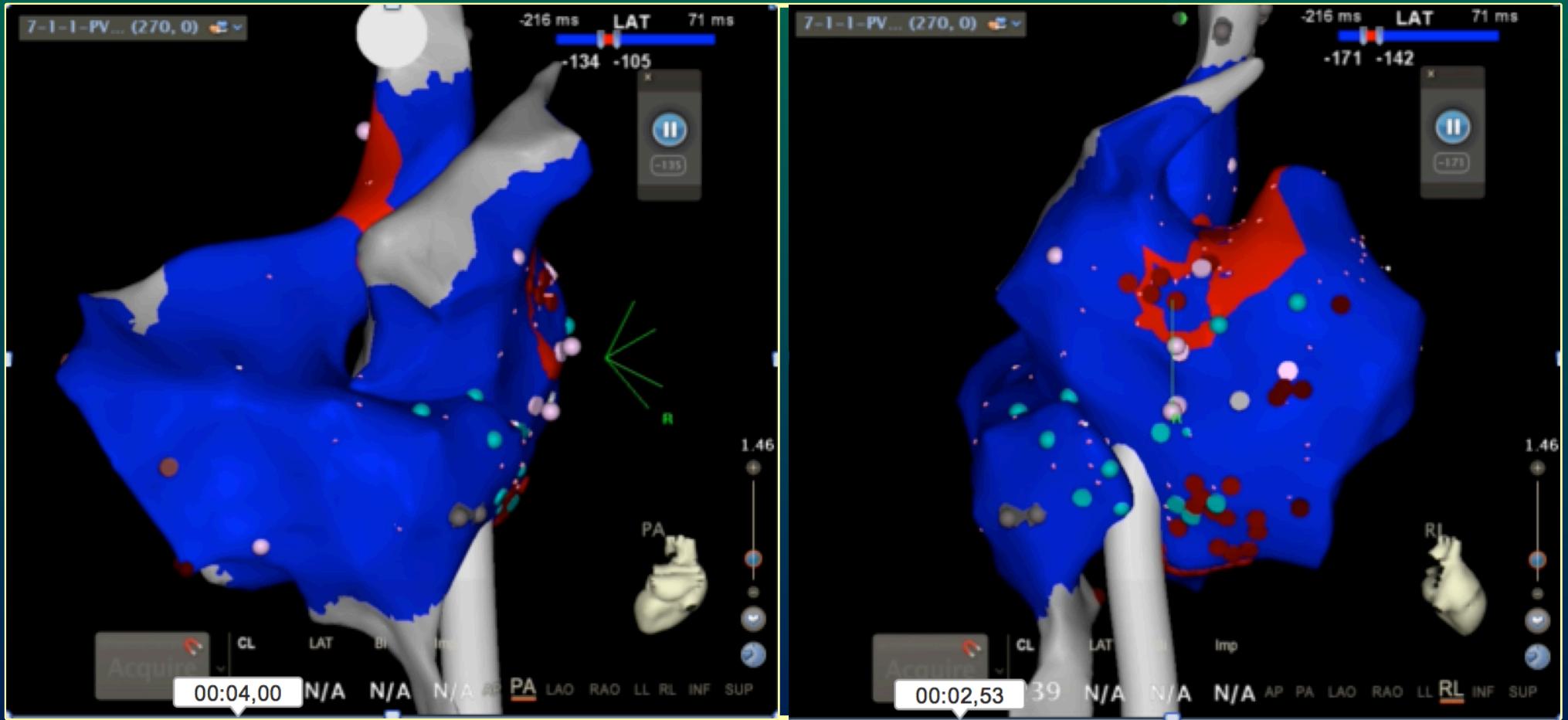




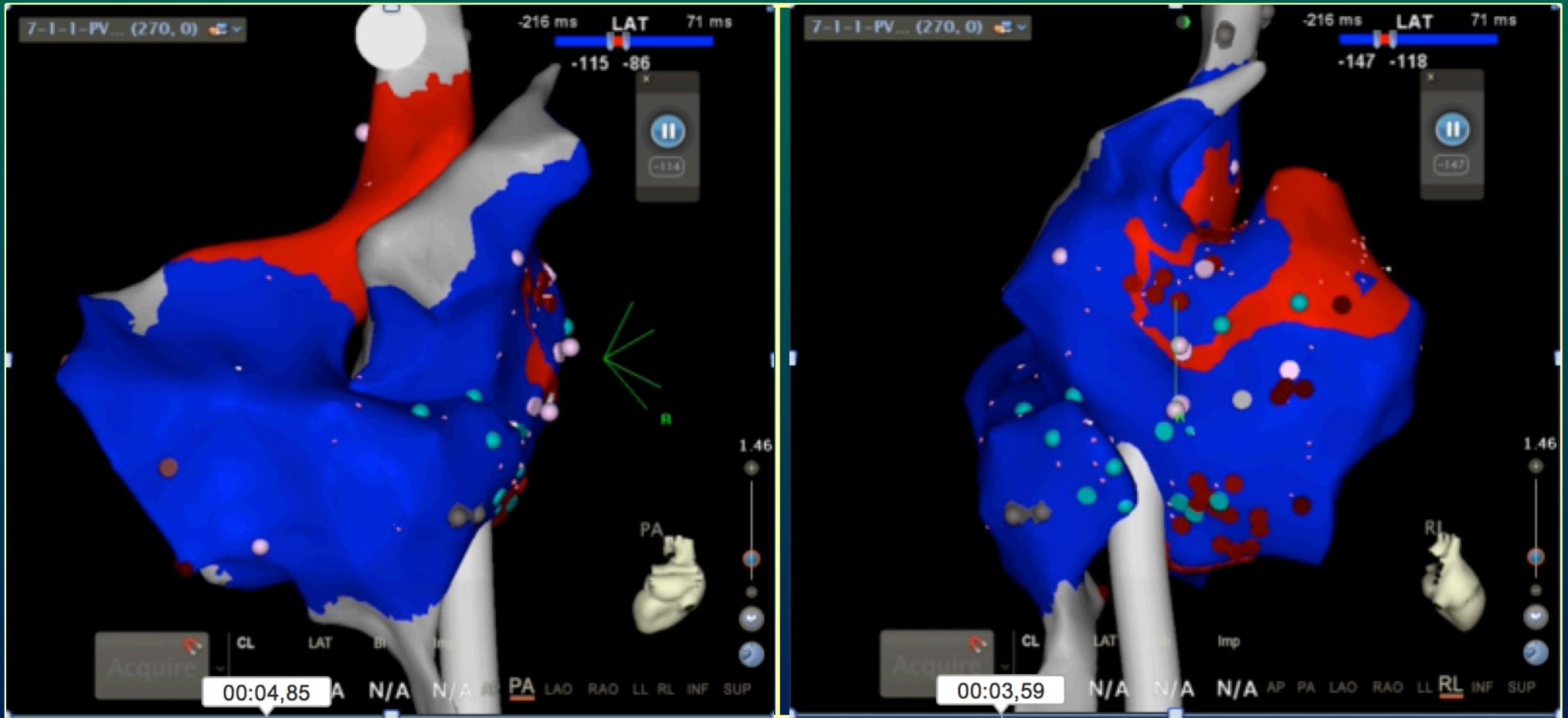
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



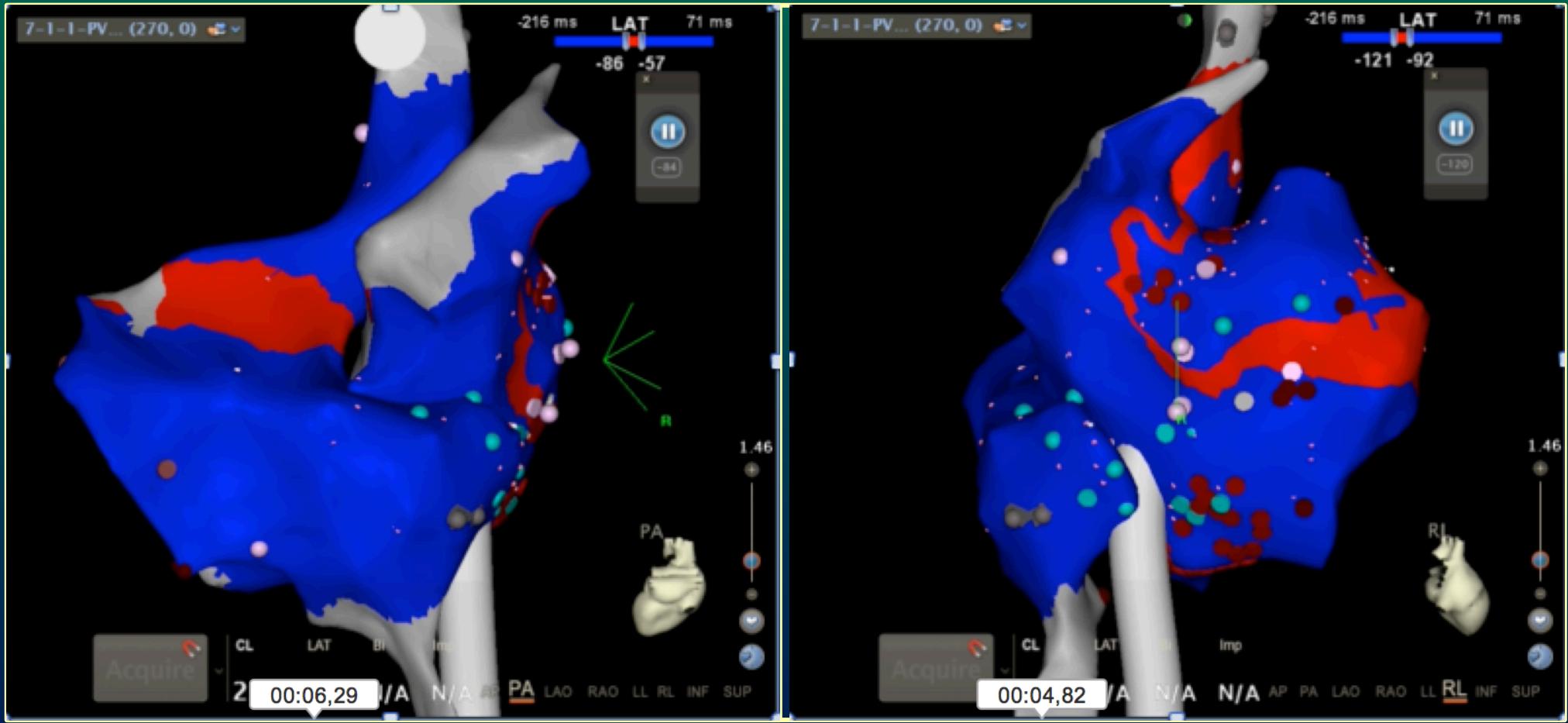
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



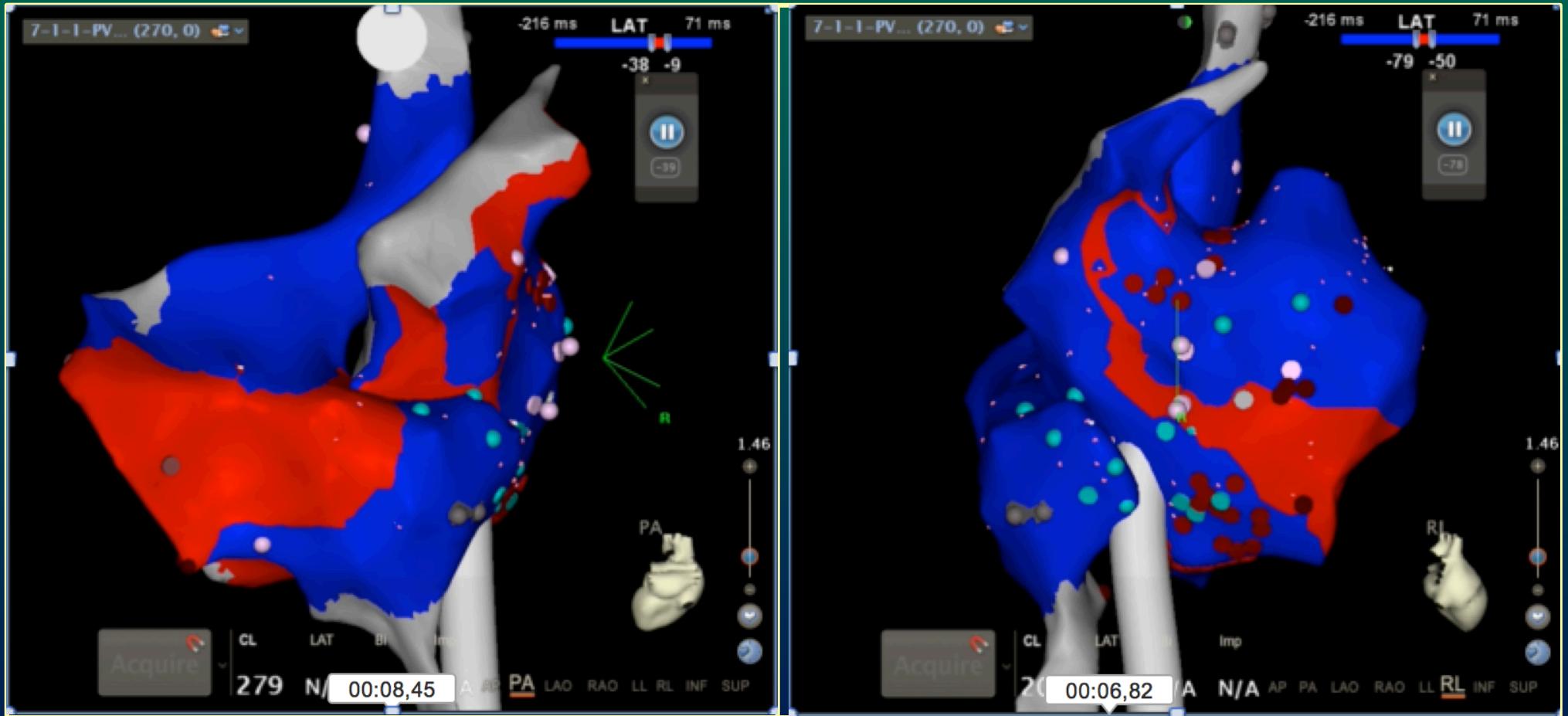
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



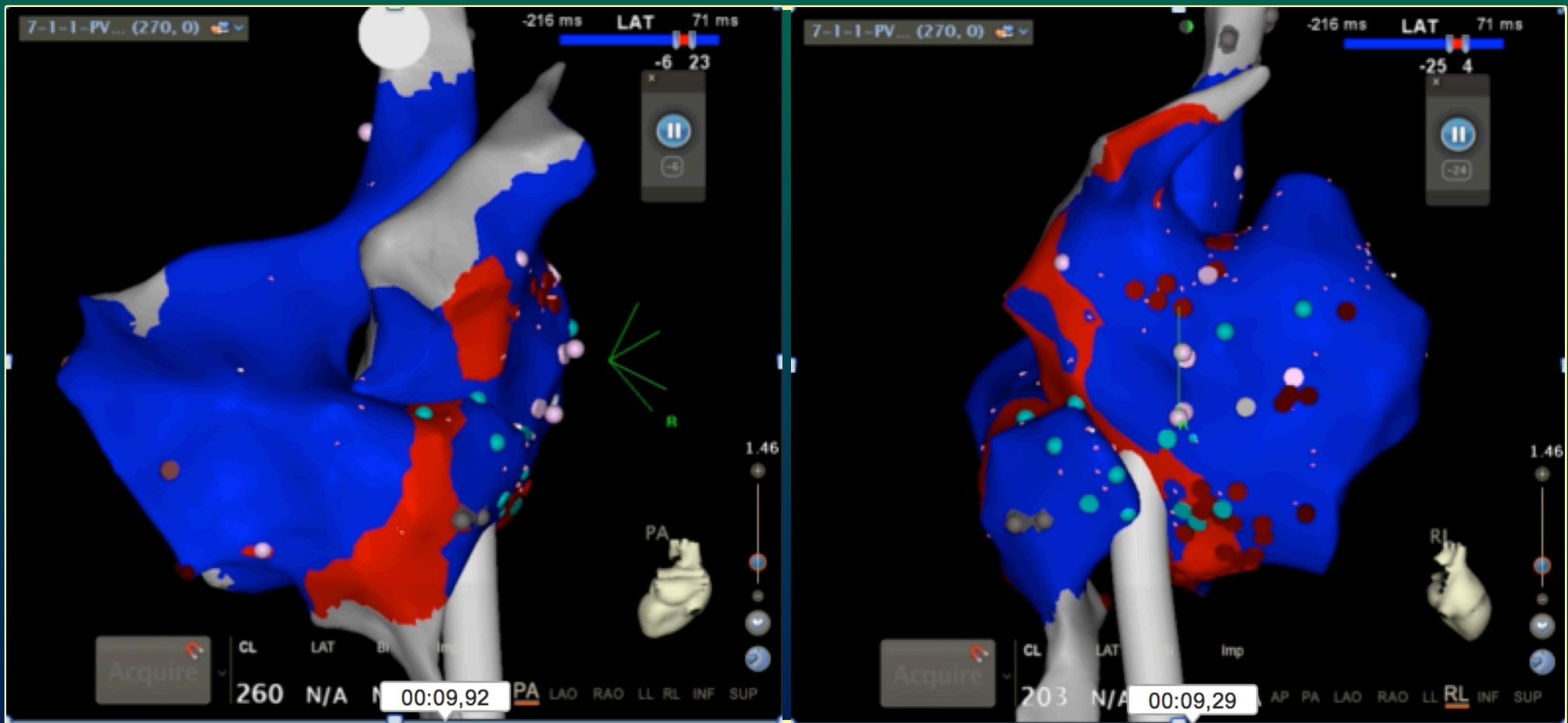
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



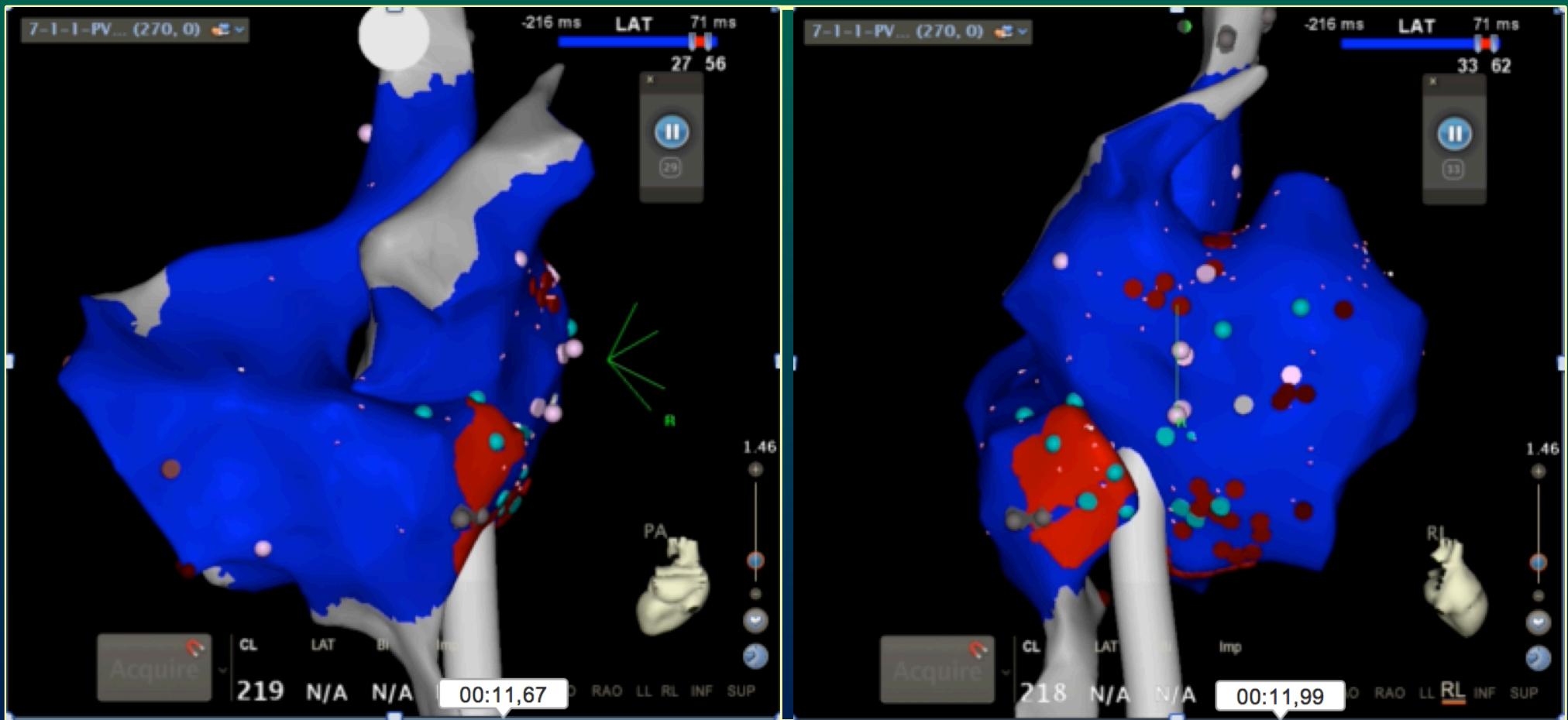
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



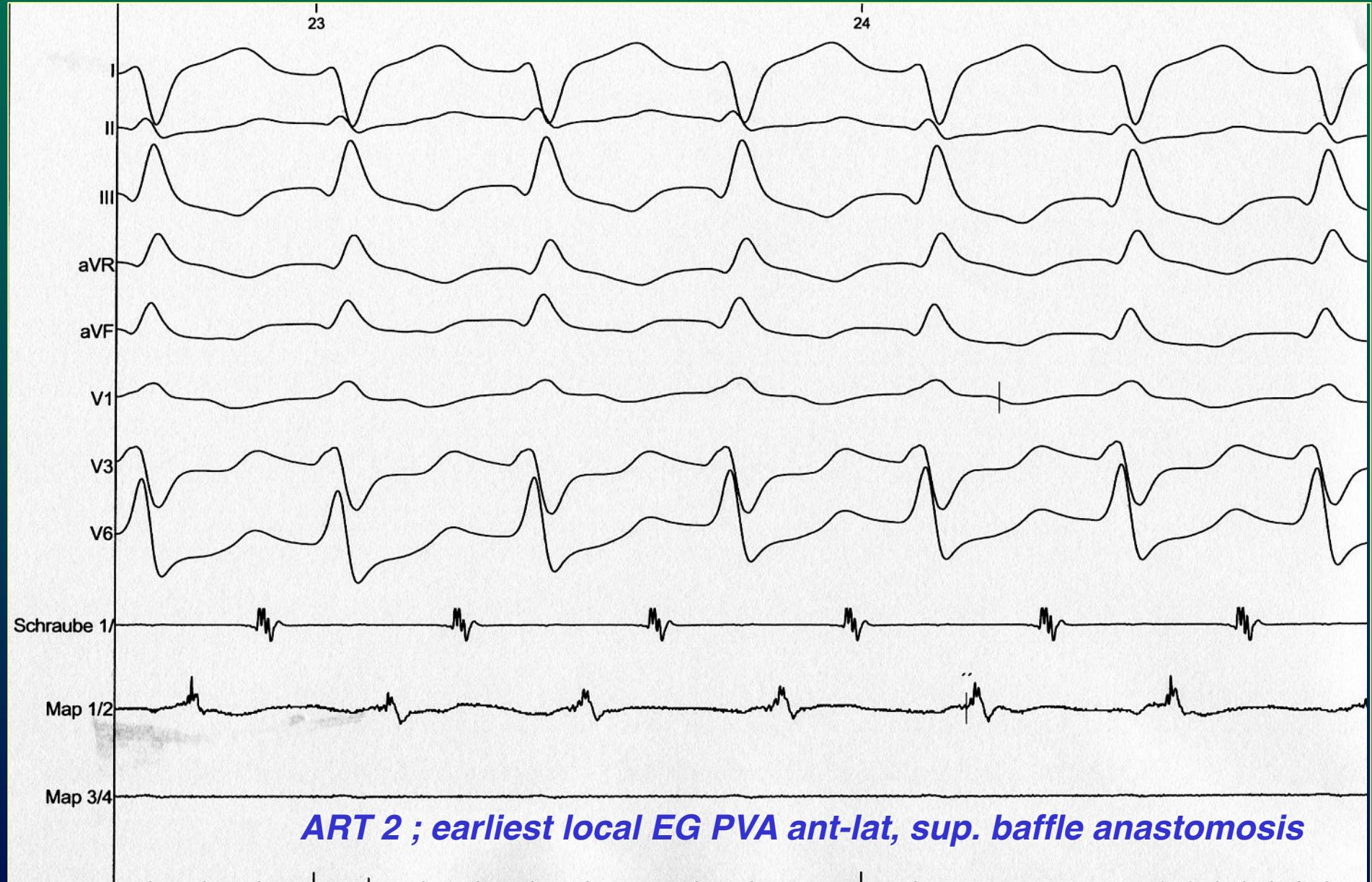
*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*

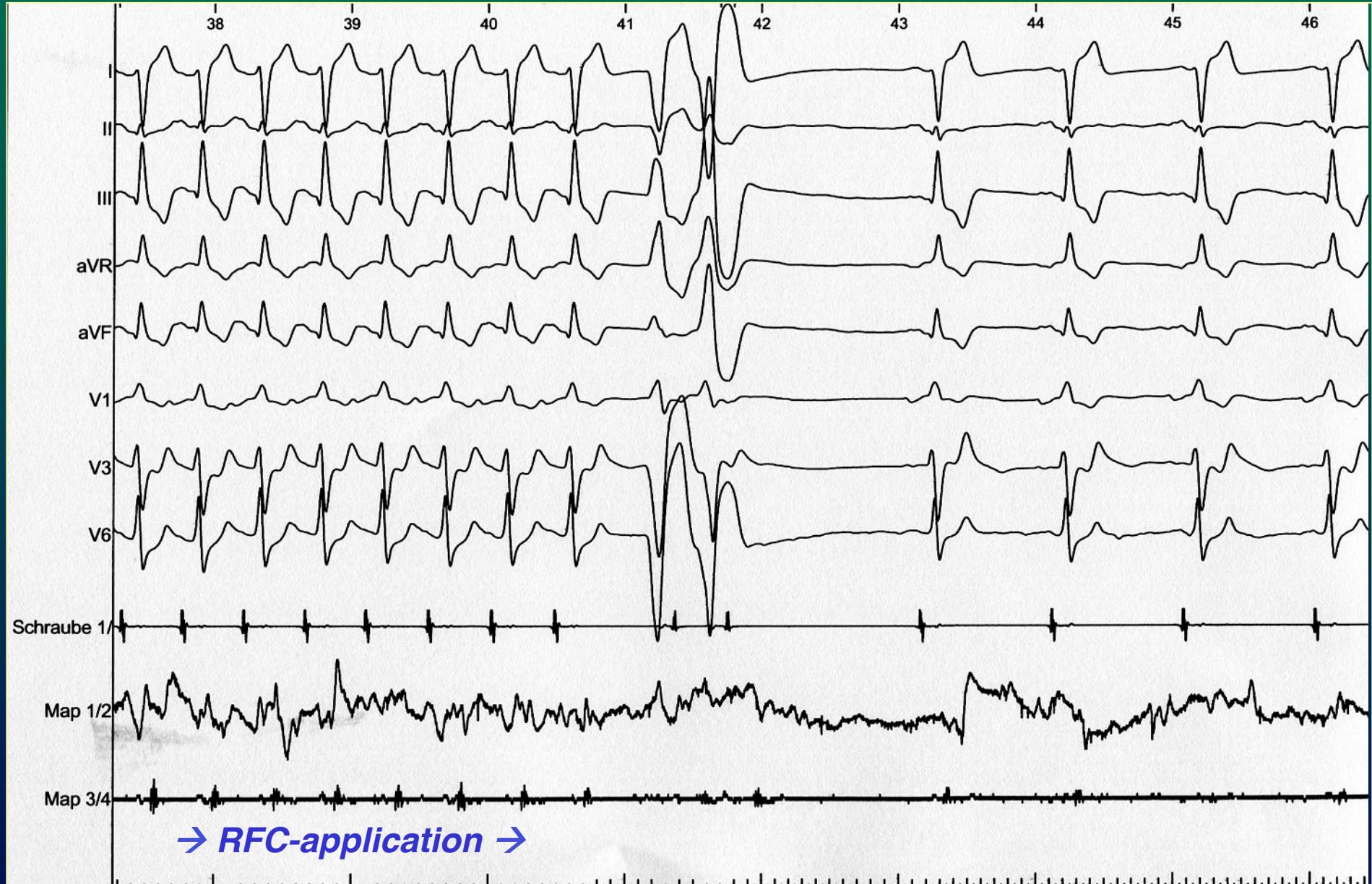


*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*



*3-D-reconstruction ART II = focal origin = NAFAT
ART 2 ; CL 350 ms*





Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

- automaticity (*triggered activity*)

- reentry

mapping

origin

strategy

validation

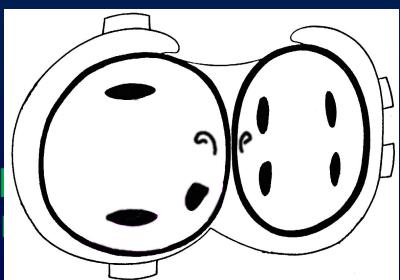
tachy stop

- Atrial ExtraSystole

- Focal Atrial Tachycardia

- Non Automatic Focal Atrial Tachy

- Atrial Reentry Tachycardia



Atrial Tachycardia and Fibrillation in ACHD

mechanism

type

- automaticity (*triggered activity*)

- Atrial Extra Systole

- reentry

- Focal Atrial Tachycardia

origin

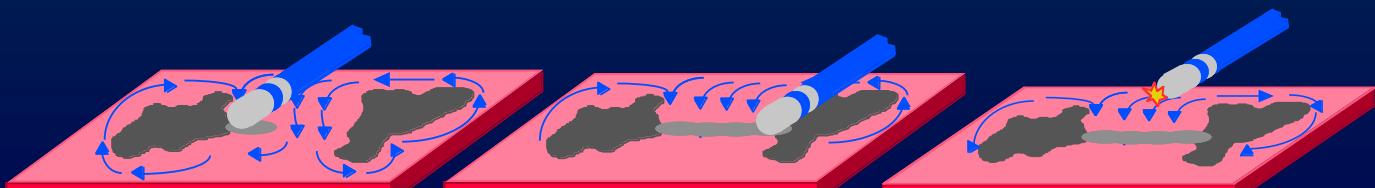
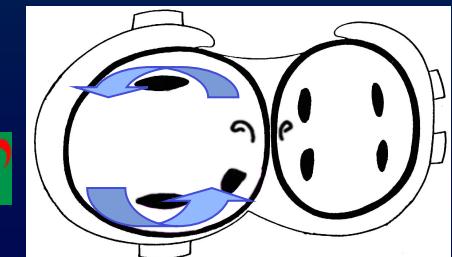
mapping

strategy

validation

- Non Automatic Focal Atrial Tachy

- Atrial Reentry Tachycardia



Atrial Tachycardia and Fibrillation in ACHD

mechanism

- automaticity (*triggered activity*)

- reentry

- fibrillation

type

- Atrial Extra Systole

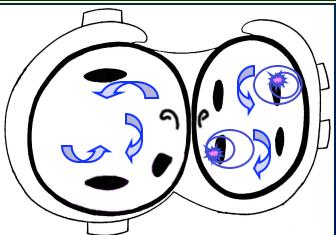
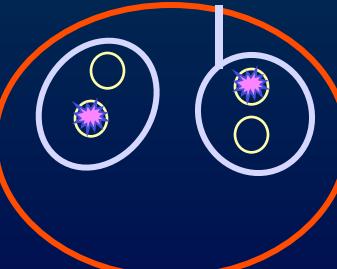
- Focal Atrial Tachycardia

- Non Automatic Focal Atrial Tachy

- Atrial Reentry Tachycardia

- Atrial Fibillation

Atrial Tachycardia and Fibrillation in ACHD

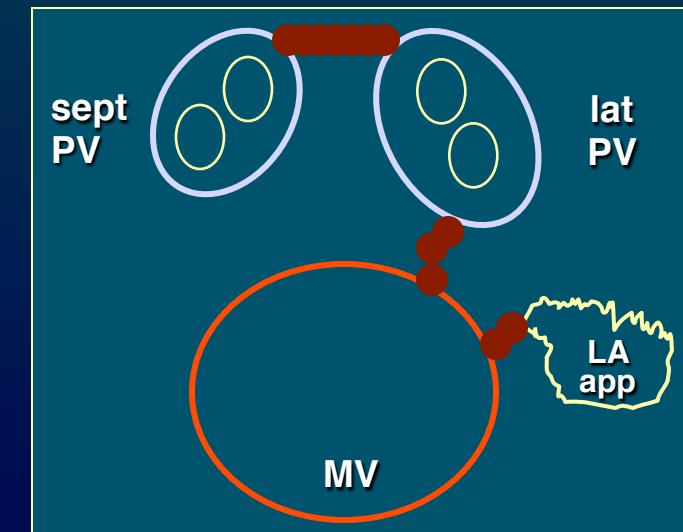
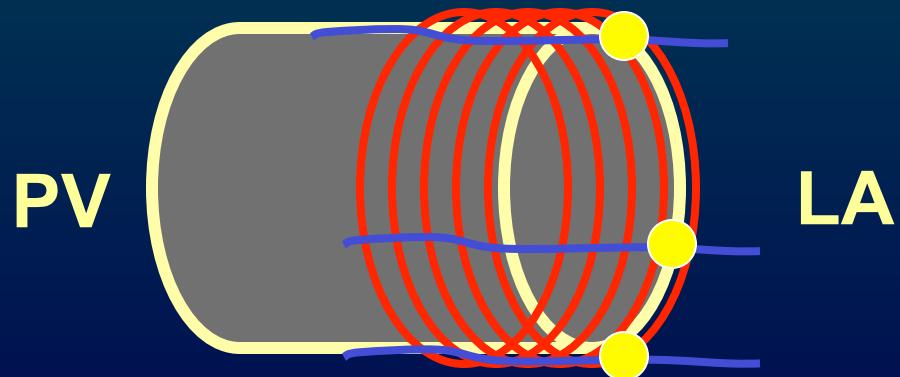
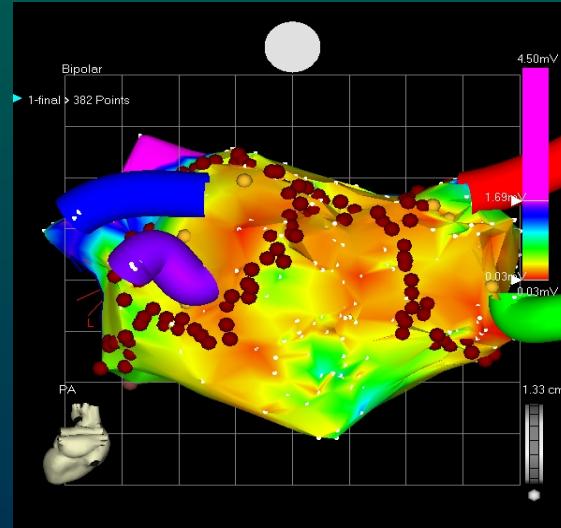
mechanism	substrate	strategy	validation
<i>automaticity NAFAT</i>			
<i>macro- reentry</i>			
<i>fibrillation</i>			<i>isolation trigger</i>

PV-Trigger Isolation

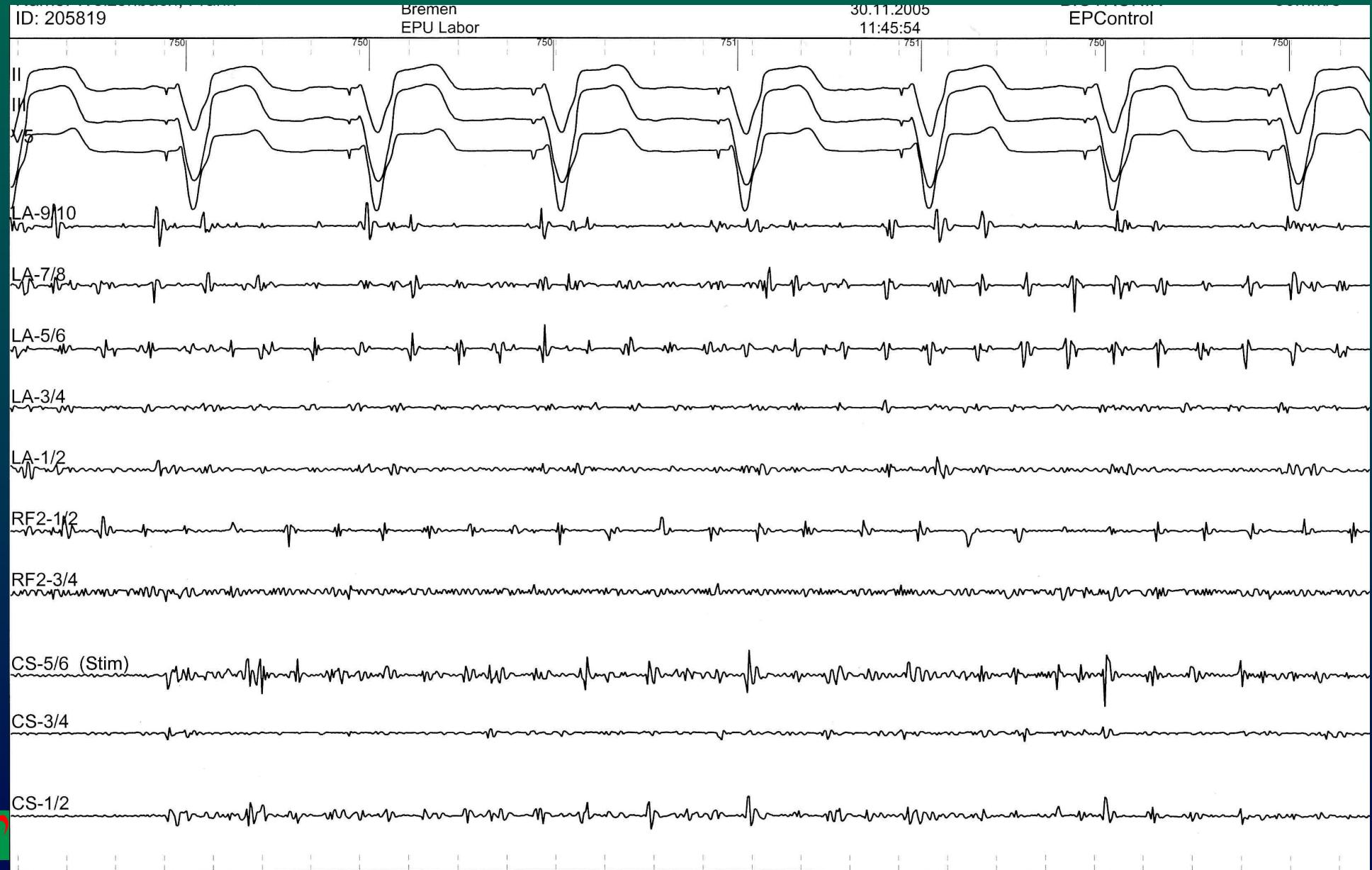
selective



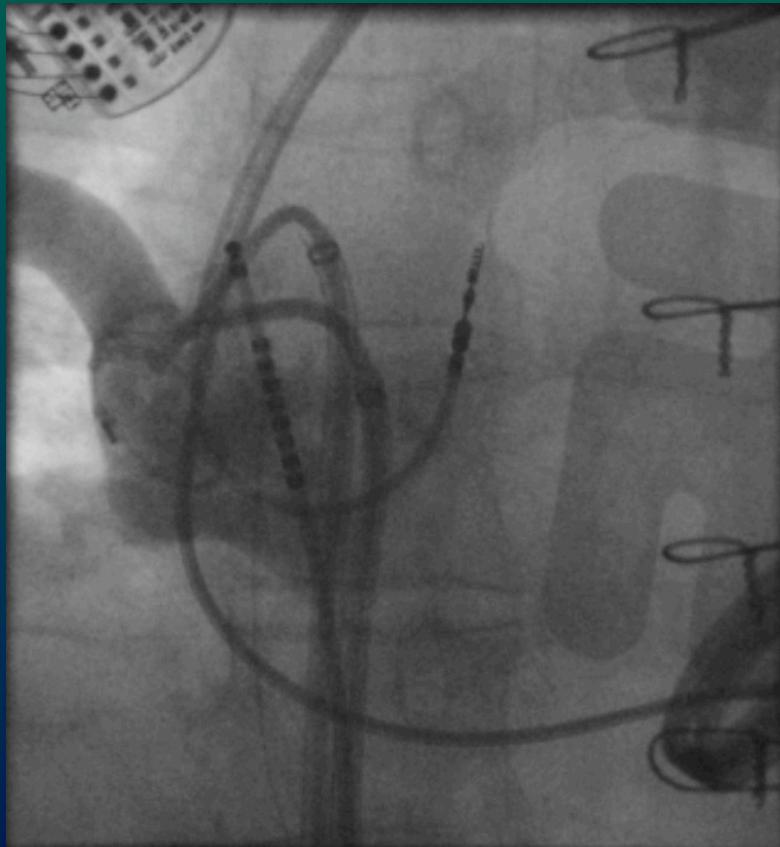
complete



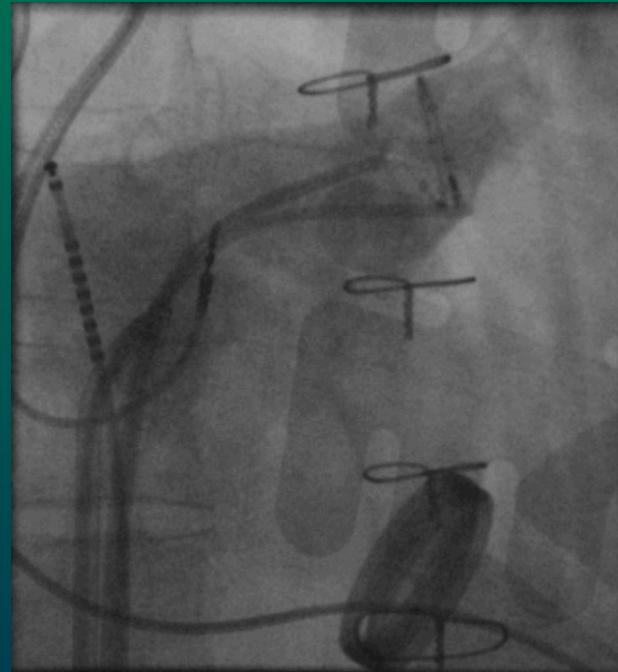
CC-TGA, VSD, ASD, AV III, TKE, LA-reconstr., A.Fib.



sept. PV

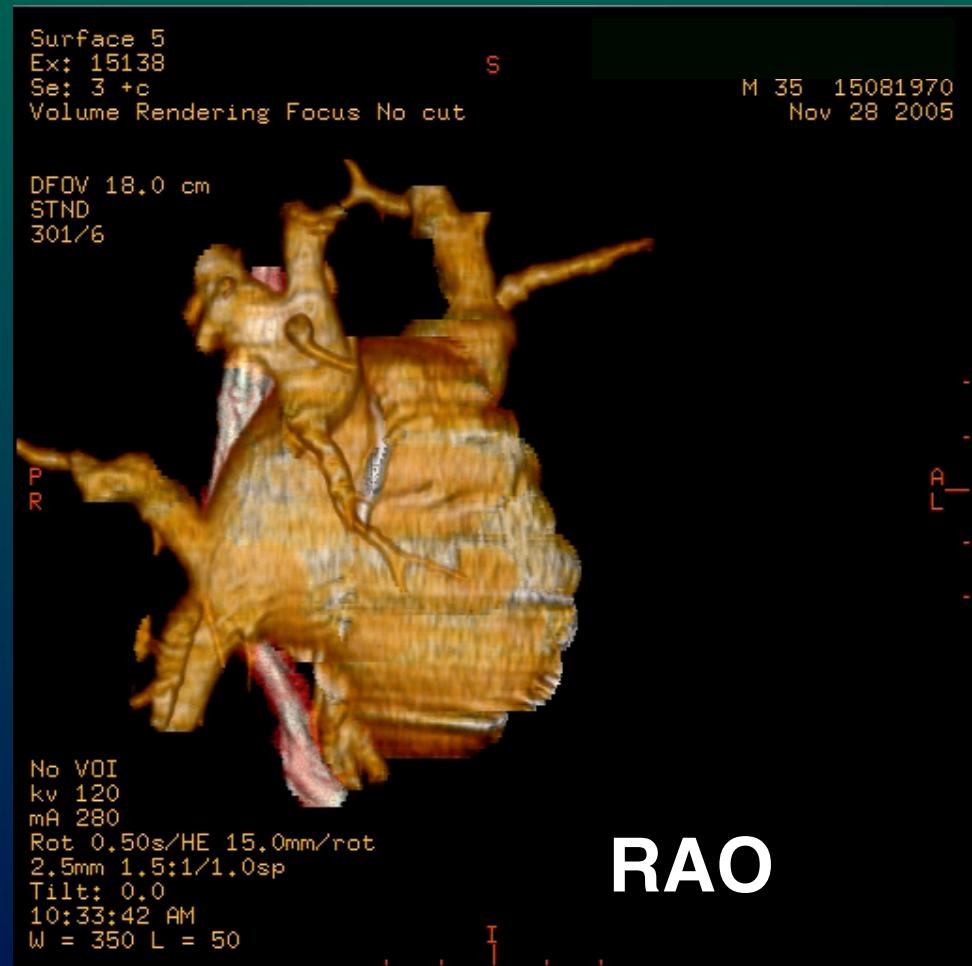
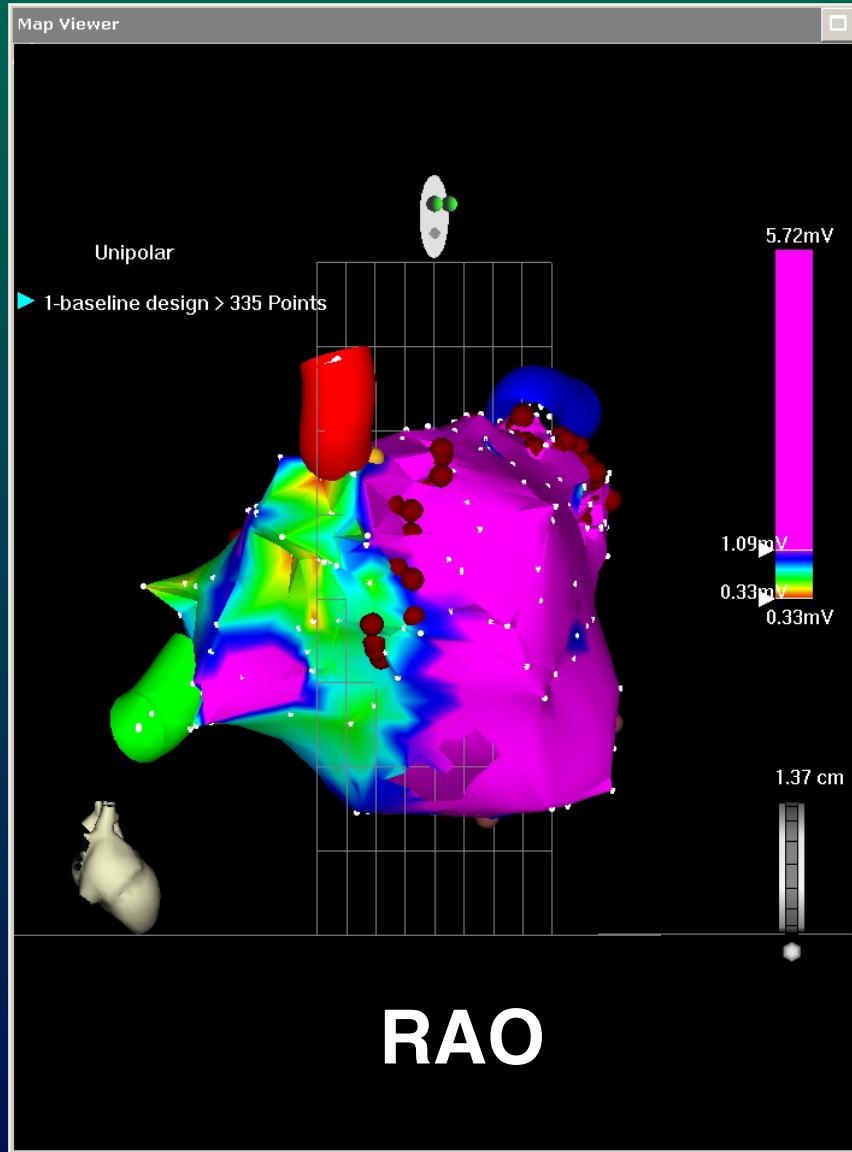


RAO 30

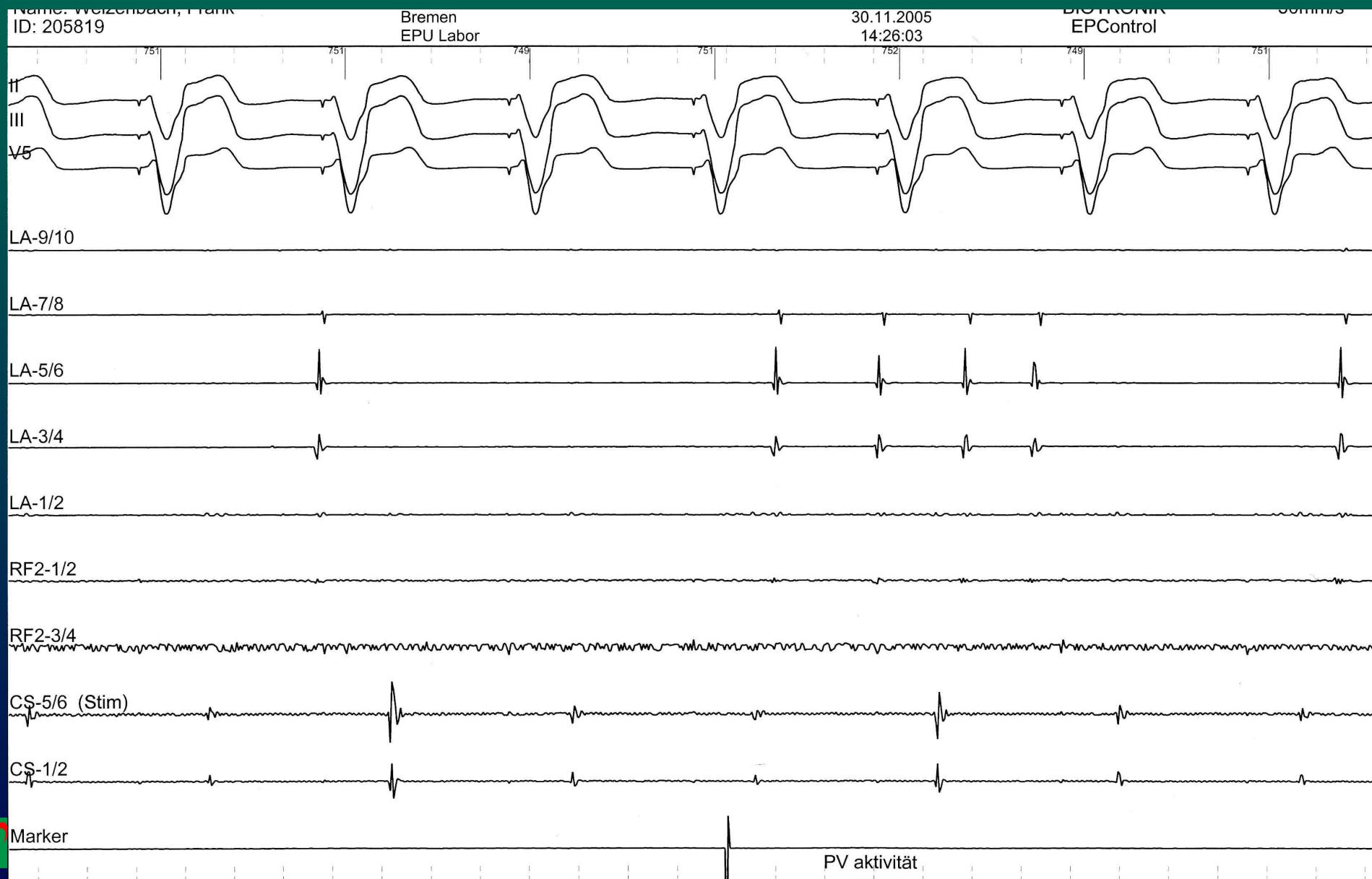


lat. PV

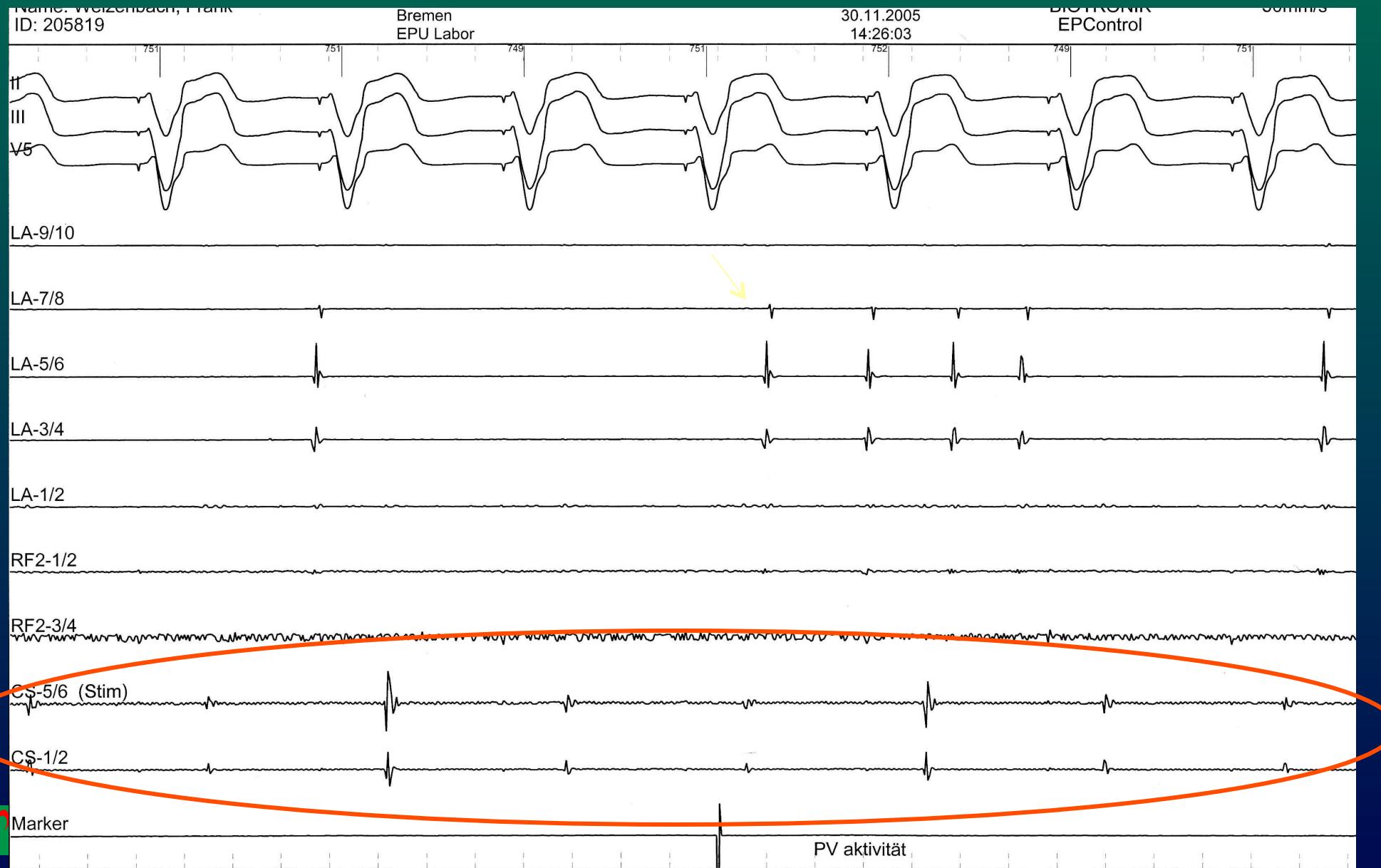
CC-TGA, VSD, ASD, AV III, TKE, LA-restr., A.Fib.



CC-TGA, VSD, ASD, AV III, TKE, LA-restr., A.Fib.



CC-TGA, VSD, ASD, AV III, TKE, LA-reconstr., A.Fib.



CC-TGA, VSD, ASD, AV III, TKE, LA-restr., A.Fib.



CC-TGA, VSD, ASD, AV III, TKE, LA-restr., A.Fib.



Ablation of Atrial Fibrillation in ACHD

EP – Bremen (2004-2016)

56 pts. (27 f; age 51.3; range 18.7-76.3 yrs)

• ASD (19 po-OP; 3 Occluder)	25
• cc-TGA	3
• d-TGA	1
• DCRV	1
• DILV	1
• Ebstein´s Anomaly	4
• AV-septal defects	1
• LSVC	2
• PAtresia	2
• TOF / VSD	4
• PAPVD	1
• Shone	1
• others	10

Ablation of Atrial Fibrillation in ACHD

EP – Bremen (2004-2016)

56 pts. (27 f; age 51.3; range 18.7-76.3 yrs)

- AF intermittent n = 48 %
- AF persistent n = 36 %
- AF long-persistent n = 17 %

- AT (additional) n = 21 %

Ablation of Atrial Fibrillation in ACHD

EP – Bremen (2004-2016)

56 pts. (27 f; age 51.3; range 18.7-76.3 yrs)

procedures / %

• total of 113 procedures:

- PVI	<i>88 / 78</i>
- additional AT ablation	<i>30 / 26.5</i>
- defragmentation	<i>3 / 4</i>

• procedure time:

median 240 min. (60 – 565 min.)

• fluo-time / dosage:

median 34.2 min. (10.6 – 148.3 min.)

*median 780 cGy*cm² (20 – 28373.9 cGy*cm²)*

• median f-u 24 mths:

- 79 % of pts in stable SR (2.04 ± 0.5 proc.; range 1 - 6 proc.)
- 38% single-procedural arrhythmia free survival

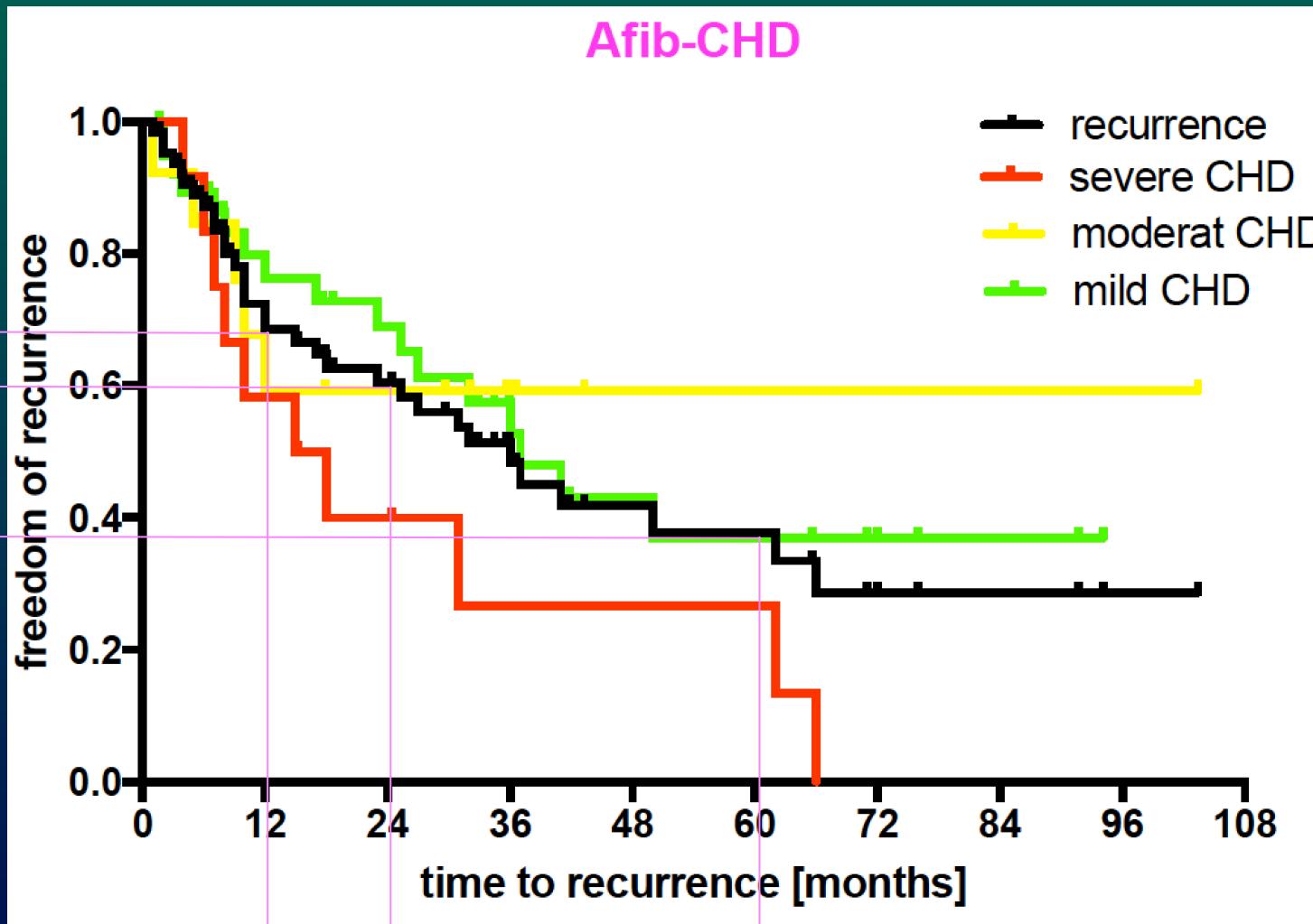
• complications:

- worsening of heart failure	<i>1 pt</i>
- AV-fistula	<i>1 pt</i>
- pericardial tamponade	<i>1 pt</i>

Ablation of Atrial Fibrillation in ACHD

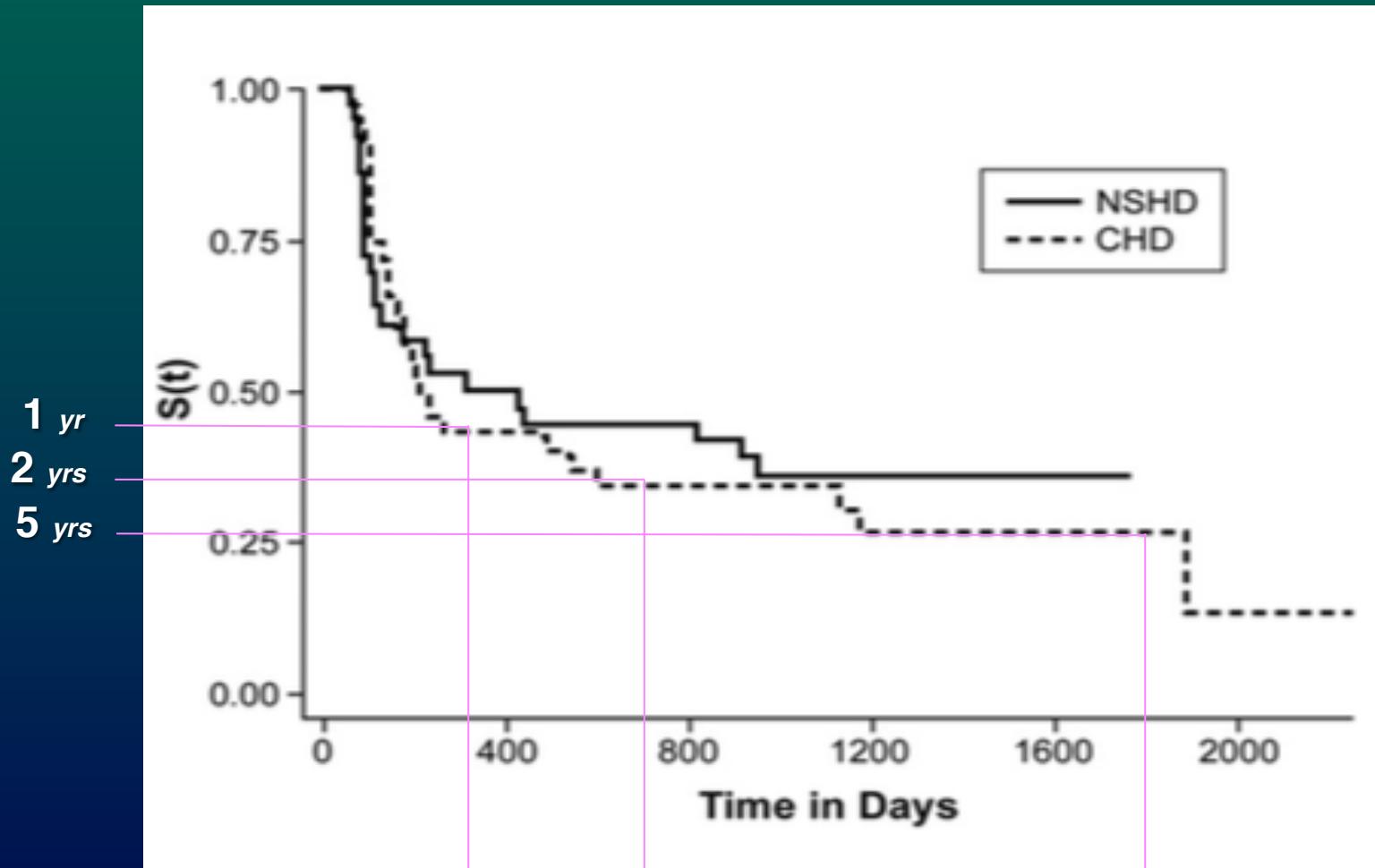
56 pts. (27 f; age 51.3; range 18.7-76.3 yrs)

EP – Bremen (2004-2016)



Ablation of Atrial Fibrillation in ACHD

36 pts. (12 f; age 53 ± 2 yrs 72% *intermitt.* AF)



Atrial Tachycardia and Fibrillation in ACHD

conclusion

- increasing N° of pts with CHD + (tachy)arrhythmia
 - *aging of CHD population (+complexity)*
 - *increasing recognition*

Atrial Tachycardia and Fibrillation in ACHD

conclusion

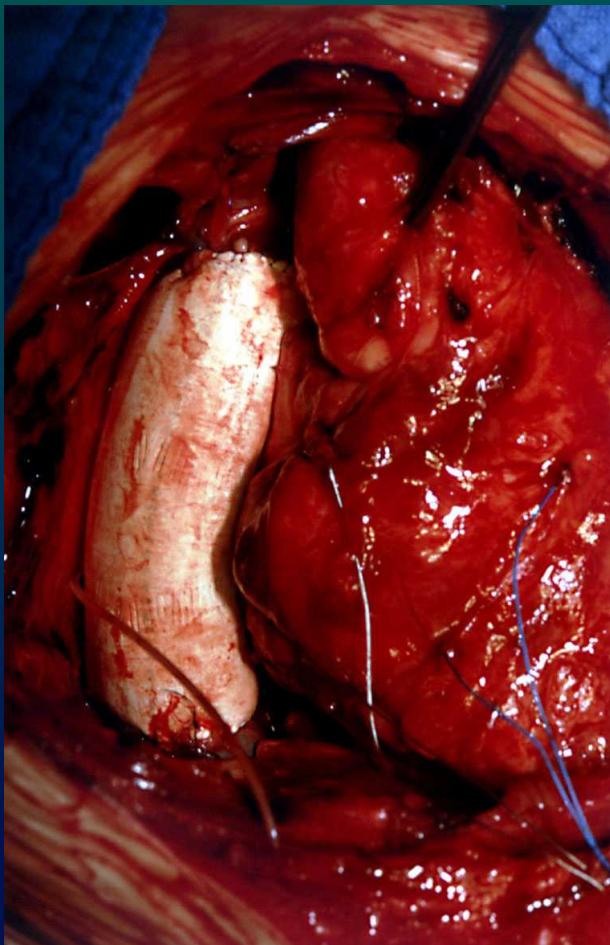
- increasing N° of pts with CHD + (tachy)arrhythmia
 - *aging of CHD population (+complexity)*
 - *increasing recognition*
- catheter ablation → „*therapy of choice*“ for most tachyarrhythmias
 - *major limitations*
 - *role of robotics ?*

*understanding
access
lesion formation*

Atrial Tachycardia and Fibrillation in ACHD

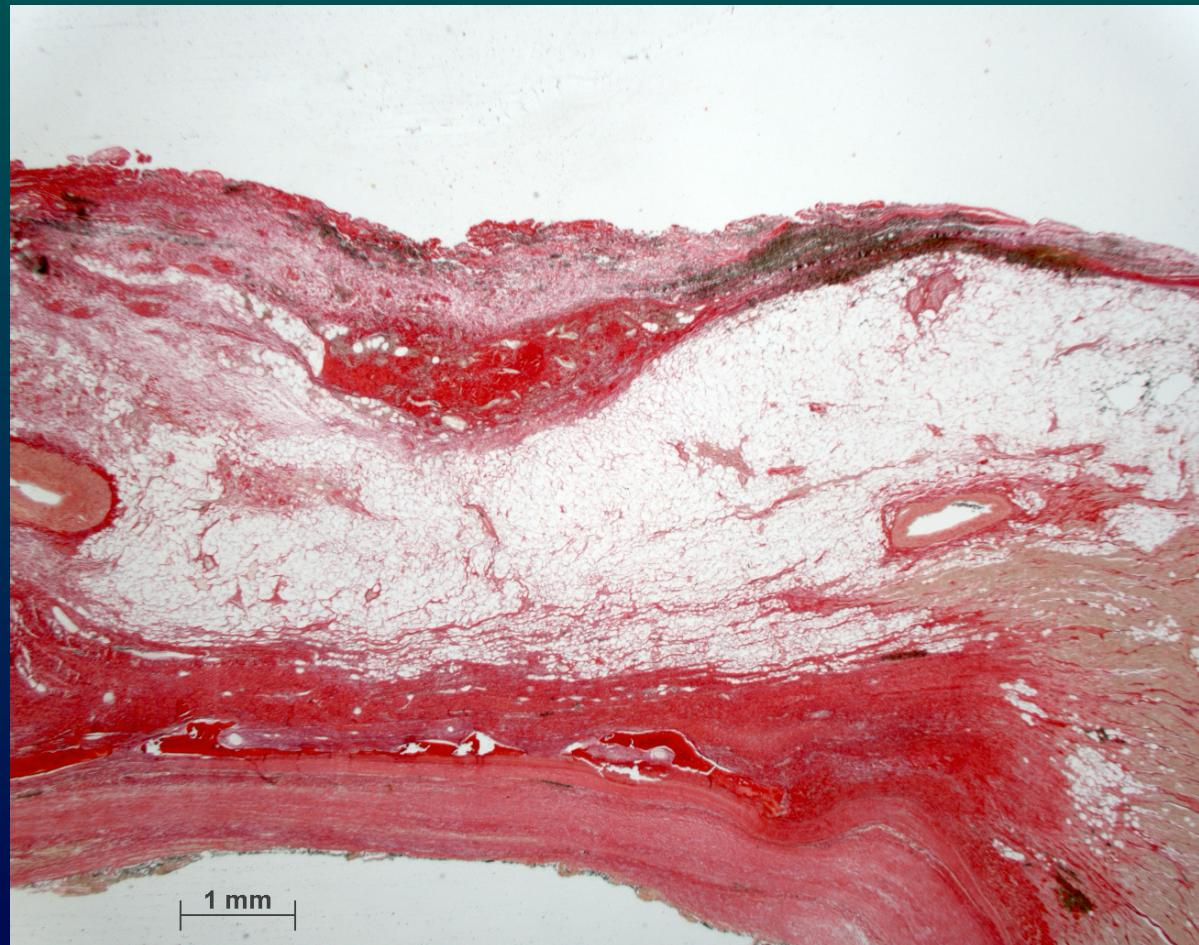
access

extraatrial tunnel



lesion formation

RA-lateral wall, classic Fontan, 36 y/o



Atrial Tachycardia and Fibrillation in ACHD

conclusion

- increasing N° of pts with CHD + (tachy)arrhythmia
 - *aging of CHD population (+complexity)*
 - *increasing recognition*
- catheter ablation → „*therapy of choice*“ for most tachyarrhythmias
 - *major limitations*
 - *role of robotics ?*
- AA surgery → *need for modifications (prevention, access)*

