## Online Supplementary Tables

Table S1. Number of cases and controls in each of ten study centers and fieldwork period.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Select characteristics** | **Canada-Montreal11** | **Canada-Toronto18** | **France15** | **Germany-Munich12** | **Germany-Bremen14 a** | **Italy-Lombardy13** | **Italy-Turin** **and Veneto19** | **New Zealand17** | **Poland16** | **United Kingdom**20 |
| **Fieldwork period** | 1996–2001 | 1997–2002 | 2001–2007 | 1990–1996 | 1988–1993 | 2002–2005 | 1990–1992 | 2007–2008 | 1998–2002 | 1998–2002 |
| **No. Cases** | 430 | 194 | 608 | 510 | 165 | 360 | 149 | 227 | 238 | 159 |
| Squamous Cell Carcinoma | 77 | 28 | 95 | 125 | 32 | 40 | 74 | 34 | 50 | 46 |
| Small Cell Carcinoma | 73 | 13 | 78 | 129 | 45 | 36 | 9 | 34 | 59 | 16 |
| Adenocarcinoma | 208 | 74 | 337 | 169 | 60 | 193 | 42 | 99 | 65 | 62 |
| Other cancer sub-types | 72 | 79 | 98 | 87 | 28 | 91 | 24 | 60 | 64 | 35 |
| **No. controls** | 568 | 496 | 752 | 540 | 164 | 457 | 251 | 357 | 259 | 343 |

1. The Germany-Bremen sample included a small number of participants from Frankfort.

Table S2. Definition of each of the 15 selected agents and top occupations considered exposed to each agent in 7227 women from ten case-control studies of lung cancer.

| **Agent** | **Agent definition a** | **Most prevalent occupations (ISCO-68 job titles) ever exposed to selected agent b** | **Lifetime prevalence of exposure among cases c** | **Lifetime prevalence of exposure among controls c** | **Study center with the lowest prevalence (among controls)** | | **Study center with the highest prevalence (among controls)** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Inorganic solids** | |  |  |  |  | |  | |
| Metallic dust | Any metal dusts generated, regardless of the specific metals involved or whether they are known or unknown. Most metals will have undergone a certain amount of surface oxidation but exposure to specific metal oxides (e.g., lead oxides; iron oxides) was coded only when the main exposure was to the oxide itself and not to the metal dust. | Machinery Fitter, Machine Assembler and Precision-Instrument Maker; Metal-Press Operator; Machine-Tool Operator; Compositor and Type-Setter; Mechanical Products Inspector and Tester | 7.0% | 4.5% | Canada-Toronto (1.2%) | | United Kingdom (13.1%) | |
| Calcium carbonate | A mineral occurring naturally in a great variety of calcite rocks which are collectively known as limestone. It has been used as a flux in the melting of iron, as a filler in asphalt, putty, crayons, paints, rubber, plastics and linoleum, for writing on blackboards and as a mild abrasive in polishes. | Primary Education Teacher; Secondary Education Teacher | 3.6% | 7.8% | Germany-Bremen (1.2%) | | New Zealand (15.7%) | |
| **Organic solids** |  |  |  |  |  | |  | |
| Cotton dust | Dust generated during carding, spinning, weaving, cutting, sewing or handling of cotton or cotton-containing textiles. Cotton is a natural fiber obtained from the Gossypium plant; chemically it is about 90% cellulose and 6% moisture, the remainder being impurities. The textile may have been treated with starches, dyes, inks, sizing or other finishing materials, which may have been coded separately. | Sewing-Machine Operator; Hand and Machine Sewer; Tailor and Dressmaker; Chambermaid | 19.8% | 17.1% | Canada-Toronto (4.6%) | | Italy-Turin and Veneto (27.5%) | |
| Synthetic fibers | Dust generated during the manufacturing, spinning, weaving, cutting sewing or handling of artificial or truly synthetic fibers or of textiles containing artificial or synthetic fibers. Artificial fibers are those in which the fiber-forming material is of natural origin (eg., viscose rayon which is regenerated cellulose and celluose acetate fibers) and the true synthetic fibers are those in which the fiber-forming material is derived from petrochemicals or coal chemicals. They are often treated with starches, dyes, inks, sizing or other finishing materials, some of which were coded separately. | Sewing-Machine Operator; Hand and Machine Sewer; Tailor and Dressmaker; Knitter | 17.0% | 15.5% | Canada-Toronto (4.8%) | | Italy-Lombardy (63.1%) | |
| Cellulose | The main constituent of the cell walls of plants. Industrial cellulose is made from wood or cotton pulp. It is used for paper making but also as a starting material for cellulose acetate and cellulose nitrate. Exposure has been mainly coded to workers exposed to paper fibres. | Hand Packer; Librarian; Mail Sorting Clerk; Mailperson; Library Clerk | 9.0% | 9.5% | Italy-Lombardy (2.0%) | | United Kingdom (29.7%) | |
| **Inorganic gases** | |  |  |  |  | |  | |
| Ammonia | A by-product of coal distillation and is also produced by passing nitrogen, hydrogen and a catalyst through an electric arc. It is an important source of various nitrogen containing compounds. An enormous quantity of ammonia is used in the production of fertilizers. As a gas it has been used in refrigeration and in nitriding, bright annealing, and for sintering metals. As an aqueous solution (NH4OH), it has been used in the textile and pharmaceutical industries, in medicine, in trade sale paints, in fire extinguishers, and in consumer cleaning products. | Farm Helper; Women's Hairdresser; Chambermaid; Farm Worker | 8.9% | 6.9% | Italy-Lombardy (1.5%) | | Germany-Bremen (17.1%) | |
| **Organic gases** |  |  |  |  |  | |  | |
| Formaldehyde | A colorless gas obtained by the oxidation of methyl alcohol, it is marketed as a 37% solution by weight under the name of formalin. Formaldehyde has been mainly used for plastics and resin manufacture (see urea-formaldehyde, melamine-formaldehyde, and phenol-formaldehyde), as a disinfectant and fumigant, and as a preservative and hardener of tissues in embalming fluids. Exposure to formaldehyde in the workplace can result from the use of formaldehyde gas or formaldehyde solutions, from outgassing or thermal decomposition of formaldehyde resins or from thermal decomposition of other resins, plastics or organic materials. | Sewing-Machine Operator; Women's Hairdresser; Cook; Tailor and Dressmaker | 16.8% | 15.3% | Canada-Toronto (8.5%) | | Canada-Montreal (22.0%) | |
| **Fumes and smokes** | |  |  |  |  | |  | |
| Cooking fumes | A mixture of volatile substances of variable composition resulting from the thermal degradation of fats and other food constituents. Significant quantities of aliphatic aldehydes (formaldehyde and acrolein) have been measured. The temperature and method used for cooking (deep-frying, roasting, charcoal broiling), the type of fat involved, and the number of times it has previously been heated can influence the level of contaminants present in the resulting fumes. | Waitress; Cook; Other Waitress, Bartender and Related Worker; Working Proprietor (Restaurant) | 15.9% | 11.8% | Italy-Lombardy (5.5%) | | New Zealand (21.0%) | |
| **Organic liquids and vapours** | |  |  |  |  | |  | |
| Isopropanol | A colorless, flammable, mobile liquid, produced by the hydration of propylene from cracked gases. It has been used mainly in the manufacture of acetone, but is also used in extraction processes, as a solvent (chiefly for oils, perfumes and synthetic resins), in liniments, skin lotions, cosmetics and pharmaceuticals. It has been used in rubbing alcohols and as an antistalling agent in winter grade motor fuels. | Women's Hairdresser; Nurse; Chambermaid; Hairdresser, Barber, Beautician and Related Worker; Offset Pressperson | 5.2% | 3.9% | Italy-Lombardy (1.3%) | | Canada-Montreal (6.0%) | |
| Organic solvents | Organic liquids used as paint thinners, spot removers, dry cleaning agents, diluents, degreasers, chemical reagents, liquid extraction agents, and for many other purposes. Among the first organic liquids used for this purpose were turpentine, benzene, gasoline and naphtha. More recently, non-flameable chlorinated hydrocarbons came into wider use. | Women's Hairdresser; Medical Science Technician; Chambermaid; Solderer; Leather Goods Maker | 14.7% | 10.3% | Poland (6.9%) | | United Kingdom (14.3%) | |
| **Chemical families** | |  |  |  |  | |  | |
| Iron compounds | Comprises iron (Fe) dust, iron oxides and iron fumes (all of which were also coded separately), dust from iron-containing alloys (mild and stainless steel were also coded separately), iron-containing ores and all other iron-containing substances. Iron is the most common of the commercial metals and forms a large group of materials known as ferroalloys. Several iron compounds have been used as paint pigments, polishing compounds, and coatings for magnetic tapes while the soluble salts have been used as dyeing mordants, catalysts, fertilizers, in sewage treatments, and in feeds. | Machinery Fitter, Machine Assemblers and Precision-Instrument Maker; Metal-Press Operator; Machine-Tool Operator; Welder and flame-Cutter | 5.2% | 3.3% | | Canada-Toronto (0.8%) | | United Kingdom (12.0%) |
| Alkanes C18+ | Includes all saturated hydrocarbons having more than 18 carbon atoms, with the general formula CnH2n+2. They are all solids at standard conditions. One mixture of these long-chained hydrocarbons, known as petroleum jelly, is widely used in lubricating oils and greases and for compounding in rubber and resins. Highly refined, it is used in the pharmaceutical industry. Paraffin waxes, which were also coded separately, also fall into this category. | Spinner and Winder; Metal-Press Operator; Cloth Weaver; Machine-Tool Operator | 6.0% | 3.8% | Canada-Toronto (0.8%) | | United Kingdom (9.6%) | |
| PAHs from petroleum | Polycyclic aromatic hydrocarbons are a group of chemicals made up of three or more benzene rings interlinked in various arrangements. They are naturally present in fossil fuels or can be formed by thermal decomposition of any organic material containing carbon and hydrogen. Crude oil, certain petroleum-derived substances (e.g., heavy fuel oil, asphalt, etc.) and their combustion products contain PAHs, albeit in smaller quantities than similar coal-derived products. Furthermore, concentrations of PAHs may increase in some of these products during use (e.g., used motor oils). | Nursery Worker and Gardener; Salesperson, Shop Assistant and Demonstrator; Spinner and Winder; Metal-Press Operator | 9.1% | 7.0% | Canada-Montreal (2.8%) | | United Kingdom (13.7%) | |
| **General categories** | |  |  |  |  | |  | |
| Cleaning agents | Materials which have cleansing action such as soap. Their main function is to aid water in the cleaning process. They may be simple sulphonated fatty acids or complex synthetic materials. Organic solvents were excluded here and have been coded separately. | Charworker; Housemaid; Nurse; Waitress | 42.1% | 35.7% | Italy-Lombardy (21.2%) | | Germany-Bremen (48.2%) | |
| Biocides | Includes all products used to disinfect, deodorize, sterilize and sanitize. This implies the capability of killing micro-organisms (algae, bacteria, viruses, etc.). This group therefore includes bactericides, algicides, fungicides, germicides and preservatives. Agricultural pesticides were coded separately. | Charworker; Housemaid; Nurse; Women's Hairdresser | 31.6% | 26.0% | Poland (15.8%) | | Germany-Bremen (39.6%) | |

1. Definition for each agent can be found at: <http://canjem.ca/>.
2. Up to five most prevalent ISCO-68 job titles assigned as exposed to each agent using CANJEM-50%, among our study population of 7227 women.
3. We refer to percent of all women in our study population that were considered exposed to the agent as lifetime prevalence of exposure to the agent.

Table S3. Odds ratio between exposure to each of 15 selected agents, estimated using CANJEM-50%, and lung cancer in women, meta-analysis of ten studies, using three exposure metrics.

| **Agent** | **Exposure Metrics** | **No. of cases** | **No. of controls** | **Meta-OR a** | **95% CI a** | ***I2*** |
| --- | --- | --- | --- | --- | --- | --- |
| **Metallic dust** | Never exposed (Ref) b | 2421 | 3569 | Ref | - |  |
|  | Ever exposed | 214 | 190 | 1.08 | 0.74 - 1.58 | 47.8% |
|  | Duration of exposure: >10 years | 68 | 60 | 1.17 | 0.63 - 2.18 | 30.1% |
|  | Cumulative exposure: high | 116 | 96 | 1.26 | 0.87 - 1.81 | 6.3% |
| **Calcium carbonate** | Never exposed (Ref) b | 2757 | 3625 | Ref | - |  |
|  | Ever exposed | 109 | 330 | 0.77 | 0.44 - 1.34 | 64.8% |
|  | Duration of exposure: >10 years | 75 | 214 | 0.89 | 0.48 - 1.65 | 61.5% |
|  | Cumulative exposure: high | 55 | 168 | 0.81 | 0.42 - 1.56 | 60.6% |
| **Cotton dust** | Never exposed (Ref) b | 2062 | 3005 | Ref | - |  |
|  | Ever exposed | 606 | 721 | 0.92 | 0.73 - 1.17 | 39.0% |
|  | Duration of exposure: >10 years | 234 | 327 | 0.87 | 0.68 - 1.12 | 12.2% |
|  | Cumulative exposure: high | 288 | 365 | 0.93 | 0.71 - 1.22 | 28.7% |
| **Synthetic fibers** | Never exposed (Ref) b | 2149 | 3137 | Ref | - |  |
|  | Ever exposed | 521 | 655 | 0.91 | 0.75 - 1.10 | 0.2% |
|  | Duration of exposure: >10 years | 208 | 305 | 0.87 | 0.68 - 1.10 | 0.0% |
|  | Cumulative exposure: high | 231 | 328 | 0.89 | 0.71 - 1.12 | 0.0% |
| **Cellulose** | Never exposed (Ref) b | 2383 | 3390 | Ref | - |  |
|  | Ever exposed | 296 | 399 | 0.82 | 0.61 - 1.11 | 45.1% |
|  | Duration of exposure: >10 years | 90 | 132 | 0.93 | 0.61 - 1.40 | 28.1% |
|  | Cumulative exposure: high | 153 | 200 | 0.90 | 0.63 - 1.31 | 40.0% |
| **Ammonia** | Never exposed (Ref) b | 1930 | 2954 | Ref | - |  |
|  | Ever exposed | 272 | 293 | 1.09 | 0.88 - 1.37 | 0.0% |
|  | Duration of exposure: >10 years | 92 | 119 | 0.99 | 0.71 - 1.39 | 0.0% |
|  | Cumulative exposure: high | 129 | 147 | 1.08 | 0.80 - 1.45 | 0.0% |
| **Formaldehyde** | Never exposed (Ref) b | 1662 | 2515 | Ref | - |  |
|  | Ever exposed | 514 | 645 | 0.92 | 0.77 - 1.09 | 0.0% |
|  | Duration of exposure: >10 years | 199 | 280 | 0.95 | 0.72 - 1.24 | 16.4% |
|  | Cumulative exposure: high | 239 | 328 | 0.93 | 0.74 - 1.18 | 7.3% |
| **Cooking fumes** | Never exposed (Ref) b | 2135 | 3164 | Ref | - |  |
|  | Ever exposed | 485 | 498 | 1.03 | 0.86 - 1.24 | 11.3% |
|  | Duration of exposure: >10 years | 209 | 188 | 1.08 | 0.75 - 1.56 | 46.0% |
|  | Cumulative exposure: high | 247 | 252 | 1.08 | 0.85 - 1.37 | 9.1% |
| **Isopropanol** | Never exposed (Ref) b | 2011 | 2970 | Ref | - |  |
|  | Ever exposed | 159 | 163 | 1.19 | 0.90 - 1.57 | 0.0% |
|  | Duration of exposure: >10 years | 69 | 78 | 1.14 | 0.67 - 1.95 | 28.5% |
|  | Cumulative exposure: high | 84 | 82 | 1.33 | 0.81 - 2.18 | 28.2% |
| **Organic solvents** | Never exposed (Ref) b | 1197 | 1881 | Ref | - |  |
|  | Ever exposed | 449 | 435 | 1.07 | 0.88 - 1.31 | 0.0% |
|  | Duration of exposure: >10 years | 157 | 161 | 1.18 | 0.88 - 1.58 | 10.4% |
|  | Cumulative exposure: high | 222 | 219 | 1.16 | 0.92 - 1.47 | 0.0% |
| **Iron compounds** | Never exposed (Ref) b | 2584 | 3733 | Ref | - |  |
|  | Ever exposed | 160 | 140 | 1.10 | 0.75 - 1.61 | 32.0% |
|  | Duration of exposure: >10 years | 50 | 47 | 1.15 | 0.54 - 2.45 | 38.6% |
|  | Cumulative exposure: high | 80 | 73 | 1.13 | 0.75 - 1.71 | 0.0% |
| **Alkanes C18+** | Never exposed (Ref) b | 2288 | 3350 | Ref | - |  |
|  | Ever exposed | 183 | 159 | 1.14 | 0.86 - 1.51 | 0.0% |
|  | Duration of exposure: >10 years | 63 | 50 | 1.37 | 0.85 - 2.19 | 0.0% |
|  | Cumulative exposure: high | 98 | 85 | 1.19 | 0.82 - 1.72 | 0.0% |
| **PAHs from petroleum** | Never exposed (Ref) b | 1964 | 2868 | Ref | - |  |
|  | Ever exposed | 279 | 295 | 0.92 | 0.72 - 1.17 | 15.5% |
|  | Duration of exposure: >10 years | 96 | 105 | 1.04 | 0.68 - 1.59 | 22.0% |
|  | Cumulative exposure: high | 164 | 155 | 1.06 | 0.78 - 1.45 | 14.9% |
| **Cleaning agents** | Never exposed (Ref) b | 1146 | 1779 | Ref | - |  |
|  | Ever exposed | 1288 | 1508 | 0.98 | 0.85 - 1.12 | 0.0% |
|  | Duration of exposure: >10 years | 747 | 828 | 1.06 | 0.91 - 1.22 | 0.0% |
|  | Cumulative exposure: high | 755 | 783 | 1.09 | 0.92 - 1.29 | 20.0% |
| **Biocides** | Never exposed (Ref) b | 1544 | 2383 | Ref | - |  |
|  | Ever exposed | 966 | 1096 | 1.03 | 0.89 - 1.18 | 0.0% |
|  | Duration of exposure: >10 years | 518 | 589 | 1.06 | 0.90 - 1.25 | 6.1% |
|  | Cumulative exposure: high | 489 | 550 | 1.07 | 0.91 - 1.26 | 0.0% |

1. The final model for each study center was adjusted for age (log-transformed), cigarette smoking (log [lifetime pack-years +1], and years since quitting), ever employed in a blue-collar job (yes/no), education or NZSEI (in OCANZ study center). The Meta-OR and 95%CI for each agent-lung cancer association was calculated using random-effects meta-analysis.
2. The number of never exposed and ever exposed women to an agent does not add up to the total number of participants, as there were also women with uncertain exposure, which are excluded here.

Table S4. Odds ratio between ever exposure to each of 15 selected agents, estimated using CANJEM-50%, and lung cancer in women by smoking category, meta-analysis of ten studies.

| **Agent** | **Stratum of Smoking** | **No. of exposed cases** | **No. of exposed controls** | **Meta-OR a** | **95% CI a** |
| --- | --- | --- | --- | --- | --- |
| **Metallic dust** | Never smokers | 46 | 92 | **1.78** | **1.12 - 2.81** |
|  | Light smokers | 56 | 64 | 1.05 | 0.65 - 1.69 |
|  | Heavy smokers | 110 | 34 | 0.85 | 0.45 - 1.59 |
| **Calcium carbonate** | Never smokers | 35 | 209 | **0.61** | **0.39 - 0.98** |
|  | Light smokers | 21 | 97 | 0.46 | 0.21 - 1.01 |
|  | Heavy smokers | 53 | 24 | 0.76 | 0.32 - 1.80 |
| **Cotton dust** | Never smokers | 133 | 448 | 0.87 | 0.58 - 1.30 |
|  | Light smokers | 103 | 167 | 0.94 | 0.66 - 1.32 |
|  | Heavy smokers | 321 | 103 | 0.99 | 0.69 - 1.42 |
| **Synthetic fibers** | Never smokers | 123 | 415 | 0.84 | 0.58 - 1.23 |
|  | Light smokers | 114 | 146 | 0.94 | 0.64 - 1.37 |
|  | Heavy smokers | 279 | 90 | 1.07 | 0.73 - 1.57 |
| **Cellulose** | Never smokers | 47 | 198 | 0.99 | 0.65 - 1.50 |
|  | Light smokers | 78 | 115 | 0.94 | 0.63 - 1.41 |
|  | Heavy smokers | 171 | 83 | 0.68 | 0.33 - 1.37 |
| **Ammonia** | Never smokers | 74 | 188 | 1.09 | 0.78 - 1.52 |
|  | Light smokers | 74 | 72 | 1.19 | 0.70 - 2.02 |
|  | Heavy smokers | 124 | 31 | 0.94 | 0.57 - 1.56 |
| **Formaldehyde** | Never smokers | 107 | 389 | 0.91 | 0.68 - 1.21 |
|  | Light smokers | 119 | 157 | 0.93 | 0.65 - 1.31 |
|  | Heavy smokers | 286 | 95 | 0.85 | 0.59 - 1.21 |
| **Cooking fumes** | Never smokers | 77 | 270 | 0.95 | 0.70 - 1.28 |
|  | Light smokers | 126 | 143 | 1.11 | 0.75 - 1.64 |
|  | Heavy smokers | 278 | 79 | 1.06 | 0.77 - 1.48 |
| **Isopropanol** | Never smokers | 30 | 79 | 1.46 | 0.89 - 2.42 |
|  | Light smokers | 46 | 60 | 1.23 | 0.74 - 2.04 |
|  | Heavy smokers | 83 | 22 | 0.99 | 0.55 - 1.78 |
| **Organic solvents** | Never smokers | 74 | 213 | 0.98 | 0.70 - 1.39 |
|  | Light smokers | 130 | 147 | 1.30 | 0.91 - 1.86 |
|  | Heavy smokers | 244 | 73 | 1.06 | 0.71 - 1.59 |
| **Iron compounds** | Never smokers | 34 | 64 | 1.59 | 0.94 - 2.70 |
|  | Light smokers | 40 | 48 | 0.99 | 0.57 - 1.73 |
|  | Heavy smokers | 85 | 28 | 0.74 | 0.40 - 1.37 |
| **Alkanes C18+** | Never smokers | 36 | 82 | 1.30 | 0.81 - 2.07 |
|  | Light smokers | 47 | 47 | 1.12 | 0.64 - 1.96 |
|  | Heavy smokers | 98 | 30 | 0.93 | 0.53 - 1.63 |
| **PAHs from petroleum** | Never smokers | 54 | 156 | 1.05 | 0.72 - 1.53 |
|  | Light smokers | 75 | 90 | 0.89 | 0.58 - 1.39 |
|  | Heavy smokers | 147 | 46 | 0.90 | 0.57 - 1.42 |
| **Cleaning agents** | Never smokers | 259 | 855 | 0.83 | 0.67 - 1.04 |
|  | Light smokers | 180 | 442 | 1.22 | 0.94 - 1.57 |
|  | Heavy smokers | 659 | 199 | 0.91 | 0.60 - 1.38 |
| **Biocides** | Never smokers | 206 | 610 | 0.96 | 0.77 - 1.20 |
|  | Light smokers | 142 | 329 | 1.16 | 0.88 - 1.54 |
|  | Heavy smokers | 473 | 149 | 1.02 | 0.68 - 1.52 |

1. The final model for each study center was adjusted for age (log-transformed), cigarette smoking (log [lifetime pack-years +1], and years since quitting), ever employed in a blue-collar job (yes/no), education or NZSEI (in OCANZ study center). Smoking covariates were not adjusted for in analyses of never-smokers. The Meta-OR and 95%CI for each agent-lung cancer association was calculated using random-effects meta-analysis.

Table S5. Odds ratio between exposure to each of 15 selected agents, estimated using CANJEM-25%, and lung cancer in women, meta-analysis of ten studies, using three exposure metrics.

| **Agent** | **Exposure Metrics** | **No. of cases** | **Meta-OR a** | **95% CI a** | ***I2* b** |
| --- | --- | --- | --- | --- | --- |
| **Metallic dust** | Never exposed (Ref) b | 2421 | Ref | - |  |
|  | Ever exposed | 310 | 1.09 | 0.81 - 1.48 | 44.0% |
|  | Duration of exposure: >10 years | 104 | 0.94 | 0.55 - 1.60 | 49.4% |
|  | Cumulative exposure: high | 172 | 1.19 | 0.89 - 1.60 | 5.4% |
| **Calcium carbonate** | Never exposed (Ref) b | 2757 | Ref | - |  |
|  | Ever exposed | 183 | 0.82 | 0.53 - 1.26 | 65.1% |
|  | Duration of exposure: >10 years | 114 | 0.84 | 0.47 - 1.52 | 71.2% |
|  | Cumulative exposure: high | 77 | 0.73 | 0.39 - 1.35 | 64.6% |
| **Cotton dust** | Never exposed (Ref) b | 2062 | Ref | - |  |
|  | Ever exposed | 672 | 0.91 | 0.72 - 1.14 | 35.7% |
|  | Duration of exposure: >10 years | 267 | 0.87 | 0.68 - 1.13 | 19.5% |
|  | Cumulative exposure: high | 325 | 0.94 | 0.72 - 1.22 | 31.0% |
| **Synthetic fibers** | Never exposed (Ref) b | 2149 | Ref | - |  |
|  | Ever exposed | 609 | 0.95 | 0.77 - 1.18 | 19.8% |
|  | Duration of exposure: >10 years | 244 | 0.91 | 0.72 - 1.14 | 0.0% |
|  | Cumulative exposure: high | 272 | 0.97 | 0.74 - 1.26 | 25.5% |
| **Cellulose** | Never exposed (Ref) b | 2383 | Ref | - |  |
|  | Ever exposed | 446 | 0.84 | 0.66 - 1.07 | 43.8% |
|  | Duration of exposure: >10 years | 151 | 0.97 | 0.71 - 1.32 | 23.8% |
|  | Cumulative exposure: high | 225 | 0.90 | 0.64 - 1.27 | 53.4% |
| **Ammonia** | Never exposed (Ref) b | 1930 | Ref | - |  |
|  | Ever exposed | 893 | 1.06 | 0.90 - 1.25 | 16.4% |
|  | Duration of exposure: >10 years | 437 | 1.09 | 0.90 - 1.33 | 13.4% |
|  | Cumulative exposure: high | 436 | 1.11 | 0.93 - 1.33 | 0.0% |
| **Formaldehyde** | Never exposed (Ref) b | 1662 | Ref | - |  |
|  | Ever exposed | 915 | 1.01 | 0.87 - 1.17 | 0.0% |
|  | Duration of exposure: >10 years | 439 | 1.07 | 0.89 - 1.28 | 0.0% |
|  | Cumulative exposure: high | 450 | 1.04 | 0.87 - 1.25 | 0.0% |
| **Cooking fumes** | Never exposed (Ref) b | 2135 | Ref | - |  |
|  | Ever exposed | 784 | 1.00 | 0.85 - 1.16 | 14.2% |
|  | Duration of exposure: >10 years | 326 | 1.14 | 0.93 - 1.40 | 0.0% |
|  | Cumulative exposure: high | 444 | 1.06 | 0.86 - 1.30 | 22.2% |
| **Isopropanol** | Never exposed (Ref) b | 2011 | Ref | - |  |
|  | Ever exposed | 666 | 1.00 | 0.87 - 1.15 | 0.0% |
|  | Duration of exposure: >10 years | 314 | 1.02 | 0.82 - 1.27 | 21.3% |
|  | Cumulative exposure: high | 308 | 1.00 | 0.83 - 1.21 | 0.0% |
| **Organic solvents** | Never exposed (Ref) b | 1197 | Ref | - |  |
|  | Ever exposed | 1240 | 0.98 | 0.84 - 1.15 | 0.0% |
|  | Duration of exposure: >10 years | 641 | 1.08 | 0.91 - 1.28 | 0.0% |
|  | Cumulative exposure: high | 659 | 1.10 | 0.93 - 1.31 | 0.0% |
| **Iron compounds** | Never exposed (Ref) b | 2584 | Ref | - |  |
|  | Ever exposed | 239 | 1.09 | 0.79 - 1.51 | 38.1% |
|  | Duration of exposure: >10 years | 76 | 0.98 | 0.58 - 1.68 | 30.5% |
|  | Cumulative exposure: high | 120 | 1.05 | 0.69 - 1.59 | 25.7% |
| **Alkanes C18+** | Never exposed (Ref) b | 2288 | Ref | - |  |
|  | Ever exposed | 340 | 0.98 | 0.80 - 1.21 | 0.0% |
|  | Duration of exposure: >10 years | 105 | 0.87 | 0.59 - 1.29 | 20.7% |
|  | Cumulative exposure: high | 189 | 1.01 | 0.71 - 1.44 | 36.7% |
| **PAHs from petroleum** | Never exposed (Ref) b | 1964 | Ref | - |  |
|  | Ever exposed | 558 | 0.87 | 0.73 - 1.02 | 0.0% |
|  | Duration of exposure: >10 years | 209 | 0.82 | 0.62 - 1.09 | 25.0% |
|  | Cumulative exposure: high | 281 | 0.86 | 0.70 - 1.06 | 0.0% |
| **Cleaning agents** | Never exposed (Ref) b | 1146 | Ref | - |  |
|  | Ever exposed | 1428 | 0.98 | 0.85 - 1.12 | 0.0% |
|  | Duration of exposure: >10 years | 869 | 1.05 | 0.89 - 1.23 | 20.6% |
|  | Cumulative exposure: high | 807 | 1.06 | 0.90 - 1.24 | 16.0% |
| **Biocides** | Never exposed (Ref) b | 1544 | Ref | - |  |
|  | Ever exposed | 1126 | 1.03 | 0.90 - 1.17 | 0.0% |
|  | Duration of exposure: >10 years | 628 | 1.07 | 0.92 - 1.25 | 0.0% |
|  | Cumulative exposure: high | 567 | 1.06 | 0.91 - 1.24 | 0.0% |

1. The final model for each study center was adjusted for age (log-transformed), cigarette smoking (log [lifetime pack-years +1], and years since quitting), ever employed in a blue-collar job (yes/no), education or NZSEI (in OCANZ study center). The Meta-OR and 95%CI for each agent-lung cancer association was calculated using random-effects meta-analysis.
2. The number of never exposed and ever exposed cases to an agent does not add up to 3040 cases, as there were also cases with uncertain exposure, which are excluded here.

Table S6. Odds ratio between exposure to each of 15 selected agents, estimated using CANJEM-50%, and lung cancer in women, pooled-analysis of ten studies, using three exposure metrics.

| **Agent** | **Exposure Metrics** | **No. of cases** | **Pooled OR** | **Pooled 95% CI a** |
| --- | --- | --- | --- | --- |
| **Metallic dust** | Never exposed (Ref) b | 2421 | Ref | - |
|  | Ever exposed | 214 | 1.13 | 0.89 - 1.45 |
|  | Duration of exposure: >10 years | 68 | 1.25 | 0.83 - 1.89 |
|  | Cumulative exposure: high | 116 | 1.27 | 0.92 - 1.76 |
| **Calcium carbonate** | Never exposed (Ref) b | 2757 | Ref | - |
|  | Ever exposed | 109 | **0.62** | **0.47 - 0.80** |
|  | Duration of exposure: >10 years | 75 | **0.64** | **0.47 - 0.88** |
|  | Cumulative exposure: high | 55 | **0.60** | **0.42 - 0.85** |
| **Cotton dust** | Never exposed (Ref) b | 2062 | Ref | - |
|  | Ever exposed | 606 | 0.87 | 0.73 - 1.03 |
|  | Duration of exposure: >10 years | 234 | 0.88 | 0.70 - 1.09 |
|  | Cumulative exposure: high | 288 | 0.91 | 0.74 - 1.12 |
| **Synthetic fibers** | Never exposed (Ref) b | 2149 | Ref | - |
|  | Ever exposed | 521 | 0.88 | 0.74 - 1.06 |
|  | Duration of exposure: >10 years | 208 | 0.87 | 0.69 - 1.09 |
|  | Cumulative exposure: high | 231 | 0.88 | 0.71 - 1.10 |
| **Cellulose** | Never exposed (Ref) b | 2383 | Ref | - |
|  | Ever exposed | 296 | **0.73** | **0.60 - 0.89** |
|  | Duration of exposure: >10 years | 90 | 0.82 | 0.60 - 1.12 |
|  | Cumulative exposure: high | 153 | 0.79 | 0.61 - 1.02 |
| **Ammonia** | Never exposed (Ref) b | 1930 | Ref | - |
|  | Ever exposed | 272 | 1.11 | 0.90 - 1.37 |
|  | Duration of exposure: >10 years | 92 | 0.98 | 0.71 - 1.35 |
|  | Cumulative exposure: high | 129 | 1.07 | 0.81 - 1.41 |
| **Formaldehyde** | Never exposed (Ref) b | 1662 | Ref | - |
|  | Ever exposed | 514 | 0.88 | 0.75 - 1.05 |
|  | Duration of exposure: >10 years | 199 | 0.93 | 0.74 - 1.16 |
|  | Cumulative exposure: high | 239 | 0.94 | 0.76 - 1.16 |
| **Cooking fumes** | Never exposed (Ref) b | 2135 | Ref | - |
|  | Ever exposed | 485 | 1.03 | 0.88 - 1.21 |
|  | Duration of exposure: >10 years | 209 | 1.14 | 0.90 - 1.44 |
|  | Cumulative exposure: high | 247 | 1.09 | 0.88 - 1.34 |
| **Isopropanol** | Never exposed (Ref) b | 2011 | Ref | - |
|  | Ever exposed | 159 | 1.16 | 0.89 - 1.51 |
|  | Duration of exposure: >10 years | 69 | 1.12 | 0.76 - 1.64 |
|  | Cumulative exposure: high | 84 | 1.22 | 0.85 - 1.74 |
| **Organic solvents** | Never exposed (Ref) b | 1197 | Ref | - |
|  | Ever exposed | 449 | 1.01 | 0.84 - 1.22 |
|  | Duration of exposure: >10 years | 157 | 1.19 | 0.92 - 1.55 |
|  | Cumulative exposure: high | 222 | 1.13 | 0.90 - 1.42 |
| **Iron compounds** | Never exposed (Ref) b | 2584 | Ref | - |
|  | Ever exposed | 160 | 1.09 | 0.82 - 1.43 |
|  | Duration of exposure: >10 years | 50 | 1.12 | 0.70 - 1.79 |
|  | Cumulative exposure: high | 80 | 1.05 | 0.72 - 1.53 |
| **Alkanes C18+** | Never exposed (Ref) b | 2288 | Ref | - |
|  | Ever exposed | 183 | 1.10 | 0.84 - 1.43 |
|  | Duration of exposure: >10 years | 63 | 1.32 | 0.86 - 2.04 |
|  | Cumulative exposure: high | 98 | 1.23 | 0.87 - 1.73 |
| **PAHs from petroleum** | Never exposed (Ref) b | 1964 | Ref | - |
|  | Ever exposed | 279 | 0.89 | 0.72 - 1.11 |
|  | Duration of exposure: >10 years | 96 | 0.98 | 0.71 - 1.37 |
|  | Cumulative exposure: high | 164 | 1.06 | 0.81 - 1.38 |
| **Cleaning agents** | Never exposed (Ref) b | 1146 | Ref | - |
|  | Ever exposed | 1288 | 0.96 | 0.84 - 1.09 |
|  | Duration of exposure: >10 years | 747 | 1.05 | 0.91 - 1.20 |
|  | Cumulative exposure: high | 755 | 1.05 | 0.91 - 1.21 |
| **Biocides** | Never exposed (Ref) b | 1544 | Ref | - |
|  | Ever exposed | 966 | 1.01 | 0.89 - 1.16 |
|  | Duration of exposure: >10 years | 518 | 1.04 | 0.89 - 1.21 |
|  | Cumulative exposure: high | 489 | 1.05 | 0.90 - 1.23 |

1. The final model for each study center was adjusted for age (log-transformed), cigarette smoking (log [lifetime pack-years +1], and years since quitting), ever employed in a blue-collar job (yes/no), education or NZSEI (in OCANZ study center).
2. The number of never exposed and ever exposed cases to an agent does not add up to 3040 cases, as there were also cases with uncertain exposure, which are excluded here.

Table S7. Meta-analysis on the association between ever exposure to each selected agent estimated using CANJEM-25% and lung cancer risk in women by smoking stratum.

| **Agent (Ever exposure)** | **Stratum of Smoking** | **No. exposed cases** | **Meta-OR a** | **95% CI a** |
| --- | --- | --- | --- | --- |
| **Metallic dust** | **Never smokers** | 60 | **1.65** | **1.11 - 2.46** |
|  | Light smokers | 83 | 1.19 | 0.75 - 1.87 |
|  | Heavy smokers | 165 | 0.91 | 0.52 - 1.60 |
| **Calcium carbonate** | Never smokers | 52 | 0.71 | 0.42 - 1.20 |
|  | Light smokers | 45 | 0.65 | 0.38 - 1.10 |
|  | Heavy smokers | 86 | 1.04 | 0.57 - 1.93 |
| **Cotton dust** | Never smokers | 145 | 0.83 | 0.57 - 1.21 |
|  | Light smokers | 170 | 0.91 | 0.65 - 1.27 |
|  | Heavy smokers | 354 | 1.06 | 0.74 - 1.52 |
| **Synthetic fibers** | Never smokers | 136 | 0.83 | 0.58 - 1.20 |
|  | Light smokers | 147 | 1.04 | 0.72 - 1.49 |
|  | Heavy smokers | 323 | 1.17 | 0.80 - 1.71 |
| **Cellulose** | Never smokers | 72 | 0.91 | 0.61 - 1.36 |
|  | Light smokers | 119 | 0.96 | 0.68 - 1.35 |
|  | Heavy smokers | 252 | 0.69 | 0.45 - 1.07 |
| **Ammonia** | Never smokers | 204 | 0.96 | 0.72 - 1.28 |
|  | Light smokers | 242 | 1.23 | 0.88 - 1.73 |
|  | Heavy smokers | 441 | 1.00 | 0.73 - 1.35 |
| **Formaldehyde** | Never smokers | 179 | 0.95 | 0.74 - 1.21 |
|  | Light smokers | 229 | 1.09 | 0.82 - 1.44 |
|  | Heavy smokers | 501 | 0.92 | 0.68 - 1.24 |
| **Cooking fumes** | Never smokers | 163 | 0.96 | 0.75 - 1.23 |
|  | Light smokers | 211 | 1.08 | 0.74 - 1.56 |
|  | Heavy smokers | 406 | 0.97 | 0.73 - 1.29 |
| **Isopropanol** | Never smokers | 152 | 1.08 | 0.84 - 1.40 |
|  | Light smokers | 204 | 1.15 | 0.84 - 1.57 |
|  | Heavy smokers | 307 | 0.81 | 0.59 - 1.11 |
| **Organic solvents** | Never smokers | 241 | 0.81 | 0.63 - 1.06 |
|  | **Light smokers** | 354 | **1.37** | **1.03 - 1.82** |
|  | Heavy smokers | 635 | 0.88 | 0.64 - 1.22 |
| **Iron compounds** | **Never smokers** | 50 | **1.60** | **1.02 - 2.51** |
|  | Light smokers | 60 | 1.06 | 0.68 - 1.68 |
|  | Heavy smokers | 127 | 0.78 | 0.48 - 1.25 |
| **Alkanes C18+** | Never smokers | 62 | 1.01 | 0.71 - 1.45 |
|  | Light smokers | 93 | 1.05 | 0.69 - 1.58 |
|  | Heavy smokers | 182 | 0.91 | 0.61 - 1.38 |
| **PAHs from petroleum** | Never smokers | 113 | 0.91 | 0.70 - 1.20 |
|  | Light smokers | 156 | 0.85 | 0.63 - 1.16 |
|  | Heavy smokers | 285 | 0.82 | 0.59 - 1.16 |
| **Cleaning agents** | Never smokers | 304 | 0.83 | 0.67 - 1.03 |
|  | Light smokers | 407 | 1.27 | 0.99 - 1.63 |
|  | Heavy smokers | 708 | 0.86 | 0.65 - 1.14 |
| **Biocides** | Never smokers | 245 | 0.96 | 0.78 - 1.19 |
|  | Light smokers | 324 | 1.16 | 0.91 - 1.47 |
|  | Heavy smokers | 550 | 0.97 | 0.73 - 1.28 |

1. The final model for each study center was adjusted for age (log-transformed), cigarette smoking (log [lifetime pack-years +1], and years since quitting), ever employed in a blue-collar job (yes/no), education or NZSEI (in OCANZ study center). Smoking covariates were not adjusted for in analyses of never-smokers. The Meta-OR and 95%CI for each agent-lung cancer association was calculated using random-effects meta-analysis.

Table S8. Comparison of odds ratios between ever exposure to each of 15 selected agents, estimated using CANJEM-50%, and lung cancer in women, using different covariate adjustments, meta-analysis of ten studies.

|  |  |  |
| --- | --- | --- |
| Agent  (Ever exposure) | Meta-OR and 95%CI (age and smoking adjusted a) | Meta-OR and 95%CI (fully adjusted b) |
| Metallic dust | 1.28 (0.89 - 1.83) | 1.08 (0.74 - 1.58) |
| Calcium carbonate | 0.54 (0.39 - 0.76) | 0.77 (0.44 - 1.34) |
| Cotton dust | 1.14 (0.97 - 1.33) | 0.92 (0.73 - 1.17) |
| Synthetic fibers | 1.14 (0.98 - 1.32) | 0.91 (0.75 - 1.10) |
| Cellulose | 0.97 (0.73 - 1.28) | 0.82 (0.61 - 1.11) |
| Ammonia | 1.28 (1.04 - 1.58) | 1.09 (0.88 - 1.37) |
| Formaldehyde | 1.09 (0.94 - 1.28) | 0.92 (0.77 - 1.09) |
| Cooking fumes | 1.15 (0.94 - 1.41) | 1.03 (0.86 - 1.24) |
| Isopropanol | 1.22 (0.93 - 1.60) | 1.19 (0.90 - 1.57) |
| Organic solvents | 1.27 (1.05 - 1.52) | 1.07 (0.88 - 1.31) |
| Iron compounds | 1.31 (0.91 - 1.89) | 1.10 (0.75 - 1.61) |
| Alkanes C18+ | 1.38 (0.99 - 1.92) | 1.14 (0.86 - 1.51) |
| PAHs from petroleum | 1.10 ( 0.85 - 1.44) | 0.92 (0.72 - 1.17) |
| Cleaning agents | 1.12 (0.98 - 1.29) | 0.98 (0.85 - 1.12) |
| Biocides | 1.16 (1.02 - 1.32) | 1.03 (0.89 - 1.18) |

a. Models were adjusted for age (log-transformed), and cigarette smoking (log [lifetime pack-years +1], and years since quitting)

b. Additionally adjusted for ever employed in a blue-collar job (yes/no), and socio-economic status (education or NZSEI (in OCANZ study center)).