The Allergic Planet, By Dr Orla Cahill, DIT, Cathal Brugha St., Dublin 1

Free Public Lecture under the auspices of The Institute of Biology of Ireland.

Globally, more than 250 million people suffer from a food allergy with more than 17 million people suffering from food allergies in Europe alone. Food allergy cases have risen by up to 50% in the past decade, with a 700% rise in hospitalisations due to anaphylaxis.

Figure 1 Dr Orla Cahill

What a headline to start this stimulating presentation by Dr. Orla Cahill in the DIT Cathal Brugha Street, Thursday 15th November 2018. The presentation was well attended by quite a large, very engaged audience. The extent of the huge increasing incidence of allergic reactions by our Irish population was quite a surprise for most of us - now 5 – 6% of us now have a food allergy.

An allergy is defined as an *'immune response to a substance, especially a particular food, pollen, dust or a medicine to which an individual has become hypersensitive'*. There are 14 major food allergies with peanut, egg and tree nut leading the posse in Europe (from a total list of 170 foods that can act as allergens). There is no cure for a food allergy so avoidance is the key to living with this type of disorder. A food allergy can develop at any stage in life so the presentation by Dr. Cahill was very appropriate for her audience (from age 5 to 75!). It can be triggered by a virus or bacterial infection or by stress and who now, in our busy world does not experience stress at some time of their lives? The human body's immune system is designed to recognise bacteria and viruses and sends out antibodies to attack foreign invaders and prevent infection. However, the immune system sometimes 'misfires' and attacks something harmless causing an allergic reaction. This is the case in food allergies, where the immune system recognises an otherwise harmless food protein as a foreign invader and attacks it. Food allergies can lead, in some cases, to a sometimes fatal reaction called anaphylaxis which can kill within 20 to 30 minutes without the medical intervention of adrenaline.

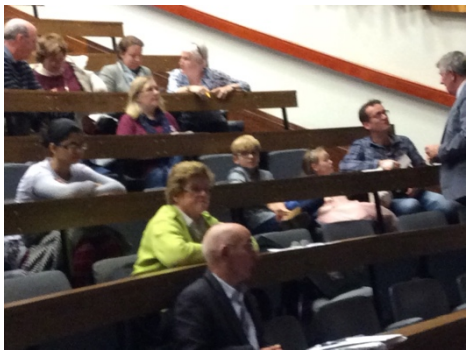

Figure 3 Snapshot of Lecture Attendees

So what's behind the mystifying rise in allergic diseases in what some experts are calling 'the allergic planet'? This is the question that Dr. Cahill addressed giving us a summary of the various research results from 1976, when J.W. Gerrard compared incidence of allergies in native Canadian populations to city populations, reporting with the 'Hygiene Hypothesis', to the present, 2017, where studies of the beneficial effect of breast feeding and the best time (3 months old being the optimum suggested by the research) to wean a baby were carried out. She also outlined the EAT (Enquiring About Tolerance) Study in the UK which aims to find out how to best prevent food allergy in young children. It aims to find out whether introducing certain foods early in a child's diet along with continued breastfeeding could stop infants developing food allergy. Research studies that set out to find out if avoiding early introduction of allergenic foods reduces

food allergy show conflicting results. Moreover, there is some emerging evidence that suggests that the early introduction of allergenic foods may actually protect against the development of food allergy, but this has yet to be confirmed. The theory is that repeated exposure of the immune system at an early age to an allergenic food via the oral route (in other words, eating the food), teaches the body to tolerate the food so it will not cause an allergy when the child grows older.

Another hypothesis points to the contents of our microbiome. The human microbiome is a cocktail of thousands of microbes. However, if there are more bad microbes than good, a condition known as dysbiosis occurs. Dysbiosis has been associated with chronic inflammatory conditions of the skin, gut and autoimmune disorders. Studies have should that more good microbes produce anti-inflammatory molecules that can prevent allergic disease. The theory of the microbiome is also used to validate the association of the increase in Caesarean sections with the development of allergies. Why? Babies born through natural childbirth are exposed to the natural bacterial population in the birth canal and can lead to their microbiome developing. However, the first organisms a baby is exposed to via C-section are more skin bacteria and airborne organisms so the theory is that the composition of their microbiome could potentially have more bad microbes than good, hence lead to the potential development of an allergic disease.

Preservatives such as MSG and Sulphites have also been identified as irritants and the lack of Vitamin D has also been identified as a suspect, suggesting that we should fortify our processed foods.
The genetic possibilities are also being researched at the moment to see if this can throw any light on the cause(s) of the surge of allergies appearing in medical clinics in the last few years. AllerGen researchers have pinpointed a new gene associated with peanut allergy. The gene, c11orf30/EMSY, is already known to play a role in other allergy-related conditions, such as eczema, asthma, and allergic rhinitis. This study is the first to associate the gene with food allergy. The Canadian researchers involved (Daley, Clarke, Asai and Eslamhave) stated in 2017 "Food allergy is the result of both genetic and environmental factors, but there are surprisingly few data regarding the genetic basis of this condition. The discovery of this genetic link gives us a fuller picture of the causes of food allergies, and this could eventually help doctors identify children at risk."

Whilst there is no cure for food allergies, other allergic disease such as asthma and allergic rhinitis can be managed effectively with medication. Innovative treatments for food allergies are also being trialled; these include desensitisation, whereby the sufferer is exposed to tiny amounts of the allergen. The theory is that gradually the body will stop recognising the protein as an invader and not illicit the immune response.

Whilst all these studies exist, the fact is that these allergies are still increasing and could be a culmination of numerous factors. Research is still ongoing and, while studies have identified links, it is still only the tip of the iceberg at the edge of 'the allergy planet'.

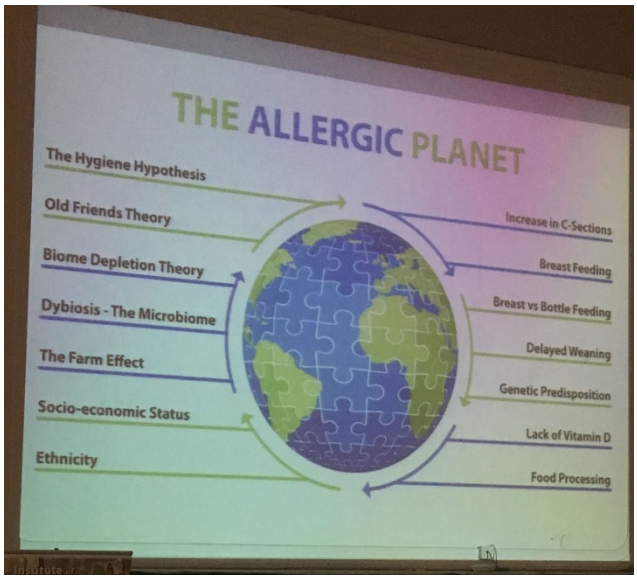

Figure 4 Synopsis of the Lecture

Thank you Dr. Cahill – a wonderful presentation – forcing us to focus on the situation and keep our eye on the emerging scientific evidence.

Mary Lee, 16th Nov 2018