

PSYCHOLOGICAL STRESS AND CARDIAC AUTONOMIC PROFILING IN DIALYSIS PATIENTS

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Introduction

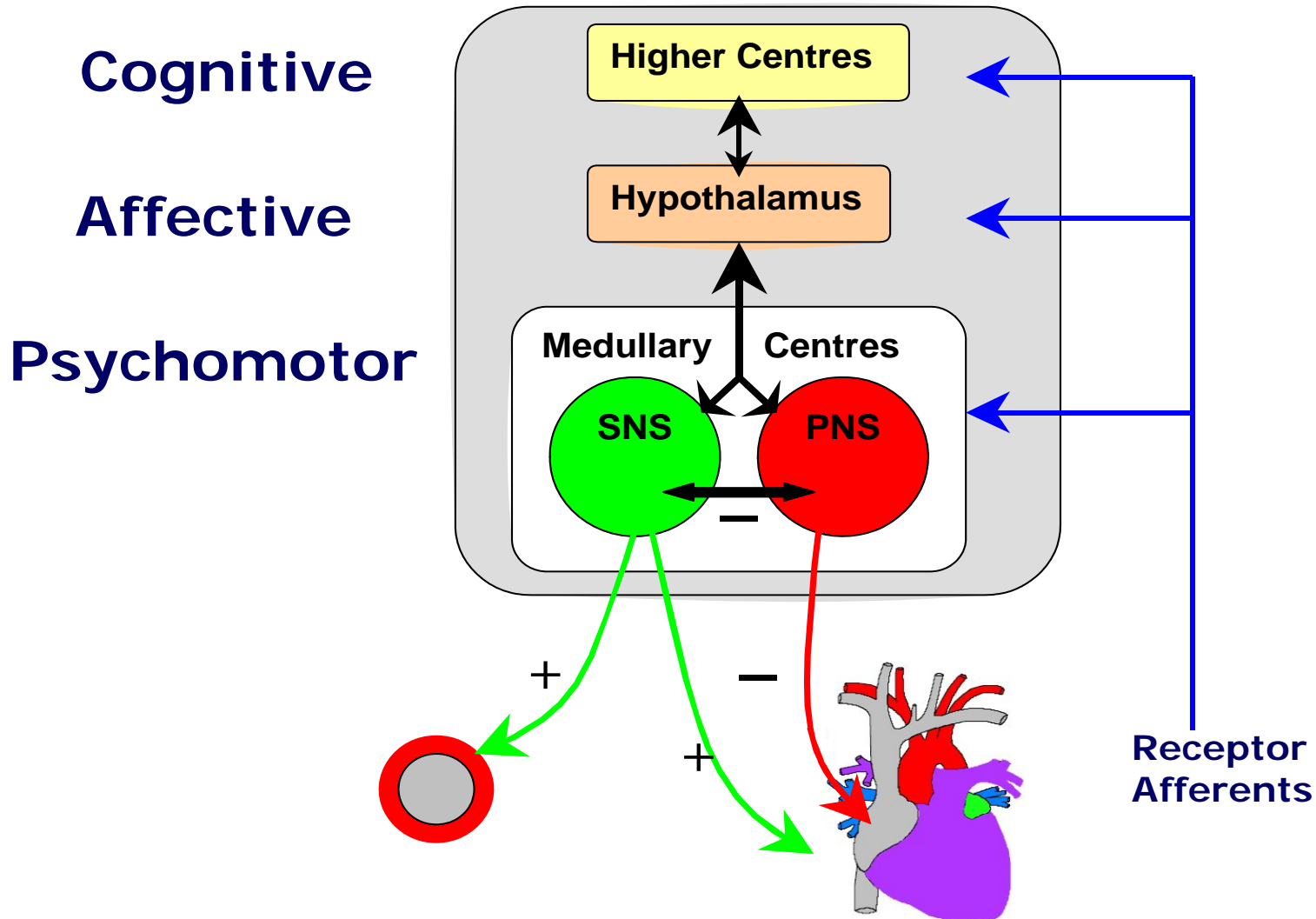
- Dialysis patients often suffer from stress, anxiety and depression
- These psychological states have been shown to influence cardiac autonomic function, especially resulting in depressed vagal tone.

Purpose of the study

The main aims of this study were to:

- Compare measures of psychological stress and cardiac autonomic function before and after dialysis
- To identify the major factors contributing to psychological stress in this patient group.

Autonomic Integration



Design

- Twenty seven patients (15F, 12M, 65 ± 13.7 yrs, mean \pm SD), took part
- A simple visual analogue scale (VAS) was used to assess psychological stress
- Both heart rate response to slow deep breathing (HRR-SDB) and short-term heart rate variability (HRV) were used as measures of cardiac autonomic tone
- Heart rate and blood pressures were also recorded to further enhance profiling.

Heart Rate Variability

- Heart rate variability (HRV) is the beat-to-beat variation in the R-R interval of the electrocardiogram.
- Power spectral analysis of HRV is a non-invasive method commonly used to evaluate cardiac autonomic activity.
- It allows the opportunity to examine the function of cardiac sympathetic and parasympathetic (vagal) pathways by analysing the various components of the frequency domain.

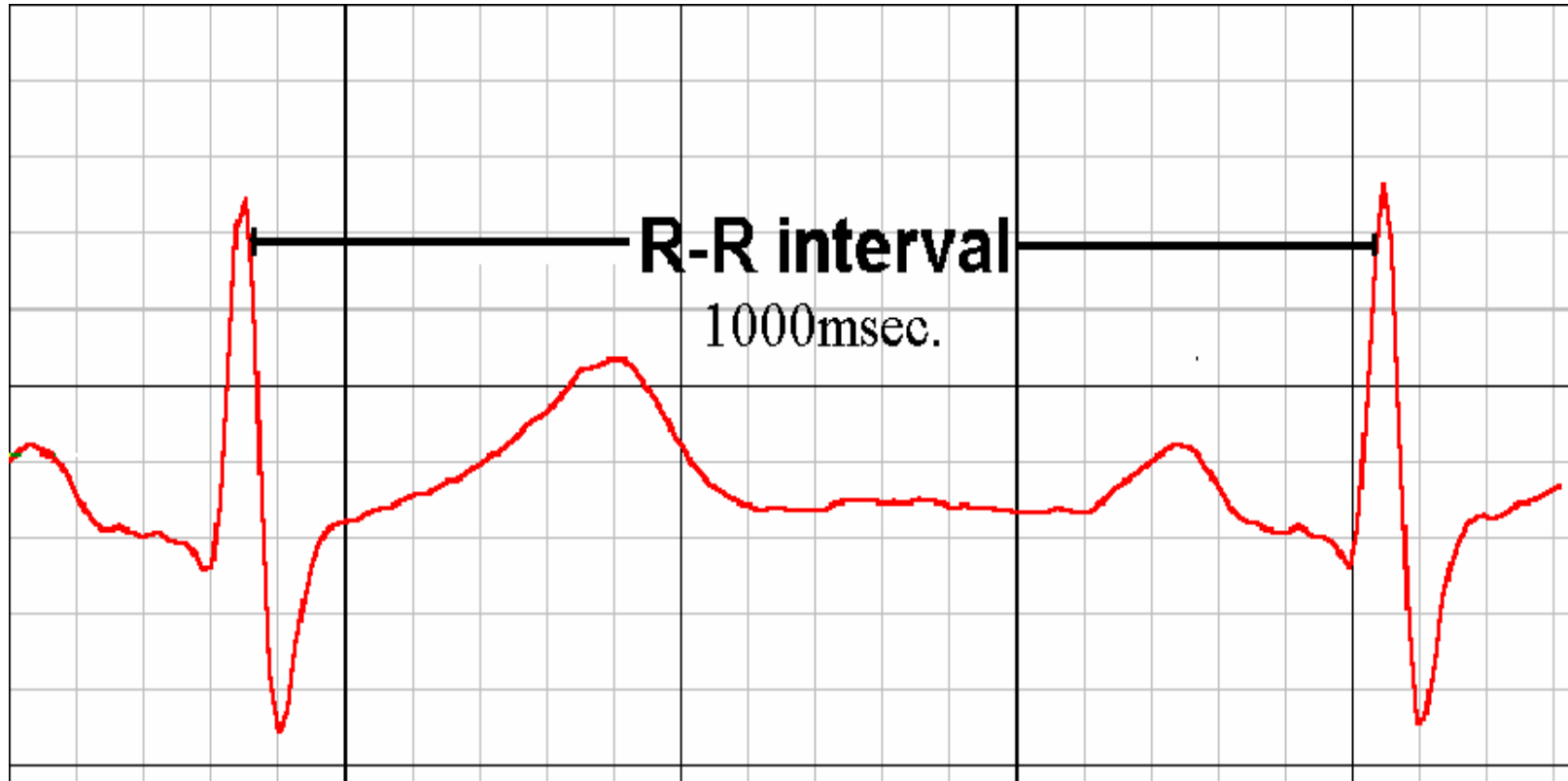
Heart Rate Variability 2

- HRV analysis has been used in the early sub-clinical detection of autonomic dysfunction in diabetes mellitus and as a prognostic marker following myocardial infarction
- A reduction in HRV is associated with an increased risk of coronary heart disease, cardiac sudden death and all-cause mortality
- HRV from short-term recordings has also been proposed as an indicator of compromised health in the general population.

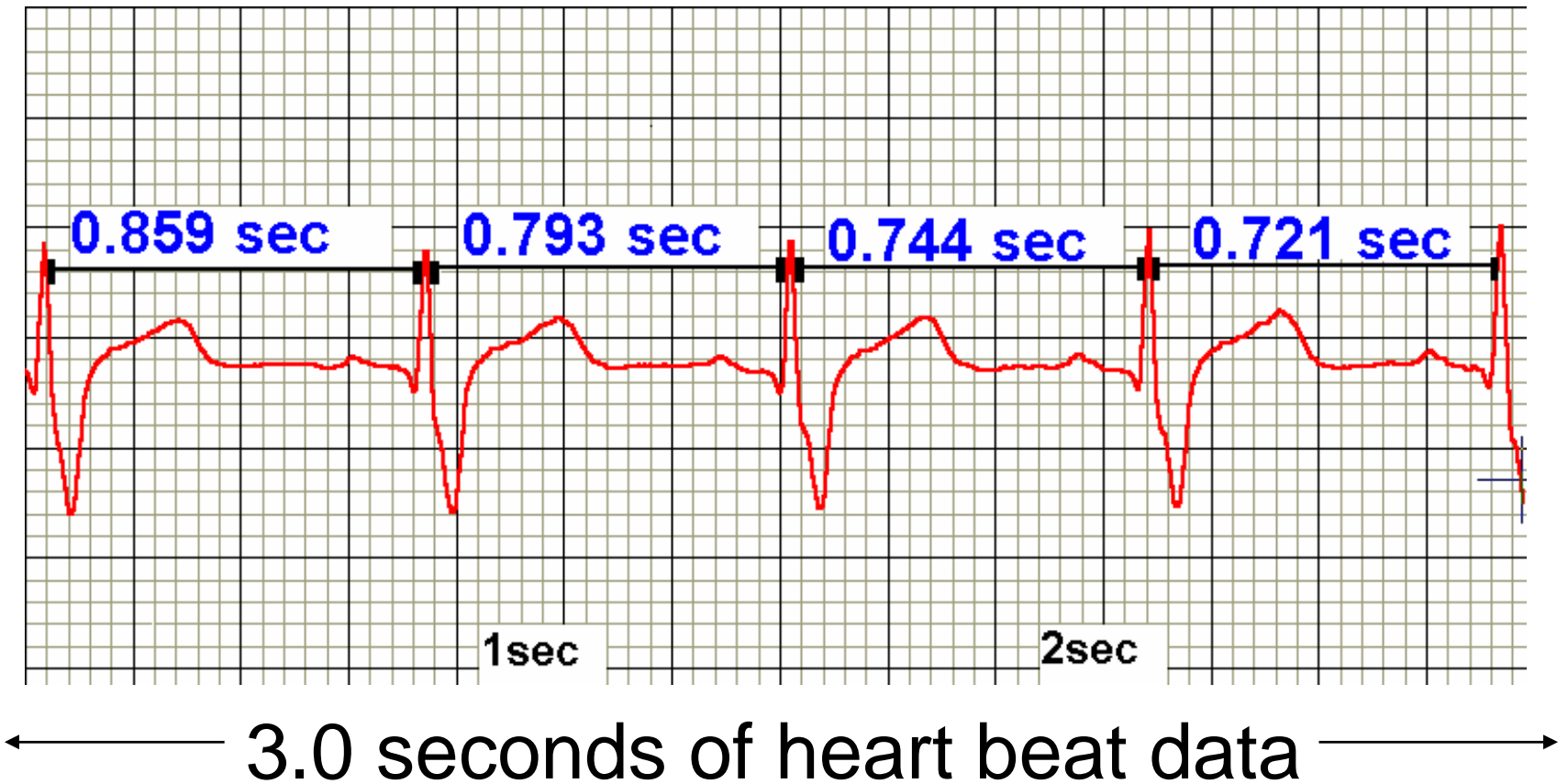
HRR-SDB

- Heart rate response to slow deep breathing is commonly used to evaluate autonomic function
- As we breathe in heart rate increases and as we breathe out heart rate slows down
- This effect is mediated by the cardiac vagus nerve
- At 6 breaths per minute an entrainment phenomenon occurs which involves the sympathetic nervous system
- Therefore HRR-SDB can be used as an indicator of cardiac autonomic potential

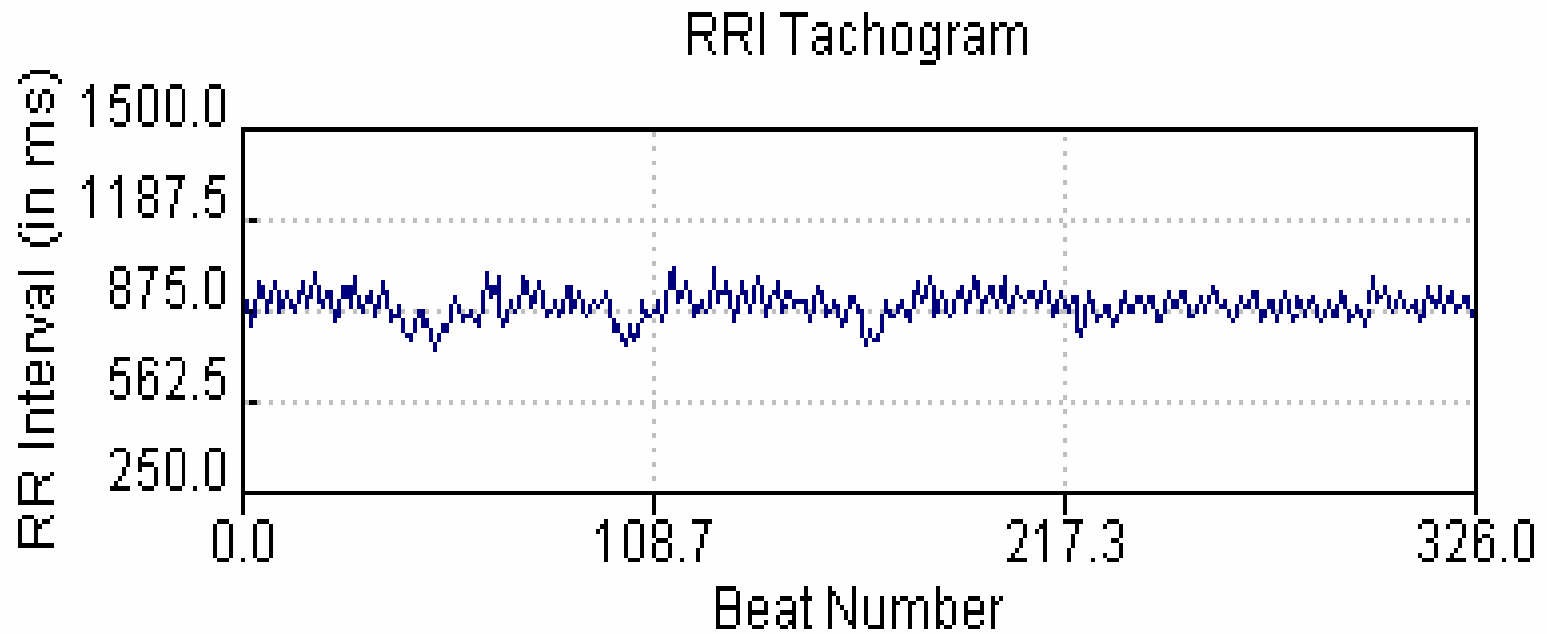
Heart Rate Variability Analysis



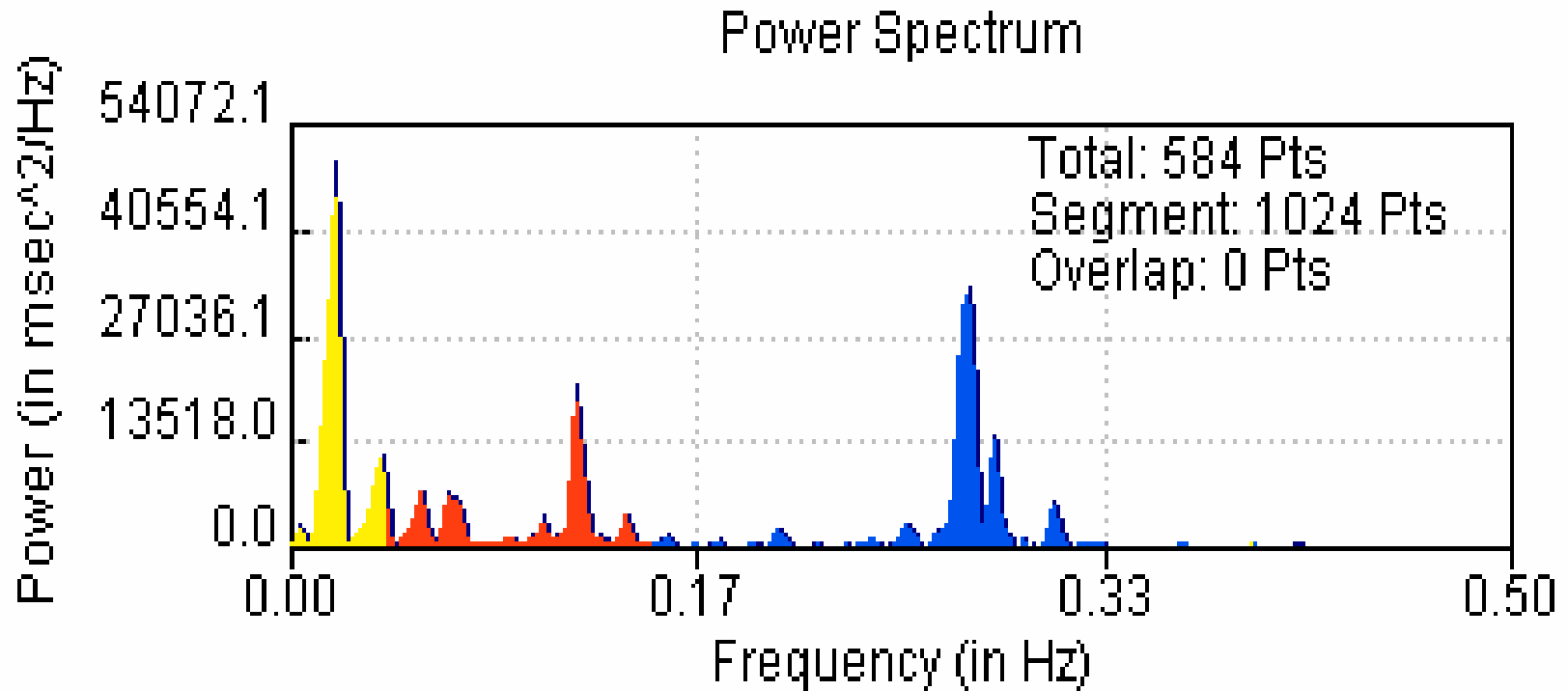
Heart Rate Variability



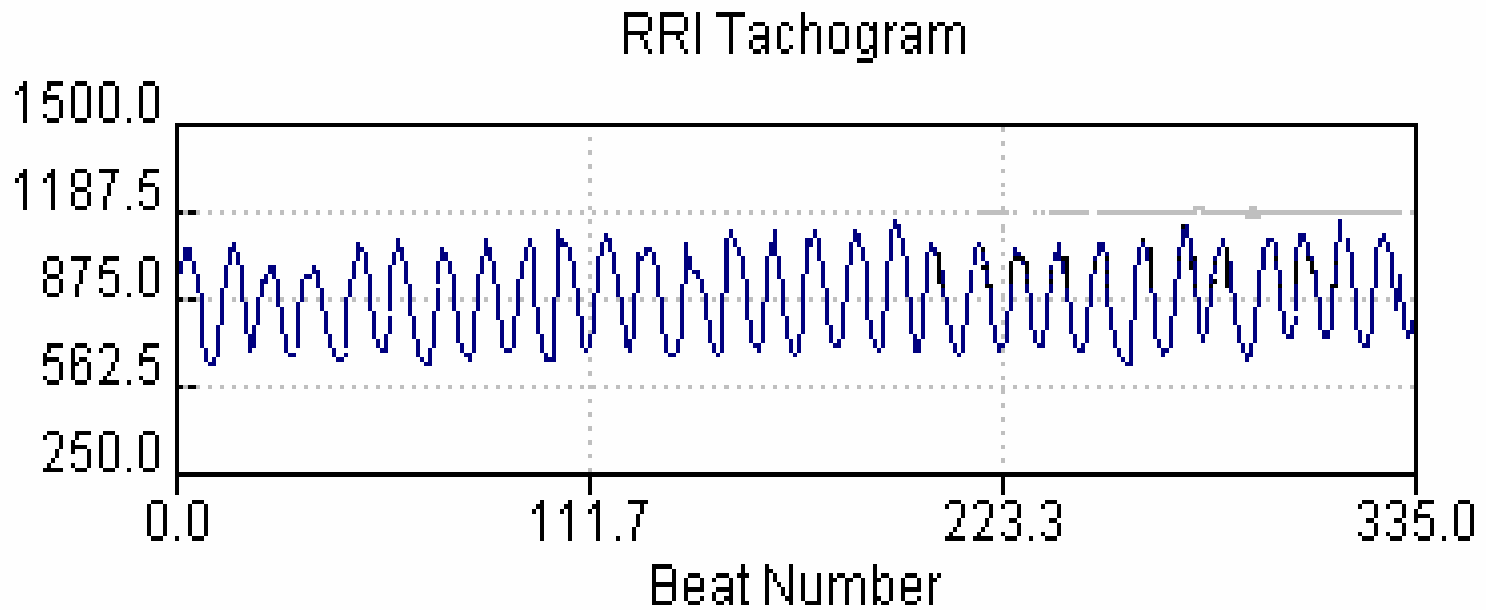
Spontaneous Breathing



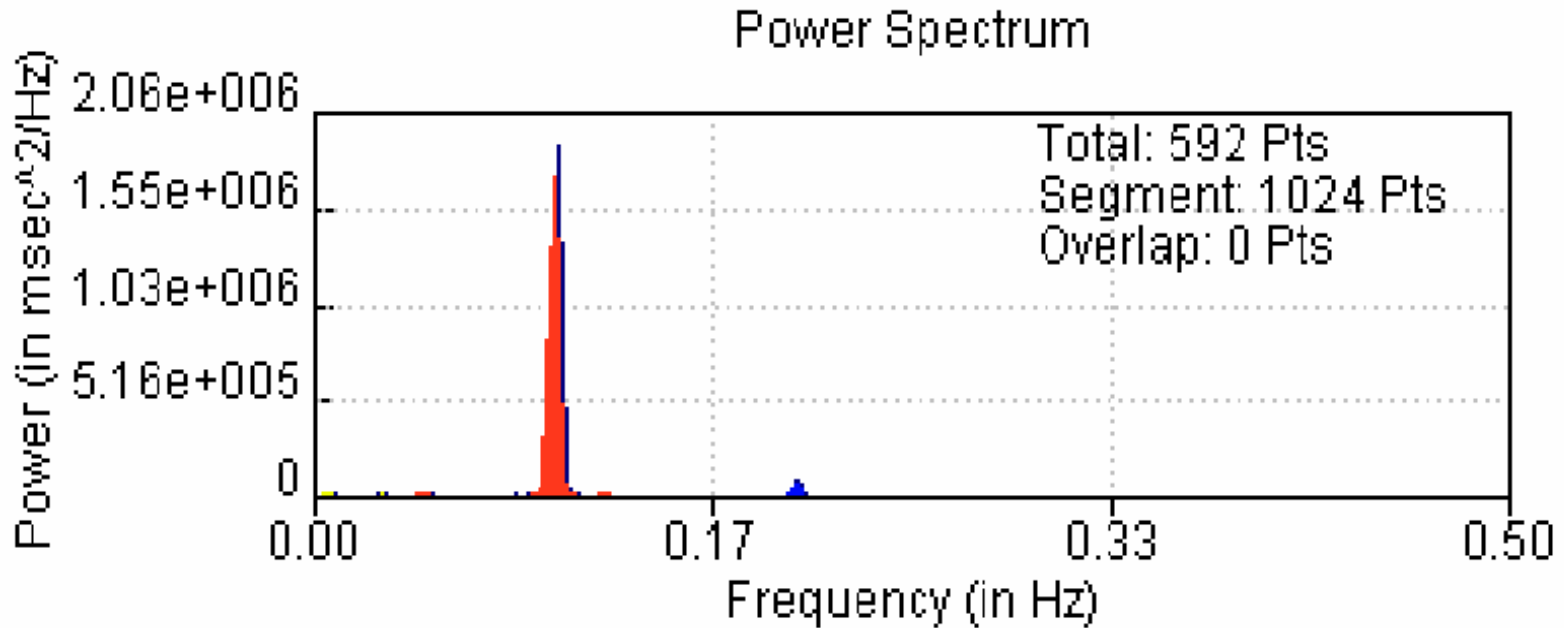
PSA of Spontaneous Breathing



Slow deep breathing

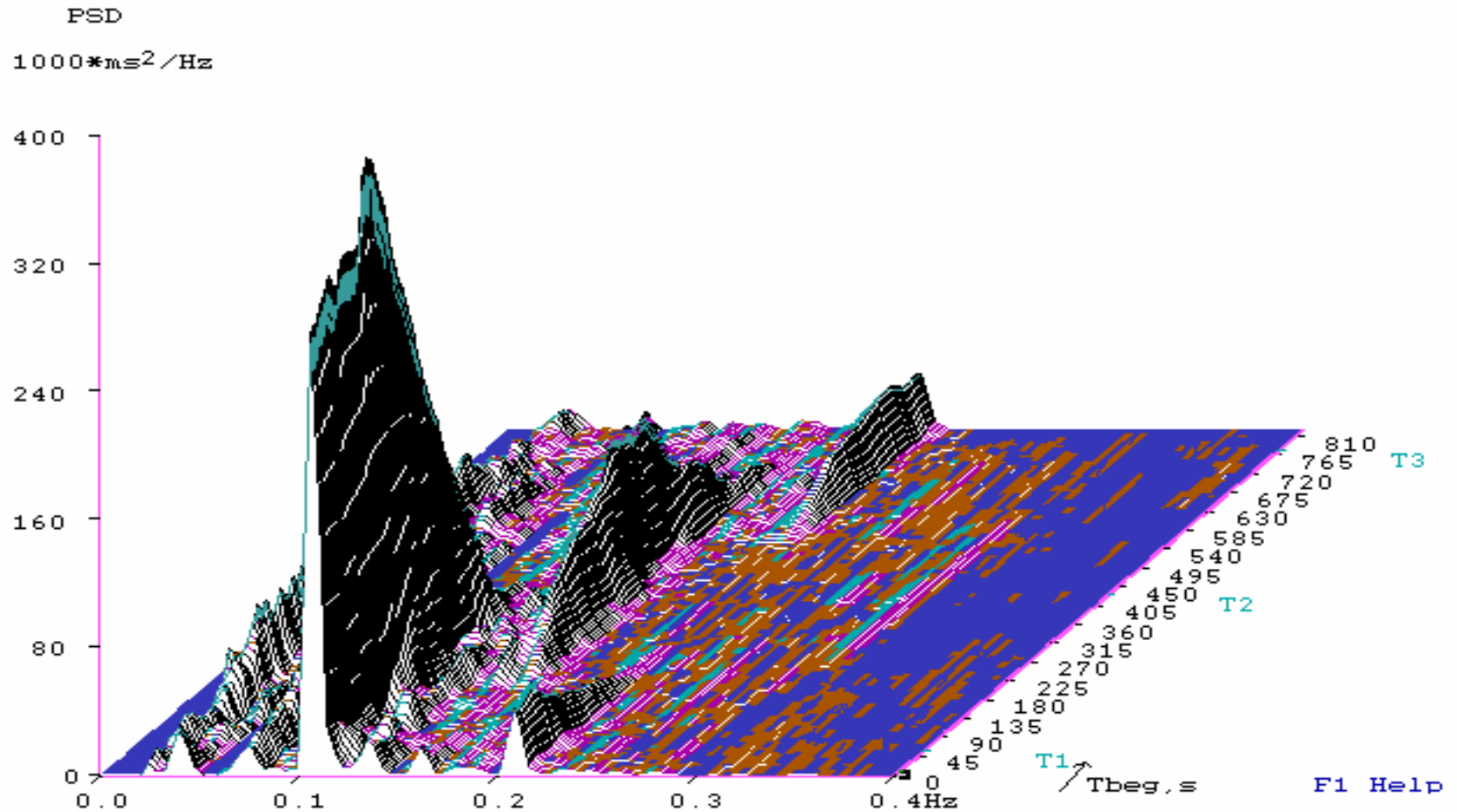


6 breaths per min (0.1 Hz)



6, 9 and 12 breaths per minute

Idn. Nr.: 1903195501 Window: 256s
Name:



Results

		Pre dialysis	Post dialysis	P-value
<i>Variable</i>	<i>Units</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>	-
Heart rate	bpm	72.1 (14.3)	71.5 (13.5)	NS
HRR-SDB	beats*	17.0 (5.8)	20.2 (8.9)	<0.02
HRV	msec ²	3619 (3440)	5182 (4458)	<0.01
Stress	VAS	5.1 (2.3)	3.8 (1.6)	<0.001
Systolic BP	mmHg	144 (24.8)	132 (27.8)	<0.002
Diastolic BP	mmHg	71 (13.9)	66 (15.7)	<0.04

* Maximum to minimum change (mean of 3 successive cycles)

Other findings...

- Only 2 patients said they felt stressed over needling
- One patient was considerably frustrated and depressed about the wait for a transplant...
- Most complained about lack of TV facilities
- **ALL** patients who were picked up by hospital-organized transport, complained vigorously about the service

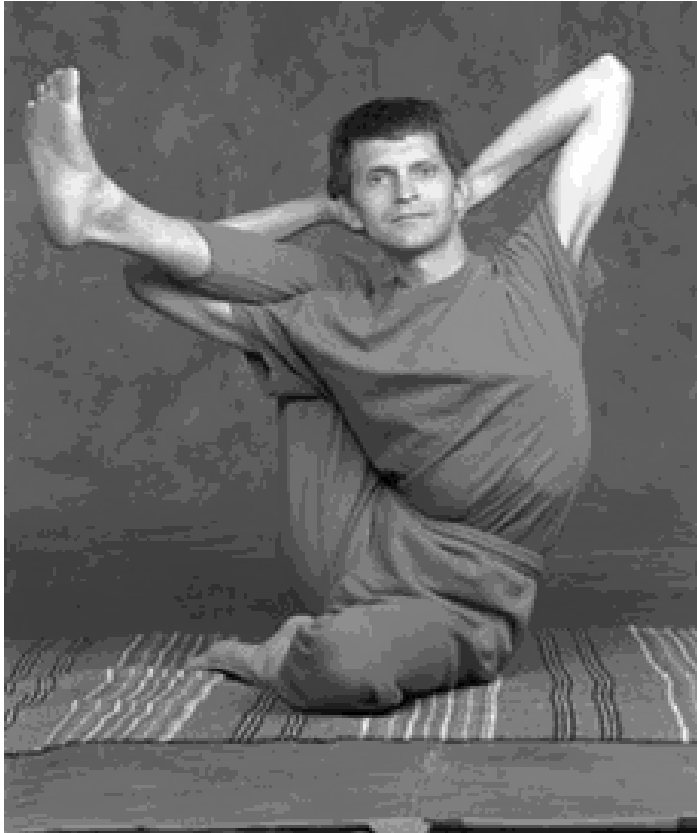
Conclusions

- It is possible that psychological factors, especially related to poor transport arrangements, impact upon cardiac autonomic tone, particularly influencing cardiac vagal tone
- Reduction of stress and improvement in autonomic tone may be associated with enhanced cardiovascular survival.

Future Directions

- Student projects
- Autonomic profiling at bedside using 3-lead ECG
- Relaxation CDs with breathing instructions
- Cultivation of an inner smile...

Thanks



Dr P McClelland



**Amanda
Balshaw-Greer**