IGF-1 C domain-modified hydrogel enhances cell therapy for acute kidney injury

With the support by the National Natural Science Foundation of China and the Ministry of Science and Technology of China, Profs. Li Zongjin and Zhao Qiang (**赵强**) from the Innovative Research Team of Cardiovascular Tissue Engineering at Nankai University, in collaboration with Prof. Xu Yong at Tianjin Medical University, made new progress in developing IGF-1C modified chitosan hydrogel as stem cell carrier for the therapy of ischemic renal injury. The research result was published in *J Am Soc Nephrol* (2016, Feb 11, doi: 10.1681/ASN.2015050578), which was accompanied by an editorial entitled "Modified hydrogels to enhance cellular therapy for acute kidney injury (AKI): a translational challenge".

AKI is an increasingly common complication of hospitalization and acute illness. Stem cells hold enormous promise in treating AKI due to their unique immunoregulatory effects and paracrine actions. However, cell-based therapy has been greatly limited by poor cell survival and engraftment after transplantation, which could be ascribed to the local ischemic/hypoxic microenvironment. In this regard, the authors developed chitosan (CS)-based injectable hydrogel, which was modified by C domain peptide of insulin-like growth factor-1 (IGF-1C) to strengthen the supportive niche function favoring the survival and paracrine effects of the transplanted adipose tissue-derived mesenchymal stem cells (ADSCs) in a murine model of AKI. Interestingly, co-transplantation of ADSCs and the hydrogel into the renal parenchyma promoted renal cell proliferation, inhibited cell apoptosis, decreased macrophage infiltration, as well as reduced injury scoring in comparison to transplantation of ADSCs alone. In parallel, CS-IGF-1C hydrogel augmented pro-angiogenic effects of ADSCs as evidenced by upregulated renal expression of angiogesis-related genes, increased capillary density, and activated VEGF receptor 2 pathway. Moreover, the hydrogel also facilitated the anti-fibrotic actions of ADSCs. Collectively, this biomimetic hydrogel represents an attractive candidate for safe and effective stem cell-mediated regeneration.

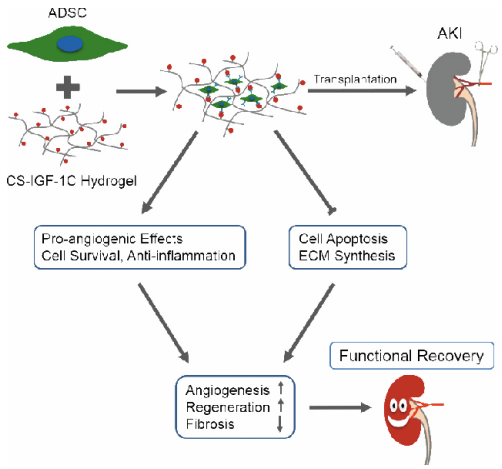

Figure Renoprotective effects of ADSCs and CS-IGF-1C hydrogel.