



# News from the Core!



## Musculoskeletal Repair and Regeneration Core Center

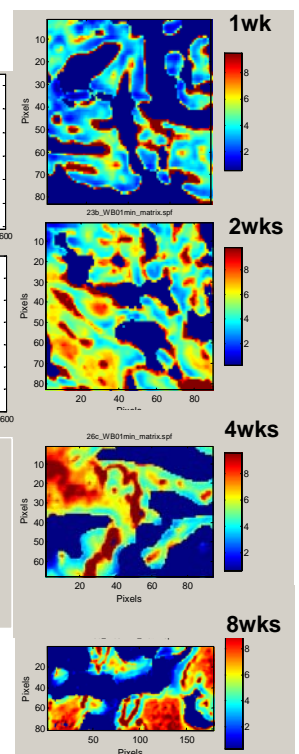
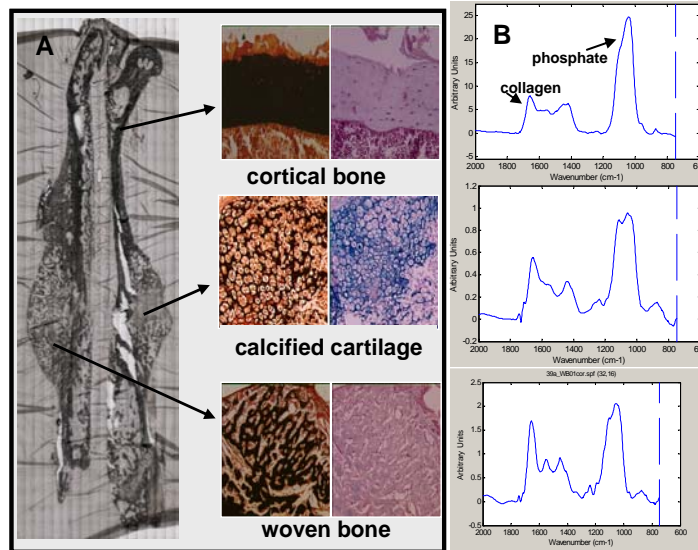
### May 2007 Upcoming Events

Please join us for the MRRCC Seminar Speaker: Professor Harrie Weinans of Erasmus University, Rotterdam, a pioneer in the development of micro CT techniques applied to bone, will be speaking at HSS on Thursday, May 24, 2007, 2:00 PM, on "Novel Imaging of Osteoarthritis using Micro-CT and Micro-SPECT".

### Research News: Combined data from the Analytical Microscopy and Imaging Cores provides insight into molecular changes that occur during the fracture healing process!

This issue we are highlighting research results from an infrared imaging investigation into fracture healing. Dr. Mathias Bostrom, an orthopaedic surgeon at HSS, is utilizing a

mouse osteotomy model to investigate how the molecular structure of fracture callus evolves over the natural time course of healing. Unstained sections of embedded bone were compared to light microscopy images obtained from the same bone that were stained with von Kossa and Alcian blue, to define the regions for collection of infrared spectral imaging data (Figure A). Data were collected from regions of the callus (calcified cartilage and woven bone), and from cortical bone, at weeks 1, 2, 4 and 8 post-fracture. Variation among different callus regions and over time was



C. Mineral:Matrix Ratio

evident based on infrared spectral differences in the phosphate absorbance contour from the apatitic mineral phase (B). Mineral density changes were assessed by the mineral:matrix ratio (phosphate absorbance area: collagen absorbance area). Over the 8 week period, all properties of the cortical bone remained constant, while the woven bone mineral matured from a poorly crystalline apatite into a more crystalline structure similar to that found in cortical bone. However, although the mineral:matrix increased over time (C, infrared images), the woven bone mineralization density was still below levels found in cortical bone at 8 weeks post-fracture. Taken together, these data demonstrate that maturation of mineral molecular structure in callus may precede complete mineralization and healing. Further infrared spectral imaging investigations will focus on how therapeutic agents may alter the progression of events during fracture healing.

Please visit our website and contact us for more detailed information regarding analyses of musculoskeletal tissues by our Applied Statistics, Analytical Microscopy, Imaging, and Mechanical and Material Assessment Cores: <http://www.hss.edu/Research/Core-Facilities>

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Summer student training coming soon at the end of June!