Sugary Band-Aid May Help Post-Op Healing

A compound found in sunless tanning spray may help to heal wounds following surgery, according to new results published by plastic surgeons from New York-Presbyterian Hospital/Weill Cornell Medical Center in New York City and biomedical engineers at Cornell University, where it was developed.

Procedures to remove cancerous breast tissue, for example, often leave a hollow space that fills with seroma fluid that must typically be drained by a temporary implanted drain. “This is an unpleasant side effect of surgery that is often unavoidable,” explains Dr. Jason Spector, co-author of the study and plastic surgeon at New York-Presbyterian Hospital/Weill Cornell Medical Center.

The gel could potentially be used in all different reconstructive surgeries to prevent seroma formation. “The new substance would act to glue together the hole left behind to prevent seroma buildup,” says Dr. Spector.

DHA is a compound that sticks to compounds in biological tissues, called amines. The sticky properties of DHA are what allows sunless tanner to adhere to the skin without being wiped off. However, it is biodegradable and water soluble as well, which means that the compound does not stay tacked onto the body's tissues forever. Currently used “bio-glues” are made from animal products and take a long time to degrade in the body – both factors that raise the risk of infection.

“DHA is a compound that is naturally produced in the body,” explains Dr. David Putnam, the study's senior author and a biomedical engineer from Cornell University's Department of Biomedical Engineering and School of Chemical and Biomolecular Engineering. “The glue is broken down, or metabolized, and then safely removed by the body.”

Dr. Putnam's lab and his collaborators work to create safe, synthetic compounds from chemicals found in nature. DHA is an intermediary compound produced during the metabolism of glucose, a sugar used by the body for fuel. To create the new compound, MPEG-pDHA, Dr. Putnam and his lab first bound the single molecule monomer of DHA, which is highly reactive, to a protecting group molecule, making it stable enough to manipulate. This allowed the engineers to bind the monomers together to form a polymer, or chain of molecules, along with MPEG. Doing so allows the polymer gel to be injected through a syringe.

Now in gel form, the compound has the ability to stick tissues together, preventing the pocket from filling with seroma fluid. The researchers found that the gel prevented or significantly lowered seroma formation or fluid buildup in rats that had breast tissue removed.

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