

Build-A-Lung

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Synopsis of the Activity: I will be teaching my audience about lung structure and function and how the two are dependent on one another. Everyone in the audience will be building a modeled lung out of provided materials with guidance from instructions I'll provide before we begin. After building the modeled lungs, we will have a discussion on what structures are most responsible for allowing breathing to occur. Additionally we will discuss and form hypotheses about how disease could affect the structure and function of the lungs.

Audience: Kids from ages 9 and up, I want this to be fun but also to encourage the audience to make their own hypotheses about how disease could affect this very important structure.

Activity (Learning) Goals OR Learning Objectives: My goal for this activity is for the audience to walk away with a new understanding of lung structure and why it is so important its healthy structure is maintained. I'm really hoping this particular activity will help them understand a fundamental concept of anatomy called, "structure dictates function". Hopefully by using household products to model a lung, it will promote a deeper appreciation for their lungs and what they do to keep us alive and healthy.

Materials: Liter soda bottles, scissors, balloons, clay (like play-dough), and straws.

Preparation and Set-up: There will either be one big table everyone can work at or multiple tables. Before bringing out the materials I want to ask what they think we should use to model the rib cage, lungs, diaphragm, and trachea. After that I will bring out the materials, including one finished product. Together, step-by-step, each audience member will put together his or her own lung with instructions provided on the tables, and I will also circle around to lend my help as needed.

Guiding Questions: To check for prior knowledge and to begin the activity I will ask things like, "Can someone tell me what the respiratory system is?" "Why is the function of the respiratory system and why is it important?", "What is the main structure responsible for breathing?" Once I have a feel for what they already know I will either discuss and teach lung structure and function in an explanatory way or continue to generate questions about the structure/function to see what they already think. To encourage more thinking throughout I will be asking things like "Why do the lungs need to be so thin and elastic? Or why does the diaphragm move during

inspiration/expiration? What purpose does the rib cage serve or the trachea?” Lastly, after everyone has made a lung and played with the diaphragm to make it “breathe”, I will ask, “What hypotheses could we generate about how the structure and function would change if disease occurred due to excessive smoking, or living somewhere with poor air quality?”

Activity Description: This activity is designed for a small group to control for the amount of materials needed and so that each participant can receive proper instruction and stimulate a higher quality of learning. Before making the lungs I will give a brief introduction on the respiratory system and ask my audience questions to get a feel for any prior knowledge or preconceptions they might have on the topic. They will be asked to discuss with a partner what kinds of materials we should use to model the lungs. Everyone will then get a chance to share their hypotheses, then I will pull out the materials that we will actually be using. I'll show the group a prototype of the lung we will be building, distribute the materials, along with instruction cards they can follow while I walk them through the steps. All of the soda bottles will already have the bottoms cut out to save time. So the first step will be to tie a knot at the top of the balloon, then cut out the bottom of it so that it can be stretched around the bottom side of the bottle. This balloon will serve as the diaphragm. Next they will secure the tip of another balloon onto the end of a straw, this balloon will serve as the lung and will be inserted into the “rib cage”, which is the body of the bottle. The top of the straw will be sticking out the neck of the bottle. The straw will be secured by securing the opening of the bottle with play-doh, keeping the straw in place and making sure the straw is the only pathway for air entering the lung. If done correctly, pulling the “diaphragm” down will force air into the lung and it will inflate and releasing the diaphragm will cause it to deflate. Lastly, everyone will be asked to play with their finished product and tell me what they think now is the main muscle of inspiration, compared to what they thought previously. Hopefully now they will recognize it is the movement of the diaphragm that is responsible for this. Additionally I will encourage everyone to come up with any hypotheses about how disease might affect this structure and function. Hopefully this will lead to a discussion on why it's important we limit pollution to preserve air quality and of course refrain from smoking to keep our lungs healthy.

Teaching Strategies: This activity gives every participant the chance to actively participate in the lesson by sharing their previous knowledge and hypotheses about the topic. Additionally they will get to do something hands-on, which I'm hoping will engage them further into the lesson and get the most out of it. By asking the audience to generate hypotheses about what house-hold materials they think would best model the lung and how they think these structures could be affected by disease will allow them to explore their previous knowledge as well as what they are learning during the activity. The main goal is for them to think about anatomy structure and function and how they depend on one another. Hopefully, by the end of the lesson the portion where they make hypotheses on how structure could be affected by disease it

will all come together and they will see how important healthy structure is for healthy function of the lung and all organs.

Vocabulary: Some key terms include inspiration, expiration, diaphragm, alveoli, and oxygen-carbon dioxide exchange. I will cover almost all of these at the beginning when I give the introduction/overview of the respiratory system. These terms will also be on notecards at their tables with definitions for them to refer to.

Science Content Background and Additional Resources: I remember doing a similar activity in my high school anatomy class, where we all had to model a human body with household products that best represented specific organ function. It got me thinking about the lungs (one of my favorite organs) and how maybe I could do something to model them. After some research on the Internet I found this lung prototype. The lesson itself is something I came up with, but the instructions on how to make it come from the following website:

<http://www.science-sparks.com/2012/04/13/breathing-making-a-fake-lung/>