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RNA sequencing uncovers lncRNA-immunity/hypoxia related mRNA-circRNA interactive relationship in patients with combined allergic rhinitis and asthma syndrome

Abstract:

Background: Combined allergic rhinitis (AR) and asthma syndrome (CARAS) is the concurrent clinical or subclinical allergic symptoms of the upper respiratory tract and lower respiratory tract. A deeper understanding of the immunity/hypoxia related mRNAs and related long non-ciding RNA (lncRNA)/circular RNA (circRNA) expression changes can help to understand disease mechanisms of CARAS.

Methods: A total of 9 subjects, including 3 CARAS patients, 3 AR patients, and 3 normal control subjects were included. LncRNA sequencing was performed followed by identification of differentially expressed lncRNAs, immunity/hypoxia related mRNAs and circRNAs. LncRNA-mRNA and circRNA-mRNA regulatory pairs were constructed, followed by functional analysis, immune infiltration analysis, drug prediction and in vitro validation.

Results: Keratin 8 (KRT8) may predict the development of AR into CARAS. Three immunity related mRNAs (IDO1, CYSLTR2 and TEC) and 2 hypoxia related mRNAs (TKTL1 and VLDLR) were associated with the occurrence and development of CARAS. TEC may be considered as a drug target for Dasatinib in the treatment of CARAS. Two important lncRNA-mRNA-circRNA regulatory pairs were identified in CARAS, including LINC00452/MIR4280HG-CLC-hsa_circ_0007272/hsa_circ_0070934 and HEATR6-DT/LINC00639/LINC01783-TEC-hsa_circ_0008903. In addition, 4 lncRNA-mRNA regulatory pairs and 1 circRNA-mRNA regulatory pairs were screened out in CARAS, including RP11-167J8.5-VLDLR, OVCH1-AS1-OVCH1, RP11-71L14.3-IDO1/SMPD3, RP11-178F10.2-IDO1/HRH4, and hsa_circ_0008903-CYSLTR2. ECM receptor interaction (involving FN1) and the regulation of activated T cell proliferation (involving IDO1 and CLC and) were significantly enriched signaling pathways. Dysregulated levels of immune cell infiltration may be closely related to CARAS.

Conclusion: The regulating effect of lncRNA-immunity/hypoxia related mRNA-circRNA regulatory pairs may be involved in the occurrence and development of CARAS.

Biography

Qian Zhang received his Ph.D. degree in Pulmonary Medicine from Nanjing Medical University, Nanjing, P.R. China. In 2010, he worked as a visiting scholar in the department of internal medicine at Far Eastern Memorial Hospital, Taiwan. From 2011 to 2016, he worked as a postdoctor in Nanjing General Hospital of Nanjing Military Command, Nanjing, Jiangsu Province, P.R. China. Currently, he is working as chief physician, professor and director in the department of respiratory medicine at Changzhou No.2 People's Hospital affiliated to Nanjing Medical University. He is interested in pulmonary medicine, critical care medicine, molecular biology, allergy and immunology.