

Mold in Christmas Trees: Science or Speculation?

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A recent poster presentation at the American College of Allergy, Asthma & Immunology Annual Scientific Meeting in Dallas* entitled “Mold Allergy and Live Christmas Trees” has created quite a stir in the popular press. The poster suggests that the presence of a fresh Christmas tree in a house is associated with elevated levels of airborne mold spores. This presentation could not have come at a more inopportune time since it coincided with the start of the Christmas season. It has drawn regrettable attention to an issue with which some people wrestle every year—should they buy a real (live) tree or an artificial tree?

Airborne fungi/molds are ubiquitous. Most people are unaffected by exposure to moderate amounts of mold. However, mold exposure can cause allergic reactions in some people. According to the National Academy of Sciences, approximately 6-10 percent of the general population, and 15-50 percent of persons who are genetically prone to develop allergies, are allergic to mold. The authors of this presentation linked allergenic fungal spores to real Christmas trees without sufficient scientific proof. The data presented are clearly preliminary and the conclusions made by the authors are not supported by sound science due to shortcomings in the experimental design. The presentation states that the number of spores increased during a 2-week trapping period when a fresh tree was placed in a house and decorated. It did not identify the spores, provide baselines and controls, use a proper sampling plan, and was not replicated—these are all necessary components of a properly designed study. Airborne molds are complex in biological life cycles, ecology, and population dynamics in both indoor and outdoor environments. Populations and types of airborne molds can vary with time: within 24 hours, seasons, locations, and geographical areas. The trend they reported might be interesting, but additional studies would be necessary to provide science-based proof of their hypothesis and for the conclusions of the study. As it is presented, most scientists would consider the information as anecdotal.

As follows are highlights of some shortcomings with this presentation:

- There were no indoor and outdoor checks/controls to determine the origin of airborne molds. A well designed study needs to take samples from a comparable room without a Christmas tree in the house as an indoor check and samples from an outdoor location as an outdoor check. The indoor check will help determine whether other indoor mold sources are present. The outdoor check will help determine whether the airborne molds originate from outdoor sources.
- The study did not establish the baselines for mold spores that are necessary to address seasonal fluctuations that might exist in the home prior to placing the tree indoors and after removing the tree from the house. Examples of coincidental sources of mold spores could be heat ducts, wet basements, or live, potted plants that can harbor fungal spores and actinomycetes.

- The time of day when samples were taken during the study was not provided. This is an important factor since some airborne molds have well-defined diurnal patterns. The difference between the peak and lowest population levels of a mold within 24 hours can be over 10 times. The samples from the rooms with and without the Christmas tree and outdoors should be taken at a similar time of day to avoid the effect of diurnal patterns. The proper sampling time should be able to catch the peaks of major airborne molds. Without a proper sampling plan, the validity of the conclusion about airborne mold populations could be challenged.
- The mold spores were not identified. This is very troubling for a study on indoor air quality. The composition of airborne molds is important information to determine indoor air quality and mold sources. Every mold has its preferable ecological niche/substrate. Airborne molds originating from the Christmas tree will be reflected in the mold composition. Allergies and other health effects caused by molds are species-specific. Since mold spores were not identified, there was no scientific basis to assume that they were spores that commonly trigger allergic reactions. It is well-documented that spores of different fungal species elicit different allergenic reactions, so studies of indoor molds need to classify the threat to human exposure on the basis of spore type. The presence of molds in homes, schools, and businesses is of growing concern in the United States and the EPA has recognized the need for reliable methods to identify and quantify exposure to these organisms. Among the many efforts to address these concerns is the development by the EPA of the Environmental Relative Moldiness Index (ERMI), a great addition to the methods of indoor mold research and investigations. In addition, the development and release of DNA sequences of common molds is a very helpful method for determining their identity. However, traditional mycological methods are still necessary to study and investigate many common indoor molds.
- The study indicated that the tree was decorated. The decorations were likely introduced into the indoor environment of the house at the same time the tree was brought in. There was no mention of the decorations being new or stored. Stored decorations are known to harbor dust mites, mold spores, and other allergens. The act of moving, carrying, and unpacking boxes with Christmas ornaments can stir up allergens and conditions that foster respiratory tract exposure.
- The experiment was not replicated and there was no control. It was one tree in one home environment for one period of time. What about replications of many trees in many homes over a number of years? What about parallel studies with artificial trees, especially trees that have been in storage?
- The report did not identify the species of the tree or provide any details about its history. Was it recently cut or cut and held for a period of time? How was it handled before and after placement in the home? Answers to these questions would have provided a better frame of reference for any of the conclusions that were drawn.
- What about levels of mold spores outdoors during that same period? Did they also increase? What about activities of residents or the presence of fire wood? Many factors indoors can interfere with transient population levels. Molds are found in virtually every environment and can be detected both indoors and outdoors year round. The months, but not the year, of the study were reported and under typical December conditions, outdoor mold counts would probably be relatively low. However, if the study was conducted in 2006, Connecticut temperatures were unusually warm during December and early

January 2007 and would have been conducive for fungal growth and sporulation outdoors. If windows or doors were open during that warm period, some spores may have entered the home from outdoors.

- Due to the aforementioned shortcomings, the conclusion of the study is questionable. Further studies on Christmas trees in indoor environments are necessary to address the public concerns about airborne fungi in the near future.

Suggestions for minimizing potential problems with real trees:

- It is helpful to cut your own tree or purchase local, fresh cut trees. If buying a pre-cut tree, ask when and where it was cut and how it was stored. If the tree was held for any period of time under moist conditions, saprophytic fungi (molds) can grow and colonize the dead needles and other plant material that might be lodged in the tree. Therefore, if a family member is sensitive to mold spores, it is best to avoid purchasing trees that are cut and held.
- Shake the tree vigorously before bringing it into the home. This removes dead/loose needles, pollen, and other potential allergens that may be on the tree. It also helps to remove mites and other unwanted insects. Many Christmas tree farms have shakers available for use on site.
- If possible, spray the tree with water from a garden hose and then let it thoroughly dry before bringing inside. This helps to remove many unwanted, potential allergens.
- Limit the amount of time the fresh tree is in the house—this would reduce the time members of the household are exposed potential allergens from the tree and the decorations.

*Poster presentation #P59 co-authored by Collin Watson, MD, William Rockwell, MD, and John Santilli, MD. Title: Mold Allergy and Live Christmas Trees. Presented at the Annual Meeting of the American College of Allergy, Asthma & Immunology, Dallas, TX, 8-14 November 2007.

The following scientists have asked to be signatories to this commentary.

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