• 系統編號	RN9311-0223
• 計畫中文名稱	母體尼古丁治療對新生老鼠肺臟發育的作用
• 計畫英文名稱	Effects of Maternal Nicotine Treatment on Neonatal Lung Development in Rats
• 主管機關	行政院國家科學委員會
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• 研究人員	陳中明 Chen, Chung-Ming
• 中文關鍵字	尼古丁; 飽和磷脂質; 肺表面素蛋白質; 肺臟發育
• 英文關鍵字	Nicotine; Saturated phosphatidylcholine; Surfactant protein; Lung development
• 中文摘要	母親懷孕時有抽煙的習慣，會引起併發症，包括胎兒生長遲緩、胎兒和新生兒死亡、自發性流產及早產等。尼古丁是引起這些併發症的主要成份，因爲它會穿透胎盤，以比母體較高地濃度聚集在胎兒體內。動物實驗已證實母親懷孕時接觸尼古丁會影響胎兒生長、肺臟發育、以及出生時的肺功能。人類研究也發現母親抽煙對嬰兒的肺功能有負面的影響。這些研究認爲母親懷孕時抽煙，在子宮內就會阻礙胎兒氣道的發育和改變肺臟彈力特性，但是這些變化的真正機轉仍然不清楚。文獻上關於產前母親抽煙對肺組織飽和磷脂質的量以及肺表面素蛋白質的表現，著墨並不多。我們設計這個實驗來探討母鼠接觸尼古丁對於初生頭幾週大老鼠的肺表面素系統及肺形態學的作用。我們使用定時懷孕的大白鼠，在懷孕第三天至二十一天時，每天每公斤皮下注射 2 毫克尼古丁。對照組則注射等量的生理食鹽水。所有老鼠皆讓其自然產出。在出生後第一、四、七、十、十四、二十一、三十五及第六十天時，各組在每一階段隨機取六隻新生老鼠，麻醉後測量其體重及器官重量。均質化右肺的上葉及中葉，用氯仿和甲醇萃取飽和磷脂質並定量之。以反轉錄 PCR 測量右肺下葉的肺表面素蛋白質的表現。左肺則以立體方法測量出生後肺臟生長的情形。這研究的目的是在瞭解母親抽煙影響嬰兒肺功能的致病機轉。
• 英文摘要	Maternal smoking during pregnancy may impair pulmonary function in infants and children but the exact mechanisms underlying these changes remain to be determined. Timed pregnant Sprague-Dawley rats were injected subcutaneously with nicotine at a dose of 2 mg/kg/day from day 3 to day 21 of gestation. A control group was injected with saline. Nicotine-exposed rats exhibited a significantly higher lung volume and lung volume/body weight ratio on postnatal day 28 when compared with control rats. Lung

saturated phosphatidylcholine contents and expressions of surfactant protein (SP)-A, SP-B, SP-C, and SP-D mRNAs were similar between controls and nicotine-exposed rats. On postnatal day 1, nicotine-exposed rats exhibited a significantly lower volume fraction of alveolar airspace, higher volume fraction of alveolar wall, larger alveolar wall thickness, and smaller surface density of alveolar walls. On postnatal day 28, nicotine-exposed rats exhibited a significantly smaller alveolar wall thickness and larger surface density of alveolar walls. In conclusion, maternal nicotine exposure does not affect lung surfactant lipid or surfactant protein genes expression but does alter lung development in postnatal rats. These results suggest that exposure to antenatal nicotine may produce structural alterations in the developing respiratory system and create various changes during different stages of lung development.