Karen Wozniak, Ph.D.
Assistant Professor
Department Microbiology and Molecular Genetics
College of Arts and Sciences
Oklahoma State University-Stillwater

Abstract

"The front line of anti-cryptococcal defense: The complex roles of macrophage and dendritic cell subsets"

Cryptococcus neoformans initially interacts with innate cells including macrophages and dendritic cells (DCs) upon inhalation into the lung. DCs kill *C. neoformans*, while macrophages have been shown to either kill *C. neoformans* or allow intracellular replication of the organism. Several laboratories have examined the cryptococcal-associated factors that allow intracellular cryptococcal growth in macrophages, but few studies have characterized host factors that lead to killing versus cryptococcal growth. We hypothesized that subsets of primary macrophages and DCs have different anti-cryptococcal responses. Therefore, we examined the anti-cryptococcal activity of different human and mouse macrophage and DC populations. Results from these studies showed that $CD11b^{+}$ human PBMC-derived macrophages inhibit cryptococcal growth, while $CD163^{+}$ human PBMC-derived macrophages allowed cryptococcal growth. Similarly, in human pulmonary BAL-derived macrophages and DCs, we observed that human alveolar macrophages inhibited cryptococcal growth, while other human pulmonary macrophage subsets and DC subsets had a mixed response. In the mouse model, murine alveolar macrophages had anti-cryptococcal activity, while murine pulmonary tissue macrophages allowed cryptococcal growth. These studies suggest that intracellular cryptococcal growth is dependent not only on cryptococcal virulence factors, but also on the subset of macrophage or DC that interacts with the organism.

Bio-Summary

Dr. Karen Wozniak is an Assistant Professor in the Microbiology and Molecular Genetics department at Oklahoma State University. She received her BS in Biological Sciences from the University of Notre Dame and her MS and PhD from Louisiana State University Health Science Center. She did her post-doctoral work at Boston Medical Center and the University of Massachusetts Medical Center. She then worked as a Research Assistant Professor at the University of Texas at San Antonio before starting her lab in 2017 at Oklahoma State University. Dr. Wozniak's lab studies innate immune cell interactions with the fungal pathogen *Cryptococcus neoformans. C. neoformans* is an opportunistic fungal pathogen that primarily affects immunocompromised patients, including those with AIDS and those on immune suppressive therapies to prevent organ transplant rejection. The disease begins as a pulmonary infection that eventually spreads to the central nervous system causing meningitis, killing almost 275,000 people each year. The primary areas of interest for her lab involve examining the roles of pulmonary macrophages and dendritic cells against this fungal pathogen. Specific projects include 1) examining the mechanism involved in fungal cell wall degradation by the DC lysosomal enzyme cathepsin B, 2) examining dendritic cell (DC) factors associated with killing the fungal pathogen *Cryptococcus neoformans* and 3) determining mechanisms that govern killing vs intracellular growth of fungal pathogens in innate immune cells.