

ABSTRACT

Allergy, as one of the worldwide most frequent pathologies, belongs to illnesses with constantly growing incidence among young children. In genetically predisposed individuals, dendritic cells are able to polarize the immune response of Th2 in contact with the allergen. Postnatal probiotic supplementation could be one the preventive measure to prevent the development of allergic diseases. It has been shown that introduction of selected probiotic strains or mixtures can prevent development of allergy. In this diploma thesis, the capacity of probiotic strain *Escherichia coli* O83:K24:H31 (*E. coli* O83) to support maturation of dendritic cells (DC) and polarization of immune responses was tested. Introduction of this probiotic vaccine called Colinfant Newborn appears to be suitable preventive measure, lowering allergy incidence in children with predisposition to development of allergy.

The aim of this diploma thesis was to observe capacity of *E. coli* O83 to support maturation of the two main subpopulations of dendritic cells (myeloid dendritic cells – mDC and plasmacytoid dendritic cells – pDC) in cord blood of newborns of healthy mothers (children with relatively low risk for allergy development) and allergic mothers (children with relatively high risk for allergy development). To achieve this goal, flow cytometry was employed. The presence of individual cytokines and transcription factors characteristic for particular subpopulations of CD4⁺ T-lymphocytes (Th1, Th2, Th17 and regulatory T cells – Treg) was detected by flow cytometry in CD4⁺ T cells after cocultivation with DC stimulated *E. coli* O83 naive CD4⁺ cells.

Results show significantly higher expression of activation marker CD83 on mDC stimulated with *E. coli* O83 in children of allergic mothers in comparison with healthy mothers was determined. Similar results were obtained for pDC but it does not reach statistical significance.

Generally higher expression of activation marker CD83 on stimulated mDC and increased intracellular presence of cytokines in CD4⁺ T cells cocultured with DC stimulated with probiotic strain *E. coli* O83 of children of allergic mothers was observed. There was no significant difference between healthy and allergic groups in pDC. After cocultivation of *E. coli* O83 stimulated pDC with CD4⁺, a significantly increased levels of IL-10 and IL-17A were detected in CD4⁺ T cells of children of healthy mothers in comparison with CD4⁺ T cells cultivated with non-stimulated DC. We can conclude that *E. coli* O83 induces maturation of DC and production of IL-10 in pDC.

Generally higher reactivity of DC as well as CD4⁺ T cells itself together with decreased IL-10 levels in children of allergic mothers could support development of undesired immune responses after contact with antigen.

Keywords: allergy, cord blood, *E. coli* O83, children of healthy mothers, children of allergic mothers, dendritic cells, myeloid dendritic cells, plasmacytoid dendritic cells.