

for this. Multidata recommends 1000 $\times$ for spores because as Smith³ tells us, "The (1000 $\times$) is usually used for oil immersion examination of fungal spores as it makes them more distinct and makes visible many of the small, colorless, transparent spores that would otherwise be not seen at all."

Another Multidata citation⁴ points out that *Ganoderma* species basidiospores will be grossly underestimated by using a rotational impaction versus a slit suction sampler.

Enumerating fungal spores in a small sample area at less than 1000 $\times$ by using a sampler that does not collect small particles efficiently might skew the numbers for basidiospores and ascospores listed in Table IV.

It might not be appropriate to use spore counts from rotational impaction air samplers in health effects studies.

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Reply

To the Editor:

Mr Anderson¹ raises a number of important points that relate to the issue of whether the Rotorod sampler provides a reasonably faithful representation of the fungi in outdoor air in the communities studied. There are 3 considerations that might be offered in this discussion. The first concerns the microscopic examination of the collecting surface. For the example given, *Ganoderma* species, we can safely state that spores of this species were not undercounted. These are large and distinct spores. We are unaware of any counting protocol that would not require going from lower to higher magnification as required for verification, including to 1000 $\times$. We omitted this detail from the methods used in the article by Dales et al² because it is common practice.

The second issue concerns the number of fields examined. In an article in the proceedings of the 1990 Pan American Aerobiology Society, Coates et al³ demonstrated that examining 27% of the Rotorod surface produced consistent total counts between rods. Pairwise correlations yielded correlation coefficients of greater than 0.95. This demonstrates that counting 27% of the Rotorod surface produces reliable data.

The final issue is the assertion that the collection efficiency of the Rotorod sampler is not adequate for determining fungal spores. There is little disagreement that Rotorod samplers reproducibly collect particles with aerodynamic diameters of greater than somewhere between 5 and 10 μ m.⁴ The majority of basidiomycete and ascomycete spores that occur in outdoor air in Canada are as large or larger than this value, as are the principal taxa of anamorphic ascomycetes. The underestimation of smaller spored taxa, such as *Cladosporium cladosporioides*, which undoubtedly occurs with the Rotorod, is also a factor for Burkard design samplers.

In the natural outdoor environment measurements from samplers are significantly affected by wind speed, but this effect is smaller with Rotorod samples than some other types.⁵ This returns us to the central question raised by Anderson¹: Is the data set we used in this study consistent and qualitatively reliable for the spore and pollen types we have used in the health analysis. We believe the answer is yes.

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Regarding incorrect allergy injections: Allergists' experiences and recommendations for prevention

To the Editor:

In the July issue of the Journal, Drs Aaronson and Ghandi¹ recommend that all patients on immunotherapy should have individualized rather than off-the-tray vaccines as a mechanism of decreasing errors. This statement is an extension of the practice parameter recommendation on allergen immunotherapy (guideline XII).²

Guidelines and parameters must be evidence based rather than authority based. The authors (Drs Aaronson and Ghandi) offer no data to support this recommendation. Although it might seem intuitive that administration errors will be reduced in patients with individualized vaccines, the authors appear to have not considered the possible increased frequency of errors in vaccine preparation.

The exacting and labor-intensive preparation of individualized allergy vaccines requires the same attention to good manufacturing practices in the allergist's office as expected with any biologic production.

Many allergists start patients on immunotherapy at the end of the pollen season. This skewed schedule of vaccine preparation places undue stress on the staff formulating allergen vaccines, and the exclusive use of individualized vaccines could easily overwhelm the vaccine laboratory. This might result in errors in labeling bottles, concentrations, allergen content, and bacterial contamination. These errors and deviations from good manufacturing practices might not be easily detectable.

It has also been our observation that few allergy offices have computerized their allergy vaccine laboratories. Manual operations might be associated with errors in transferring information from the original source documents to labels and vaccine instruction sheets.

The authors do not differentiate between highly trained allergy nurses administering injections and nurses with minimal training in nonallergy offices. Allergy nurses have advanced knowledge of allergen nomenclature, units, concentrations, and dilutions and are familiar with off-the-tray vaccines. On the other hand, it is disconcerting to discover frequent errors in allergen administration outside the allergist's office, even when individualized vaccines are provided.

Off-the-tray vaccines have the advantage of maintaining uniform potency through the year because these are constantly replaced with fresh dilutions.

Anecdotally, the most severe systemic reaction from allergy injections that we have encountered occurred in a patient who transferred to our office with newly prepared individualized vaccines from a board-certified allergist. This reaction occurred after the first injection from the highest concentration of her vaccines. Subsequent investigation revealed that this allergist's staff had supplied us with diluent only in the starting and middle bottles. The proper dilutions had never been made, despite being labeled otherwise.

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Reply

To the Editor:

Melamed et al¹ object to our recommendation for individualized vials and discontinuation of off-the-board treatment for all patients² and state that this recommendation is an extension of Guideline 12 in "Allergen immunotherapy a practice parameter."³ We believe that they are referring to a general statement that does not specifically focus on vials of allergen extract. However, Summary Statement 35 of the immunotherapy guideline does specifically address the issue as follows:

Summary Statement 35. The maintenance concentrate and serial dilutions, whether a single vaccine or a mixture of vaccines, should be prepared and labeled for each patient. The use of individually prepared and labeled vials is recommended because it has several advantages over the use of shared vials. The risk of error of administration is reduced. The risk of allergen cross-contamination is eliminated. ... The off-the-board method of sharing vials among different patients is not recommended. This recommendation was arrived at by consensus of the guideline editorial board.³

The writers also called for guidelines and parameters to be evidence based but site only anecdotal evidence for several of the theories they advance. They note individualized vial volume might overwhelm the vaccine laboratory, and highly trained nurses in allergy offices might have benefits over nurses in nonallergy offices. They also cite a single case report of systemic reactions from a fresh vaccine prepared in an individual vial by a single allergist.

We gave serious consideration to our recommendation in the area because we recognize some allergists would need to make a significant change in their office procedures. We believe, however, that the immunotherapy guidelines are a very important source for recognizing the current standard of allergy care in the specialty. Failure to follow Specialty adopted standards of care might be acceptable but requires significant hard evidence in support of a different procedure, and none was offered here. Furthermore, it is clear that there is a lack of solid evidence to support best practices, thus emphasizing the need for better research, error identification, and data collection in the allergy specialty to better inform our decision making about safety practices.

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