

Letters

Sensitization to bald cypress and cross-reactivity with red cedar in Northeastern Georgia

Bald cypress, *Taxodium distichum*, is a deciduous conifer that grows in wet soils across the Eastern United States.^{1–4} Previous studies have shown that its pollen is allergenic, producing rhinitis symptoms in patients undergoing nasal challenge.⁵ We could not discern from the existing literature whether the extent of cross-reactivity between bald cypress and red cedar was sufficient to allow testing patients with only red cedar, as is our current practice, or whether testing with both red cedar and bald cypress would enhance patient care. Given the high prevalence of bald cypress in our region and an intense spring tree pollen season, we believed this was a clinically important question for the Southeastern United States. Therefore, we conducted a retrospective analysis to determine the prevalence of allergic sensitization to bald cypress and to assess the extent of bald cypress cross-reactivity with red cedar, both members of the cypress family (Cupressaceae).⁶

Residual serum samples from adult and pediatric patients (>3 years of age) with at least 1 positive allergen specific IgE to a tree pollen (ImmunoCAP; Thermo Fisher Scientific, Waltham, Massachusetts) were evaluated (n = 102). Each sample was assayed for bald cypress and red cedar pollen specific IgE using commercial reagents with the same ImmunoCAP system per the manufacturer's protocol. The results were considered positive if the IgE concentration was 0.1 kUa/L or greater. To reduce the skew of the IgE results, the natural logarithm of the IgE concentrations was used for a calculation of a Pearson correlation (SigmaStat, version 3.5; SigmaStat, Point Richmond, California).

Twenty samples of the 57 positive for both bald cypress and red cedar were randomly selected, and 100 μ L of each sample was used to create a positive serum pool. First, varying dilutions of red cedar extract (Greer Labs, Lenoir, North Carolina) were tested for inhibition of the pooled sera IgE binding to bald cypress CAPs. After 30 minutes of gentle mixing, the serum extract mixes were assessed for bald cypress specific IgE. Next, the same method was used to assess bald cypress inhibition of IgE from the same positive sera pool to red cedar. Percent inhibitions were calculated using the measured fluorescent units compared with the blank samples (which only contained volumes of glycerosaline diluent equal to the amount of dilute allergen extract added). The percentage of inhibition was graphed against the percentage of extract per total volume in pooled serum extract mixes, and Pearson correlation analysis was performed.

Fifty-seven of 102 samples (56%) had bald cypress IgE concentrations of 0.1 kUa/L or higher, and 64 of 102 (63%) had red cedar IgE concentrations of 0.1 kUa/L or higher. All samples positive for bald cypress were also positive for red cedar. However, 7 patients (7%) had positive results for red cedar, with values ranging from 0.11 to

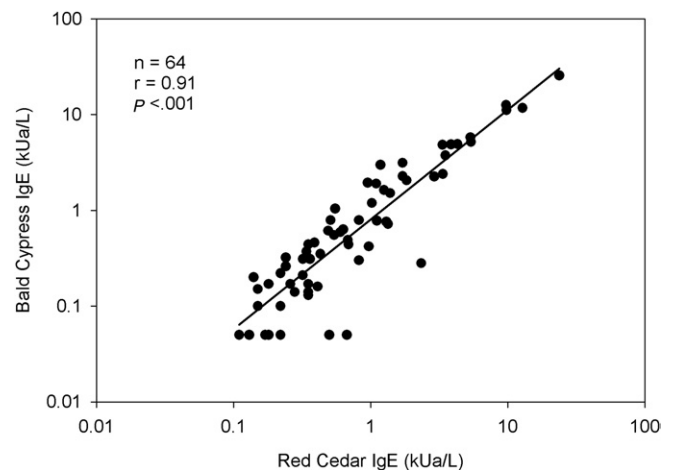


Fig. 1. Log-linear scatterplot of specific IgE concentrations to red cedar (*Juniperus virginiana*) vs bald cypress (*Taxodium distichum*).

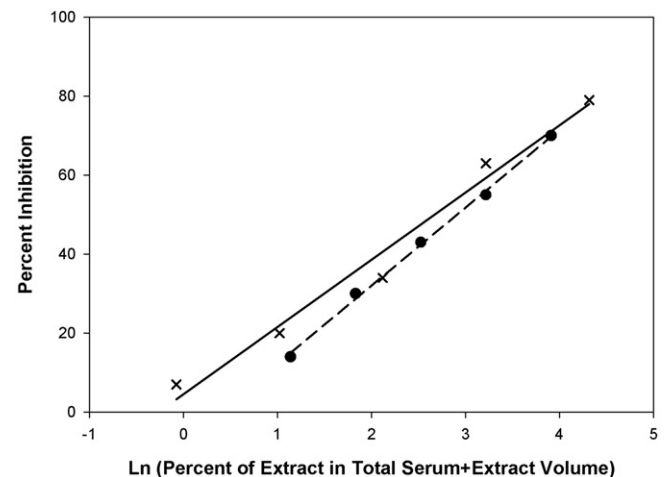


Fig. 2. Log-linear plot of bald cypress inhibiting red cedar (solid circles) and red cedar inhibiting bald cypress (x's).

0.67 kUa/L, but were negative for bald cypress IgE (<0.10 kUa/L). The correlation between the specific IgE concentrations of individual serum samples to the 2 trees was strong ($r = 0.91$; $P < .001$) (Figure 1). Inhibition assays revealed that both the red cedar and bald cypress extracts readily inhibited the binding of IgE to the other allergen in a dose-dependent manner (Figure 2). Bald cypress inhibited sera binding to red cedar ($r = 0.999$; $P < .001$), and red

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cedar extract similarly inhibited sera binding to bald cypress ($r = 0.989$; $P < .001$). The very similar and strong inhibitions by both bald cypress and red cedar suggest similar antigenic composition, but the 7 serum samples positive for red cedar and negative for bald cypress demonstrate at least one minor antigenic difference.

The strengths of this study are that the specific IgE concentrations of both trees were highly correlated and there was evidence of similar amounts of inhibition by each tree extract on IgE specific for the other tree. The weaknesses of the study are that it was retrospective and that we did not confirm clinical allergy with nasal challenges. It is widely recognized that there is only a modest correlation between antibody levels and clinical symptoms. Also, if we had used individual serum samples for immunoblots, we might have discovered allergenic components unique to one or the other tree pollen extracts with some sera. Finally, we do not know the source of the allergenic extracts used for ImmunoCAP production. Despite these weaknesses, our results suggest that red cedar extract contains most of the allergens of bald cypress extract and that testing for red cedar sensitivity will detect nearly all individuals who are sensitive to bald cypress. Because of the results of this study, we did not think it was necessary to add bald cypress to our routine tree pollen testing.

Erin M. Cannington, MD*

Katherine L. Roe, MT*

Penny F. Young, MHE, MT*

Dennis R. Ownby, MD*

*Department of Pediatrics

Division of Allergy, Immunology and Rheumatology

Georgia Health Sciences University

Augusta, Georgia

erincannington@yahoo.com

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