

Ozone damage of molecules in the lungs

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Lungs are lined with a mixture of molecules to ensure that they function well. For example, some of these help with the removal of inhaled particles. Retention of a moist film at the surface is also crucial. Recent work published in *Langmuir* provides important ideas as to how some of these molecules are affected by ozone that can arise as a pollutant in the atmosphere and is known to be a severe pulmonary irritant.

The new study has focussed on phospholipids that are major components in both walls of biological cells and the fluid that covers the surface of the lungs. Simple measurements of layers of these molecules spread at a water surface suggested that a few ppm (parts per million) of ozone in oxygen can cause rapid degradation of a certain type of phospholipid followed, unexpectedly, by much slower changes over hours that arise from loss of the material from the surface.

Neutron reflection measurements at the ISIS facility near Oxford in the UK allow the amount of the material and the structure of the layers to be studied. A process in which partially degraded parts of molecules, known as radicals, are formed is suggested. These radicals cause further reactions and loss of material from a surface that would on its own be stable in the presence of ozone.

Katherine Thompson leader of the team at the Department of Biological Sciences, Birkbeck University of London said “This work demonstrates how much we can learn about the reaction of a major air [pollutant](#), ozone, with the fluid found at the surface of the lungs. We are keen to carry on our work and hope to better understand the damage caused by

[ozone.](#)”

“Neutron reflection is a unique tool to identify where particular parts of molecules are found in surface layers.” said Professor Adrian Rennie of the Department of Physics and Astronomy at Uppsala University. “We have a strong interest in applying our developments of this technique to a range of environmental issues.”

Provided by Uppsala University

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