Gamma-aminobutyric acid (GABA) production by probiotics

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Introduction: Gamma-aminobutyric acid (GABA) plays a central role in inhibitory neurotransmission in the human brain. Abnormal GABA levels have been linked to certain psychopathological conditions. The potential to alter GABA levels through diet opens up possibilities for novel interventions. To this end, we assessed the ability of 7 commercial probiotic strains to produce GABA.

Methods: Seven commercial probiotic strains were screened for GABA production. Probiotics were inoculated in 10 mL MRS tubes supplemented with monosodium glutamate (1% w/v) in combination or not with the prebiotic inulin Synergy-1 (1% w/v). The two strains with the highest production of GABA were assessed for 48 h in pH-controlled anaerobic batch cultures inoculated with faecal samples. LC-MS was used for the quantification of GABA and microbiota composition was determined using 16S rRNA gene sequencing.

Results: *Lactobacillus brevis* LB01 and *Lactobacillus plantarum* 299v were the most efficient probiotic strains tested for GABA production in pure cultures. High GABA levels (62.9 mM ± 14.3) were obtained by the probiotic strain *L. brevis* when added in the fermentation vessels at pH 5.4-5.6. This result was significantly higher compared to GABA levels obtained with *L. plantarum* (4.8 mM ± 6.8) and negative control (2.9mM ± 3.1). The prebiotic did not stimulate GABA production under the conditions tested.

Discussion: The ability of different commercial probiotics to produce GABA in-vitro was evaluated. *L. brevis* LB01 was found to be the most efficient probiotic strain tested in a faecal microbiota environment. High GABA levels obtained make this probiotic formulation a candidate for a potential interventions aimed at increasing GABA levels. Ongoing work in our lab will test this possibility.