



Aerosols and Health Effects

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Abstract

Concerns about the potential contribution of the Salton Sea to increased pulmonary health issues in its surrounding communities prompted researchers at the University of California Riverside to investigate the impact of Salton Sea aerosols on respiratory health. Animal studies have involved exposing mice in large chambers to dust from the exposed Salton Sea playa. Aerosolizing the collected dust for mouse exposure chamber studies revealed a strong response resembling the reaction to bacteria.

Introduction

Several years ago, researchers at the University of California Riverside began to suspect that the Salton Sea itself was contributing to the increased incidence of pulmonary health issues in the communities surrounding the Salton Sea. Air pollution poses a significant threat to environmental and human health, and armed with the resources and funding to investigate what is driving these effects on health, research began.

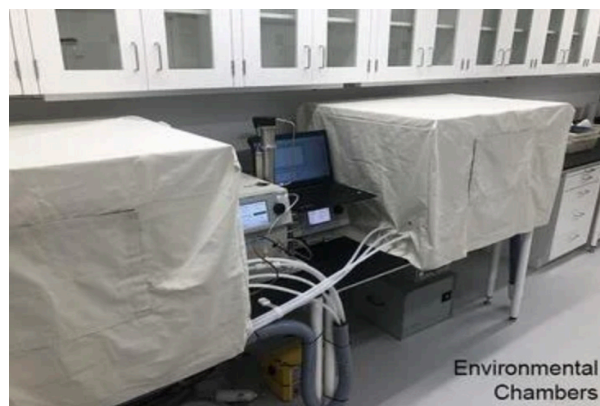
Research is often conducted using animal models before initiating clinical studies on human volunteers. Laboratory animals such as mice are biologically similar to humans and can be susceptible to many of the same health problems. In addition, scientists can control the environment around the animal (diet, temperature, lighting, etc.), which would be difficult and often unethical to

do with people. Results from animal studies can provide insights into similar effects in humans, though to be clear they are not exactly the same as humans and differences between species need to be taken into consideration. After animal studies are conducted, and depending on the results, clinical trials can then begin to either confirm the predictions made from animal studies, or refine our understanding of disease processes.



Development of large animal exposure chambers

In research on air quality and its impacts on health, researchers at UCR developed an environmental exposure chamber for animal studies that would simulate the kinds of exposure to aerosols experienced by humans in specific settings. By controlling the types of aerosols in the chamber, researchers can study the specific impacts of various kinds of dusts or air pollution.



Studies on the health impacts of the Salton Sea

With the development of the large animal exposure chamber, researchers at UCR then began to investigate the potential role of the Salton Sea dusts on pulmonary health. Mice in these chambers were exposed to various aerosols, including aerosolized Salton Sea water and aerosols from dusts collected around the region. Aerosolized Salton Sea water was able to trigger an inflammatory response distinct from an allergen, suggesting that material in the Salton Sea environment induced an immune response but it was not inducing an allergic response. The reason the focus was on comparing to allergic responses is that the high incidence of asthma in the community might have been expected to be caused by allergic immune responses.

The next step was to test the effects of the

aerosols produced from the dust collected around the region. Consistent with the response to aerosolized Salton Sea water, the dust aerosols triggered an immune response in the lungs that was clearly not an allergic response. In addition, the characteristics of the response resembled the response to microbial (bacterial) material. Thus, while the high incidence of asthma in the community might have been assumed to be due to a response to an environmental allergen such as plant pollen or fungus, the dust exposures point to a rather different type of inflammatory trigger. The research is now pursuing the possibility that bacteria in the Salton Sea ecosystem are producing toxic material that is causing lung inflammation in residents.

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