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1) Introduction

Most allergic reactions involve interactions between IgE antibodies and protein allergens. The location of these interaction zones, known as "epitopes" bound by IgE allows to determine the similarities between pollen and food allergens and the risk of cross-reactions in a patient. Lipid transfer proteins (LTPs) are allergens from the prolamins superfamily that can trigger allergies to multiple plants and/or foods. They display a highly conserved α-helical fold stabilized by four disulfide bonds.

2) Objective

We previously showed that the conformation of wheat LTP1 has a strong impact on the IgE-binding to this protein both for man and mouse antibodies (Denery-Papini *et al.*, 2011).
Here, we aim to identify key structural zones and residues of antibody binding to wheat LTP1 as a model.

3) Method

Site-directed mutagenesis was used on wheat recombinant LTP1 to target: (1) conservation sequence and/or structure flexibility or (2) each disulfide bonds. Secondary structure by synchrotron radiation circular dichroism coupled to molecular modeling was used to assess the impact of these mutations on LTP1 structure. The antigenicity of the different LTP1 variants was evaluated with patient's sera and with mouse monoclonal antibodies.

4) Results

Removing of the disulfide bond involving C28 and C73 drastically affected IgE-binding and protein conformation. The C13-C27 bond disruption reduced slightly LTP1 antigenicity and global folding. The mutation of the charged and highly conserved residue across plant LTPs (Lysine, K) at the position 72 yielded in a drastic decrease in IgE binding. This mutation induced local modifications without affecting the global folding of the protein. Interestingly, these five amino-acids are grouped together on the protein's 3D structure. They are also essential for the binding of wheat LTP1 to monoclonal antibodies. This emphasize their role in protein-antibody in general.

5) Conclusions

This contribution sheds light on key structural elements that are involved in wheat LTP1 alleregnicity. They could prove generic to several members of this family of plant allergens.

6) References

1. S. Denery-Papini, *et al.*, *Clinical & Experimental Allergy* **41**, 1478–1492 (2011).
2. H. Mameri, *et al.*, *Scientific Reports* **12**, 12253 (2022).