• 系統編號	RC9008-0273
• 計畫中文名稱	正常與不正常華人平均信號心電圖在時間領域與頻率領域之研究
• 計畫英文名稱	A Research of Time Domain and Frequency Domain Signal Averaged Electrocardiography in Normal and Abnormal Chinese
• 主管機關	行政院國家科學委員會 • 計畫編號 NSC89-2213-E038-003
• 執行機構	台北醫學院醫學資訊暨計算機中心
• 本期期間	8808 ~ 8907
• 報告頁數	11 頁 • 使用語言 英文
• 研究人員	楊騰芳 Yang, Ten-Fang
• 中文關鍵字	信號平均；心電圖；心室性心律不整；高解析度；心室遲緩電位；類神經網路；模糊邏輯；心電圖
• 英文關鍵字	Signal average；Electrocardiogram；Ventricular arrhythmia；High resolution；Ventricular late potential；Neural network；Fuzzy logic；Electrocardiogram (ECG)
• 中文摘要	心室性遲緩電位之存在已被證明與產生心律不整的介值有關連。這些產生心律不整之介值可在心肌中表現出傳導進行的延遲以及心室激化的延緩而具有支離破碎的電力活動，這些電力活動與心室性心律不整的發生具有因果關係。平均信號心電圖被用來偵測心室性的遲緩電位以利於對心臟血管病患未來產生心室性心律不整事件的危險加以預測。華人及西洋人時間值域平均信號心電圖的正常值領域界定在近年來由本研究者已有研究報告，而頻率領域之平均信號心電圖的測量項目則尚未有人系統化的研究發展。在另一方面，人工智慧領域（例如：類神經網路判斷系統以及模糊邏輯診斷系統）當被運用於心臟電氣學領域之診斷研究。因此，本研究之主要目的乃在於探討應用人工智慧來幫助偵測平均信號心電圖（在時間及頻率值域）中心室性遲緩電位之存在。同時也對信號處理技術在平均信號心電圖的發展有本土化之研究。本研究者將會建立臨床數據資料及平均信號心電圖的數據。這些平均信號心電圖數據將會用來輸入於人工智慧診斷系統中以便於訓練及設計這些系統。此些研究將與台灣科技大學王教授之研究群合作，而信號處理技術之發展研究將與台灣科技大學陳教授之研究群合作來完成，經過數學統計學 ROC 曲線之運算後，最佳截取點會被決定出來，而且最合適的人工智慧模型系統將會造出來以便未來的評估及修正。經由上述這些研究步驟，華人及西洋人的平均信號心電圖（包括時間值域及頻率值域）均可以詳細研究完成，且其診斷心室遲緩電位之標準也可以因此確立。而人工智慧自動心臟平均信號心電圖之診斷系統也可因此完成，對於心臟電氣學之臨床研究診斷有所助益。
• 英文摘要	The presence of ventricular late potentials (VLPs) has been associated with an arrhythmogenic substrate characterised by fragmented electrical activities due to delayed ventricular activation and slowed propagation of conduction in the myocardium, which in turn seems to be related to the development of ventricular

arrhythmias. The signal-averaged electrocardiogram (SAECG) has been used to detect ventricular late potentials in order to stratify patients at risk of future arrhythmic events on account of their underlying cardiovascular diseases. Several researches of the normal limits of the time domain SAECG in Chinese and Caucasians have been performed by the principal researcher in recent years. Whereas measurements from the frequency domain SAECG has not been systemically investigated. On the other hand, the advance of artificial intelligence (AI), namely artificial neural networks classification system and Fuzzy logic diagnostic system, has been applied in the field of Electrocardiology. Therefore, it is thought the application of AI to the detection of VLPs by use of SAECG time domain and frequency domain parameters might be useful in the field of non-invasive electrocardiology. It is also possible to investigate the appropriate signal processing techniques in generating SAECG measurements. The clinical materials and SAECG database will be collected as well as established by the principal researcher. This database will be used as input to train the AI diagnostic systems and the topologies of the AI systems will be developed and designed with the cooperation with Professor Wang's group and the signal processing techniques will also be developed with Professor Chen's group. After the statistical manipulation through the Receiver Operation Characteristic (ROC) curve the best cutoff point will be determined and the most appropriate AI configuration will be chosen and used for the further evaluation and revision. Through these researches the research on SAECG of Chinese and Caucasians can be completed. The diagnostic criteria can be established and the SAECG automated AI interpretation programme can be finished in order to aid the clinical diagnosis in electrocardiology.