

Medical startup Flowbone: Preventing bone fractures caused by osteoporosis

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Credit: Ecole Polytechnique Federale de Lausanne

EPFL scientists have developed a gel that can locally reinforce bones weakened by osteoporosis. The startup they created, called Flowbone, has just made it through the second round of the Venture Kick competition.

Femoral neck fractures occur frequently among the elderly, and are

usually caused by osteoporosis—a disease that weakens the [bone structure](#). "250 million people around the world have osteoporosis," says Professor Dominique Pioletti, the head of the Biomechanical Orthopedics Laboratory (LBO) at EPFL's School of Engineering. "It manifests as a reduction in [bone mass](#) and a deterioration of the bone microarchitecture, leading to increased fracture risk." Ulrike Kettenberger, a post-doc researcher at LBO, adds: "It's a big problem in our society. 40% of people who fracture their hip can never walk again without assistance and 33% become no longer self-sufficient. One out of five patients dies in the year following the fracture. These figures are alarming."

Hip bones, vertebrae and wrist bones

Drugs are available to strengthen the bones of people suffering from osteoporosis. But it's a silent disease, meaning many people don't know they have it. "Doctors generally discover it only after the first fracture, which is already too late," says Pioletti.

The drugs currently available have two drawbacks. The fact that they act on all bones of the body—a good thing in itself—unfortunately means the secondary effects also affect the entire body. Osteoporosis-related fractures typically occur in the hip bones, vertebrae and wrist bones. Second, the benefits are only visible 12 months after treatment begins. "This window is critical," says Kettenberger, "because that's when people who have an initial fracture often have a second one. We need to strengthen their bones quickly to prevent this from happening."

Localized injections

The LBO scientists came up with a novel compound called Flowbone to address this problem. "We developed a biomaterial in the form of a gel

that contains a hyaluronic acid matrix, calcium phosphate particles and a tiny dose of a bisphosphonate," says Kettenberger. Doctors can inject the gel directly in a patient's bone under [local anesthesia](#). The gel penetrates the bone structure without damaging it. "Flowbone is only administered where it's important to prevent a fracture," she adds. "It could serve as a minimally invasive treatment to help avoid systemic secondary effects. The local [bone](#) structure would show a marked improvement three or four months after the injection, and the effect would last around three years." A radiologist could perform the injection through an outpatient procedure. Flowbone would be useful mainly for preventing subsequent [fractures](#), since osteoporosis often goes undetected before an initial fracture.

A Venture Kick startup

The scientists entered their Flowbone startup in the Venture Kick competition for Swiss entrepreneurs and have just made it through the second round with a prize of CHF 50,000 in funding. "We plan to use this money to conduct pre-clinical trials," says Pioletti. They expect to launch their Flowbone gel on the market within five or six years.

A disease that afflicts mostly women

Osteoporosis is a disease that affects mainly the elderly—and especially women. "One out of three women over 50 has it, as opposed to one out of every five men," says Ulrike Kettenberger, a researcher at EPFL's Biomechanical Orthopedics Laboratory. Bone mass naturally starts declining after the age of 30, but that process accelerates in people with osteoporosis. Young people can develop the disease too, such as those suffering from anorexia, a disorder that—like [osteoporosis](#)—afflicts women more than men.

Provided by Ecole Polytechnique Federale de Lausanne

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