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Stem cells from fat may help heal bone

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(PhysOrg.com) -- Wounded soldiers may one day be treated with stem cells from their own fat using a method under development at UC Davis.

Kent Leach, assistant professor of biomedical engineering, has already used the treatment in three racehorses. Now, with a $100,000 grant from the U.S. Army, he will begin testing it in rats.

The method employs a gel-like material to encourage stem cells from fat to regenerate damaged bone.

The stem cells have been shown to stimulate the growth of small blood vessels in developing bone, encouraging healing. The gel keeps the stem cells at the injury site; as the bone heals, the gel breaks down.

"Straight injection of stem cells has a limited effect," Leach said. "If we can localize the cells at the treatment site, the treatments should be more effective."

With Larry Galuppo, professor of veterinary medicine at UC Davis, Leach has already tested the technique in racehorses undergoing treatment for bone cysts at the UC Davis Veterinary Medical Teaching Hospital. Galuppo and his colleagues are treating most of the horses by injecting them with stem cells alone, but in three horses to date, they have used Leach's gel method. Results from those equine patients are still being assessed. The technique has not yet been tested in humans.

Using stem cells from a patient's own fat has two main advantages,

Leach said. The stem cells have a better chance of succeeding and not being rejected by the body; and the main alternative, extraction from bone marrow, can be painful, requires several days of recovery time, and is not feasible for severely injured or weakened patients.

"Stem cells from adipose tissue are an exciting alternative to stem cells from bone marrow or other tissues because we can isolate a large number, no matter what the patient's condition is," Leach said.

Leach envisions that eventually, surgeons could extract fat from a patient, separate out the stem cells, mix them into the gel and inject the mixture directly into a fracture.

The team will test several compositions in rats to find one that yields the most rapid growth of new blood vessels and resulting bone formation, using noninvasive imaging technologies.

Provided by UC Davis