

**Ingested Arsenic, Cigarette Smoking, and Lung Cancer  
Risk: A Follow-up Study in Arseniasis-Endemic Areas in  
Taiwan**

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摘要

**Abstract**

CONTEXT: Arsenic has been documented as a lung carcinogen in humans in only a few follow-up studies, which were limited by a small number of cases or the lack of information on cigarette smoking. OBJECTIVES: To elucidate the dose- response relationship between ingested arsenic and lung cancer and to assess the effect of cigarette smoking on the arsenic-lung cancer association. DESIGN, SETTING, AND PARTICIPANTS: A total of 2503 residents in southwestern and 8088 in northeastern arseniasis-endemic areas in Taiwan were followed up for an average period of 8 years. Information on arsenic exposure, cigarette smoking, and other risk factors was collected at enrollment through standardized questionnaire interview. MAIN OUTCOME MEASURES: The incidence of lung cancer was ascertained through linkage with national cancer registry profiles in Taiwan (January 1985-December 2000). The joint effect of arsenic and cigarette smoking was estimated by both etiologic fraction and synergy index. RESULTS: There were 139 newly diagnosed lung cancer cases during a follow-up period of 83 ,783 person -years. After adjustment for cigarette smoking and other risk factors, there was a monotonic trend of lung cancer risk by arsenic level in drinking water of less than 10 to 700 microg/L or more ( $P<.001$ ). The relative risk was 3.29 ( 95% confidence interval, 1.60-6.78) for the highest arsenic level compared with the lowest. The etiologic fraction of lung cancer attributable to the joint exposure of ingested arsenic and cigarette smoking ranged from 32% to 55%. The synergy indices ranged from 1.62 to 2.52, indicating a synergistic effect of ingested arsenic and cigarette smoking on lung cancer. CONCLUSIONS: There was a significant dose- response trend of ingested arsenic on lung cancer risk, which was more prominent among cigarette smokers. The risk assessment of lung cancer induced by ingested arsenic should take cigarette smoking into consideration.