



Behavior of *Bacillus coagulans* Unique IS-2 spores during passage through the simulator of human intestinal microbial ecosystem (SHIME) model

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Summary:

Survival and germination of spores in the upper gastrointestinal tract (GIT) is crucial for spore-probiotics to confer beneficial effects to the host. In the present study, the survival, germination and metabolic activity of *Bacillus coagulans* Unique IS-2 spores in an in vitro Simulator of Human Intestinal Microbial Ecosystem (SHIME®) model was investigated. The survival and germination of spores under fed and fasted GIT conditions was analyzed by using flow cytometry and agar plate method. Lactate and short chain fatty acid (SCFA) were measured as indicators of metabolic activity. *B. coagulans* Unique IS-2 showed 102% and 99% survival under fed and fasted conditions of upper GIT. Significant amount of spore germination was detected in the small intestine, where the spores had not transformed completely into vegetative cells but assisted in digestion of lactose and fructose. Furthermore, once the germinated spores entered into the colon they underwent vegetative growth and produced significant levels of lactate (8.30 ± 0.07 mM) and acetate (31.75 ± 3.58 mM) as major metabolites. In conclusion, *B. coagulans* Unique IS-2 demonstrated ability to survive and germinate under gastrointestinal conditions and aid in digestion of carbohydrates.
