Developing a novel degradable polymeric biomaterial for use in the treatment of osteoporotic peri-prosthetic fractures

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Abstract

Osteoporosis is a degenerative condition, which predominantly affects post-menopausal women. With the condition there in an increased chance of fractures, which can be fatal. Periprosthetic fractures occur in individuals who have previously received a hip replacement and who also have osteoporosis, a combination which is becoming more frequent due to an aging population and an increasing number of total joint replacements. Fracture types B2 and B3 on the Vancouver classification scale are a particular cause for concern. These fractures occur at the bed of or around the implant and often require complex revision surgery. Numerous studies have indicated a poor outcome and higher mortality with revision for peri-prosthetic fractures. One of the aims of the GIOTTO project is to develop a device which will be fixed at the fracture site to help treat periprosthetic fractures in long bones. It is proposed that the device be 3D printed and biodegradable, with the intention of stimulating bone healing. Here we present material development work conducted collaboratively by Newcastle University, the Politecnico di Torino, IESL FORTH, the University of Pisa, Novaicos, and Fluidinova, with the main objective being to create a novel polymer composite material with appropriate osteostimulatory and degradation profiles.

Biography

Kenny Dalgarno is Sir James Woodeson Professor of Manufacturing Engineering at Newcastle University, and is Deputy Director of the Arthritis Research UK Tissue Engineering Centre and the Newcastle University lead investigator for the UK EPSRC Centre for Doctoral Training in Additive Manufacture and 3D Printing. He researches in the area of additive manufacture and biofabrication, with applications in biomedical engineering, tissue engineering, and regenerative medicine, with work supported by the EPSRC, the European Commission, Arthritis Research UK, the NC3Rs, and industry. Current projects address developing novel biomaterials for osteoarthritis and osteoporosis, and the use of bioprinting techniques in the creation of physiological micro-tissues.