Immunomodulatory effects of aqueous birch pollen extracts and phytoprostanes on primary immune responses in vivo.

Abstract:

BACKGROUND: We recently demonstrated that pollen not only function as allergen carriers but also as rich sources of bioactive lipids, such as phytoprostanes, that modulate human dendritic cell (DC) function in a way that results in an enhanced T(H)2 polarization in vitro. OBJECTIVE: Here we analyzed the immunomodulatory capacities of Betula alba (white birch) aqueous pollen extracts (Bet-APEs) and pollen-associated phytoprostanes in the murine system in vitro and in vivo. METHODS: DC function was analyzed in vitro by using BALB/c bone marrow-derived DCs. T-cell responses were analyzed with DO11.10 peptide 323-339 from chicken ovalbumin (OVA)-specific CD4 T cells as responder cells. For in vivo studies, OVA-specific CD4 T cells were adoptively transferred into BALB/c mice. Twenty-four hours later, mice were challenged by means of intranasal application of OVA in the absence or presence of Bet-APEs or phytoprostanes. Polarization of T-cell responses in vivo was analyzed in draining lymph node cells. RESULTS: In vitro Bet-APEs and E(1)-phytoprostanes dose-dependently inhibited LPS-induced IL-12p70 of DCs. In addition, Bet-APEs induced a T(H)2 polarization in vitro. Similarly, intranasal instillation of Bet-APEs in vivo, together with the antigen, lead to increased IL-4, IL-5, and IL-13.
secretion and decreased IFN-gamma secretion from antigen-specific T cells in the draining lymph nodes. In contrast, intranasal E1- and F1-phytoprostanes downregulated both T(H)1 and T(H)2 cytokine production in vivo. CONCLUSION: Pollen release water-soluble factors that display T(H)2-polarizing capacities in vivo independently of E(1)- and F(1)-phytoprostanes. CLINICAL IMPLICATIONS: Identification of the underlying mechanisms might open new approaches for pharmacologic intervention.