May 20th, 12:30 PM

Vancomycin-bearing Synthetic Bone Graft Delivers rhBMP-2 and Promotes Healing of Critical Rat Femoral Segmental Defects

Jordan D. Skelly  
*University of Massachusetts Medical School*

Jeffrey Lange  
*University of Massachusetts Medical School*

Tera M. Filion Potts  
*University of Massachusetts Medical School*

*See next page for additional authors*

Follow this and additional works at: [https://escholarship.umassmed.edu/cts_retreat](https://escholarship.umassmed.edu/cts_retreat)

Part of the Molecular, Cellular, and Tissue Engineering Commons, Musculoskeletal System Commons, Orthopedics Commons, and the Translational Medical Research Commons

Skelly, Jordan D.; Lange, Jeffrey; Filion Potts, Tera M.; Li, Xinning; Ayers, David C.; and Song, Jie, "Vancomycin-bearing Synthetic Bone Graft Delivers rhBMP-2 and Promotes Healing of Critical Rat Femoral Segmental Defects" (2014). *UMass Center for Clinical and Translational Science Research Retreat*. 114. [https://escholarship.umassmed.edu/cts_retreat/2014/posters/114](https://escholarship.umassmed.edu/cts_retreat/2014/posters/114)

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Presenter Information
Jordan D. Skelly, Jeffrey Lange, Tera M. Filion Potts, Xinning Li, David C. Ayers, and Jie Song

Comments
Abstract of poster presented at the 2014 UMass Center for Clinical and Translational Science Research Retreat, held on May 20, 2014 at the University of Massachusetts Medical School, Worcester, Mass.

Creative Commons License
This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.

This poster abstract is available at eScholarship@UMMS: https://escholarship.umassmed.edu/cts_retreat/2014/posters/114
Vancomycin-bearing synthetic bone graft delivers rhBMP-2 and promotes healing of critical rat femoral segmental defects
Jordan D. Skelly, Jeffrey Lange, Tera M. Filion, Xinning Li, David C. Ayers, Jie Song

Department of Orthopedics & Physical Rehabilitation, University of Massachusetts Medical School, Worcester, MA, USA

Contact: Jie.Song@umassmed.edu
(508) 334-7168

For graft-assisted repair of large volumetric bone loss resulting from traumatic orthopedic injuries, strategies that simultaneously promote osteointegration/graft healing and mitigate risks for infections are highly desired. Previously, we developed a poly(2-hydroxyethyl methacrylate)-nanocrystalline hydroxyapatite (pHEMA-nHA) composite as a synthetic bone graft. The composite, when loaded with a single dose of 400-ng rhBMP-2/7 and press-fit into a 5-mm rat femoral segmental defect, led to bony callus fully bridging over the defect and substantial restoration of the torsional rigidity by 12 weeks. More recently, we showed that 4.8 wt% vancomycin can be encapsulated within the composite without compromising the structural and mechanical integrity. Additionally, FDA-approved rhBMP-2 can be absorbed onto the graft and both the vancomycin and rhBMP-2 can be released in a localized and sustained manner. Here we examine the efficacy of pHEMA-nHA-vancomycin grafts pre-absorbed with rhBMP-2 in repairing 5-mm rat femoral segmental defects, and determine if vancomycin hinders the repair. pHEMA-nHA-vancomycin or pHEMA-nHA with/without 3-µg rhBMP-2 were press-fit in 5-mm femoral defects in male rats. Histology, microcomputed tomography, and torsion testing were performed on 12-week explants to evaluate the extent and quality of repair. Partial bridging of the defect with bony callus by 12 weeks was observed with pHEMA-nHA-vancomycin without rhBMP-2 while full bridging with substantially mineralized callus and partial restoration of torsional strength was achieved with 3-µg rhBMP-2. The presence of vancomycin did not significantly compromise graft healing. The pHEMA-nHA-vancomycin graft, with the ability to deliver safe doses of osteogenic recombinant proteins and to simultaneously release the encapsulated antibiotics in a sustained manner holds promise in improving the clinical outcome of graft-assisted repair of traumatic bone injuries.