

# Bulletin Board

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## CHEMICAL EFFECTS

**Estimation of the dose of electronic cigarette chemicals deposited in human airways through passive vaping**

2021-07-08

Background: Existing studies on the health effects of e-cigarettes focused on e-cigarette users themselves. To study the corresponding effects on passive vapers, it is crucial to quantify e-cigarette chemicals deposited in their airways.

Objective: This study proposed an innovative approach to estimate the deposited dose of e-cigarette chemicals in the passive vapers' airways. The effect of the distance between active and passive vapers on the deposited dose was also examined.

Methods: The chemical constituent analysis was conducted to detect Nicotine and flavoring agents in e-cigarette aerosol. The Mobile Aerosol Lung Deposition Apparatus (MALDA) was employed to conduct aerosol respiratory deposition experiments in real-life settings to generate real-time data.

Results: For e-cigarette aerosol in the ultrafine particle regime, the deposited doses in the alveolar region were on average 3.2 times higher than those in the head-to-TB airways, and the deposited dose in the passive vaper's airways increased when being closer to the active vaper.

Significance: With prolonged exposure and close proximity to active vapers, passive vapers may be at risk for potential health effects of harmful e-cigarette chemicals. The methodology developed in this study has laid the groundwork for future research on exposure assessment and health risk analysis for passive vaping.

Authors: Wei-Chung Su, Ying-Hsuan Lin, Su-Wei Wong, Jin Y Chen, Jinho Lee, Anne Buu

Full Source: Journal of exposure science & environmental epidemiology 2021 Jul 8. doi: 10.1038/s41370-021-00362-0.

## ENVIRONMENTAL RESEARCH

**Ecotoxicological effects of microplastics on aquatic organisms: a review**

2021-07-05

Microplastics (<5 mm), which are classified based on primary or secondary sources, are widely distributed in the environment and exert significant effects on aquatic life forms; however, evidence regarding

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the ecotoxicological effects of microplastics on aquatic organisms is still limited. This research aims at filling a knowledge gap regarding generation sources, distribution, physicochemical properties, and biological behavior of microplastics (MP) in aquatic environments and their interaction with aquatic organisms. The literature indicates that concentrations of MPs observed in such environments are higher than the threshold for safe concentration (6650 buoyant particles/m<sup>3</sup>). MPs having large specific surface area, low polarity, and hydrophobic properties have been shown to absorb dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbon (PAHs), bisphenol A (BPA), polyfluoroalkyl substances (PFAS), antibiotics, and heavy metals. MPs adsorb large amounts of toxic organic chemicals (18,700 ng/g PCBs; 24,000 ng/g PAHs) and heavy metals (0.21-430 µg/g Cr; 0.0029-930 µg/g Cd; 0.35-2.89 µg/g As; 0.26-698,000 µg/g Pb). MPs originating from polystyrene (PS), polypropylene (PP), and polyvinylchloride (PVC) show greater toxicity toward aquatic organisms, with effects on the immune system, reproductive system, nervous system, and endocrine system. Thus, elucidating the cumulative toxic expression of MPs in different polluted environments is critical.

Authors: Huu Cong Vo, Minh Hen Pham

Full Source: Environmental science and pollution research international 2021 Jul 5. doi: 10.1007/s11356-021-14982-4.

**Indoor PM<sub>2.5</sub>, VOCs and asthma outcomes: A systematic review in adults and their home environments**

2021-07-02

Introduction: As the amount of time people spend indoors increases globally, exposure to indoor air pollutants has become an important public health concern. Asthma is a complex disease caused and/or exacerbated by increased exposure to diverse chemical, physical and biological exposures from multiple indoor and outdoor sources. This review aims to investigate the relationship between increased indoor PM and VOC concentrations (i.e. objectively measured) and the risk of adult asthma in higher-income countries. Methods: Eleven databases were systematically searched on the February 1, 2019 and again on the February 2, 2020. Articles were limited to those published since 1990. Reference lists were independently screened by three reviewers and authors were contacted to identify relevant articles. Backwards and forward citation chasing was used to identify further studies. Data were extracted from included studies meeting our eligibility criteria by three

**Introduction: As the amount of time people spend indoors increases globally, exposure to indoor air pollutants has become an important public health concern.**

**Background: Existing studies on the health effects of e-cigarettes focused on e-cigarette users themselves.**

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reviewers and assessed for quality using the Newcastle-Ottawa scale designed for case-control and cohort studies.

Results: Twelve studies were included in a narrative synthesis. We found insufficient evidence to determine the effect of PM<sub>2.5</sub> on asthma in the indoor home environment. However, there was strong evidence to suggest that VOCs, especially aromatic compounds, and aliphatic compounds, were associated with increased asthma symptoms.

Discussion & conclusion: Although no single exposure appears to be responsible for the development of asthma or its associated symptoms, the use of everyday products may be associated with increased asthma symptoms. To prevent poor health outcomes among the general population, health professionals and industry must make a concerted effort to better inform the general population of the importance of appropriate use of and storage of chemicals within the home as well as better health messaging on product labelling.

Authors: C A Paterson, R A Sharpe, T Taylor, K Morrissey

Full Source: Environmental research 2021 Jul 2;111631. doi: 10.1016/j.envres.2021.111631.

### Predicting Spatial Variations in Multiple Measures of Oxidative Burden for Outdoor Fine Particulate Air Pollution across Canada

2021-07-09

Fine particulate air pollution (PM<sub>2.5</sub>) is a leading contributor to the overall global burden of disease. Traditionally, outdoor PM<sub>2.5</sub> has been characterized using mass concentrations which treat all particles as equally harmful. Oxidative potential (OP) (per µg) and oxidative burden (OB) (per m<sup>3</sup>) are complementary metrics that estimate the ability of PM<sub>2.5</sub> to cause oxidative stress, which is an important mechanism in air pollution health effects. Here, we provide the first national estimates of spatial variations in multiple measures (glutathione, ascorbate, and dithiothreitol depletion) of annual median outdoor PM<sub>2.5</sub> OB across Canada. To do this, we combined a large database of ground-level OB measurements collected monthly prospectively across Canada for 2 years (2016-2018) with PM<sub>2.5</sub> components estimated using a chemical transport model (GEOS-Chem) and satellite aerosol observations. Our predicted ground-level OB values of all three methods were consistent with ground-level observations [cross-validation R<sup>2</sup> = 0.63-0.74]. We found that forested regions and urban areas had the highest OB, predicted primarily by black carbon and organic carbon from wildfires and transportation sources. Importantly, the dominant components associated with OB were different than

**Fine particulate air pollution (PM<sub>2.5</sub>) is a leading contributor to the overall global burden of disease.**

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those contributing to PM<sub>2.5</sub> mass concentrations (secondary inorganic aerosol); thus, OB metrics may better indicate harmful components and sources on health than the bulk PM<sub>2.5</sub> mass, reinforcing that OB estimates can complement the existing PM<sub>2.5</sub> data in future national-level epidemiological studies.

Authors: Jun-Wei Xu, Randall V Martin, Greg J Evans, Dana Umbrio, Alison Traub, Jun Meng, Aaron van Donkelaar, Hongyu You, Ryan Kulka, Richard T Burnett, Krystal J Godri Pollitt, Scott Weichenthal

Full Source: Environmental science & technology 2021 Jul 9. doi: 10.1021/acs.est.1c01210.

### OCCUPATIONAL

#### Risk of asbestosis, mesothelioma, other lung disease or death among motor vehicle mechanics: a 45-year Danish cohort study

2021-07-08

Introduction: The risk of asbestosis, malignant mesothelioma and lung cancer among motor vehicle mechanics is of concern because of potential exposure to chrysotile asbestos during brake, clutch and gasket repair and maintenance. Asbestos has also been used in insulation and exhaust systems.

Methods: We examined the long-term risk of incident mesothelioma, lung cancer, asbestosis and other lung diseases and mortality due to mesothelioma, lung cancer, asbestosis and other lung diseases in a nationwide cohort of all men registered as motor vehicle mechanics since 1970 in Denmark. This was compared with the corresponding risk in a cohort of male workers matched 10:1 by age and calendar year, with similar socioeconomic status (instrument makers, dairymen, upholsterers, glaziers, butchers, bakers, drivers, farmers and workers in the food industry, trade or public services).

Results: Our study included 138 559 motor vehicle mechanics (median age 24 years; median follow-up 20 years (maximum 45 years)) and 1 385 590 comparison workers (median age 25 years; median follow-up 19 years (maximum 45 years)). Compared with other workers, vehicle mechanics had a lower risk of morbidity due to mesothelioma/pleural cancer (n=47 cases) (age-adjusted and calendar-year-adjusted HR=0.74 [95% CI 0.55 to 0.99]), a slightly increased risk of lung cancer (HR=1.09 [95% CI 1.03 to 1.14]), increased risk of asbestosis (HR=1.50 [95% CI 1.10 to 2.03]) and a chronic obstructive pulmonary disease risk close to unity (HR=1.02 [95% CI 0.99 to 1.05]).

**Introduction: The risk of asbestosis, malignant mesothelioma and lung cancer among motor vehicle mechanics is of concern because of potential exposure to chrysotile asbestos during brake, clutch and gasket repair and maintenance.**

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Corresponding HRs for mortality were 0.86 [95% CI 0.64 to 1.15] for mesothelioma/pleural cancer, 1.06 [95% CI 1.01 to 1.12] for lung cancer, 1.79 [95% CI 1.10 to 2.92] for asbestosis, 1.06 [95% CI 0.86 to 1.30] for other lung diseases caused by external agents and 1.00 [95% CI 0.98 to 1.01] for death due to all causes. Conclusions: We found that the risk of asbestosis was increased among vehicle mechanics. The risk of malignant mesothelioma/pleural cancers was not increased among vehicle mechanics.

Authors: Reimar Wernich Thomsen, Anders Hammerich Riis, Esben Meulengracht Flachs, David H Garabrant, Jens Peter Ellekilde Bonde, Henrik Toft Sørensen

Full Source: Thorax 2021 Jul 8;thoraxjnl-2020-215041. doi: 10.1136/thoraxjnl-2020-215041.

### [Occupational cancers in urology]

2021-07-09

Cancers can be triggered by occupational causes. In the field of urology, bladder cancer is by far the most frequent occupationally induced tumor disease. Causes are particularly carcinogenic aromatic amines and carcinogenic polycyclic aromatic hydrocarbons. The frequency of this disease has shifted over the last decades from the classical hazard in the chemical industry to the users. Among a variety of hazardous occupations, hairdressers and painters are the best known. Rarely, renal cell carcinoma can be triggered by high trichloroethylene exposure and mesothelioma of the tunica vaginalis testis by asbestos. If a disease that can be caused by occupational activities has been confirmed (e.g. urinary bladder cancer), the risk factors must be recorded by a complete occupational history from the first employment on in order to be able to report a suspected occupational disease. In addition, spinal cord injury due to occupational and commuting accidents can lead to urinary bladder cancer over the long term.

Authors: Klaus Golka, Ralf Böthig, Olaf Jungmann, Martin Forchert, Micha El Zellner, Wolfgang Schöps

Full Source: Der Urologe. Ausg. A 2021 Jul 9. doi: 10.1007/s00120-021-01597-3.

### Cytostatic drugs and risk of genotoxicity in health workers. A literature review

2021-08

Objective: To analyse the genotoxic risk of cytostatic drugs in health professionals after occupational exposure.

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Method: Literature was searched for the databases PubMed, Lilacs, The Cochrane Library and Scopus with free and controlled language (MeSH terms) using boolean operators AND and OR. The research was limited to articles published between 2005-2016.

Results: 11 articles were selected depending on their relevancy to this review's aim. Nine of the 11 articles proved the existence of damage to genetic material (DNA) of health workers, who were exposed to cytostatics. Furthermore, current security practices do not eliminate the chance of exposure completely. Therefore, the creation of new clinical trials is required. Conclusions: Handling cytostatic drugs can cause a genotoxic risk to health workers who are exposed to these substances. This exposure may cause damage on the workers' DNA. There are not enough data to prove a cause-effect relationship between the genotoxic risk and adverse reactions on individuals. Health education will be the main way to raise the awareness and prevention this problem.

Authors: Macarena Mateo González-Román, Patricia Paloma Hidalgo García, David Peña Otero

Full Source: Enfermeria clinica [English Edition] Jul-Aug 2021;31(4):247-253. doi: 10.1016/j.enfcl.2019.07.004.

### Infantile neuroblastoma and maternal occupational exposure to medical agents

2021-07-09

Background: Healthcare workers are often exposed to hazardous agents and are at risk for adverse health consequences that affect not only themselves but also their infants. This study aimed to examine whether such occupational exposure increased the risk of childhood cancer in offspring.

Methods: We used the dataset of the Japan Environment and Children's Study, a nationwide birth cohort involving over 100,000 mother-child pairs. Information was obtained via successive questionnaires that were completed until the child turned 1 year of age. The parents were asked whether they occupationally handled medical agents during pregnancy. Results: A total of 26 infants developed neoplasms: neuroblastoma, leukemia, and brain tumor. The incidence of neuroblastoma was significantly higher in infants whose mothers were exposed to radiation (3/2142: 140.1 per 100,000 population) than in those who were not (12/90,384: 13.3 per 100,000 population). Multivariable regression analyses revealed a close association between maternal irradiation and the development of neuroblastoma [adjusted incident rate ratio: 10.68 [95% confidence interval: 2.98-38.27]]. Conclusions: The present

Cancers can be triggered by occupational causes.

Background: Health-care workers are often exposed to hazardous agents and are at risk for adverse health consequences that affect not only themselves but also their infants.

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study demonstrated, for the first time, a potential association between maternal occupational exposure and the occurrence of neuroblastoma in offspring. Further studies involving the large pediatric cancer registries are needed to confirm these preliminary results.

Impact: Healthcare workers are often exposed to hazardous agents and are at risk for adverse health consequences that affect not only themselves but also their infants. This study examined the association between such occupational exposure and offspring's cancers that developed until the age of 1 year. Maternal exposure to ionizing radiation was associated with infantile neuroblastoma in offspring. Further studies involving the large pediatric cancer registries are needed to confirm these preliminary results.

Authors: Yuhki Koga, Masafumi Sanefuji, Syunichiro Toya, Utako Oba, Kentaro Nakashima, Hiroaki Ono, Shunsuke Yamamoto, Maya Suzuki, Yuri Sonoda, Masanobu Ogawa, Hiroyuki Yamamoto, Koichi Kusuhara, Shouichi Ohga, Japan Environment and Children's Study (JECS) Group, Michihiro Kamijima, Shin Yamazaki, Yukihiro Ohya, Reiko Kishi, Nobuo Yaegashi, Koichi Hashimoto, Chisato Mori, Shuichi Ito, Zentaro Yamagata, Hidekuni Inadera, Takeo Nakayama, Hiroyasu Iso, Masayuki Shima, Youichi Kurozawa, Narufumi Suganuma, Koichi Kusuhara, Takahiko Kato  
Full Source: Pediatric research 2021 Jul 9. doi: 10.1038/s41390-021-01634-z.

## PHARMACEUTICAL/TOXICOLOGY

### The relationship between maternal perfluoroalkylated substances exposure and low birth weight of offspring: a systematic review and meta-analysis

2021-07-09

Some studies have shown that maternal perfluoroalkylated substances (PFAS) exposure may be associated with low birth weight (LBW) of offspring. We conducted a meta-analysis to assess the association between maternal PFASs exposure and LBW in offspring. The researchers searched PubMed, Science Direct, Scopus, Google Scholar, Web of Science, and Embase to find all the articles before October 2020. The Newcastle-Ottawa Scale was used to evaluate the quality of the studies. Finally, six articles were included for meta-analysis. Our meta-analysis showed no significant correlation between maternal perfluorooctanoic acid (PFOA) exposure and LBW of offspring: odds ratio (OR) = 0.90, 95% confidence interval (95% CI) = 0.80-1.01, with low heterogeneity (I<sup>2</sup> =

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18.4%, P = 0.289); there was a significant positive correlation between maternal perfluorooctane sulfonate (PFOS) exposure and LBW of offspring (OR = 1.32, 95% CI = 1.09-1.55) with no heterogeneity (I<sup>2</sup> = 0.00%, P = 0.570). The grouping analysis of PFOS showed a significant positive correlation between maternal PFOS exposure and LBW of offspring in American (OR = 1.44, 95% CI = 1.15-1.72). This study provided a systematic review and meta-analysis evidence for the relationship between maternal PFASs exposure and LBW of offspring through a small number of studies. Researchers should conduct further studies between different regions.

Authors: Tengrui Cao, Aibin Gu, Zixuan Li, Wenjuan Wang, Ran Liu, Xue Wang, Yaxiong Nie, Suju Sun, Xiaolin Zhang, Xuehui Liu  
Full Source: Environmental science and pollution research international 2021 Jul 9. doi: 10.1007/s11356-021-15061-4.

### Is cadmium a risk factor for breast cancer - results from a nested case-control study using data from the Malmö Diet and Cancer Study

2021-07-08

Background: Some studies have shown that cadmium is associated with breast cancer risk. One hypothesis is that cadmium has estrogen-like properties. This case-control study investigates the association between breast cancer risk and blood cadmium levels. Methods: All breast cancers in the Malmö Diet and Cancer cohort were identified through linkage to the Swedish Cancer Registry, baseline (1991-1996) through 2014. Two controls per case were selected from the same cohort. Blood cadmium (BCd) was analyzed at baseline. Associations were analyzed using logistic regression.

Results: Mean BCd was 0.51 µg/L among 1274 cases and 0.46 among 2572 controls. There was an overall increased risk of breast cancer (odds ratio (OR)=1.18 [95% confidence interval (CI) 1.05 - 1.36] per µg/L of BCd. An increased risk was, however, only found at high BCd: OR=1.34 [95% CI 1.05-1.73] for BCd >1.20 µg/L. The group with the highest BCd were mainly smokers. A spline indicated that at BCd <1.0 µg/L, the OR was not increased. The association with BCd was stronger in current smokers and at body mass index above 25, while no modification due to receptor status was found.

Conclusions: The results indicated increased risk of breast cancer only for high Cd exposure, which occurred mainly among smokers. This made it difficult to disentangle the effects of smoking and Cd, despite inclusion of smoking habits in the models.

Some studies have shown that maternal perfluoroalkylated substances (PFAS) exposure may be associated with low birth weight (LBW) of offspring.

Background: Some studies have shown that cadmium is associated with breast cancer risk.

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**Impact:** This study provides support for reducing cadmium exposure through smoking cessation and dietary choice. On the population level preventive measures against cadmium pollution are warranted.

**Authors:** Eva M Andersson, Malte Sandsveden, Niklas Forsgard, Gerd Sallsten, Jonas Manjer, Gunnar Engstrom, Lars Barregard

**Full Source:** Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology 2021 Jul 8;cebp.0181.2021. doi: 10.1158/1055-9965.EPI-21-0181.