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Session IV: Biology, Host-Pathogen-Interaction and Immunology

Can we use Trichinella spiralis muscle larvae extracellular vesicles for the treatment of allergic airway inflammation?

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Extracelular vesicles (EVs) are a fundamental way of communication between cells of one organism but also between different organisms and even different species. These nano-sized membrane-limited biological particles, carry information in the form of proteins, lipids, RNA, as well as other molecules, and deliver them to target cells, thus playing role in all physiological and pathophysiological processes in an organism. We have recently discovered that extracellular vesicles isolated *from Trichinella spiralis* excretory-secretory products (TsEVs) exert immunomodulatory properties on human monocyte derived dendritic cells. It was previously shown that *T. spiralis* infection alters immune response and exerts beneficial effect in mice with allergic airway inflammation. Our goal was to investigate the potential of TsEVs to ameliorate ovalbumin (OVA)-induced allergy in a murine model. Experimental allergic airway inflammation was induced in BALB/c mice by intraperitoneal injection of OVA in alum. On days 21-24 mice were challenged with intranasal application of OVA. Treatment by intranasal administration of TsEVs was performed on the days of sensitization and challenge. Blood samples were taken for serum IgE determination, while lungs and spleens were extracted for the isolation of immune cells. Phenotype of immune cells was determined by flow cytometry.

TsEVs treatment lead to significant lowering of the proportion of CD103+ dendritic cells (DC) in lungs compared to allergic control, cells that play important role in priming Th2 response to inhaled allergens.
On the other hand, the proportion of CD11b+ Ly6C+ subset of cells, i.e. myeloid-derived suppressor cells, was increased, along with CD8+ and CD19+ T cells. Upon restimulation with OVA, lung immune cells of TsEVs-treated mice produced lower level of Th2 cytokine IL-5, while the production of Th1 cytokine IFN-γ was elevated. Lower IgE levels were found in TsEVs-treated mice compared to sham-treated controls. Our preliminary results show that TsEVs possess immunomodulatory properties that are reflected in the alleviation of allergic airway inflammation in mice. These results encourage further research into possible application of vesicles for therapeutic purposes.
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Keywords: *Trichinella spiralis*, extracellular vesicles, allergy

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