

Analytical Equations Relating Aerosol Risk to Surface Concentrations

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Project Scope:

In many cases human health risk from biological agents is associated with aerosol exposures. Environmental sampling conducted on surfaces can provide information about past and future aerosol risks presented by a biological agent. In this project, analytical equations are developed to relate the risk from aerosol exposure to the concentrations of spores on surfaces that could be sampled after a release.

Recent Progress:

Two scenarios are modeled. The first scenario assumes a release of aerosolized spores. This scenario is termed a retrospective risk scenario as the environmental samples would be used to infer past risk to occupants of the building. Analytical equations are developed to relate the past risk of mortality to the concentration of spores on four surfaces that could be sampled after the release 1) tracked floor, 2) untracked floor, 3) walls, 4) HVAC filters. These equations can be used to relate observed environmental concentrations to an allowable threshold for responding to risk. The second scenario assumes that the spores are initially on a tracked surface. This scenario is termed prospective risk, as environmental samples would be used to estimate future risk to occupants of the building. Analytical equations are again developed to relate risk to concentration of spores initially present on the tracked surfaces.

Future Plans:

In the future, we will focus on assessing the size distribution of aerosolized spores based on surface sampling results and identifying important uncertainties in the risk-sample relationships developed here.

Relevance to listed research areas:

This project is related to the area of Risk and Decision Sciences because it can provide guidance to incident response. By facilitating the estimation of risks, this work may assist responders in deciding whether response measures are justified, including vaccination and prophylactic treatment of exposed individuals, re-occupancy and decontamination of affected buildings.

Publications: Gurian, Dudley Ward, and Kenyon. "Responding to anthrax contamination: Listening to surfaces and talking to people," Society for Risk Analysis Annual Meeting, December 2006.