Proceedings of the Nutrition Society (2021), **80 (OCE5)**, E192 doi:10.1017/S0029665121003207

Summer Conference, 6–8 July 2021, Nutrition in a changing world

Galactooligosaccharide fibres exert immunomodulatory properties and interfere with riboflavin derivatives in an ex-vivo study

S. Del Fabbro[1]*, P.C. Calder[1,2,3] and C.E. Childs[1,3]

[1]*School of Human Development and Health, Faculty of Medicine, University of Southampton, Southampton, UK,*
[2]*NIHR Southampton Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust and University of Southampton, Southampton, UK and*
[3]*Institute for Life Sciences, University of Southampton, Southampton, UK*

Mucosal-associated invariant T (MAIT) cells are T lymphocytes with a key role in immune surveillance. Riboflavin derivatives produced by the gut microbiota are MAIT cell ligands[1]. Evidence suggests that unknown metabolites synthesised by probiotic strains modulate MAIT cell function[2,3]. Galactooligosaccharides (GOS) are prebiotics produced via transgalactosylation by β-galactosidases, which are expressed by gut bacteria[4]. We aim to assess whether GOS modulate the function of MAIT cells or other peripheral blood mononuclear cell (PBMC) subsets and whether cells respond differently to a riboflavin derivative in presence of GOS.

Healthy PBMCs (n = 8) were cultured for 20 h with GOS (Bimuno®) (12 mg/mL), or a riboflavin derivative (5-A-RU 0.18 μM + methylglyoxal 1 μM), or co-stimulated with both. Unstimulated cells were used as control. One-way ANOVA or Kruskal-Wallis test followed by Bonferroni's or Dunn's post-hoc test were performed depending upon data distribution.

Treatment with GOS did not affect viability. PBMCs incubated with GOS presented lower CD4 expression on T helper cells (MFI 14,561 ± 612.3 vs 17,593 ± 2,157; p = 0.0053) and secreted more IL-8 (104.0 ± 62.9 ng/mL vs 3.8 ± 2.6 ng/mL; p = 0.0005) compared to control. Intracellular staining revealed that monocytes were responsible for the upregulated IL-8 expression. Co-treatment of cells with the riboflavin derivative and GOS resulted in decreased CD69 expression by lymphocytes (MFI 19,076 ± 2,648 vs 15,761 ± 1,158 p = 0.0017), T cells (MFI 20,317 ± 2,303 vs 16,572 ± 1,439 p < 0.0001) and cytotoxic T cells (MFI 24,669 ± 4,249 vs 20,188 ± 3,485 p = 0.0205) compared to riboflavin derivative alone, and in lower % MAIT cells expressing IL-17A vs riboflavin derivative alone (0.03 ± 0.03 vs 0.49 ± 0.40 p = 0.0008).

Overall, GOS showed immunomodulatory effects, including the modulation of CD4 expression and enhancement of IL-8 secretion. PBMCs responded differently to ligand challenge in presence of GOS, suggesting that the prebiotic may interfere with riboflavin metabolites or signal via similar pathways.

Acknowledgements

GOS (Bimuno®) was provided by Clasado Biosciences

References

1. Patel O, Kjer-Nielsen L, Le Nours J, *et al.* (2013) *Nat Commun* **4**, 1–9.
2. Johansson MA, Bjorkander S, Mata Forsberg M, *et al.* (2016) *Front Immunol* **7**, 1–15.
3. Hinks TS (2016) *Immunology* **148**, 1–12.
4. Grimaldi R, Swann JR, Vulevic J, *et al.* (2016) *Br J Nutr* **116**, 480–486.

*Corresponding author: IDS Building, MP887, Southampton General Hospital, Tremona Road, Southampton, UK