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Occupational Exposure to Antineoplastic Agents of Pharmacy Workers in Hospital

中文摘要

醫院化學治療工作人員，在調配藥物、包裝及傳送藥物等作業流程中，都有可能因洩漏等問題而造成暴露。研究指出，這些職業暴露者會引發細胞毒性，增加致癌風險；致畸胎、異位懷孕或自發性流產等女性生殖危害等；也有引發急性過敏反應的病例報告。國內目前化學治療相關工作人員有數千人之多，人員暴露及健康效應相關研究極少。

本研究以立意取樣的方式，選取台北市一家醫學中心與兩家區域醫院作爲樣本醫院。研究設計包括：環境擦拭樣本採集分析以及暴露者問卷調查。環境樣本之採集區域包括：藥劑部門抗腫瘤藥劑調配室及相鄰辦公室區，並以醫院常用的抗腫瘤藥劑 5-Fluorouracil 以及 Cisplatin 作爲污染指標；問卷調查採結構式自填問卷，對象爲三家醫院藥劑科人員所有人員，內容包含：基本人口學資料、工作現況、抗腫瘤藥劑暴露史、健康狀況、個人防護情形與認知等。

環測結果顯示，調劑前後調配室內外皆可測到抗腫瘤藥劑的存在，整天調劑後調配室內 5FU 污染濃度範圍爲 N.D.~934.62pg/cm2，Cisplatin 濃度範圍爲 N.D.~24.93pg/cm2，其中又以垃圾桶前地面、transfer box 前桌面與氣罩檯面測到濃度較高的污染；調配室外 5FU 污染濃度範圍爲 N.D.~825.75pg/cm2，Cisplatin 濃度範圍爲 N.D.~55.46pg/cm2，濃度最高的樣本是儲藥櫃內表面與傳送盒內。除外層手套均可測到兩種抗腫瘤藥劑外，部份內層手套也可測到 Cisplatin 污染（平均 333pg/隻手套）。

個人問卷共回收 81 份問卷（回收率 85.3%），四成受訪藥師爲抗腫瘤藥劑暴露者，其中半數懷疑操作時可能有藥劑外洩。六成以上藥劑暴露者認爲暴露發生在抽取、混合與包裝藥劑時，暴露途徑爲口鼻吸入與皮膚吸收，但不認爲會有食入問題。然由於辦公桌面發現抗腫瘤藥劑污染，且人員會於此區進食，顯示藥劑經飲食暴露之可能性值得重視。

各醫院均訂定個人防護具之使用規範，一致要求全面使用手套及隔離衣，而問卷結果顯示，各種防護具實際使用率爲手套 100%、隔離衣 90.5%、髮套 80.0%及口罩 77.8%。兩家醫院改變管理措施增加鞋套之使用規定，則使地面污染獲得改善。

本研究結果證實調配室內外均存在抗腫瘤藥劑之污染，而個人防護與環境清潔管理仍未臻完善，建議各醫院應強化管理規範並確實執行；同時，鑑於研究對象之潛在暴露風險，建議應進行暴露者生物偵測。

英文摘要

Antineoplastic agents are widely used in hospitals for cancer treatment. Several epidemiological studies found that exposure to antineoplastic agents were associated with reproductive toxic effects, higher rates of advance micronuclei (MN) and sister-chromatic-exchange (SCE), spontaneous abortion, as well as acute allergic reactions. There are thousands of health care workers involving in chemotherapy in Taiwan, but few studies have been conducted to examine the potential health risk related to the use of antineoplastic agents.

One medical center and two area hospitals in Taipei, Taiwan were selected to monitor antineoplastic agent levels and to collect exposure background of hospital workers. Surface wipe samples were collected in the pharmacy units and in their adjacent offices in each study hospital. We examined the concentrations of two commonly used antineoplastic agents, 5-Fluorouracil (5FU) and Cisplatin, in wipe samples and in the disposable protective equipments used in pharmacy units. A self-administered questionnaire was used to collect demographic data, working practices, medical and contact history, and perceived work-related symptoms of staff working in pharmacy units.

According to our results, antineoplastic agents were recovered in all of the sampling pharmacy units, including both inside and outside of the administration rooms (inside: 5FU: N.D.~934.62pg/cm2, Cisplatin: N.D.~24.93 pg/cm2; outside: 5FU: N.D.~825.75pg/cm2, Cisplatin: N.D.~55.46pg/cm2). We detected antineoplastic agents not only on outer gloves (5FU: N.D.~2.87×106 pg/gloves, Cisplatin: N.D.~1.02×105pg/gloves), but also on some of the inner gloves (333pg/gloves). Among the 81 study pharmacy workers, 40% have been exposed to antineoplastic agents. Half of them suspected that the agents leaked during drug preparation. Although gloves and gown must be worn at all time while handling drug in all of the study hospitals, eye protection, mask, and hair cot were not required. Most subjects recognized the potential exposure to antineoplastic agents through inhalation and dermal contact, but not through ingestion. However, we did detect antineoplastic agents on office tables, indicating potential exposure through contaminated hands or food.

In light of extensive antineoplastic agent contamination in pharmacy units, the study hospitals applied improved precaution practices, which resulted in better contamination control. Therefore, better control regulations and procedures should be implemented in hospital pharmacy units to minimize workers' exposure and health risk.