



# Colorado Science and Engineering Fair

## 2024 Team Project Abstract Form

**Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.**

Title of Project: Lung Transplant Theory: Mechanical Pumps and How the Body Accepts Foreign Ventilators

Team Leader's Name: Kennedy Camacho-Orona

Team Member 1: Emma Perry

Team Member 2:

School and City: South High School, Pueblo

Sponsor's Name: Allison Hellman

Category: Biomedical & Health Sciences (BMED)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

The purpose of this initial project stage was to identify parameters needed for artificial lungs to be optimally functional in the human body and lay the foundation for future research regarding body-safe material alternatives. We hypothesized that if the artificial lung was made from extremely flexible material, it would have a higher percent expansion compared to the lung made from more resistant material.

The experiment involved mastering the multifaceted and complex program Fusion360 to create scaled 3D models of human lungs. These printed models were then pressed into kinetic sand to make molds in which different variations of heat-molded plastic were poured. Once the plastic cooled, we created a cavity in the center and sealed the sides. A plastic molded plug with a rubber tube attached, adhered to the superior aspect of the models and facilitated the transfer of air in and out of the model lungs.

The data collected didn't support the original hypothesis. It was predicted that the soft lung (more elastic) would have a higher percent expansion. However, the hard lung (more resistant) had an expansion of 34.62% before bursting, while the soft lung only had a 24% expansion before bursting, a difference of 10.62%.

These findings support the conclusion that future artificial lungs will need to be similar in flexibility to the hard model lung. The hard lung was able to hold its reasonable capacity without any issue and, when challenged, maintained its max capacity for approximately 4 minutes before the structure became compromised.

*We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. We also attest that the above properly reflects our own work.*

Team Leader's Signature: Kennedy Camacho-Orona

Date: March 2, 2024

Team Member 1's Signature: Emma Perry

Date: March 2, 2024

Team Member 2's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with your Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.