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A polycaprolactone - gelatinenanofibre matrix as a combined growth and delivery system for endothelial progenitor cells (EPCs) in treatment of diabetic wounds

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Prolonged diabetes mellitus (DM) induced endothelial progenitor cell (EPC) dysfunction causes impaired wound healing which may be rescued by delivery of large numbers of 'normal' EPCs to wound sites. The challenge herein isculturing the number of EPCs required and in achieving sustained delivery onto wound sites for effective participation in the diabetic wound healing process. Most known scaffolds allow adhesion, but not growth or proliferation of EPCs and may / may not permit delivery onto wound sites. Clearly, a matrix that can perform a multitude of functions is the need of the day.

To remedy these lacunae, we standardized direct seeding and attachment of murine bone marrow MNCs onto a uniformly smooth polycaprolactone : gelatine (PCG) nano-fibre matrix, followed by 14 day culture. Cellularsaays such as CAA, CFC, proliferation and viability assays revealed that seeding of BM-MNCs directly onto the PCG matrix allowsenhanced 4.42 fold attachment of BM- MNCs, andpromoted growth, colony formation (1.33 fold) as well as proliferation (1.25 fold)as compared to controls, without compromising viability of EPCs. In vitro, the PCG-matrix allows chemotactic migration of cells while facilitating sustained delivery of EPCs onto diabetic wounds, resulting in a pathologically significant, scar-freehealing of diabetic wounds.

Our data, thus, highlight the novel therapeutic potential of the "PCG-embedded EPCs" - as a combined 'growth and delivery system'- functioning both as a 'substrate' for direct seeding, and growth of EPCs and as a 'scaffold' for direct application onto diabetic wounds.

Biography

Meghana has completed her Ph.D in 2007 and is currently pursuing her postdoctoral research in the National Centre for Cell Science, Pune, India. Her research interests are EPC dysfunction and rescue for improved wound healing in diabetes mellitus

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