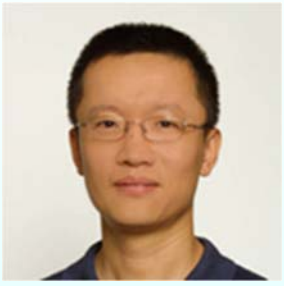
The Chinese University of Hong Kong

Department of Biomedical Engineering

Time: 10:00 am – 12:00 noon, 2 May 2019 (Thursday)
Venue: Room 513, William M.W. Mong Engineering Building

Macrophage modulated cartilage repair by regulating Macrophage



Professor GE Zigang

Biomedical Engineering Center

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Abstract

Objective Modulation of stem cells during cartilage repair remain elusive in vivo. Macrophages influence regeneration in tissues of all kinds via modulation of stem cells, with implication of their involvement in cartilage regeneration. However, the lack of direct elucidation of molecular connection between macrophages and stem cells in the joint hampers engineered immunomodulation and therapy amelioration. The aim of this study was to investigate the influence of macrophage depletion on cartilage repair.

Design C57BL/6 mice were used for cartilage repair models, with longitude defect on the trochlea groove. Macrophages were cleared by intraarticular injection of clodronate liposomes. Macrophages were analyzed by F4/80+, CD86, CD206 and CD163 antibodies. Repair outcome was evaluated by histology scoring system (Modified O'Driscoll). Proliferation and apoptosis were detected by Phospho-Histone H3 (PHH3) immunostaining and TUNEL assay.

Results Tremendous macrophages were activated after injury, especially M1-like macrophages. After macrophage clearance, cartilage repair almost failed. Synovium hypertrophy diminished at one week after injury, with reduced macrophages and total cells in synovium compared to untreated mice. Proliferative cells declined significantly 2 weeks post injury, though total cell recruitment was not affected. The percentage of apoptotic cells increased in regenerative area at 1 month. Meanwhile, more apoptotic cells could be observed in adjacent tissues within about 150μm.

Conclusion Macrophages are essential in cartilage regeneration. Upon injury, macrophages are activated and arise in large number, later polarized into different phenotypes. Proliferation and apoptosis of stem cells are potentially regulated by macrophages.

Biography

Dr. Ge Zigang, Professor, Biomedical Engineering Center, Peking University; Adjunct Professor, Center for Bone & Joint Disease, Peking University People's Hospital; Program Faculty of Georgia Institute of Technology. Dr. Ge Zigang graduated from Peking University School of Health Science and worked as an orthopaedic Surgeon in Beijing Jishuitan Hospital. Since 2000, he has studied at the National University of Singapore. He has received Master of Science and Doctor of Medicine degree and Singapore Millennium Scholarship in 2006. In 2007, he joined the Department of Biomedical Engineering under the "Outstanding Overseas Young Talents Introduction Program of College of Engineering, Peking University". Dr. Ge Zigang's main contributions in the research of articular cartilage regeneration include: 1) developing a series of biomaterials for regenerative medicine; 2) deeply analyzing the mechanism of biophysical signals (nanosecond electric pulse) on stem cell differentiation and cartilage regeneration; 3) deepening the research of stem cell cartilage differentiation, and developing a series of biotechnologies, which promotes the development of cartilage regeneration medicine. Dr. Ge Zigang has published 50 + SCI articles in the field of bone, ligament and cartilage regeneration medicine, and has been cited 1600 + times.

***** ALL ARE WELCOME *****

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