ABSTRACT

Charles University

Faculty of Pharmacy in Hradec Králové

Department of Biological and Medical Sciences

Study program: Pharmacy

Author: Veronika Drgoňová

Supervisor: PharmDr. Ondřej Janďourek, Ph.D.

Consultant: Mgr. Martin Schwarzer, Ph.D.

Title of diploma: Impact of selected probiotic bacteria on juvenile host growth in gnotobiotic mouse model

This thesis expands understanding of the ability of *Lactiplantibacillus plantarum* WJL bacteria to support the growth of gnotobiotic hosts in models of chronic malnutrition. It was investigated whether other bacteria also have similar capabilities and whether these traits are species- and strain-specific. Strains of *Bifidobacterium longum* ssp. *longum* and *Bifidobacterium adolescentis* were tested in a gnotobiotic juvenile mouse model of chronic malnutrition and their impact on the host's somatotropic axis was monitored. Concurrently, it was analysed how malnutrition affects the bacteria in the host's gut and the level of its colonization.

Germ-free C57BL/6J mice were mono-colonized *via* intragastric gavage with the aforementioned bacterial strains. The mice were mated after confirming stable colonization and F1 male offspring were weaned on the 21st day after birth onto an experimental diet with low protein and fat content. Their growth was monitored weekly by measuring body length and weight. The mice were euthanized 5 weeks later and samples were collected for further analysis. Germ-free mice were used as a control.

Results suggest that other bacterial strains besides *Lactiplantibacillus plantarum* WJL exhibit growth-promoting effects in chronically malnourished mice, with these effects being species- and strain-specific.

The colonization level of all tested bacterial strains decreased in mice on the experimental diet. Species and strain specificity were demonstrated by both tested *Bifidobacterium longum* (Bl) strains showing improved systemic growth compared to both *Bifidobacterium adolescentis* (Bad) strains and the control germ-free (GF) group, with Bl 372 strain exhibiting significantly enhanced growth compared to Bl 367. This was accompanied by elevated levels of IGF-1 in the serum of mice colonized with Bl 372 compared to those colonized with Bl 367, Bad 368, and Bad 373. Histological analysis of the architecture of the small intestine revealed the longest villi in mice colonized with Bl 372.

Keywords: bfidobacteria, gnotobiology, growth, somatotropic axis