

Star-polymers are a new class of polymer architecture which consist of linear arms radiating from a central core. Novel Star-polypeptides discovered at RCSI have been demonstrated to have superior transfection and delivery efficacy compared to current commercially available technologies. Therapeutic applications include the delivery of DNA plasmids, siRNA, miRNA, proteins and small molecules. The polypeptides have also been demonstrated to have intrinsic angiogenic, osteogenic and antimicrobial properties.

VALUE PROPOSITION

The RCSI star-shaped polypeptides, with their densely packed sub-units possess several advantages as drug delivery vectors compared to commercially available systems as well as possessing intrinsic bioactivity of their own.

Therapeutic applications include:

- The ability to deliver therapeutic nucleic acid cargos to lung epithelial cells (Calu-3 cells/cystic fibrosis bronchial cells) via nebulisation.
- The ability to be incorporated into collagen-based scaffolds to encourage osteogenesis via the delivery of dual DNA plasmids and also their intrinsic osteogenic properties.
- The ability to be incorporated into hydrogels for delivery to the heart post-MI to encourage angiogenesis via incorporation of VEGF and also their intrinsic angiogenic properties.
- Potent antimicrobial activity against multi-drug resistant bacterial strains such as TB, MRSA, VRE, E coli, Pseudomonas aeruginosa.

TECHNOLOGY

The RCSI Star polypeptide technology relates to a specific type of star-polymer whereby the core is made from a polypropylene imine dendrimer and the “arms” consist of polypeptides.

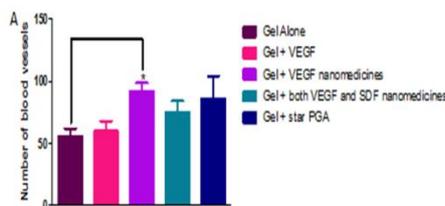


Fig 1. Pro-angiogenic activity of VEGF-loaded STAR Polypeptides in a chick chorioallantoic membrane model

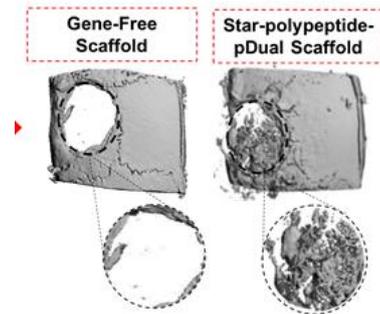


Fig 2. Pro-Osteogenic activity of dual pDNA-loaded STAR Polypeptides in a chick chorioallantoic membrane model

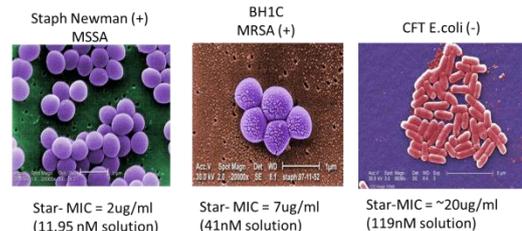


Fig 3. Intrinsic antimicrobial activity of STAR-polypeptides against a range of drug-resistant strains

FEATURES & BENEFITS

Features	Benefits
Nebulised Delivery of nucleic acid cargos directly to lung cells	Treatment of chronic respiratory disease
Intrinsic bioactivity combined with delivery of osteogenic pDNA via collagen/hydroxyapatite scaffolds	Faster repair of large bone defects due to disease or trauma
Intrinsic bioactivity combined with delivery of angiogenic proteins	Revascularisation of damaged heart tissue post-MI
Intrinsic antimicrobial activity	Treatment of resistant infections