

# Do we really understand carotid sinus hypersensitivity?

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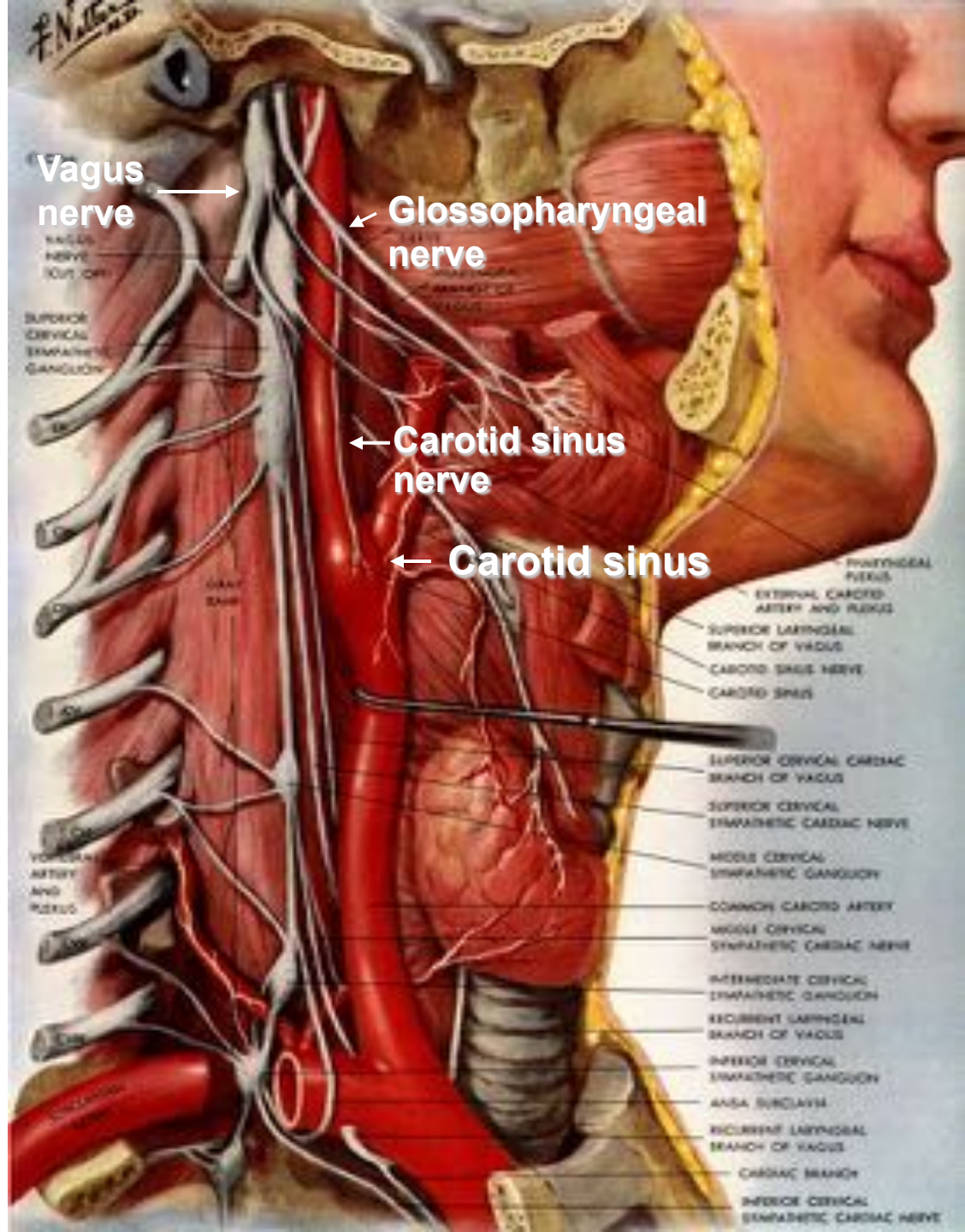
*Syncope Unit – Dept of Cardiology  
Lavagna, Italy*

**Paolo Alboni**

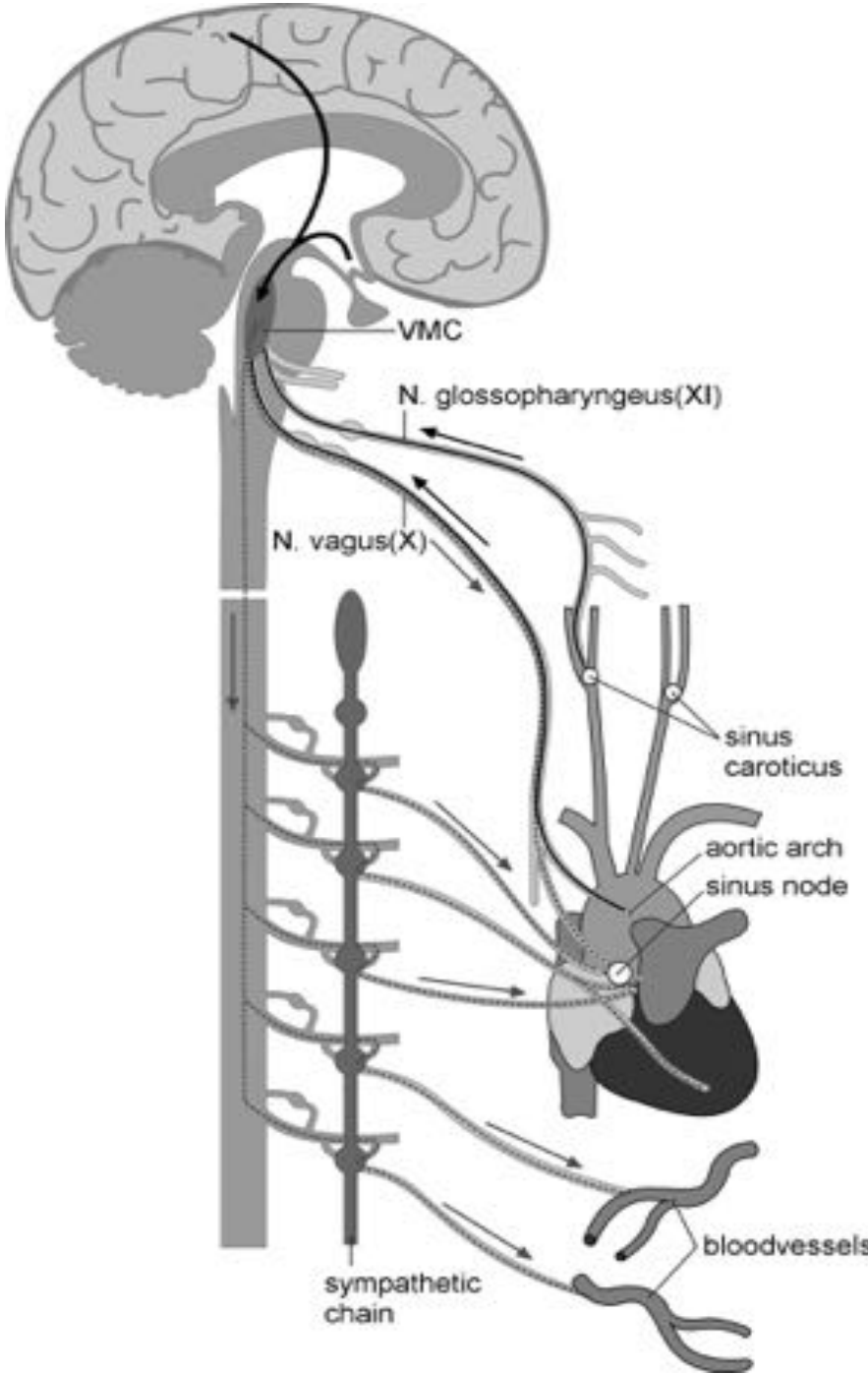
*Syncope Unit – Section of Cardiology  
Ospedale Quisisana  
Ferrara, Italy*



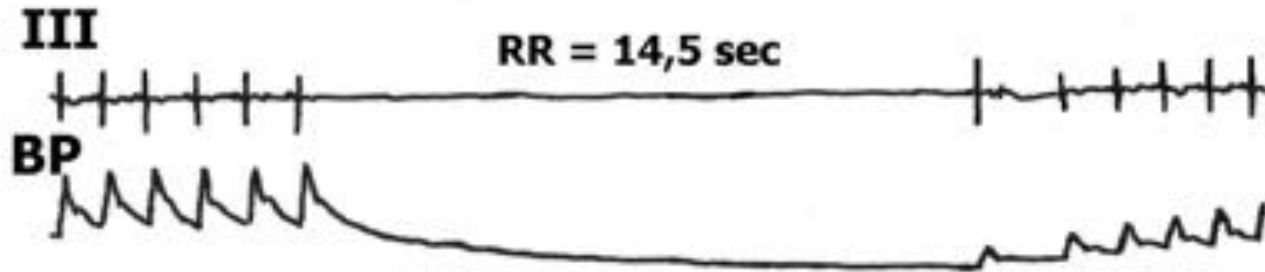
# Carotid sinus hypersensitivity



# CS reflex arc



## carotid sinus massage

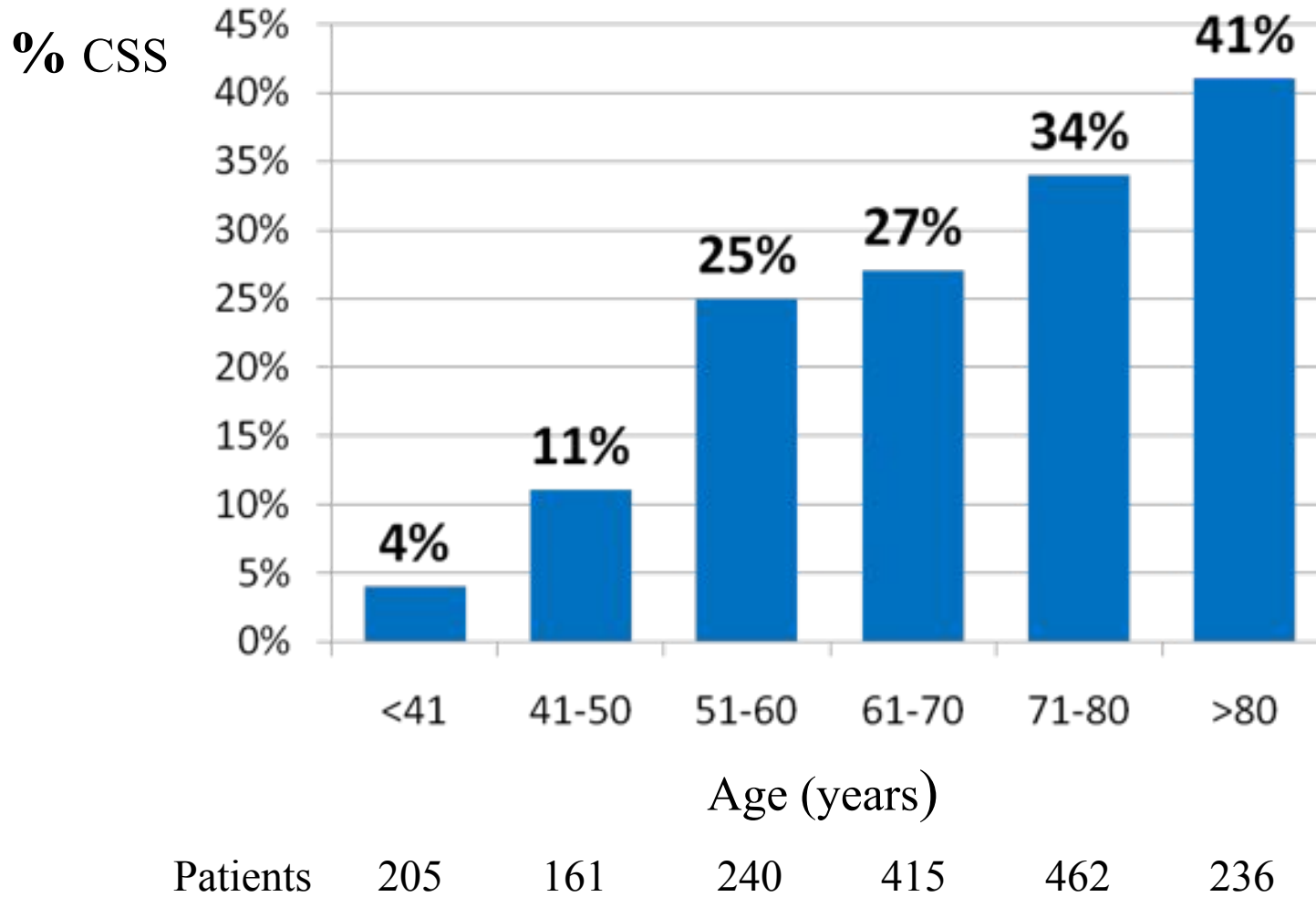


CSM is the tool for evaluation of CS reflex arc function

**Carotid sinus massage responses:**

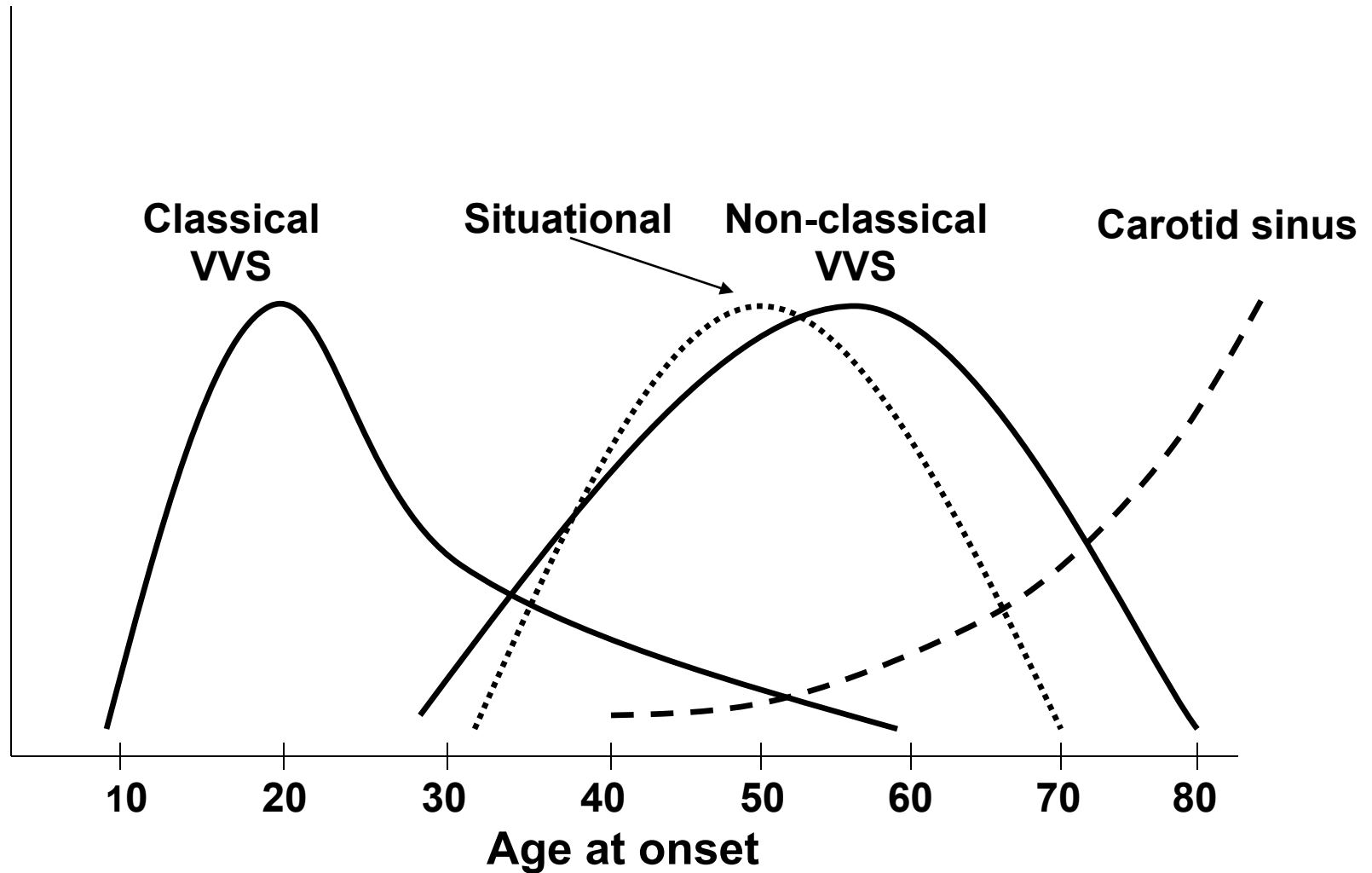
**Ageing process?**

**Syndrome?**



*Results and complications of CSM. Puggioni E et al. Am J Cardiol 2002*

# Age of onset of Reflex Syncope



# Carotid Sinus Hypersensitivity in Asymptomatic Older Persons

Arch Intern Med. 2006;166:515-520

## Implications for Diagnosis of Syncope and Falls

Simon R. J. Kerr, MB, MRCP; Mark S. Pearce, PhD; Carol Brayne, MD, FRCP;  
Richard J. Davis, MB, MRCP; Rose Anne Kenny, MD, FRCP

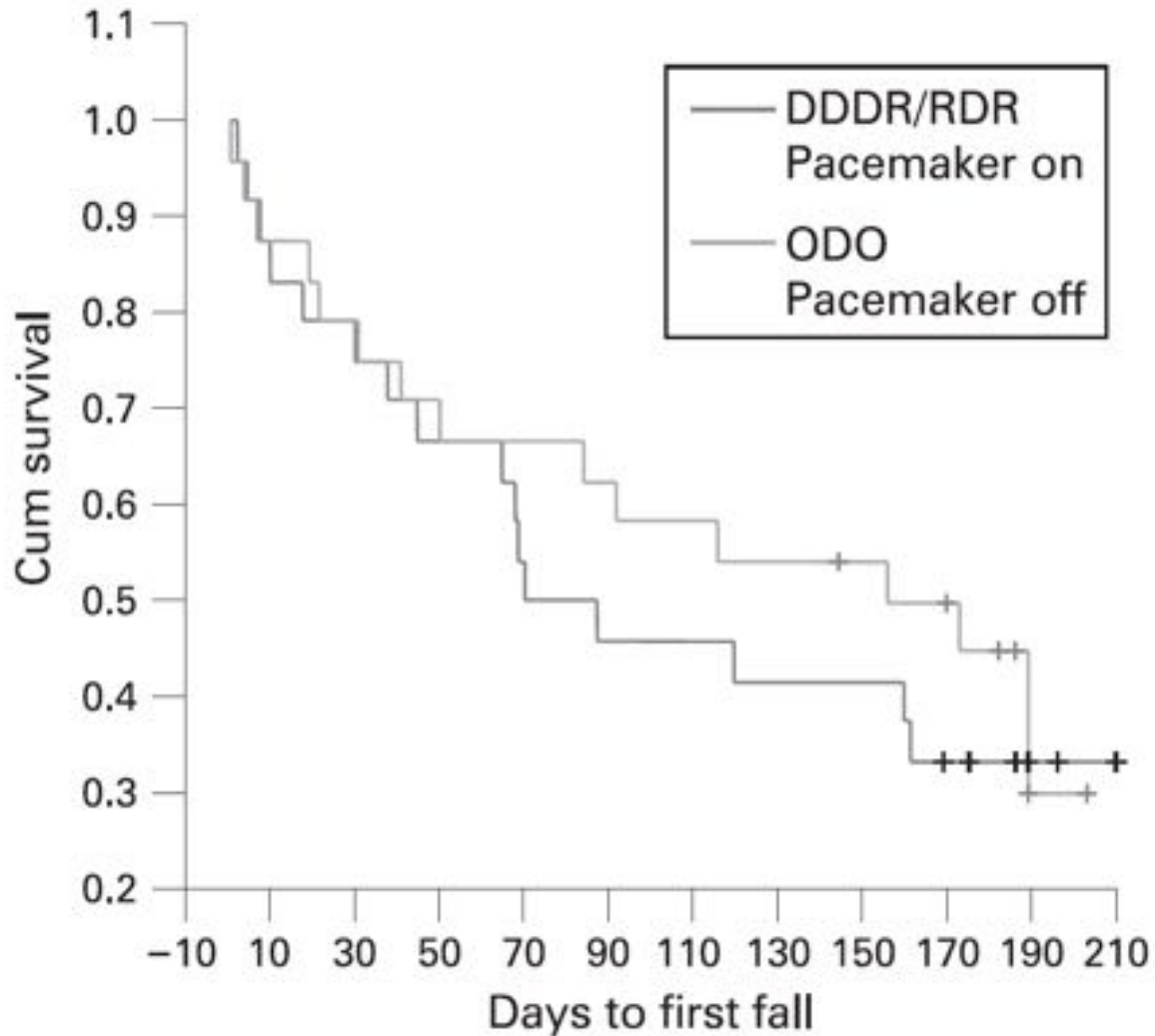
Low specificity of CSH !!!

Variable	Study Group (n = 272)	Subsample With No Prior Falls, Syncope, or Dizziness (n = 80)
CSH	107/272 (39)	28 (35)
Cardioinhibitory CSH	6/107 (6)	2/28 (7)
Vasodepressor CSH	42/107 (39)	8/28 (29)
Mixed CSH	59/107 (55)	18/28 (64)
Symptoms with CSH	43/107 (40)	10/28 (36)
Syncope	18/43 (42)	4/10 (40)
Presyncope/dizziness	25/43 (58)	6/10 (60)
RR interval post-CSM, median (range), ms	1701 (633-11264)	1676 (633-8637)
Maximum delta RR, median (range), ms	766 (29-10021)	783 (29-7798)
SBP nadir, mean $\pm$ SD, mm Hg	83 $\pm$ 28	85 $\pm$ 27
Maximum fall in SBP during CSM, mean $\pm$ SD, mm Hg	47 $\pm$ 20	45 $\pm$ 17

272 participants sampled from a single general practice register who underwent supine and upright CSM

Pacing in elderly recurrent fallers with carotid sinus hypersensitivity: a RCT crossover trial

Parry S, et al. Heart 2009



Time to first fall: survival analysis.





# Carotid sinus syndrome

## “Method of Symptoms”

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### Definitions

- Carotid sinus hypersensitivity (CSH):  
asystole  $\geq 3$  sec and/or SBP fall  $\geq 50$  mmHg  
(irrespective of symptoms)
- Carotid sinus syndrome (CSS):  
reproduction of syncope in presence of CSH

Brignole M et al. Eur Heart J 2004 25, 2054–2072

Moya A. et al. Eur Heart J. 2009;30:2631–2671

# CSS: definition

Reproduction of syncope  
by means of CSM

+

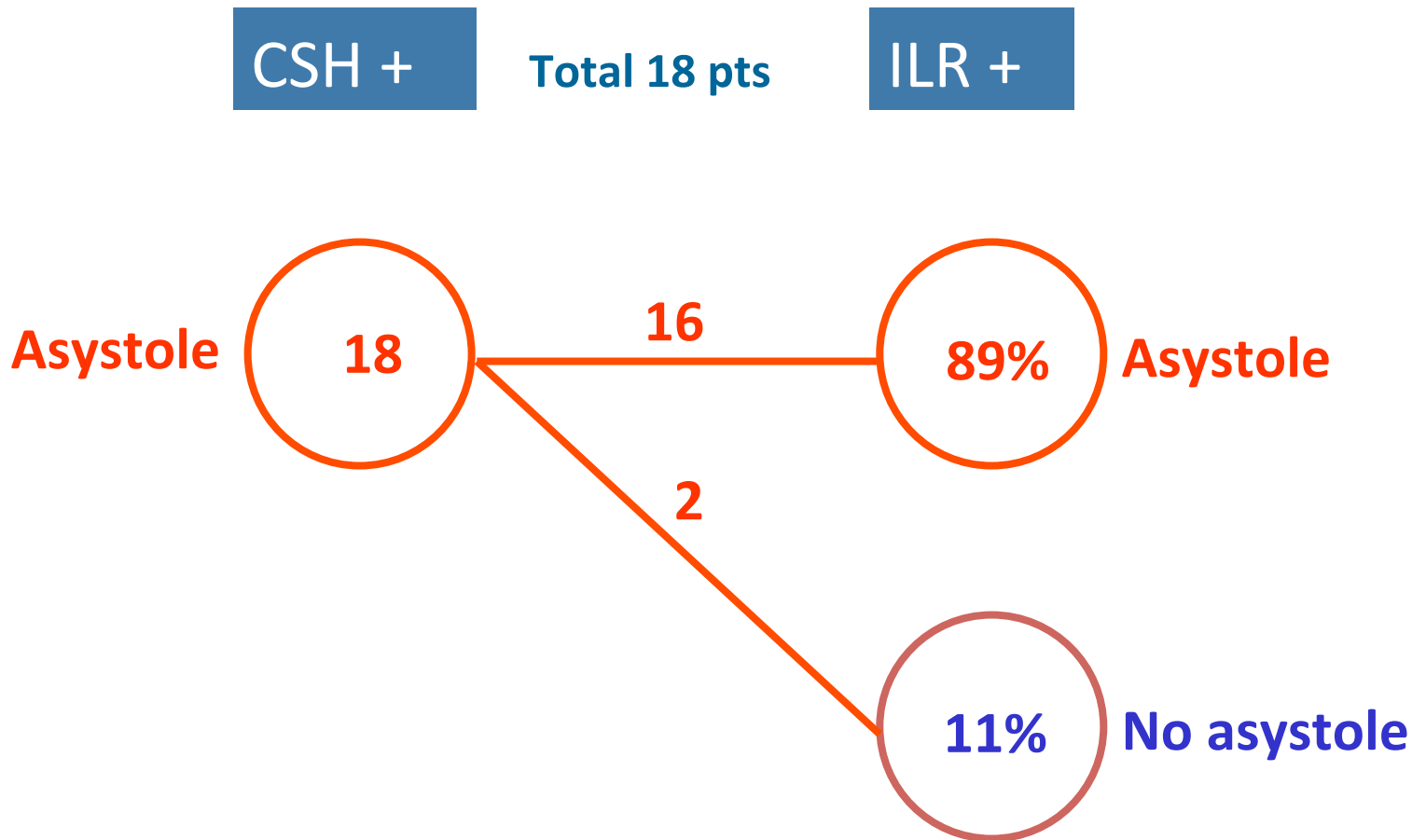
Clinical features  
compatible with CSS

### Typical features of CSS

- Certain or suspected reflex syncope
- Short (<10") or no prodromes
- Recurrent
- Severe, i.e., unpredictable
- Onset in older age

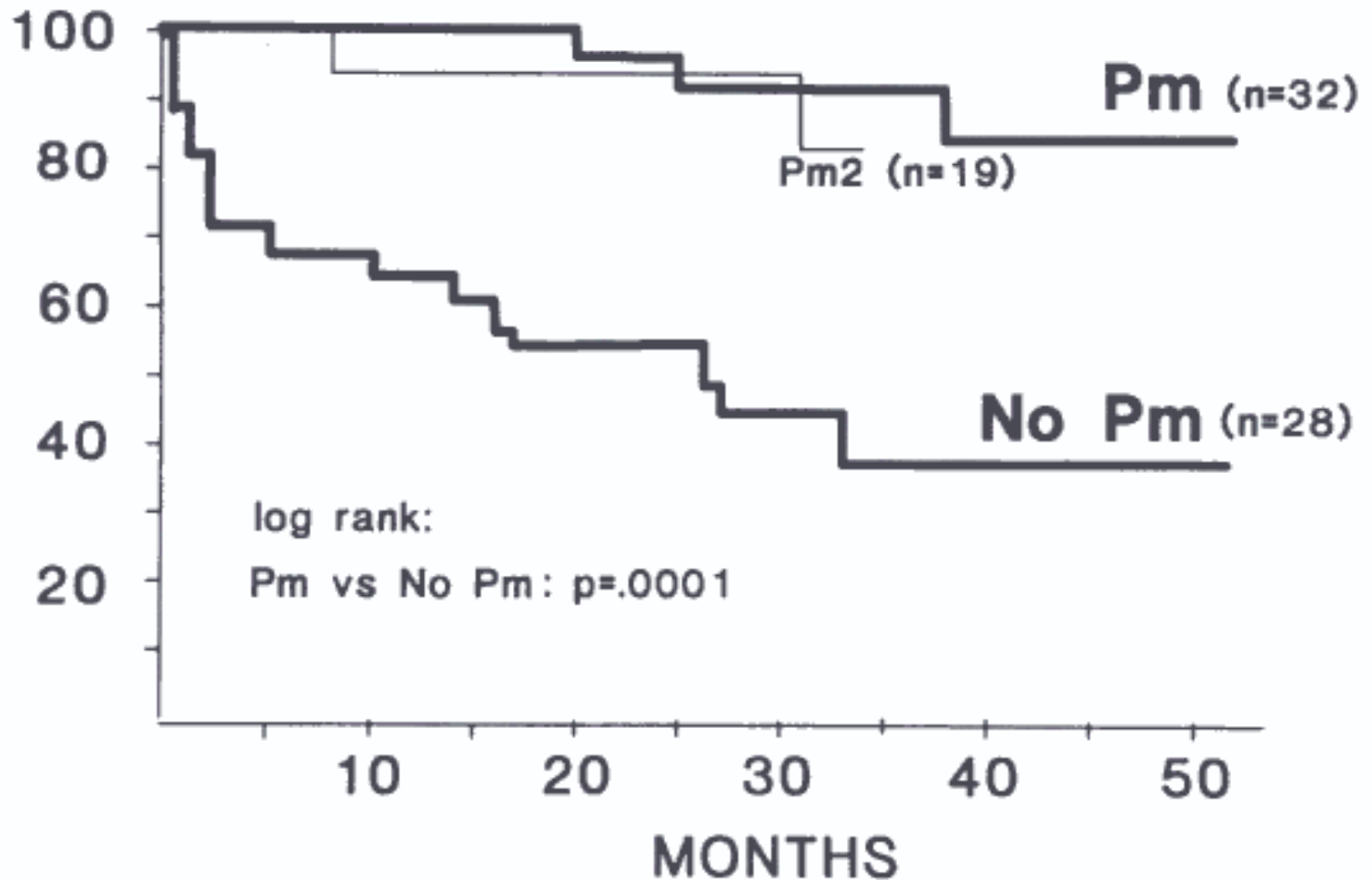
Number of patients	<b>n=66</b>
Age	<b>77±9</b>
Men	<b>68%</b>
Syncope events:	
- Total syncope, median	<b>4 (3-6)</b>
- Syncope in the previous 2 years, median	<b>3 (2-4)</b>
- Age on first syncope	<b>70±16</b>
- Syncope without or with prodromes <10 s,	<b>88%</b>
- Hospitalization for syncope	<b>55%</b>
- Injuries related to fainting	
- Major injuries	<b>11%</b>
- Minor injuries	<b>69%</b>
Medical history	
- Structural cardiac abnormalities	<b>23%</b>
- ECG abnormalities	<b>25%</b>
- Hypertension	<b>58%</b>
- Diabetes	<b>19%</b>
- Neurological/psychiatric disorders	<b>16%</b>
Concomitant vasoactive medications	<b>59%</b>

Cardioinhibitory carotid sinus hypersensitivity predicts an asystolic mechanism of spontaneous neurally-mediated syncope  
*Maggi et al. Europace 2007; 9, 563–567*

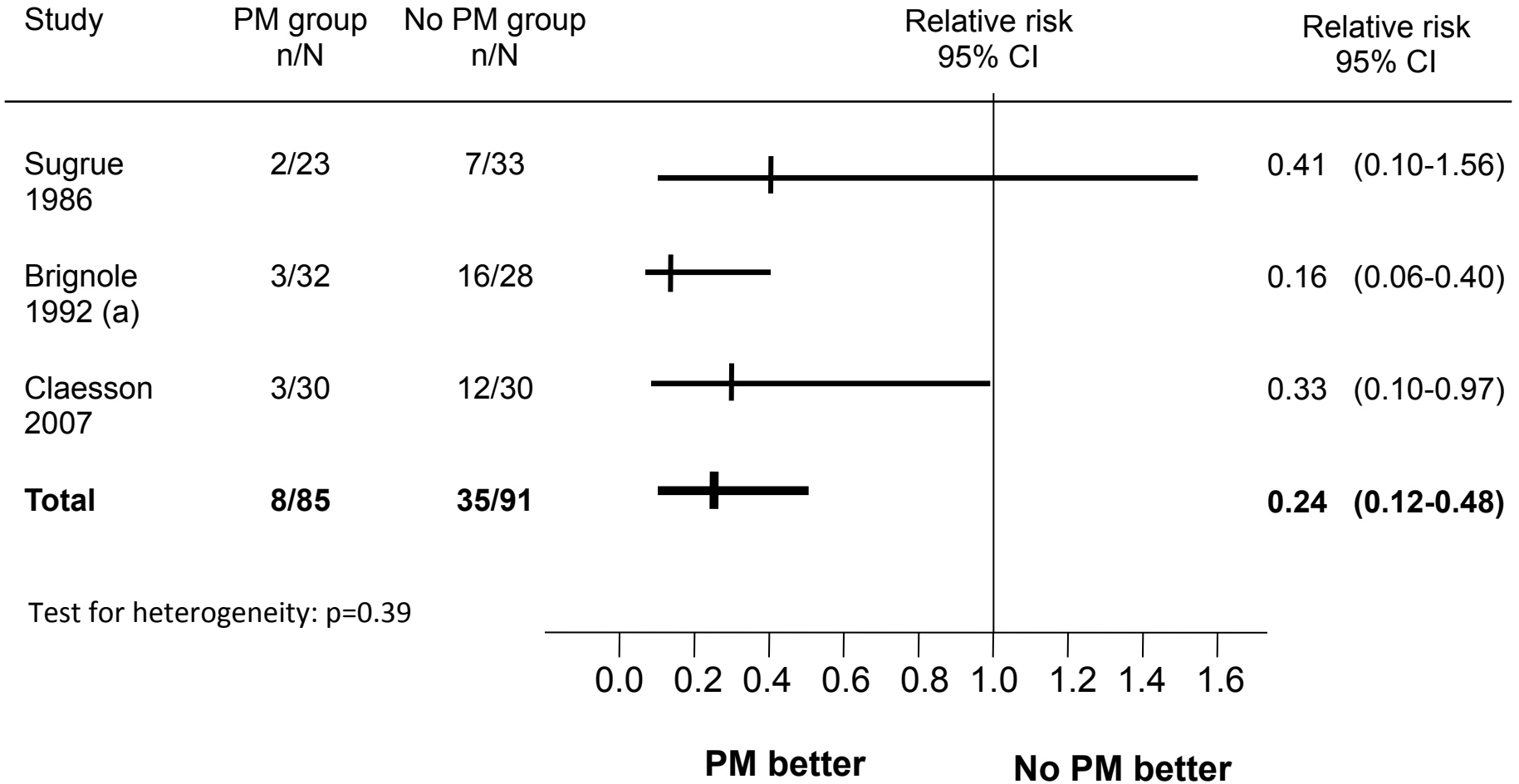


# Cardiac pacing in CSS by Method of Symptoms

% ABSENCE  
OF SYNCOPES



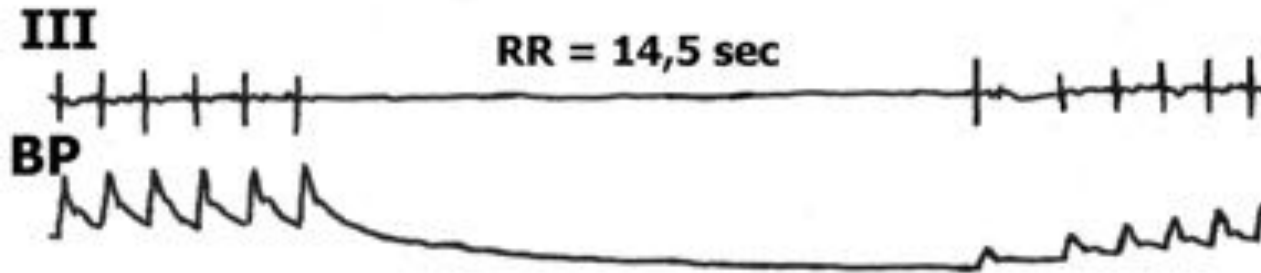
# Cardiac pacing in CSS by Method of Symptoms





A **syndrome** is a set of medical signs and symptoms that are correlated with each other and often with a specific disease

## carotid sinus massage



CSM is the tool for evaluation of CS reflex arc function

### *Carotid sinus massage responses*

## Conclusions

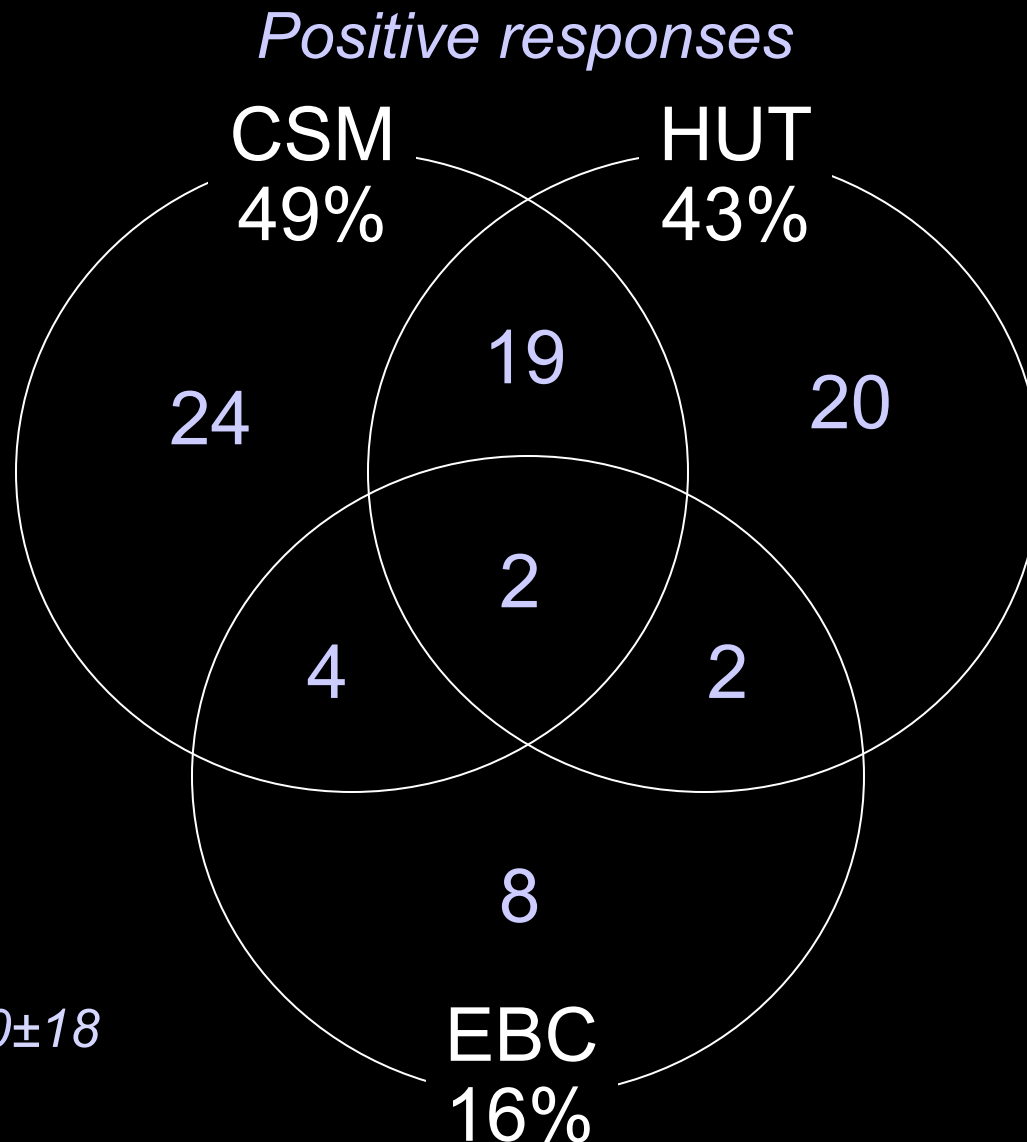
- 1.CSH is an ageing process**
- 2.CSS is an ageing-related syndrome**
- 3.The underlying disease is poorly understood**



# CSM, EBC & HUT in 100 patients with syncope

*Brignole M et al. Am Heart J 1991; 122: 1644*

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Positive 79 pts  
Negative 21 pts

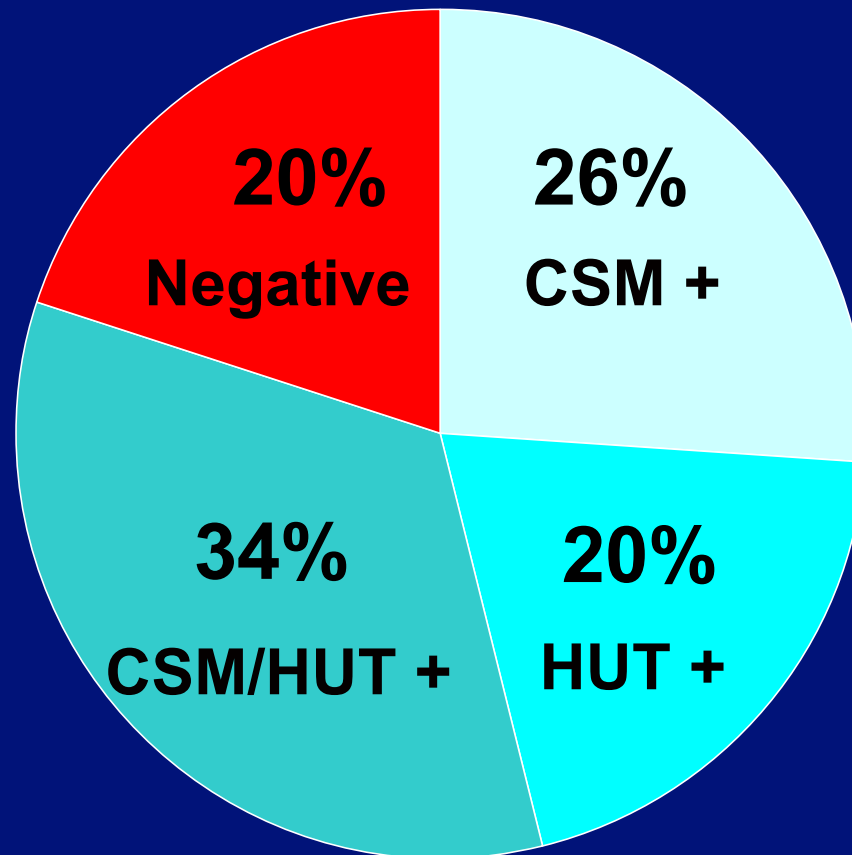
*Mean age 60±18*

# SSS & NMS

*Brignole et al. Am J Cardiol 1991; 68: 1032-6*

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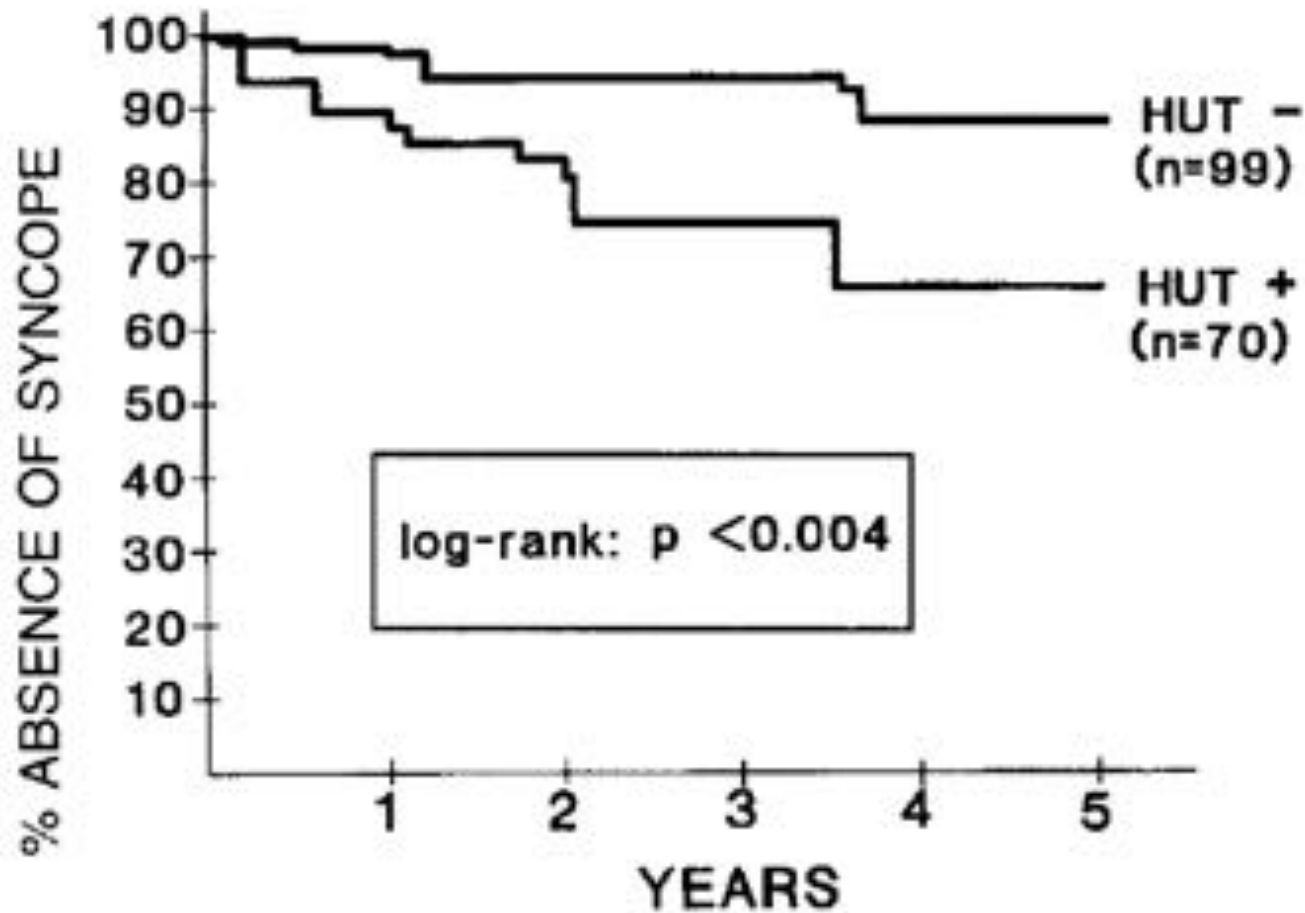
35 pts with SSS and syncope



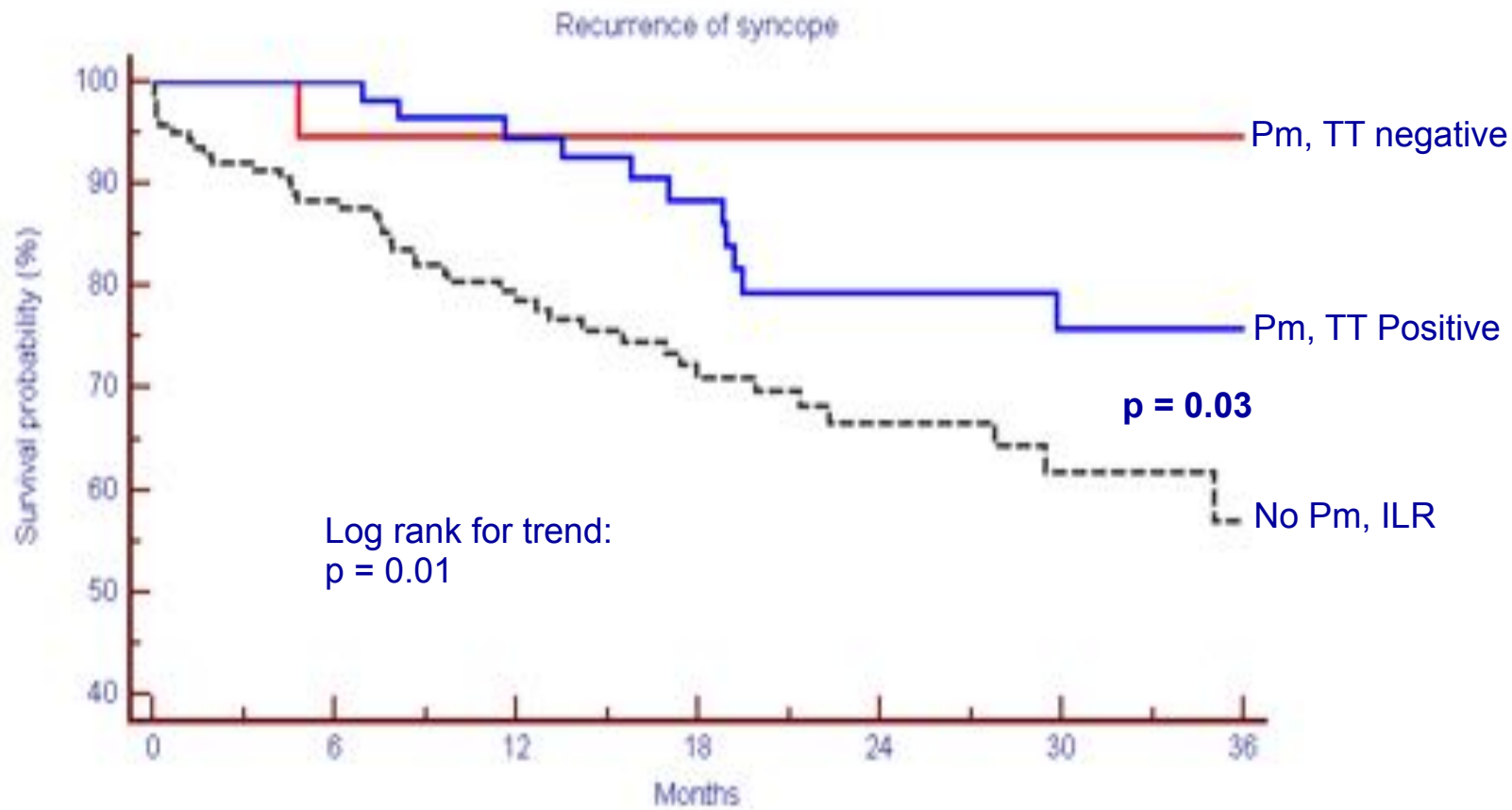
# A Positive Response to Head-Up Tilt Testing Predicts Syncopal Recurrence in Carotid Sinus Syndrome Patients With Permanent Pacemakers

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



# SUP 2 study: 3-years extended follow-up

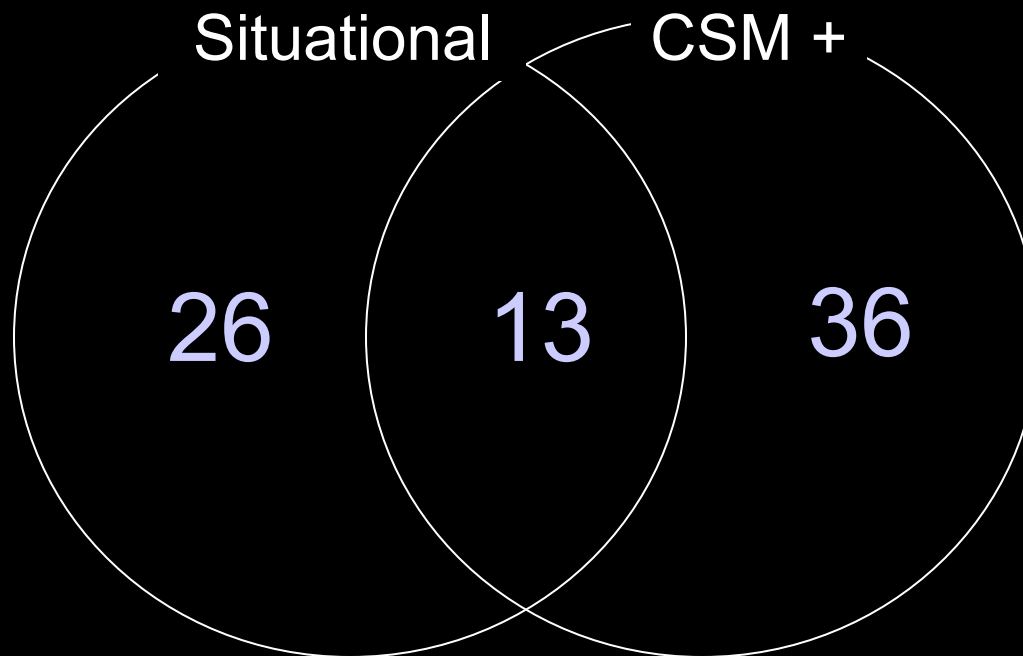


Number at risk	0	6	12	18	24	30	36
Group: 1	20	18	17	12	11	6	4
Group: 2	61	57	50	41	30	21	8
Group: ILR	142	115	90	58	37	22	10

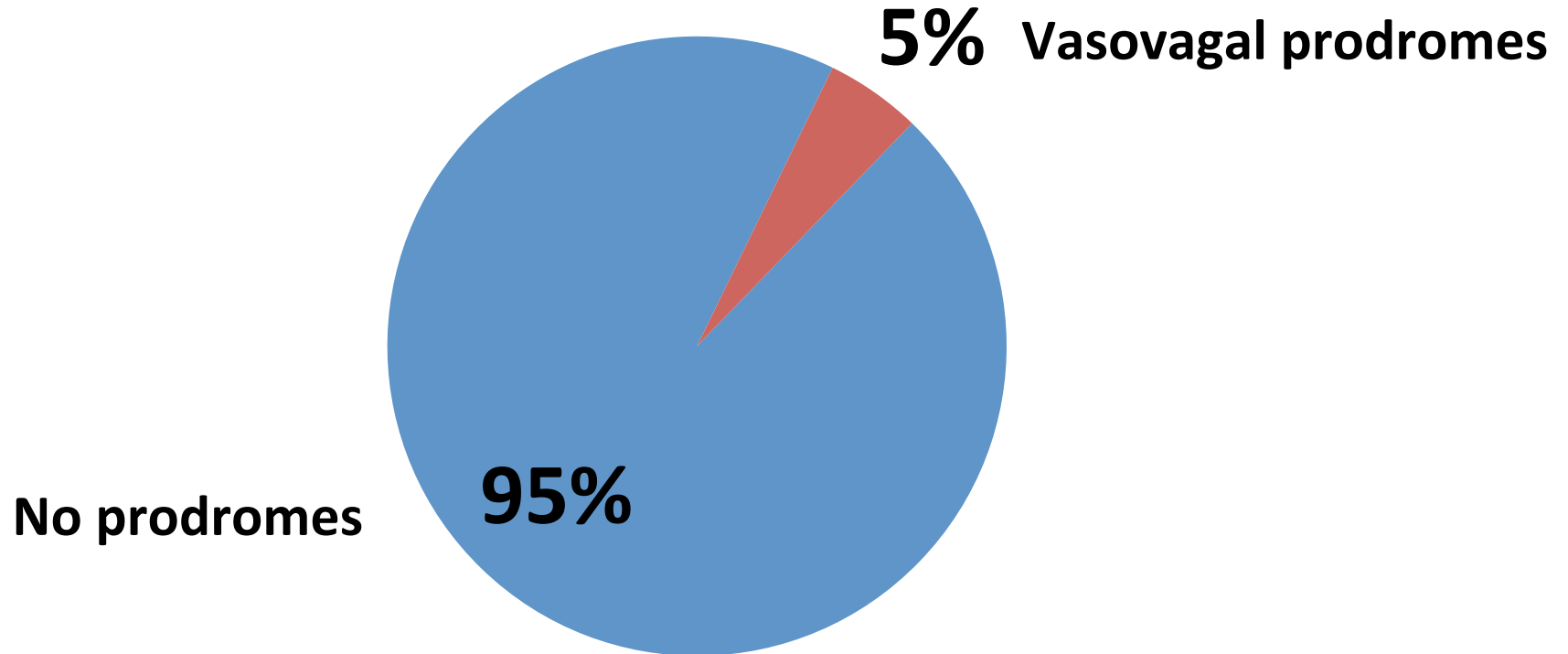
# CSM, EBC & HUT in 100 patients with syncope

*Brignole M et al. Am Heart J 1991; 122: 1644*

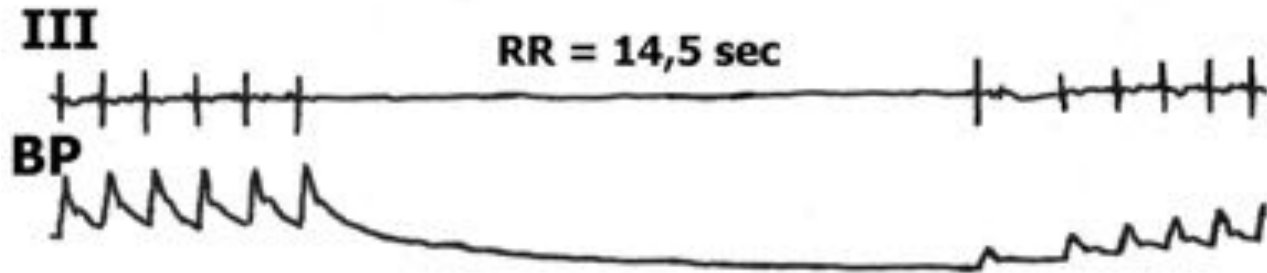
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Positive CSM 49 pts  
Situational 39 pts



## carotid sinus massage



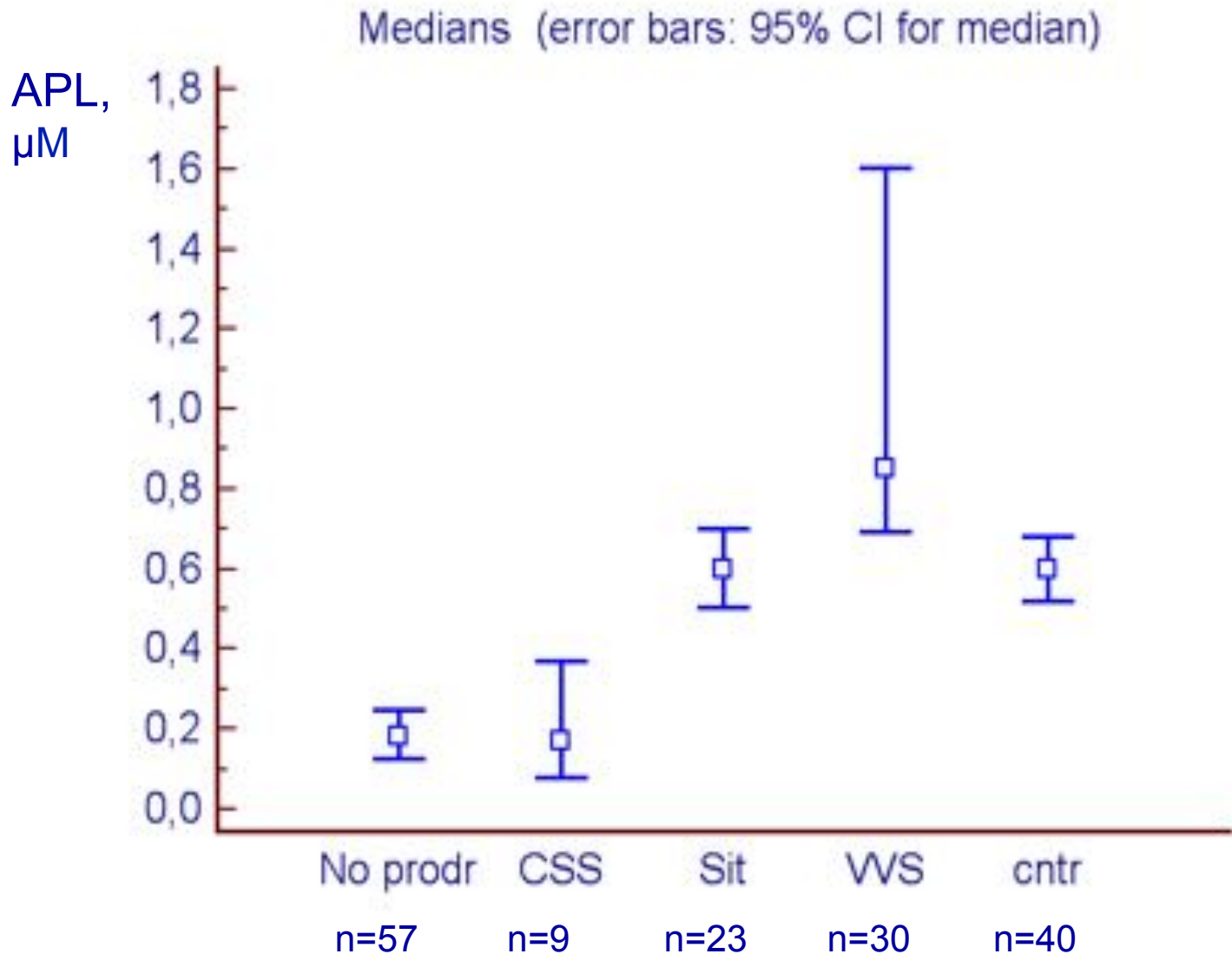
CSM is the tool for evaluation of CS reflex arc function

### CSS: the underlying disease (I)

**Age-related degenerative CNS disease ?  
(impairment of compensatory baroreflexes  
and cardiac SN effectors?)**

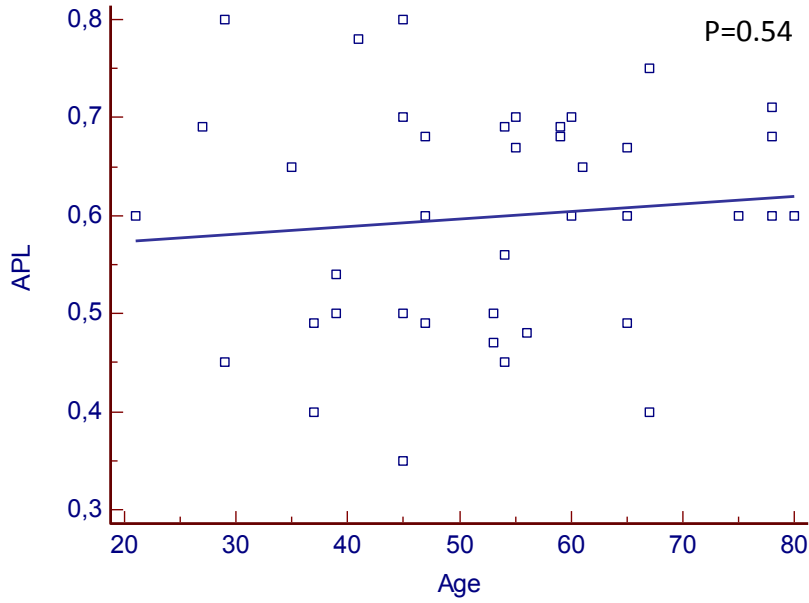
*CSS is frequently associated with other  
abnormal reflexes, but not with typical VVS*

# Adenosine phenotypes and neurally-mediated syncope

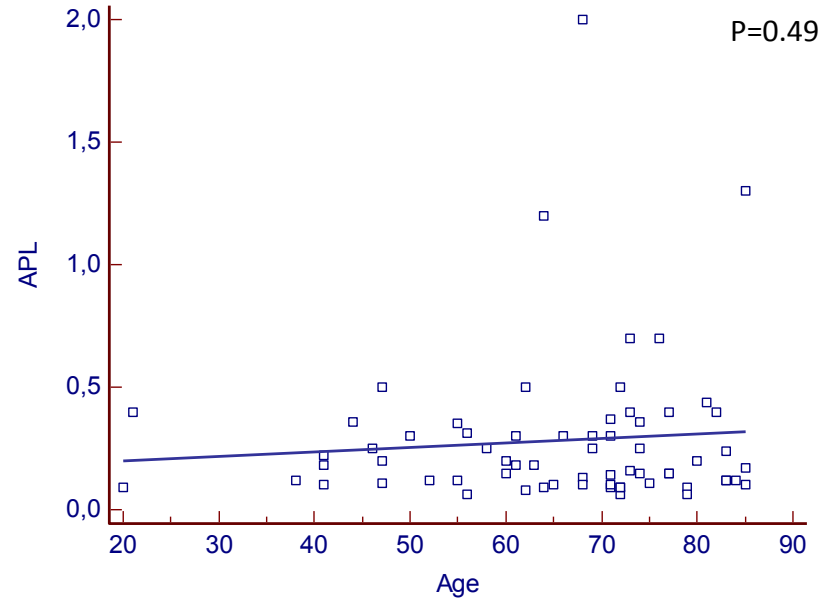




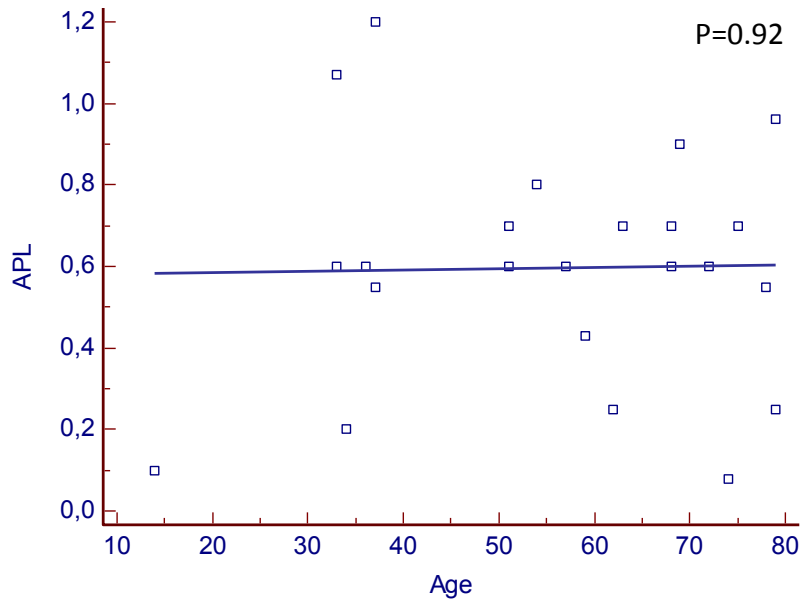
Control group



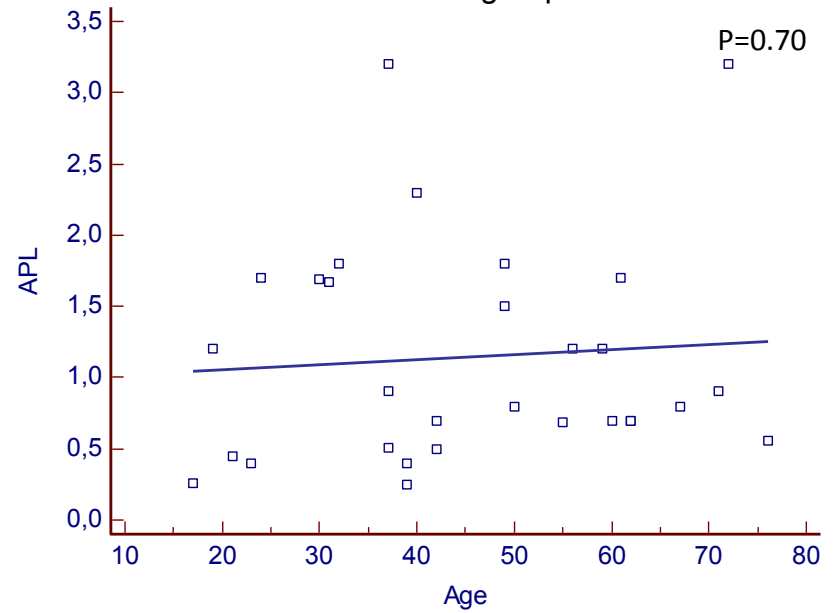
No prodromes and CSS groups



Situational group

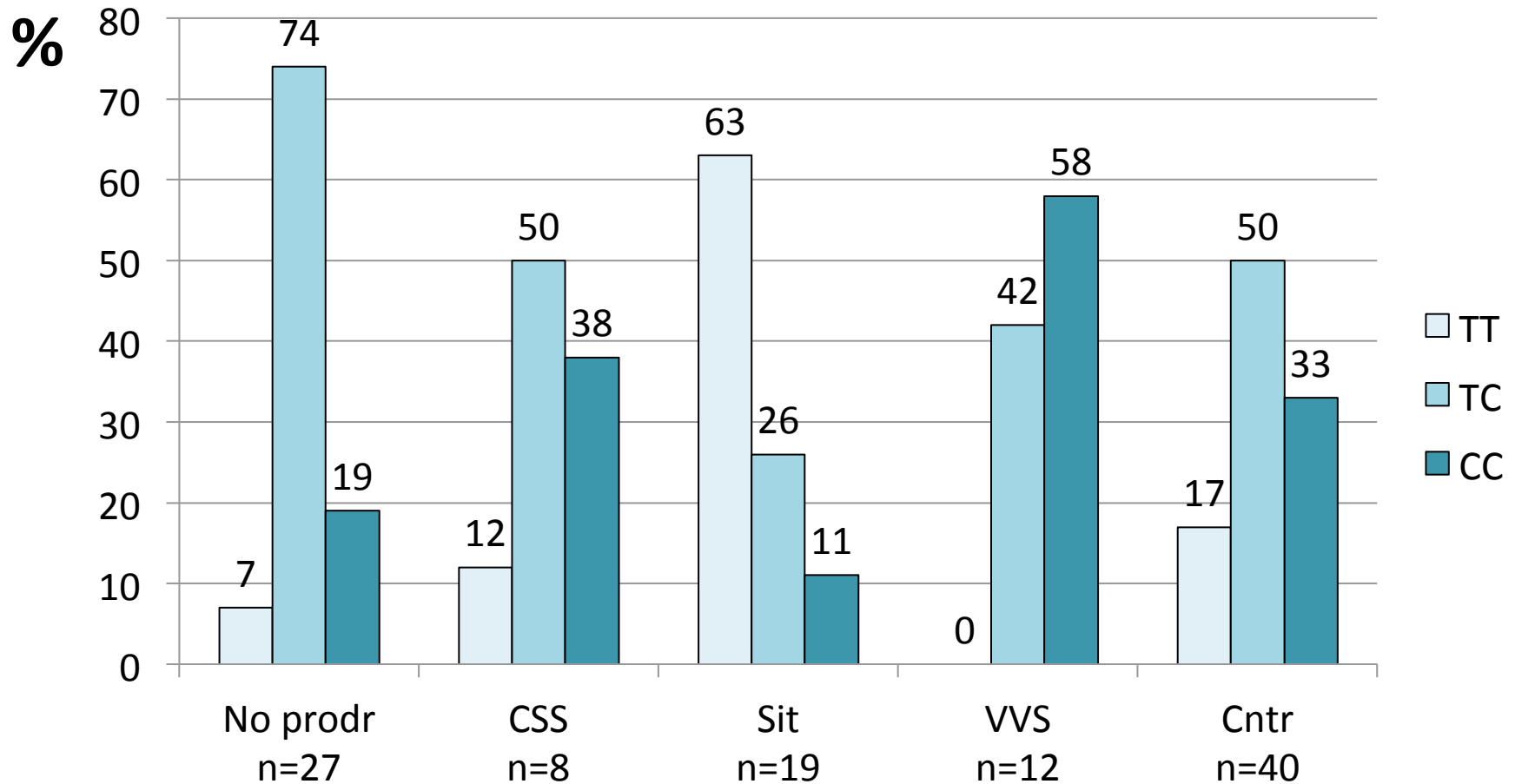


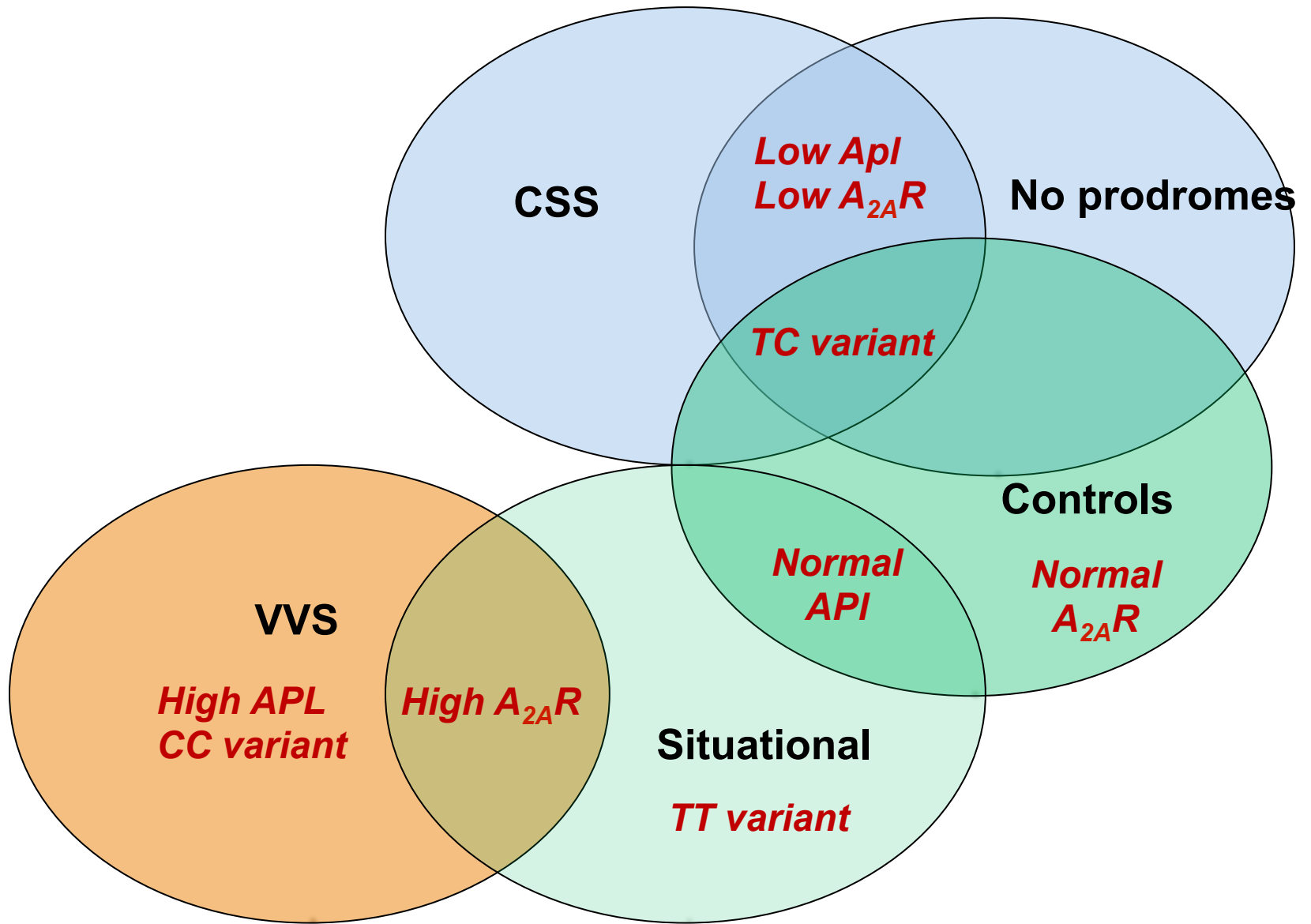
VVS group

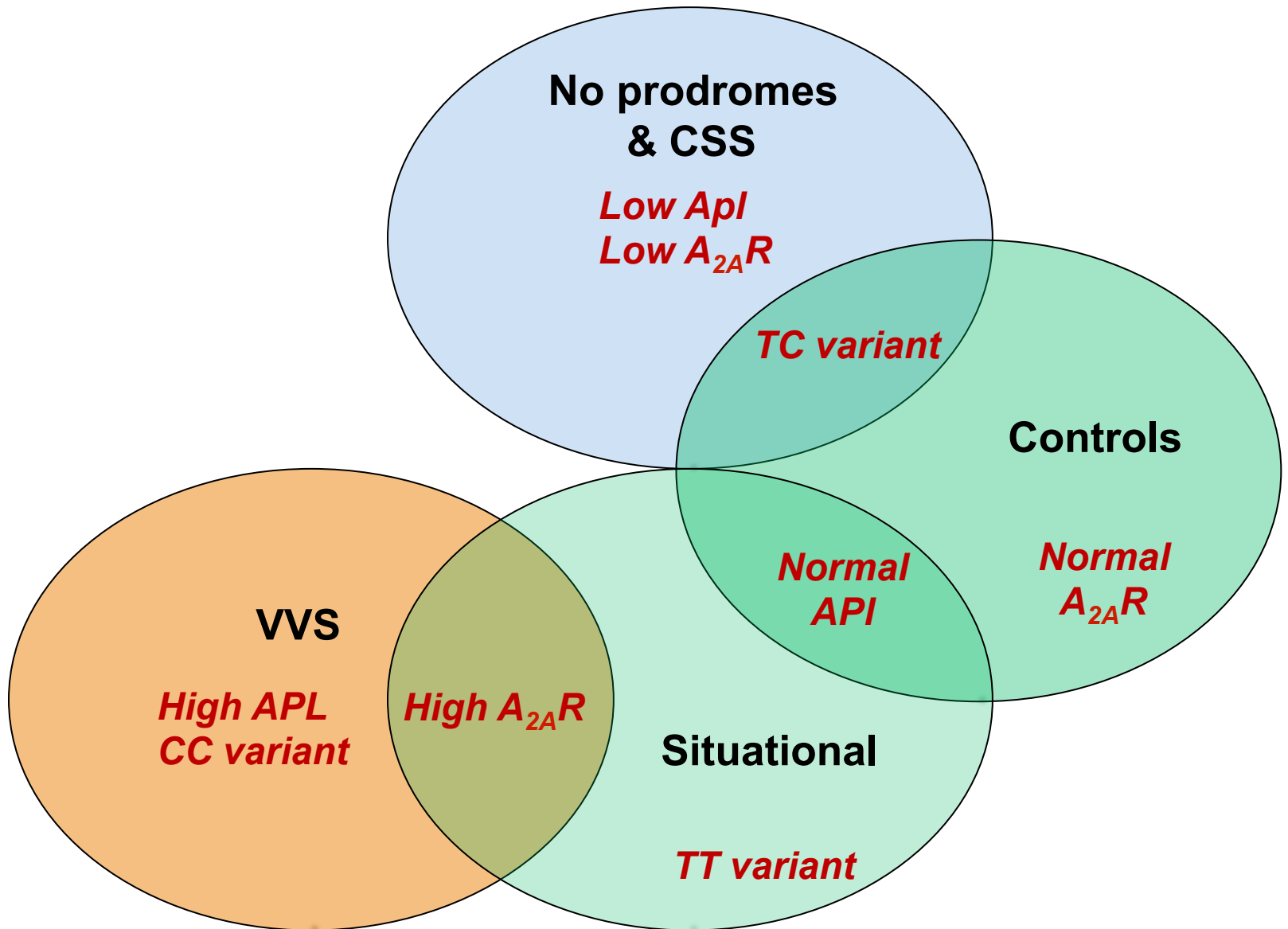


# Adenosine phenotypes and neurally-mediated syncope

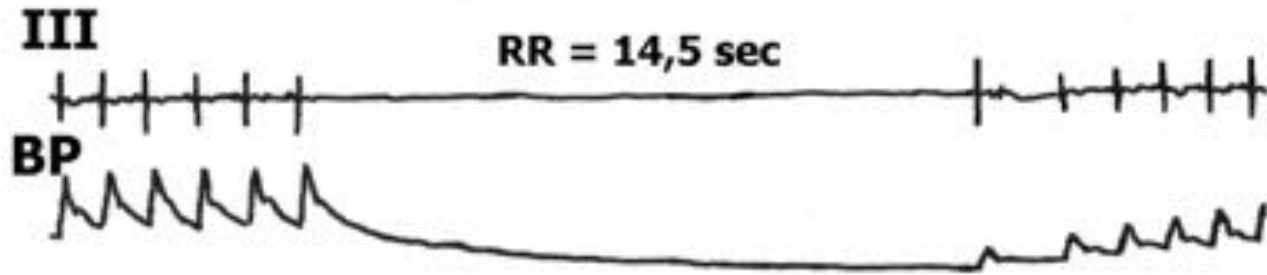
## Genotype of the A<sub>2A</sub> R gene polymorphism







## carotid sinus massage



CSM is the tool for evaluation of CS reflex arc function

## CSS: the underlying disease (II)

1. CSS, a form of “Low Adenosine” disease ?
2. “Low Adenosine” disease is different from Vasovagal syncope

Do we really understand carotid **sinus massage**  
**responses ?**

## Summary

<p>Ageing process? Syndrome ?</p>	<ol style="list-style-type: none"><li><b>1. CSH is an ageing process</b></li><li><b>2. CSS is an age-related syndrome</b></li></ol>
<p>Which is the underlying disease ?</p>	<ol style="list-style-type: none"><li><b>3. Age-related degenerative CNS disease ?</b></li><li><b>4. A form of “Low Adenosine” disease ?</b></li><li><b>5. “Low Adenosine” disease is different from VasoVagal syncope</b></li></ol>