

Hyperspectral Imaging Using Intracellular Spies: Quantitative Real-Time Measurement of Intracellular Parameters *In Vivo* during Interaction of the Pathogenic Fungus *Aspergillus fumigatus* with Human Monocytes.

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Projects

Measuring interacellular pH during the apoptosis induction and inhibition regarding the *Aspergillus fumigatus* infection

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Abstract

Hyperspectral imaging (HSI) is a technique based on the combination of classical spectroscopy and conventional digital image processing. It is also well suited for the biological assays and quantitative real-time analysis since it provides spectral and spatial data of samples. The method grants detailed information about a sample by recording the entire spectrum in each pixel of the whole image. We applied HSI to quantify the constituent pH variation in a single infected apoptotic monocyte as a model system. Previously, we showed that the human-pathogenic fungus *Aspergillus fumigatus* conidia interfere with the acidification of phagolysosomes. Here, we extended this finding to monocytes and gained a more detailed analysis of this process. Our data indicate that melanised *A. fumigatus* conidia have the ability to interfere with apoptosis in human monocytes as they enable the apoptotic cell to recover from mitochondrial acidification and to continue with the cell cycle. We also showed that this ability of *A. fumigatus* is dependent on the presence of melanin, since a non-pigmented mutant did not stop the progression of apoptosis and consequently, the cell did not recover from the acidic pH. By conducting the current research based on the HSI, we could measure the intracellular pH in an apoptotic infected human monocyte and show the pattern of pH variation during 35 h of measurements. As a conclusion, we showed the importance of melanin for determining the fate of intracellular pH in a single apoptotic cell.

Identifier

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