Bone research that grows on you

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Rapid and guided healing of bones has moved a step closer with research by two biomedical engineering students who have found new ways to deliver bone growth enhancers directly to broken or weakened bones.

Major ongoing research at Queensland University of Technology focuses on biodegradable materials that carry bone growth enhancing substances to encourage bones to heal quickly with much less intervention.

The research is ultimately aimed at repairing fractured bones or replacing bone weakened or lost from osteoporosis, cancer or trauma with minimal intervention and without painful and expensive bone grafts or pins and plates.

Fourth year biomedical engineering student Wayne Shaw has developed tiny biodegradable spheres made from polymers that can be loaded with calcium phosphate compounds – known bone growth facilitators – and placed on bone defects.

"As the microspheres degrade the calcium phosphate compounds are absorbed and encourage the bone to grow quickly into the area and build new bone," Mr Shaw said.

"The microspheres, which are highly porous, range in size from 50 to 500 microns and have calcium phosphate abundantly deposited throughout the pores, can be used in a variety of ways.

"They could be used to fill bone defects or cavities, to coat load bearing

implants, and to make scaffolds for the regeneration of bone."

Mr Shaw won joint best exhibit in the National 2006 Engineering and Physical Sciences in Medicine conference at Noosa in September.

Fellow fourth year biomedical engineering student Achi Kushnir has developed a load bearing ceramic material capable of carrying the same bone growth enhancing chemicals and of being absorbed by the body.

Mr Kushnir has integrated a dense ceramic core with a porous ceramic layer that can be used in place of metal implants for some clinical situations because it will attach to and integrate with bone and eventually degrade away in the body.

"The dense core has high compressive strength for load bearing applications such as for the long bones of the legs or arms," Mr Kushnir said.

"The unique core structure of the material will provide the mechanical properties needed for load bearing bones and the outside porous layer will assist with the bone repair."

"Bioactive ceramics are known to be body-friendly but until now they have been limited by lack of mechanical properties including compressive strength for carrying loads."

Source: Queensland University of Technology

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