

New Natural Plastic Extends Life Of Bone Implant

Stainless steel will be replaced by fiber composites. This is the future for bone implants, according to a team of EU researchers who will be meeting at a conference hosted by the University College of Borås, Sweden, on November 5 - 6. They are collaborating on research into the technological properties of composites that have a better capacity to adapt to the skeleton, thereby hopefully eliminating risky re operations.

These scientists are part of a major EU funded project that goes by the name of NEWBONE. The whole team comprises researchers from nine countries. Osteoporosis is a common and costly disease for society today. Skeletal cancer and serious bone fractures also require expensive treatment. Normally worn parts are replaced with bone implants of metal, but one problem is that the implants need to be replaced after a time. The aim of NEWBONE is to find replacement materials that allow the bone's tissue to be recreated.

"We want to increase the compatibility of the new material with the human skeleton and reduce the number of risky re-operations," explains Mikael Skrifvars, professor of polymer technology at the University College of Borås, and one of the researchers in the project.

"We're working with a variant of fiber composites (that is, reinforced plastics) that have properties that are compatible with the bones of the skeleton. This means that the mechanical properties of the implant will be the same as those of the bone and that the implant will function well together with the skeleton," continues Karri Airola, a researcher at the University College of Borås.

Cost effective

"The new bone implant would offer several advantages compared with metal implants. With metal implants, there is sometimes a risk that the patient will have to undergo another operation, to replace the implant. For implants made of fiber composite, this risk is smaller, since the properties of the fiber composite more closely mimic those of the bone."

"The new implant materials represent a new technology that needs to be developed. The combination of polymers and fiberglass provides very strong materials, and when their surface has been treated with bioactive glass, these implants can grow together with bone tissue. On top of this, new production methods will need to be introduced."

A knee or hip implant is estimated to cost roughly SEK 90,000 (USD 14,000). Together with the cost of rehabilitation, this amounts to an annual cost of about EUR 80 million for just over one million inhabitants. It is therefore necessary to develop new materials that last longer and do not need to be replaced after a while.

Growing problem

According to information from NEWBONE research groups, the global implant market has an annual turnover of USD 1,000 million, a figure that is increasing by 20 percent each year.

"People who suffer sports injuries, have been involved in a traffic accident, or have developed bone cancer and the like all need implants, and they represent potential customers on the implant market," says Karri Airola, who maintains that this research is receiving high priority, which explains the large EU investment in the field.

The final research results are expected to be presented in 2011, with possible production of the new materials starting after that.

FACTS

NEWBONE

An EU project involving 16 organizations from nine EU countries (Finland, France, Belgium, the U.K., Greece, Italy, Switzerland, Spain, and Sweden). The total budget for the project is about EUR 6.5 million, and the funding comes from the EU Sixth Framework Program. The project targets small to medium-size companies, and more than half of the participants are companies. The University College of Borås is the only participant from Sweden.

Osteoporosis

Osteoporosis is a disease that involves the partial loss of calcium and strength in the skeleton. Astronauts are usually diagnosed with osteoporosis when they return to earth. The weightlessness of space entails that they do not exercise their skeleton and the bone cells lose the ability to regenerate. Osteoporosis can also arise when a person has received an implant. For example, in a hip transplant, the implanted hip-joint prosthesis carries part of the weight of the body, so the bone cells have a lighter load, which means that they do not regenerate to the same degree.

In the hip joint, the joint socket of the pelvis is the cavity that surrounds the joint head of the thighbone. The joint head is held in place by the joint socket. The play between the joint socket and the joint head is what allows the leg to move. This play that was previously achieved in a natural manner can be recreated after a fracture with the help of a bone implant.

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