Disneyland's Elephants

DUQUESNE UNIVERSITY
MYLAN SCHOOL OF PHARMACY

PIC QUESTION OF THE WEEK: 10/17/11

Q: What is the role of helminths (worms) in the treatment of autoimmune disorders?

A: It has been theorized that our obsession with hygiene may be creating many of the chronic diseases that exist today. The *hygiene hypothesis* proposes that children exposed to more antigens and "dirt" tend to be protected from allergies and asthma. Further studies have suggested that this hypothesis may account for many of the autoimmune diseases that are prevalent in the developed world, yet non-existent in third-world countries. Ulcerative colitis, Crohn's disease, rheumatoid arthritis, multiple sclerosis, and diabetes mellitus type I have been studied extensively to determine an etiology; however, there is little evidence to support definitive causes and allow for specific treatment regimens. Therapies exist to manage the mild to moderate symptoms of these diseases, but we have not yet identified the "magic bullet" to cure these disorders. Investigators have hypothesized that the existence of autoimmune disorders in places with strict sanitation regulations may be a consequence of decreased parasitic infections. This appears shocking; however, multiple human and animal studies based on this concept have produced promising results. Researchers believe that parasitic infections stimulate an immune response that specifically recruits B-cells and immune mediators such as interleukin-10, transforming growth factor ß, and prostaglandin E_2. These mediators, and possibly others, protect mucosal homeostasis, and may result in *down-regulation* of the immune response. A deficiency in these cytokines has been proposed as a mechanism for the progression of multiple sclerosis. One study analyzed patients with multiple sclerosis (MS) and existing helminth infections. In patients harboring these parasites, there was an increase in the amount of interleukin-10 and other immunoprotective cytokines compared to patients infected with other parasites (*T. cruzi*, *P. brasiliensis*) as well as uninfected patients. The patients infected with helminths also showed a decrease in MS exacerbations, decreased changes in disability scores, and fewer MRI changes over a four-year period. Another study tested the hypothesis by administering 2,500 ova from *T. suis* every two weeks over a three month period to patients with ulcerative colitis. These patients showed significant improvement over the placebo group, especially in criteria such as stool blood loss, mucosal appearance, and overall intestinal integrity. In each of these studies, the administered parasites did not produce any adverse events. It is important that administration of parasites does not result in subsequent systemic infection, thus selection of an appropriate helminth is critical. *T. suis* is a good candidate because it cannot replicate in the human host. The apparent safety of this treatment and the possibility for remission make it a plausible option for patients who have not responded to other therapies currently used in autoimmune disorders.

References:

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