TRPA1 and TRPV1 activation is a novel adjuvant effect mechanism in FITC-induced contact hypersensitivity

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Crosstalk between the immune system and the nervous system is one of the important subjects of immunological research. We have revealed that the adjuvant effect of dibutyl phthalate (DBP) in a fluorescein isothiocyanate (FITC)-induced mouse contact hypersensitivity model is mediated through local stimulation of sensory neurons. In this process, transient receptor potential (TRP) A1 and TRPV1, members of the TRP family of cation channels, seemed to be candidate DBP targets. Here we directly demonstrated that DBP activates a subset of neurons in mouse dorsal root ganglia that overlaps with most of the allyl isothiocyanate-responsive (TRPA1) subset and part of the capsaicin-responsive (TRPV1) one of neurons. Activation of TRPA1 and TRPV1 by DBP was further demonstrated using cells expressing one of these TRP channels. Among structurally different phthalate esters, there is a positive relationship between the activation of TRPA1- or TRPV1- expressing cells and the adjuvant effect. As to risk assessment methods for the adjuvant activities of chemicals, no simple assay involving a reduced number of experimental animals is available. The present study suggested that testing of the ability of TRP channel activation as a good *in vitro* marker will allow prediction of the adjuvant effects of chemicals.