

Presenting Author Name

Jackie (Jia Qi) Wang

Phonetic spelling of your (full) name

JAK-ee w-ONG

Presenting Author Category

Masters Student

Supervisor Name

Richard Keijzer

Research Category

Basic Science

Abstract Title

Exploring the rat lung proteome to identify novel targets in abnormal lung development in congenital diaphragmatic hernia

Authors

Name	Role	Profession
Jackie (Jia Qi) Wang	Presenting Author	Graduate
Arzu Ozturk Aptekmann	Co Author	Graduate
Daywin Patel	Co Author	Graduate
Jodi Qiao	Co Author	Graduate
Ying Lao	Co Author	Graduate
René Zahedi	Co Author	Full Professor
Richard LeDuc	Co Author	Graduate
Richard Keijzer	Co Author	Full Professor

Background

Congenital diaphragmatic hernia (CDH) is a severe birth defect resulting in a hole in the diaphragm and abnormal lung development (pulmonary hypoplasia and persistent pulmonary hypertension), the main cause of mortality in CDH. The pathogenesis of CDH is not fully understood.

Objective

Identify novel protein targets that may play a role in abnormal lung development in CDH.

Methods

Using the well-established nitrofen CDH rat model, bulk protein analysis was conducted on the left lungs of fetal rats at embryonic day 21 in the control and nitrofen CDH group. Fetal lungs were dissected, flash frozen, digested, and processed via liquid chromatography tandem mass spectrometry (LC-MS/MS). The peptide-level data were rolled up into protein-level data, where significant protein differential abundance analysis was done in R. The proteins-of-interest were selected after PANTHER-db analysis and literature review. Since this is an exploratory bulk protein analysis, the chosen adjusted p-value threshold for differential protein abundance was 0.1.

Results

293 proteins were found to be significantly differentially abundant between the control and nitrofen-treated group. 3 proteins-of-interest were selected: Serpina1 ($p = 0.0000478$), Talin-1 ($p = 0.0897$), and Timp3 ($p = 0.04334$), all of which were downregulated (Serpina1 $\logFC = -0.4669883$; Talin-1 $\logFC = -0.118032$; Timp3 $\logFC = -0.301690$) in nitrofen-treated lungs. Immunofluorescent staining of E21 lung sections were completed to show spatio-temporal abundance and validate protein location. Semiquantitative image analysis will be done prior to ELISA and/or Western Blot assays to support protein quantification in control and nitrofen-treated lungs.

Conclusion

Serpina1, Talin-1, and Timp3 were found to be significantly downregulated in the nitrofen CDH rat model. Others have reported the dysregulation of these proteins in other pulmonary diseases such as emphysema, chronic obstructive pulmonary disease, asthma, and pulmonary fibrosis. This study is the first step in exploring potentially novel dysregulated proteins in abnormal lung development in CDH.