SUMMARY

REGULATION OF *BLASTOCYSTIS* ST3 (PROTISTA) AND INTESTINAL MICROBIOTA PROLIFERATION WITH PROBIOTICS AND SELECTED MEDICAMENTS *IN VITRO*

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The PhD dissertation is based on two original research articles:

1) The influence of probiotic bacteria and human gut microorganisms causing opportunistic infections on *Blastocystis* ST3; Gut Pathogens 2019: 11: 6, https://doi.org/10.1186/s13099-019-0287-8;

2) Influence of proton pump inhibitors and histamine receptor 2 antagonists on *Blastocystis* ST3 and selected microorganisms of intestinal microbiota *in vitro*; Clinical and Translational Gastroenterology 2021: 12, DOI: 10.14309/ctg.0000000000000325

The articles include a study on the regulation of *Blastocystis* ST3 and intestinal microbiota proliferation with the probiotics and medicaments used in the treatment of gastrointestinal diseases *in vitro*.

Blastocystis is the most common intestinal protist present in humans throughout the world with a controversial pathogenic potential. It has been found in both patients with gastrointestinal symptoms and skin disorders as well as in asymptomatic individuals. Several research studies have suggested that probiotic bacteria such as *Lactobacillus rhamnosus* and yeasts such as *Saccharomyces boulardii* inhibit the multiplication of gut protozoans, while others like *Escherichia coli* are beneficial for their development. Moreover, protozoan infections or the colonization of human intestine depends on the composition of its natural microbiota. An association between PPIs and alteration of the gut microbiota has been reported. Proton pump inhibitors (PPIs) and histamine receptor 2 (H2) antagonists are commonly prescribed medications. Long-term usage of them may lead to changes in the

composition diversity of gut microbiota and protozoan colonization; including parasitic infections.

The dissertation attempts to evaluate the efficacy of the lactic acid bacteria *Lactobacillus rhamnosus*, *Lactococcus lactis* and *Enterococcus faecium* and their cell free supernatants in *Blastocystis* subtype 3 (ST3) eradication as well as the relevance of the intestinal microorganisms *Escherichia coli*, *Candida albicans* and *Candida glabrata* and their chemical components in *Blastocystis* ST3 proliferation *in vitro*. Further research has aimed to investigate the influence of PPIs and H2 blockers on the *in vitro* proliferation of these selected intestinal microorganisms - *Lactobacillus rhamnosus, Enterococcus faecium, Escherichia coli, Candida albicans* and *Blastocystis* ST3.

The results have shown *Blastocystis* inhibition by *L. rhamnosus* and *L. lactis* and their supernatants from the second day of co-incubation, in both, xenic and axenic culture. Furthermore, co-incubation with both *E. faecium* and *E. coli* showed a beneficial influence on *Blastocystis* during the first two days. Only after three days did the above-mentioned bacteria start to inhibit *Blastocystis* growth in both cultures. Compared to the control samples, co-incubation with both *C. albicans* and *C. glabrata* showed a faster decrease in *Blastocystis* proliferation; although it was insignificant.

Pantoprazole and esomeprazole exerted a significant inhibition on *Blastocystis* and *C. albicans*, especially at higher concentrations, which were even more effective than metronidazole. On the other hand, treatment with pantoprazole caused an increase in the proliferation of *L. rhamnosus* and *E. coli*. H2 blockers showed no influence on the examined microorganisms.

The fact that probiotic bacterial strains such as *L. rhamnosus* and *L. lactis*, as well as *E. faecium* are able to disrupt the cell cycle of *Blastocystis* shows a promising future in the use of probiotics for the prophylactic treatment of blastocystosis, or as an additional treatment regimen in combination with standard drugs. Moreover, PPIs, such as pantoprazole, can be a potential treatment in the prophylaxis or eradication of *Blastocystis* and *C. albicans*.

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