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## The inhibitory effect of licorice roots on IFN- $\gamma$ -mediated microglia stimulation and the reactive mouse splenic T cell responses

Eun-Ju Yang and Kyung-Sik Song

Kyungpook National University, Republic of Korea

Multiple Sclerosis (MS) is an autoimmune neurodegenerative disorder in the Central Nervous System (CNS), and the immune responses induced by auto reactive T cells are the hallmark in the development of MS. The autoreactive T cells overproduce the pro-inflammatory cytokines, such as interferon- $\gamma$  (IFN- $\gamma$ ) leading to the microglia stimulation via the CXCL10 (IP-10) chemokine production. The licorice roots (*Glycyrrhizae Radix*, GR) have been investigated for various biological activities, however, the suppressive effect of GR on IFN- $\gamma$ -stimulated microglia BV2 and the reactive mouse splenic T cell responses have not been reported yet. In this study, the GR ethanolic extract and its partitions were treated to BV2 cells and mouse splenic T cells to determine the anti-inflammatory effects. Ten ng/mL IFN- $\gamma$  significantly enhanced the nitric oxide and Tumor Necrosis Factor (TNF)- $\alpha$  productions in BV2 cells, however, it was effectively inhibited by not only GR extract but also the Dichloromethane (MC) and Ethyl Acetate (EA) fractions of GR. In addition, MC and EA fractions decreased the IP-10 production. On the other hand, when the mouse splenocytes were stimulated with anti-CD3 and anti-CD28 for 3 days, GR extract reduced the populations of IL-17A+IFN- $\gamma$ + and IL-17A-IFN- $\gamma$ + in CD4+ and CD8+ T cells. The IL-17A, IFN- $\gamma$ , and IL-6 productions were decreased, as well. By MC and EA fractions, IL-17A+IFN- $\gamma$ +CD4+, IL-17A-IFN- $\gamma$ +CD4+, and IL-17A-IFN- $\gamma$ +CD8+ T cell populations were effectively decreased, and the productions of IL-17A and IFN- $\gamma$  were also suppressed. Especially, MC fraction significantly reduced the populations of Tbet+IFN- $\gamma$ -, Tbet+IFN- $\gamma$ +, and Tbet-IFN- $\gamma$ + in CD8+ cells, when the CD3+ T cells were polarized into TH1 and TC1 cells. The elevated IL-17A, IFN- $\gamma$ , IL-6, TNF- $\alpha$ , and CXCL10 productions were also decreased. These data suggest that GR and its fractions could be useful for anti-inflammatory effect on microglia and T cells in the CNS autoimmune condition, especially MS.

### Biography

Eun-Ju Yang is a professor at Kyungpook National University, Republic of Korea. He has his expertise in Natural Products and Medicinal Chemistry.

wendy.soria\_sotillo@biol.lu.se

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