INTRODUCTION

Auto-immunity is where the body’s immune system mistakenly attacks and destroys the body’s own healthy cells and tissues. An autoimmune disease is a disorder that occurs because of auto-immunity. There are over 70 classified diagnosable auto-immune conditions, with over 200 now suspected. Each condition relates to a specific area of the body that is being attacked, for example, the pancreas in type 1 diabetes mellitus, the joints in rheumatoid arthritis, the nervous system in multiple sclerosis and the gut lining in Crohn’s disease. Over time, the immune system permanently damages and disables the structure under attack, leading to chronic disease. It is reported that autoimmune diseases are the third leading cause of morbidity and mortality in the industrialised world, surpassed only by cancer and heart disease1. Each autoimmune disease is typically treated separately with immunosuppressive medication to suppress the body’s own immune response.

POSSIBLE CAUSES OF AUTO-IMMUNITY

The etiology of most autoimmune diseases remains unknown. Although there is an underlying genetic link, studies suggest there is a combination of other factors included, like environmental factors2. One theory is that some microorganisms (such as bacteria or viruses) or drugs may trigger some of these changes, especially in people who have genes that make them more likely to get auto-immune disorders2.

THE CONNECTION BETWEEN AUTO-IMMUNITY AND THE GUT MICROFLORA

As over 70% of our immune system is located within the gut3, many experts now believe that the development of auto-immune disorders begins here. A well-functioning immune system is able to provide protection against foreign substances such as harmful microbes and toxins. Our gastrointestinal tracts are home to trillions of organisms, mainly bacteria, and these form what is known as the gut microflora. It is known that the gut microflora profoundly influences the continued development and health of the gut mucosal lining4 and the corresponding immune system5-6. It appears that an infant’s immune system is originally activated by the gut microflora received from the mother via vaginal birth and breast feeding, and from the surrounding environment7. Any disturbance to this protective gut flora could have severe impacts on the appropriate functioning of the gut immune system at any stage of life. The gut microflora could be damaged by a number of mechanisms such as antibiotics, infection, stress, diet and lifestyle. Recent epidemiologic data showed that children with autoimmune disease have a different intestinal flora from healthy ones8. In adults with auto-immune conditions alterations of intestinal flora have also been observed910.

THE ROLE OF INTESTINAL BARRIER FUNCTION

A healthy gut mucosal lining with its intercellular tight junctions is our internal barrier against the outside world, protecting the body from foreign substances such as toxins or pathogens. Once food has been adequately digested along the various stages of the gastrointestinal tract, the final stage is completed by digestive enzymes produced by glands on the gut lining and by the accompanying gut microflora. These minute food particles are then absorbed across the gut lining into the blood stream, enabling us to get the necessary nutrients from our foods. It is believed the gut lining can be damaged in a number of ways such as by inflammation, toxins, pathogens, food sensitivities, alcohol, medications, stress etc. A healthy balanced gut microflora is one mechanism reported to protect against damage to the health and integrity of this gut mucosal barrier11. However, if the gut microflora is imbalanced and the final stages of food digestion are not completed, mal-digested proteins appear to then cross a damaged gut lining in genetically susceptible individuals11. When not recognised as beneficial nutrients the corresponding immune system appears to stimulate an immune response to destroy these unknown substances, and antibodies are created to remember this invader for the future, as in a food allergy. Various mal-digested proteins often look very similar to the body’s own proteins which are the building blocks for every cell. These are then later attacked by the antibodies where ever they are found in the body, causing the long term damage seen in auto-immune diseases. This new theory suggests that the auto-immune process in genetically susceptible individuals can be arrested if the interplay between genes and environmental triggers is prevented. In 2005, Fasano et al11 proposed this could be achieved by re-establishing intestinal barrier function, including rebalancing the gut microflora, ultimately leading to correct functioning of the immune system.
PROBIOTICS AND AUTO-IMMUNITY

Probiotics are live microorganisms which, when administered in adequate amounts, confer a health benefit on the host10. As probiotics have been shown to positively influence gut micro flora balance, the immune system13 and intestinal barrier function15, there is theoretical rationale for their use in auto-immune diseases. However, there is a large amount of conflicting data on the preventive/therapeutic effects of probiotics in auto-immune diseases, although there is also fairly promising evidence to recommend them as well8. The table below summarises some of these:

<table>
<thead>
<tr>
<th>Author</th>
<th>Species</th>
<th>Dosage</th>
<th>Study Details</th>
</tr>
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<tbody>
<tr>
<td>Pineda et al, 201116</td>
<td>Lactobacillus rhamnosus and Lactobacillus reuteri</td>
<td>2 x 10^10 CFU / capsule twice daily for 3 months (4 billion/day)</td>
<td>29 patients with stable rheumatoid arthritis with chronic synovitis. Although probiotics did not clinically improve RA within the short time scale of 3 months, significant functional improvement was seen within the probiotic group compared to placebo.</td>
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<tr>
<td>Mandel et al, 201017</td>
<td>Bifidobacterium breve, Bifidobacterium bifidum and Lactobacillus acidophilus</td>
<td>1 x 10^12 CFU/day for 12 weeks (10 billion)</td>
<td>20 patients with mild to moderate, active ulcerative colitis were randomly assigned to a fermented milk product alongside conventional treatment. The multi-strain probiotic was shown to be safe and more effective than conventional treatment alone at reducing UC activity scores.</td>
</tr>
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<td>Zocco et al, 200619</td>
<td>Lactobacillus rhamnosus</td>
<td>18 x 10^9 CFU/d for 12 months (18 billion)</td>
<td>187 ulcerative colitis patients with quiescent disease were randomised to receive a probiotic, mesalazine (standard maintenance treatment) or both. Although all patients relapsed the probiotic seemed to be effective and safe for maintaining a longer remission period.</td>
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</table>

CONCLUSION

Whilst there is clear, strong evidence to show that probiotics have a role to play in autoimmune disease, these study results vary in the strain used, the dosage given and for the limited time period of the study. A mixture, or multi-strain product, appears more beneficial than a single strain product in terms of clinical outcomes. This may be due to synergy between the probiotic bacteria or the increased likelihood of the mixture containing a relevant probiotic for that individuals distinct gut flora or their condition. A multi-strain probiotic taken on a daily basis could therefore, be considered as an adjuvant to existing therapy in autoimmune disease.

References

8. Vanotti et al, 2010 | Bifidobacterium breve, Bifidobacterium bifidum and Lactobacillus acidophilus | 1 x 10^12 CFU/day for 12 weeks (10 billion) | 20 patients with mild to moderate, active ulcerative colitis were randomly assigned to a fermented milk product alongside conventional treatment. The multi-strain probiotic was shown to be safe and more effective than conventional treatment alone at reducing UC activity scores. |
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