5-16-2022

Liquid co-polymers as biodegradable surgical sealant

Neta Shimony

Alona Shagan

Boaz Mizrahi

Adi Gross

Bat-hen Eylon

See next page for additional authors

Authors
Neta Shimony, Alona Shagan, Boaz Mizrahi, Adi Gross, Bat-hen Eylon, and A. Nyska

LIQUID CO-POLYMERS AS BIODEGRADABLE SURGICAL SEALANT

Neta Shimony, The Department of Biotechnology and Food Engineering, Technion, Israel
NetaShimony@campus.tehnion.ac.il
Alona Shagan, The Department of Biotechnology and Food Engineering, Technion, Israel
Bat-hen Eylon, The Department of Biotechnology and Food Engineering, Technion, Israel
Dr. A. Nyska, Tel Aviv University and Consultant in Toxicologic Pathology, Tel Aviv, Israel
Dr. Adi Gross, The Department of Biotechnology and Food Engineering, Technion, Israel
Boaz Mizrahi, The Department of Biotechnology and Food Engineering, Technion, Israel

Key Words: Bio-adhesives; sealant; polyethylene glycol; PLGA; hydrogels

Surgical sealants are widely used to prevent seepage of fluids and liquids, promote hemostasis, and close incisions. Despite the remarkable progress the field of biomaterials has undergone, the clinical uses of surgical sealants are limited because of their short persistence time in vivo, toxicity, and high production costs. Here, we present the development of two complementary neat (solvent-free) prepolymers, PEG_4-PLGA-NHS and PEG_4-NH_2, that harden upon mixing to yield an elastic biodegradable sealant. The mechanical and rheological properties and cross-linking rate can be controlled by varying the ratio between the two prepolymers. The tested sealants showed a longer persistence time compared with fibrin glue, minimal cytotoxicity in vitro and excellent biocompatibility in vivo. The neat, multi-armed approach demonstrated here improves the mechanical and biocompatibility properties and provides a promising tissue sealant solution for wound closure in future surgical procedures.

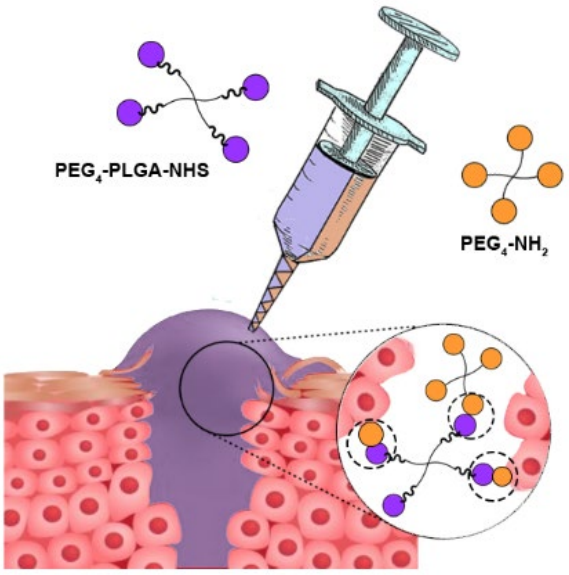

Figure 1 : A stiff biodegradable sealant based on a mixture of two complementary, liquid pre-polymers is introduced