

01.2 Fungal fragments; nature, occurrence, and clinical implications in human disease

Brett J. Green¹

1. Allergy and Clinical Immunology Branch, Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, WV.

Recent advances in fungal detection methodologies have provided new insight into the nature, occurrence, and clinical implications associated with exposure to fragments of fungi. The term non-gonomorphic particle has been proposed for those particles that have become mechanically severed from the parent mycelium but were not programmatically differentiated as separable. These particles include hyphal fragments <100 μm long, partial multicellular conidia, and subcellular fragments of hyphae, conidia, yeast cells, chlamydozoospores, and fruiting bodies. Fragmentation can be caused by several biotic (fungal autolysis, hyphal vacuolation, shizolytic/rhexolytic separation, comminution) or abiotic events (wind, vibration, anthropogenic and mechanical disturbances); however, these processes remain uncharacterized for fungi that frequently colonize water-damaged building materials or are occupationally relevant. In some environments, non-gonomorphic particles (>2.5 μm) represent a significant proportion of the aerospora (0.01-56%), and are derived from species in the orders Capnoidiales, Pleosporales, and Eurotiales. Sub-micron non-gonomorphic particles (<2.5 μm) have been shown in chamber experiments to be aerosolized in greater concentrations than conidia and these particles have been detected in field studies that have quantified (1 \rightarrow 3)- β -D-glucan, ergosterol, glycerophospholipids, and antigens derived from *Alternaria alternata* and *Aspergillus niger*. Although the nonviable subcellular fraction of non-gonomorphic particles is of low potential importance to opportunistic disease, a respiratory deposition model demonstrated these particles to penetrate the terminal airways in greater concentrations than conidia. The significance of these findings to respiratory disease is further reinforced by studies that have demonstrated these particles to contain antigens, allergens, secondary metabolites, mycotoxins, ergosterol, and (1 \rightarrow 3)- β -D-glucan. Although no direct associations between non-gonomorphic particle counts and health outcomes have been identified as yet, the presence of these particulates in environmental samples needs further characterization utilizing modern methods of assessment. These data in combination with murine models of exposure, will improve our understanding of the potential health effects associated with personal fungal exposure.

Organic Dust Tromsø Symposium

ABSTRACTS



Photo University of Tromsø

April 3 – 6, 2011
Tromsø / Hurtigruten
Norway