Docket #: S23-384

Encapsulation and Local Delivery of Inhibitors of the Activator Protein 1 (AP-1) for Preventing Adhesions

Stanford scientists have developed a novel hydrogel for long-term drug delivery of an Activator Protein 1 (AP-1) inhibitor for the prevention of post-surgical abdominal adhesion. Abdominal adhesions are fibrotic scars that form between abdominal organs and occur in 50-90% of abdominal operations. Their work shows that the formulation prevents adhesion and does not hinder healing at the site of surgery. There are currently no effective standard-of-care anti-adhesion treatments for abdominal adhesion, therefore, this has the potential to immensely improve clinical care.

Adhesions occur post-operatively in 50- 90% of all open abdominal operations, representing an enormous clinical problem impacting hundreds of millions of patients worldwide. Currently, there is no standard-of-care treatment to prevent adhesions which can cause bowel obstruction, chronic pain, and/or infertility. T-5224 is a small molecule inhibitor of the Activator Protein 1 (AP-1) transcription factor complex, and local application of the drug has previously been shown to prevent abdominal adhesion. But, a practical and effective delivery method of the drug has not been developed for clinical use.

Using a mouse and porcine model of abdominal adhesions, the researchers found the hydrogel formulation promotes sustained release of T-5224 and inhibits adhesion formation in vivo. Importantly, no negative side effects were observed. Consequently, sustained release of AP-1 inhibitors to the surgical site has the potential to drastically improve post-surgical outcomes by eliminating abdominal adhesion in patients.

Stage of Development:

- Preclinical

- Continued research – Validation in a porcine model, application for ongoing grant support

Applications

- Prevention of abdominal adhesions in patients following surgical operations or intra-abdominal infection
- Treatment of other peritoneal diseases related to fibrosis (e.g., peritoneal carcinomatosis)
- Fibrosis elsewhere in the body (e.g., prevention of pleural or pericardial fibrosis in the context of surgical procedures in the chest or prevention of adhesions after tendon repairs)

Advantages

- These findings represent a topical formulation for an effective anti-adhesion treatment
- No effective standard-of-care anti-adhesion therapies exist
- Potential significant advancement in the prevention of abdominal adhesions

Publications

- Foster, D. S., Marshall, C. D., Gulati, G. S., Chinta, M. S., Nguyen, A., Salhotra, A., ... & Longaker, M. T. (2020). Elucidating the fundamental fibrotic processes driving abdominal adhesion formation.. Nature communications, 11(1), 4061.

Patents

- Published Application: WO2025101703

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