



Episode 785 | August 21st, 2026

Gene Cole, DrPh

The life and times of a public health and infection control Titan, Part 2

Good Day and welcome to IAQ Radio+ episode 785 blog. This week we continued our interview with Eugene “Gene” Cole, DrPH, bridges the gap between deep, academic public health research and the boots-on-the-ground cleaning and restoration industries. Dr. Cole has spent over 35 years showing why cleaning is an essential branch of public health. Learn More this week on IAQ Radio+.

Dr. Gene Cole is Director of Research for LRC Indoor Testing & Research, Cary, NC; and formerly Professor of Environmental Health Sciences at Brigham Young University, Provo, UT. He has 35 years of research experience, with a primary focus on the ecology of indoor and work environments, with special emphasis on identification and reduction of pollutant reservoirs and sources, bioaerosols, human exposure assessment and control, product evaluation, cleaning and restoration, mold and sewage remediation, and biocides.

Since 2000, he has continued to conduct research on the relationship between the use of antibacterial cleaning and hygiene products in the home, and antibiotic resistance; as well as on the effectiveness of cleaning to reduce the transmission of disease agents in schools. He has also worked with national and international organizations to address environmental health and infectious disease concerns such as medical waste management in Central Europe and Southeast Asia, hygiene promotion in Africa, and healthy homes and buildings in the U.S. and Asia.

Dr. Cole is a member of the Scientific Advisory Council of the Cleaning Industry Research Institute (CIRI), and a Fellow of the American Industrial Hygiene Association. He holds a Master of Science in Public Health Microbiology and a Doctor of Public Health in Biohazard Science and Occupational Health, both from the University of North Carolina at Chapel Hill.

Nuggets mined from today's episode:

What is your definition of "Clean"? Dr Cole defines "clean" as a result that leads to negligible risk of human exposures and health risk?

ATP: You were a pioneer in researching Adenosine Triphosphate (ATP) testing as a metric for cleaning effectiveness during sewage intrusion remediation and later participated in a large study of cleanliness in schools. Walk us through the findings of the studies.

-ATP is the driving energy force of all living cells. ATP is a terrific marker for comparative measurement of soiling and cleanliness. Richard Shaughnessy and Greg Whiteley are other notables who have experience studying the use of ATP in real world studies. In regard to ATP testing during Covid, when using a 1 step combination cleaner/disinfectant on soiled hard it took 3 applications to get surfaces to satisfactory levels. ATP is a useful tool for Covid PRV because ATP measures the *Milieu* (physical environment or surrounding) of the surfaces being tested. In studies in an elementary school ATP found that after cleaning/disinfecting of high touch surfaces, original levels of contamination would recur within 3 days. Knowing this, cleaning was prescribed at a maximum of 2-day intervals.

ATP was used to demonstrate to custodians and management the improvement in cleanliness of each repeated cleaning. ATP was used to demonstrate exposure reduction by lowering levels of disease-causing organisms. During a school study in which Gene was involved (Nov 2019- March 2020) an outbreak occurred in one of the schools used as a control, Gene's prescribed cleaning protocol was used to quell the outbreak. Educating custodians to superintendents on the importance of shifting focus away from floor and onto "high-touch surfaces", effective cleaning methods and frequency to prevent outbreaks.

The Disinfection Disconnection: You've written about the "disinfection disconnection". In the wake of recent global health events, do you think the public—and the cleaning industry—has over-relied on the labor-saving activity of spraying antimicrobials rather than removing the organic load/soil?

-The subject of disinfection is controversial. Active Ingredients used to manufacture disinfectants vary in safety, efficacy and cost. In the 1970's, historically infection control was not a significant force. Pseudomonas outbreaks raised awareness. Pseudomonas aeruginosa is a pathogen of medical importance. Pseudomonas is resistant to antimicrobials. A study of disinfectants found pseudomonas growing in quaternary chloride-based disinfectants.

Dr Cole recounted the story of a Japanese scientist fascinated by dysentery who was doing gain of function research on Shigella bacteria. He was successful in creating a Shigella strain that is totally resistant to antimicrobials. This strain is globally banned out of fear of its use as a bioterrorism weapon. The researcher succumbed to his strain of shigella when he accidentally infected himself and doctors were unable to save him.

All EPA registered antimicrobial active ingredients are not created equal. What is your opinion of antimicrobial active ingredients such as "citric acid" which provide both cleaning and antimicrobial capability?

-Generally supportive of citric acid chemistry, recommends routine product testing and routine rotation of disinfectant products.

You conducted an interesting study on whether in-place carpet drying results in bacterial amplification after clean water intrusion. What did that research reveal, and how should it change how a standard restoration contractor approaches a flooded room?

-Time and temperature are both contributors to microbial amplification.

As an expert in sewage remediation and antimicrobials, what is the most dangerous piece of misinformation currently circulating among restoration contractors when they deal with Category 3 water intrusion?

-Effective prevention against airborne cross contamination. Importance of training restoration workers on PPE. Dr Cole told of a remediation contractor who had bread baking in the oven when residents returned to their home following sewage intrusion remediation. Z-Man commented on his observation that plumbers have strong immune systems as he rarely sees them wearing PPE.

Dr. Cole recounted a litigation case in which 6,000 gallons of sewage backed up into the basement of a home while the occupants were away. The HVAC system was left running to cool the home. When the restoration firm responded, there was little liquid left to extract, presumably most of the water drained out and much of what remained evaporated. The HVAC system, partially submerged in sewage, was turned off. The HVAC system was subsequently turned on to comfort the workers, resulting in airborne cross contamination of the structure. The case is 6 years old, and the owners are still residing elsewhere.

Are most indoor microorganisms nonpathogenic? If so, since they multiply under favorable conditions and stop when conditions are unfavorable, would you expect them to become pathogenic over time—within 48 to 72 hours?

- Properties have a “pre-event contamination baseline” before a water loss. Tap water isn’t sterile. Preexisting fecal matter of humans and animals exists. Based upon the “pre-event contamination baseline” even a category 1 water loss can become category 3 over time.

What is your opinion on environmental use of antimicrobials relationship to the evolution of “superbugs”?

-Dr. Cole attributes antibiotic resistant “super bugs” to the over prescription of antibiotics NOT use of topical antimicrobials.

ROUNDUP

Pete Consigli- Global Restoration Watchdog, Industry Historian & Moisture Mob Consigliere

Historical perspective= The impetus for development of the S-500 Water Damage Standard is the result of a California lawsuit over sewage intrusion. A water loss occurred in a multi-unit building caused by construction defects resulting in fungal and bacterial amplification inside interstitial spaces. At the time of the loss, it was not common practice to open wall cavities on water losses. Legal questions over “what is the right thing to do” resulted in a white paper, a collaboration between industry and researcher which was subsequently published in a scientific journal. A consensus opinion was “any standard of care is better than no standard of care.”

Link to the white paper:

<https://www.thefreelibrary.com/Suggested+guidelines+for+remediation+of+damage+from+sewage+backflow...-a016352864>

Citing the example of “in-place drying,” Pete expressed his concern over self-serving interests/product recommendations that have found their way into IICRC standards.

Dr. Gene Cole

- Loved the opportunity to exchange ideas with practitioners during development of voluntary industry standards. (e.g. gaps in science, what practitioners know and don’t know, etc.).
- Recounted the “sugary cereal commercials”, where the bowl of cereal is positioned on a table with fruit, milk and the voiceover says part of a nutritious and healthy diet. Dr. Cole resisted opportunities to do research (he deemed unethical) for private companies who sought him out to conduct research proving superiority, uniqueness, or to support unwarranted health claims for their products.

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Most rewarding:

Looking back at your time as a Professor of Environmental Health Sciences at BYU and your work in the private sector, what has been the most rewarding evolution you have been a part of in IEQ field?

-The value and importance of industry standards as living documents that keep up with emerging science.

Advice for the Next Generation:

For the young industrial hygienists, restoration professionals, and indoor environmental consultants listening today—what is the most critical piece of advice you can give them as they carry the torch of environmental health into the future?

-Every man-made structure is a man-made artificial ecosystem. Artificial ecosystems are prone to go awry.

Key Building Considerations: Construction, Operation, and maintenance.

Key Occupant Considerations: Exposure Dose, the Organism and the Immune Status of the occupants.

The Next Frontier:

If you were advising a young researcher or a new industrial hygienist entering the field today, what is the unsolved mystery or the next major frontier in indoor environmental health that they should focus on?

-EMFs, *electromagnetic fields*. Dr Cole recounted a story of a building investigation of a “smart home” in which a lightbulb glowed when placed on the bed in a second-floor bedroom.

Learn more about EMFs IAQRadio Episode 495

<https://www.iaqradio.com/sal-la-duca-environmental-assay-inc-electricity-emfs-ieq-part-2-how-to-assess-issues/>

The Legacy:

When people look back at the contributions of Dr. Gene Cole to the fields of public health, disaster restoration and building science, what is the core messages or lessons you hope sticks with the industry forever?

-Repeat Dr Michael Berry’s quote: “there are no sick buildings only mismanaged ones”. Keep the science going.

Z-Man signing off

Trivia question: Name the type of fungi that can exist in two forms: as a mold at lower temperatures and as yeast at higher temperatures. This ability to switch forms is often related to temperature changes in their environment.

Answer: Dimorphic fungi