

Corso Avanzato GIMSI sulla Sincope

Il nuovo ruolo del tilt test



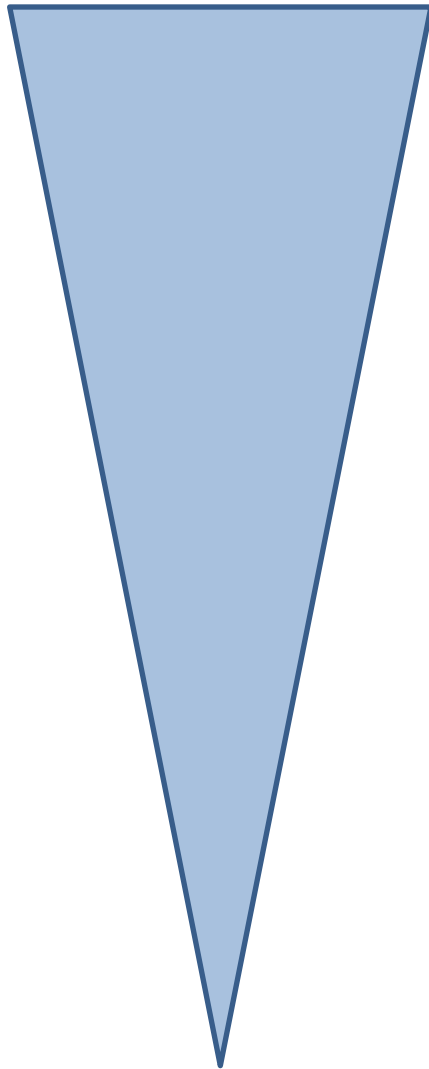
Michele Brignole
*Centro Aritmologico &
Syncope Unit - Lavagna*

Tilt table testing: limitations

- Too often negative in pts with likely VVS (*“low sensitivity”*)
- Too often positive in pts without VVS syncope (*“low specificity”*)
- No value in assessing efficacy of treatment with drugs or pacemaker

Someone stopped to perform it
(*“clinical history better than tilt table testing”*)

Tilt testing: positivity rate



92% Typical VVS, emotional trigger (Clom)

78% Typical VVS, situational trigger (TNT)

73%-65% Typical VVS, miscellaneous (Clom) (TNT)

56%-51% Likely reflex, atypical (TNT)

47% Cardiac syncope (TNT)

45% Likely tachyarrhythmic syncope (Passive)

36%-30% Unexplained syncope (TNT) (Clom)

13%-8% Subjects without syncope
(Passive) (Clom) (TNT)⁸

Twenty-eight years of research permit reinterpretation of tilt-testing: hypotensive susceptibility rather than diagnosis

Richard Sutton^{1*} and Michele Brignole²

A positive tilt test suggests the presence of a **hypotensive susceptibility**, which plays a role in causing syncope irrespective of the etiology and mechanism of syncope.

Changed indications for Tilt Table Testing

Old (initial) indications	New indications
Diagnosis of VVS	Susceptibility to orthostatic stress, irrespective of the etiology of syncope

Study design

ILR screening phase

Pts affected by **severe, recurrent** reflex syncope, **aged >40 yrs**



Tilt Table Testing (Passive + TNT)



ILR implantation (Reveal DX/XT)



ILR follow-up (max 2 yrs)



ISSUE 3 therapy phase

ILR eligibility criteria:

- *Asystolic syncope ≥ 3 s, or*
- *Non-syncopal asystole ≥ 6 s*



Pm ON



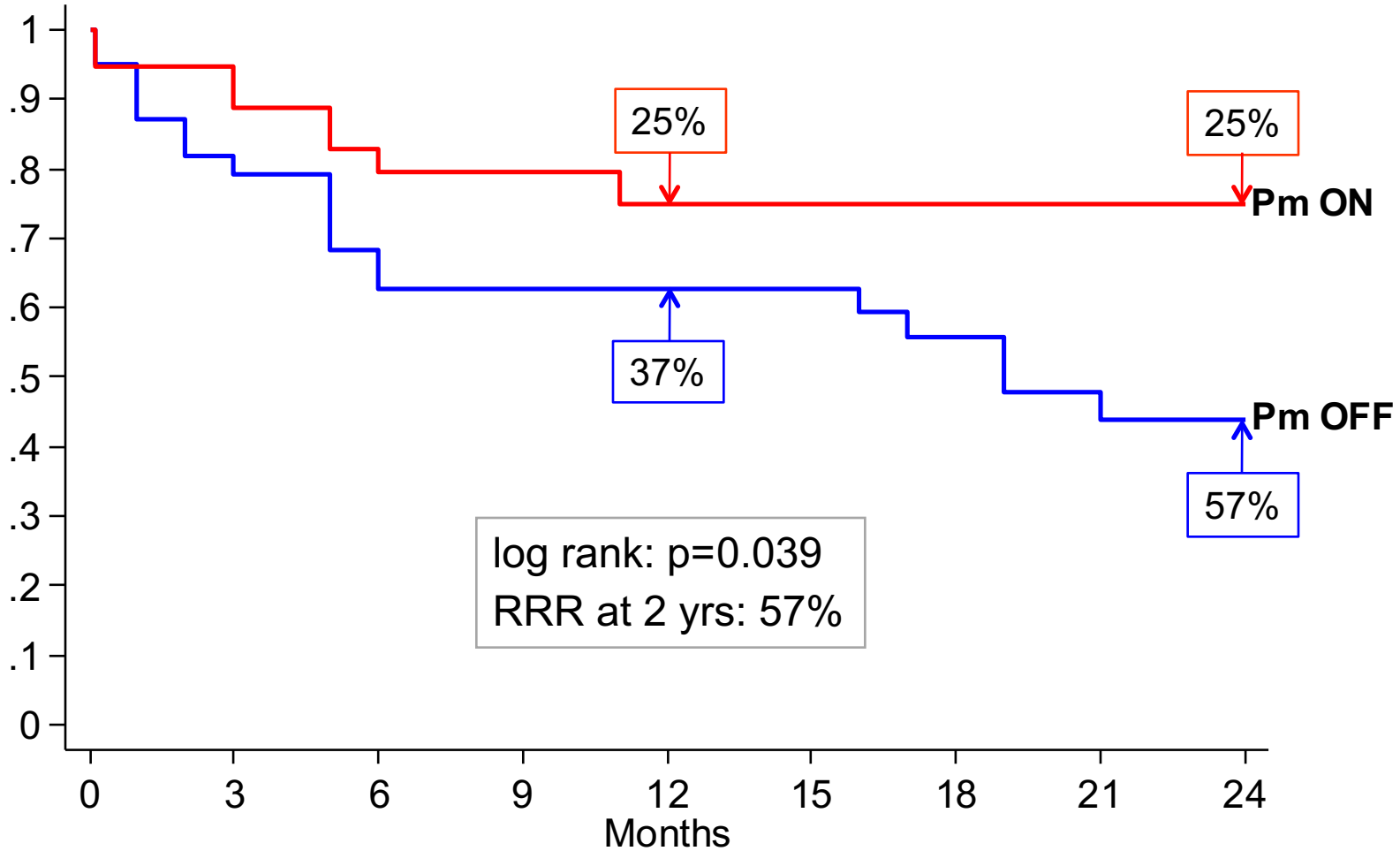
Pm OFF

First syncope recurrence (intention-to-treat)

SYNCOPE

ISSUE 3

Freedom from syncope recurrence



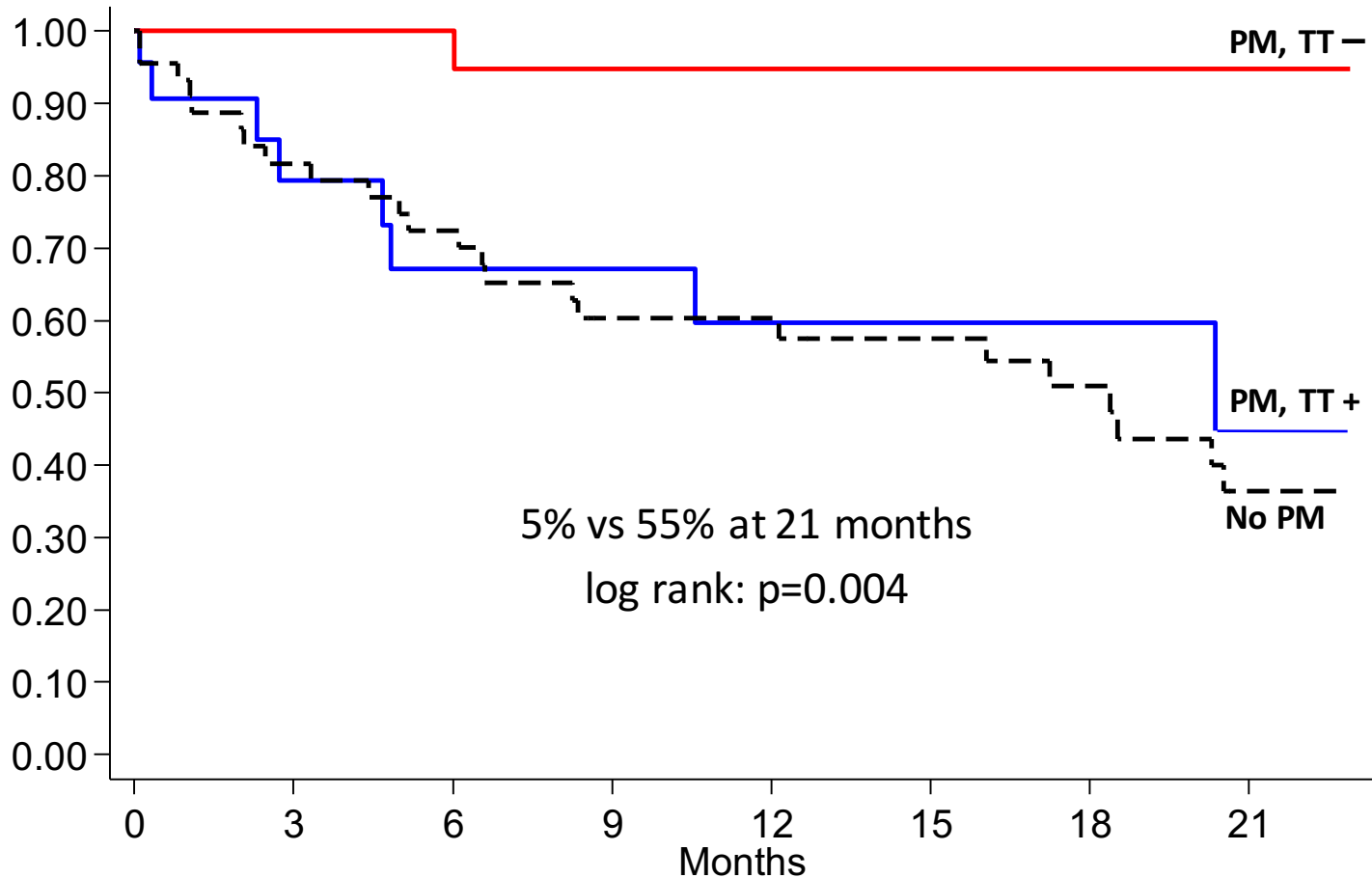
Number at risk

Pm OFF	39	31	25	21	21	18	15	12	8
Pm ON	38	32	27	22	16	14	13	13	11

Factors predicting recurrence of syncope after pacemaker therapy (II)

<i>Characteristics</i>	Recurrence n=9	No recurrence n=43	P value
Tilt testing: positive	89%	42%	0.0004
- Asystolic (Vasis 2B)	44%	23%	ns
- Non-asystolic	44%	19%	ns
ILR findings (asystole)			
- Asystole duration, sec	9	8	ns
- Type 1A (sinus arrest)	44%	63%	ns
- Type 1B (sinus brady + AV block)	33%	14%	ns
- Type 1C (AV block)	22%	24%	ns
Systolic blood pressure			
- Supine, mmHg	135	130	ns
- Standing, mmHg	127	118	ns

Syncope recurrence after PM therapy according to tilt test results



	Number at risk							
	0	3	6	9	12	15	18	21
PM TT+	26	14	10	9	8	6	4	3
PM TT-	26	19	19	15	11	10	9	9
NO THER	45	35	31	22	22	18	14	9

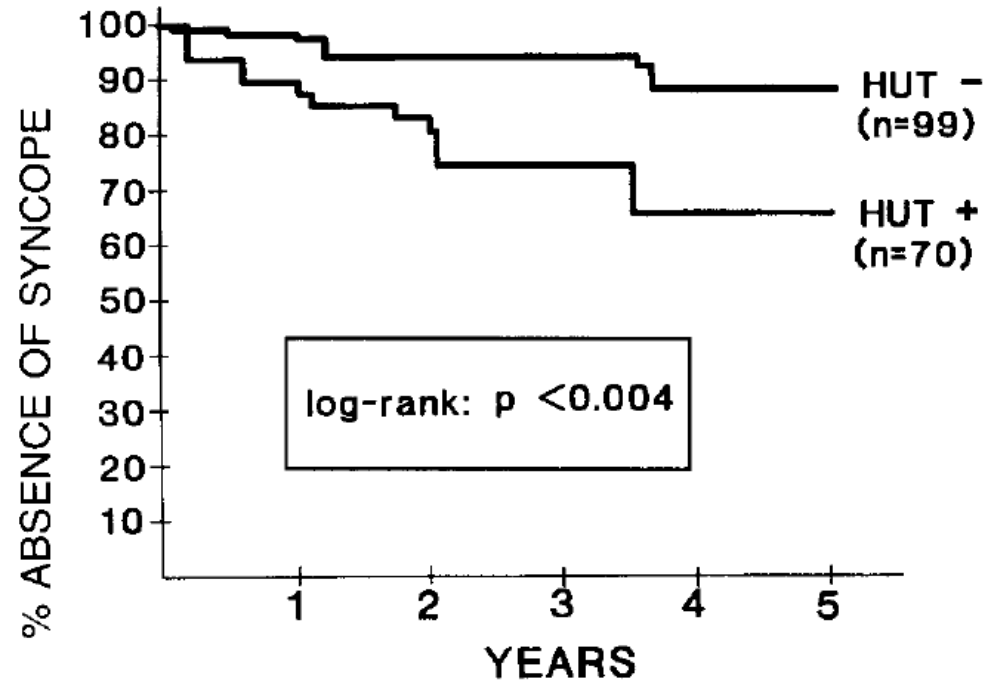
A Positive Response to Head-Up Tilt Testing Predicts Syncopal Recurrence in Carotid Sinus Syndrome Patients With Permanent Pacemakers

Germano Gaggioli, MD, Michele Brignole, MD, Carlo Menozzi, MD, Gianluigi Devoto, MD, Daniele Oddone, MD, Lorella Gianfranchi, MD, Enrico Gostoli, MD, Nicola Bottoni, MD, and Gino Lolli, MD

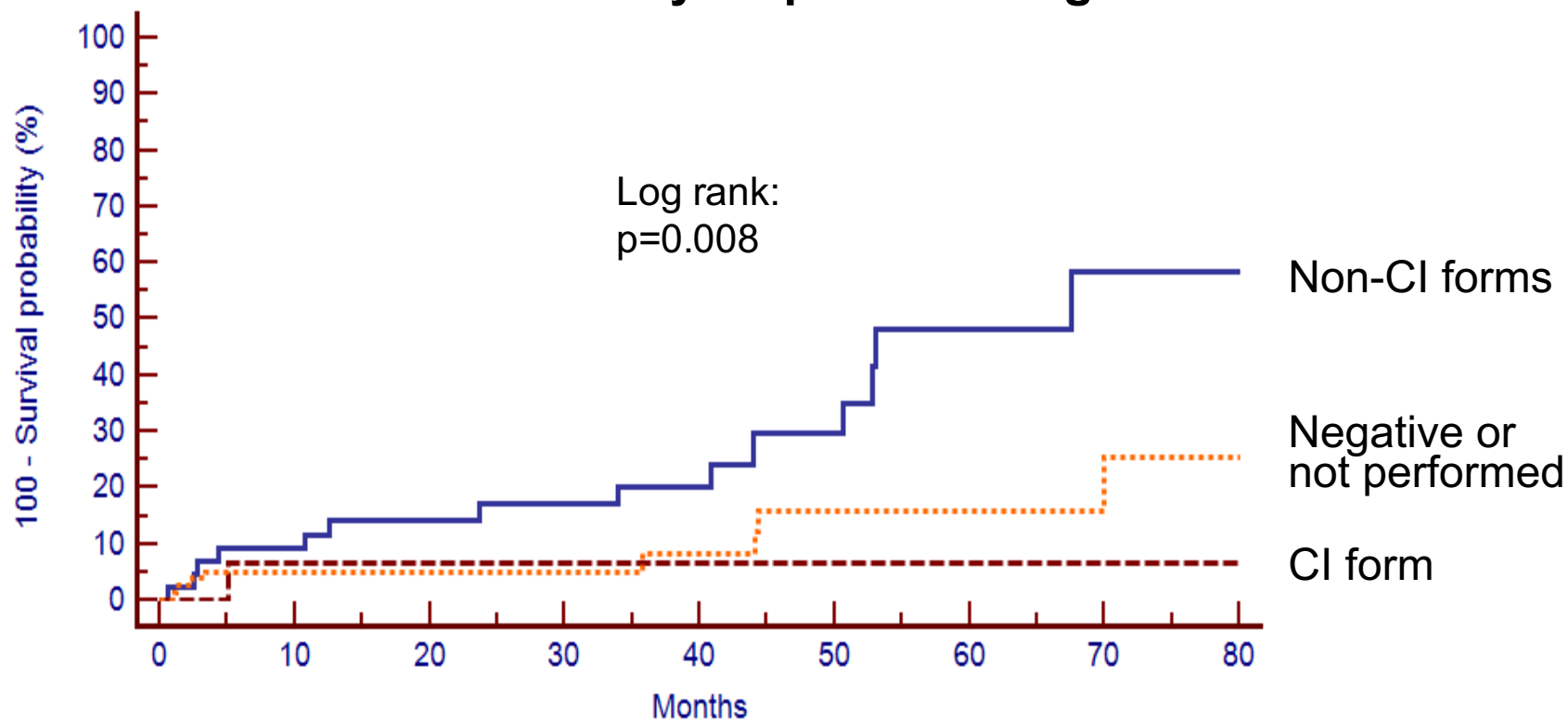
Am J Cardiol 1995; 76: 720

TABLE I Comparison Between Patients With and Without Syncopal Recurrence at Follow-Up

Factors	Syncope (n = 24)	No Syncope (n = 145)
Head-up tilt test		
Positive	15 (63)*	55 (38)*
Negative	9 (38)*	90 (62)*
Underlying heart disease		
Yes	12 (50)	88 (61)
No	12 (50)	57 (39)
Age		
>70 yr	15 (63)	92 (63)
≤70 yr	9 (38)	53 (37)
Pacemaker mode		
Dual-chamber	14 (58)	96 (66)
VVI	10 (42)	49 (34)
Type of carotid sinus syndrome		
Cardioinhibitory	13 (54)	83 (57)
Mixed	11 (46)	62 (43)
Gender		
Male	19 (79)	107 (74)
Female	5 (21)	38 (26)
Number of syncopal episodes		
>3	14 (58)	61 (42)
≤3	10 (42)	84 (58)



Recurrence of syncope according to tilt test results



Number at risk

Group: 1

44	37	31	28	22	13	6	2	2
----	----	----	----	----	----	---	---	---

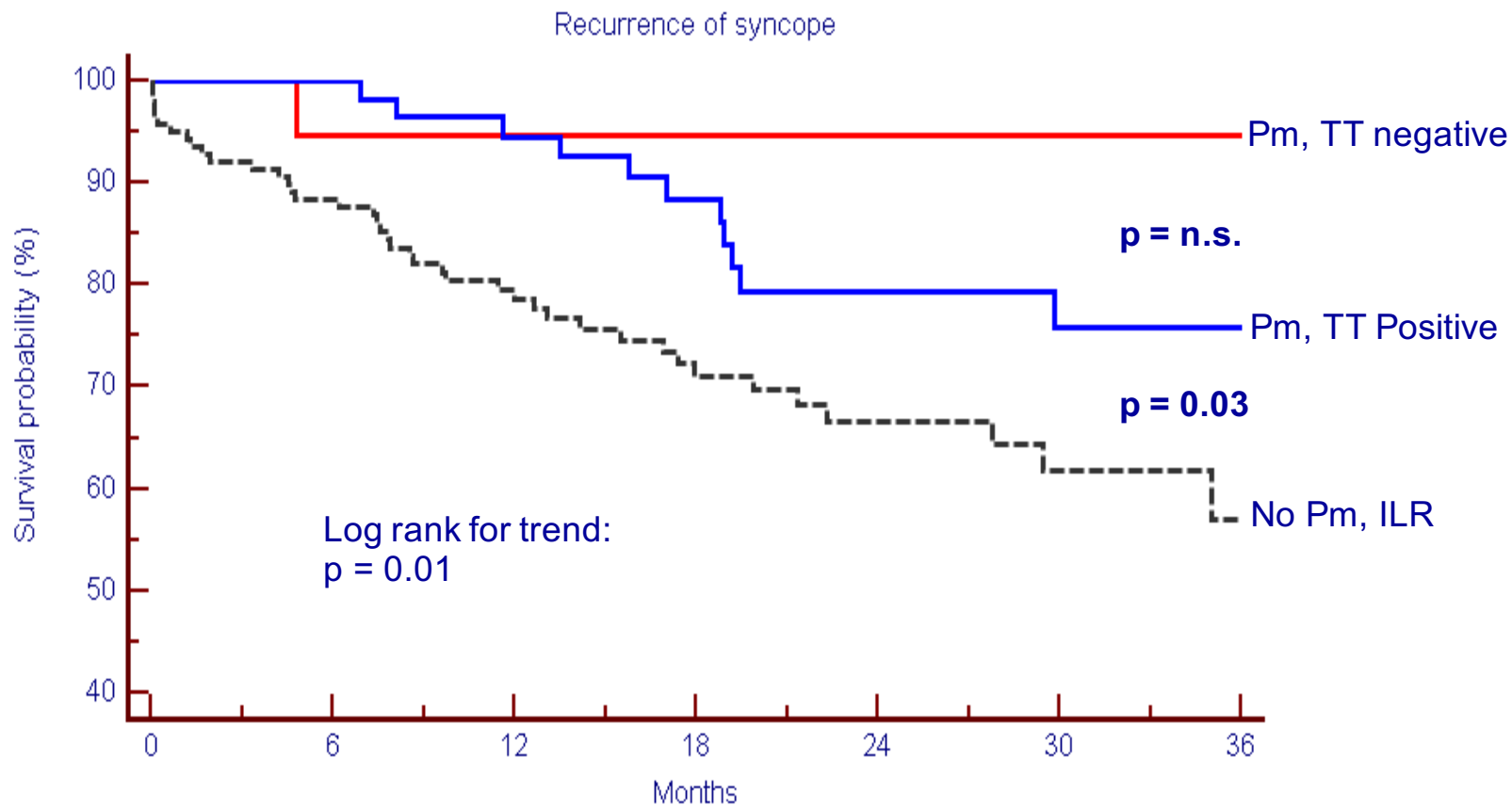
Group: 2

15	14	13	12	8	8	6	2	1
----	----	----	----	---	---	---	---	---

Group: 3

82	63	51	35	27	17	13	8	5
----	----	----	----	----	----	----	---	---

SUP 2 study: 3-years extended follow-up



Number at risk

Group: 1

20	18	17	12	11	6	4
----	----	----	----	----	---	---

Group: 2

61	57	50	41	30	21	8
----	----	----	----	----	----	---

Group: ILR

142	115	90	58	37	22	10
-----	-----	----	----	----	----	----

Changed indications for Tilt Table Testing

Old (initial) indications	New indications
Diagnosis of VVS	Susceptibility to orthostatic stress, irrespective of the etiology of syncope
Identification of candidates for permanent pacing (CI form)	Identification of non-responder to cardiac pacing (any positive response)

Reflex syncope: Dual-action model

Hypotensive susceptibility

YES (Tilt +)
Low reflex threshold

NO (Tilt -)
High reflex threshold

← +

Trigger
(neuro and/or humoral)

+++ →

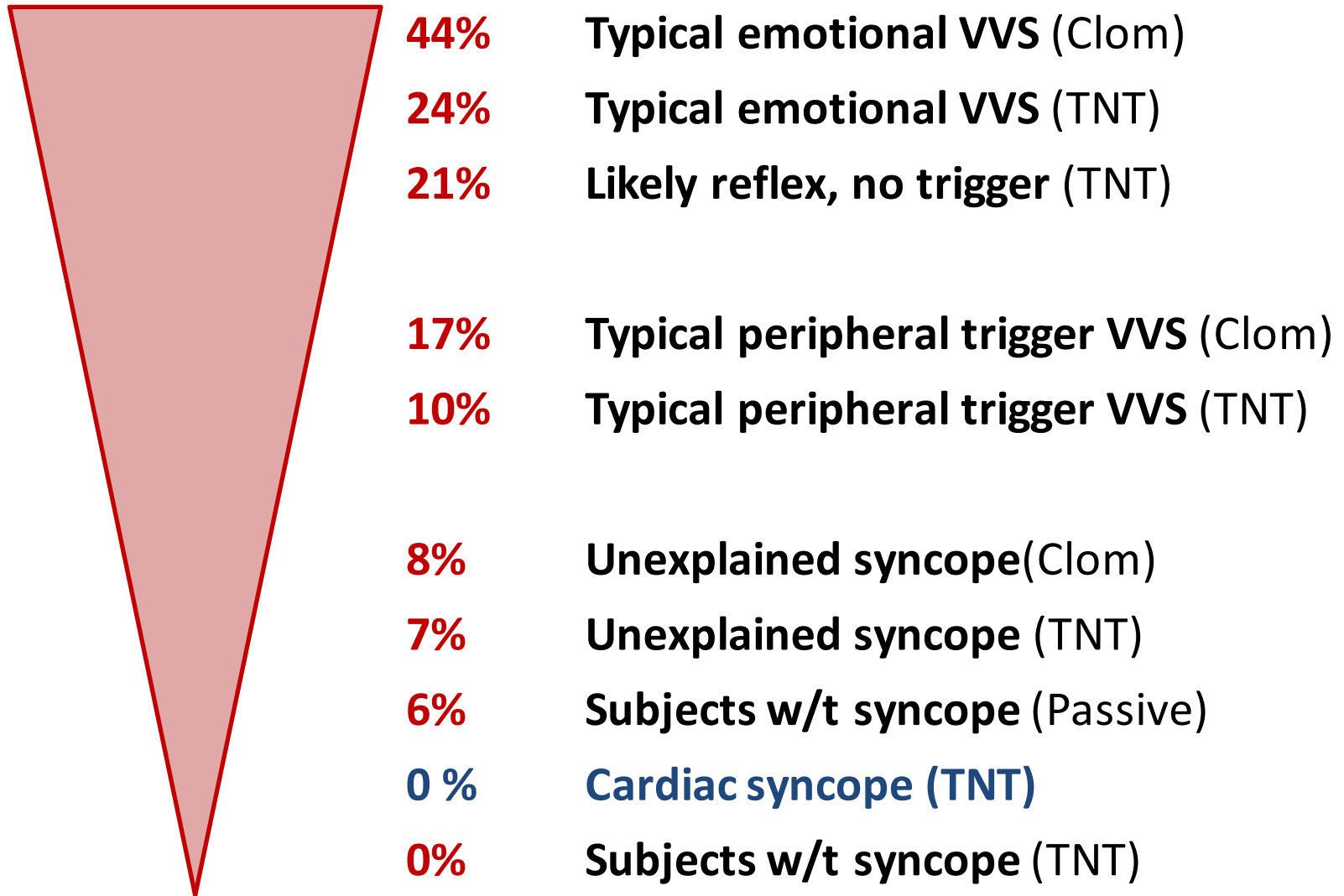
Vasovagal syncope
(hypotension-bradycardia)

**Cardio-inhibitory
reflex syncope**

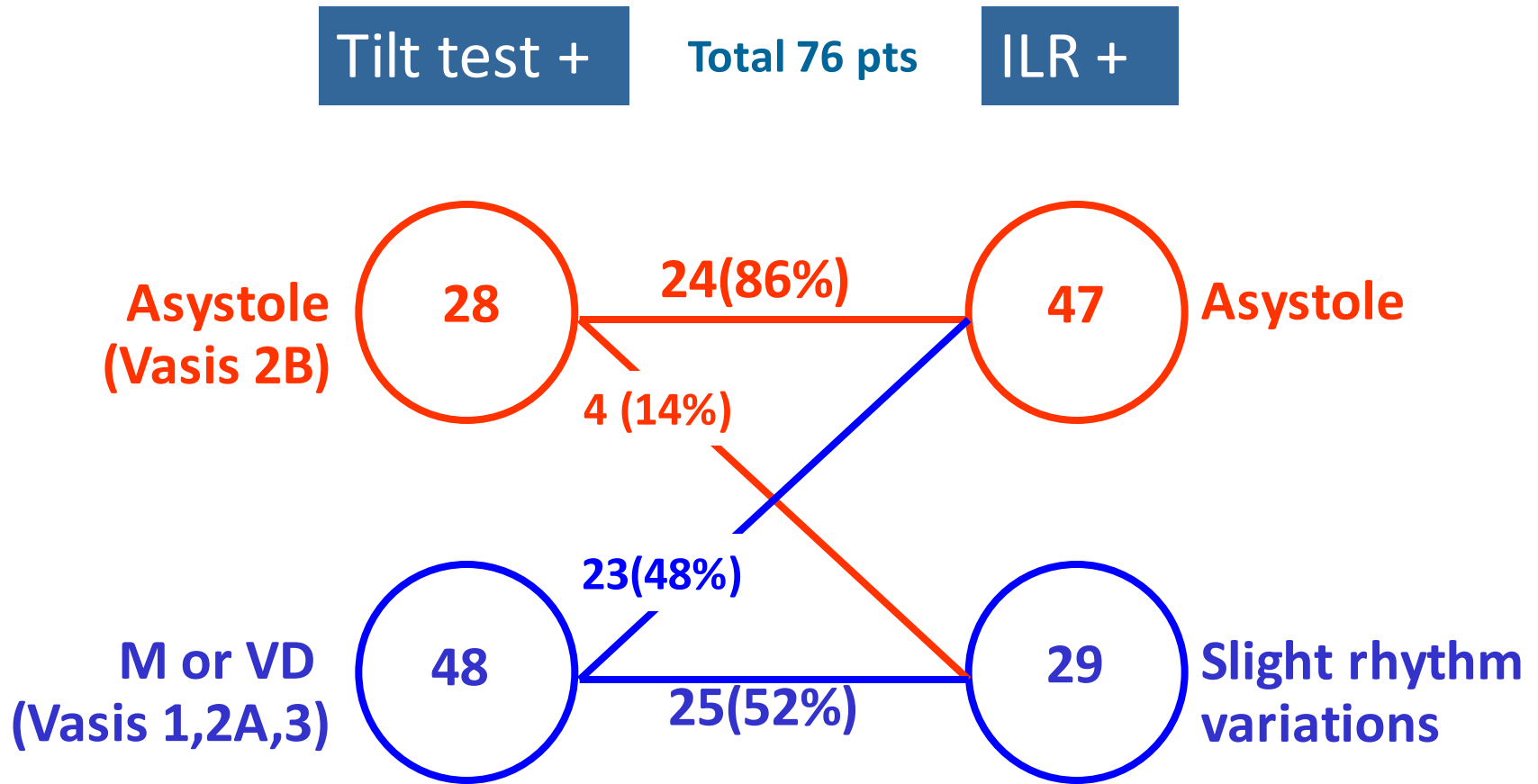
Hypotension phenotype domain
(*pacing low responder*)

Bradycardia phenotype domain
(*pacing high-responder*)

Tilt table testing: asystolic form (VASIS 2B)

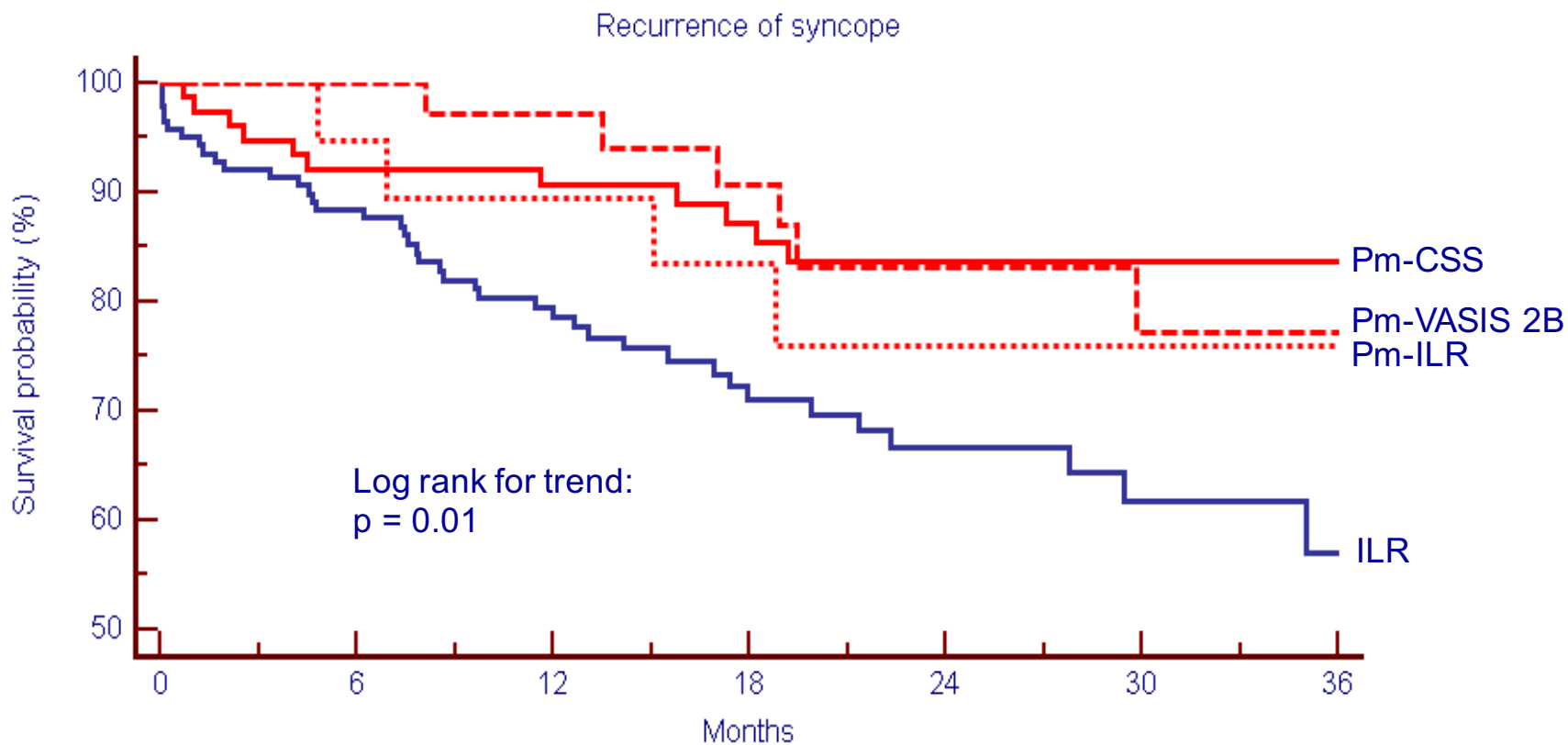


Correlation between tilt test responses and ILR- documented mechanism



Positive predictive value of asystolic tilt: 0.86 (95% CI 0.70-0.95)

SUP 2 study: 3-years extended follow-up



Number at risk

Group: ILR

142	115	90	58	37	22	10
-----	-----	----	----	----	----	----

Group: PM-CSS

78	69	61	51	40	26	17
----	----	----	----	----	----	----

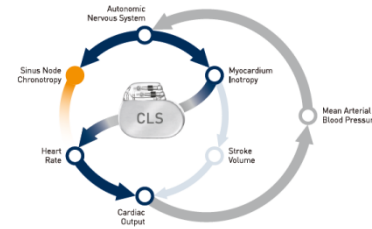
Group: PM-ILR

21	18	17	11	8	6	1
----	----	----	----	---	---	---

Group: PM-VASIS 2B

38	37	32	26	21	13	6
----	----	----	----	----	----	---

BioSync

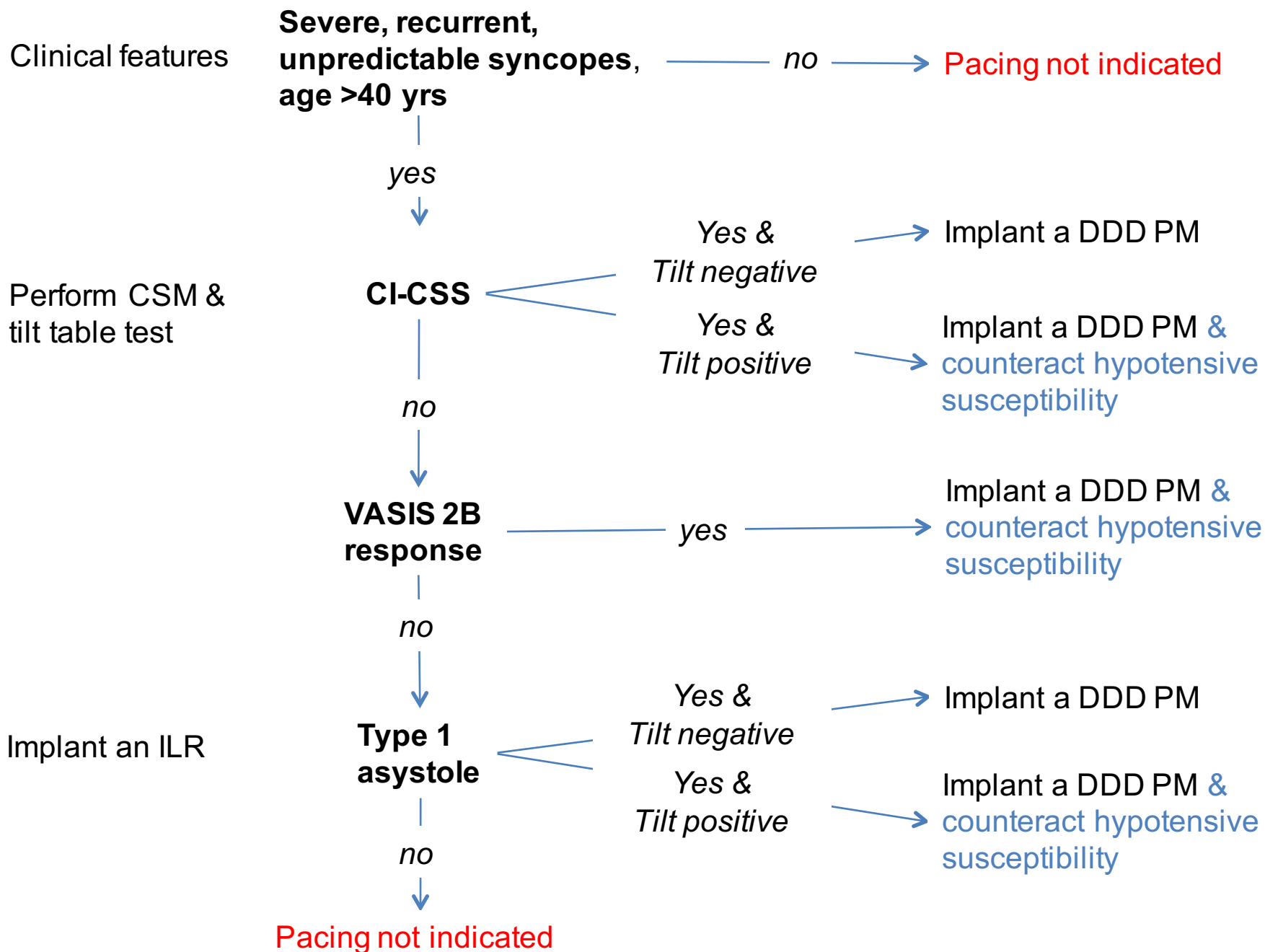


Benefit of dual-chamber pacing with Closed Loop Stimulation (CLS) in tilt-induced cardio-inhibitory reflex syncope.

A randomized double-blind parallel trial

M. Brignole (PI) - M. Tomaino (Co-PI)

Pacing for neurally-mediated syncope: decision tree





Gruppo Italiano Multidisciplinare per lo Studio della Sincope

Italian Multidisciplinary Group for the Study of Syncope:

Established in 2003 by 5 national societies:

- arrhythmology,
- internal medicine,
- emergency medicine,
- geriatrics
- neurology

www.gimsi.it