LG21, A PROBIOTIC STRAIN SPECIALIZED IN THE USE FOR THE GASTRIC DISEASES SUCH AS H. PYLORI INFECTION AND FUNCTIONAL DYSPEPSIA

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Introduction:
In a previous study (Gut 1997;41:49-55), we found that H. pylori could not colonize the stomach of gnotobiotic mice, which had been associated with lactobacilli. In contrast, H. pylori could colonize the stomach in large numbers in germfree mice. In addition, lactobacilli given after H. pylori infection reduced the density of H. pylori in the stomach. These findings suggested the possibility that lactobacilli can be potentially useful probiotic agents to H. pylori. While the acidity in the stomach of mice is mild (pH4~5), the acidity in the stomach of human is so high (pH1~2) that a probiotic strain, that is resistant to acid and bears ability to bind to the gastric mucosa, is required as a probiotic strain for use in the human stomach. Based on this idea, we selected Lactobacillus gasseri OLL2716 (LG21) as the most suitable strain for human use because this strain demonstrated both a high resistance to acidity and a strong binding to the gastric epithelial cells.

Methods:
To examine the effect of LG21 on H. pylori infection in human, randomized controlled clinical trials were performed using H. pylori-infected subjects. The subjects took active yogurt (containing one billion CFU of LG21) or placebo yogurt everyday for 12 weeks. The exclusion criteria include antecedent therapy with antibiotics in the previous 4 weeks, prior treatment with acid-suppressive anti-inflammatory drugs or a history of gastric surgery. The density of H. pylori and the degree of H. pylori-induced inflammation in the stomach were evaluated by urea breath tests and serum pepsinogens levels, respectively. To investigate the effect of LG21 on both the symptoms and the structure of the gastric microbiota in functional dyspepsia (FD), we used questionnaires and examined the 16S rRNA gene sequence profiling, respectively.

Results:
While both urea breath tests and serum pepsinogens levels revealed a significant improvement following LG21 treatment, a complete eradication was scarcely found. However, the pretreatment of the patients with LG21 on eradication therapy with antibiotics significantly improved the eradication rate (~10%) compared with the treatment with antibiotics only. In the RCT using FD patients, the LG21-treated group showed significant improvement in postprandial fullness and epigastric bloating compared with the placebo-treated group.
An obvious dysbiosis at the phylum level was found in the gastric fluid microbiota in FD patients, and treatment of FD patients with LG21 markedly improved the dysbiosis.

Discussion:
The adhesion of H. pylori to gastric epithelial cells is a primary event in the development of inflammation, which results in the occurrence of chronic gastritis and leading to peptic ulcers and gastric cancers. Inhibition of the adhesion by LG21 is thought to be a major mechanism of this probiotic to suppress H. pylori that are colonizing the stomach. A particular property of LG21, a resistance to acidity thus keeping this strain alive long time in the stomach, appeared critical for this probiotic strain to exert such suppressive effect in the stomach, because killed LG21 could not exert an inhibitory effect on the adhesion of H. pylori to the mucosa anymore.

Keywords: Probiotics, LG21, Stomach, H. pylori, Functional dyspepsia

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