**Interactions between fungal pathogen Cryptococcus neoformans and innate immune cells.**

**Research by Dr. Karen Wozniak and her lab members at Oklahoma State University**

**Name Here | April 18, 2018**

Dr.Woziak’s lab studies the interactions between the fungus *Cryptococcus neoformans* and the inherent immune cells with focus on macrophages and dendritic cells. She was brought onto the topic by her previous studies in laboratories where the fungus *Cryptococcus* was the subject of research. Dr.Wozniak had decided to continue the research in her lab at Oklahoma State University.

The fungus is the leading cause of meningitis and exists just about everywhere. It enters the body through the lungs where it encounters our first line of immune defense : dendritic cells and macrophages. Her lab is working on three main projects: Examining dendritic cell factors correlated with killing the fungus, elucidating the mechanism by which the lysosomal enzyme cathespin B degrades the fungal cell wall, and determining the processes that control intercellular growth vs macrophage killing. The first project leads into the second in that the dendritic cells have antifungal components in their lysosome. Dr.Wozniak had hit a wall in her research that lead her to turn to past publications for the answer. In them she found that the dendritic cells contain lysosomal enzymes, specifically cathespin. She ordered 5 purified cathespin enzymes. Then proceeded to tested their effects on the inhibition of growth of the fungus under an electron microscope. Her results had shown a dose dependent correlation between the two, specifically cathespin B. This enzyme had been shown to burrow a hole into the fungal cell wall. However the mechanisms by which this degradation takes place are still unknown leading her to research the exclusive interaction between the two.

She intends on studying other antifungal components of the lysosome to further the understanding of its role in immune defense. Her third project is based on *C.neoformans’* peculiar interactions with macrophages. Recent research by her lab has shown that the fungus can either be killed by two different subsets of human macrophages or can enter them initiating intercellular growth. The fungus’s ability to hide in macrophages allows it to conceal itself from our immune system until it is weak enough for the fungus emerge and seize the opportunity. Her lab is now focused on RNA-sequencing to determine the different gene expressions in each subset of macrophages upon exposure to the fungus. The goal of studies like this are to identify the processes by which antifungal macrophages and apply them to immunotherapy against the pathogen. In doing so many lives will be bettered thanks to the research of scientists like Dr.Wozniak.

**Acknowledgments:**

Hole, C.R., H. Bui, F.L. Wormley, Jr., and K.L. Wozniak. Mechanisms of Dendritic Cell Lysosomal Killing of *Cryptococcus*. *Scientific Reports*. 2012;2:739. PMCID: PMC3472389.

Leopold Wager, C.M., C.R. Hole, K.L. Wozniak, M.A. Olszewski, M. Mueller, F.L. Wormley, Jr. STAT1 signaling within macrophages is required for antifungal activity against *Cryptococcus neoformans*. *Infection and Immunity*. 2015; 83 (12) 4513-27. PMCID: PMC4645398