High-density mapping in VT ablation

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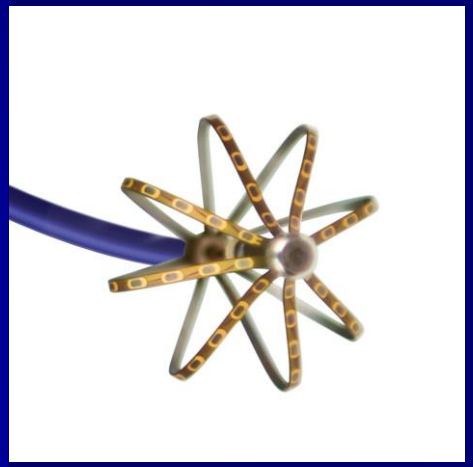
Disclosures

- Speaking honorarium: Biosense Webster, Boston Scientific, Medtronic, St Jude Medical, Livanova, Sanofi-Aventis, Boehringer Ingelheim, Bayer, Pfizer,
- Consulting fees: St Jude Medical, Bayer Healthcare, Biotronik
- Research grant: Medtronic

High density mapping
Multipolar catheter + annotation algorithm

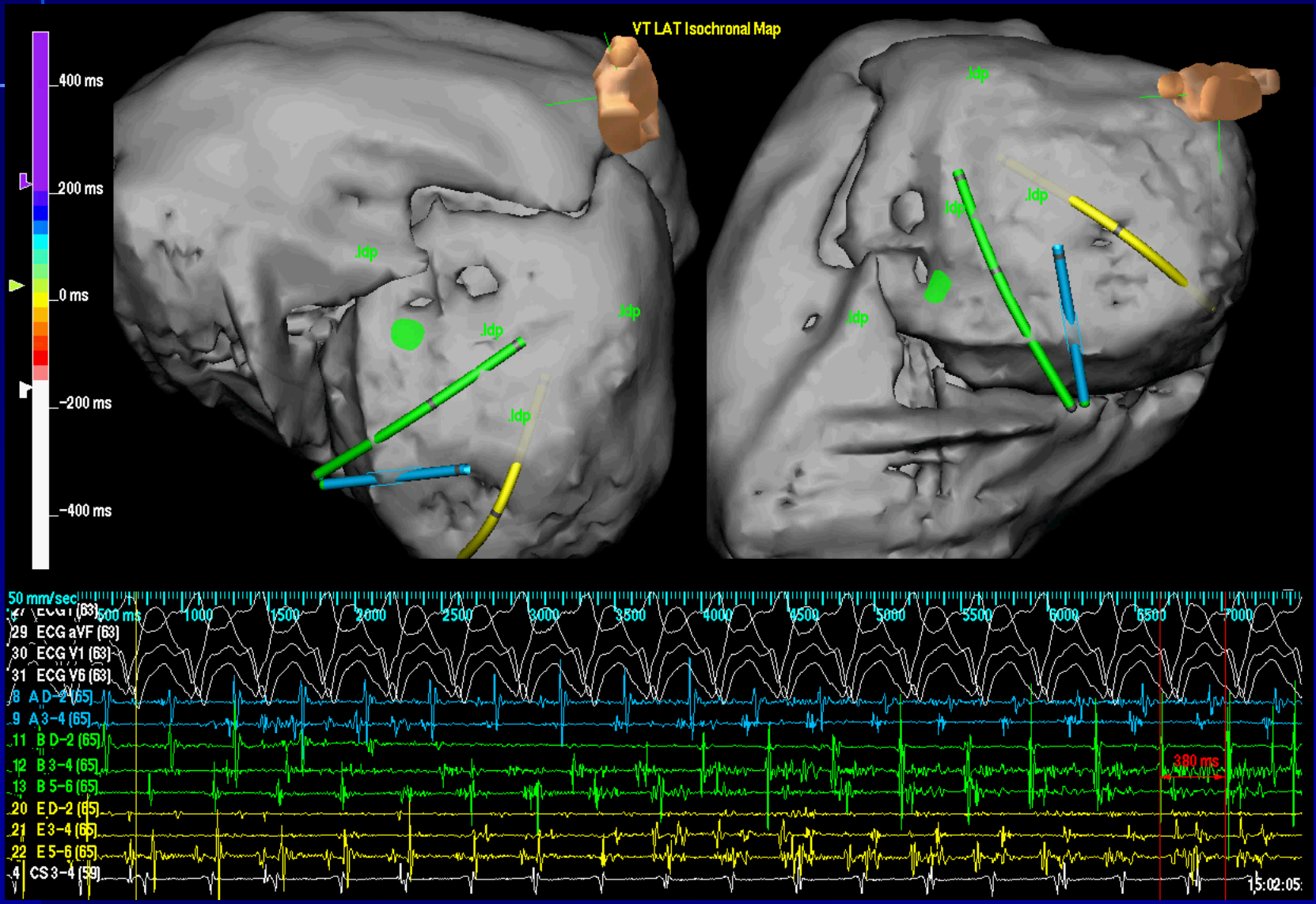
- Multipolar catheter with smaller electrodes and shorter interelectrodes distances

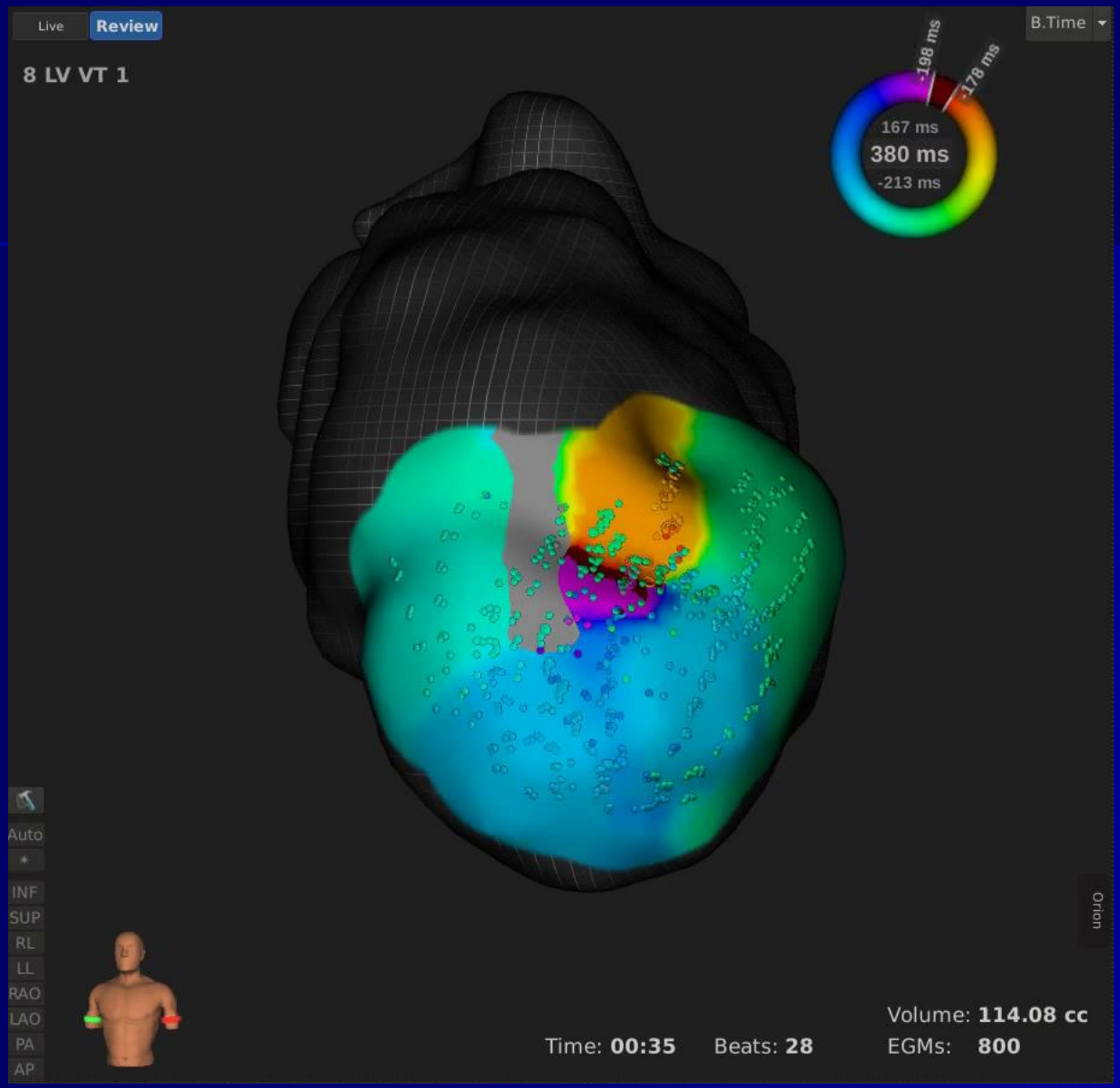


Why multipolar catheters?

- Faster mapping
- Higher density of points
  - Better accuracy
  - Less interpolation
- Dedicated electrodes
  - Smaller
  - Shorter inter-electrode distance
  - Less sensitive to far field signals

VT mapping:
70 pts within 10 sec




Live
Review
8 LV VT 1
B.Time
-198 ms
-178 ms
167 ms
380 ms
-213 ms
Auto
INF
SUP
RL
LL
RAO
LAO
PA
AP
Orion
Time: 00:35
Beats: 28
Volume: 114.08 cc
EGMs: 800

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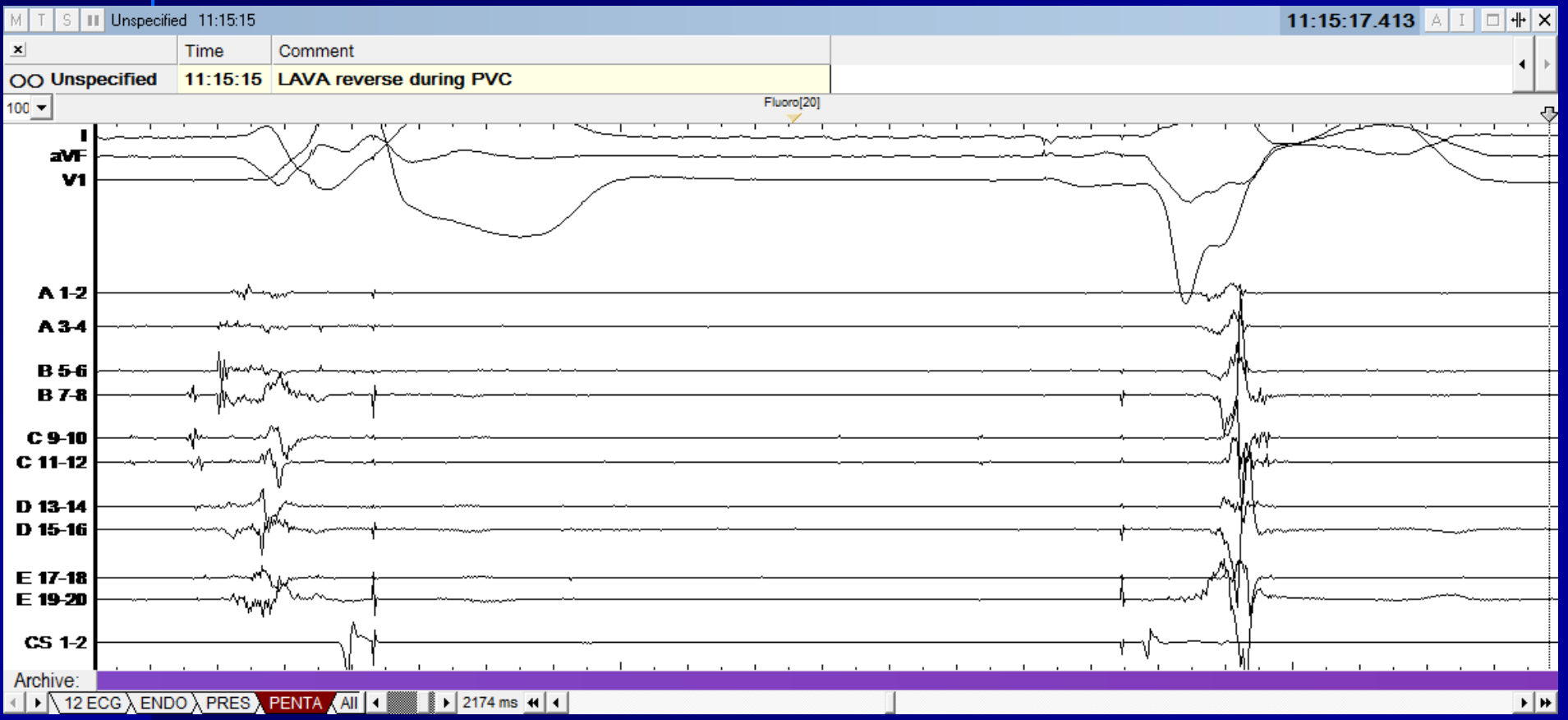
Multi electrode catheters allow to identify much easily the entrance(s) within the scar



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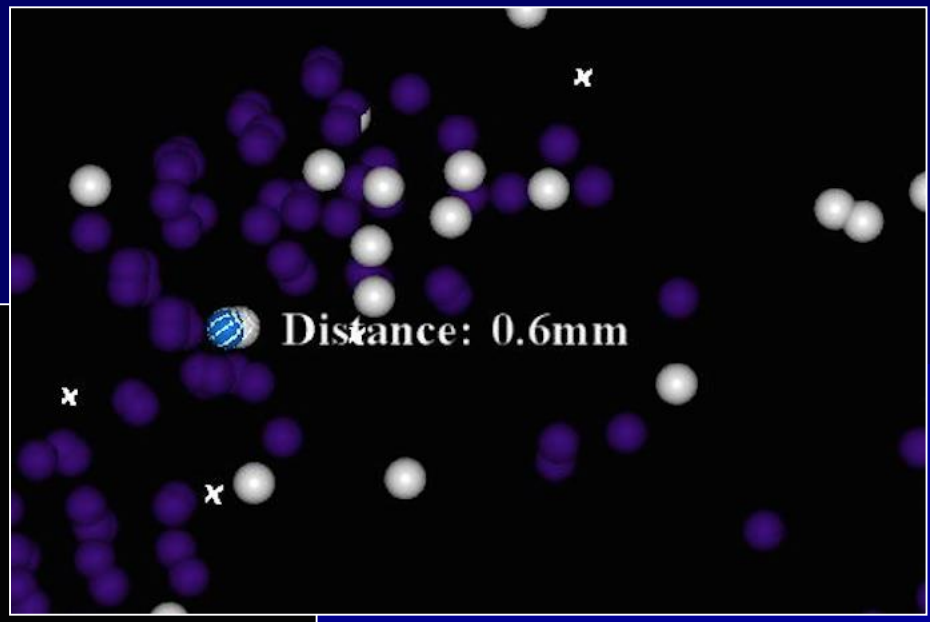
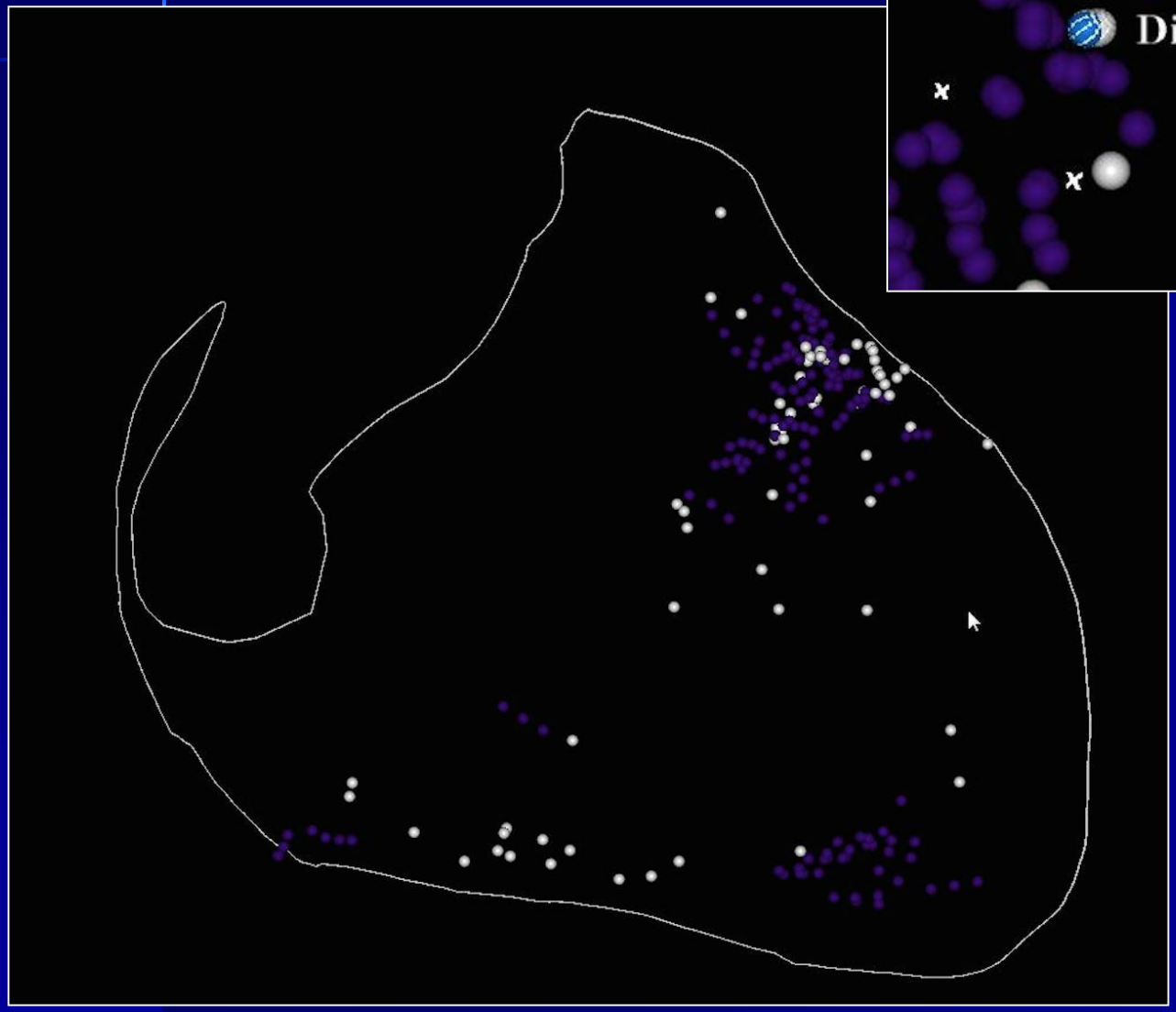
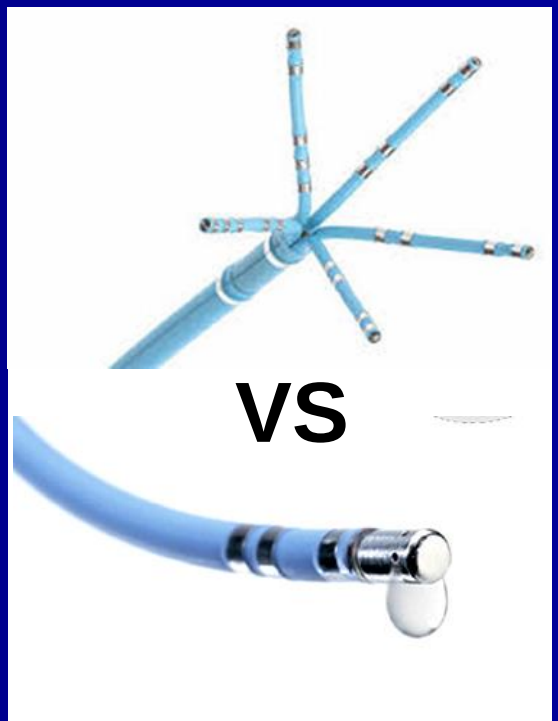
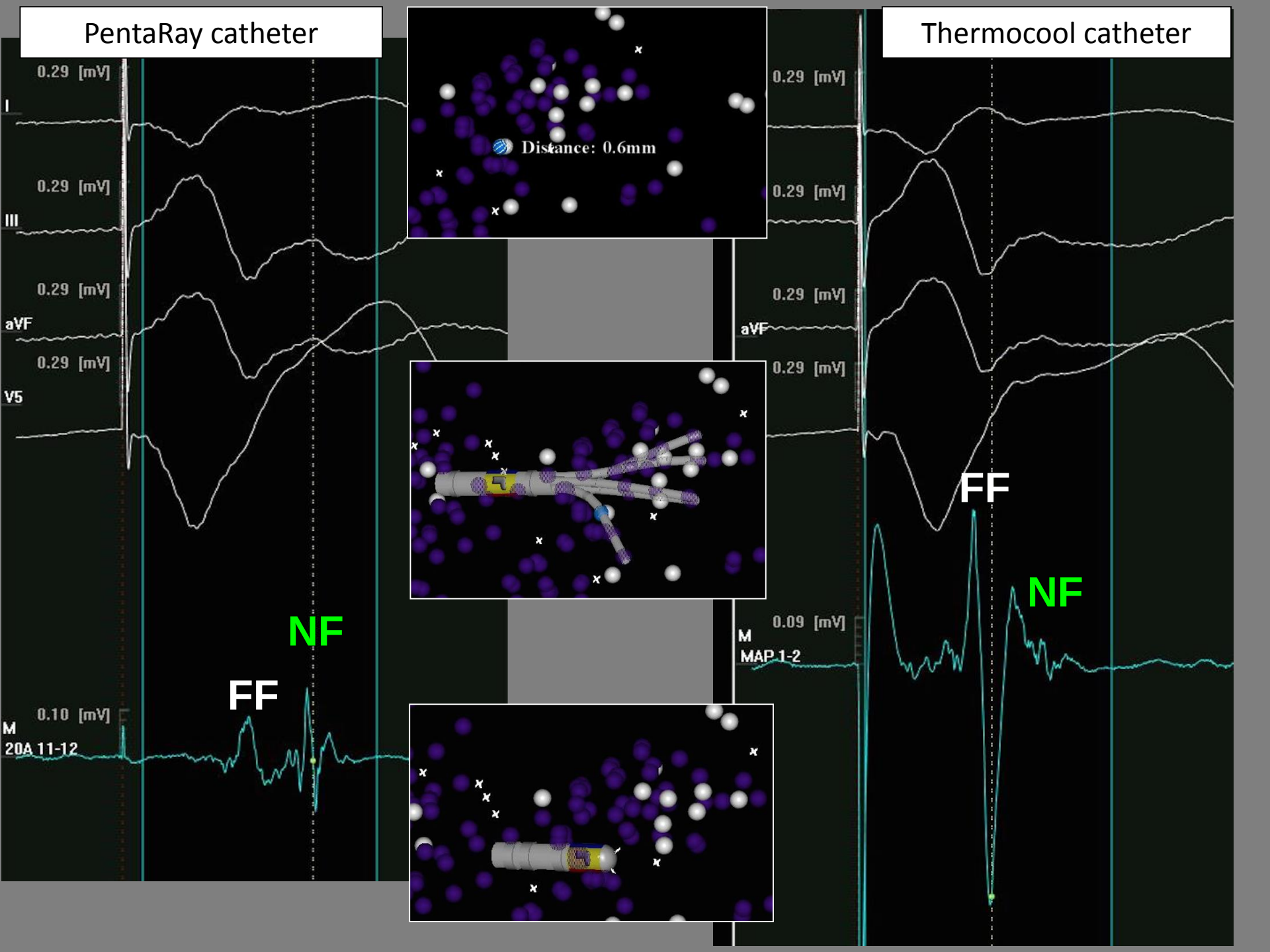
3D distance measurement between points in CARTO system

Berte et al. JCE 2015

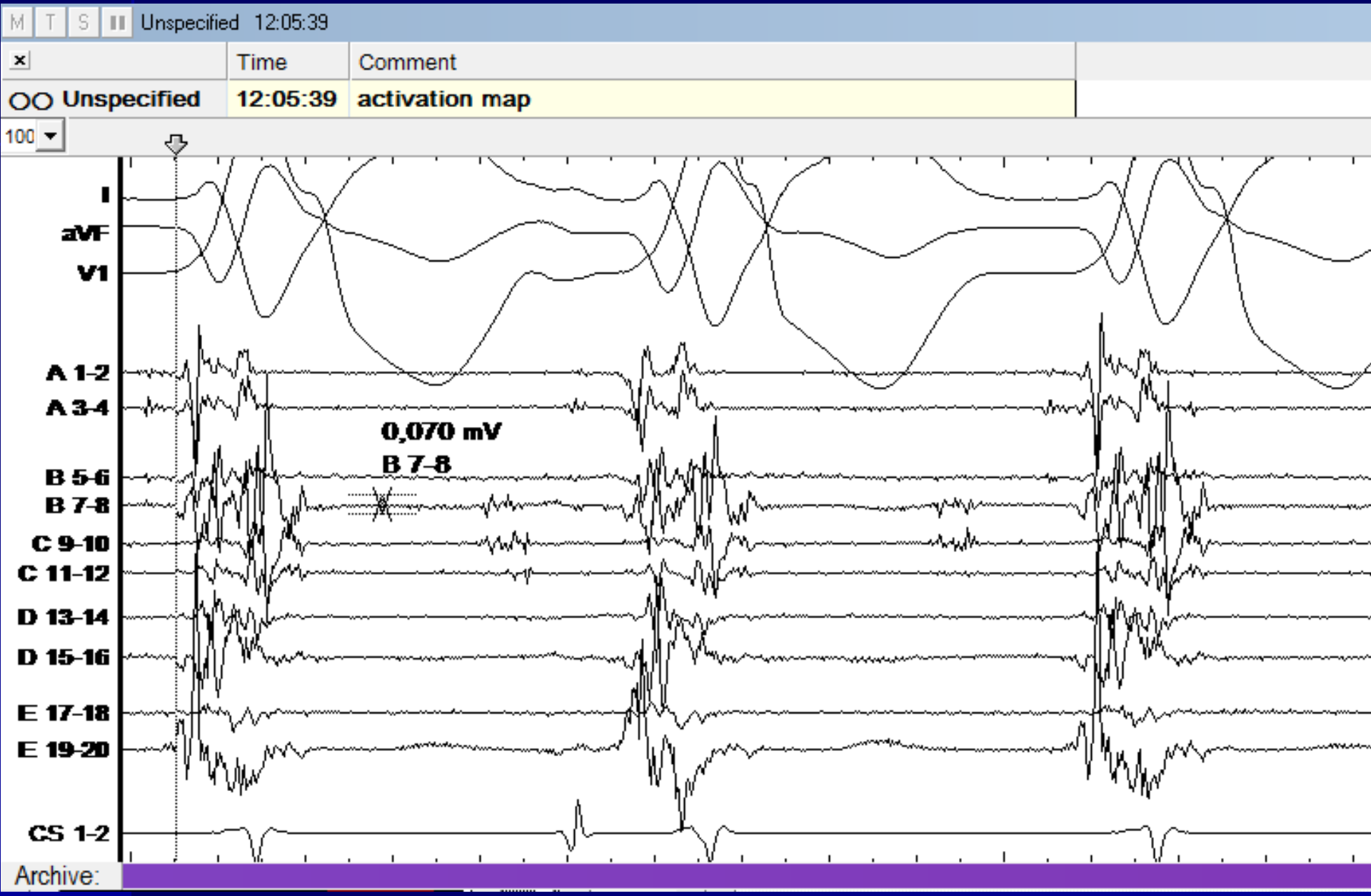






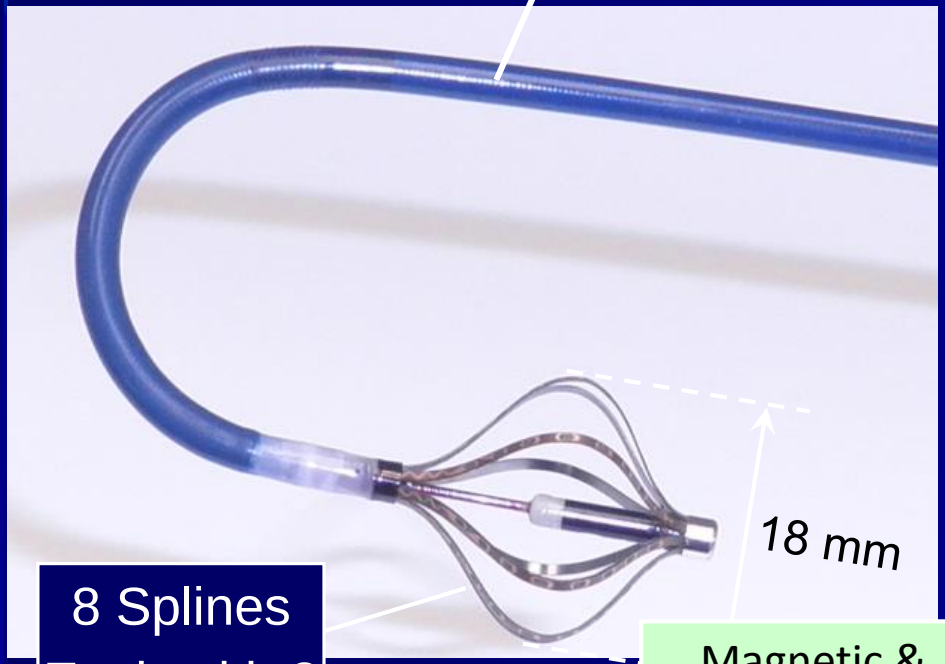

PentaRay catheter
Thermocool catheter
0.29 [mV]
I
0.29 [mV]
III
0.29 [mV]
aVF
0.29 [mV]
V5
Distance: 0.6mm
NF
FF
0.10 [mV]
M
20A 11-12
0.09 [mV]
M
MAP 1-2

Small electrodes with short interspaced allow to identify small near field potential in scar area



Mini-Basket Electrode Catheter (Orion, Boston Scientific)

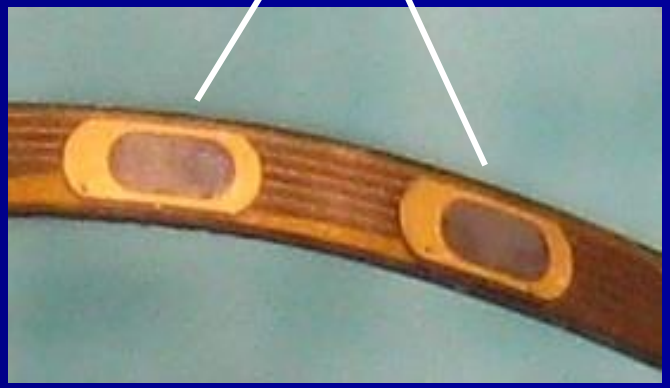
8 Fr Bidirectional Catheter



8 Splines Each with 8 electrodes

Magnetic & Impedance Location Sensors

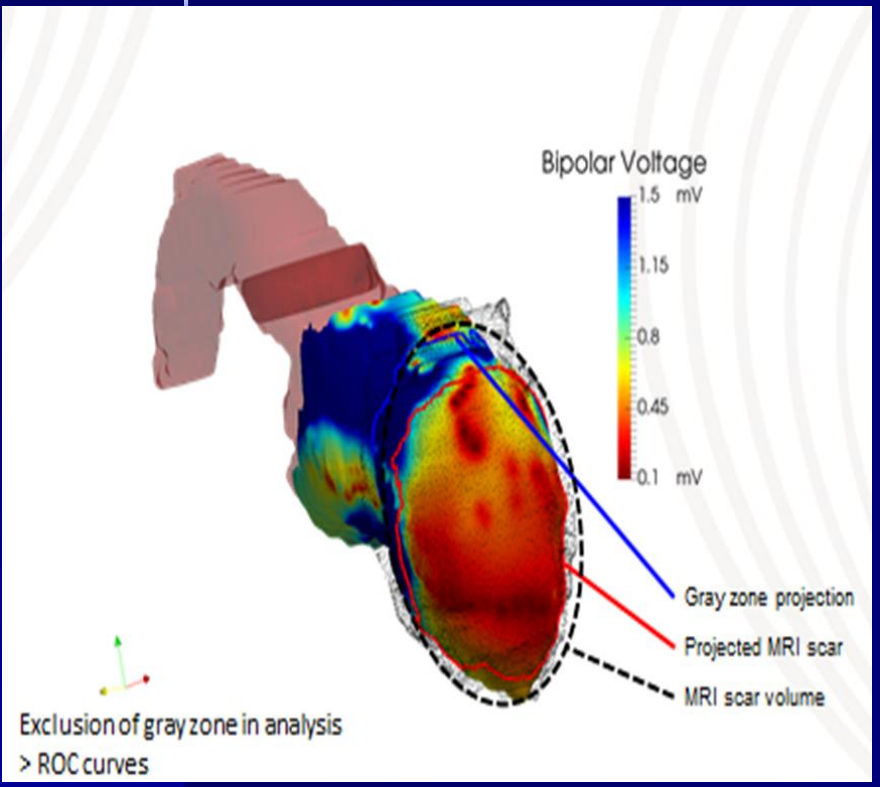
64 Low Noise Electrodes



Electrode Area: 0.4 mm^2

Spacing: 2.5 mm (center-to-center)

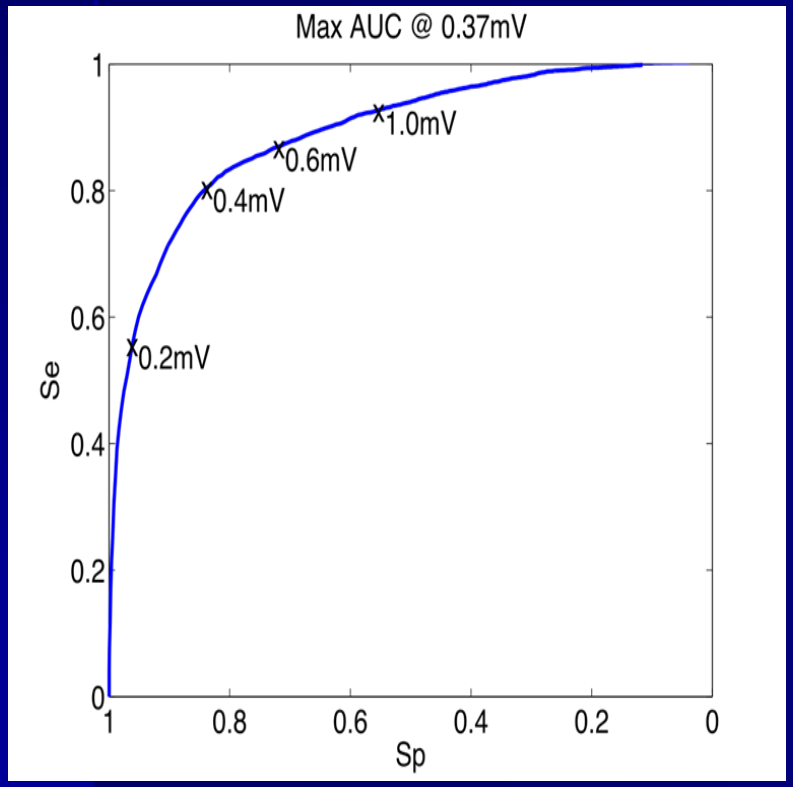
Voltage Threshold



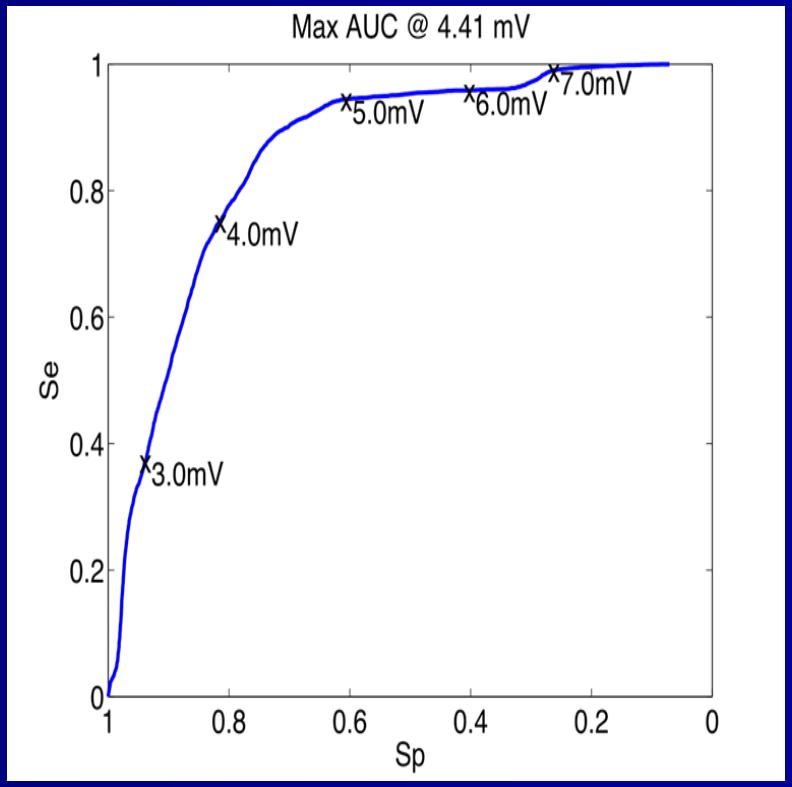
- In 8 chronically infarcted ovine
  - MRI
  - Endo-epi map with Orion (Rhythmia system)
  - Endo: 8012 ±3370 points, Epi: 30232 ±10530 pts
- Fusion and determination of voltage tsd

Voltage Threshold

Endo bipolar

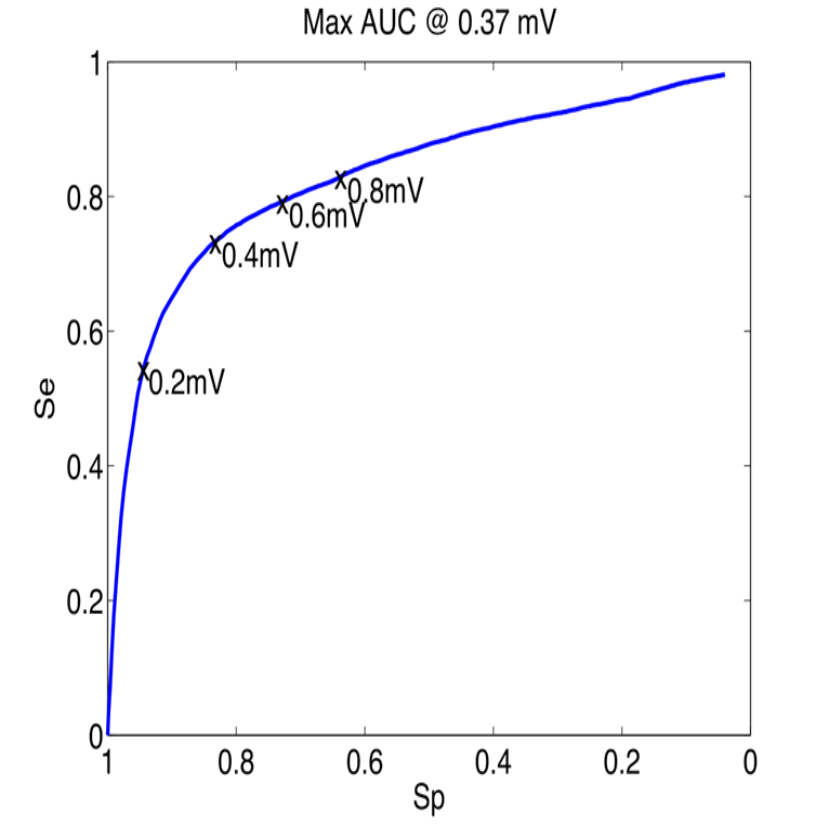


Endo Unipolar

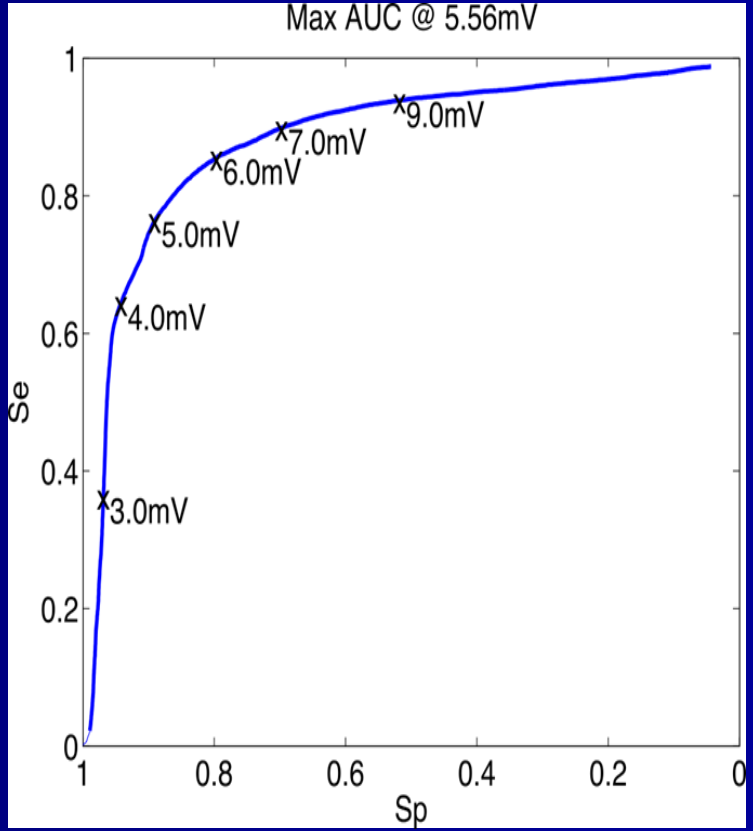


Voltage Threshold

Epi bipolar



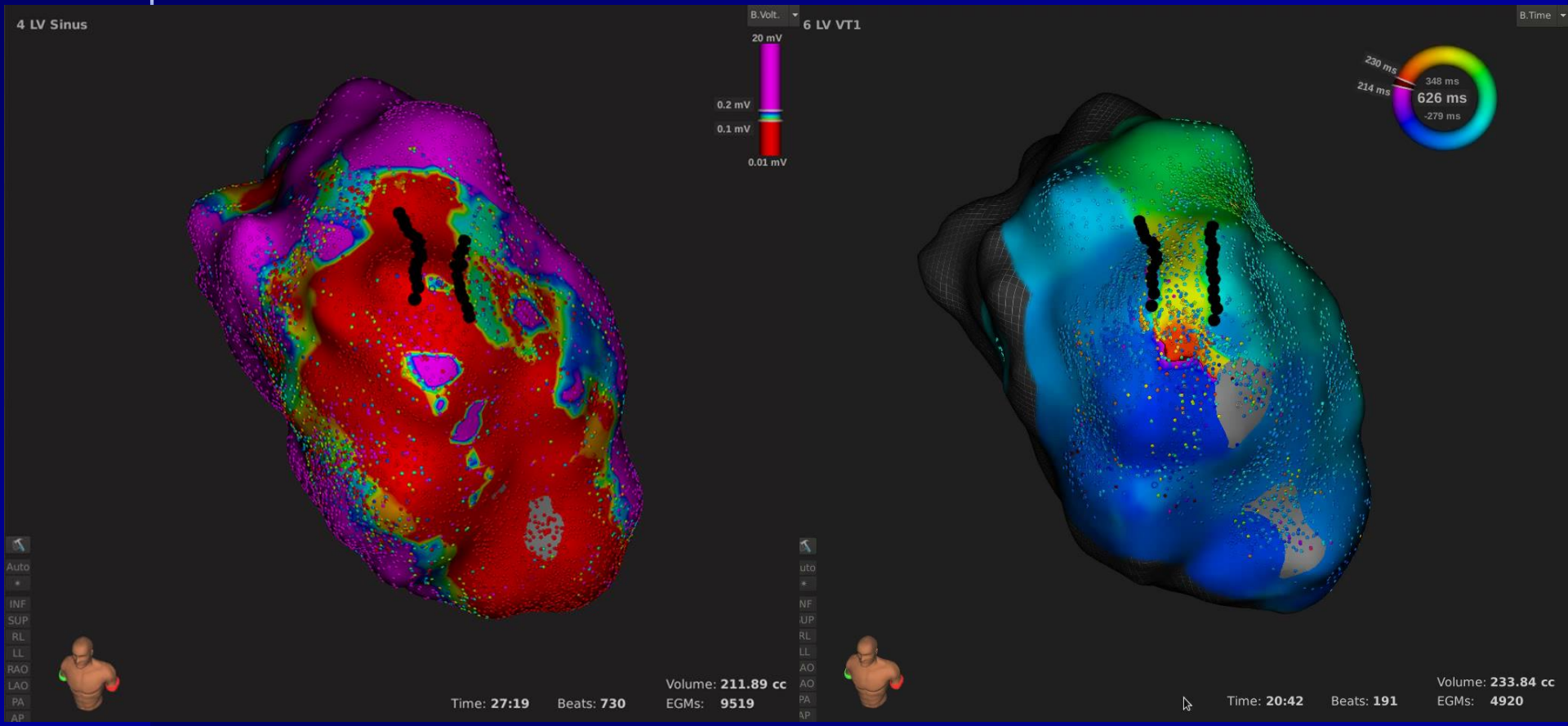
Epi Unipolar



VT Case 1

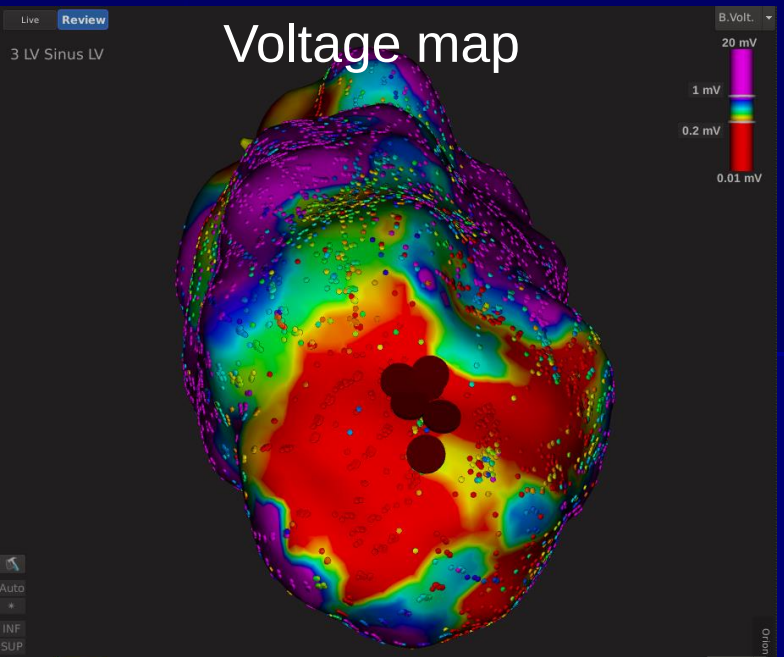
- 50 yo male with anterior MI in 2001

Mr 50 yo old anterior MI coming from La Reunion

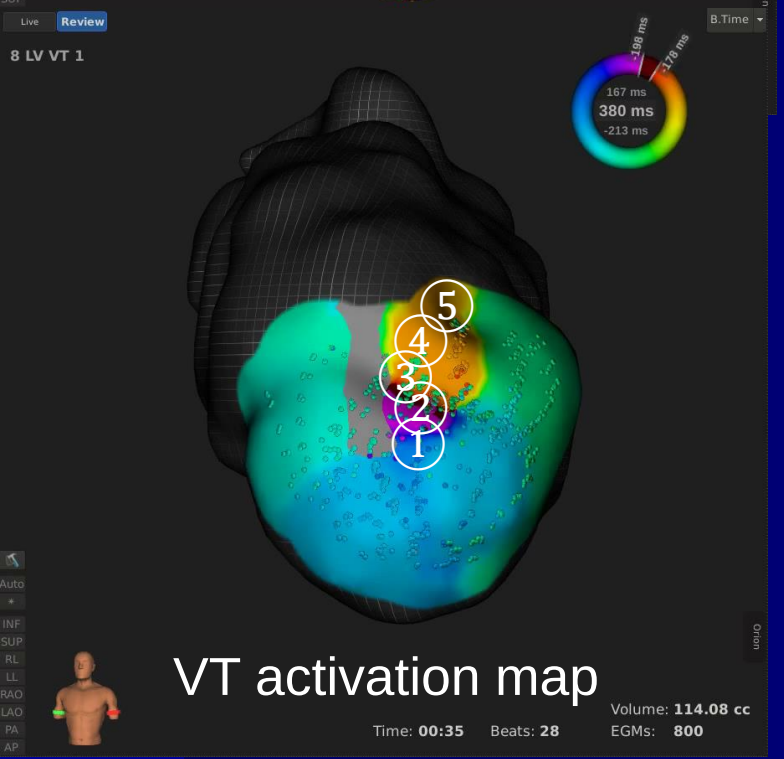


VT Case 2

- 47 yo female with anterior MI in 2004
- 2006 LV thrombus on large anterior aneurysm→ surgery with aneurysmectomy
- LVEF 35-40%
- 2013: VT → ICD
- 2015: VT Recurrences (20 ATP and 3 shocks)

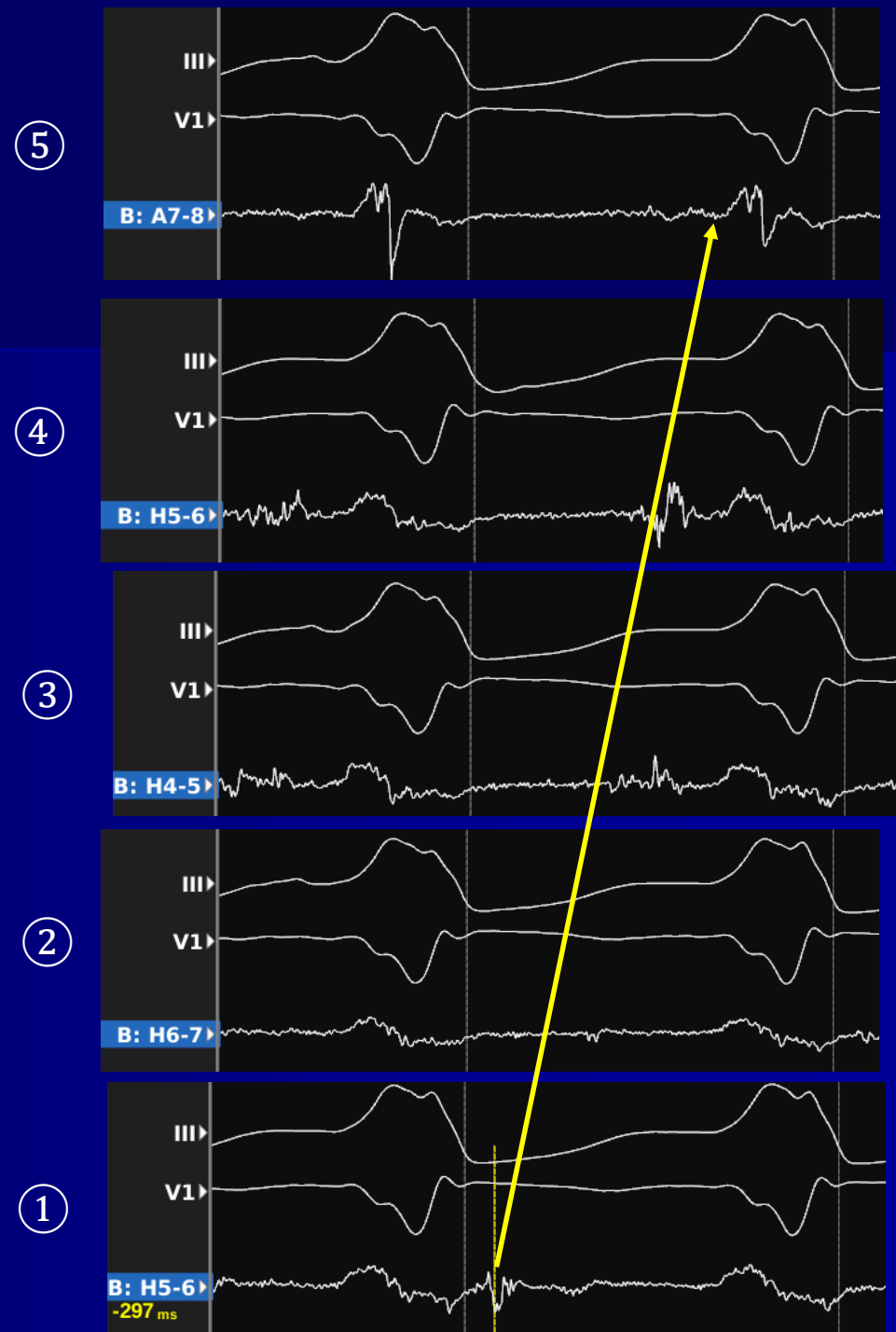


Voltage map

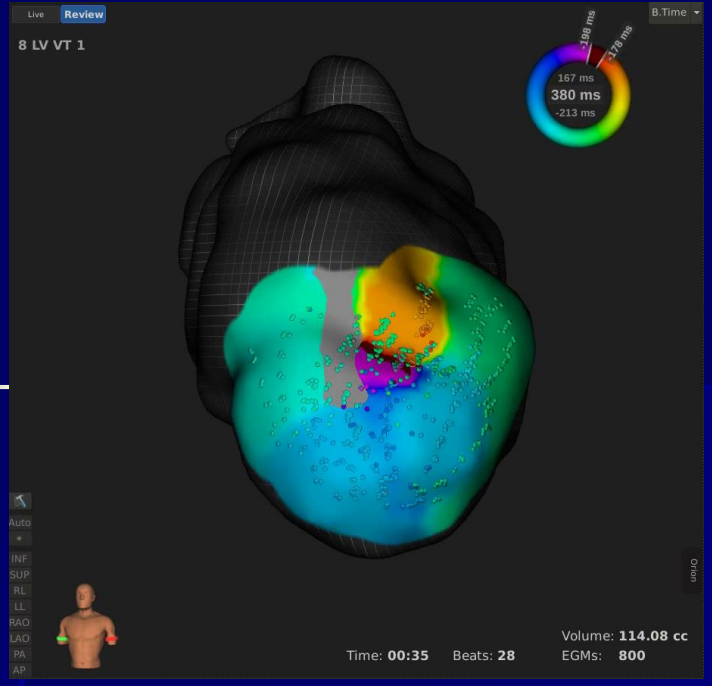


VT activation map

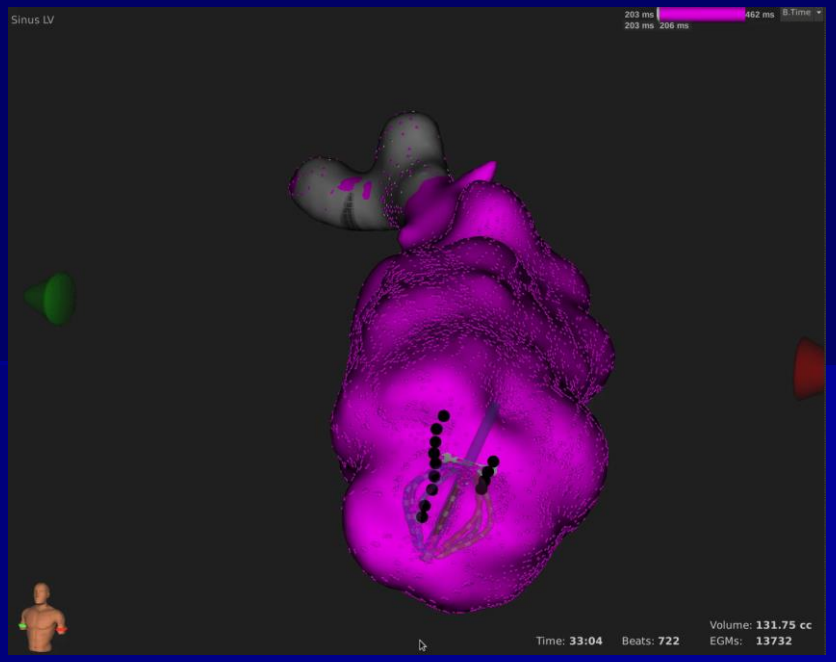
Time: **00:35** Beats: **28** Volume: **114.08 cc** EGMs: **800**



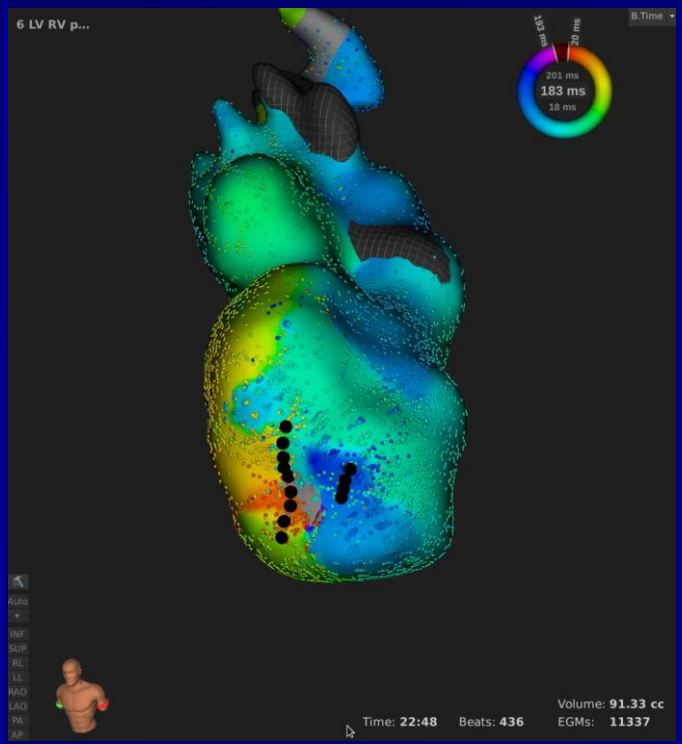
VT map



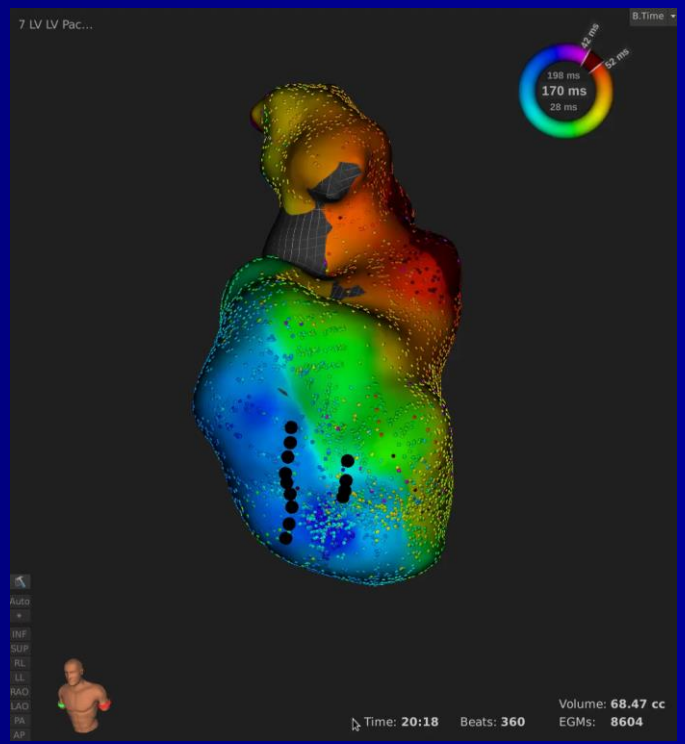
Sinus Rhythm



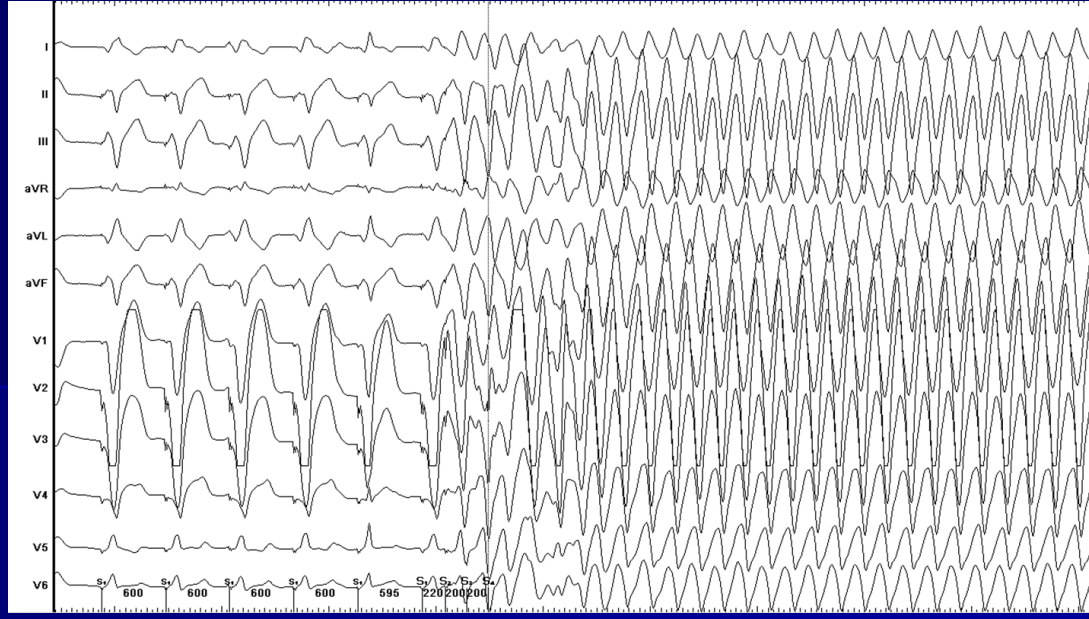
RV pacing



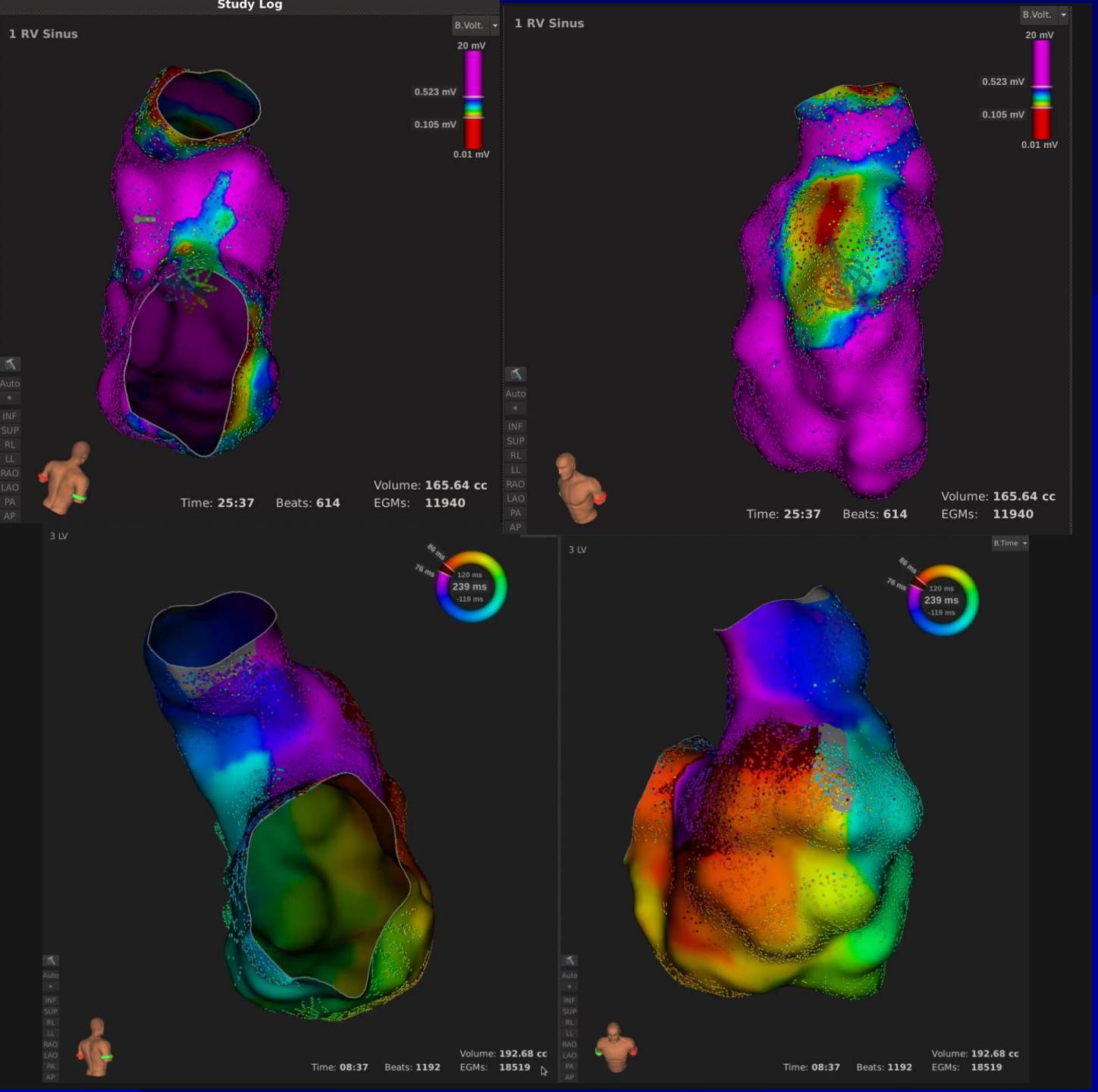
LV pacing



VT Case 3



- 22 yo male with ToF
- Complete surgery in 1996
- Lightheadedness
- Severe pulmonary regurgitation
- Schedule for surgery



Voltage map

VT map

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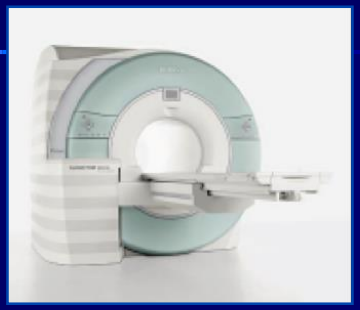
MUSIC platform



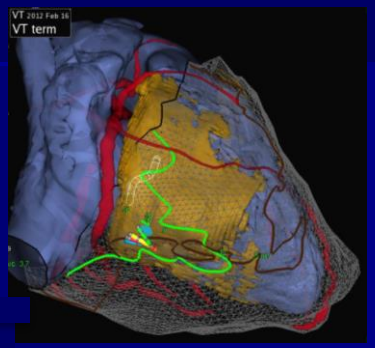
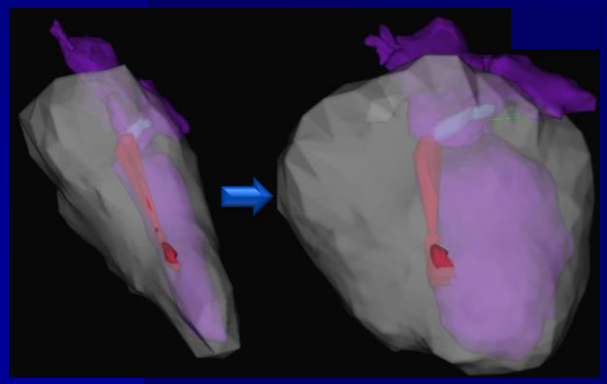
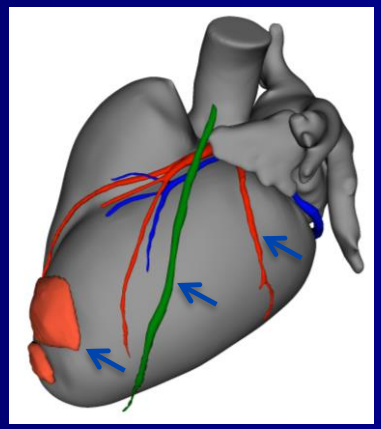
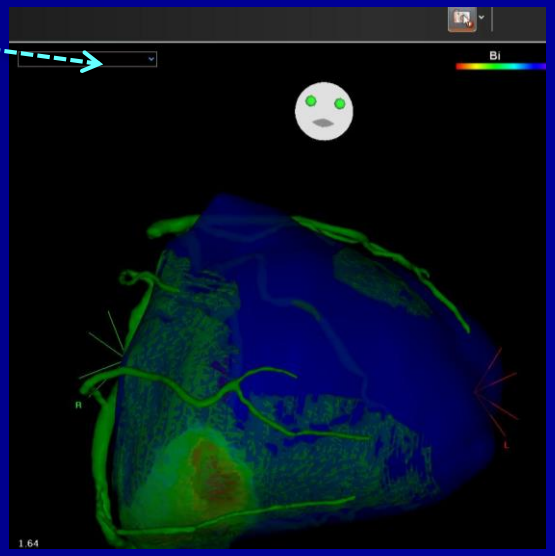


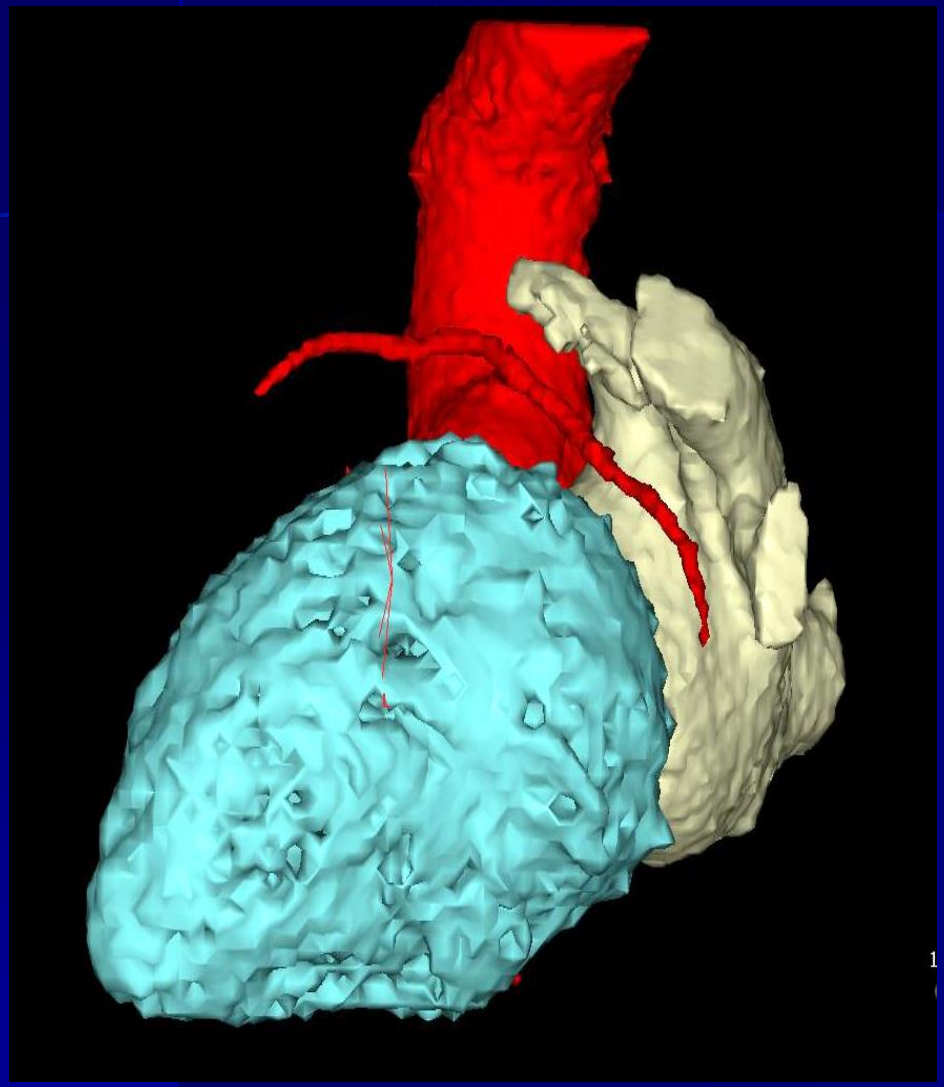
IMAGE INTEGRATION



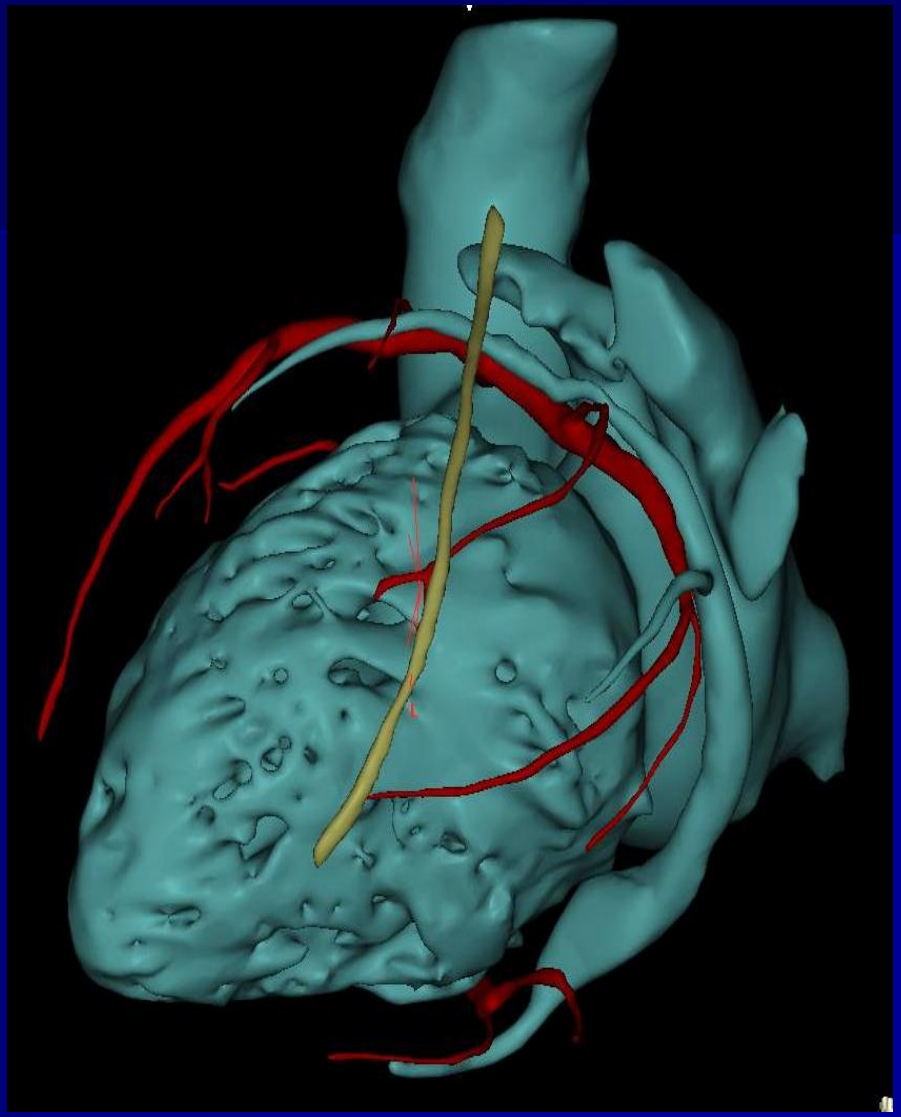




MUSIC Image Integration

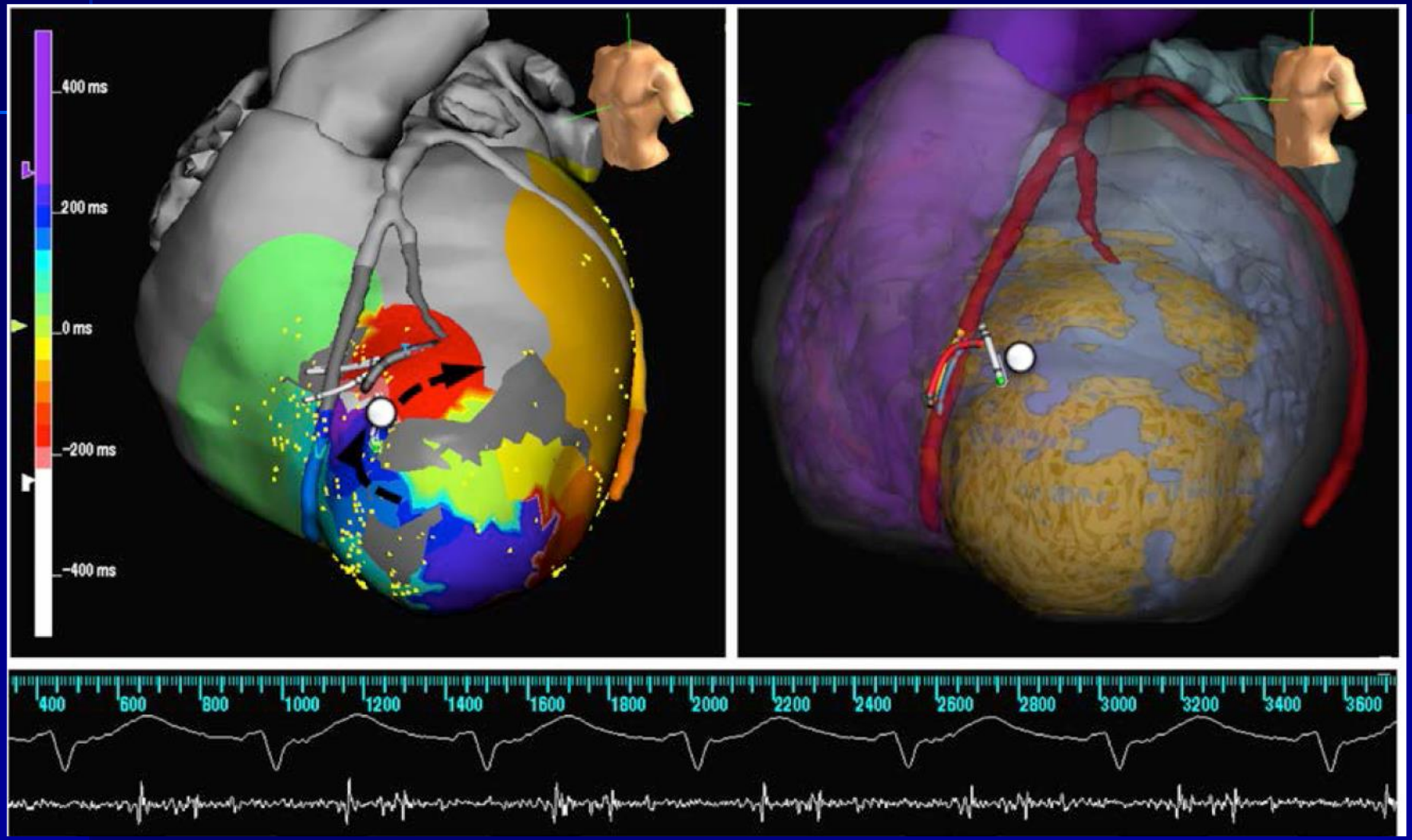


Conventional segmentation



Segmentation with
Music platform software

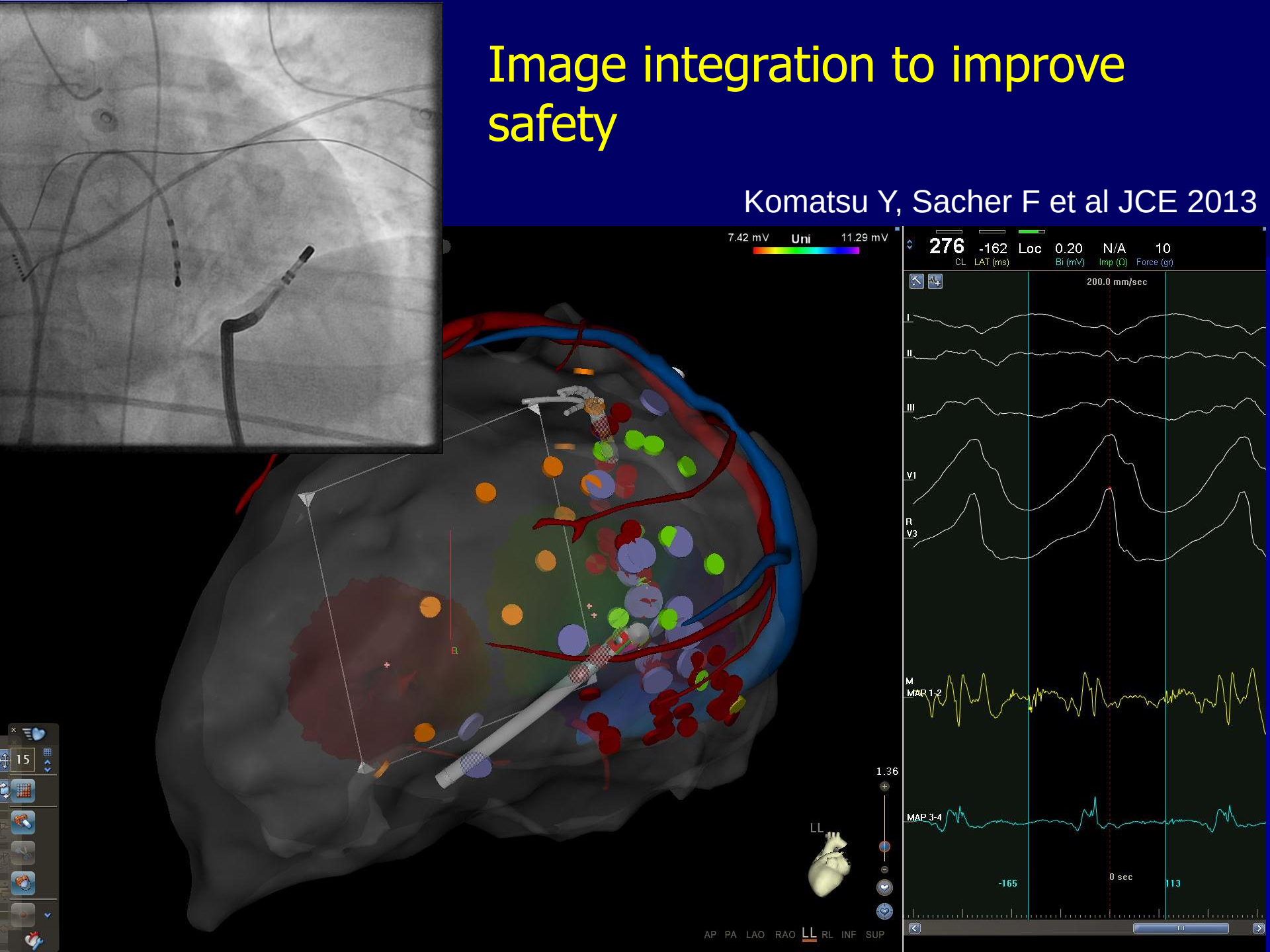
Good relationship with wall thinning on CT scan



Komatsu Y et al. Circ A & E 2013

Image integration to improve safety

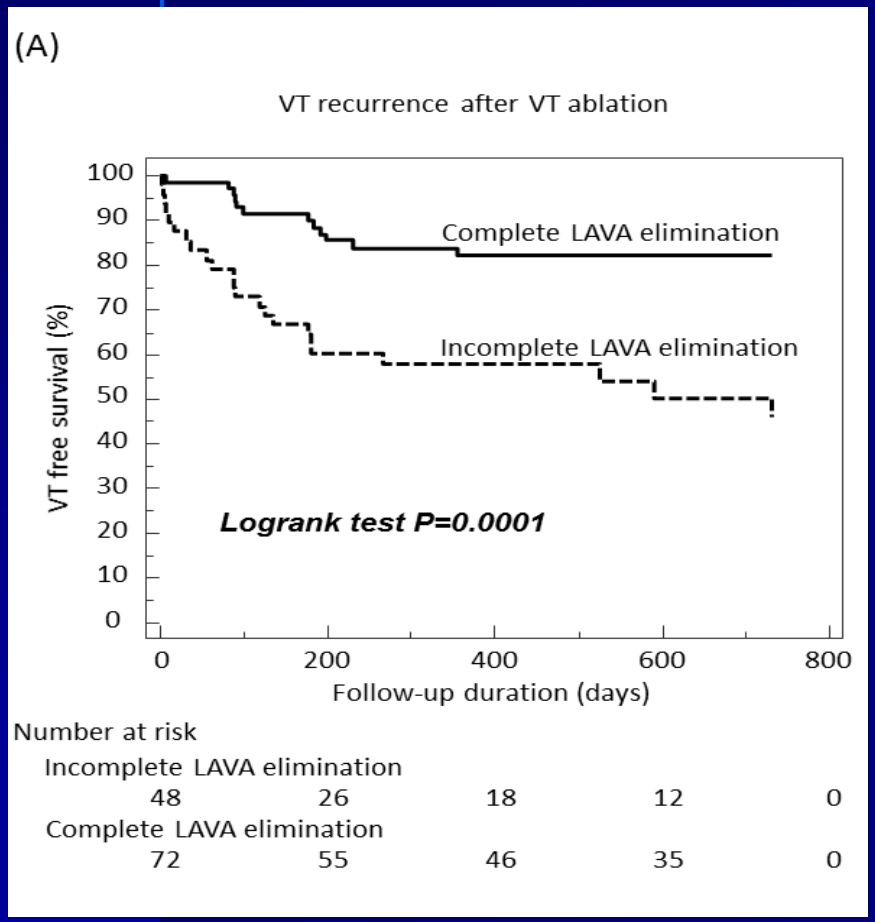
Komatsu Y, Sacher F et al JCE 2013

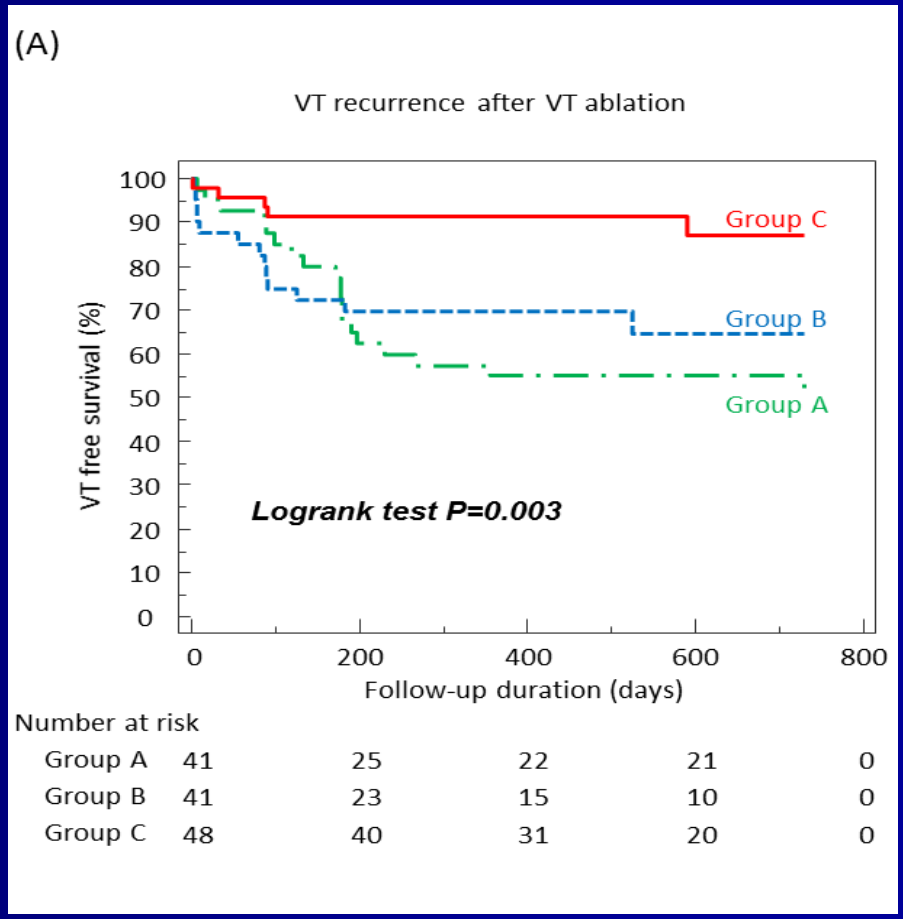


Impact of ablation with 3D EAM and real-time image integration on clinical outcome in post MI VT patients

130 consecutive post MI VT pts
MDCT 40, MR 18

Image integration and use of multipolar mapping catheters associated with fewer VT recurrences





High density mapping in scar-dependent VT

- True improvement or marketing tool?
  - Extremely important for substrate based approaches
  - Improve substrate assessment
- Advantages with multi-electrodes catheters
  - higher mapping density and better substrate definition
  - higher detection of LAVA
  - reduces the far-field signals and magnify the near field component (LAVA)
- Re-evaluation of standard voltage thresholds for multipolar mapping
- Association with imaging tools