

Hydrogel-based cell patch fabricated by elastic silk-like protein

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For transplantation of cells into tissue, direct injection has been attempted. However, direct injection has difficulty in controlling shape, population, and location of cells. Although cell-harboring three dimensional grafts were utilized as alternative, many grafts presented several limitations in production cost, purification, and especially mechanical properties. Among them, weak mechanical property has a negative influence on handling and enduring physiological stimulus. Because structure and composition are the main factors to regulate material properties, a new elastic silk-like protein derived from sea anemone (aneroin) could be a new approach to improve mechanic and/or biological properties of material. By utilization of aneroin, hydrogel-based cell patch was successfully fabricated and it showed higher elastic modulus than skeletal muscle, and stronger strength than cardiac muscle. Additionally, aneroin-based cell patch presented proper transmittance for photo-crosslinking, swelling ability, and pore structure as a hydrogel scaffold. Injected fibroblast and keratinocytes also maintained their proliferation abilities and viabilities for days. This new marine elastic silk would expand its application fields such as space filling agents, delivery vehicles, and see-through organs with its improved material properties.