Proceedings of the Nutrition Society (2010), **69 (OCE3)**, E281 doi:10.1017/S0029665110000704

3rd Immunonutrition Workshop, 21–24 October 2009, Girona, Spain

Cytokine production by peripheral blood mononuclear cells (PBMCs) stimulated by *Bifidobacteria* spp. or galactooligosaccharide

M. Baran[1], S. Kolida[1], C. Childs [1], P. Yaqoob[1], G. Tzortzis[2] and R. Rastall[1]
[1]*University of Reading, Food Biosciences, PO Box 226, Whiteknights, Reading RG6 6AP and* [2]*Clasado Ltd, 5 Canon Harnett Court, Milton Keynes MK12 5NF, UK*

The relationship between gut microbiota and intestinal immune response has been intensively studied. Several studies showed that bifidobacteria enhance many aspects of immune function[1–3]. It is suggested that probiotic strains can be screened *in vitro* for their immunomodulatory potential using peripheral blood mononuclear cells (PBMCs), before clinical (*in vivo*) investigations[1]. Galactooligosaccharides (GOS) are one of the best established prebiotic compounds; however, immunomodulatory properties of prebiotics are not yet fully understood.

In vitro studies to date have employed either live[1,3] or heat-killed bacterial cells[4], but rarely both. This study compares cytokine production in response to live and heat-killed bifidobacteria by human PBMC. Furthermore, it investigates different concentrations of GOS, which will induce TNF-α production by PBMCs.

In this study live and heat-killed *Bifidobacterium lactis HOWARU* and *Bifidobacterium bifidum NCIMB 41171* were co-cultured with human PBMC isolated from the blood of healthy donors ($n = 4$). Their effects on pro- and anti-inflammatory cytokine production were investigated.

In order to determine the effect of GOS, PBMCs were incubated in the presence of different concentrations of GOS with or without LPS (0.001 μg/l).

Regardless of whether bacteria were live or heat-killed, both *B. lactis* and *B. bifidum* stimulated cytokine production by PBMC. *B. lactis* induced a significant increase in the production of IL-1β ($P \leq 0.01$) and TNF-α ($P<0.05$) compared to the unstimulated control, and *B. bifidum NCIMB41171* showed a similar trend. No significant change in IL-10 production was observed. There was no effect of heat killing on cytokine production, or on the ratio between pro-inflammatory and anti-inflammatory cytokines for either bacterial strain.

7 and 5.5 g/l of GOS stimulate significantly PBMCs to produce TNF-α. In the presence of LPS, GOS stimulate the TNF-α level significantly higher than in the absence of LPS thus LPS have additive effect.

In conclusion, both species of bifidobacteria induced production of IL-1β and TNF-α but not on IL-10, regardless of whether the cells were live or heat-killed. High concentration of GOS is also able to induce PBMCs to produce cytokines.

1. Foligne B, Nutten S, Grangette C *et al*. (2007) *World J Gastroenterol* **13**, 236–243.
2. Hatcher *et al*. (1993) *J Dairy Sci* **76**, 2485.
3. Medina M, Izquierdo E, Ennahar S *et al*. (2007) *Clin Exp Immunol* **150**, 531–538.
4. Shida K, Suzuki T & Kiyoshima-Shibata J (2006) *Clin Vaccine Immunol* **13**, 997–1003.