PURDUE INNOVATES | Office of Technology Commercialization

Protein-Based Adhesive Modifications

A strong, highly elastic second-generation surgical sealant offers a superior alternative to traditional staples and sutures, decreasing infection risk, pain, and scarring while eliminating the need for removal appointments.

In a report published by MedMarket Diligence LLC in 2017, the United States accounts for 30% of the 114 million surgical wounds that occur every year worldwide. The traditional method of closing surgical incisions are staples and sutures. The major disadvantages of staples and sutures are pain, infection, and added trips to doctor to remove them. Medical professionals have an increasing interest in ways to decrease the risk of infection and eliminate the damage of healthy tissue near the surgical site. Surgical sealants are a promising technology that could hold incisions closed without mechanical support of sutures or staples. There are a few commercially available surgical sealants. Commercially available surgical sealants have poor elasticity and adhesive strength and, therefore, require mechanical support. A strong and elastic surgical sealant would not require additional support. A first generation sealant have addressed the elasticity problem with the development of their first generation surgical sealant.

Recently, researchers at Purdue University have modified their their first generation surgical sealant to improve its adhesive strength. The adhesive strength was higher for the second generation in comparison to the first generation surgical sealant on pig skin at physiological conditions. The adhesive strength was also measured on aluminum and it was found that second generation was 130% stronger than first generation adhesive and 14,000% stronger than Tisseel (commercially available surgical sealant from Baxter).

Advantages:

-Decreased risk of incision infection

-Decreased pain and scarring at surgical sites

-High adhesive strength and elasticity

Technology ID

2018-LIU-68335

Category

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Materials Science & Nanotechnology/Biomedical & Bioinspired Materials

Authors

Sydney E Hollingshead

Charng-yu Lin

Julie C Liu

Jonathan James Wilker

Further information

Clayton Houck

CJHouck@prf.org

View online

Potential Applications:

-Closing surgical incisions

Publications:

ACS Appl Bio Mater. 2022 Feb 21;5(2):630-641. doi: 10.1021/acsabm.1c01095.

Effect of Cross-Linkers on Mussel- and Elastin-Inspired Adhesives on Physiological Substrates

Sydney Hollingshead, Jessica E Torres, Jonathan J Wilker, Julie C Liu

TRL: 3

Intellectual Property:

Provisional-Patent, 2018-08-22, United States | PCT-Patent, 2019-08-22, WO | NATL-Patent, 2021-02-22, United States | CON-Patent, 2025-03-28, United States

Keywords: Surgical sealants, Adhesive strength, Wound closure, Tissue adhesives, Biomedical materials, Elastic surgical sealant, Incision infection decrease, Surgical staples alternative, Mussel-inspired adhesives, Elastin-inspired adhesives