

Studies of interaction between intestinal bacteria and the protozoan parasite *Giardia intestinalis*

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Giardia intestinalis is an organism (parasite) that lives within another organism (host) from which it obtains nutrients. The host has no benefit from this association and usually it is harmed by it. The parasite has a worldwide distribution and cause a disease called giardiasis.

In the last decades scientist have dedicated more and more time trying to understand the interaction between *G. intestinalis* and the bacteria that are part of human micro flora. The micro flora is a mixture of microorganisms that exist in several parts of the human body such as the gastrointestinal tract.

Bacterial species have an important role in the gut flora since they produce vitamins that the human body cannot produce by itself and they are important in the metabolism of nutrients that humans cannot digest.

In this project we examine the interactions in several ways. First we tested whether *G. intestinalis* products that are produced while the parasite grows under normal conditions (spent medium), can affect bacterial growth and we could show that the parasite spent medium can reduce the growth of *E. coli* and *S. typhimurium*. Moreover the effect of bacterial growth products on *G. intestinalis* growth was tested. *G. intestinalis* has two different genotypes (genetic identity that is inherited) that can both infect humans; assemblage A and B. Growth was tested on both assemblages of the parasite. The results showed that *E. coli* and *S. typhimurium* spent medium inhibits *G. intestinalis* growth while *Lactobacillus* spent medium stimulates the growth.

In addition to those experiments the parasite was also treated with several B vitamins. *Lactobacillus* species that resides in the human gastrointestinal tract are known to produce vitamins that belong to vitamin B family. Vitamin B6, B8 and B12 where found to have a stimulating effect on the parasite while B9 has an inhibiting effect.

Menadione (K3 vitamin) is known from previous studies to induce oxidative stress in *G. intestinalis*. Oxidative stress is a harmful condition since free

oxygen radicals attack biological molecules such as lipids, proteins and DNA. The results showed a highly inhibitory effect of menadione, especially on assemblage B.

Through this study we could show that different bacteria that reside in the same niche as the parasite can have either positive or negative effects on Giardia growth. We could also show that the parasite can affect bacterial growth.

More work needs to be done in order to understand co-infections and to establish a successful treatment of giardiasis based on probiota.