Living with mold: importance of studying filamentous fungi under simulated spaceflight conditions

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Microorganisms such as archaea, bacteria, viruses, yeast and filamentous fungi (known as “mold”) are an integral part of our human body and our natural environment on Earth. When human space exploration started at around 1961, microbial life has been brought along with astronauts across terrestrial borders and to our space stations Mir (Russian Space Station) and ISS (International Space Station). Filamentous fungi are one of the most abundant pathogens on earth. They emit mycotoxins to our environment, causing allergies and various disease patterns, especially in immunosuppressed humans, which lead to up to over 300 Million fungal infections worldwide.

The well-known “black mold”, is a filamentous fungus called *Aspergillus niger* and one of the main contaminants on the ISS. It is able to spread its spores easily under microgravity and can survive under extreme and seemingly sterile conditions. Since one of the main sources of fungal infections is due to the uptake of spores via contaminated food or inhalation, a closed built environment like a space station is a major risk factor for our astronauts.

Due to that, basic research on the resistance of fungal spores towards extreme environments needs to be addressed more. Knowledge about how to effectively constrain and prevent fungal growth in closed environments could not only be applied to human spaceflight but lead to improvements of clean rooms and hospital building materials. In order to find possibilities for efficient decontamination on one hand and targeted preventions against mold on the other hand, investigations of plasma sterilization and antifungal surface development are conducted.