Environmental Sciences Graduate Program Student Seminar Series

Quantification and visualization of fungal growth in residential carpet and dust

Nicholas Nastasi

March 26th, 2021 | 2:00-3:00 PM

Join Zoom Meeting

https://osu.zoom.us/j/99820921442?pwd=d3hpTS9wYnc2Z29uZDR4NE4wNy81UT09

Meeting ID: 998 2092 1442

Abstract

Mold growth indoors is associated with adverse human health effects including increasing frequency and severity of asthma, allergic rhinitis, and other irritant related symptoms. Fungal growth is often limited by moisture availability in the indoor environment. Carpet and dust are an important source of human exposure due to potential elevated resuspension into the indoor air when compared to hard flooring materials. However, we need an improved understanding of fungal growth in dust and carpet to better estimate human exposure. The goal of this study was to compare fungal growth quantity and morphology in residential carpet under different environmental conditions, including equilibrium relative humidity (ERH) (50%, 85%, 90%, 95%, 100%), carpet fiber material (nylon, olefin, wool) and presence/absence of dust. We analyzed incubated carpet and dust samples from three Ohio homes for total fungal DNA, fungal allergen Alt a 1, and fungal morphology. Dust presence and elevated ERH (≥85%) were the most important variables that increased fungal growth. Elevated ERH increased mean fungal DNA concentration up to 1000 times at 100% compared to 50% ERH after two weeks. Microscopy also revealed more fungal growth at higher ERH conditions. Fungal concentrations were up to 100 times higher in samples containing house dust compared to no dust. Carpet fiber type also influenced fungal growth, with olefin fibers showing the least amount total fungal growth. Nylon fibers had the most total fungi and *A. alternata* growth in unaltered dust. Increased ERH conditions were associated with increased Alt a 1 allergen concentration. The results of this study demonstrate that ERH, presence/absence of house dust, and carpet fiber type influence fungal growth and allergen production in residential carpet, which has implications for human exposure.