

Surgical glue

December 3 2007

In a few years' time, instead of fiddling with needle and thread, surgeons may simply use glue to connect implants to living tissue. They took their idea from mussels, which can stick to any surface, be it porous rock or the smooth hull of a ship.

It sounds like a venturesome plan: Implants such as artificial heart valves and vessels are to be welded to the body's own tissue using a special glue, completely obviating the need for bothersome sutures. The bond will be rapidly hardened by UV light, so that only 30 seconds later, the foreign object is firmly implanted in the patient's body.

Dr. Klaus Rischka, a chemist at the Fraunhofer Institute for Manufacturing Engineering and Applied Materials Research IFAM in Bremen, is confident that this scenario will soon become reality. In the course of this award-winning project, the Fraunhofer researcher and his partners at Frankfurt University Hospital, the Center of Biotechnical Engineering BitZ at Darmstadt University of Technology, the State Materials Testing Institute MPA and the implant manufacturer Straumann in Freiburg will initially demonstrate the glue's suitability on the basis of a dental implant made of titanium.

It is current practice to anchor tooth implants in the jaw bone without an adhesive. This often leaves gaps between the gums and the metal, allowing bacteria to enter and cause infections. A glue that firmly connects the gums to the implant would serve as an effective barrier against aggressive germs. Conventional products are not suited to such a purpose, however, as they would sooner or later dissolve in the moist

environment inside the mouth.

Mussels have provided the Fraunhofer experts with a solution: Over the course of evolution, these mollusks have developed a special glue that not only works under water, but is also a particularly firm and lasting bonding agent. The strength of the bond is due to a particular protein. Chemists at IFAM are able to synthetically reproduce the key elements of the substance, and have already used them in a joint project with the European Space Agency ESA to develop an adhesive intended for everyday repairs in manned spaceflight.

The use of this substance in medical applications requires an additional ingredient: a growth protein, which can likewise be synthetically produced using the classic technique of solid-phase peptide synthesis. Its purpose is to stimulate cell growth so that the body's own tissue – in this case the gums – bonds as closely as possible with the implant.

A third component, in the form of a classic polymer, is then added as a carrier substance. Over the next two years, the participating chemists, medics and engineers intend to create a basis for practical applications. According to Rischka, it may then take another five to ten years before the glue is ready to be used on humans.

Source: Fraunhofer-Gesellschaft

Citation: Surgical glue (2007, December 3) retrieved 25 April 2024 from <https://phys.org/news/2007-12-surgical.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.