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New Israeli gel improves nature's healing

By Sharon Kanon

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Skiing, skating, climbing, soccer are all invigorating sports, but if you fall and injure the cartilage in your knee - or, if it wears out - there is no easy fix. Until now.

Israeli company Regentis Biomaterials has developed an innovative biosynthetic hydrogel plug-in, called Gelrin, which promises to stimulate tissue regeneration. The hybrid material, which has undergone pre-clinical trials, looks a little like a jellybean, and can be placed in situ in the knee to help cartilage regeneration and seamlessly integrate new cartilage with the surrounding environment.

The patented platform technology could be a medical breakthrough, and while the company's first application is for cartilage regeneration, it is also suitable for other regenerative processes, such as bone repair and spinal fusion.

"Current treatments for the loss of cartilage in the joints are not satisfactory because they are unable to grow new tissue with similar properties as native tissue," Yehiel Tal, CEO of Regentis tells ISRAEL21c.

The cartilage regeneration market is estimated at \$1.6 billion worldwide. It is a hefty part of the orthopedic market, and more than 400,000 patients in the US and Europe need treatment every year.

Knee cartilage, hyaline (articular) joint cartilage, is one of the most specialized in the human body. Lubricated to reduce friction (like shock absorbers), it has a key role in empowering the knee to bear weight. Unfortunately, when injured, its regenerative power is very low due to the lack of blood supply, as well as low mitotic (division of cells) activity.

Traditional techniques treat symptoms of the injury, rather than curing the problem itself. In some cases, new tissue may not have the properties to supply mechanical support; and if regeneration is done too quickly, it may form scar tissue. New approaches, such as a cellular approach, require costly biopsies and additional surgery.

According to Tal, Gelrin saves costs, time, morbidity, and requires minimal surgery.

Gelrin is a synthetic biodegradable, bioactive polymer, composed of PEG (polyethylene glycol) that is cross-linked with fibrinogen produced from human plasma. Fibrinogen, a natural protein, the main component of blood clots - the body's unique healing mechanism - is called into action whenever tissue is damaged. It serves as a scaffold in the Gelrin implant, and enables the controlled degradation process of the implant.

Synchronized tissue regeneration and biodegradation is the key to Gelrin's innovation. "During production of Gelrin, the structure is engineered to degrade away," explains Tal. "Degradation is synchronized with the growth rate of new tissue. We improve on nature, which lacks a control system. More PEG slows the biodegradation process and gives the cells time to properly heal the injured tissue."

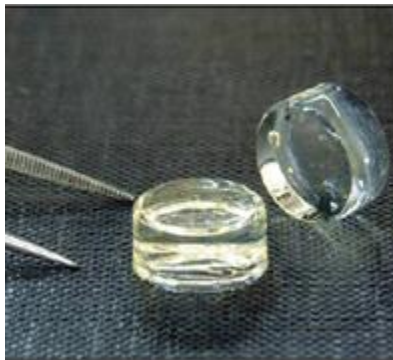
The problem with other treatment materials used today is that they degrade rapidly or leach out of the injury site prematurely. Gelrin stays anchored, says Tal.

"We can plug in the hydrogel, or inject a liquid that takes the shape of the cavity in the injured tissue," says Tal. "When illuminated with UV light, the solution solidifies. Then the healing process begins."

Haifa-based Regentis employs 12 and was founded in 2004 by Tal and Dr. Dror Seliktar from the Department of Biomedical Engineering at the Technion-Israel Institute of Technology.

In August 2007, after favorable pre-clinical testing of the product, Regentis raised \$7.5 million from two venture capital companies in Israel, Vitalife, and Medica. The company plans to begin multi-centered clinical trials within a year in Europe. If all goes well, Tal says the first product could be on the market in two years.

Interest in the company is high, and several large orthopedic companies are watching progress closely, according to Tal. "The need for cartilage regeneration is unmet," he declares. "The first company that gets a solution to fill that need will get a major share of the market."



Created in the Regentis lab, Gelrin could help repair damage to the cartilage in the knee.