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## science news

### New Gene Therapy to Repair Damaged Lungs for Transplantation

Timmy Wang

It is a widely known fact that a shortage of organs, such as kidneys, lungs, and livers, exists in the United States. As a result of this shortage, waiting lists of patients hoping for a second chance at life from organ transplantation continue to grow. However, cutting edge research from Toronto's University Health Network may provide a way through gene therapy to actually repair lungs that would have once been discarded due to damage and/or inflammation of the airways. This especially bodes well for the supply of lungs for transplants as only 15% of lungs from organ donors are qualified for transplant. The therapy was devised in a two step process experiment by Dr. Shaf Keshavjee, the chief of lung transplant at University Health Network. The first step began by taking damaged lungs from pigs as well as 10 donated human lungs. These lungs were each placed into a dome which mimicked the internal temperature, nutrients, and oxygen concentration of the human body. Essentially, the dome was able to keep the lung cells alive outside of the body. The second step was the introduction of a gene known as interleukin-10 (IL-10), which, when expressed, is able to prevent the inflammation of the lungs cells and any further damage of the lungs as a transplant is taking place. This second step began by first inserting the interleukin-10 gene into an adenovirus. The adenovirus was placed in the airways of the lung to allow the cells to take in the virus along with the interleukin-10 gene. From the study,



the research team found that when the gene-treated lungs were transplanted into pigs, there was a significant improvement in the lungs' ability to exchange carbon dioxide and oxygen within four hours of the transplantation compared to that of an untreated lung transplantation. Dr. Keshavjee also noted that it may be possible "to transduce the cells in the lungs to become little IL-10 factories. It's personalized medicine for the organ, if you will." This would mean that the lungs will also not have any post-surgery inflammation. As of yet, there have been no human lung transplants using this IL-10 gene therapy treatment as most specialists believe that more studies need to be conducted on animals before starting human trials. Additionally, others, such as Indiana University's Dr. David Wilkes, have noted that previous studies using the adenovirus as a vector for gene therapy has caused some side effects. However, Dr. Keshavjee made note that the adenovirus disappeared after it delivered the gene into the lung cells, meaning there was less chance of side effects. Overall, if proven effective, both sides agree that this new treatment would improve the lives of many more patients who are still waiting on the list.