The Cancer Breathalyzer: Chemical Strips that Detect Chemicals in Lung Cancer "Breathprint"

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Every year, thousands of people are diagnosed with lung cancer. 85% of patients are diagnosed at a late stage with only a 4% survival rate when diagnosed late. The purpose of this project is to make chemical strips for testing in a modified breathalyzer to detect lung cancer at an earlier stage based on chemicals released in a high concentration in lung cancer ‘breathprints’. The experiment was conducted in three phases. Phase I, yeast cultures were grown in lung cancer breathprint chemicals, for the chemicals to be released through fermentation combined with CO2. The yeast’s ability to survive was measured through density, pH, cell size, and growth. Phase II, chemical strips were made that changed color when exposed to chemicals yeast cultures released by direct liquid contact and constant or alternating aromatic exposure. Color changes, if any, were recorded. In Phase III, further testing was performed using chemicals that modeled aspects of the reaction between the strips and yeast to determine the color-changing agent and increase the rate, concentration, and color change. The color change was recorded. After all data was gathered, color key charts were made that displayed the color change with respect to quantities of chemicals present. The rate of color change was calculated. A cost analysis between the potential breathalyzer and current methods of lung cancer tests was made. In conclusion, the project was successful in making it more possible to develop a breathalyzer for detecting lung cancer.

Awards Won: