**Dr.Wozniak’s work on Cryptococcus**

**Dr.Wozniak**

Dr.Wozniak is an new faculty member as well as an associate research professor at Oklahoma State University. She is a part of the Microbiology and Molecular Genetics Department at OSU. I recently sat down with the Professor to discuss her current research within the study of immunology. In Dr.Wozniak’s lab, she conducts research on the Fungi Cryptococcus Neoformans.

**What Is Cryptococcus?**

Cryptococcus Neoformans is highly prevalent in areas where HIV/AIDS is common, such as in West Africa. It is also common in individuals who are immunocompromised (those who have a impaired immune system). Cryptococcus Neoformans can eventually lead to a fungal disease called fungal meningitis. Fungal Meningitis effects the upper respiratory tract which causes symptoms such as coughing, shortness of breath, chest pain and fever. Before 2009, individuals who acquired Cryptococcus Neoformans, through person-to-person respiratory transmission through infectious aerosols, had an 80% mortality rate. This disease “used to have over a million cases per year with over 500,000 deaths per year”.

Since 2009, the “disease has declined over the years”, the mortality rate of this disease has drastically decreased causes less the half the amount of deaths. The decline of this disease is “due to increased availability of HIV drugs, especially in Sub Saharan African as well as an increase in early detection of the disease “. “Current treatments consist of antifungal drugs such as the drug called fluconazole which doesn’t kill the fungus but stops it from replicating. If the patient has acquired meningitis, then the drug of choice is amphotericin B for which is really toxic to the body”.

The current treatment for Cryptococcus Neoformans infections that have proven to be effective consist of a concoction of antifungal drugs that aid to inhibit the DNA Replication processes. Though there are current treatments on the market, these treatments do not kill or prevent the pathogen from causing an infection. Though, the number of deaths due to this disease has decreased greatly over the years there is still a “70-80% Mortality rate if acquired, which is why there is still a need for a vaccine or a better immunotherapy treatment”.

**Dr.Wozniak’s Research on Cryptococcus**

Specifically, With Cryptococcus Neoformans, Dr.Wozniak is interested in studying the body’s innate immune response to this infection. Within the innate immune system, Dr.Wozniak focuses on dendritic Cells and macrophages and their innate response to Cryptococcus. Dendritic cells are cells of the immune system that present antigen (a toxin or part of a foreign substance) to T cells. Macrophages are cells of the immune system that work to kill and engulf bacteria and foreign substances. She has discovered that dendritic cells are either “really great at killing the fungus or not effective at all” and the same goes for macrophages. She is interested in looking at the mechanisms between these different kinds of Dendritic Cells and Macrophages (the kind that does kill the fungus and the those that do not) to discover why dendritic cells and Macrophages choose not to fight this fungus. Dr.Wozniak has separated these two different types based on their cell surface receptors, which are cell markers that respond to different substances. “My hope is to better understand these activation pathways and to see, if possible, if the inactive dendritic cells and macrophages can become activated to better kill Cryptococcus”. As a result of Dr.Wozniak’s research she hopes to discover a more effective therapeutic drug or even a vaccine.

**Publications**

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.

**Wozniak, K.L.**, M.A. Olszewski, and F.L. Wormley, Jr. Host Immune Responses Against Pulmonary Fungal Pathogens. Pulmonary Infections. 2012; pp 85-128. Amer Amal (Ed.), InTech.