

## **Cigarette smoking and lung cancer – risk estimates for the major histological types from a pooled analysis of European case-control studies**

Benjamin Kendzia<sup>1</sup>, Per Gustavsson<sup>2</sup>, Hermann Pohlbeln<sup>3</sup>, Wolfgang Ahrens<sup>3</sup>, Karl-Heinz Jöckel<sup>4</sup>, Georg Johnen<sup>1</sup>, Ann Olsson<sup>5</sup>, Isabelle Mercedes Gross<sup>1</sup>, Irene Brüske<sup>6</sup>, Heinz-Erich Wichmann<sup>6</sup>, Franco Merletti<sup>7</sup>, Dario Mirabelli<sup>7</sup>, Lorenzo Richiardi<sup>7</sup>, David Zaridze<sup>8</sup>, Adrian Cassidy<sup>9</sup>, Neonila Szeszenia-Dabrowska<sup>10</sup>, Peter Rudnai<sup>11</sup>, Jolanta Lissowska<sup>12</sup>, Isabelle Stücker<sup>13</sup>, Eleonora Fabianova<sup>14</sup>, Rodica Stanescu Dumitru<sup>15</sup>, Vladimir Bencko<sup>16</sup>, Lenka Foretova<sup>17</sup>, Vladimir Janout<sup>18</sup>, Paolo Boffetta<sup>19,20</sup>, Kurt Straif<sup>5</sup>, Thomas Brüning<sup>1</sup> and Beate Pesch<sup>1</sup>

<sup>1</sup> Institute for Prevention and Occupational Medicine of the German Social Accident Insurance – Institute of the Ruhr-Universität Bochum (IPA), Germany

<sup>2</sup> Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

<sup>3</sup> Bremen Institute for Prevention Research and Social Medicine, University of Bremen, Germany

<sup>4</sup> Institute for Medical Informatics, Biometry and Epidemiology, University Hospital of Essen, Germany

<sup>5</sup> International Agency for Research on Cancer (IARC), Lyon, France

<sup>6</sup> Helmholtz Zentrum München, Institute of epidemiology, German Research Center for Environmental Health, Munich, Germany

<sup>7</sup> Cancer Epidemiology Unit, CPO-Piemonte and University of Turin, Italy

<sup>8</sup> Russian Cancer Research Centre, Moscow, Russia

<sup>9</sup> Roy Castle Lung Cancer Research Programme, Cancer Research Centre, University of Liverpool, UK

<sup>10</sup> The Nofer Institute of Occupational Medicine, Lodz, Poland

<sup>11</sup> National Institute of Environment Health, Budapest, Hungary

<sup>12</sup> The M Sklodowska-Curie Cancer Center and Institute of Oncology, Warsaw, Poland

<sup>13</sup> INSERM U 754 - IFR69, Villejuif, France

<sup>14</sup> Regional Authority of Public Health, Banska Bystrica, Slovakia

<sup>15</sup> National Institute of Public Health, Bucharest, Romania

<sup>16</sup> Institute of Hygiene and Epidemiology, 1st Faculty of Medicine, Charles University, Prague, Czech Republic

<sup>17</sup> Masaryk Memorial Cancer Institute, Brno, Czech Republic

<sup>18</sup> Palacky University, Faculty of Medicine, Olomouc, Czech Republic

<sup>19</sup> The Tisch Cancer Institute, Mount Sinai School of Medicine, New York, USA

<sup>20</sup> The International Prevention Research Institute, Lyon, France

### **Introduction**

Smoking is a strong risk factor for lung cancer. As part of a series of supplemental analyses of the project SYNERGY that has been designed as a pooled analysis of lung cancer studies on the interaction of occupational carcinogens the risk of smoking was estimated for histological subtypes.

### **Materials and Methods**

This dataset comprised 10,050 cases (8,403 males, 1,647 females) and 12,388 controls (10,246 males, 2,142 females) from 11 European countries. Odds ratios (ORs) and 95% confidence intervals (CIs) of smoking cigarettes for squamous cell carcinoma (SqCC), small cell lung carcinoma (SCLC), and adenocarcinoma (AdCa) were estimated with logistic regression models in men and women, conditional on study center, adjusted for smoking of any other type of tobacco (yes/no) and age (in five-year classes).

### **Results**

Only 2% males and 29% females were never smokers, with AdCa as leading subtype. In current smokers, 54% men and 35% women had a diagnosis of SqCC. Current smoking of cigarettes was associated with an OR of 45.3 (95% CI 33.3-61.6) for SqCC, 43.0 (95% CI 27.5-67.3) for SCLC, and 9.2 (95% CI 7.2-11.7) for AdCa among men. The corresponding risk estimates in women were 12.4 (95% CI 9.2-16.5) for SqCC, 17.7 (95% CI 12.4-25.3) for SCLC, and 3.2 (95% CI 2.5-4.0) for AdCa. High risks of current smoking of > 30 cigarettes/day were observed for SqCC (OR 91.6; 95% CI 64.2-130.6) and SCLC (OR 84.5; 95% CI 51.2-139.6) in men and for SqCC (OR 46.9; 95% CI 17.3-127.1) and SCLC (OR 77.4; 95% CI 22.7-263.8) in women.

### **Conclusion**

Cigarette smoking in our study was associated with a considerably higher risk both for SqCC and SCLC than for AdCa. These observations corroborate findings from experimental and former epidemiological studies.