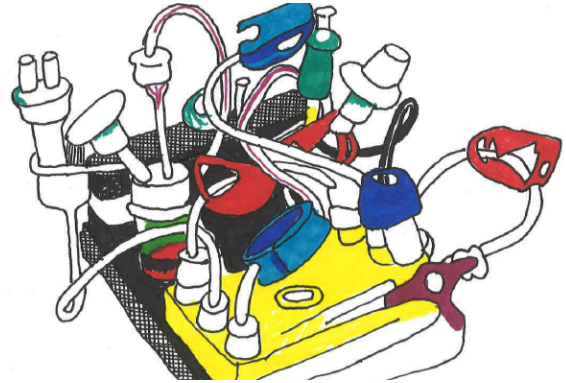


How Do Los Alamos Scientists Make a Lung From Scratch?

It is part of a project called ATHENA. They begin by scratching a volunteer's arm. The skin cells they collect are then reprogrammed to behave as stem cells, with the potential to be any kind of human tissue. Next, they teach the cells to be lung tissue, either air sacs (alveoli) or bronchial cells. The tissues are cultured in three dimensions in small, extraordinarily clever life support systems. Pumps, tiny tubes and laser cut channels in plastic supply the tissues with air, nutrients, and blood, and carry away waste products.

Tissue culture is not new. What is unique about this project is the tissues perform as they would inside a human being. The tissues in this device actually breathe, they respond to medications, and they are impacted by toxins just as human lung tissue are.



Because the tissues are essentially clones of an individual, the potential for personalized medicine is enormous. Typically, when a doctor prescribes a medication to a patient, the decision is based on a statistical model. This medication may aid some percentage of patients with this condition. Those of us who fall outside the statistics may not be served by this medication. Athena tissue cultures may allow medical personnel to test several treatment regimes simultaneously to quickly identify the most effective ones.

In a similar way, the project may permit researchers to decrease our reliance on animal testing. Animals have been used to test for drug reactions and complications for a long time. The tests are not always reliable. Animals are not identical to humans. In some cases this has led to terrible consequences for people, not to mention animals. Having the ability to watch living human cells respond to treatment may have benefits for safety and effectiveness.

ATHENA is funded by the Defense Threat Reduction Agency (DTRA) and is a collaboration of Los Alamos National Laboratory, Harvard University, Vanderbilt University, Charité Universitätsmedizin, Berlin, Germany, CFD Research Corporation, and the University of California San Francisco.