

秦嶺

LING QIN



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BIOMATERIAL AND DRUG TRANSLATIONAL RESEARCH

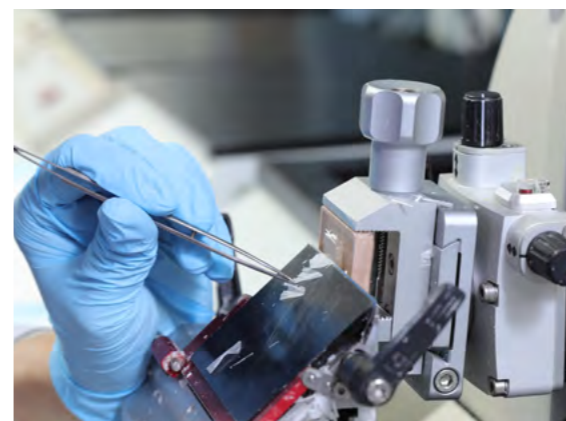
Innovative Orthopaedic Biomaterial and Drug Translational Research

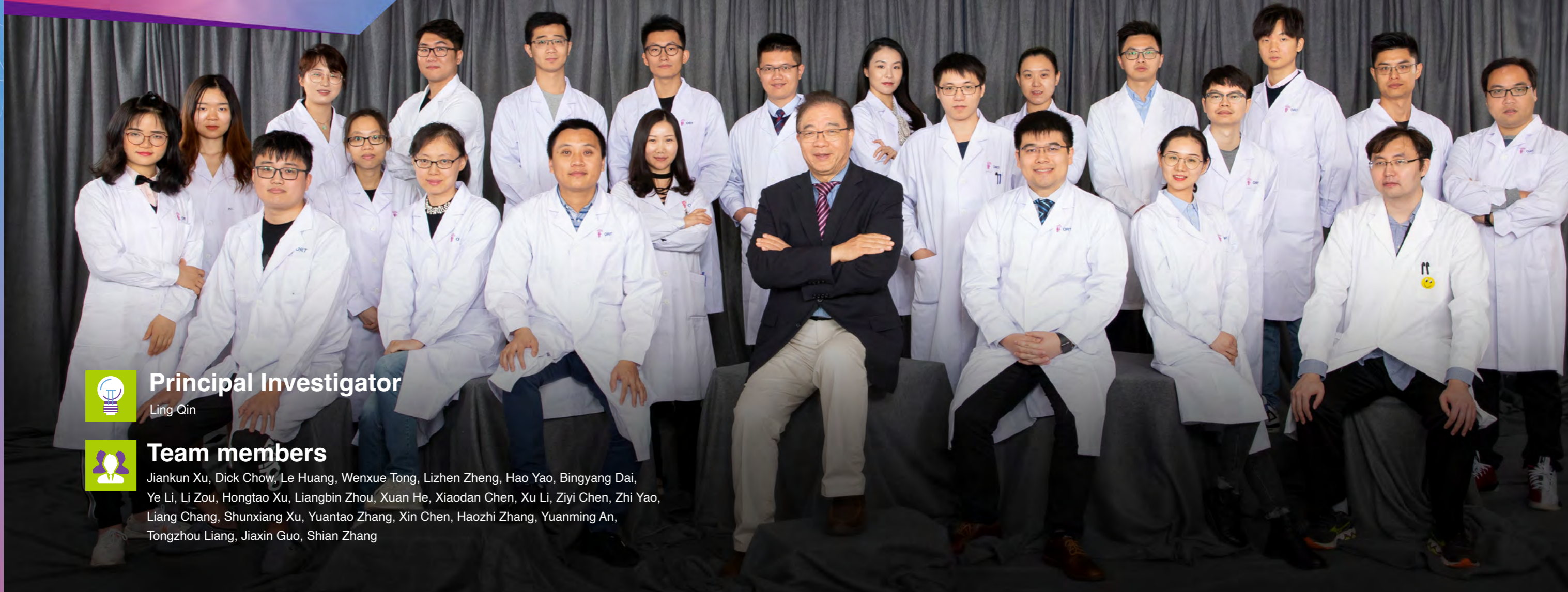
Research Progress Summary

The team led by 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 benefits patients. The feedback from patients and clinicians would refine future R&D and improve the quality of innovative products.



With collective efforts and endeavors, Ling'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 2021, they have also got two General Research Fund proposals funded and run a company under the Technology Start-up Support Scheme for Universities. In 2021, Ling published 35 papers (6 of them with impact factor above 10).





Principal Investigator

Ling Qin



Team members

Jiankun Xu, Dick Chow, Le Huang, Wenxue Tong, Lizhen Zheng, Hao Yao, Bingyang Dai, Ye Li, Li Zou, Hongtao Xu, Liangbin Zhou, Xuan He, Xiaodan Chen, Xu Li, Ziyi Chen, Zhi Yao, Liang Chang, Shunxiang Xu, Yuantao Zhang, Xin Chen, Haozhi Zhang, Yuanming An, Tongzhou Liang, Jiaxin Guo, Shian Zhang

Research Awards and Recognitions

Member's Name	Details	
	Award	Organisation
Weihao Yuan Zhi Yao Jiaxin Guo Shunxiang Xu	Professor Charles K.KAO Student Creativity Awards 2021 Second Runner-up	The Chinese University of Hong Kong
	The 7 th Hong Kong University Student Innovation and Entrepreneurship Competition Second Prize of Life Sciences	Hong Kong New Generation Cultural Association Innovation and Technology Commission
Zhi Yao	2021 Virtual Student Paper Competition Gold Award	The Tissue Engineering and Regenerative Medicine International Society, Inc. – Asia Pacific

Member's Name	Details	
	Award	Organisation
Jiaxin Guo	2021 Virtual Student Paper Competition Royal Society of Chemistry Award	The Tissue Engineering and Regenerative Medicine International Society, Inc. – Asia Pacific
Le Huang Shunxiang Xu	The 7 th Hong Kong University Student Innovation and Entrepreneurship Competition Third Place Award of Startup	Hong Kong New Generation Cultural Association Innovation and Technology Commission

Research and Scholarship

Member's Name	Details	
	Award	Organisation
Le Huang Shunxiang Xu Jiankun Xu Yuanta Zhang Jiaxin Guo	The 7 th China International "Internet+" College Students Innovation and Entrepreneurship Competition – Hong Kong Chapter Silver Award	Hong Kong New Generation Cultural Association Innovation and Technology Commission
Le Huang Shunxiang Xu	Intellectual Property Innovation and Entrepreneurship Contest: Hong Kong Chapter Top Ten	Cyberport, Hong Kong

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 European Cells & Materials Journal
Editorial Board Member	Current Osteoporosis Reports	
Jiankun Xu	Editorial Board Member	Journal of Orthopaedic Translation

Reviewer of Journal / Conference

Member's Name	Details	
	Role	Journal / Conference
Dick Chow	Reviewer	Orthopaedic Research Society 2022 Annual Meeting

Grants and Consultancy

Name	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK\$)
Ling Qin	Multifunctional Bioactive 3D-Printed Scaffold as an All-in-One Platform for Postsurgical Osteosarcoma Treatment and Bone Defect Repair	Innovation and Technology Fund – Mainland-Hong Kong Joint Funding Scheme	01/11/2021	31/10/2023	2,162,000
	Aging, Skeletal Degeneration and Regeneration	Research Grants Council – Areas of Excellence Scheme	01/05/2021	30/04/2029	64,889,000
	Identification of a Central to Sympathetic Neural Circuit in Magnesium-promoted Bone Regeneration Using Retrograde Tracing and Single-cell RNA-seq	Research Grants Council – General Research Fund	01/01/2021	31/12/2023	1,126,379
	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 Fund – Innovation and Technology Support Programme	01/01/2019	31/12/2022	2,449,000
	Functional Bone Regeneration in Challenging Bone Disorders and Defects	Research Grants Council – Theme-based Research Scheme	01/11/2017	31/10/2022	33,333,000

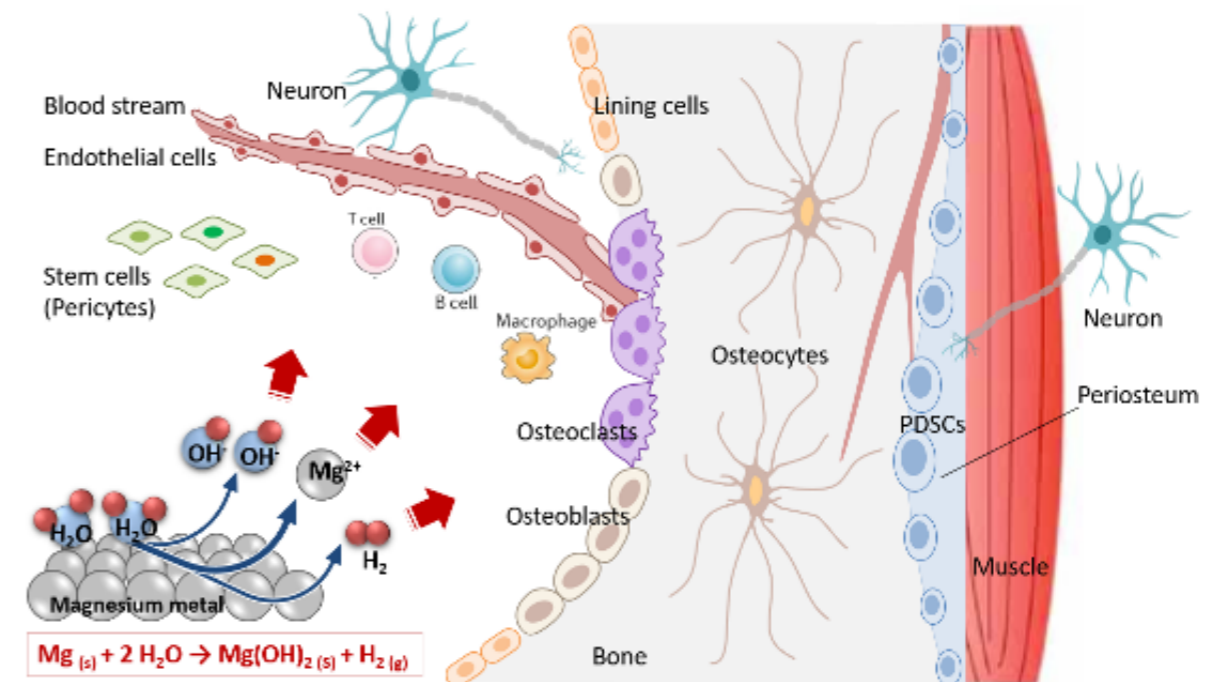
Publications

A. Journal Papers

1. 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 hang, Qin L. Magnesium-pretreated periosteum for promoting bone-tendon healing after anterior cruciate ligament reconstruction. *Biomaterials*. 2021;268. doi:10.1016/j.biomaterials.2020.120576.
2. He X, Li Y, Guo J, Xu J, Zu H, Huang L, Ong MTY, 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*. 2021;269. doi:10.1016/j.biomaterials.2020.120625. (Review)
3. Zu H, Chau K, Olugbade TO, Pan L, Dreyer CH, Chow DHK, Huang L, Zheng L, Tong W, Li X, Chen Z, He X, Zhang R, Mi J, Li Y, Dai B, Wang J, Xu J, Liu K, Lu J, Qin L. Comparison of modified injection molding and conventional machining in biodegradable behavior of perforated cannulated magnesium hip stents. *Journal of Materials Science and Technology*. 2021;63:145-160. doi:10.1016/j.jmst.2020.02.057.
4. 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.
5. Cheng W, Gan D, Hu Y, Zheng Z, Zeng Q, Li L, Wang X, Zhang Y, Xu Z, Qin L, Zhang P. The effect and mechanism of QufengZhitong capsule for the treatment of osteoarthritis in a rat model. *Journal of Orthopaedic Translation*. 2021;28:65-73. doi:10.1016/j.jot.2020.10.013.
6. 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.
7. Zheng L, Huang L, Chen Z, Cui C, Zhang R, Qin L. Magnesium supplementation alleviates corticosteroid-associated muscle atrophy in rats. *European Journal of Nutrition*. 2021;60(8):4379-4392. doi:10.1007/s00394-021-02598-w.
8. Wan P, Wang W, Zheng L, Qin L, Yang K. One-step electrodeposition synthesis of bisphosphonate loaded magnesium implant: A strategy to modulate drug release for osteoporotic fracture healing. *Journal of Materials Science and Technology*. 2021;78:92-99. doi:10.1016/j.jmst.2020.10.055.
9. Li Y, Xu J, Mi J, He X, Pan Q, Zheng L, Zu H, Chen Z, Dai B, Li X, Pang Q, Zou L, Zhou L, Huang L, Tong W, Li G, Qin L. Biodegradable magnesium combined with distraction osteogenesis synergistically stimulates bone tissue regeneration via CGRP-FAK-VEGF signaling axis. *Biomaterials*. 2021;275:120984. doi:10.1016/j.biomaterials.2021.120984.
10. Dai B, Li X, Xu J, Zhu Y, Huang L, Tong W, Yao H, Chow DHK, Qin L. Synergistic effects of magnesium ions and simvastatin on attenuation of high-fat diet-induced bone loss. *Bioactive Materials*. 2021;6(8):2511-2522. doi:10.1016/j.bioactmat.2021.01.027.
11. Chang L, Yao H, Yao Z, Ho KKW, Ong MTY, Dai B, Tong W, Xu J, Qin L. Comprehensive analysis of key genes, signaling pathways and miRNAs in human knee osteoarthritis: Based on bioinformatics. *Frontiers in Pharmacology*. 2021;12:1-17. doi:10.3389/fphar.2021.730587.
12. Mi J, Xu JK, Yao Z, Yao H, Li Y, He X, Dai BY, Zou L, Tong WX, Zhang XT, Hu PJ, Ruan YC,

Tang N, Guo X, Zhao J, He JF, Qin L. Implantable electrical stimulation at dorsal root ganglions accelerates osteoporotic fracture healing via calcitonin gene-related peptide. *Advanced Science*. 2021;2103005:1-14. doi:10.1002/advs.202103005. (Epub ahead of print)

13. Liu Y, Peng L, Li L, Huang C, Shi K, Meng X, Wang P, Wu M, Li L, Cao H, Wu K, Zeng Q, Pan H, Lu WW, Qin L, Ruan C, Wang X. 3D-bioprinted BMSC-laden biomimetic multiphasic scaffolds for efficient repair of osteochondral defects in an osteoarthritic rat model. *Biomaterials*. 2021;279:121216. doi:10.1016/j.biomaterials.2021.121216.
14. Chow DHK, Wang J, Wan P, Zheng L, Ong MTY, Huang L, Tong W, Tan L, Yang K, Qin L. Biodegradable magnesium pins enhanced the healing of transverse patellar fracture in rabbits. *Bioactive Materials*. 2021;6(11):4176-4185. doi:10.1016/j.bioactmat.2021.03.044.
15. Li X, Dai B, Guo J, Zheng L, Guo Q, Peng J, Xu J, Qin L. Nanoparticle–cartilage interaction: Pathology-based intra-articular drug delivery for osteoarthritis therapy. *Nano-Micro Letters*. 2021;13(1). doi:10.1007/S40820-021-00670-Y. (Review)



Ling Qin and his team's research area is on further understanding of bioactive effects of the implant byproducts (i.e. Mg^{2+} , OH^- and H_2) in bone regeneration via exogenous and endogenous growth factors.

Source: Ling Qin and his team