Causes of food allergy development

Sean has a peanut allergy. The accidental ingestion of that cookie resulted in a severe allergic reaction, in which a very visible red, itchy rash instantly spread across his face, neck, chest, and arms, in which his face, lips, and tongue swelled almost beyond recognition, and he began to have trouble breathing. Thankfully, a quick shot of medicine into his quadracep muscle and a trip to the emergency room was able to save his life.

Many find it hard to comprehend that the ingestion of even trace amounts of a particular food could cause a reaction severe enough to threaten a person’s life. It is almost unimaginable that food, which we depend on not only for our sustenance, but for a majority of our social activities as well, could pose such a threat to those who suffer from food allergies. However, many do suffer. In fact, it is estimated that 12 million Americans, 3 million of whom are children, have food allergies (1, 2). Milk, eggs, nuts, and seafood are the most common food allergy culprits among American children, and peanut allergy in particular has more than doubled in children from 1997-2002. Although the majority (95%) of peanut allergic patients can safely eat soy or beans, which are also legumes, many (25%) have a concurrent allergy to tree nuts such as pecans or walnuts. Within the confines of peanut allergy alone, one in five allergic reactions to peanuts are Anaphylactic, amounting for approximately 47, 000 cases, 184 of which were fatal, in 2008 (2). These statistics are alarming, which is why it is imperative not only to understand allergies in general, but to understand the biological development of food allergies, noting that the scope of this paper and review of the literature will focus specifically on severe peanut allergy. Furthermore, the result of a severe peanut allergy is often Anaphylactic shock, which is combated

through an injection of epinephrine. This is vital to grasp due to its role in preventing death. Finally, due to current research being done surrounding severe peanut allergy a treatment called “ oral tolerance induction”, in which carefully supervised does of peanuts, often in miniscule amounts, are given to patients in order to reduce sensitivities, not all hope is lost upon those suffering (Fitzsimons, para. 32).

What Is A Food Allergy?

- Food Allergy vs. Food Intolerance

Food allergy is an abnormal response to a food that is triggered by the body’s immune system and causes a hypersensitivity. Allergic reactions can cause, in its milder reactions, vomiting, cramping, diarrhea, an itchy mouth, lip swelling, and hives. In its more severe forms it can cause throat tightness, wheezing, obstructive tongue swelling, trouble breathing, and loss of consciousness (Mayo Clinic, http://www. mayoclinic. com/health/food-allergy/AN01109, para 2; Sicherer, p 4-15).

This however, is different than a food intolerance. In a situation of food allergy, there is a system of steps within the immune system that causes a person’s body to respond abnormally. Although this will be reviewed in a later section, on a basic level, the immune system mistakenly identifies a food as a foreign and harmful substance and responds by producing an antibody to fight the said substance. This results in a release of chemicals into the bloodstream and can cause the symptoms noted above (Campbell, p. 501).

A food intolerance, on the other hand, does not usually involve the immune system. Some common food intolerances that are often confused for allergies are as follows: Irritable Bowel Syndrome, which causes chronic diahrhea; a sensitivity to food additives, such as those in wine or in preserved fruit; an absence of an enzyme required to digest a food, such as lactose intolerance; and Celiac disease, a condition that (Mayo Clinic, para 5).

Biological Development of Food Allergy

- The Role of the Immune System

The immune system defends the body against infections, such as those caused by bacteria, viruses, parasites, and fungi. Essential to its health, is its ability to discriminate between the body’s own cells-self-and foreign cells-non-self. When the body is exposed to such foreign invaders, called an antigen, the immune system generates antibodies specific to that which it was exposed to. These antibodies bind to the particular antigens it was produced for and attacks them. This antibody production allows the body to effectively fight against a future invasion from the same antigen (Playfair).

- Abnormal Immune Response

Sometimes, an abnormal reaction can occur, such as when the immune system mistakes “ self” for “ non-self” cells, and therefore attacks its body’s own cells. This is called an autoimmune disease. Another abnormal reaction can occur when the immune system reacts to an apparently benign foreign substance, such as the protein from a food, as if it was a germ or antigen and produces antibodies, specifically an antibody referred to as

Immunoglobulin E (IgE), to combat it. This food is called an allergen. The IgE antibody reacts to the allergen, such as peanut protein, by attaching itself to the immune system’s mast cells and releasing histamine and other chemicals which trigger the inflammatory response. This is considered the first stage of food allergy development, called sensitization (Playfair, Campbell, 501). Because mast cells are found throughout the body-in the skin, mucous membranes, and gut, symptoms can be widespread and can manifest themselves in a variety of ways (Fitzsimmons, para 4).

- Future Exposure and Histamine Release

When an individual is exposed to the allergen again, the release of histamine can often become more prevalent, resulting in a quicker and more serious onset of symptoms. It is important to note that these symptoms may range in scope from mild to severe-even fatal. The immune system’s heightened response and confusion of an allergen to a more detrimental antigen can cause some food allergic individuals to develop more severe reactions over time. What may start out as an itchy mouth and mild rash can eventually develop into Anaphylaxis (Fitzsimmons, para 4; Yunginger).