STEM CELLS AND TISSUE REGENERATION
(Adult Stem Cell Biology and Applications)

Principal Investigators

Professor Gang Li (Department of Orthopaedics and Traumatology)

Team

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Research Progress Summary

In 2016, the research team has 19 members (2 Research Assistant Professors, 2 Postdoctoral fellows, 2 Research Assistants, 4 Visiting fellows and 9 PhD students) with the following research projects firmly carried out: (1) Exploring the clinical application potential of secretomes derived from human mesenchymal stem cells. (2) Biological roles of microRNAs and novel development of biomaterials in bone, cartilage and tendon tissue engineering research. (3) Industry contract research works on pre-clinical studies of biological compounds. (4) Engaging in two pioneer clinical trials of mesenchymal stem cells therapy for chondral lesion in wrist and knee in Hong Kong. These projects are in good progress as planned, with 17 peer-reviewed publications generated. Meanwhile, over HK$3.9 million research grants have been secured by Prof. Li in 2016.

This year, Prof. Li has organised the 6th CUHK International Symposium and the 1st Croucher Summer Course on Stem Cell Biology & Regenerative Medicine, and co-organised the 1st International Combined Meeting of Orthopaedic Research Societies in Xian, China as Scientific Chairman. Prof. Li has been invited to give keynote speeches and lectures at various national and international conferences and meetings for 14 times in 2016, and served as Visiting Professors in 3 universities, as well as council members of at least 5 research societies. He also actively engages in knowledge transfer and provided advice/consultation service for the Hong Kong Science Park, local and international healthcare related industries. Prof. Li contributes to the CUHK Shenzhen Research Institute by serving as the Deputy Director of the CUHK-ACC Joint Laboratory of Space Medicine and Health Maintenance.
Histological analysis showed that the secretome intervention accelerated new callus consolidation. (A) Representative sections stained with Trichrome Goldner showing better quality callus formation in the secretome group than that of the other two groups. (B) Von Kossa staining clearly exhibited that most of new bone has been consolidated and the continuity of the cortical bone and bone marrow cavities was evident in the secretome group at week 6.

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HFS treatment promoted hAMSC proliferation and osteogenic differentiation. hAMSC was treated with either HFS, HAS or vehicle control. (A) Direct cell count showed that HFS treatment (50μg/mL) increased the cell proliferation of hAMSC at day 2 and 4. The increment is statistical significant at day 4. HAS did not possess detectable effect on cell proliferation when compared with control group. (B) qPCR result showed significant up-regulation of sirt1 and foxo3a in hAMSC after HFS treatment for 3 days. (C) Alizarin red staining showed HFS promoted the formation of calcium nodules in a concentration dependent manner. (D) HFS treatment induced the up-regulation of osteogenic genes Rex1, Alp and Runx2 at day 3. N=3, *p<0.05, Mann-Whitney-U-test.

The figure was published by Stem Cells and Development 2016. Copyright © 2016 Gang Li.
## Grants and Consultancy

<table>
<thead>
<tr>
<th>Full Name of PI</th>
<th>Project Title</th>
<th>Funding Source</th>
<th>Start Date (dd/mm/yyyy)</th>
<th>End Date (dd/mm/yyyy)</th>
<th>Amount (HK$)</th>
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<td>Gang Li</td>
<td>Mir-21调控所导致的软骨/骨组织形成的调控及应用研究</td>
<td>深圳市科技创新委员会</td>
<td>01/01/2016</td>
<td>31/12/2017</td>
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<td>Gang Li</td>
<td>Promote Fracture Healing by Administration of Allogenic Mesenchymal Stem Cells (MSCs)</td>
<td>Research Grant Council - General Research Fund</td>
<td>01/01/2014</td>
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<td>Gang Li</td>
<td>Is Smad7 a Potential Therapeutic Target for Preventing Osteoporotic Bone Loss?</td>
<td>Research Grant Council - General Research Fund</td>
<td>01/01/2016</td>
<td>31/12/2018</td>
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<td>Sox11调控所导致的软骨/骨组织形成的调控及应用研究</td>
<td>The National Natural Science Foundation of China</td>
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<td>Gang Li</td>
<td>血管和神经化诱导组织工程形成的机制研究</td>
<td>The National Natural Science Foundation of China</td>
<td>01/01/2015</td>
<td>31/12/2019</td>
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<td>Gang Li</td>
<td>A Micro Array Chip based Single Cell Manipulation System for Characterization of Electrical Stimulation Induced Stem Cell Differentiation</td>
<td>The National Natural Science Foundation of China - Research Grant Council Joint Research Scheme</td>
<td>01/01/2016</td>
<td>31/12/2019</td>
<td>400,000 (Amount allocated to Professor Gang Li)</td>
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## Appendix

### Stem Cells and Tissue Regeneration

#### Publications

**A. Journal Papers**


