

5. Stem Cell and Tissue Regeneration Research

PI: Gang Li (Orthopaedics & Traumatology)

Team: Stem Cells and Regenerative Medicine

Research Progress Summary:

The research team expanded rapidly during the last 12 months, and team now has 10 members with the following research projects firmly established: (1) tendon stem cells for tendon repair; (2) circulating stem cells in diseases and repair and their homing and recruitment mechanisms; (3) novel strategies promoting fracture healing and spinal fusion; (4) gene therapy work using bone marrow mesenchymal stem cells over-expressing TK gene as anti-tumour gene therapy carrier; (5) cell banking and human cell line development for clinical trials. In 2010, we have recruited 1 Postdoc RA, 1 RA, and 4 PhD students to work on these projects. These projects are all progressing well, some of these already archived good results. 10 papers have been published from the research work and over HK\$8.5 Million research grants have been secured by this PI over the period 2010 as PI or Co-I (over HK\$3.5 million as PI). The PI has successfully obtained 1 GRF, 1 ITF grant and 1 industry contract research as PI and several other GRF and industry grants as Co-I. The PI has already submitted one GRF grant for 2011 round and acted as Co-I on 8 other GRF grant applications with colleagues from CUHK and other Hong Kong institutions. The PI also leads the Stem Cells and Regeneration theme of CUHK School of Biomedical Sciences, and has been involved in organizing Theme Based Research grant submission; the PI as a coordinator has submitted one proposal with 18 Co-Is aiming for research support of HK\$80M on stem cells and regeneration theme. The PI has also actively involved in participating the research program in CUHK Shenzhen Research Institute (CUHK-SZRI) and has proposed to establish a "Stem Cell and Regeneration Medicine Centre" at CUHK-SZRI as deputy director together with 11 other PIs from CUHK. The PI also spent his time in managing the GMP standard human cell culture laboratory at Li KS Institute, and helping to organize several projects to be started in 2010 in the said GMP facility. The PI has been invited to give keynote speeches and lectures at various national and international conferences and meetings for more than 12 times in 2010. The PI also engaged in knowledge transfer to publics and has been interviewed by various forms of medium for at least 10 times during 2010 and provided advice/consultation service for Hong Kong Consumer Association, Hong Kong Science Park, Local Industries, etc.

Recognitions:

Awards and Fellowships

Member's Name	Details
Gang Li	Best Clinical Research Paper Award, Hong Kong Orthopaedic Association Annual Meeting, 2010.
Gang Li	Visiting Professor, Key Laboratory of Cell Biology, Ministry of Education of PRC, China Medical University, Shenyang, China.
Gang Li	Member of Member of Advisory Board, Shanghai Key Laboratory of Orthopaedic Implant, Shanghai Jiaotong University, China.
Gang Li	Member of Editorial Board, NeuroImage

Gang Li	Member of Editorial Board, Word Journal of Stem Cells
Gang Li	Member of Editorial Board, Orthopaedics Journal of China
Gang Li	Member of Editorial Board, Journal of Orthopaedic Surgery and Research
Gang Li	Member of Editorial Board, Calcified Tissue International
Gang Li	Consultant, Beijing International Orthopaedic Research Centre

Grants and Consultancy

Details	Member's Name	Amount (HK\$)
ITF-Tier 3 Project. Development of an Immortalized Human Mesenchymal Stem Cell Line Overexpressing Thymidine Kinase (TK) Gene for Anti-tumor Therapy. (01/04/10-30/09/11)	LI, Gang (PI)	HK\$997,000
ITF Internship Grant. Hong Kong Innovation and Technology Commission. InP/045/10 (CUHK6902858) InP/046/10 (CUHK6902868) (01/04/10-30/09/11)	LI, Gang (PI)	HK\$453,600
Contract Research Grant, Eli Lilly Co., USA (TE095245) Animal studies of proprietary bioproduct or small molecules with potential osteogenesis stimulation effect. (01/01/10-30/12/12)	LI, Gang (PI)	HK\$1,337,000
General Research Fund (GRF). CUHK-471110. Functional characterizations of peripheral blood derived mesenchymal stem cells. (01/01/2011-31/12/2013)	LI, Gang (PI)	HK\$1,133,900
General Research Fund (GRF). CUHK-460710. The use of tenogenic cells and acellular tendon matrix for tendon tissue engineering. (01/01/2011-31/12/2013)	LI, Gang (Co-I)	HK\$1,380,000
General Research Fund (GRF). CUHK-460710. The use of tenogenic cells and acellular tendon matrix for tendon tissue engineering. (01/01/2011-31/12/2013)	LI, Gang (Co-I)	HK\$1,296,096
General Research Fund (GRF). CUHK-475910. Role of hypoxia inducible factor-1 α pathway in skeletal regeneration (01/01/2011-31/12/2013)	LI, Gang (Co-I)	HK\$1,380,000
Science and Technology Commission, Shanghai City Government, China. 10410711100. The interaction of mesenchymal stem cells and osteosarcoma. (01/04/2010-31/03/2012)	LI, Gang (Co-I)	HK\$397,000 (RMB 350,000)
Natural Science Research Foundation, Beijing City Government. 7102146. Tissue engineering approach for promoting bone consolidation during distraction osteogenesis. (01/09/2010-31/12/2012)	LI, Gang (Co-I)	HK\$125,000 (RMB 110,000)
Contract Research. TBF Company, France and Xizia Company, Hong Kong. TT105675. Phases III trial comparing a microfracture treatment to a CARTIPATCH $\text{\textcircled{R}}$ chondrocyte graft treatment in the femoral condyle lesions. (01/10/2010-01/10/2014)	LI, Gang (Co-I)	HK\$356,696 to HK\$713,392 (depends on the patient number)

Publications:

1. Song C, **Li G**. CXCR4 and MMP-2 are involved in mesenchymal stem cells homing and engraftment to the tumors. *Cytotherapy*, 2010, accepted. (IF: 3.55)
2. Ominsky MS, Li CY, Li XD, Tan HL, Lee E, Barrero M, Asuncion FJ, Dwyer D, Han CY, Vlasseros F, Samadfam R, Jolette J, Smith SY, Stolina M, Lacey DL, Simonet WS, Paszty C, **Li G**, Ke HZ. Inhibition of Sclerostin by monoclonal antibody enhances bone healing and improves bone density and strength of non-fractured bones. *Journal of Bone and Mineral Research*, 2010, accepted. (IF: 6.04)

3. Lu H, Hu J, Qin L, Chan KM, **Li G**, Li KH. Area, length and mineralization content of new bone at bone–tendon junction predict its repair quality. *Journal of Orthopaedic Research*, 2010, in press (IF: 3.11)
4. Bian ZY, Fan QM, **Li G**, Xu WT, Tang TT. Human MSCs promote growth of osteosarcoma: the involvement of interleukin-6 in the interaction between hMSCs and Saos-2 cells. *Cancer Science*, 2010; accepted. (IF: 3.77)
5. Song C, Xiang J, Tang JQ, Hirst D, Zhou JW, Chan KM, **Li G**. Thymidine kinase gene modified bone marrow mesenchymal stem cells as vehicles for anti-tumor therapy. *Human Gene Therapy*, 2010; accepted. (IF: 4.20)
6. Tang H, Zhao JD, Li Y, Chen H, Jia P, Chan KM, **Li G**. The efficacy of percutaneous kyphoplasty (PKP) in treating osteoporotic multi-thoracolumbar vertebral compression fractures. *Orthopaedics*, 2010, accepted. (IF: 1.91)
7. Rui YF, Lui PPY, Chan LS, Chan KM, Fu SC, **Li G**. Does erroneous differentiation of tendon-derived stem cells (TDSCs) contribute to the pathogenesis of calcifying tendinopathy? *Chin Med J (Engl)*, 2010, accepted. (IF: 0.95)
8. Rui YF, Lui PP, **Li G**, Fu SC, Lee YW, Chan KM. Isolation and characterization of multipotent rat tendon-derived stem cells. *Tissue Eng Part A* 2010; 16(5):1549-58. (IF:5.44)
9. Weber AJ, **Li G**, Kalak R, Street J, Buttgereit F, Dunstan CR, Seibel MJ, Zhou H. Osteoblast-targeted disruption of glucocorticoid signalling does not delay intramembranous bone healing. *Steroids*. 2010; 75(3): 282-285. (IF:2.90)
10. Yang Z, Shi Y, Wei X, He J, Yang S, Dickson G, Tang J, Xiang J, Song C, **Li G**. Fabrication and repair of cartilage defects with a novel acellular cartilage matrix scaffold. *Tissue Engineering Part C Methods* 2010; 16(5):865-76. (IF: 5.44)

Non-technical Summary

5. [Stem Cell and Tissue Regeneration Research](#)

Prof Gang Li who joined CUHK in April 2009, led the stem cells and regeneration laboratory at the Li Ka Shing Institute of Health Sciences. His main research interests are to develop tissue engineering, gene therapy and clinical trials using bone marrow derived mesenchymal stem cells. He has published more than 10 research papers and generated over HK\$8.5M research grants in the period of 2010. Prof. Li also leads the Stem Cells and Regeneration theme of the School of Biomedical Sciences and helps organizing Theme Based Research proposal submission of stem cells and regeneration program research and leads two projects in the cell therapy laboratory at the Li Ka Shing Institute of Health Sciences in 2010.

非技術性簡介

5. [幹細胞及組織再生研究](#)

李剛教授于 2009 年 4 月加入香港中文大學，並在李嘉誠健康科學研究所領導幹細胞和再生實驗室。他的主要研究興趣是利用骨髓來源的間充質幹細胞進行組織工程學、基因療法和臨床試驗的科研工作。他在 2010 年共發表 10 餘篇研究論文並獲得了超過八

百五十萬港幣的研究經費。李教授同時也是生命科學院幹細胞和再生醫學研究組的負責人，並積極組織參與香港的幹細胞與再生醫學的重大項目基金申請，領導開展兩個利用李嘉誠健康科學研究所的細胞治療實驗室的幹細胞應用專案。