Preventive capacity of birch sap to birch pollen allergy

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Background
Birch pollen allergy is a major health problem of growing concern, affecting the quality of life of millions of people worldwide. Current treatment approaches are often inadequate and may induce adverse side effects. Across Scandinavia, many birch pollen allergy sufferers have reported mitigation of their symptoms after drinking birch sap. However, there is no scientific evidence supporting the use of birch sap as a treatment of birch pollen allergy. We **hypothesise** that birch sap contains Bet v 1 cross-reactive proteins and can be used to treat birch pollen allergy. The aim of this study is to examine the protein content of birch sap and to study if birch sap can induce tolerance to birch pollen for it to be used as a natural product for prevention of birch pollen allergy.
Methods
Birch sap from Danish birch trees was collected during the tapping season and the protein content and profile analysed by proteomic analyses. Immune reactive proteins in birch sap and birch pollen cross-reactive allergens were identified by immunoblotting. The potential induction of oral tolerance to birch pollen by birch sap and consequently, the prophylactic efficacy against birch pollen allergy was determined in a Brown Norway rat model of food allergy primary prevention. Rats were administered birch sap *ad libitum* for three weeks and subsequently post-immunised i.p. with birch pollen. Allergen specific IgG1 and IgE levels and avidity were analysed by ELISAs and the clinical reactivity assessed by an ear swelling test.
Results
Birch sap protein concentration increased during the tapping season, being highest at the end of the season. No significant correlation between protein concentration and either temperature, rain, or hours of sun was observed. Birch sap contained proteins ranging from 10 to 80 kDa and Bet v 1 homologous proteins were detected by anti-Bet v 1 antibodies as well as with antibodies from birch pollen-sensitised animals. Oral administration of birch sap resulted in decreased levels of IgG1 and IgE antibodies after i.p. post-immunisations with birch pollen, as well as in decreased clinical reactivity to birch pollen in an ear swelling test.
Conclusions
These results demonstrate the presence of the birch pollen Bet v 1-homologous proteins in birch sap, thus birch sap could be the foundation for an innovative, ecological, safe and cheap method to treat millions of birch pollen allergic individuals.