SurFACTS in Biomaterials

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Medtronic Launches New Bone Cement in U.S.

KYPHON® ActivOs™10 Bone Cement Is the Latest Offering from Medtronic for Treatment of Vertebral Compression Fractures

Medtronic, Inc. recently launched KYPHON ActivOs 10 Bone Cement with Hydroxyapatite, a polymethylmethacrylate (PMMA) bone cement containing hydroxyapatite (HA) for use in the treatment of patients with vertebral compression fractures (VCFs) who are undergoing minimally invasive surgery with KYPHON(R) Balloon Kyphoplasty.

The launch of KYPHON ActivOs 10 Bone Cement with Hydroxyapatite in the United States marks a milestone for the Kyphon Products Division, part of the Spinal and Biologics business at Medtronic. With this product, Medtronic now has a portfolio of cements offering surgeons a choice for treating VCF patients. Surgeons performing KYPHON Balloon Kyphoplasty can now use either KYPHON HV-R® Bone Cement, a PMMA bone cement, or KYPHON ActivOs 10 Bone Cement with Hydroxyapatite, a PMMA-HA composite bone cement.

HA is chemically and structurally similar to the mineral component of bone, has been widely studiedi, and has a long history of use in dental and orthopedic implants.

"ActivOs 10 encompasses the benefits of HA without sacrificing the reliability of a PMMA cement," said Dr. Douglas Beall,

Medtronic Continued on Page 3

From the Editor

The summer is coming to an end, the academic year is starting, and the busy work year and meeting calendar now begins. First and foremost, the annual BioInterface Workshop and Symposium will be in Atlanta this October 18-20. For more information please see page 11 or go to the Surfaces in Biomaterials website **http://surfaces.org/**. This meeting, as always, promises to be the premier professional meeting for our industry and the premier opportunity meet with like-minded professionals.

Speaking of networking…

In a previous editorial in the Jan/Feb 2009 SurFACTS, I wrote about professional networking through the Foundation, and I introduced the Surfaces in Biomaterials LinkedIn group to our members. From a starting roster of less than a dozen, as of this writing there are now 244 members in the group from around the world. Our membership includes engineering and science professionals from medical device and analytical instrument firms, academics, service providers, consultants, government officials and more. Recent posts to the group include the upcoming BioInterface Symposium, other relevant professional

From the Editor Continued on Page 2

What's Inside

From the Editor
Continued

By Steven L. Goodman, Ph.D., 10H Technology Corporation

meetings, and job ads. I encourage you to join the group if you have not yet done so. Also, I encourage you to use this as a professional resource to connect with like-minded professionals to discuss topics of importance and to find the resources you need to do your job.

Speaking of resources…

In every issue of SurFACTS we strive to provide timely and useful information to our readers on Biomaterials and Analysis Science, Medical Device Regulation, Industry Press, and other topics. We are always seeking interesting and informative articles and press releases for future issues. Please contact me or other appropriate topic editors listed on the masthead to discuss submission.

I look forward to seeing you at BioInterface 2010 in Atlanta.

SurFACTS in Biomaterials is the official publication of the foundation and is dedicated to serving industrial engineers, research scientists, and academicians working in the field of biomaterials, biomedical devices, or diagnostic research.

Medtronic Continued from Page 1

chief of radiology services for Clinical Radiology of Oklahoma. "The cement has great handling characteristics, is highly radiopaque and has optimal working time for clinicians to complete the balloon kyphoplasty procedure. I feel comfortable in using it on my patients with spinal fractures caused by cancer or osteoporosis."

In a non-human trial* where KYPHON ActivOs 10 Bone Cement with Hydroxyapatite was implanted into eight rabbit femurs, new bone was seen to form on the surface of the cement without an intervening fibrous tissue layer, and no inflammatory foreign body reaction was observed. This suggests that the surface of the cement is compatible with bone.

"With ActivOs 10, we are excited to offer an alternate choice in bone cements for our customers conducting KYPHON Balloon Kyphoplasty," said Alex DiNello, vice president and general manager of the Kyphon Products Division. "With this product, Medtronic continues to leverage our leadership position in balloon kyphoplasty for the treatment of vertebral compression fractures. Since we began marketing this treatment in 2000, an estimated 700,000 fractures have been treated worldwide with KYPHON Balloon Kyphoplasty by approximately 14,000 trained spine specialists."

Important Safety Information
The complication rate with KYPHON Balloon Kyphoplasty has been demonstrated to be low.ii There are risks associated with the procedure (e.g., cement leakage), including serious complications, and though rare, some of which may be fatal. This procedure is not for everyone. A prescription is required. Please consult a qualified physician for a complete list of indications, contraindications, benefits, and risks. Only a patient and his or her physician can determine whether this procedure is appropriate for individual cases.

More information about KYPHON ActivOs 10 Bone Cement with Hydroxyapatite can be found at www.kyphon.com.

Standard Helps Manufacturers Design Toxicokinetic Study

From Association for the Advancement of Medical Instrumentation (AAMI)

A newly updated standard from the Association for the Advancement of Medical Instrumentation (AAMI) guides manufacturers on how to determine if toxic chemicals in polymeric implants could leak out and harm patients. ANSI/AAMI/ISO 10993-16 offers guidance on how to design a toxicokinetic study to detect if any leachable or degradation products could hurt a patient. Manufacturers of polymeric implants will find the standard useful to root out possible degradation in their materials.

"We were under the assumption that the medical device has no interaction with the body, but we learn that polymeric medical implants, for example, are composed of a mixture with chemicals like antioxidants and plasticizers," says Hoan-My Do Luu, who is co-chair of the AAMI Biological Evaluation Toxicokinetic Study Working Group, which developed the U.S. standard. "When in contact with the body, they could inadvertently leach or degrade, therefore migrate out of that device and absorbing in the body over time."

Breast implants, for example, have a polyurethane cover that potentially could degrade, releasing chemicals, says Luu, a chemist at the U.S. Food and Drug Administration (FDA).

A toxicokinetic study on an animal shows how the chemical would react, and then extrapolate those results into a human to do a more realistic assessment of risk. An example is a toxic monomer, which is one component of a polymer, that might be toxic, Luu says.

"You would want to radio label, which is used to track the chemical, if possible and then implant it into the animal, simulate its clinical use, and follow that radio label over time and see where it absorbs, distributes, metabolizes, and/or excretes in an experimental animal model like a rat," she says. "If all of that radio label (e.g., 100% of the chemical) would be excreted in the urine or feces, you wouldn't have a problem with that chemical. If you could see that these radio labels stay in certain organs, then you worry that organ could cause problems."

The standard also shows how to deal with chemicals that you cannot radio label, and addresses other factors such as how many blood samples to take out to measure the exposure or rate of absorption of the chemical.

Medtronic's AMPLIFY™ rhBMP-2 Matrix Receives Positive Votes from FDA Advisory Panel on All Three Key Questions: Safety, Effectiveness and Benefit/Risk

New biologic bone graft product demonstrated superior fusion rates compared to current standard of care for complex fusion procedures of the lower spine in the pivotal clinical trial

The U.S. Food and Drug Administration (FDA) Orthopaedic and Rehabilitation Devices Panel voted 9 for and 4 against (1 abstention) on safety and 10 for and 3 against (1 abstention) on effectiveness, that data including results from a large, prospective randomized clinical trial demonstrated the safety and effectiveness of AMPLIFY™ rhBMP-2 Matrix for fusions of the lower spine in patients with degenerative disc disease. The benefits of this new bone graft option, which is specifically designed for single-level, posterolateral spinal fusion procedures, were also found by a majority of those voting to outweigh any risks associated with this product by a vote of 6 for and 5 against (3 abstention).

AMPLIFY rhBMP-2 Matrix was found in the clinical trial to produce statistically higher rates of bone fusion at the designated 24-month endpoint compared to the control group, which used the patient's own bone harvested from the hip. Harvested hip bone, long considered the standard of care bone graft, presents challenges for patients and surgeons, including the need for a second surgery to harvest the bone.

"AMPLIFY rhBMP-2 Matrix represents a monumental advancement in the arsenal of bone grafting options available for posterolateral spine fusions. This is the first recombinant bone graft that has been proven to yield statistically higher fusion rates than the current standard of care," said James Hardacker, MD, an orthopedic surgeon from Indianapolis, and a researcher in the AMPLIFY™ rhBMP-2 Matrix clinical trial. "With this important new product, a second operation to harvest bone from the hip, which can increase pain and other complications for the patient, can be avoided."

AMPLIFY rhBMP-2 Matrix is a combination product that includes the following:

- Recombinant human bone morphogenetic protein-2 (rhBMP-2) solution, a synthetically produced version of a naturally occurring protein in the body, which is used to stimulate bone formation
- A unique porous carrier system called a compression-resistant matrix (CRM) comprised of collagen and resorbable ceramic to carry the rhBMP-2 solution and maintain the rhBMP-2 at the site of implantation. The CRM also serves as a scaffold on which new bone may form.

AMPLIFY rhBMP-2 Matrix must be used in conjunction with a metallic posterior supplemental fixation device that is indicated for temporary stabilization of the spine.

Medtronic vice president Tom McGuinness, who serves as the General Manager of the firm's Biologics business, noted that the Advisory Panel's affirmative votes on all three questions represent an important first step of bringing this product to market to meet the needs of degenerative disc disease patients. "We will continue to collaborate closely with the FDA to develop the path forward. The potential approval of AMPLIFY rhBMP-2 Matrix will further strengthen our position as the market-leading provider of a comprehensive portfolio of bone grafting options."

Clinical Effectiveness, Safety and Positive Benefit/Risk Ratio of AMPLIFY rhBMP-2 Matrix

The panel reviewed data from a large, prospective clinical trial that enrolled 463 patients who were randomized to receive AMPLIFY rhBMP-2 Matrix or undergo surgical treatment with autogenous bone harvested from their hip bone, referred to as autograft.

AMPLIFY rhBMP-2 Matrix was shown to be statistically non-inferior to autograft for the primary study endpoint, Overall Success, which was a combination of both safety and effectiveness measures. AMPLIFY rhBMP-2 Matrix also achieved statistically superior fusion results at 24 months, with sustained high fusion rates and patient satisfaction through 60 months. The safety profile also compared favorably to autograft with reduced surgery blood loss and shorter mean operative times. AMPLIFY rhBMP-2 Matrix provides a solution for patients that lack sufficient

AMPLIFY™ rhBMP-2 Continued on Page 7

AAMI Joins International Implant Standardization Effort

From Association for the Advancement of Medical Instrumentation (AAMI)

The Association for the Advancement of Medical Instrumentation (AAMI) has formed a new working group to focus on gaps in existing standards of bioabsorbable vascular implants such as coronary stents.

The AAMI working group will complement activities of a proposed working group by the International Organization for Standardization (ISO) on bioabsorbable vascular implants by reviewing and examining any standards created by ISO and possibly initiating the U.S. adoption of any ISO documents.

One important gap that will be examined focuses on the erosion of metallic and polymer-based stents, according to Peter Albrecht, director of research and development at Boston Scientific and managing director of the device manufacturer's European R&D location. "The iron-alloy based technology has the potential for corrosion. You can measure the corrosion of a material in vitro with corrosion test methods, but what we can't measure yet is the biological effects of the corrosion in the body," says Albrecht, who is a member of the ISO working group. "The biological component is part of the absorption process, but it is not yet fully understood nor do we have clear bench tests defined. That is something the working group might address when they start to work."

Another area that needs further understanding is what happens with the by-products of the corrosion process. "Where does the degradation products go?" asks Albrecht. "Do we know the clearance paths from a metabolism perspective?"

The working group will also touch on the mechanical properties of bioabsorbable implants. "Say you have a stent in a coronary artery, and the chronic process of degradation or absorption takes a year or a couple of months," he says. "We don't have a clear specification of the mechanical properties. How do we measure the mechanical properties during degradation?"

The new working group will be initiated and officially started at the ISO's international meeting in Orlando, FL, in September. For more information on the AAMI mirror group, including how to join, contact Cliff Bernier at cbernier@aami.org.

Stentys Completes Enrollment in Clinical Study of its Breakthrough Stent to Treat Acute Myocardial Infarction

International clinical trial could soon prove superiority of the novel stent over conventional techniques in a $5 billion market

Stentys, which develops innovative stents to treat Acute Myocardial Infarction (AMI), announced the enrolment of the final patient in the APPOSITION II clinical study—a randomized trial comparing the Stentys self-expanding stent with a conventional balloon-expandable stent in patients with AMI. The study results will be announced in September.

Founded in 2006, Stentys develops radically innovative solutions with the best North American and European cardiologists and high-tech R&D for the treatment of AMI, which affects 100,000 people every year in France and an additional 900,000 people in the United States.

The Stentys stent features a major breakthrough compared to conventional stents: stents: self-expansion. In other words, it behaves as a spring once implanted; its shape and diameter adapt to the anatomic changes of the coronary arteries during the post-AMI phase. By being in permanent contact with the vessel wall, the Stentys stent avoids malapposition observed with conventional stents, which put the patient at risk of potential fatal complications such as implant blockage (in-stent thrombosis).

"The Stentys stent, once implanted, continues expanding and, in our experience, has provided very good apposition to the wall of the vessel compared to conventional stents. This is important because malapposition is one of the factors causing stent thrombosis," said study investigator Corrado Tamburino, M.D., Ph.D., Chair of the Cardiology Department, Ferrarotto Hospital, Italy.

Stentys Continued on Page 6

PolyTouch Medical Ltd. Receives FDA Clearance to Commercialize PatchAssist™ – an Innovative Surgical Instrument Intended to Facilitate the Delivery of Soft Tissue Prosthetics During the Laparoscopic Repair of Soft Tissue Defects

PolyTouch Medical Ltd., a leading developer of laparoscopic soft tissue prosthetic placement technologies, recently received broad FDA 510(k) clearance to commercialize PatchAssist™. PatchAssist is an innovative laparoscopic surgical instrument that enables accurate and rapid delivery and placement of soft tissue prosthetics for a variety of procedures, including laparoscopic ventral hernia repair (LVHR).

PatchAssist is a stand-alone surgical device that is compatible with all currently commercialized soft tissue prosthetics. PatchAssist enables surgeons to rapidly deliver and position soft tissue prosthetics over the defect potentially reducing operation time by 30 percent to 50 percent. Arik Levy Founder and Chief Technical Officer of PolyTouch commented, "PatchAssist is compatible with all currently commercialized soft tissue prosthetics, a technically challenging design requirement. We are pleased that the FDA has granted broad commercial clearance to PatchAssist."

"We are thrilled to have reached this value-creating milestone with the FDA clearance of PatchAssist" said Ofek Levin, CEO and Founder of PolyTouch Medical. "According to the Millennium Research Group, surgeons will perform over 160,000 laparoscopic ventral hernia repair procedures this year in the U.S. We believe PatchAssist has the potential to shorten the procedure time for all these cases." Mr. Ofek continued, "Clinical and commercial interest in PatchAssist is extremely high. Recent clinical surveys conducted during the American Hernia Society Congress in Orlando, suggest that nearly half of surgeons performing LVHR will switch from current to alternate soft tissue Prosthetics if offered with PatchAssist. We are currently considering a number of strategic options to commercialize PatchAssist." Karl A. LeBlanc, MD, MBA, FACS, a member of the PolyTouch Medical Advisory Board and Clinical Professor of Surgery, Louisiana State University School of Medicine, commented, "PolyTouch has been working very diligently to produce a product that fills a need that surgeons have long desired. The PatchAssist Device represents a first step in the technology of PolyTouch. This device will greatly enhance the repair of ventral and incisional hernias. It will make the introduction, manipulation and fixation of any prosthetic material that will be used in the repair of these hernias much easier. The FDA 510(k) represents an acknowledgement that this laparoscopic instrument will benefit the surgical technique but most importantly, the patient. It will ultimately save costs because the time saved with the use of the PatchAssist will be significant."

David Earle, MD, FACS, a member of the PolyTouch Medical Advisory Board and Assistant Professor of Surgery, Tufts University School of Medicine, said,

"When I first saw the device, I was intrigued. It had the potential to really improve the way both specialists and general surgeons perform laparoscopic hernia repair. When I first used the device, I was convinced."

Stenty's Continued from Page 5

"If the APPOSITION II study results are positive in September, we will have the indisputable proof of the superiority of the Stentys stent over conventional stents. This will be a significant advance for cardiology because all AMI patients could benefit from it," said Prof. Jacques Seguin, Chairman and co-founder of Stentys.

"After receiving European market approval for our two flagship products in the first half of the year, this clinical study will confirm scientifically the efficacy of our solution. Since the technological and regulatory risks are behind us, Stentys will now begin a pre-release phase in Europe, giving cardiologists the possibility to use the Stentys stent immediately," said Gonzague Issenmann, CEO and co-founder of Stentys. "Each year, more than 3 million stents are implanted worldwide. This annual market is estimated at $5 billion," added Issenmann.

Gore Receives CE Mark for Longer Length GORE® VIABAHN® Endoprosthesis

Longest Stent-Graft Ever Introduced in Europe for SFA Endoluminal Bypass

W. L. Gore & Associates (Gore) received European CE Mark approval for the 25 cm GORE®VIABAHN® Endoprosthesis with PROPATEN Bioactive Surface. The new 25 cm GORE VIABAHN Endoprosthesis with PROPATEN Bioactive Surface is the longest length stent-graft available, designed to cover more of the lesion in the Superficial Femoral Artery (SFA) potentially reducing the need for multiple devices.

The recently redesigned Gore device features a precision laser trimming technology used to remove excess material, resulting in a contoured proximal edge that may improve flow dynamics at the proximal end. Removal of excess material at the proximal edge improves device apposition to the vessel wall when oversizing prevents device expansion to its nominal diameter. The device also incorporates the PROPATEN Bioactive Surface which utilizes end-point immobilization of derivatized heparin to the endoprosthesis luminal surface. This proprietary surface technology preserves the heparin bioactive sites such that they remain free to interact with the blood at the device surface without being consumed. The original GORE® HEMOBAHN® Endoprosthesis was introduced to Europe in 1996; the GORE VIABAHN Endoprosthesis with PROPATEN Bioactive Surface was first approved for use in the European Union in December 2008.

"In 1996, the [GORE] HEMOBAHN-VIABAHN device was the first SFA stent-graft that had good patency rates and it came already in 15 cm length," said Jacques Bleyn, MD, Vascular Surgeon, Antwerp Blood-Vessel Center, Antwerp, Belgium. "Because long SFA occlusions can be treated endovascularly with the GORE VIABAHN device, Gore took this best SFA device and made it better: heparin bonded and a new length of 25 cm."

The GORE VIABAHN Endoprosthesis with PROPATEN Bioactive Surface is available with a low-profile delivery system that gives interventionalists a more streamlined approach to re-line the peripheral arteries. The GORE VIABAHN Endoprosthesis is constructed with a durable, reinforced, biocompatible, ePTFE liner attached to an external nitinol stent structure. The excellent flexibility of the GORE VIABAHN Endoprosthesis enables it to better traverse tortuous areas of the SFA and conform more closely to the complex anatomy of the artery.

"With all the new advancements to the GORE VIABAHN device over the last 12 months, we are pleased to be able to expand this product's offerings across Europe to include a longer length device," said Ben Beckstead, PhD, Product Specialist with the Gore Peripheral Vascular Business. "Since the SFA anatomy does vary greatly from case to case, it is important for Gore—which has an ongoing commitment to providing physicians with innovative products—to be able to provide physicians with the tools and confidence they need to successfully treat their patients."

AMPLIFY™ rhBMP-2 Continued from Page 4

high quality hipbone to harvest, and also eliminates the complications and pain of the bone harvest surgery in all patients.

About Posterolateral Spine Fusions
Posterolateral spine fusions stabilize two adjoining vertebrae by inducing bone formation to form across a space, sometimes as much as 4 cm in length, where bone previously never existed. To induce bone formation, bone-grafting material is required. Currently, local bone, allograft or ceramic substitutes may be used, but the standard of care is bone taken from patients' hip bone, which can cause significant postoperative pain, blood loss and morbidity.

About Degenerative Disc Disease
Degenerative disc disease is pain caused by deterioration of the disc confirmed by patient history and radiographic studies. Degeneration makes the disc more susceptible to herniation that can lead to sciatica, severe pain caused by irritation of the spinal nerves. Degenerative disc disease can result in significant, chronic pain and greatly affect patient's productivity and quality of life. When pain from degenerative disc disease is significant, non-surgical treatment options may be ineffective.

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To be leaders in the surface science community

- Join a forum that fosters discussion and sharing of surface and interfacial information
- Have your voice heard and your interests represented within the surface science and biomedical community
- Help shape workshops and symposia that further the world-wide education of surface science
- Promote understanding of interfacial issues common to researchers, bio-medical engineers and material scientists.

Benefits of Membership:

- Discounted registration at BioInterface, the annual symposium of the Surfaces in Biomaterials Foundation.
- Your logo and a link to your Web site in the member directory on the official Web site of the Foundation, www.surfaces.org.
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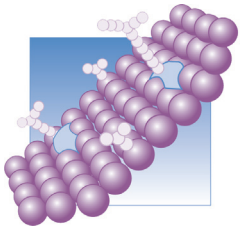

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