A coating for life: Biodegradable fibers advance stent technology and brain surgery, then disappear

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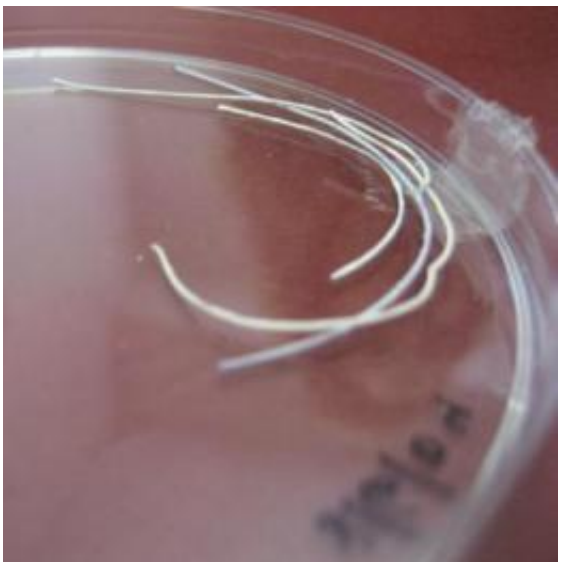

Fibers from Tel Aviv University that can be used to coat both metal and biodegradable stents. Credit: AFTAU

Stents that keep weakened and flabby arteries from collapsing have been true life-savers. But after six months, those stents are no longer needed -- once the arteries are strengthened, they become unnecessary. Previously, doctors had no choice but to leave them in place.

Prof. Meital Zilberman of Tel Aviv University's Department of Biomedical Engineering has developed a new patent-pending fiber

platform that carries drugs where they're needed, then dissolves.

"Our new composite fibers consist of a strong core coated with a drug-releasing, or 'eluting,' solution. They combine strength with the desired elements necessary for drug delivery, so they can be used as the basis of biodegradable drug-eluting stents," says Prof. Zilberman.

Her unique coating technology, she adds, can be used to coat both metal stents, which are currently available, and the biodegradable stents now in development.

Controlling the flow

"The main problem with drugs used on stents is that coating manufacturers have been unable to develop a method for releasing them in a controlled manner," explains Prof. Zilberman. Insoluble in water, these drugs do not release well from a coating, she explains. A coating made from an extremely porous structure like hers, however, provides a large surface area for diffusion. This gives heart specialists "a desired release profile."

Pre-programmed to release the drugs in a controlled manner, Dr. Zilberman's patent-pending fibres can also be designed to dissolve within a precise number of months, so the stent can do its work, then disappear.

Fibers to mend cancers and brain tumors

Prof. Zilberman says that her biodegradable drug-eluting fibers -- only five times the thickness of a human hair -- can be applied in cancer treatments as well, particularly for cancers in hard to reach and sensitive areas such as in the brain, or in small children, she notes.

"When you take a tumor out of the brain, you can't 'clean' the surrounding brain tissue -- attempts to do so may lead to additional tissue damage. But if you left our biodegradable drug-loaded fiber in the brain, it could do the work, then disappear when it's no longer needed," she says.

And since the fibres are thin and delicate, Prof. Zilberman adds, laparoscopic methods can be used for their insertion, further increasing the chances for a full recovery.

So far, Prof. Zilberman and her Ph.D. student Amir Kraitzer have conducted biological experiments using an anti-cancer drug developed at TAU by Prof. Yoel Kloog, dean of the Faculty of Life Sciences, and the results have been very encouraging.

Prof. Zilberman is continuing her work on her feasibility studies in both stenting and in cancer. Meanwhile the applications of this novel technology multiply as fast as she can imagine them: Prof. Zilberman has also developed a bone growth scaffold and dissolvable wound healing application, both derived from this basic research.

Source: Tel Aviv University (news : web)