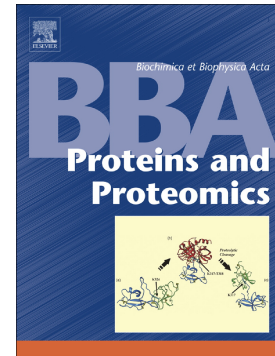


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Tandem Mass Tags Labeled Quantitative Proteomics to Study the Effect of Tobacco Smoke Exposure on the Rat Lung

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Abstract: Background: The causal link between tobacco smoke exposure (TSE) and numerous severe respiratory system diseases (RSD), including chronic bronchitis, chronic obstructive pulmonary disease, and lung cancer, is well established. However, the pathogenesis of TSE-induced RSD remains incompletely understood. This research aims to detect the pathogenetic mechanisms and potential therapeutic targets of TSE-induced RSD; Methods: this study employed TSE model which rats were exposed to a concentration of 60% tobacco smoke in a toxicant exposure system for four weeks. Tandem mass tags (TMT) labeled quantitative proteomics combined with off-line high pH reversed-phase fractionation, and nano-liquid chromatography-mass spectrometry method (off-line high pH RPF-nano-LC-MS/MS) were adopted to detect differentially expressed proteins (DEPs) in the lung tissues of the TSE model rats and to compare them with those in control. The accuracy of the results was verified by western blot; Results: Compared with the control group, 33 proteins in the TSE model group's lung tissues showed significant differential expression. Analysis based on the Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways indicated that, several biological pathways, such as the steroid biosynthesis pathway, were involved and played significant roles in the pathogenesis of the experimental group's TSE; Conclusions: These findings make a crucial contribution to the search for a comprehensive understanding of TSE-induced RSD's pathogenesis, and furthermore provide guidance for the diagnosis and treatment of TSE-induced RSD.

Keywords: TMT; Quantitative proteomics; Respiratory system diseases; Tobacco smoke exposure

1. Introduction

Tobacco smoke exposure (TSE) has been firmly linked with numerous serious and potentially fatal diseases, ranging from inflammation to depression, tumors, cancer, and cardiovascular diseases.[1-3] According to the World Health Organization, tobacco-related diseases claim around 6 million lives lost annually, more lives than HIV, AIDS, malaria, and tuberculosis combined. Tobacco-related illnesses suffered by smokes are the World's leading cause of preventable death and lead to an enormous economic toll, costing billions of dollars in treatment every year. TSE harms not only the smoker, but second-hand TSE affecting children and pregnant mothers is also the third leading cause of preventable death.[4] In China, efforts at prevention are a long way away from achieving even basic inroads into the reduction of tobacco consumption, especially in the countryside where awareness of tobacco's ill effects are insufficient, smoking bans are few, and enforcement of prohibitions that do exist is lacking.[5] In addition to TSE, abundant air pollution from such sources as the industry, burning of biomass, ambient ozone, and traffic, has led to a very significant increase in the incidence of RSD in recent years.[6-12] Despite all this, early stages RSD has yet to draw serious attention. Entirely one-half of patients with RSD fail to visit a physician before their conditions become dangerous.[11] Since RSD, which it's not prompt to treat, can

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