The cardiac autonomic profile in women working in healthcare services: the role of the burden of additional family duties and children

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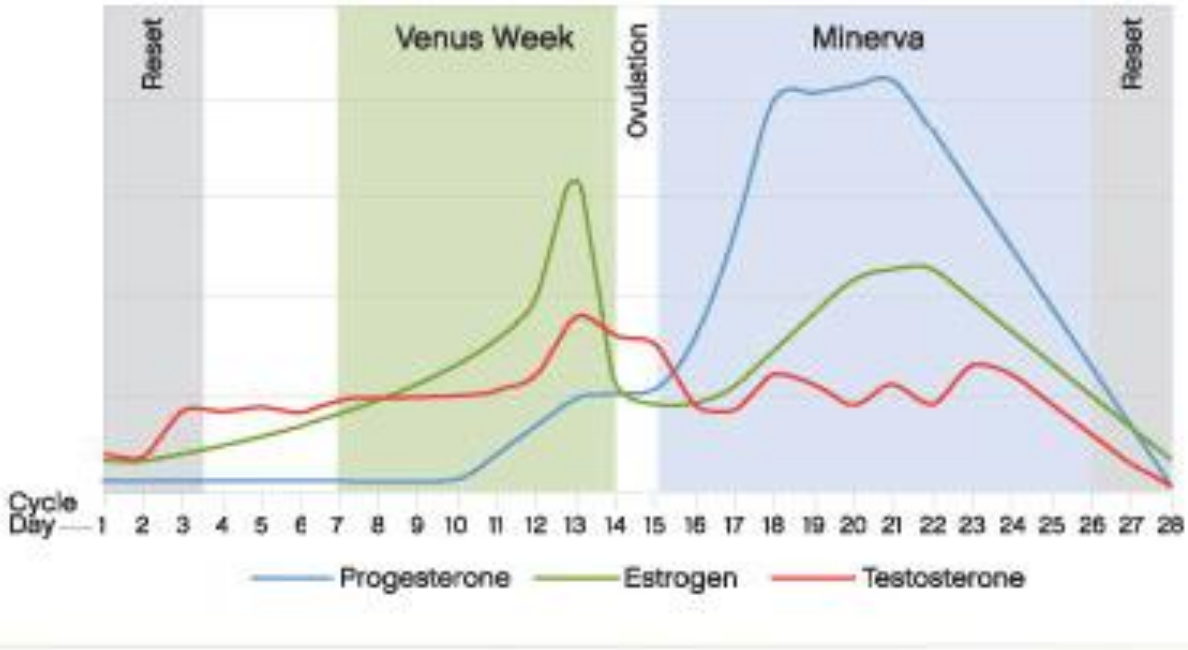
Man & Women

♀ Biological differences
♀ Gender differences

"*Gender refers to the socially constructed characteristics of women and men - such as norms, roles and relationships of and between groups of women and men. It varies from society to society and can be changed*.“ WHO definition

Biological differences



Biological differences

- ♀ Impact of endo- and exogenous estrogens on heart rate variability in women: a review. von Holzen JJ, Capaldo G, Wilhelm M, et al. Climacteric. 2016
- ♀ Sex differences in autonomic function following maximal exercise. Kappus RM, Ranadive SM, Yan H, et al. Biol Sex Differ. 2015
- ♀ Cardiac autonomic adjustments to normal human pregnancy: insight from spectral analysis of R-R interval and systolic arterial pressure variability. Lucini D, Strappazzon P, Dalla Vecchia L, et al. J Hypertens. 1999
- ♀ After-exercise heart rate variability is attenuated in postmenopausal women and unafeccted by estrogen therapy. Harvey PJ, O'Donnell E, Picton P, et al. Menopause. 2016

CARDIOVASCULAR AUTONOMIC NERVOUS SYSTEM

Gender differences:

♀ Do different roles determine different CV ANS profiles?

♀ What would be the significance of these differences?


I promised to pick them up at school....
mmmm
...still here in hospital

The burden of family duties and children

The effects of multiple roles on stress/distress

The «Superwoman Syndrome»:

a woman who does it all, and does it well

The Depletion Hypothesis

⇒An increased number of roles leads to overload and strain

The Enrichment Hypothesis

⇒ Multiple-role engagement enhances social connections, power, prestige and emotional gratification

Martire L, Stephens M, Townsend A. Psycol Aging. 2000;15(1):148-156

Chrouser CJ, Ryff CD. Sex Roles. 2006;55:801-815

Sumra MK, Schillaci MA. Plos One. 2015; 10(3):1-24

The burden of family duties and children

The effects of multiple roles on stress/distress

Is the stress of performing multiple concurrent roles associated with an increased risk of developing stress-related conditions or disease?

- ♀ Harmful habits (smoking, no regular exercise, ….)
- ♀ Depression/anxiety/mental disorders
- ♀ Eating disorders
- ♀ Diabetes
- ♀ Hypertension
- ♀ Coronary artery disease

WOrking Women and their Cardiac Autonomic Profile
WOW & CAP (Pilot Study)

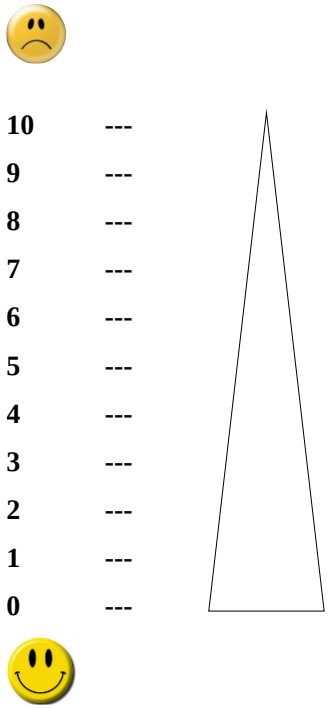
Population

34 women (healthcare assistants, nurses, physicians, or physiotherapists)

- 18 women with preschool children (W_KIDS)
- 16 women without children (W_NO KIDS)

Experimental protocol

- A standard 24-hour ambulatory ECG monitoring during a regular working day (not preceded by a night shift)
- A Visual Assessing Scale (VAS) for stress
- The Maslach Burnout Questionaire
- The Psychological Well-Being Questionarie (PWB-18, Carol Ryff)



- Visual Assessing Scale (VAS)

"How much do you feel stressed?"

- Maslach Burnout Scale

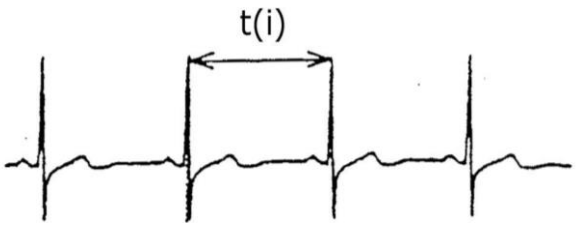
Emotional exhaustion:
< 17 low; 18-29 moderate; >30 high
Depersonalization:
< 5 low; 6-11 moderate; >12 high
Personal accomplishment:
> 40 low; 34-39 moderate; <33 high

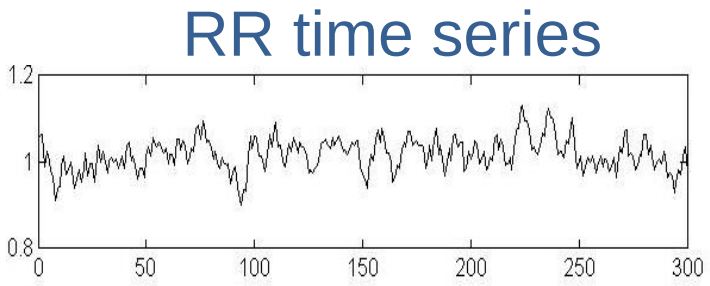
- Psychological Well-Being Scale

range 1-18

RR time series extraction

ECG

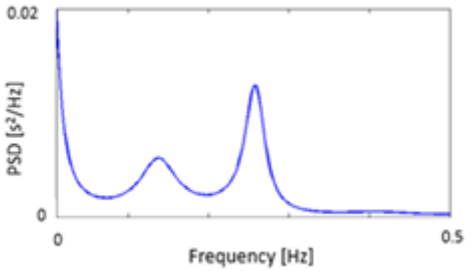




Selection of 5000 consecutive stationary beats (iterated analysis on windows of 250 beats, superposition of 200 beats).

Time domain indices

- Mean of RR series μ_{RR}
- Variance of RR series σ^2_{RR}



Parametric power spectral analysis

- Absolute power in low frequency band (LF, 0.04-0.15 Hz) of RR series => LF_{RR}
- Absolute power in high frequency band (HF, 0.15-0.5 Hz) of RR series => HF_{RR}
- Sympatho-vagal balance => **LF/HF**

Results

	W_KIDS	W_NO KIDS	p_value
Age, years	37.67±5.99	33.62±7.23	0.084
Working time per day, hours	7.75±1.66	7.65±0.99	0.536
Sleeping time per night, hours	6.39±1.43	6.75±0.73	0.458
Smokers	3	2	0.889
Regular exercisers	7	9	0.508
Exercise per week, hours	2.86±2.12	2.44±0.92	0.591
BMI, kg/m^2	23.54±3.22	22.13±3.71	0.248
Supine SAP, mmHg	110.28±13.55	110±9.83	0.947
Supine DAP, mmHg	70.56±11.1	68.75±7.19	0.883
Standing SAP, mmHg	107.5±13.2	104.69±10.56	0.501
Standing DAP, mmHg	72.5±9.12	66.87±6.8	0.052

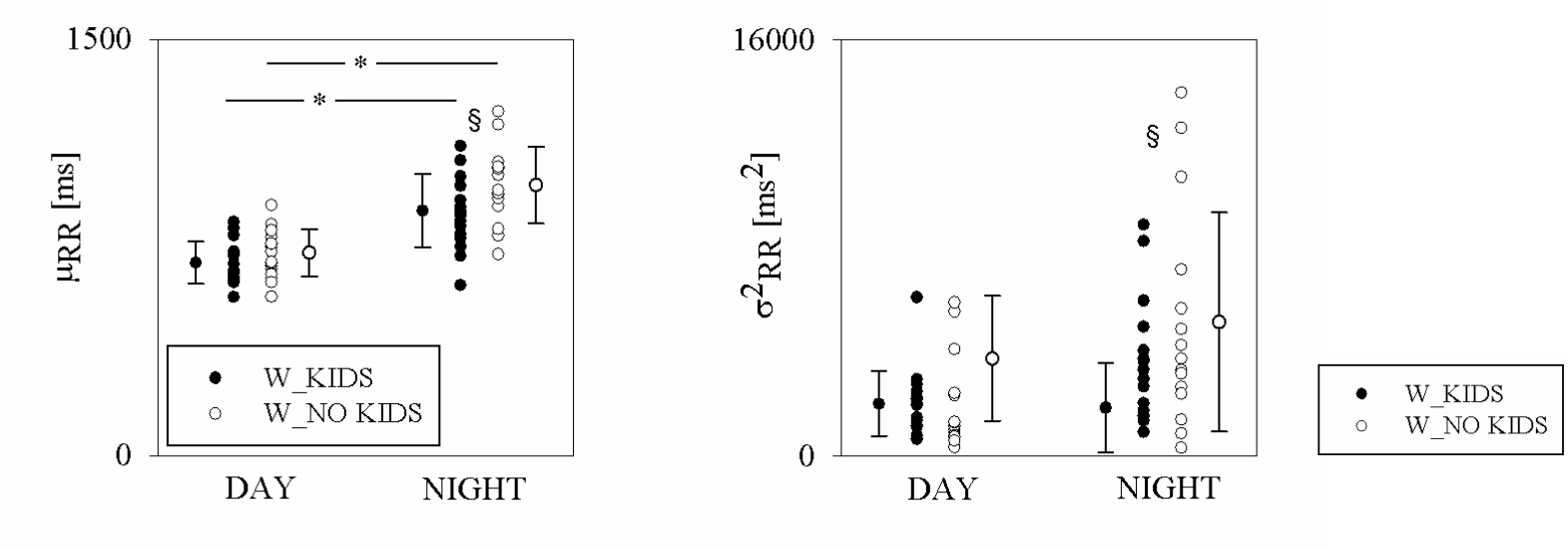
Results

	W_KIDS	W_NO KIDS	p value
VAS	4.58±1.94	5.78±2.47	0.124
Emotional exhaustion*	15.28±7.88	17.5±7.79	0.342
Depersonalization*	10.83±5.65	11.5±5.73	0.735
Personal accomplishment *	27.94±7.17	31.62±6.28	0.123
Autonomy °	11±2.03	10.75±1.73	0.704
Environmental mastery°	12.56±3.11	13.25±2.86	0.432
Personal growth°	14.72±2.35	16.06±2.08	0.071
Positive relations°	13.67±2.22	15.31±2.27	**0.041**
Purpose in life°	12.17±2.41	13.19±2.2	0.208
Self-acceptance°	11.89±3.08	12.12±3.14	0.827

*subscales from Maslach ° subscales from Well-being

Results

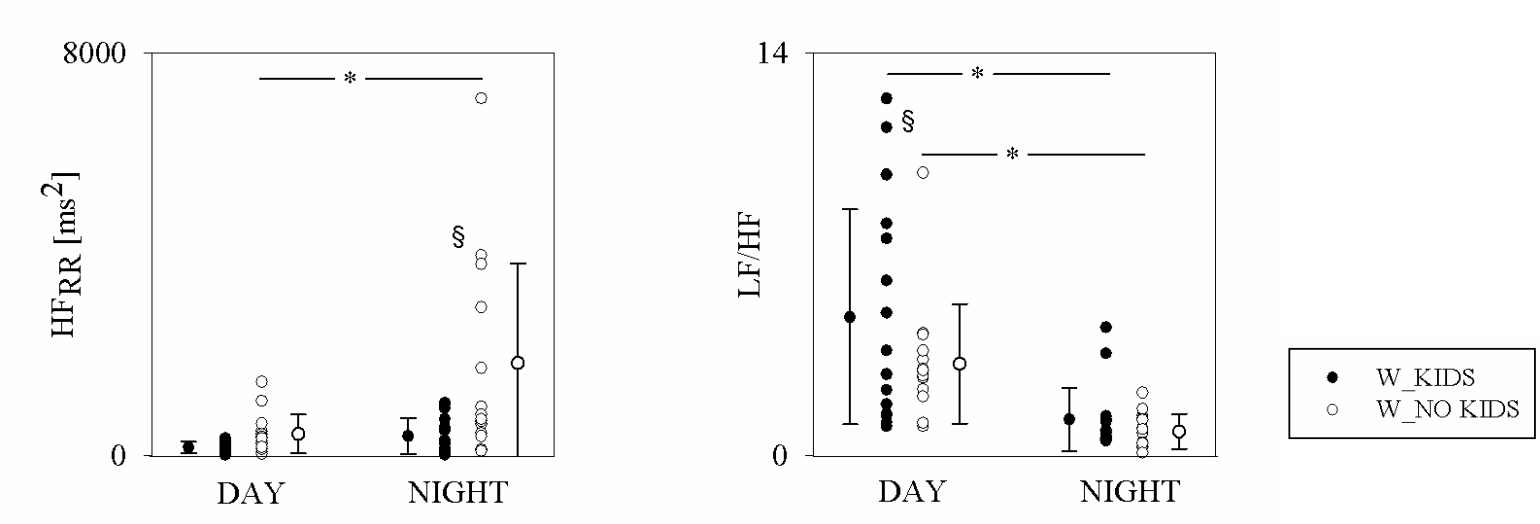
RR variability - time domain indices



- W_KIDS were more tachicardic than W_NO KIDS during NIGHT
- W_KIDS had lower RR variance than W_NO KIDS during NIGHT

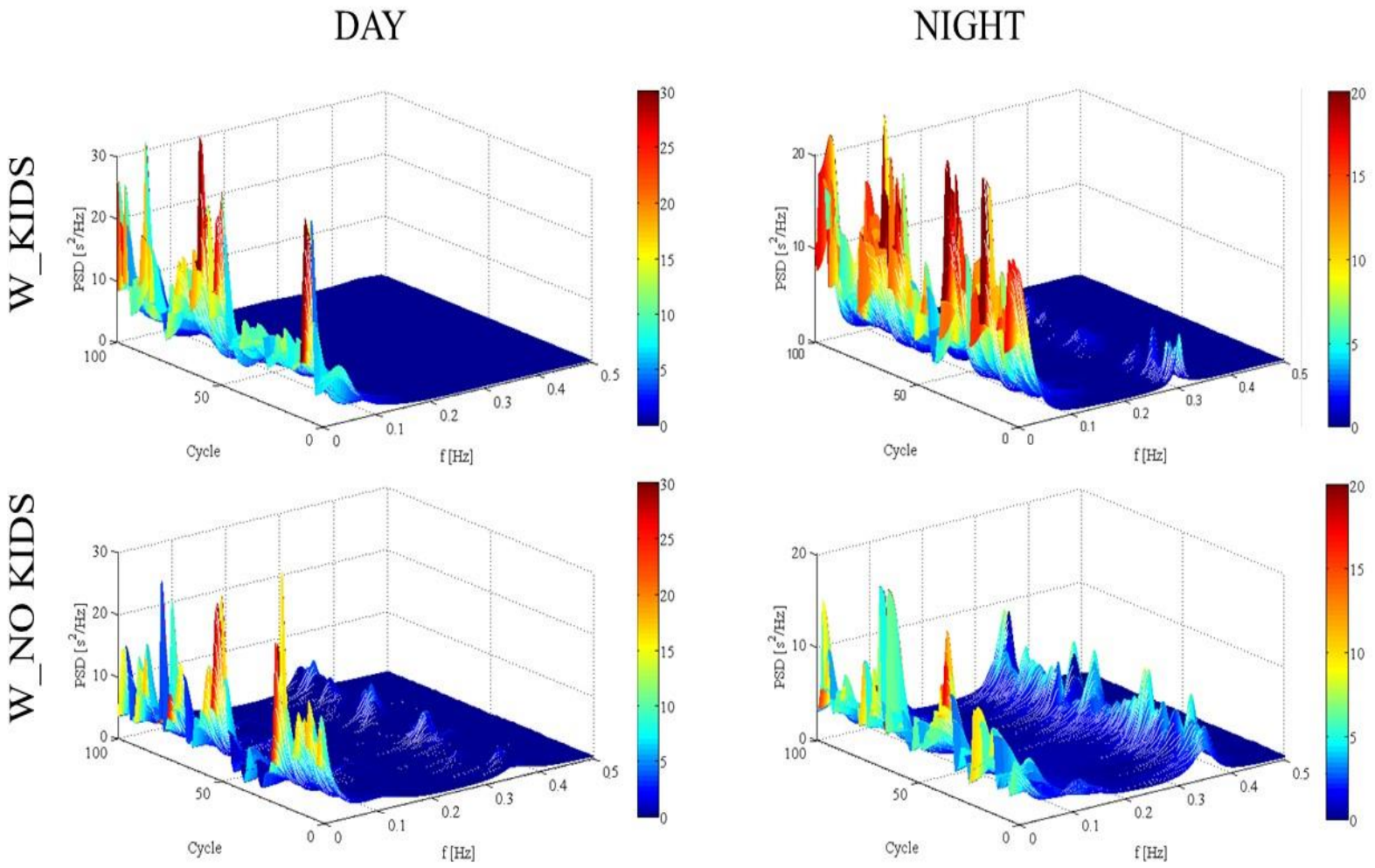
Results

RR variability - frequency domain indices



- During night, W_KIDS showed a lower vagal activity directed to the heart than W_NO KIDS
- W_KIDS showed no HF_{RR} change from day to night
- During day, W_KIDS showed a higher sympathetic activity directed to the heart than W_NO KIDS

Results



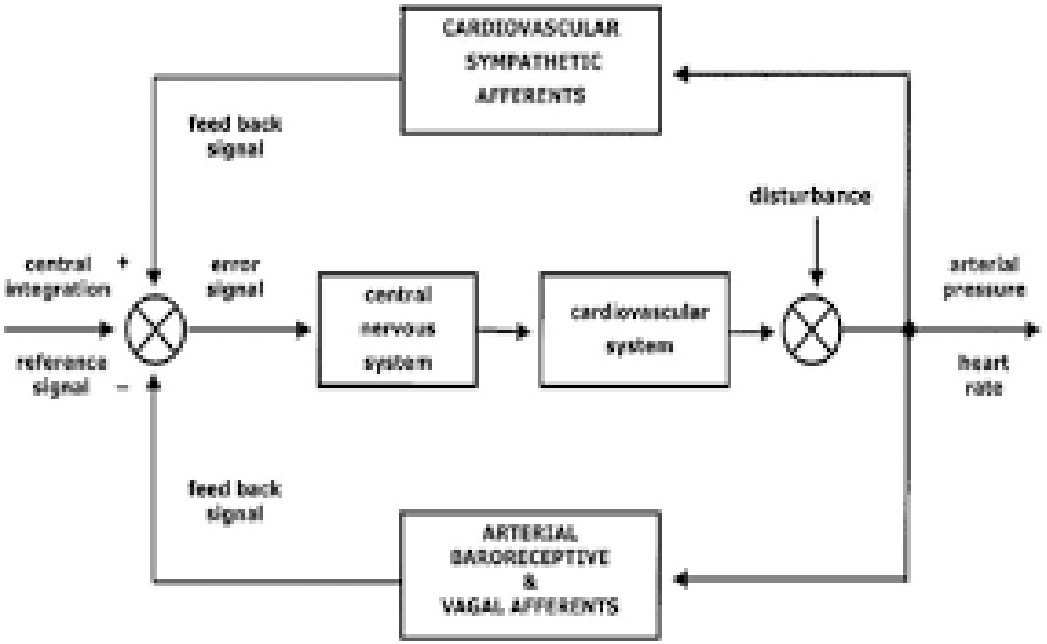
Conclusions

The presence of preschool children influenced the cardiac neural regulation in our group of women working in healthcare services.

The women with kids showed a shift of the sympathovagal balance towards a higher sympathetic activation.
This was not related to an increased level of perceived stress.

Indeed, the presence of young children did not increase the level of stress due to the combination of work and family commitments.

Nevertheless, some degree of “stress” seemed present in working women regardless the presence of children.

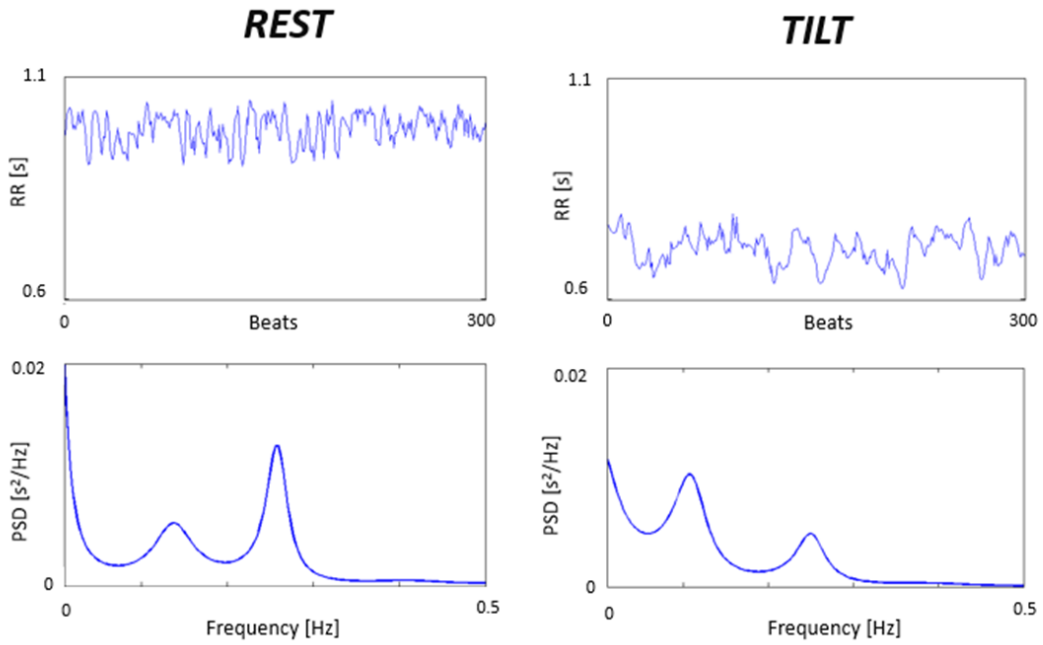


From Alberto Malliani et al 1986

The sympathovagal balance

- Homeostasic purposes
- Homeodynamic changes, i.e. response to the biological strategies

Response to the biological strategies



LF/HF

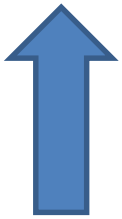
= favorable effects

When the finalistic strategy is lost

Ex: Acute MI

The abnormal excitatory state is independent of any *homeostatic* design

- increased oxygen consumption
- arrhythmias
- coronary vasoconstriction



LF/HF

= deleterious effects

Malliani A, Schwartz PJ, Zanchetti A. Am Heart J 1980; 100:705-715
Feigl EO. Physiol Rev 1983; 63:1-205
Gregorini L, Fajadet J, Robert G et al. Circulation 1994; 90:895-907

Conclusions:

In our women with preschool children the higher sympathetic activation could represent a physiological adaptation that could have finalistic purposes, for example favoring a prompt mother reaction when needed.

«The fight or flight response»

LF/HF

A physiologic response to acute stress

Limitations:

- ♀ This is a small study
- ♀ Lack of a male control group
- ♀ The superwoman represents a complex model
- ♀ Further investigations and long-term follow-up


LF
HF