

ADHESIVE COATED SUTURES FOR STRONGER MUSCULOSKELETAL REPAIRS

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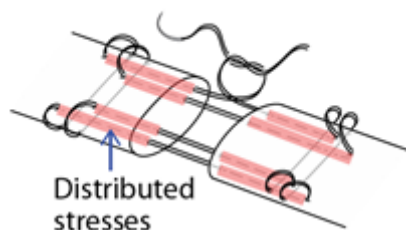
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Technology Description

An interdisciplinary team at Washington University in St. Louis has developed patented adhesive-coated sutures with the potential to reduce ruptures following surgical repair of tendons and ligaments. These modified sutures are designed to minimize stress by shifting the mechanical load from individual anchor points and instead distributing it along the length of the suture.

Adhesive-coated suture



Currently, tendon to bone repairs (such as rotator cuff repair) are challenging and have failure rates up to 94%. These new sutures are designed to address this problem, reduce ruptures and provide strong biomechanical resilience to accommodate activities of daily living. Using a mechanical model, the inventors identified adhesives that could coat the sutures and “stick” to collagen which would thereby distribute the mechanical load along the length of the repair site. The adhesive-coated sutures could be further enhanced with growth factors or other biological agents that augment healing while they are integrated into the tissue. These sutures could be used for a variety of musculoskeletal surgeries, particularly tendon or ligament repairs which demand strong biomechanical resilience to prevent failure.

Proof of concept - Using an ex vivo canine tendon model, the inventors compared a prototype coated suture to conventional sutures and demonstrated 17% increase in strength (load to failure and load to create a 2mm gap between the repaired tissues). NIH-funded development of optimal adhesives is underway.

Publications

- Linderman, S. W., Golman, M., Gardner, T. R., Birman, V., Levine, W. N., Genin, G. M., & Thomopoulos, S. (2018). [Enhanced tendon-to-bone repair through adhesive films](#). *Acta biomaterialia*, 70, 165-176.
- Linderman, S. W., Korpakakis, I., Gelberman, R. H., Birman, V., Wegst, U. G., Genin, G. M., & Thomopoulos, S. (2015). [Shear lag sutures: Improved suture repair through the use of adhesives](#). *Acta biomaterialia*, 23, 229-239.

Applications

- **Musculoskeletal surgical repair** – particularly tendon or ligament repairs, such as flexor tendon and rotator cuff repair, which demand strong biomechanical resilience to accommodate activities of daily living

Key Advantages

- **Stronger repair** – coated sutures are more resilient than standard sutures, which could potentially:
 - improve surgical success with fewer ruptures
 - improve functional outcome to sustain daily activities and enable more aggressive rehabilitation
 - prevent gaps at the repair site and promote organized tissue instead of a disorganized scar
- **Augmented healing** – adding growth factors or other biological agents to the coated sutures could further improve outcomes because the biofactor would be mechanically integrated into the tissue rather than added as a patch over the repair site

Patents

- [Adhesive-coated sutures](#) (U.S. Patent No. 10,314,574)
- [Compositions and methods for tissue repair](#) (U.S. Patent Application, Publication No. 2017-0360554)