Evaluation of the skin sensitization potential of essential oils using the naive THP-1 cell line.

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Essential oils, commonly used as fragrance ingredients, are derived by physical processes from odorous plant materials. The oils themselves are complex mixtures, which may contain varying amount of naturally occurring contact sensitizers. It is known that dendritic cells (DCs) including Langerhans cells (LCs) play a critical role in the skin sensitization process. Many attempts have been made to develop *in vitro* sensitization tests that use DCs derived from peripheral blood mononuclear cells (PBMC-DC) or $CD34^+$ hematopoietic progenitor cells purified from cord blood or bone marrow. However, the use of DCs in *in vitro* methods has been difficult due to the nature of these cells such as low levels in the source and/or donor-to-donor variability. In our studies, we used the human monocytic leukemia cell line, THP-1, in order to avoid some of these difficulties.
First, we examined THP-1 responses to known sensitizers, dinitrochlorobenzene (DNCB) or nickel sulphate ($NiSO_4$), and non-sensitizers, dimethyl sulfoxide (DMSO) or sodium dodecyl sulfate (SDS). We analysed the expression of the co-stimulatory molecules CD80 and CD86, of the antigen presenting molecule HLA-DR, as well as the secretion of IL-8. Subsequently, responses to some essential oils were examined. After 48-h exposure to samples, sensitizers such as DNCB enhanced CD86 expression on THP-1 cells, while nickel sulphate, irritants such as SDS or DMSO, and essentials oils did not augment CD86 or any other molecule significantly. However, both sensitizers DNCB and $NiSO_4$ induced the secretion of large amounts of IL-8 and so did some essentials oils (Neroli, Ginger, Carrot seed). Interestingly, the potential of essential oils to induce IL-8 secretion was not correlated to their allergen composition. Thus, whereas these results suggest that the THP-1 cell line may be a useful *in vitro* skin sensitization model to predict various contact allergens of defined chemicals, it does not seem appropriate for a complex mixture.

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