Proteomics Study Reveals Profound Gender-related Differences in Lung Responses to Cigarette Smoke

Changes in cell signaling proteins are induced at lower doses in female rats compared to males

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VANCOUVER, British Columbia –Kinexus Bioinformatics Corporation, a world-leader in molecular intelligence research, announced today the publication of the results from a major study undertaken in collaboration with the A. W. Spears Research Center, Lorillard Tobacco Company to uncover cigarette smoke protein biomarkers. The findings appear in the Journal of Proteome Research (http://pubs.acs.org/doi/abs/10.1021/pr200345y) and reveal profound differences in the responses of many lung proteins in male and female rats exposed to dilute mainstream smoke for 3 hours per day for 5 consecutive days. The data is also available online with open-access in the Kinexus KiNET DataBank (http://www.kinexus.ca/ourServices/kinet/kinet.html).

Using the Kinexus integrated platform of proteomics discovery services, the researchers initially analyzed lung lysates that were pooled from similar groups of exposed rats using antibody microarrays that tracked over 500 key cell signaling proteins for their abundance and their phosphorylation status. Phosphorylation acts as an on/off switch for most of the 23,000 proteins encoded by the human genome. Promising leads from these antibody microarrays were confirmed by immunoblotting studies, and they were further monitored using microarrays that were printed with lysates from individual animals as separate spots on the chips. Over 20 signal transduction and stress proteins were found to be consistently and significantly altered with the short term cigarette exposures, and bioinformatics was used to show how these proteins connected within cell signaling networks.

Smoke-altered proteins regulate apoptosis, proliferation, stress response, cell structure, cell migration and inflammation. The female rats demonstrated much higher sensitivity to low doses of cigarette smoke and resultant changes in these protein pathways than their male counterparts. The study utilized proteomic technologies to enable a systematic approach to understanding lung proteins altered by smoke.

“This study demonstrates the robustness of antibody-driven proteomics to discover useful biomarkers” commented one of the authors of the scientific publication Dr. Steven Pelech, President and Chief Scientific Officer of Kinexus and a professor in the Department of Medicine at the University of British Columbia. “Monitoring the expression and phosphorylation of proteins is immensely more challenging than genomic analyses, but is more insightful for guiding biomedical researchers in finding biomarkers for understanding the pathology of disease induced by toxins in the environment.”

For 12 years, Kinexus has been a unique provider of proteomics services to academic and industrial laboratories to track protein kinases and their phosphoprotein targets in experimental tissue and cell specimens. The company has developed a diverse panel of microarrays and complementary technologies that can monitor the presence and activity levels of hundreds of signaling proteins, their interactions, and the effects of promising drug candidates. The application of this knowledge positions Kinexus and its clients for improved disease diagnosis and personalized drug therapies to improve human health.

For further information, please contact Kinexus Bioinformatics Corporation toll free at 1-866-KINEXUS or email csutter@kinexus.ca or visit our website at www.kinexus.ca