


BIOMATERIAL AND DRUG TRANSLATIONAL RESEARCH

Innovative Orthopaedic Biomaterial and Drug Translational Research



 **Principal Investigator**
Professor Ling Qin

 **Team Members**
Dick Chow | Jiankun Xu | Le Huang | Wenxue Tong | Lizhen Zheng | Hao Yao | Bingyang Dai | Ye Li | Li Zou | Qianqian Pang | Liangbin Zhou | Xuan He | Xiaodan Chen | Xu Li | Ziyi Chen | Haiyue Zu | Zhi Yao | Liang Chang | Shunxiang Xu | Yuantao Zhang

Research Progress Summary

The team led by Professor Ling Qin focuses on the development of orthopaedic implants/devices with innovative biomaterial or hybrid systems and medical drugs/nutrition supplements for orthopaedics diseases or injuries, such as osteoporosis, osteoporotic fractures, osteonecrosis. By integrating medical science, life science, material science,

pharmacological science, imaging technology, and biomechanics, they identify the potential solutions for clinical problems. Then, they collaborate with their industrial partners to transform their research into medical products that benefit patients. The feedback from patients and clinicians would refine future R&D and improve the quality of innovative products.



With collective efforts and endeavours, Prof. Qin's R&D programme has secured significant R&D and scientific competitive grants, including the Areas of Excellence Scheme, the Theme-based Research Scheme and the Collaborative Research Fund, which are the most competitive grants schemes given by the Research Grants Council of the Hong Kong Special Administrative Region. In 2020, they have also got one General

Research Fund proposal funded and run a company under the Technology Start-up Support Scheme for Universities (TSSSU). In 2020, Prof. Qin published 31 papers (6 of them with an impact factor above 10). Yet, due to COVID-19, their outreach and physical presence in national and international collaborations were significantly affected.

Research and Scholarship

Research Awards and Recognitions

Member's Name	Details	
	Award	Organisation
Ling Qin	優秀創新創業導師	中國「互聯網」大學生創新創業大賽組織委員會
Xuan He	Best Paper Award for Associate Member	Hong Kong Orthopaedic Association
Li Zou	Hong Kong ICT Awards 2020: Smart People Award	Hong Kong Council of Social Service
	Hong Kong ICT Awards 2020: Smart Ageing Silver Award	

Fellowships

Member's Name	Details	
	Fellowships	Organisation
Ling Qin	Fellow	International Union of Societies for Biomaterials Science and Engineering
		American Society for Bone and Mineral Research

Academic Editorship

Member's Name	Details	
	Role	Journal
Ling Qin	Editor-in-Chief	Journal of Orthopaedic Translation
	Editorial Advisory Board Member	Recent Patents on Biomedical Engineering
	Member	International Society of Musculoskeletal and Neuronal Interactions
		World Journal of Rheumatology
	第三屆編委	中華創傷骨科雜誌
	Associate Editor	Orthopaedic Surgery
	International Review Panel	European Cells & Materials Journal
Editor Board Member	Current Osteoporosis Report	

Reviewer of Journal / Conference

Member's Name	Details	
	Role	Journal / Conference
Jiankun Xu	Reviewer	Chemical Engineering Journal
		Acta Biomaterialia
		Bioactive Materials
Dick Chow	Reviewer	American Journal of Sports Medicine
		Biomaterials
		Journal of Orthopaedics, Trauma and Rehabilitation

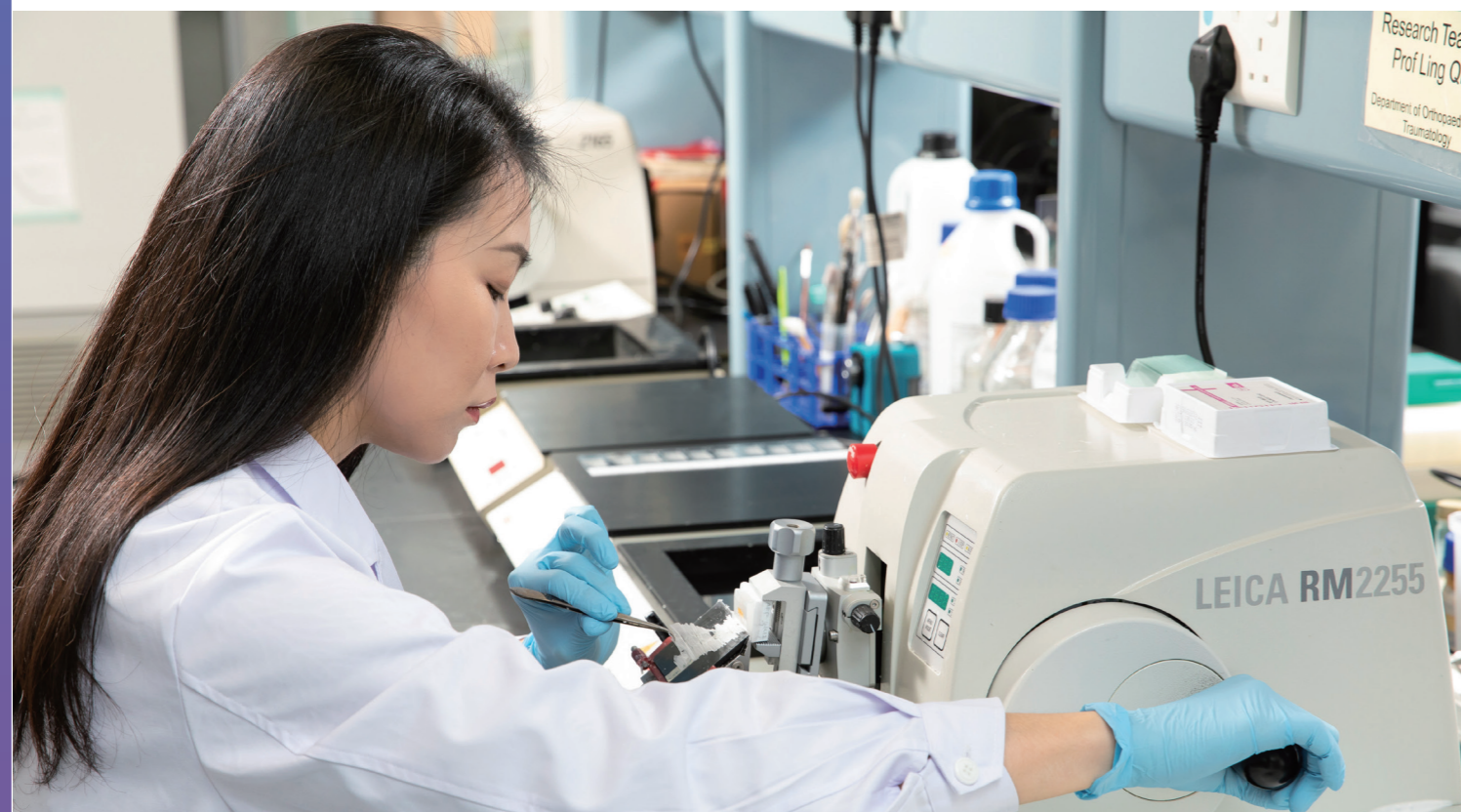
Grants and Consultancy

Name	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK\$)
Ling Qin	Calcitonin Gene-related Peptide Induced by Electrical Stimulation at Single Dorsal Root Ganglion Accelerates Osteoporotic Fracture Healing	Research Grants Council – General Research Fund	01/01/2020	31/12/2022	1,115,145
	Further Development and Translation of Innovative Titanium-magnesium Plate-screw Hybrid Fixation System for Osteoporotic Fracture Fixation and Healing Enhancement	Innovation and Technology Commission – Internship Programme	16/09/2019	31/12/2020	261,891
	Further Development and Translation of Innovative Titanium-magnesium Plate-screw Hybrid Fixation System for Osteoporotic Fracture Fixation and Healing Enhancement	Innovation and Technology Commission – Internship Programme	10/10/2019	31/12/2020	265,579.54
	生物醫用與高分子材料高通量實驗平台	廣東省科學技術廳	09/04/2019	08/04/2022	RMB 500,000
Dick Chow	Effect of Magnesium Intramedullary Nail on Fracture Healing of Type II Diabetic Mice	CUHK Research Committee – Direct Grant	01/06/2019	31/12/2020	104,400
Jiankun Xu	Cartilage-targeting AAV system	Innovation and Technology Commission – Technology Start-up Support Scheme for Universities	01/05/2020	30/04/2021	200,000

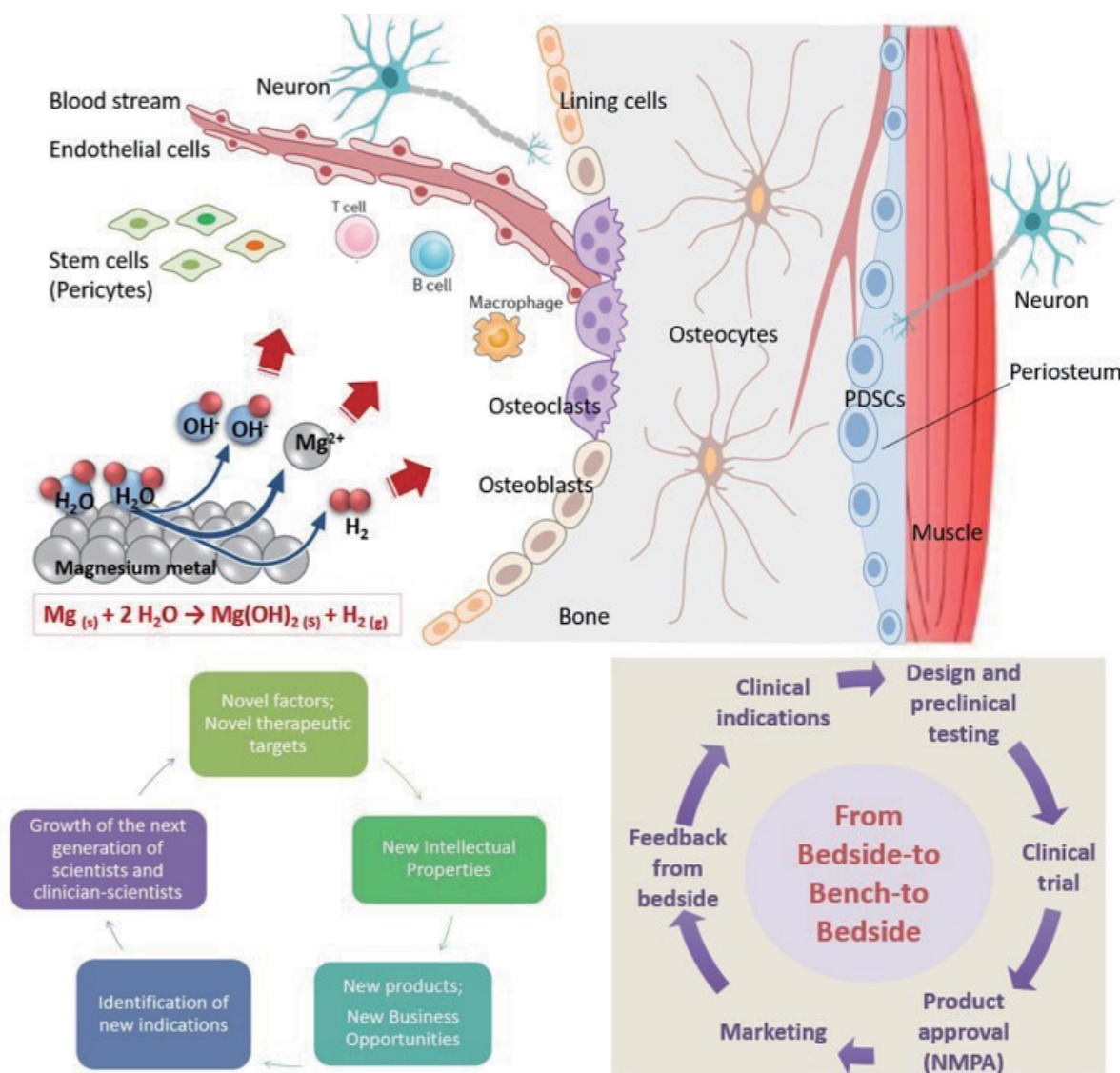
Publications

A. Journal Papers

1. He X, Li Y, Guo J, Xu J, Zu H, Huang L, Ong M, Yung PSH, Qin L. Biomaterials developed for facilitating healing outcome after anterior cruciate ligament reconstruction: Efficacy, surgical protocols, and assessments using preclinical animal models. *Biomaterials*. 2020;269:120625. doi:10.1016/j.biomaterials.2020.120625. (Review)
2. Xu J, Wang J, Chen X, Li Y, Mi J, Qin L. The effects of calcitonin gene-related peptide on bone homeostasis and regeneration. *Current Osteoporosis Reports*. 2020;18(6):621-632. doi:10.1007/s11914-020-00624-0. (Review)
3. Wang J, Xu J, Wang X, Sheng L, Zheng L, Song B, Wu G, Zhang R, Yao H, Zheng N, Yun Ong MT, Yung PS, Qin L. Magnesium-pretreated periosteum for promoting bone-tendon healing after anterior cruciate ligament reconstruction. *Biomaterials*. 2021;268:120576. doi:10.1016/j.biomaterials.2020.120576. (Epub ahead of print)
4. Yao H, Xu J, Wang J, Zhang Y, Zheng N, Yue J, Mi J, Zheng L, Dai B, Huang W, Yung S, Hu P, Ruan Y, Xue Q, Ho K, Qin L. Combination of magnesium ions and vitamin C alleviates synovitis and osteophyte formation in osteoarthritis of mice. *Bioactive Materials*. 2021;6(5):1341-1352. doi:10.1016/j.bioactmat.2020.10.016. (Epub ahead of print)
5. Liu Y, Li H, Xu J, TerBush J, Li W, Setty M, Guan S, Nguyen TD, Qin L, Zheng Y. Biodegradable metal-derived magnesium and sodium enhances bone regeneration by angiogenesis aided osteogenesis and regulated biological apatite formation. *Chemical Engineering Journal*. 2021;410:127616. doi:10.1016/j.cej.2020.127616. (Epub ahead of print)
6. Zhou L, Gjvm VO, Malda J, Stoddart MJ, Lai Y, Richards RG, Ho K, Qin L. Innovative tissue-engineered strategies for osteochondral defect repair and regeneration: Current progress and challenges. *Advanced Healthcare Materials*. 2020;9(23):2001008. doi:10.1002/adhm.202001008. (Review)
7. Li X, Xu J, Dai B, Wang X, Guo Q, Qin L. Targeting autophagy in osteoporosis: From pathophysiology to potential therapy. *Ageing Research Reviews*. 2020;62:101098. doi:10.1016/j.arr.2020.101098. (Review)



8. Zheng LZ, Wang JL, Xu JK, Zhang XT, Liu BY, Huang L, Zhang R, Zu HY, He X, Mi J, Pang QQ, Wang XL, Ruan YC, Zhao DW, Qin L. Magnesium and vitamin C supplementation attenuates steroid-associated osteonecrosis in a rat model. *Biomaterials*. 2020;238:119828. doi:10.1016/j.biomaterials.2020.119828.
9. Mi J, Xu J, Yao H, Li X, Tong W, Li Y, Dai B, He X, Chow DHK, Li G, Lui KO, Zhao J, Qin L. Calcitonin gene-related peptide enhances distraction osteogenesis by increasing angiogenesis. *Tissue Engineering Part A*. 2021;27(1-2):87-102. doi:10.1089/ten.tea.2020.0009. (In press)
10. Wang J, Xu J, Hopkins C, Chow DH, Qin L. Biodegradable magnesium-based implants in orthopedics – A general review and perspectives. *Advanced Science*. 2020;7(8):1902443. doi:10.1002/adv.201902443. (Review)
11. Liang C, Yang KY, Chan VW, Li X, Fung THW, Wu Y, Tian XY, Huang Y, Qin L, Lau JYW, Lui KO. CD8⁺ T-cell plasticity regulates vascular regeneration in type-2 diabetes. *Theranostics*. 2020;10(9):4217-4232. doi:10.7150/thno.40663.
12. Huang ZQ, Fu FY, Ye H, Gao H, Tan B, Wang RT, Lin, Qin L, Chen W. Chinese herbal Huo-Gu formula for the treatment of steroid-associated osteonecrosis of femoral head: A 14-year follow-up of convalescent SARS patients. *Journal of Orthopaedic Translation*. 2020;23:122-131. doi:10.1016/j.jot.2020.03.014.
13. Cheng WX, Zhong S, Meng XB, Zheng NY, Zhang P, Wang Y, Qin L, Wang XL. Cinnamaldehyde inhibits inflammation of human synoviocyte cells through regulation of jak/stat pathway and ameliorates collagen-induced arthritis in rats. *Journal of Pharmacology and Experimental Therapeutics*. 2020;373(2):302-310. doi:10.1124/jpet.119.262907.
14. Guillaume O, Geven MA, Varjas V, Varga P, Gehweiler D, Stadelmann VA, Smidt T, Zeiter S, Sprecher C, Bos RRM, Grijpma DW, Alini M, Yuan H, Richards GR, Tang T, Qin L, Lai Y, Jiang P, Eglin D. Orbital floor repair using patient specific osteoinductive implant made by stereolithography. *Biomaterials*. 2020;233:119721. doi:10.1016/j.biomaterials.2019.119721.
15. Zhao D, Zhang F, Wang B, Liu B, Li L, Kim SY, Goodman SB, Hernigou P, Cui Q, Lineaweaver WC, Xu J, Drescher WR, Qin L. Guidelines for clinical diagnosis and treatment of osteonecrosis of the femoral head in adults (2019 version). *Journal of Orthopaedic Translation*. 2020;21:100-110. doi:10.1016/j.jot.2019.12.004. (Editorial)



Research focus of Professor Ling Qin and his research team

Source: Schematic diagram adapted from our Areas of Excellence Project (AoE-M_402-20)