

# National Science Foundation CAREER Award



Ron June

Montana State University mechanical and industrial engineering professor Ron June studies a bone sample with anthropology student Michael Ruiz in a lab at MSU.

# Ron June's Research

A Montana State University researcher searching for ways to keep our joints healthy as we age recently received a \$500,000 CAREER Award from the National Science Foundation.

The CAREER Award is the NSF's most prestigious award to support early career development of teacher-researchers. It's particularly notable because it is awarded to a single person instead of a team, honoring outstanding faculty who haven't yet received tenure.

The grant will further the work of Ron June, assistant professor of mechanical and industrial engineering in the MSU College of Engineering, who hopes his research will lead to advanced treatments for osteoarthritis, an aging-related disease in which cartilage deteriorates, resulting in painful joints and decreased mobility.

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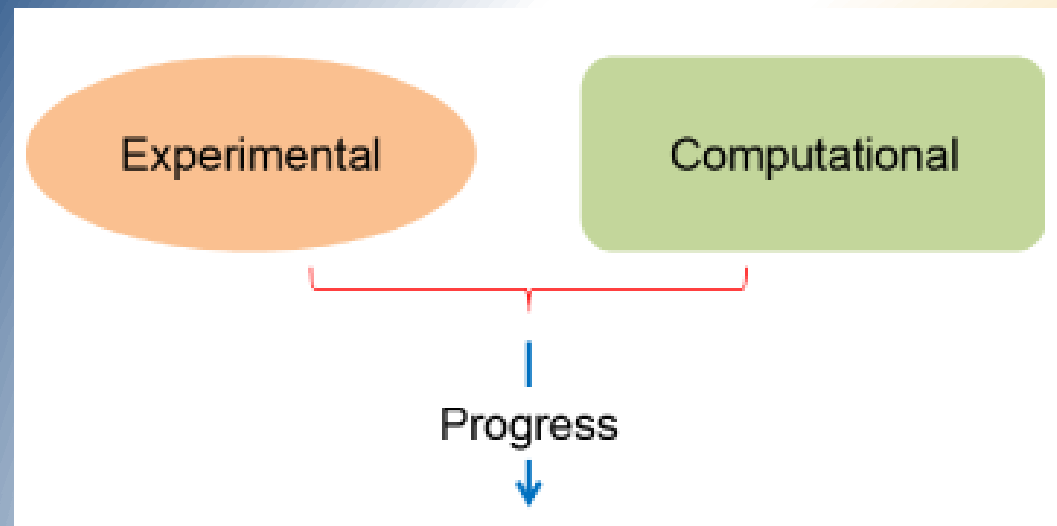
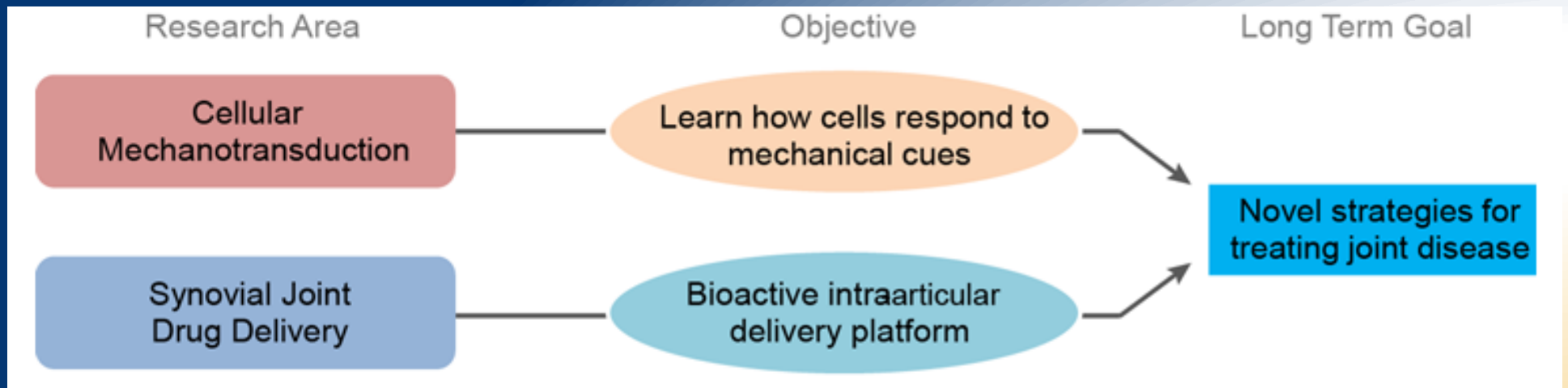
Understanding these processes, he said, may lead to ways to prevent the deterioration of cartilage tissues, or even their regeneration after damage has occurred.

“It may be a pipe dream, but I’d love to come up with a drug that works in conjunction with the cells’ chemicals that would allow a patient to hop on an exercise bike and pedal for 20 minutes to regenerate cartilage,” June said.

The research at MSU may also reveal how other types of cells respond to mechanical environments.

“We could gain a better understanding of how cells of the vascular systems respond to the effects of heart disease, for instance,” June said. “A greater understanding of why we lose bone mass when we stop exercising could help us have stronger bones as we age. So, there could be wide applications for the work we’re currently doing.”

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Research Approach

The grant will also enable June to increase the involvement of undergraduate and graduate students in his research. In addition to teaching undergraduates, June is adviser to three doctoral students.

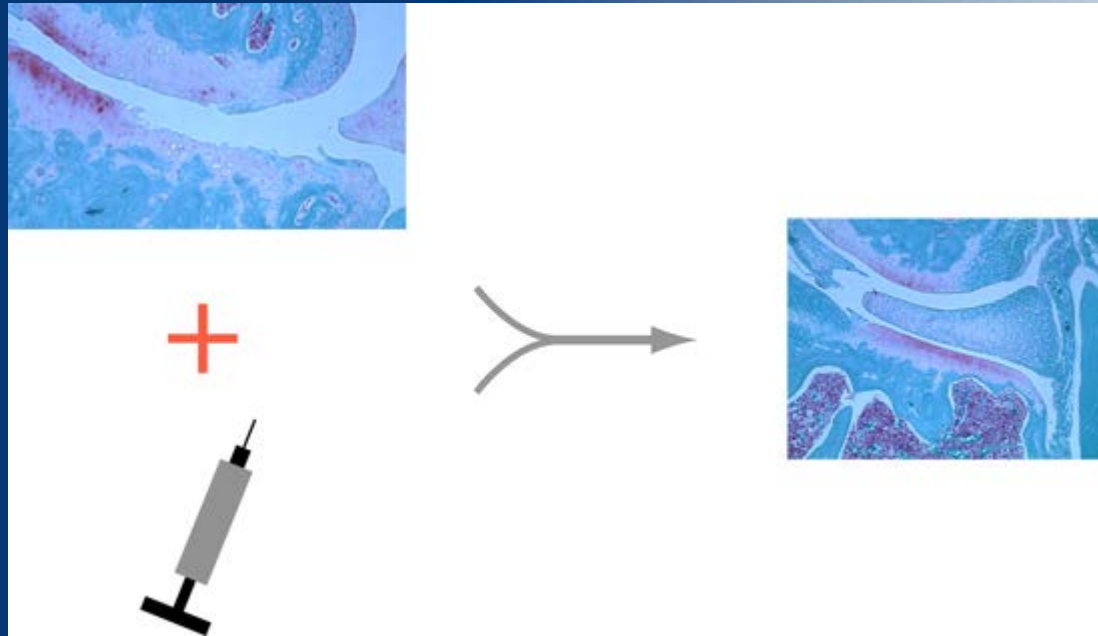
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“They’ll be doing mechanical compression testing, cell culture, biochemical extraction, and computational data analysis,” he said. “Involving undergraduate and graduate students makes it a better educational experience for everybody involved.”

“This CAREER award represents a high-risk, high-reward project that is likely to have a transformative impact on the field of mechanobiology and future treatments for aging and damage of cartilage,” said Kara Peters, NSF program director for the Mechanics of Materials and Structures Program. “Further, the educational and research integration plan may have a positive impact on increasing the number of Native American engineers in the workforce.”

Our long-term goal is to develop novel treatment strategies that use protein transduction and build upon what we know about how cartilage cells respond to mechanical loads caused by forces, such as gravity, and activities, such as walking.

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Cellular mechano-transduction is the mechanism by which cells convert mechanical signals to biochemical responses. We conduct research related to osteoarthritis, an aging-related disease in which cartilage deteriorates, resulting in painful joints and decreased mobility.