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Letter to the Editor

Recurrent Breast Cancer and an Adenocarcinoma of the Lung Occurring in One Patient: c-*myc* Oncogene Amplification and K-*ras* Codon 12 Point Mutation as Tumour Markers

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CERTAIN oncogene activations are associated with several human malignancies including breast cancer and lung cancer. Knowledge of the spectrum of specifically activated oncogenes in a type of cancer may aid in a more functional classification of tumours and may be a prognostic factor. In breast cancer, activation of both the c-*myc* oncogene [1] and the c-*neu* (c-*erbB*-2) oncogene [2, 3] has frequently been found. We have described the activation by point mutation of the K-*ras* oncogene in adenocarcinomas of the lung, particularly in those patients with a history of smoking [4]. Here we report on one case in which we found two of these oncogenes activated in two tumours of different origin in the same patient.

In 1980, a 38-year-old woman presented with a small (2.5 cm) tumour in the left breast that was diagnosed as an infiltrating ductal carcinoma. Axillary lymph nodes were negative. She underwent breast conserving treatment which consisted of tumourectomy plus axillary lymph node dissection, followed by a 50 Gy external beam irradiation and an additional 25 Gy dose administered by means of an iridium implant. During the following 6 years there were no signs of recurrent disease.

In 1986 a 'coin' lesion, located within the irradiated field, was detected on a follow-up chest X-ray. A lobectomy was performed and the 1 cm nodule proved to be a poorly differentiated adenocarcinoma of the lung histopathologically distinct from the earlier breast cancer. There were no regional lymph node metastases. The tumour material was included in our previous study on the mutational activation of the *ras* oncogenes in human lung carcinoma [4]. As we reported earlier the DNA of the lung nodule contained a K-*ras* codon 12 point mutation but no other *ras* oncogene abnormalities.

About half a year later a local recurrence was found in the left breast and a mastectomy was done. This tumour material was examined for oncogene abnormalities which revealed a five-fold amplified c-*myc* oncogene, whereas a K-*ras* point mutation was absent. No other *ras* oncogene point mutations were found, neither were any *ras* family or c-*neu* oncogenes amplified in this tumour.

The patient had a 20-year history of smoking 12 cigarettes a day; the occurrence of a mutational K-*ras* gene activation in her lung cancer, which is associated with tobacco smoke exposure [5], is therefore not unusual. However, the possibility that the previous radiotherapy caused this point mutation cannot be excluded.

Since the different origin of the tumours is reflected in the specific type of oncogene activations, such findings might facilitate the distinction between different types of adenocarcinoma. As our knowledge of cellular oncogenes is rapidly increasing, characterization of tumour DNAs may eventually lead to improved classification and diagnosis of tumours that contain activated oncogenes.

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