Environmental tobacco smoke and risk of respiratory cancer and chronic obstructive pulmonary disease in former smokers and never smokers in the EPIC prospective study

Abstract

Objectives To investigate the association between environmental tobacco smoke, plasma cotinine concentration, and respiratory cancer or death. Design Nested case-control study within the European prospective investigation into cancer and nutrition (EPIC). Participants 303,020 people from the EPIC cohort (total 500,000) who had never smoked or who had stopped smoking for at least 10 years, 123,479 of whom provided information on exposure to environmental tobacco smoke. Cases were people who developed respiratory cancers or died from respiratory exposure to environmental tobacco smoke. Controls were matched for sex, age (plus or minus 5 years), smoking status, country of recruitment, and time elapsed since recruitment. Main outcome measures Newly diagnosed cancer of lung, pharynx, and larynx; deaths from chronic obstructive pulmonary disease or emphysema. Plasma cotinine concentration was measured in 1574 people. Results Over seven years of follow up, 97 people had newly diagnosed lung cancer, 20 had upper respiratory cancers (pharynx, larynx), and 14 died from chronic obstructive pulmonary disease or emphysema. In the whole cohort exposure to environmental tobacco smoke was associated with increased risks (hazard ratio 1.30, 95% confidence interval 0.87 to 1.95, for all respiratory diseases; 1.34, 0.85 to 2.13, for lung cancer alone). Higher results were found in the nested case-control study (odds ratio 1.70, 1.02 to 2.82, for respiratory diseases; 1.76, 0.96 to 3.23, for lung cancer alone). Odds ratios were consistently higher in former smokers than in those who had never smoked; the association was limited to exposure related to work. Cotinine concentration was clearly associated with self reported exposure (3.30, 2.07 to 5.23, for detectable/non-detectable cotinine), but it was not associated with the risk of respiratory diseases or lung cancer. Frequent exposure to environmental tobacco smoke during childhood was associated with lung cancer in adulthood (hazard ratio 3.63, 1.19 to 11.11, for daily exposure for many hours). Conclusions This large prospective study, in which the smoking status was supported by cotinine measurements, confirms that environmental tobacco smoke is a risk factor for lung cancer and other respiratory diseases, particularly in ex-smokers.

Introduction

Environmental tobacco smoke, or involuntary smoking, comprises sidestream smoke from the smouldering tobacco between puffs and exhaled mainstream smoke from the smoker. More than 50 investigations, mostly case-control studies, have shown that involuntary smoking is associated with an increased risk for lung cancer. In 2002, a working group of the International Agency for Research on Cancer evaluated the epidemiological evidence and included environmental tobacco smoke in group I (human carcinogen). Few cohort studies are available, however, with accurate information on potential confounders or effect modifiers. We analysed data from the large European prospective investigation into cancer and nutrition (EPIC) to assess the relation between environmental tobacco smoke and lung cancer, upper respiratory cancers, and death from chronic obstructive pulmonary disease (COPD) or emphysema, limiting our analysis to never smokers and people who had not smoked for more than 10 years. The advantage of the cohort design is the lack of recall bias as information about exposure was collected before onset of disease.

Methods

The EPIC cohort

EPIC is a multicentre study, coordinated by the International Agency for Research on Cancer (Lyons), in which more than 500,000 healthy volunteers were recruited in 10 European countries (Sweden, Denmark, Norway, the Netherlands, United Kingdom, France, Germany, Spain, Italy, Greece). The cohort includes men and women, mostly in the age range 35-74 at recruitment. Recruitment took place between 1993 and 1998. Diet was measured by questionnaires specific for each country, designed to address local dietary habits and to provide high compliance. Six countries administered a dietary questionnaire, which provided data on up to 350 food items per country. In France, Spain, and Ragusa (Italy) similar dietary questionnaires but structured by meals were used. The centres in Spain and Ragusa performed a face-to-face dietary interview with a computerised dietary programme, the others used a self-administered questionnaire. All dietary measurement instruments have been validated previously in a series of studies within the various source populations participating in EPIC. Lifestyle questionnaires included questions on reproductive history, use of oral contraceptives and hormone replacement...