

Role of Gastric Microbiota in *H. Pylori*. Infection: A Hero or a Villain?

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Gastric cancer is known as the second leading cause of cancer death. *H.pylori* is classified as a group 1 human carcinogen by the international agency of research on cancer. Gastric microbiome is proved to be affected by *H.pylori* infection. Molecular methods and approaches for microbiome have increased the interest of studying the role of gastric microbiota in health and disease. Several studies have claimed the “mask changing” behavior of gastric microbiota in *H.pylori* infection which may cause more complications. Also, there are huge amount of studies that suggest using probiotics instead of antibiotic treatment in gastric infection. Although in vitro and animal model studies suggest anticancer effects of probiotics, results are controversial in human models. There are some investigations suggest the negative role of probiotics in gastric cancer. In this study, we will observe gastric microbiome and probiotics differently, compare the hero/villain role of these microbes in critical gastric condition and will discuss novel studies that we willing to do if opportunities are available in a professional environment.

Microbiome can show a different face

Das et al studied positive and negative interactions between microbiome and *H.pylori* and believed that microbiome is suspected to play a role in diseases caused by *H.pylori*. On the other hand, presence of *H.pylori* modulates interactions between various microbial genera. *H.pylori* abundance may influence or be influenced by gastric microbiota. We must notice that these interaction patterns can be used in identification of microbial genera which can help to restore harmony in gastric microbial community. In *H.pylori* infection, increase of gastric environment pH leads to best growth condition for microbes that are incapable of growing in normal environment. This may cause microbial bloom and outnumbering *H.pylori*. So adding new microbial genera (probiotics) in this critical situation may cause further new diseases in long term.

Gastric microbiota contains fungi and yeasts in addition to bacteria. Fungal colonization is common among patients with gastric ulcer. In this critical situation, microbiota changes its positive role to negative role and increases the risk of infection in addition to cancer.

So it is important to consider gastric microbiota as our ally we shouldn't underestimate, because it changes the mask in case of complications and makes the process of healing even harder.

Engstrand et al Claimed that changes in gastric pH or antibiotic treatment can cause noticeable shift in stomach microbiota and can lead to disease. They believe that the role of gastric microbiota is unclear in diseases. They also found that oral microbiota was more stable than intestinal microbiota in antibiotic treatment. So in *H.pylori* infection this stable oral microbiota may find a way to stomach, where pH has increased due to the infection and colonized there. This may cause further diseases.

Probiotics can make everything more complicated

Little is known about cross-interactions among probiotics. Since there are evaluations of interactions between probiotics and colorectal cancer, studies must focus on effects of these organisms on gastric cell proliferation, which may lead to gastric cancer. It is important to consider the fact that bacterial overgrowth in stomach may cause other infections. Changes in physiological condition of stomach in different diseases or during drug treatment, may result in extraneous microbe colonization in stomach. Low production of gastric acid causes reduction in gastric barrier effect and results in bacterial

overgrowth. The international definition of Probiotics is: “living microorganism that in adequate amount brings health benefits for host”.

According to this definition, adequate amount of these microbes must be used which is a critical subject, because “adequate amount” is probably different for people in different geographical regions with various food consumption and enough or poor health education. If patients have experienced any of conditions we mentioned above, they may experience “probiotic colonization” in stomach and new diseases due to over use of probiotics.

Susceptibility and outcome of *H.pylori* infection vary according to *H.pylori* and host genetic background[5]. This important factor may change the result of treatment by probiotic administration, too. In other part of probiotic definition it is claimed that they must originate from the host, but in different studies people with various ethnicities were found to be different in microbiome composition. So use of same products with specific amount of probiotics may lead to harm for people with different history.

2 groups of patients with and without probiotics yogurt consumption were studied by Kim et al and as a part of the result, it was claimed that the frequency of adverse effects in yogurt group were higher than control group (41% to 26%) and addition of this yogurt didn't reduce triple therapy side effects (diarrhea and metallic taste)[6].

So in spite of the fact that probiotics can be very useful in many cases, same amounts and same species can't be used for all groups of patients.

Conclusion: Gastritis is known as one of the most challenging health problems that can cause gastric cancer, the second leading cause of cancer death worldwide. *H.pylori*, famous for its leading role in gastritis, can alter gastric microbiome and accelerate process of cancer progression in different ways.

Gastric microbiota is known for its role in stomach health, but in some cases when stomach faces crisis, microbiota uses this opportunity to overgrow, causing additional problems. In this case, adding more bacteria species (probiotics) may show adverse results. Although use of probiotics has been appreciated in many studies, it is evident that people with different background (geographically, various food consumption, etc.) may face more side effects when they use probiotics.

So there are some main questions that must be answered: Is it totally safe to use probiotics as alternative of present treatments in gastric complications? Can we change the composition of microbiota to prevent it from causing additional problems?

To answer these questions there are some aspects that we want to elucidate when we have the opportunity to work in professional academic environment:

- 1) It must be studied that how shift of microbiota happens in *H.pylori* infection in different ethnicity.
- 2) Prospective studies must be done to clarify effects of probiotics in people with same gastric complications and different ethnicity.
- 3) Age is another important factor that hasn't been focused on, in most studies. Change of microbiota and probiotic effects must be studied in different ages.