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Research Article

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Restaurants' Vents, Drizzle & Fog, Acute Mold Allergy

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Abstract

From mid-January through February 2024 the author, an 81-year-old retired chemical engineer, suffered from significant chronic allergic rhinitis related to the unusually high mold concentrations in his living area caused by the unusual continuous extensive rain and snow storms throughout this period. Even December 2023 was one of the wettest months on record for this area. On March 2 the author experienced an acute attack of allergic rhinitis as he approached a restaurant to pick up a takeout dinner. The obvious causal factors for this were the weather and location. Drizzle continued throughout the day rendering fog hovering at ground level a temperature inversion. The location included seven restaurants within a circle with a diameter of 250 yards. Pollution from restaurants in the United States accounts for 20% of the US total pollution. The author over the past two years has had published seven research articles, twelve PowerPoint Presentations, and three books all addressing the relationship of sub-micron pollutant particulates, concentrated under temperature inversion conditions, serving as carriers for fine coronavirus aerosols in such manner that they hover in the air and drift without loss of hazard for up to hundreds of miles. In this mode anywhere along the travel path, they readily are inhaled by people with deficient immunities passing through their lungs and entering stomachs and bloodstreams. The author's acute allergic rhinitis event indicates the same phenonenom occurs with mold spores.

Background

The joint area of northern Delaware, northeastern Maryland, and southeastern Pennsylvania in the vicinity of Newark, Delaware experienced one of its historic wettest periods from December 2023 through early March 2024. Many area people in this area, including the author, have been experiencing continuous significant sinus congestion, sneezing, runny noses, drainage and sometimes heavy coughing to the point that many have "concluded they will have sinus congestion problems the rest of their lives". The author personally experienced this for six weeks starting in mid-January 2024 with variations in the symptoms from ear and throat pain while swallowing to heavy sinus congestion that wouldn't clear, to runny nose, frequent sinus blowing and fever blisters until it evolved into an acute coughing fit with heavy drainage mucus for an hour during the night of February 23. A following day visit to a local emergency room doctor was made and testing confirmed no Covid, no pneumonia, no flu, no cold – just allergic rhinitis. Discussion centered on the author's history as an adult of receiving monthly allergy injections for mold for decades until the allergist retired and offered the advice that "allergy injections were no longer needed, but sensitivity to mold allergies would remain".

Of note is the fact that the author typically experienced allergic rhinitis problems doing yard work in the wet months of November and March each year. All of the flu-like sinus congestion problems and fever blisters were routine during these periods. Typically ended within two weeks after ending the yard work and consumption of antihistamines. From 2020 through fall 2023, the author experienced none of these issues. Likely related to precautions taken to combat Covid exposure like mask wearing, vaccinations for Covid, flu and pneumonia, and other restrictions in travel. Yard work continued throughout, however. Doctor prescribed a pill to combat the coughing of February 23 and an antihistamine. Within 24 hours noticeable improvement occurred and medicines were discontinued on February 26. A follow-up visits to author's Primary Care Physician confirmed original diagnosis. In fact PCP advised that he personally suffers from allergic rhinitis year round and nightly takes an antihistamine and daily uses an anti-allergy nasal spray. He emphasized that there are no cures for allergic rhinitis and only prevention can be done.

Author's sinus problems remained minor until late afternoon March 2 when an acute allergy attack occurred that lasted several hours. The subject of this article is this acute attack and the author's interpretation of its cause and its relationship to his publications of seven articles, twelve PowerPoint Presentations, and three books focusing on the "characteristics of coronavirus death regions".

Overview of Author's Covid Publications

Throughout the course of the pandemic April 2020 through May 2022, the author conducted a data analysis of patterns of coronavirus deaths worldwide using Worldometer Coronavirus. Common characteristics were identified for the world's deadliest coronavirus regions. Introduction of coronavirus into populated areas simultaneously with normal polluting activities under meteorological temperature inversion conditions routinely led to rapid rise of coronavirus daily deaths, typically many months in duration, depending on government response to establish lock down conditions. Lock downs typically included mask wearing and restrictive public curfews. During lock downs substantial curtailment of transportation, eventually manufacturing and ultimately creation of pristine environments ended each death cycle.

Exposure to pollution particulate matter was identified to be paramount, as it caused immunity deficient populations from long term chronic exposure and acute exposure by providing micron-sized surfaces for absorbance of coronavirus aerosols capable of being inhaled into and through lungs into stomachs

and bloodstreams. Under temperature inversions these aerosol-particulates drifted many miles from coronavirus source due to typically low, gentle wind speeds. Not only Air Quality Index measured PM_{10} and $PM_{2.5}$ particulates exhibited this behavior, but also PM_1 and ultrafines, not measured by AQI. These "fines" are present in world's largest cities at ratios of 0.75:1.00 vs PM_{10} and $PM_{2.5}$ particulates combined. All of this research was initially logged into a dozen PowerPoint Presentations and a WordPress website [1] established at end of 2021 containing them all. These PPTs were all published in 4th quarter 2023 [2,3]. From January 2022 through July 2023, seven articles were written and published [4-10]. In spring and summer 2023, three books [11,12,13] were written to summarize the PowerPoint Presentations and articles. The author has been invited to present at 67 international conferences and to join over 100 editorial boards. Since the author is a BSCHE 1966 and has no doctorate or association with academia, he does not meet minimum qualifications to be a member of editorial boards. Since he is unaffiliated and unfunded to be able to attend any conferences, he declined them all.

Acute Allergic Rhinitis Attack

During the late afternoon of March 2, 2024, the author made a trip into Wilmington, Delaware and started his return trip about 6:00 pm. No sinus symptoms were evident at this time. The trip from Wilmington to Newark is south along a four-land highway and about 10 miles in length. Traffic on Saturday afternoon was normal and heavy in both directions and moving freely and a light rain was falling as it had been all day. This light rain was providing a temperature inversion with ground level fog evident, which prevents pollutant particles from disbursing and in fact concentrates them and keeps them in this form up to about 1,000 feet from the ground, probably lower in elevation under drizzly conditions.

Upon reaching a major intersection halfway down this highway, the author started having a significant sinus attack with constant sinus congestion, runny nose and continuous nose blowing. Three miles later author stopped at a restaurant to pick up take outs for dinner and sinus attack gotten even more pronounced. Five miles later author left Delaware and entered rural northeastern Maryland where drizzling had stopped and sinus attack lessened. Upon arriving at home extensive sneezing occurred followed by coughing. Antihistamine and coughing pill consumed finally stopped the acute attack several hours after its onset.

From the major intersection to the restaurant location for take outs, there are two dozen restaurants and in the shopping center for the take out there seven restaurants. All of these were busy as it was typical dinner time in the area. For those familiar with driving and parking near restaurants under rainy conditions, a noticeable concentration of pollution at ground level is always present.

In the author's coronavirus research and publications, he postulated that the combination of the coronavirus, significant pollution sources and temperature inversions which concentrate the pollutant particulates lead to attachment of coronavirus aerosols to the surface of the pollutant particulate at the 2 micron and sub-micron sizes such that these aerosol-pollutant species drift for miles and are easily inhaled into the lungs and through the lungs into the stomachs of people, and those with deficient immunities become Covid victims.

In the author's opinion this is what happened on March 2 to cause his acute rhinitis attack, not from Covid aerosols attaching to pollutant particulates, but rather from mold spores attaching to pollutant particulates.

Viruses, Bacteria and Fungi

A June 17, 2020 Cedars-Sinai Staff article [14] provides an excellent explanation of the differences between viruses, bacteria and fungi (which includes mold). The author has abbreviated the text.

"Each of us shares our air, food, water and shelter with tiny colonies of microorganisms that include viruses, bacteria and fungi. Most of these miniscule microbes are harmless, but some are pathogens - the kind that can make you sick, such as the novel coronavirus that causes COVID-19.

What makes a virus, like the highly contagious strain now causing a worldwide pandemic, different from other germs, such as bacteria or a fungus? How do they each infect us, and how can we recover from them?

Dr. Fayyaz Sutterwala, director of Infectious Diseases at Cedars-Sinai, says infections are sometimes difficult to diagnose. Though certain microbes can cause very specific disease, many others can infect any organ and cause similar symptoms and immune response.

"For example, bacteria, viruses and fungi can all cause slightly different forms of pneumonia," he says. "The symptoms are subtly different depending on the type of microbe causing the conditions.

Viruses: ***Common forms****: Viruses cause colds and flus, as well as more serious conditions such as HIV/AIDS, Ebola and COVID-19.*

A virus is the simplest of germs - it is nothing but genetic material encased in protein. Researchers debate whether a virus is even "alive."

By itself, a virus can accomplish nothing - it needs to enter a living thing to perform its only function, which is to replicate. When a virus gets inside a human body, it can hijack a person's cellular machinery to produce clones of itself, overtaking more cells and continuing to reproduce.

Viruses also are capable of infecting any living thing, including bacteria and fungi.

When the virus reproduces faster than the immune system can control it, it begins to destroy cells and harm the body.

Viruses are also the smallest germ, making them generally the easiest to contract - they're so tiny they can spread through the air in a cough or a sneeze. Some viruses also are spread by mosquitoes or through bodily fluid.

Since each virus is very different, no one drug exists to attack whichever virus is in your body. Vaccines give preemptive protection from certain viruses by training the body's immune system to recognize and attack a specific virus.

Bacteria: ***Common forms:*** *Bacteria cause food poisoning, strep throat and urinary tract infections, as well as infections such as tuberculosis.*

Bacteria are bigger and more complex than viruses, though they can still spread through the air. A bacterium is a single cell, and it can live and reproduce almost anywhere on its own: in soil, in water and in our bodies.

For the most part, we live peacefully with bacteria—the colonies in our guts are helpful to us and strengthen our immune system. But like viruses, bacteria can also harm us by replicating quickly in our bodies, killing cells. Some bacteria also produce toxins

which can kill cells and cause an outsized, damaging immune reaction.

Broad-spectrum antibiotics were developed to kill bacteria in our bodies and in the food supply by inhibiting their growth. But bacteria are extremely adaptive and can quickly evolve to evade antibiotics. Bacteria share their antibiotic-resistant genes with each other, meaning more strains generate resistance to the drugs we use.

Fungi: ***Common forms:*** *Fungi are responsible for causing conditions such as yeast infections, valley fever and meningitis.*

Fungi are more complicated organisms than viruses and bacteria—they are "eukaryotes," which means they have cells. Of the three pathogens, fungi are most similar to animals in their structure.

There are two main types of fungi: environmental, which are yeast and mold that often live in soil and don't generally cause infection in most healthy people; and commensals, which live on and in us and generally don't hurt us.

Commensal fungus, may play a beneficial role in our overall health.

Certain environmental fungi reproduce "spores," particles that can enter our body through the lungs or on the skin. Fungi can be especially damaging for people with weakened immune systems, as fungi can spread quickly and damage many organs.

Other fungal infections can be caused by an overgrowth of commensal fungus.

Fungi are slower to mutate, so they are easier to target with antifungal medications than bacteria are with antibiotics."

Mold Exposure Symptoms

Following is extracted from an article written by **Grainger Editorial Staff** March 8, 2020, in Grainger KnowHow [15].

"Mold is a type of fungus that grows into thread-like multi-cellular structures called hyphae. While some molds are visible in foods that have spoiled, others reside inside building materials susceptible to moisture, such as pipes, paint, wallpaper, insulation and carpeting. **As long as moisture, oxygen and an organic source are present, mold can grow on almost any surface.**

The Centers for Disease Control and Prevention (CDC) explains how molds like *Cladosporium*, *Penicillium*, and *Aspergillus* typically enter homes and offices through openings like windows, vents and HVAC systems. Since about **1,000 mold species are present in outdoor air in the U.S.**, the mold spores may also enter the facility by attaching to clothing and shoes. When this happens, a building itself becomes the patient—what epidemiologists refer to as "sick building syndrome"—and facility occupants become the recipients of infection.

Depending on how vulnerable a person's immune system is, they may experience a mold allergy or mold toxicity. *Psychology Today* explains the difference between the two, pointing out that a mold allergy is the result of mold spores being inhaled, whereas mold toxicity is the result of the toxic vapors released by mold causing a chronic inflammatory response. According to the Mayo Clinic, a mold allergy can manifest through a number of different symptoms, including sneezing, coughing or watery eyes. Those with asthma may be especially sensitive and could suffer wheezing or coughing. However, according to *Psychology Today*, mold toxicity can produce a number of symptoms including fatigue, headaches, shortness of breath, sensitivity to light and muscle cramps, among many others.

Many concerns about mold center around what's referred to as "black mold." The most common strain of this species of mold, which appears black or green, is *Stachybotrys chartarum*. According to *Healthline*, certain species of black mold can release toxins, which can in high concentrations make some people susceptible to mold poisoning, and cause them to exhibit symptoms from coughing, wheezing and itchy eyes to more serious symptoms like headaches, exhaustion, sinusitis and more. People with chronic illnesses such as asthma or a weakened immune system can experience severe symptoms."

Mold Allergy

Following is extracted from July 2022 article by John James, MD, Asthma and Allergy Foundation of America, Medical Review [16].

"Mold is a type of fungus that produces spores that float through the air. Can grow on almost anything when moisture or damp environments are present and can be found indoors and outdoors. Common cause of allergy and asthma symptoms. Most common molds that cause allergy symptoms include Alternaria, Aspergillus, Cladosporium, Penicillium and mildew. Molds are different from plants or animals in how they reproduce and grow. The "seeds", called spores, travel through the air. Upsetting a mold source can send the spores into the air. Some spores spread in dry, windy weather. Others **spread with the fog of dew when humidity is high**, **which makes it easier to breathe spores into lungs** and causing allergic reactions year-round.

Many molds grow on rotting logs and fallen leaves, in compost piles, and on grasses and grains. Unlike pollen, molds do not die with the first killing frost. Most outdoor molds become inactive during the winter. In spring, they grown on plants killed by the cold. Indoors, fungi grown in damp areas like the bathroom, kitchen, or basement.

The author notes that in mid-January at the outset of his chronic allergic rhinitis, he spent three days in the yard raking and mulching fallen leaves and grass and branches fallen from the rain storms and moving rotting logs of 10 inch diameter in his landfill. Unfortunately temperatures for next two months were consistently 40-50 degrees Fahrenheit and weather continuously wet and ground saturated with water."

Mold Vs. Particulate Matter Pocket Particle AQI 2.0

Air Quality Index is measured using The Particle Plus Sensor [17]. This sensor measures particulates in the air near two different sizes, 2.5 microns ($PM_{2.5}$) and 10 microns (PM_{10}). These are the two particulate sizes typically measured when assessing air quality because they affect human health. Particles of these sizes are capable of entering the lower respiratory tract. The PM_{10} particles are capable of penetrating to the very deepest parts of the lungs while $PM_{2.5}$ particles or smaller can cross the blood barrier. Typical size of beach sand is 90 microns; human hair 50-70 microns; dust, pollen, mold 10 microns; and combustion particles, organic compounds, metals 2.5 microns.

The concentration of each particle size in air is measured separately and the sensor reports the value in micrograms (of each particle size) per cubic meter (of air). This unit of measure is what is used for industrial health evaluations and is abbreviated ug/m^3. Mold spores will typically show up as elevated 10 micron readings and are typically between 3 to 30

microns and will show up on the PM_{10} channel of the Particle Plus sensor. The readout from the Particle Plus detector is micrograms per cubic meter. A rough conversion can be made using this number and the mass of a mold spore. The mass of a single mold spore has been estimated to be 1.4 x 10^9 grams. Across the entire range of mold spore sizes (3 to 30 microns) the PM_{10} channel is roughly 30% efficient at measuring the spores. Therefore, a PM_{10} reading of 10 micrograms per cubic meter would correspond to 2100 spores per cubic meter.

Restaurant Emissions and Impact

So far this paper has reviewed the details of the author's acute allergic rhinitis event, the relationship of this event to the author's earlier publications on the interaction of viruses with pollutant particulates that magnified the impact of the coronavirus pandemic around the world, an understanding of the differences of mold spores to viruses, an understanding of mold allergies, and the impact of wet weather and fog to allergic rhinitis effects from mold spores on immune deficient people. The impact of restaurant chimney emissions on outdoor air quality will now be addressed. The author's hypothesis is that the interrelationship of all of these were the causal factors for his event with acute allergic rhinitis on March 2, 2024.

Impact of Restaurant Chimney Emissions on Outdoor Air Quality [18]

Emission of cooking fumes is a serious concern because it harms the health of restaurant workers and customers and damages the outdoor air quality. A study was conducted to evaluate the impact of restaurant emissions on ambient air quality. Twenty restaurants with four different types of food cooking were selected in Dammam City, which represents a densely populated urban city in Saudi Arabia. Levels of five air pollutants were simultaneously measured in the restaurants' chimneys and in the surrounding ambient air. The highest mean levels of CO 64.8 ppm, CO_2 916.7 ppm, VOCs 105.1 ppm, NO_2 4.2 ppm, and SO_2 8.0 ppm were recorded in chimneys of the grilling restaurants. The highest levels of all pollutants were recorded in the areas adjacent to the grilling restaurants. Figure 1 provides results for mean levels of air pollutants in different restaurant chimneys for the restaurants studied. Figure 2 provides results for mean levels of air pollutants in surrounding areas of outdoor restaurants.

Figure 1

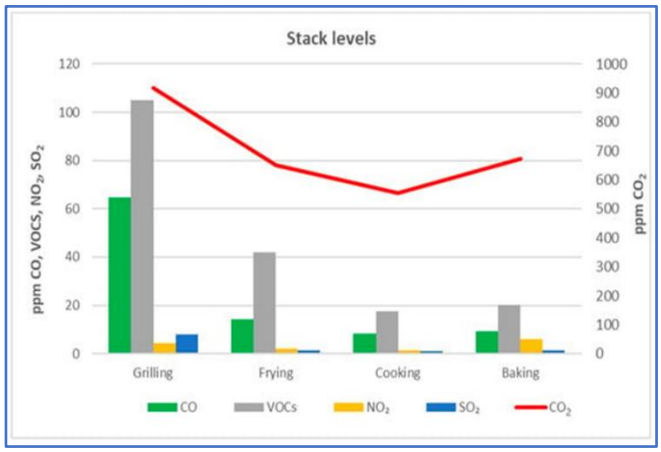
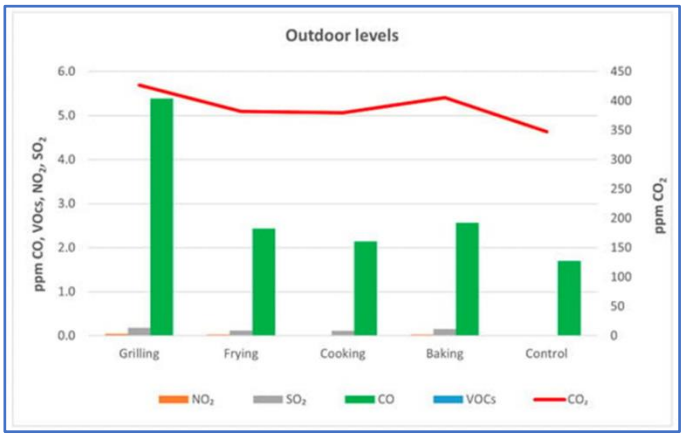


Figure 2



There are no emission standards specific for restaurants' chimneys. The emission standards promulgated in the U.S. by the EPA, Europe, and some countries of Asia are standards intended to control air pollution from several industries.

Exact quantification of the contribution of restaurants' emissions to outdoor air is very scarce. Few previous studies were conducted to study the impact of cook stove smoke on ambient air quality. For example, a field study was conducted in four randomly selected households in two rural locations of southern Nepal during April 2017. This study revealed that 66% of particulate matter is less than 2.5 microns ($PM_{2.5}$) and 80% of the black carbon emissions from biomass cook stoves directly escape into ambient air. Another study was also conducted in rural Nepal revealed that a range of 6–58% of the particulate matter emitted from the open design cook stoves is liberated to the outdoor atmosphere.

The wide and fast spread of restaurants in all urban areas of the world cannot be dispensed or neglected, particularly in densely populated areas. The emission of pollutants from the restaurant chimneys has a considerable and direct effect on the outdoor ambient air, particularly the grilling process that emits pollutants at a much higher rate than those of the other food cooking methods used in restaurants. Any negative or positive change in the combustion efficiency or the internal cooking process of restaurants will be accompanied by the same change in the outer atmosphere.

The result of this study is expected to help the decision-makers and regulators to effectively inspect the emissions of pollutants from restaurants for protecting people's health against restaurant fumes and helping the restaurants' owners to take the correct actions for reducing levels of air pollution both inside the restaurant and in its chimneys before discharging their contaminants to the outer atmosphere.

Why Restaurant Air Pollution is a Big Deal [19]

Nearly two-thirds of US adults think climate change is a concern for their community and the federal government is not doing enough to mitigate it. Similarly, support for protecting the environment increased eight percent between 2019 and 2020, the second-largest year-over-year increase since 2015-16.

This increased support has renewed calls to address the restaurant industry and its numerous ways of contributing to climate change and global warming. From chemicals and energy

consumption to food and water waste, restaurants are notorious polluters, accounting for up to 20 percent of the total pollution in the US, according to The Green Restaurant Association.

Several jurisdictions have taken the first step by requiring their restaurants to stop selling products made from fossil fuels. Maryland recently banned foam food containers. New Jersey enacted what environmental newsgroup EcoWatch called "the most comprehensive plastic bag ban in the country." In Manchester, England outlawed the use of plastic straws, stirrers, and cotton buds.

Each of these pieces of legislation means to lower the carbon footprint of local restaurants by limiting what supplies they can buy from their suppliers. **However, none of them address what makes restaurant air pollution a big deal - their exhaust systems**.

Restaurants cook with lots of oils and organic matter, the remnants of which are captured by exhaust systems and filtered out of the kitchen. Last winter, researchers at Carnegie Mellon University's Center for Atmospheric Particle Studies (CAPS) found that restaurant exhaust systems are responsible for large concentrations of organic aerosol (OA) in the atmosphere. The National Academy of Sciences estimates OA contributes to approximately 4.2 million premature deaths per year.

The researchers performed their study in Pittsburgh, concentrating on neighborhoods with lots of restaurants and busy thoroughfares. This gave them the opportunity to sample collections of released OA called "plumes" from multiple sources. Using a device called an aerosol mass spectrometer to isolate plumes released by nearby restaurants, they traced seven out of ten "plumes" in their sample back to local restaurants.

"Restaurant food-cooking emissions are a major, if not the major, driver of spatial variability of organic aerosol," Ellis Robinson, a CAPS postdoctoral researcher, said.

Spatial variability is a way scientists measure the differences between plumes in separate areas. Plumes originating in restaurant-dense regions have slightly different characteristics than those originating elsewhere, and it's this diversity that makes OA one of the greatest pollutants restaurants emit.

Currently, restaurant exhaust systems are largely unregulated outside of cities like Los Angeles and New York. California's Health and Safety Code requires restaurants to have ventilation "over all cooking equipment as required to effectively remove cooking odors, smoke, steam, grease, heat, and vapors." In New York, restaurants are required to purchase a permit from the city before building their exhaust system and must follow strict building requirements governed by the city's Mechanical Code.

Even with these restrictions, some restaurants have forgotten their exhaust systems. Instead, they're choosing to focus on keeping customers and revenue coming in their doors. A recent report by EaterNY found that restauranteurs are scrambling and spending big money to upgrade and clean their HVAC systems before their customers return.

A recent study by the National Institute of Health found that particulate matter in air pollutants may contribute to the spread of coronavirus. This would help explain why California and Washington were so hard hit. A recent report by MarketWatch found nearly 25 percent of residents in those states regularly breathed unhealthy air prior to the pandemic beginning.

To avoid these potential risks, restaurant owners need to pay attention to the Indoor Air Quality (IAQ) of the places they serve. IAQ can be measured with Indoor Quality Meters that measure levels of carbon monoxide, radon, and other volatile organic compounds (VOCs) in a given area. One way to improve areas with poor air quality is to use outdoor air drawn HVAC units. The outdoor air helps dilute the indoor air, thereby reducing the risk of airborne disease transmission.

Business owners could also replace their traditional overhead supply systems with a displacement ventilation system. Typically, displacement systems are known as "underfloor systems" because they pump outside air in at floor level, forcing old air up to the ceiling where it's captured and recycled.

While upgrades and modifications to exhaust systems are expensive and time-consuming, many business owners are considering them a necessary cost in order to bring customers back to their restaurants.

"It's expensive, but it's worthwhile," Saga's general manager and partner Jeff Katz told EaterNY. "Our first concern is making people feel comfortable in the space so that they can think as little as possible about the global pandemic. Nothing ruins a meal like the thought of pathogens."

Authors note: bringing outdoor air into an HVAC system during a temperature inversion condition like fog where pollution particulates are concentrated will actually make indoor air quality worse. Under outdoor mold conditions, the impact would be similar.

Extensive Moldy Environments vs Climate Change

Following are the Abstract and conclusion from a June 30, 2022 research article "Climate Change and Effects on Molds and Mycotoxins published in *Toxins* [20].

"Earth's climate is undergoing adverse global changes as an unequivocal result of anthropogenic activity. The occurring environmental changes are slowly shaping the balance between plant growth and related fungal diseases. Climate (temperature, available water, and light quality/quantity; as well as extreme drought, desertification, and fluctuations of humid/dry cycles) represents the most important agroecosystem factor influencing the life cycle stages of fungi and their ability to colonize crops, survive, and produce toxins. The ability of mycotoxigenic fungi to respond to Climate Change (CC) may induce a shift in their geographical distribution and in the pattern of mycotoxin occurrence. The present review examines the available evidence on the impact of CC factors on growth and mycotoxin production by the key mycotoxigenic fungi belonging to the genera Aspergillus, Penicillium, and Fusarium, which include several species producing mycotoxins of the greatest concern worldwide: aflatoxins (AFs), ochratoxins, and fumonisins (FUMs)."

"In the past century, the rates of CC have been registered; although comprehensive and continuous updates have been provided on its potential effects, it is clear that there is currently

a significant knowledge gap and only generalizations can be made. Overall, the evidence suggests that CC will negatively affect crops worldwide in terms of loss of suitable cultivation areas and an increase in mycotoxin contamination. Global warming will make growing crops in some areas impossible and, where growing crops will be possible, plants will be subjected to suboptimal climatic conditions, resulting in increased susceptibility to fungal contamination. Furthermore, warmer climates will favor thermotolerant species, leading to the prevalence of *Aspergillus* over *Penicillium* species. Further studies should also focus on the impact of the interacting environmental factors at an epigenetic level, with the aim to integrate these findings with transcriptomic analysis, ecology, and mycotoxin production. Finally, there is a need for conducting studies on other regulated and non-regulated mycotoxins, as well as in other crops and countries to obtain a more comprehensive view of the effects related to CC."

The abstracts and discussion from another research article "Increased duration of pollen and mold exposure are linked to climate change" published June 17, 2021 in *Nature Communications* [21] advises:

"Pollen and molds are environmental allergens that are affected by climate change. As pollen and molds exhibit geographical variations, we sought to understand the impact of climate change (temperature, carbon dioxide (CO_2), precipitation, smoke exposure) on common pollen and molds in the San Francisco Bay Area, one of the largest urban areas in the United States. When using time-series regression models between 2002 and 2019, the annual average number of weeks with pollen concentrations higher than zero increased over time. For tree pollens, the average increase in this duration was 0.47 weeks and 0.51 weeks for mold spores. Associations between mold, pollen and meteorological data (e.g., precipitation, temperature, atmospheric CO_2, and area covered by wildfire smoke) were analyzed using the autoregressive integrated moving average model. We found that peak concentrations of weed and tree pollens were positively associated with temperature ($p < 0.05$ at lag 0–1, 0–4, and 0–12 weeks) and precipitation ($p < 0.05$ at lag 0–4, 0–12, and 0–24 weeks) changes, respectively. We did not find clear associations between pollen concentrations and CO_2 levels or wildfire smoke exposure. **This study's findings suggest that spore and pollen activities are related to changes in observed climate change variables."**

"Some of our findings are consistent with the observations made in other studies. These include increasing pollen seasons, and their association with observed climate variables. However, we found that the average annual concentrations of most species in our study region has been decreasing over the years. Prior studies with regards to annual trends of pollen concentrations show a mixed result, with increases in some areas and decreases in other. Notably, **a study of pollen counts in different areas in the United States observed that the annual concentrations were increasing significantly in northern latitudes**, but not in the southern latitudes. In our study, we observed increasing periods of activity for several species even as we observed a decrease in their average annual concentrations, suggesting that the **pollen and mold activities are increasing outside their peak seasons**.

Conclusion

This paper has addressed the author's personal experience with an acute allergic rhinitis attack and the obvious causal factors, and has provided information from related publications addressing these causal factors. It has also compared this information to the author's previous twelve publications on the "characteristics of coronavirus death regions" because of the obvious similarity. There can be no doubt that the combination of excessive mold in air concentrations coupled with venting pollutants from numerous adjacent restaurants into a drizzly fog, concentrating the mold spores and pollutant particulates together, directly affected the author with an acute allergic rhinitis attack. The author's previous medical history indicated little immunity versus mold allergy. This paper also has noted that climate change is increasing the intensity of allergen concentrations particularly in the northern latitudes into non-normal seasons.

The author's observation in his publications on Covid was "that pollution not only causes climate change but also reacts with the effects of climate change to create deadly coronavirus regions". This paper extends the boundary to include other pathogens like mold spores, which behave in a similar manner. During the course of the author's chronic allergic rhinitis experience over two months, the startling fact is that so many other people are similarly affected and have decided permanent nasal congestion is here to stay. Imagine the thought that doctors and their patients are taking antihistamines everyday of their lives. The pharmaceutical industry must be leaping for joy for their future profits!

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