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Artificial bone substitutes for bone repair purposes

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The second most common transplantable tissue after blood is bone. Bone fractures are one of the most common forms of injury. In order to encourage the bone healing process, bone grafts are often needed. The patient's own bone is the gold standard for bone grafting but the lack of the bone supply raised the need for artificial bone substitutes. The novel biomaterials with tailorable biodegradation rate and mechanical strength have been developed. Using this we are in the process of developing orthopedic implants with customizable shapes based the patient's age and the location of the damaged bone in the body. This novel material can also be used in a 3-D printer in order to obtain custom-fit implants. Constituents of these implants closely mimic the properties of real bone such as chemical and thermal properties. These implants will revolutionize current ways of bone repair treatments since they provide three advantages over other metallic and non-metallic implants: Elimination of the second surgery to extract the implant, prevention of complications such as immunogenic responses caused by using other individual's or animal's bone powder, reduction of long term adverse effect such as pain from thermal contraction of metallic implants in cold weather, and tailorable biodegradation rate, mechanical strength and shape customizable for each patient, Such a product will give patients in need of bone grafts a speedy and efficient recovery.

Biography

Samin Eftekhari is a PhD candidate in the Chemical Engineering Department of Ryerson University, who will defend her PhD dissertation on August 2015. She is collaborating with Mechanical Engineering Department and St. Michele's Hospital as well. Her PhD research focuses on design and development of innovative biodegradable nanocomposites projected for bone repair applications. She received her MSc in Biomedical Engineering from Amirkabir Polytechnic University (Tehran Polytechnic) and her BSc in Material Science & Engineering from Sahand Polytechnic University. She has over 10 years of experience in biomaterials research and commercialization which resulted several scientific papers, international presentations and a patent.

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