

## Research Interests & Projects

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### **Histological Evaluation of Undecalcified Bone**

When the response of tissue to implanted biomaterials is evaluated, an important observation is the localized response of the tissue at the interface between the tissue and the test sample. When the tissue is bone and/or when the biomaterial is metallic or ceramic, conventional histological preparation techniques in which the tissue is embedded in wax and cut with a microtome cannot be performed. One solution has been to shell the implant out of the tissue and to decalcify bone so that only the collagen portion of the bone remains. This technique is less than satisfactory since the interface tissue may be strongly adherent to the test specimen and therefore removed before embedding and because important information about the response of bone to the biomaterial will be lost during decalcification, such as comparison of osteoid tissue to calcified new bone and to pre-existing bone or the loss of chemical labels of bone formation.

Our laboratory has the capability of processing bone and tissues containing hard biomaterials without decalcification or removal of the implanted test specimen. The tissue block is dehydrated by techniques very similar to those used in wax-embedded histology and then is embedded in poly(methyl methacrylate). The block may then be sectioned using a ground section technique in which polishing wheels are used to reduced a sawn section to a thickness appropriate for viewing or, in some cases, cut on a sledge microtome using a tungsten-carbide blade. Some representative projects:

- Development and animal evaluation of a new synthetic bone graft material based upon hydroxyapatite and tricalcium phosphate.
- Histological analysis of spinal fusion cage devices upon surgical removal from clinical trial patients.
- Histological evaluation of tissue samples removed from patients during a clinical trial of a new synthetic bone graft material.
- Histological evaluation of spinal vertebrae in an animal study of image-guided cryoablation of spinal tumors.

