Allergies, Genetics, or Both: What Causes Asthma?

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Do We Really Know What Causes Asthma?

I grew up one of four kids — all with asthma.

My mother can't remember specifics, but she believes I was diagnosed with asthma as a toddler. I'm 31 now — that's a lot of years I've spent suffering from asthma — and even more years ahead of me that I'll be dealing with this disease.

I have often wondered, "Why do I have asthma? Why does my ENTIRE FAMILY have asthma?"

Here's an explanation of what causes asthma — and if it *really* has a familial tendency.

The Cause

Here's the truth — according to the National Heart, Lung and Blood Institute (NHLBI), the exact cause of asthma isn't known.

That being said, there are several theories about what may cause asthma. One such theory is that genetics and environmental factors cause asthma. These factors include:

- Respiratory infections during childhood
- Exposure with airborne allergens and/or viruses during infancy and early childhood when immunity is developing
- Parents with asthma
- Atopy, or the inherited tendency to develop allergies.

The "hygiene hypothesis" is another theory of causation of asthma. According to the NHLBI, "our Western lifestyle — with its emphasis on hygiene and sanitation — has resulted in changes in our living conditions and an overall decline in infections in early childhood."

This theory further hypothesizes that, due to the decrease in exposure to illness, immune systems do not develop as fully as they had in the past, leaving them susceptible to atopy and asthma.

The Genetic Link

Asthma is commonly thought of as a chronic disease that is passed on from generation to generation. But is it as hereditary as we once believed?

According to a 2014 University of Chicago Medical Center research study, the likelihood of passing on asthma to a future generation may have been overestimated.

Lead author Dr. Carole Ober, chair of the Department of Human Genetics, states: “This could be because those estimates are based on correlations between family members that share environment as well as genes, which could inflate the heritability. Gene-environment interactions are not considered in these large-scale association studies, and we know that these are particularly important in establishing individual risks for asthma.”

According to the research, they identified three gene mutations that increased the risk of developing asthma — GRASP, GSDMB, and MTHFR. These are found in less than five percent of the population, meaning that genetic predisposition is likely in a tiny amount of people. The MTHFR gene mutations were primarily found in people of African descent, while the GRASP and GSDMB were typically found in Latinos.

Although the genetic mutation affects only a small portion of people, the research is extremely positive – Dr. Ober believes that the research can be a template for drug development for more promising pharmaceuticals for the treatment of asthma. As she points out, statins for the treatments of elevated cholesterol originated due to research that discovered genetic mutations in the LDL receptor.

The Allergy Link

With less than five percent of the population testing positive for gene mutations that increase their risk of asthma, what else can significantly increase their risk for asthma?

I found it interesting that from a family of four siblings, all four have asthma — but also, all four of us have allergies of some variety.

About 90 percent of children who have asthma also have allergies of some variety. This is also true for 50 percent of adults.

For this reason, there is a specific diagnosis of asthma, termed allergic asthma, for people who have asthma related to allergies.

Allergens that are known to cause asthma include pollens, such as those blown from grasses, trees, and weeds, animal dander, dust mites and mold spores. Airway irritants may also cause an asthma attack, such as cigarette smoke, dust, strong fumes, cold air and air pollution.

Formula Feeding Infants

As we all know, formula feeding versus breastfeeding is a hot-button issue these days. I was a formula fed baby. As a new mother, I chose to breastfeed – then had to formula feed my son at three months due to supply issues. So reading the research can be upsetting.

The American Academy of Pediatrics (AAP), the American Medical Association (AMA), and the World Health Organization (WHO) all recommend breastfeeding. Breastfeeding is recommended by most of these organizations exclusively for the first six months, then encouraged until twelve months. Why? According to *Kids Health,* “Breastfeeding helps defend against infections, prevent allergies, and protect against a number of chronic conditions.”

The American Academy of Allergy, Asthma & Immunology (AAAAI) also advocate for breastfeeding. They state that breast milk, “…least likely to trigger an allergic reaction, it is easy to digest, and it strengthens the infant’s immune system. Especially recommended for the first four to six months, it may possibly reduce early eczema, wheezing and cow’s milk allergy.”

That being said, all of these organizations as mentioned earlier (thankfully!) that not all women are capable of breastfeeding, for a myriad of reasons. All agree that in these instances, formula feeding is a healthy alternative. The AAAAI also state that hydrolyzed infant formulas can decrease the risk of food allergy, and subsequently the risk of developing asthma.

Unfortunately, infants that do receive a formula that they are allergic to (such as a formula containing soy or dairy) can have a reaction. A reaction, as discussed above, can subsequently cause asthma.

This is one of those situations where a mother must weigh the pros and cons – and in most cases, a child's need to be fed outweighs the possibility of developing asthma later on. If the infant is at a very high risk of developing asthma, this should be discussed with the physician, and hydrolyzed infant formula is then an option.

Next page: How to prevent asthma from occurring.

Preventing Asthma from Occurring

Often, developing asthma is inevitable. However, the AAAAI does note several tactics for asthma prevention. They may not be foolproof, but they are worth a try.

Food Allergies

Preventing food allergies from occurring can be helpful. But how the heck can we do this? Well, research indicates that infants who have a sibling or a parent with a food allergy are at an increased risk of developing food allergies themselves. This risk can be mitigated by allowing the mother to eat a full diet during gestation (unless she has food allergies herself). In addition, breastfeeding is recommended as it is least likely to cause an allergic reaction.

To reduce the risk of allergy in the infant and toddler, it is recommended to…

- **Between four and six months, introduce single-ingredient foods such as fruits, vegetables, and cereal grains.** A new food can be introduced every three to five days. Introducing new foods slowly gives the parent or caregiver a chance to identify an allergenic food, should an allergy occur.
- **Foods that are known to be highly allergenic, such as peanuts, eggs, dairy, fish, shellfish, and tree nuts, are also introduced during the same four to six month period, after less allergenic foods are introduced.** In the past, these foods were introduced after one year, but research now indicates that doing so actually *increases* the risk of food allergy – and subsequently the risk of asthma.
- Different recommendations may apply if the child has a parent or sibling with a severe allergic reaction, especially if the reaction is to peanut.

Preventing environmental allergies is also helpful, but can be difficult. Perhaps the easiest thing to control is a child's exposure to dust. Dust is highly allergenic, and once an allergy to dust is formed, exposure can send a child into a full-blown asthma attack.

Consider the Family Pet

As a child who grew up with a dog in the house, then immediately got a dog when I moved in with my soon-to-be husband (and got another dog shortly after marriage), I really, really didn't want to believe that having pets in the home could be the cause, or at least promote the worsening, of asthma.

But consider this anecdotal evidence. All four kids in my family have asthma. We've always had a dog. My husband also has asthma (albeit a very mild form), and his family home had a dog, then cats.

I'm in tears reading this. "Do I have to give up my dogs?" I think?

Hold up, friends! According to the AAAAI, the evidence regarding pets in the home is highly conflicted. There has been evidence that suggests that children who grow up in homes with pets are more likely to have allergies and asthma. Another study suggests that children with early exposure to pets may be protective against allergies and asthma.

So, who is right?

I suspect it may be a combination of factors.

Not every child has an allergy to animals, but some children have allergies to environmental allergens. Pets who spend time outdoors are more likely to bring these allergens inside (such as pollen and grass), causing allergic reactions and asthma.

However, taking proper care of our pets who come inside can mitigate this from occurring. Bathing our pets or simply washing them down with a damp cloth may prevent the dreaded allergic reaction.

Unfortunately, for the child that has an actual dog or cat allergy, exposure to pets could increase the risk of developing asthma.

Secondhand Smoke and Smoking

Tobacco smoke can increase the risk of developing asthma. Smoking during pregnancy increases the risk of breathing issues during infancy and continuing to smoke during the child's infancy increases the risk of asthma and chronic respiratory illness.

Plus, we know by now that smoking is not good for much of *anything.*

Is there a Cure for Asthma?

Currently, there is no known cause for asthma. However, a British study from the University of Edinburgh and the University of Glasgow may soon have different news.

Dr. Henry McSorley of the Medical Research Council Centre for Inflammation Research at the University of Edinburgh, stated, "We have known for some years that infections with parasitic worms appear to protect people against asthma."

His team of researchers have isolated a protein molecule – *H. polygyrus* Alarmin Release Inhibitor (HpARI) – that seems to prevent allergic reactions in mice. Mice with the intestinal parasite *Heligomosomoides polygyrus* (HES) interfere with interleukin-33 (IL-33), a secretion that is produced in response to immune reactions like asthma. To tie these all together, "In the new investigation, the team screened the substances secreted by HES and identified that the protein HpARI was blocking the release of IL-33 and "consequent allergic sensitization."

Their findings indicate that HpARI is an asthma treatment – and also a tool for investigating the role of IL-33 in immune function.

Also, researchers in Melbourne, Australia are working hard to develop a medication that treats the underlying cause of "thunderstorm" asthma.

What Is "Thunderstorm" Asthma?

Well, as it turns out, it is a moniker for common asthma that a lot of us may have. This specific type of asthma is the result of an allergic response to ryegrass pollen particles – and "thunderstorm" because it is more frequently released into the air during or after a thunderstorm.

This all means that if you have an allergy to this type of pollen, you could ultimately end up with asthma.

The research rolled out since 8,500 people were hospitalized – and nine died – from asthma-related attacks after thunderstorms in Melbourne last year. And the research is promising; several of the leads may block the inflammatory response that causes asthma.

According to Dr. Allan, one of the researchers, “It effectively rewires the cell so it can’t drive that disease anymore. As opposed to Ventolin, which opens up the airways but doesn’t do anything to the immune system, we want to destabilize those cells during the reaction. The next time you become exposed you might actually switch those cells off completely; that’s the dream.”