

Effects of short- and medium-chain fatty acids on TSLP production and induction of allergy

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Thymic stromal lymphopoietin (TSLP) plays critical roles in the induction and exacerbation of allergic diseases. We found that medium-chain fatty acid such as nonanoic acid induced the production of TSLP in vivo. Nonanoic acid promoted sensitization to ovalbumin, resulting in an enhancement of the cutaneous anaphylactic response. In this report, we clarified that the exposure to nonanoic acid after the sensitization augmented picryl chloride-induced thickening of the ear, which was reversed in TSLP receptor-deficient mice. However, coconut oil, which includes medium-chain fatty acids, did not induced TSLP production. To clarify the molecular mechanisms by which free fatty acid induced TSLP production, mouse epithelium cell line PAM212 was used. We found that valeric acid potently induced TSLP production. Isovaleric acid but not the related compounds showed the activity. The agonists to GPR120, GPR84, GPR43 (FFA2R), GPR41 (FFA3R), and GPR40 were not induced TSLP production. PTX did not inhibit TPA-induced TSLP production but inhibited valeric acid-induced one. Valeric acid-induced TSLP production was inhibited by U0126 and TACP-1, suggesting that ERK and NF- κ B were involved in the production. These findings suggested that valeric acid induced TSLP production via G protein-coupled receptor and mediated by ERK and NF- κ B.

Conclusion: Low and medium-chain fatty acids have the activity to produce TSLP via unidentified receptors and TSLP exacerbated allergic inflammation. Although coconut oil shows no activity, our findings suggested that the natural soap, which includes medium-chain fatty acids, might be a risk to induce allergic dermatitis.