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Oral lactoferrin and glycine display *in vivo* synergistic anti-inflammatory activity

A. Hartog and J. Garssen

Numico Research, Wageningen, The Netherlands and Department of Pharmacology & Pathophysiology, Utrecht Institute for Pharmaceutical Sciences (UIPS), Utrecht University, The Netherlands

There is a growing awareness of the interaction of food constituents with the immune system. The present study aims to evaluate immunomodulatory effects of two of these nutritional components, i.e. glycine (Gly) and lactoferrin (LF)[1,2]. Mice orally supplemented with gly, LF or Gly + LF were injected intradermally in the ear with zymosan. Ear swelling, as a measure of inflammation, as well as IL-1, TNFα and IL-6 levels in the ear and the number of TNFα-producing spleen cells were analysed. Gly and LF decreased the zymosan-induced inflammatory response locally (decreased ear swelling and pro-inflammatory cytokine levels) as well as systemically (reduced number of TNFα-producing spleen cells). Gly effects (20, 50 and 100 mg per mouse per d) were concentration dependent whereas for LF only the lowest doses (0.1 and 1 mg per mouse per d) significantly inhibited the inflammatory response. Surprisingly, higher doses of LF (5 and 25 mg per mouse per d) failed to influence the inflammatory reaction. A combination of both nutrients (LF 0.1 mg per mouse per d + gly 20 or 50 mg per mouse per d) inhibited the zymosan-induced ear swelling synergistically (Figure). Additionally, an enhancing effect of both components was seen on the number of TNFα-producing spleen cells.

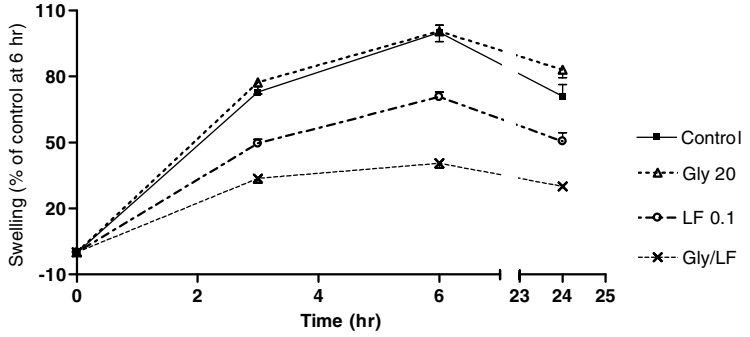

Figure. The effect of glycine, bovine LF and a combination of gly + LF on zymosan-induced ear inflammation. Vehicle (control), gly (20 mg per mouse per d), bovine LF (0.1 mg per mouse per d) and gly + LF (Gly/LF) were orally administered for 3 d, at day 2 the ears were injected with zymosan. Ear thickness was measured before and 3, 6 and 24 h after the injection. The swelling of the ears of the vehicle-treated animals at 6 h (generally the maximal swelling) was set to 100 %. Results are shown as means with their standard errors represented by vetical bars for six mice.

The present findings show anti-inflammatory activity of gly and LF using the zymosan-induced inflammation model. Moreover, a combination of both components demonstrated a synergistic effect on inflammation of the skin and an enhancing effect on the number of TNFα-producing spleen cells.

1. Zhong Z, Wheeler MD, Li X *et al*. (2003) *Curr Opin Clin Nutr Metab Care* **6**, 229–240.
2. Legrand D, Elass E, Pierce A & Mazurier J (2004) *Biometals* **17**, 225–229.