



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Therese A. Santiago</b>   | <b>Project Number</b><br><br>35438 |
| <b>Project Title</b><br><b>Detection of Biomarker Ciz1 b variant for Early Detection of Lung Cancer</b>  |                                    |
| <b>Abstract</b><br><b>Objectives/Goals</b><br>Lung cancer is one of the leading causes of death in the US and worldwide. Despite multimillion-dollar research, the mortality rate continues to remain high. Most patients have delayed diagnosis due to lack of symptoms, which results in poor prognosis of the disease. So far, early diagnosis has been the only factor that improves survival in lung cancer. CT images can detect abnormalities but do not distinguish benign lung nodules from cancer nodules. Therefore, additional research using biomarkers is needed to increase diagnostic accuracy. Ciz1 b variant is a biomarker that has only been detected in one study. The b variant Ciz1 was found to control the function of cancer cell DNA and factors that promote cell growth. Presence of the b variant form of Ciz 1 has been associated with malignant tissue. However, presence of the b-variant Ciz-1 in lung cancer tissue must be validated in order to assess its diagnostic utility. In this study, the goal is to identify the expression of the Ciz1 marker in lung cancer. Non-Small Cell Lung Cancer (NSCLC) is found in approximately 85% of all lung cancers, so this research is focused on NSCLC. It was hypothesized that detection of the Ciz1 biomarker in Lung Cancer may help in early diagnosis and monitoring of lung cancer.<br><b>Methods/Materials</b><br>Ciz1 b variant expression was examined in surgically removed Stage 1 NSCLC tissue. Tumor section slides were prepared using IRB approved protocol. Immunohistochemical (IHC) staining was used to study Ciz1 expression in tumor cells. Findings were validated using PCR and the Eliza assay.<br><b>Results</b><br>The data shows that Ciz1 is highly expressed in Stage I NSCLC compared to normal tissue. Identification of Ciz1 in cancer tissue of early stage lung cancer indicates that Ciz1 can be used as a marker for early stage lung cancer.<br><b>Conclusions/Discussion</b><br>Presence of the Ciz1 b variant has been correlated with malignant tissue. The finding of Ciz1 b in Stage I NSCLC compared to the control tissue suggests that Ciz1 expression in tumor cells can be used to identify cancer. This finding may open an important avenue for Ciz1 as a biomarker for the early detection of lung cancer, which could lead to better prognosis. The Ciz1 marker may have high potential for use as a tumor maker alongside CT screening for early detection of lung cancer. If validated, Ciz1 expression may be used to differentiate benign from malignant lung nodules. |                                    |
| <b>Summary Statement</b><br>Our findings of detection of the Ciz1 marker in lung cancer tissue may open an important avenue of using Ciz1 as a biomarker in Stage 1 lung cancer. If validated, Ciz1 expression may be used to differentiate benign lung nodules from malign  |                                    |
| <b>Help Received</b><br>This study was conducted at the University of California San Francisco (UCSF) Fresno under the supervision of Dr. Upadhyay.  |                                    |