In Vivo Bony Incorporation of Fresh Osteochondral Allografts Pretreated with Bisphosphononates During Cold Storage

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2013 Annual Meeting of the American Orthopaedic Foot and Ankle Society
July 2013
Hollywood, Florida
“In Vivo Bony Incorporation of Fresh Osteochondral Allografts Pretreated with Bisphosphonates During Cold Storage.”
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All author disclosures are listed in the Final AOFAS Program Book.

• Kevin C. Baker, Ph.D. receives research support as PI from Zimmer Inc. and Globus Medical. and receives consulting fees from Globus Medical. Dr. Baker also received a research grant from AOFAS for the presented work.

• Paul T. Fortin, M.D. receives research support as PI from the Musculoskeletal Transplant Foundation (MTF), and consulting fees from Tornier Inc. Dr. Fortin also received a research grant from AOFAS for the presented work.
Failure of Osteochondral Allografts

- Good early functional results.
- Graft collapse noted at 12-18 months (below).
  - Graft rejection?
  - Poor initial incorporation?
- Shelf life of fresh allografts is limited.
  - Significant decrease in chondrocyte viability at 28-35 days.

Initial post-op on patient with fresh osteochondral allograft of talus.

12 month post-op on patient with fresh osteochondral allograft of talus.

H&E (top) and Safranin-O (bottom) stained histologic sections of failed allograft.
In Vitro Effects of Bisphosphonates on Fresh Osteochondral Allografts

Previous Work

• Results from recent in vitro study indicate beneficial effect of bisphosphonates on osteochondral allograft tissue during cold storage.

![Image of histology slides with GAG staining intensity](attachment:image.jpg)

- Highest GAG staining intensity at late time point with Risedronate pretreatment.

In Vivo Study: Pig Trochlear Defect Model

• Two miniature swine underwent bilateral osteochondral allograft transplantation into patellar trochlea.

- Grafts were cold stored in storage media with either Etidronate (non-nitrogenated) or Risedronate (nitrogenated).

- Histology and mCT performed at 6 weeks post-transplant.
μCT Imaging: Etidronate
μCT Imaging: Risedronate
Histologic Analysis – Etidronate Grafts

Control

Etidronate
Histologic Analysis – Risedronate Grafts

Control

Risedronate
Summary and Next Steps

• Both Etidronate and Risedronate demonstrate in vitro protective effects on chondrocytes during cold storage.

• In vivo results following transplantation of bisphosphonate-treated fresh osteochondral allografts indicates that nitrogenated bisphosphonates (Risedronate) have a significant effect on bony incorporation as determined by microCT and decalcified histology.

• Current study is underway in a rabbit trochlear defect model to elucidate dose dependent effects of Risedronate pretreatment on osseous incorporation.

• Study planned to investigate the effect of duration of cold storage in Risedronate-containing storage media on cartilagenous and osseous incorporation of fresh osteochondral allografts.
Thank You

- The authors would like to acknowledge the American Orthopaedic Foot and Ankle Society for providing a research grant to fund this project.

- The authors also wish to acknowledge the histology services provided by the Yale Orthopaedic Histology & Histomorphometry Laboratory (New Haven, CT).