Induction of allergic contact dermatitis by astigmatid mite-derived monoterpene, α-acaridial

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Dust mites (*Dermatophagoides pteronyssinus and D. farinae*) are known to cause allergic reactions by the type I dust mite proteinaceous allergens (Der p I and Der f I). More recently, however, our group has identified α-acaridial, a highly conjugated terpene from the house dust mite, *Tyrophagus putrescentiae*, as a novel class of non-protein allergen that induced positive skin reactions in atopic dermatitis patients. Here we show the mechanistic studies of the delayed-type hypersensitivity induced by α-acaridial.

First, Balb/c mice, sensitized with α-acaridial for 5 days, were challenged by repeated administration of the antigen on the ear skin. After 2 weeks, significant redness and swelling were observed locally at the challenge site, where $CD4^+$ T lymphocytes were predominantly mobilized. To address the possibility that α-acaridial might be conjugated with protein and function as a hapten recognized by $CD4^+$ T lymphocytes, we next looked at its reactivity to proteins. When incubated with BSA in the phosphate buffer/acetonitrile mixture (pH 5.5) at 36℃, the free form of α-acaridial absolutely disappeared after 30 hours. Furthermore, when incubated with butylamine or butanethiol, α-acaridial reacted with the primary amine and thiol to form pyrrole and furan adducts, respectively.

These results emphasize the ability of α-acaridial to react with Lys or Cys residues of proteins. Thus, the α-acaridial conjugated proteins or their peptide fragments may activate specific $CD4^+$ T cells that mediate the delayed type hypersensitivity observed in atopic dermatitis patients.