

Message from the Chair

What is BME?

BME at a glance

News & Events

- **Faculty News**
- Student/Post-doc News
- Newsletters
- Events

BME Positions

Location & Facilities

Directions & Maps

Contact Information

Search

FACULTY NEWS

[Return to faculty news.](#)

"Designed Bioactive Scaffolds for Mandibular Reconstruction"



Scott Hollister, PhD, and Stephen Feinberg, DDS, PhD

2009 funding: \$100,000

Reconstruction of segmental mandibular defects resulting from trauma, tumor resection, and congenital defects is a significant challenge. The ability to design scaffolds to fill complex anatomic defects, provide load bearing and deliver osteogenic factors is needed to address these clinical issues, especially for children who cannot be treated with alloplastic materials.

Segmental mandibular defects often occur after tumor resection, infection, trauma or through abnormal skeletal development. Reconstruction of these defects is presently done with the use of bone grafting (autogenous and/or allogeneic) or through the use of alloplastic materials such as titanium. A significant difficulty in reconstructing these defects is the complex geometry that must be replicated in addition to the functional load bearing requirements. These methods carry the potential for immunologic rejection, foreign body reactions or infection. In addition, with the use of autogenous bone there is also the resultant potential of donor site morbidity and increase in operative time with limitations on the amount of bone one can harvest. For example, with vascularized fibular grafts taken from the leg, there is significant ambulation morbidity, including difficulty climbing stairs. Furthermore, it is extremely difficult to fill complex 3D defects with bone grafts. With the use of either autogenous or allogeneic bone it is also difficult to form it into the desired shapes necessary for reconstruction, giving low patient satisfaction for these approaches.

Dr. Hollister's team has worked with Dr. William Murphy of the University of Wisconsin to develop the unique integration of designed scaffolds with bioactive coatings which deliver growth factors for bone regeneration and offer a promising solution for difficult mandibular reconstruction challenges. Designed, degradable scaffolds provide the ability to fill complex geometric defects with load bearing capability. This ability has not been previously achieved with any mandibular reconstruction approach.

Drs. Feinberg and Hollister have collaborated closely for the past 10 years on scaffold-based tissue engineering approaches for craniofacial reconstruction, during which they have had several joint papers and grants. Dr. Feinberg is a board certified Oral/Maxillofacial surgeon with a significant practice in craniofacial reconstruction. In addition to his work with Dr. Hollister, Dr. Feinberg has a significant research effort in craniofacial soft tissue reconstruction, and developed a cell based therapy for oral mucosal reconstruction, which is currently in a phase I clinical trial. They have collaborated on scaffold designs for mandibular reconstruction and have tested these designed scaffolds in pigs as large functional animal models.

The UM Coulter Program provides important funding allowing the team to engineer an integrated degradable polymer scaffold with a calcium coating and to test mandibular reconstruction using the scaffolds.

A list of all the U-M Coulter funded projects is found on the [UM BME Coulter Site](#).

[SITE INDEX](#) | [TEXT VERSION](#) | [INTERNAL RESOURCES](#) | [CONTACT US](#) | [U-M GATEWAY](#)

© Copyright 2009 The Regents of the University of Michigan
Ann Arbor, MI 48109 USA All Rights Reserved - Non-Discrimination Policy