A cloud over our lives: Air pollution linked to learning problems and depression

By DAILY MAIL REPORTER

Air pollution has long been blamed for a host of heart and lung related illnesses.

Now scientists believe long-term exposure to smog can also make people lose their memory and become more depressed - as it physically alters the brain.

It could have huge implications for city dwellers across the world, it has been claimed.

Blamed: Air pollution leads to a loss of memory and depression, scientists claim

'The results suggest prolonged exposure to polluted air can have visible, negative effects on the brain, which can lead to a variety of health problems,' said Ohio State University's Laura Fonken.

'This could have important and troubling implications for people who live and work in polluted urban areas around the world.'

The study, which appears in the journal Molecular Psychiatry, is the first to show the negative impact of air pollution on the brain, rather than just the heart and lungs.

Researchers from Ohio State University's Department of Neuroscience collaborated with the university's Davis Heart and Lung Research Institute.

The team included Qinghua Sun, associate professor of environmental health sciences, and Sanjay Rajagopalan, professor of cardiovascular medicine.

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Previously the Davis research group had used mice to find that fine air particulate matter causes widespread inflammation in the body, and can be linked to high blood pressure, diabetes and obesity.

In the new study mice were exposed to either filtered or polluted air for six hours a day, five days a week for 10 months - nearly half their lifespan.

The polluted air contained fine particulate matter, the kind of pollution created by cars, factories and natural dust.

The fine particulates were tiny, the average width of a human hair, and can reach deep areas of the lungs and other organs.

Experiment: Mice were exposed to the kind of pollution produced by cars, factories and natural dust, over a period of 10 months

The mice were exposed to the equivalent matter that people who live in polluted urban areas could expect.

After 10 months of exposure the researchers then performed a variety of behavioral tests on the animals.

In a learning and memory test, mice were placed in the middle of a brightly lit arena and given two minutes to find an escape hole leading to a dark box where they would feel more comfortable.

The mice who breathed polluted air took longer to learn where the escape hole was located. They were also less likely to remember where the escape hole was when tested later.

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In another experiment mice exposed to the polluted air showed more depressive-like behaviours, with higher levels of anxiety.

The researchers tested the hippocampal area of the mice brains to find out how air pollution leads to changes in learning, memory and mood.

Results showed clear physical differences in the hippocampi of the mice who were exposed to polluted air compared to those who were not.

The researchers looked specifically at branches that grow off of nerve cells (or neurons) called dendrites, which have small projections growing off them called spines, which transmit signals from one neuron to another.

Mice exposed to polluted air had fewer spines in parts of the hippocampus, shorter dendrites and overall reduced cell complexity.

In other studies researchers found chronic exposure to polluted air leads to widespread inflammation in the body, which is linked to a variety of health problems in humans, including depression.

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