Abstract

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Attenuation of the ovalbumin-induced allergic airway response by cannabinoid treatment in A/J mice.

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Abstract

T cells are sensitive to modulation by cannabinoids as evidenced by their ability to inhibit expression of cytokines, including interleukin (IL)-2 and IL-4. Because T cells play a key role in the pathophysiology of allergic asthma by expressing T helper cell (Th)2 cytokines, the objective of the present studies was to examine the effect of cannabinoids on immunologic and pathologic features associated with the allergic airway response induced by ovalbumin (Ova). A/J mice were systemically sensitized with Ova and subsequently challenged with aerosolized Ova. The steady-state mRNA expression of IL-2 and Th2 cytokines (IL-4, IL-5, and IL-13) was markedly increased in the lungs of Ova-sensitized mice 24 h after a single Ova challenge. Concordantly, the level of total and Ova-specific serum immunoglobulin (Ig)E and intraepithelial mucosubstances in the axial intrapulmonary airway of Ova-sensitized mice was robustly elevated 96 h after the second Ova challenge. Cannabinol (CBN) or Delta(9)-tetrahydrocannabinol (Delta(9)-THC; 50 mg/kg, ip), administered daily for 3 consecutive days before sensitization and then before challenge, significantly attenuated the elevation of IL-2, IL-4, IL-5, and IL-13 steady-state mRNA expression elicited by Ova challenge in the lungs. In addition, the elevation of serum IgE and the mucus overproduction induced by Ova challenge was also markedly attenuated by CBN or Delta(9)-THC administration in Ova-sensitized mice. These results suggest that plant-derived immunomodulatory cannabinoids exhibit potential therapeutic utility in the treatment of allergic airway disease by inhibiting the expression of critical T cell cytokines and the associated inflammatory response.

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