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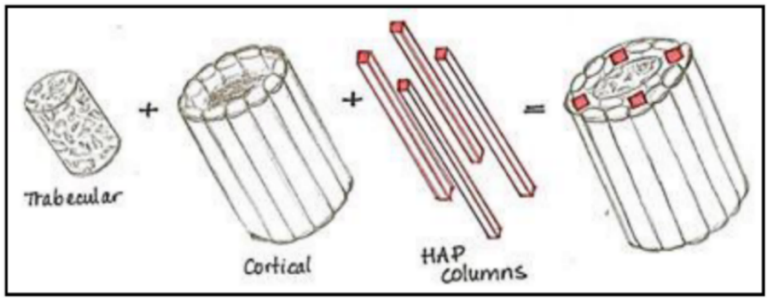
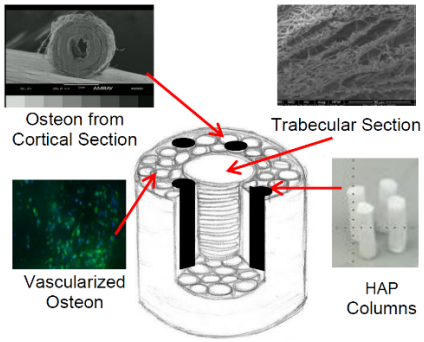
Commercializing Rutgers Technologies

3-D Pre-Vascularized Scaffold for Bone Regeneration



Joseph Freeman is an Associate Professor at Rutgers University in the Biomedical Engineering Department. His areas of research include developing new implantable scaffolds for the regeneration of musculoskeletal tissues, using molecular modeling to investigate collagen structure and function, and developing tumor engineering models.

Intellectual Property Status: Nationalized PCT patents filed in Europe, Japan, and United States



Schematic of the device. It contains synthetic cortal and trabecular for guided bone and vasculature development and HAP columns load bearing

Innovation Summary:

Rutgers researchers have developed a novel bone graft which combines bone-like architecture, ceramic support structures, pre-vascularized tubes, and patient-derived stem cells to create a graft that can immediately support patient weight upon implantation and simultaneously develop new bone and integrated vasculature for short-term and long-term viability and mechanics. This regenerative bone replacement will create more natural bond with existing bone and function better and longer than existing replacements by re-establishing the blood supply surrounding the device, facilitating better healing and tissue development.

This will be among the first devices to coordinate the simultaneous, in vivo development of bone and vasculature that supports the natural development of stable integrated bone. The device supports this approach by fostering natural cellular invasion of the device by creating an artificial environment that mimics natural bone development.

Advantages:

- Weight bearing upon implant allowing for increased patient mobility and faster rehabilitation time
- Resorbable non-metallic material
- Pre-vascularized to promote faster healing and integration
- Customizable for each patient
- Promotes natural bone formation (osteoinductive and osteoconductive
- Shorter, simpler surgery

Market Applications:

Bone disorder, loss, and skeletal deficiencies arising from traumatic injury, abnormal development, cancer, and degenerative bone diseases. Over 3 million orthopedic procedures are performed annually in the United States. Approximately 500K of these are bone grafting procedures with an estimated cost of $2.5 billion annually. The bone grafting market in the U.S. has an estimated value over $1 billion, making bone second to blood as the most frequently transplanted material. There are currently no load-bearing, synthetic bone grafts on the market.

Potential Social and Economic Impact:

From injured warriors, to car crash passengers, to cancer survivors – this device has the potential to offer a faster recovery with better patient outcomes after surgery compared to current bone repair devices such as the Stryker T2 Recon Nailing System or the Zimmer Free-Lock Femoral Fixation System. This will in turn lead to health care cost savings and improved quality of life for patients. Because of its weight bearing properties, one of the greatest impacts is predicted to be shorting rehabilitation by allowing patients to be more mobile sooner.

Next R&D Steps:

- In vivo proof-of-concept animal data in rabbits
- Scaling production of scaffold for commercial scale production
- Pre-clinical studies in preparation for regulatory fillings