

Photo-cross-linked scaffold with kartogenin-encapsulated nanoparticles for cartilage regeneration

With the support by the National Natural Science Foundation of China, the research team led by Prof. Jiang Qing (蒋青) at the Joint Research Center for Bone and Joint Disease, Model Animal Research Center, Nanjing University, cooperated with Prof. Gu Zhen's team from the Joint Department of Biomedical Engineering, University of North Carolina at Chapel Hill and North Carolina State University, and used an innovative kartogenin release system to restore full-thickness cartilage defects, which was published in *ACS Nano* (2016, 10(1): 1292—1299).

The regeneration of cartilage, an aneural and avascular tissue, is often compromised by its lack of innate abilities to mount a sufficient healing response. Kartogenin, a small molecular compound, can induce bone marrow-derived mesenchymal stem cells into chondrocytes. Previous *in vitro* study demonstrated that kartogenin had chondrogenesis effect on synovium-derived mesenchymal stem cells. They also detected that intra-articular injection of kartogenin after microfracture can repair the cartilage defects (*Arthritis Research & Therapy*, 2015, 17:20). All these studies showed that kartogenin has the ability to regenerate cartilage *in vivo*. The teams designed an innovational one-step technology, which uses an ultraviolet-reactive, rapidly cross-linkable scaffold integrated with kartogenin-loaded nanoparticles to recruit the host's endogenous progenitor cells for cartilage defects restoration. This innovative kartogenin release system regenerated hyaline-like repair tissues that were close to the natural hyaline cartilage *in vivo*.

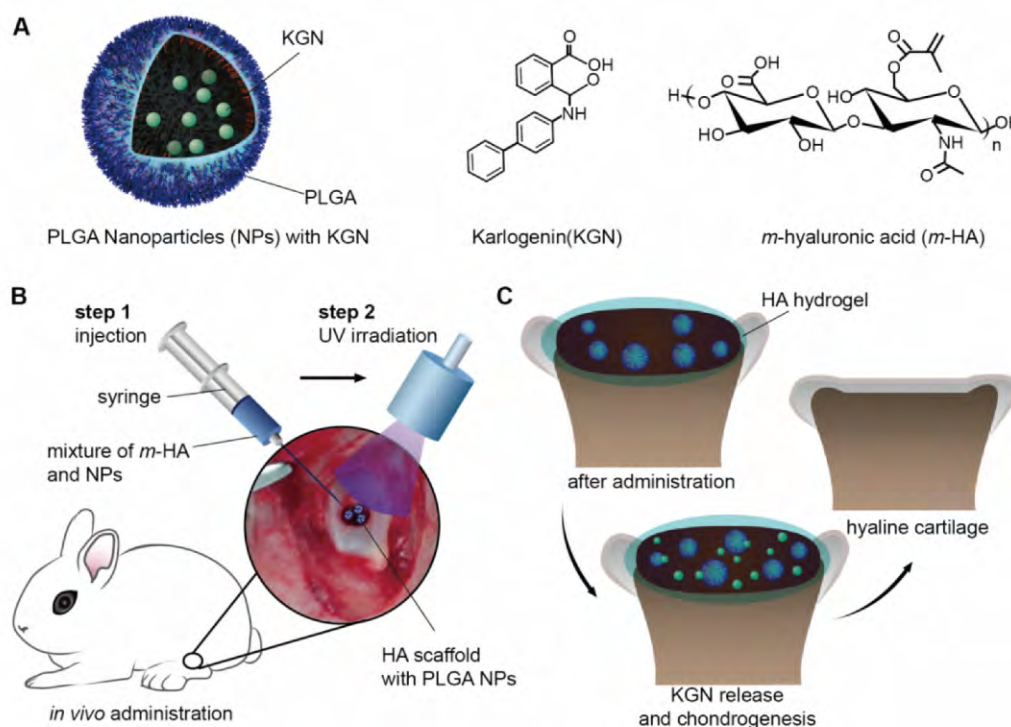


Figure (A) Schematic of KGN-loaded PLGA nanoparticles, molecule structures of KGN, and acrylated hyaluronic acid (m-HA). (B) Schematic of the surgical procedure for the cartilage defects repair. (C) Schematic of the hyaline cartilage chondrogenesis with photo-crosslinked HA scaffold encapsulated with KGN-loaded nanoparticles.