Food & Nutrition: A Closer Look At Carrageenan
Carrageenan is a seaweed-derived food ingredient that is widely used across the world. Extracted from red seaweed, carrageenan is a hydrocolloid that is used in a variety of ways in a variety of foods. From suspending the nutrients in infant formula to reducing fat content in ice cream without sacrificing texture or taste, carrageenan is a vital component in many foods we eat every day.

Carrageenan has been widely used by home cooks for centuries and by the food industry since the 1930s. In that time it has never been shown to be unsafe for human consumption. However, despite its history and widespread use, public opinion has begun to turn against this safe food ingredient.

Due to the efforts of a small-yet-vocal number of carrageenan opponents, and fueled across social media, an anti-carrageenan crusade has gained a significant following. The claim being made is that carrageenan is unsafe and potentially linked to various health conditions.

If the rumors associated with carrageenan were true, it makes sense that the FDA and other food regulatory agencies around the world would move to ban its use. They have not. This is because the FDA (2017), FAO/WHO Joint Expert Committee on Food Additives (WHO, 2015), and other regulatory agencies base their decisions on sound science, not social media buzz. The simple truth is that there is no reliable evidence of adverse effects in humans from ingesting carrageenan.

Unfortunately, this has not stopped various bloggers, “health gurus,” special-interest groups, and biased researchers from touting flawed science to generate public interest while ignoring robust, peer-reviewed scientific studies that confirm carrageenan’s safety (Weiner et al., 2015; McKim, Wilga, Pregenzer, & Blakemore, 2015; McKim et al., 2016).

The question, then, is this: Where did this controversy originate? And more importantly, what can we all do to support accurate information about food? If the reputation of a perfectly safe, widely used food ingredient like carrageenan can be so easily hijacked, what’s next?
The current controversy can be traced back to the efforts of a single individual. In the late 1990s, Joanne Tobacman of the University of Illinois at Chicago made claims that carrageenan was associated with gastrointestinal disease (Tobacman, 1997). She went on to publish other findings (Tobacman, 2001; Tobacman, Wallace, & Zimmerman, 2001; Tobacman & Walter, 2001) concluding that carrageenan was responsible for inflammation of the epithelium of the gastrointestinal tracts, potentially resulting in complications such as inflammatory bowel disease, diabetes, or even cancer.

Tobacman’s work was largely ignored or rejected, due to beliefs that the methods used were flawed and not scientifically based. For example, in 2008, Tobacman filed a citizens petition asking the FDA to revoke carrageenan’s status as a direct food additive. In response, the FDA issued a letter concluding that Tobacman’s alleged claims about carrageenan did not support revoking its status (Elkin, 2008). Unfazed, Tobacman continued to devote the majority of her research toward discrediting carrageenan, and with the advent of social media in the early 21st century, she finally found an audience.

One interested party was the Cornucopia Institute, a trade group representing small organic farmers who view their competition as companies that are able to make organic products more widely available and less expensive because of ingredients like carrageenan. Primarily using social media platforms such as Facebook and Twitter, and in cooperation with various for-profit food bloggers who rely on site visits and clicks, Cornucopia used Tobacman’s anti-carrageenan findings to propel the ingredient into the spotlight.

In 2012, both Tobacman and the Cornucopia Institute lobbied the National Organic Standards Board (NOSB)—a non-technical, volunteer board that includes only one scientist and makes recommendations to the USDA—to remove carrageenan from its list of ingredients allowed in organic foods. Again in 2016, Cornucopia petitioned the NOSB to recommend preventing carrageenan from being allowed in organic food.
While the NOSB bowed to public pressure in 2016 and recommended that carrageenan be removed from organics, it did so for reasons entirely unrelated to safety. NOSB lead scientist Zea Sonnabend stated, “Science sides pretty clearly with the safety of carrageenan,” and the board’s Handling Subcommittee found that “the body of scientific evidence does not support claims of widespread negative human health impacts from consumption of carrageenan in processed foods” (NOSB, 2016). The USDA will decide this year whether to accept or overturn the NOSB’s recommendation.

The anti-carrageenan literature relies on various studies that are believed to fail good laboratory practice (GLP) standards, as noted by ML Weiner (2016). They also sometimes rely on tests that use unrealistic feeding methods, with no real-world application, and tests in which carrageenan was not used. Furthermore, there are more recent studies that directly contradict anti-carrageenan findings (Liu et al., 2015; McKim et al. 2015; 2016).

To investigate the safety of carrageenan, and help offset the inaccurate information from outdated studies, a new GLP-compliant study was undertaken (WHO, 2015). This study focused on the safety of carrageenan in infant formula, which is consumed by the most vulnerable human population. The study used piglets (infant pigs) as analogues for the human digestive tract, a practice that is widely considered the best way to simulate the human gut. Piglets were chosen to simulate the age ranges of the infants who would be consuming the formula. The study showed conclusively that the consumption of carrageenan has no negative consequences.

The Joint FAO/WHO Expert Committee on Food Additives (JECFA), which brings together some of the world’s most respected toxicologists to evaluate food-additive safety and whose standards are trusted by more than 130 countries around the world, found that the study met its strict standards and approved carrageenan for use in infant formula and in formula for infants with special medical needs (WHO, 2015).
Other studies have conflated carrageenan with poligeenan, a completely different substance that is never used in food (Cohen, 2002). Poligeenan was once formally referred to as “degraded carrageenan,” but it is not carrageenan and so was renamed by the U.S. Adopted Names Council in 1988 to avoid this very confusion. Poligeenan, which has shown harmful health effects in some studies (Fabian, Abraham, Coulston, & Golberg, 1973) is not carrageenan and is not a food additive.

Scientific studies continue to affirm carrageenan’s safety, including one in 2016 that challenged many of the findings presented by Tobacman (McKim et al., 2016). The goal of this study was to replicate results obtained by Tobacman; the researchers were unable to do so. Contrary to Tobacman’s findings, the study concluded that carrageenan “was not absorbed, and was not cytotoxic. It did not induce oxidative stress, and did not induce proinflammatory proteins.” The researchers concluded that it was unlikely that carrageenan is in any way associated with inflammatory diseases.

Despite the preponderance of scientific evidence in support of carrageenan safety, Tobacman and her followers continue to make claims of bias and conspiracy, rather than accept sound science. Cornucopia has gone so far as to allege the existence of a massive “conspiracy between corporate agribusiness interests and the USDA” (Cornucopia Institute, 2012).

In response to public pressure, some food producers have removed carrageenan from their products. When carrageenan is removed from a product, the consequences include multiple additives being used in its place, longer ingredient labels, and more expensive products. In addition, carrageenan is non-GMO and made from sustainably harvested seaweed, while its replacements may not be.

Perhaps most disconcerting of all is that food policy is being influenced by unqualified individuals. While scientists, nutritionists, dietitians, and regulatory agencies remain supportive of carrageenan, a small
fraction of carrageenan detractors are vocally forcing their opinions. This sets a dangerous precedent that affects not only food, but public health in general.

Modern technology has made it easier than ever before to access and share information (and misinformation) on almost any topic. The onus is on all of us to think critically about what we read and hear and be careful to promote food facts, not myths, to our friends, family, and colleagues. Don’t blindly accept and share online claims without doing some research first. Go beyond the hype to investigate what authoritative sources are saying.

Reliable food science should not take a backseat to rumor. There are decades of science and centuries of home use proving the safety of carrageenan, a sustainable ingredient that is essential to many of the foods we enjoy every day. As more of us take it upon ourselves to set the record straight, we’ll all be able to enjoy a food future built on fact, not fiction.

What Can Be Done?

There’s certainly no shortage of scientific research, but the truth is that not all studies are dependable. How can you tell when research is flawed? Here are some questions to ask:

**Are these findings replicable?** If the science is accurate, other scientists in other labs will be able to produce the same results. So if only one lab is able to produce the results of the study, it may not be reliable.

**Do the conditions replicate reality?** When it comes to food, a study should replicate the specific conditions of human consumption as closely as possible.

**Does the study account for other variables?** Sometimes unexpected results may be a result of other reasons or variables that are not the main subject of the study.

Remember, just because a study has been published somewhere doesn’t mean that its results are accurate, but if the study’s results are meaningful, the answers to all of these will be yes.
References


