

Industry Investment in Orthopaedic Surgery Research Far Outpaces Public Spending

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INTRODUCTION: Over 127 million people in the United States are affected by musculoskeletal conditions with direct costs of \$380.9 billion annually, surpassing that of diabetes, cardiac disease and cancer. Although musculoskeletal conditions constitute a significant and growing healthcare burden, funding from the National Institutes of Health (NIH) has remained disproportionately allocated to other diseases. We aimed to quantify and compare research funding between the NIH and industry.

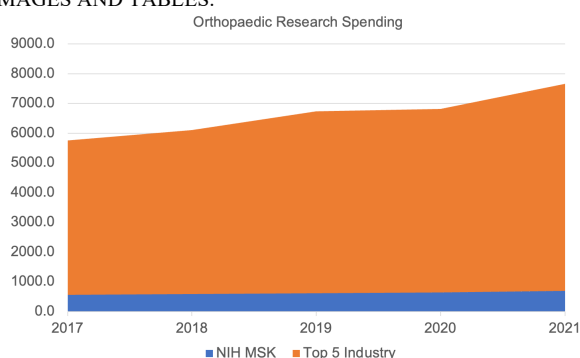
METHODS: Public research funding over the past 10 years (2012 to 2021) was aggregated using data from NIH funding to arthritis and other musculoskeletal conditions with >\$10M in funding (arthritis, osteoarthritis, osteogenesis imperfecta, osteoporosis, rheumatoid arthritis). Private funding into research and development (R&D) from 2017 to 2021 was tabulated from the top 5 orthopaedic companies by revenue, compared to net sales to calculate R&D as a percentage of total sales. Annually reported financial statements (10-K) were obtained from Securities Exchange Commission (SEC) filings, with R&D funding as specific to orthopaedics as possible obtained from reported R&D operating expenses. Private funding from each of the 5 vendors was summed/aggregated on a per annum basis, and compared to NIAMS spending, with descriptive statistics to compare differences and identify the relative percentage of public versus private spending.

RESULTS SECTION: NIH research allocated to MSK conditions grew from \$448 million to \$698 million USD, respectively. From 2017 to 2021, R&D spending from the top 5 orthopaedic companies grew from \$5,189M to \$6,958M USD. During this time period, net sales from Stryker, JNJ Medical Devices, Zimmer Biomet, Smith and Nephew and Medtronic grew to \$17.1B, \$27.0B, \$7.9B, \$5.1B and \$30.1B, respectively. When comparing public and private companies in 2021, R&D spending/investment from the top 5 companies constituted 10.0 times more than that from NIH research funding for MSK conditions from the NIH. This has grown from 2017, when R&D spending from the top 5 companies constituted 9.2 times that of NIH research funding. Overall, at least \$7.5B from both private/public sources has been allocated to orthopaedic research, with ~9.1% coming from public sources, with research funding from the top 5 orthopaedic vendors being 10.0x that of the NIH.

DISCUSSION: Annual research funding from only the top 5 orthopaedic vendors (62.6% of market share) is 10.0 times that of the NIH, which has grown since 2017 when it constituted 9.2 times. Given this disparity and the important burden of musculoskeletal disease, efforts should be considered to appraise public investment in orthopaedic research. In addition, there should be an appreciation for the important role that industry plays in funding orthopaedic research.

SIGNIFICANCE/CLINICAL RELEVANCE: Public funding for orthopaedic surgery research is significantly lacking compared to private industry funding. At a comparative rate of 10 times that of public funding, industry funding plays a crucial role in creating important strides in orthopaedic research.

IMAGES AND TABLES:



	2017	2018	2019	2020	2021	TOTAL
NIH	\$563M	\$579M	\$610M	\$645M	\$698M	\$3,095M
Top 5 Industry	\$5189M	\$5520M	\$6120M	\$6168M	\$6958M	\$29,955M

Figure 1: Annual NIAMS spending versus R&D spending from the Top 5 Orthopaedic Companies