Air pollution creates drug‑resistant bugs

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Tiny particles found in air pollution can significantly worsen infections and make them harder to treat with antibiotics, scientists have discovered.

Grains of black carbon were found to help pneumonia and other respiratory diseases to spread into the lungs and grow into thick clumps that ward off antibiotics.

The fumes from diesel engines are the biggest source of black carbon in cities. It has already been implicated in thousands of deaths a year through stress to the cells in the human body and damage to the immune system. Now, however, it appears that it can turn the bacteria into superbugs that exacerbate a number of life-threatening illnesses.

Scientists at Leicester University found that the microscopic particles prompt the bugs to grow into thick structures known as biofilms that are harder for drugs to break down. Tests on mice also suggest that they help the bacteria to propagate deep into the body.

Black carbon levels in the air over Britain range from 0.2 micrograms per cubic metre in the countryside south of Edinburgh to 1.4 in central Glasgow and 7 in some parts of London. In the first research of its kind, a group led by Julie Morrissey, a microbial geneticist, exposed samples of *Staphylococcus pneumoniae* and *Staphylococcus aureus* bacteria, both of which cause potentially fatal lung infections, to a solution containing black carbon.

They found that the polluting particles, each no more than a hundredth of a millimetre in diameter, seemed to provoke a stress response in the bacteria, giving rise to tough chemical scaffolds that the body’s defensive enzymes struggle to prise apart.

There are some important caveats to the findings, which are published in the journal *Environmental Microbiology*. The concentrations of black carbon used by Dr Morrissey were thousands of times higher than those in the real world, in order to mimic the way pollution can build up. It is not clear whether this reflects what goes on in humans.