



# Weill Cornell Medicine

## Tissue-Engineered Intervertebral Discs for the Treatment of Degenerative Disc Disease

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## Background & Unmet Need

- Degenerative disc disease (DDD) is a condition in which the intervertebral discs (IVDs) in the spine degrade over time
- This degradation leads to nerve compression and chronic back pain
- DDD is widespread, affecting >90% of adults 50 years or older
- Surgical intervention for severe cases involves removing the entire IVD followed by fusion of the adjacent vertebrae or placement of a mechanical disc prosthesis to preserve motion
- However, fusion and disc replacement are associated with increased risk of pseudarthrosis and adjacent segment disease
- **Unmet Need:** An intervertebral disc implant that preserves a patient's spinal movement without the risk of developing complications or comorbidities

## Technology Overview

- **The Technology:** Tissue-Engineered IVDs (TE-IVDs) combined with a bioresorbable stabilization system for improved treatment of DDD
- The bioresorbable support structure keeps the implant in place during the healing process but allows for segmental movement after the stabilization system dissolves
- **PoC Data:** In a canine model, the TE-IVD implants engrafted successfully and persisted in the spine for 16 weeks
- The TE-IVDs were stable and maintained disc height up to 70% of adjacent normal discs
- The TE-IVD implants did not generate a chronic immune response, supporting the use of allogeneic cells

### Inventors:

Roger Hartl  
Lawrence Bonassar  
Yu Moriguchi  
Gernot Lang  
Rodrigo Navarro-Ramirez

### Patents:

US Patent [11,504,245](#)  
EP Application [3,583,213](#)

### Publications:

[Moriguchi et al.](#) *PLOS One*. 2017.

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### Cornell Reference:

D-7728



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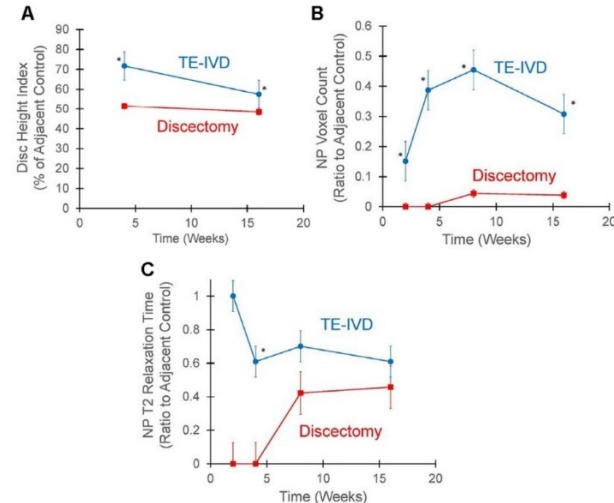
## Technology Applications

- Treatment of degenerative disc disease in patients with severe back pain that doesn't respond to noninvasive approaches

## Technology Advantages

- Replaces the entirety of the IVD utilizing viable tissues
- Restores disc height and spinal flexibility
- Inclusion of a bioresorbable support system reduces the risk of implant displacement

## Supporting Data / Figures



**Figure 1:** Quantitative analysis of disc height index and MRI. Compares the TE-IVD to the discectomy condition at different lengths in time. Data demonstrates that the TE-IVD had greater height index, a higher NP Voxel Count, and a higher NP T2 Relaxation Time which indicates the implant was well hydrated within the body.

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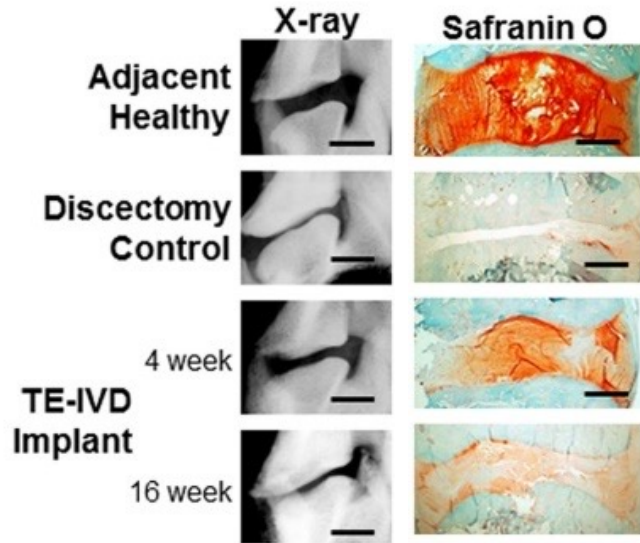
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**Figure 2:** X-ray and histology of adjacent motion segment, discectomy, and TE-IVD at 4 and 16 weeks. The TE-IVD implant showed clear vertebral separation and abundant staining with Safranin O, demonstrating proteoglycan-rich tissue with distinct morphological features of nucleus pulposus (NP) and annulus fibrosus (AF).

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