腸音分析的科學與應用

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腸音聽診由於兼具操作簡單、成本低廉且非侵襲性之優點，因此一直是理學檢查裏必要的一環，對於許多臨床疾病有其重要性；但腸音本身就有難以預測及低再現性之缺點，加上對腸音的描述與判讀尚無客觀之標準，以致其臨床應用有限，主要的根源就是缺乏科學的證據。

本人之研究主要是利用超音波或螢光透視，加上同步紀錄其腸音，可以直接觀察到人體內腸音產生的過程；藉著分析各種物理量度與相關的聲學特徵，逐步發現了數種腸音存在的證據，例如:來自個別氣泡振動的氣泡腸音，以及來自複雜氣泡流集體振動的腸圈腸音等，最後再將這些腸音訊號與病患之臨床表現做關聯分析，可以進一步了解它們所代表的臨床意義。

關於腸音分析的技術方面，由於已發表的文獻不多，迄今學術界並無共識；但我們發現，短時傅立葉分析及 Hilbert-Huang Transform 在此領域甚能發揮所長，對於複雜氣泡流重疊的音訊或是氣泡產生後又撞擊腸壁…等複雜的狀況下，仍然能夠分辨出個別之氣泡頻率，又沒有訊號滲漏等缺點，個人認為是未來腸音研究中值得開發的領域。

Effects of Complementary Music Therapy on Autonomic Function and Subjective Sensations in Treated Cancer Survivors

馬偕醫學院　李沛群助理教授

Outlines

- Signals and signal processing in Audiology and Speech-Language Pathology discipline
- Treatment of breast cancer
- Music therapy and intervention program
- Heart rate variability analysis
- Measures and apparatus of the study
- Results and Discussion

Treatment of breast cancer

- Treatment of locoregional lymphatic metastases breast cancer
- Surgery
- Adjuvant anthracycline-containing chemotherapy
- Anthracycline chemotherapy
- Potent antineoplastic agents
- Reduced risk of disease progression
- Disadvantages
- Anthracycline-induced cardiotoxicity
- Lead to congestive heart failure

Impaired cardiovascular autonomic function

- Congestive heart failure impairs autonomic function
- Heart rate variability (HRV)
- Commonly used, reliable, noninvasive tool
- Assessing autonomic function
- HRV decreased in anthracycline treated breast cancer patients
- Decreased HRV
- Cardiovascular autonomic dysfunction
- Cardiovascular risk
- Associated with shorter survival in cancer patients

Music therapy on cancer patients

- Most music therapy researches focus on

Awaiting surgical procedures
Receiving treatment
Immediately after surgery
Terminal cancer care

- Only few researches focus on treated cancer survivors
- Treated cancer survivors

Need regular follow-up care
Always face to possible cancer recurrence
Provoke anxiety response
Impaired autonomic function

Correlation between heart rate variability and psychological effects

- Certain psychological effects are reflected by HRV

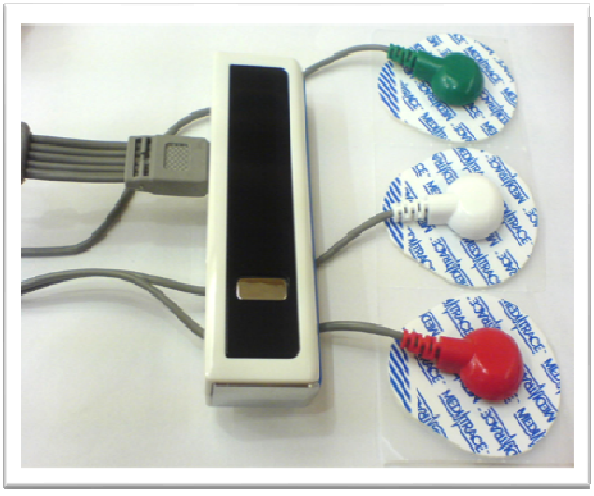
Mental stress
Increased sympathetic and decreased parasympathetic
Anxiety and panic disorder
Reduced of total autonomic function (TP)
Listening sedative music
Increment of the parasympathetic (HF)

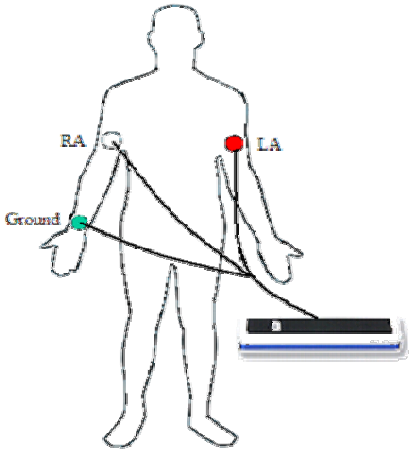
- Parasympathetic system is considered to be a good index of the relaxation sensation

Measures and apparatus

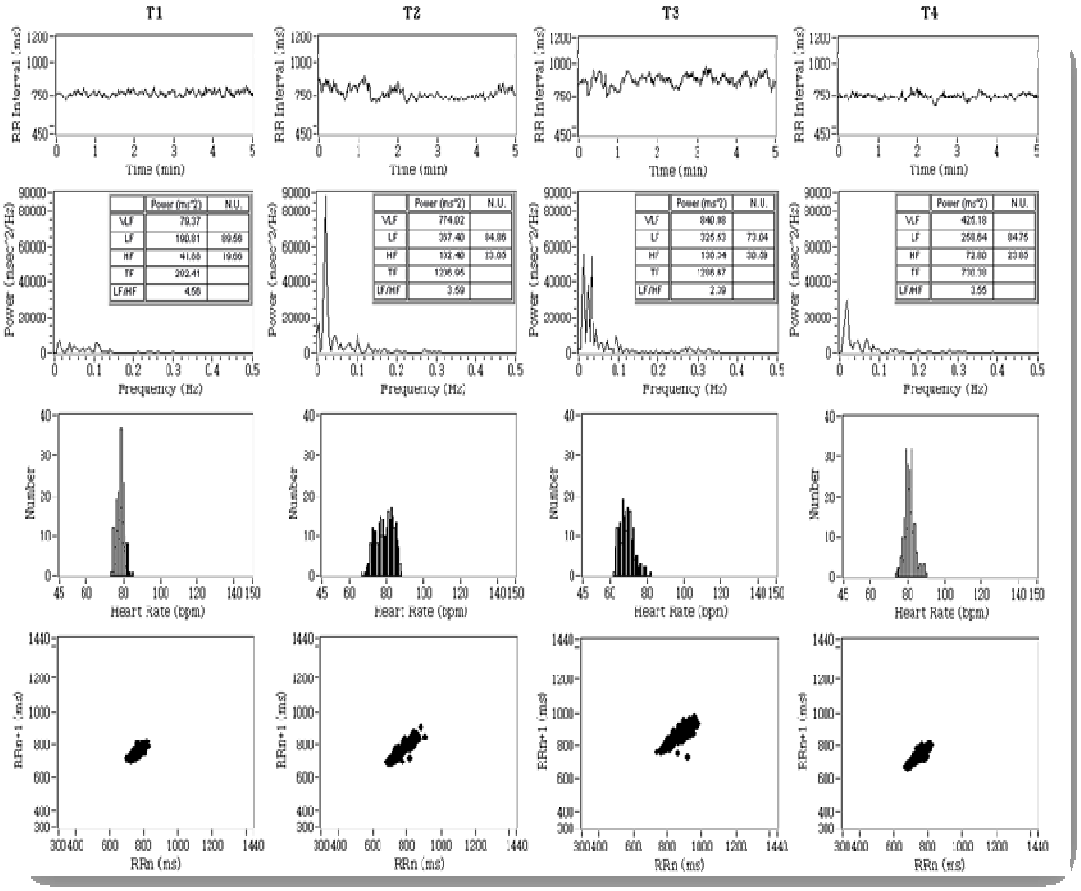
- Measures : monitoring of ECG signals and questionnaires
- ECG recordings

Lead I: bipolar leads
Using a portable ECG recorder





A typical case for 5 minutes RR interval, HRV PSD, heart rate histogram and Poincare plot of four times



Chaotic Wave Theory of Fractal Continuum and Its Connotations in Biomedical Signal Processing

清華大學　張翔教授

- Chaotic wave theory of fractal continuum is an important tool in the modeling and signal processing of modern physics, nanotechnology, biomedicine, physiology, and traditional Chinese medicine. For instance, it has been used to explain the blackbody radiation, quantum optics, self assembly in nanotechnology, synergic/cooperative co-activations of physiological functions and mechanism of acupuncture in traditional Chinese medicine via its scaling and self-similar properties. Recently, its essential ideas are further used to derive a more general uncertainty principle. By combining it with the blackbody radiation formula, the chaotic wave theory can readily account for the emission and absorption of light and laser. Hence, the theory of optics from the emission, transmission, to absorption can be described completely by this theory. It is believed that many of the phase transition phenomena in physiology and modern physics can also be unified under the same notion of this theory. In this talk, the applications of it to the signal processing of the micturition mechanism of lower urinary tract of Wistar rats, the volitional flexion and forearm pronation of human forearm will be fully investigated. Results indicate that this chaotic wave theory can be used successfully in interpreting the physiological functions. It will also be explained in this talk the treason why it can readily account for many of these diverse phenomena in physiology, biomedicine, TCM and modern physics.

Autonomic Cardiovascular Physiology of Osmopressor Response

三軍總醫院　呂志成醫師

Drinking water is one of the essential daily activity that has been shown to have unexpected haemodynamic effects. Oral ingestion of water greatly elevates blood pressure in individuals with severe orthostatic hypotension caused by autonomic failure. In elder healthy subjects, water ingestion raises the systolic blood pressure about 11 mmHg in healthy middle-aged and elderly subjects. In young healthy subjects, there was no notably change in arterial blood pressure and, or even a slight reduction in heart rate in young healthy subjects.

Water ingestion raised peripheral sympathetic vasoconstrictor discharge in accompany with the increase of sympathetic drive in young healthy subjects. Our preliminary result demonstrated that there water reduce skin blood flow in accompany with peripheral vasoconstriction in young healthy subjects. Water ingestion alters certain regional cerebral blood flow in correspond to enhance tolerance to orthostatic challenge. The osmopressor response of water ingestion may signal an important but heretofore unrecognized mechanism at work in human cardiovascular regulation both in health and disease.

There are several animal studies demonstrating osmosensitive receptors located in the hepatic portal vein projecting to the thoracic spinal cord. We suggested water increases sympathetic activity through an unknown cardiovascular control mechanism, but the portal osmosensitive receptor has been thought to play as an important afferent sensor of water. We speculated that the aqauporin water channel receptor might contribute to a critical afferent signal input into the central nervous system.

The efficiency of the nitric oxide (NO) component was therefore to counteract an

adrenergic evoked rise in total peripheral vascular resistance. There are evidently that the defective NO synthesis from the vascular system might provoke sustained vasoconstriction by 2 distinct mechanisms, including the loss of vasodilator tone at vascular smooth muscle cells and the facilitating central neural vasoconstrictor outflow. We suggested defective NO system might involve in the mechanism mediated the robust water pressor's response in severe autonomic disorder or normal healthy elderly subject.

This phenomenon may have important diagnostic and therapeutic implications. Thus, we purposed to analyze the cardiovascular physiology of water ingestion and address the mechanisms and clinical significance of its osmopressor response. We seek to understand the basis of water's afferent stimuli and efferent output underlying the water's osmopressor response and the physiological consequences of its clinical implication. Mechanistically, we begin to address the efferent side of the osmopressor response and its afferent transduction modulation. Then at the more practical level, we examine consequences of acute water ingestion for metabolic syndrome, and as a therapeutic strategy for postprandial angina and dumping syndrome.

從意識到意識之外

談各種生理訊息分析對意識的意義與未來應用

工研院　蔡淑慧博士

般人來說都是屬於較為形而上的認知。所幸能量醫學與華人文自從腦波及生理訊號應用在情感科技的研究熱潮後，不難看出全世界的資訊業開始從關注於電腦與網路上的資訊，轉而關注到人身體上的資訊及能量整合。而屬於身心意識與能量，對於一化中醫所講究的訊息與能量概念，加上近來運用非線性複雜科學及量子理論的輔助，許多勇於探索的前瞻科學家便嘗試以新科學方法，來研究並解釋生命中令人費解的一些問題，也對身心及意識科技背後原理的闡明帶來更具體化的闡述。而二十世紀末發展的腦心科學，其研究也是遇見相同的瓶頸，腦心科學的研究正視整體化的科學方法，也因而走上分科化約之傳統科學近來才開始的反省之路。

故在此演講中，詳述講者針對身心及意識科技裡所觸及的資訊及能量的探索過程，從清醒到睡夢，以及特殊意識狀態下，身體能量資訊的顯著性特徵，並探討身心能量的同調性、共振性以及負熵性來研究身心意識科技的新穎性研究與應用。