

Ask The Doctor: A Six Part Series on Lifestyle Recommendations to Look After Your Nervous System.

By Dr. Christabelle Yeoh.

PART 2: Immune Dysregulation in the Context of Tick Borne Diseases.

Most people realise that their immune system is suffering when they are unwell with a chronic infection. This is particularly the case with infections such as borrelia and the many related co-infections. There are a number of ways that the immune system is impacted when a person receives a tick bite and also when they might later develop a chronic infection. It is useful to think about how a person's immune system is positioned, so that one can attempt to understand the disease process and thus make decisions in therapies.

In this article, I will describe broadly what kinds of Immune dysregulation is commonly seen in practice and what this means. While, in theory there can be a large number of deficits, in order to simplify things, the broad category of patient presentations can be more streamlined.

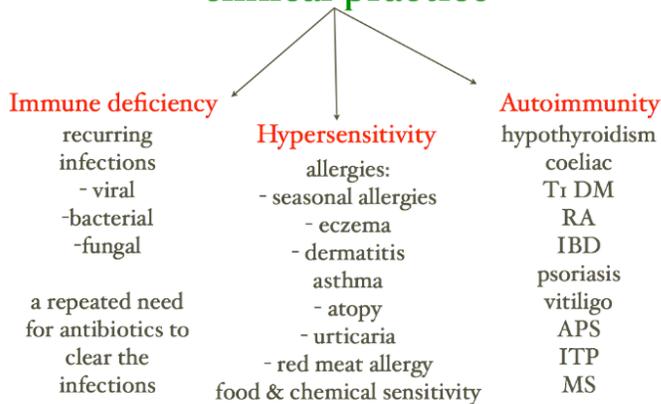
This chart shows the three broad categories of Immune dysregulation. Of course patients can present with only one or all three of these. Traditionally, immunologists described a process whereby the imbalance of immune function was called "Th1-Th2 imbalance". This is where skewing towards Th2 would lead more to allergies and skewing towards Th1 would lead more to autoimmunity. However, this is a very simplistic way of looking at immune function and in recent years, there is increasing understanding that mechanisms of immune tolerance is far more complex.

Immune tolerance is the main job of the immune system, that is, it needs to decide on whether it will tolerate an antigen/non self-signal or whether it will fight it.

If it decides to fight it, the best outcome would be overcoming it and developing immunity to it (say in an acute infection). However, the worst outcome would be ongoing inflammation and an ongoing fight. In this situation, the immune system does not overcome nor find resolution to the process, autoimmunity forms and harms the self-tissues. On the other hand, another outcome would be if the immune system decides that the antigen is not tolerated and reacts towards it as an allergen. In this case, the best outcome would be for allergic reaction to develop and expel the allergen successfully from the body (some examples of this would be sneezing, crying, vomiting, and diarrhea).

However, due to the nature of allergen exposure in our current environments, this tends to lead to more chronic and repeated problems which in turn, leads to the immune system having frequent reactions to the allergen/s, being in constant "fight" and inflammatory states. The cytokines in the immune system (chemical messengers that coordinate immune responses) that are

Immune dysregulation in clinical practice



causing allergic inflammation and autoimmune inflammation might be different, but the end result of unresolved inflammation is the same - A chronic immune mediated disorder and a wide presentation of symptoms develop.

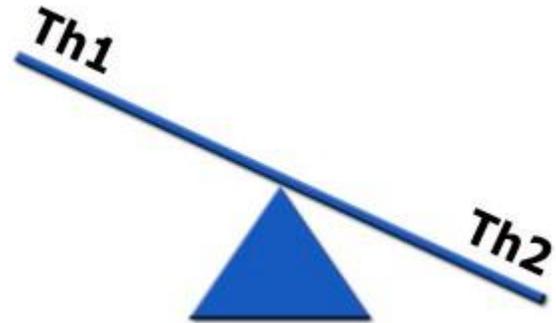
There are some allergens which are taken for granted as a normal allergic provoking antigen, like ragweed and grass pollen causing hay fever. However, there are many more common daily allergens which should make us question why a reaction is being provoked when homo-sapiens have been exposed to them for all of evolution, (e.g.: foods like egg and dairy). A reaction to common day to day non-self-antigens, (for example chicken), is not normal and it implies that the immune system has lost its "tolerance".

Many people take allergies and autoimmune states as being common medical conditions but in my view, when I encounter this, I question why this loss of tolerance has occurred and from where it arose. In the context of tick borne disease, this may even pre-date the tick bite and infection. If so, additional efforts should be made to understand the triggers and address them. This is because any immune dysregulation that underlies the tick borne disease will undoubtedly affect the prognosis and treatment outcomes of the acquired infection.

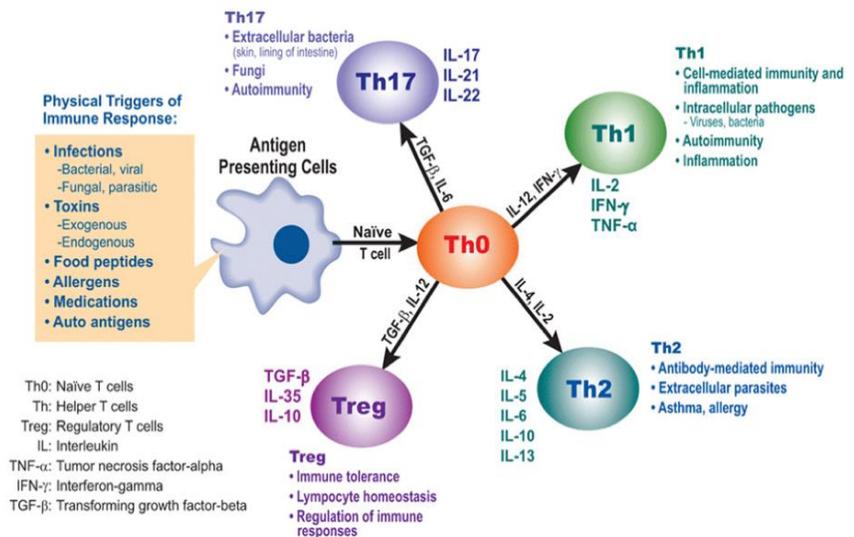
Remember that the cytokines (cellular messengers) which transmit inflammation are quite non-specific. This means that when it is being triggered, it affects the generalised inflammatory state that can worsen the symptoms in any part of the body, aggravating systemic symptoms and/ or peripheral problems. This also applies to inflammation in the body contributing the inflammation in the brain.

Dealing with allergies and autoimmunity is a mind field. However, for now it suffices to say where immune triggers can be avoided, they should. This therefore includes all common allergens, toxins, chemicals and other non-self-particles that adds to the load of the immune system which has to process it.

TRADITIONAL IMMUNITY REGULATION:



MORE RECENT IMMUNITY REGULATION:



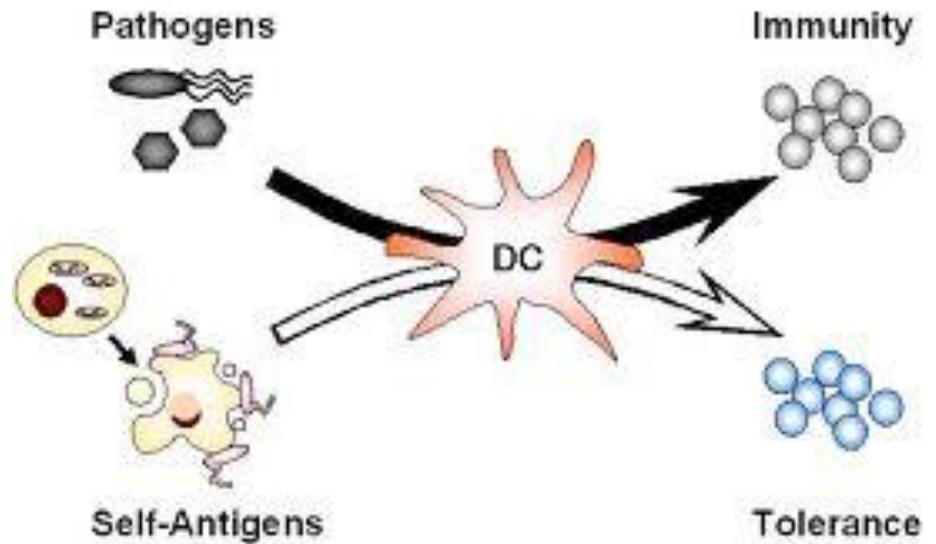
Hawrylowicz C. Regulatory T cells and IL 10 in allergic inflammation. JEM 2005; 202 (11): 1459-63

To understand the more recent concept, simply think about all the parts of the body which have to 'see' the outside world and deal with it. This are the parts of the body where the immune system largely lies so that it can protect us from external pathogens and insults. This very large area is referred to as the mucosal immunity- where there is skin or mucus membrane demarcating our tissues from us and the external world.

individual. Furthermore, some sensitive people may have to introduce therapies slowly.

The Dendritic Cell.

In essence, the largest surface area of the mucosal immunity lies in the gastrointestinal tract. The other very large areas are the lungs and skin. There is also the upper respiratory tract, urinary tract and female reproductive surfaces. The key participant in this equation is the dendritic cell 'DC' (see in diagram). Depending on the numerous signals the dendritic cell receives, it will either provide a signal for developing tolerance or autoimmunity. Also, the decision it makes is influenced by the cytokine environment that it is sitting in. Hence if there are allergic or autoimmune reactions happening and inflammatory cytokines from either, the dendritic cell is less likely to effect a resolution. Dendritic cells are found all over our mucosal surfaces and forms a very large part of the immune system helping us fight infections and develop immunity.



If you understand that protecting your mucosal immunity greatly strengthens you whole body's immune function, it should give you a number of strategies to improve you overall immune health and prognosis when dealing with a neuro immune mediated disorder. These are the key strategies I would employ in supporting mucosal immunity.

- 1) Dietary management to address inflammation and to minimize injury e.g. allergies
- 2) Specific nutrient therapy including vitamin A, Vitamin D, Zinc and Butyric acid.
- 3) Large efforts to introduce high numbers and a broad variety of probiotic and commensal gut bacteria using supplements and cultured food.
- 4) Supporting the intestinal permeability.

Please note doses have been omitted in this article because details of nutrient therapy and probiotics as specific therapies must always be considered for the