Glucose delivery system based-hydrogel composite scaffold for improving mesenchymal stromal cell survival and functionalities

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BACKGROUND

Mesenchymal stem cells (MSCs) are appealing candidates for regenerative medicine due to their paracrine abilities and their capacity to differentiate into bone, cartilage and adipose tissue. However, a major limitation in the use of MSCs is their massive death post-transplantation. This issue can be overcome by supplying glucose to MSCs post-implantation (Deschepper et al.2011 and 2013).

OBJECTIVE: To engineer a composite scaffold providing glucose to MSCs when transplanted in vivo.

MATERIALS & METHODS

- Hydrogels + hMSCs
- Cell survival (H33342, PI)
- “Starch + AMG” system improves hMSCs survival inside hydrogels near anoxia
- “Starch + AMG” system promotes the chemotactic potential of hMSCs secretome inside hydrogels near anoxia
- “Starch + AMG” system improves hMSCs survival inside hydrogels after subcutaneous implantation

RESULTS

These findings suggest that glucose delivery system based on « Starch + AMG » inside hydrogel scaffold is a promising strategy in tissue engineering applications to improve hMSCs survival and functionalities in in-vivo ischemic environment.