A New Prognostic Model for Lung Adenocarcinoma According Propionate Metabolism Related Genes: A Comprehensive Bioinformatic Study

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Abstract

Background: The effect of propionate metabolism on the prognosis of adenocarcinoma of the lung (LUAD) is currently unknown. *Methods*: TCGA-LUAD and GSE13213 datasets were sourced from TCGA and GEO, respectively. To begin with the differentially expressed genes (DEGs) were screened out between LUAD and normal groups. The differentially expressed propionate metabolism related genes (DE-PMRGs) were got through taking the intersection between DEGs and PMRGs. After that, a prognostic risk model was built adopted to univariate COX and LASSO (least absolute shrinkage and selection operator) regression. Next, gene set variation analysis (GSVA) and immune analysis were performed on the high risk groups and low risk groups. In the end, the chemotherapy drug sensitivity was analyzed. *Results*: In total, 166 DE-PMRGs were acquired via taking intersection between4403DEGs and 531PMRGs. Next we build a risk model according the 5characteristic genes (LDHA, KYNU, SLC2A1, CFTR, MAOB). GSVA results showed that 18 signaling axis were enabled in the high risk group, for instance heme metabolism, P53 pathways, etc., and 14 signaling axis were enabled in the low risk group, for instance E2F targets, mtorc1 signal, etc. Meanwhile, 14 immune cells (such as eosinophil, neutrophil), 4immunization checkpoints (PDCD1LG2, CD274, CD27, IDO1), and TIDE score were significant variations between these two risk groups. Moreover, the LDHA, KYNU, and SLC2A1 were significantly positively related to immunocytes, such as activated CD4 T cell, $\gamma\delta$ T cell, memory B cell, and neutrophil. CFTR and MAOB were markedly actively relevant to 9 immune cells, such as activated B cells, eosinophil, immature B cells, etc. Finally, 8 drugs were obtained that were relevant to risk score, and between two risk groups, there were markedly differential. *Conclusion*: Taken together, this study identified 5PMRGs are potential biomarkers for LUAD, providing scientific references for further research on LUAD.

Keywords

Lung Adenocarcinoma, Propionate Metabolism, Risk Score, Immune, Prognosis