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.

Acknowledgements
The University of Western Australia Department of Anatomy and Human Biology.

The V.A. Merit Review and Career Award Programs, the Whitaker Foundation, Intermedics, Sulzer, Centerpulse, Zimmer, Wright Medical, Johnson and Johnson Inc., Hexcel Corporation, Mr. and Mrs. James Hess, Dr. Richard E. and Susan Jones, and the Harrington Foundation.

The Albert and Margaret Hofmann Chair of Orthopaedic Research. The Department of Orthopaedics, University of Utah School of Medicine, Departments of Bioengineering and Biology, University of Utah.

And most of all, my family: wife Lois, sons Andy and Drake, daughter Megan, mother Joan Drake Bloebaum, brother Gus and sisters Pam and Denise.

I will always be greatly indebted to my main collaborator, friend, and world class surgeon, Dr. Aaron A. Hofmann.

A great deal of gratitude also belongs to friend, collaborator, and exceptional bioengineer, Dr. Kent N. Bachus.

All my staff members at the Bone and Joint Research Lab. I also wish to thank Dr. John Skedros who has always been an inspiration in the field of bone adaptation.

I would also like to thank all of the great technicians I have worked with in the past. Cathy Mayton, Janson Emmanaul, Karyn Koller, R. Tyler Epperson, Bryan Wyatt.

Finally, I would like to acknowledge the 21 graduate students and the 33 undergraduates, who gained careers in medicine and the 27 medical students who advanced into the field of orthopaedic surgery who volunteered in our labs.

Thank you all from the bottom of my heart.