



The science of superantigens!

It is always a great pleasure to hear one of our patients come back to tell us that since they changed their diet and started taking probiotics and natural antifungal supplements, not only has their digestion improved but their joint pains, psoriasis, eczema or sinusitis has also surprisingly improved. Is this just chance, or is there a scientific explanation waiting to be discovered?

“I learnt in China that sinuses are like vents on a ship; if you want to sort out problems with the vents you have to sort out the problems in the engine room!” This was one of the first things Julian told me when I joined the Dove Clinic, and I remember thinking at the time that I didn’t remember the chapter on engine rooms in the Oxford Handbook of Clinical Medicine! However, as a GP I had become familiar with patients who came back time after time when their sinusitis didn’t settle with steroid inhalers, nasal washes or antibiotics, yet I remembered one of Julian’s patients telling me at that time her sinusitis felt so much better since she changed her diet and started taking natural antifungal supplements. As Julian went on to explain, there are often gut and digestive symptoms in people who struggle to clear long-term symptoms with their sinuses. Nutritionists sometimes refer to this concept as dysbiosis - an alteration in the normal gut flora which is capable of producing fermentation of foods, bloating and a wider range of symptoms. This way of thinking that one system, the gut, could be related to something so far away as the sinuses was a lesson that I believe has helped me to improve many peoples’ health and wellbeing, but why?

In 1999 the Mayo Clinic published a study that concluded that 93% of all long-term sinus problems related to an immune reaction to fungi and moulds. More recently fungi and other bacterial organisms have been linked to immune-mediated conditions such as psoriasis, rheumatoid arthritis, asthma and eczema. Doctors also hypothesised why conditions such as eczema should occur in similar locations to the moist and warm skin creases that we know provide an ideal environment for fungal growth. It’s a complicated world to explore, but the coexistence of certain types of infection and the presence of abnormal immune responses causing symptoms may start to unravel the reasons behind why our immune system has gone wrong. This has led to the discovery of “superantigens”.

Let’s start with an antigen. This is a part of a substance – could be from pollen, milk protein, part of a virus or bacteria or even from one of our own cells - that is capable of being presented and recognised by our immune system. In the case of self-antigens, these are usually tolerated or ignored by our immune system, while external antigens, for example from a cold virus, are recognised as being a threat, and consequently a targeted response is mounted by a small and specific subsection of our adaptive immune system to clear the challenge. However, superantigens, which have been described only within the last 10-15 years, relate to certain antigens from fungal and bacterial organisms which are capable of



creating a much larger non-specific T cell response, for example up to 30% of all T cells responding compared to the usual 0.01% with marked inflammatory cytokine production. This non-specific T cell response can then trigger a cascade of reactions in our own tissues such as sinuses, joints or skin. Many fungi, moulds and bacteria are known to act as superantigens and the over-reactive T cells have been isolated within areas of psoriasis, eczema and inflamed sinuses. The primary goal of medical treatment is to eliminate the microbe that is producing the superantigen. So it remains just hypothesis, but the right dietary modification, probiotics and antifungal supplements may help by reducing our total body load of potential superantigens and increasing our supply of health-giving flora which balances immune response.

For anyone wishing to read more about the science of the superantigen hypothesis please see:

Reference 1: Donald P Dennis. Chronic Sinusitis: Defective T-Cells Responding to Superantigens, Treated by Reduction of Fungi in the Nose and Air. Archives of Environmental Health. Vol. 58 (No. 7) July 2003.

Reference 2: Schubert MS. A superantigen hypothesis for the pathogenesis of chronic hypertrophic rhinosinusitis, allergic fungal sinusitis, and related disorders. Ann Allergy Asthma Immunol. 2001 Sep;87(3):181-8.

Reference 3: Leung DYM. Atopic dermatitis. New insights opportunities for therapeutic interventions. J Allergy clin immunol 2000; 105(5): 860-876.

Dr. Richard Fuller

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