



Ischemic VT ablation

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Visualization of the Critical Isthmus by Tracking Delayed Potential in Edited Windows for Scar-Related Ventricular Tachycardia

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Background and Objectives:

- Identifying the critical isthmus of slow conduction is crucial for successful treatment of scar-related ventricular tachycardia.
- Current 3D mapping is not designed for tracking the critical isthmus and may lead to a risk of extensive ablation.
- We edited the algorithm to track the delayed potential in order to visualize the isthmus and compared the edited map with a conventional map



Subjects and Methods

- We marked every point that showed delayed potential with blue color.
- After substrate mapping, we edited to reset the annotation from true ventricular potential to delayed potential and then changed the window of interest from the conventional zone
 - ⑩ (early, 50–60%; late, 40–50% from peak of QRS) to the edited zone (early, 80–90%; late, 10–20%) for every blue point.
 - ⑩ - Finally, we compared the propagation maps before and after editing.



Case 1. 57 year-old male

C/C : Multiple ICD shocks

- Known idiopathic DCMP for 4 years
- ICD implantation 1 year ago due to repeated VT and syncope
- Echo : global hypokinetic LV , EF : 19%

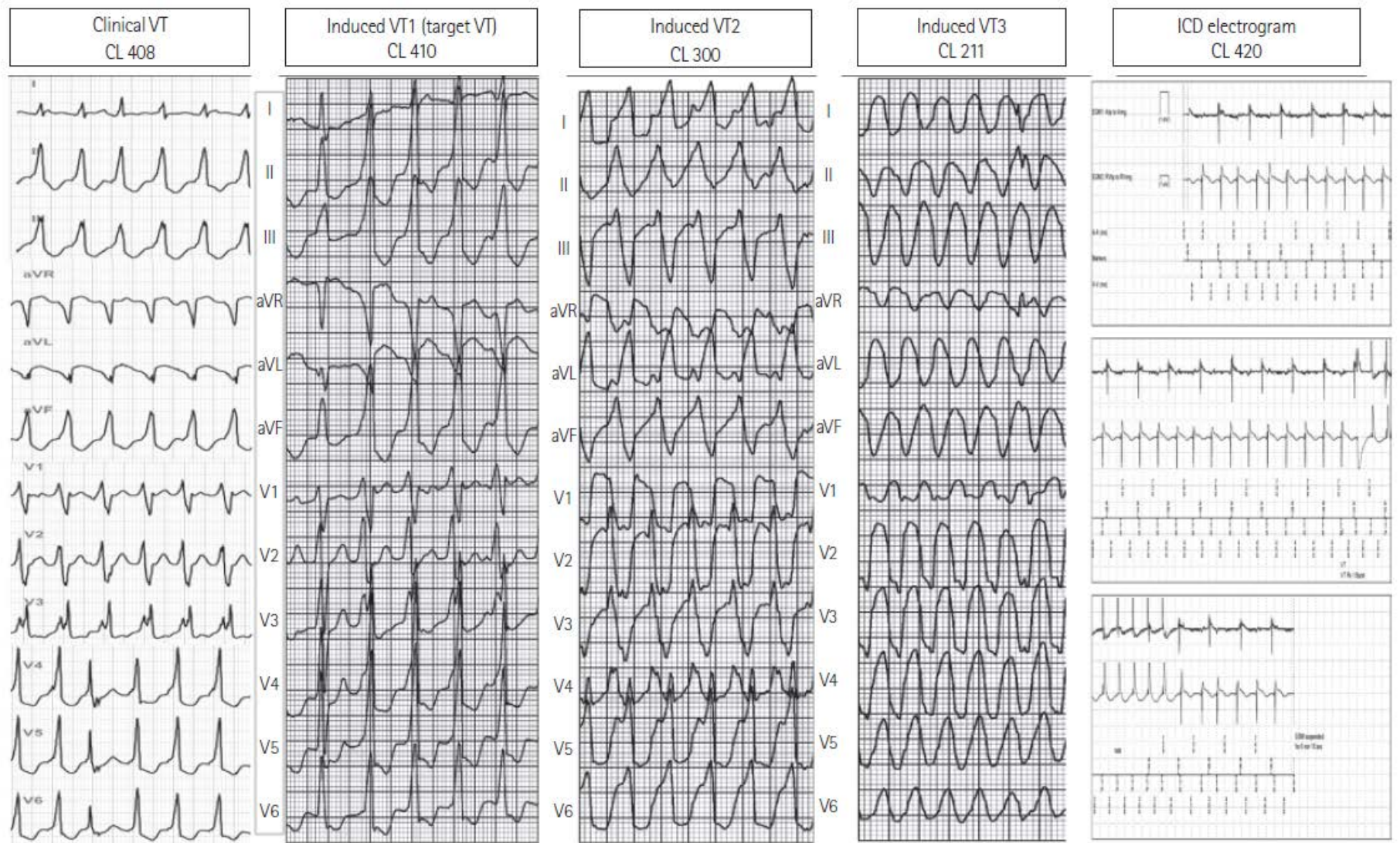
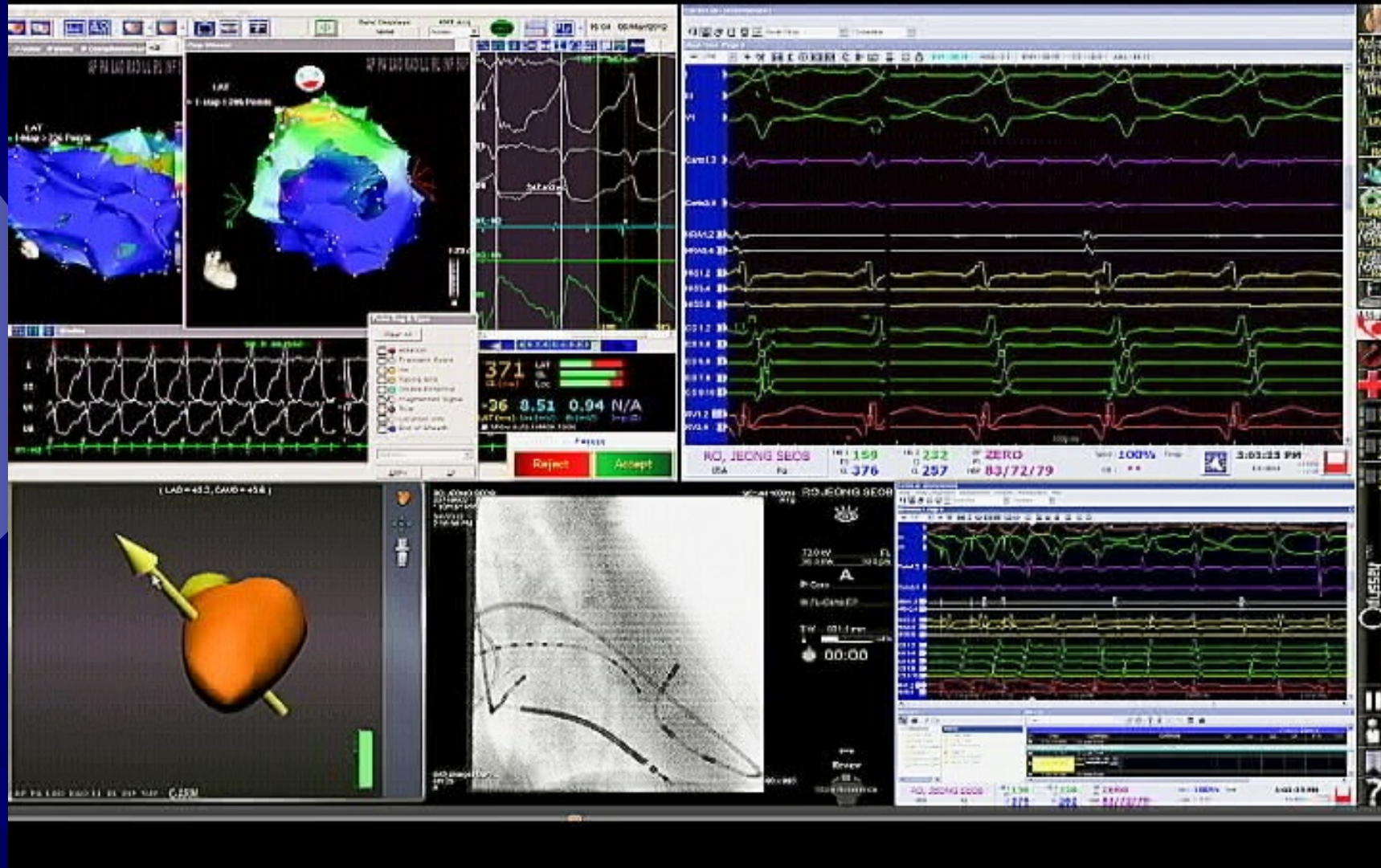
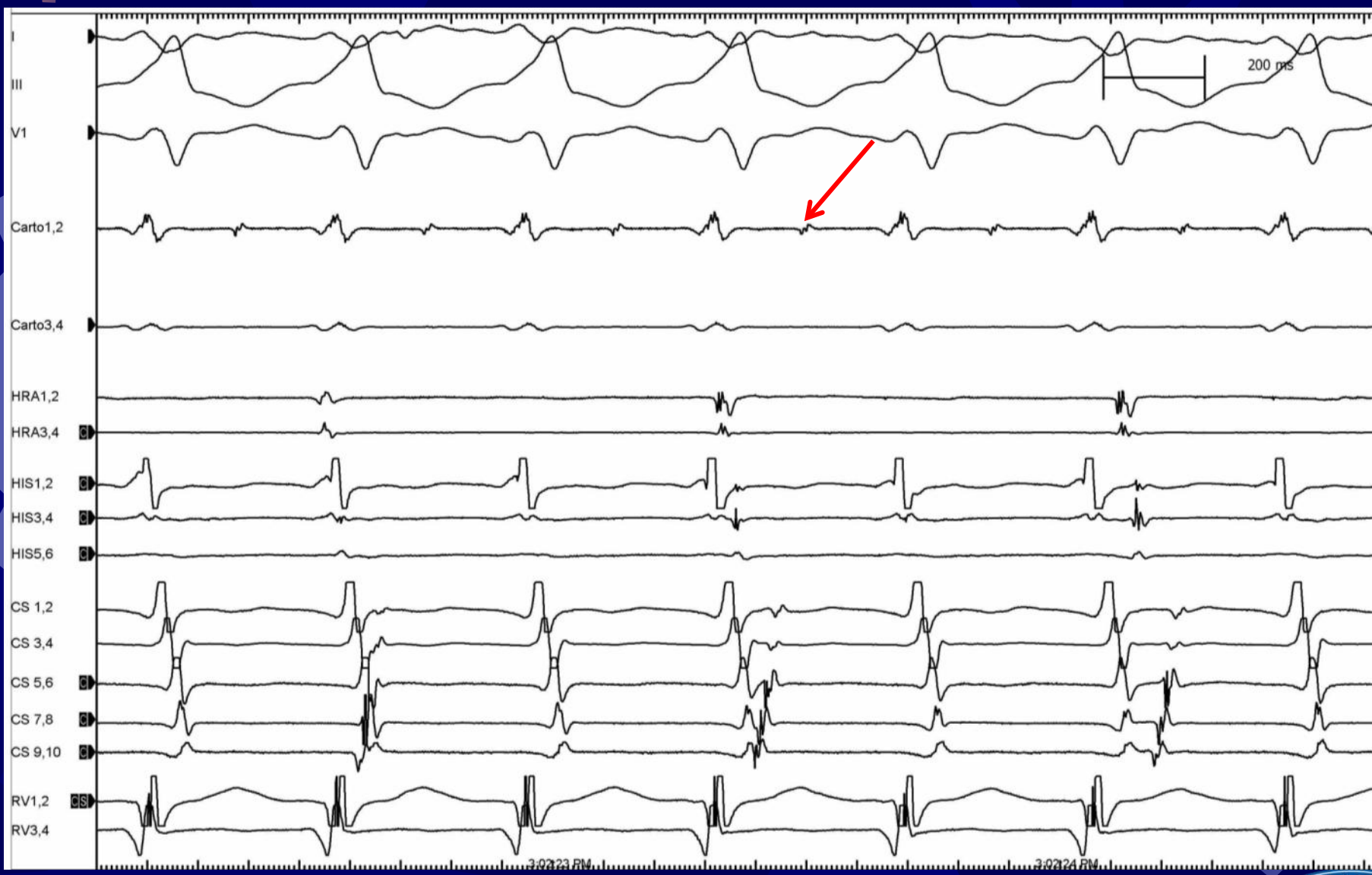


Fig. 1. 12-lead ECG of clinical VT and that of VT that was induced and targeted during the induction study. Nonclinical VT showed different axis and cycle lengths. VTs that were documented in the ICD electrograms showed similar cycle lengths and could not be terminated by anti-tachycardia pacing. ECG: electrocardiogram, VT: ventricular tachycardia, ICD: implantable cardioverter-defibrillator.

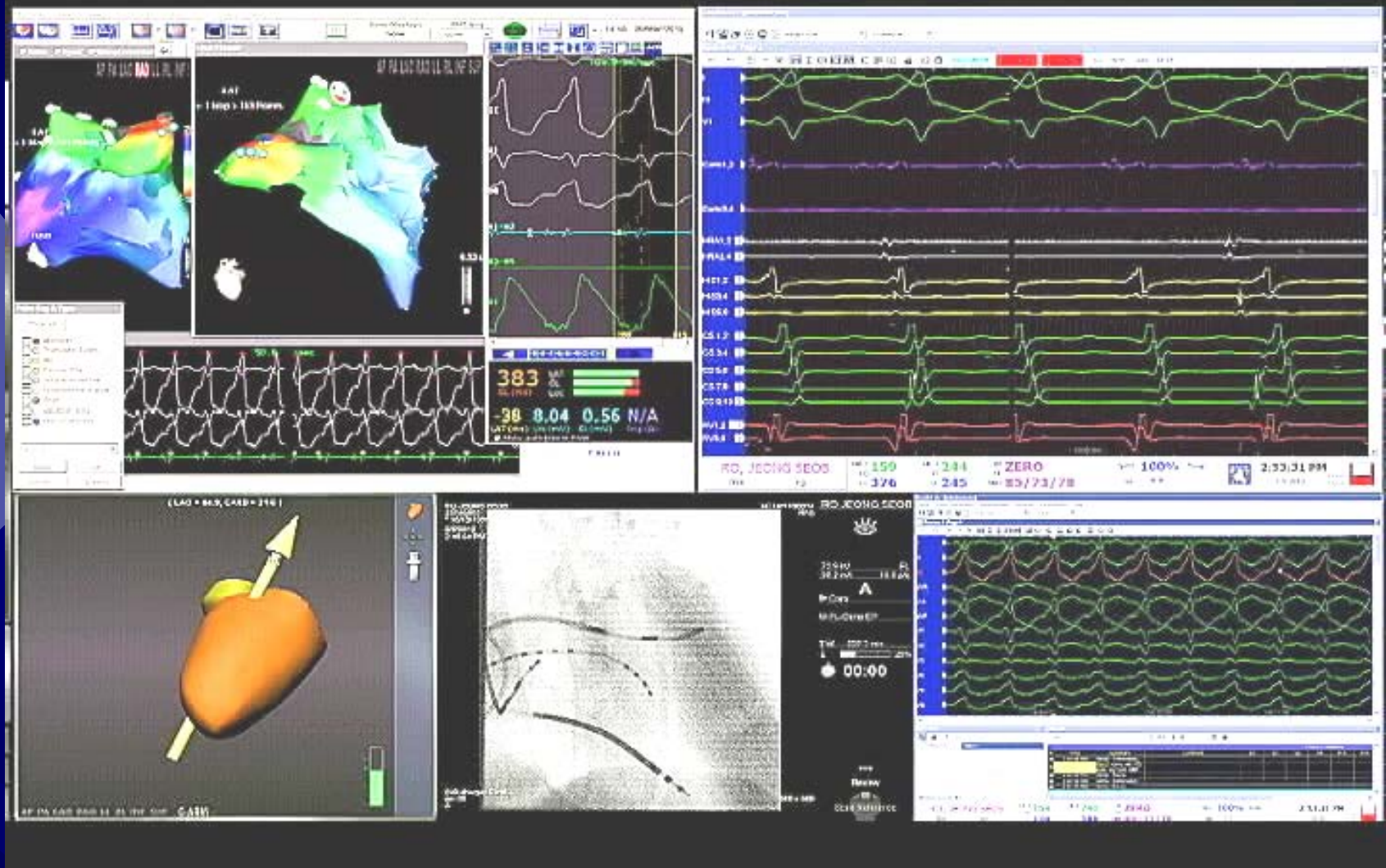


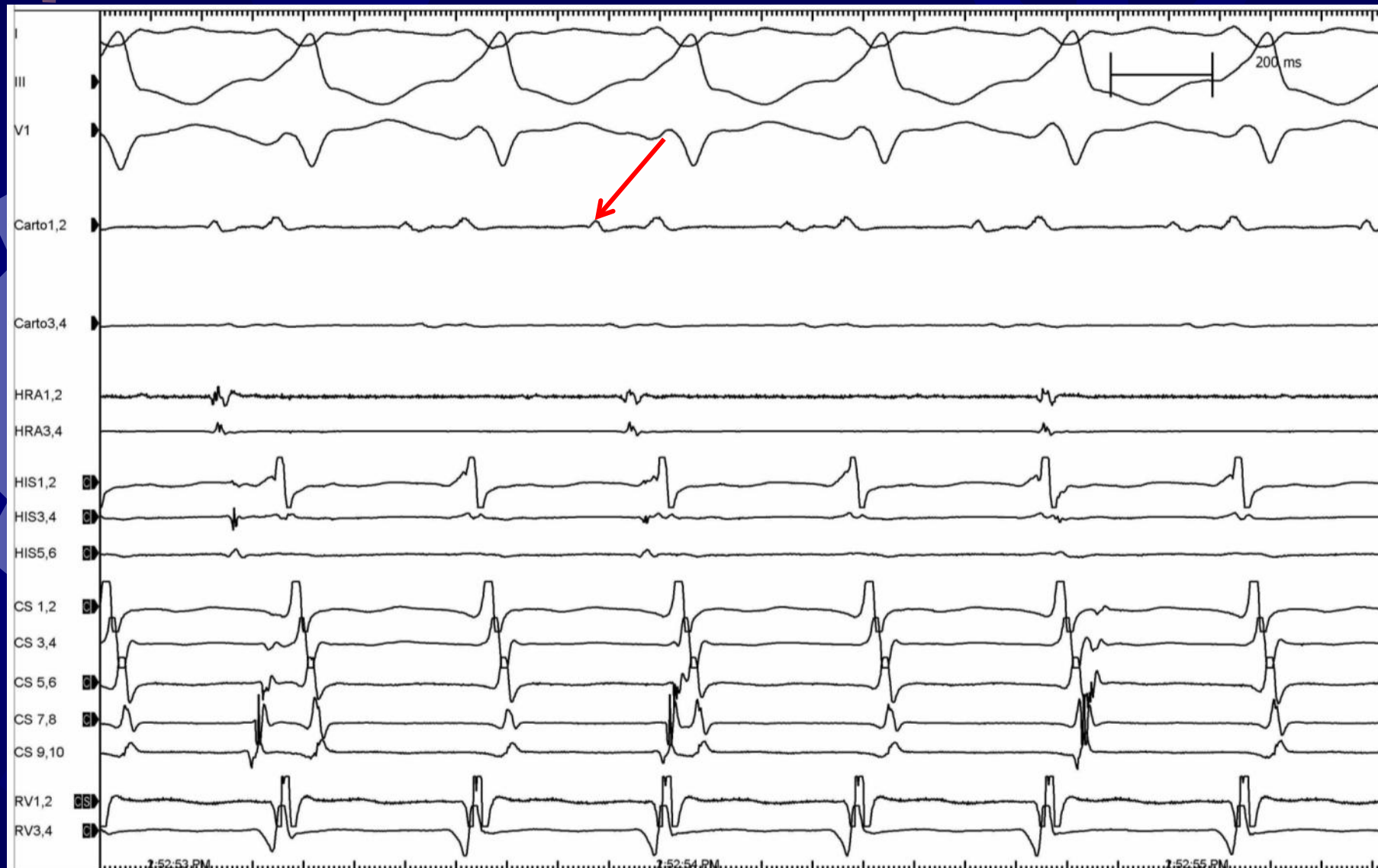
VT map – delayed potential 1



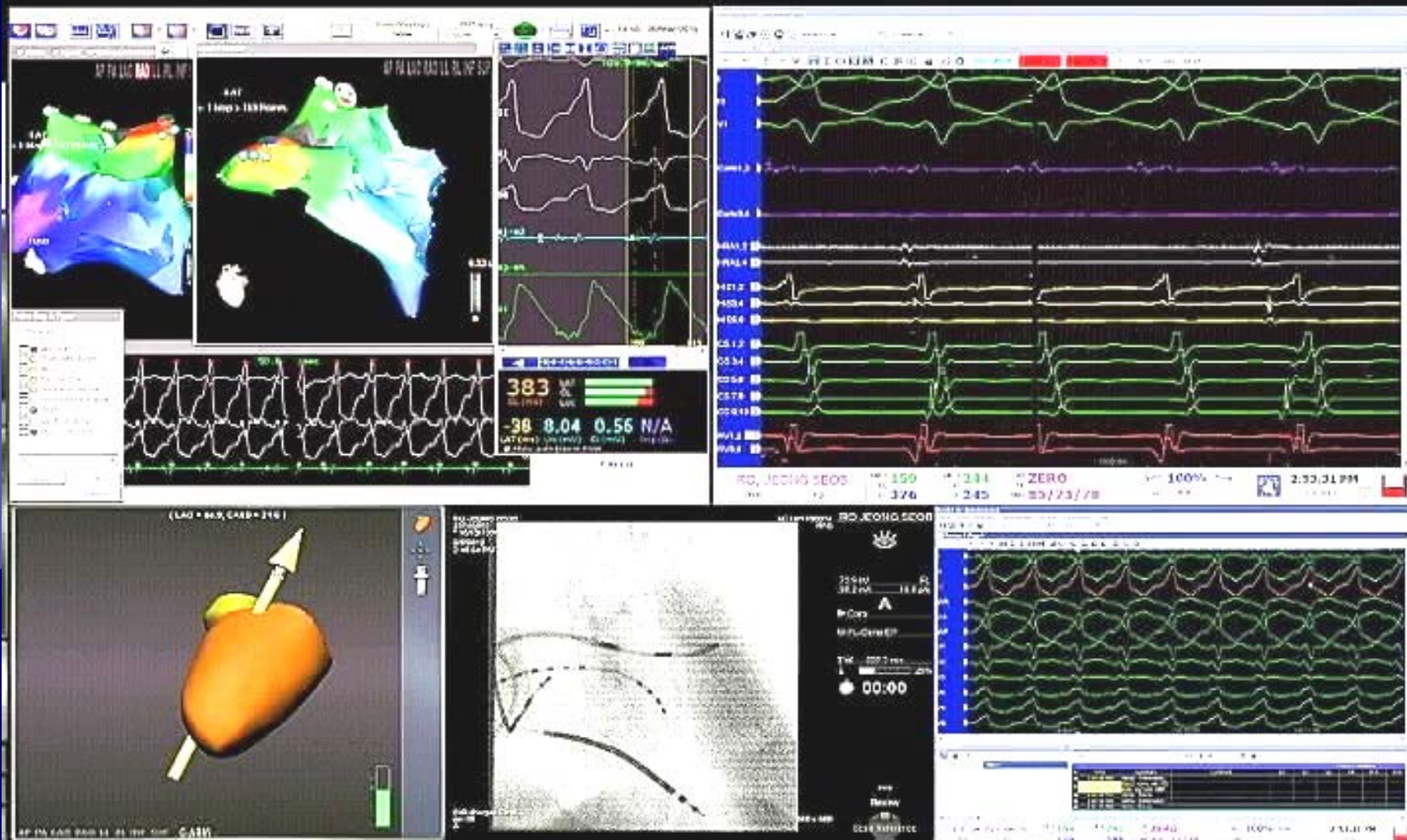


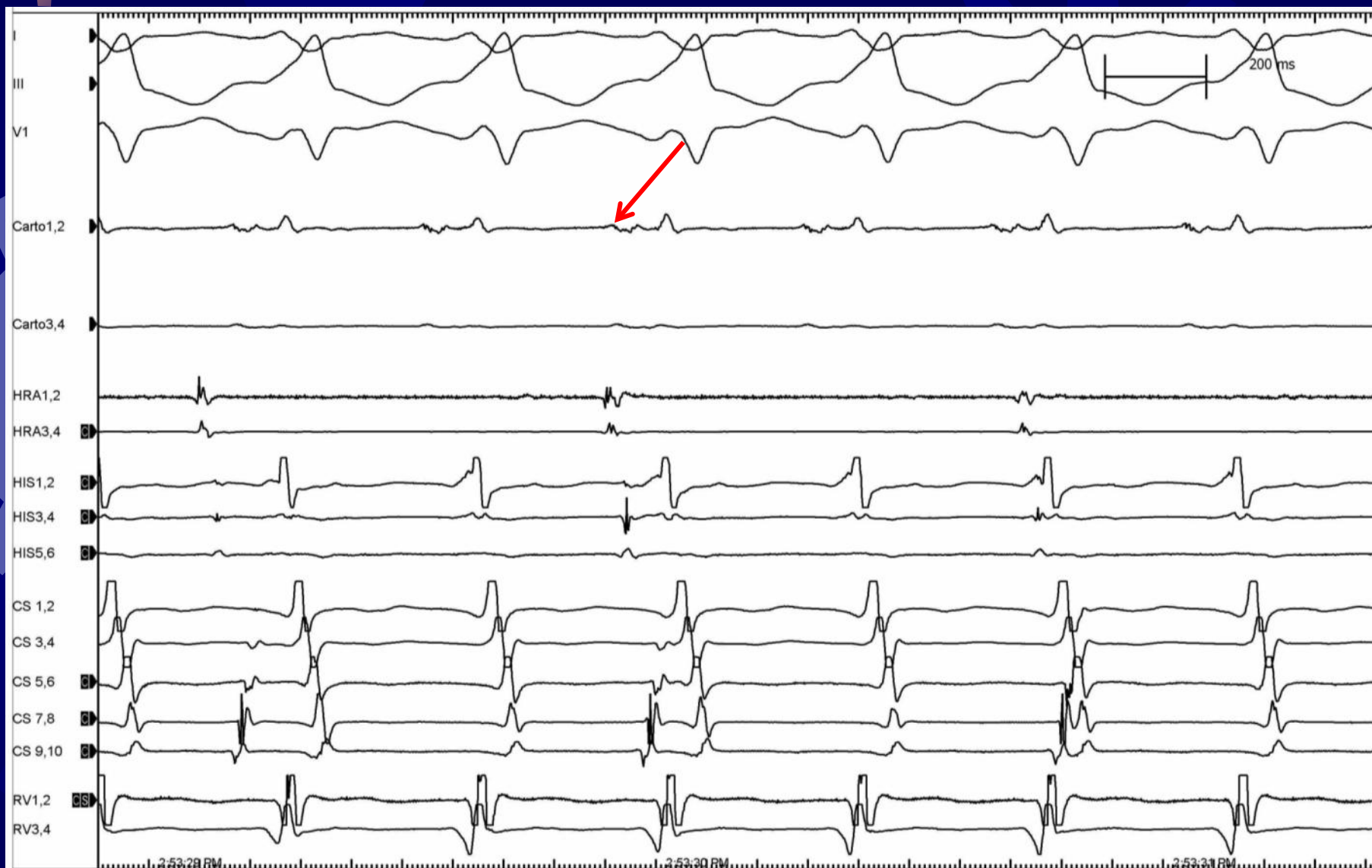
VT map – double potential 2



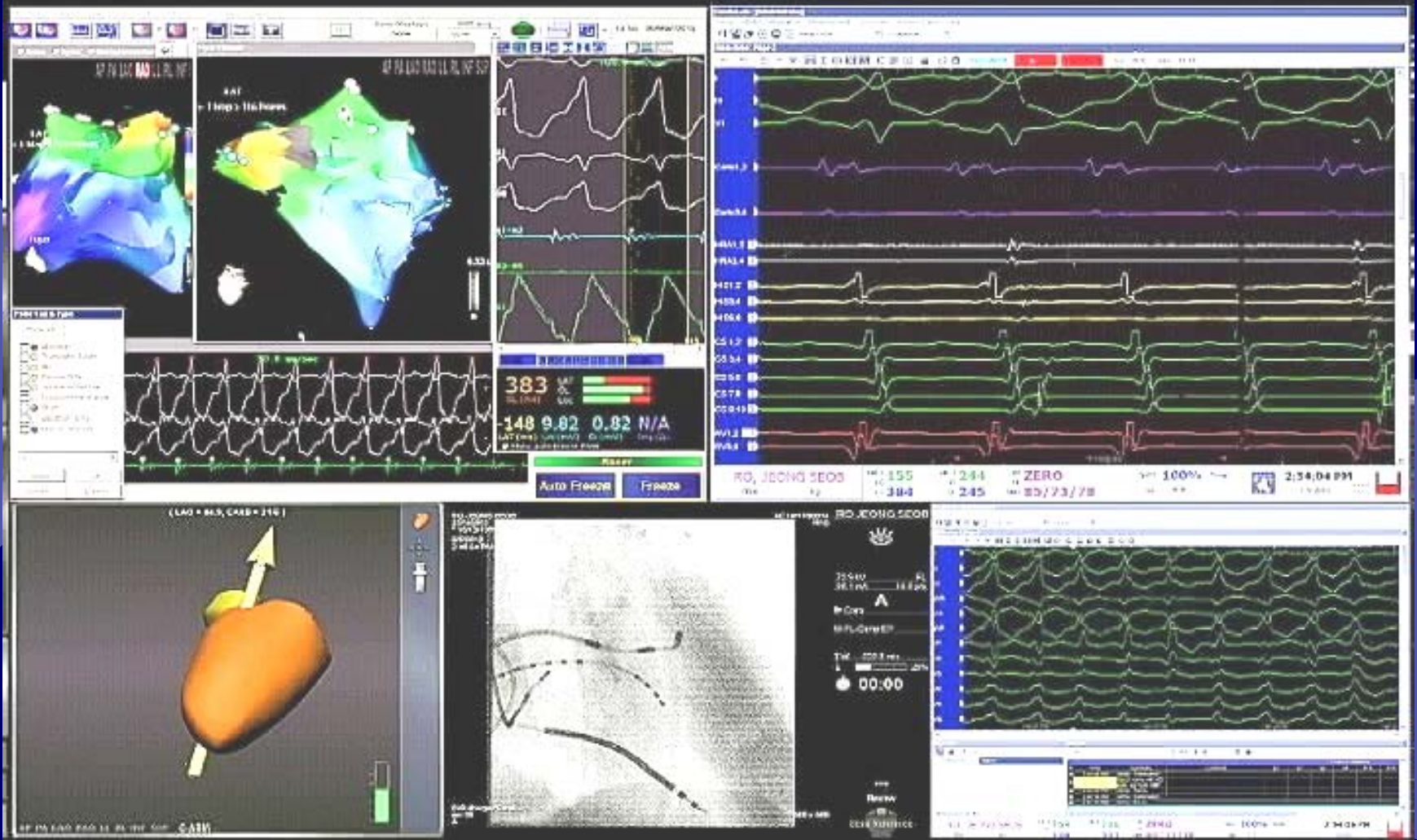


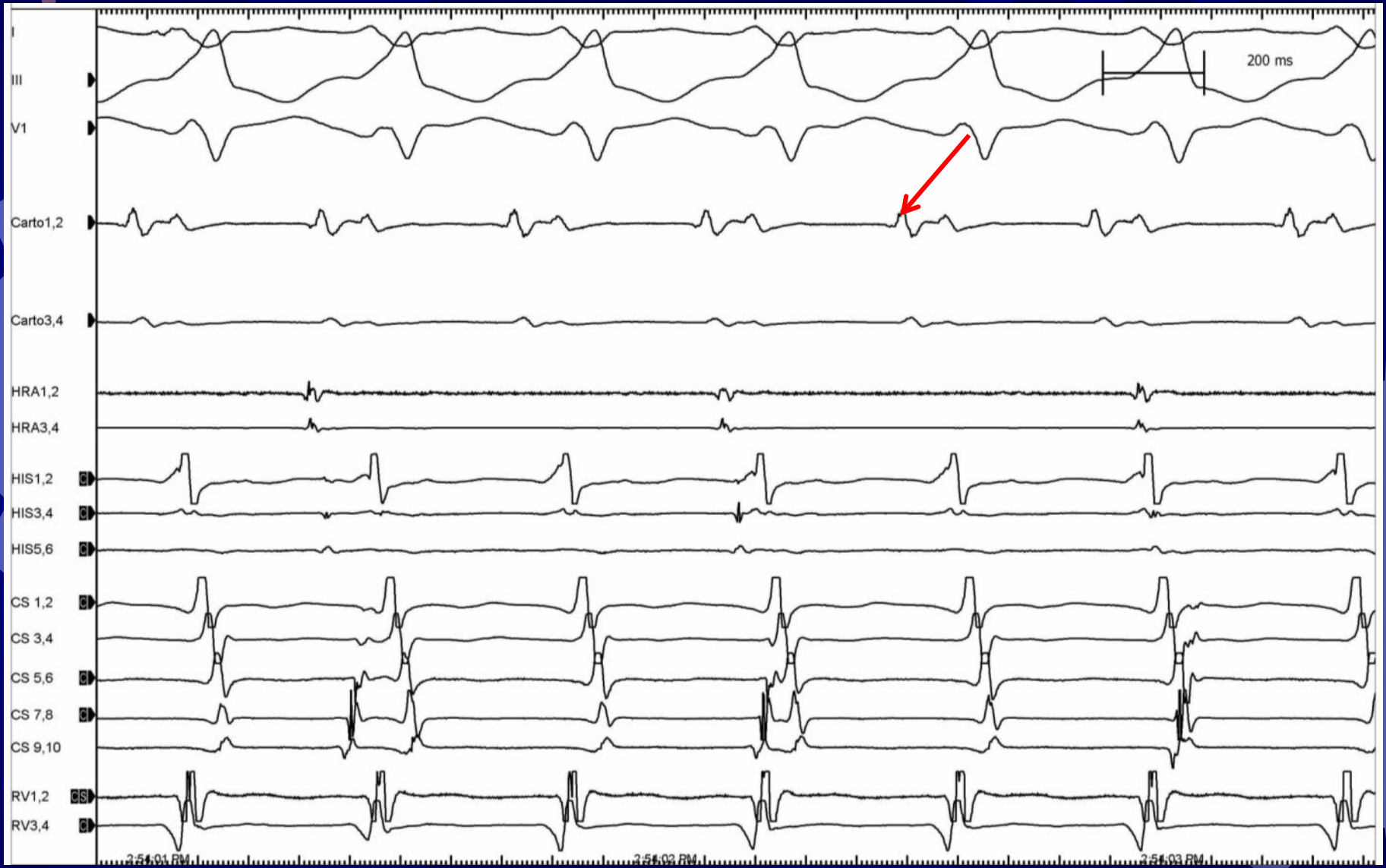
VT map – double potential 3



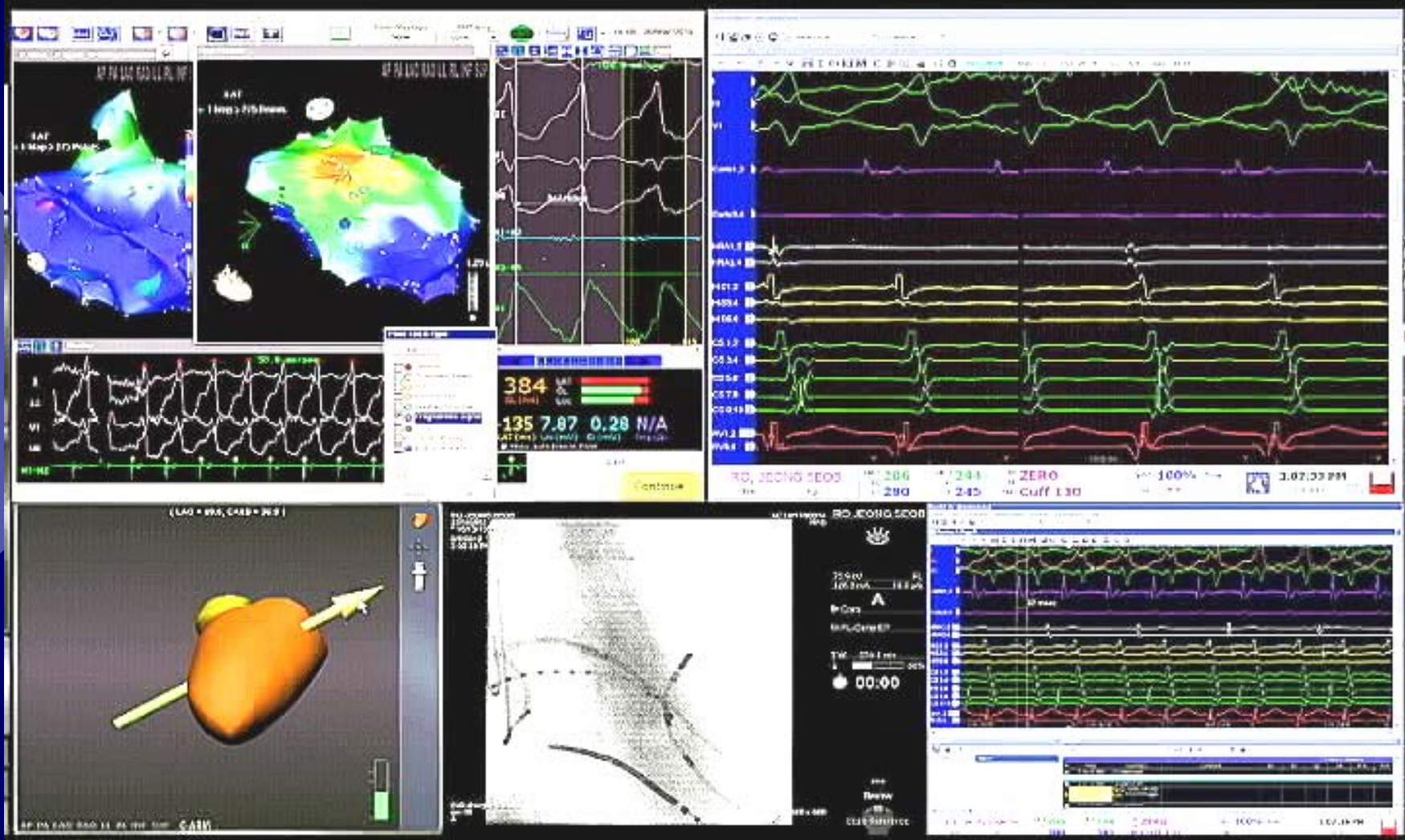


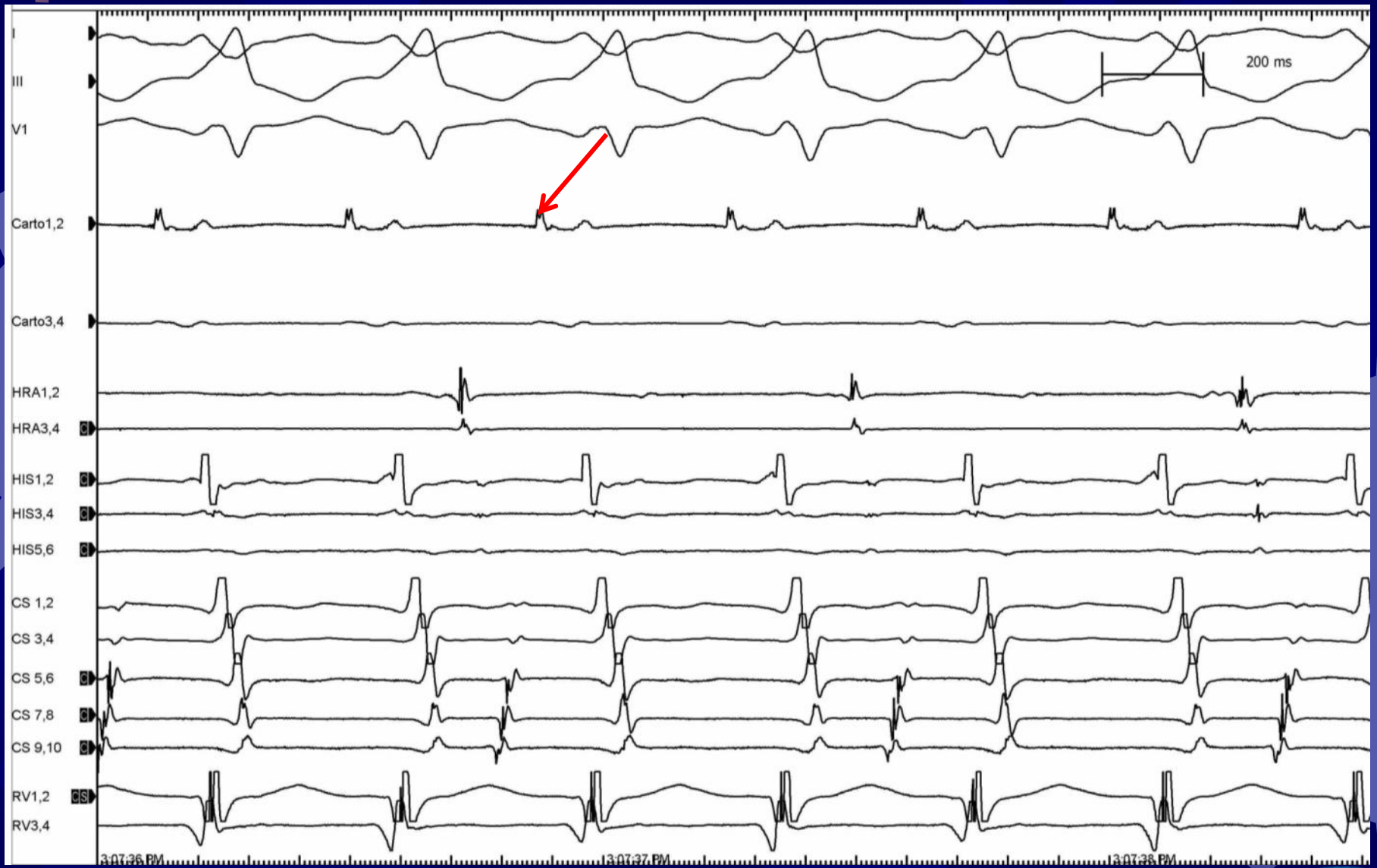
VT map – double potential 4





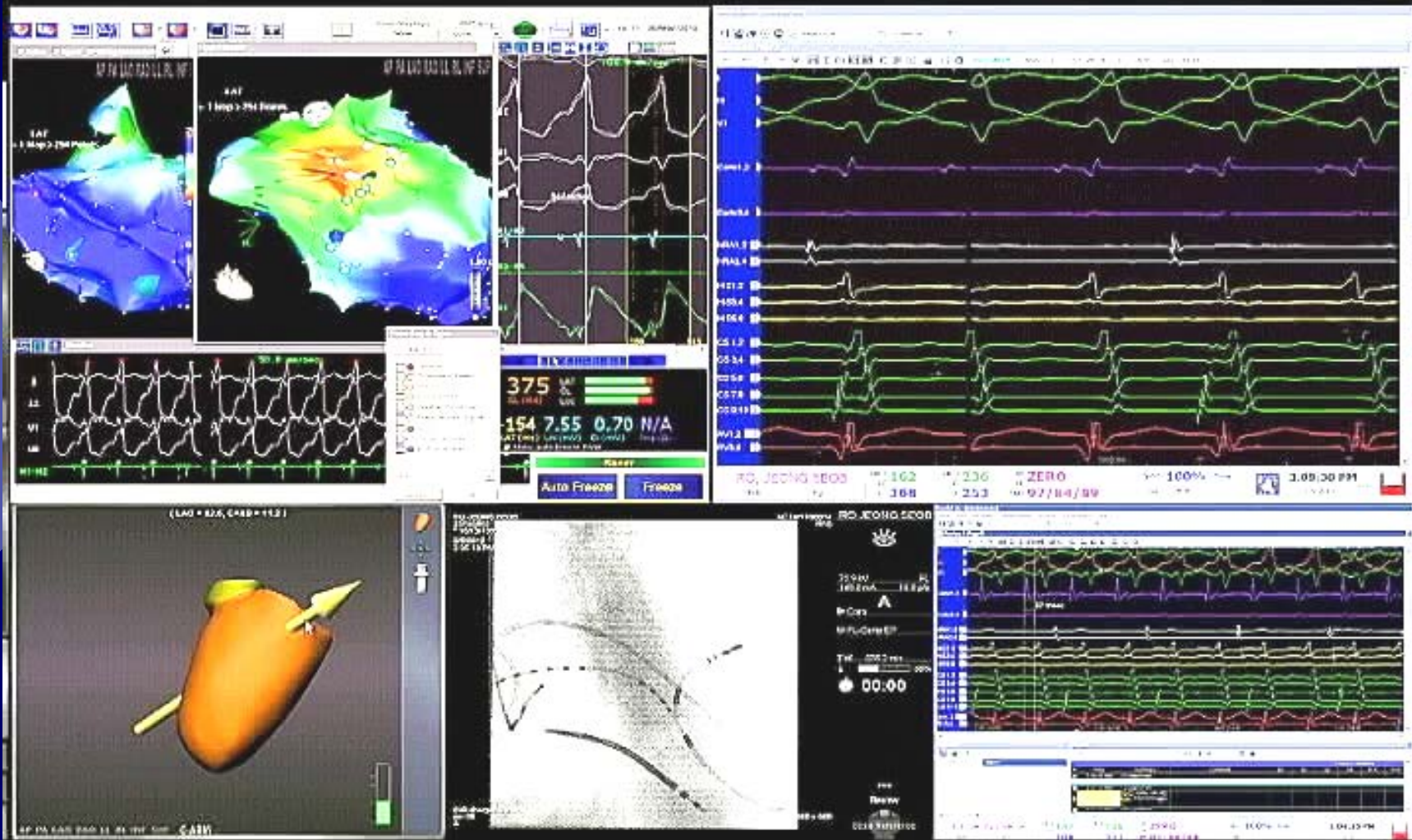
VT map – double potential 5

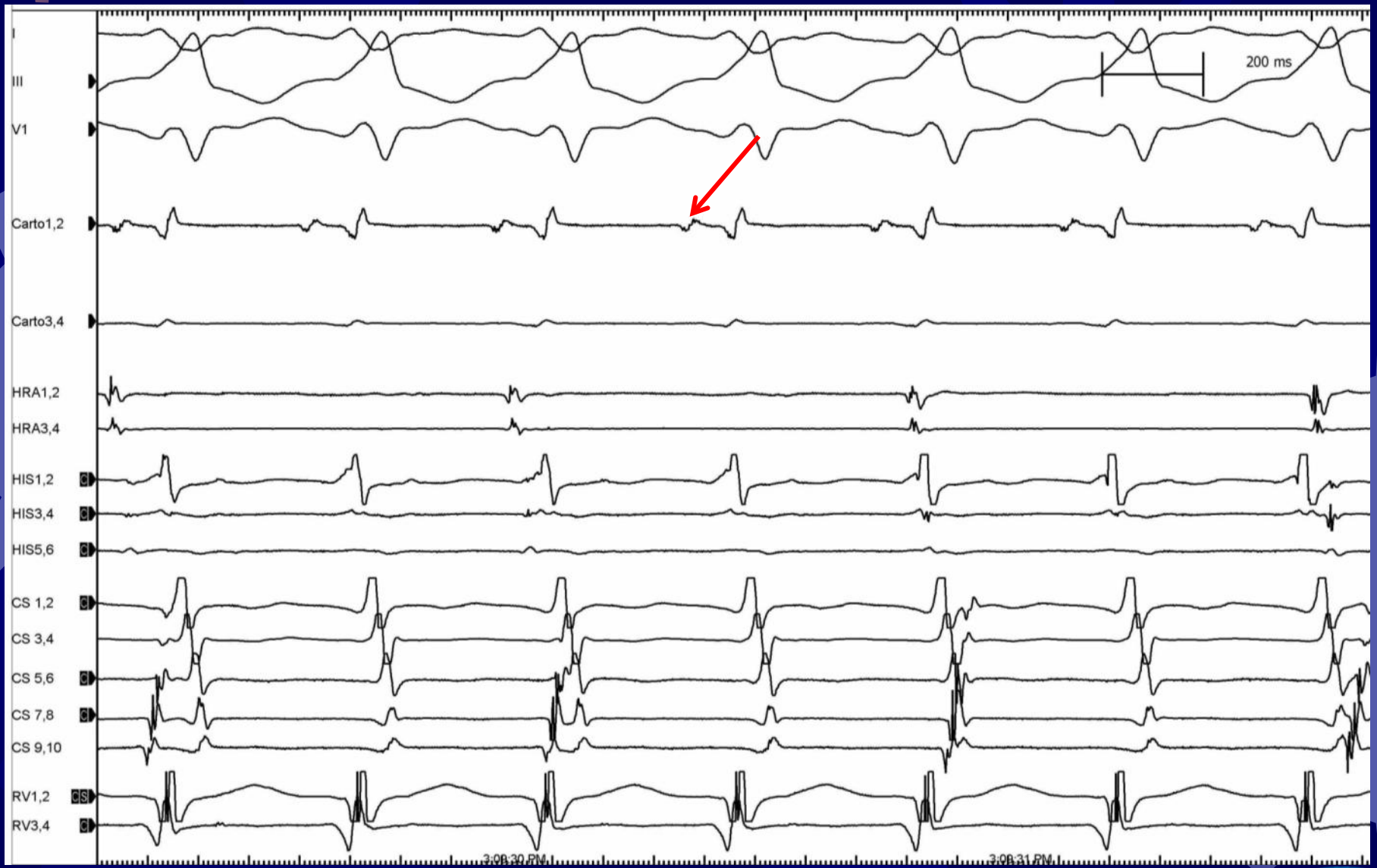




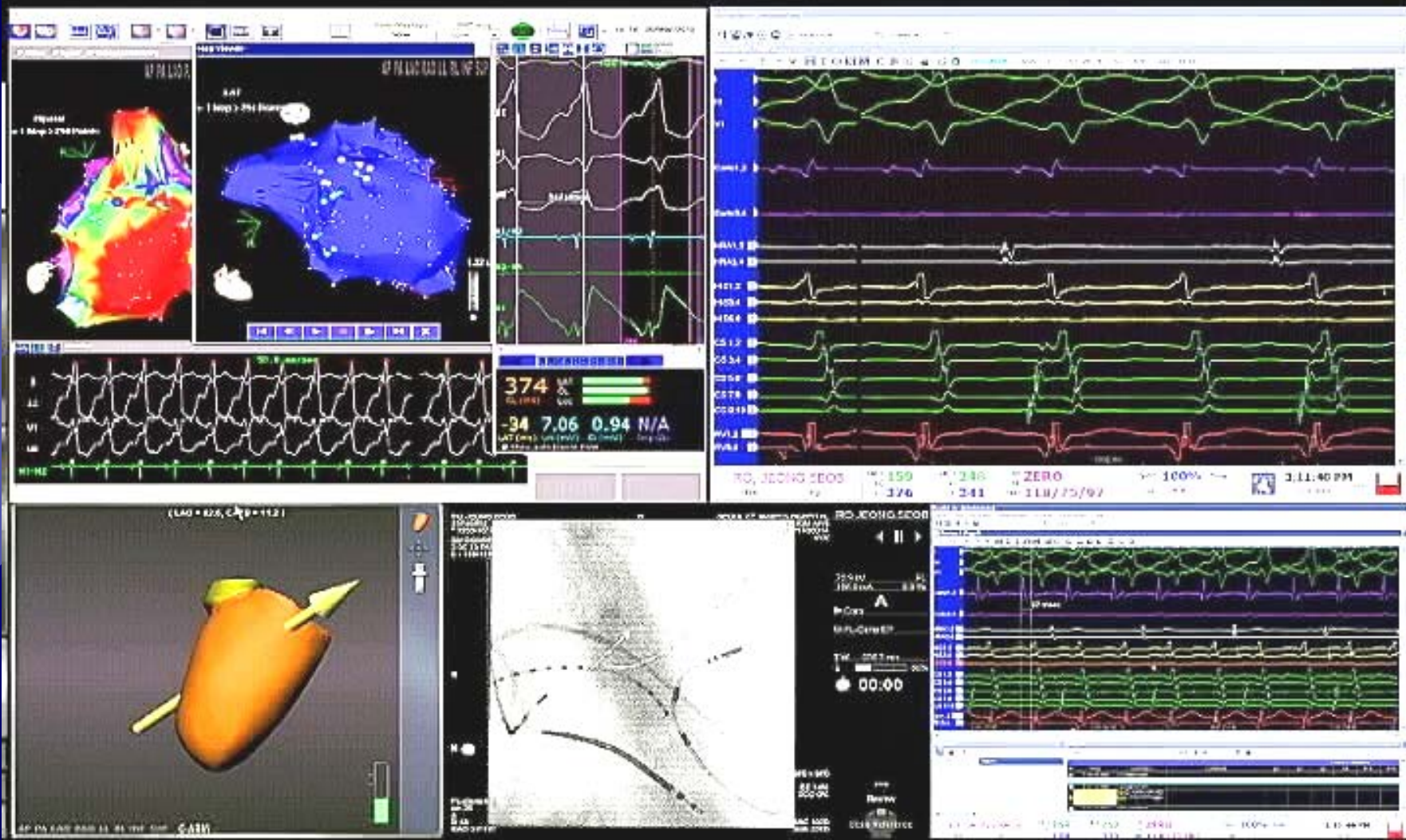


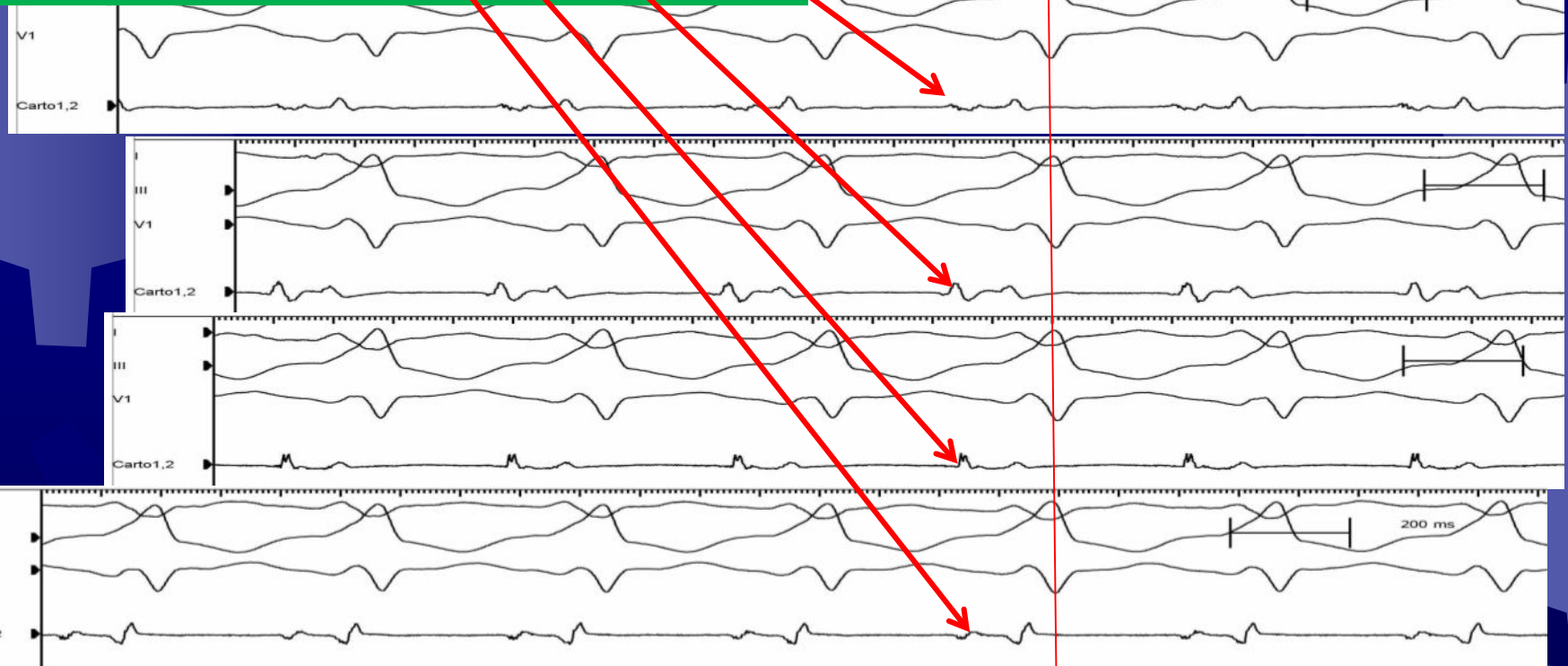
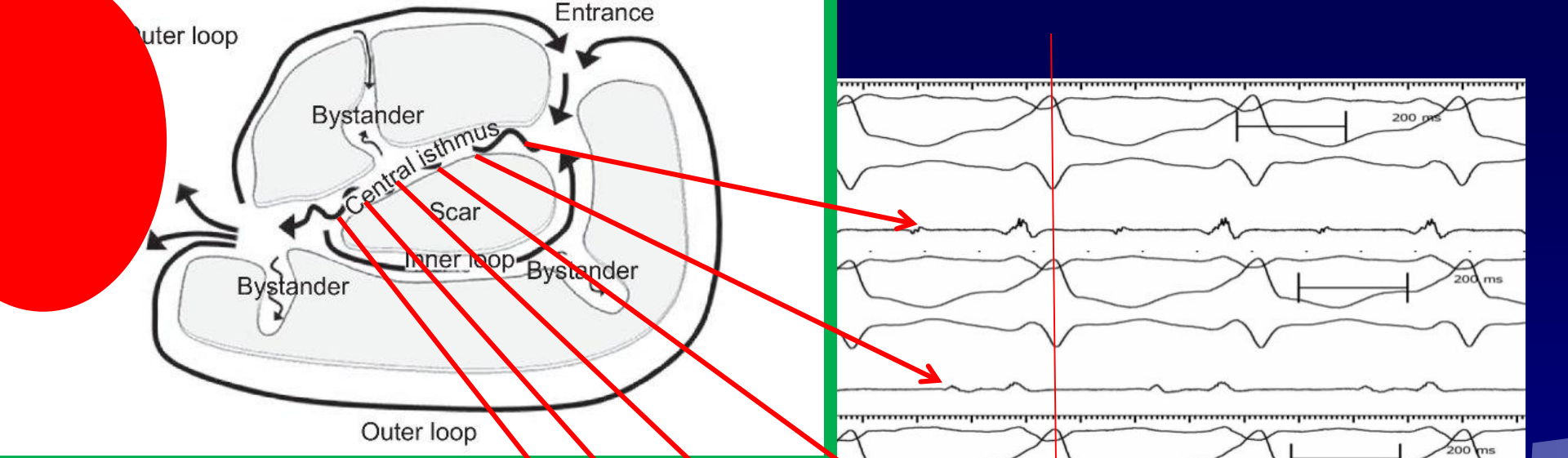
VT map – double potential 6





VT map - propagation





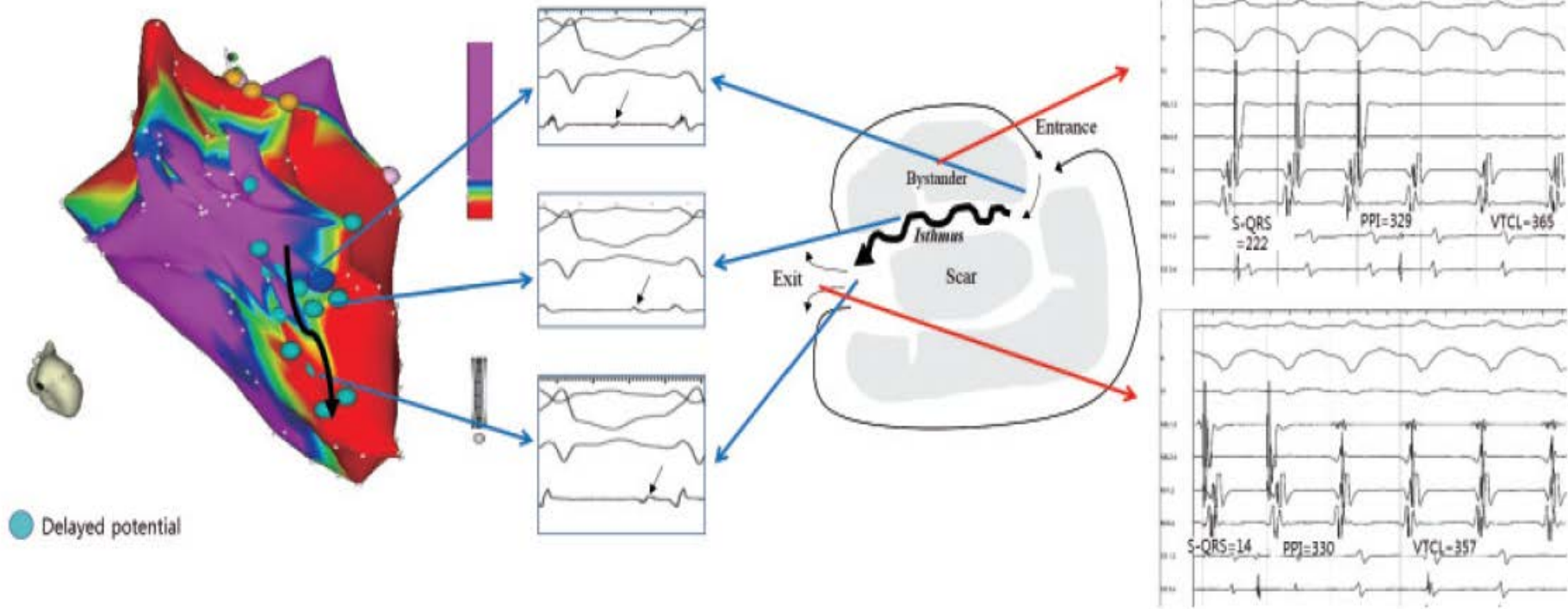
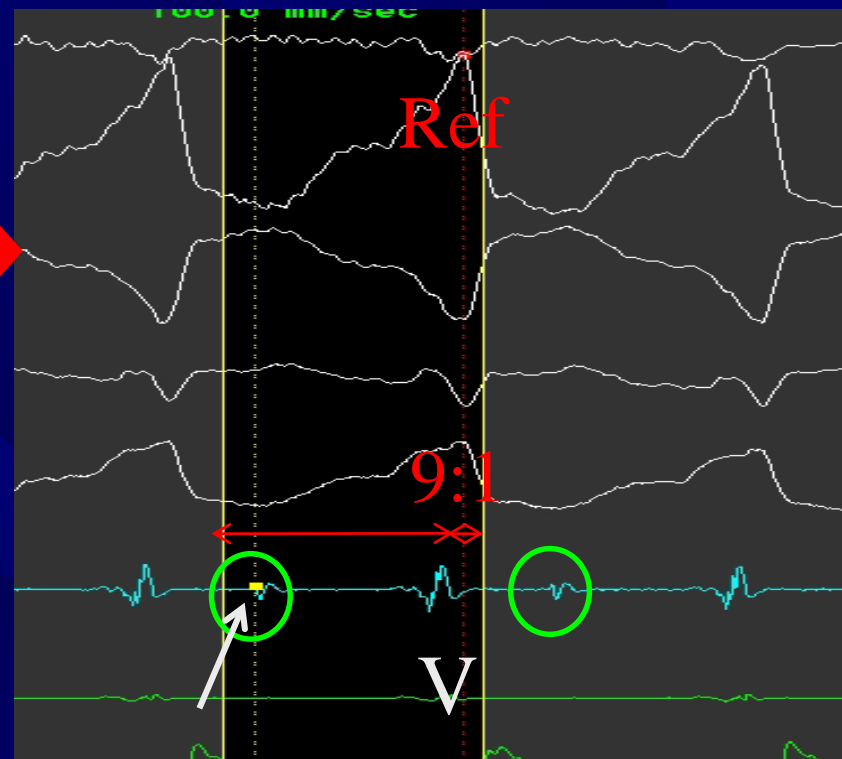
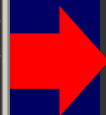
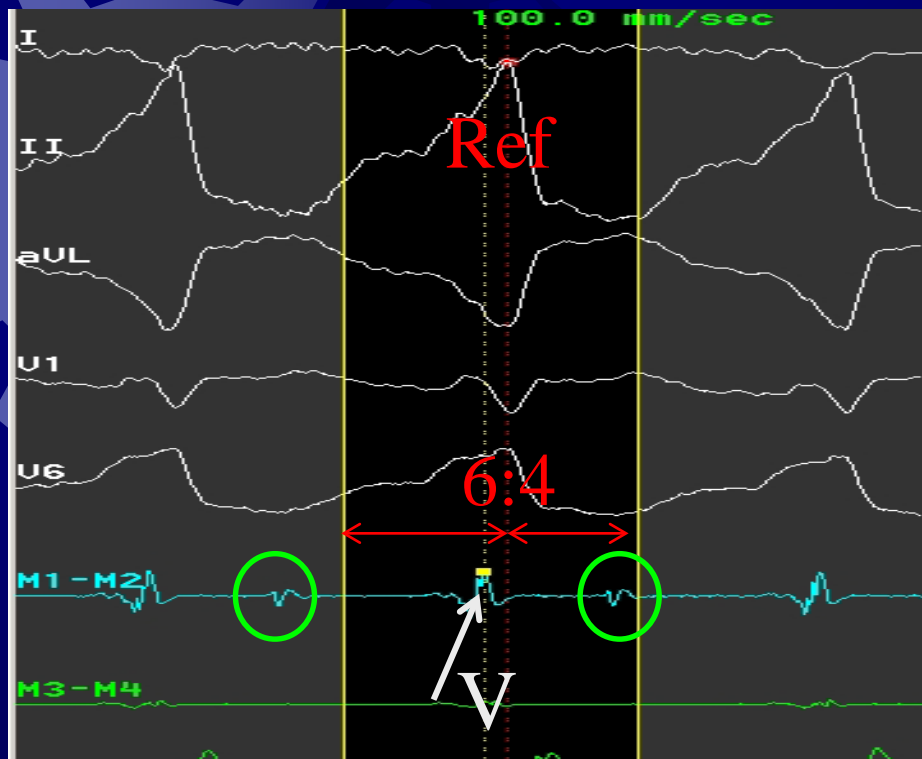


Fig. 3. Voltage map showing the locations of delayed potentials (AP view). Blue dots denote delayed potentials, which are noted along the scar border zone. Tracing of the diastolic potentials (black arrow) and entrainment of the exit and bystander sites were shown. Entrainment showed concealed fusion. AP: anterior-posterior, S-QRS: stim to QRS, PPI: post-pacing interval, VTCL: ventricular tachycardia cycle length.

Editing of Propagation map

Window of Interest
: -180~140 (6 : 4)

Window of Interest
: -300~25 (9 : 1)

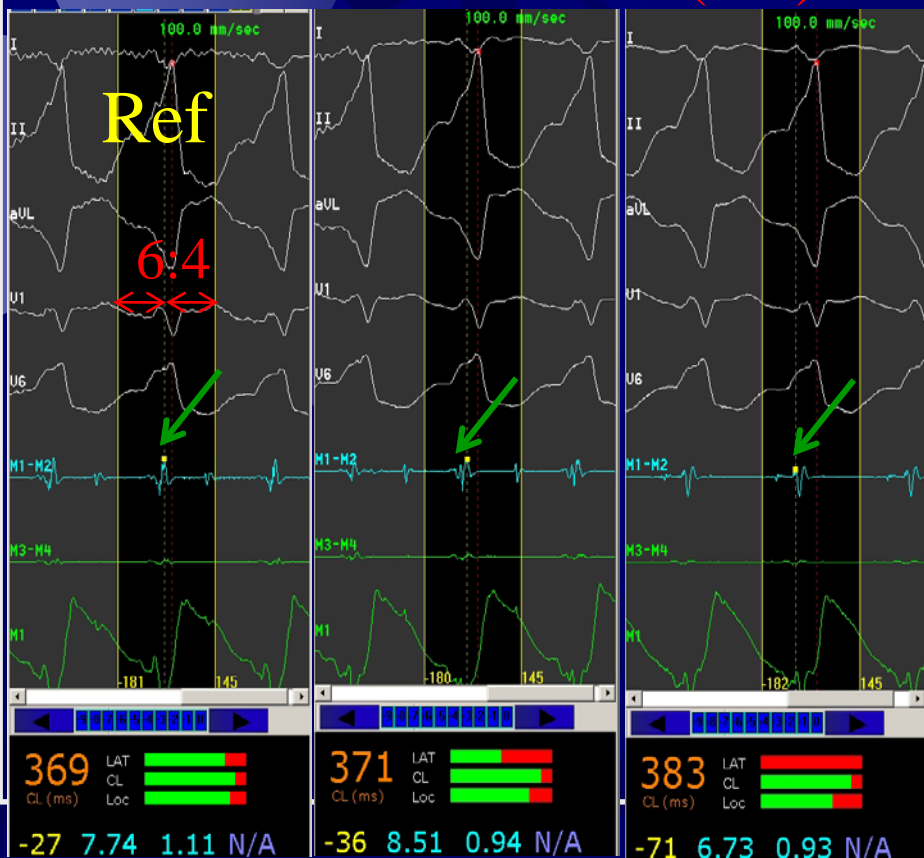




Reast 'Window of interest', trace delayed potential

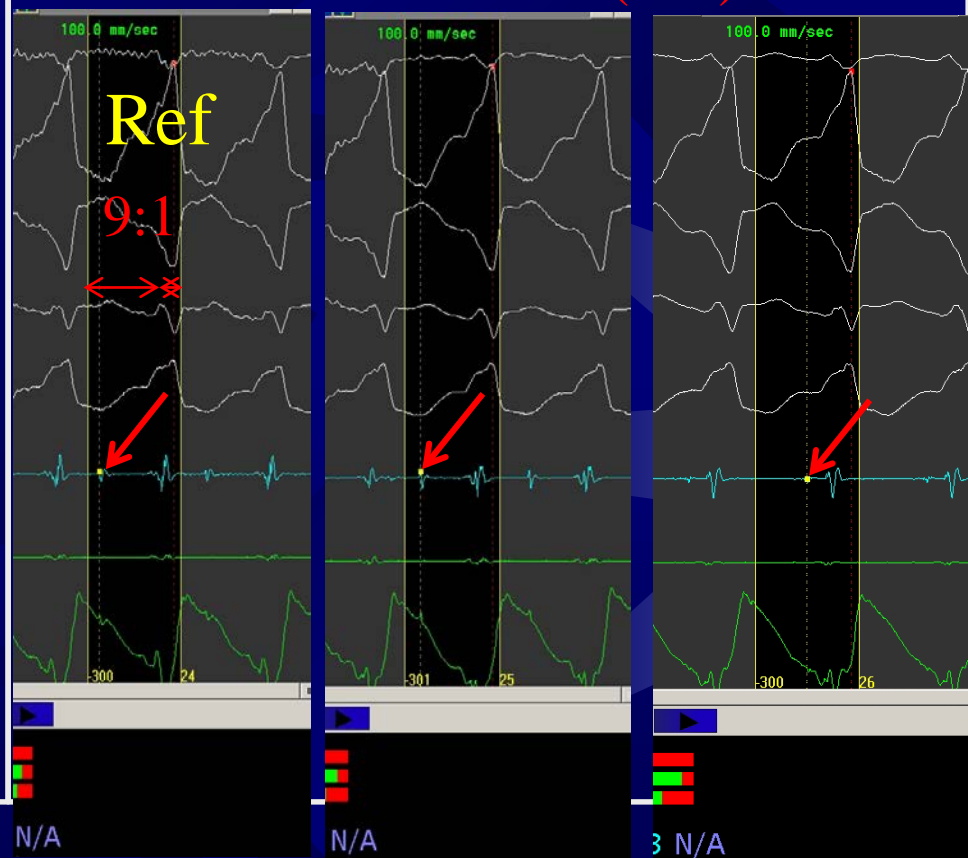
Pre Editing

Window Of Interest setting : -180ms ~ 140ms (6:4)



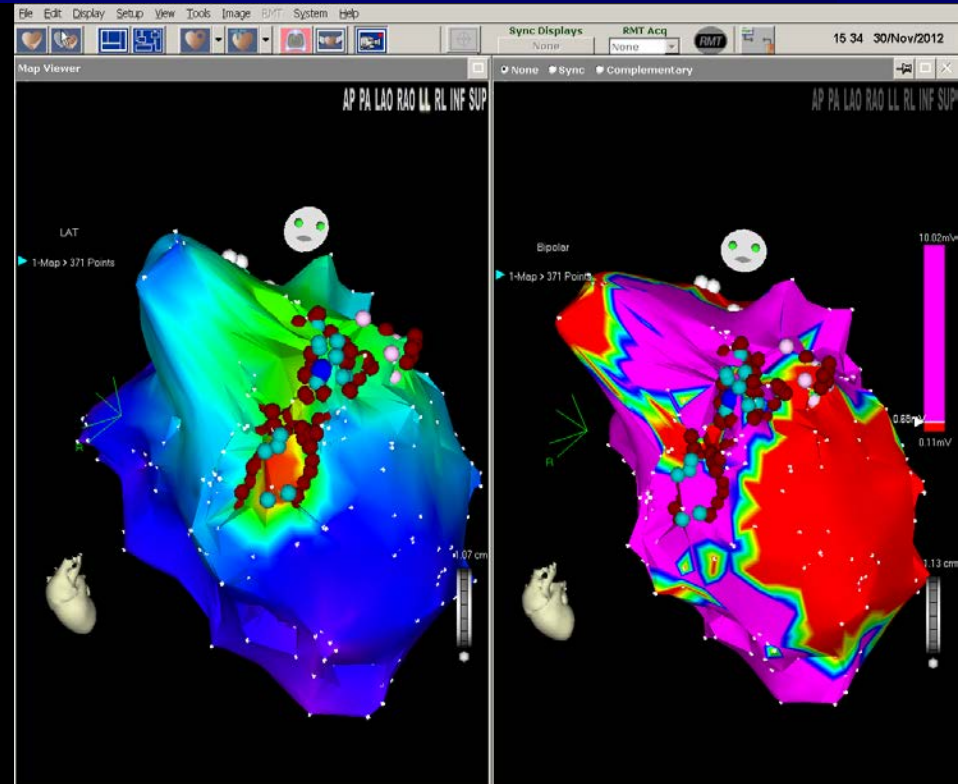
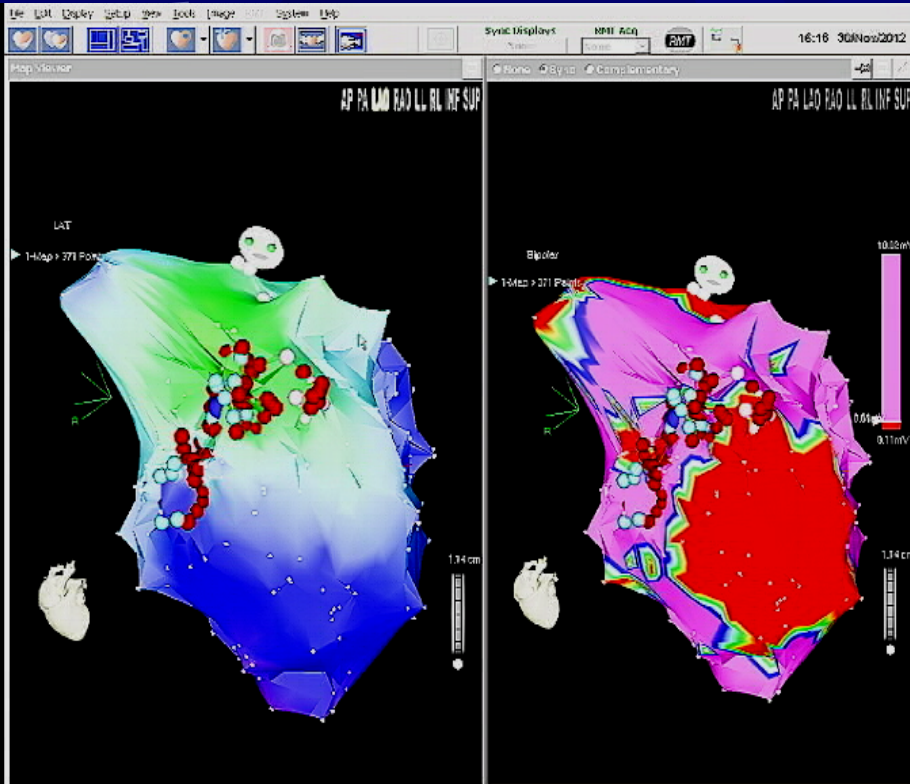
Post Editing

Window Of Interest setting : -300ms ~ 25ms (9:1)

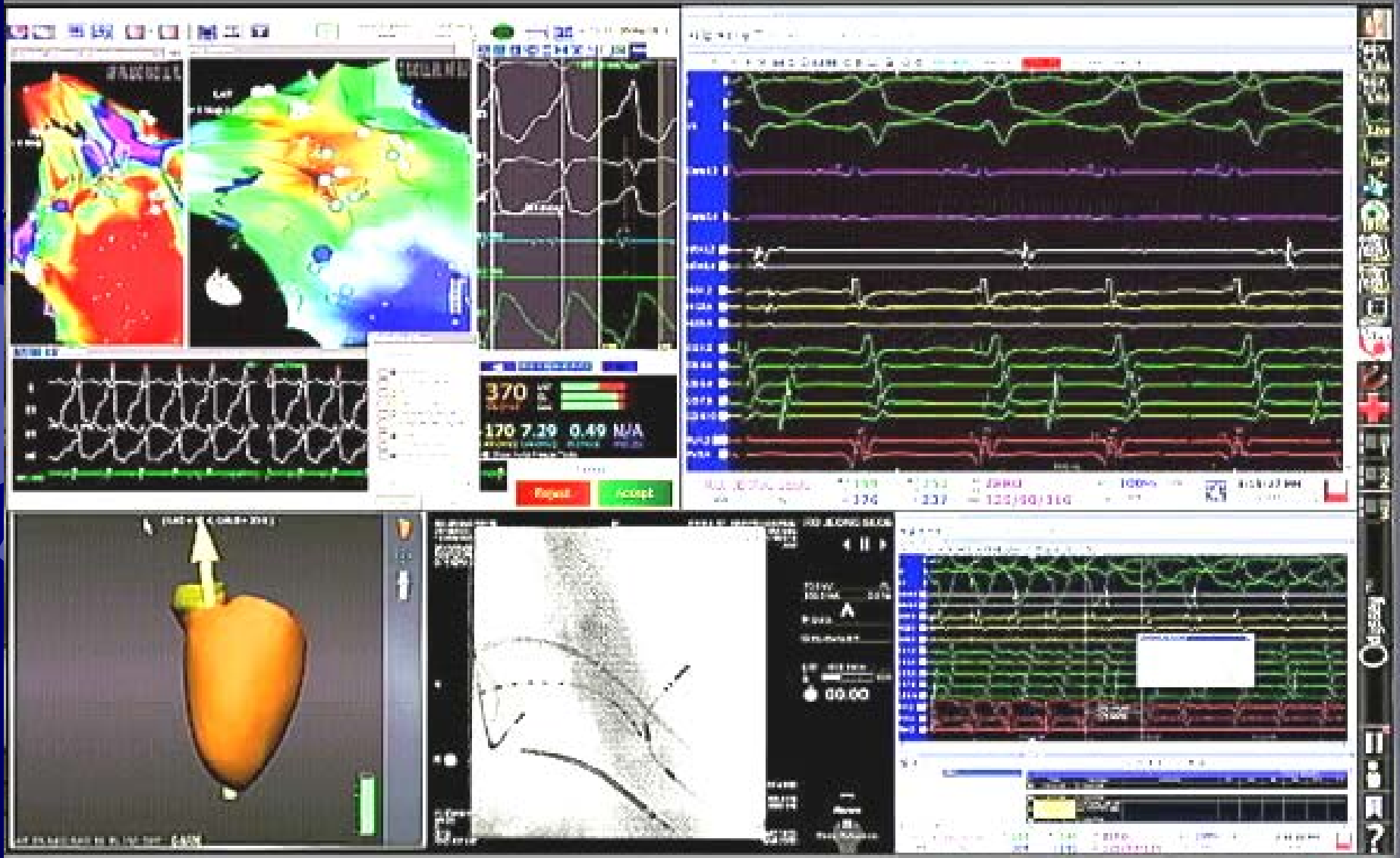


Pre Editing

Post Editing



VT termination



No induction of VT





Case 2. 60 year-old male

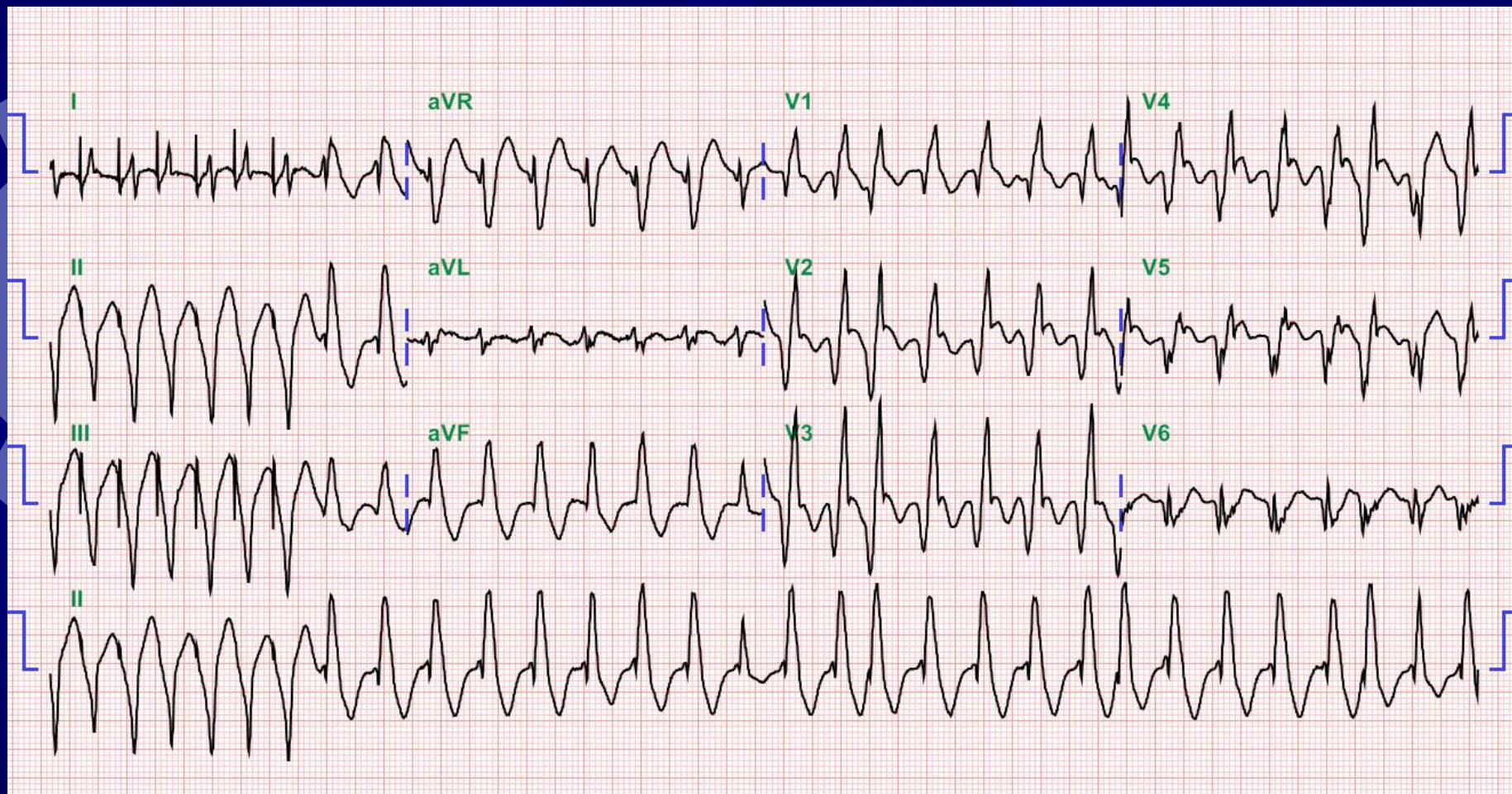
C/C : VT ablation due to multiple ICD Shock

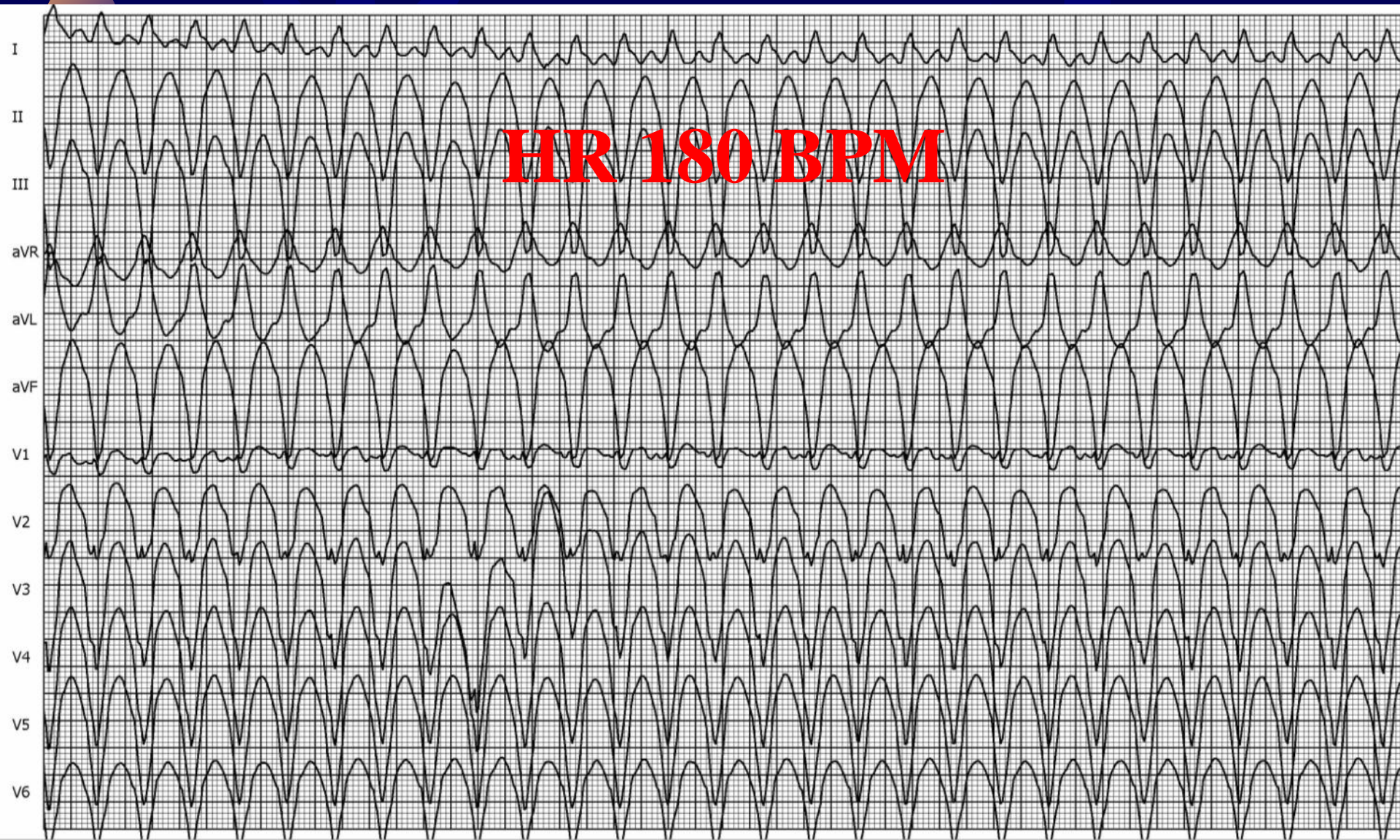
- 2006 Ant wall MI : PCI – pLAD

- 2009 ,1 Sustained VT : ICD insertion



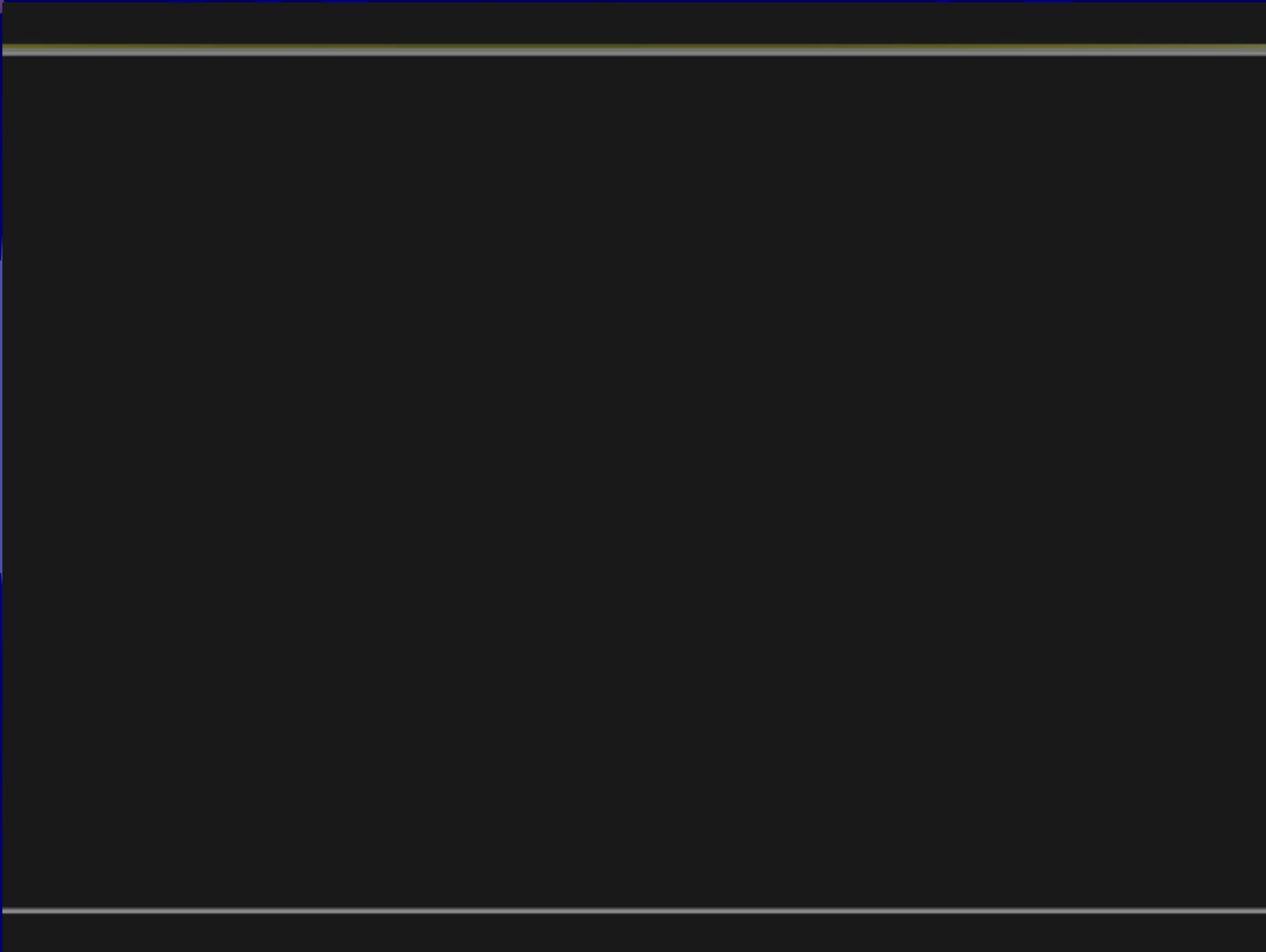
Initial EKG

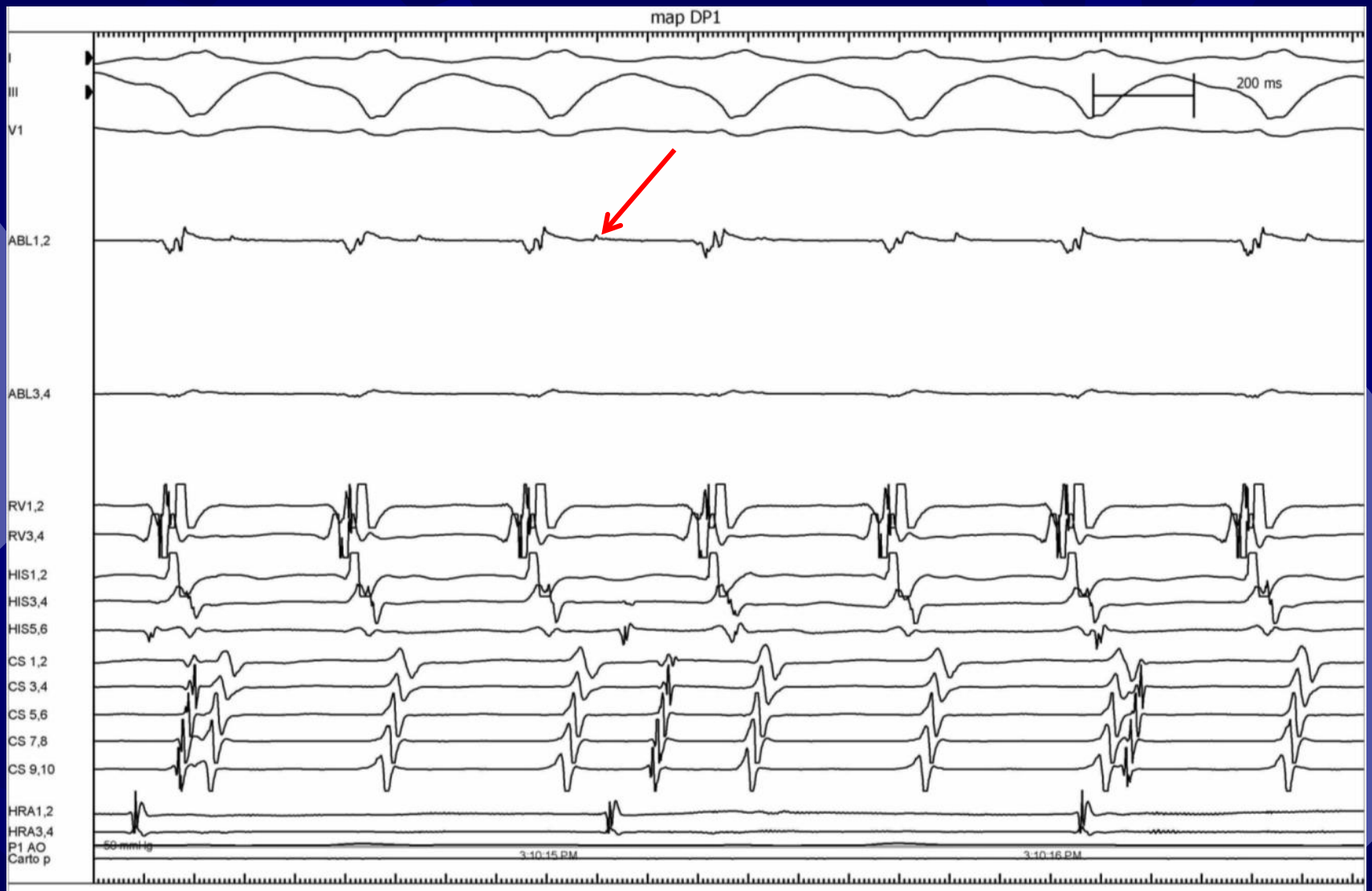






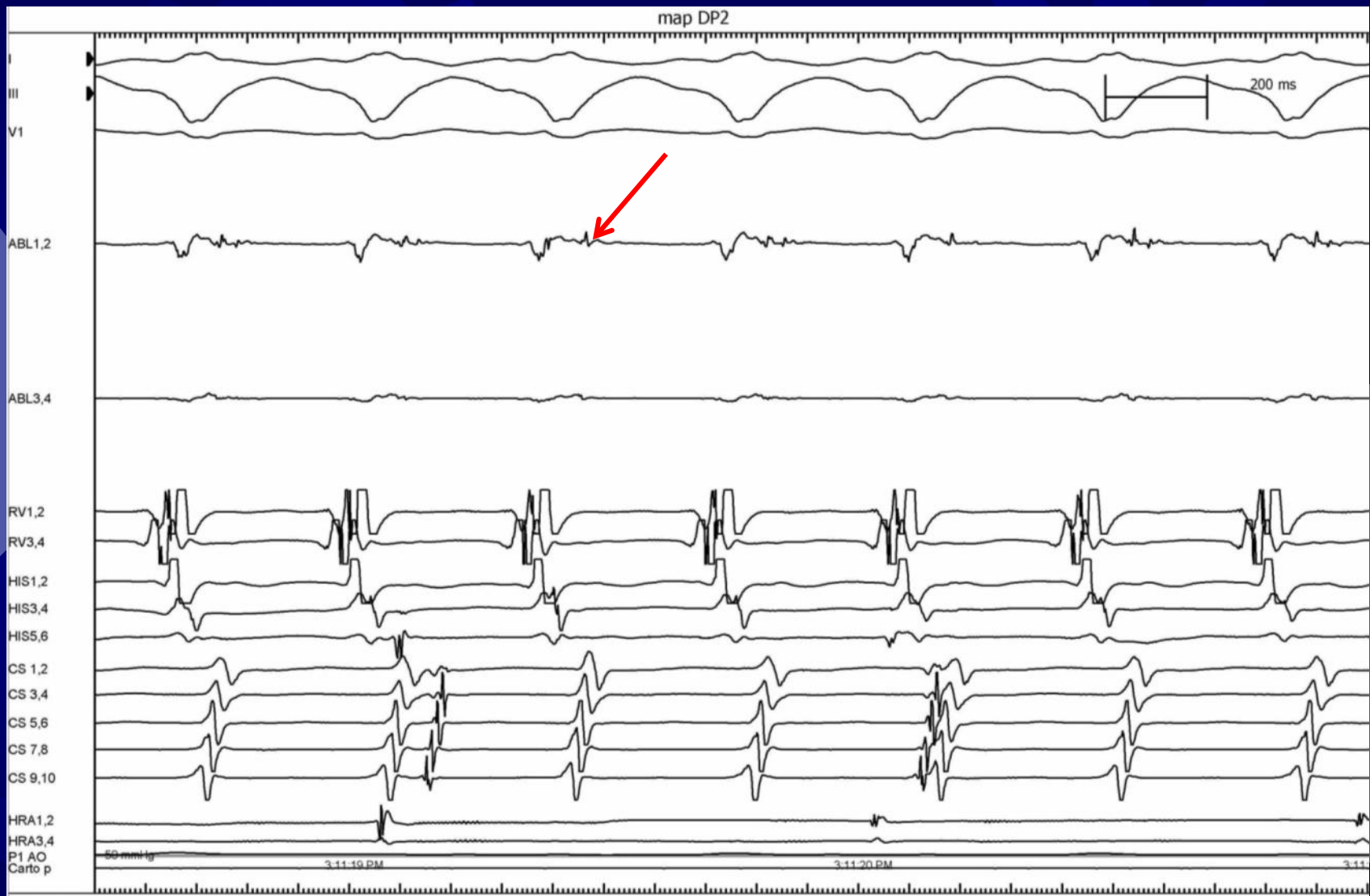
VT map – delayed potential 1



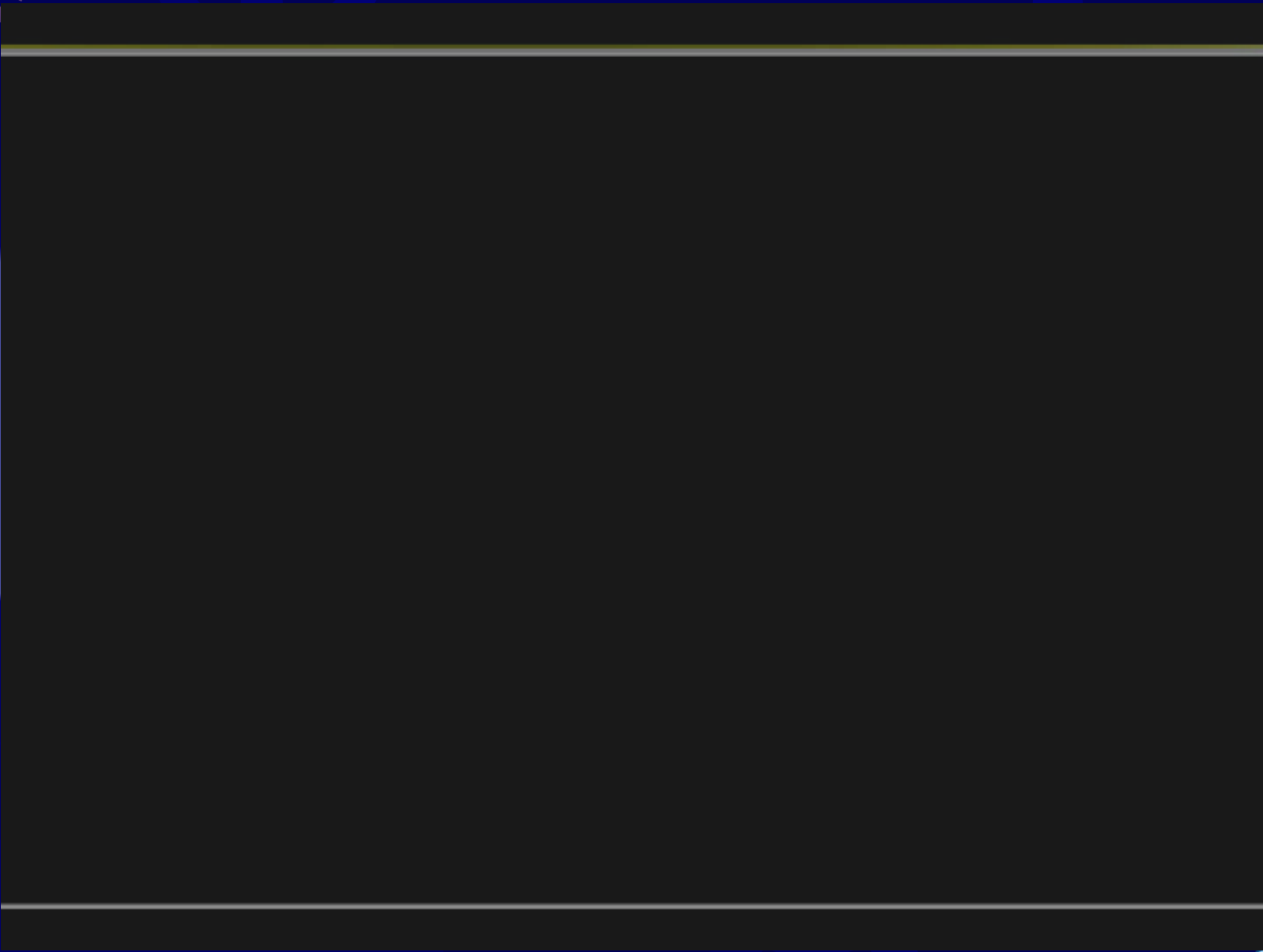


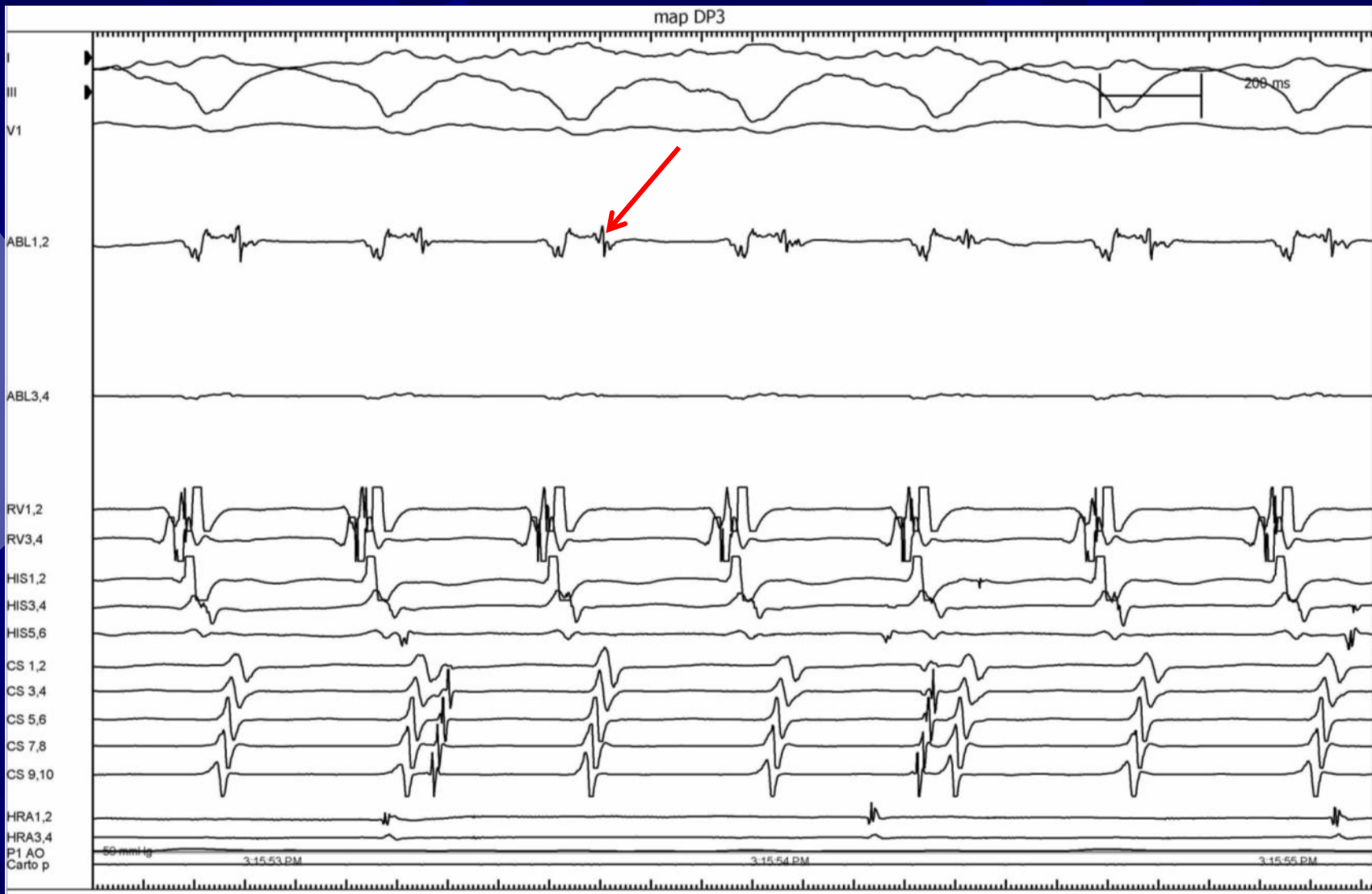


VT map – delayed potential 2



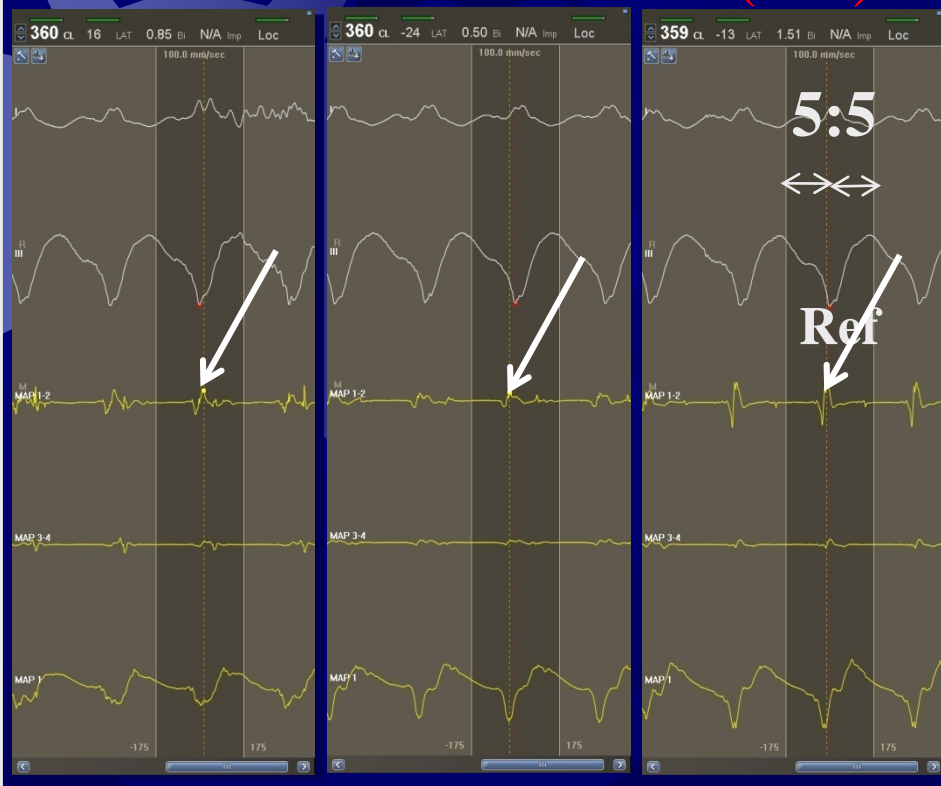
VT map – delayed potential 3





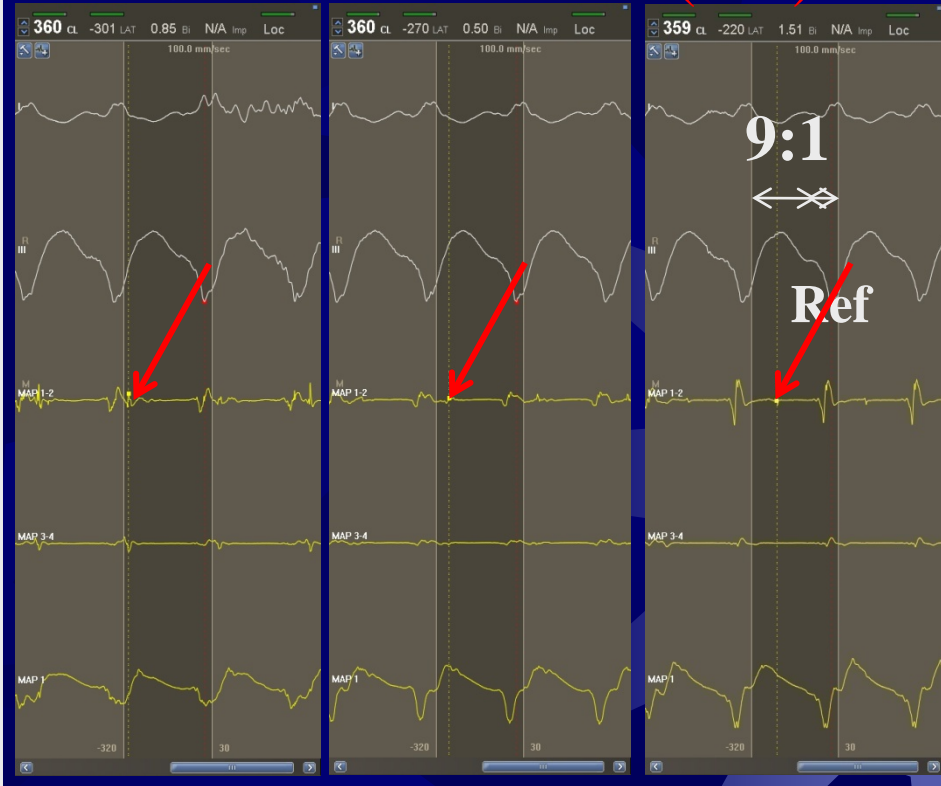
Pre Editing

Window Of Interest setting
: -175ms ~ 175ms (5:5)

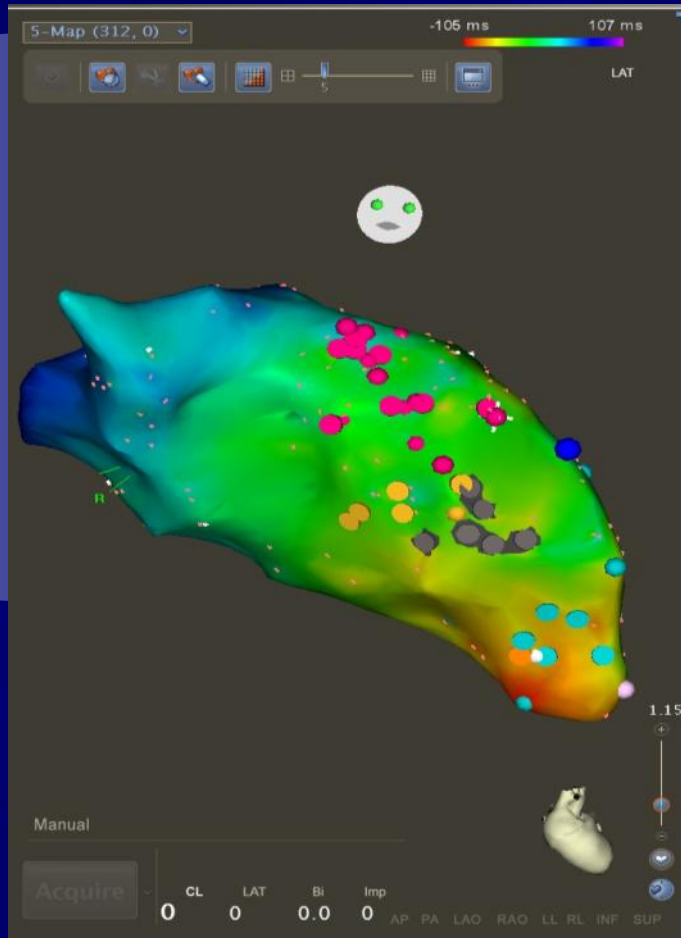


Post Editing

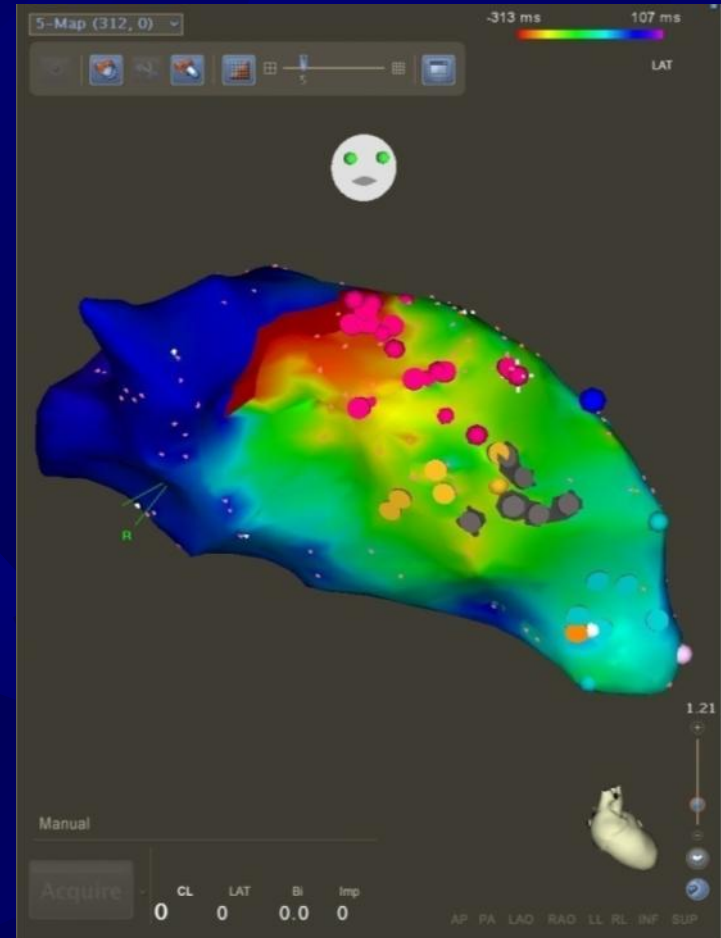
Window Of Interest setting
: -320ms ~ 30ms (9:1)



Pre Editing

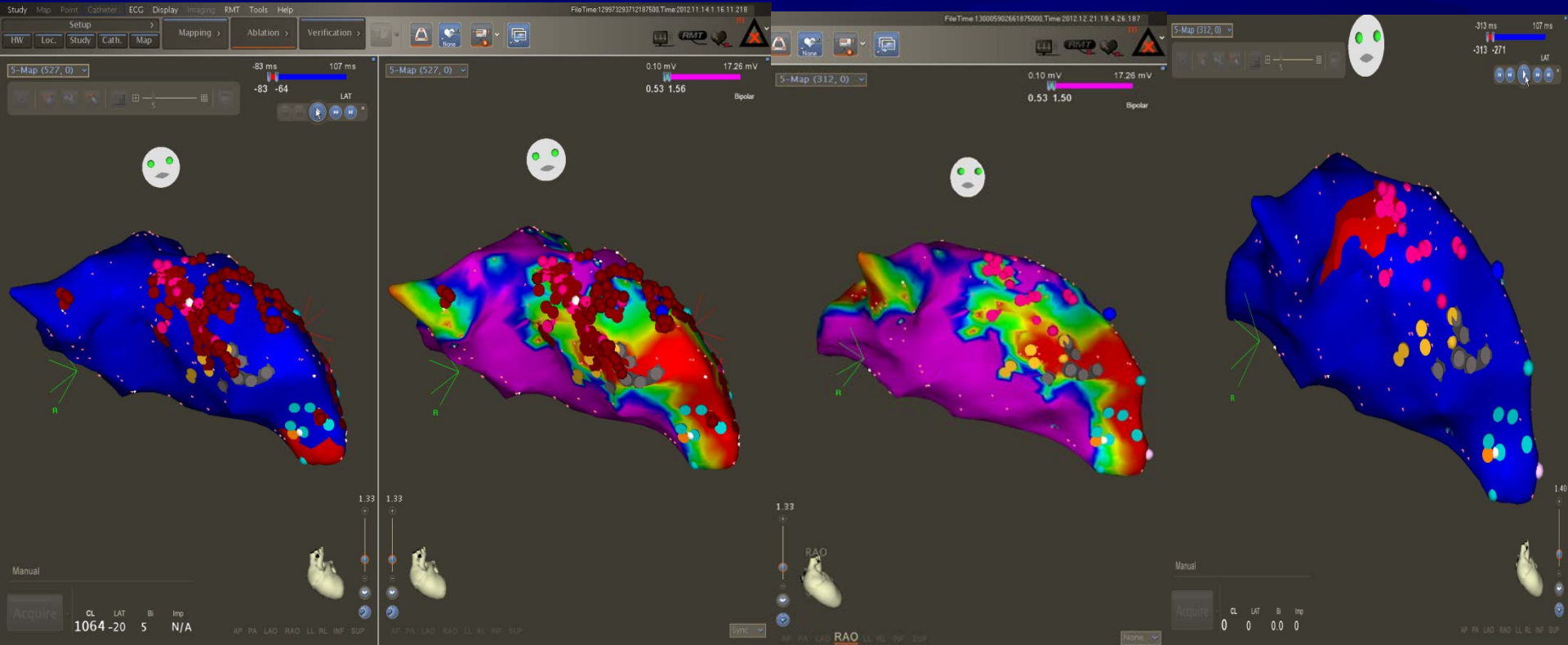


Post Editing



Pre Editing

Post Editing





Results

- We analyzed five scar-related ventricular tachycardia cases.
- In the propagation maps, the edited map showed the critical isthmus and entrance and exit sites of tachycardia that showed figure 8 reentry.
- However, conventional maps only showed the earliest ventricular activation sites and searched for focal tachycardia.
- All of the tachycardia cases were terminated by ablating the area around the isthmus.



Conclusions

- Identifying the channel and direction of the critical isthmus by a new editing method to track delayed potential is essential in scar-related tachycardia ablation.



Thank you for your attention !

