

STRATEGIES FOR VASCULARIZATION AND CONTROLLING REMODELING

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A critical issue associated with creating large tissues and whole organs is the difficulty of supplying nutrients to all the cells in a thick segment of tissue beyond the limits of Fick's law. Vascularization is also thought to benefit wound healing in some difficult-to-heal chronic wounds in the elderly. We have been exploring multiple strategies for both objectives: delivery of angiogenic growth factors in our case from microencapsulated genetically modified cells, endothelial cell seeding (on collagen modules) and a novel biomaterial that induces vascularisation in its vicinity as a consequence of the peculiarities of the wound healing response. This angiogenic Theramer™ (a therapeutic polymer made by Rimon Therapeutics, Ltd) has an angiogenic effect due to material composition (45 mole% methacrylic acid) and without immobilized or other form of biomolecule incorporation. The awkwardness of translating the latter into a commercial product lead to the creation of a second Theramer™, a matrix metalloproteinase (MMP) sequestering material for treatment of chronic wounds. In pilot clinical trials, the MMP inhibiting wound dressing has reduced MMP levels in chronic wound exudates and enabled wound closure. Both Theramers™ influence and “control” the remodeling of host tissue, a critical aspect of successful *in vivo* tissue engineering.