

Full details

All details held on the selected case study are shown below.

Went live on	Title	Reference
9 Dec 2009	Assessing urban air quality's impact on lung tissue	SID0231

Synopsis

Research shows that the response of genes and proteins in human lung tissue exposed to an urban environment depended on the size of inhaled airborne particles. This has implications for public health and regulation of pollution sources worldwide.

Description

There is strong medical evidence that particles in the air we breathe into our lungs can cause increased hospitalisations and deaths from cardio-respiratory disease. There is also evidence that they can reduce lung development in children. The major source of particles in urban areas is motor traffic, in particular nanoparticles emitted in vehicle exhaust.

In this project, genes and proteins in human lung tissue exposed to air in an urban environment were found to respond in different ways. This was dependent on different-sized particles that made up the airborne pollutant. It was also noted that, for genes, there was more suppression (down-regulation) caused by particles, rather than stimulus (up-regulation). Significantly, it was found that for both genes and proteins, down-regulation increased for particles of progressively smaller size.

The work was carried out using real-time sampling methods. This involved collection of nanoparticles and state-of-the-art analysis of gene and protein responses. It was the first time that such responses to different sizes of ambient nanoparticles had been investigated in human lung tissue.

The relevance of the work is that there should be a worldwide investigation of the size and chemical composition of particles in the air and their impact on human health. This will inform policy and regulation of air-borne pollutants.

"Current policy and standards relating to particulate air pollution may not adequately address the risk to public health from nanoparticles emitted by motor vehicles," said Professor Ian Matthews of Cardiff University. "Our research is directed at an identifiable gap in scientific knowledge and shows a differential in effect by particle size. We aim to inform future policy on air pollution."

Mr Huw Morgan, Environmental Protection Advisor to the Local Government Association, said, "This research is very important. The failure of NO2 targets highlights the potential for health impacts driven by vehicular particulate emissions. Much effort will be expended in future in the assessment of methods of calculating reductions in population exposure and effects using established metrics. However, it is necessary to understand the biological mechanisms of damage to ensure proper protection measures."

The research was supported by NERC'S Environment and Human Health programme.

References and links

Hyperlinks

- [Cardiff University - Prof Ian Matthews](#)
- [Cardiff University - Prof Ian Matthews - Research](#)
- [NERC - Environment and Human Health](#)

Impacts

Research and funding

Funding type	Research Programme
Date of research	August 2007 - July 2008

Researchers at Universities

Grant reference	NE/E00833X/1	
Investigator	Professor I Matthews	Cardiff University, Division of Community Specialities
Co-investigator	Dr B Hoogendoorn	Cardiff University, School of Medicine

Co-investigator	Dr CJ Gregory	Cardiff University, Division of Community Specialities
Co-investigator	Dr K Berube	Cardiff University, School of Biosciences
Co-investigator	Dr TP Jones	Cardiff University, School of Earth and Ocean Sciences

Classification	
Science themes	Environment, pollution and human health
Science areas	Atmospheric
Policy areas	Pollution
Keywords	Air-borne pollutants, Nanoscience