

## ALPHA GALACTOSE ALLERGY

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### LECTURE TO THE BIG STONE GAP KIWANIS CLUB

There is a newly discovered tick conveyed disease in our part of the world. Since everyone hereabouts is sooner or later bitten by a tick, each of us will be interested in this 'new' disease. It is called 'alpha galactose allergy', or 'alpha gal disease' for short. I know of a case from the New River Valley. So it is a clear and present danger. Its occurrence in Virginia is so intense that most of the basic research has been done at the University of Virginia.

Its presentation is that a person who previously has had no problems eating red meat suddenly gets total body hives after eating some beef, pork, or mutton. The patient is likely to drop their blood pressure to dangerous levels. Eating fish or poultry is safe. The hives can be life threatening if they involve the throat or windpipe.

Half a century ago, when I was in medical school, there was only one common tick born disease in Virginia, and that was Rocky Mountain Fever. About 40 years ago Lime Disease was discovered. These two diseases are similar in that a tick carries a bacterium that it injects into a human when it bites them to suck the blood out. This is not the case with alpha gal disease.

Galactose is a sugar. 'Sugars' are a class of chemicals that share the common characteristic of being sweet to the taste. Sugars are like Lego Blocks, and can be fastened together in a wide variety of combinations. We are all familiar with glucose, which is the fuel the body burns for energy, and which gets too high in diabetes. We are familiar with the sugar in fruit, which is fructose. We know about lactose, which is the sugar in milk. If we fasten a fructose molecule together with a glucose molecule, we get dextrose, which is table sugar. If we fasten a glucose molecule to a galactose we get lactose, or milk sugar. One can even fasten two galactose molecules together, and depending at what point of the molecules we fasten them, they are given different names, such as alpha, beta etc.

In most animals with red meat, the muscle fibers are coated with a layer of alpha galactose. The major exceptions are primates, of which the humans are one. To put it another way, humans have no alpha galactose in their bodies. To us it is a foreign substance, just as foreign as pollen or peanut oil.

Other animals, such as deer, cows, sheep, and hogs have alpha galactose in their bodies. If a tick were to bite such an animal, and then bite us, some of its alpha galactose will leak out into our flesh as it bites us. Alpha gal is recognized by our immune system as a foreign substance, and over a period of a month or six weeks it

develops an antibody to it. After this, if we eat red meat we are likely to have an allergic reaction consisting of generalized hives. It is very much like a person who eat shell fish, or peanuts if they are allergic to them.

There is, however, a significant difference in the course of alpha galactose allergy than in the situation to shellfish or to peanuts. In the latter case, the hives come quickly after eating the offending agent. In the case of alpha gal disease the symptoms usually present two to four hours after eating red meat. The reason is interesting. As we digest the red meat the process separates the alpha galactose from the muscle fiber. The fat in the meat dissolves the alpha galactose and is then drawn into the blood stream from the intestines. The fat is digested. The blood circulation then carries the digested fat that carries the dissolved alpha galactose to the lymph nodes, which is where the immune system lives. At this point the immune system detects the alpha galactose, and starts making the antibody to it, which is then carried body wide by the blood. This process takes a couple of hours to complete.

The treatment is primarily avoidance of red meat. If one gets the allergic reaction the treatment is either Benadryl or an Epipen. One should present to the emergency room as soon as possible.

The diagnosis is made by history, and by a blood test. A wide variety of ticks can carry the disease, which seems to be world wide wherever there are ticks. The MidAtlantic states are particularly heavily involved.

This condition may be life long. However, if one meticulously avoids red meat for a couple of years, some people will find that the problem goes away. Some people find that they react to dairy products. This is not understood. Dairy products have lactose in them, and as you recall lactose can be digested into galactose and glucose. However, there should be no alpha galactose involved.

Another problem is that heparin, which is animal derived, sometimes causes alpha gal reactions in some people. This is not understood, either.

As far as what role alpha galactose plays on the muscle fibers of many animals, I believe it is unknown. Why we do not all have it is also a mystery.