Session Descriptions

Clinical Application Sessions: (90 minutes) Clinical Application Sessions will focus on the latest research being applied clinically, and may include an invited lead speaker. Each session will have 6 presentations, with a ten minute presentation, followed by five minutes of questions, similar to the Annual Meeting General Sessions.

1. What is the State of the Stent?:
Sponsored by the following Special Interest Groups: Cardiovascular Biomaterials; Drug Delivery; Implant Pathology; Protein and Cells at Interfaces; and Surface Characterization and Modification
Organized by: Nicholas Ziats, Peter Edelman and Jeff Schwartz

This session includes papers that cover the translational range from commercialized product to R&D bench work. A presentation from Abbott demonstrates the thorough characterization necessary to fully understand DES performance using multiple state of the art analytical tools. The next two papers discuss implementation of nitric oxide release to prevent restenosis. One approach is by stimulation of intrinsic release, the other by use of a controlled delivery approach. Since inflammatory response due to the presence of a polymer have been implicated in late stent thrombosis, the next paper presents on a novel polymer free drug delivery methodology using a sub-micron layer of hydroxyapatite. The following paper goes from thin to thinner employing a self assembled monolayer approach with covalently bound drug. The final paper in this session explores use of a bio-inspired approach to attach endothelial cell adhesion promoters using adhesion peptide technology.

2. Ocular Comfort and Drug Delivery:
Sponsored by the Drug Delivery and Ophthalmic Biomaterials Special Interest Groups.
Organized by: Jean Jacob and Mark Byrne

Ocular comfort and the delivery of therapeutics to the eye can present some unique challenges. For topical drug administration, the eyelids and tear film provide a dynamic ocular clearance system. Also, ocular barriers in the corneal and conjunctiva limit drug transport depending on drug hydrophilicity/lipophilicity, solubility, degree of ionization, and size. And obtaining a therapeutic quantity of drug in the posterior chamber without repeated injections is problematic. Additionally, the extensive innervation of the cornea makes the comfort of contact lens and other therapeutic devices on the eye particularly important issue. In this session, novel research developments will be presented that focus on enhanced comfort of ocular devices and drug delivery to treat ocular discomfort, infection, and disease.

3. Inflammation and Immunology:
Sponsored by the following Special Interest Groups: Drug Delivery; Implant Pathology; and Protein and Cells at Interfaces.
Organized by: Julia Babensee and Carl Simon

This session will examine cellular and molecular aspects of innate and adaptive immunity in the context of biomaterials as a means of understanding the foreign body response to biomaterials, and situations of immune responses in the context of biomaterials. New discoveries in immunology (e.g., toll-like receptors) will be presented which further our understanding of how the body responds to biomedical materials. Implants fail for various reasons involving patient, physician, implant factors and infection. Implant pathology to elucidate failure mechanisms of biomedical implants will be presented, as well as approaches to enhance device integration and function in the host.

4. Spine & Nerve Repair:
Sponsored by the Orthopaedic Biomaterials Special Interest Group.
Organized by: Ebru Oral and Harold Aberman

Augmentation of spinal deficiency and correction of spinal deformity with minimally invasive and efficient technologies is an area of growing interest. This is mostly due to advances in materials and tissue engineering to provide treatment and relief to the large number of people who suffer from pain and disability due to spinal injury. Discussion will focus on the continuum of care options that are available including success and failure rates for established and improved fusion methods and alternative treatments to fusion; the current status of clinical trials on motion-sparing technologies such as total disc arthroplasty; as well as cutting-edge areas such as new materials for nucleus pulposus/annulus fibrosus augmentation, vertebroplasty/kypholasty, pediatric deformity and tissue engineering strategies to repair spinal cord injury.

5. Current and Future Strategies for Repair and Replacement of Hard Tissues:
Sponsored by the following Special Interest Groups: Dental/Craniofacial Materials; Orthopaedic Biomaterials; Protein and Cells at Interfaces; Surface Characterization and Modification; and Tissue Engineering.
Organized by: Sachin Mamidwar and Yusuf Khan.

There has been renewed interest and increased use of bone graft and bone graft substitutes in orthopaedic and dental/craniofacial applications. Clinical strategies for bone repair have historically focused on mechanical integrity, wear resistance, and biocompatibility of materials, while current and future strategies are evolving to incorporate materials-based innovations such as microgrooving and nanotexturing, and biological innovations to enhance vasculogenesis, and osteointegration through cell and factor incorporation. The challenge lies in bringing the most up-to-date advances in both basic biology and materials science to the clinical realm. This session will serve as a forum to discuss the latest findings, from both the materials science and biological perspective, and how these advances are translated into clinically relevant strategies for hard tissue repair.

Session Descriptions *(continued)*

6. Imaging and Therapeutics Delivery:
Sponsored by the Drug Delivery and Protein and Cells at Interfaces Special Interest Groups.
Organized by: Michael Caplan and Mark Byrne

This session will focus on targeting of drugs or imaging moieties to pathologies by conjugating them to cell-binding materials. Current technology includes quantum dots conjugated to ligands or antibodies, as well as drugs directly linked to antibodies. The session will also showcase state-of-the-art application to tumor targeting, and unmet clinical challenges such as delivery, biocompatibility, and tumor specificity.

7. Musculoskeletal Applications:
Sponsored by the Orthopaedic Biomaterials Special Interest Group.
Organized by: Ebru Oral and Tim Simon

Damage to joints and musculoskeletal tissue can be caused by various factors such as trauma, ligamentous instability, diseases such as osteoarthritis and rheumatoid arthritis. This session will be focused on materials and methods to augment and repair damaged joints and musculoskeletal tissue such as the anterior cruciate ligament.

Joint repair at different stages will be discussed; these will include current and promising strategies to repair, augment and replace cartilage in small defects, and second generation cross-linked polyethylenes and other new materials and methods in joint arthroplasty for end-stage defects.

Another area of focus will be anterior cruciate ligament (ACL) reconstruction. The initial graft strength of an ACL substitute graft is a potential limiting factor for clinical application, and acceptance of this material for use in ACL reconstruction. Focus will be given to improving the time zero strength of various graft materials by augmenting them with an internal or external biocompatible device used for ACL reconstruction

Technology Rapid Fire Sessions: (60 minutes) Technology Rapid Fire Sessions will include research advances that are on the brink of clinical application. Each session will have two blocks (30 minutes each); each block will have five presentations (five minutes) followed by five minutes of questions for all presentations in the block. Presenters will also have a poster at the poster session designated as Rapid-Fire presenters. (This is a new session format for the Society.)

1. Biomaterials for Nanomedicine: From Bench to Bed:
Organized by: Jinming Gao and Thomas J. Webster

This Technology Rapid Fire Session will feature the recent development and commercialization of nanomedicine platforms from research labs to the marketplace. The first part will focus on novel biomaterial systems with new architectures and unique physical properties for nanomedicine applications. The second part will focus on clinical and commercial translation of nanosystems in diagnostic or therapeutic applications.

2. Cell-interfacing Technologies:
Sponsored by the Cell/Organ Therapies and Tissue Engineering Special Interest Groups.
Organized by: Krish Roy, Glenn Prestwich, Kent Leach and Claudia Fischbach

The overall theme of this session is the rational design and modification of biomaterials systems to recreate biologically relevant conditions to control cellular behavior. In particular, it will focus on 2-D and 3-D biomaterials-based microenvironments that can be utilized to investigate the mechanisms and effects by which biochemical, structural, and physical cues regulate cell responses such as stem cell fate and drug responsiveness.

3. Tissue Engineering Strategies:
Sponsored by the following Special Interest Groups: Cell/Organ Therapies; Orthopaedic Biomaterials; and Tissue Engineering.
Organized by: Jan Stegemann, Todd McDevitt, Thomas Barker and Edward Botchwey

This Technology Rapid Fire Session will focus on emerging technologies and strategies in tissue engineering, and how these approaches address major barriers in the development and clinical translation of new tissue engineered products. The session will highlight recent research efforts to apply fundamentals of biomaterial science and engineering to the improvement of tissue engineering therapies. Topics will include strategies to enhance vascularization, innervation and integration of engineered tissue, as well as advances in cell-based therapies, drug delivery and scaffold design. The target audience is clinicians, researchers and students working in the field of biomaterials for tissue engineering and regenerative medicine applications.

Session Descriptions (continued)

4. Novel Biomaterials:
Sponsored by the Cell/Organ Therapies and Tissue Engineering Special Interest Groups.
Organized by: Eben Alsberg, Hyun-Joon Kong and Jennie Leach

The field of biomaterials has focused recent attention on designing new materials with enhanced control over interactions with cells and tissues, as well as capabilities to dynamically respond to microenvironment stimuli. This session will focus on experimental and theoretical aspects of novel biomaterials, and seeks to include research that represents the breadth of this area. Presentation topics will include, but are not limited to, the following areas: engineered biomaterials to elicit specific cellular responses; novel patterning and processing technologies; aspects of three-dimensional biomaterials and tissue culture; enabling technologies for analyzing biomaterial properties and cell-biomaterial interactions; intelligent or responsive materials; and other novel materials to advance tissue engineering, device performance, biosensors and drug delivery.

Moderated Poster Sessions: Moderated Poster Sessions (MPS, 20 min each) will highlight four selected posters within a topic. As the audience walks from poster to poster, each presenter will give a five-minute presentation. MPS-A will showcase research from the Spine & Nerve Clinical Application Session. MPS-B will feature posters from Nanomedicine, Novel Biomaterials, and Cell Interfacing Technologies. MPS-C will highlight Musculoskeletal Applications. MPS-D will focus on Tissue Engineering Strategies.

Workshops: (60 minutes) The purpose of a workshop to provide an in-depth educational experience on topics relating to biomaterials with a significant amount of time dedicated to discussion and questions and answers. Both Workshops will be held concurrently on Thursday evening.

1. Genomic and Proteomic Chips in Translational Medicine:
Sponsored by the Surface Characterization and Modification Special Interest Group.
Organized by: Lara Gamble and Erika Johnston

Personalized translational medicine encompasses both the benchtop techniques used to predict disease as well as the measures then taken to prevent disease development. This workshop will focus on the genomic and proteomic chip arrays at the heart of disease prediction. Speakers will address the current state of surface modification and characterization of microarray chips, as well as their manufacture and ultimate impact on clinical outcomes.

2. Process Development and Manufacturing of Cells and Tissue Engineered Constructs:
Sponsored by the Cell/Organ Therapies and Tissue Engineering Special Interest Groups.
Organized by: Jon A Rowley

The theme of this workshop will be to educate SFB members on the unique challenges in manufacturing cells or engineered tissues for human use in the United States. The quality systems and GMPs that are required to be in place are extensive for supplying cell-based products for human use. The workshop will give examples of challenges specific to cell or tissue-engineered products.

Panel Discussions: Panel discussions provide a format that foster open debate on a topic. The invited guests include renowned experts in the area of focus and the chair allows time for open discussion with the audience.

1. Changes in Biomaterials Unavailability, Patents, Product Liability, Tort Reform, and the FDA:
Patents, Product Liability, Tort Reform, and the FDA
Sponsored by the Biomaterials Availability and Policy and Biomaterials Education Special Interest Group.
Organized by: Carl McMillin and Jim Curtis

Some of the changes and current status of topics critical to the successful commercialization of medical devices and implants will be presented by experts in the fields including: the unavailability of many polymers for long-term implants, 10 years after legislation that was intended to solve this problem; Status of legislation that may change the fundamental processes of patent application and litigation in the United States; product liability, including plaintiff tactics such as disruptive discovery, joint and several liability, mass tort, venue shopping, and manipulation of public opinion; the status of tort reform, and how it may be related to biomaterials unavailability; and regulation of devices by the FDA.

2. A Biomaterials Primer for Translation: Is the value in the device or in the material?:
Sponsored by the following Special Interest Groups: Biomaterials Education; Cell/Organ Therapies; and Tissue Engineering.
Organized by: Barbara Boyan, Paul Ducheyne, Jonathan Gindes, Lisa Friis, Kristyn Aalto and Matt Gevaert

As biomaterials are typically critical components for end products—rather than the end products themselves—they present unique challenges in the development of appropriate financial, management and technical development plans for an emerging company. This creates specific factors that must be considered when soliciting initial funding, considering strategic partnerships and updating business plans for biomaterials. Case studies will be presented that discuss the relative business draw of a biomaterials platform vs. a specific product application; if and when to transition from non-dilutive to professional (venture) investment; appropriate milestones for staging investment, and the pros and cons of various strategic partnerships. Specifically, suggestions will be offered for assessing when a biomaterials company is ready for initial venture investment and for addressing general issues that can temper venture investing in this sector.