Diesel exhaust exposure and the risk of lung cancer – a review of epidemiological evidence

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Objective

To critically evaluate the association between diesel exhaust (DE) exposure and the risk of lung cancer, we conducted a systematic review of published epidemiological evidences.

Methods

To comprehensively identify original studies on the association between DE exposure and the risk of lung cancer, literature searches were performed in MEDLINE, EMBASE, NIOSHTIC, CISDOC, Cochrane and TOXNET for the period between 1970 and 2013, including bibliographies and cross-referencing. MEGA-JEM was used for an objective interpretation of previous published studies.

Results

In total, 42 cohort studies and 32 case-control studies were identified in which the association between DE exposures and lung cancer was examined.

- Besides some common limitations in design, exposure assessment methods and statistical analysis used,
- Lack of objective exposure information appears to be the main problem in interpreting epidemiological evidence
  - Historical industrial hygiene data on DE exposure not available
  - Exposure assessment limited only to job title in most studies
  - Three studies quantified DE exposure based on historical surrogate measurements of nitro, one on historical measurements of CO and one on current measurements of total carbon.
  - Despite the exposure assessment methods used, no consistent results can be found in the published studies.

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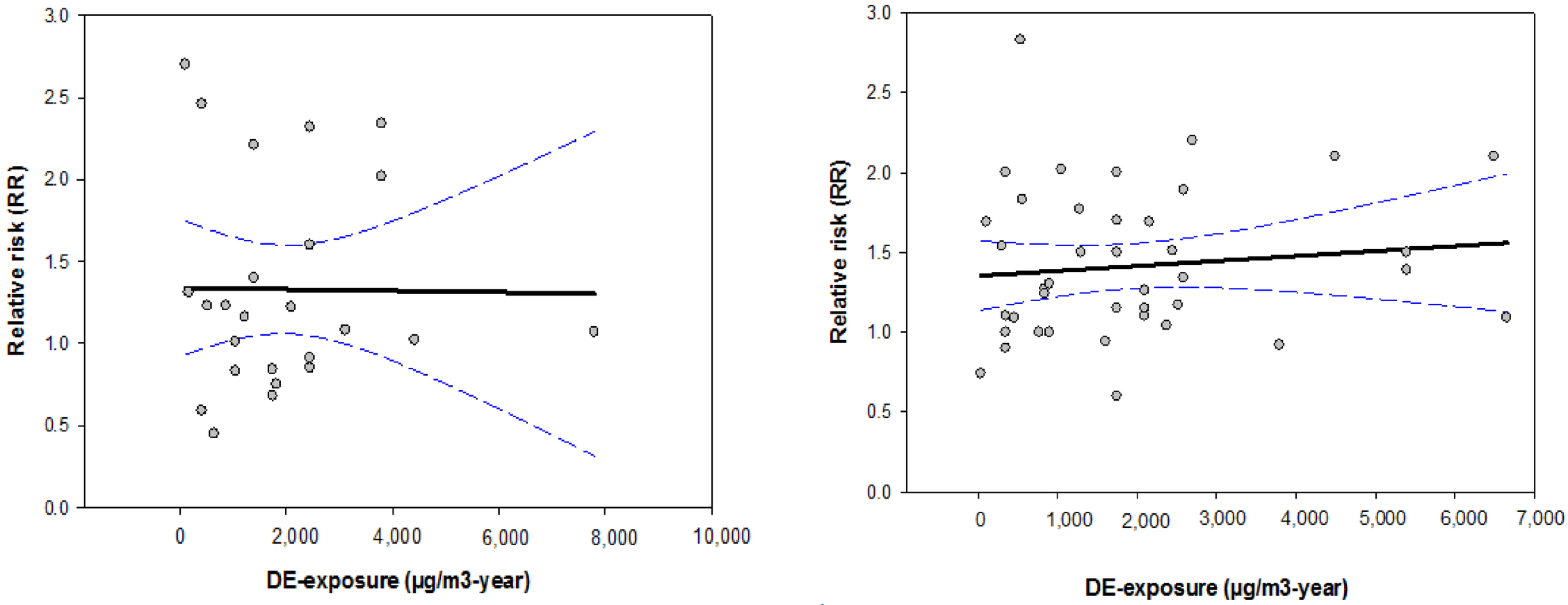
Objective interpretation and comparison of previous studies by using the MEGA-JEM.

- A job-exposure-matrix (MEGA-JEM) was developed based on the historical industrial hygiene data of MEGA.
- The MEGA database is a large industrial hygiene database of the Germen Social Accident Insurance
  - Established in 1972
  - Contains 2.4 million historical measurements of around 1,380 industrial chemical and biological agents.
  - 4,000 historical measurements of DE exposures are available in this database
- The values from the MEGA-JEM were considered during interpretation and comparison of previous studies as shown in Fig 1.

Fig 1. Effects of DE-exposures on the risk of lung cancer given in previously published cohort and case-control studies



Conclusion:

Overall, neither cohort nor case-control studies indicate a clear exposure-response relationship between DE exposure and lung cancer. Epidemiological studies published to date do not allow a valid quantification of the association between DE and lung cancer.

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