ELECTRA

5-6 DÉCEMBRE 2024

HOTEL VILLA MASSALIA,
MARSEILLE I FRANCE

18èmes journées françaises
pratiques de rythmologie
& de stimulation cardiaque

2004 - 2024
20 ans
ELECTRA

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ELECTRA

ufr3s Sciences de Santé et du Sport

Centre Hospitalier Régional Universitaire de Lille

MANŒUVRES ELECTROPHYSIOLOGIQUES DANS L'ABLATION DE TV EN 2024 ou QUAND L'IMAGERIE ET LE SUBSTRAT SONT-ILS PRIS A DEFAUT?

Pôle Cardiovasculaire et Pulmonaire Hôpital Cardiologique
francois.brigadeau@chru-lille.fr

ELECTRA

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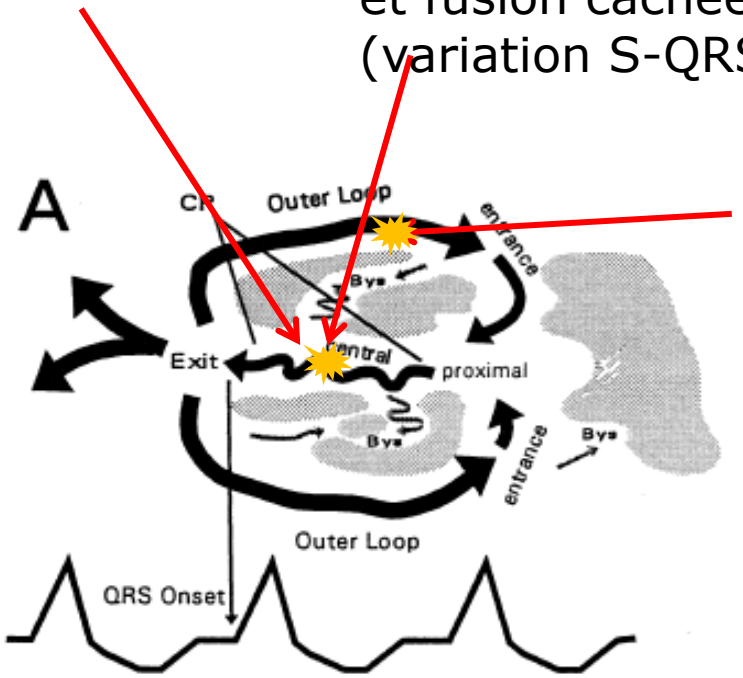
2004 - 2024
20 ans
ELECTRA

PAS DE CONFLIT D'INTERET POUR CETTE PRESENTATION

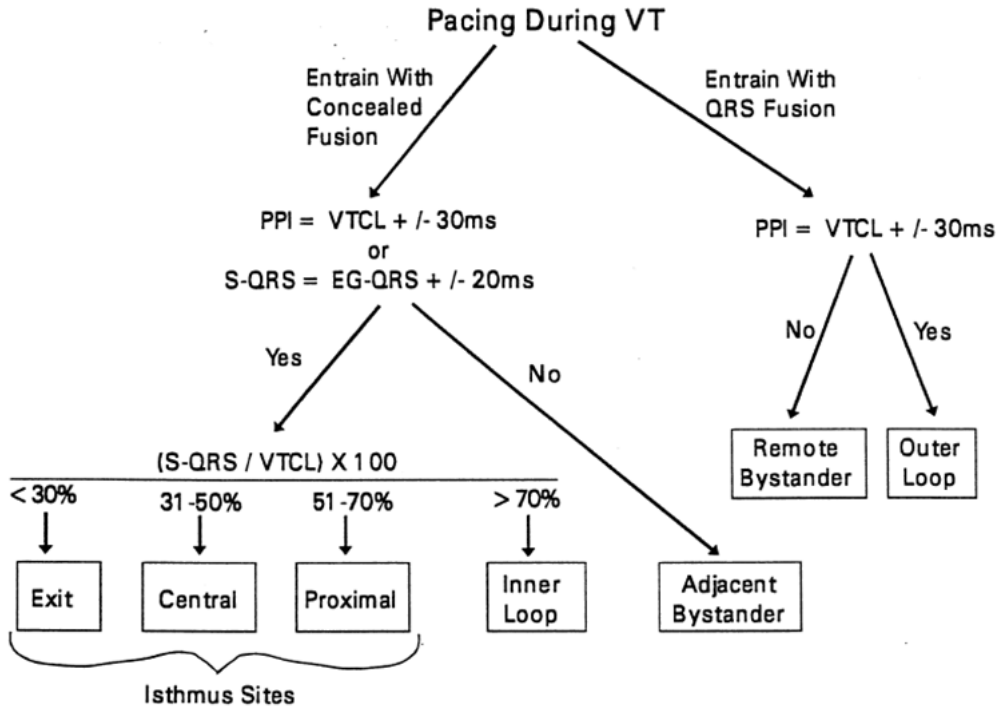
QUELLE MANŒUVRES EP SUBSISTENT EN 2024 ?

Isthme protégé

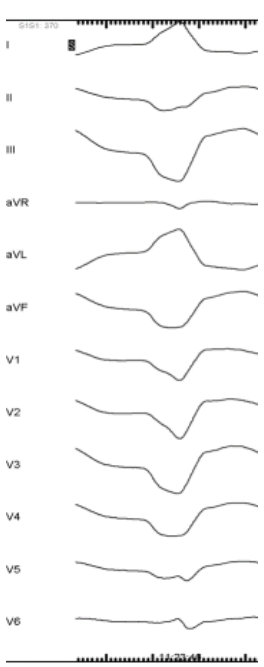
PPI +/- 30 ms = TCL
et fusion cachée
(variation S-QRS)

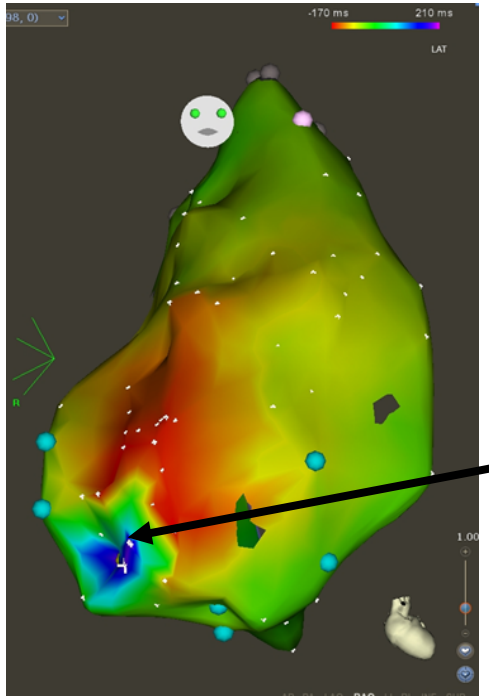


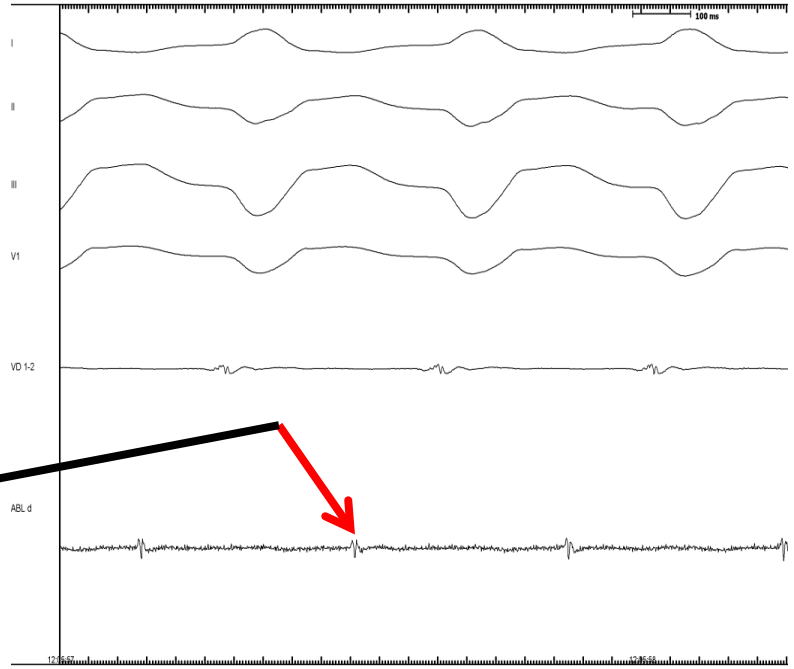
Outer loop:
Fusion et PPI
+/- 30 ms

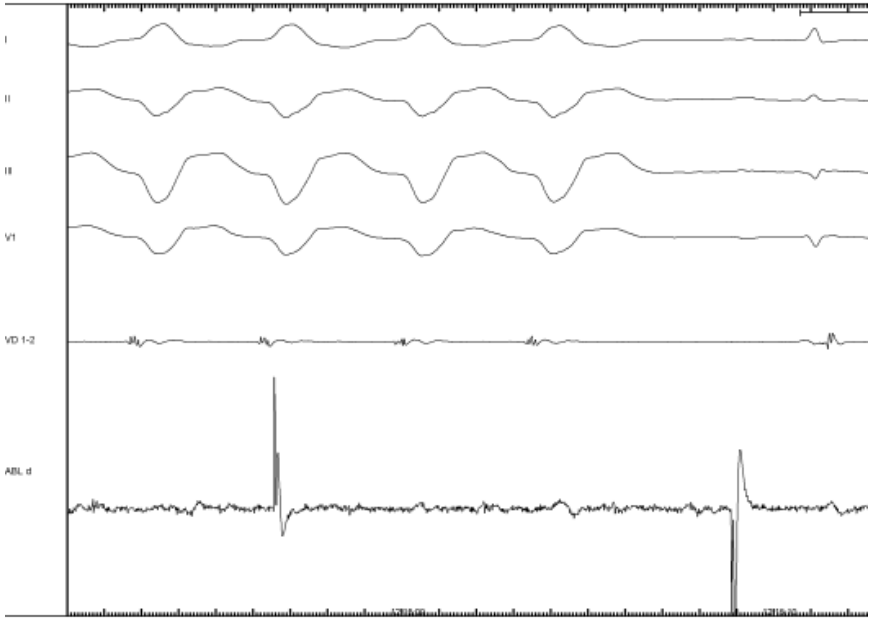


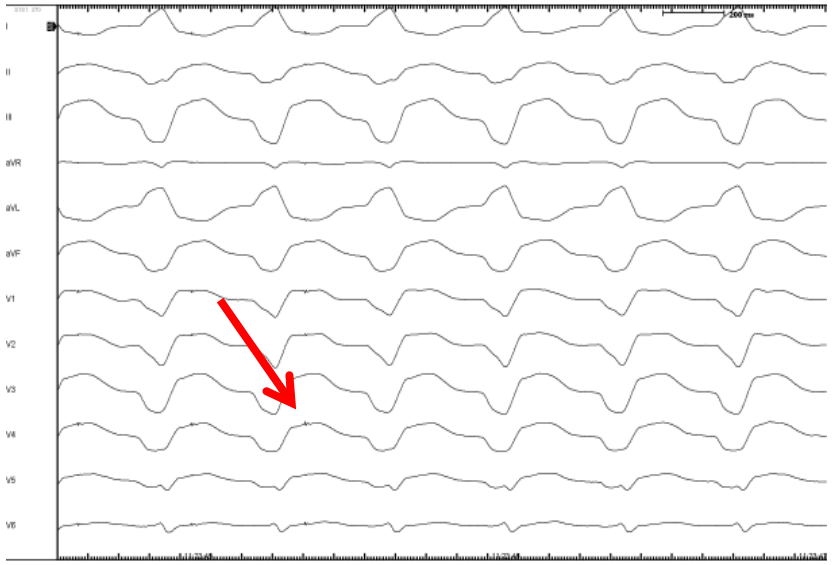
Stevenson et al J Am Coll Cardiol 1997 ; 29:1180-9

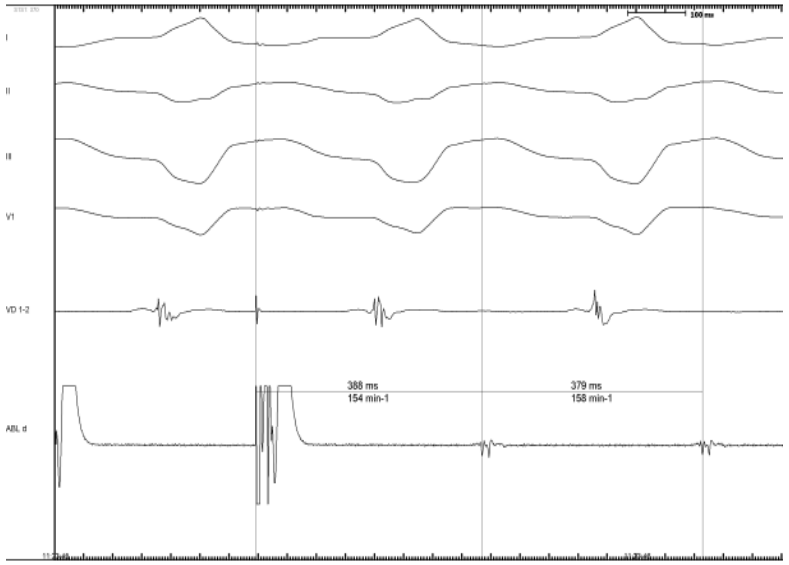

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

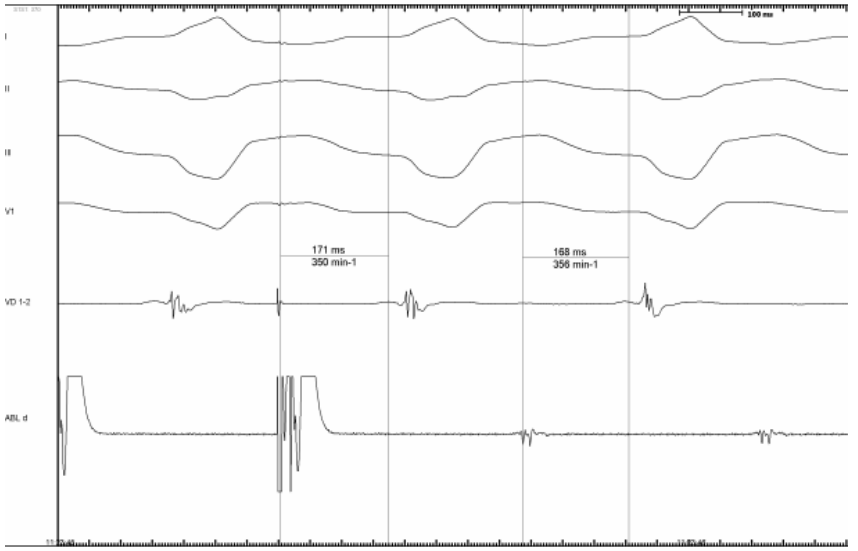

-170 ms
210 ms
LAT


I
II
III
V1
VD 1-2
ABL d

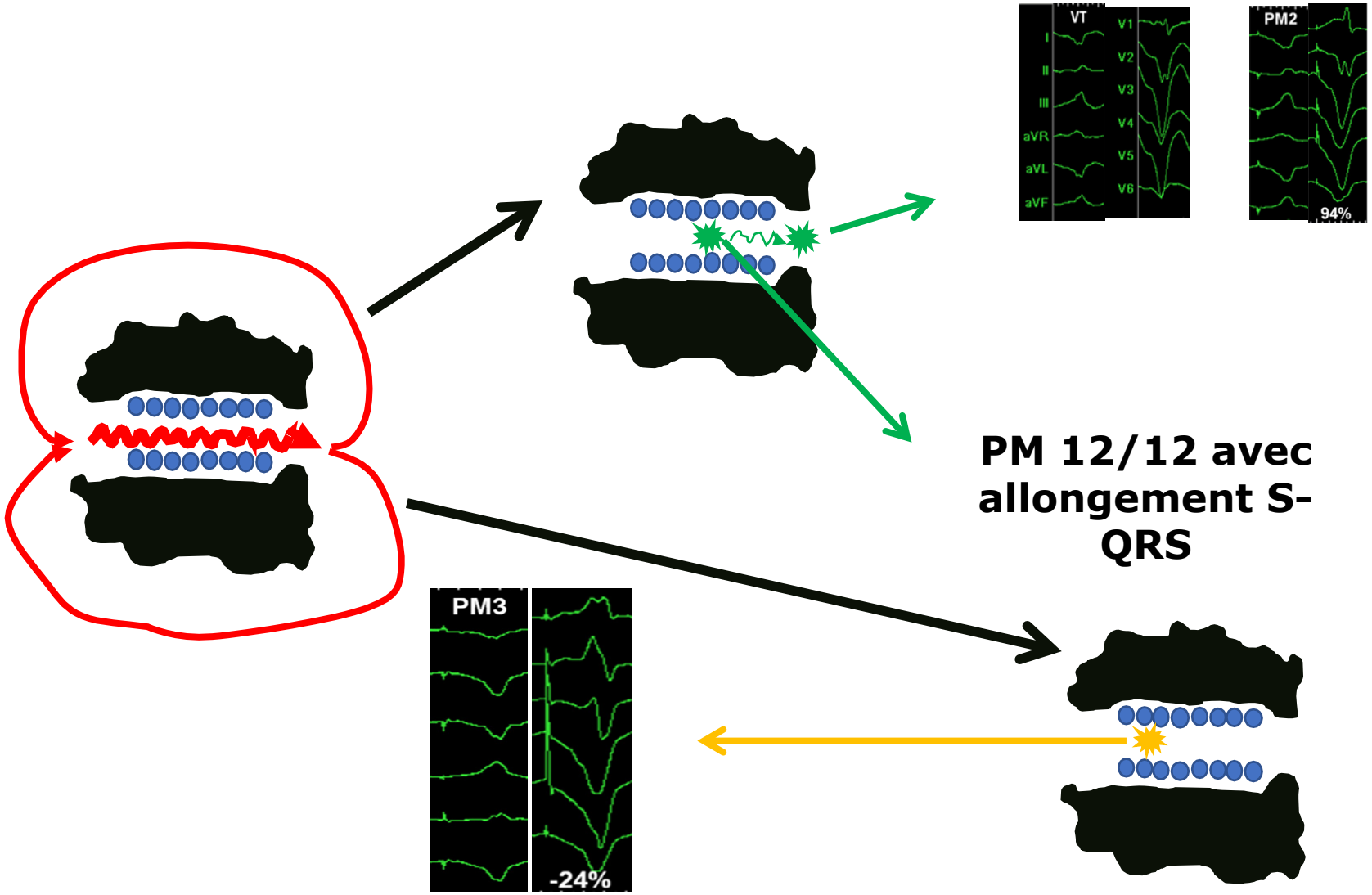

I
II
III
V1
VD 1-2
ABL d


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

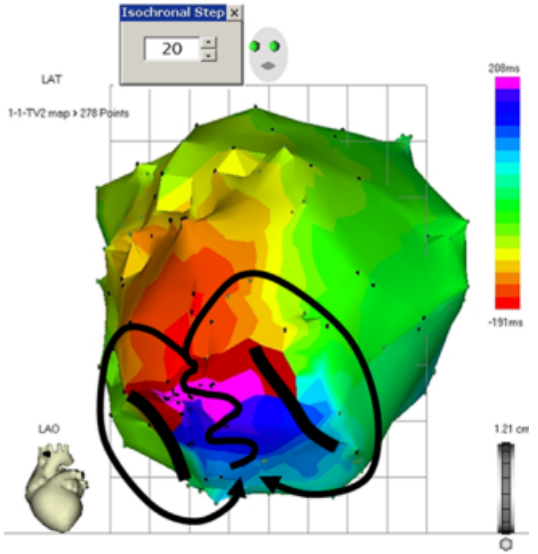

I
II
III
V1
VD 1-2
388 ms
154 min-1
379 ms
158 min-1
ABL d


I
II
III
V1
171 ms
350 min-1
168 ms
356 min-1
VD 1-2
ABL d

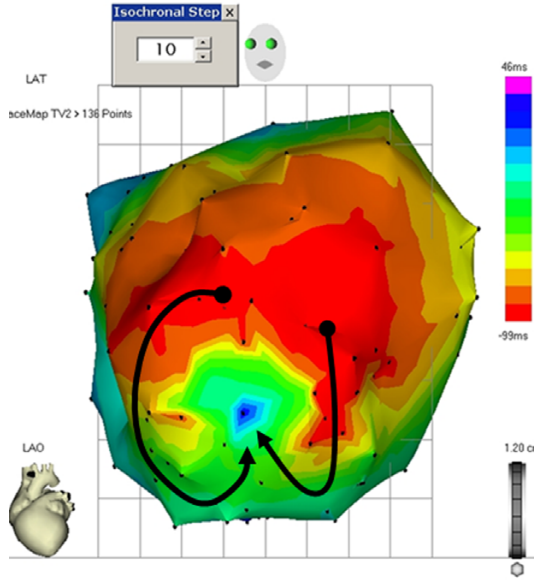
ON PEUT EN RAPPROCHER LA TS



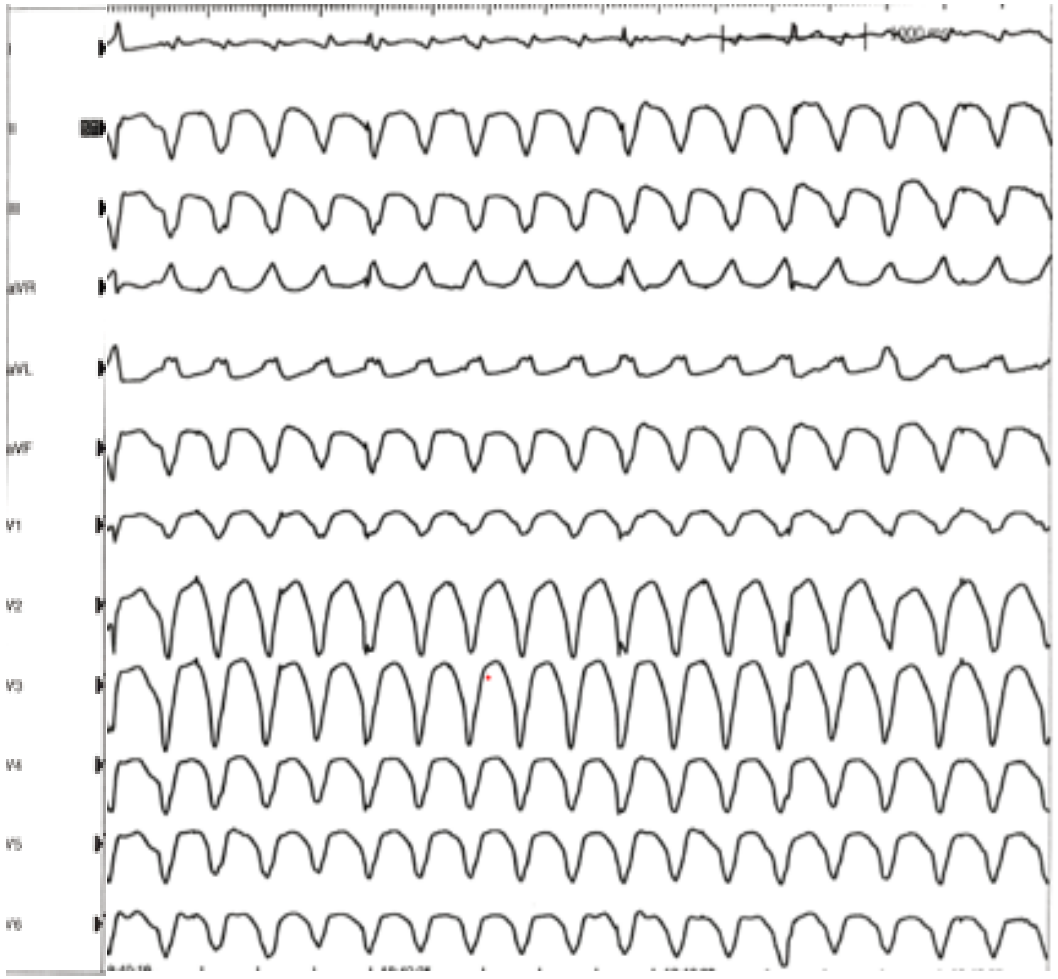
Activation time mapping in VT

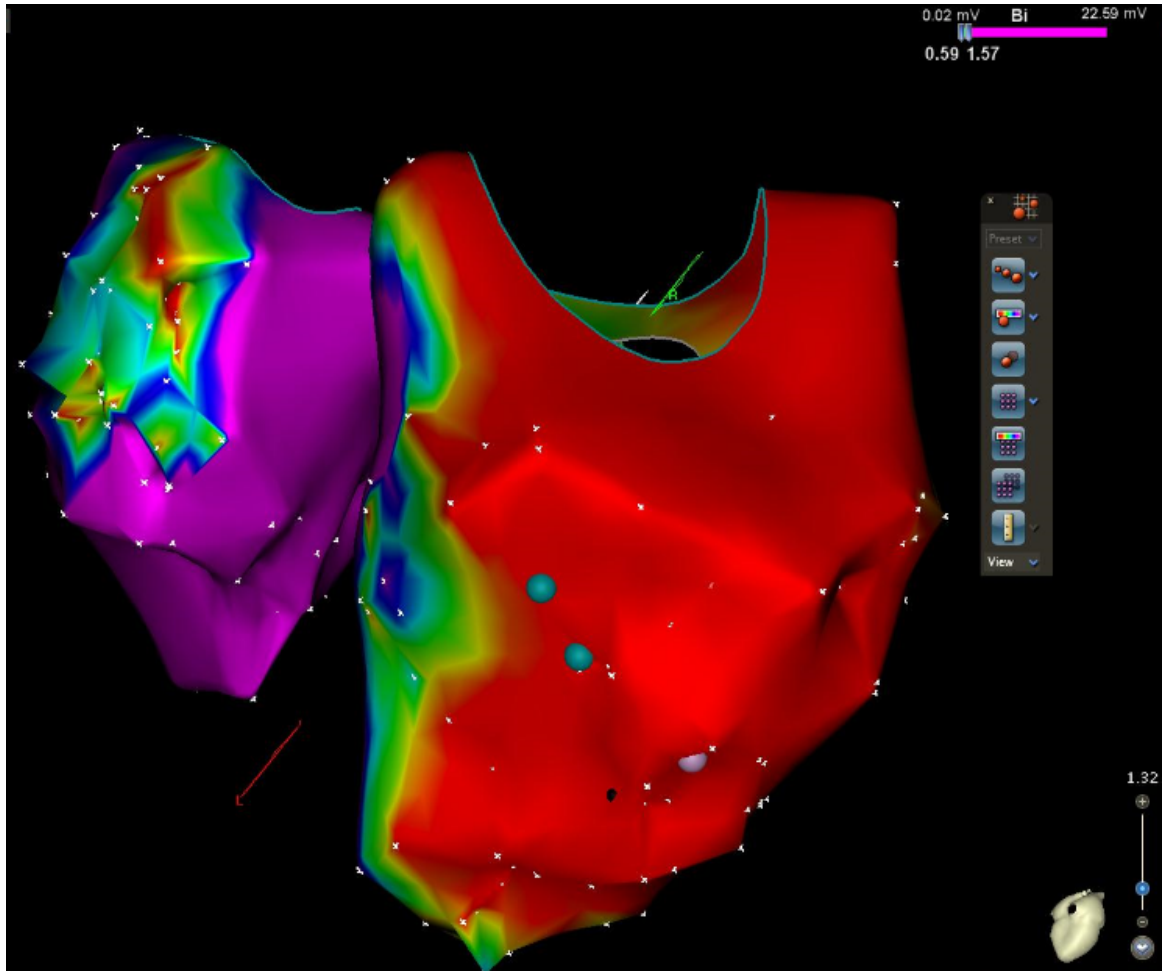


Pace-mapping map

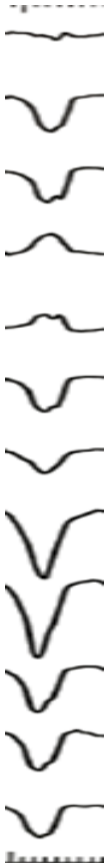


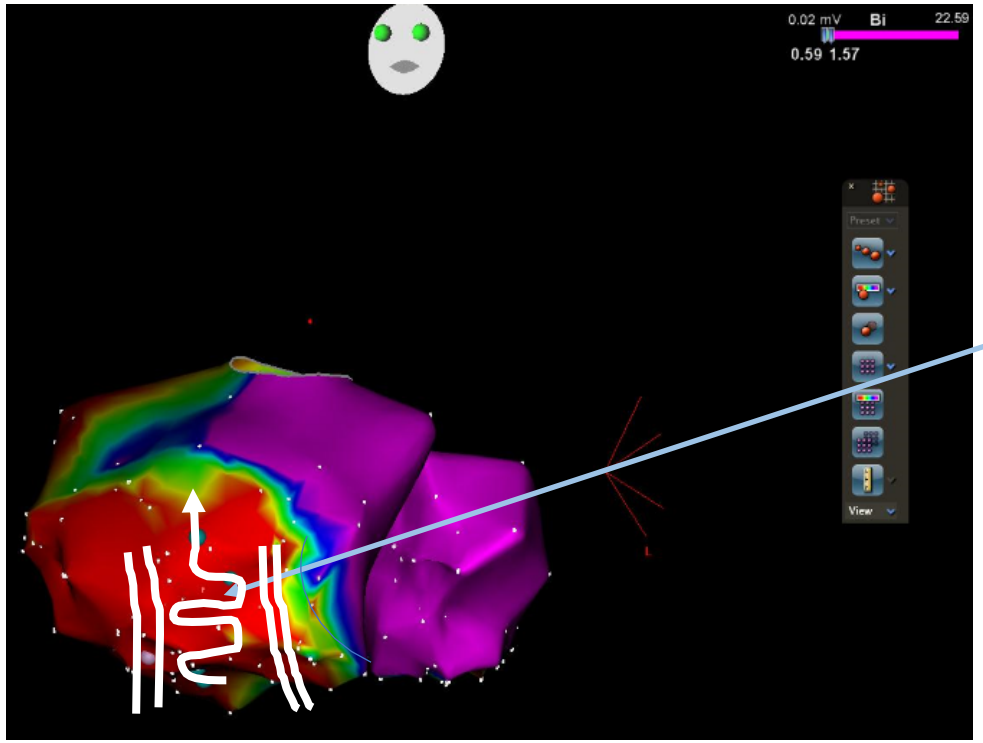
De Chillou et al Heart Rhythm 2014;11:175-81

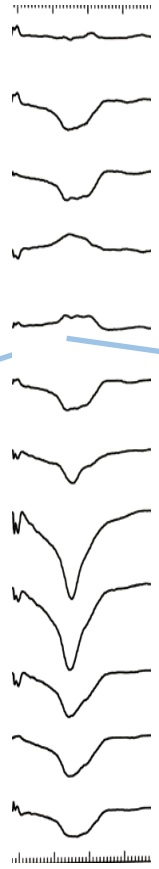

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

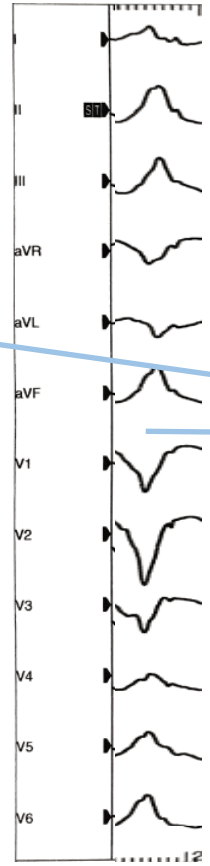

0.02 mV
Bi
22.59 mV
0.59 1.57
Preset
View
1.32

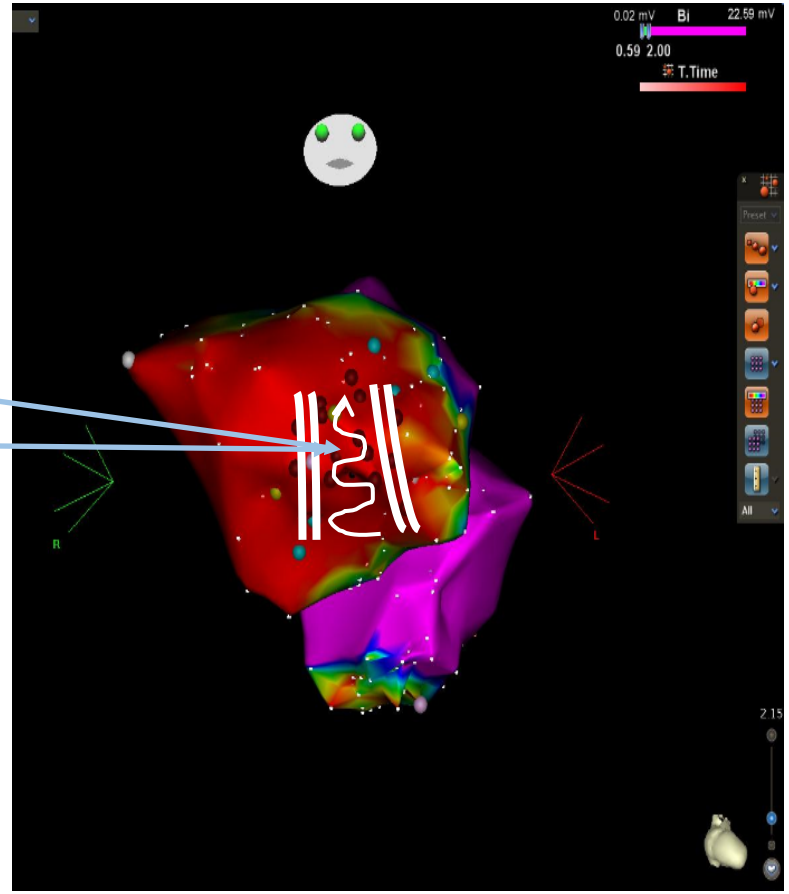
LA VALIDATION DU BLOC DANS L'ISTHME









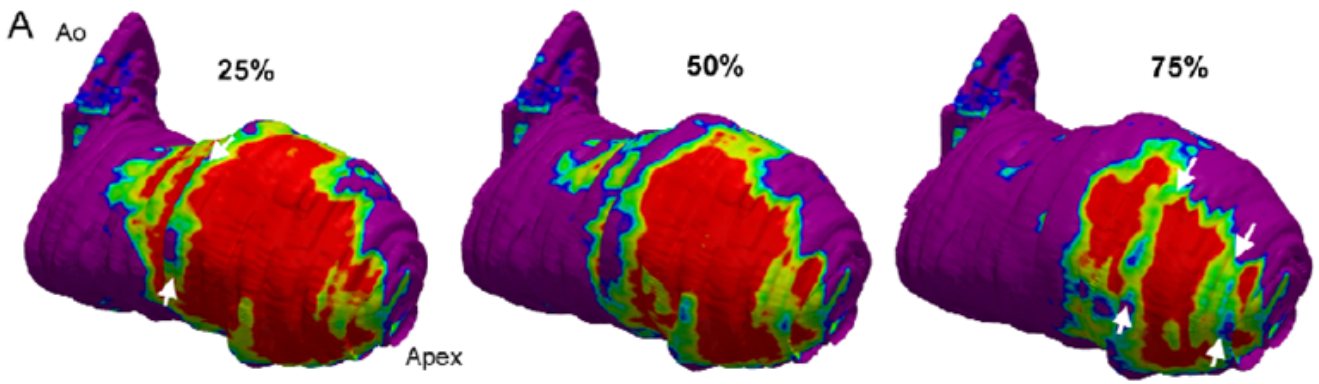


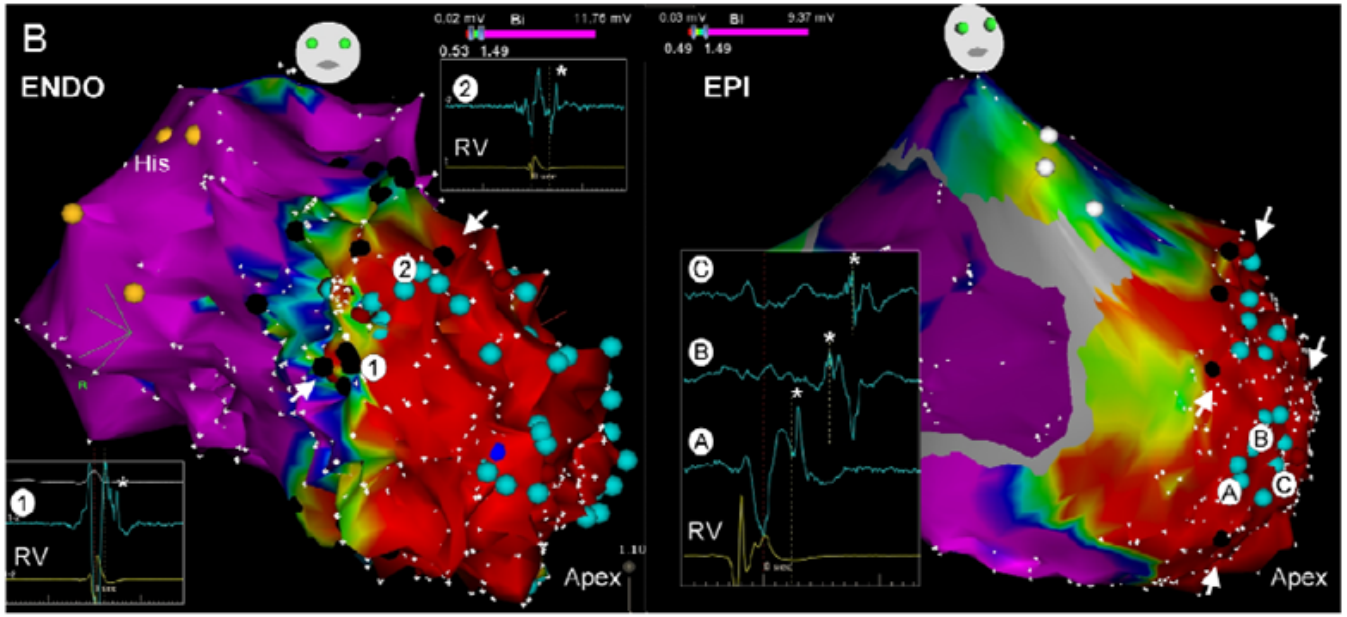
TV clinique

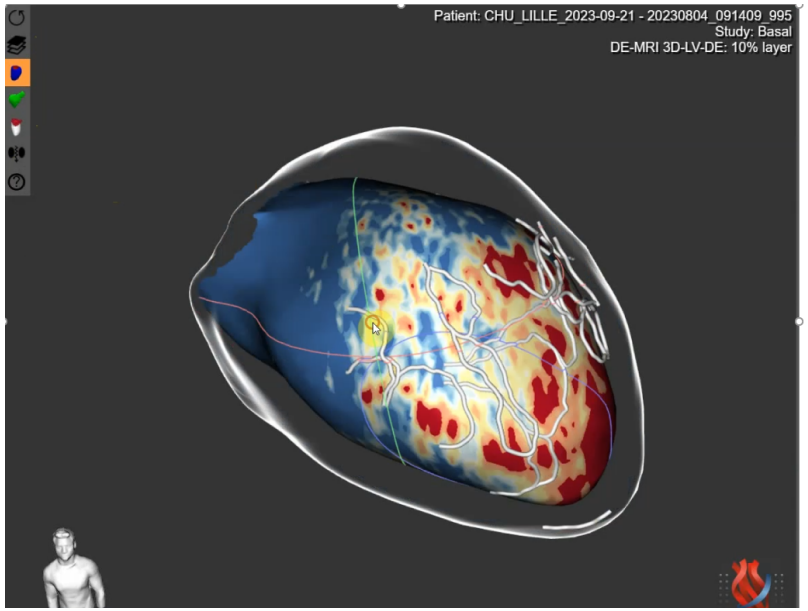
S-QRS 60ms
PM pré RF

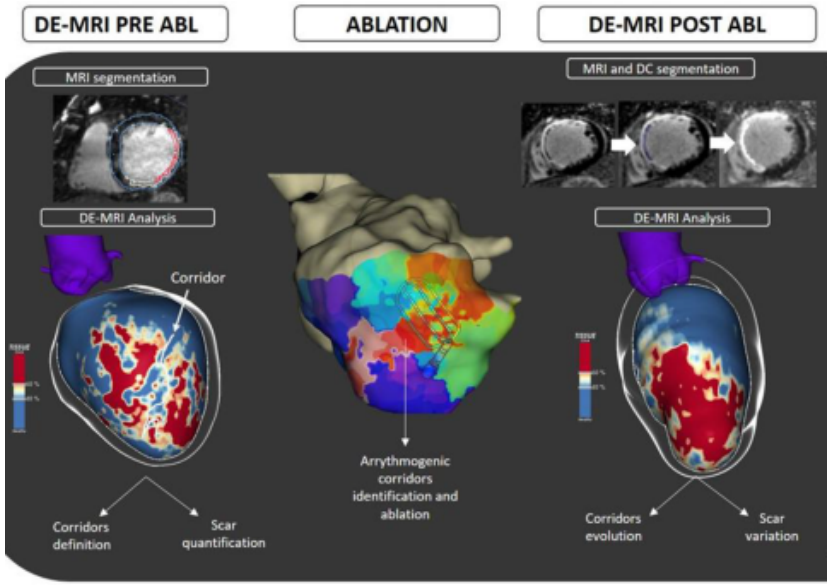
PM post RF

IMAGERIE POUR LA RF DE TV





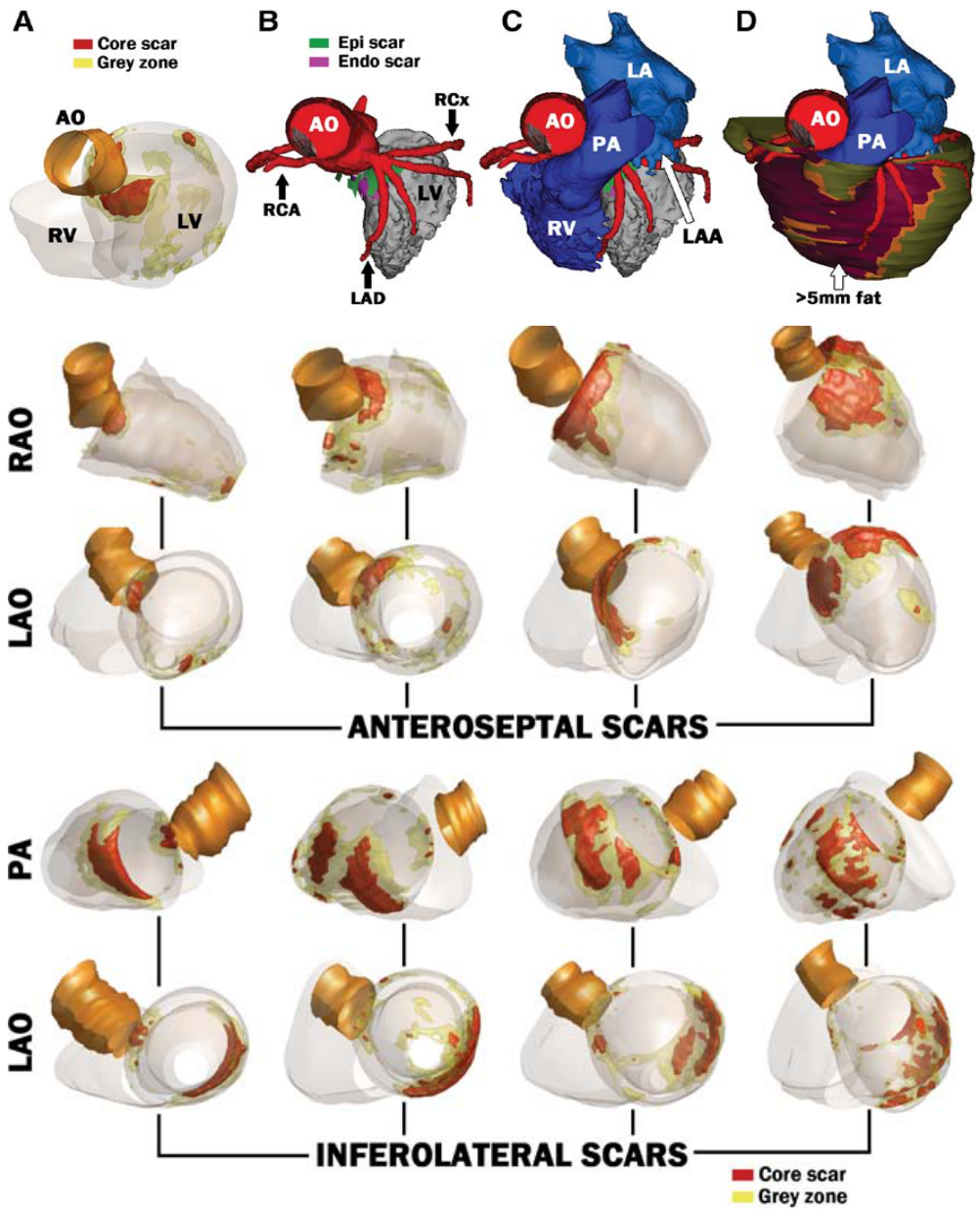


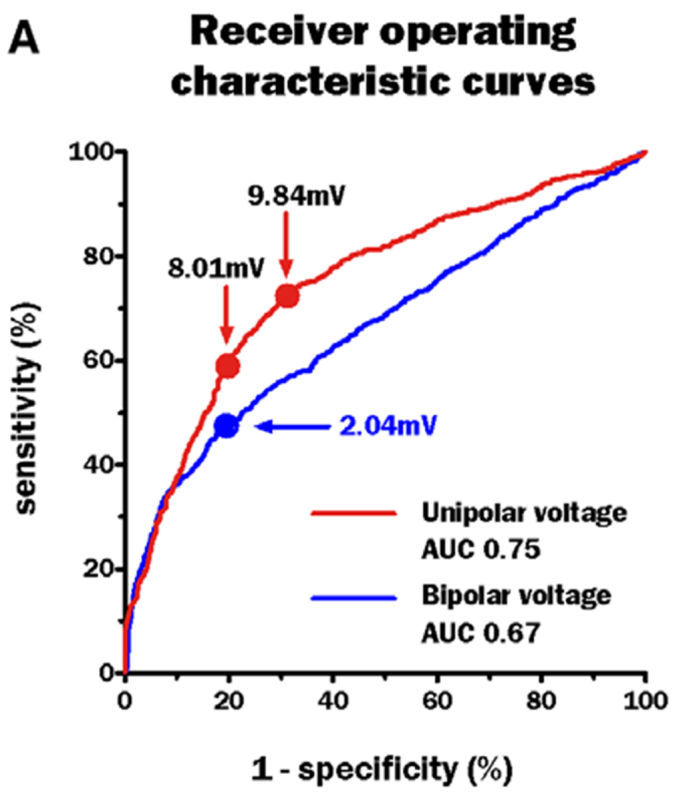


Berruezo et al Circ Electrophysiol Arrhythm 2015 ;8:326-36.

Roca-Luque Ivo et al Eur Heart J- Cardiovasc imaging 2023;00:1-11

IMAGERIE POUR LA RF DE TV DANS LES CMD

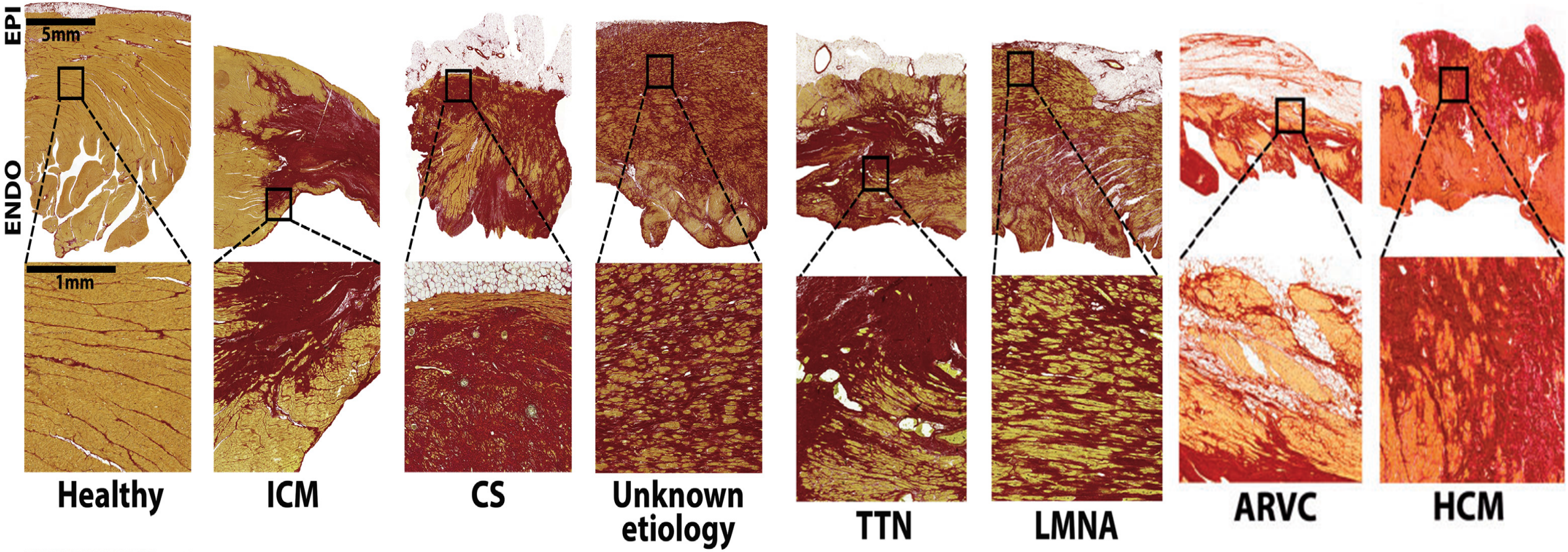




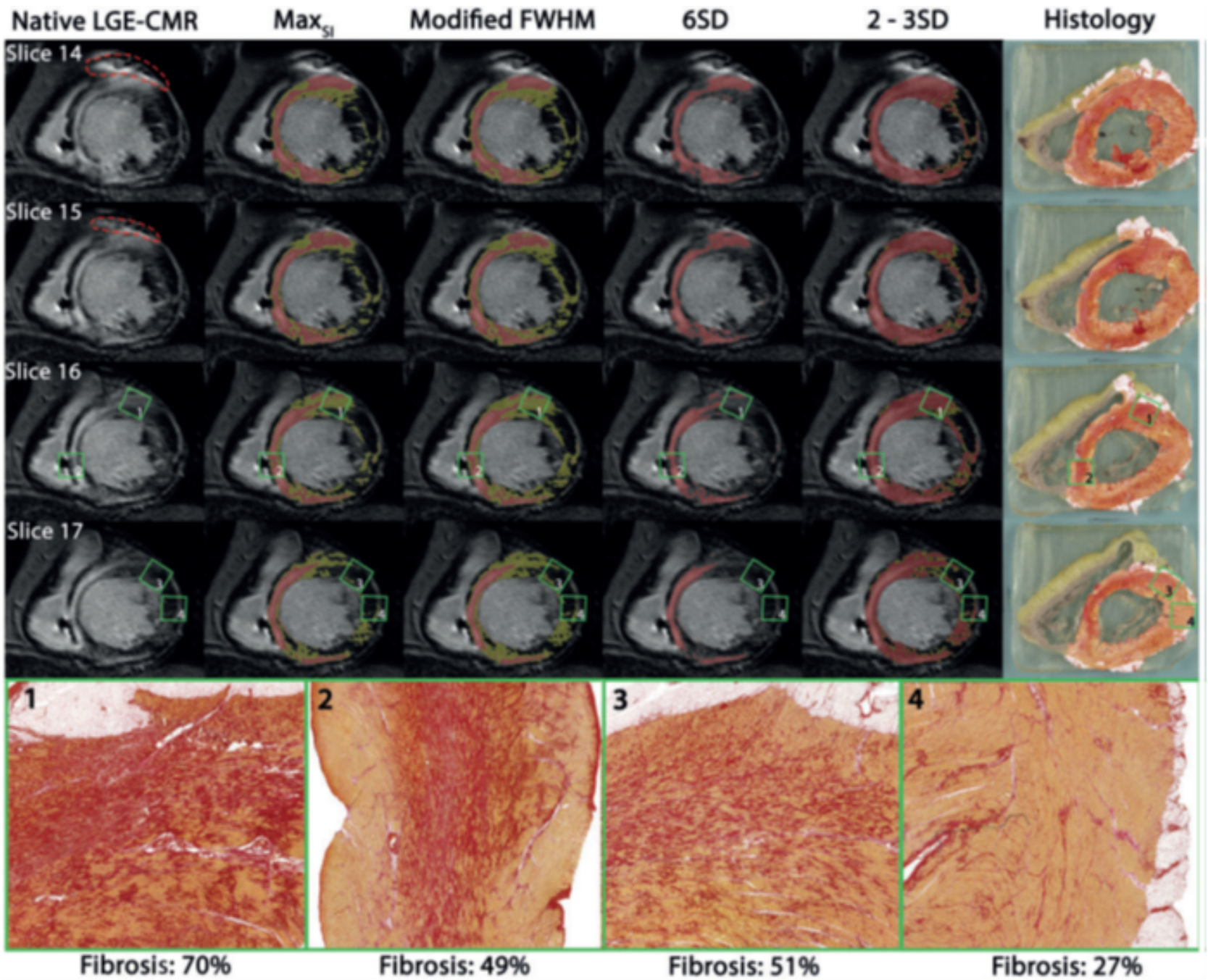
BZ cut off à 2,04 en bipolaire
Se 48% Sp 81%...

Piers SR et al Circ Arrhythm Electrophysiol 2013;6:875–83

IMAGERIE POUR LA RF DE TV DANS LES CMD

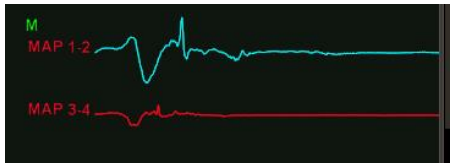


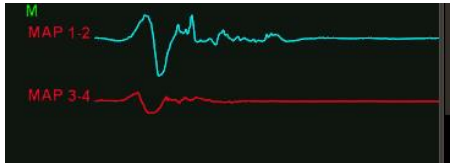
Sramko M, Zeppenfeld K et al europace 2019;21:383-403

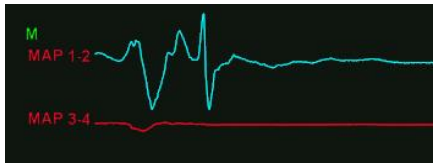


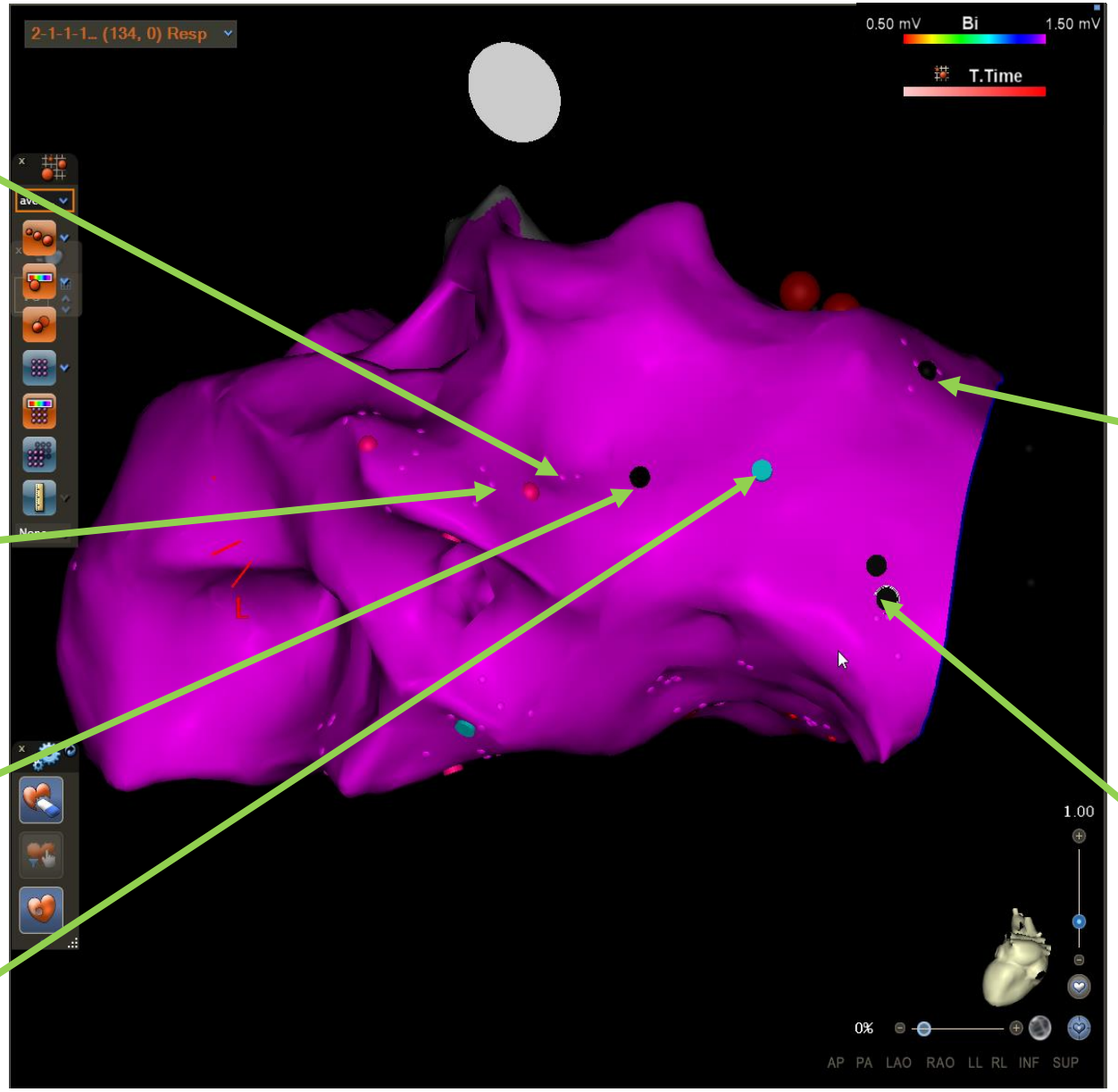
Glashan C et al Eur heart J 2018;39:2867-75

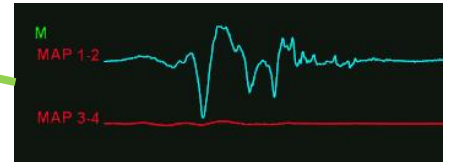

M
MAP 1-2
MAP 3-4


M
MAP 1-2
MAP 3-4

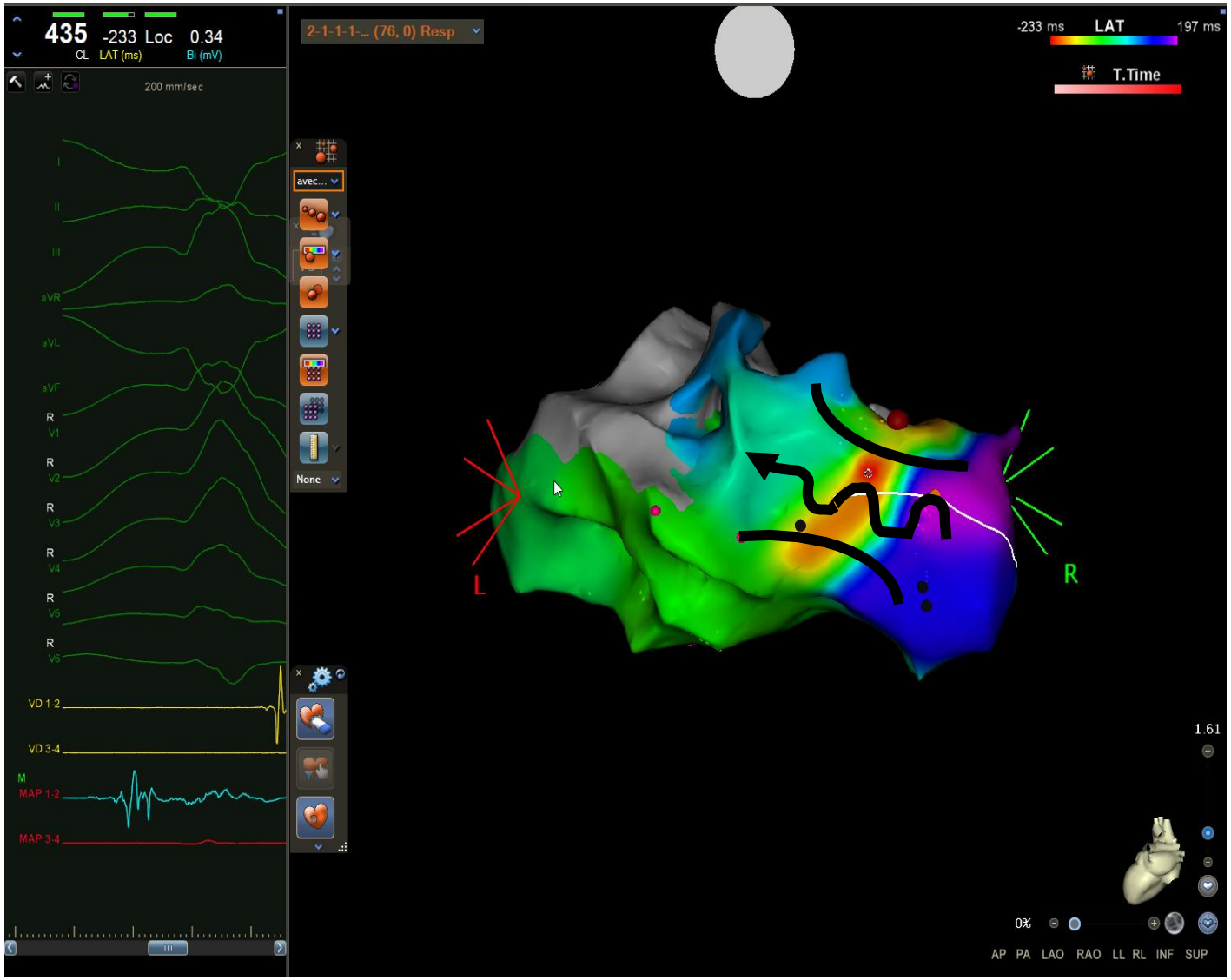

M
MAP 1-2
MAP 3-4

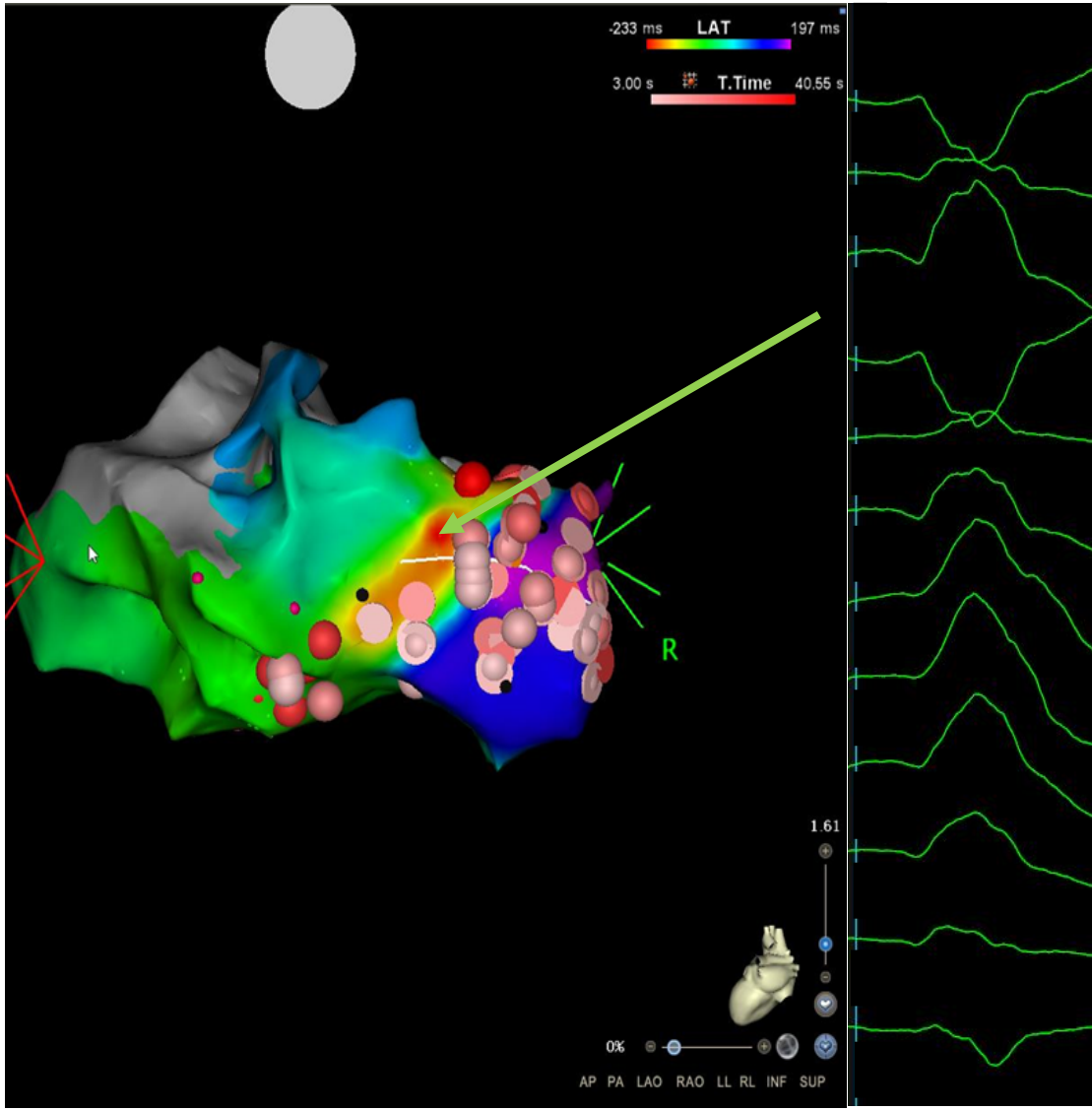

M
MAP 1-2
MAP 3-4


2-1-1-1_ (134, 0) Resp
0.50 mV
Bi
1.50 mV
T.Time
1.00
0%
AP PA LAO RAO LL RL INF SUP

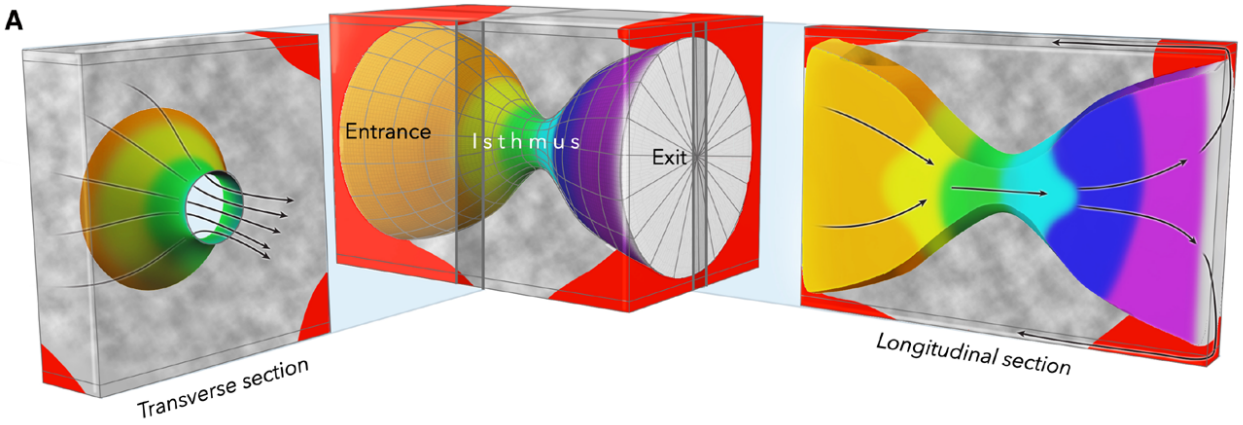

M
MAP 1-2
MAP 3-4

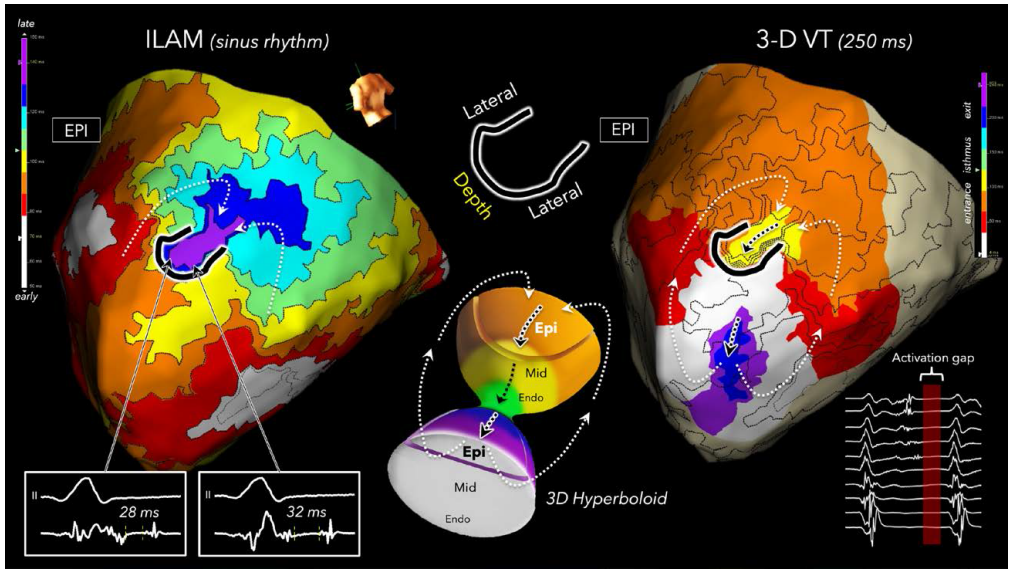

M
MAP 1-2
MAP 3-4


435
-233 Loc 0.34
CL LAT (ms) Bi (mV)
200 mm/sec
I
II
III
aVR
aVL
aVF
R V1
R V2
R V3
R V4
R V5
R V6
VD 1-2
VD 3-4
M
MAP 1-2
MAP 3-4
2-1-1-1-... (76, 0) Resp
-233 ms LAT 197 ms
T.Time
avec...
None
L
R
1.61
0%
AP PA LAO RAO LL RL INF SUP

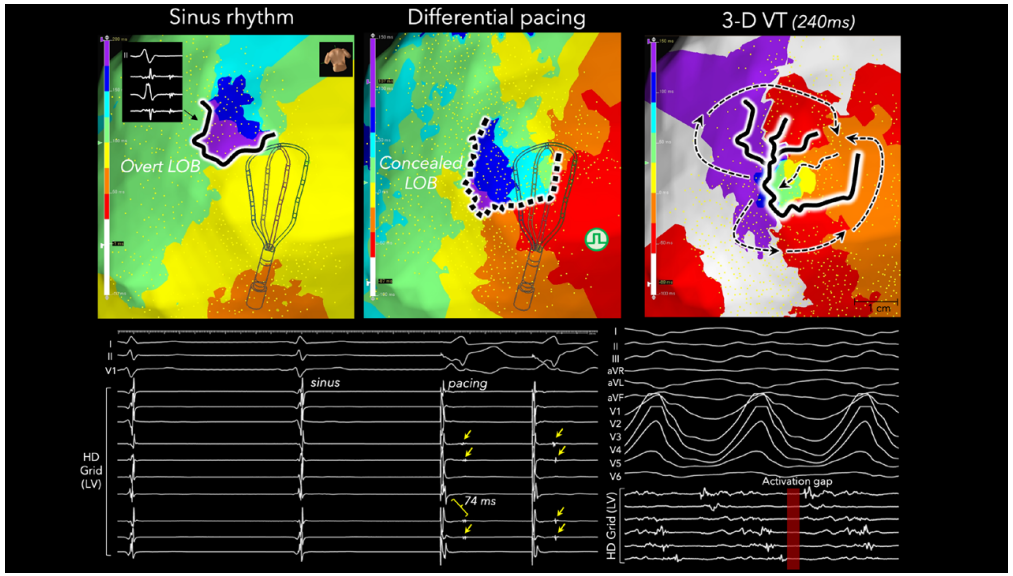

-233 ms LAT 197 ms
3.00 s T.Time 40.55 s
R
1.61
0%
AP PA LAO RAO LL RL INF SUP

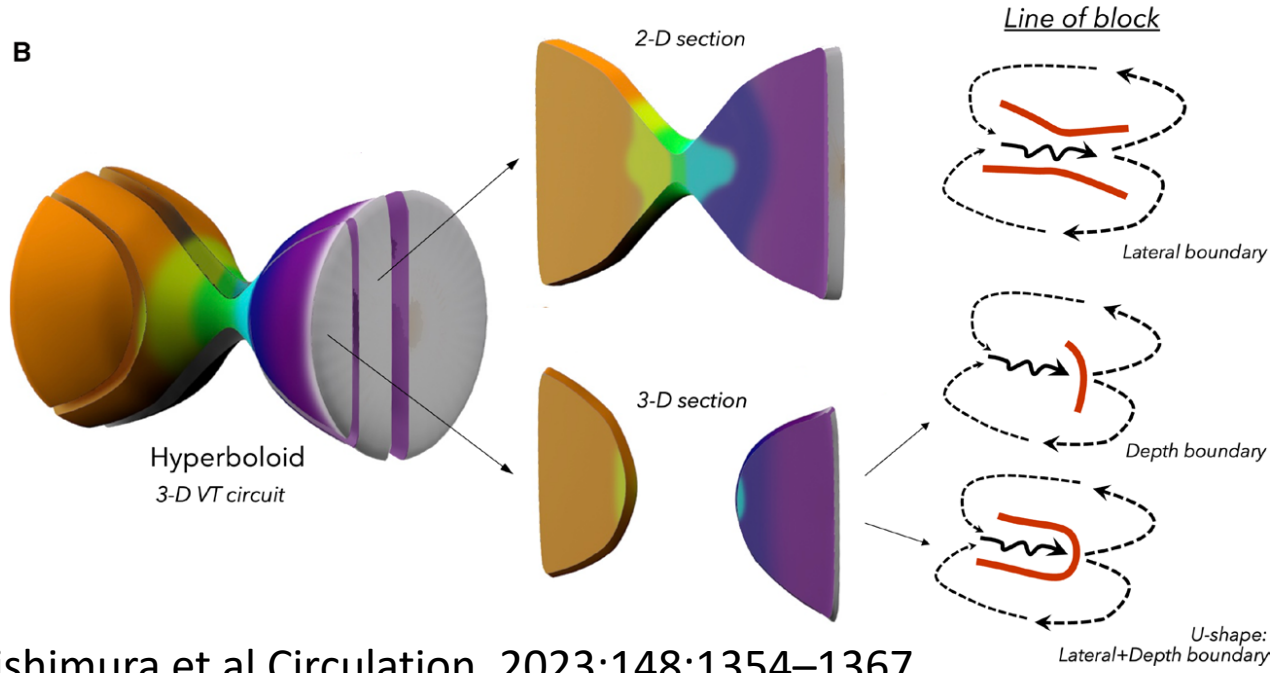
LA DIFFICULTE DE L'ANALYSE DU SUBSTRAT



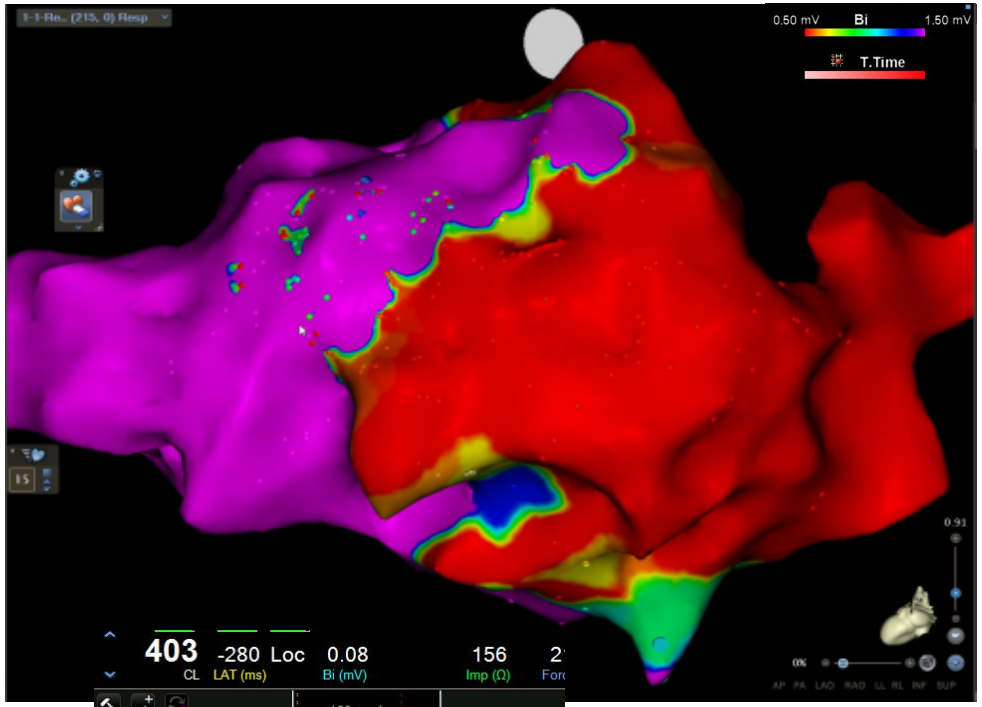


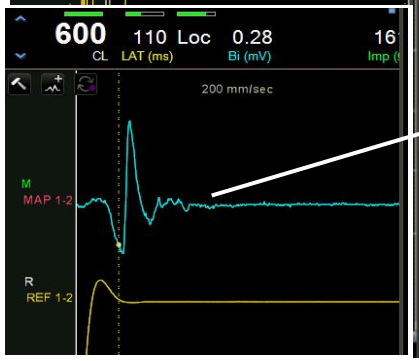
Pacing >> rythme sinusal

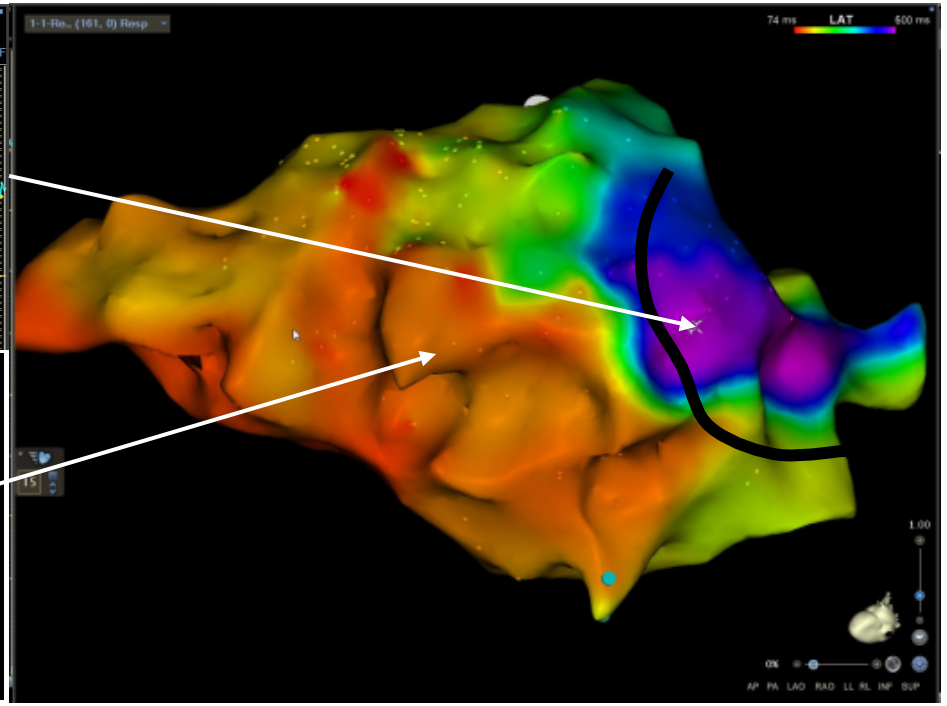


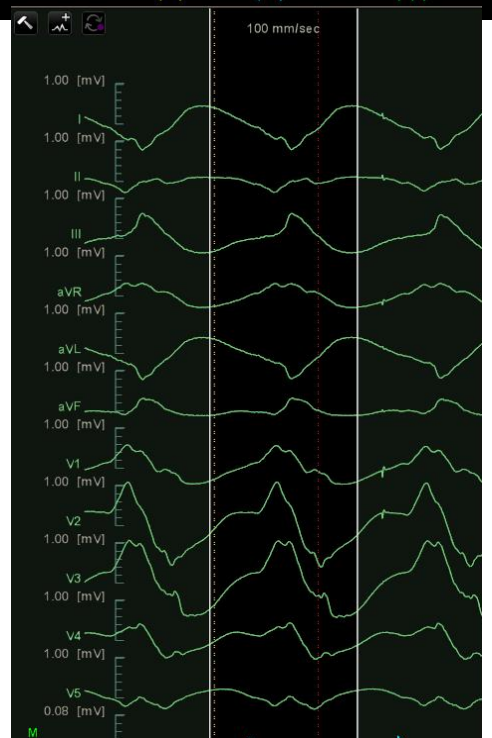


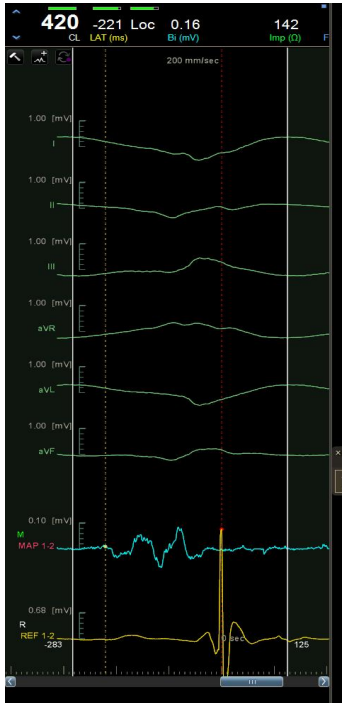
Nishimura et al Circulation. 2023;148:1354–1367

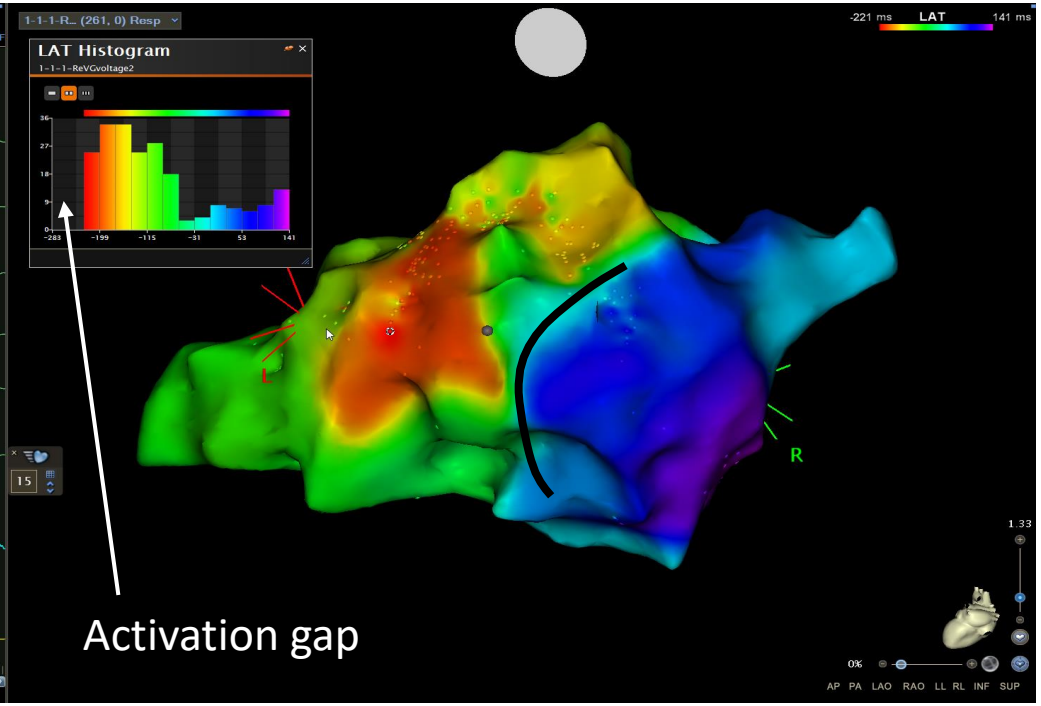








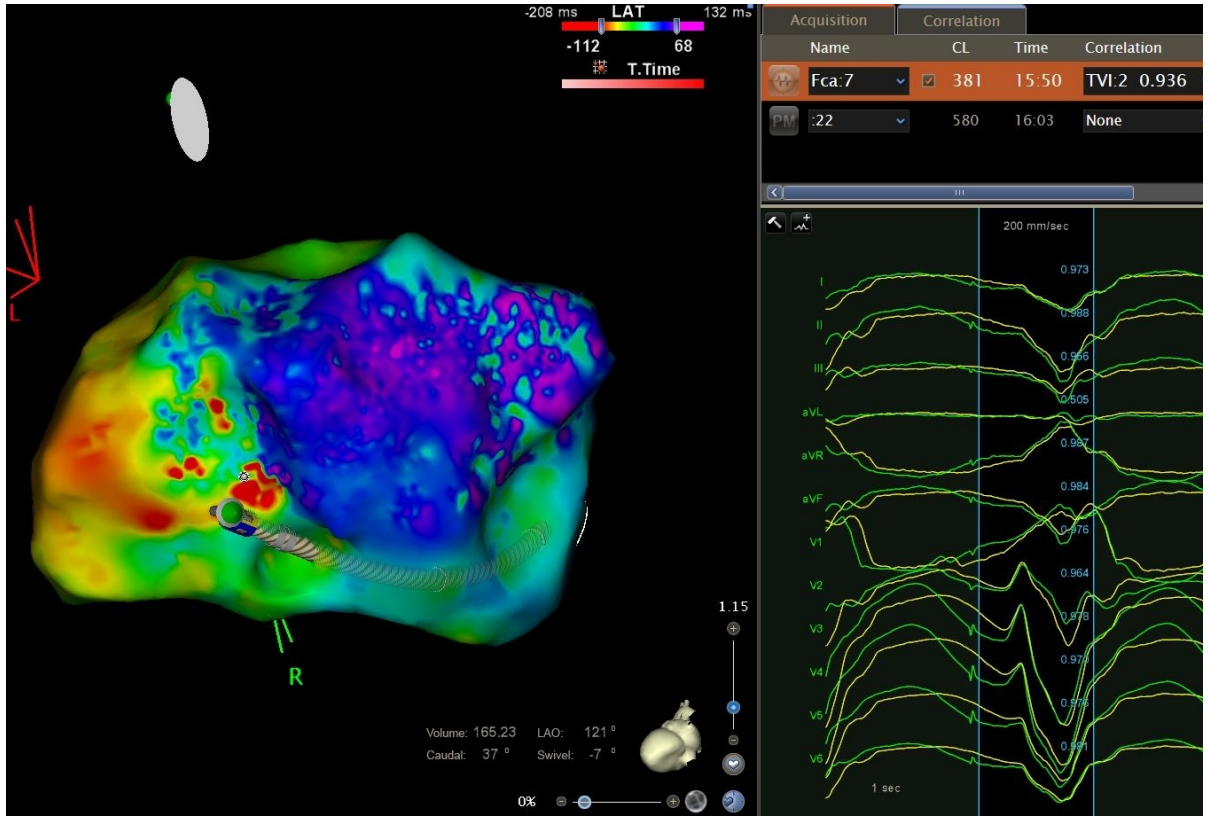




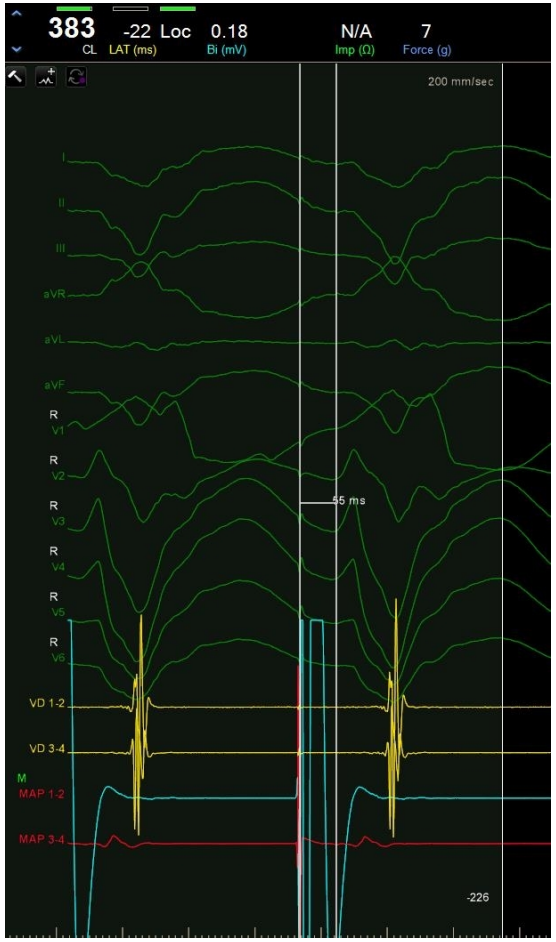
Activation gap

LA DIFFICULTE DE L'ANALYSE DU SUBSTRAT

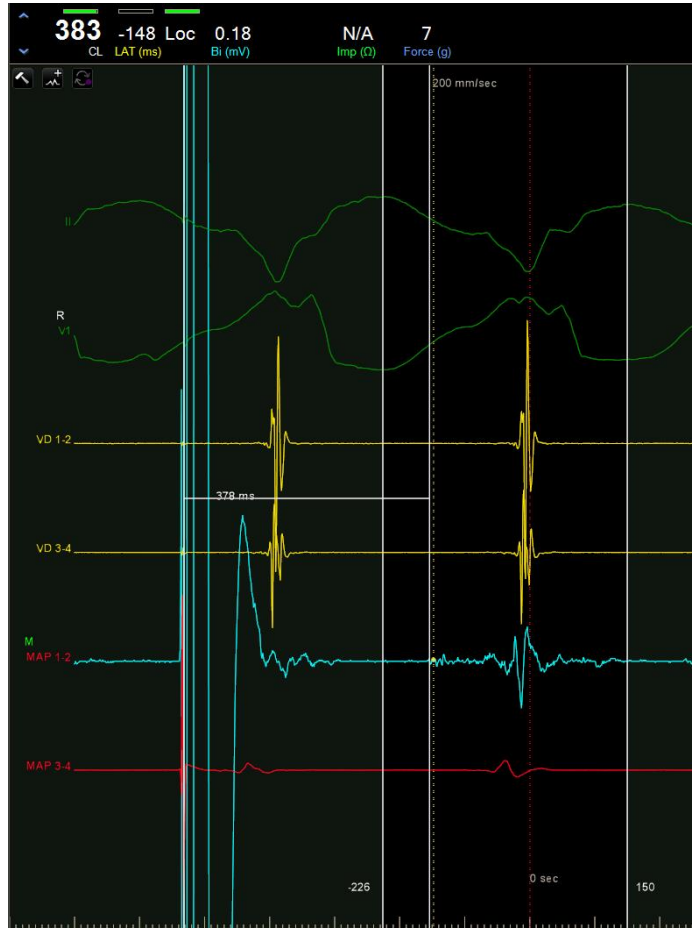
Fusion cachée. PASO : 93,6 %

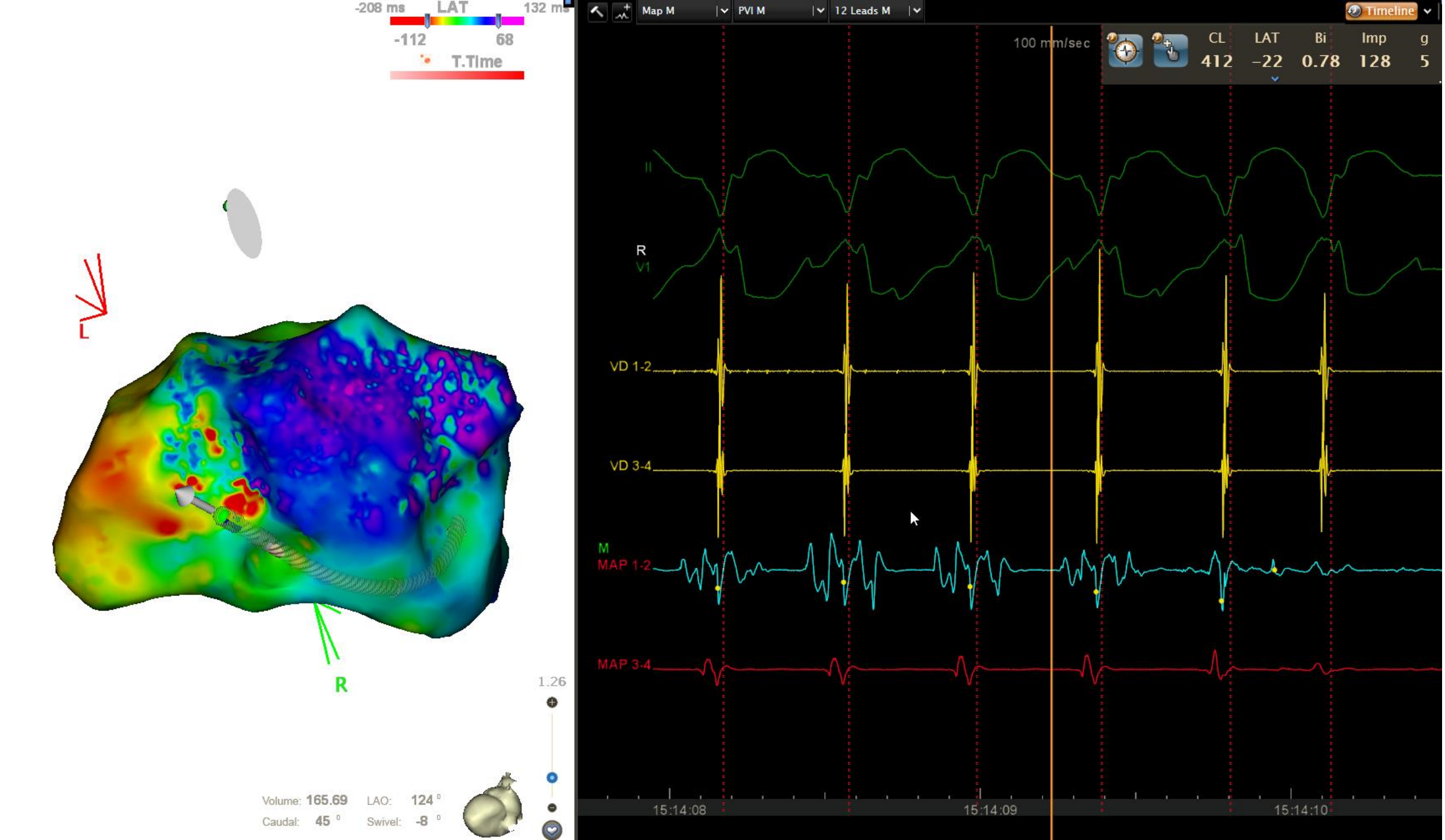


S-QRS : 55 [14%]

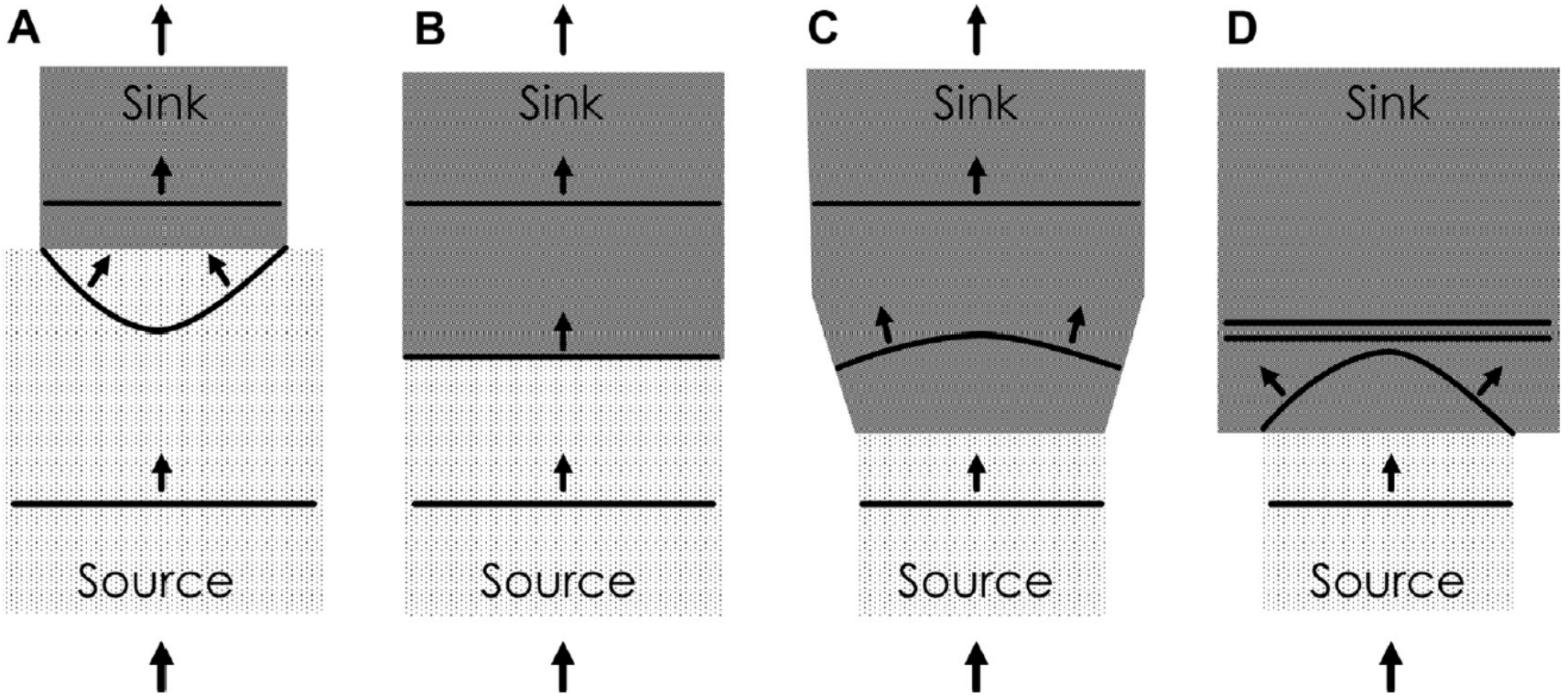


PPI-TCL = 20ms




-208 ms
LAT
132 ms
-112
68
T.Time
L
R
1.26
Volume: 165.69
LAO: 124 °
Caudal: 45 °
Swivel: -8 °
Map M
PVI M
12 Leads M
Timeline
100 mm/sec
CL
LAT
Bi
Imp
g
412
-22
0.78
128
5
II
R
V1
VD 1-2
VD 3-4
M
MAP 1-2
MAP 3-4
15:14:08
15:14:09
15:14:10

LES BLOCS FONCTIONNELS



conduction | conduction | ralentissement | bloc

$$\theta = \theta_o - D\,\frac{\Delta T}{c \cdot T}$$

Θ = vit de conduction du front

Θ_0 = Vit de conduction du front en l'absence de « source/sink mismatch » = const

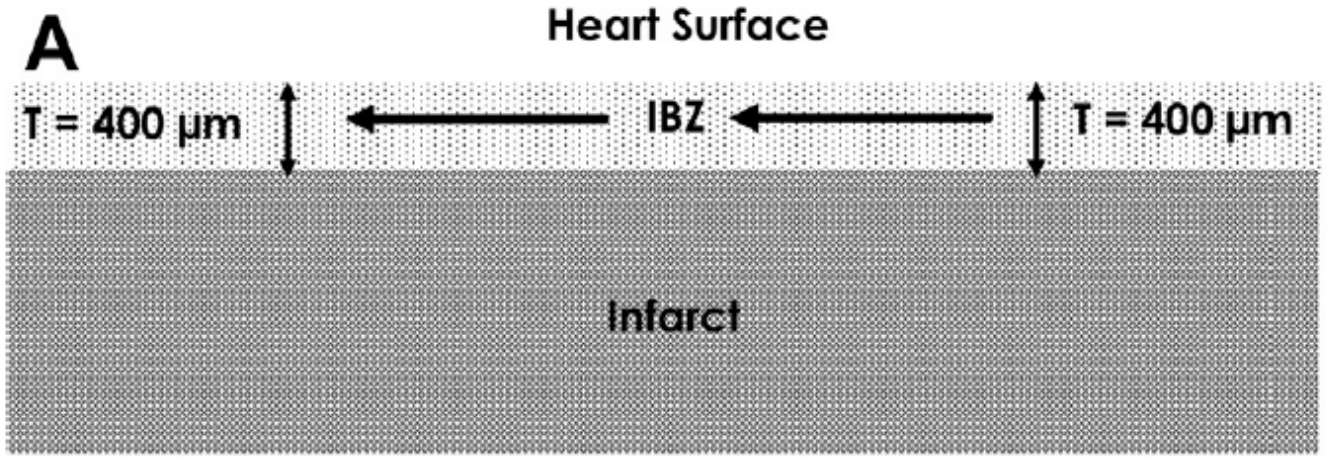
D = coeff de diffusion = constante

T = épaisseur du tissue

ΔT = chgt d'épaisseur par unité de dist (c)

Ciacco EJ et al J Am Coll Cardiol EP 2018;4:1–16

LES BLOCS FONCTIONNELS



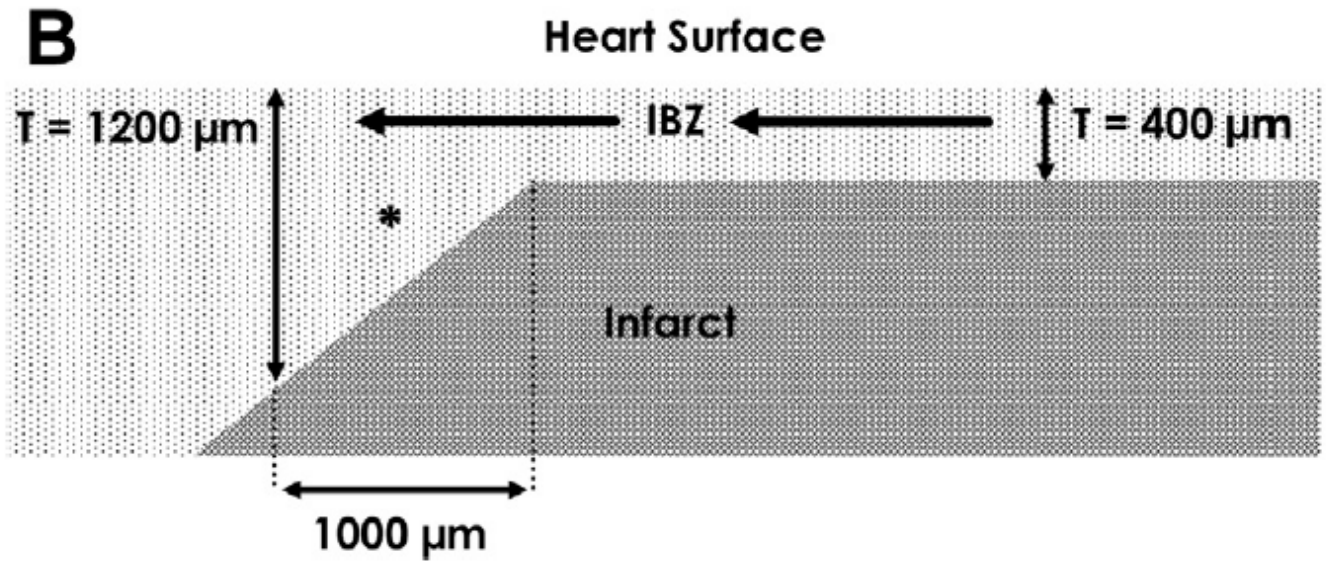
ΔT = 0 µm

conduction

$$\theta = \theta_o - D\frac{\Delta T}{c \cdot T}$$

$$\theta = 0.4\frac{mm}{ms} - 0.2\frac{mm^2}{ms}\frac{1.2\,mm - 0.4\,mm}{1.0\,mm \cdot 0.4\,mm}$$

$$\theta = 0\frac{mm}{ms} \qquad \text{(Equation 3)}$$

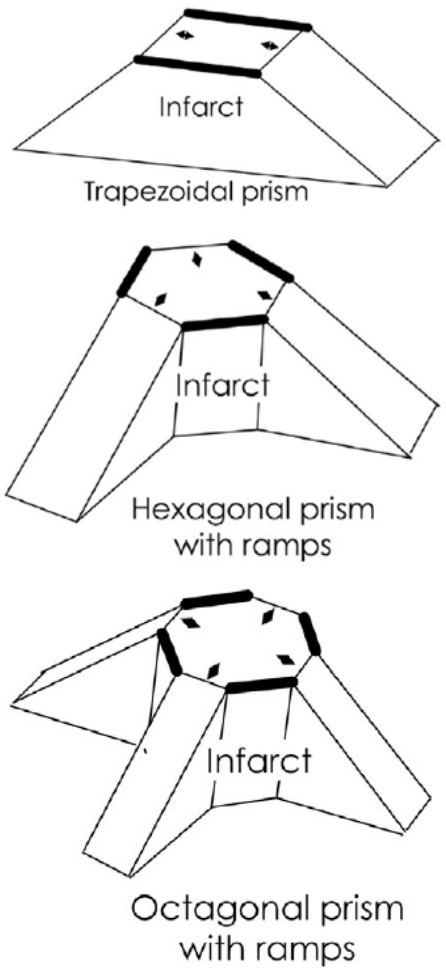


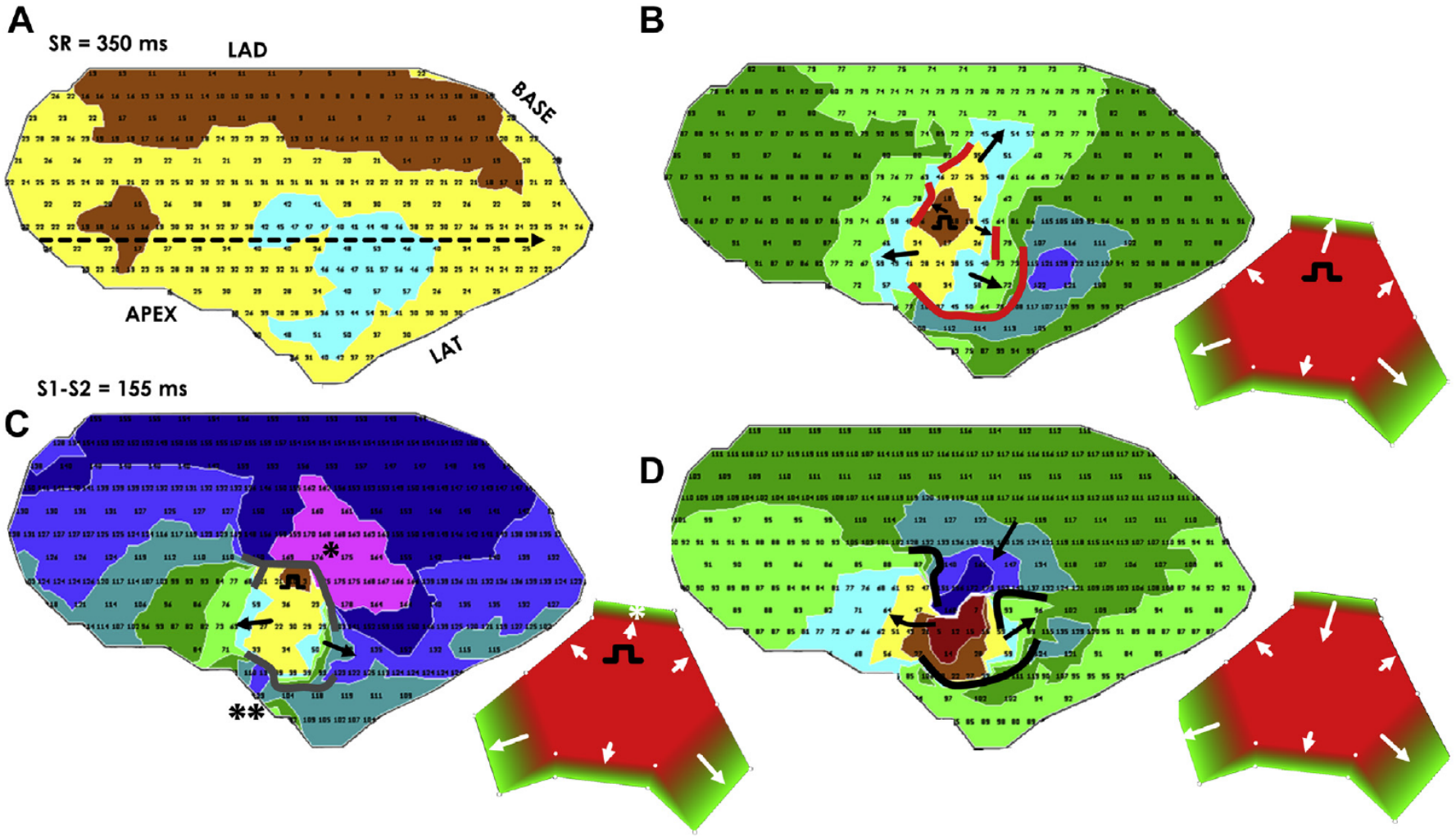
* ΔT = 800 µm

bloc

Ciacco EJ et al J Am Coll Cardiol EP 2018;4:1–16

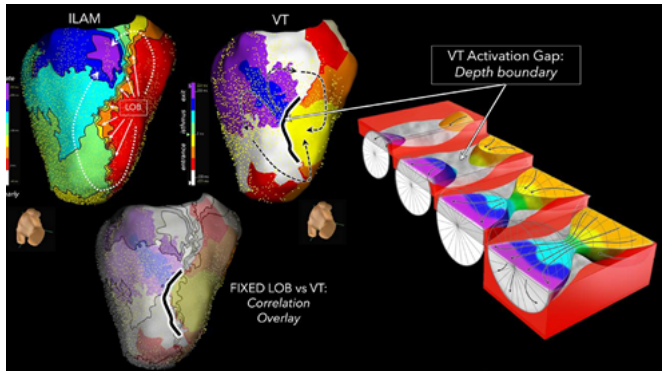
LES BLOCS FONCTIONNELS

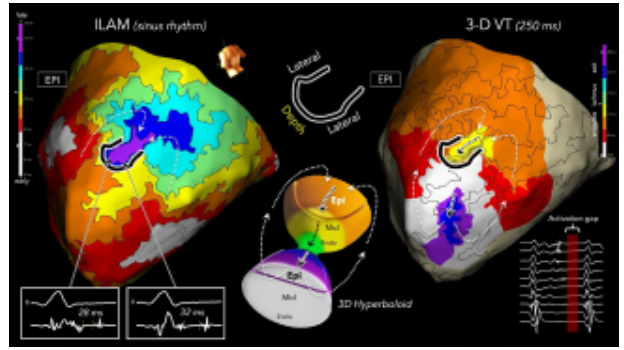




Ciacco EJ et al J Am Coll Cardiol EP 2018;4:1–16

LES BLOCS FONCTIONNELS





152 VT activation maps

2-D VT n=53

106 lateral boundaries

Fixed LOB n=73 (69%)

No LOB proven n=33 (31%)

Overt LOB n=46 (63%)

Concealed LOB n=18 (25%)

Mitral annulus n=9 (12%)

3-D VT n=99

99 depth boundaries

Fixed LOB n=78 (79%)

No LOB proven n=21 (21%)

Overt LOB n=60 (77%)

Concealed LOB n=18 (23%)

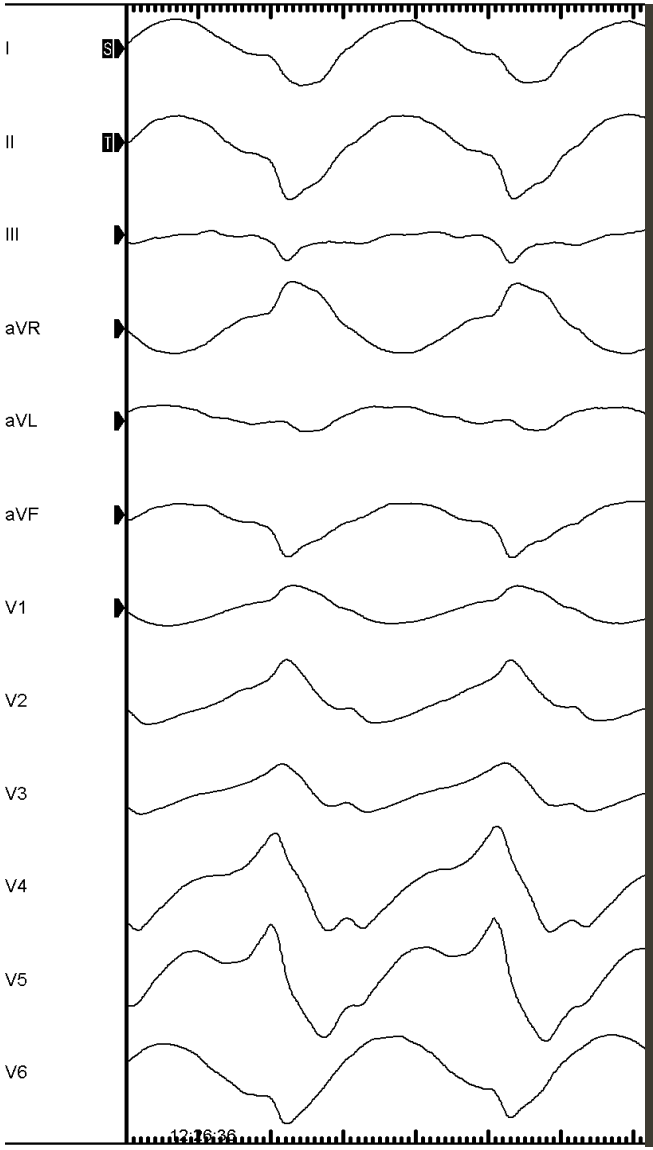
Nishimura et al Circulation. 2023;148:1354–1367

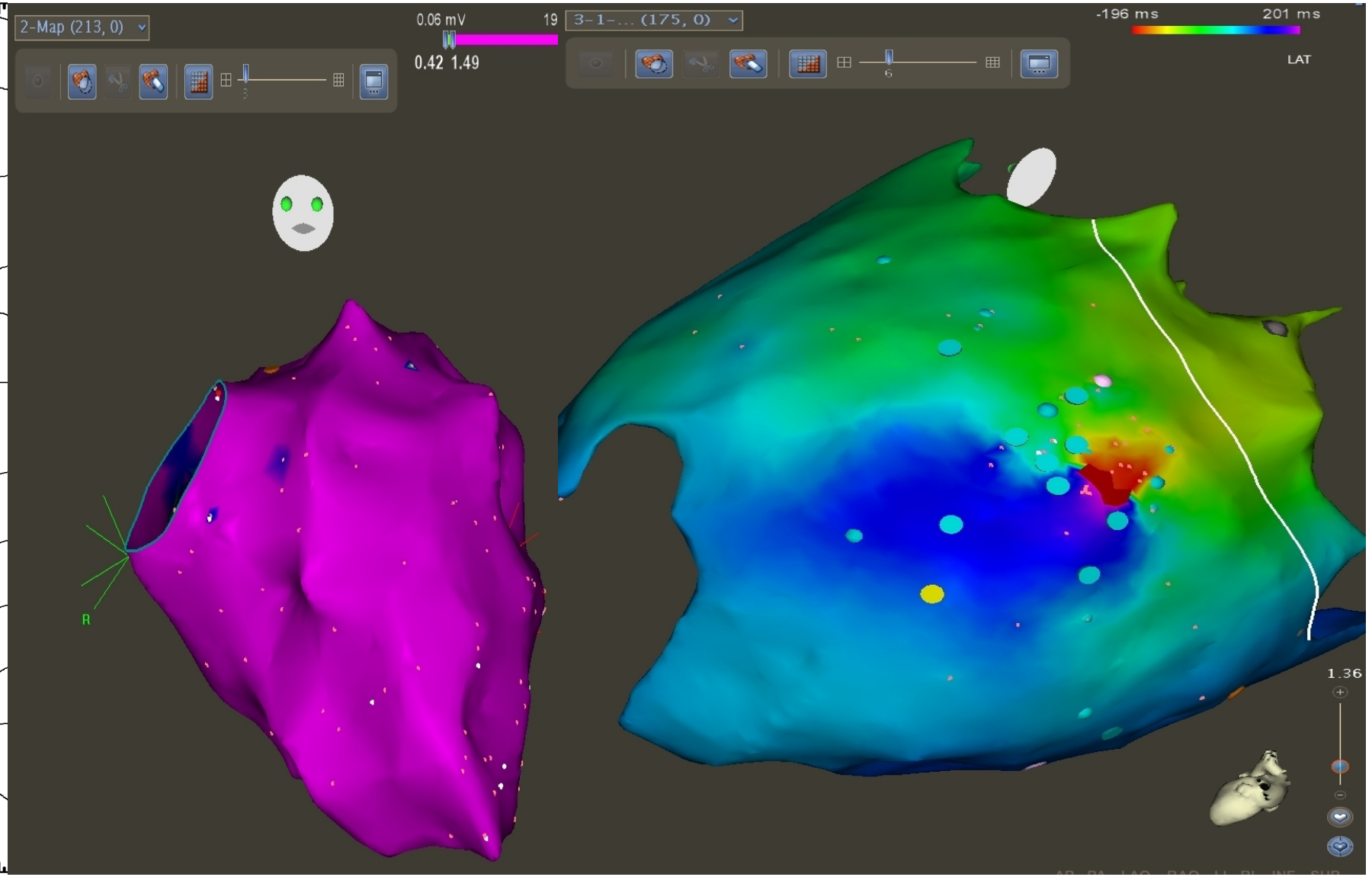
CONCLUSIONS

POURQUOI CONTINUER A FAIRE DES MANŒUVRES D'ENTRAINEMENT ?

- L'ablation de TV est suffisamment difficile utiliser toutes les informations disponibles
- Les critères de Stevenson sont très sensibles et spécifiques
- Dans les CMD les cicatrices sont moins homogènes et l'imagerie est prise en défaut
- Dans la CPI les circuits ne sont pas toujours visibles de façon complète
- Il existe une possibilité non nulle de bloc fonctionnel invisible à la fois en imagerie et en analyse de substrat

DANS LES CMD


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6


2-Map (213, 0)
0.06 mV
19
0.42 1.49
3-1-... (175, 0)
-196 ms
201 ms
LAT
R
1.36