

5. Stem Cells and Tissue Regeneration Research (Part I)

PI: Prof. Gang Li (Orthopaedics & Traumatology)

Team: Stem Cell and Regenerative Medicine Laboratory (LiKS 501 Lab)

Non-technical Summary ([in layman language for the donor to read \(i.e. a short paragraph of <100 words in both English and Chinese characters will do\)](#)):

Prof. Gang Li is a PI at LiKS Institute of Health Sciences, who is jointly appointed by CUHK-ORT department and School of Biomedical Sciences (SBS) from July 2011. The main research interests of his team are to develop tissue engineering, gene therapy and clinical trials using bone marrow derived mesenchymal stem cells. He has published more than 14 research papers and generated over HK\$12M research grants in the period of 2011 as PI and Co-I. Prof. Li is a deputy Chief of Stem Cells and Regeneration theme of the SBS and organized Theme Based Research proposal submission of stem cells and regeneration program research in 2011, became a PI in CUHK SZRI and led two projects in the cell therapy laboratory at the LiKS in 2011. Prof. Li has also successfully organized the 1st CUHK International Symposium on Stem Cell Biology and Regenerative Medicine in PWH, 6 December 2011, with more than 20 overseas invited speakers and over 200 attendants.

李剛教授于 2011 年 7 月由香港中文大學骨科和生命科學院聯合聘用，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 and 臨床試驗的科研工作。他在 2011 年共發表 10 餘篇研究論文並獲得了超過一千二百萬港幣的研究經費。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，他再 2011 年同時加入香港中文大學深圳研究院成為學術帶頭人，並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。李教授于 2011 年 12 月 6 日在威爾士醫院成功主辦了首屆香港中文大學幹細胞與再生醫學國際研討會。

Research Progress Summary:

In 2011, the research team has 12 members (2 Postdoc RAs, 2 RAs, 1 Senior technician, 7 PhD students) with the following research projects firmly established: (1) Circulating stem cells in diseases and regeneration; their recruitment and homing potentials and underlying biological mechanisms. 循环幹細胞在疾病和組織再生中的作用；他們的調動和募集的生物學機理。(2) MSCs as anti-cancer vehicles 利用幹細胞治療腫瘤的研究。(3) Tendon, cartilage and bone tissue engineering research and new technologies development. 肌腱、軟骨、骨組織工程新技術的研發。(4) Industry contract research work for new technologies development and developments of preclinical disease animal models. 與公司合作利用前臨床疾病動物模型開發新的治療方法。(5) Clinical translational research in musculoskeletal regeneration. 骨骼肌肉系統的再生臨床實驗研究。These projects all progress well, some of these already archived good results. 14 papers have been published from the research work and over HK\$12 Million research grants have been secured by this PI as over the period 2011 as PI or Co-I (over HK\$6.0 million as PI). The PI also played a leadership role in the Stem Cells and Regeneration

theme of CUHK SBS, and has been involved in organizing Theme Based Research grant submission in 2011. The PI has also actively involved in organizing the research programs in CUHK Shenzhen Research Institute (CUHK-SZRI) and has been invited as PI in 3 CUHK-SZRI funded research programs. The PI also spent his time in managing the GMP-standard human cell culture laboratory at LiKS Institute, and successfully organized the 1st CUHK International Symposium on Stem Cell Biology and Regenerative Medicine in PWH, 6 December 2011, with more than 20 overseas invited speakers and over 200 attendants. The PI has been invited to give keynote speeches and lectures at various national and international conferences and meetings for 12 times in 2011. The PI also engaged in knowledge transfer and provided advice/consultation service for Hong Kong Science Park, local and international healthcare related industries, etc.

Recognitions:

Awards and Fellowships

Member's Name	Details
Gang Li	Best Basic Research Paper Award for Associated Members, Hong Kong Orthopaedic Association Annual Meeting, 2011.
Gang Li	Visiting Professor, Guang Dong Medical College, Dongguan, China.
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	Visiting Professor, Xijing Orthopaedic Hospital, The Fourth Military Medical University, Xian, China.
Gang Li	Visiting Professor, Department of Orthopaedic Surgery, 1 st Affiliated Hospital, Shuzhou University Medical School, Shuzhou, China.
Gang Li	Visiting Professor, South Eastern University Medical School, Nanjing, China.
Gang Li	Hon. Consultant, Beijing International Orthopaedic Research Centre
Gang Li	Hon. Consultant, Beijing Institute of External Fixation Technology, Beijing, 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
Gang Li	Member of Editorial Board, Chinese Journal of Orthopaedic Trauma

Grants and Consultancy

Name of PI	Project Title	Funding Source	Start/End dates (dd/mm/yy)	Amount (HK\$)
Gang Li	Animal studies of proprietary bioproduct or small molecules with potential osteogenesis stimulation effect	Eli Lily Co., USA	01/03/2010 -31/12/2012	\$1,337,000
Gang Li	Functional characterizations of peripheral blood derived mesenchymal stem cells	Research Grant Council, Hong Kong Government	01/01/2011 -31/12/2013	\$986,000
Gang Li	Spinal fusion studies	Eli Lily Co., USA	01/02/2011 -31/01/2013	\$1,099,060
Gang Li	Effect of Sclerostin antibody on	Amgen Company	01/05/2011	\$1,208,103

	osteoporotic fracture healing in rats and underline mechanisms	USA	-30/04/2013	
Gang Li	用胸腺嘧啶激酶基因修饰的间充质干细胞治疗肿瘤的研究	国家自然科学基金	2012.01-2015.12	\$616,000 (RMB 550,000)
Gang Li	Assessment of the anti-angiogenic effect of an antibody on retinopathy-associated neovascularization using oxygen-induced retinopathy model in premature neonatal mice	Amgen Company USA	01/05/2011-30/12/2011	\$361,100
Gang Li	Development of a center for research inflammatory diseases (Allocated to ORT)	Focused Investment Scheme B, CUHK Central Fund	01/03/2011-31/12/2013	\$387,360
Sub-total				Approx. \$6.0M

Publications:

To avoid duplication of outputs between years, only published (online or in print form) publications within the period of 1 December 2010 – 31 December 2011 with LiHS acknowledged should be counted. Papers ahead of printing, or published after 31 December 2011 will be reserved for next year's report. (Please provide details of the publications in APA style and attach relevant documentary proof, viz. copy of publication/letter of acceptance/conference abstract)

1. Tang JQ, Luo ZH, Zhou GQ, Song C, Yu FL, Xiang JJ, **Li G**. Cis-regulatory functions of overlapping HIF-1alpha/E-box/AP-1-like sequences of CD164. *BMC Molecular Biology*, 2011; 12:44. (IF: 3.19).
2. Ni M, **Li G**, Tang PF, Chan KM, Wang Y. rhBMP-2 not Alendronate combined with HA-TCP biomaterial and distraction osteogenesis enhance bone formation. *Archives of Orthopaedic and Trauma Surgery*, 2011; 131:1469–1476.
3. 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*, 2011, 26 (5):1012–1021. (IF: 6.04)
4. Song C, **Li G**. CXCR4 and MMP-2 are involved in mesenchymal stem cells homing and engraftment to the tumors. *Cytotherapy*, 2011; 13(5): 549-61. (IF: 3.55)
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*, 2011; 22(4):439-49. (IF: 4.20)

One to two Symbolic Figure(s) which can represent your team's research area (aim to emphasize your team's characteristics and help people relate to your area of research) **(Please separately**

attach the figure(s) in graphic format, e.g. jpg, and also supporting document for copyright permission for using the figure(s)):

Source of figure	Legend of figure	Copyright owner and year
Fig. 1 JPEG	Group Photo of 1 st CUHK International Symposium on Stem Cell Biology and Regenerative Medicine in PWH, 6 December 2011	The PI-Gang Li 2011
Fig. 2 JPEG	Schematic of possible mechanisms by which CRBP1 promotes osteogenesis of MSCs. RXR α leads to the degradation of β -catenin through direct protein-protein interaction. CRBP1 could block this pathway through unknown mechanism, resulting in accumulation of β -catenin and upregulation of pERK1/2, eventually leading to upregulation of osteogenesis-related markers.	The PI-Gang Li 2011
Fig. 3 JPEG	PC3 tumour cell-agarose pellet and BMSC co-culture system for the actin polymerization assay. The actin filaments in the BMSCs only culture was randomly arranged (Left). Exposure of MSCs to PC3 tumour cells altered actin filaments organization, all actin filaments were arranged perpendicular to the tumour cells (right), bar=20 μ m.	The PI-Gang Li 2011



Fig. 1.

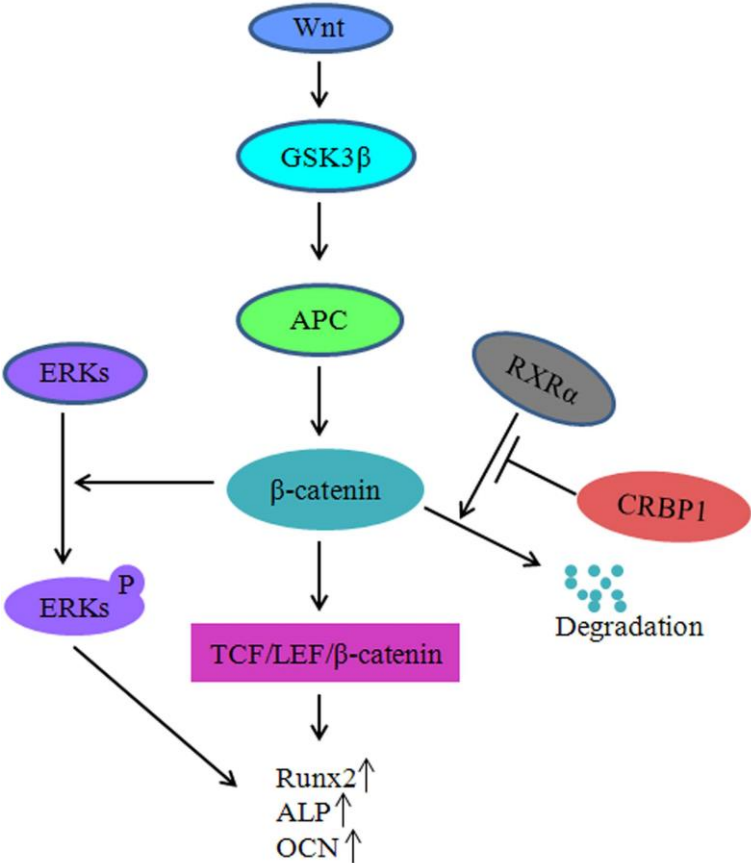


Fig. 2

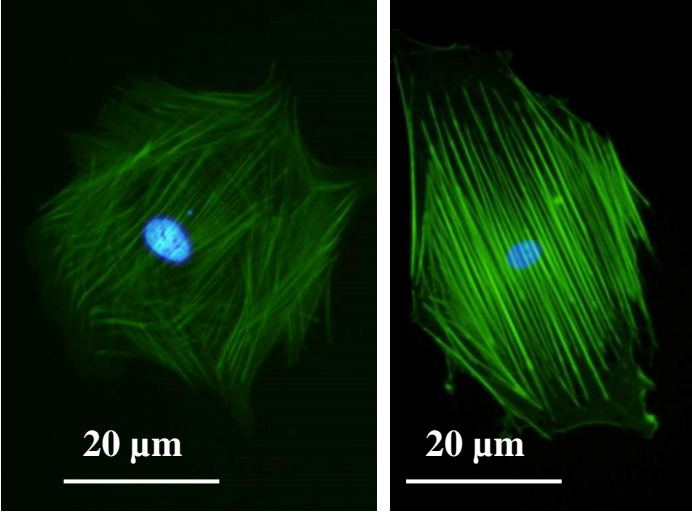


Fig. 3