• 計畫中文名稱	表面功能化處理之電燒器械於抗組織沾黏與臨床研究		
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• 中文摘要

隨科技技術日趨發達，醫療技術亦日新月異，爲減少病人手術時之負荷，加速傷口癒合時間，微創醫療觀念因應而生。微創手術即應用當代先進的電子、電熱以及光學等設備及技術，利用影像傳導系統代替肉眼直視、精細器械代替手術刀，以最小的切口及最少之組織損傷，完成病灶的觀察診斷、切除或治療。電燒器械爲常見之微創手術器械，其利用電流流經人體組織時，於富有黏滯性之組織表面振動，把電能轉換成熱能，使尖端下組織快速脫水分解蒸發，分裂爲不出血、窄而平坦之切口，並切斷血管並同時被凝固，以產生切除或止血的效果。然而電燒器械具有一種大功率、高頻及高壓之特性，若直接用於人體，電燒器械安全使用需外科醫師之技術與電燒刀本身安全設計之配合。由此，表面多功能處理應用於微創醫療器械電燒器械之技術由此而生。而目前之電燒器械多以 Teflon 表面披覆材，其於電燒過程產生之含氟毒性氣體，以廣爲醫護人員注意。爲減少組織與電燒器械表面沾黏程度與組織熱傷害，並避免毒性氣體產生，本研究以表面多功能處理技術，於電燒器械表面改質並鍍上一層類鑽碳薄膜，使表面性質更爲優異，手術時組織沾黏程度減少，並加強電燒刀表面之熱均質化，減少組織傷害。第一年度以參數規劃與利用 XRD、SEM 及 AFM 等儀器分析來獲得較佳之類鑽碳膜結構於電燒器械表面上；第二年度則分爲體外與體內實驗，首先使用自行設計之自動切割器械作模擬實際切割之情況判斷，並作器械血液相容性與凝血測試，了解實際沾黏與血液凝附器械表面之情形，之後利用動物實驗作爲臨床測是前之效果確認。第三年則廣募招試者作人體臨床測試，比較類鑽碳鍍膜表面改質、電化學表面改質與市售之電燒器械之差異性，確認改質後之相關抗沾黏與熱組織傷害之效果是否改善，以評估與產商合作實際應用於商品上之可行性。

• 英文摘要

Advances in technology affect numerous aspects of life. There is no exception in the medical field. Minimal invasive surgery is the new trendy with the highly technological specialty of surgical practice. The electrosurgical devices are commonly applied in open surgery and laparoscopy to coagulate, cut, and ablate tissue and to produce hemostasis. As the clinical findings, there are high risks of tissue and structures injuries surrounding the surgical site. The high frequency currents applied to target tissue create the wide zone of thermal damage to adjunct tissue. The target tissue also tends to stick the electrosurgical device at high temperature. The aim of this study is to develop the new electrosurgical device with surface functionalization to reduce the effects of tissue sticking and thermal damage around adjacent tissue. Several related researches had noticed that the electrocautery devices with Teflon coating could result in harmful gas such as fluorine during operating. In order to decrease stick condition on the electrocautery surface with tissue and prevent noxious gas form producing. This reseach is used surface muti-functional technology to coat the diamond-like carbon film on the surface of the electrocautery devieces and get better property to reduce stick condition during operation and improve heat uniform on the surface of devices to decrease damage on tissue. This study has been arranged for three-years, and the specific aims are as follows: First year：The experimental designs and parameters of surface treatment (coating diamond-like carbon thin film, DLC film) are developed to modify the physical and chemical characterizations of electrosurgical devices. The surface properties of electrosurgical

	devices with surface functionalization are analyzed by XRD、SEM、AFM and so on. Second year：The in-vitro pork liver and in-vivo rat experiments are performed for testing the effect of electrosurgical device with surface functionalization on anti-sticking and thermal damage. The auto cutting system is developed to quantity the applied strength as the tissue sticking the electrosurgical devices. Third year：Clinical trial and research in minimally invasive spinal surgery by electrosurgical devices with surface functionalization will be carried out in this stage. We will confirm whether the surface muti-functional technology can improve the stick condition and tissue damage range through a lot of analysis and experiments to estimate that apply to the feasibility of the electrocautery products with related company.