砷代謝能力、微量營養素與慢性腎臟病及腎臟功能之相關性研究

The Relationship among Arsenic Metabolism Capability, Micronutrients and Chronic Kidney Disease and Kidney Function

中文摘要

慢性腎臟病（包括腎炎、腎症候群及腎變性病）在 95 年台灣十大死因排名第八位，國內目前約有四萬多名腎臟透析病患，盛行率在全世界的排名第一名。本研究主要探討砷代謝能力、血漿中微量營養素與慢性腎臟病及腎臟功能的相關性，另外也探討抽菸、喝酒與止痛藥的使用等危險因子對慢性腎臟病之交互作用。慢性腎臟病病例共 201 位來自財團法人新光吳火獅紀念醫院腎臟科門診，皆由腎臟專科醫師診斷，患有輕重程度不一的腎臟相關疾患。對照組為與病例組匹配年齡（± 3 歲）及性別之萬芳醫院參與健康檢查之民眾共有 408 位健康民眾。向所有的研究對象說明研究目的與簽具同意書後進行問卷訪視與檢體收集。利用高效率液相層析儀進行血漿中維生素 A、維生素 E、蕃茄紅素與 β-胡蘿蔔素分析，尿液砷物種則使用高效能液相層析儀分離三價砷、五價砷、單甲基砷酸與雙甲基砷酸，使用流動系統注入氫化物產生器與原子吸收光譜儀進行定量。分析結果顯示總砷濃度較高會增加慢性腎臟病危險性，這可能代表慢性腎臟病患體內暴露的砷較多。微量營養素中蕃茄紅素濃度較低，顯著增加慢性腎臟病的風險。若以腎絲球過濾率作為腎臟功能指標，發現血漿維生素 E、蕃茄紅素和 β 胡蘿蔔素越高腎臟功能越好呈現正相關，尿液單甲基砷酸百分比越高腎臟功能越差呈負相關。本研究同時發現慢性腎臟病患服用止痛藥的比例較健康對照顯著偏高，顯示止痛藥也是慢性腎臟病重要危險因子。

英文摘要

Chronic renal disease (include nephritis, nephrotic syndrome, and nephropathy) is the eighth among the top ten leading causes of death in Taiwan. There are about forty thousand hemodialysis patients in our country; the prevalence is the first rank in the world. This study explored the relationship among arsenic metabolism capability, micronutrients and chronic kidney disease and kidney function. In addition, this study also examined whether cigarette smoking, alcohol drinking and analgesic usage confounded the results or not. A total of 201 chronic kidney disease (CKD) patients were recruited from the department of nephrology in Shin Kong Wu Ho-Su Memorial Hospital and diagnosed by nephrologist. All CKD patients had different stages of kidney function damage. Age (± 3 years) and gender matched controls were recruited from the Taipei Medical University-Wan Fang Hospital. Plasma samples were examined by high-performance liquid chromatography (HPLC) to analyze the concentration of plasma micronutrients (retinol, α-tocopherol, lycopene, and

β-carotene). Urine samples were examined by HPLC to specify the arsenite (AsIII), arsenate (AsV), monomethylarsonic acid (MMA), and dimethylarsinic acid (DMA) and then quantitated by hydride generator combined with atomic absorption spectrometry. This study found that the higher total arsenic concentration have the higher CKD risk. It is suggested that arsenic exposure in CKD group was higher than control group. CKD patients had higher plasma retinol and lower lycopene than control group. According to the glomerular filtration rates to define kidney function, and found glomerular filtration rates were inversely correlated with MMA percentage. α-Tocopherol, lycopene and β-carotene were positively related with the glomerular filtration rates. The frequency of analgesic usage was higher in CKD group than in control group. It is also suggested that analgesic usage is an important risk factor for CKD.