

Diesel Exhaust and Asthma

Diesel exhaust is a mixture of particulates and gas. An estimated 1.4 million workers in the construction, mining, railroad, and transportation industries are exposed to diesel exhaust. Transportation industry workers include drivers, mechanics, and those in the merchant marine. Other potentially exposed workers are firefighters, traffic officers, tollbooth workers and garage attendants.

There are a large number of studies, both in animals and humans, on the health effects of diesel exhaust (<http://www.phi.org/uploads/application/files/xq1rssien18tmqtavs3k97m6ojpp6rey-hgmy3ajnh9jhcjy93r.pdf>). These include measurement of inflammatory cells and cytokine production after diesel exposure. Adverse effects have also been identified in animal studies in offspring after prenatal exposure to diesel exhaust. Aggravation of asthma in the general population has been associated with exposure to increased traffic, including diesel vehicles.

There are two reports of work-related asthma in workers exposed to diesel fumes. Two railroad workers had a specific high-level exposure to diesel exhaust that led to respiratory symptoms and hospitalization with: absence of pre-existing lung disease; persistent respiratory symptoms; and repeated pulmonary function tests showing obstruction and hyperreactivity (1). These individuals met the diagnostic criteria for Reactive Airways Dysfunction Syndrome (RADS).

From 1990 – 2000, 15 workers with occupational asthma attributed to diesel fumes were reported to the occupational asthma surveillance system in the West Midlands of the United Kingdom (2). Three of the 15 workers had positive methacholine challenge tests and positive peak flow testing associated with work in bus garages. The three workers were in their 50's and worked in bus garages: one as a mechanic, one as

a tire fitter and inspector, and one worked next to an emission tester. Two had never smoked cigarettes and one was an ex-smoker. Two had positive skin prick tests to common environmental antigens. None had childhood asthma. All had wheezing and shortness of breath, which started 1.5 – 15 years after beginning to work indoors with diesel buses. All three had improvement in their respiratory symptoms on days off and holidays and were on inhaled steroids.

Chronic exposure to diesel exhaust has been classified by the International Agency for Research on Cancer (IARC) as a Group I Carcinogen to Humans based on studies showing increased lung cancer in dock workers, miners, railroad workers and truck drivers. IARC also concluded there was sufficient evidence of carcinogenicity in experimental animals for whole diesel exhaust and diesel particulate. A possible role for exposure to diesel exhaust has also been reported in the increased incidence and mortality from COPD among railroad workers (4,5).

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Silicosis and Engineered Stone Kitchen Countertops

The first case of silicosis reported in the United States of an engineered stone countertop worker was in 2014. A 37 year old male developed progressive massive fibrosis (PMF) after ten years of polishing, laminating and fabricating kitchen countertops (1). In the last few months, the California Public Health Department has reported two individuals who died from silicosis who worked at a countertop fabricator in California. Previous to these U.S. reports all cases of silicosis from engineered stone countertops have been reported from overseas; 25 cases receiving lung transplantation in Israel (2), nine countertop fabricators from Spain (3) and 98 countertop fabricators with 15 having PMF in Australia (4).

Synthetic quartz-containing bathroom and kitchen countertops were first introduced in 1987. These engineered stone countertops are composed of a mixture of synthetic polymer resin with natural quartz aggregates, and have a silica content ranging from 85-93%. In contrast, the average silica content of pure granite countertops is 60-70%. Synthetic countertops with high silica content are manufactured under different brand names such as CaesarStone®, Silestone®, and Zodiaq®. The engineered stone countertops have attained increased popularity because of their strength, water resistance and pigment options in comparison to pure granite. Silestone® is manufactured in Spain with its U.S. corporate headquarters in Texas. Zodiaq® is a Dupont product manufactured at a facility in Canada. CaesarStone® has two manufacturing sites in Israel and one in Georgia. We do not have information on the number of fabricating shops in Michigan. However, we do know that there are over 1,000 distributors of the three brands of countertops in Michigan. These facilities are located across the state.

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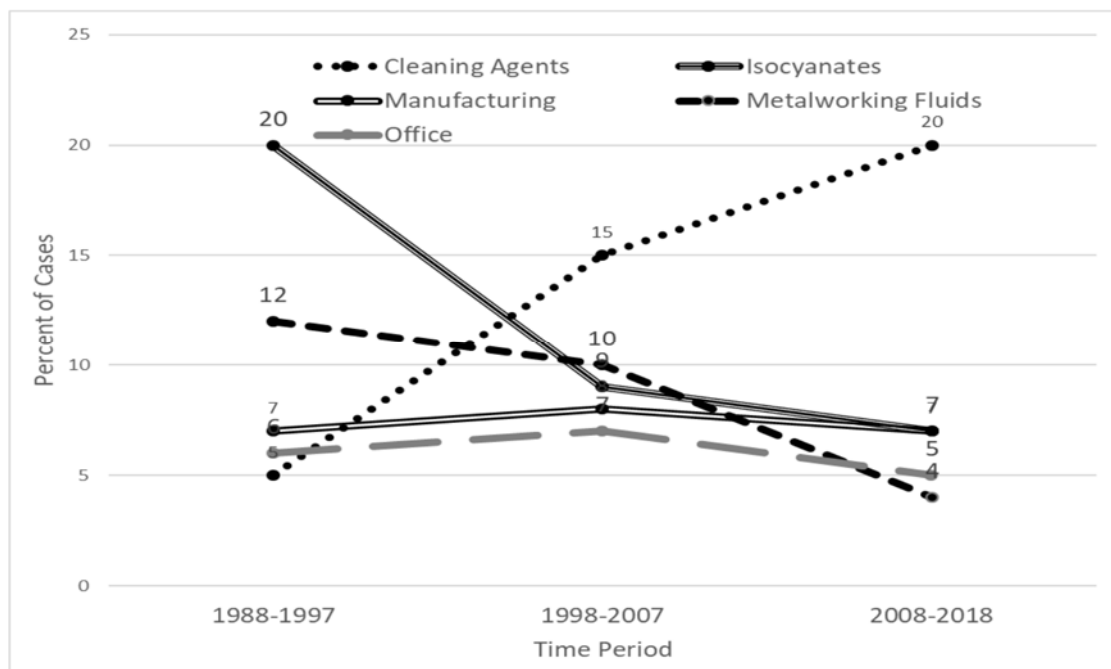
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We are interested in hearing if you have patients with respiratory problems from either working around diesel exhaust or from performing work related to fabricating kitchen countertops, please contact Kenneth Rosenman, M.D. at 1-800-446-7805.



Changes Over Time in the Exposures Causing Work-Related Asthma (WRA) among Reported WRA Cases, Michigan 1988-2018

Over the last 30 years, the percentage of WRA cases in Michigan associated with the top five exposures (cleaning agents, isocyanates, metalworking fluids, manufacturing and office) has changed. The percentage of WRA cases exposed to cleaning agents increased from 5% to 15% to 20% over the three time periods, while those exposed to isocyanates decreased from 20% to 9% to 7%. Metalworking fluids and office exposures also decreased over time. There was no change over the three periods in the percent of WRA cases associated with other manufacturing exposures.



Possible reasons for the decrease in WRA cases related to isocyanates and metal working fluids could be the introduction of improved engineering and controls, including product substitution for certain types of exposures, enclosure of work processes, and the use of personal protective gear. For example, despite an increase in the number of facilities using isocyanates in Michigan, from 107 in 2014 to 111 in 2016, the number of cases of isocyanate-induced asthma has continued to decrease.

The widespread use of cleaning agents in many industries likely contributes to the increase in cases secondary to cleaning agents. Increased use of disinfectants and changes in the disinfectants despite lack of evidence that their use is effective in preventing infectious disease in schools, daycare and food establishments (1, 2) and even some uses in health care facilities (3) may also be a factor.

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News

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In this issue: V30n3: Diesel Exhaust and Asthma

*Project
S Remember to report all cases of occupational disease!

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