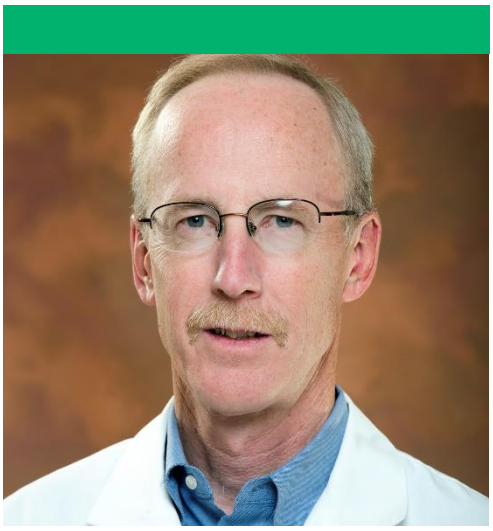
RUSH

D. Rick Sumner, PhD

The Mary Lou Bell McGrew Presidential Chair of Medical Research



Advancement of Medicine

In 2024, I continued to serve as the chairperson of the Department of Anatomy & Cell Biology. There are 20 faculty members in the department, with one-third having a research-focused mission, one-third having an education-focused mission, and one-third providing significant contributions to both research and education. The research focus includes musculoskeletal biology, cancer biology and movement disorders.

I am a past president of multiple scientific societies, including the Orthopaedic Research Society, the American Association for Anatomy, the International Society of Bone Morphometry, and the Association of Anatomy, Cell Biology and Neurobiology Chairpersons. I am also an elected fellow in several societies, including the American Association for the Advancement of Science, the Orthopaedic Research Society, the American Society for Bone and Mineral Research, and the American Association for Anatomy.

Research

In 2024, my research continued to focus on genetic factors that affect bone regeneration. This project will help discover new pathways that can be targeted to improve bone healing in many circumstances, including total joint replacement surgery and repair of fractures. The project is supported by an award from the National Institutes of Health, or NIH.

We are also investigating the effects of preterm birth on bone growth after birth. The immediate goal is to gain a better understanding of metabolic bone disease (osteoporosis) of prematurity. A longer-term goal is to determine if there are lifelong consequences of preterm birth on the skeleton. This project is also supported by an award from the NIH.

I am also the principal investigator on a shared instrumentation grant from the NIH to acquire a laser-based instrument for making thin sections of tissues containing bone and teeth. These sections

are viewed with a light microscope and can be examined by other advanced technologies. Once installed in 2025, Rush will be one of three universities in the U.S. with this capability. We earned this award based on the very strong musculoskeletal research base at Rush. Compared to traditional techniques, the images obtained from specimens prepared with this instrument are spectacular. The acquisition of this novel equipment will enhance health-related research on bone growth and regeneration, osteoporosis, osteoarthritis, joint replacement, rare bone diseases, tissue engineering, and dental reconstruction. The instrument will be used by more than 15 principal investigators and their labs and will support over 25 NIH research grants.

Education

Faculty in my department teach medical students in Rush Medical College, graduate students in the Division of Translational Sciences, nursing students in the College of Nursing and health science students in the College of Health Sciences. The teaching faculty have received many awards, including being ranked among the top 15% of educators in nationwide surveys. Several of the students taught by departmental faculty have also gained research experience.

I am the principal investigator on an NIH training grant that provides research opportunities for PhD graduate students, postdoctoral fellows and medical students in joint health. This program involves about 20 faculty at Rush and eight trainees, who receive stipend support from the grant. The overall goal of NIH training grants is to prepare trainees for careers that significantly impact the health-related research needs of the U.S.

Publication Highlights – Abbreviated

1. Wilson BM, Ko FC, Moran MM, Adra A, Rasmussen MB, Thymann T, Sangild PT, Sumner DR. Skeletal consequences of preterm birth in pigs as a model for preterm infants. *Journal of Bone and Mineral Research*. 2024;39(6):791-803.

2. Scheller EL, McDonald M, Andersen TL, Sumner DR, Noda M, Erben RG, Boyce BF, Compston JE, Dempster DW, Takahashi HE, Malluche HH, Wronski TJ. Celebrating 50-years: the history and future of the International Society of Bone Morphometry. *JBMR Plus*. 2024;8(7):ziae070.

3. Ko FC, Xie R, Willis B, Herdman ZG, Dulion BA, Lee H, Oh CD, Chen D, Sumner DR. Cells transiently expressing periostin are required for intramedullary intramembranous bone regeneration. *Bone*. 2024;178:116934.

4. de Souza W, Gemini-Piperni S, Ruivo C, Bastos N, Almeida S, Lopes D, Cardoso P, Oliveira MJ, Sumner DR, Ross RD, Jacobs JJ, Granjeiro JM, Fernandes MH, Rocha LA, Melo S, Ribeiro AR. Osteoblasts-derived exosomes as potential novel communicators in particle-induced periprosthetic osteolysis. *Materials Today Bio*. 2024;28:101189.

The Year Ahead: 2025 and Beyond

Our main priority is supporting researchers who will leverage resources for projects likely to gain extramural support. For instance, one of our newer recruits received a subaward from the National Science Foundation. This new faculty member's primary effort is teaching medical and health science students, but she also dedicates time to research, which is supported by your generosity.

With Gratitude

As a basic science department chairperson, I have limited discretionary funding to support trainees and faculty. Since it is unreasonable to expect faculty to be 100% funded from extramural sources for their research effort, your support is critical to maintaining continuity. Multiple federal grant submissions, including to the NIH, U.S. Department of Defense, and National Science Foundation, have been enabled by your support. We are pleased to report that several have been funded.

On behalf of my faculty and trainees, I am very grateful. Your generosity supports our musculoskeletal, cancer and movement disorders research.