Does common enzymatic activity predict cross-reactivity? – a study of phospholipase A1 in different species

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Introduction

Phospholipase A1 is present in different species, one of them being wasp. In wasp venom it is one of the major allergens and here it is termed Ves v 1. Among subjects allergic to wasp venom it is estimated that 50-80% have specific IgE (sIgE) towards Ves v 1. Phospholipase A1s from microorganisms (mPLA1s) are used in the industry as catalysts for hydrolysis of fatty acids from phospholipids. Bioinformatic studies of sequence homology conducted prior to this study showed no similarity between the mPLA1s and known allergens including Ves v 1. It is however not known whether the common enzymatic activity could cause cross-reactivity and thereby an allergic reaction to mPLA1s in wasp allergics. Therefore, the aim of this project was to test for possible cross-reactions between sIgE towards Ves v 1 and three mPLA1s.

Methods

Serum from 10 known wasp allergic persons with sIgE towards Ves v 1 spanning from 1.57 kU/l to 1734 kU/l were used for inhibition studies. From each, 125 µl serum was incubated with 125µl of either saline solution (negative control), 50 µg/ml ALK802 Soluprick solution (positive control) or one of three mPLA1s, each in three concentrations (either 0.5 µg/ml, 5 µg/ml and 50 µg/ml (n=3) or 5 µg/ml, 50 µg/ml and 500 µg/ml (n=7)). The level of sIgE towards Ves v 1 was measured using the i211 ImmunoCAP, and a decrease in this level was calculated as %inhibition compared to the sIgE measured from serum incubated with the negative control. Inhibition by mPLA1s would indicate cross-reactivity.

Results

The positive control caused 62.5±28.6% (n=10) inhibition of sIgE towards Ves v 1. This was lower than expected but was found to be caused by a few sera where the fraction of sIgE towards Ves v 1 was <6% of all sIgE towards wasp venom. In the remaining sera, %inhibition by wasp venom was 78.1±14.9% (n=7). No inhibition was found in any of the sera tested for all concentrations of the three mPLA1s.

Conclusions

No inhibition of sIgE to Ves v 1 was found to any of the three microbial phospholipases tested. This indicates that no cross-reaction is found between the phospholipase A1 in wasp, Ves v 1, and phospholipase A1 from microorganisms despite the common enzymatic activity.