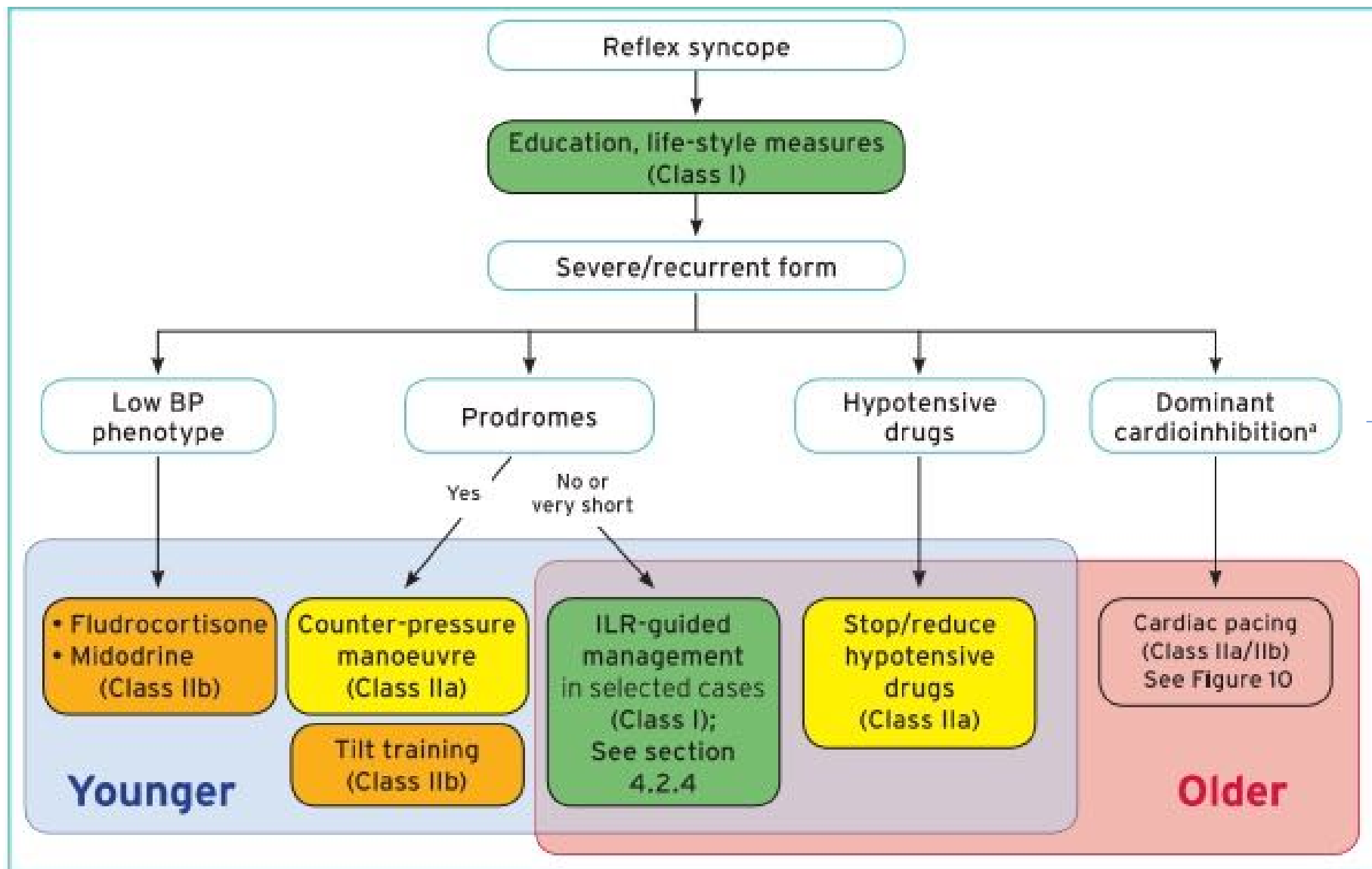


Cardio Neuro Modulation (CNM) : l'espoir de traiter les syncopes réflexes par l'ablation

Dr Baptiste MAILLE

Rythmologie

MARSEILLE



Cardioneuroablation

©ESC 2018

Brignole, Michele, Tolga Aksu, Leonardo Calò, Philippe Debruyne, Jean Claude Deharo, Alessandra Fanciulli, Artur Fedorowski, et al. « Clinical Controversy: Methodology and Indications of Cardioneuroablation for Reflex Syncope ». *Europace* 25, n° 5 (19 mai 2023): euad033. <https://doi.org/10.1093/europace/euad033>

1. Indications CNA

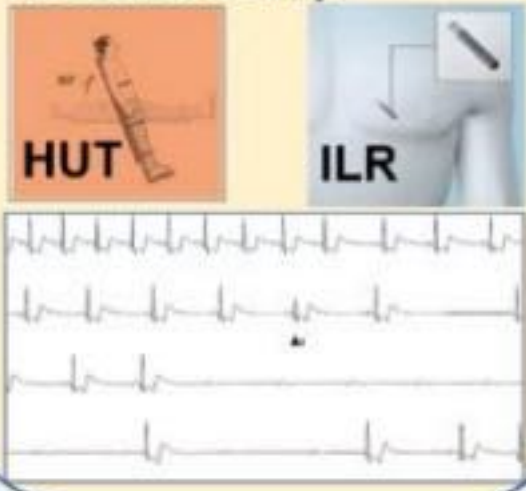
IDENTIFY
the proper candidate

What is known

Asystolic reflex syncope documented by:

HUT

ILR



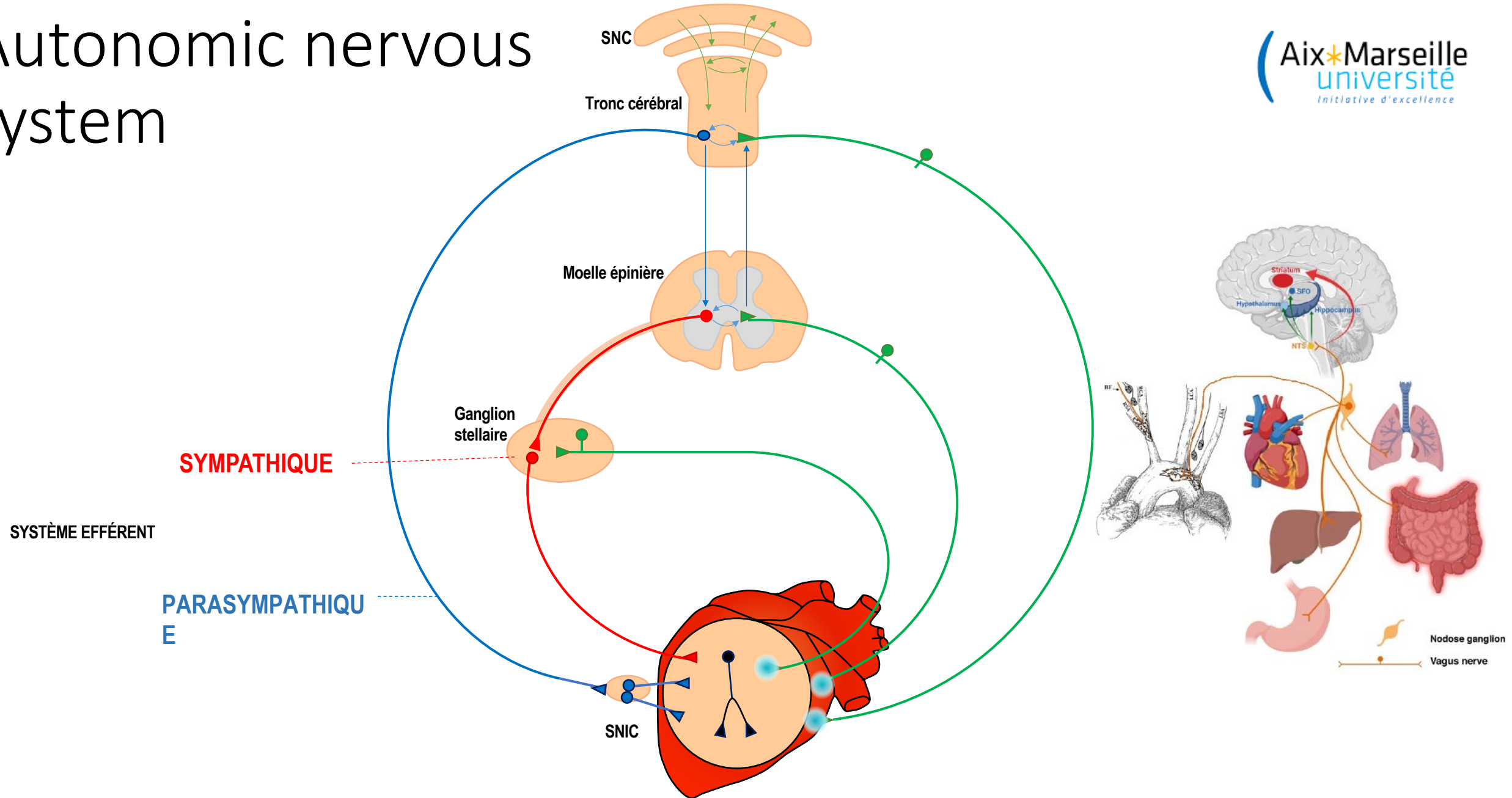
SYNCOPE REFLEXES GRAVES

Conséquences: fonction de la qualité de vie du patient et recurrence des symptômes:

- Traumatismes
- Gène scolaire ou professionnelle
- Incompétence à la conduite automobile
- Csq psychologiques, personnelles....

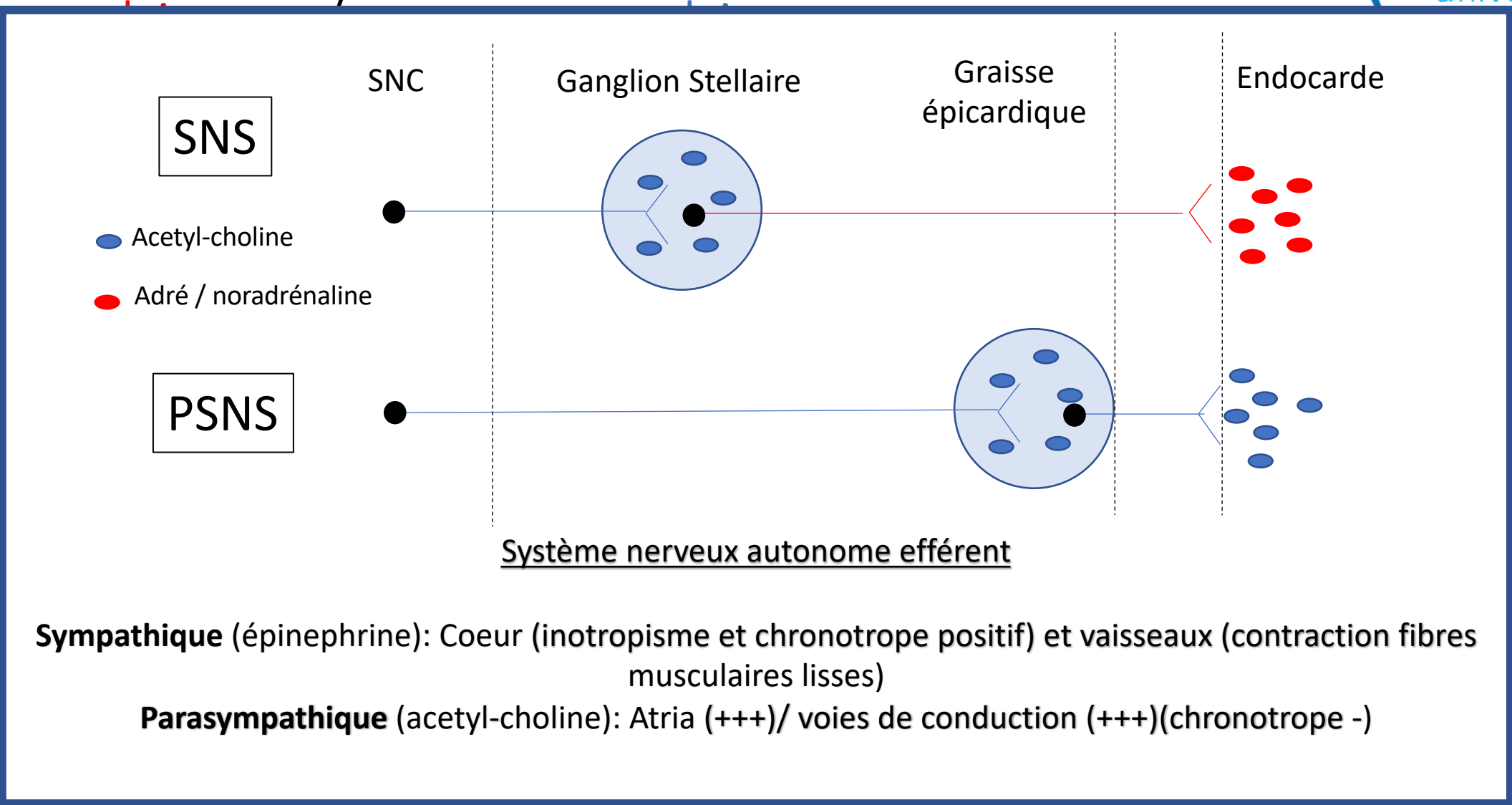
Brignole, Michele, Tolga Aksu, Leonardo Calò, Philippe Debruyne, Jean Claude Deharo, Alessandra Fanciulli, Artur Fedorowski, et al. « Clinical Controversy: Methodology and Indications of Cardioneuroablation for Reflex Syncope ». *Europace* 25, n° 5 (19 mai 2023): euad033. <https://doi.org/10.1093/europace/euad033>.

Autonomic nervous system



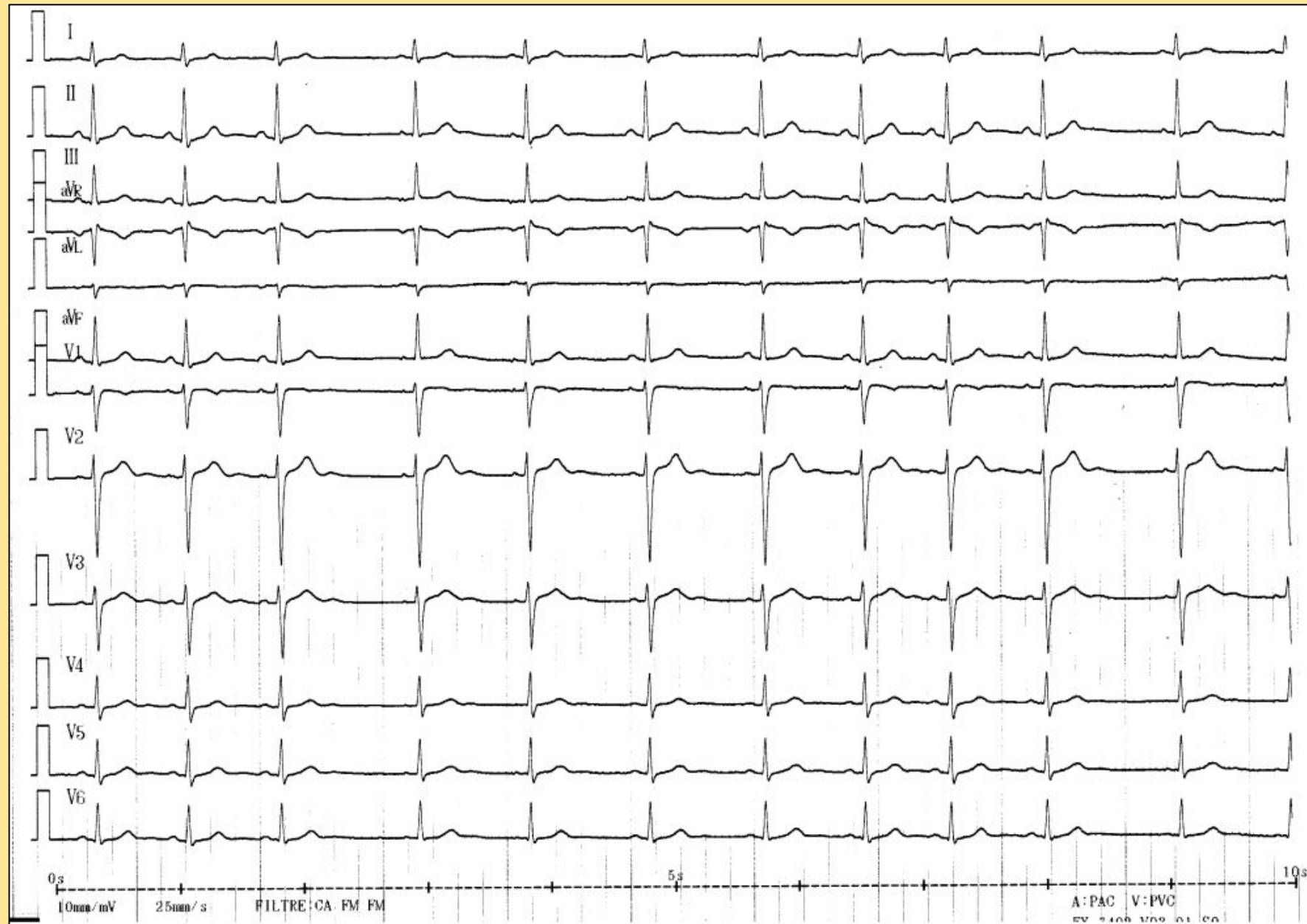
Fibres efférentes cardiovasculaires:

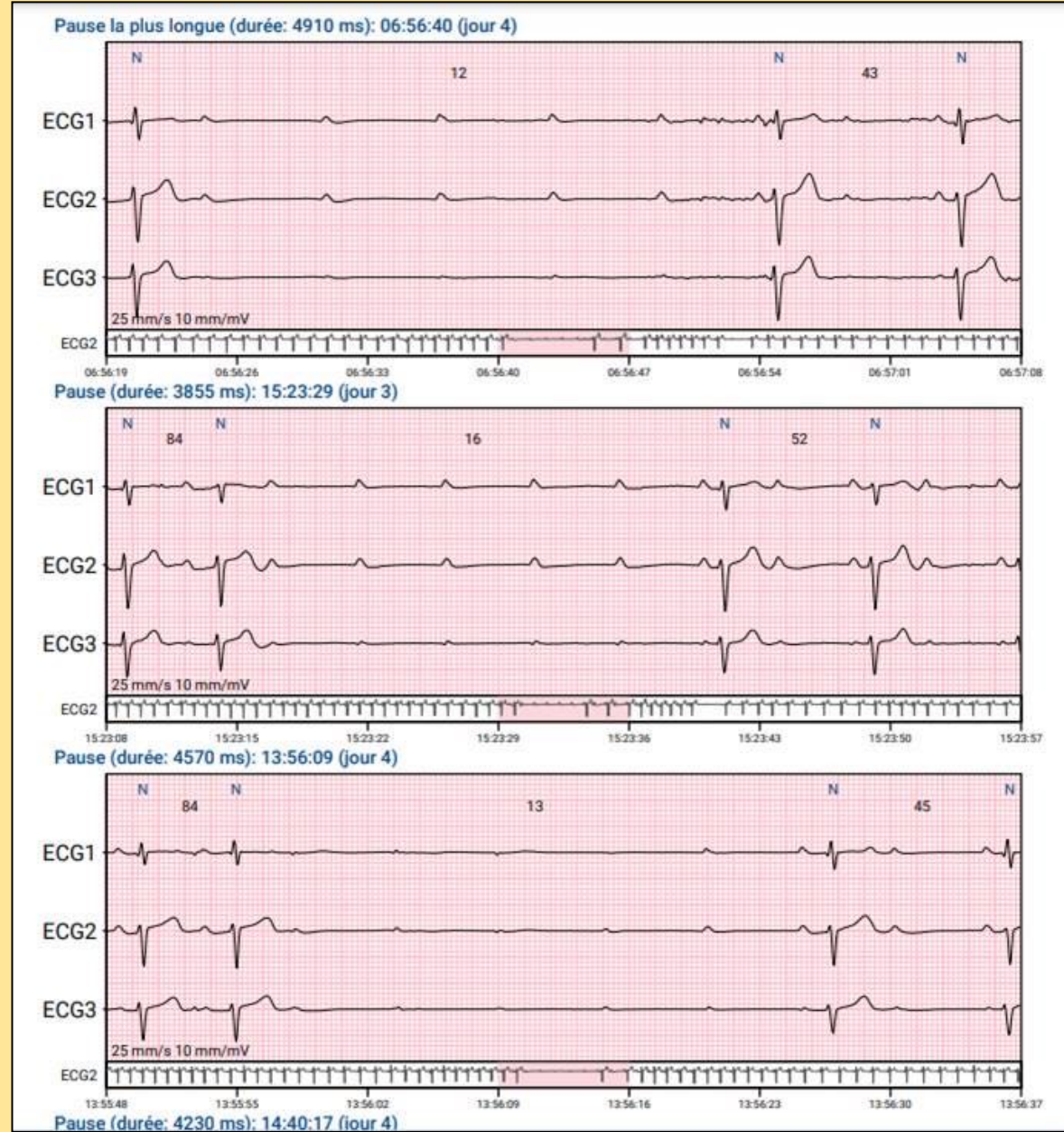
symp



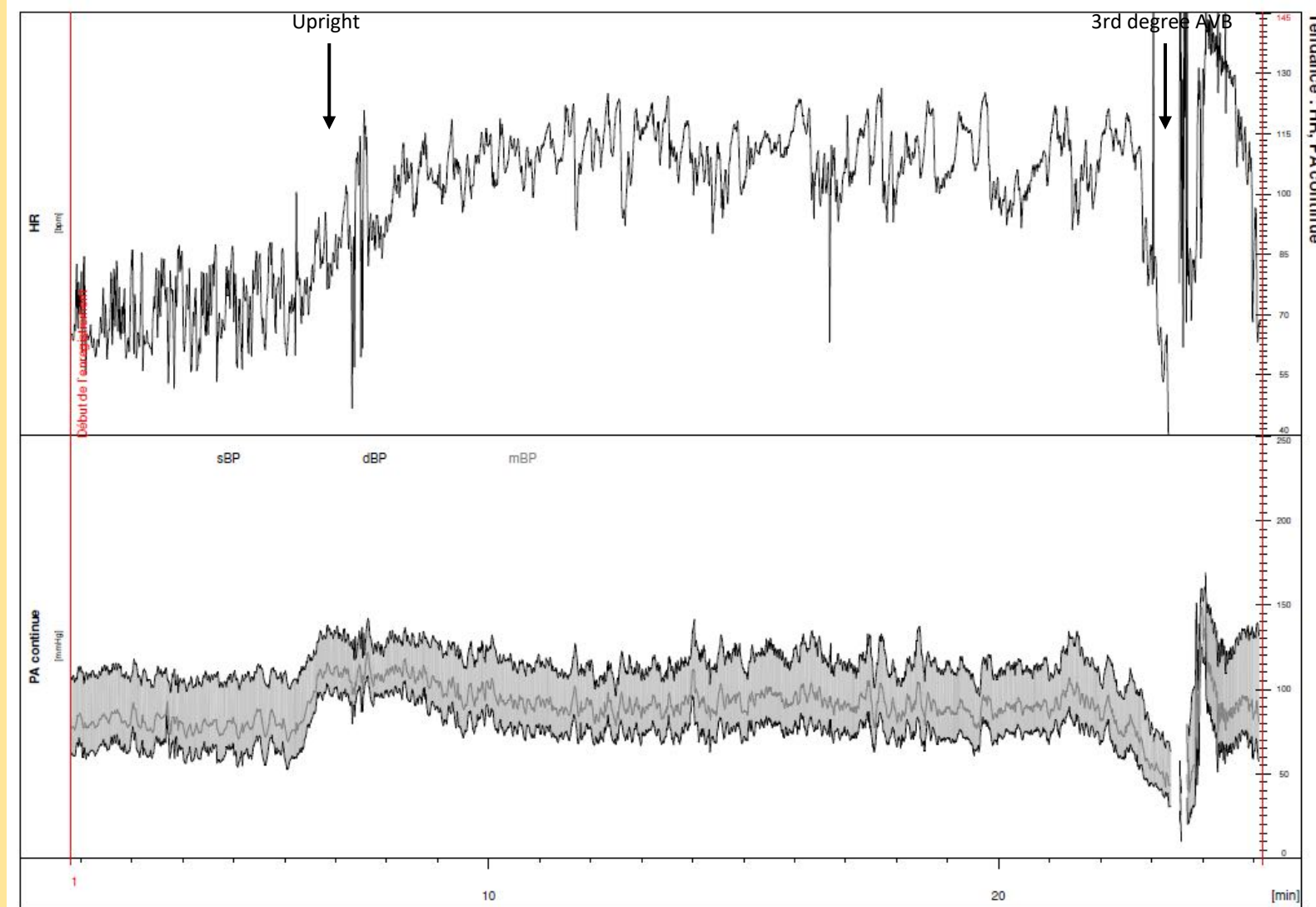
Zipes. Et al. 'Ro
Research 114,
Berthoud, et
Neuroscience
[0702\(00\)00215-0](http://0702(00)00215-0).

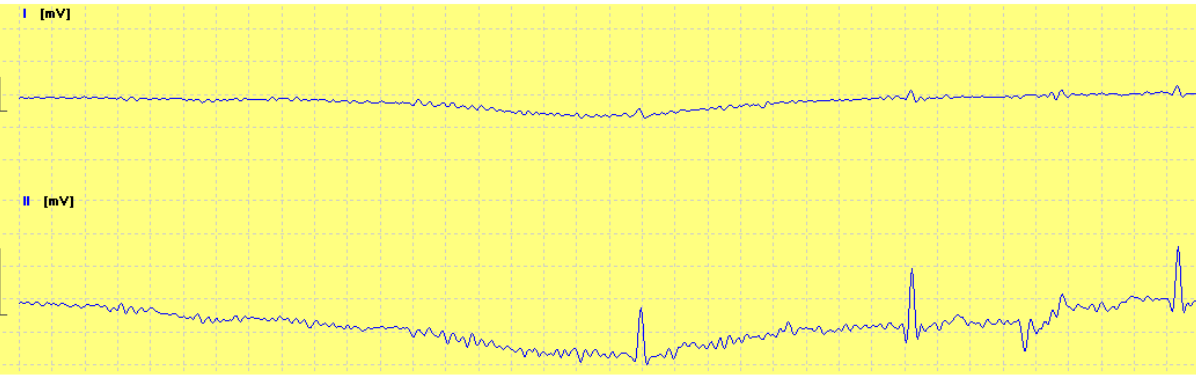
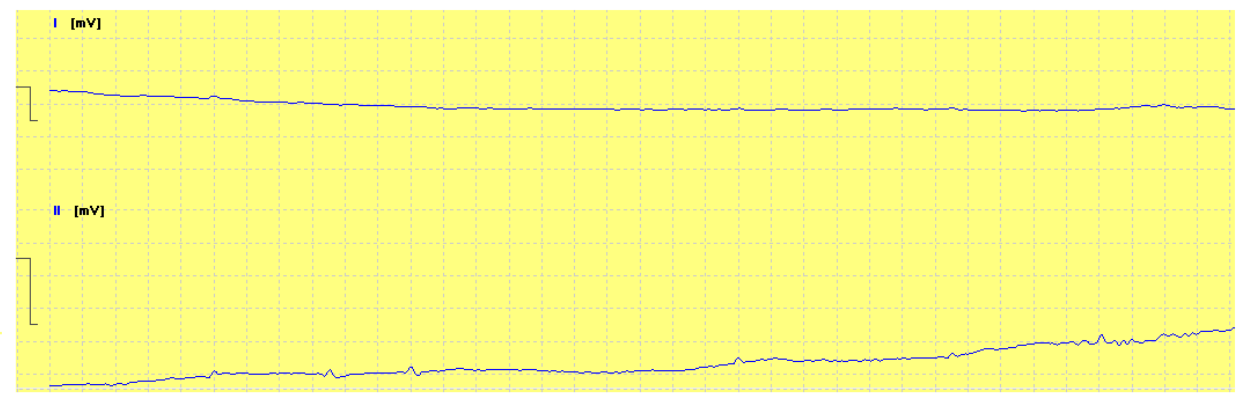
Case 1:
Femme,
24 ans



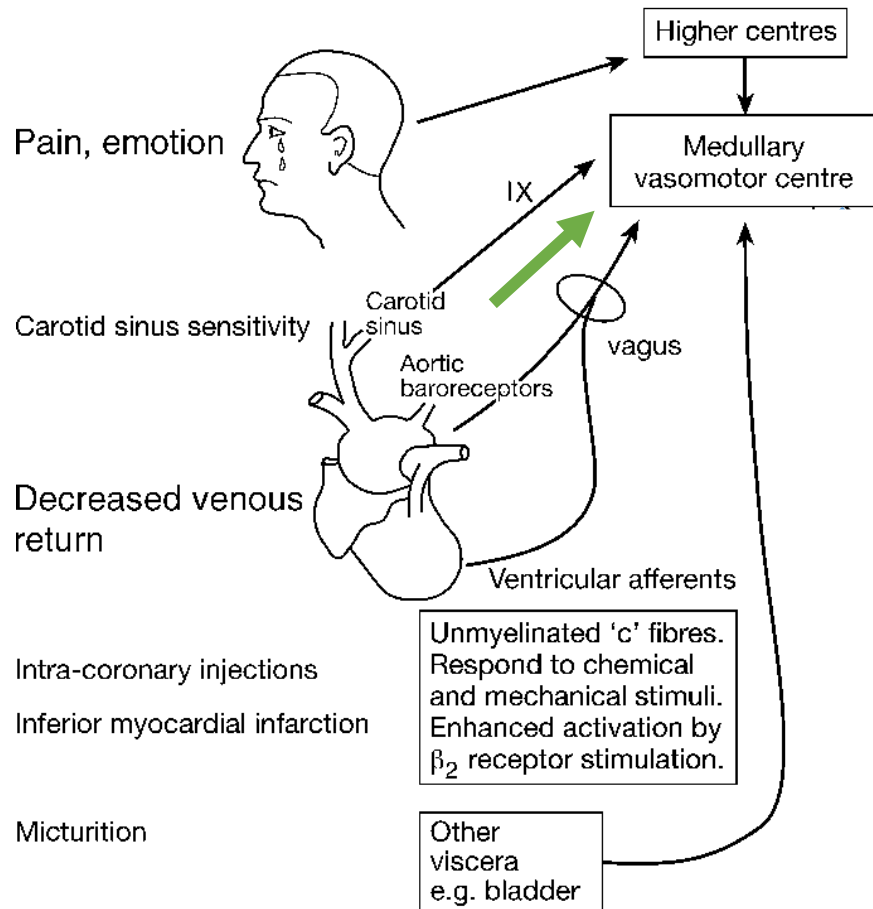


Tilt test





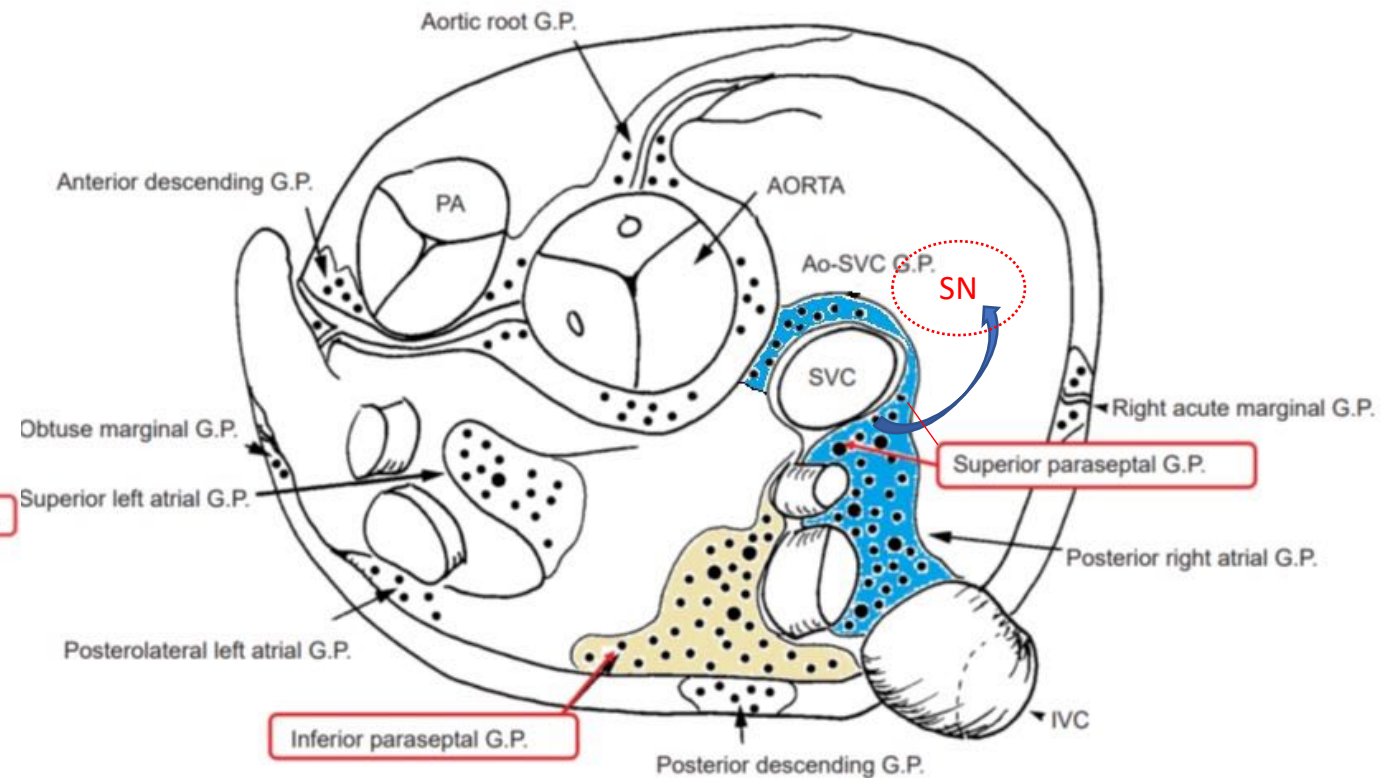
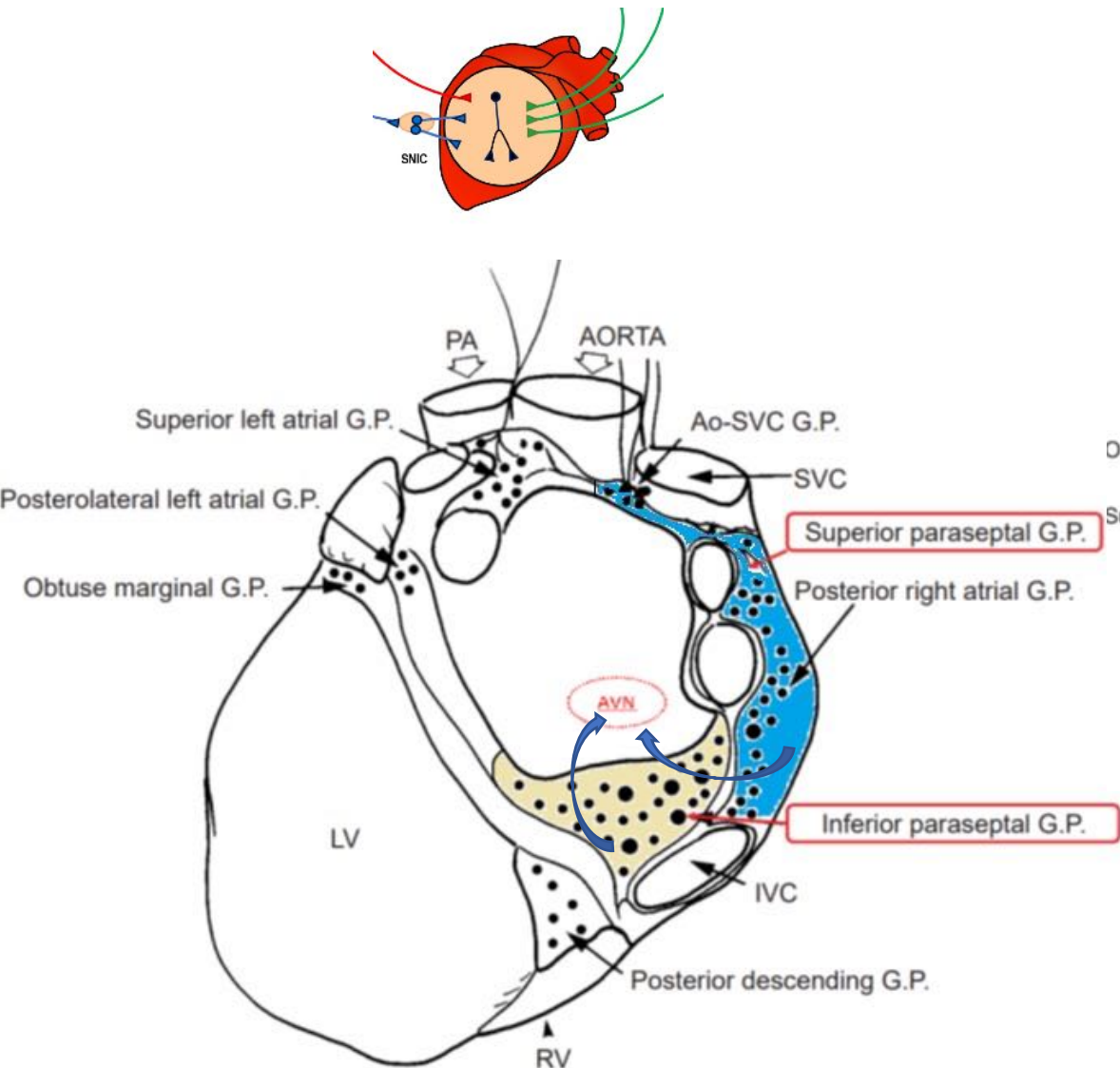
Afferent pathway



SYNCOPE REFLEXE

= Réflexe
anormal
(fibres
afférentes)

Plexus cardiaque effecteur



Adapted from,

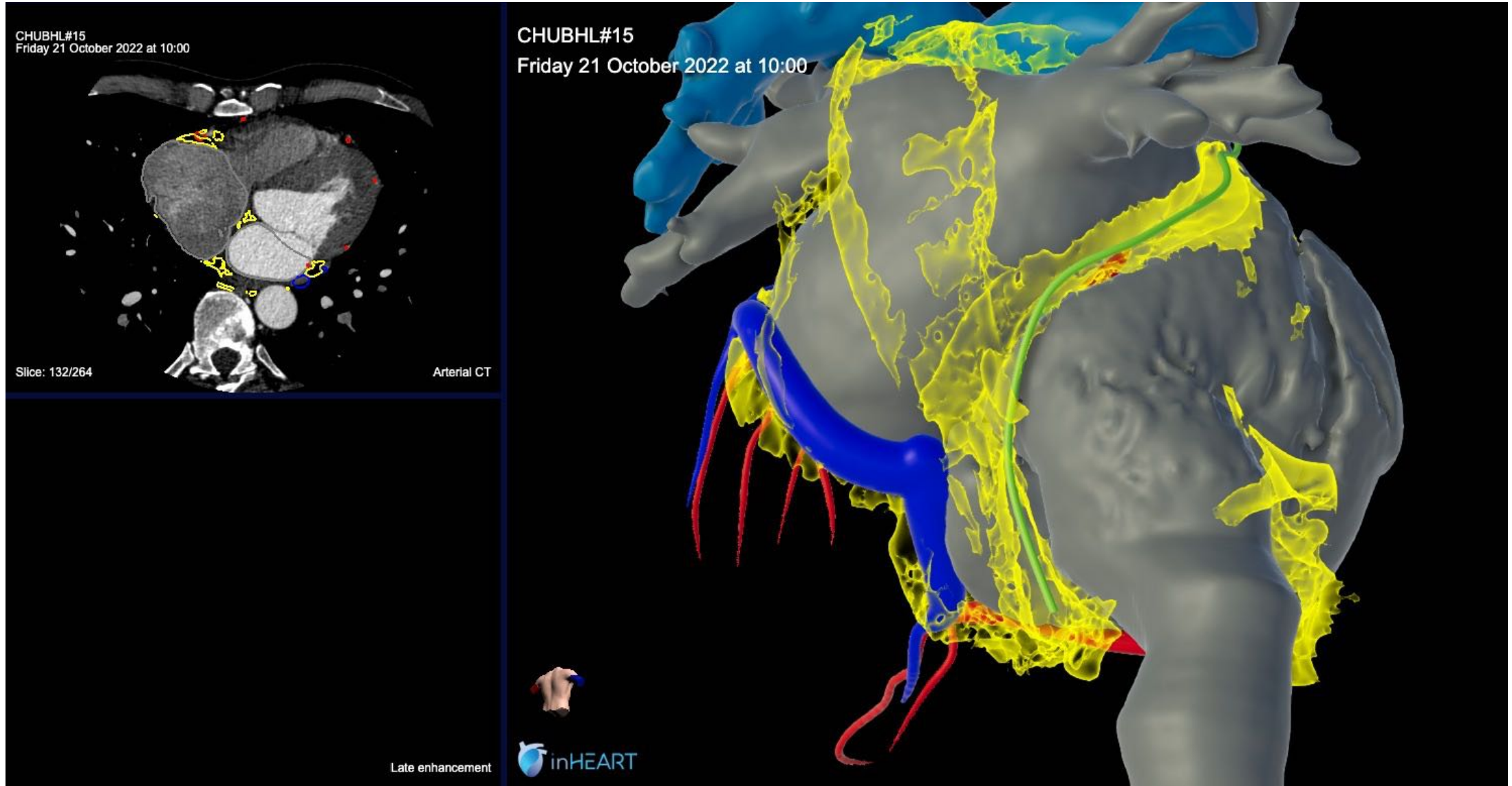
Hanna et al. 'Innervation and Neuronal Control of the Mammalian Sinoatrial Node a Comprehensive Atlas'. *Circulation Research* 128, no. 9 (30 April 2021): 1279–96.
<https://doi.org/10.1161/CIRCRESAHA.120.318458>.

Armour et al. 'Gross and Microscopic Anatomy of the Human Intrinsic Cardiac Nervous System'. *The Anatomical Record* 247, no. 2 (1997): 289–98.
[https://doi.org/10.1002/\(SICI\)1097-0185\(199702\)247:2<289::AID-AR15>3.0.CO;2-I](https://doi.org/10.1002/(SICI)1097-0185(199702)247:2<289::AID-AR15>3.0.CO;2-I).

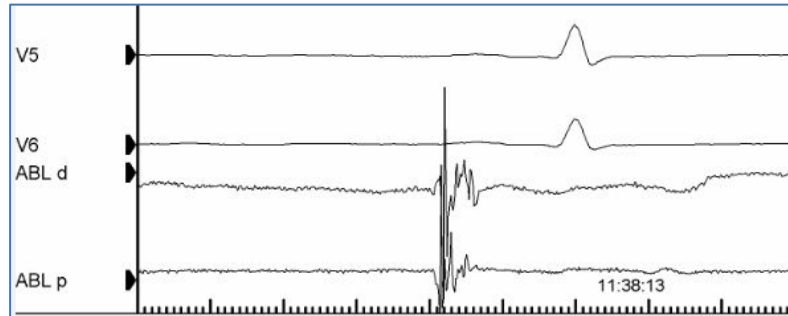
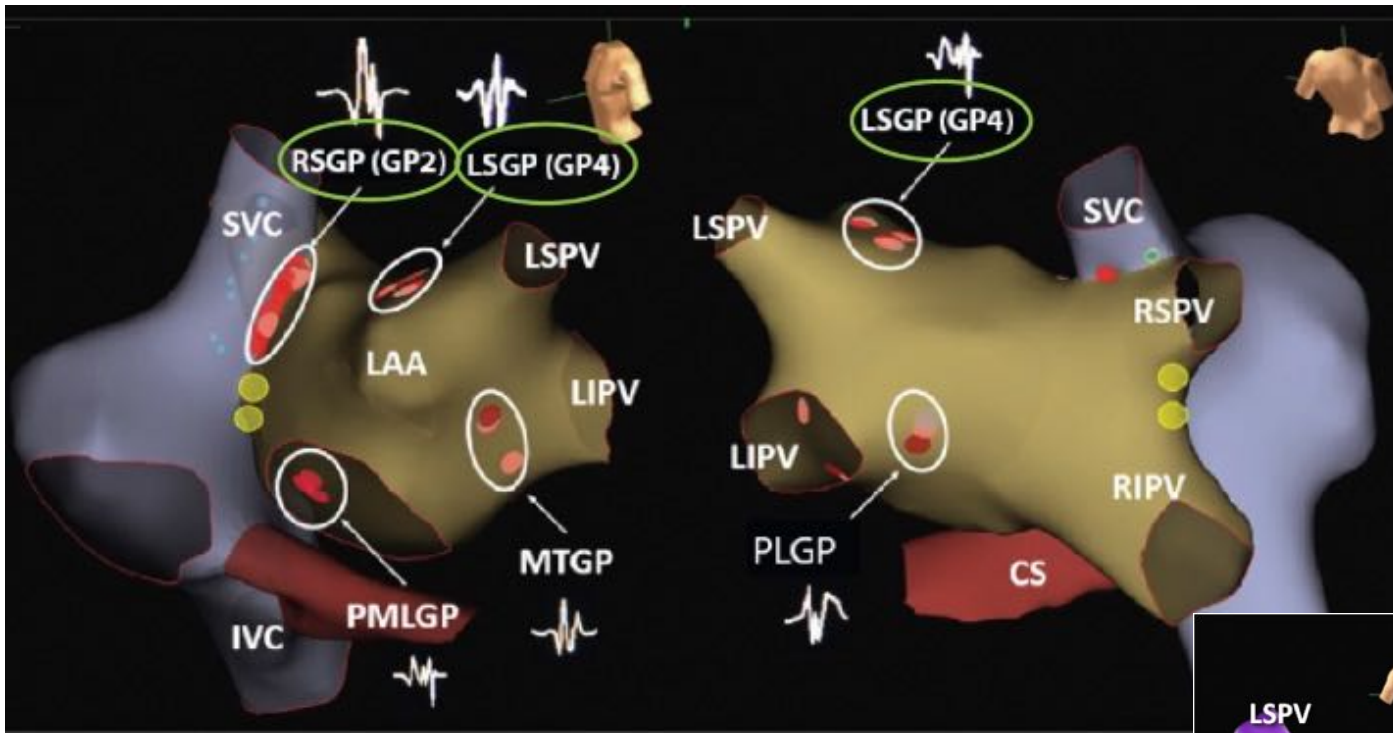
2. Cardioneuroablation – En pratique

- Pre-procedural coroTDM
- General anesthesia:
 - hemodynamic steady state
 - Remifentanil to maximize the vagal status
 - **Sevoflurane** / desflurane (not associated with sympathetic activation)
- Veinous Femoral Access

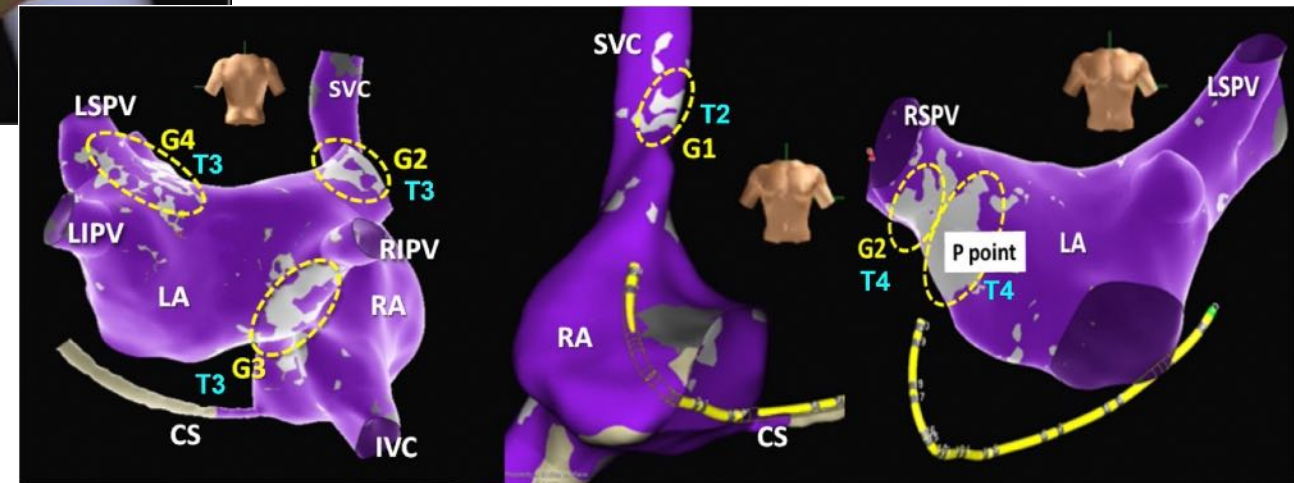
1. Ganglionnated plexi location



High fractionnated signal guided



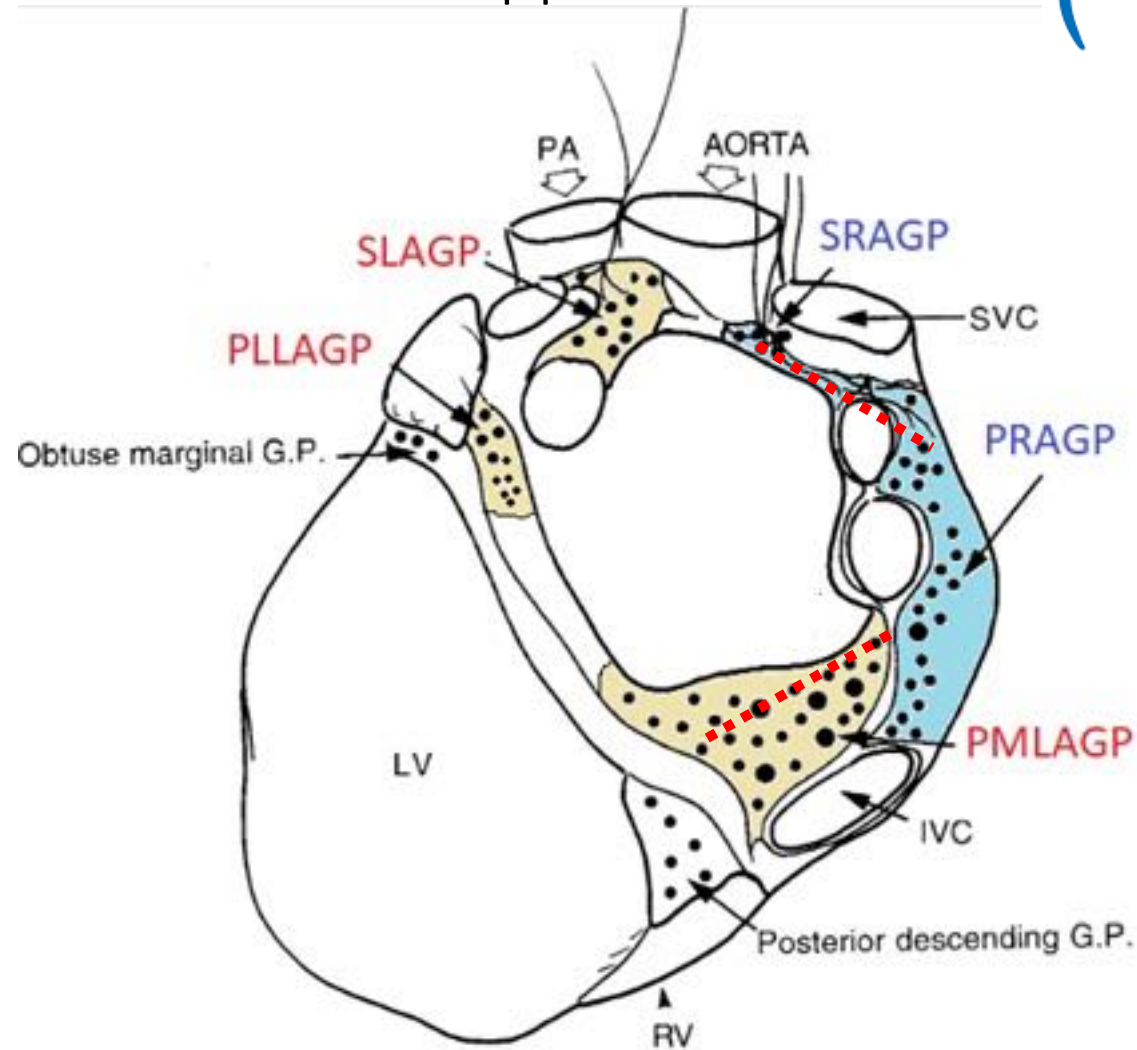
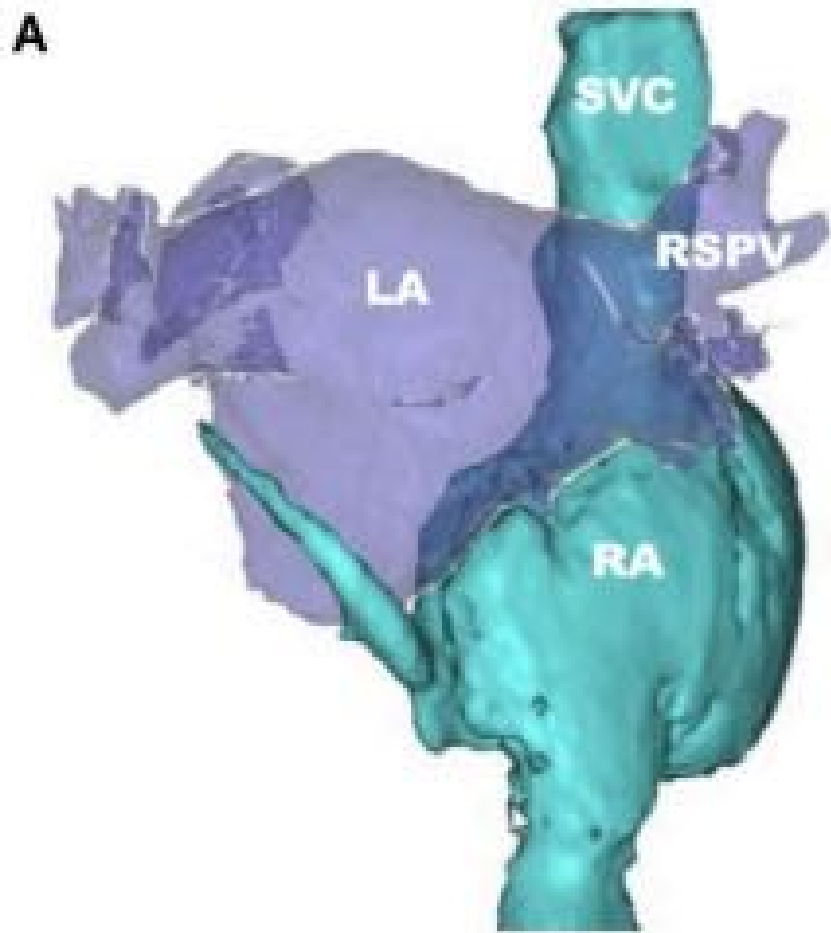
Fractionated



Pachon, Jose Carlos, Enrique Indalecio Pachon, Tolga Aksu, Rakesh Gopinathannair, Josef Kautzner, Yan Yao, et Fred Kusumoto. « Cardioneuroablation: Where Are We At? » *Heart Rhythm O2*, mars 2023, S2666501823000648. <https://doi.org/10.1016/j.hroo.2023.02.007>.

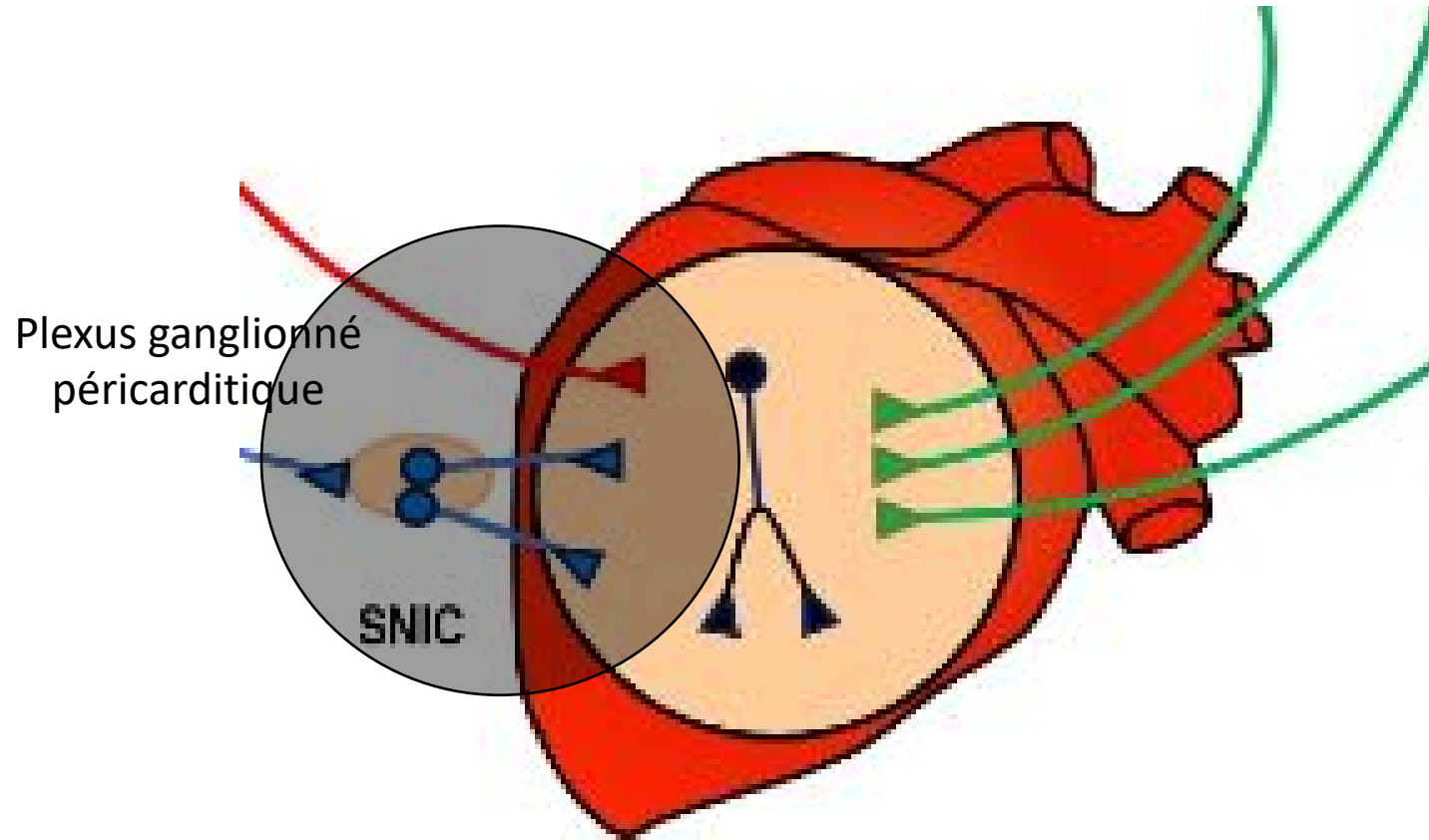
Aksu, Tolga, Tumer Erdem Guler, Ferit Onur Mutluer, Serdar Bozyel, Sukriye Ebru Golcuk, et Kivanc Yalin. « Electroanatomic-Mapping-Guided Cardioneuroablation versus Combined Approach for Vasovagal Syncope: A Cross-Sectional Observational Study ». *Journal of Interventional Cardiac Electrophysiology* 54, n° 2 (mars 2019): 177-88. <https://doi.org/10.1007/s10840-018-0421-4>.

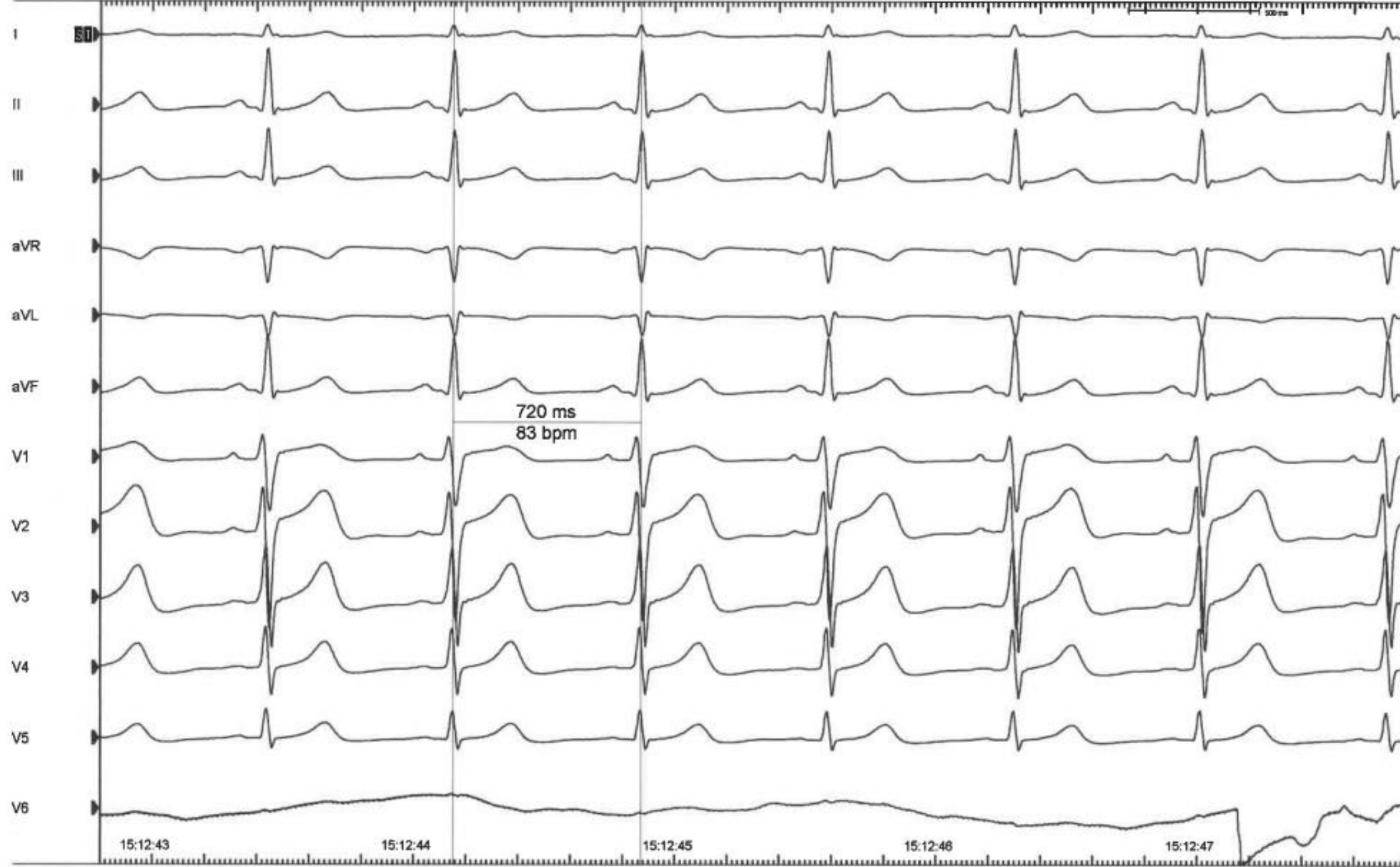
Ganglionated plexi location – Anatomical approach



Debruyne, Philippe, Tom Rossenbacker, Christine Collienne, John Roosen, Bavo Ector, Luc Janssens, Filip Charlier, Bart Vankelecom, Willem Dewilde, et William Wijns. « Unifocal Right-Sided Ablation Treatment for Neurally Mediated Syncope and Functional Sinus Node Dysfunction Under Computed Tomographic Guidance ». *Circulation: Arrhythmia and Electrophysiology* 11, n° 9 (septembre 2018): e006604. <https://doi.org/10.1161/CIRCEP.118.006604>.

2. Ablation End-point

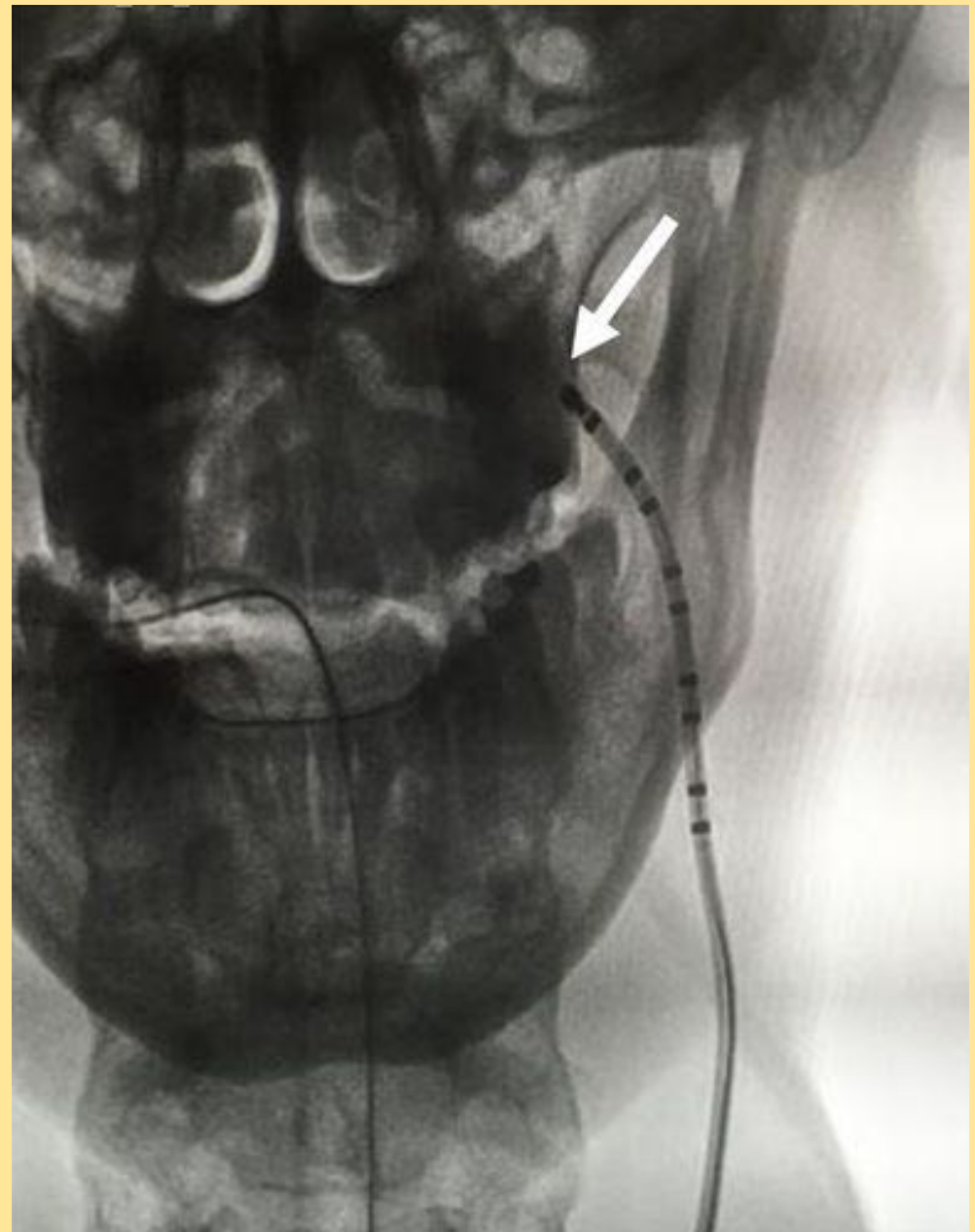


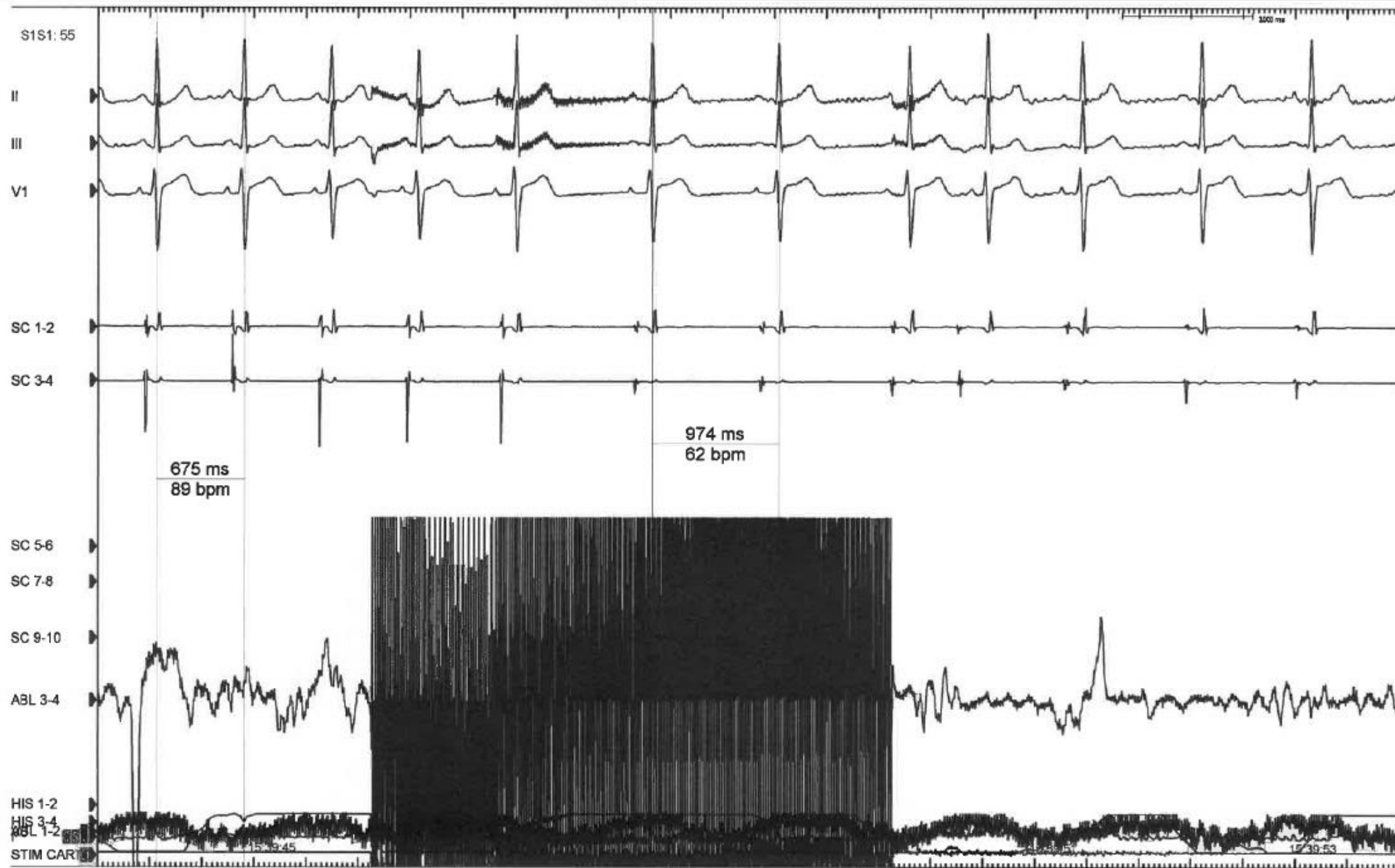


Stimulation Vagale

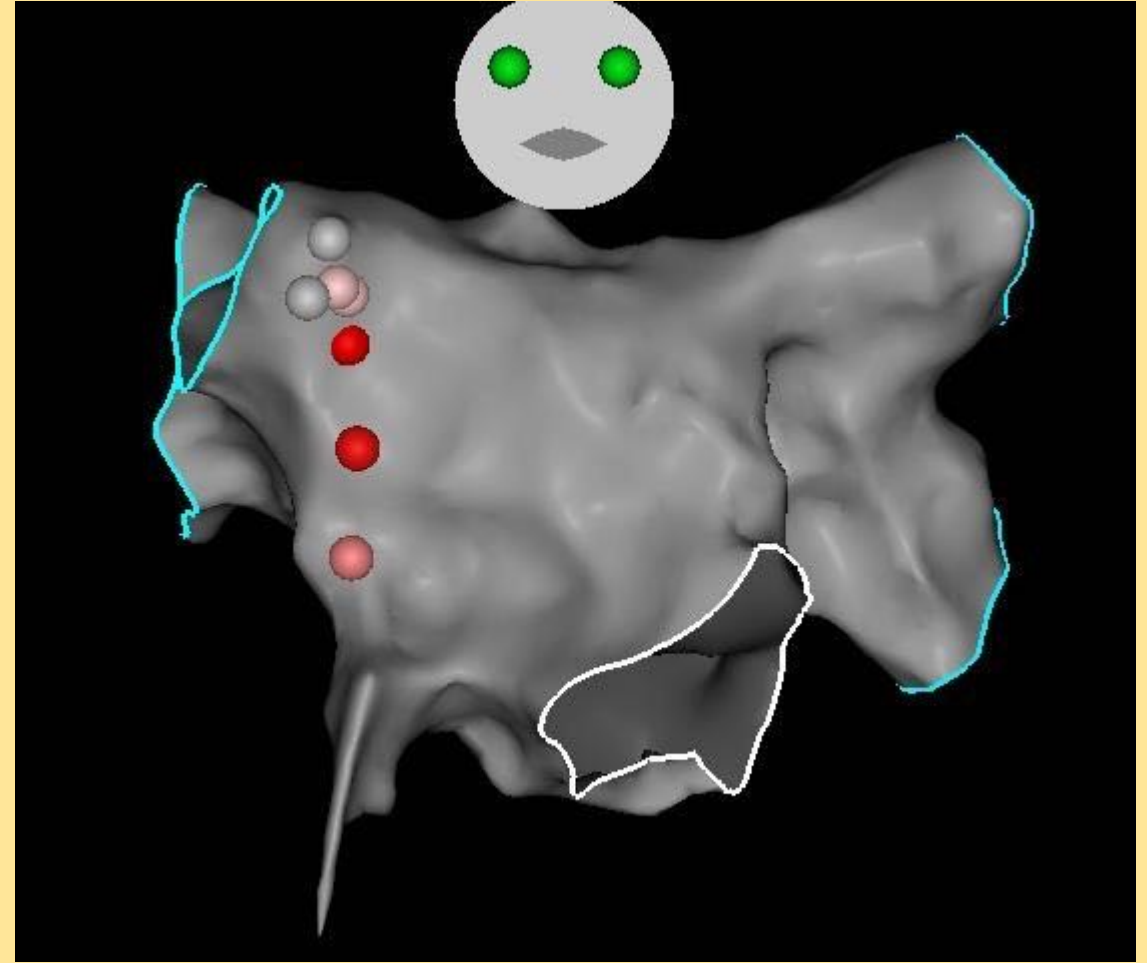
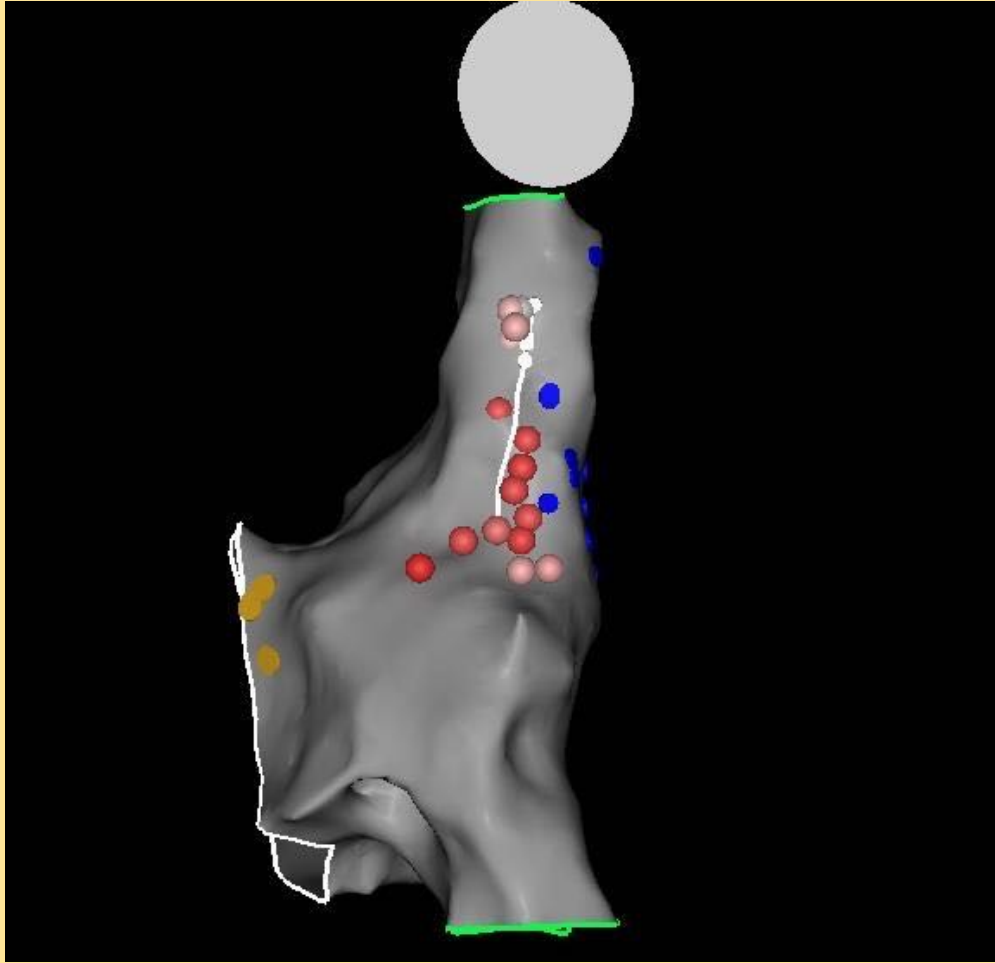
Sinus carotidien

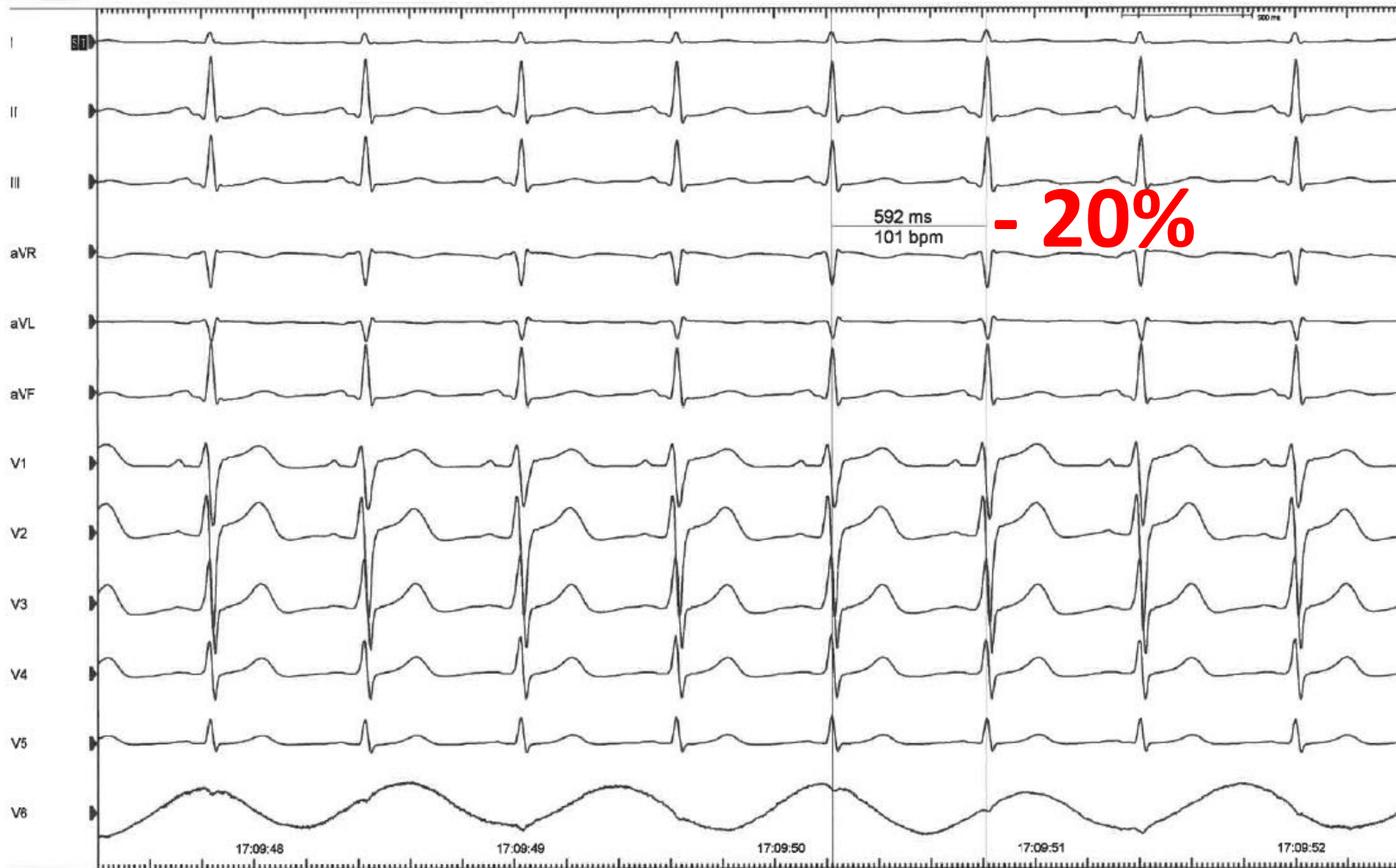
- 50 hz
- 20-50 V

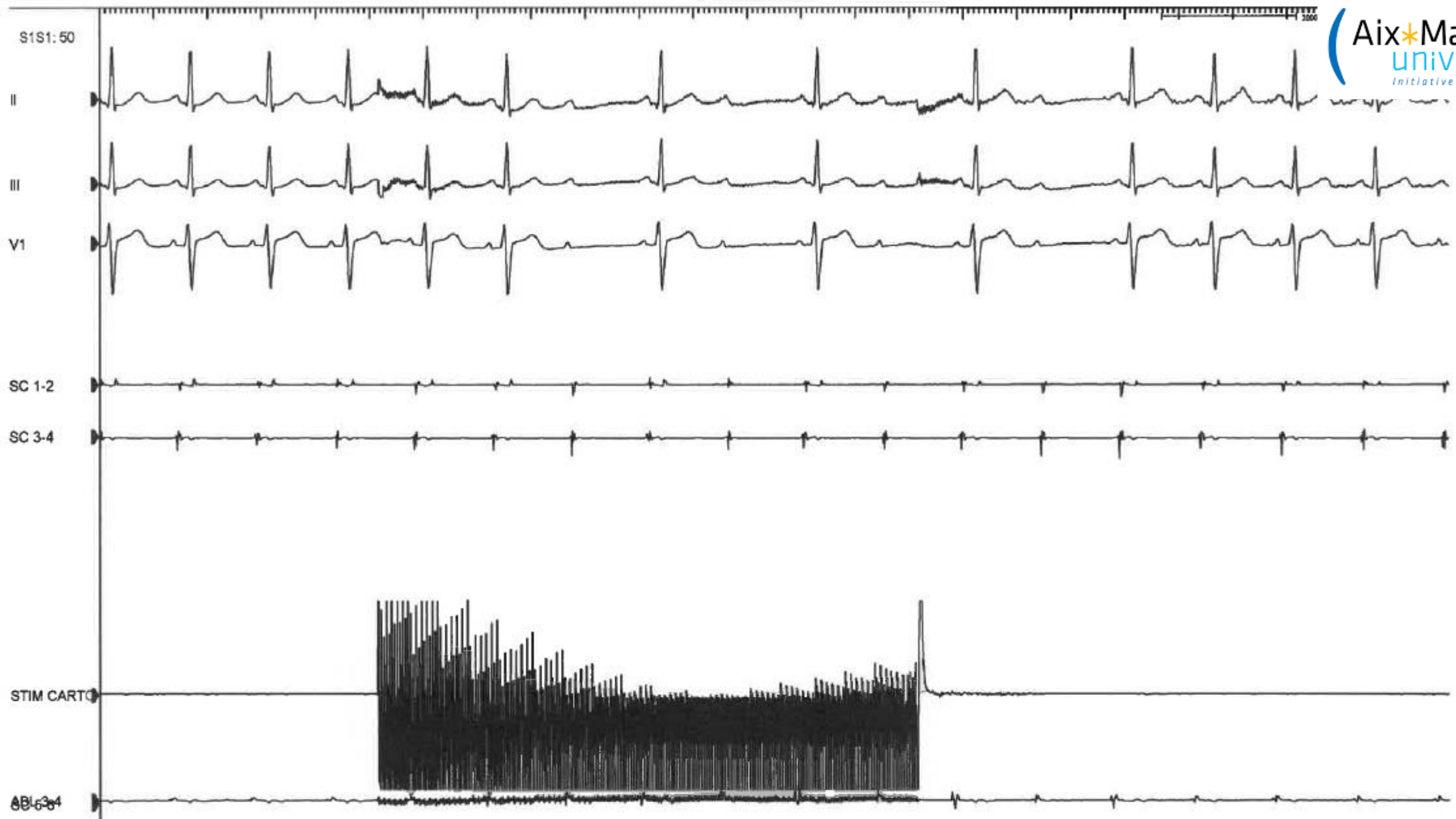




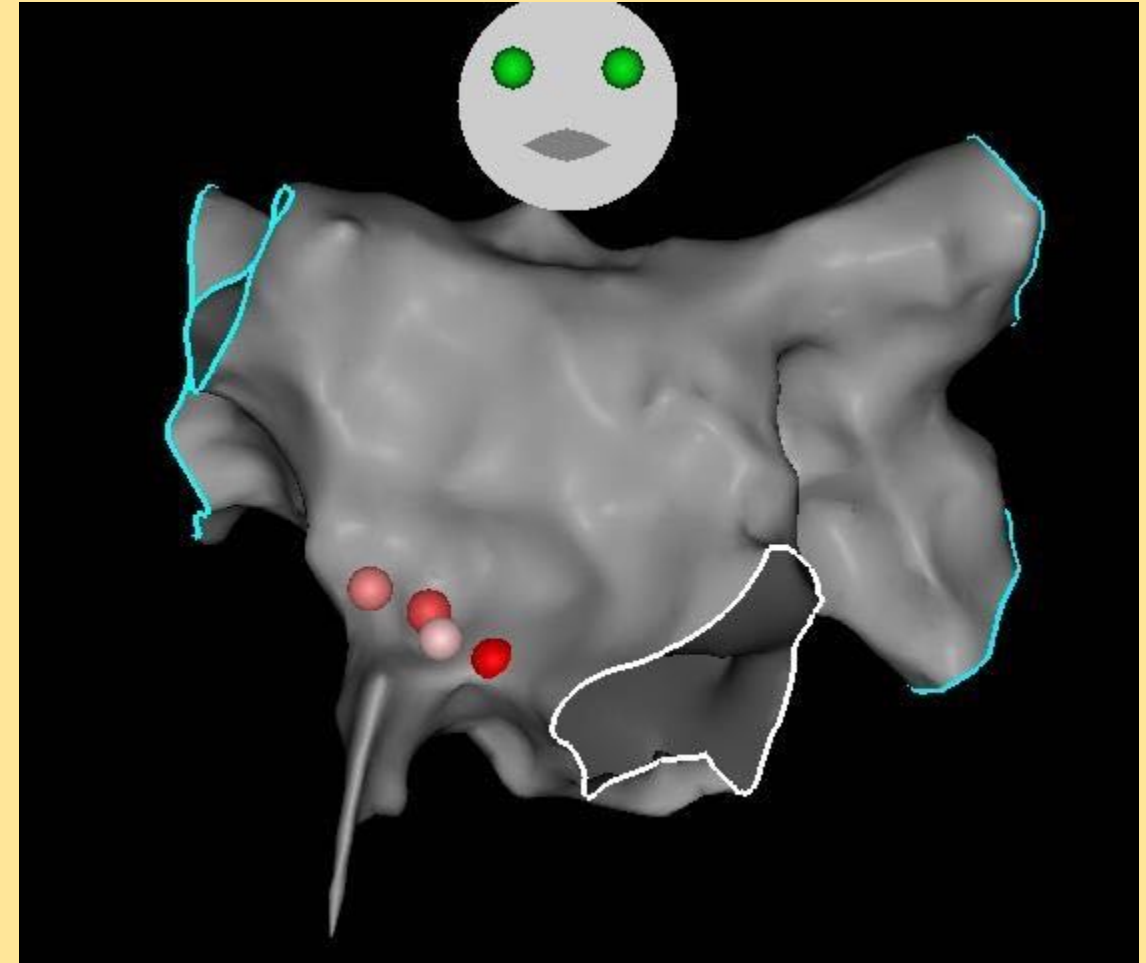
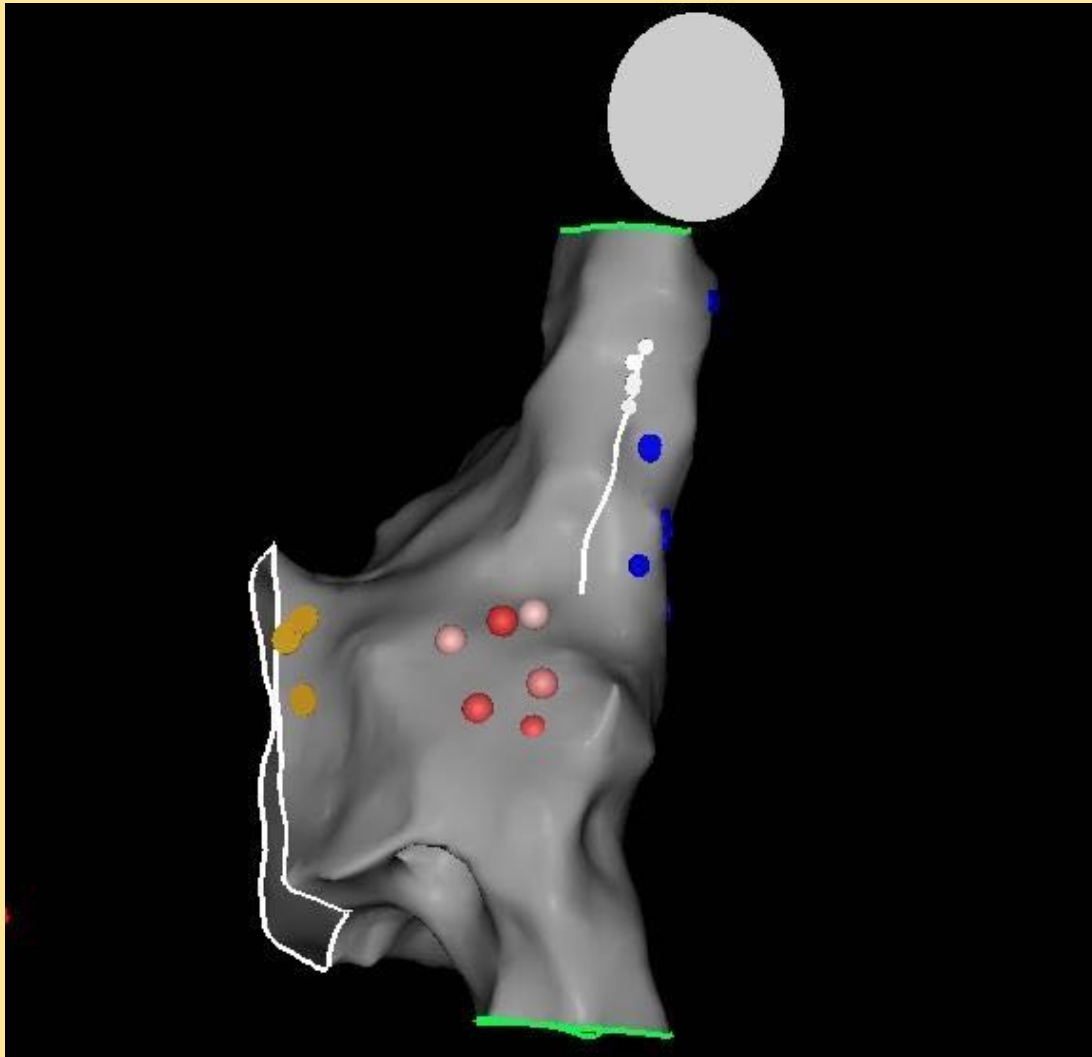
Ablation ganglion postérieur droit (SPSGP)

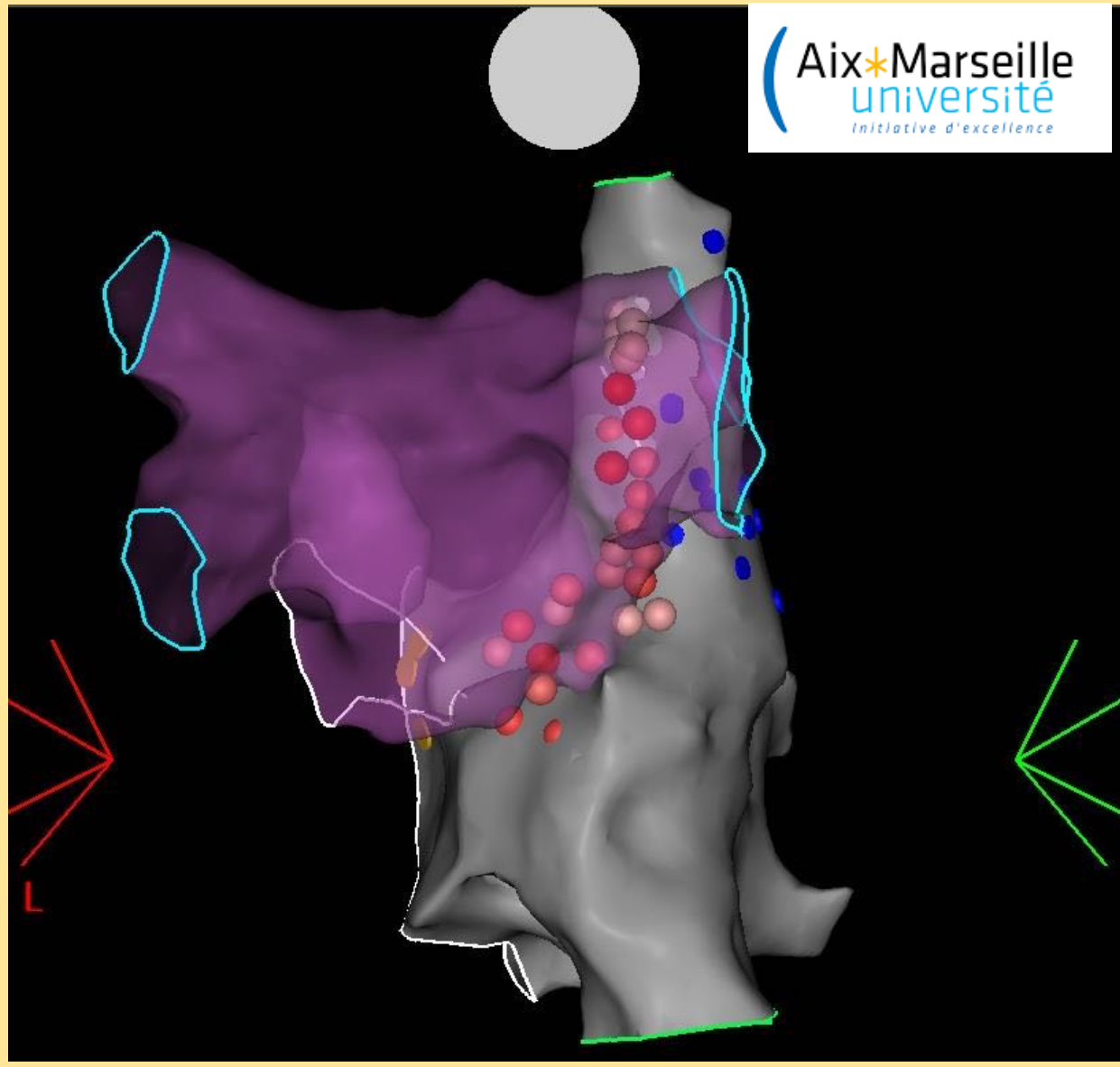
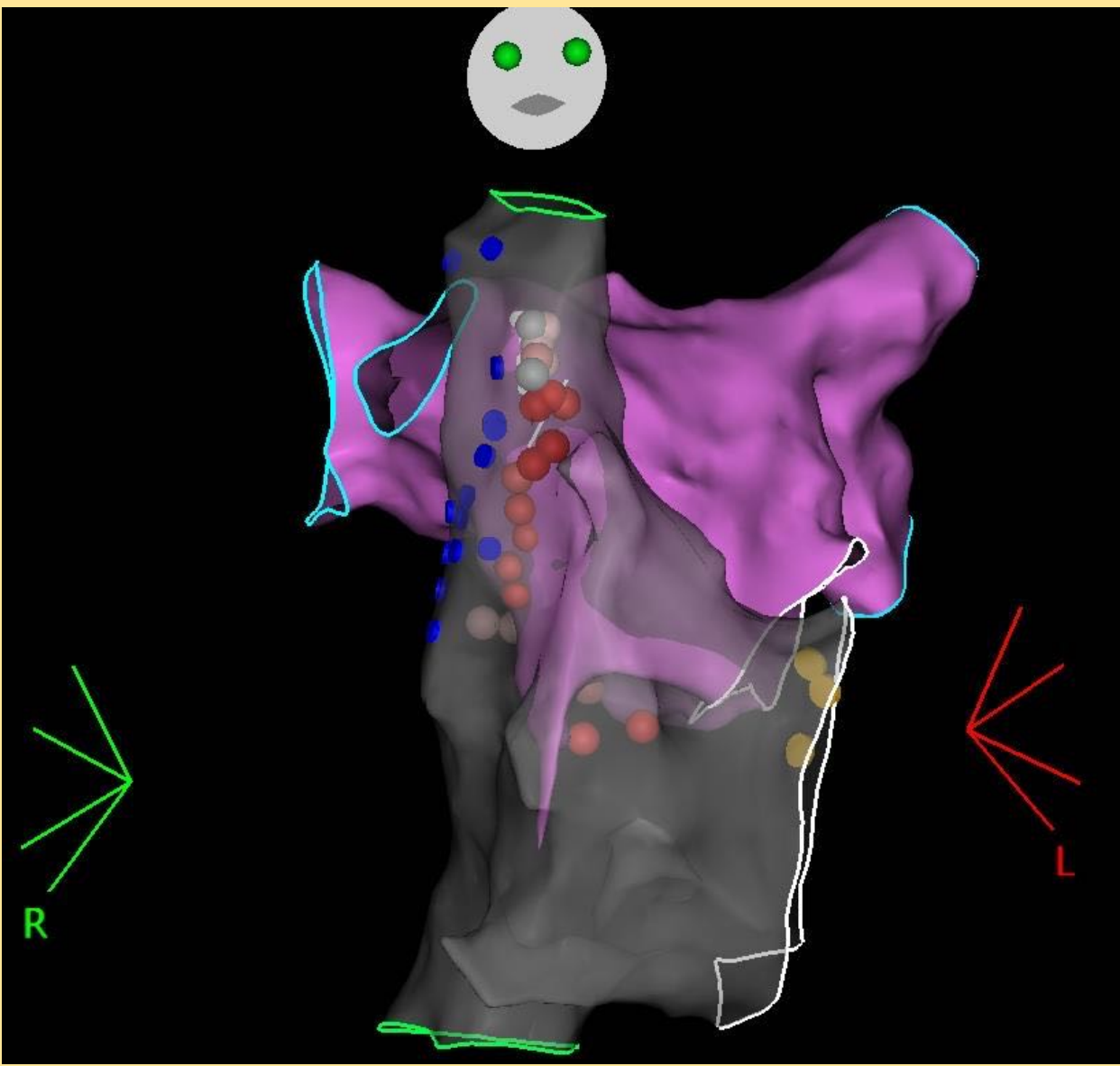


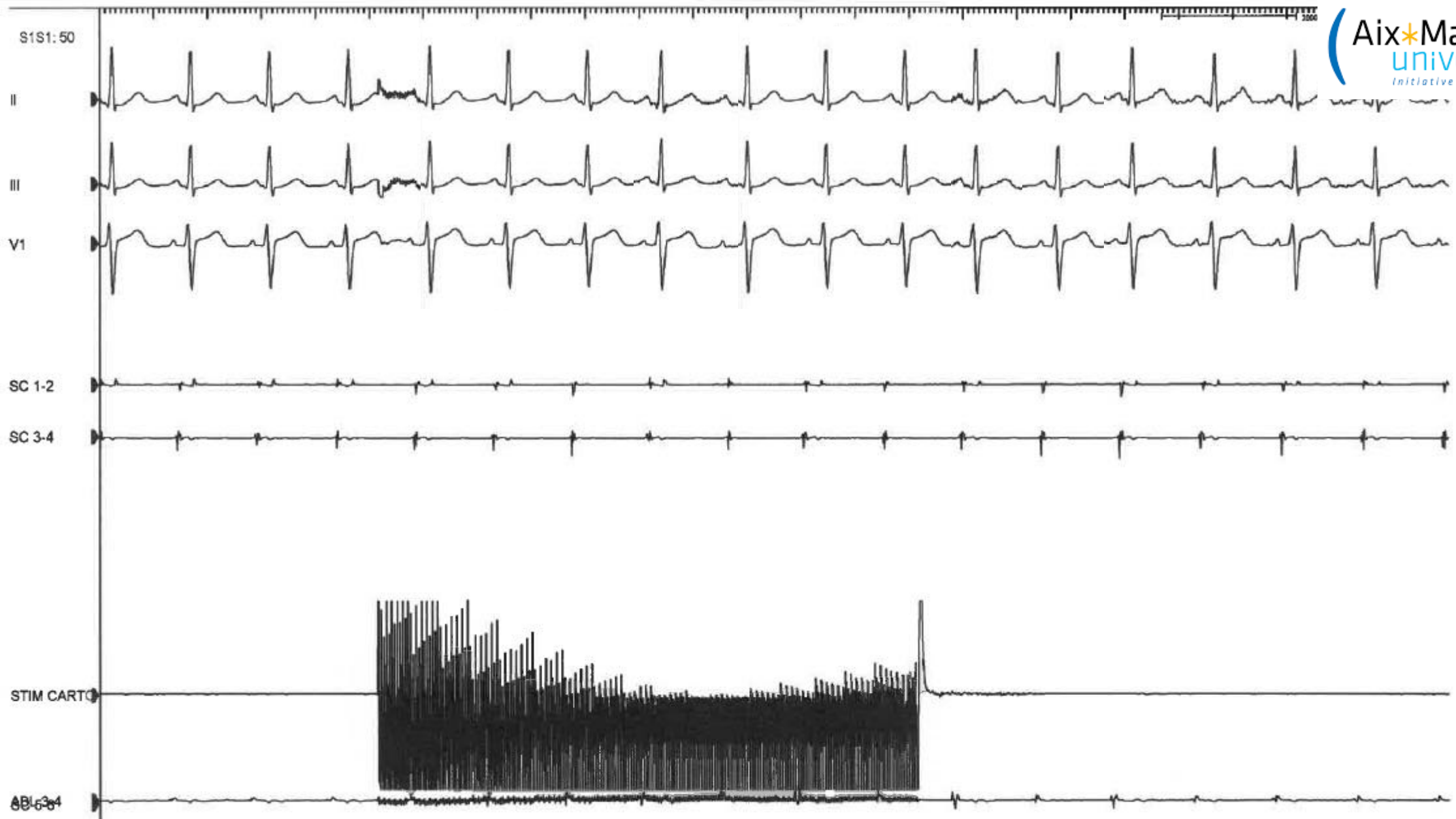




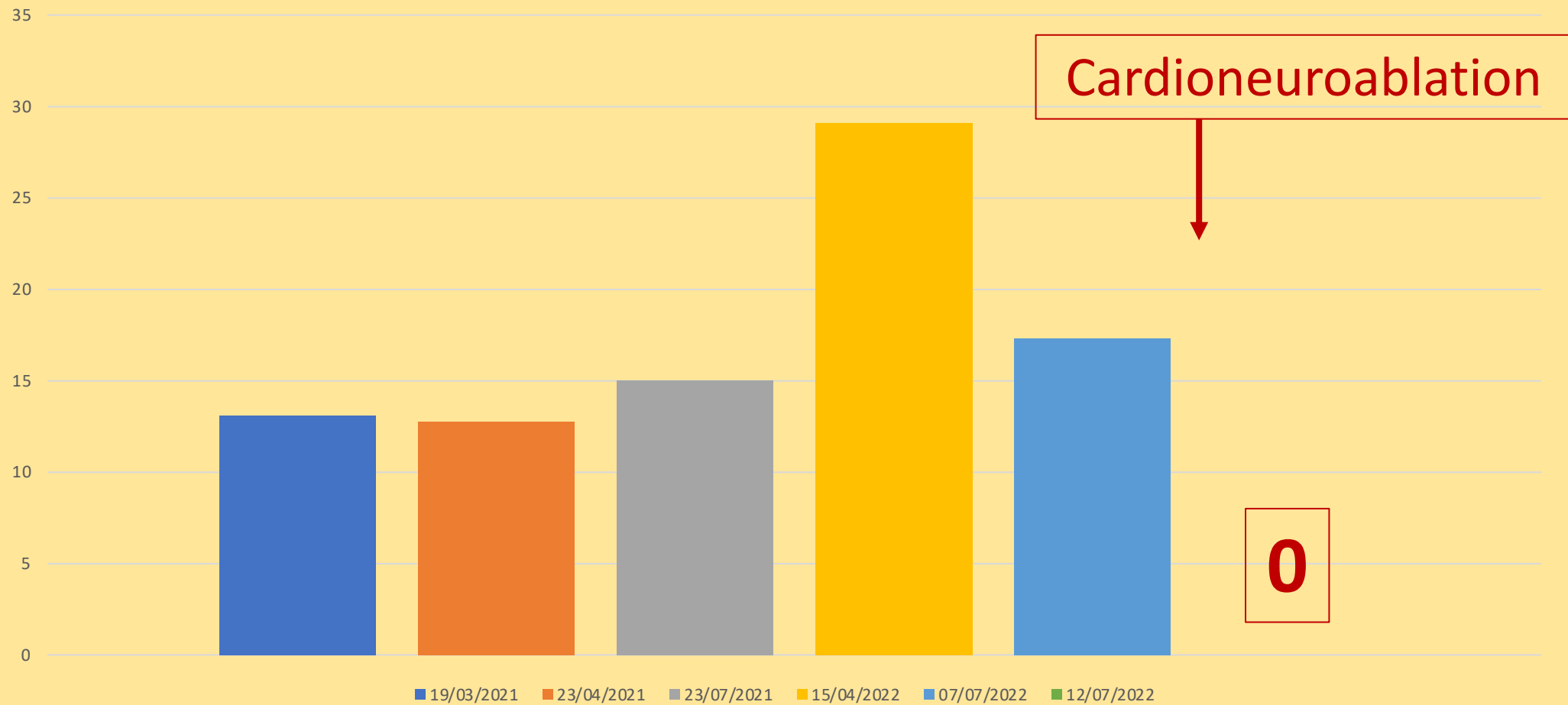
Ablation du ganglion paramedian (IPSGP)





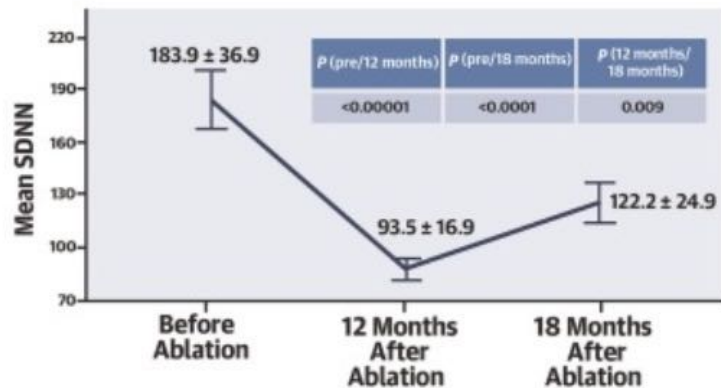
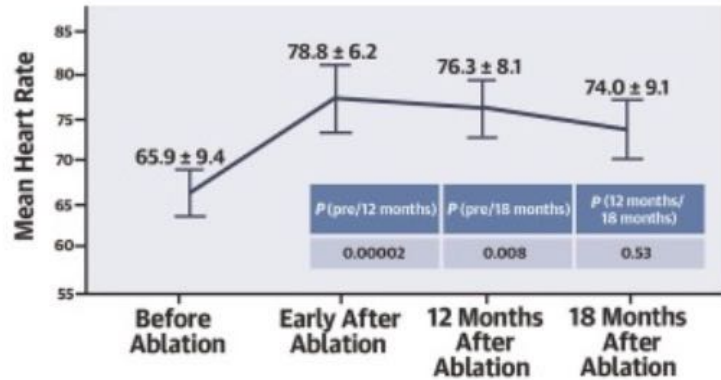


Number of pauses / day



CNA – Sympathetic tone hyperactivity

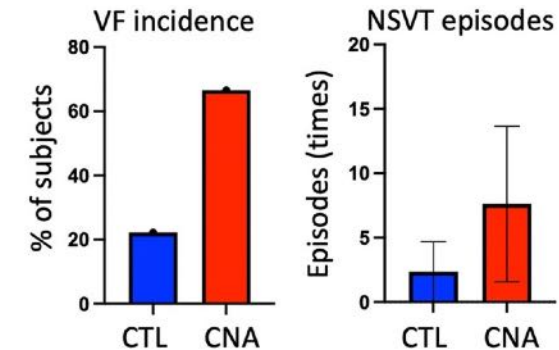
Heart Rate (HR) and Heart Rate Variability (HRV) at 12 and 18 Months Follow-Up



Cardioneuroablation



Ventricular arrhythmia during ischemia



Rivarola, Esteban W. R., Denise Hachul, Tan Chen Wu, Cristiano Pisani, Vinicius D. Scarioti, Carina Hardy, Francisco Darrieux, et Mauricio Scanavacca. « Long-Term Outcome of Cardiac Denervation Procedures: The Anatomically Guided Septal Approach ». *JACC: Clinical Electrophysiology*, FOCUS ON VENTRICULAR ARRHYTHMIAS, 9, n° 8, Part 1 (1 août 2023): 1344-53. <https://doi.org/10.1016/j.jacep.2023.01.032>.

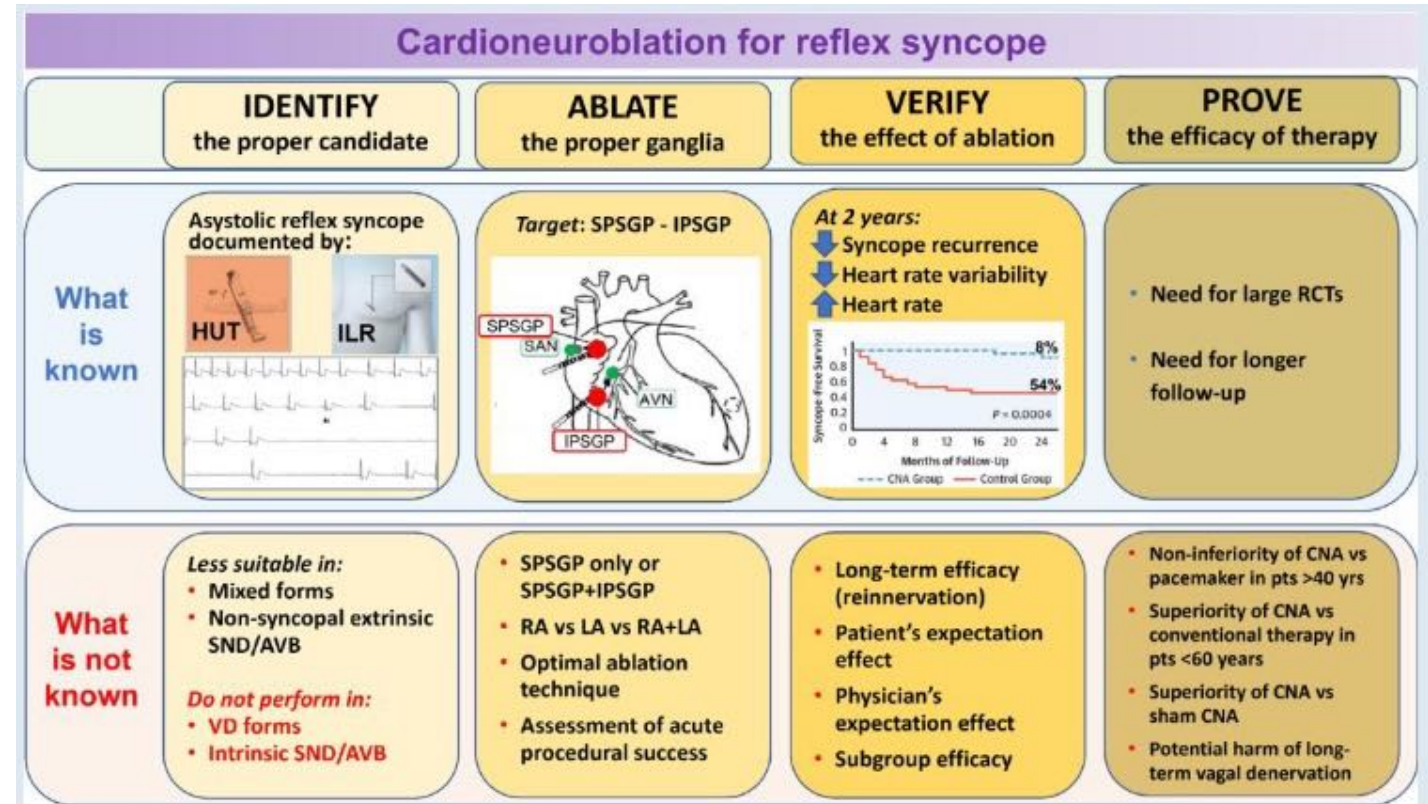
Chung, Wei-Hsin, Kiyoshi Masuyama, Ronald Challita, Justin Hayase, Shumpei Mori, Steven Cha, Jason S. Bradfield, Jeffrey L. Ardell, Kalyanam Shivkumar, et Olujimi A. Ajjijola. « Ischemia-induced ventricular proarrhythmia and cardiovascular autonomic dysreflexia after cardioneuroablation ». *Heart Rhythm* 20, n° 11 (1 novembre 2023): 1534-45. <https://doi.org/10.1016/j.hrthm.2023.08.001>.

Conclusions

- Syncope réflexe: inadéquation du système nerveux autonome afférent induisant une réponse effectrice inappropriée

- Cardioneuroablation

- Localiser la cible
- Ablation / critère de succès
- Follow-up



Brignole, Michele, Tolga Aksu, Leonardo Calò, Philippe Debruyne, Jean Claude Deharo, Alessandra Fanciulli, Artur Fedorowski, et al. « Clinical Controversy: Methodology and Indications of Cardioneuroablation for Reflex Syncope ». *Europace* 25, n° 5 (19 mai 2023): euad033. <https://doi.org/10.1093/europace/euad033>.

