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**Title**

A self-healing hydrogel as an injectable instructive carrier for cellular morphogenesis

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**Abstract:**

Transplantation of progenitor cells can accelerate tissue healing and regenerative processes. Nonetheless, direct cell delivery fails to support survival of transplanted cells or long-term treatment of vascular related diseases due to compromised vasculature and tissue conditions. Using injectable hydrogels that cross-link *in situ*, could protect cells *in vivo*, but their sol-gel transition is time-dependent and difficult to precisely control. Hydrogels with self-healing properties are proposed to address these limitations, yet current self-healing hydrogels lack of bio-functionality, hindering the morphogenesis of delivered cells into a tissue structure. Here we establish a gelatin (Gtn)-based self-healing hydrogel cross-linked by oxidized dextran (Odex) as an injectable carrier for delivery of endothelial progenitors. The dynamic imine cross-links between Gtn and Odex confer the self-healing ability to the Gtn-I-Odex hydrogels following syringe injection. The self-healing Gtn-I-Odex not only protects the progenitors from injected shear force but also allows controllable spatial/temporal placement of the cells. Moreover, owing to the cell-adhesive and proteolytic sites of Gtn, the Gtn-I-Odex hydrogels

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