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NICE



« Resynchronization » with His-bundle pacing

Sok-Sithikun BUN, MD, PhD
French Riviera University Hospital, Nice, FRANCE

Disclosure

Speaker name:

Sok-Sithikun BUN

I have the following potential conflicts of interest to report:

~~Consulting~~

~~Employment in industry~~

~~Shareholder in a healthcare company~~

~~Owner of a healthcare company~~

~~Other(s)~~

I do not have any potential conflict of interest

30 % of Non-responders

- Factors for nonresponse are multiple:

A/ Patient-related

- Ischaemic (Scar +++)
- Men
- Non-LBBB morphology

Ypenburg C et al. *Eur Heart J* 2007

B/ Device-related

- Non-optimal lead position

Ypenburg C et al. *JACC* 2008

- Contrast-induced nephropathy

- 10.2 % with CRT

(↗ 26.5-44 $\mu\text{mol/L}$)

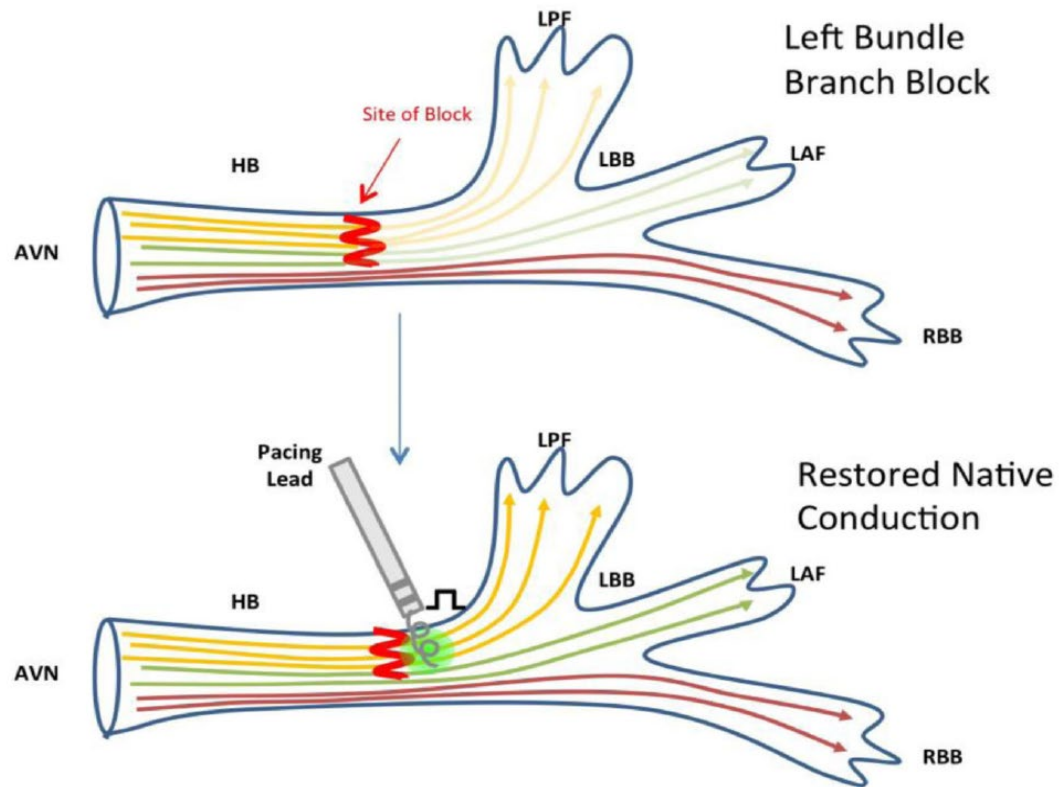
Kowalczyk J et al, *JICE* 2014

- Failure rate for CS lead: 7.5 – 10 %

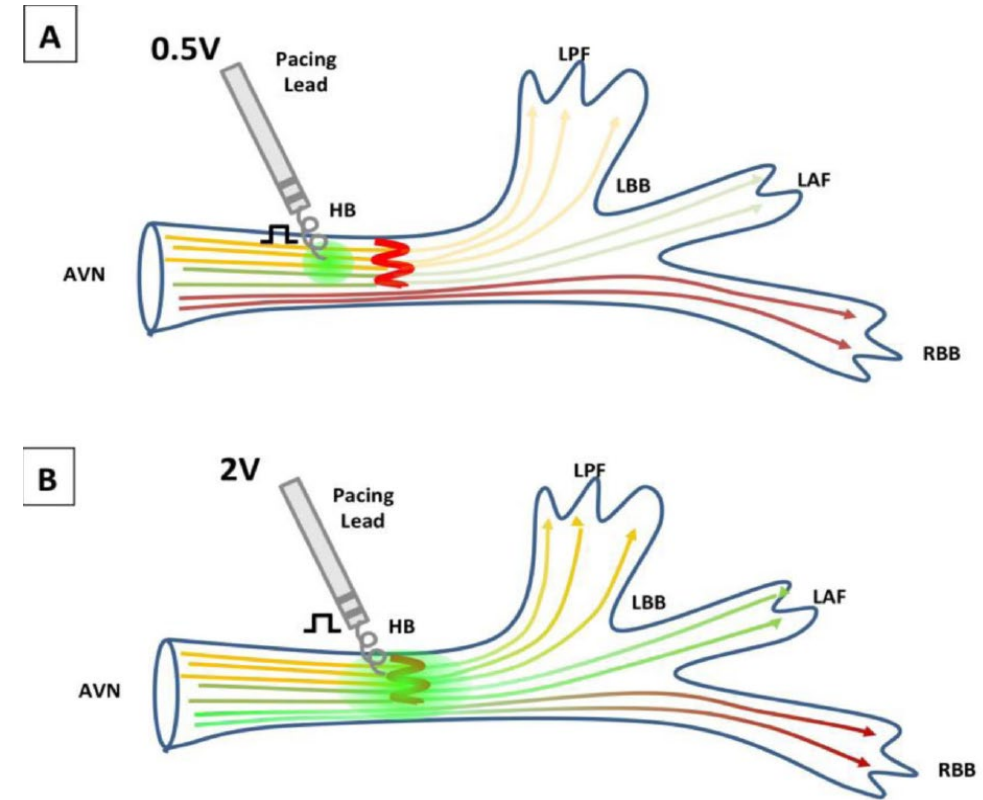
Moss AJ et al, *NEJM* 2009

Tang AS et al, *NEJM* 2010

- Deshmukh et al (2000) : 14/18 patients with fast AF and AVN ablation



Longitudinal dissociation



Output dependence

- Apical RV pacing → Pacing-induced cardiomyopathy

Sweeney MO et al . MOST Study. *Circulation* 2003

- Meta-analysis: HBP > RV pacing (higher LVEF/ lower NYHA / shorter QRS duration)

7 studies/ 325 patients / FU 13 ± 11 mo

Yu Z et al . MOST Study. *BMC Cardiovasc Disord* 2017

IIa (B)

- AVB with indication for permanent pacing
- LVEF = 36-50 %
- Expected to require VP > 40 % of the time

HBP or CRT

IIb (B)

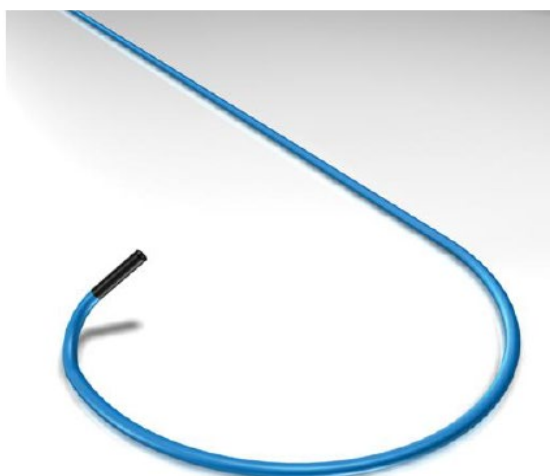
- Nodal AVB with indication of permanent pacing

HBP

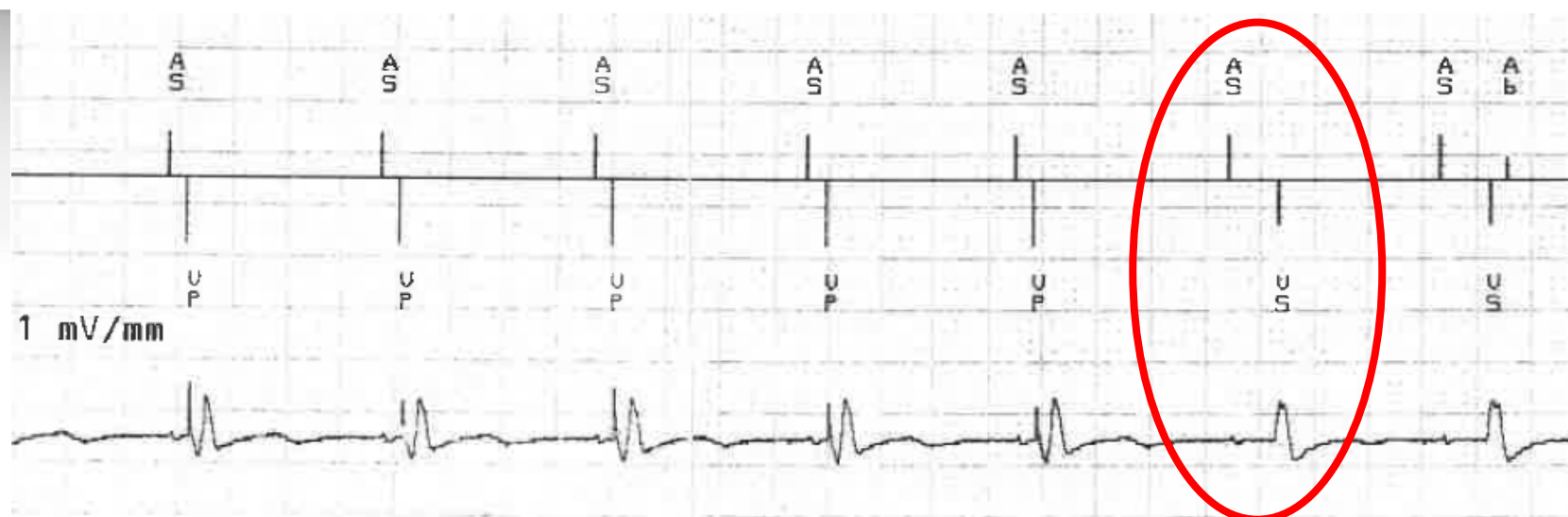
HBP: Methods



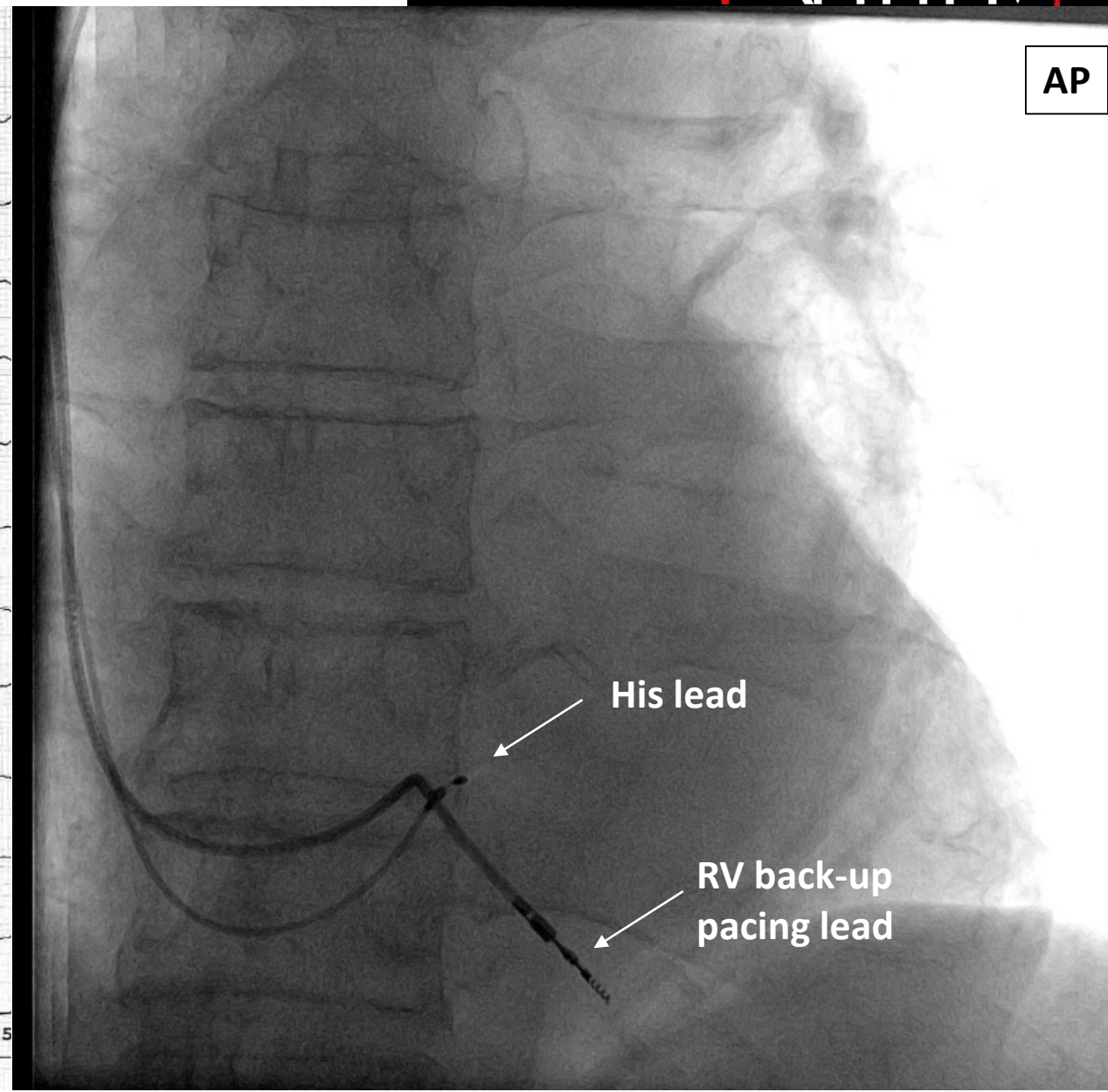
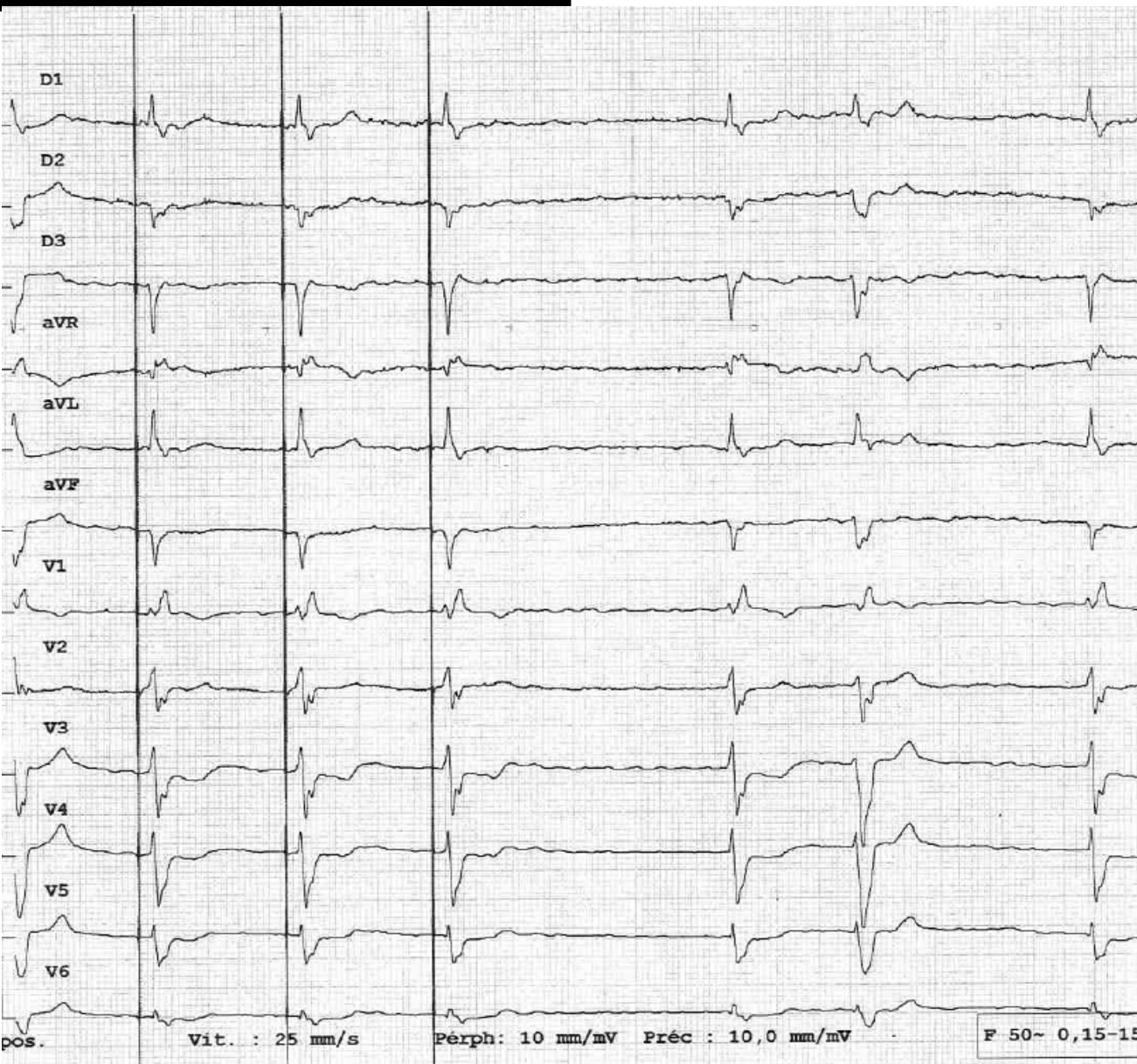
Model 3830 Lead



C315HIS Catheter

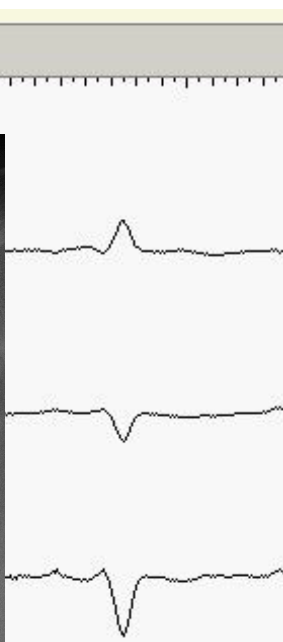
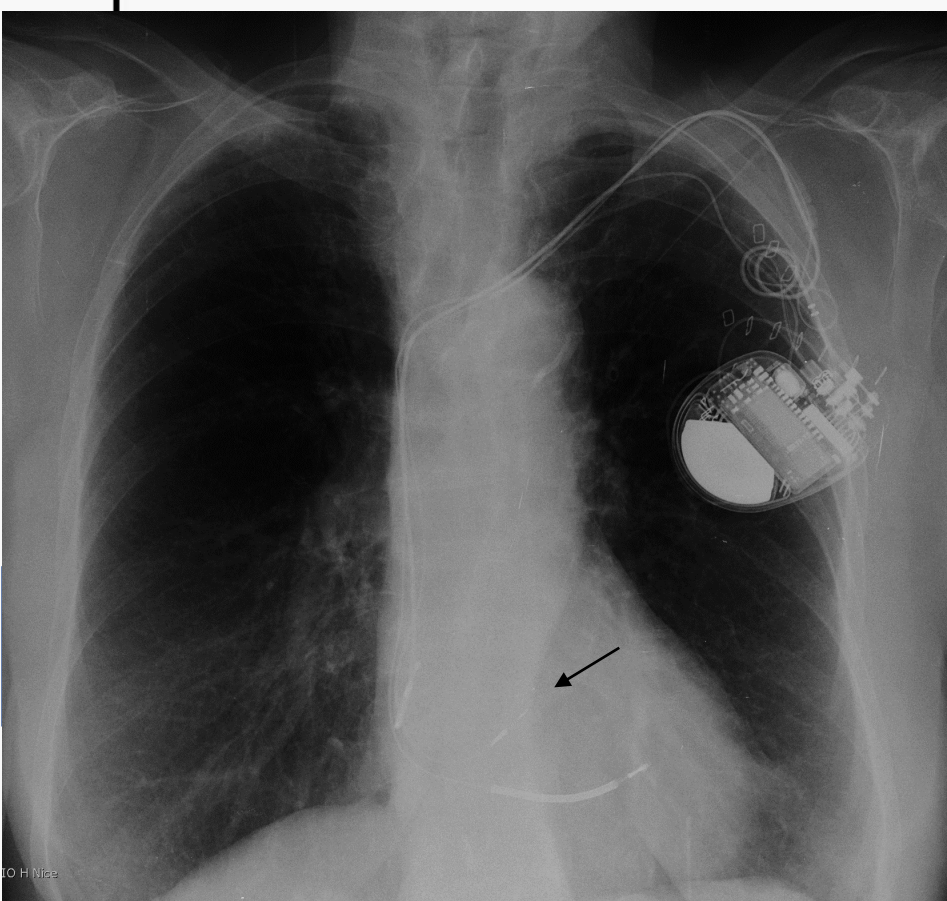


- 79-yo male patient
- Slow permanent AF / NYHA III
- DCM with LVEF 35 %



- 77-yo female patient
- Failure CRT (phrenic !)
- DCM with LVEF 30 %

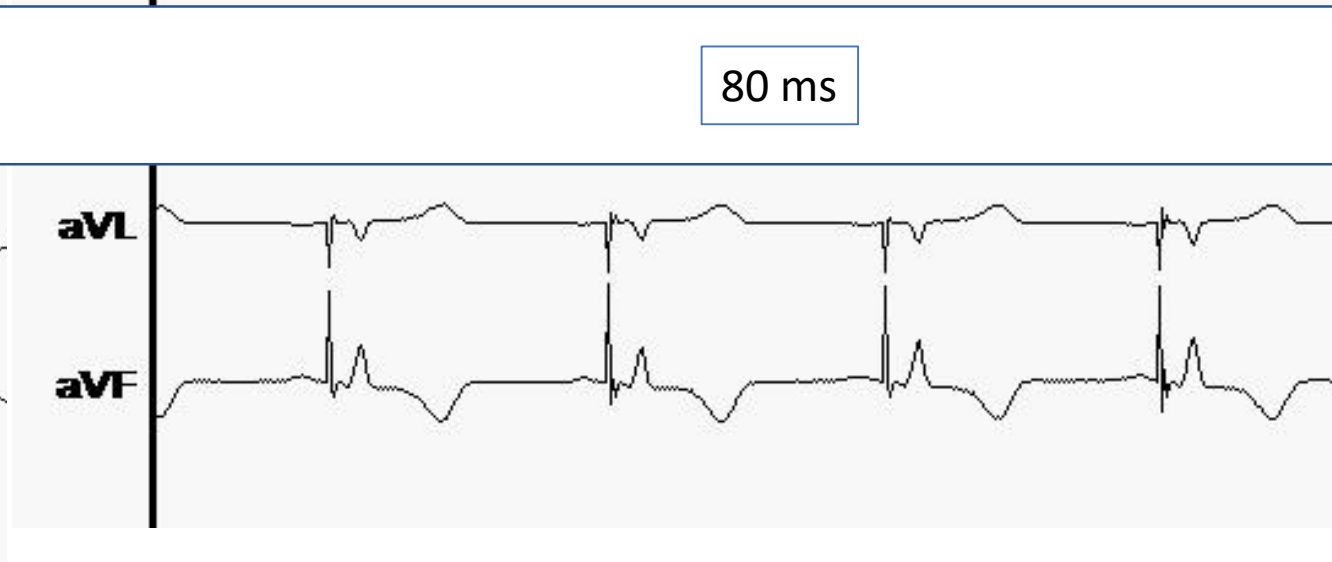
25 ECG DEB 13.05.14



25 ECG FN 14.01.15



80 ms



Publication	Year	Study type	Patients	Implant success	Follow-up	Results
<i>Sharma et al¹</i>	2018	Single arm	37 RBBB	95	15 ± 23	Narrowing RBBB (78 %)/LVEF 31 to 39 %
<i>Sharma et al²</i>	2018	Single arm	95 Rescue strategy or primary alternative	90	14	NYHA 2.8 to 1.8 / LVEF 30 to 43 %
<i>Ajjola et al³</i>	2017	Single arm	21	76.2	12	NYHA III to II/LVEF 27 to 41 %
<i>Su et al⁴</i>	2016	Single arm	38	NA	NA	
<i>Lustgarten et al⁵</i>	2015	versus CRT	29	96.6	12	QRS narrowing (72 %) / LVEF improved
<i>Barba-Pichardo et al⁶</i>	2013	Single arm	13	69	31 ± 21	

1.Sharma PS et al. Permanent His Bundle Pacing for Cardiac Resynchronization Therapy in Patients With Heart Failure and Right Bundle Branch Block. Circ Arrhythm Electrophysiol. 2018 Sep;11(9):e006613.

2.Sharma PS et al. Permanent His-bundle pacing for cardiac resynchronization therapy: Initial feasibility study in lieu of left ventricular lead. Heart Rhythm. 2017 Sep;14(9):1353-1361.

3.Ajjola OA et al. Permanent His-bundle pacing as an alternative to biventricular pacing for cardiac resynchronization therapy: A multicenter experience. Heart Rhythm. 2018 Mar;15(3):413-420.

4.Su L et al. Pacing and sensing optimization of permanent His-bundle pacing in cardiac resynchronization therapy/implantable cardioverter defibrillators patients: value of integrated bipolar configuration. Europace. 2017 Jun;19(6):1000-1006.

5.Lustgarten DL et al. His-bundle pacing versus biventricular pacing in cardiac resynchronization therapy patients: A crossover design comparison. Heart Rhythm. 2015 Jul;12(7):1548-57

6.Barba-Pichardo R et al. Ventricular resynchronization therapy by direct His-bundle pacing using an internal cardioverter defibrillator. Europace. 2013 Jan;15(1):83-8.

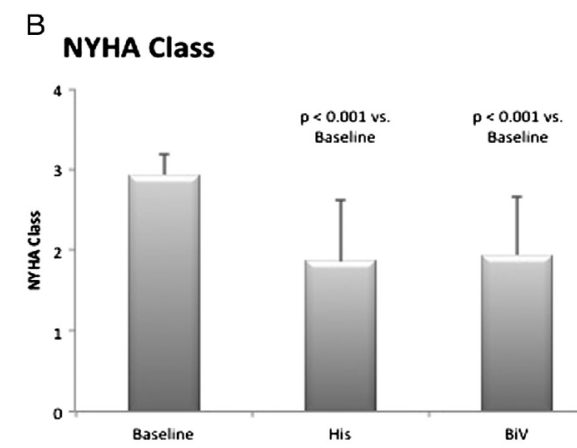
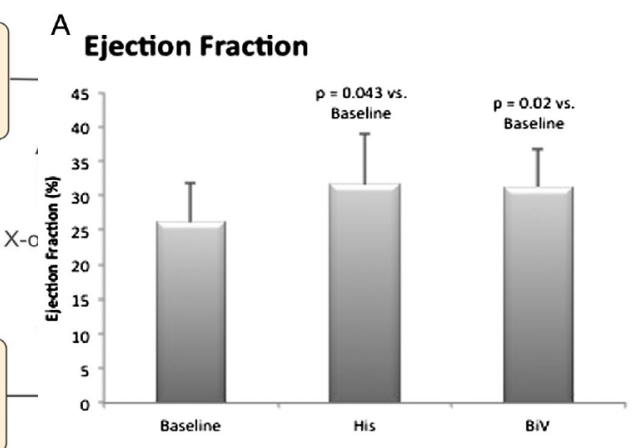
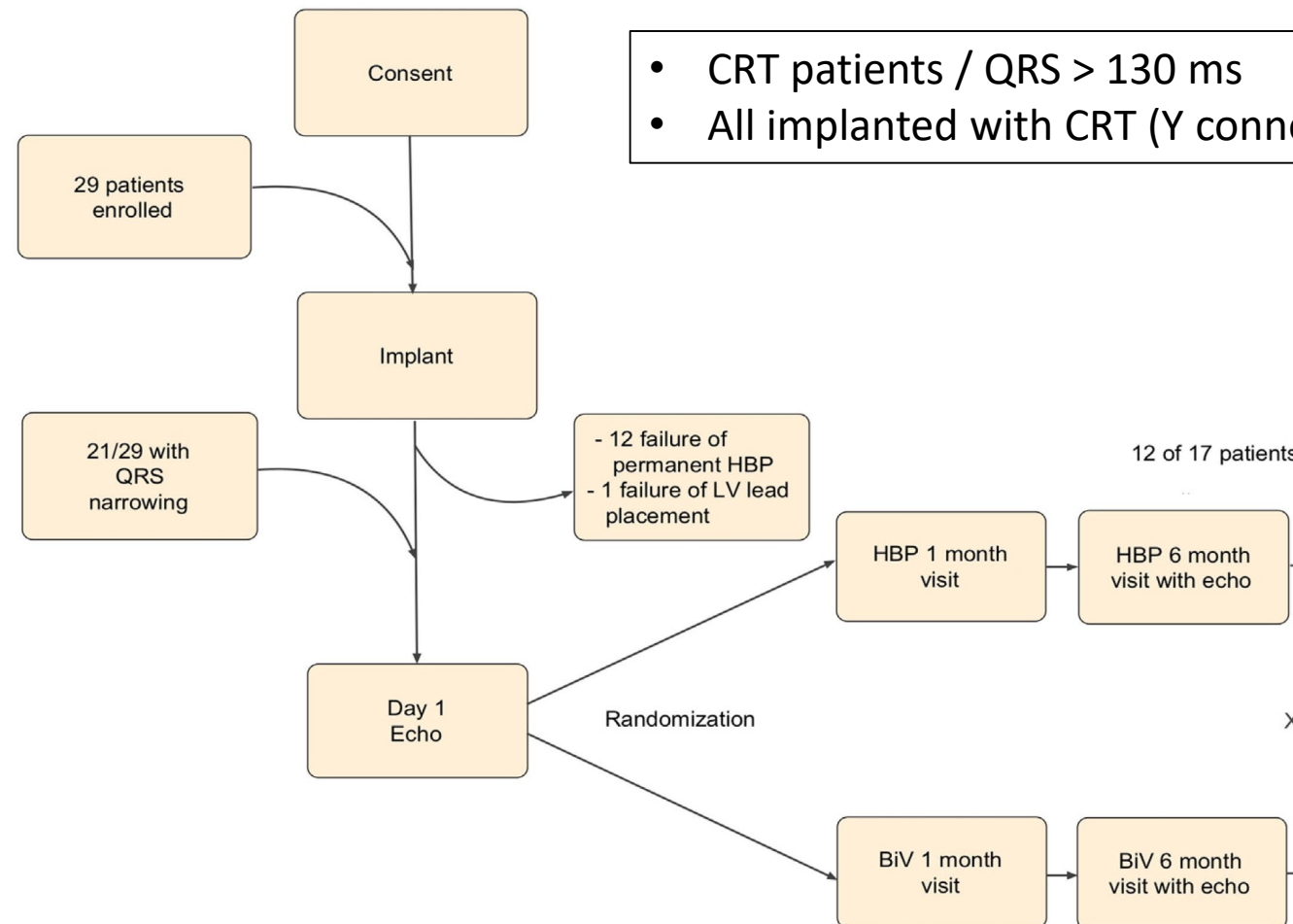
HBP vs CRT



- CRT patients / QRS > 130 ms
- All implanted with CRT (Y connector)



- 88 % ischaemic narrowed their QRS
- 54 % non-ischaemic patients

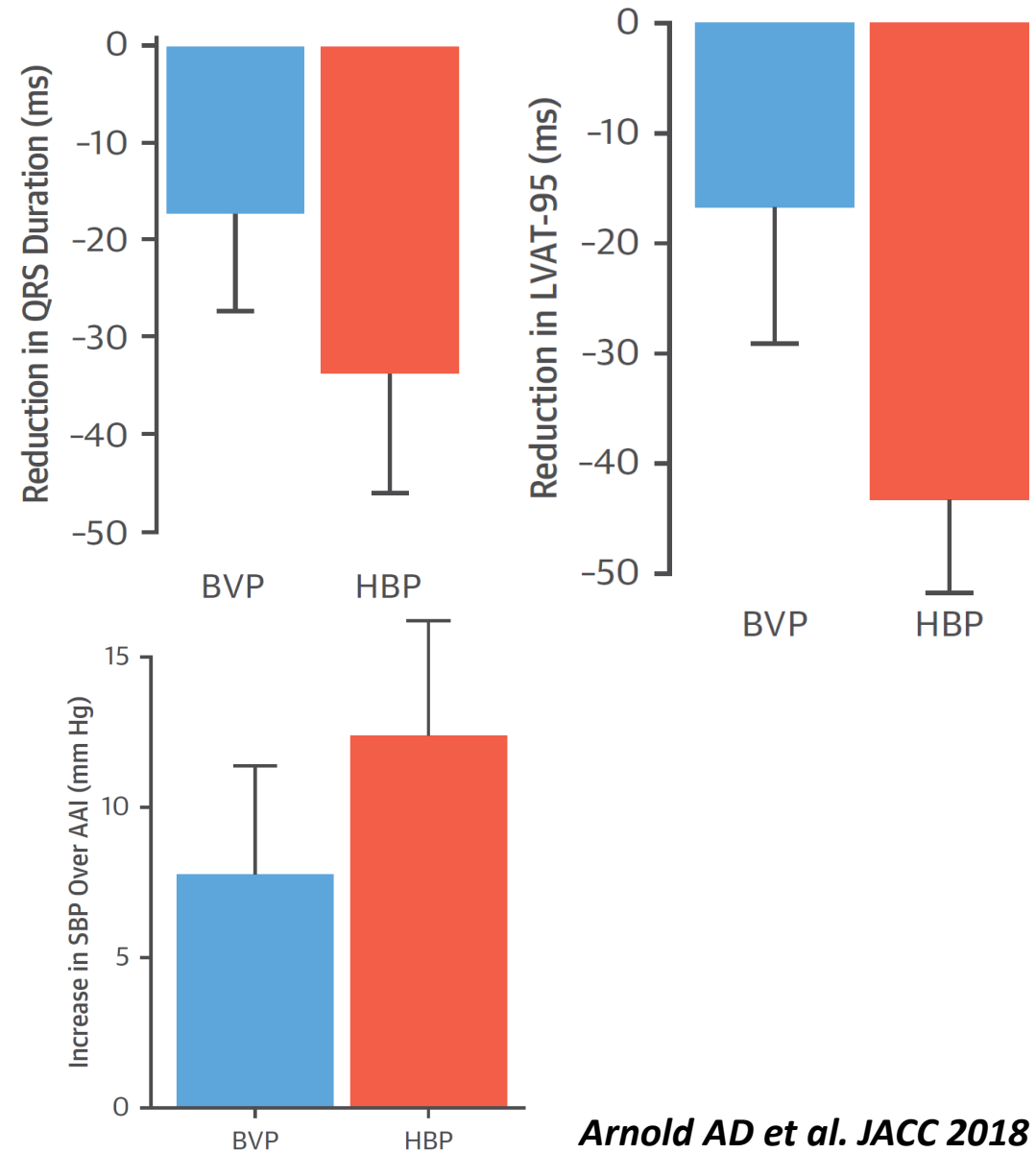
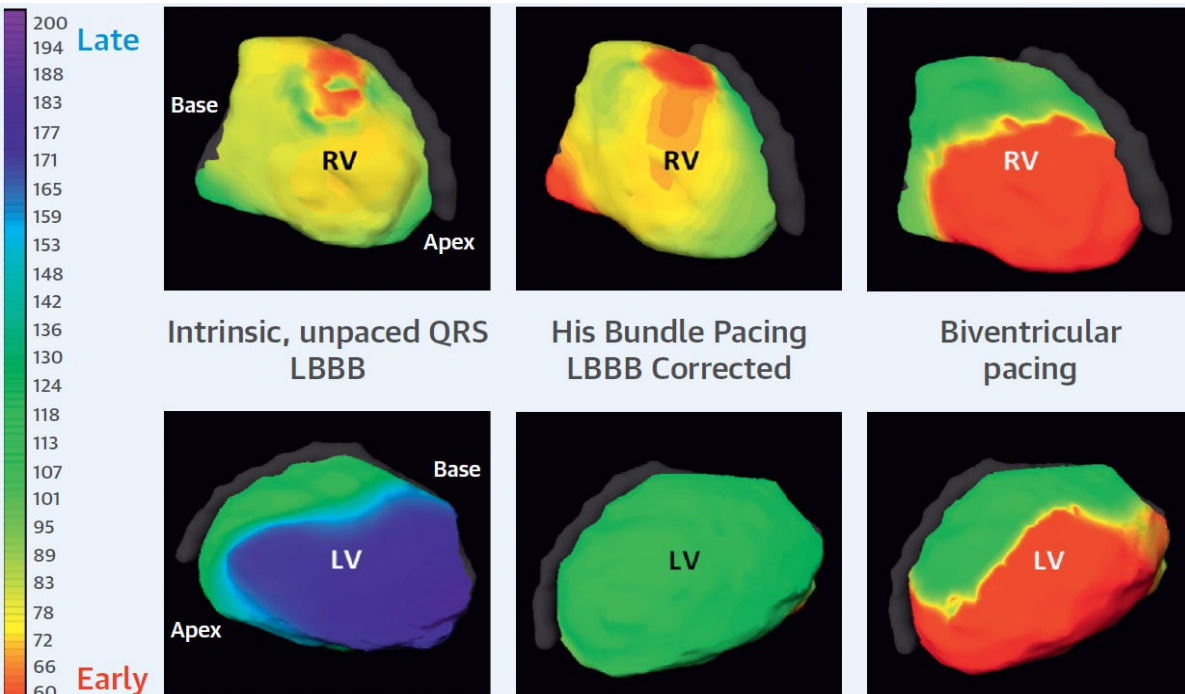


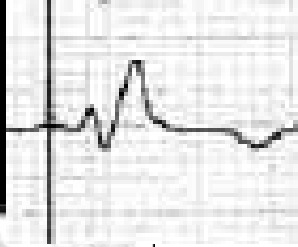
QRS duration (ms)

	Baseline	Nonselective HBP	Selective HBP	His to LV	BiVP
Mean ± SD	169 ± 16	160 ± 25	131 ± 35	145 ± 24	165 ± 17
P value compared to baseline QRS	-	.23	.014	.002	.52
P value compared to BiVP QRS	-	.57	.01	.007	-

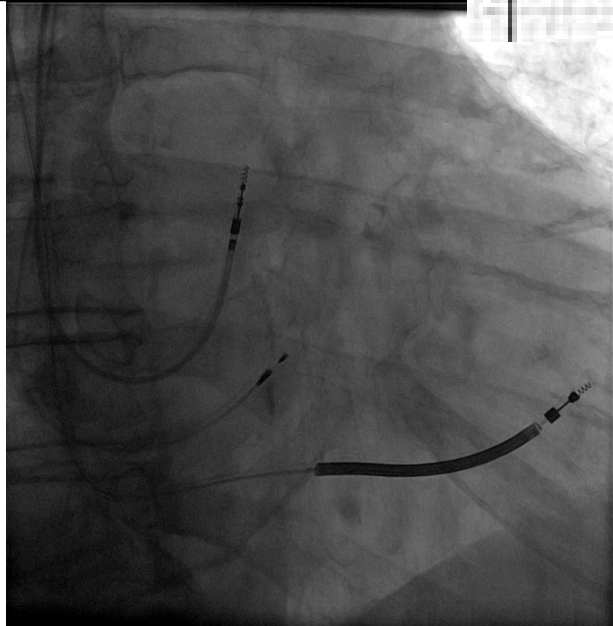
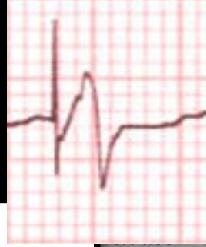
HBP vs CRT: Acute effects

- 23 CRT candidates: HF/LBBB
- Temporary HBP with haemodynamic measurements / ECGi
- « Within »-patient comparison
- QRS narrowing in 19 (83 %)





V1



Both prevent pacemaker-mediated cardiomyopathy in patients with high pacing burden



Advantages

Shorter procedure time

Most similar to native conduction pattern

Higher familiarity for physicians due to longer time in use

Drawbacks

Higher output needed

Dyssynchrony with narrow QRS patients ?

Contrast injection

30 % of nonresponse

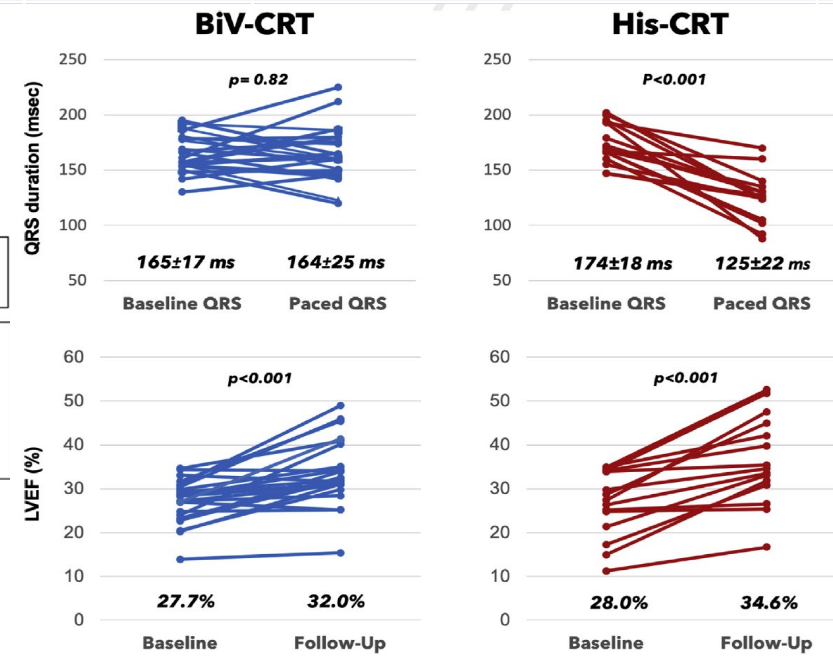
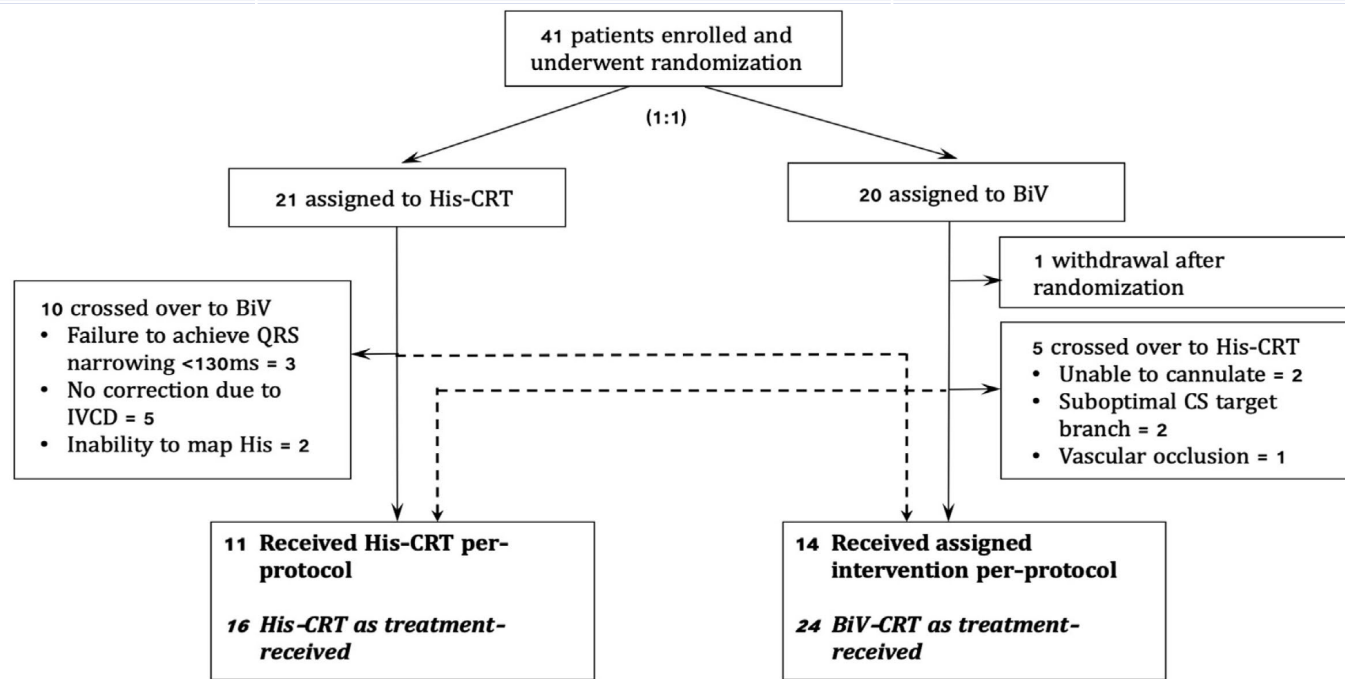
Electrical Resynchronization

Myocardial/Mechanical Resynchronization

HBP : Ongoing Studies

Study Name	Design	Number	Country	Endpoint	ClinicalTrials.gov
His-SYNC	LVEF < 35 % / QRS > 120 ms	40 Randomized HBP vs CRT	USA	LVEF at 6 mo QRS duration Time to 1st hospitalization	NCT02700425

NCT02671903

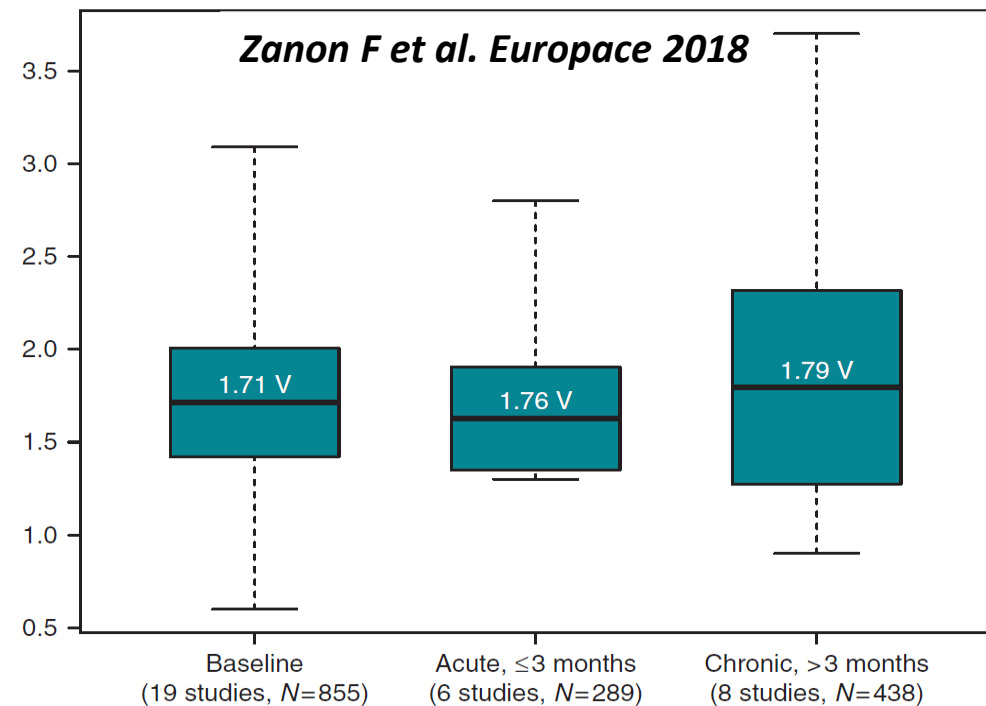


To summarize

Indications	Studies
1. LVEF < 35 % / Broad QRS	His-SYNC study
2. LVEF = 36-50 % / AVB / Expected VP > 40 %	IIA (B) / Alternative to CRT
3. « Rescue strategy » to CRT	<i>Sharma et al (2018) – Barba-Pichardo et al (2013)</i>
4. Non eligible to CRT: HF with narrow QRS / RBBB	Hope-HF study
5. AVN ablation	NCT02805465

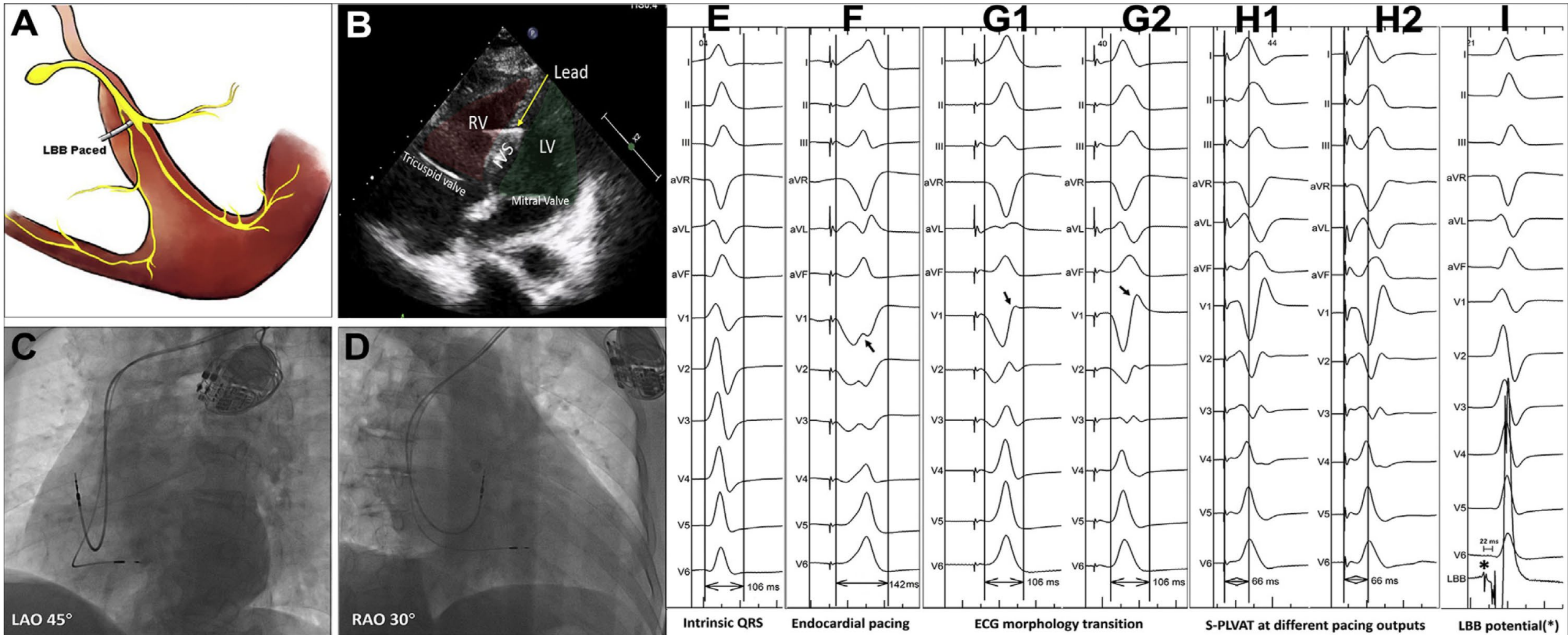
- HBP has just been integrated into the most recent guidelines
- More economical solution in developing countries ?

- Unanswered questions:
 - Few control on the pacing threshold...
 - RCT and long-term results...
 - RV back-up lead or not ?



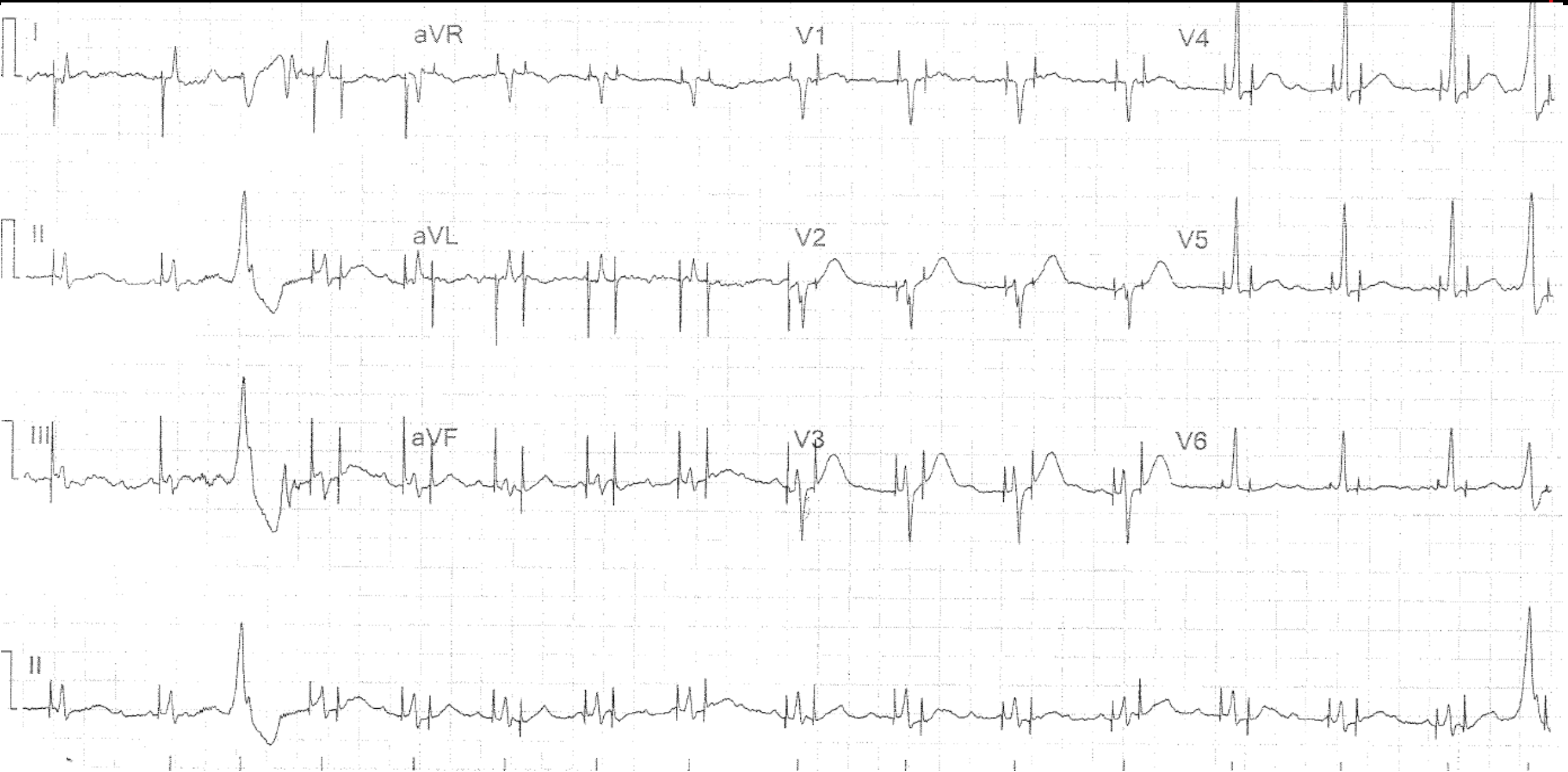
Left bundle branch area pacing

- Successful in 30/33 (90.9 %) / 0.64 ± 0.2 V x 0.4 ms at 3 months



- BBB correction in 11/16 (68.7 %)

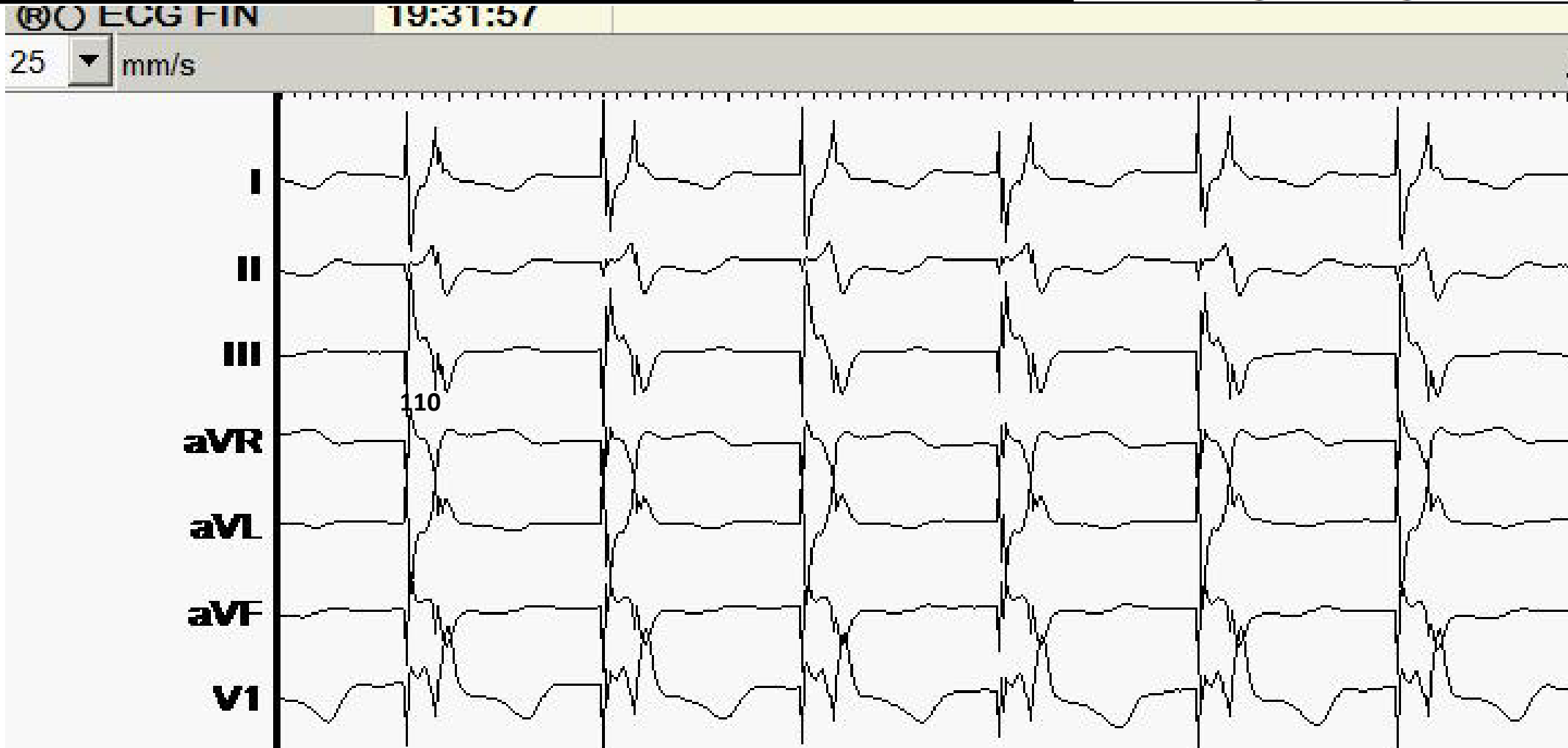
Funny ECG



Funny ECG

REVIEW

Device Programming for His Bundle Pacing



Haran Burri, MD
Daniel Keene, MD
Zachary Whinnett, MD
Francesco Zanon, MD
Pugazhendhi Vijayaraman,
MD



- 45-yo female patient with AIDS
(Dolutegravir/Abacavir/Lamivudine)
- Symptomatic Mobitz II AVB
- No fibrosis nor lymphoma on MRI

