• 系統編號	RN9604-1034
• 計畫中文名稱	運用獨立元件分析方式評估正常人與巴金森氏病的腦血流差異
• 計畫英文名稱	Building a Model Using Independent Component Analysis to Assess RCBF Changes in Parkinsons Disease
• 主管機關	行政院國家科學委員會 • 計畫編號 NSC93-2320-B038-033
• 執行機構	臺北醫學大學醫學資訊研究所
• 本期期間	9308 ~ 9407
• 報告頁數	9 頁 • 使用語言 中文
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• 中文關鍵字	巴金森氏病; 腦血流; 獨立成分分析
• 英文關鍵字	SPECT; Parkinson's disease; Regional cerebral blood flow; Independent component analysis; Statistical parametric mapping
• 中文摘要	目前已有相當多的研究指出巴金森氏病人的腦血流與正常人有所不同，然而對於血流異常區域卻有許多不一致的發現，本研究試圖運用新的分析方法-獨立元件分析來分析巴金森氏病與正常人之單光子電腦斷層造影之不同。本研究收集 24 位正常人與 27 位不同程度之巴金森氏病人。腦血流測量使用 HMPAO 試劑，病人與正常人之腦影像，先使用標準化的模版做標準化。使每個影像的空間位置相同後，再把所有影像輸入做獨立成分分析，經由此分析後，以邏輯迴歸找出與疾病有相關之成分後，再以 SPM 的方法找出疾病箱關之腦血流異常區域，與過去的方法相比較，本研究不但發現傳統上在巴金森氏病典型的變化，包括 2 基底核與小腦的腦血流增加，額葉與枕顳葉的腦血流下降，我們更發現輔助運動區與尾核的腦血流於病人有異常的下降，此發現能與疾病的病理生理學相符合。說明以此方法可以有效的發現疾病相關之異常腦血流區域。
• 英文摘要	This study investigates regional cerebral blood flow (rCBF) changes in patients with Parkinson's disease using independent component analysis (ICA) followed by statistical parametric mapping (SPM). Methods: 99mTc- hexaemethyl-propyleneamine oxime (99mTc-HMPAO) was used as the CBF tracer for rCBF measurements. A single photon emission computerized tomography (SPECT) study was performed on 27 patients with Parkinson's disease in various disease stages, and also on 24 aged-matched controls. SPECT images were first spatially normalized to standard space, concatenated, and then subjected to ICA decomposition. The resulting image components were then separated by logistic regression into two sets: disease-related components, whose subject weights differenced between groups and non-disease related components, whose subject weights exhibited no group difference. Components of each set were back-projected and summed across components. The resultant rCBF images were normalized to the global CBF for each subject and then analyzed using SPM to compare the rCBF values changes between Parkinson's disease and control subject. Results: In the disease-related image subspace, patients with Parkinson's

disease exhibited significantly higher adjusted rCBF in the subthalamic nucleus, putamen, globus pallidum, thalamus, brainstem, and anterior lobe of cerebellum, and significant hypoperfusion in the supplementary motor plus dorsolateral prefrontal, pariteo-occipital cortex, insula, and cingulate gyrus. In the non-disease related image subspace, very few regions showed a significant group difference. Using SPM only without ICA separation gave significantly lower peak t value and at a smaller number of image voxels. Some of the regions revealed by ICA to be affected by Parkinson's disease have not shown significant changes in previous HMPAO-SPECT studies, though those are central to the pathophysiological model of Parkinson's disease. Conclusion: In a HMPAO-SPECT study, ICA-based separation of normalized images into disease-related and unrelated subspaces revealed more disease-related brain regions than applying SPM directly. The diseased-related regions indicated by ICA are consistent with the current model of pathophysiology in Parkinson's disease, though their rCBF changes in Parkinson's disease have not been fully demonstrated by any previous single functional imaging study. Thus ICA provides a new and more comprehensive method for testing functional and brain circuit models in Parkinson's disease.