

PLACE

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

ROMA

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**Auditorium
della Tecnica**

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Cardiostimolazione: Nuove Evidenze

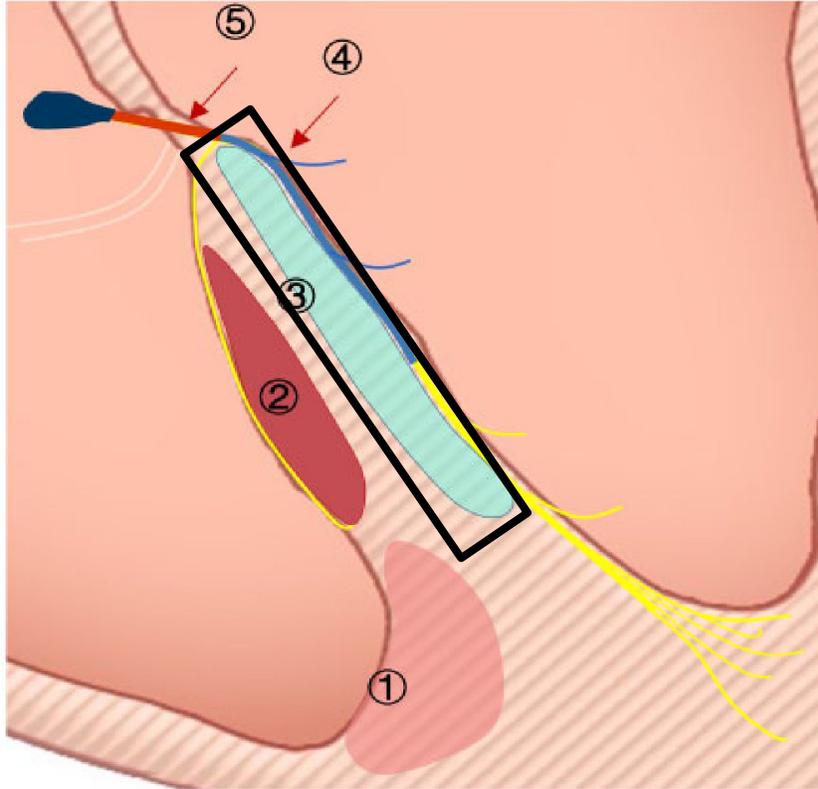
LA NUOVA FRONTIERA: LA STIMOLAZIONE DELLA BRANCA SINISTRA

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No disclosures regarding this presentation

LBBAreaP = LBBP and LVSP



- ①: RV apex
- ②: RV septum
- ③: Deep LV septum
- ④: proximal LBE
- ⑤: His bundle



Procedure Steps

- **Locate screwing site**
- **Lead screwing**
- **Monitor Lead depth**
- **Confirme LBB capture**
- **Programming**

- V1 NOTCHES CHANGE
- FIXATION BEATS
- IMPEDENCE MONITORING
- PACING WHILE SCREWING
- LB-PO
- FULCRUM SIGN
- PACING FROM RING
- SHEATH ANGIOGRAPHY

- R' IN V1
- QRS TRANSITION
- PHYSIOLOGY BASED CRITERIA
- MORPHOLOGY CRITERIA
- COI

Principal studies reporting on LBBAP outcomes

Study	Patients	Implant success (%)	Baseline QRS (ms)	Paced QRS (ms)	Procedural duration (min)	Baseline LVEF (%)	Implant pacing threshold (V)	Implant sensed R wave (mV)	Mean FU (months)	LVEF at FU (%)	Lead-related complications (%)
Padala et al. [9]	341	89	114±30	112±12	75±34	N/A	0.74±0.30	10.7±4.9	12	N/A	0.87
Su et al. [31●●]	632	98	114±32	113±17	86±44	57±16	0.65±0.27	11.4±5.5	19±7	62±12	1
Vijayaraman et al. [32]	28	93	144±27	125±15	96±38	59±12	0.64±0.3	14±8	12±14	61±12	0
Chen et al. [26●]	237	95	117±26	132±8	N/A	N/A	0.59±0.21	11.8±4.2	18±2	N/A	1.27
Vijayaraman et al. [6●●]	100	93	133±35	136±17	117±48	33±10	0.60±0.40	10±6	5±3	44±11	3
Li et al. [27]	87	81	107±3	113±10	N/A	N/A	0.76±0.22	12±5	3	N/A	0
Wang et al. [28]	66	92	99±14	121±10	94±16	61±6	0.94±0.21	12±4	6	N/A	4.5
Hou et al. [29]	56	100	109±29	118±11	N/A	64±3	0.50±0.10	17±7	5±2	N/A	0

Principal studies reporting data on LBBAP in pts with CRT indication

Study	Patients	Baseline QRS (ms)	Paced QRS (ms)	Baseline LVEF (%)	Pacing threshold (V)	Mean FU (months)	LVEF at FU (%)	Lead dislodgement (%)
Zhang et al. [34]	LBBAP <i>n</i> = 11	180 ± 16	139 ± 17	32 ± 5	0.83 ± 0.16	6.7	*	0
Wang et al. [35]	BiVP <i>n</i> = 30	175 ± 19	142 ± 15	26 ± 5	1.00 ± 0.58	6	39 ± 12	0
	LBBAP <i>n</i> = 10	184 ± 19	123 ± 17	27 ± 4	0.54 ± 0.11		46 ± 9	
Li et al. [36]	BiVP <i>n</i> = 54	–	159 ± 22	–	1.22 ± 0.62	6	35 ± 11	0
	LBBAP <i>n</i> = 37	176 ± 17	125 ± 12	29 ± 5	0.81 ± 0.30		44 ± 9	
Wu et al. [37]	BiVP <i>n</i> = 54	161 ± 18	135 ± 20	30 ± 6	0.93 ± 0.58	12	**	0
	HBP <i>n</i> = 49	170 ± 19	101 ± 15	30 ± 6	1.35 ± 0.73		2	
	LBBAP <i>n</i> = 32	166 ± 16	111 ± 11	31 ± 7	0.49 ± 0.13		0	
Vijayaraman et al. [40••]	LBBAP <i>n</i> = 325	152 ± 32	137 ± 22	33 ± 10	0.60 ± 0.30	6	44 ± 11	2.5
Huang et al. [38]	LBBAP <i>n</i> = 63	169 ± 16	118 ± 12	33 ± 8	0.50 ± 0.15	12	55 ± 10	0
Li et al. [39]	LBBAP <i>n</i> = 25	164 ± 29	123 ± 11	35 ± 7	0.80 ± 0.30	9	47 ± 10	0

Complication associated with LBBAP

Study	Patients (<i>n</i>)	Lead dislodgement (<i>n</i> , %)	Significant threshold rise (<i>n</i> , %)	Lead revision (<i>n</i> , %)	Acute septal perforation (<i>n</i> , %)	Delayed septal perforation (<i>n</i> , %)	Other (<i>n</i> , %)*	Overall (<i>n</i> , %)
Padala et al. [9]	341	3 (0.9)	1 (0.3)	3 (0.9)	15 (4.9)	0	9 (2.8)	28 (8.9)
Su et al. [31●●]	632	2 (0.3)	6 (1)	2 (0.3)	2 (0.3)	1 (0.2)	3 (0.5)	14 (2)
Vijayaraman et al. [32]	28	0	0	0	0	0	0	0
Chen et al. [26●]	237	2 (0.8)	0	3 (1.3)	0	1 (0.4)	0	3 (1.2)
Vijayaraman et al. [6●●]	100	3 (3)	0	3 (3)	3 (3)	0	1 (1)	7 (7)
Li et al. [27]	87	0	0	0	0	0	0	0
Wang et al. [28]	66	2 (3)	0	3 (4.6)	0	1 (1.5)	0	3 (4.5)
Hou et al. [29]	56	0	0	0	0	0	0	0
Vijayaraman et al. [40●●]	325	5 (2.5)	2 (0.6)	N/A	10 (3.6)	0	7 (2.5)	24 (8.6)
Huang et al. [38]	63	0	0	0	0	0	0	0
Ravi et al. [25]	57	6 (10.5)	0	3 (5.3)	0	1 (1.8)	N/A	7 (12.3)
Chen et al. [24]	612	2 (0.3)	0	4 (0.6)	0	2 (0.3)	0	4 (0.6)
Total	2604	25 (1)	9 (0.3)	21 (0.8)	30 (1.2)	6 (0.2)	20 (0.8)	90 (3.5)

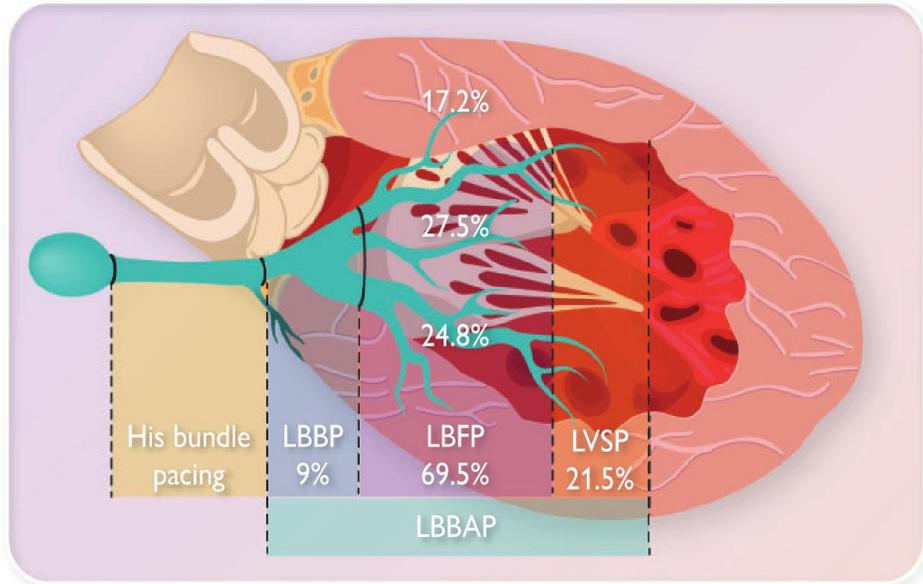
*Other complications including pocket hematoma requiring surgical revision, pneumothorax, stroke, coronary artery injury, and infection

MELOS — MULTICENTER EUROPEAN LEFT BUNDLE BRANCH AREA PACING OUTCOMES STUDY

Prospective, multicenter, registry-based observational study

2533 Participants

14 European centres



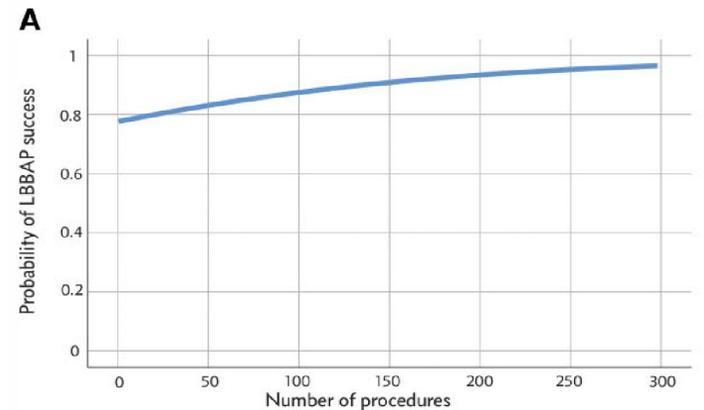
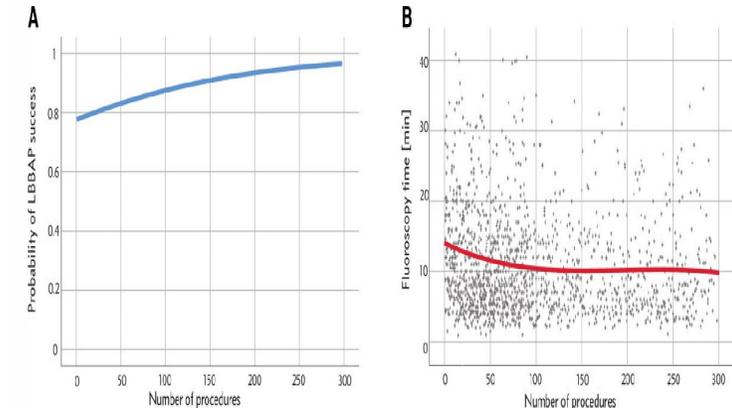
Independent predictors of LBBAP lead implantation failure

Heart failure indication	OR 1.49, 95% CI 1.01–2.21
Baseline QRS duration, per 10 ms	OR 1.08, 95% CI 1.03–1.14
LVEDD, per 10 mm increase	OR 1.53, 95% CI 1.26–1.86

LBBAP implantation success
 Bradycardia indication success **92.4%**
 Heart failure indication success **82.2%**

LBBAP lead complications 8.3%

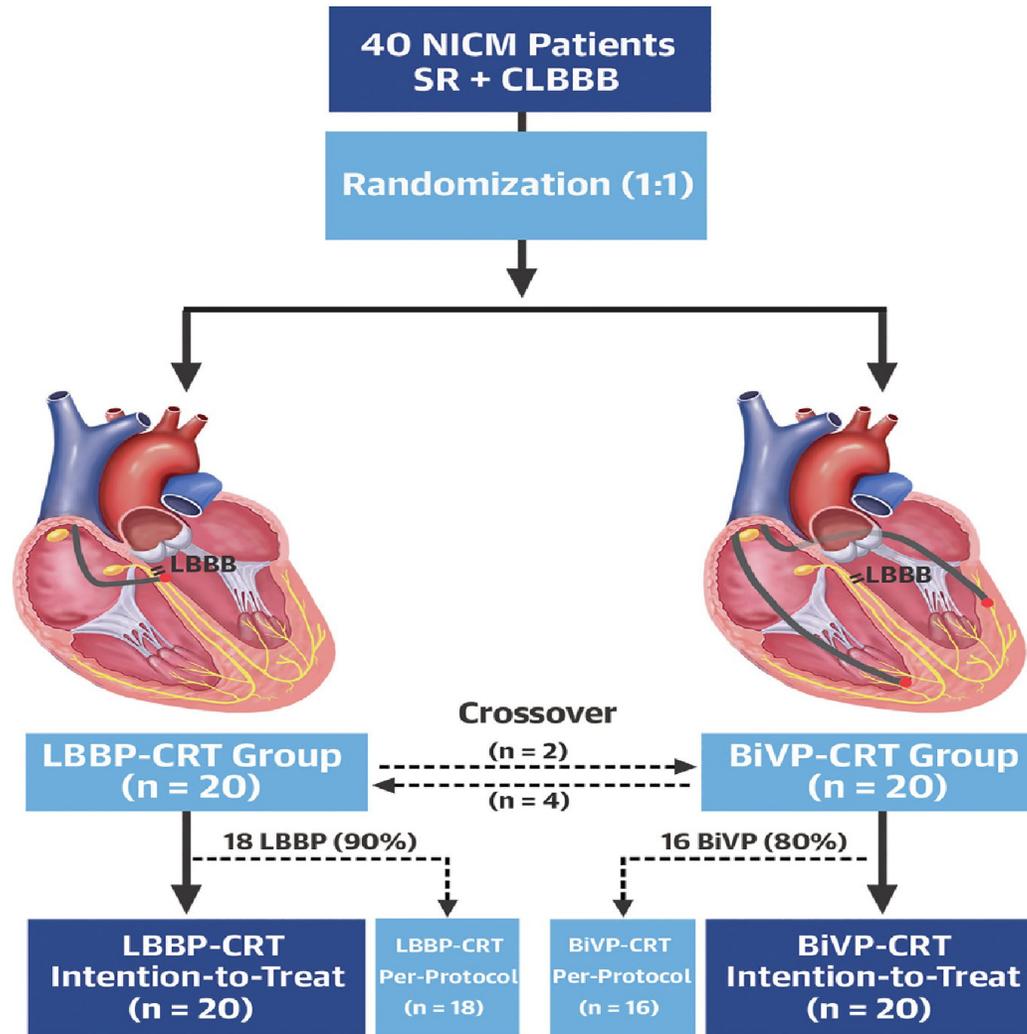
- Acute perforation to LV 3.7%
- Lead dislodgement 1.5%
- Acute chest pain 1.0%
- Capture threshold rise 0.7%
- Acute coronary syndrome 0.4%
- Trapped/damaged helix 0.4%
- Delayed perforation to LV 0.1%
- Other 0.7%



RCT of LBBP-CRT

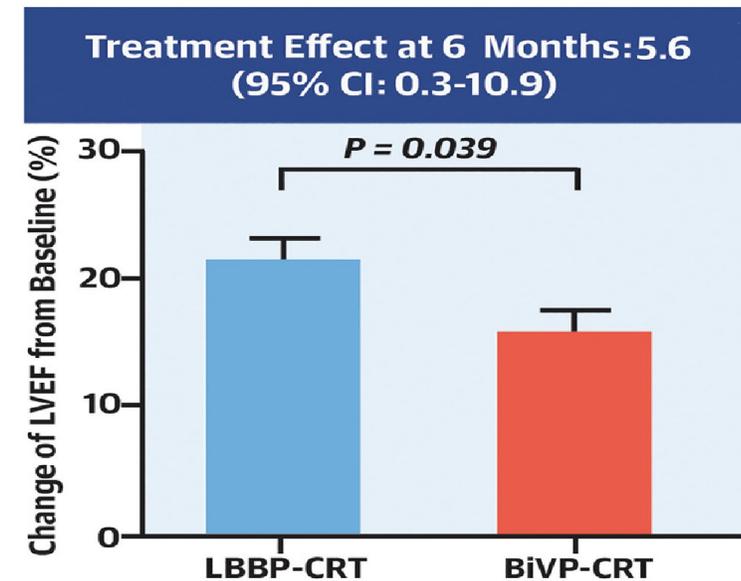
LBBB-Resync (NCT04110431) LBBP vs Biv-P 	His-Alt_2 (NCT 04409119) Direct HBP/LBBP vs Biv-P 	LB-CRT trial (NCT05434962) LBBP vs Biv-P (non inferiority) 
40 pts with HF, LVEF < 35%, LBBB	125 pts with HF, LVEF < 35%, LBBB, NYHA 3-4	176 pts in 11 centers Class I-II CRT indication LBBB defined by Strauss
Primary outcome	Primary outcome	Primary outcome
Changes in LVEF, LVESV and LVEDV	Success rate (LBBB correction)	Clinical composite score or ↓ 15% LVESV
Secondary Outcomes	Secondary Outcomes	Secondary Outcomes
QRSd	LVEF	LVEF
NT-proBNP	6-MWT	Clinical composite score
NYHA	NYHA	6-MWT
6-MWT	Minnesota Score	QoL
QoL	QRSd	HF-H, CV and global mortality
All Cause Mortality, HF-H, CV-H, VA	NT-proBNP	Cardiac transplantation
	Complications	Ventricular arrhythmias
		Device related complications
F-Up 6 month	F-Up 6 month	F-Up 12 month

Randomized Trial of Left Bundle Branch vs Biventricular Pacing for Cardiac Resynchronization Therapy



- CARE-HF : EF ↑ 3.7% @ 3 m and 6.9% @ 18 m
- MADIT-CRT : EF ↑ 8% @ 12 m

EF ↑ 5.9% @ 6 months

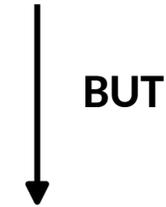


2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

Recommendations for using His bundle pacing

Recommendations	Class ^a	Level ^b
In patients treated with HBP, device programming tailored to specific requirements of HBP is recommended. ^{430,431}	I	C
In CRT candidates in whom coronary sinus lead implantation is unsuccessful, HBP should be considered as a treatment option along with other techniques such as surgical epicardial lead. ^{318,424,440,443}	IIa	B
In patients treated with HBP, implantation of an RV lead used as 'backup' for pacing should be considered in specific situations (e.g. pacemaker dependency, high-grade AVB, infranodal block, high pacing threshold, planned AVJ ablation) or for sensing in the case of issues with detection (e.g. risk of ventricular undersensing or oversensing of atrial/His potentials). ^{423,426,444}	IIa	C
HBP with a ventricular backup lead may be considered in patients in whom a 'pace-and-ablate' strategy for rapidly conducted supraventricular arrhythmia is indicated, particularly when the intrinsic QRS is narrow. ^{197,199,200,318}	IIb	C

Only HBP is contemplated in current European GL as **alternative** to traditional (RV and BIV) pacing



- None of RCTs states BIVp – rather CRT!!!
- Believing that BIVp, Epicardial, Non-Physiological pacing is better than «pacing» chosen by nature is impertinence not EBM!!!
- Evolution is the largest RCT!!!

Recommendations for using left bundle branch area pacing cannot therefore be formulated at this stage. However, conduction system pacing (which includes HBP and left bundle branch area pacing) is very likely to play a growing role in the future, and the current recommendations will probably need to be revised once more solid evidence of safety and efficacy (from randomized trials) is published. A comparison of RV pacing, HBP, and left bundle branch area pacing is provided in [Supplementary Table 12](#).