

Mode of Action for **healthymouth**TM Products

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It has long been accepted that oral bacteria residing within a biofilm, referred to as *dental plaque*, is the proximate cause of gingivitis and periodontal disease in dogs, cats and humans. From this it would initially seem that preventative measures should be aimed at ridding the oral cavity of all bacteria. More recent information points out that not only is that not possible, it is also not in the least desirable.

The oral cavity will always be (and should be) host to a great many microorganisms (known collectively as the oral microbiome). Our entire bodies are colonized by our collective microbiome and when things are as they should be, we live in a symbiotic relationship with these organisms. It is when things get out of balance that “good” bacteria can over-grow and/or “bad” (pathogenic) bacteria can gain the upper hand. Either of those situations can cause disease.

In a healthy mouth, the plaque film on the teeth and oral soft tissues is relatively thin, allowing penetration of oxygen, favouring the “good” aerobic oral bacteria. When plaque is allowed to accumulate in a thicker layer, not only does the total number of bacteria increase dramatically, but also oxygen can no longer penetrate the plaque and so the growth of “bad”, anaerobic bacteria, is favoured and disease develops.

Just as a healthy lawn resists weeds, maintaining good gingival and periodontal health is predicated on maintaining a healthy (but not too large) population of the “good” bacteria. In human periodontal care, probiotic therapy is sometimes used to recolonize diseased areas with these “good” bacteria to help re-establish a healthy balance by competitively squeezing out the “bad” bacteria.

Numerous animal studies have been performed to obtain the dozens of VOHC Seals awarded to **healthymouth**TM products for helping to control plaque. These studies have firmly established that daily use of **healthymouth**TM can reduce plaque accumulation by upwards of 85% compared to control. However, it is the many ADA-approved studies in human subjects that have established how this is achieved.

The mode of action is not antimicrobial, but instead is physical, forming a barrier over teeth and gums which makes it difficult for pathogenic bacteria to adhere to these structures. The barrier is a result of the surfactant effect of three of the ingredients: yucca, clove, cinnamon. These naturally occurring saponins act synergistically to inhibit the bacterial colonization of oral hard and soft tissue, thus inhibiting the development of a thick (anaerobic) plaque film while allowing for the preservation of a healthy population of the “good” bacteria (a healthy oral microbiome).

It is this novel, first-in-class mode of action that sets **healthymouth**TM products apart and make them so suitable for daily, life-long use and ingestion. The ingredients all have the GRAS (“generally regarded as safe”) designation and are human-food-grade. They are mostly natural plant extracts and vitamins. And while the products are very effective at retarding plaque accumulation, *they do not upset the healthy oral microbiome*, rather they help to support it.

In the human studies, where a plaque reduction of 78% was demonstrated, 66% was found to be due to the surfactant action. Another 12% reduction in plaque accumulation was found to be due to the various effects of the other ingredients listed on the other side of this page.

For more information, visit www.toothvet.ca/hm2.html

Other healthymouth™ Ingredients

Papain; a proteolytic enzyme, able to tackle the glycoproteins of the pellicle to which the oral biofilm attaches. These actions would expose and/or release the pathogenic biofilm from its anchorage. In addition, all clinical trials of the formulation have found that any plaque remaining in the mouth stays softer for longer, which is attributed to the same properties in papain which make it a natural tenderizer for meat. As a result, **healthymouth™**, when used in conjunction with dental chews, dental diets or tooth brushing helps these other modalities achieve improved results.

Pomegranate and Blueberry; contain phenolic and flavonoid compounds, both of which have well known anti-oxidant properties that support the host's own immune response to plaque bacteria.

Zinc Gluconate; provides anti-inflammatory effects for relief from tissue oxidative stress.

Ascorbic Acid (Vitamin C); a nutrient important for optimal gingival health, ascorbic acid acts to decrease cellular oxidative stress as well, being a potent scavenger of oxygen radicals (reactive oxygen species).

Riboflavin (Vitamin B2); supports the function of the immune system.

Chlorophyll; acts as a natural breath freshener as **healthymouth™** products contain nothing to “mask” the bad breath. Also, gives the apple green color to the formulations.

Xanthan gum; long been used in cooking to increase solution viscosity when that property is desired. It is included in the **healthymouth™** formulations in order that all the active components maintain contact with the oral surfaces for an extended period.

Sorbic Acid; provides an inhibitory effect against micro-organism growth and is very effective to help preserve the formulations.

Glycerine; a wetting agent

