



## Bioengineered Vocal Fold Mucosa for Voice Restoration

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**WARF: P140307US02**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing engineered vocal fold mucosa for implantation and treatment of voice impairment due to tissue damage, loss or disease.**

### Overview

Voice impairment (dysphonia) affects an estimated 20 million people in the U.S., resulting in reduced quality of life and direct health care costs exceeding \$11 billion per year. Between 60 and 80 percent of voice complaints in the treatment-seeking population involve changes to the vocal fold (VF) mucosa. Severe mucosal impairment or loss due to trauma or disease often culminates in fibrosis and deterioration of VF vibratory capacity for voice.

Patients with significant VF mucosal damage have limited treatment options. These include implants and injection of regenerative biomaterials, both of which have drawbacks. Creation of a bioengineered VF mucosa could potentially bypass these challenges by providing on-demand tissue for transplantation that is suitable both for voice production and maintenance of barrier function between the tissue and the airway.

### The Invention

UW-Madison researchers have engineered vocal fold mucosae from isolated and purified human VF fibroblasts and epithelial cells, co-cultured under organotypic conditions. When grafted into larynges *ex vivo*, the engineered VF mucosae generate vibratory behavior and acoustic output indistinguishable from native VF tissue, thus demonstrating that they have the biomechanical properties essential for use as an implant in treating voice impairment due to tissue damage, loss or disease.

In addition, when grafted into humanized mice *in vivo* (a transgenic mouse model supporting a functional human adaptive immune system) the mucosae survive and are well tolerated by the human adaptive immune system. This indicates that implanting the engineered mucosa into the larynx of a human patient would likely not trigger rejection or immune system attack against the implant.

### Applications

- Transplant therapy

### Key Benefits

- No comparable bioengineered tissue currently exists for restoring vocal function.
- Unique biomechanical and immunological properties

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Using a humanized mouse system, the researchers implanted engineered VF mucosal auto- and allografts *in vivo* and documented robust graft survival with favorable tolerance by the human adaptive immune system. Taken together, these results indicate that the new bioengineered mucosae have the potential to restore voice function in patients with otherwise untreatable VF mucosal disease.

## Additional Information

### For More Information About the Inventors

- [Nathan Welham](#)

### Publications

- [Ling et al. Bioengineered Vocal Fold Mucosa for Voice Restoration. Sci Transl Med. 2015 Nov 18;7\(314\):314ra187. doi: 10.1126/scitranslmed.aab4014.](#)

### Tech Fields

- [Therapeutics & Vaccines : Organ & tissue transplants](#)
- [Therapeutics & Vaccines : Skin & connective tissue](#)

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