



Report

## Radiation dose, chemotherapy and risk of lung cancer after breast cancer treatment

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### Summary

It is of particular concern to evaluate the risk of lung cancer occurrence after breast cancer treatment as women with breast cancer quite often undergo radiation therapy as part of their initial treatment and their life expectancy remains long. From a roster of 7711 women initially treated for breast cancer between 1954 and 1984, a cohort-study was performed among 4171 1-year survivors followed during the period 1975–1995. The relationship between the radiation dose received by the lung and the risk of lung cancer was then evaluated in a nested case-control study of 11 breast-cancer patients who developed lung cancer and 22 controls matched for age at diagnosis of breast cancer, period of initial treatment and length of follow-up. Among the 4171 women, six developed lung cancer during the entire follow-up as compared to 5.4 cases expected (SIR = 1.1, 95%CI: 0.4–2.3). When considering only the women initially treated by radiotherapy with or without adjunction of chemotherapy and excluding the 10 first years of follow-up, the SIR was significantly increased (SIR = 3.2, 95%CI: 1.0–7.4). In the case-control study, nine of the 11 lung cancers occurred in the ipsilateral lung and two in the trachea. The overall odds ratio (OR) of lung cancer associated with initial radiotherapy was 1.4 (95%CI: 0.2–11.1) and an excess in the OR of 7% (90%CI: ? to 41%,  $p = 0.10$ ) per gray delivered to the site of lung cancer was evidenced. Our results agree with previous studies in favor of an increased risk of lung cancer after radiation therapy for breast cancer.

### Introduction

Radiation has been related to lung cancer occurrence [1, 2]. High doses of gamma radiation delivered at a high dose rate [3–5] and radon exposure [2] have both been shown to induce lung cancer. In contrast, no increased risk of lung cancer has been demonstrated for gamma-ray or x-ray doses as high as 1 Gy delivered in many fractions or lower doses delivered by radiotherapy of distant organs [6–8]. Radiation therapy is used in the treatment of breast cancer to reduce the risk of local recurrence. Due to the widespread use of conservative surgery, radiation therapy continues to play an important role in the treatment of this cancer. Given the increased survival of breast cancer patients,

the risk of second cancer development in the lungs is of particular concern.

Only one published study has estimated the relationship between the dose of radiation and the risk of lung cancer occurrence after treatment of breast cancer [9]. That case-control study was performed among women having survived at least 10 years after breast cancer treatment.

To evaluate the risk of lung cancer occurrence after breast cancer treatment, we conducted a cohort study among women treated for breast cancer between 1954 and 1984. In addition, we performed a nested case-control study to estimate the relationship between radiation dose and risk of lung cancer.