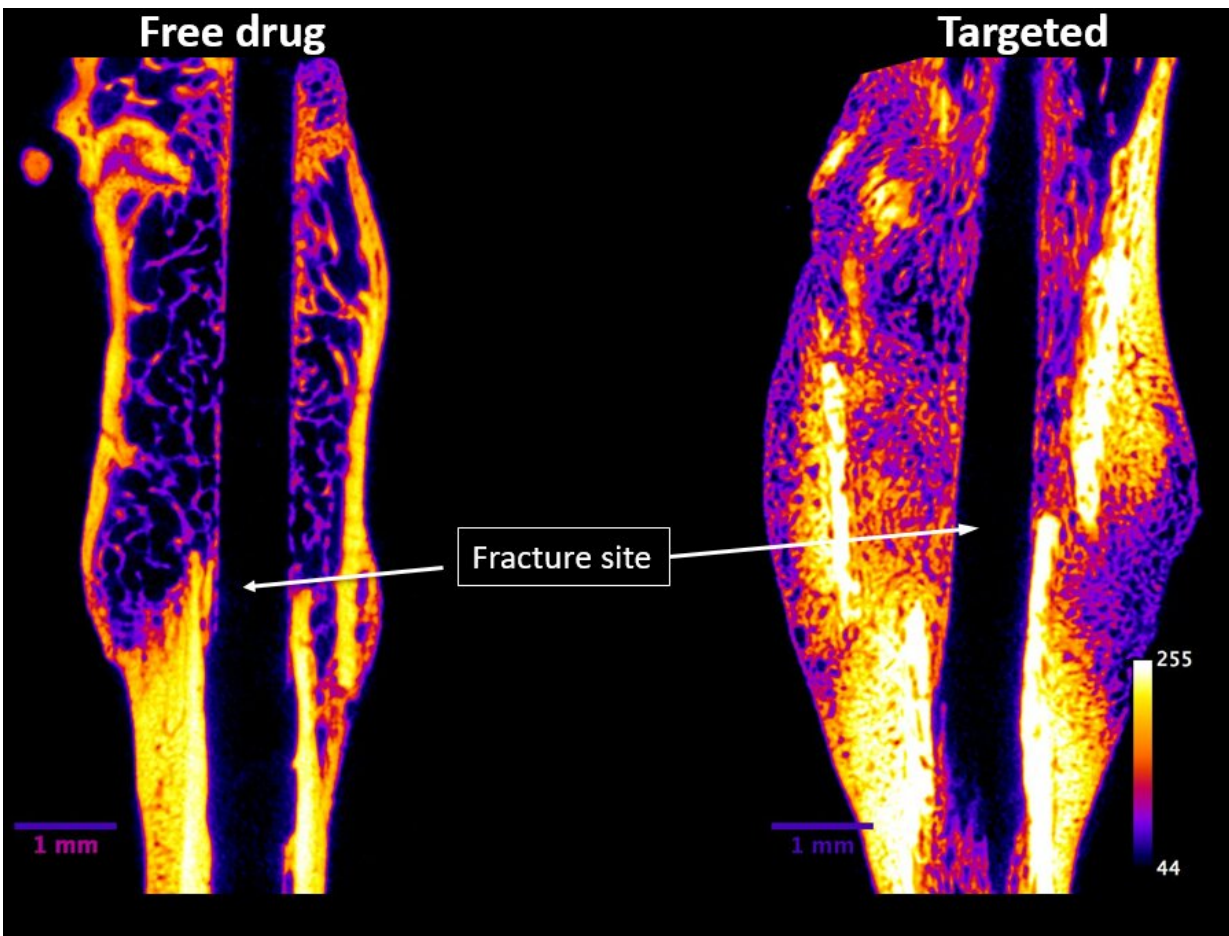


Injectable drug aims to accelerate bone healing

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Novosteo, a Purdue-affiliated startup, is advancing a technology shown to repair bone fractures faster and at greater benefit to a patient. The image above shows fractured femurs at four weeks post-fracture. The 'Targeted' bone received Novosteo's injectable targeted drug. Yellow and orange colors indicate higher density bone than purple and blue. Credit: Stewart Low, Novosteo Inc.

Every person in the U.S. will experience, on average, two broken bones in their lifetime.

It is expected that more than 6.3 million bones will be broken in the U.S. this year, according to the National Institutes of Health. Average recovery time for a young, healthy adult with a broken arm is six to eight weeks.

Average recovery time for a fractured hip for someone 55 or older is much more serious. Recovery can take six months to a year. One out of three will die due to complications within one year, and for those surviving only 50 percent will regain full mobility within a year, the NIH reports.

Hip [fractures](#) are expected to climb by 160 percent to 500,000 fractures annually by 2040. Costs of treating fractured hips continues to skyrocket. Medicare alone paid \$31 billion in hip fracture treatment in 2015.

A new injectable [bone healing drug](#) could change the treatment of breaks, fractures and weak bones. The drug has been shown to reduce fracture healing time by 50 percent and reduce side effects. Costs and recovery times are expected to reduce at about the same rate with the [novel drug](#).

"Most of us can relate to the discomfort and problems that arise from a bone fracture. If you are expected to have a cast on for 12 weeks, we want to cut that down to six weeks," said Stewart Low, a visiting scholar in Purdue's Department of Chemistry who helped develop the technology. "If you have to have your jaw wired shut for two months, our goal is to reduce the time to one month. If you are told that your fracture has a 30 percent chance it won't heal, our goal is to reduce that to 15 percent."

The Orthopaedic Research Society awarded [Novosteo Inc.](#), the startup developing the new bone treatment, with a first-place award for its work in bone repair during the society's 2019 Annual Meeting held Feb. 2-5 in Austin, Texas.

Jeffrey Nielsen and Mingding Wang, two graduate students in Philip Low's lab, also placed first and second, respectively, in the society's Junior Investigator 3-minute Thesis Competition for "Targeting Neuropeptides to Bone Fractures for Accelerated Healing."

The innovation was developed at Purdue University and Novosteo was co-founded by father-son team Philip Low, the Ralph C. Corley Distinguished Professor of Chemistry, and Stewart Low. Stewart Low also presented Novosteo's findings at the Orthopaedic Research Society's conference.

"There is a lot of interest in this drug from orthopedic surgeons because they currently have very few options for treatment of difficult-to-heal bone fractures such as those that can occur in elderly populations," Stewart Low said. "Our motivation is to shorten the time people have to suffer through bone fractures. We are very excited to move these discoveries into the clinic."

The injectable drug goes directly to site of the fracture and attaches itself to the bone without the need for invasive surgery to treat fracture directly on the bone.

"The ability of the fracture homing drug to attach itself specifically to the site of a bone fracture is the primary attribute that distinguishes this technology from all other fracture treatments," Philip Low said. "The only clinically approved bone fracture healing drug available now must be applied topically during surgery, where the drug is 'painted' directly onto the broken bone. Our drug does not require this invasive procedure,

but can be injected subcutaneously anywhere on the body even several days after the injury."

Novosteo has already completed preclinical studies that successfully demonstrate how the new targeted drug heals [bone fractures](#) faster and better than the same untargeted drug. The research findings were published last year in the Department of Defense Spotlight article "Fracture-targeted drugs for accelerated bone repair," authored by Philip Low and Stewart Low.

Novosteo is already looking at using the injectable targeted drug for other future uses including [dental implants](#), head and facial fractures, hip and knee replacements and complicated hard-to-heal nonunion or complex fractures.

Novosteo received a \$1.7 million from the National Institutes of Health SBIR Phase I/II grant through the National Institute of Dental and Craniofacial Research in 2018 to help fast track to human trials of the injectable targeted drug. The grant supports the drugs' efficacy testing and preparation for Phase 1 clinical human trials.

Provided by Purdue University

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