Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Information

Integration of Stem Cell-Derived Exosomes with In Situ Hydrogel Glue as a Promising Tissue Patch for Articular Cartilage Regeneration

Xiaolin Liu[a‡], Yunlong Yang[a,b‡], Yan Li[b], Xin Niu[a], Bizeng Zhao[a], Yang Wang[a]*, Chunyan Bao[b], Zongping Xie[a], Qiuning Lin[b]* and Linyong Zhu[b]

a. Institute of Microsurgery on Extremities, Department of Orthopaedic Surgery, Shanghai Jiaotong University Affiliated Sixth People' Hospital 600 Yishan Road, Shanghai, China, 200233.

b. Key Laboratory for Advanced Materials, Institute of Fine Chemicals, East China University of Science and Technology, 130# Meilong Road, Shanghai, 200237, China.

‡ Xiaolin Liu and Yunlong Yang contributed equally to this work.

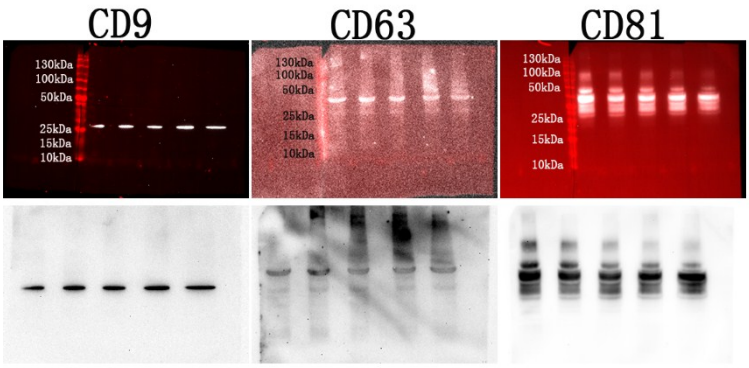

Fig. S1 Western blotting analysis for CD9, CD63 and CD81.

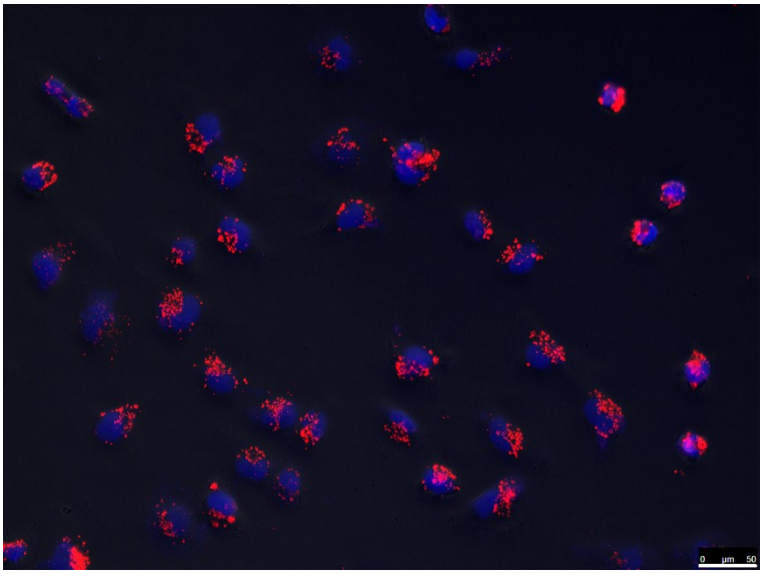

Fig. S2 Internalization of exosomes by chondrocytes. The nucleus was stained with DAPI (blue fluorescence) and the exosomes were stained with DiI (red fluorescence). Scale bar: 50 μm.

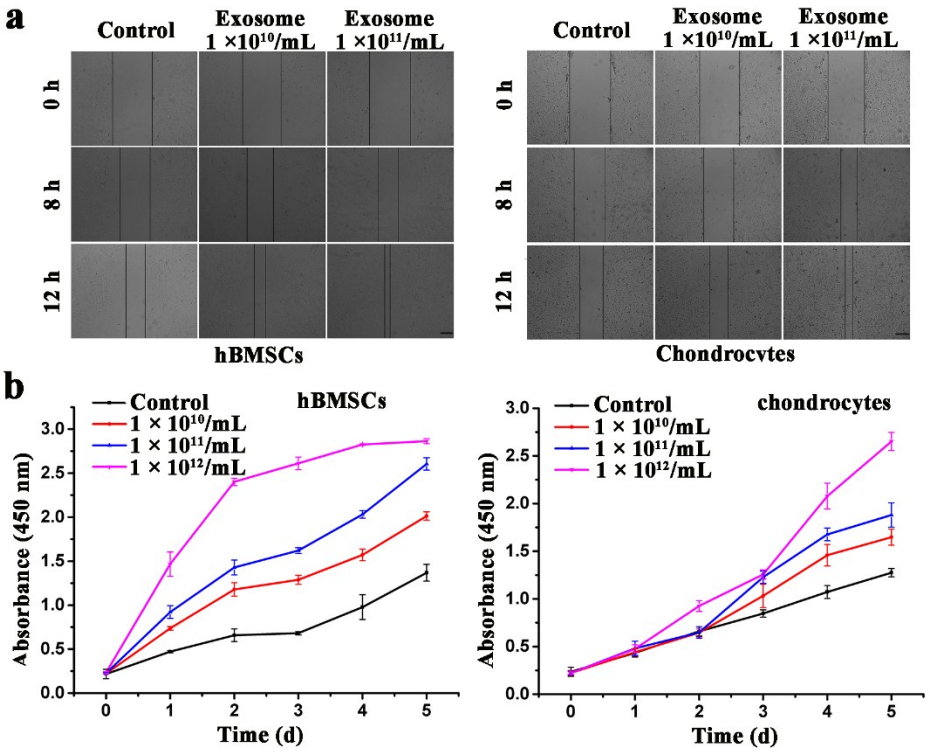

Fig. S3 The promotion effect of hiPSCs-MSCs-derived exosomes on the migration and proliferation of plate-cultured cells: a) scratch migration test of chondrocytes and hBMSCs in the DMEM medium with or without hiPSCs-MSCs-derived exosomes, scale bar: 250 μm; b) proliferation of chondrocytes and hBMSCs in the medium with or without hiPSCs-MSCs-derived exosomes tested by CCK-8.

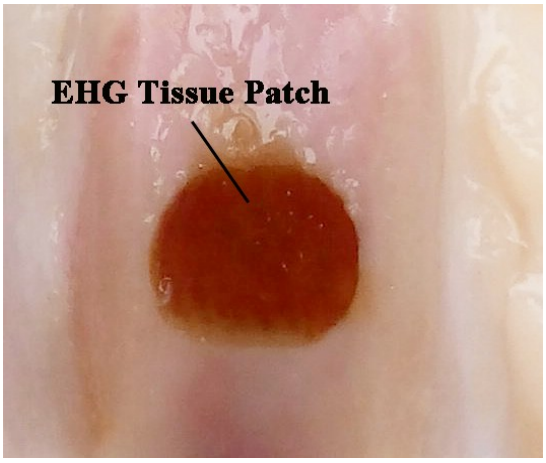

Fig. S4 The rabbit full-thickness articular cartilage defect that was fully filled with 20 μL in situ formed EHG tissue patch.

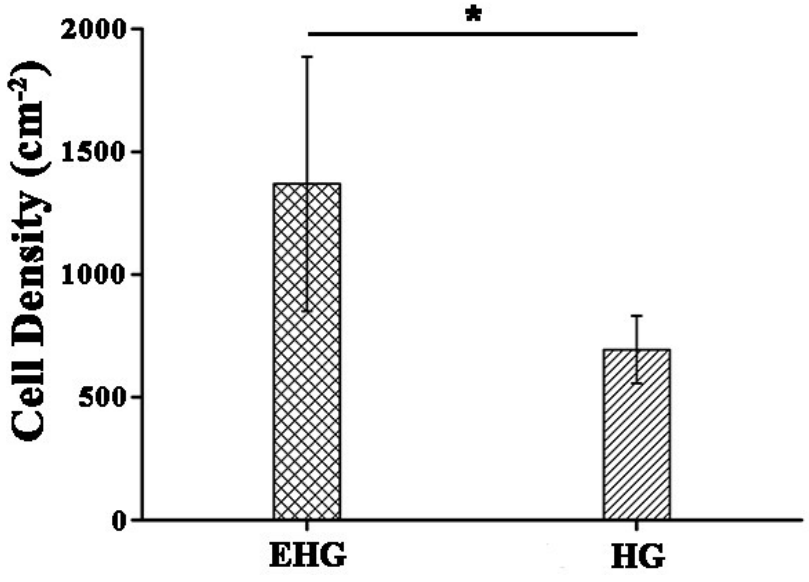

Fig. S5 Statistic data of cell density at the articular cartilage defect sites treated with EHG tissue patch or HG. The data was shown as mean ± s.d. (n = 6), * $p < 0.05$.

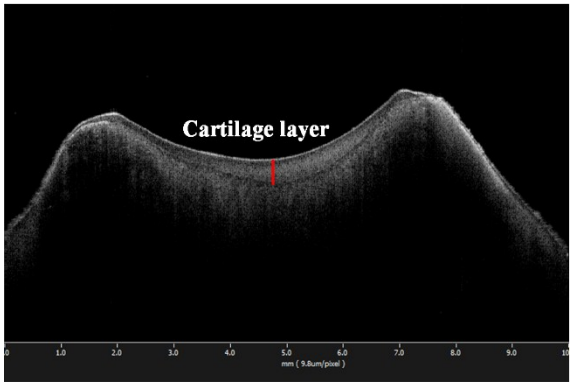

Fig. S6 OCT image of joint cross section from normal rabbit hind leg knee. A uniform and well-organized cartilage layer was exhibited.

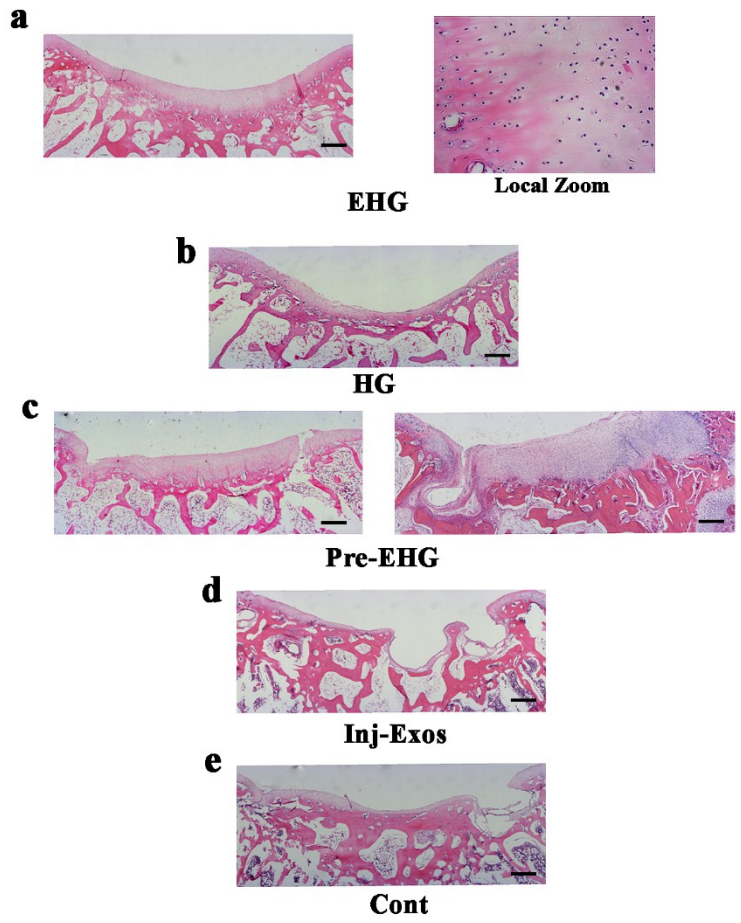

Fig. S7 H&E staining of the samples from the articular cartilage defects treated with: a) 20 μL in situ formed EHG tissue patch (EHG); b) 20 μL in situ formed HG (HG); c) 20 μL in vitro preformed EHG tissue patch (Pre-EHG); d) one time injection of 20 μL 1 × 10^{11}/mL hiPSC-MSCs-derived exosome suspension (Inj-Exos); e) saline rinsing (Cont). Scale bar: 500 μm.

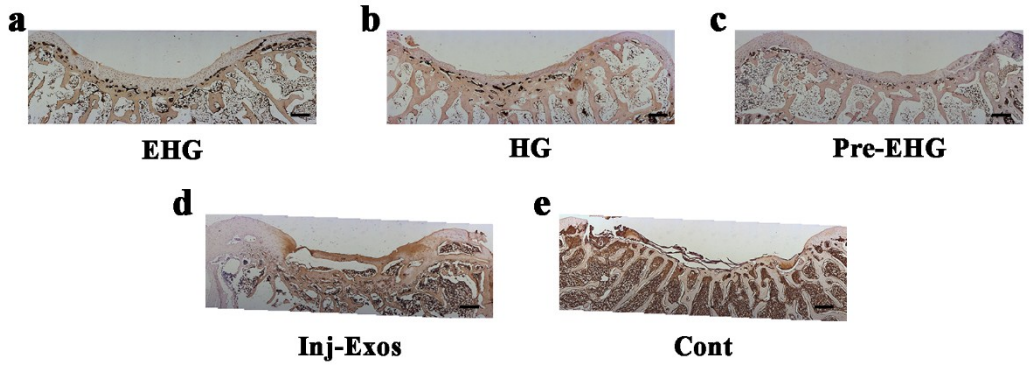

Fig. S8 Inmmunohistochemical staining of type Ⅰ collagen of the samples from the articular cartilage defects treated with: a) 20 μL in situ formed EHG tissue patch (EHG); b) 20 μL in situ formed HG (HG); c) 20 μL in vitro preformed EHG tissue patch (Pre-EHG); d) one time injection of 20 μL 1×10^{11}/mL hiPSC-MSCs-derived exosome suspension (Inj-Exos); e) saline rinsing (Cont). Scale bar: 500 μm.

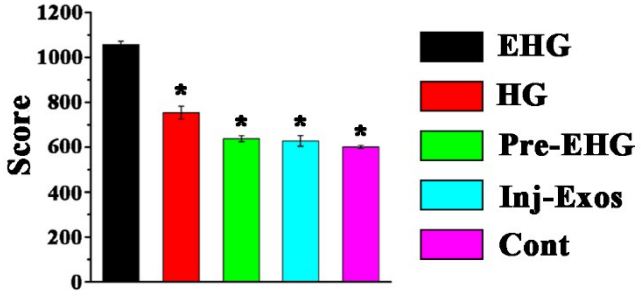

Fig. S9 Histological scores of regenerated cartilage tissue in each group. The data was shown as mean ± s.d. (n = 8), * $p < 0.05$.

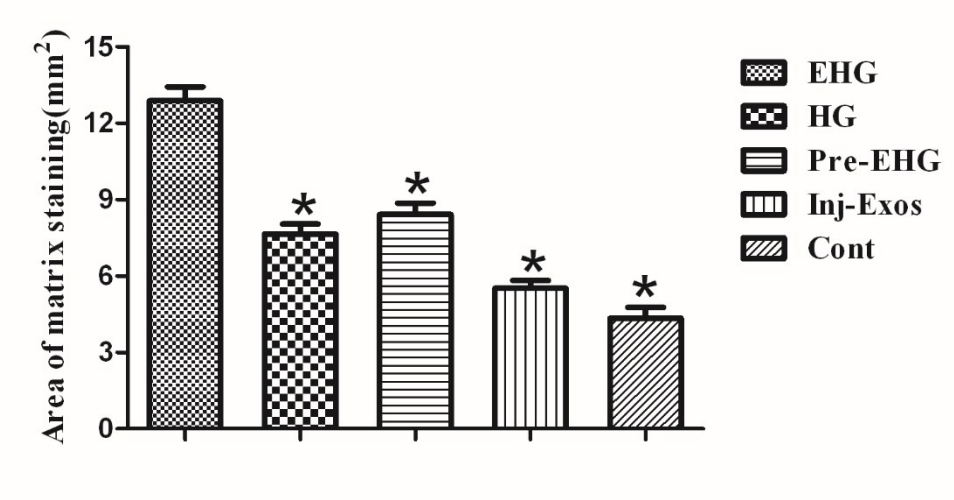

Fig. S10 Staining area of Safranin-O of the samples in each group. The data was shown as mean ± s.d. (n = 8), *p<0.05.