# Evaluation of a rapid test system for the detection of specific IgE to cross-reactive carbohydrates

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**Background:** Cross-reactive Carbohydrate Determinants (CCDs) can cause cross-reactivity of specific IgE (sIgE) between different allergens. The role of sIgE to CCDs continues to be controversially discussed. However, the measurement of CCD sIgE might help to explain discrepant results between skin prick test (SPT), history and in-vitro methods. The objective of this study is the evaluation of ALFA (Dr. Fooke Laboratorien, Neuss, Germany), a rapid test system for the detection of specific IgE to CCD in a well defined cohort of insect venom allergic patients.

**Methods:** Sera of four groups were analyzed: A: Patients with well defined insect venom allergy to either bee (n=12) or wasp (n=28) venom; B: Patients with hypersensitivity to bee (i1) and/or wasp (i3) venom, with (n=20) or without (n=20) detectable levels of CCD sIgE (by ImmunoCAP®); C: Atopic individuals without history of insect venom allergy (n=30); D: Non atopic individuals without history of insect venom allergy (n=30). Skin prick tests and, if negative, intradermal tests were performed in group A+B. Diagnosis of insect venom allergy was based on history, skin testing and detection of sIgE by ImmunoCAP®. Sera were tested for sIgE to CCDs by ALFA (Group A-D) and ImmunoCAP® - MUXF3 (Group B). Statistical analysis was done using Analyse-it for Excel.

**Results:** The prevalence of CCD sIgE determined by ALFA was 26% (Group A), 48% (Group B), 13% (Group C) and 7% (Group D). The prevalence of CCD sIgE in patients with hypersensitivity to bee venom was 4/12 (33%) and to wasp venom 6/28 (21%) and thus not significantly different ($p$=0.674).

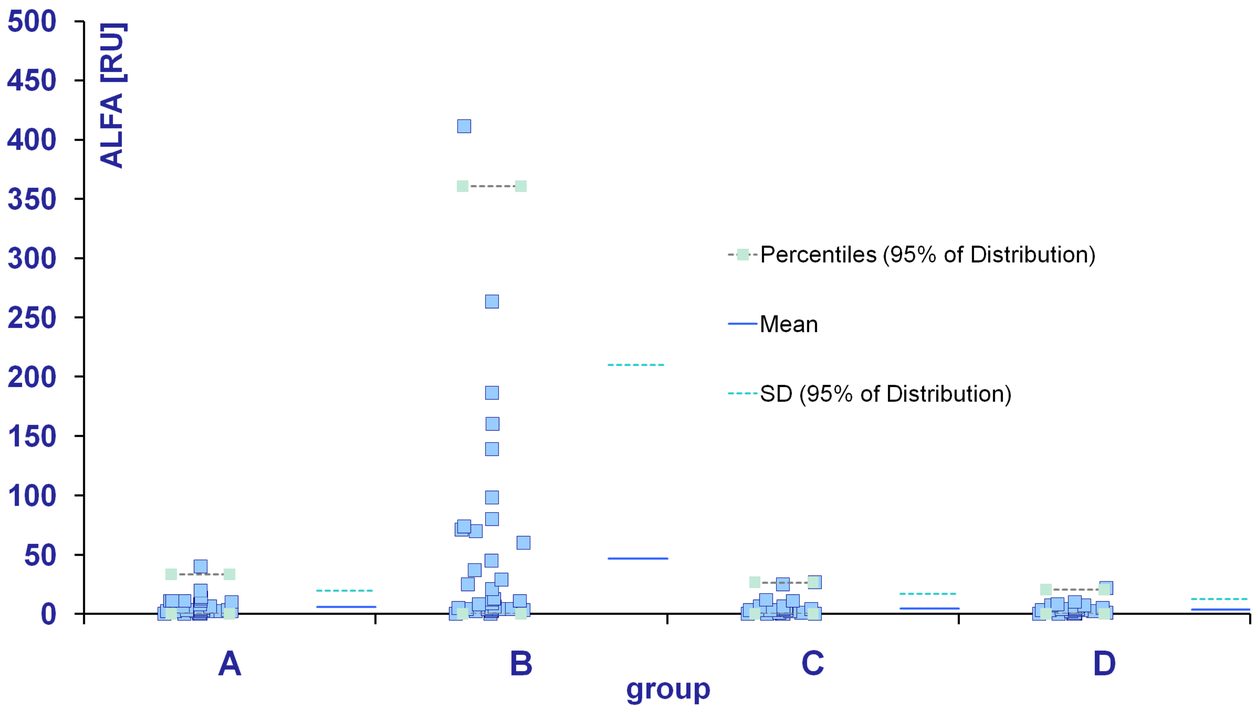


**Figure 1** Descriptive-Comparative Analysis of ALFA CCD results. Group A (sIgE to either bee or wasp); Group B (sIgE to bee and/or wasp); Group C (atopic individuals); Group D (nonatopic individuals).

Comparison of ImmunoCAP® and ALFA results for sIgE to CCDs in group B revealed a Spearman Correlation Coefficient of 0.75.

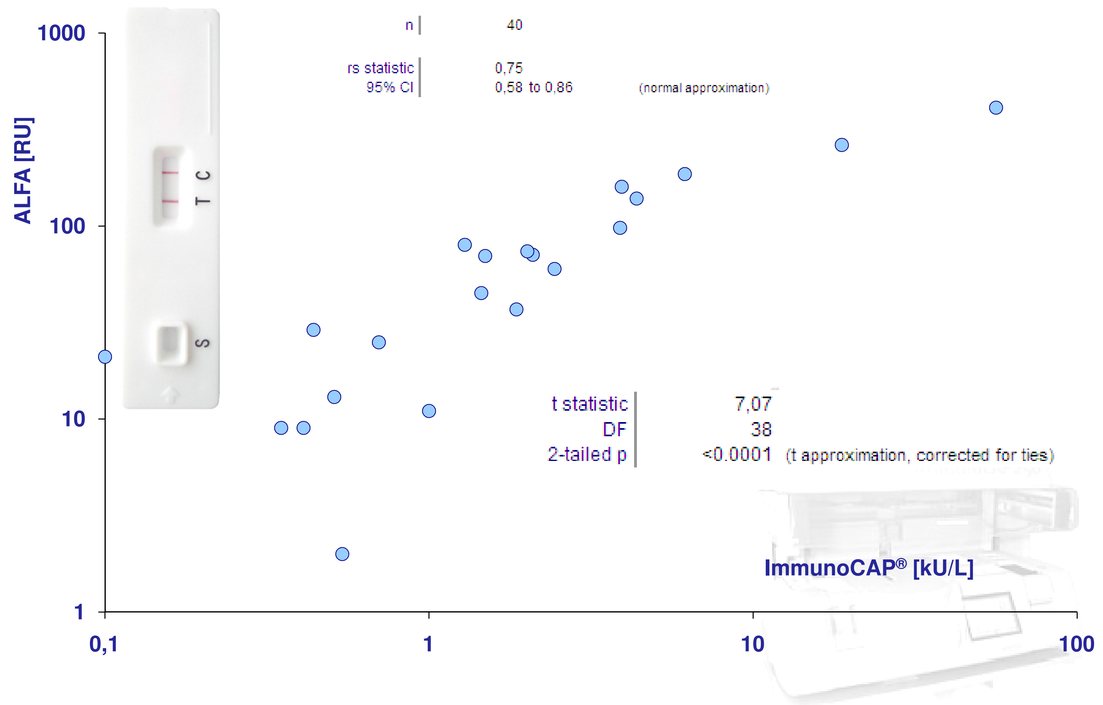


**Figure 2** Spearman correlation diagram of ALFA CCD vs. ImmunoCAP® (Group B; n=40).

Receiver Operating Characteristic analysis indicates 95% sensitivity and 90% specificity (AUC=0.94) at a cut-off value of 9.0 RU (ALFA).

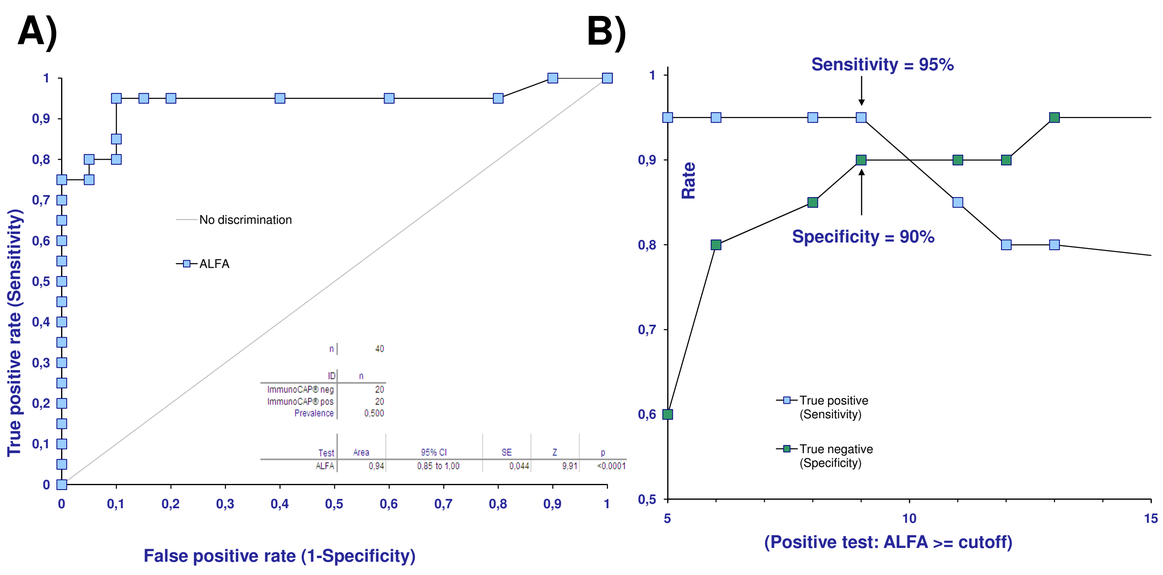


**Figure 3** Receiver operating characteristic ALFA CCD vs. ImmunoCAP® (Group B). A) ROC Analysis, B) ROC Decision Plot.

**Conclusion:** ALFA is a reliable method for the detection of sIgE to CCDs. Despite a significant different detection system and the antigen used, a good quantitative agreement was found between ALFA CCD and ImmunoCAP®. Patients with double positive sIgE results for bee and wasp venom should be tested for sIgE to CCDs.

presented at **EAACI London 2010**