



Commentary

Indoor air as a vehicle for human pathogens: Introduction, objectives, and expectation of outcome



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Key Words:

Aerobiology
indoor air
airborne pathogens
air decontamination
airborne pollutants

Airborne spread of pathogens can be rapid, widespread, and difficult to prevent. In this international workshop, a panel of 6 experts will expound on the following: (1) the potential for indoor air to spread a wide range of human pathogens, plus engineering controls to reduce the risk for exposure to airborne infectious agents; (2) the behavior of aerosolized infectious agents indoors and the use of emerging air decontamination technologies; (3) a survey of quantitative methods to recover infectious agents and their surrogates from indoor air with regard to survival and inactivation of airborne pathogens; (4) mathematical models to predict the movement of pathogens indoors and the use of such information to optimize the benefits of air decontamination technologies; and (5) synergy between different infectious agents, such as legionellae and fungi, in the built environment predisposing to possible transmission-related health impacts of aerosolized biofilm-based opportunistic pathogens. After the presentations, the panel will address a set of preformulated questions on selection criteria for surrogate microbes to study the survival and inactivation of airborne human pathogens, desirable features of technologies for microbial decontamination of indoor air, knowledge gaps, and research needs. It is anticipated that the deliberations of the workshop will provide the attendees with an update on the significance of indoor air as a vehicle for transmitting human pathogens with a brief on what is currently being done to mitigate the risks from airborne infectious agents.

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“Clean air is a basic requirement of life. The quality of air inside homes, offices, schools, day care centres, public buildings, health care facilities or other private and public buildings where people spend a large part of their life is an essential determinant of healthy life and people’s well-being. . .” –World Health Organization, 2010

I welcome you all to this multinational workshop! This workshop was conceived over a year ago, and the organizing committee (Table 1) formally requested that ASTM International (www.astm.org/) hold the event under its auspices. ASTM’s Committee E35, which deals

with pesticides, antimicrobials, and alternative control agents, approved the proposal in April 2015.

Mounting recognition of indoor air as a vehicle for infectious agents is leading government regulators, such as the U.S. Environmental Protection Agency, to refine and update their guidelines,¹ researchers to develop better means of studying airborne pathogens,² and civil engineers and architects to find innovative means of making indoor air safer while keeping energy conservation in mind.³

Although comprehensive guidelines and standardized means are available to study chemical pollutants in indoor air;⁴ there remains a general lack of suitable experimental facilities and standardized protocols to quantitatively assess the survival of pathogens in indoor air and to document their removal and inactivation by physical and chemical means. This workshop will address these issues, among others.

SPECIFIC OBJECTIVES

The workshop’s specific objectives, therefore, are as follows:

- To provide a forum for the exchange of ideas on current research on the role of the indoor environment in general and indoor air in particular in the spread of human pathogens;

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Conflicts of Interest: None to report.

Table 1
Workshop organizing committee and support staff

Designation	Name	Affiliation
Chair	John A. Mitchell	Wordsmith Scientific and Regulatory, LLC, 3304 Wagon Wheel Rd, Bozeman, MT 59715
Co-chair	M. Khalid Ijaz	RB, One Philips Pkwy, Montvale, NJ 07645 and Adjunct Associate Professor of Biology, Medgar Evers College of The City University of New York (CUNY), Brooklyn, New York
Secretary	Mary K. Bruch	Mary Bruch Micro Reg Inc, 23 Hamilton Terrace, Hamilton, VA 20158
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Recording secretaries	Kathy Baxter, Darla Goeres, Rhonda Jones, and Carol Vincent	Members, ASTM Subcommittee E35.15, ASTM International, 100 Barr Harbor Dr, West Conshohocken, PA 19428

*Mary Mikolajewski and Ellen Diegel served as coordinators for ASTM in the early stages of the workshop planning.

- To discuss experimental facilities and test protocols for the study of airborne microbial survival;
- To review available means of recovering viable microbes from indoor air;
- To propose better surrogates for the study of indoor air as a vehicle for human pathogens;
- To model microbial movements in indoor air for further improvements in the design of experimental aerobiological facilities and test protocols; and
- To review ongoing research on physical and chemical means of indoor air decontamination.

The deliberations will also focus on the development of standards for assessing indoor air decontamination technologies and government regulations for registration of products to be marketed.

SPONSORSHIP AND FINANCIAL SUPPORT

As noted, this workshop has been organized under the auspices and with the support of ASTM International. The City University of New York and the University of Ottawa (Canada) are the 2 academic sponsors of the workshop, and financial support has been provided by RB (Montvale, NJ) and Microbac (Sterling, VA). These 2 companies are also funding publication of the workshop proceedings. We gratefully acknowledge their generous support.

THE PROGRAM

The organizing committee has put together an outstanding group of speakers who will offer a comprehensive yet balanced perspective on the key issues. [Table 2](#) lists the topics to be covered, along with the names and affiliations of the presenters.

WORKSHOP PROCEEDINGS

Elsevier (www.elsevier.com) has agreed to publish the proceedings of the workshop after peer review. Elsevier will also provide a preview of the proceedings, including the abstracts for each presentation, for release during the 2016 conference of the Association

for Professionals in Infection Control and Epidemiology. The workshop proceedings will also contain a summary of the concluding discussions.

TARGET AUDIENCE

Potential members of the audience include researchers in aerobiology, makers of air purification technologies, contract laboratories that assess air decontaminants, government regulators dealing with indoor air quality, and members of standards-setting organizations, such as ASTM International (www.astm.org) and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (www.ashrae.org).

BACKGROUND ON THE TOPIC

[Table 3](#) is a glossary of the common terms used throughout this workshop's presentations. This is included in an attempt to create a level playing field while facilitating the understanding of the subject matter by experts in fields other than environmental microbiology. However, the emphasis here is on working definitions, recognizing that efforts are needed to develop a more comprehensive glossary for broader applications in this area.

Aerobiology

Aerobiology, the study of living organisms and their components in air, became a full-fledged scientific discipline in 1964. This was followed in 1974 by the founding of the International Association of Aerobiology (<https://sites.google.com/site/aerobiologyinternational/>). The initial focus of this group was the study and movement of pollen, but microbes and other life forms were soon added to the mix with a corresponding broadening of the organization's scope ([Fig 1](#)). The microbiologic quality of indoor air comes under the rubric of aerobiology ([Fig 2](#)). This workshop will focus only on indoor air as a vehicle for human pathogens.

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