An up-close look at what air pollution is doing to your body

October 17 2014, by Ella Kelly

We are all aware that air pollution can be bad for our health – the World

Health Organisation estimated that ambient air pollution caused 3.7 million premature deaths worldwide in 2012 – yet what exactly happens to your body when it comes into contact with pollutants?

Scientists from the University of Melbourne's Faculty of Science are studying links between pollution and respiratory disease on a basic molecular level, revealing how pollutants interact with the lining of the respiratory tract.

To keep our air clean, the Australian Government closely monitors concentrations of dangerous pollutants, including nitrogen dioxide and ozone, which are produced through industrial practices such as transport and the burning of fossil fuels.

Currently, the concentrations of pollutants are below the national limits – yet these standards are constantly being updated to reflect new developments in the scientific understanding of the impact of pollution on health.

PhD candidate Luke Gamon and Associate Professor Uta Wille have been investigating how nitrogen dioxide and ozone, two common environmental pollutants, interact to cause harmful effects on the body.

When these pollutants are inhaled, they cause oxidative damage in the lining of the respiratory tract.

To examine this process in more detail, the researchers exposed peptides like those found in the respiratory tract to nitrogen dioxide and ozone (pictured) – and then examined the results with spectroscopy.

This method allowed the researchers to examine detailed chemical modification at a much higher scale than has previously been seen in this area of research.

Interestingly, the combined interaction of nitrogen dioxide and ozone caused much greater oxidative damage than the two molecules did alone.

When present together, nitrogen and ozone react to form the highly oxidative radical NO3 – which has a much greater impact on biological peptides and amino acids, and consequently, human health.

Luke Gamon said he hopes this work will help policy makers who control pollution levels make more informed decisions about air quality standards, ultimately reducing the risk to human health.

More information: "Oxidative damage of aromatic dipeptides by the environmental oxidants NO_2 and O_3." L F Gamon, J M White and U Wille, *Org. Biomol. Chem.*, 2014, DOI: 10.1039/c4ob01577k

Provided by University of Melbourne