

Lactobacillus as potential psychobiotic treatment for depression and anxiety-related diseases



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Introduction

Several commensal species of bacteria are being tested as a possible treatment for stress-derived mental diseases, and *Lactobacillus* seems to have a main role in the research due to its capacity to produce γ -aminobutyric acid (GABA), which alters serotonin concentration in brain [1].

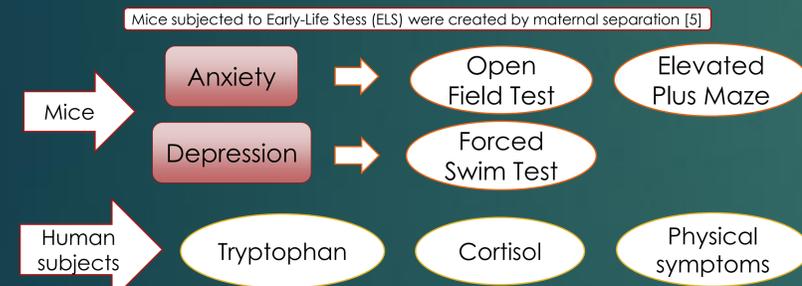
With the knowledge that the gut microbiota status can affect motivation and cognitive functions, arises the possibility of new prophylactic or therapeutic approaches to stress-related disorders, one of these being the oral administration of selected commensal bacteria, usually referred as probiotics [2][3].

The objective of this work is to focus on the *Lactobacillus* genus to assess its potential as psychobiotic for depression and anxiety treatment.

Methodology

All material of information was taken from the research database PubMed, via the National Centre for Biotechnology Information (NCBI). Searches were limited to Full Text, accessible through the Universitat Autònoma de Barcelona (UAB) ARE program, which grants access to most databases, books and journals for free.

Tests performed



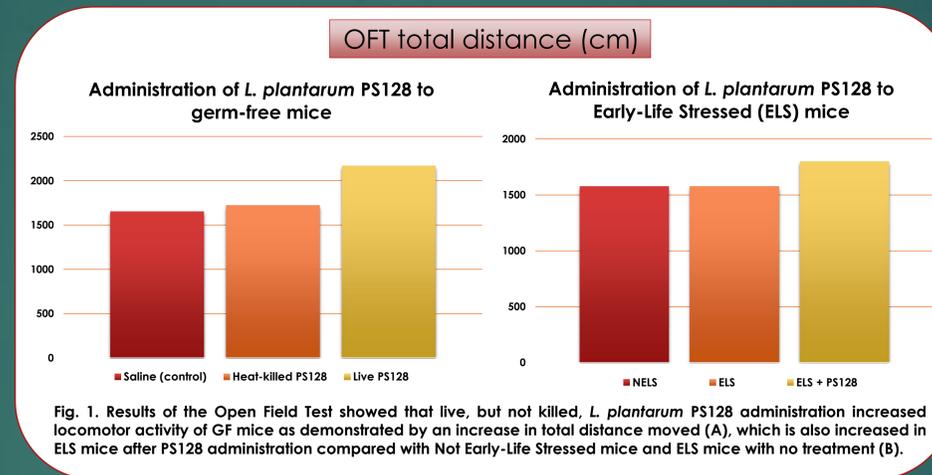
Conclusion

All studies indicated that a dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, a complex set of interactions among the three endocrine glandules that controls reactions to stress, could be normalized by administration of probiotic *Lactobacillus* strains. Neurotransmitters levels that affect directly stress-related diseases were stabilized, and depression and anxiety related symptoms decreased with the administration of various strains both in mice and human subjects.

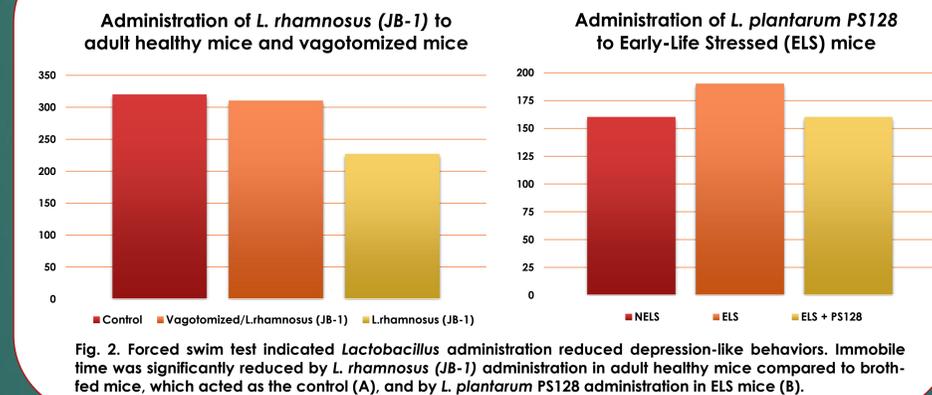
These results demonstrate a possible application as adjuvant therapy [8] or maybe even to replace chemotherapeutic agents in part [9].

Results

Administration of treatment on mice



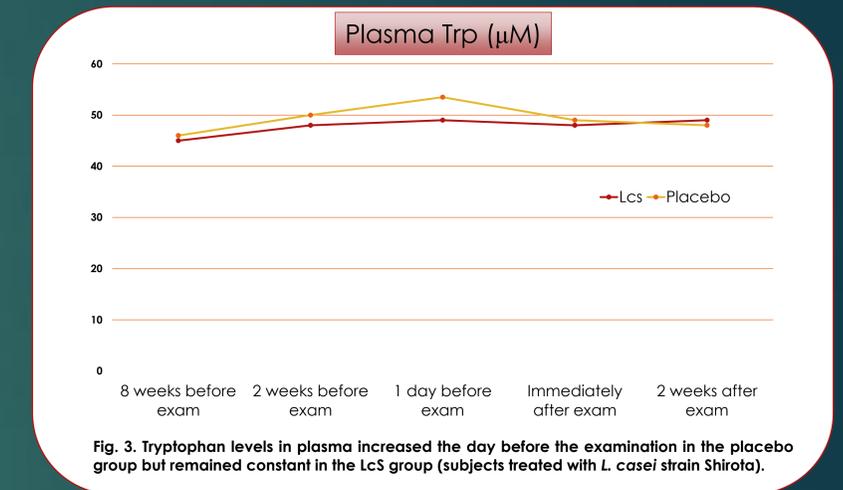
FST Immobility time (s)



- A significant increase in the total distance traveled by mice treated with *Lactobacillus plantarum* PS128 is observed on the Open Field Test, commonly used as a qualitative and quantitative measure of the general locomotor activity and willingness to explore in rodents (Fig. 1) [4,5].
- Elevated Plus Maze test is also performed to determine anxiolytic effects, and results prove that the mice that receive treatment present less aversion to open spaces [4].
- A significant decrease is observed in the immobility time spent by mice fed with the psychobiotic on the Forced Swim Test (Fig. 2) [5,6].
- Behavioral effects are not found in vagotomized mice, identifying the vagus nerve as a major modulatory constitutive communication pathway between the bacteria exposed to the gut and the brain [6].

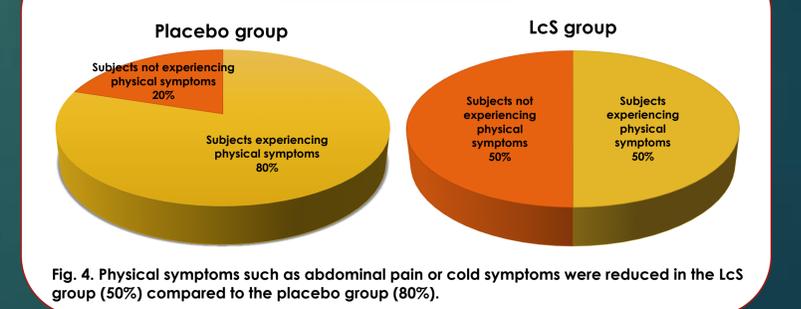
Administration of treatment on humans

Effects of probiotic *Lactobacillus casei* strain Shirota (LcS) on psychological, physiological, and physical stress responses in medical students undertaking an authorised nationwide examination for promotion [7].



- Salivary cortisol levels increased significantly 1 day before the examination in the placebo group, but remained steady in the group treated with the bacteria (LcS group).
- Concentration of tryptophan in plasma was also examined, showing similar results as salivary cortisol. Tryptophan levels increased the day before the examination in the placebo group, but remained steady in the LcS group (Fig. 3)
- The rate of subjects experiencing physical symptoms was considered to be increased in the placebo group (Fig. 4). Subjects who had not been administered LcS were more likely to suffer higher levels of stress as the day of the academic examination approached [7].

Physical symptoms



References

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