Investigating the Impact of Parasitic Worm-Induced Secretions on Anaphylaxis

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A sharp rise in food allergies during the last century has left millions with this chronic, often life-threatening condition. In fact, nearly all known autoimmune diseases are being diagnosed at higher rates than ever before, even after accounting for improvements in diagnosis techniques. Leading theories attribute this rise in immune disorders to a lack of exposure to “Old Friend” pathogens that evolved alongside humans for millennia. This study attempts to prove the veracity of the “Old Friends” hypothesis by reintroducing human tissue to the conditions created by Necator Americanus infection, determining whether the presence of N. Americanus is able to “undo” existing autoimmune disorders. This study simulated N. Americanus infection using the two major secretory products of the helminth, cytokines IL-4 and IL-10. Americanus has been shown to be able to inhibit the anti-parasitic effects of the body’s IgE antibody pathway through a complex mixture of molecules whose secretion from epithelial cells is induced by worm infection. Because IgE is also responsible for activating mast cells in chronic inflammatory disorders, it was theorized that parasitic worm-induced secretions would be able to alleviate inflammation through IgE inhibition. The cytokines IL-4 and IL-10 were administered to blood samples and an enzyme-linked immunosorbent assay (ELISA) was used to detect the presence of key inflammatory molecule tryptase. Optical density data gathered by microplate reader showed that there was a significant decrease in inflammation through IL-4 stimulation but not through IL-10 stimulation.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: Glass trophy and USAF medal for each recipient
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category,