Applied Research in the Fields of Cartilage, Bone, Biomaterials, and Skeletal Attachment

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The goal of this presentation is to provide a condensed review of 25 years of applied research ranging from articular cartilage structure to implant skeletal attachment. It must be emphasized that all of the research to be presented was a team effort. I can take credit for directing the research and intellectual contribution but many deserve credit for their collaborations, along with their intellectual stimulation and inspiration.

The presentation will begin with issues of articular cartilage structure and what relationship this information will have in attempting to develop scaffolds and other cartilage substitutes to repair or replace articulate cartilage.

Next, I will review the collaborative work that I conducted with Drs. Aaron Hofmann and Kent Bachus to understand how human cancellous bone ingrowth occurs and the quantitative studies to support our understanding of the skeletal attachment of porous coated implants in patients. Then a quick review of studies on bone and the effects of implants on bone maintenance will be presented. Institutional Review Board approved implant retrieval work will be emphasized to support the quantitative interpretations.

There will be a brief review of quantitative studies that were conducted on polyethylene and challenge of the past findings to as they apply to the hypothetical improvements in polyethylene materials.

The role of our advancement of the Backscattered Electron Imaging technique for use in the quantifying bone, bone attachment, examining third body inclusions in clinically retrieved polyethylene inserts will be presented.

Future research directions will be discussed in the field of osseointegrated implants in the treatment of our warrior amputees returning form Iraq and Afghanistan.

In closing I cannot thank the Society of Biomaterial and Clemson University enough for presenting us this prestigious award. We are humbled. Handouts will be offered with all the citations mentioned in this presentation for the attendees to take with them.

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