

Progress Report for The Becky Werner Meningitis Foundation – 2018

Clinical Activities

1. We continue to apply Transcranial Doppler (TCD) ultrasound and treatment with sapropterin (BH_4) and arginine to the management of bacterial meningitis. **We evaluated and treat 9 patients this year.**

Laboratory Activities

2. We completed our second and final year of our Advancing Healthier WI Foundation grant. We focused on the brain abscess model, generating data on rescue from brain damage using vitamin B_{12} (without antibiotics). We need to study additional rats to make this statistically conclusive.
3. **We confirmed that the meningococcus produces hydrogen sulfide (H_2S), a notorious environmental toxicant known as “knockdown gas that causes brain asphyxia and shock.** In a collaboration with Dr. Joe Dillard at UW-Madison, we developed strains of *N. mucosa* (cousin to *Neisseria meningitidis*, less dangerous) where this enzyme was knocked out (inactivated) and other strains where it was then replaced. We are currently phasing these mutants into our various assays. This is a scientifically superior laboratory system that provides better scientific proof that H_2S production is behind the horrific shock and tissue asphyxia produced during meningococcal sepsis. We have models of brain abscess, refractory shock in human arteries and inhibition of immune cell function.
4. Experiments using *Neisseria* species (like *Neisseria meningitidis*) in a human artery model has confirmed that they produce refractory shock through H_2S production. **We can rescue this using vitamin B_{12} as a potent antidote to H_2S produced by bacteria.** We transitioned from Dr. Beyer to Dr. Freed, an anesthesiologist for these experiments.
5. We submitted a pilot grant internally to fund **a clinical trial testing use of vitamin B_{12} to treat refractory shock in children.** This grant was not funded, but we did begin the process of seeking human subjects committee (**IRB approval**) as well as FDA approval for a clinical trial. The FDA had some objections that this work was premature, but we disagree and will respond.

****We may need some help from advocacy groups with the FDA at some point****

Publications

Abstract. International Society for Magnetic Resonance in Medicine/European Society for Magnetic Resonance in Medicine and Biology: #4077 “Advanced diffusion models in assessing abscess structure” June 16-21, 2018

Abstract. International Anesthesiology Research Society: “Hydroxocobalamin for treatment of bacteria-induced vasoplegia: the magic bullet for septic shock?” April 26-May 1, 2018

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