Update and Overview of Mold Contamination in Post Katrina New Orleans

L. Faye Grimsley, PhD, CIH
Associate Professor
Tulane University
Presentation Overview

- Brief Facts about Mold
- Mold Sampling Methodologies
- Mold Sampling Post Katrina
- Suggested Ways to Communicate Results
- Words of Wisdom
- Recommendations and Conclusions
Mold Health Hazard Facts

- Molds are a potential health hazard
  - Allergy
  - Infection
  - Toxicosis
  - Evidence of clinical illness (in humans and animals) from ingestion of significant quantities of mycotoxin-contaminated foodstuffs
  - Illness associated with bioaerosol exposures in agricultural or industrial environments has also been reported
  - Relevance of these findings to the indoor (non-industrial) environment is unclear
Measuring Indoor Mold in the Home

- Bulk sample
- Surface wipe
- Dust collection
- Air sample
Assessing Mold Exposure in the Home

- Air sampling
  - Short term
  - Long term (integrated)

- Lab analysis
  - Spore counts
  - Colony counts
  - MSQPCR
Home Environmental Assessment

- Air sampling for fungal spores
  - Spore traps
  - Indoor/outdoor

- Analysis conducted by third party laboratory
Katrina Related Exposure Surveys

- Mold – CDC/LaDEQ
- Mold - NCHH
- Mold – NRDC
- Mold – NIEHS
- Katrina Cough- NIOSH
NCHH -New Orleans Pilot Project

- Best remediation practices
- Conducted in 4 flood damaged homes
- Results are available:


- National Center for Healthy Housing: http://www.centerforhealthyhousing.org/
NCHH Data

- **Baseline Culturable Mold**
  - Ranged from 22,000 – 515,000 CFU/m³

- **Baseline Spore Counts**
  - 82,000 – 630,000 spores/m³

- *Penicillium, Aspergillus*, and *Paecilomyces* predominated
NRDC Survey

- Natural Resources Defense Councils (NRDC)

- Airborne mold and endotoxin surveys conducted between October and November 2005

- Partial drywall removal and other walls scrubbed with bleach had average mold concentration of 377,000 spores/m³
NRDC Selected Results

- Most common types of mold Cladosporium (in non-flooded)
- Aspergillus/Penicillium species in flooded homes
- Spore counts flooded homes
  - Ranged from 11,000 to 650,000 spores/m³
Post Katrina Mold Levels

- Spore concentrations un-gutted flood damaged homes (n=12)
  - Range (1,674 - 101,086 spores/m$^3$)
  - Geometric mean (12,442 spores/m$^3$)

- Outdoor concentrations (n=5)
  - Range (1,121- 8,445 spores/m$^3$)
  - Geometric mean (2,771 spores/m$^3$)

T. Reponen et al., Atmospheric Environment (online 6-27-2007)
Predominant Mold Spores Identified

- Aspergillus
- Penicillium
- Cladosporium
- Stachybotrys
- Chaetomium
Outdoor Mold Concentrations Pre-Post Katrina Comparison*

- Pre-Katrina (2003)
  - Mean concentration P/A (885 spores/m³)

- Post-Katrina (10/2005)
  - Mean concentration P/A (1,562 spores/m³)
  - Elevated Chaetomium
  - Eurotium and Stachybotrys detected

“Aerosolization of fungi, (1→3)-\( \beta \)-D glucan, and endotoxin from flood-affected materials collected in New Orleans homes”

Simplified Title: Biocontaminant Sampling in Post-Katrina N.O.

Joint Collaborative HUD Research Investigation (Univ. Cinn., Tulane, Columbia Univ.)
TU- UC Mold Sampling: Design

- Project Period: Spring ‘07 – Winter ‘07
- 1° Focus: Mold spores, endotoxins, and dust mites in flood-damaged N.O. homes
- 2° Focus: Testing new device for mold spore detection
- Criteria:
  - At least 3 feet of indoor floodwater
  - Visible signs of mold and/or water damage
  - Partially renovated – walls and floor not replaced in sampling room
  - Source of electricity
Example: Mold in Home
Example: Water Damage
HUD Biocontaminant Results

- **Mold**
  - Indoor range (200 – 8,128 spores/m³)

- **Predominant spore types**
  - Penicillium
  - Aspergillus
  - Cladosporium
  - Ascospores
  - Basidiospores
Head-off Environmental Asthma in Louisiana

(HEAL)
HEAL Study Aims

- **Primary objective:**
  - Evaluate the effectiveness of a novel asthma case management intervention, emphasizing environmental risk control among children with asthma in the recent natural disaster setting of post-Katrina New Orleans.
  - This project tests the hypothesis that morbidity can be reduced among children with moderate to severe asthma by an enhanced asthma counselor program that provides both asthma case management and guidance for addressing environmental factors such as moisture, mold, and allergens.

- **Additional objectives:**
  - Characterize relationships between environmental allergens, exposures, and asthma morbidity in post-Katrina New Orleans
  - Collect and bank biospecimens to support other genetic and gene × environment studies of asthma
Environmental Assessments Background

- **Home environmental evaluations**
  - Visual Inspection
    - Walkthrough - checklist
    - Interview - questionnaire
  - Moisture Survey
  - Air Sampling
    - Indoor and outdoor mold
  - Dust Sampling
    - Dust mites, cockroach, mouse, mold
    - Glucans, endotoxin
Communicating HEAL Environmental Exposure Data to Participants

**Methods used:**
- Prepare and provide FAQs
- Outline exposure data
  - Tables
  - Charts/graphs
- Develop letter explaining results
- Explain results in person
- Provide results and contact information by mail
Ways to Communicate Results

- Oral-in person
- Town Hall Meetings
- Neighborhood Associations
- Non-profit Organizations
- Faith-based Organizations
- Written Exposure Summary
Written Format

- Memorandum
- Letter
- Tables
- Charts
- Graphs
- Brochures/Pamphlets
- Electronic
- Combination
Challenges to Communicating Mold Results

- Health-based indoor exposure limits have not been established
- No exposure response relationships
- Limited standardized sampling protocols
- Currently few regulations regarding identification, testing, or remediation of mold problems
Words of Wisdom

- Articulate complex scientific concepts to laypersons with sensitivity
- Create the right atmosphere
  - Open dialogue
- Use applicable examples
- Always tell the truth
Recommendations and Conclusions

- Immediately following Katrina mold levels were elevated
- Mold levels have decreased since Katrina
- Proper remediation does reduce mold levels
Recommendations and Conclusions

- People entering into mold contaminated homes should wear resp. protection—at least an N-95 respirator

- Respiratory protection is especially important for people doing deconstruction and renovation work.
Recommendations and Conclusions

- Respiratory Protection Training
  - Training in English and Spanish
  - Fit testing

- Future Mold Surveillance
  - Tracking
  - Enable prevention of respiratory disease

"Mold Exposure and Health Effects Following Hurricanes Katrina and Rita"
Annual Review of Public Health, Vol. 31, Apr 2010
Any Questions???