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Published in *Journal of Allergy and Clinical Immunology* 129:2 (Supplement) (February 2012), p. AB233 (no. 877); doi: 10.1016/j.jaci.2011.12.155
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Identification and Analysis of the IgE Binding by Parvalbumin and Other Potential Allergens in Different Fish and Frog Species

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Rationale: Serological cross-reactivity to different fish and frog species is common among fish-allergic individuals. We examined the intra- and inter-individual diversity in IgE responses of fish-allergic subjects to various fish and frog species and identified novel allergens besides parvalbumin.

Methods: Sera from 38 subjects with a clinical history of fish allergy were analyzed for IgE-binding profiles to crude extracts of 26 raw fish and frog species, and purified cod and carp parvalbumin using IgE-immunoblotting. Sera of 7 subjects showing similar IgE-binding profiles in the IgE-immunoblotting were pooled to identify potential allergens in pilchard, herring, cod, cusk, and rainbow trout using two-dimensional electrophoresis (2D) combined with IgE-immunoblotting and liquid chromatography-tandem mass spectrometry.

Results: IgE-immunoblotting demonstrated great diversity among the fish-allergic individuals with respect to the IgE-binding to the parvalbumins and non-parvalbumin proteins in fish and frog species. Of the 38 individuals, 26 (68%) and 21 (55%) reacted to cod and carp parvalbumin, respectively. However, low IgE reactivity to parvalbumin from frog, mahi-mahi, and swordfish was observed. The pooled sera showed IgE-binding to parvalbumin and its corresponding isoforms separated by 2D in all 5 species. The IgE from pooled sera also recognized several novel fish allergens, including alpha actin, enolase, creatine kinase, glyceraldehyde 3-phosphate dehydrogenase, and fast myosin light chain proteins.

Conclusions: The variation in IgE-binding depended on the individuals and fish species analyzed. The results suggested parvalbumin as the major cross-reactive allergens among fish species. Further characterization of the novel fish allergens is warranted at the molecular level using sera from additional fish-allergic subjects.