Food & Nutrition:
A Closer Look At Carrageenan
Carrageenan is a seaweed-derived food additive that is widely used across the world. Extracted from red seaweed (Chondrus crispus, also known as “Irish moss”), this hydrocolloid is an essential thickening, gelling, stabilizing, and suspending agent used 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.

Thanks 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), European Commission (FSA, 2016), 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 nutrition and food science professionals, along with consumers, 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, 2001a; Tobacman, Wallace, & Zimmerman, 2001b; Tobacman & Walter, 2001c) 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.

Because of the flawed scientific method that Tobacman adopted, her work was largely ignored or rejected. 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 the 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 expensively 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 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 FDA will decide this year whether to accept or overturn the NOSB’s recommendation.

The anti-carrageenan literature relies on various studies that fail to meet good laboratory practice (GLP) standards (Weiner, 2016). They also often rely on tests that use animals with gastrointestinal tracts vastly different from those found in humans, unrealistic feeding methods with no real-world application. Furthermore, there are more recent studies that directly contradict these findings (Liu et al., 2015).

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 infant large pigs and a breed of dwarf pigs as analogues for the human digestive tract, a practice that is widely considered the best way to simulate the human gut. The two different breeds of pig 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 (WHO, 2015).

Other studies have conflated carrageenan with poligeenan, a completely different substance that is never used in food (Cohen, 2002). Poligeenan was 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 safety, including one in 2016 that challenged some 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).

Impact And Consequences

In response to public pressure some food producers have removed carrageenan from their products. Carrageenan can’t be replaced with just one food ingredient, and multiple additives mean longer labels and more expensive products. In addition, carrageenan is GMO-free and made from sustainably harvested seaweed, while its replacements are grown from bacteria in a vat or otherwise manmade.
Of even more concern is the fact that food scientists, nutritionists and dietitians, and other qualified professionals are not the ones making decisions about the future of food. This sets a dangerous precedent that affects not only food but public health in general.

As dietitians, nutritionists, and other food professionals, you are uniquely able to educate consumers about food and help them make smart nutrition choices. Whether counseling an individual, communicating across social media, advising a grocery store, or sharing information with colleagues, you are positioned to affect general consensus about food and remove the power from those unqualified, yet loud, voices.

What Can Be Done?

- **Educate** yourself about food ingredients and the most up-to-date science surrounding them.
- **Team up** with other experts, such as food scientists.
- **Join** others (including researchers, environmentalists, food retailers/marketers, and governments) in voicing support for unfairly maligned ingredients.
- **Educate** your peers and consumers on this issue.
References


