Astaxanthin and Gastric Health

Lowering Gastric Inflammation

Astaxanthin for Dyspepsia and Helicobacter pylori

Dyspepsia is the general term given to a variety of digestive problems localized in the upper abdominal region. Typical symptoms for example include stomach pain, gas, acid-reflux or bloating. Dyspepsia is like the stomach version of the irritable bowel syndrome and its symptoms may appear at any age or to any gender. The medical approach to dyspepsia involves looking for treatable causes and addressing them if identified. Failing that, doctors suggest treatments by trial-and-error. The problem associated with this non-standardized approach involves drugs that may not work, may cause side effects and exacerbate the patient’s condition brought on by stressful attempts to cure symptoms.

To understand the benefits of astaxanthin in dyspepsia, it is necessary to categorize specific types; most common forms are either non-ulcer dyspepsia or gastric dyspepsia. Non-ulcer dyspepsia problems usually do not have an identifiable cause, but fortunately, for most cases it is non-disease related and therefore temporary. On the other hand, gastric type dyspepsia is more severe and linked to identifiable causes. For example, the bacterial infection of Helicobacter pylori is a commonly known cause. Pathological symptoms of H. pylori infection include high levels of oxidative stress and inflammation in the stomach lining and symptoms like gastric pain and acid reflux. H. pylori can contribute to mild and severe kinds of symptoms, but on the other hand, people who are H. pylori positive can remain asymptomatic whereas others may develop into clinical problems. It is still unclear what triggers the severe form of infection and how the bacteria is passed on, but scientists suggested using strong antioxidants like astaxanthin for therapy and better long term protection.

Helicobacter pylori in Gastric Dyspepsia

This Gram-negative bacterium is present in approximately half of the world population, and typically resides in the human gastric epithelium (stomach lining). H. pylori infection is generally acknowledged as the main cause for type B gastritis, peptic ulcer disease and gastric cancer. The pathogenesis of this infection is partly due to the immunological response as shown by Bennedsen et al., (1999). Astaxanthin (200 mg/kg body weight) fed to H. pylori infected mice for 10 days exhibited signs of improved immune system. Normally, the T-helper1 (Th1) response exacerbates inflammation and epithelial cell damage due to infection, but the astaxanthin treated mice responded with a mixed Th1/Th2-response (Figure 1), which lowered gastric inflammation (Figure 2) and bacterial loads (Figure 3). Furthermore, the findings by Wang et al., (2000) also supported the idea that a diet supplemented with astaxanthin or vitamin C in mice lowered inflammation after 10-days of treatment (in vivo), and also inhibit H. pylori growth (in vitro). The mice treated with astaxanthin (10 mg/kg body weight) had the same effect as vitamin C (400 mg/kg) which significantly lowered gastric inflammation and lipid peroxidation (Figure 4) compared to infected control mice; which continued to develop severe gastritis.

Figure 1. IL-4 release of splenocytes after restimulation with H. pylori sonicate (Bennedsen et al., 1999)

Figure 2. Gastric inflammation (antrum + corpus) (Bennedsen et al., 1999)

Figure 3. Bacterial load (antrum + corpus) (Bennedsen et al., 1999)

Figure 4. Amount of lipid peroxidation products (MDA and 4-hydroxyalkenals) during H. pylori infection (Wang et al., 2000)
The success of astaxanthin in dyspepsia animal models prompted further prospective human studies. In 1999, the first clinical study performed in collaboration with the Centre for Digestive Diseases, Australia, involved 10 H.pylori positive subjects (non-ulcer) with typical dyspeptic symptoms such as heartburn and gastric pain, were each treated with 40 mg daily dose of astaxanthin for 21 days. 10 clinical parameters assessed the efficacy before and after the treatment period. The gastric pain, heartburn and total clinical symptoms results showed a significant drop of 66%, 78% and 52% drop respectively (Figure 5). Furthermore, follow-up checks 27 days after the cessation of astaxanthin intake (a total of 49 days from day 0), showed that the dyspeptic symptoms remained low (Lignell et al., 1999). In summary, astaxanthin effectively controlled the dyspepsia symptoms, and H.pylori eradication trend was observed, but not significant.

**Figure 5. Total Clinical Symptoms (Lignell et al., 1999)**

![Graph showing total clinical symptoms](AX_Gastric_JUL30.2010)

Astaxanthin reduced total grade of clinical symptoms in H. pylori positive non-ulcer dyspeptic subjects after 21 days. Low symptom score continued even up to 28 days after treatment ceased.

**Reflux in Non-Ulcer Dyspepsia**

Approximately one in four people experience dyspepsia at some time that are linked to common causes such as food types, stress, stomach ulcers, or acid reflux (stomach acid backs-up into the esophagus). If the exact causes of non-ulcer dyspepsia are unknown, there are no standardized treatments that exist to effectively treat the patient. The usual procedure involves the problematic remedies of acid blocking medicines, painkillers or antibiotics. However, drug treatment faces problems with increasing antibiotic resistant bacteria and carries increased risk of damage to the stomach. Therefore, clinically proven non-drug treatments are becoming more attractive to physicians and patients.

Astaxanthin efficacy in non-ulcer dyspepsia was demonstrated in a randomized double-blind placebo controlled study involving 131 patients complaining of non-ulcer dyspepsia. This collaborative trial conducted by the Kaunas University Hospital, Lithuania; Rigshospitalet, Copenhagen; University of Lund and the Karolinska Institute, Sweden demonstrated that 40 mg astaxanthin treatment up to 4 weeks significantly reduced reflux compared to the 16 mg (P<0.05) or placebo (P<0.05) groups (Figure 6). Although there was a strong placebo effect, other improved trends included reduced gastric pain and abdominal pain (Kupcinskas et al., 2008).

**Figure 6. Reflux-syndrome**

![Graph showing reflux-syndrome score](AX_Pylori_DEC03.09)

Reduced reflux-syndrome score of non-ulcer dyspepsia patients treated with 16 mg and 40 mg astaxanthin.

**Outlook**

There are considerable overlaps in a number of gastrointestinal disorders that may be treatable with conventional medicine, but what if it does not work? In that case, astaxanthin may be useful, particularly against H.pylori positive gastritis and non-ulcer dyspepsia acid reflux. The mechanisms of action include the following: decreasing oxidative stress by astaxanthin’s potent antioxidant property; controlling bacterial infection by shifting the immune response; and alleviating dyspeptic symptoms by retarding inflammation. Furthermore, these results infer that acid reflux in connection with either H.pylori positive or negative conditions can still expect improvements with astaxanthin.

**References**


**H.pylori & Dyspepsia Patents**

WO98/37874 and WO00/23064.