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**UNIVERSITY OF MIAMI CHIEF OF ORAL SURGERY DEVELOPS NEW TECHNOLOGY
TO HARVEST SIGNIFICANTLY MORE STEM CELLS, WITHOUT PAIN**

MIAMI -- To collect a greater number of stem cells derived from the patient's own bone marrow, more safely, and without painful procedures, the chief of oral and maxillofacial surgery at the University of Miami Miller School of Medicine has been testing and developing a device that targets the inner wall of the bone, where more stem cells naturally live.

Dr. Robert E. Marx, professor and chief of oral and maxillofacial surgery at the UM Miller School of Medicine, has found that key cells in your bone marrow are actual stem and osteoprogenitor cells and are the best sources of stem cells, which live along the inner surface of the cortex in bone. Since 2008, Dr. Marx has been studying an unbreakable, flexible device that will remain in the bone marrow to move along the inner cortex in bone, where most of the stem cells (such as CD34+ and CD105+) can be harvested.

"In order to prevent pain and send the patient home more quickly, we need a device that is minimally invasive and will stay within the bone marrow rather than damaging tissue, nerves or blood vessels," says Marx. "In over 500 cases so far, the technology we are working on has shown the ability to more safely harvest selectively more stem cells than any device has been able to do." The device is estimated to be available by the end of the year.

Currently, stem cells are collected through the bone marrow donation process of apheresis, which can be painful and uncomfortable for patients and can require lengthy and expensive hospital stays. Since 2005, the industry has tried to harvest a large amount of stem cells, but several flaws have complicated this effort.

"We are now ready to regenerate new tissue and do it with minimally invasive techniques," says **Dr. Theodore I. Malinin, emeritus professor of orthopedics, University of Miami Miller School of Medicine, former medical director, University of Miami Tissue Bank**. "Today, with this type of a device, and even with some of the other ones out there, we now have the ability to harvest greater numbers of stem cells, with greater safety. We also know that if you combine osteoprogenitor cells and/or stem cells with a bone growth factor, such as recombinant human bone morphogenetic protein and a scaffold, we have shown that you can rebuild large segments of the lower jaw."

The new device under research is minimally invasive and enters with only a small puncture into the ilium, the tibia or the calcaneus, or almost any bone a surgeon will need to penetrate. It will stay within the bone marrow, and not perforate through the cortex. With its flexibility it enters the medullary component of bone, and will harvest 250,000-400,000 stem cells per ml.

"Out of 500 cases Marx saw complete bone regeneration with no long hospital visits or foreseeable days in the ICU—that's what we want, says **Dr. H. Thomas Temple, professor of orthopedics, NOVA Southeastern University School of Medicine**. "These are important results."

In the area of today's regenerative medicine, through the use of cell-based or biologic therapies, there are various options, even with the choice of autologous stem cells. Until

now, this has required the clinician to use inadequate technology and expertise, with quite a few limitations: the expense and frustration of centrifuges; difficulty collecting stem cells and instrument breakage.

Historically, stem cells have been difficult to find. They can stay non-dividing and non-specific for years until the body summons them to repair or grow new tissue. Bone marrow stem cells are taken under a general anesthetic, usually from the hip or pelvic bone. Technicians can then isolate the stem cells from the bone marrow for storage, donation, or as Dr. Marx has done, apply them for patient needs at the point of care.

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