



A Plasmacytoid Dendritic Cell-Based Assay to Screen the Allergenicity Potential of Chemicals

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An in vitro assay system that utilizes human cells to predict the allergenicity potential of chemicals will have utility throughout industry to monitor products for contact sensitization. Development of such a non-animal alternative assay system for hazard assessment directly addresses REACH (Registration, Evaluation, and Authorization of Chemicals). In this study, we investigated whether CD86 expression in plasmacytoid dendritic cells (pDC) can be used to identify contact allergens. Human DC were generated from CD34+ progenitor cells and the pDC fraction (CD123+/CD11c-) was harvested using FACS sorting. The pDC were exposed to chemical allergens (n=26) or irritants (n=22). Sub-toxic concentrations of each chemical were determined using FACS analysis of propidium iodide stained cells. Allergens were identified based on stimulation index (SI) calculated by the fold increase in CD86 expression. A material that had an SI =1.5 in at least 50% of the pDC donors (n=2-5 donors) was considered an allergen. Using this methodology, CD86 expression increased =1.5 fold for 25 of 26 allergens but not for 19 of 22 non-allergens. Based on these results, a preliminary prediction model was developed to identify chemical allergens (sensitivity=96%, specificity=86%, accuracy=92%); these results were similar to those obtained using the mouse local lymph node (LLNA) assay (sensitivity=83%, specificity=82%, accuracy=82%). In conclusion, CD86 expression in pDC appears to be a sensitive and specific predictor of allergenicity. The assay is advantageous because high throughput screening of chemicals is possible, donor-to-donor variation can be monitored, the cells are of human origin, and the assay is cost effective.

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