

# Scholarship in Orthopedics: Why do We Need It and How to Support It?

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Generating and applying new knowledge to our field is critical in enhancing our ability to manage patients with orthopedic problems. Advances in clinical research, biologics, and less invasive technologies, all are poised to revolutionize orthopedic care. It is important that we should have appropriate scholarly activities in our profession to support for bringing these advances in patient care as efficiently and effectively as possible. As such, scholarship remains an important part of the orthopedic profession.

However, as clinical demands increase, finding time for scholarship in orthopedic is difficult. In addition, increasing complexity of the health-care environment has resulted in scholarship taking new forms. For instance, scholarship in business and behavioral economic aspects of health care can be applied to develop models to optimize our ability to provide quality of care to a larger population of patients.

With the increasing clinical loads and more diversity in areas of scholarship, the role of research in orthopedics is being questioned. Yet, it is this type of research that fuels the development of new therapies that will ultimately improve care. In addition to the importance of scholarship in advancing the field of orthopedics, it is also an important component of training.

The Accreditation Council for Graduate Medical Education requires research in training during orthopedic residency. Engaging in research during the training of an orthopedist teaches how to apply new research findings to clinical practice. This skill is important regardless of the clinical practice environment of the ultimate practice setting in which the trainee will work.

Yet there are substantial challenges to fit research training into the residency, as well to be able to offer a diversity of scholarship pursuits to trainees. Given these challenges, how do we ensure continued scholarship in our field? Our faculty and trainees need access to the appropriate physical or intellectual infrastructure, the time to do the work, funding, and a culture that encourages scholarly activities.

Given practical constraints, not all areas of work can be supported in all four realms. As such, how should we select what to support? Work from several decades ago investigated what areas of investigation are most likely to result in clinical advances. Julius Comroe from the University of California, San Francisco and Robert Dripps from the University of Pennsylvania worked for years on this topic in an attempt to bring science, rather than anecdote, to the decision-making process of how government should be directing research dollars.

They became interested in this topic a full decade before it was published, based on a public comment that then President Lyndon Johnson made. He was responding to a Department of Defense publication that investigated the origin of the development of important military weapons. That study concluded that the contributions of university research were minimal; that scientists contributed most effectively when their efforts were mission-oriented; and that the lag between discovery and utility was shortest when the sponsor directed the research, not the scientist.

In Johnson's words, "A great deal of basic research has been done... but I think the time has come to zero in on the targets by trying to get our knowledge fully applied.... We must make sure that no lifesaving discovery is locked up in the laboratory." The authors analyzed the relative contributions of types of research to landmark discoveries. They chose cardiovascular and pulmonary disease, and directed their attention to clinical advances that had been directly responsible for diagnosing, preventing, or curing diseases: open heart surgery; vascular surgery; drug treatment of hypertension; medical treatment of coronary insufficiency; cardiac resuscitation; oral diuretics for heart failure and hypertension; the development of intensive care units; prevention of polio; antibiotics to treat rheumatic fever, tuberculosis and pneumonias; and new diagnostic methods, such as the electrocardiography. To uncover the origins of these advances, they examined over 4,000 articles published over many decades.

They found that these clinical advances were the product of many individuals' work in many disciplines. Cumulatively, they found that 41% of all work judged to be essential or crucial for these clinical advances were not clinically oriented at all, but they were undertaking research for the sake of knowledge.<sup>1</sup>

Taken together, their work supports the notion that the most innovative research, tackling diverse questions from diverse directions is the best way to advance a field. Indeed, there is little evidence that targeted funding in the absence of a cohort of innovative investigators pushes clinical care forward. With this in mind, how do we push advances in clinical care in orthopedics forward? We need to ensure that innovative individuals in our field can get the support they need to make advances in orthopedic scholarship, regardless of the discipline.

Access to different areas of scholarship is needed, and it needs to be easy for clinicians and trainees to engage in scholarship across the spectrum. In our department, we developed research programs around five themes: (1) Cell, Genetic, and Developmental Biology; (2) Musculoskeletal Bioengineering, Regeneration, and Repair; (3) Movement Sciences, Kinesiology, and Rehabilitation; (4) Clinical Research; and (5) Populations, Policy, and Implementation Research.

Developing diverse areas of research within the department facilitates our faculty and trainees engaging in scholarly activity across this diverse spectrum. Ultimately, this will result in generating and applying new knowledge across this scholarship spectrum that will improve orthopedic care. Our departmental goal of CLIMBING HIGHER—to inspire through innovations in basic science, clinical, and translational research—is well aligned with this concept.

*Duke Orthopaedics* passed an important milestone in 2017, as we are now ranked third in the country for National Institutes of Health funding held by an orthopedic department.<sup>2</sup> Furthermore, our research funding is for work across the scholarship spectrum, from basic biology to population-based investigations. In addition, our faculty have filed multiple patents, and even developed new start-up companies to commercialize these.

This effort has resulted in manuscripts published not only in the top orthopedic journals but also in high impact general medical and sciences journals, such as in *Nature* and *Lancet* series journals. Many of these publications and patents are laying the foundation for new orthopedic treatment. It will be an exciting future ahead.

An ongoing challenge is how to best use this infrastructure to allow those trainees and faculty who have the desire, to be able to engage in scholarly activity at an appropriate level. This work in innovation will foster improvements in orthopedic care. There is guidance in how to achieve this goal, as in 2014, the American Academy of Orthopaedic Surgeons Board of Specialty Societies Research and Quality Committee convened a Clinician-Scientist Collaboration Workgroup that was tasked with identifying barriers to resident research, proposing feasible recommendations to overcome them, and promoting the findings to the broader orthopedic community.

Their recommendations outlined a process to introduce all residents to scholarship, and they suggest a pathway to support the smaller cohort of trainees who wish to have a career with a stronger scholarship focus.<sup>3</sup> We are in the process of incorporating these at Duke. In addition, we developed unique institutional support initiatives, such as Strong Start, Duke Health Scholars, and the Enable program, which provide funding to support traditional research work; as well as Coulter and MedBlue funding to support innovations that can be developed into commercial products.

Many of our orthopedic faculty received funding from these programs.<sup>4,5</sup> Scholarship is not about grants, papers, and patents, but improving health and society. There is a strong tradition of innovation in our department. Microsurgery techniques, free fibula grafting, and total ankle replacement are just a few of the areas in which Duke Orthopedics has made seminal advances improving clinical care.

The foundation in scholarship and tradition of innovation, we have at Duke, will inspire the kinds of future advances in orthopedic care that Julius Comroe and Robert Dripps wrote about 40 years ago.

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