• 計畫中文名稱	奈米材料量子點的聚順丁烯二酸鎳修飾與生物醫學應用		
• 計畫英文名稱	The Poly-Maleate Nickle Modification of the Quantum Dot and Its Biomedical Applications		
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• 執行機構	臺北醫學大學醫學系		
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• 研究領域	化學類		
• 研究人員	陳建志		
• 中文關鍵字	--		
• 英文關鍵字	--		
• 中文摘要	奈米量子點發出強烈螢光，取代有機染料作爲基因蛋白質及癌細胞的螢光標 籤，優點是只需單一光源的激發下，量子點因大小不同即可發出不同顏色的光， 用以區分不同的生物分子具方便性。過去我們利用量子點標幟 Tat-SOD，成功的把 QD-Tat-SOD 送入 PC12 神經細胞，與有機染料的結果相符。第二，初步的老鼠活 體塗抹 QD-Tat-SOD，觀察到鼠蹊部淋巴節有量子點聚集，顯示 QD-Tat-SOD 可成 功的送入活體，但仍需再做條件的修改。第三，在抗體上標幟量子點，進行細胞 訊息偵測，初期結果觀察到 LNCaP cell 中 MAO-A、NF-kB 和 PKB 的螢光染色， 然量子點有水不溶性、容易聚集、凝集等物理不穩定的性質，需找尋化學修條件 並藉以接合分子做爲生物探針等應用。 本計畫的目標在合成一個量子點載體平臺(Ni-QD)，可以做爲多功能生物醫學 應用的平台，在平台上裝上不同探針，達成不同生物醫學研究上的檢測或治療追 蹤的目的。第一年合成量子點平台(Ni-QD)，讓量子點平台可以結合數種蛋白質分 子，並攜入細胞內；第二年能夠組合抗癌成分與目標導引的量子點，抑制癌細胞 生長；第三年測試安定度與生體分布。 量子點經聚順丁烯二酸聚合與 Ni-NTA 反應，修飾表面電價，接合 Tat-1 做爲 平台用以組裝 Endostatin 與 Cytosine deaminase 等攜帶穿透入細胞，可轉化 5-FC 生成 5-FU 抗癌，或組裝 SOD 等抗氧化酵素，延緩細胞老化。 未來研究分年規劃進行(1)量子點的物理化學分析;(2)表面聚合		

	修飾;(3) (Ni-QD)-Tat-1 細胞穿透與蛋白裝載; (4) (Ni-QD)-G 免疫細胞染色和 Western blot; (5) 組裝抗癌成分與目標導引量子點或多重抗氧化量子點; (6)材料安定度與生體分佈。
• 英文摘要	Quantum dot with a strong fluorescence illumination property, instead of the organic dye, serves as a label for research of the genes, proteins and cells. The advantage of quantum dot is that those in different size emit their own colors under a single specific excited energy which provides an easy method for distinguish one molecule from other. Previously we labeled Tat-SOD with quantum dot and successfully transduced it into PC12 cell; then, we administrated this dot-labeled Tat-SOD topically on the dorsal skin of mice and found the dots accumulated at groin lymph node, indicating a successful in vivo transduction. We also labeled the antibodies with quantum dot for immunohistostaining and resulted in MAO-A, PKB and NF-kB multiple staining in LNCaP cell. Although the powerful performance of quantum dot, it sometimes physically behaves water-insoluble or aggregated even to clot which is a problem always used to be solved by chemical modification in addition to adapt the biological molecules. The aim of this project is to synthesize a quantum dot carrier platform which can manipulate multiple biological signals, in other words, to adapt several probes for biomedical signal transduction research or clinical tracking and therapy. In the first year, we will synthesize the platform, and adapt it with some biological probes; then, transduce the platform dots into cells. In the second year, we will construct a functional dot with anti-tumorigenesis protein and tissue-specific signaling peptide for the purpose of tumor suppression. Subsequently, we will determined the distribution and half-life of the dots in vivo. The synthesis of the platform is carried out by reacting dots with poly-maleic anhydride and Ni-NTA complex. The platform then can adapt endostatin and cytosine deaminase for catalyzing 5-FC to 5-FU in the cells for cancer cell suppression. In addition, it also can adapt multiple antioxidant enzymes for slowing down the aging. This research will proceed as follows by years : (1) to determine the physical and chemical properties of quantum dots; (2) to modify the surface of quantum dots with polymer and electrostatic agent; (3) to test the transduction and probe adaptation of (Ni-QD)-Tat-1 platform ; (4) to test the immunohistostaining and western blot application of (Ni-QD)-G; (5) to construct a tissue-specific and anti-tumor quantum dot or a multiple antioxidant quantum dos; (6) to examine the fate of the platform dots.