

Editorial

Mold and Immunity



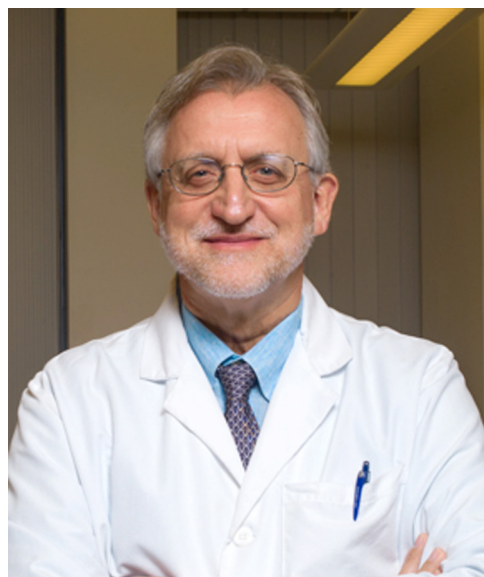
Bacterial resistance to antibiotics and the virulence of the *Hemophilus influenza* virus have been prominently featured in lay and scientific media. However, the floods in Louisiana, Texas, Puerto Rico, and Massachusetts, as well as other parts of the world, may pose even greater potential health hazards because of mold-infected foods, homes, and businesses.

Mold is a type of fungus growing in sheets on wet surfaces. A mold is normally colorless or white, the color of the mycelium. However, when the fungus is sporulating, it produces colorful spores such as black (*Stachybotrys*), blue/green (*Penicillium*s), grey (*Botrytis*), and red (*Aspergillus*, *Fusarium*, and *Rhodotorula*), which may sometimes be confused with bacterial growth or mineral deposits such as iron oxide (red).

There are thousands of fungi, but few cause clinically important diseases (mycoses). Yet, life-threatening fungal infections are on the rise, especially due to immunocompromised hosts, absence of vaccines against fungi, and the complicated nature of the immune response,^{1,2} which often leads to uncontrollable autoinflammatory storms.³ Luckily, mycoses are not communicable from person to person.

More relevant to the general public than systemic fungal infections is the production of mycotoxins,⁴ which can be carried by airborne fungus-derived spores and fragments; these mycotoxins are absorbed through the lungs, nasal mucosa, and skin. It was recently reported that present climate change (+2°C) favors the growth of mold and the production of dangerous aflatoxins.⁵ Unfortunately, because of the multitude of symptoms experienced by patients exposed to mold (Table I) and the possible overlap with other diagnoses (Table II), some colleagues still believe that there is no link between mold exposure and immune disorders.⁶

The Occupational Health and Safety Administration estimates that about 15% of the workforce, in the United States and about as many schoolchildren may be affected by exposure to mold. The Centers for Disease Control



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Table I. Symptoms associated with exposure to molds.

Brain fog
Chest tightening
Coughing
Dizziness
Fatigue
Headaches
Irritability
Muscle aches
Paresthesias
Sneezing

Table II. Conditions confused with exposure to molds.

Carcinoid syndrome
Chronic inflammatory response syndrome
Mast cell activation syndrome
Monoxide poisoning
Multiple chemical sensitivity syndrome
Myalgic encephalomyelitis/chronic fatigue syndrome
Post-Lyme syndrome
Gulf War syndrome

and Prevention (<https://www.cdc.gov/mold/default.htm>) and the National Institutes of Health (<https://www.niehs.nih.gov/health/topics/agents/mold/index.cfm>) have dedicated websites stressing the risks of fungal and mold-related health problems. Nonetheless, for most people, mold-related symptoms remain under the radar, largely because of their vagueness and the difficulty measuring mycotoxins.⁷ The response of individuals to exposure to fungi and molds depends on a number of factors, including the type(s) and duration of exposure; any other concurrent environmental triggers⁸; the nutritional status of the individual, especially lack of vitamin D₃⁹; physiologic or psychological stress¹⁰; as well as the possible presence of other medical diagnoses that would make the individual even more vulnerable, such as atopic conditions¹¹ and mastocytosis.¹²

Mold (or mildew) was recognized in the *Old Testament* as one of the plagues God would unleash on His people for straying away from His commands. King Solomon asked the Lord to spare them from mildew (Kings 8:37:38). Elsewhere in the *Old Testament*, the High priest recommended that if a dwelling had been infected by mold it had to be torn down and if clothes had been infected they had to be burned (Deuteronomy 28:1-2, 15). "And the Lord said to Moses and Aaron, When you enter the land of Canaan...if the mildew has spread on the walls, (40) the priest is to order that the contaminated stones be torn out and thrown into an unclean place outside the town. (41) He must have all the inside walls of the house scraped and the material that is scraped dumped into an unclean place outside the town. (42) Then they are to take other stones to replace these and take new clay and plaster the house," (Leviticus 14:33-42). This is a wise recommendation that may well serve many people today.

In this issue, investigators review the difficulties inherent in the early diagnosis and management of aspergillosis and murcomycoses.^{13,14} A commentary focuses on the immune responses to fungal infections, while a brief report describes the personal treatment approach in 100 mold-exposed patients at one clinical center.^{15,16} Finally, a review discusses the available evidence on the effects of exposure to molds on neuroimmune functioning, including autism.¹⁷ It should be noted that, despite the importance of the topic, it was very difficult to secure qualified authors and reviewers. It is, therefore, hoped that this issue will spark more interest in evidence-based publications on the effects of fungi and especially molds and mycotoxins on human health.

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