# A Hopeful SSc Drug: Immune Regulation of Astragalus (Huangqi) in the Treatment of Systemic Scleroderma (SSc)

Li, Yexin (School: Shanghai Foreign Language School Affiliated to SISU)

Systemic Scleroderma (SSc) is a severe autoimmune disease, characterized by immune abnormality, vasculopathy, and fibrosis. Clinically, SSc has no cure. Although the Chinese herb Astragalus has long been used practically, the mechanisms of Astragalus' treating SSc remain unclear, which prevents further application. The study systemically analyzed possible active ingredients, targets, and signaling pathways of Astragalus in treating SSc through Network Pharmacology. CCK-8 method was applied to conduct the drug toxicity study. And the mRNA expressions of inflammatory and endothelial adhesion factors in Jurkat and THP-1 cells were tested by qPCR after the action of Astragalus and its ingredients, such as Astragaloside Ⅳ. Moreover, the Th cells in PBMCs from SSc patients and the mice were detected respectively by flow cytometry. Based on Bioinformatics results, the main ingredients of Astragalus were saponins and flavones, and multiple pathways and targets were involved in SSc treatment. To be mentioned, the IL-17 signaling pathway with the highest score was regarded as the key pathway. And the qPCR experiments indicated the downregulation caused by Astragalus and Astragaloside Ⅳ in the mRNA expressions of IL17A, IL6, and adhesion factors SELP and SELE. Besides, the flow cytometry analyses showed that the Th1, Th2, and Th17 cells decreased while Treg cells increased, simultaneously, Th17/Treg and Th1/Th2 ratios were regulated. This study showed that Astragalus may reduce SSc symptoms by downregulating Th17, a potential treating target, with the adjustment of the immune balance. Both the IL-17 signaling pathway and efficient components of Astragalus in SSc can be further explored.

**Awards Won:**

Fourth Award of $500