Bioengineering growth factor delivery systems

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Tissue engineering and regeneration is an inter-disciplinary field of research that combines principles from both biology and engineering. While the use of biomaterials has long been associated with this field of research, more recently there has been a paradigm shift for the modern biomaterial to be biomimetic, through replication of the *in vivo* situations they are trying to substitute. Growth factors and their use as a therapeutic is of great interest in tissue regeneration applications however, to achieve a beneficial response, appropriate administration is required. Furthermore, due to biological heterogeneity of these structures, their low abundance, and difficulty in isolation from mammalian tissues there is a need to develop an alternative source of these biomimetic materials.

This study aims to engineer materials to mimic the sulphated sugar structures, known as glycosaminoglycans that protect and deliver growth factors *in viv*o. It was hypothesised that by adjusting structural variables, the specificity and affinity of these bioengineered materials towards different growth factors could be modulated.

Results demonstrated changes in material structure modulated the specificity and affinity of the bioengineered materials towards fibroblast growth factor FGF2 and FGF7. Additionally, the bioengineered materials were demonstrated to enhance epithelial cell migration and enhance formation of an epidermis in an organotypic skin model.

This study demonstrated the ability to bioengineer materials that mimic the biological function of growth factor binding molecules glycosaminoglycans.