THE UNIVERSITY OF MANCHESTER INTELLECTUAL PROPERTY
UMIP®

TISSUE BIOREACTOR

BACKGROUND

Currently 2.2 million bone grafting procedures are performed annually worldwide in order to repair bone defects in orthopaedics, neurosurgery and dentistry. These procedures employ autografts, allografts and synthetic implants (metals, ceramics, polymers and composites) to repair and stimulate regeneration of the defective area.

Autologous bone grafts are considered by many to be the gold standard for the treatment of bone defects but they suffer from some major drawbacks. Allogenic bone grafts avoid the problems associated with harvesting but the quality of the graft is not as good when compared with autologous grafts. Synthetic bone substitutes alone have insufficient osteogenic properties for use in large bone defects and would be far more successful if they were bio hybrid grafts made exvivo incorporating both osteoconductive and osteointegrative properties.

Tissue engineered bone implants could one day become a reliable and safe method for the treatment of orthopedic trauma or disease such as bone non-unions, large size defects, osteogenesis imperfect and osteoporosis. Despite the early promises of tissue engineering researchers have faced challenges in regenerating tissue to the desired quality. Problems associated with cell seeding, nutrient delivery/waste removal, cell differentiation, cell proliferation, limited size of the construct, inflexible shape of the construct, formation of hot spots, inability to mimic endogenous electricity and problems interfacing different tissue types have severely limited the application of tissue engineered implants.

THE TECHNOLOGY

Academics at the UoM have developed a bioreactor that can support the growth of two tissue types simultaneously providing a platform that could ultimately supply exvivo grown synthetic grafts for transplant avoiding the problems associated with current techniques. The bioreactor could also be used immediately for the evaluation of acellular products.

KEY BENEFITS

Advantages of biohybrid grafts over allo- and auto-grafts

- No issues with rejection as scaffolds lack immunogenicity and can be seeded with patients own cells
- No harvesting procedure so no risk, donor site morbidity or size of graft limit.
- Quality of graft is comparable to the gold standard of autologous grafts
- No risk of donor virus transmission or need for processing techniques (demineralisation, freeze drying and irradiation) that can compromise the structure and healing potential of the graft.

OPPORTUNITY

We are looking to engage with commercial experts interested in development of the technology towards a product.

CONTACT

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