## University of Notre Dame

Journal

of

## Biomaterials Applications Reviews

Volume 6

May 2012

All Contributions from the Students of AME 50571

Edited by Prof. Ryan K. Roeder

Published by the Department of Aerospace and Mechanical Engineering, University of Notre Dame, Notre Dame, Indiana

© Copyright 2012

## Table of Contents

Section I: Cardiovascular Applications			
Foresman, Meg	Cardiovascular Grafts Used for Tetralogy of Fallot	3	
George, Michael	A Critical Review of Occluders as Biomaterials	14	
Kreipke, Tyler	Strategies to Increase the Longevity of Bioprosthetic Heart Valves	24	
Metzger, Thomas A.	The Evolution of Angioplasty Stent Materials	39	
Trembley, Nathan	Cerebral Intra-Aneurysm Embolization Devices	56	
Walden, Nathaniel D.	The Development of Pacemaker Leads, Electrodes, and Insulation	69	
Section II: Dental Applications			
McGarry, Thomas J.	Biomaterial Considerations of Dental Fillings and Cements	81	
Sakamoto, Davin	An Overview of Orthodontic Braces: Methods and Procedures	90	
Selep, Michael J.	A Critical Review of the Biomaterials in Screw-Type Endosteal Dental Implants	105	
Section III: Orthopaedic Applications			
Baumann, Andy	Bioabsorbable Fusion Cages	119	
Brown, Angelo A.	Biomaterials for Reducing Stress Shielding and Bone Resorption in Total Hip Arthroplasty	132	
Chmell, Oliver M.	Critical Review of Bearing Materials in Total Knee Arthroplasty	143	
Cirillo, Matthew	A Critical Review of Shoulder Prostheses	153	
Frick, Eric C.	Investigation of Polyglycolic Acid for Fracture Fixation	166	
Libardi, Amy	Tribology of Metal-on-Metal Hip Implants	180	
Rose, Michael	Biomaterials in Anterior Cruciate Ligament Repair	191	
Tribble, Mary	Functional requirements for Total Intervertebral Disc Replacement Biomaterials	200	

## Table of Contents (Continued)

Section IV: Other Applications			
Bicoy, Ayla	Intrafascicular Bioelectrodes for Neural Prostheses	213	
Biddle, Stephen	Role of Biomaterials in Glucose Monitering: History, State of the Art, and Development	229	
Bonitsky, Craig	Synthetic Bioabsorbable Sutures	236	
Borchers, Christopher	Critical Review of Silicone Gel Breast Implants	251	
Kennedy, Thomas A.	Critical Review of the Copper Intrauterine Device	261	
Niver, Samantha	Bioartificial Liver Devices and Bioreactor Membrane Design	271	
Plageman, Chelsae M.	Microencapsulated Pancreatic Islet Cell Technology	284	
Reese, Hayley B.	Cochlear Implants for the Restoration of Hearing	301	
Rosini, Jonathan	A Critical Review of Synthetic Bladder Implants	311	
Wilcox, Matthew	Critical Review of Contact Lens Technology	323	
Zhang, Teng	Passive Targeted Drug Delivery	336	