**Intruder Alert: Cryptococcus neoformans**

**April 19, 2018**

Our bodies do amazing things. One of those amazing things is keeping out unwanted intruders that could get us sick or even kill us. That is what our immune system is for. There are all kinds of things that our immune system deals with. Most of the time they are successful in destroying the antigen (or unwanted thing that has entered your body) but sometimes they are unsuccessful, and it spreads, or even uses some immune cells to spread throughout the body. Sometimes these antigens can be eukaryotic which means they are cells with similar makeup to our own cells, containing a nucleus and organelles. There is an antigen that causes respiratory issues in animals and is a fungus. This fungus is named Cryptococcus neoformans. *C. neoformans* creates respiratory issues in humans and in some cases can be fatal. “Most people who breathe in C. neoformans never get sick from it. However, in people who have weakened immune systems, *C. neoformans* can stay hidden in the body and cause infection later when the immune system becomes too weak to fight it off” (Saha, Shao, et al). One professor at Oklahoma State University hopes to find a therapeutic treatment for *C. neoformans*.

 Dr. Karen Wozniak of the Microbiology department at Oklahoma State University (OSU) is researching ways that may become therapeutic treatments for *C. neoformans* in the future. Currently there are not many publications or new exciting findings in her research since her laboratory at OSU started in January of 2018. There are two main projects her lab is working on currently. A graduate student in the lab is

working on *C. neoformans* and macrophage interactions. Macrophages are one of our innate cells that can be in the lungs, and *C. neoformans* enters through the respiratory tract. Over many years other researchers have found that *C. neoformans* can live inside of a macrophage. Leading researchers to believe that this is one-way *C. neoformans* escapes from the lungs and into the brain causing the worst type of *C. neoformans* in the meningitis strain. Dendritic cells and macrophages are very similar, however dendritic cells always kill the fungus (Wozniak, 2018). Which is where one of the questions lie: why does the fungus sneak past on a macrophage if dendrites and macrophages are so similar? When macrophages are taken from human blood there are sub populations of macrophages, one is very good at killing *C. neoformans* and the other is very good at letting the fungus grow inside. (Wozniak, 2018). Dr. Wozniak is hoping to find a way to shut off that specific macrophage that is carrying the fungus and prevent it from spreading to the brain.

The second project they are conducting in their lab is a dendritic cell project. Dr. Wozniak also isolated hundreds of lysosomes from dendritic cells and popped them open and then cultured those with *C. neoformans* which killed the fungus (Wozniak, 2018). What the lab found is a specific enzyme pokes a hole in the cell wall of the fungus and the cell lyses (Wozniak, 2018). After this discovery they hoped to present it as a therapeutic treatment. However, this enzyme is associated with cancer so other enzymes located in the lysosome are being looked at. Dr. Wozniak is hoping to eventually find a therapeutic treatment for *C. neoformans*. It mostly effects people in sub Saharan Africa with HIV. “An estimated 220,000 cases of cryptococcal meningitis occur among people with HIV/AIDS worldwide each year, resulting in nearly 181,000 deaths” (Rajasingham, Smith, et al). Dr. Wozniak feels there should be more awareness with this infection because it is so deadly to people with compromised immune systems. Although the therapeutic treatment of *C. neoformans* is a work in progress, it is very important and could save many lives.

References

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