

• 系統編號	RG9811-0421		
• 計畫中文名稱	腦部多重監測系統應用於嚴重腦外傷之跨院研究		
• 計畫英文名稱	--		
• 主管機關	行政院衛生署	• 計畫編號	NHRI-EX98-9707PI
• 執行機構	台北醫學大學傷害防治學研究所		
• 本期期間	9801 ~ 9812		
• 報告頁數	334 頁	• 使用語言	中文
• 研究人員	邱文達；林茂榮；黃勝堅；蔣永孝；張丞圭；施養性 Chiu, Wen-Ta；Lin, Mau-Roung；Huang, Sheng-Jean；Chiang, Yung-Hsiao；Chang, Cheng Kuei；Shih,Yang-Hsin		
• 中文關鍵字	腦外傷；腦組織氧氣分壓監測；顱內壓；腦灌流壓；壓力自動調節；；；		
• 英文關鍵字	traumatic brain injury；brain tissue oxygen tension；intracranial pressure；cerebral perfusion pressure；pressure；autoregulation；；		
• 中文摘要	本年度研究重點及進度九十八年度本研究計畫之執行方向，可分為三個方向：一、腦外傷登錄資料庫本研究繼續進行腦外傷病例登錄，建立國內腦外傷資料庫。目前收集有效問卷為 3,010 份，輕度腦外傷(昏迷指數 13-15)佔 81.8%，中度腦外傷(昏迷指數 9-12)佔 8.7%，重度腦外傷(昏迷指數 3-8)佔 9.5%。由資料中可以得知，病人受傷的原因、是否有顱內出血、痙攣、傷後健忘及預後情形等。初步結果發現輕度腦外傷的患者中男性佔大多數（60.0%）；以受傷原因來看，車禍是主要導致輕度腦外傷的原因（46.7%），其次原因為跌落（39.1%），在跌落情形中，以滑倒絆倒的人數最多（24.5%）。受傷導致因素以喝酒的情況為多數（77.2%）；受傷之昏迷指數(Glasgow Coma Scale, GCS)平均為 14.55 分（標準差為 9.54 分）；以受傷情形而言，有顱骨骨折佔 16.2%；有意識喪失者佔 29.3%；有傷後健忘者佔 17.0%；傷後有痙攣者佔 2.5%。以顱內出血來看，性別、年齡、受傷原因和顱骨骨折是導致輕度頭部外傷產生顱內出血的主要危險因子。造成顱內出血的受傷原因而言，車禍為其主要的因子。另外，有意識喪失和意識喪失時間的愈長，愈容易產生顱內出血。從研究結果得知大約有 10%的輕度腦外傷患者會導致死亡、輕度或重度殘障，且輕度腦外傷導致顱內出血的病例中，有 25%會導致死亡或殘障等嚴重後果，因此輕度腦外傷亦不容忽視，此重大發現需更深入探討。二、腦部多重監測系統應用本計畫已沒有衛材費用給付問題，因此收案進度得以大幅改善，每個月至少收案三例。同時因為衛材給付問題的排除，所以病患退出試驗的機率也已經改善。目前研究發現，性別分布以男性占多數(65.0%)；患者平均受傷年齡為 51.28 歲（標準差為 21.10 歲）；到院前的 GCS 平均為 9.08 分（標準差為 4.14 分）；62.5%的患者非交通意外入院；受傷相關原因各有 7.5%的患者與工作和酒精相關。教育程度以大專或大學比例最高；婚姻狀況大多為已婚或同居；患者大多無慢性病史。受傷後 24 小時內的 GCS 平均為 9.0 分；開刀者進入加護病房的 GCS 平均為 7.13 分。Abbreviation Injury Score(AIS)平均分數為 5.78 分；Injury Severity Score(ISS)為 10.0 分。平均住加護病房天數為 21.07 天；普通病房平均天數為 30.12 天。患者於加護病房的 GCS 平均為 6.56 分；其血壓之平均壓為 95.68mmHg；ICP 平均為 11.25mmHg，CPP 平均為 72.70mmHg；PaCO2 平均為 24.20mmHg，PaO2 平均為 152.03mmHg；PbtO2 平均為 27.96mmHg，範圍介於 12.25 至 46.64 mmHg 之間。患者癒後追蹤的情形，葛氏癒後指數 GOS，平均分數為 2.95 分；細化型葛氏癒後指數 GOSE，平均分數為 3.61 分。分析實驗組與對照組患者到院前 GCS、AIS、加護病房住院天數、ICP、CPP、PaO2、PaCO2、患者癒後追蹤的情形之 GOS 與 GOSE，僅 PaCO2 達統計上顯著差異。依患者到院前嚴重度分組：3 至 8 分為重度腦外傷、9 至 12 分為中度腦外傷，探討實驗組及對照組 AIS、ISS、加護病房住院天數、ICP、CPP、PaO2、PaCO2、PbtO2、患者癒後追蹤的情形之 GOS 與 GOSE 檢定其相關性，結果發現，兩組患者癒後 GOS 達統計上顯著差異。依據本研究所提出之研究架構，進一步瞭解危險因子間的影響關係。經多元複迴歸分析結果顯示，患者年齡、性別、到院前 GCS、AIS、ISS、住加護病房天數、ICP、CPP、PaO2、PaCO2、PbtO2 等危險因子，對兩組患者癒後追蹤的情形之 GOS 與 GOSE，其影響達統計上顯著差異。多元複迴歸分析中，隨著患者年齡的下降、到院前 GCS 分數的升高、ICP 平均值的降低，兩組患者癒後追蹤的情形之 GOS 有上升情形，並達到統計上顯著差異，且實驗組高於對照組。GOSE 部份，隨著患者年齡的下降、到院前 GCS 分數的升高，患者癒後追蹤的情形之 GOSE 有上升情形，並達到統計上顯著差異，且實驗組高於對照組。其他危險因子，隨著性別的不同、AIS 的增加、		

住加護病房天數的減少、ICP 下降、CPP 上升、PaO₂ 升高、PaCO₂ 升高、PbtO₂ 升高，皆會使患者癒後追蹤的情形之 GOS 與 GOSE 有上升情形，且實驗組高於對照組。以整體存活率作為指標，接受多重監測系統之嚴重腦外傷患者之存活率高於未接受者，在本研究中接受多重監測系統可有效降低嚴重腦外傷病患之死亡率。目前持續運用 WHOQOL-BREF 台灣版及針對腦外傷後病人之腦部傷害病患生活品質問卷之評估，並以 GOS 及 GOSE 追蹤已收案病患評估其恢復狀態及癒後情形之相關性。三、2009 年 5 月 23 至 5 月 24 日台灣神經創傷學會於台北醫學大學主辦 Symposium on Neuro-protection and Neuro-regeneration in Conjunction with 4th Annual Meeting of Taiwan Neurotrauma Society，中文譯為神經修護與再生研討會暨第四屆台灣神經創傷學會年會，邀請多位國際神經創傷學術研究領域享譽盛名之專家學者，包括美國及台灣講員及座長。國外講員邀請美國 National Institute on Drug Abuse Prof. Barry J. Hoffer, Prof. David C. Klein, Prof. Nigel H. Greig。國內包括基礎及臨床神經科學研究相關領域之專家學者與會。大會主題涵括神經創傷基礎研究、腦外傷治療之爭議及預後評估、神經修護與再生相關研究。目標則希望藉由此研討會，不僅促進國際間神經外科交流，同時提供機會予國內、外神經科學研究各界人士學術交流，更對提升我國國際地位有莫大助益。本次大會圓滿落幕。研討會中，聽取來自美國國家衛生研究院三位重量級學者精闢的演說，國內專家亦發表各領域的研究成果及目標，國內外專家相互交換意見，促進了研討會的進行，達成舉辦此會之初衷。

Focus and Process Three study projects of this research have been accomplished in the year 2009. They are as follows: 1. Establishment of traumatic brain injury (TBI) registry system in Taiwan: In the last year, totally 3,010 valid entries of traumatic brain injury questionnaire for registry system were obtained. Among them, 81.8% were mild TBI (GCS 13-15), 8.7% were moderate TBI (GCS 9-12) and 9.5% were severe TBI (GCS 3-8). Based on the record, we may identify the causes of injury, the presence of intracranial hematoma, the extremity spasm, the post-TBI amnesia, and the prognosis on mild TBI patients. The majority of mild TBI patients were male (60.0%). The frequent cause of injury was traffic accident (46.7%) and followed by fall (39.1%). The frequent type of fall accident was the slip on the floor(24.5%) and the most common influence factor associated with fall was alcohol drinking (77.2%). The average GCS of mild TBI patients was 14.55 with a standard deviation of 9.54. The commonly identified injuries were skull fracture (16.2%), conscious loss (19.7%), posttraumatic amnesia (4.1%), and posttraumatic spasm (1.8%). The risk factors related to the development of intracranial hematoma were sex, age, type of injury, and skull fracture. Traffic accident was the major risk factor to cause of intracranial hematoma. Furthermore, patients with history of initial loss of consciousness and longer duration of conscious loss were more likely to have intracranial hematoma than those did not have conscious loss. Surprisingly, about 10% of mild TBI patients were dead, mildly or severely disabled. For those with intracranial hematoma, 25% of them were either dead or disabled. These interesting findings were important and needed further study. 2. Application of multiple monitoring systems to TBI patients. In the past year, we overcame the problem of patient payment for the monitoring device after obtained a good support from device company by giving an acceptable discount to fit our study budget. Because of that, the recruitment rate of study cases became much better than that of year 2008. Approximately, we were able to recruit 3 cases in a month and to have lower dropout rate with a result of even distribution of number of cases in either treatment or control group. We found that the majority of the study cases were male (65.0%). The average age was 51.28 years old (standard deviation 21.10 years old), and the average GCS on arrival of hospital was 9.08 (standard deviation was 4.14). The 62.5% of patients were injured by non-traffic accident. Only 7.5% of patients, their injuries were associated with their job and alcohol drinking. The majority of cases were college educated, married and lived with partners. Most of them did not have history of medical illness. The average of GCS 24-hour after injury was 9.0 and 7.13 after being moved into ICU postoperatively. The average of abbreviation injury score (AIS) was 5.78. The average of injury severity score (ISS) was 10.0. The average of length of stay in ICU was 21.07 days and 30.12 days in ordinary ward. The average of GCS of TBI patients in ICU was 6.56. The average of mean blood pressure was 95.68 mmHg. The average of ICP was 11.25 mmHg. The average of CPP was 72.70 mmHg. The average of CVP was 7.05 mmHg. The average of PaCO₂ was 24.20 mmHg. The average of PaO₂ was 152.03 mmHg. The average of PbtO₂ was 12.25 mmHg. We use GOS and GOSE to evaluate the outcome of studied patients. The average of GOS was 2.95. The average of GOSE was 3.61. The dependent variables were trial group, case group and control group, respectively. The independent variables were GCS, AIS, days of ICU, ICP, CPP, PaO₂, PaCO₂, GOS, and GOSE. After analysis, only PaCO₂ was found to be statistically significant different. The pre-hospital GCS, a dependent variable, were divided into score 3 to 8, score 9 to 12, and score 13 to 15, respectively. The independent variables were AIS, ISS, days of ICU, ICP, CPP, PaO₂, PaCO₂, PbtO₂, GOS, and GOSE. We found that there were significant differences of GOS and GOSE in both treatment and control groups. Based on our past

research model, we selected important variables into multiple regression enter method to identify the relationship between dependent variables and independent variables. We found independent variables such as age, sex, GCS, AIS, ISS, days of ICU, ICP, CPP, PaO₂, PaCO₂, PbtO₂, were statistically significant to influence patient outcome indicated by the results of GOS and GOSE ($F=5.462$, $p<0.001$; $F=4.669$, $p<0.001$). Furthermore, patients of both groups with younger age, better pre-hospital GCS and lower ICP showed significant increased GOS as well as GOSE. The treatment group had significant better GOS and GOSE than control group. Similarly, other factors such as sex, higher SIA, shorter length stay in ICU, lower ICP, higher CPP, higher paO₂, higher PaCO₂, and higher PbtO₂ also improved the GOS and GOSE in both groups. The treatment group had higher GOS and GOSE than control group. The overall survival of severe TBI patients who had multiple monitoring systems was significant better than those without multiple monitoring systems. The mortality rate was significant lower in the treatment group as well. We evaluated the quality life of TBI patients with WHOQOL-BREF and the outcome of those patients with GOS and GOSE.

3. In 2009, we organized the Symposium on Neuro-protection and Neuro-regeneration in conjunction with the 4th Annual Meeting of Taiwan Neurotrauma Society and invited speakers from National Institute on Drug Abuse. They were Prof. Barry J. Hoffer (Scientific Director, NIDA, NIH), Prof. David C. Klein (Senior Investigator/ Chief, Neuroendocrinology Section, Laboratory of Developmental Neurobiology, NICHD, NIH), and Prof. Nigel H. Greig (Chief, Drug Design & Development Section, Lab of Neurosciences, & Acting Chief, Lab Experimental Gerontology, NIA/NIH). Meanwhile, we also invited a number of experts from Taiwan to join the meeting and exchange their research with others. Finally, we officially signed a “Letter of Intent” between the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, United States of America and Taipei Medical University. Based on the agreement, the collaboration between two sides may include subject to mutual decision, activities designed to further scientific and academic interactions, to complement their respective areas of expertise, and to enhance their missions, especially those researches relate to the advancement of neuroscience research. Activities may include: 1. The exchange of faculty; 2. Consistent with usual and customary practice, the exchange of postdoctoral research fellows and pre-doctoral student trainees; 3. The sharing of research materials, subject to the terms of a material transfer agreement and all applicable laws, regulations, and policies; 4. Participation in lectures, conferences, workshops, and seminars. This research project will play an important role of developing new guideline in the management of severe TBI, and will provide good educational and training courses to Taiwan healthcare providers by organizing international symposia.