• 系統編號	RN9611-5007
• 計畫中文名稱	利用化學演化技術產生對碳奈米球具特異性之 RNA/DNAaptamers 及其在生物感應器上之應用
• 計畫英文名稱	Novel RNA/DNA Aptamers Specific for Fullerenes by in Vitro Selection and Their Biosensor Applications
• 主管機關	行政院國家科學委員會
• 計畫編號	NSC94-2113-M038-006
• 執行機構	台北醫學大學醫學系
• 本期期間	9408 ~ 9507
• 報告頁數	10 頁
• 使用語言	英文
• 研究人員	吳瑞裕 Wu, Jui-Yu
• 中文關鍵字	--
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• 中文摘要	查無中文摘要
• 英文摘要	Nanotechnology has captured exceptionally attentions and appeared with extreme pace just in these few years. To date, we know very little about the health and environmental influences of nanomaterials, such as the properties of nanoparticles vary with their chemical composition, sizes, interactions, and virtually nothing about their synergistic impacts. Fullerene is one of the well known nanoparticle and a new type of carbon allotrope that was discovered in 1985. Due to the excessive hydrophobicity and poor solubility of the compounds in aqueous solution make the study of fullerene and its derivatives become difficult. Since the first water-soluble fullerene was reported in 1993, however, many papers have demonstrated on their interaction with biological target, (i) as antioxidants and neuroprotective agents (1-3), (ii) antiapoptotic activity (4-6), (iii) DNA photocleavage (7), (iv) enzyme inhibition (7-9), (v) anti-HIV activity (10,11), and (vi) antimicrobial activity (12,13). Based on the most recent toxicology reports have shown that nanoparticles may pose a unique risk to everything from bacteria to mammals (14-16). These studies have demonstrated that fullerene when washed in a suspension into the lung tissue of rats, can form aggregates, causing tissue damage, respiratory problems, and even death. Therefore, practical applications of fullerenes as biological or pharmacological agents require that dosage and serum levels be capable of accurate measurement, preferably by sensitive and simple detection procedures. This requires some types of antibody for fullerene to be produced. As fullerene derivatives become useful clinically, anti-fullerene antibodies are ideally suitable for serum assays. Chen

et al. have successfully prepared water-soluble fullerene derivatives of several proteins and peptides that were used for the immunization as well as for the isolation and characterization of the antibodies (17,18). Several mice derived monoclonal anti-C60 antibodies were prepared by standard procedure and the specificity for fullerene was determined by competitive inhibition. There are several drawbacks of using anti-C60 antibodies assay, however, to detect the existence of C60 nanoparticle in vivo or in our environment. It's a time-consuming process to have production of anti-C60 antibodies through mice immunization, including the conjugation between C60 and bovine thyroglobulin, rabbit serum albumin, and pentalysine derivatives (17). In addition, only small quantities of anti-C60 antibodies can be produced, and also it's inconvenient to purify and characterize their specificity from each batch. In order to (i) obtain different type of molecules other than classical antibody which are capable of specifically recognizing and binding to fullerene, (ii) overcome the problems by using anti-C60 antibodies assay, here we propose a novel method to accomplish this approach. In vitro selection, or SELEX (Systematic Evolution of Ligands by EXponential enrichment), is a technique that allows the simultaneous screening of highly diverse pools of different RNA/DNA molecules for a particular feature. In 1990, the laboratories of Joyce (Scripps Institute, CA), Szostak (Harvard, Boston), and Gold (U. of Colorado, Boulder) independently developed a technique which allows the simultaneous screening of more than 1015 individual nucleic acid molecules for different functionalities.