Bronchoalveolar Lavage Trap

Group 17
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Team: *Laura Zeitler (Team Leader)*
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Problem Statement:

In order to diagnose respiratory problems in immunosuppressed patients, bronchoalveolar lavage is used to obtain a bronchiole fluid sample. A bronchoscope is guided through the respiratory tract and wedged into a bronchiole, which is then flushed with saline solution. The solution is then extracted with a vacuum and accumulates in the sterile collection trap. In the current procedural setup, the lavage trap is free-hanging and unstable. Manipulation of the bronchoscope and surrounding movement can displace the trap resulting in loss of sample to the vacuum line. To prevent unnecessary expense and patient inconvenience from sample loss, a new trap needs to be developed.

Last Week's Goals

- Get shop permits
- Test vacuum pressure at hospital
- Experimentally determine appropriate weight of ball using hospital's vacuum
- Begin fabrication of prototype
- Begin work on Solidworks depiction of final design

Summary of Accomplishments

- Kim and Ali finished their shop certification
- The vacuum pressure was tested at the hospital.
    - Approximately 160 mmHg- however this value is probably not useful until we can test it for the various sizes of valves and traps because the pressure changes in every instance.
    - Different sized balls were tested and the vacuum was able to lift all weights. Further testing in a more realistic cage situation will be needed. One conclusion is that kinking the vacuum tube will work to release the ball from its seal in the design.
- A rough testable prototype was created from two traps connected together including a rubber washer and a wire cage that can be adjusted to fit the various balls. This will be useful in testing the vacuum and design in a more realistic setting.
- We met with a lab in the genetics and biotechnology center to discuss rapid prototyping or "3-d printing" and the possibility to using it to create our final prototype. It sounds like this will work for our situation if we have a Solidworks model, and it should only cost \$8.00 per in^3. The material it is made out of has been described as "plaster-like" but can be sprayed with something to make it waterproof.

- Work has begun on creating this Solidworks model and after testing from the initial prototype; dimensions should be finalized after initial testing on the other prototype and ready to submit for rapid prototyping shortly.

This Week's Goals

- Determine proper dimensions for final prototype from vacuum testing on initial prototype
- Finalize Solidworks model
- Submit design to rapid prototyping lab

Project Difficulties

We do not know how to quantify the data from the vacuum testing on our initial prototype and apply those values to our final prototype design. We are not certain if we can just scale the values down to the size we want without other factors being affected.

Activities

Collaboration Group Activities		
Date	**Activity**	**Duration**
3/27/2009	Group and Advisor Meeting/Rapid Prototype Lab	2 hours
3/31/2009	Rapid Prototyping Meeting/ Solidworks	30 minutes

Team Member	**Date**	**Activity**	**Duration**
Elise Larson	3/27/2009	Design Ethics	45 minutes
	3/27/2009	Vacuum Testing at Hospital	1 hour 45 minutes
	3/31/2009	Brainstorming: Cage Simulation	1 hour
	4/1/2009	Rough Prototype Building	1 hour 45 minutes
Kim Kamer	3/27/2009	Vacuum Testing at Hospital	1 hour 45 minutes
	4/1/2009	Rough Prototype Building	1 hour 45 minutes
Ali Johnson	4/1/2009	Rapid Prototype Design Sketches	1 hour
	3/27/2009	Vacuum Testing at Hospital	1 hour 45 minutes
Laura Zeitler	4/1/2009	Rough Prototype Building	1 hour 45 minutes
	4/1/2009	Solidworks Design	1 hour
	4/2/2009	Progress Report	30 minutes

Expenses

Date	Item	Cost	Comments
3/19/09	Miscellaneous Prototype Supplies	$3.70	American Science and Surplus Store

Project Schedule

Task	January		February				March				April				May
	23	30	6	13	20	27	6	13	20	27	3	10	17	24	1
Project Research and Development															
Researching															
Brainstorming															
Design Matrix/ Cost Estimation															
Design Selection															
Ordering Materials															
Prototyping															
Testing															
Final Prototype															
Deliverables															
Progress Reports															
PDS															
Mid-semester Presentation															
Mid-semester paper															
Final Presentation															
Final Paper															
Meetings															
Client															
Advisor															
Website															