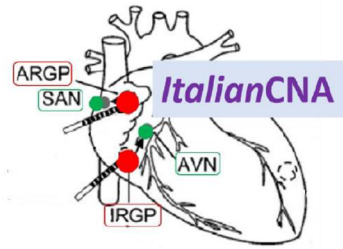
La cardioneuroablazione

Marco Rebecchi

Aritmologia Clinica ed Interventistica
Policlinico Casilino, Roma



Efficacia dell'ablazione transcatetere dei plessi gangliari (Cardioneuroablazione) in atrio destro in pazienti affetti da sincope neuromediata asistolica

Studio multicentrico Italiano promosso da GIMSI

Acronimo: *Italian*CNA

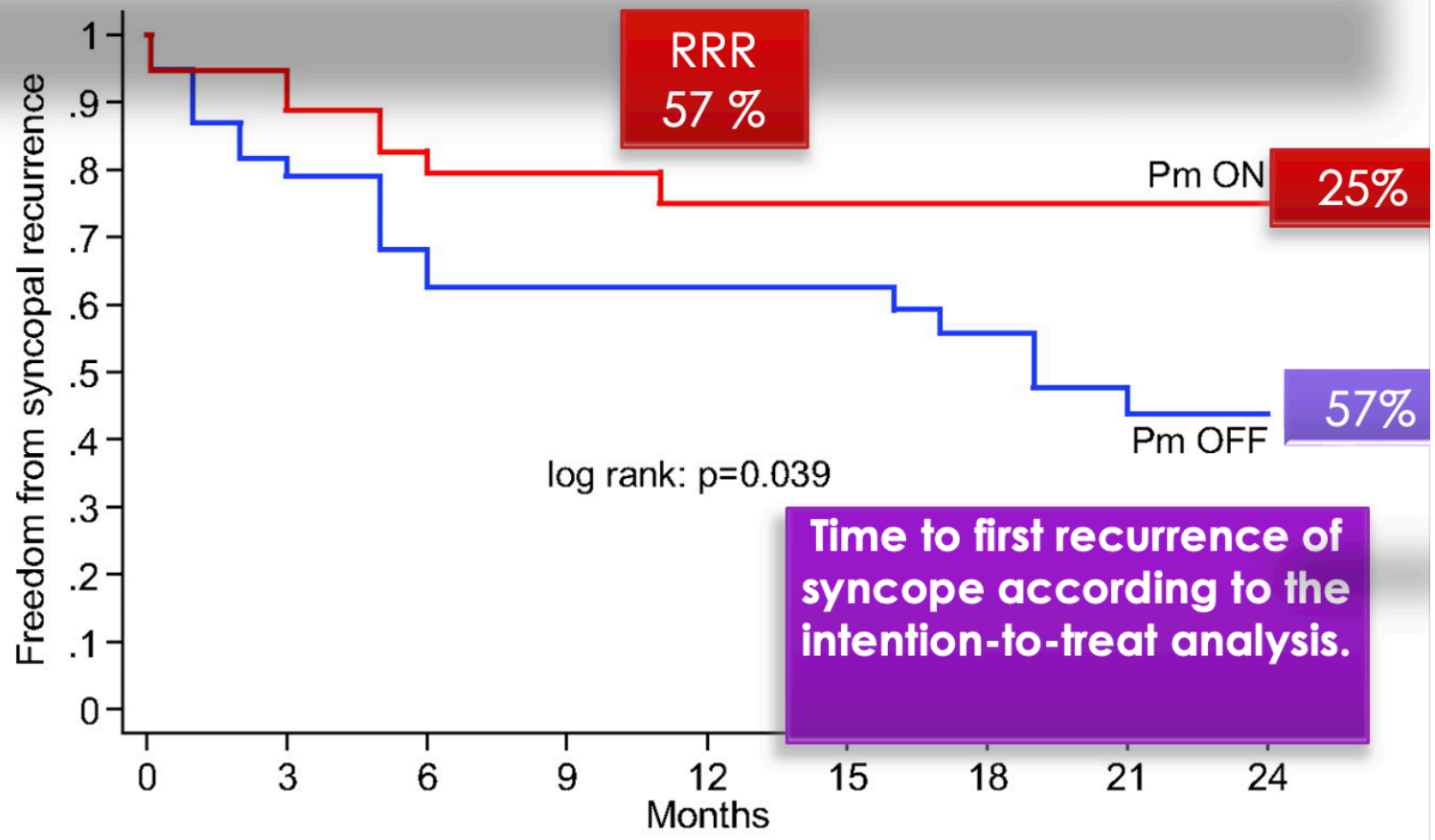
Steering Committee

Coordinatore Scientifico

Prof Michele Brignole

Prof Leonardo Calò	Coordinatore
Dott Alessio Borrelli	Membro
Prof Michele Brignole	Membro
Dr Ermenegildo de Ruvo	Membro
Dr Marco Rebecchi	Membro
Prof Stefano Strano	Membro

International Study on Syncope of Uncertain Etiology 3
ISSUE 3 Trial



Background

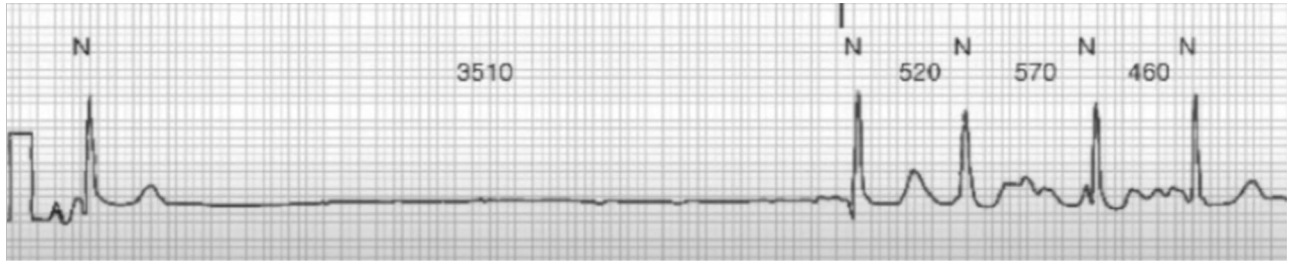
- Despite this, **the role of pacemaker treatment for young patients remains to be established.**

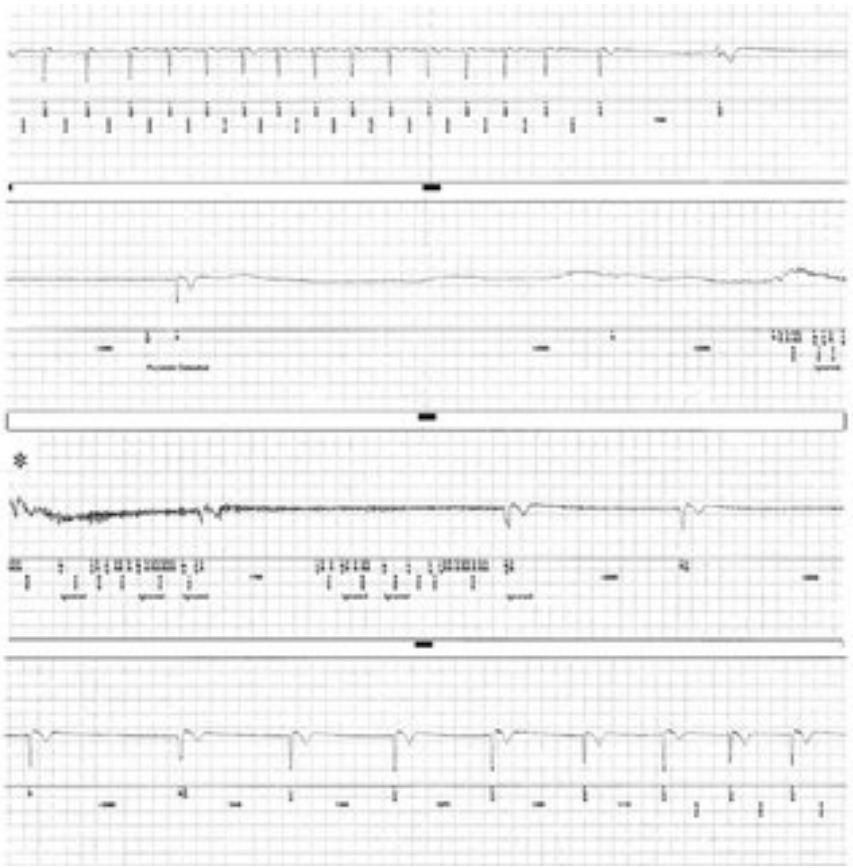
- **Psychological sequelae and the burden of the long-term implanted device** should be considered, with a significantly increased risk of

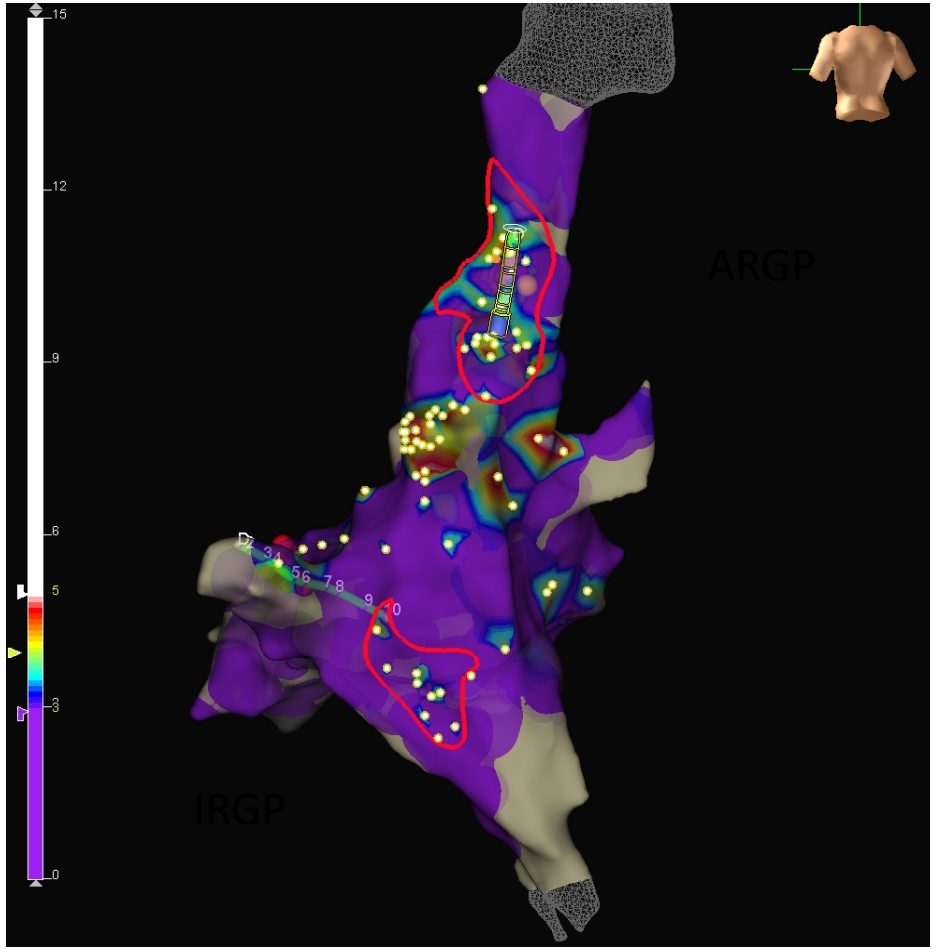
① numerous replacements of pacemaker with increased risk of infection
② Time-related Leads deterioration
③ Possible ventricular remodelling induced by right ventricular pacing over time .

Male, 44 y.o.

4 syncopal episodes in 5 months→ ILR-→AF after sinus arrest







Medico responsabile del follow-up : Remoto

Riepilogo Episodi

Ultima sess. clinica 6 apr 2021
Ultima cancellazione 2 apr 2020
Ultima sessione remota 10 mag 2021

Conteggi episodi

	Da 10 mag 2021	Da 2 apr 2020	Da Impianto
AF	0	36	36
Tachy	0*	249*	886
Brady	0*	0*	0
Pausa	0*	3*	6
Sintomo (Tutti)	0*	2*	26
Sintomo (con Rilevamento)	0*	0*	1

* N. max. di episodi. Sono possibili altri rilevamenti.

Directory Episodi

Tipo	Data e Ora	Durata (D:H:M:S)	Ulteriori informazioni	Stato

Session 1: Why «only» Right Atrial GP ?

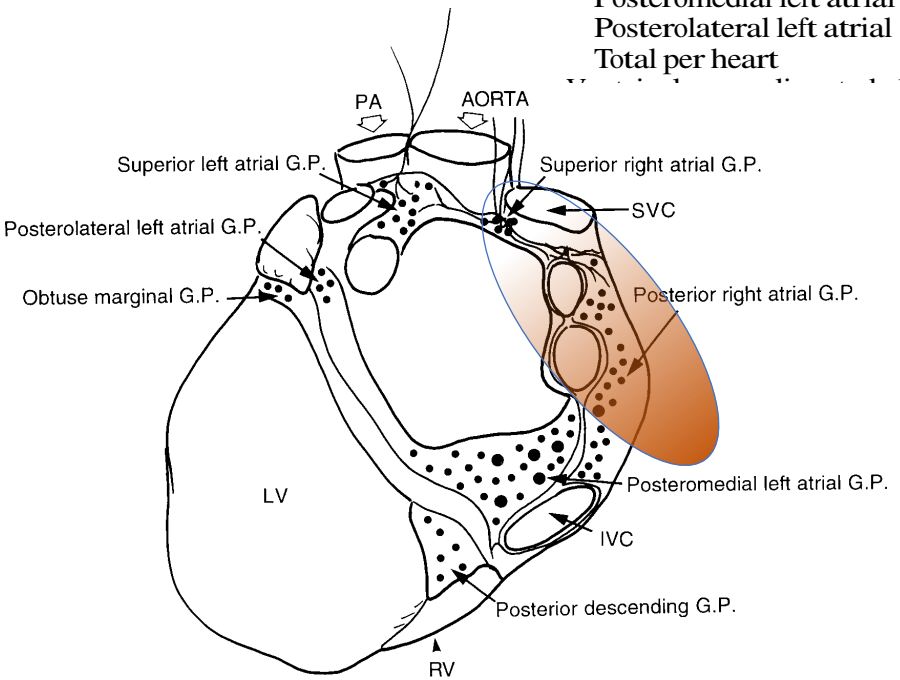
Anatomical and functional GP classification

Gross and Microscopic Anatomy of the Human Intrinsic Cardiac Nervous System

J. ANDREW ARMOUR,[3,*] DAVID A. MURPHY,[1] BING-XIANG YUAN,[3]
SARA MACDONALD,[2] AND DAVID A. HOPKINS[2]
[1]*Departments of Surgery,* [2]*Anatomy and Neurobiology, and* [3]*Physiology and Biophysics,*
Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

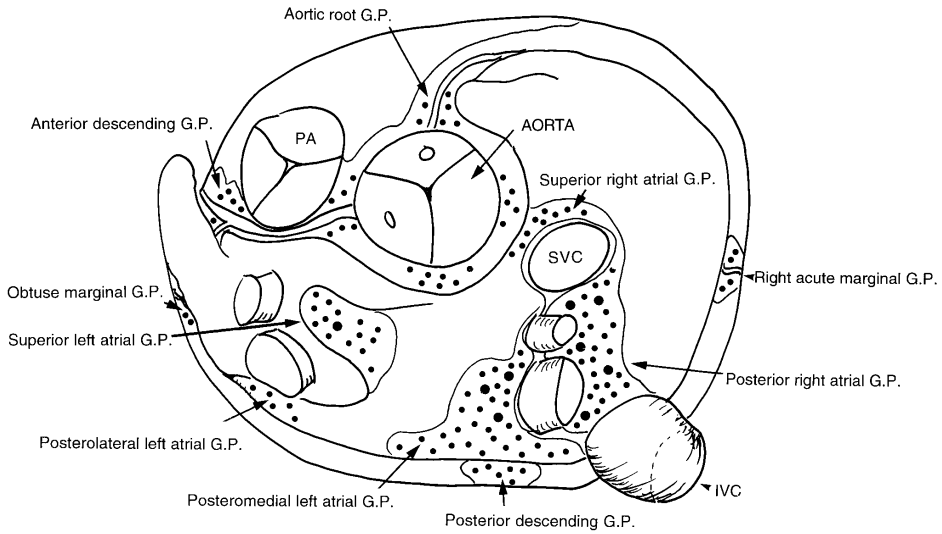
Total RA GP
225±27

Ganglionic plexus	5–10 Neurons	11–50 Neurons	50–100 Neurons	100–200 Neurons	>200 Neurons	Total no. ganglia per heart
Atrial ganglionated plexuses						
Superior right atrial	19.2 ± 2.9	9.5 ± 2.8	2.2 ± 0.4	0.3 ± 0.1	0	31 ± 5
Superior left atrial	29.4 ± 5.9	19.7 ± 5.1	5.3 ± 1.9	2.2 ± 0.7	0.5 ± 0.2	56 ± 12
Posterior right atrial	90.1 ± 13.7	66.4 ± 7.6	22.8 ± 1.9	9.7 ± 0.7	4.7 ± 0.7	194 ± 22
Posteromedial left atrial	82.8 ± 13.5	56.4 ± 9.8	18.2 ± 4.1	4.5 ± 0.9	1.8 ± 0.6	161 ± 27
Posterolateral left atrial	8.2 ± 2.2	5.7 ± 1.1	1.7 ± 0.4	0.3 ± 0.1	0	16 ± 2
Total per heart						458 ± 43

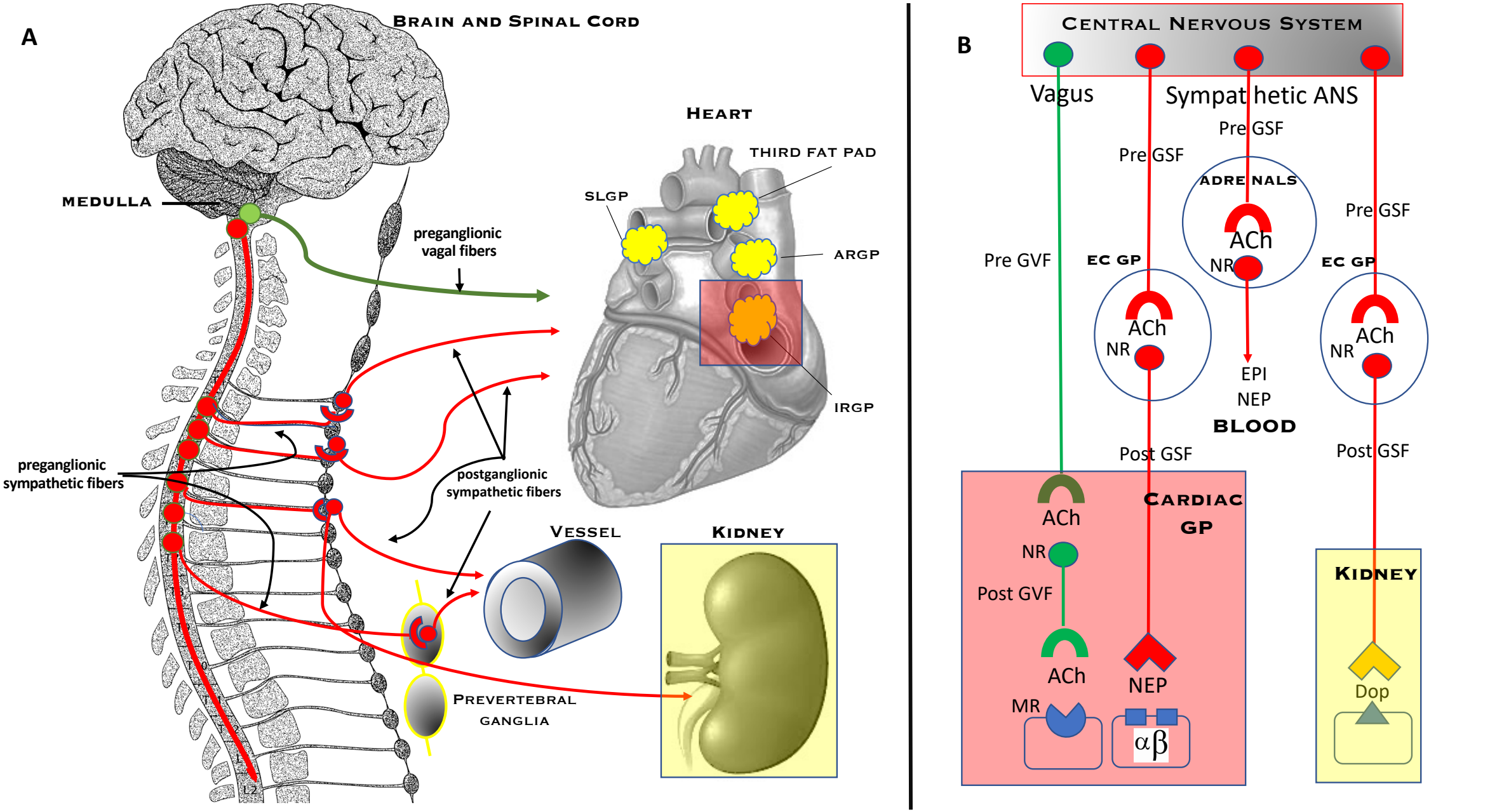


Posterior view

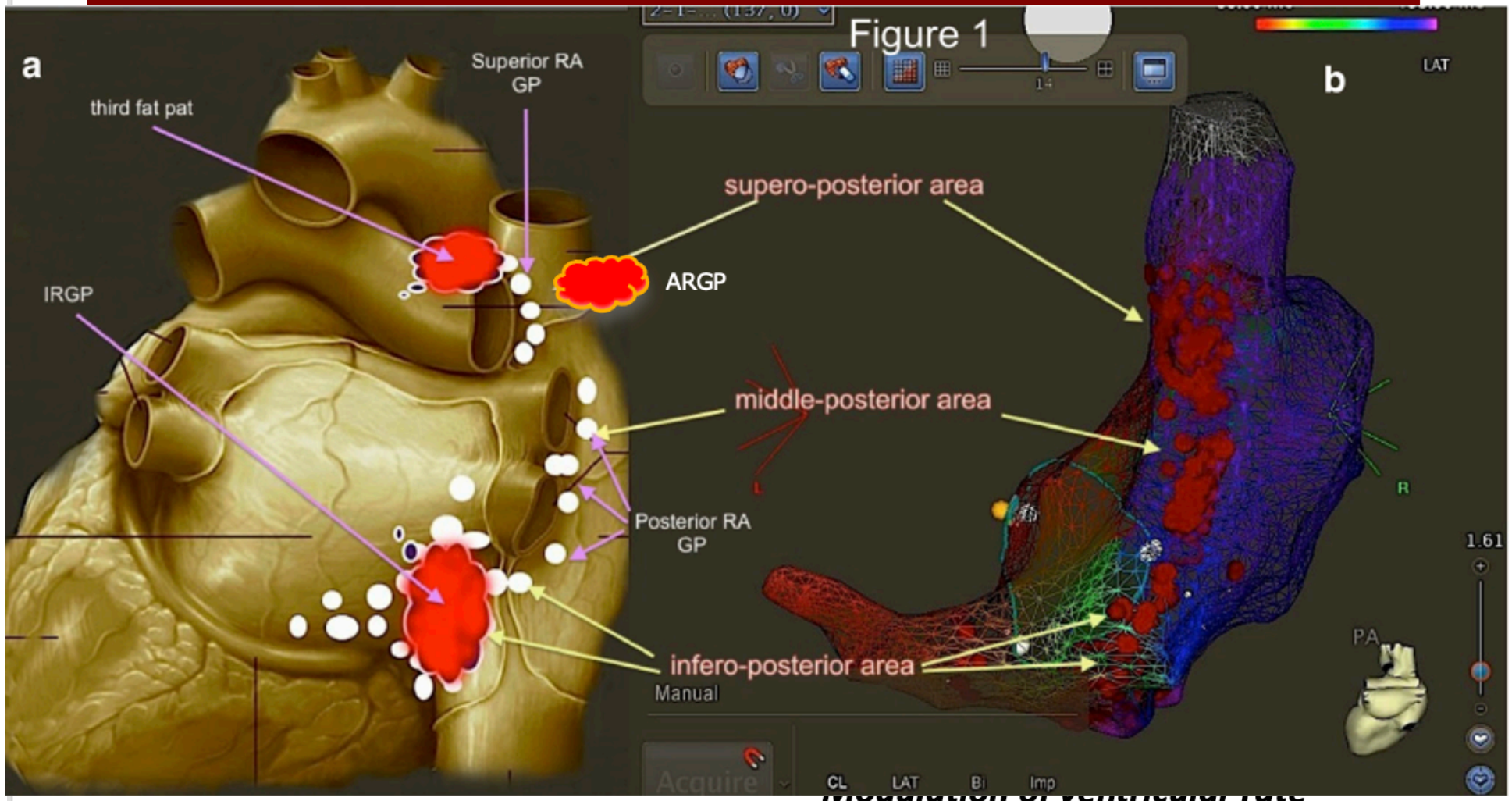
Superior view



Armour JA, Anat. Rec. 247. 1997


A
Brain and Spinal Cord
Medulla
preganglionic
vagal fibers
Heart
Third fat pad
SLGP
ARGP
IRGP
preganglionic
sympathetic fibers
postganglionic
sympathetic fibers
Vessel
Kidney
Prevertebral
ganglia
B
Central Nervous System
Vagus
Sympathetic ANS
Pre GSF
Pre GSF
Adrenals
ACh
NR
Pre GSF
Pre GVF
EC GP
ACh
NR
EC GP
ACh
NR
EPI
NEP
Blood
Post GSF
Post GSF
ACh
Cardiac
GP
NR
Post GVF
ACh
NEP
MR
αβ
Kidney
Dop

The role of IRGP (Inferior-right ganglionated plexi)

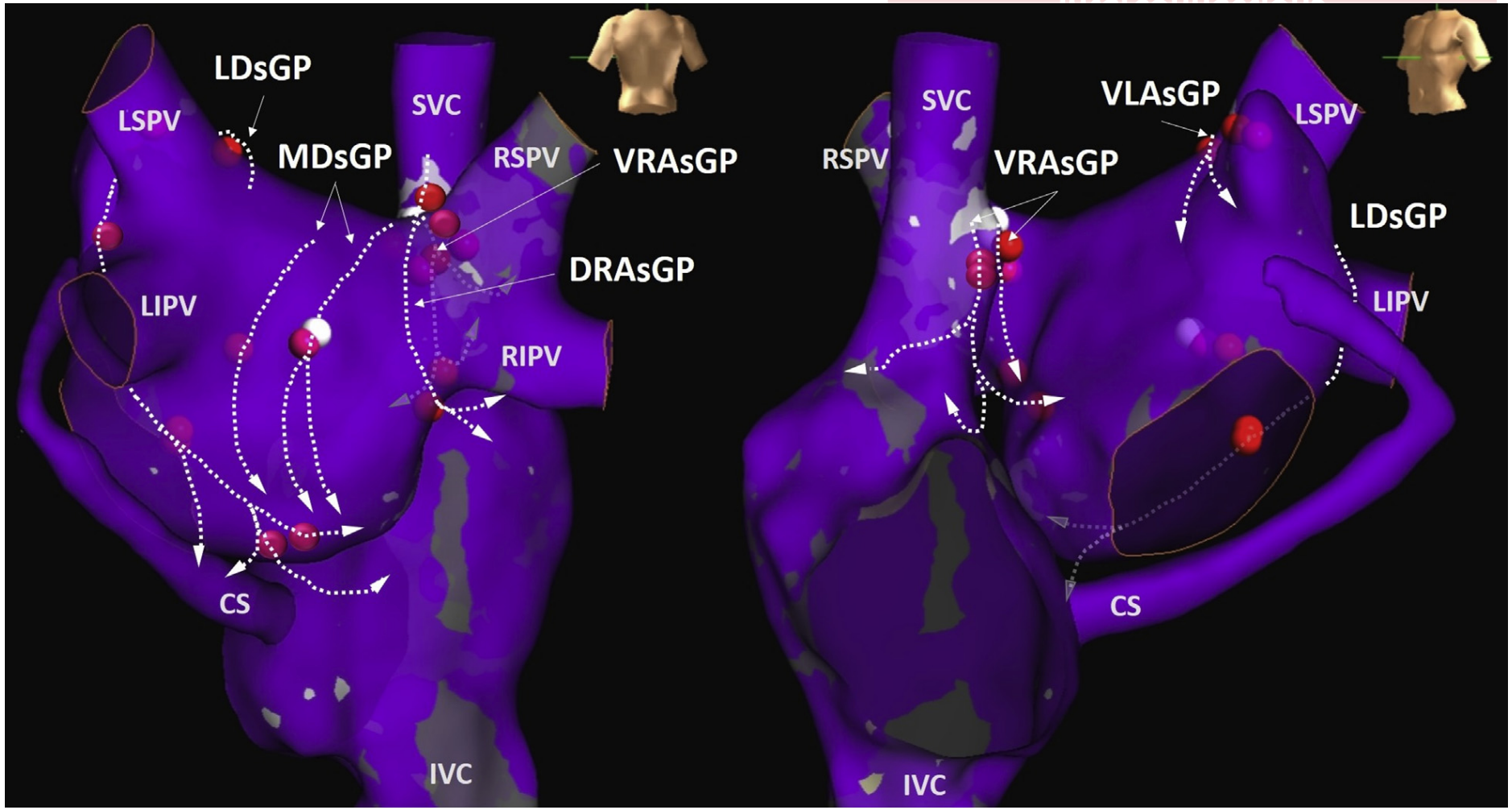


Modulation of sinus rate by vagosympathetic stimulation.

during atrial fibrillation by vagosympathetic stimulation.

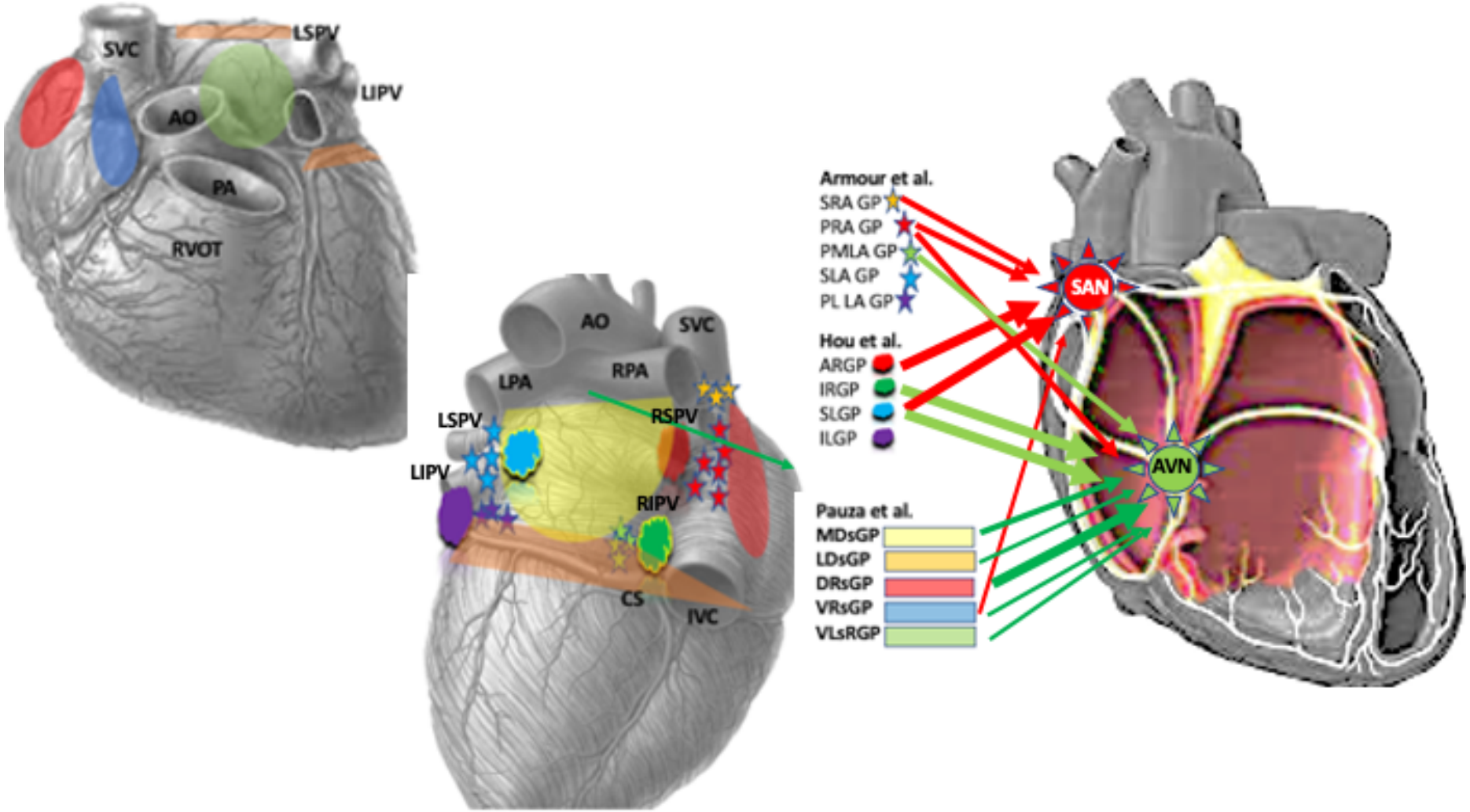
JACC: CASE REPORTS
VOL. 3, NO. 4, 2021

RA GPs and LA GPs interconnections



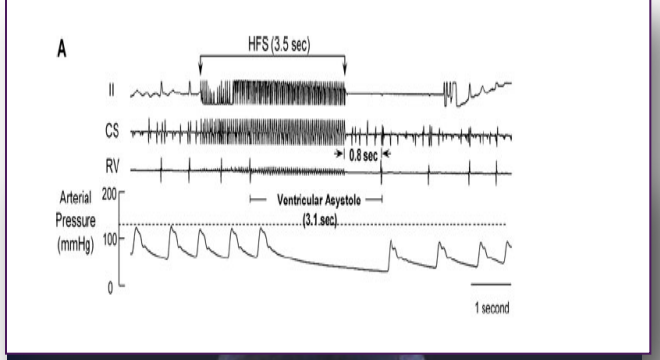
…the **dorsal right atrial GsP** *occupies mainly the dorsal superior right atrial region, the dorsal side of the root of the superior vena cava,* ***and the region over the interatrial septum.***

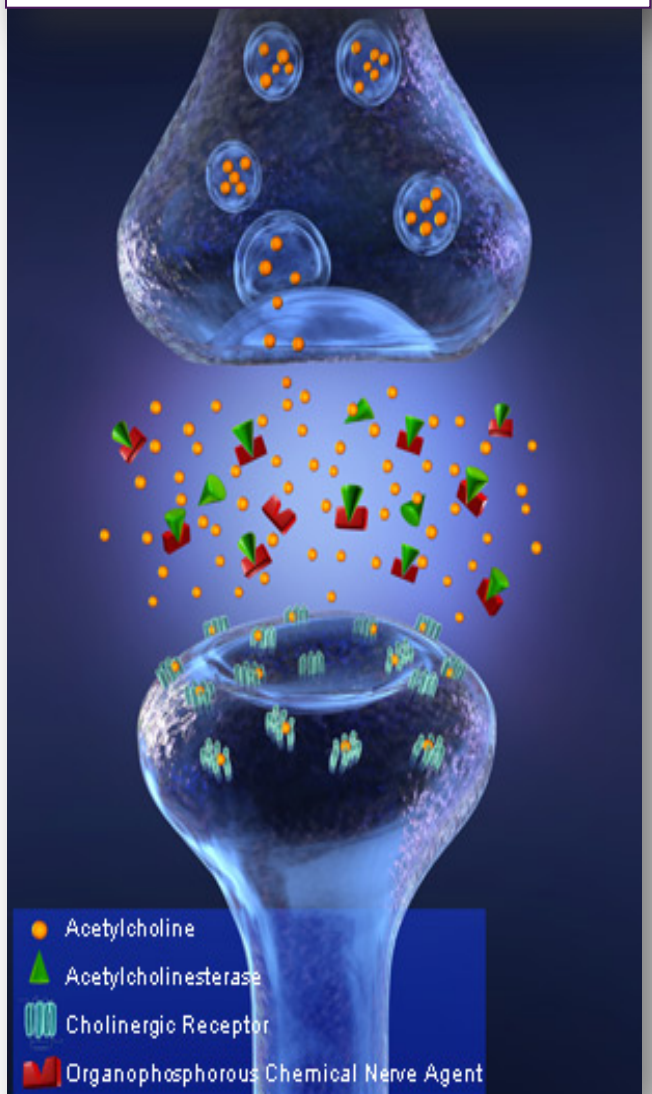
Classification and spatial distribution of main atrial GP and gateway influence on SAN and AVN



Session 2: Why Right Atrial GP?

Why anatomical GP ablation approach?





The neural basis of selective GP stimulation…

ELSEVIER

Available online at www.sciencedirect.com
ScienceDirect

Journal of Electrocardiology 39 (2006) S

OF
ology
ectrocard

The neural basis of atrial fibrillation

Benjamin J. Scherlag, PhD,* Eugene Patterson, PhD, Sunny S. Po, MD, PhD

Cardiac Arrhythmia Research Institute, at the University of Oklahoma Health Sciences Center, Oklahoma City, OK 73104, USA

Received 3 May 2006; accepted 31 May 2006

HFS
(high frequency stimulation)

↓

Acetylcholine

↓

- shortening of atrial and PV sleeve refractoriness
- Triggering/Ca-related of PVs firing

↓

Atrial fibrillation

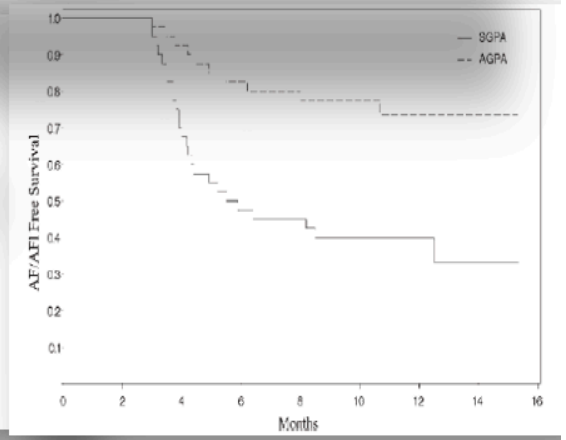
BETTER PROGNOSIS OF ANATOMIC VS SELECTIVE APPROACH DURING BIATRIAL ABLATION AND RIGHT ATRIUM ABLATION IN AFIB PATIENTS

Hearth rhythm, 2009

Selective ganglionated plexi ablation for paroxysmal atrial fibrillation

Evgeny Pokushalov, MD, PhD,* Alex Romanov, MD,* Pavel Shugayev, MD,* Sergey Artyomenko, MD,* Natalya Shirokova, MD,* Alex Turov, MD,* Demosthenes G. Katritsis, MD, PhD†

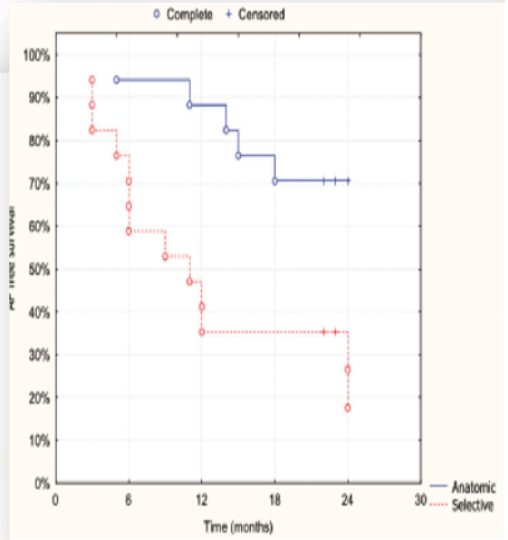
*From the *Arrhythmia Department, State Research Institute of Circulation Pathology, Novosibirsk, Russia; and the †Department of Cardiology, Athens Euroclinic, Athens, Greece.*



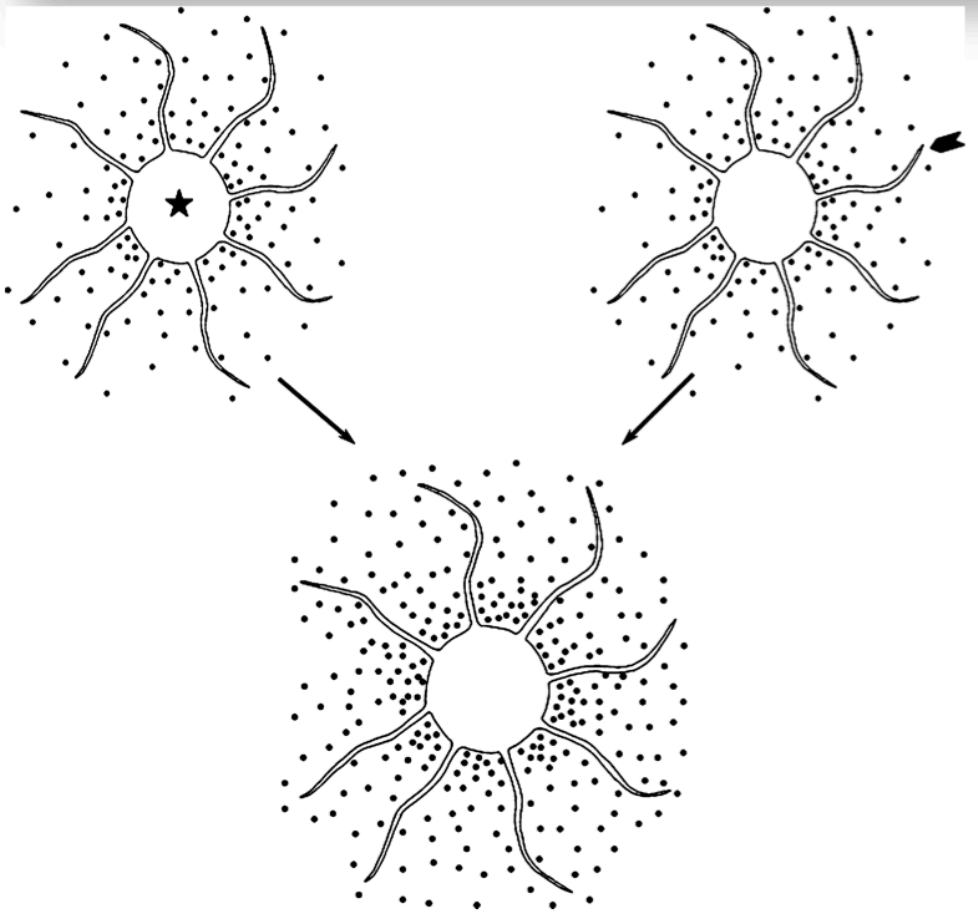
Circ Arrhythm Electrophysiol, 2012

Catheter Ablation of Right Atrial Ganglionated Plexi in Patients With Vagal Paroxysmal Atrial Fibrillation

Leonardo Calò, MD, FESC; Marco Rebecchi, MD; Luigi Sciarra, MD; Lucia De Luca, MD; Alessandro Fagagnini, MD; Lorenzo Maria Zuccaro, MD; Pietro Pitrone, BS; Serena Dottori, BS; Maurizio Porfirio, MD; Ermenegildo de Ruvo, MD; Ernesto Lioy, MD



Why the reduced effectiveness of selective approach



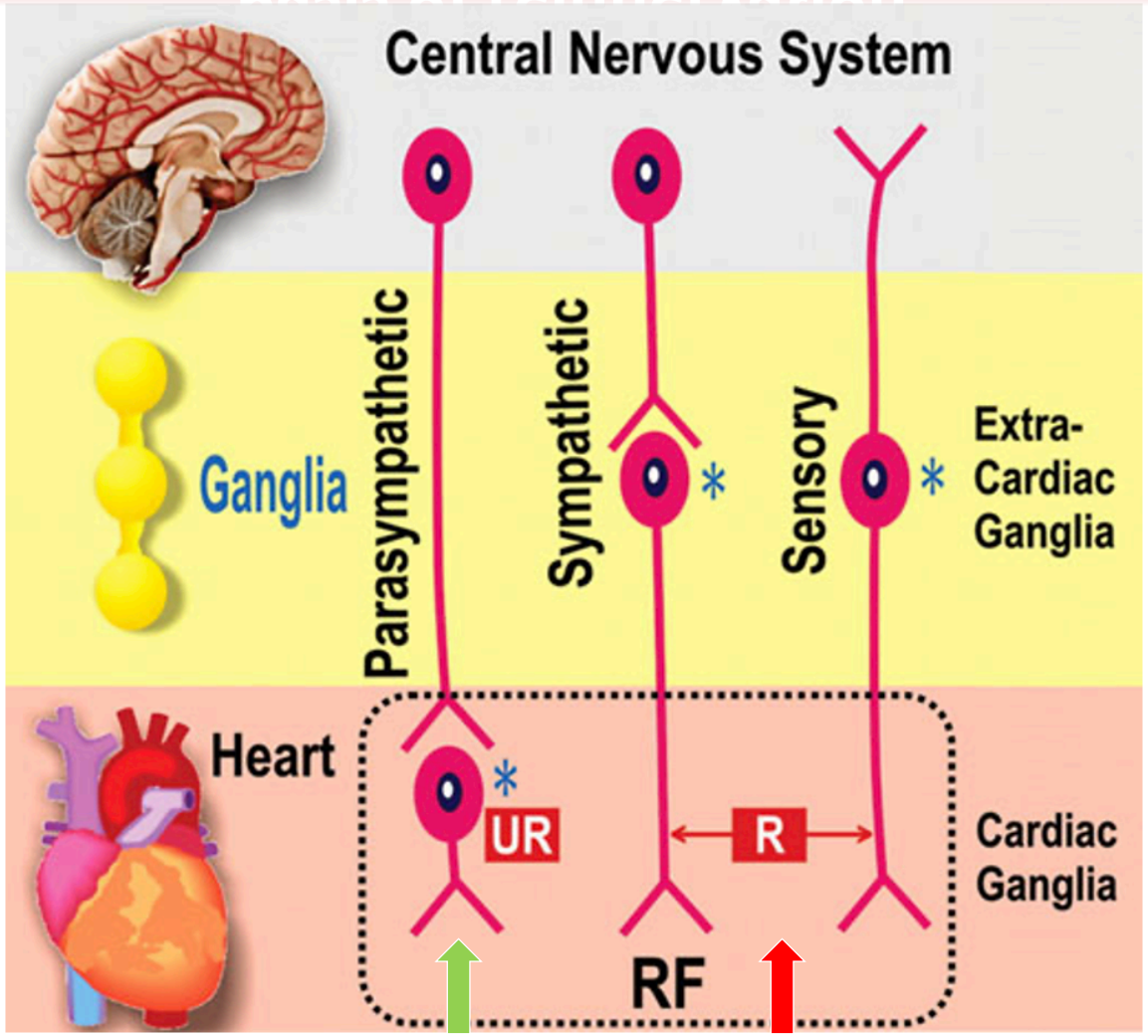
- An hyperactive state of the GP/head of octopus, may trigger local release of a gradient of excessive amounts of neurotransmitters and subsequently initiate AF
- the excitation of assons/tentacles can determines a retrograde activation of GP at distance, can provide an interesting explanation for the discrepancy between the sites of vagal response (which are also the sites of radiofrequency ablation) and real location of GP.

J Cardiovasc Electrophysiol, Vol. 18, pp. 83-90, January 2007

Session 3: Why Right Atrial GP?

Why Endocardial Ablation and Why the Important Role of Endocardial Signals?

Effectiveness RF cardiac GP ablation on the basis of reinnervation

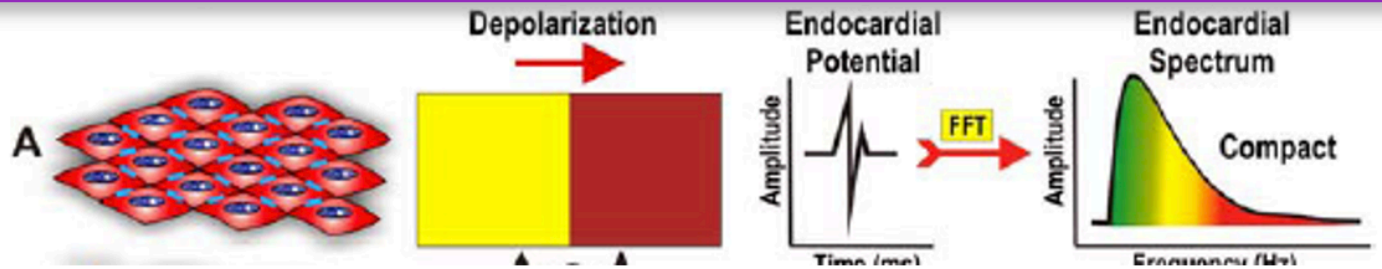


Not Reinnevation

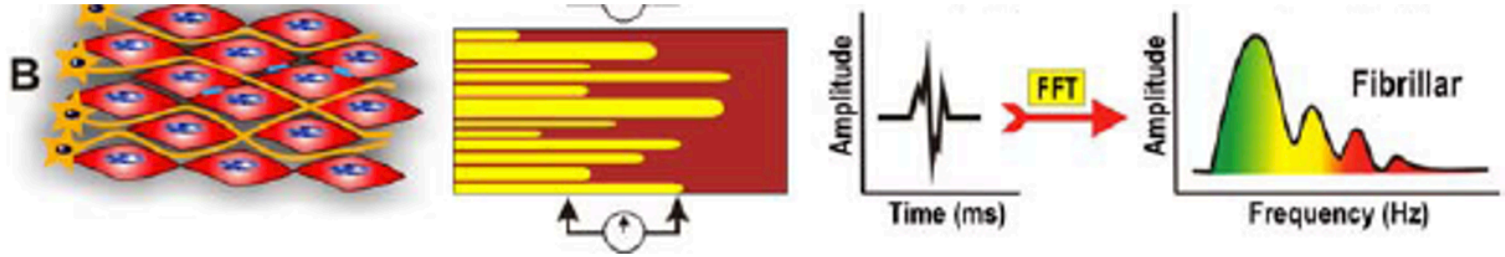
Reinnevation

Tissue signal guided cardioneuroablation

isotropic (homogeneous) conduction of compact myocardium



Heterogeneous conduction of fibrillar myocardium (ncursion of the nervous fibres into myocardium)



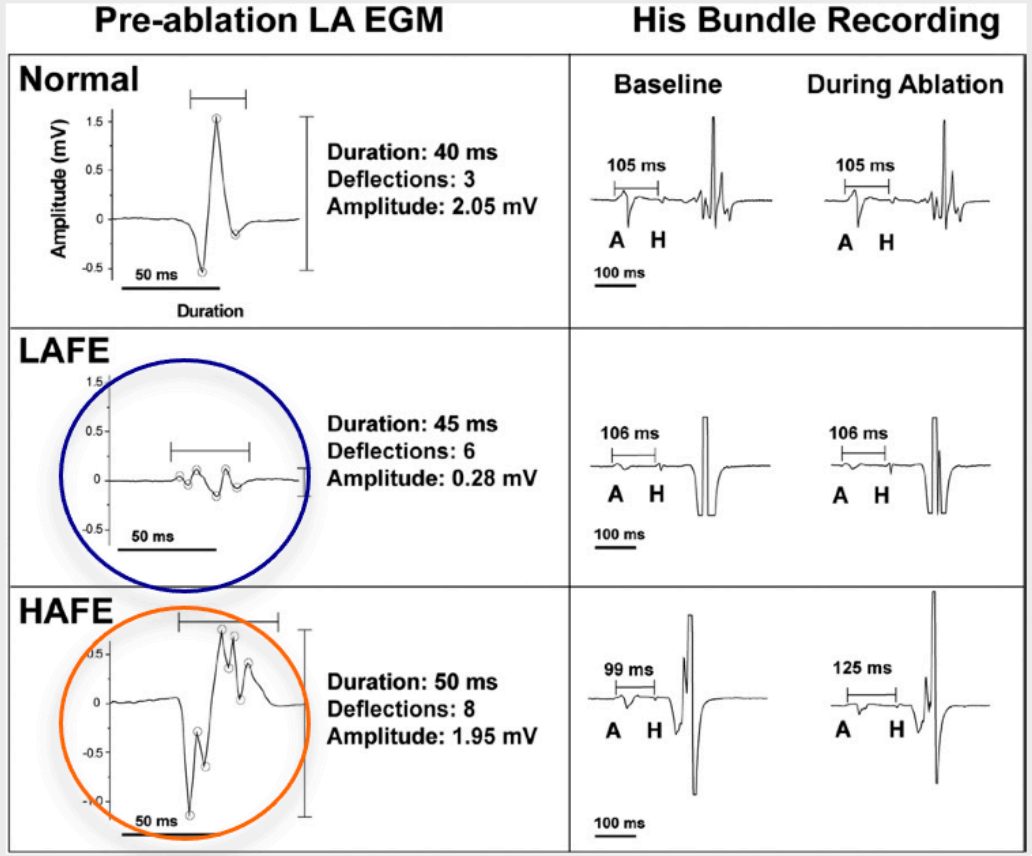
Pachon, Europace 2011

Functional Characterization of Atrial Electrograms in Sinus Rhythm Delineates Sites of Parasympathetic Innervation in Patients With Paroxysmal Atrial Fibrillation

Nicolas Lellouche, MD, Eric Buch, MD, Andrew Celigoj, BS, Carin Siegerman, PHD,
David Cesario, MD, PHD, Carlos De Diego, MD, Aman Mahajan, MD, PHD,
Noel G. Boyle, MD, PHD, Isaac Wiener, MD, Alan Garfinkel, PHD, Kalyanam Shivkumar, MD, PHD

LAFE
expression of tissue fibrosis (persistent AF)

HAFE
expression of ANS (Paroxysmal AF, Cardioneuroblation)



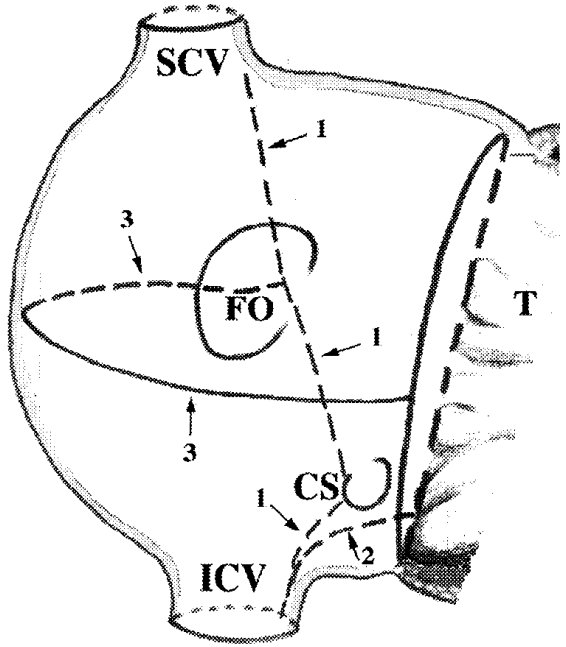
Atrial Mapping and Radiofrequency Catheter Ablation in Patients With Idiopathic Atrial Fibrillation

Electrophysiological Findings and Ablation Results

Fiorenzo Gaita, MD; Riccardo Riccardi, MD; Leonardo Calò, MD; Marco Scaglione, MD;
Lucia Garberoglio, MD; Renzo Antolini, PhD; Michele Kirchner, PhD;
Filippo Lamberti, MD; Elena Richiardi, MD

Right atrial endocardial catheter ablation of AF is a safe procedure and may be effective in some patients with idiopathic AF.

The atrial mapping during AF showed a ***more disorganized right atrial activation in the septum than in the lateral wall*** *in patients with successful ablation.*



(*Circulation*. 1998;97:2136-2145.)

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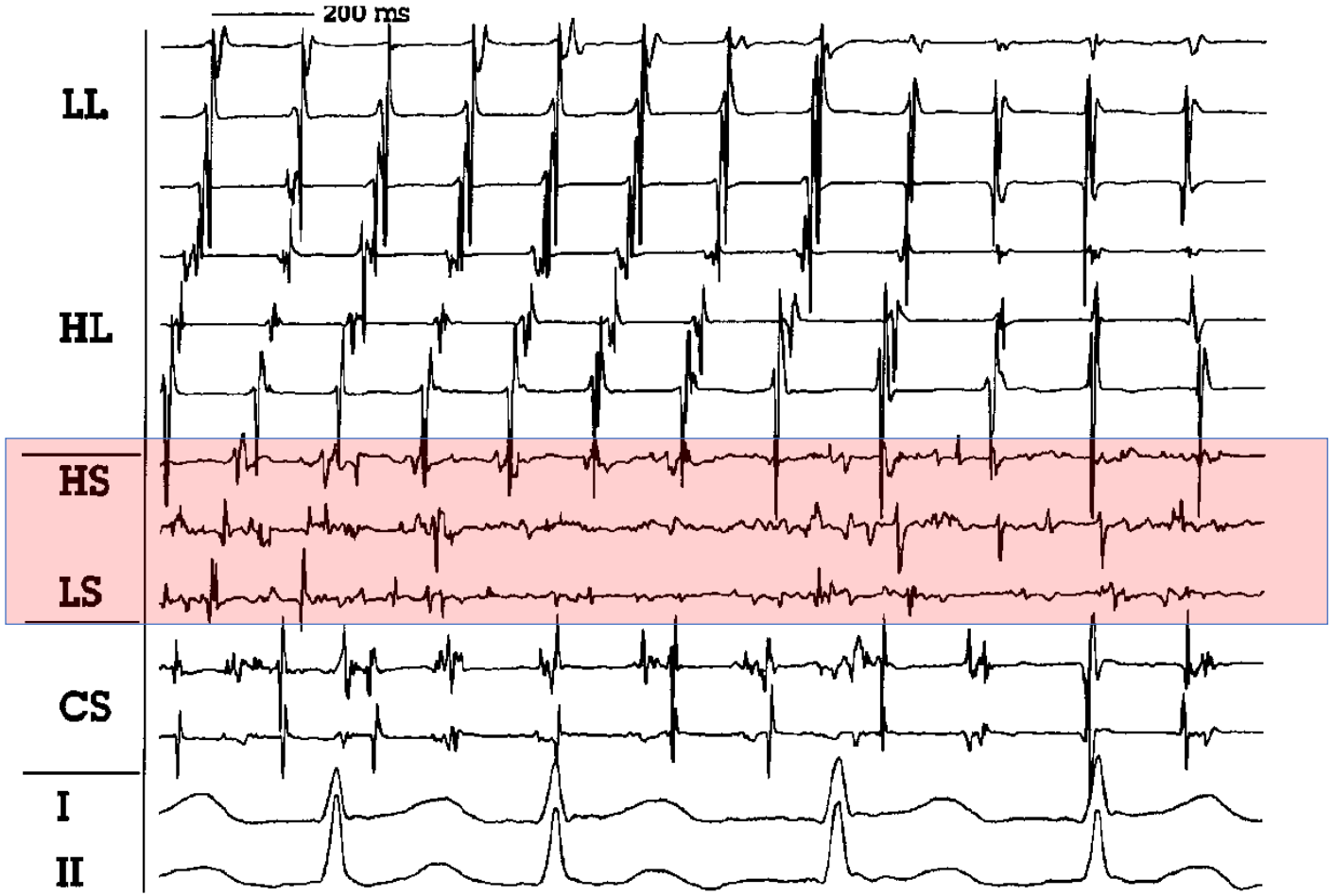
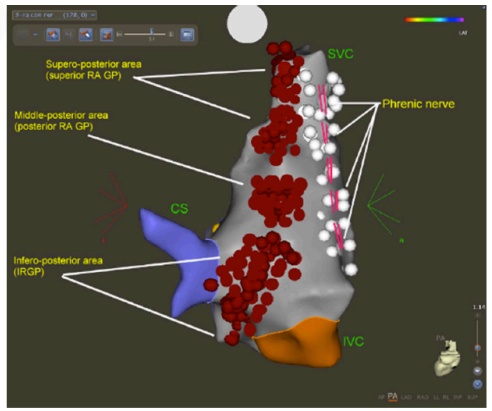


(*Circulation*. 1998;97:2136-2145.)

Ganglionated plexi ablation in right atrium to treat cardioinhibitory neurocardiogenic syncope

Marco Rebecchi · Ermenegildo de Ruvo · Stefano Strano · Luigi Sciarra · Paolo Golia · Annamaria Martino · Leonardo Calò

J Interv Card Electrophysiol (2012)



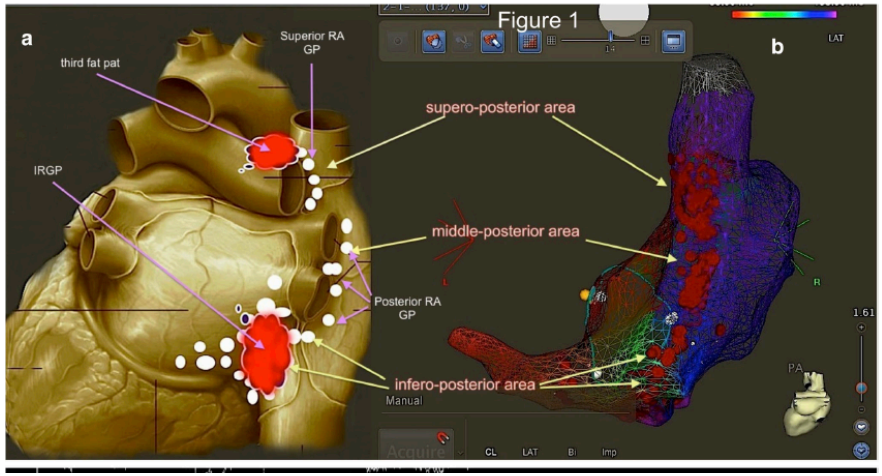
A **31-year-old female patient (case 1) and a 45-year-old female patient (case 2)** with recurrent typical CNS associated to physical trauma undergone a right atrial vagal modification.

Heart rate variability (HRV) and tilt-table test evaluation was assessed at baseline, and during the follow up.

Case 1	Pre-ablation	1 day post-ablation	2 months	8 months
HR/bpm	65	78	80	74
LF (ms^2)	235	7	78	201
HF (ms^2)	207	8	21	127
LF/HF	1.13	0.87	3.72	1.58
Case 2	Pre-ablation	1 day post-ablation	2 months	5 months
HR/bpm	58	87	78	62
LF (ms^2)	197	12	101	185
HF (ms^2)	184	14	42	176
LF/HF	1.08	0.83	2.41	1.05

Catheter ablation of right atrial ganglionated plexi to treat cardioinhibitory neurocardiogenic syncope: a long-term follow-up prospective study

Leonardo Calo[1] · Marco Rebecchi[1] · Antonella Sette[1] · Luigi Sciarra[1] · Alessio Borrelli[1] · Antonio Scara[1] · Domenico Grieco[1] · Alessandro Politano[1] · Marianna Sgueglia[1] · Lucia De Luca[1] · Annamaria Martino[1] · Germana Panattoni[1] · Paolo Golia[1] · Oronzo Valerio Turrisi[1] · Margaret Knowles[1] · Stefano Strano[2] · Ermenegildo de Ruvo[1]



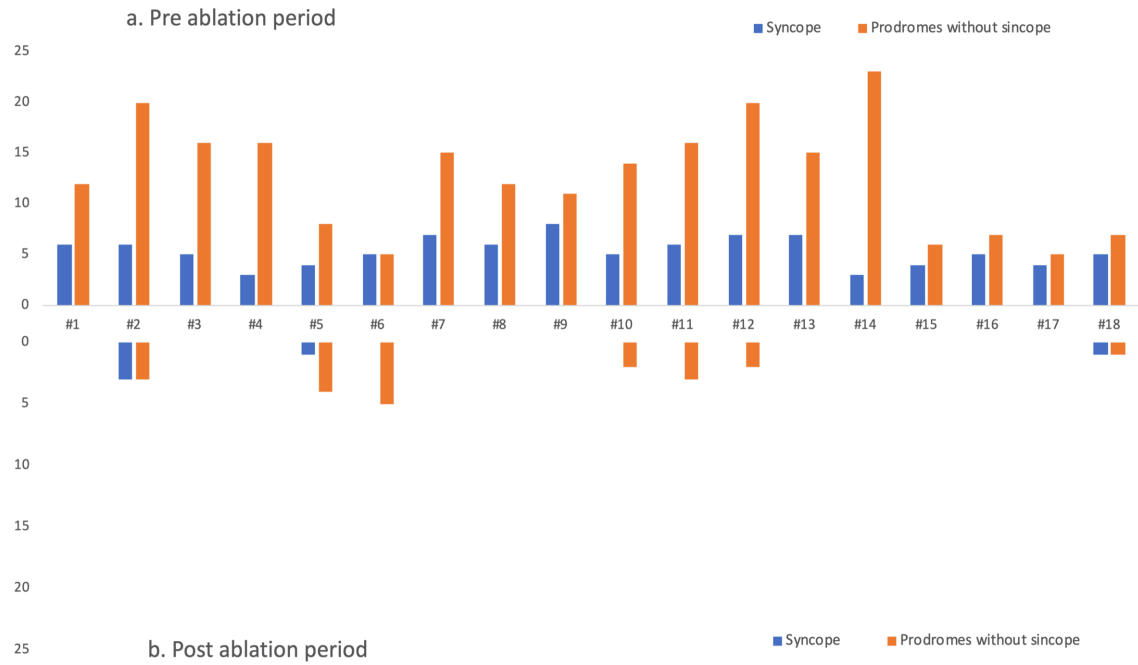
- **Eighteen consecutive patients (mean age: 36.9 ± 11.2 years) with severe CNS were submitted to transcatheter ablation of GPs in the RA alone using an anatomical approach**.
- **Head up tilt test** evaluation was performed during the follow-up period at 6, 12, and 24 months and in case of significant symptoms.
- HRV were evaluated at patients discharge at 1, 3, 6, 12, 24, and 36 months after ablation.

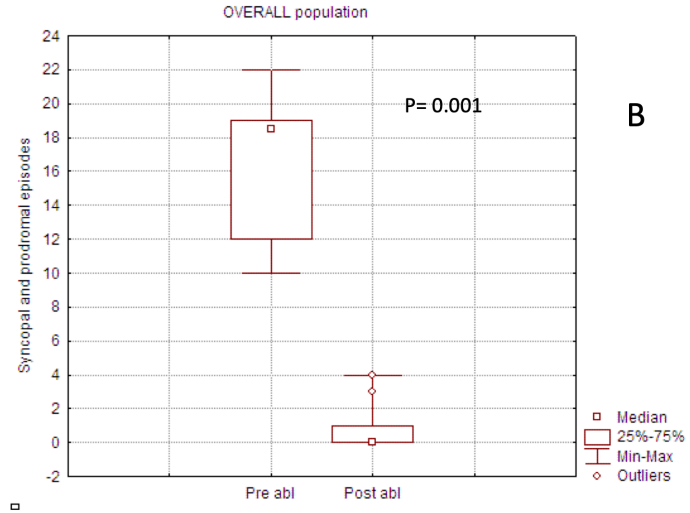
	Preablation	Post-ablation
AH (ms, M ± SD)	89.3 ± 4.2	56.8 ± 2.4*
HV (ms, M ± SD)	46.3 ± 1.8	45.3 ± 1.4
Wenckebach cycle length (ms, M ± SD)	582.1 ± 40.1	383.8 ± 26.7*
SNRT (ms, M ± SD)	1381.5 ± 105.2	792.3 ± 31.5

SNRT sinoatrial node recovery time. *$P < 0.01$ vs preablation

Journal of Interventional Cardiac Electrophysiology
https://doi.org/10.1007/s10840-020-00840-9

A





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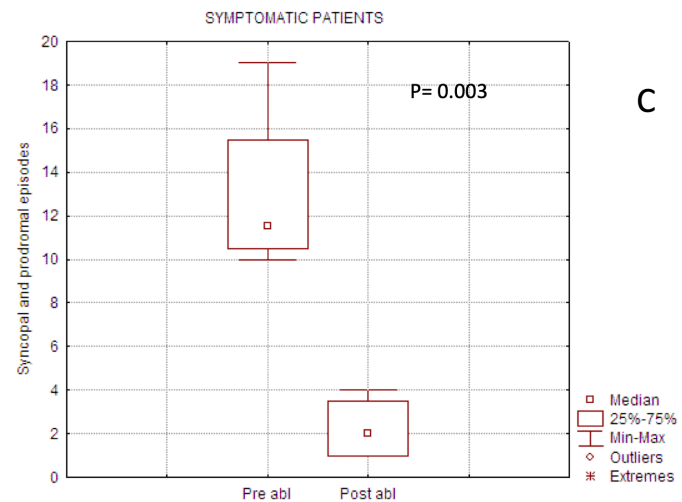


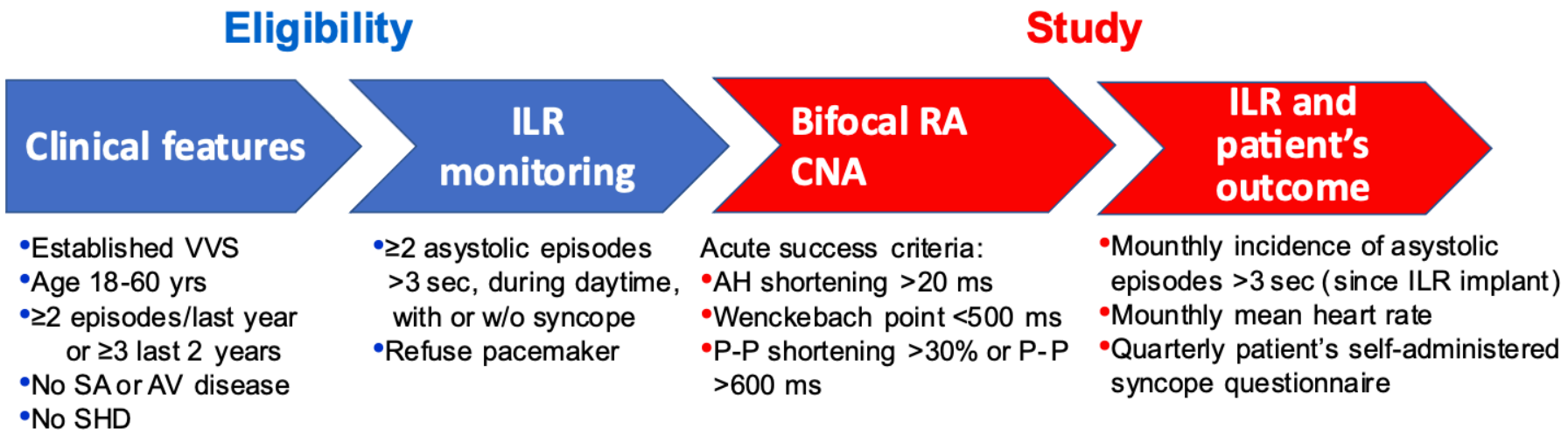
C

Journal of Interventional Cardiac Electrophysiology
https://doi.org/10.1007/s10840-020-00840-9

Bifocal right atrial CNA for asystolic VVS
A proof-of-efficacy study

GIMSI
Gruppo Italiano Multidisciplinare per lo Studio della Sincope

ITALIAN-CNA



Primary endpoint: intrapatient comparison of mounthly incidence of asystolic episodes >3 sec before and after CNA
Secondary endpoint: intrapatient comparison of mean heart rate and mounthly incidence of (pre)syncopal recurrences before and after CNA