INTRODUCTIONS

Moderator:
Gillian Giem, Program Manager of USGBC West Michigan

Speakers:
Pasquale Demitrio, Head of Sales HVAC North America, Carel
Jon Rumohr, Manager of Mechanical Engineering, TowerPinkster
What is the Most Exciting topic in Healthcare Today?

Humidification!

COVID-19 !!!
Overview

1. Humans and the Healthy Zone
2. Pathogens and How They Travel
3. Reduced Infectivity
4. Indoor Environment
5. Conclusion
1. Humans and the Healthy Zone
Low ambient humidity impairs barrier function and innate resistance against influenza infection

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Contributed by Akiko Iwasaki, April 4, 2019 (sent for review February 19, 2019; reviewed by Gabriel Núñez and Peter Palese)

These results indicate that exposure to dry air impairs host defense against influenza infection, reduces tissue repair, and inflicts caspase-dependent disease pathology.
Mucosal Breakdown and Immune Defense

Landmark research reveals how humidification protects airways from influenza disease

**RH 50%**
Gets rid of the virus or gets mildly sick

**RH 20%**
Gets very sick
Mucosal Breakdown and Immune Defense

Our internal defense

Mucociliary Clearance

Upper airway protection at RH 50%

- Improved mucociliary clearance
- Enhanced protection induced by Interferon
- Decreased inflammation and tissue damage
- Enhanced tissue repair
Mucosal Breakdown and Immune Defense

Our internal defense

Mucociliary Clearance
https://youtu.be/Zi9RcyYbeGc?t=125
Adult airways (nasal, throat, lungs) are roughly 85% water.

What happens when we stay in a dry room 15% RH?

The universe seeks equilibrium.
2. Pathogens and How They Travel
Infectious droplets shrink and travel in dry air

- **6 seconds**
- **1.5 hours**
- **41 hours to 21 days**

- **>40% RH**: Diameter: 100 um
- **3 um**: Diameter: 10 um
- **0.5 um**: Diameter: 0.5 um
- **<20% RH**: Diameter: 1 um

Distance Traveled: 33+ FT
Pathogen Travel vs. Humidity (RH%)
Routes of Travel COVID-19

← Prevention →
Airborne transmission of SARS-CoV-2: The world should face the reality

Lidia Morawska\textsuperscript{a,}\textsuperscript{*}, Junji Cao\textsuperscript{b}

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\textsuperscript{a} L. Morawska and J. Cao

Fig. 1. Larger droplets with viral content deposit close to the emission point (droplet transmission), while smaller can travel meters or tens of meters long distances in the air indoors (aerosol transmission).
3. Infectivity of Virus
Patient Health: Aerial Transmission

NIOSH Flu Study

Infectious droplets shrink and travel in dry air:

- 6 seconds: >40% RH (Diameter: 100 um)
- 1.5 hours: Float time (Diameter: 3 um)
- 41 hours to 21 days: <20% RH (Diameter: 0.5 um)

**Distance Traveled:**
- 33+ FT (3 feet)
4. Indoor Environment
Indoor Environments

**HOSPITALS**
Very High Risk for Spread of Infections, Vulnerable Population

**Long Term Care / Nursing Homes**
24/7 Living, Elderly Population, Comorbidities

**WORK / OFFICES**
Easy to spread, Productivity, Absenteeism

**SCHOOLS**
Easy to spread, Absenteeism, Cognitive Function

Healthy Zone
40-60% RH

**HOME**
Majority Hours spent in Home

90% of Time Spent Indoors
Indoor Microbiome Animation
5. Conclusion

“Get in The Zone”
HUMIDITY IN YOUR BUILDING

Know your building envelope

Vapor Barrier, Wall Construction, and Window Types

**HOT CLIMATES/SUMMER**

1. Brick Veneer
2. Air Barrier
3. Exterior Construction Board
4. Fiberglass Insulation
5. Vapor Barrier
6. Interior Wall Board

**GOOD OPTION!**

**COLD CLIMATES/WINTER**

1. Brick Veneer
2. Air Barrier
3. Exterior Construction Board
4. Fiberglass Insulation
5. Vapor Barrier
6. Interior Wall Board

MOISTURE/ VAPOR DRIVE
HUMIDITY IN YOUR BUILDING

Know your building envelope

Have a professional evaluate your building and complete a dewpoint analysis.
HUMIDITY IN YOUR BUILDING

Know your building envelope
Solutions for consideration

Keep your perimeter warm! Use perimeter heat and/or slot diffusers at the exterior wall.

Use controls to reduce RH to below space surface dewpoints
QUESTIONS?

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