BIOAEROSOLS

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THE ABSTRACTS OF THE 6TH INTERNATIONAL SCIENTIFIC CONFERENCE ON BIOAEROSOLS, FUNGI, BACTERIA, MYCOTOXINS IN INDOOR AND OUTDOOR ENVIRONMENTS AND HUMAN HEALTH.

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INTRODUCTION AND OVERVIEW

Since our last meeting in 2003, the body of knowledge regarding indoor and occupational microbial exposure (fungi, bacteria and their allergenic, irritant and toxic by-products) and related diseases with important public health implications has grown significantly. Diseases such as allergy, asthma, inflammatory lung diseases, infections, and cases of mycotoxicosis and neurological or vascular disorders continue to be associated with exposure to bioaerosols. Complex reactions and interactions that result in adverse human health reactions pose great challenges to investigators, clinicians and public health officials.

Large scale natural disasters caused be storms and flooding that led to significant water damage and microbial contamination of homes and buildings have occurred in many countries throughout the world: USA, Australia, Pakistan, India, China, England, Poland, Germany, France, Belgium, and elsewhere. In addition to the human tragedy, the costs and technical challenges for cleaning and restoration are tremendous. How do we effectively protect the clean-up workers and the building occupants from harmful microbial contaminants (bacteria, mold, bio-toxins) and exposures?

We have learned that poor building and ventilation designs or maintenance, can contribute to increased microbial indoor exposure. Furthermore, the use of water-sensitive materials in areas with hot and humid climates, inadequate resources, as well as deficient renovation of existing architectural designs are factors that can lead to indoor mold growth. This has raised international concern about the impact of bioaerosols on the building occupants and workers' health.

Based on a focus group meeting at the Healthy Buildings 2009 meeting in Syracuse, N.Y., this 2011 Bioaerosols conference addressed the state of art research and practical experience to improve the understanding of microbials (bacteria, mold, bio- and mycotoxins), determine important agents and diagnosis of adverse human health effects, as well as explore new treatment approaches, and the control and prevention of such exposure. Scientific advances and knowledge gaps were discussed. Future research priorities were developed.

Precious artwork, books, paper documents and furniture contaminated with biologicals (mold, etc.) often contribute to occupant's exposure and patient complaints. Chemicals (called biocides) intended to kill bacteria and mold also are often harmful to humans and the environment. Little attention has been paid to these issues in hygiene practices and the systematic approach varies in the unregulated cleaning and restoration industry. Some say "a building keeps a memory" of a contamination, even after careful clean up! Some even suggest that such buildings or items should be condemned and destroyed. We would like to explore the scientific basis for safe materials and practice for the cleaning workers, users and building occupants.

Clearance criteria for re-occupancy and re-use shall be critically reviewed and any minimum consensus was explored

This meeting connected internationally-recognized researchers and leading investigators with "front line" practitioners and consultants addressing "real world" problems. We explored the scientific basis for what we do and recommend.

CONFERENCE RATIONALE, GOALS AND LEARNING OBJECTIVE

The 6th International Conference was a forum for the presentation and discussion on scientific papers in the field of bioaerosols in order to enhance the knowledge of professionals in the field. .

There is a need for enhanced knowledge for health care practitioners and other professionals regarding the proper diagnosis, pathology and treatment of adverse health effects from bioaerosols exposures encountered in the environment and work place, in particular in indoor environments or workplaces that involve handling biological waste products (composting), wet and damp buildings, allergenic and toxic biological by-products from mold and bacteria.

The now dated National Academy of Science/ Institute of Medicine scientific committee formulated in 2004 that there is a public health interest in the topic of Indoor Dampness and Health. However, it also identified that there is further research required to learn about the causal connections of certain exposures, biological agents and adverse health effects. The following research gaps were identified (Institute of Medicine (U.S.), 2004):

- "Given the present state of the literature, the committee identified several kinds of research needs. Standard definitions of dampness, metrics, and associated dampness-assessment protocols need to be developed to characterize the nature, severity, and spatial extent of dampness... Any efforts to establish common definitions must be international in scope because excessive indoor dampness is a worldwide problem and research cooperation promoted the generation and dissemination of knowledge.
- Research is also needed to better characterize the dampness-related emissions of fungal spores, bacteria, and other particles of biologic origin and their role in human health outcomes; the microbial ecology of buildings, that is, the link between dampness, different building materials, microbial growth, and microbial interactions; and dampness-related chemical emissions from building materials and furnishings, and their role in human health outcomes.
- Studies should be conducted to evaluate the effect of the duration of moisture damage of materials and its possible influence on occupant health and to evaluate the effectiveness of various changes in building designs, construction methods, operation, and maintenance in reducing dampness problems…."
- "Indoor environments subject occupants to multiple exposures that may interact physically or chemically with one another and with the other characteristics of the environment, such as humidity, temperature, and ventilation rate. Few studies to date have considered whether there are additive or synergistic interacti-

ons among these factors. The committee encourages researchers to collect and analyze data on a broad range of exposures and factors characterizing indoor environments in order to inform these questions and possibly point the way toward more effective and efficient intervention strategies."

- "The committee encourages the CDC to pursue surveillance and additional research on acute pulmonary hemorrhage or hemosiderosis in infants to resolve questions regarding this serious health outcome. Epidemiologic and case studies should take a broad-based approach to gathering and evaluating information on exposures and other factors that would help to elucidate the etiology of acute pulmonary hemorrhage or hemosiderosis in infants, including dampness and agents associated with damp indoor environments; environmental tobacco smoke (ETS) and other potentially adverse exposures; and social and cultural circumstances, race/ethnicity, housing conditions, and other determinants of study subjects' health.
- Concentrations of organic dust consistent with the development of organic dust toxic syndrome are very unlikely to be found in homes or public buildings. However, clinicians should consider the syndrome as a possible explanation of symptoms experienced by some occupants of highly contaminated indoor environments.
- Greater research attention to the possible role of damp indoor environments and the agents associated with them in less well understood disease entities is needed to address gaps in scientific knowledge and concerns among the public."

The WHO Regional Office for Europe commissioned a study and concluded in its 2008 review that the most important health effects of mold and dampness exposures are increased prevalences of respiratory symptoms, allergies and asthma as well as perturbation of the immunological system. (WHO, 2009) The document also summarized the available information on the conditions that determine the presence of mold and measures to control their growth indoors. The guidelines were intended to protect public health under various environmental, social and economic conditions, and to support the achievement of optimal indoor air quality. However, while the guidelines provided objectives for indoor air quality management, they did not provide specific guidelines and strategies for achieving those objectives. The WHO-EU guidelines recommended formulating policy targets, and that governments should consider their local circumstances and select actions that will ensure achievement of their health objectives most effectively. This requires learning the latest research results, risk analysis and communication, team and interdisciplinary work. Physicians, industrial hygienist and air quality specialists and consultants need to better understand the technical exposure assessment methods, language, and successful intervention and control strategies.

In 2010 a 'New York State Toxic Mold Task Force' made up of politically appointed academic and non-academic members issued a report to the Governor and Legislature of New York State regarding the public health status, needs and research gaps. It was concluded that several information and data gaps exist regarding the timely recognition, assessment and control of environmental toxic and non-toxic biologicals (i.e., mold or fungi) in areas of indoor environments, public health and prevention (New York State Department of Health, 2010). The task force states that it focused their analysis on newly-emerging scientific information and on identifying areas where significant knowledge gaps still exist that appear to "substantially hinder decision making". Although some criticize that the committee lacked specific inside expertise and apparently failed to consider newer scientific papers and knowledge since the NAS analysis in the early 2000s and should have involved a broader spectrum of experts in the committee, the following conclusion and uncertainties were never the less summarized in their report:

- Exposure to building dampness and dampness-related agents including mold has been recognized nationally and at the state and local level as a potential public health problem.
- Asthma and other allergic respiratory diseases that can be exacerbated by mold exposures are common in NYS. This means many people are at risk for exacerbation of their respiratory conditions by exposure to mold conditions in buildings.
- Evidence for associations between non-respiratory effects and mold exposures in buildings is much more limited and generally does not allow clear conclusions to be drawn one way or the other.
- Molds, along with other organisms such as bacteria, mites and insects that proliferate in damp buildings, produce volatile compounds, spores and other minute particles that can cause irritant and allergic responses that range from annoying to serious depending on the amount of exposure and the immune system of the individual. Although some molds produce toxins, their contribution to adverse health effects in damp buildings, based on existing scientific information, is uncertain.

The 6th Annual International Scientific Conference on Bioaerosols, Fungi, Bacteria, Mycotoxins in Indoor and Outdoor Environments and Human Health addressed key areas of these identified knowledge gaps and provided scientific research, data, didactic materials and learning opportunities, that shall target change in knowledge, attitude, confidence and beliefs, practice-based clinical skills of health care providers with different professional background and specialty expertise. At the completion of the scientific meeting, the physician, industrial hygienist, health and safety specialist as well as public health officials and other participants gained a wor-

king knowledge of practical definitions, science based evidence to apply in their professional practice.

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About the Conference Organization:

The Fungal Research Group Foundation, Inc. and Dr. Eckardt Johanning organized the first international scientific meeting on " Bioaerosols, Fungi and Bacteria, Mycotoxins in Saratoga Springs, New York in 1994, and following in 1996, 1998, 2000 in Helsinki, Finland (together with Healthy Buildings 2000), and in 2003 which brought together a wide range of leading international researchers and health specialists devoted to public health and prevention. Proceeding books of the scientific presentations were published for the 1994, 1998 and 2003 and were made available for generally distribution.

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