

記錄 編號	6248
狀態	NC094FJU00058015
助教 查核	
索書 號	
學校 名稱	輔仁大學
系所 名稱	公共衛生學系
舊系 所名 稱	
學號	493926124
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論文 名稱 (中)	手術室中電刀煙霧之致癌物質成份調查
論文 名稱 (英)	Investigation to Carcinogenic Components of Electrocautery Smoke in Operation Rooms
其他 題名	
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校內 全文 開放 日期	不公開
校外 全文	不公開

開放日期	
全文不開放理由	
電子全文送交國圖.	同意
國圖全文開放日期.	2006.09.01
檔案說明	電子全文
電子全文	01
學位類別	碩士
畢業學年度	94
出版年	
語文別	中文
關鍵字(中)	手術室、電刀煙霧、丙烯腈、1,3-丁二烯、苯、苯乙烯、紅外線光譜儀 致癌物質 呼吸道 手術門 紅外線 氣懸膠
關鍵字(英)	operation room, electrocautery smoke, acrylonitrile, 1,3-butadiene, benzene, styrene, infrared spectrophotometer
摘要(中)	摘要 背景：電刀 (electrocautery) 在開刀房進行手術時是不可或缺的一項工具，而且使用頻繁，廣泛用來進行切除組織和燒結血管。使用過程中產生的可見煙霧 (smoke) 會遮蔽執刀者的視野，且刺鼻難聞，容易誘發急性或是慢性的呼吸道發炎。國外研究已指出，這些煙霧中含有多種危害化學物質成份，也具有生物性危害的生物性氣懸膠和細胞成份的微粒，其中某些化學成份甚至可能導致有致突變性、致畸胎性、或致癌性的健康風險。有鑑於此，本研究希望瞭解手術室內電刀煙霧的致癌物成份暴露情形，並探討手術類型、手術型式、能量模式和使用時間長短等因子對煙霧濃度之影響。 方法：以 2 家醫學研究中心一般外科手術室中

所進行之乳房外科手術為實驗對象，利用直讀式紅外線光譜儀 (MIRAN 205B Series SapphIRe)連續測量於靠近操刀醫生呼吸區域的丙烯腈、1,3-丁二烯、苯和苯乙烯 4 種致癌物之濃度，偵測時間為電刀開始使用至結束使用，實驗過程中詳細記錄電刀種類、手術類型、手術型式、能量模式、使用功率和時間長短；並進一步評估致癌物濃度與這些可能影響因子之相關性。結果：於 A 和 B 醫學研究中心之一般外科乳房手術的電刀煙霧中測到致癌物濃度之最高值 (peak-value) 分別為：丙烯腈 - 5.68 ppb (A)、3.79 ppb (B)，1,3-丁二烯 - 1.74ppb (A)、1.16 ppb (B)和苯乙烯 - 0.09 ppb (A)、0.09 ppb (B)。而苯致癌物因無法驗證低濃度的讀值，故不列入評估。A 醫學研究中心之結果顯示手術診斷、能量模式、電刀使用時間長短和手術門開啟或關閉等因子與 3 種致癌物濃度都無統計上之顯著相關。B 醫學研究中心之結果與 A 醫學研究中心相同顯示在手術診斷、能量模式、電刀使用時間長短和手術門開啟或關閉等因子與 3 種致癌物濃度皆無顯著的相關，但觀察兩研究中心發現當電刀一開始使用時所產生的煙霧中測到的致癌物濃度通常會升高。結論：在 A 和 B 醫學研究中心手術室 3 種致癌物質濃度確實會於一般乳房外科手術的電刀煙霧中測得，但其濃度是低於國內勞工職業暴露標準。致癌物質濃度與相關因子雖無統計上的顯著相關，但是否會影響手術室工作人員的健康還需累積更多資料進一步探討。

摘要  
(英)

Abstract Background: Electrocautery is widely used for dissection of tissues and cauterization of blood vessels. During the use of electrocautery, a visible plume of smoke with unpleasant odors is produced and can induce acute and chronic inflammation of respiratory tract. Electrocautery smokes contain chemical and biological components. Some of the chemicals might be mutagens, tetragons or carcinogens. They are hazardous and can increase the health risk of medical personnel. This study intended to evaluate the surgeons' exposures to certain chemical carcinogens in the electrocautery smoke. The factors - type of surgery diagnosis, type of surgery procedure, type of electrocautery, type of energy imparted and operating duration of electrocautery, that might affect the concentrations of investigated carcinogens were investigated. Method: The studies were conducted to investigate the smokes of different breast surgeries in the general operation rooms of two medical research centers, A and B. Four chemical carcinogens - acrylonitrile, 1,3-butadiene, benzene, and styrene in the electrocautery smoke were quantified. The portable infrared spectrophotometer (MIRAN 205B Series SapphIRe) was utilized to measure the concentrations of the 4 chemicals near the surgeons' breathing zones during the operations continuously and simultaneously. All factors and conditions of each operation were recorded for further analyses. Results: The peak concentrations of acrylonitrile, 1,3-butadiene, benzene and styrene were: 5.68 ppb, 1.74ppb and 0.09 ppb in medical research center A; 3.79 ppb, 1.16ppb and 0.09 ppb in center B, respectively. The low concentration readings of benzene could not be distinguished from the noise level, concentrations of benzene could not be reported. In medical research center A, none of the factors - type of surgery diagnosis, type of surgery procedure, type of energy imparted, operating duration

	<p>of electrocautery and door close/open - affected the peak concentrations of three investigated carcinogens significantly at <math>\alpha = 0.05</math> level, either in medical research center B. However significant peak concentrations were usually detected at the beginning of using the electrocautery in both medical reaserch centers.</p> <p>Conclusion: Three carcinogens in the electrocautery smokes from breast surgeries were detected in both medical research centers, but the concentrations were below the occupational exposure limits. Although the vapor concentrations were not significantly affected by the investingated factors, more database required to evaluate the health risk of the operation staff.</p>
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論文 頁數	110
附註	
全文 點閱 次數	
資料 建置 時間	
轉檔	

日期	
全文 檔存 取記 錄	
異動 記錄	M admin Y2008.M7.D3 23:18 61.59.161.35