



A plasmacytoid dendritic cell-based assay to predict allergenicity potential of chemicals

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A cost-effective 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 non-animal alternative assay systems for hazard assessment is within the provisions of the European Union chemicals policy known as REACH (Registration, Evaluation, and Authorization of Chemicals). In this study, we investigated whether the CD86 expression level in plasmacytoid dendritic cells (pDC) could be used as a non-animal alternative. To achieve this goal, human DC were generated from CD34+ progenitor cells and the pDC fraction (CD123+/CD11c-) was harvested using FACS sorting. The pDC were pulsed with chemical allergens (n=13) or irritants (n=13). 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 pDC from at least 50% of the donors (n=2-5 donors) was considered an allergen. Using this methodology, 12 of 13 allergens tested positive and all 13 non-allergens tested negative (SI < 1.5). Based on these results, a preliminary prediction model was developed to identify chemical allergens (sensitivity = 91-93% and specificity = 92-100%). In conclusion, CD86 expression in pDC appears to be a sensitive and specific predictor of allergenicity of chemicals. 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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