Diesel exhaust fumes affect people with asthma, study finds

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Diesel exhaust fumes on polluted streets have a measurable effect on people with asthma, according to the first study looking at exhausts and asthma in a real-life setting, published on 6 December in the *New England Journal of Medicine*.

The new study looked at the effects on 60 people with mild and moderate asthma of walking along the western end of busy Oxford Street in London, where only diesel-powered taxis and buses are permitted.

The researchers, from Imperial College London, the New Jersey School of Public Health, and other international institutions, found that both during and after a two hour walk along Oxford Street, the test volunteers experienced increased asthmatic symptoms, reduced lung capacity, and inflammation in the lungs. It took a few hours for these to return to their normal levels.

The researchers confirmed their results by comparing how the same people were affected by a two hour walk in the traffic-free, western part of London's Hyde Park. Here, the volunteers experienced some of the same problems but to a far lesser degree.

This is the first study to investigate in a real-life setting, outside of the laboratory, if traffic fumes make symptoms worse for people with asthma. Two thirds of people with asthma believe this to be the case, according to Asthma UK.

The researchers believe that diesel exhausts cause problems for people with asthma because of the particulates - minute particles of dust, dirt, soot and smoke - which they release into the air. Particulates come in different sizes but those of less than 2.5 microns, and the tiniest "ultra fine" ones, can interfere with the respiratory system, because they are so tiny that they can be inhaled deeply into the lungs. Ultra fine particles can also be absorbed in the blood, which may have damaging effects.

The researchers found a correlation between the level of diesel exhaust particulates at street level during the two walks and reductions in lung capacity and increases in lung inflammation in the volunteers.

Diesel engines emit lower concentrations of carbon monoxide and carbon dioxide than petrol engines, but they can generate over 100 times more particles per distance travelled than similar sized petrol engines, and are major contributors to particulate pollution in the atmosphere. Previous studies have shown that in urban environments, almost 90 per cent of traffic-generated particulate matter is from diesel exhausts.

Professor Fan Chung, from the National Heart and Lung Institute at Imperial College London and one of the authors of the study, said: "Our study illustrates the need to reduce pollution in order to protect people's health. For the first time we are able to measure exactly what's happening inside the lungs of people with asthma when they spend only a couple of hours strolling in a real-life polluted area. By observing the effect of pollutant diesel particles on the lung surfaces, we can confirm that such an exposure causes inflammation in the lungs of asthmatic people.

"Our study should not necessarily deter asthmatic people from venturing into Oxford Street, but different measures to reduce the levels of pollution, and to protect the lungs of asthmatic people from the effects of pollution, should be considered," added Professor Chung.

The researchers measured air quality in the study areas and found more than three times as many ultra fine particles on Oxford Street compared with Hyde Park (65,229 pt/cc vs 18,298 pt/cc). The researchers also found that Oxford Street had more

than three times as much nitrogen dioxide in the air (80.8 vs 20.9 micrograms per cubic metre) and six times as much elemental carbon (12.4 vs 2.0 micrograms per cubic metre).

The researchers measured lung function; symptoms; exhaled nitric oxide and condensate from the breath; bronchial reactivity; sputum and blood. They took measurements before, during and after the volunteers' walks.

While the changes that were reported in their study were relatively modest, the researchers would now like to investigate the cumulative effects of exposure to these diesel fumes over time and to look at the effects of pollution on other conditions such as cardiovascular disease. They also want to look into whether the treatments currently available to combat asthma are able to reduce the effects of exposure to diesel exhausts on the lungs, for example by analysing if it is possible to reduce these effects by using an inhaler or tablets before going for a walk in a polluted area.

Source: Imperial College London