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Characterization of IgG and IgE Binding to Parvalbumin Derived from Commercially Important Fish Species

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Characterization of IgG and IgE Binding to Parvalbumin Derived from Commercially Important Fish Species

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Rationale: Parvalbumin is recognized as pan-allergen in fish and frog. However, previous studies demonstrated that the IgE- and IgG-binding patterns to parvalbumins vary depending on the fish species. We aimed to use 3 anti-parvalbumin IgG and human IgE to investigate the contributing factors for the binding differences.

Methods: Indirect enzyme-linked immunosorbent assay (ELISA) and IgG immunoblotting were used to determine the reactivity of the polyclonal anti-cod parvalbumin antibody and the commercially available, monoclonal anti-frog and anti-carp parvalbumin antibodies against raw muscle extracts of 25 fish species. Additionally, sera from 46 individuals with clinical history of fish allergy were analyzed for IgE reactivity to parvalbumin using indirect ELISA. Inhibition ELISAwas performed to determine the effects of heating and calcium on IgG-binding to parvalbumin.

Results: The 3 IgG antibodies demonstrated varying specificity for different fish species. Polyclonal anti-cod parvalbumin antibody showed reactivity to a wider range of species, whereas the monoclonal anti-frog parvalbumin antibody showed the least cross-reactivity. The binding of the 3 IgG antibodies to parvalbumin was unaffected by heating, but the absence of calcium abolished the binding. IgE reactivity to cod parvalbumin or cod extracts were observed in > 50% of individuals' sera, whereas < 0.1% of the sera showed reactivity to tuna and swordfish extracts. Both IgG and IgE antibodies showed low reactivity to tuna and swordfish that are apparently deficient in parvalbumin.

Conclusions: These results suggested that the antibodies' specificity to parvalbumins in various fish species is associated with the parvalbumin expression, its structural conformation, and the primary structure of antigenic determinations on parvalbumin.