Department of Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON

Spring 2026
Seminar Series

From Development to Repair: Using Skeletal Development Principles to Advance Stem Cell–Mediated Cartilage Regeneration

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Why does cartilage regeneration still fall short despite major progress in stem cell engineering? In this seminar, I will argue that one important reason is that cartilage repair strategies are often developed without fully accounting for the developmental programs that shape cartilage formation in vivo. I will present our lab's recent work showing that developmental origin strongly influences the identity and regenerative potential of human iPSC-derived chondrocytes.

Using isogenic differentiation models, we compared mesoderm-derived and neural crest-derived chondrocytes and found that neural crest-derived chondrocytes more closely resemble native articular chondrocytes and perform better in cartilage repair settings. Building on these findings, I will also discuss our efforts to develop a stepwise induction strategy for generating chondrocytes from human iPSC-derived neural crest cells in a more controlled and efficient manner.

Together, these studies support a broader message that developmental biology is not simply background knowledge for regenerative medicine, but a practical framework for selecting better cell sources, asking more precise biological questions, and overcoming major barriers in the field.

About the Speaker

Wan-Ju Li, PhD, is an associate professor in the Department of Orthopedics and Rehabilitation at the University of Wisconsin–Madison, where he serves as principal investigator of the Musculoskeletal Biology and Regenerative Medicine Laboratory. He is also affiliated with the Department of Biomedical Engineering and the Department of Cell and Regenerative Biology, and leads the Musculoskeletal Regeneration Group in the Stem Cell and Regenerative Medicine Center. Dr. Li earned his PhD in Cell and Tissue Engineering from Thomas Jefferson University in 2004 and completed postdoctoral training at the National Institutes of Health in 2008.

His research focuses on stem cells and skeletal tissue engineering, with the goal of developing effective stem cell-based therapies for orthopedic diseases such as osteoarthritis and osteoporosis. His NIH funded studies have helped advance the use of induced pluripotent stem cells for cartilage repair and musculoskeletal regeneration. He has published more than 100 research articles, with more than 14,830 citations and an H index of 47 on Google Scholar

Dr. Li is an active member of major professional societies, including the International Society for Stem Cell Research, Osteoarthritis Research Society International, and the Orthopaedic Research Society, where he helped establish the Stem Cell Interest Group. His honors include the NIH Fellow Award for Research Excellence, the Young Investigator Research Award from the North American Spine Society, the 3M Nontenure Faculty Award, and the Emerging Investigator Award from *Stem Cell Research & Therapy*. In 2025, he was elected a Fellow of the International Combined Orthopaedic Research Societies. He also serves on the editorial boards of several scientific journals, including *Journal of Orthopaedic Translation, Frontiers in Cell and Developmental Biology, Genes and Diseases, and Regenerative Engineering and Translational Medicine*.

Monday, March 16 at Noon
1003 Engineering Centers (Tong Auditorium)