Bone cell growth therapy tested to treat osteoporosis

An experimental procedure under investigation at the University of Michigan Health System may make it possible to grow new bone to replace the bone that's lost due to osteoporosis.

The therapy, which employs the AastromReplicell System, uses a patient's own bone marrow to grow new cells and strengthen existing bones. The first clinical trial of the technique is underway.

If the trial's results show promise, the therapy could provide a new treatment for the millions of women – nearly half of all women aged 45 and older – who are affected by osteoporosis, a disorder marked by the slow thinning and weakening of the bones. Osteoporosis, which most often affects women during and after menopause, can cause stooped posture, chronic aching and, in an estimated one-third of women, bone fractures.

"The way we treat osteoporosis now is to try to stop it from getting worse, and almost all the therapies that we have are aimed at preventing further bone loss," said Robert Lash, co-director of the UMHS Osteoporosis and Metabolic Bone Disease Program who is working with Aastrom Biosciences Inc. to carry out the investigation. "One of the goals of osteoporosis therapy, and our goal at UMHS, has been to find therapies that would help people build bone."

The therapy under investigation at UMHS shows early promise of doing just that.

Growing cells

In the bone marrow, there are two types of cells – some that make blood cells and others that make bone cells.

"What our project involves is taking a small amount of this bone marrow out of the patient, putting it into a special device that grows these cells to very, very large numbers and then giving people back their own cells," said Lash. The cells produced will be a mixture of both blood-forming and bone-forming ones.

The bone cells that are injected back into the patient have the ability to hone in on places in the body that have bone – in effect, going where they're needed and adding to the bone that's there.

"So we're hoping that giving a patient back large numbers of the cells that normally form bone will make it easier for *them to form new bone, and* therefore they will have stronger bones," said Lash.

Some other current therapies for osteoporosis target – and try to stop – the process that breaks down bone, allowing the bone to regrow naturally. Current therapies like those could allow a person to have a 3 percent to 5 percent increase in bone.

Lash said that, even if the UMHS study using the AastromReplicell system is only modestly successful, he hopes it will produce a clinically significant increase in bone mass in his patients.

"We're hoping we're going to be able to give patients enough of these cells and that these cells will be active enough that we can turn on the bone-producing process to a much greater degree than would occur naturally."

Test subjects

Currently, the therapy is being tested on those with significant osteoporosis and is not designed for patients who have minimal bone loss or for those who are concerned about bone loss.

"Right now, we are hoping to help people who have a strong family history of osteoporosis and who've also demonstrated already that they have significant bone loss," Lash says.

In the first phase of the trial already underway, the study includes women who are less than 65 years old and who have osteoporosis but are otherwise healthy. Because it's a phase-one trial, the study is only investigating the safety of the treatment. For more information or to see if you qualify for the trial, call U-M TeleCare at 1-800-742-2300, category 2222.

Prevention

Lash notes that taking preventive measures is still vitally important in warding off osteoporosis.

"Our goal is always to prevent osteoporosis, and we certainly encourage women to take calcium and vitamin D from their teenage years through their adult years," said Lash. "We urge people to maintain healthy lifestyles, not to smoke, to exercise, not to drink excessive amounts of caffeine."

Even taking those precautions, many people – especially women – may develop osteoporosis because of diseases, medications or other conditions.

"We certainly hope we're going to improve the quality of life for patients with osteoporosis," said Lash. "We don't know yet because this is an experimental process, but we think that any bone that we can give patients – given the fact that they're growing their own bone – *will be good bone, strong* bone, healthy bone, and will make it possible for them to have a more active lifestyle with less risk of fracture."

Facts about osteoporosis:

- Although women are most at risk for osteoporosis, they are not alone. Today, 2 million American men have osteoporosis, and another 3 million are at risk for this disease.
- Bone building occurs over a lifetime. But it's particularly important during adolescence because that's the last time there is major building of bones. Teenagers, especially girls, need to be certain they are getting enough calcium in their diets. A deficiency in adolescence could lay the groundwork for osteoporosis later in life.
- Those at higher risk for developing osteoporosis include women who have reached menopause, women who've had their ovaries removed, people with a family history of the disease, and those who smoke, drink alcohol or eat few calcium-rich dairy foods.

Web sites

- U-M Health Topics A to Z: Osteoporosis
  www.med.umich.edu/1libr/womens/gyn07.htm
- U-M Health Topics A to Z: Non-Exercise Dangers
  www.med.umich.edu/1libr/primry/fit04.htm
- U-M Health Topics A to Z: Fractures
  www.med.umich.edu/1libr/topics/muscle08.htm
- National Institutes of Health's Osteoporosis and Related Bone Diseases National Resource Center: www.osteo.org

Empowerment *from page D4*

Empowering

Steinberg recommends joining a health club or enrolling in a weight-lifting exercise program. Find an instructor who can give you a good orientation, he said. "Having a positive experience early on can really make a difference in your confidence level. Remember, everybody is a novice, whether they're 15 or 55."

Starting a weight-training program is trial and error. Make sure you give your muscles time to rest between work-out sessions. "Doing too much too quickly is the biggest reason for injury," said Nicoloff.

Hooner can't not imagine a life without weight-lifting. "It can be addictive. Whatever it releases – those cool little things, endorphins – it's like you're on runner's high, It's that empowering feeling," she said.

"I think weight lifting makes you confident. And I feel proud of myself for being able to get this far," said Rachel Medlen.

Such feelings are added benefit of weight-lifting, said Steinberg. "It's important to have those peak experiences where we know we've done a good job and reached our goals. Weight-lifting gives everyone a chance to be a winner."