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Preliminary *in vitro* characterization of *Lactobacillus plantarum* strains isolated from fermented foods

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INTRODUCTION

Since the publication in 1908 of Elie Metchnikoff's work "The prolongation of life", the concept of microbes, in particular acid lactic bacteria, as health promoters was introduced and set the foundations for what is now known as "probiotic bacteria". According to the Food and Agriculture Organization of the United Nations and the World Health Organization (FAO/WHO, 2002), probiotics are live microorganisms that confer healthy benefits to the host when administered in adequate amounts, reaching the intestine and equilibrating the gastrointestinal microbiota. Since many food-associated bacterial strains share genetic and physiological traits with probiotic strains they could be able to display probiotic properties, and thus, the interaction between host cells and food-borne strains is a mandatory feature to investigate. In this perspective, the first two activities of the PhD project are described, in which microbial adhesion ability was assessed to normal human colon mucosal epithelial cells and mucus of 22 *Lb. plantarum* strains belonging to UNITE Culture Collection.

Strains	Origin
WCSF1	Human saliva
ATCC® 14917™	Pickled cabbage
IMC 510®	Synbiotec s.r.l.
IMC 513®	Synbiotec s.r.l.
C9O4/C9S2/N14/O13/O5	Table olives
21B/CF1	Sourdough
LT21/LT52/LT53	Raw-milk cheeses
LAB40/LAB49/LAB62	
LT99/LT100/LAB30	
LAB1/LAB32	

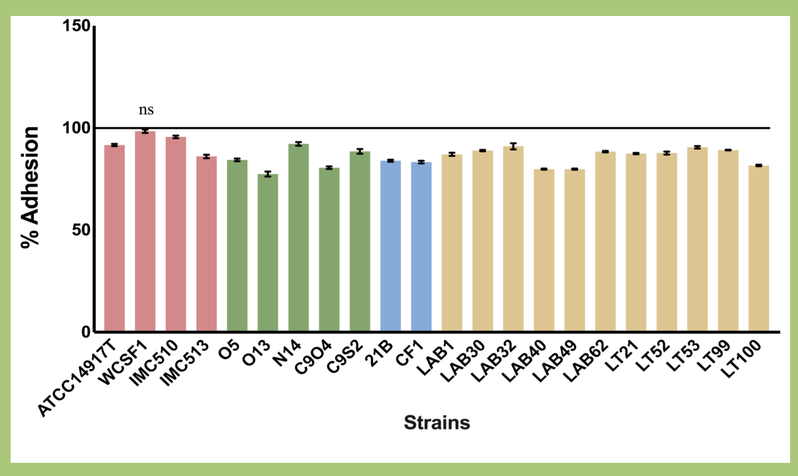
RESULTS

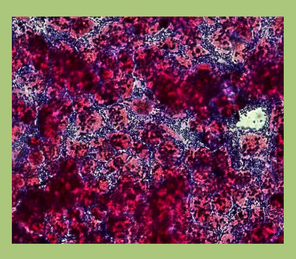
Adhesion to Intestinal Human Cells

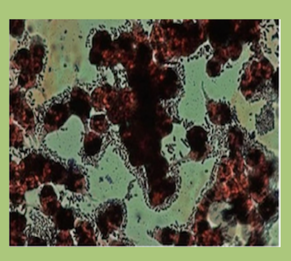
Adhesive strains to human cells were microscopically observed by using **GRAM stain** (Kotzamanidis et al., 2010).

Adhering bacteria to NCM460 cells were quantified **by plating serial dilutions on MRS agar plates**.

Values are expressed as mean ± SEM and are reported as percentage of adhesion compared with the control (100%). ANOVA Bonferroni's test showed significant differences in all samples compared with the control (p<0.001), except for WCSF1 strain (ns).

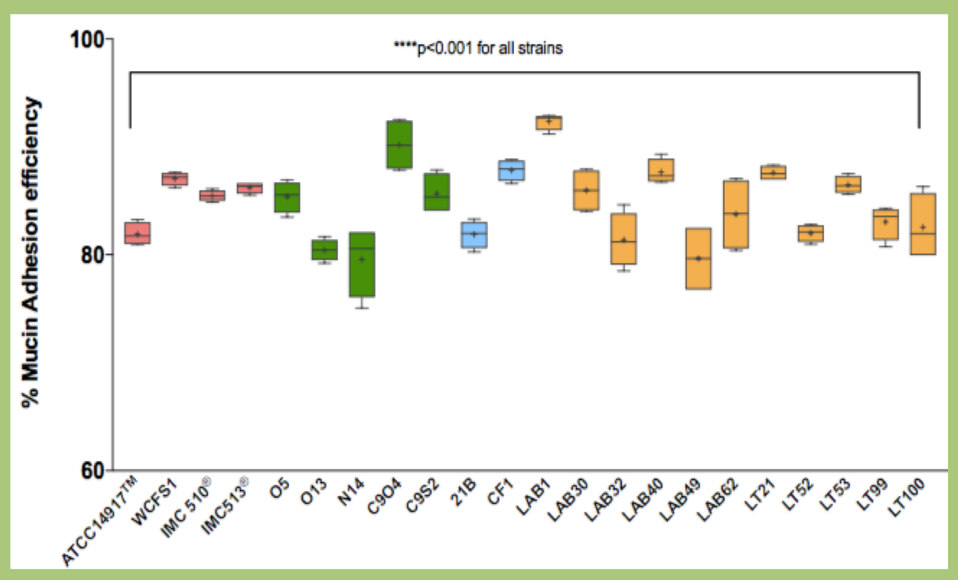






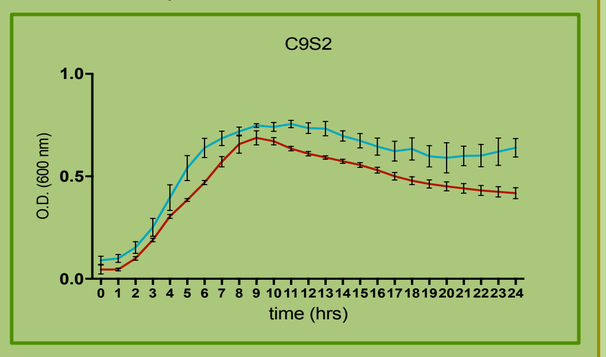
Mucin-Microbe Adhesion

Bacterial adhesion to mucin layer was performed quantifying adhered bacteria to **pig mucin type III** by plating serial dilutions on MRS plates (Tallon *et al*., 2007).

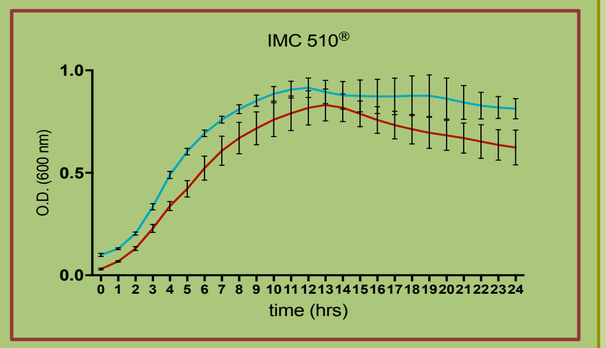


Adhesion values are expressed as mean (bold horizontal bars) with min and max values (boxes) ± SD and are reported as percentage of adhesion compared with the control (100%). ANOVA Bonferroni's test showed significant differences (p<0.001) for all samples compared with the control.

Microbial growth in presence of mucin was assessed by monitoring growth in presence of pig mucin type III using an EnSpire multimode plate reader.



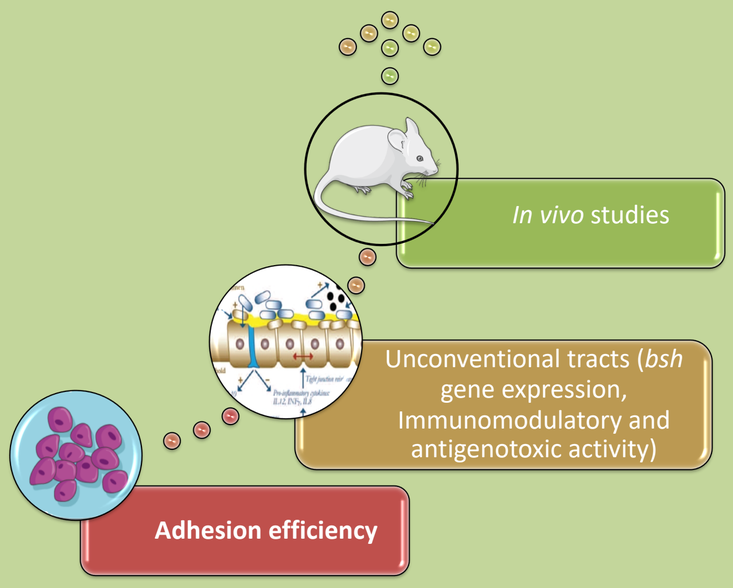
Two representative growth curves were chosen in order to showed how **food-borne** strains were able to grow in presence of mucin as **probiotics**



All *Lb. plantarum* strains showed to be affected by growth in the presence of porcine mucin in a strain-dependent way.

FORTHCOMING STEPS

Fermented Food + Selected ***Lb. plantarum*** strain = **Functional Food**



CONCLUSIONS

- ✓ Adhesion efficiency of food-borne strains similar to that of probiotics.
- ✓ High adhesion efficiency to human intestinal cells with preference to cell edges.
- ✓ All the strains evaluated were able to grow in a medium containing mucin in a strain-dependent way.

ACKNOWLEDGMENTS

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2. Tallon, R. et al. J. Appl Microbiol. **102**, 442-451 (2007).

XXIII WORKSHOP ON THE DEVELOPMENTS IN THE ITALIAN PhD RESEARCH ON FOOD SCIENCE, TECHNOLOGY AND BIOTECHNOLOGY
ORISTANO 19th · 20th · 21st SEPT 2018