

## Carrageenan Safety

There is no confusion regarding the safety of carrageenan. Carrageenan is a safe and natural fiber extracted from seaweed [1]. It is an indigestible polysaccharide that is commonly used in foods as a natural thickening, gelling, and stabilizing agent. It is used as a gelling agent in our vegetarian softgels and On Guard Toothpaste. Carrageenan-containing softgel capsules are the only stable vegetarian alternatives to animal-sourced softgel capsules. Seaweed and seaweed fiber have a long history of safe use in foods, are used extensively throughout the world, and have well-established safety records supported by numerous clinical studies. Carrageenan is GRAS (Generally Recognized As Safe) in the United States and is approved for topical use and in foods. Carrageenan safety has been evaluated in numerous studies and it is considered safe for use as a food additive by regulatory agencies worldwide [1], including the Joint World Health Organization and Food and Agriculture Organization Expert Committee on Food Additives.

For an ingredient with such strong safety data, there are unfortunately a lot of common misconceptions that have been perpetuated throughout the media and the internet. The most common misconception is that carrageenan may have negative effects in the gastrointestinal tract and may possibly lead to cancer. The fact of the matter is that these misconceptions are simply not true.

There are two basic forms of carrageenan: degraded carrageenan and undegraded carrageenan. The major issue of misinformation resides in that both degraded carrageenan and undegraded carrageenan are commonly referred to as “carrageenan,” even though they are very different compounds with very different molecular weights and very different chemical properties. Undegraded carrageenan (“proper” carrageenan) is the form approved for use in food products [1], and the form we utilize in our vegetarian softgels and On Guard toothpaste. Degraded carrageenan, which is also called poligeenan, is not approved for use in food and is not used in our products. Poligeenan is never used in foods today because it does not have the food functions of carrageenan.

The effects of carrageenan and poligeenan have been studied in animals by administering the compounds to test animals in diet or drinking water. In fact, much of the current criticism and misinformation regarding carrageenan stems from a single literature review of 45 animal studies that was published nearly 14 years ago [2]. The author of this review concluded that carrageenan was not safe, arguing that heat applied during processing, and stomach acid during digestion, can degrade it into poligeenan [2]. Poligeenan can be chemically derived from carrageenan using very low pH (0.9–1.3) and high temperatures (>80 °C or >176 °F) for extended periods of time [1]. However, these extreme conditions (temperature and pH) for poligeenan production do not exist in the human digestive tract, and therefore carrageenan does not degrade into, or turn into poligeenan during digestion of food in the body.

Again, poligeenan and carrageenan are two totally different and separate compounds with different effects. It is poligeenan that has been shown to be responsible for inflammatory responses in the intestine [1], not carrageenan [3]. More recent reviews of the scientific literature have been published supporting the safety of carrageenan [1], [4], [5], and the fact that food-grade carrageenan has not been shown to cause cancer in humans or animal models. Recently, the Joint

FAO/WHO Expert Committee on Food Additives (JECFA) concluded that the use of carrageenan is even safe in infant formula [6].

The very small amounts of carrageenan used to stabilize our vegetable softgel material are thousands of times smaller than the unsafe levels of exposure some attribute to poligeenan. In short, unlike poligeenan, the carrageenan used in our vegetarian softgel capsules and On Guard Toothpaste is a large and indigestible fiber that is not absorbed by the body and is safe to consume.

#### References:

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