

# **Modulation of stem cell responses for biomedical applications**

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Stem cells such as mesenchymal stem cells (MSCs) are increasingly being used as therapeutic agents for a range of disorders, due to their properties of self-renewal, cell signalling, and differentiation. However, their limited natural availability typically necessitates ex vivo expansion prior to administration into patients. Conventional MSC culture processes are inefficient, costly, and can lead to functional heterogeneity in harvested cells. We have discovered that the soluble extracellular matrix protein, tropoelastin, which is classically designated as a structural matrix protein, strongly drives multiple aspects of MSC regenerative behaviour<sup>1</sup>, including migration, proliferation, phenotypic maintenance, and differentiation. Tropoelastin induces MSC responses via activation of cell-surface integrin receptors, when immobilised on a substrate or added in solution. This duality of action converges the mechanistic features of cell-anchoring matrix proteins and soluble growth factors, and can be applied towards a range of regenerative medicine applications<sup>2</sup> including MSC expansion, targeted MSC delivery and retention, and endogenous MSC recruitment for tissue repair.

## **References**

<sup>1</sup> Yeo, GC and Weiss, AS. *PNAS* **116**, 6, 2042-2051.

<sup>2</sup> Yeo, GC, Kosobrodova, E, Kondyurin, A, McKenzie, DR, Bilek, MM and Weiss, AS. *Macromolecular Bioscience* **19**, 3, e1800233.