

# Tissue-engineered implants provide new hope for vocal injuries

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New technology from Purdue University and Indiana University School of Medicine innovators may one day help patients who suffer devastating vocal injuries from surgery on the larynx.

A collaborative team consisting of Purdue [biomedical engineers](#) and clinicians from IU has [tissue-engineered](#) component tissue replacements that support reconstruction of the larynx. The team's work is published in *The Laryngoscope*.

The larynx is a very complex human organ consisting of outer cartilage for structural support, inner muscle that contracts to permit voicing, swallowing, and breathing, and inner vibratory lining.

Currently, thousands of patients each year with [laryngeal cancer](#) or trauma require a procedure called total laryngectomy in which the entire larynx is removed, and patients are left without a [human voice](#) and breathing through a hole in their neck called a stoma.

"There are very few options for laryngeal reconstruction and no options for restoration of laryngeal appearance, structure and function," said Stacey Halum, a fellowship-trained laryngologist specializing in head and neck surgery. "While surgeons occasionally use local or free tissue transfers to repair laryngeal defects, these local or regional tissues just 'plug holes' or close the defects without really restoring function because the transferred tissues are not dynamic—they do not move or contract. They also tend to lose bulk and scar over time."

Halum, along with Sherry Harbin, a professor in Purdue's Weldon School of Biomedical Engineering, led the innovation team.

The innovators used a patented collagen polymer developed by Harbin's lab to fabricate the three regenerative replacement tissues for the laryngeal

reconstruction procedure.

"Our approach is unique in that we are using customized engineered tissue replacements, with the muscle component fabricated using the patient's own muscle progenitor cells," Harbin said. "We believe these engineering approaches will provide patients with better options for reconstruction so that total laryngectomies become something of the past."

Harbin and Halum believe the technology has widespread applications for custom fabrication of engineered tissue replacements for tissue restoration in other parts of the body.

Harbin founded GeniPhys, a Purdue startup focused on the commercialization of the collagen polymer technology.

**More information:** Sarah Brookes et al, Laryngeal Reconstruction Using Tissue-Engineered Implants in Pigs: A Pilot Study, *The Laryngoscope* (2020). [DOI: 10.1002/lary.29282](https://doi.org/10.1002/lary.29282)

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