The 27th Annual Meeting of the Academy of Surgical Research

October 27–29, 2011
Austin, Texas - Hyatt Regency Austin

Program

The 27th Annual ASR Meeting will include presentations on new and refined methods and materials used in preclinical and clinical surgical investigations, as well as new procedures that will enhance the attendees' fields of scientific and surgical research. Renowned academic and industry experts will share cutting-edge surgical concepts, research, and techniques, thereby fostering an interdisciplinary transfer of ideas and theories in experimental surgery.

Meeting attendees will have the opportunity to engage in dialogue with speakers and presenters, colleagues and friends. This meeting will offer diverse scientific content that will promote and encourage the advancement of the field of surgery.

Learn about surgical research and surgical challenges in areas including

- Organ transplant surgery
- Long-term vascular access/infusion
- Medical device implantation/surgical/orthopedic models
- Surgical techniques
- Surgical research
- Cardiovascular surgery
- Minimally invasive surgery (MIS)

Annual Meeting Overview

Registration Hours

Thursday, October 27	7am–5pm
Friday, October, 28	7am–5pm
Saturday, October, 29	7am–12pm

Wednesday, October 26

1 pm–4 pm	ASR Board Meeting

Thursday, October 27

7:30 am	Bus departs from hotel to UT-Austin
8 am–12 pm	**ASR Examinations** Light continental breakfast served
8 am–12 pm	**Wet Labs** • Introduction to Microsurgery • Advanced Laparoscopic Techniques Lecture • Principles of Stereotaxic Surgery
12 pm	Bus departs/returns to Hyatt Regency
1 pm–5 pm	**Wet Labs (UT-Austin)** • Advanced Microsurgical Techniques • Advanced Laparoscopic Techniques • Experimental Techniques in Swine • Advanced Cardiovascular Rodent Telemetry Implantation Lab
5 pm	Bus departs from UT-Austin to Hyatt Regency
5:30 pm–7:30 pm	Welcome Reception

Friday, October 28

7 am–8 am	Continental breakfast Poster set-up
8 am–8:15 am	Opening Remarks
8:15 am–9 am	ASR History
9 am–10 am	**Keynote Speaker**
10 am–10:30 am	*Break*
10:30 am–12 pm	Surgical Models & Anesthesia Platforms
12 pm–1 pm	*Lunch*
1 pm–3 pm	Vascular/Gastrointestinal Access & Anesthesia Platforms
3 pm–3:15 pm	*Break*
3:15 pm–5 pm	Surgical Models & Surgical Training
5 pm–6 pm	Poster Judging
6:30 pm–9:30 pm	Reception

Saturday, October 29

7 am–8 am	Continental breakfast Poster viewing
8 am–9:30 am	Oral/Dental Surgery & Telemetry Platforms
9:30 am–9:45 am	*Break*
9:45 am–11:30 am	Surgical Models & Telemetry Platform
11:30 am–12:30 pm	*Awards Luncheon*
12:30 pm–1:30 pm	Luncheon Speaker
1:30 pm–3 pm	Surgical Models Certification Prep
3 pm–3:15 pm	*Break*
3:15 pm–5 pm	Surgical Writing Technician Round Table

Welcome

Howdy!

Welcome to the Academy of Surgical Research's 27th Annual meeting in Austin, Texas.
New for ASR this year:

*ASR Webinars: Thanks to the dedication and hard work from Nance Moran and the Publications Committee, ASR in conjunction with Veterinary Bioscience Institute have successfully hosted the first of many webinars - "**The Handling and Care of Microsurgical Instruments**".*
Educational Grant: Thanks to Tim Edwards and the Program Committee for acquiring an Education Grant from Pfizer to facilitate the Microsurgical wet labs this year.

Both of these accomplishments are examples of ideas and suggestions by the membership of ASR to continue to serves the mission of ASR and its membership. ASR continues to grow and develop due to the contributions of its membership and I encourage everyone to continue to share their knowledge and ideas and become involved.

Thank you for the opportunity and privilege to serve ASR as President this year and enjoy the program!

Jan Bernal, DVM
President, ASR

Board of Directors & Committee Chairs

Board of Directors

President
Jan Bernal, DVM

President-Elect
Teresa Gleason, BS, LVT, LATG, SRS

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Thomas Long, PhD

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Marcel I. Perret-Gentil, DVM, MS
John C. Resendez, SRS, MS, RLATG, CMAR
Lisa Johnson, SRS, LATg, LAT, BA

Committee Chairs

By-Laws Committee
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Certification Committee
Lisa Johnson, SRS, LATg, LAT, BA

Communications Committee
Nance Moran, SRS, RLATG

Membership Committee
Randy Pielemeier, SRS, LVT, LATG

Nominating Committee
Thomas Long, PhD

Program Committee
Tim Edwards, SRS, BS, RLATG

Strategic Planning Committee
Steve Hachtman

Journal Editor
Luis Toledo - Pereyra, MD, PhD

ACADEMY OF SURGICAL RESEARCH

Program Committee

Progam Committee

Tim Edwards, BS, RLATG, SRS
WIL Research Laboratories LLC

Margaret Baldwin, RVT, RLATG, SRS, MS
University of South Florida

Heather Bogie, RLAT, CVT
Data Sciences International

Melanie Graham, MPH, PhDc
University of Minnesota

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Data Sciences International

Layne Norlund, DVM
Innovative Medical Device Solutions

Nancy Poy, DVM
Pfizer Inc.

John Cody Resendez, MS, RLATG, SRS, CMAR
MPI Research

Luis Toledo, MD, PhD
Michigan State University

Distinguished Speakers

Keynote Speaker

James (Jimi) Cook, DVM, received a BS degree from Florida State University in 1988. After a short career as a professional water skier, he completed the DVM degree in 1994 at the University of Missouri. He then went on to a small animal rotating internship at the University of Minnesota. He returned to the University of Missouri in 1995 for a dual PhD-Small Animal Surgery Residency program. He completed his PhD in Pathobiology in 1998 and became a Diplomate of the American College of Veterinary Surgeons in 1999. His PhD research involved developing a unique in vitro system of chondrocyte culture for studying osteoarthritis. In 1999, he co-founded the Comparative Orthopaedic Laboratory at the University of Missouri, which is a research laboratory involving the College of Veterinary Medicine, The School of Medicine, and The College of Engineering. Today, more than 30 scientists are currently involved in this laboratory's research in the areas of osteoarthritis, tissue engineering, and articular cartilage physiology. He has over 100 peer-reviewed publications to his credit in both the veterinary and human medical literature. He has received extensive funding for his research, including grants from The National Institutes of Health, The Orthopaedic Trauma Association, The Musculoskeletal Transplant Foundation, Johnson & Johnson, Pfizer, Zimmer, DePuy Orthopaedics, Inc, and Arthrex. He has received numerous awards including America's Best Veterinarian in 2007, the Orthopaedic Research Society's New Investigator Recognition Award, the Norden Distinguished Teacher Award, MU Alumnus of the Year, MU Faculty-Alumni Award, The Dean's Impact Award, The Bloomberg Memorial Research Award, The Hohn-Johnson Research Award, The Bojrab Research Award, The MU Graduate and Professional Council Gold Chalk Award, and The University of Missouri Superior Graduate Achievement Award. Dr. Cook was president of the Veterinary Orthopedic Society for 2008-2009. He holds 12 US Patents and has seen 3 biomedical devices through to FDA approval and human clinical trials. His clinical interests are in arthroscopy, minimally invasive orthopaedic surgery, orthopaedic tissue engineering, cartilage repair, and management of osteoarthritis. He regularly speaks at major national and international meetings. He currently has a dual appointment at the University of Missouri in Small Animal Orthopaedics and Orthopaedic Surgery (human), and is the Director of The Comparative Orthopaedic Laboratory and the William & Kathryn Allen Distinguished Professor in Orthopaedic Surgery. He is also the co-founder and co-director along with his wife Dr. Cristi Cook (also faculty in Vet Med) of Be The Change Volunteers, a non-profit organization dedicated to building schools in third world countries so that children around the world can receive the opportunities that only education can provide.

Guest Speaker

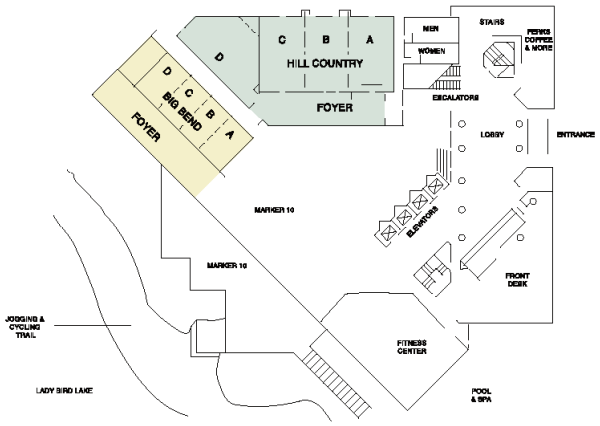
Paul McKellips has written, directed and produced three motion pictures and numerous television shows. McKellips served as a media trainer for the Iraqi National Army during the surge (2006-07; 2009) and for the Afghan National Army (2011). Since joining the Foundation for Biomedical Research (2007) he has produced several TV programs, a daily radio show and is the author of UNCAGED: A Thriller, a bio-terror novel that paints a dangerous "what if" scenario should animal rights extremists successfully shut down animal research in the US. McKellips has received 20 Telly Awards and was nominated for an Emmy (2011) for his documentary on breast cancer research involving rodents.

Venue

Hyatt Regency Austin

Discover the perfect balance between the city beat and resort calm at Hyatt Regency Austin. Set on the shore of Lady Bird Lake, the ideal location of our AAA Four Diamond downtown Austin hotel lets you experience the best of our eclectic city. Catch the display at the famous "Bat Bridge," right across from the hotel. Wander across Congress to find yourself immersed in the entertainment districts – including SoCo, Warehouse District, 2nd Street and Sixth Street.

FIRST FLOOR



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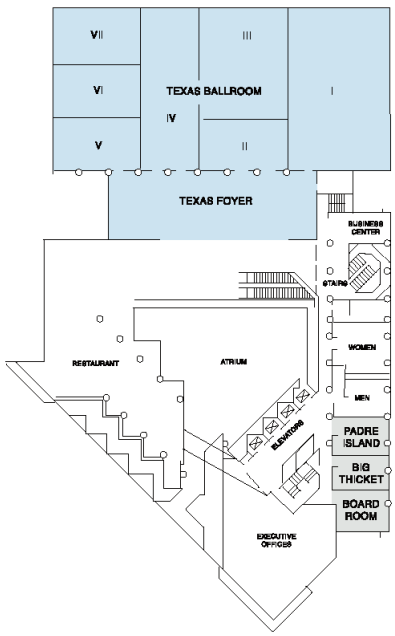

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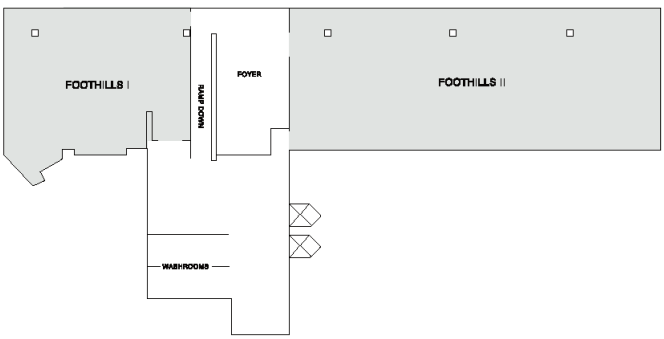
FOOTHILLS BALLROOMS



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Austin, Texas - Hyatt Regency Austin

Program

Program

Wednesday, October 27 2011

1 pm–4 pm
ASR Board Meeting — **Foothills I, 17th Floor**

Thursday, October 28 2011

(Meeting registration hours, 7 am—5 pm)

7:30 am
Bus departs from Hyatt Regency Austin to UT-Austin

8 am–12 pm
ASR Examinations

8 am–12 pm — **Hill Country A & B**

Wet Lab #1 Introduction to Microsurgery
Wet Lab #3 Advanced Laparoscopic Techniques Lecture — **Hill Country C**
Wet Lab #4 Principles of Stereotaxic Surgery

12 pm
Bus departs/returns to Hyatt Regency Austin

1 pm–5 pm
Wet Lab #2 Advanced Microsurgical Techniques
Wet Lab #3 Advanced Laparoscopic Techniques
Wet Lab #5 Experimental Techniques in Swine
Wet Lab #7 Advanced Cardiovascular Rodent Telemetry Implantation Lab

5 pm
Bus departs from UTA to Hyatt Regency

5:30 pm–7:30 pm
Welcome Reception with Exhibitors — **Texas 2-4**
Sponsored by Taconic and VetEquip, Inc.

Wet Lab Descriptions

Lab #1 – AM ***Introduction to Microsurgery***
Instructor: Dr. Yelena Akelina
This introductory microsurgical training lab will cover basic aspects of microsurgical procedures such as instrumentation, use of a surgical microscope, and micro-suturing. After watching a video presentation, students will work hands-on underneath a surgical microscope to learn proper suturing techniques and basic cannulations using a plastic model.

Lab #2 – PM ***Advanced Microsurgical Techniques***
Instructor: Dr. Yelena Akelina
This microsurgical training lab will cover more advanced techniques than the introductory course. This lab will build on the basics of micro vascular techniques utilizing live rats, which includes dissections and ligation of small vessels, arteriotomy and venotomy, and end-to-end arterial and venous microsurgical anastomosis.

Lab #3 – AM ***Lecture and PM Advanced Laparoscopy Techniques***
Instructors: Drs. Szczepan Baran and Marcel Perret-Gentil
This workshop will teach participants various laparoscopic techniques that can be performed in rats and rabbits. These techniques can be a substitute for techniques currently conducted in these species by the traditional open approach. Adoption of these techniques will lead to refinement and reduction of animals. It is a refinement because animals recover more quickly and with less pain when compared to the traditional approach. Traditionally these species are euthanized at each testing point to obtain data. The use of laparoscopy could be considered a minor procedure and should allow the investigator to use the same animal to obtain tissue samples repeatedly and over several procedures without having to euthanize an animal each time tissues are required. In addition, the accuracy of data increases because the same animal may be used both as control and test subject.

Lab #4 – AM ***Principles of Stereotaxic Surgery***
Instructors: Randy Reed and Eric Adams
The main goal of this hands-on laboratory experience will be to introduce those who are unfamiliar with stereotaxic procedures to the equipment, basic techniques and nuances of performing stereotaxic surgical approaches in the rat and canine model as commonly used in an academic or research setting. This lab will also be an opportunity for those with only experience with the rodent model or those who wish to fine tune their stereotaxic training through exposure to new techniques in both animal models. The following is a basic overview of the laboratory experience.

- Familiarization with the stereotaxic frame, manipulators, attachments and ear bars (species specific)
- Short exercise in reading the scales on the manipulators correctly
- Basic anatomy and anatomical landmarks used in rodent stereotaxic surgery
- Commonly used equipment and hardware in rodent stereotaxic surgery
- Correct placement of a rodent in the frame
- ICV (intracerebroventricular) cannula placement in the rodent
- MRI targeting used in the canine (also applicable to non-human primates)
- Correct placement of the canine head in the frame
- Intraparenchymal (e.g. putamen) catheter/cannula placement in the canine

Wet Lab Descriptions

Lab #5 – PM ***Experimental Techniques in Swine***
Instructor: Dr. Michael Swindle
This workshop will provide didactic and hands on training including anesthesia, analgesia, perioperative care, and surgical techniques. These techniques may include bone marrow sampling, lateral thoracotomy, venipuncture, surgical cut-downs, and thoracic and abdominal surgical approaches. Specific instruction may be provided upon written request by the student should time and instruments be sufficient.

Lab #7 – PM ***Advanced Cardiovascular Rodent Telemetry Implantation Lab***
Instructors: Dan Huetteman, Kimberly Holliday-White and Steve Hachtman
Hands-on surgical training session will demonstrate and teach advanced rodent model telemetry implantation procedures that include catheter placement to measure intra pleural pressure, abdominal aortic arterial pressure catheter placement, and diaphragmatic EMG lead placement. Accomplished instructors will demonstrate implantation of a new dual pressure telemetry implant that enables simultaneous real time monitoring of two pressures, one biopotential recording, and one temperature recording in the rodent model. The student training session with the rat model will include both traditional arterial pressure recording and recent approaches for intrapleural pressure catheter placement. Other approaches with this new device such as left ventricular pressure catheter placement and right ventricular pressure catheter placement will also be reviewed in detail. Experienced instructors will share information on preoperative care, surgical tips and techniques, and on post operative recovery support. Students will implant training modules of the telemetry implant to learn skills and approaches to these more technically complicated procedures. Each student will be provided with their own individual surgical station, a small animal instrument set, and appropriate surgical supplies for their session.

General Wet Lab Sponsors

Friday, October 28

7 am–8 am	Continental Breakfast-*Sponsored by Colonial Medical Supply Company*	**Texas 2-4**
8 am–8:15 am	Opening Remarks: ASR President, **Jan Bernal,** DVM	**Texas 1**
8:15 am–9 am	*History of ASR* - **Stephen Vore**	**Texas 1**
9 am–10 am	**Keynote Speaker:James Cook,** DVM, PhD, DACVS, DACVSMR *Regenerating the Knee: Biological Solutions to Biomechanical Problems*	**Texas 1**
10 am–10:30 am	Break-*Sponsored by Access Technologies*	**Texas 2-4**

Surgical Models—Texas 1	
10:30 am–11:30 am	***Porcine Models in Surgical Research*** Michael Swindle, DVM
12 pm–1 pm	**Lunch** *Sponsored by Strategic Applications, Inc.*
Vascular/Gastrointestinal Access—Texas 1	
1 pm–1:30 pm	***Comparison of Peripheral vs. Surgically Cannulated IV Infusion Dosing in the Rat - Considerations when Selecting the Optimal Study Design*** Jennifer Sheehan, BS, RLATG, SRS
1:30 pm–2 pm	***An Alternative Approach to Venous Access for Large Diameter Catheters and Devices in the Swine Model: Using the Iliac Vein*** Amanda McSweeney, BS, RLAT, SRT
2 pm–2:30 pm	***Development of a Surgical Model with Intragastric and Vascular Access Ports in Rabbits*** Kuldip Mirakhur, DVM, PhD
2:30 pm–3 pm	***Development of a Novel Duodenal Catheterization Model in the Minipig using an Implant Modified from the Clinic*** Rita Rose, BSc, MA, VetMB, MSc(WAH), MRCVS
3 pm–3:15 pm	**Break**—Texas 2-4 *Sponsored by DRE Veterinary Equipment*
Surgical Models—Texas 1	
3:15 pm–3:45 pm	***Myocardial Infarct Model in Rodents: Surgical Aspects*** Delphine Bouard, DVM, Dip. Vet. LAS
3:45 pm–4:15 pm	***Animal Model of Sporadic Alzheimer's Disease: The Surgically Modified Samaritan FAB Rat*** Marla Wilwol LVT, RLATG, SRS
4:15 pm–4:45 pm	***Animal Model of Parkinson's Disease: Unilateral 6-Hydroxydopamine Lesion of the Nigrostriatal Pathway*** Marla Wilwol LVT, RLATG, SRS
5 pm–6 pm	Poster Judging—Texas 2-4
6 pm–9:30 pm	Reception—Foothills Ballroom 17th Floor *Sponsored by DSI and Lomir Biomedical Inc.*

Anesthesia—Hill Country C&D	
10:30 am–11 am	***Sharing Best Veterinary Practices for Anesthetic and Analgesic Drug Selection in Canine Surgery*** Bozena Antil, BS, CVT, RLAT, SRA
11 am–11:30 am	***How to Choose Anesthetic Protocols*** Cholawat Pacharinsak , DVM, MS, PhD, Diplomate ACVA
11:30 am–12 pm	***Rabbit Anesthesia and Analgesia*** Jon Ehrmann, BS, SRS, SRA, LATG
12 pm–1 pm	**Lunch** *Sponsored by Strategic Applications, Inc*
Anesthesia—Hill Country C&D	
1 pm–3 pm	***Advanced Anesthesia*** Nancy Poy, DVM, Jennifer Smith, DVM, DACLAM Mike Talcott, DVM, DACLAM
3 pm–3:15 pm	**Break**—Texas 2-4 *Sponsored by DRE Veterinary Equipment*
Surgical Training—Hill Country C&D	
3:15 pm–4 pm	***Microsurgery Training Program at the Department of Orthopaedic Surgery, Columbia University, NY: Its Application to the World of Small Lab Animal Science*** Yelena Akelina, DVM, MS
4 pm–5 pm	***Development and Implementation of Objective Surgical Competency Assessment in the Laboratory Animal Science and Biomedical Fields*** Szczepan Baran, VMD, MS
5 pm–6 pm	Poster Judging—Texas 2-4
6 pm–9:30 pm	Reception—Foothills Ballroom 17th Floor *Sponsored by DSI and Lomir Biomedical Inc.*

7 am–8 am	Continental Breakfast Poster Viewing	Texas 2-4

Oral/Dental Surgery—Texas 1	
8 am–8:30 am	***A Critical Comparison of Pre-Clinical Animal Models for Analyzing Peri-Implant Hard Tissue*** Stefan Stübinger, DDS
8:30 am–9 am	***Experimental Models for Guided Bone Regeneration in Compromised Healing Conditions*** Nikos Mardas, Dipl DS, MS, PhD
9 am–9:30 am	***Bone Response Between Platform Switched Implant in Mini Pigs*** Nicolas Elian, DDS
9:30 am–9:45 am	**Break**—Texas Foyer West *Sponsored by Instech Solomon*
9:45 am–10:15 am	***The Critical-Size Supraavlveolar Peri-implant Defect Model: Characteristics and Use*** Ulf Wikesjö, DDS, DMD, PhD
10:15 am–10:45 am	***Combination of Scaffolds, Scaffold Retainers and rhBMP-2 for Alveolar Ridge Augmentation in Various Animal Models*** Martin Freilich, DDS
Surgical Models—Texas 1	
10:45 am–11:30 am	***Overview of the 5/6 Nephrectomy in Rodent Models Targeting Anemia and Hypertension*** Allison Parlapiano, BS, SRS, LATG
11:30 am–12:30 pm	**Business/Awards Luncheon**—Texas 2-4
12:30 pm–1:30 pm	***US Public Opinion and Animal Research—***Texas 2-4 Paul McKellips, BA, MA *Sponsored by WIL Research, LLC*
Surgical Models—Texas 1	
1:30 pm–2 pm	***Refinement of Gastro-Intestinal Procedures in Rat Models for Obseity and Diabetes Studies*** Szczepan Baran, VMD, MS
2 pm–2:30 pm	***An Improved Method for Sampling Thoracic Duct Lymph Fluid in Rats*** Xiaolan Shen, LATG, MS
2:30 pm–3 pm	***Effect of Small-diameter Proximal Splenorenal Shunt in the Treatment of Portal Hypertension: Experience from 176 Cases*** Weihua Qiu, MD, PhD
3 pm–3:15 pm	**Break**—Texas Foyer West *Sponsored by AVA Biomedical, Inc*
Training/Discussions—Texas 1	
3:15 pm–5 pm	***Surgical Writing: Ways to Facilitate the Process for Successful Publication*** Tracie Rindfield, SRS, LAT Luis Toledo, MD, PhD

Telemetry Models—Hill Country C&D	
8 am–8:30 am	***Surgical Implantation of a DSI TruSense TS-L21 Telemetry Implant in Large Animals*** Heather Bogie, RLAT, CVT
8:30 am–9 am	***Use of DSI Radiotelemetry Transmitter HD-X11 in Freely Moving Syrian Golden Hamsters*** Oscar (Tony) Bermeo, DVM, RLATG, SRS
9 am–9:30 am	***Refinement of Surgical Wound Closure for Telemetry Implantation in Thirteen-lined Ground Squirrels*** Toni Mufford, RLATG, CVT
9:30 am–9:45 am	**Break**—Texas Foyer West *Sponsored by Instech Solomon*
9:45 am–10:15 am	***Comparison of Electroencephalogram (EEG) Lead Placement for Measurement of Brain Activity in the Conscious, Free Roaming Dog*** Teresa Gleason, BS, LVT, SRS, RLATG
10:15 am–10:45 am	***7 Lead (3 Channel) Surgical Implantation of DSI D70-EEE in the Rhesus Monkey*** Oscar (Tony) Bermeo, DVM, RLATG, SRS
Risk Analysis—Hill Country C&D	
10:45 am–11:30 am	***Hazard and Risk Analysis: Pre-Clinical Study Planning (Animal Studies)*** Vince Mendenhall, DVM, PhD
11:30 am–12:30 pm	**Business/Awards Luncheon**—Texas 2-4
12:30 pm–1:30 pm	***US Public Opinion and Animal Research—T***exas 2-4 Paul McKellips, BA, MA *Sponsored by WIL Research, LLC*
Training/Discussions—Hill Country C&D	
1:30 pm–3 pm	***ASR Certification Prep*** Kimberly Bayer, BS, LATG, CVT, SRS Lisa Johnson, BA, LATg, SRS
3 pm–3:15 pm	**Break**—Texas Foyer West *Sponsored by AVA Biomedical, Inc*
Training/Discussions—Hill Country C&D	
3:15 pm–5 pm	***Technician Round Table*** Heather Bogie, RLAT, CVT Leslie Stoll, SRS, LATg, RVT

The 27th Annual Meeting of the Academy of Surgical Research

Exhibitor Directory

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Marshall BioResources	# 5
Medline Industries, Inc.	# 11
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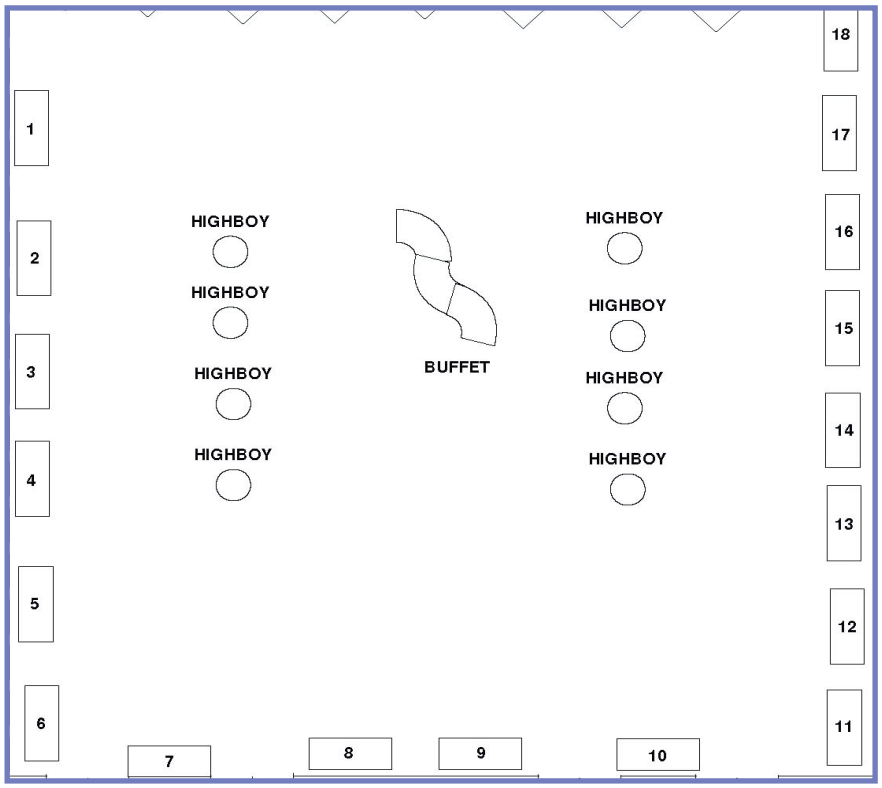
Ehibitor Hours:

Set-up
Thursday, October 27
8 am–5 pm

Teardown
Friday, October 28
3–6 pm



Exhibitor Directory

Access Technologies
For 30 years Access Technologies has been the world leader in the design and manufacture of implanted access and infusion systems in support of Pre-Clinical research. We offer a complete line of vascular access ports, catheters, needles, infusion and extension sets, and accessories for species from mice to non-human primates. Custom design and prototyping is our specialty. Access Technologies prides itself on offering high quality products and superior technical and customer support. To learn more visit us at www.norfolkaccess.com, email pwolf@norfolkmedical.com or call us 847-674-7131.

ALN Magazine
ALN Magazine is a publication of resources, products, and information to design, build, and equip today's research animal facilities. Free subscriptions available at www.alnmag.com.

AVA Biomedical, Inc.
AVA Biomedical, Inc. is a global manufacturer of cutting-edge laboratory animal infusion products. We provide complete, customized infusion systems for all species. AVA Biomedical provides researchers with unique infusion products; Cath-In-Cath II Port System, Compati-Cath rounded tip, tapered, coextruded catheters, FastTether II Rodent Infusion Systes. In addition, we carry state of the art infusion pumps with realtime WIFI monitioring. Come and see what makes us different.

BioVision Veterinary Endoscopy
BioVision Veterinary Endoscopy offers a compact endoscopic tower along with hands-on surgical training. BioVision is the leading endoscopic visualization company dedicated to bringing minimally invasive surgery and diagnostics to veterinarians. Our system scales to multiple endoscopic applications, from simple exam room diagnostic Otoscopy to therapeutic Laparoscopy and Arthroscopy.

Exhibitor Directory

CBSET, Inc.
CBSET provides GLP (Good Laboratory Practice) and non-GLP research services ranging from early product evaluation, through lead optimization and pre-clinical safety, to physician assessment and training. Our world-renowned regulatory and scientific expertise helps transform early-stage concepts into novel therapies.

Colonial Medical Supply
Colonial Medical Supply is the exclusive vendor for the TonoLab. This tonometer is specifically designed for rodent research. We also sell and service anesthesia delivery systems; life support monitors, surgical support systems and a full line of fluid management equipment. We deliver the highest quality of equipment and service.

Covance
Covance Research Products Inc. provides purpose-bred animals and surgical services to the biomedical research community. Covance's surgical services include vascular access ports (VAPs), telemetry implantation, sterilization procedures, and digital radiography in multiple species such as nonhuman primates, canines, rabbits, ferrets, guinea pigs, and swine.

Data Sciences International (DSI)
DSI provides advanced physiological monitoring solutions for pulmonary, cardiovascular, and CNS applications involving acute or chronic studies. Products include advanced data acquisition and analysis systems synchronizing implantable and externally worn telemetry with hardwired amplifiers. Infusion solutions include catheters and iPRECIO infusion pumps. Global offices provide local support and product expertise.

Exhibitor Directory

DRE Veterinary Services
DRE Veterinary delivers new and professionally refurbished veterinary and animal related equipment. Veterinary specific products include MRI-compatible anesthesia systems (including rodent systems), animal monitoring/telemetry, medical gas systems, specialty operating/exam tables, surgical lighting, electrocautery units, and other medical supplies. DRE's Animal Health Division has partnered with veterinary, university, and research professionals since 1984.

Instech Solomon
Instech Solomon continues to innovate with its release of Orchesta ™ automated infusion and ABS2 automated blood sampling technologies. Please ask about our new dual channel VAH ™ harness and WhiteTip ™ Catheter as well as other new infusion products.

ISIS Services, LLC
ISIS Services is a preclinical CRO specializing in medical device testing, physician and sales force training, experimental surgery, and prototype development. The organization's staff of industry leaders and AAALAC-accredited research facility is built specifically for collaboration to help clients get from research to clinical application as soon as possible.

Kent Scientific
Kent Scientific Corporation is a worldwide provider of integrated solutions for pre-clinical research and drug discovery advancement. As the World Leader in non-invasive blood pressure and pulse oximetry products for mice and rats, we enable our customers to achieve results that are fast, consistent and exceedingly accurate.

Lomir Biomedical, Inc.
Since 1989 Lomir has distinguished itself as a leading-edge designer and manufacturer of high quality innovative, easy to use and durable equipment for biomedical research facilities around the world. Lomir is the world's largest manufacturer of animal jackets, infusion products and restrainers. Jacket models have been extended to include many custom made options and protective undershirts for large animals. Lomir products are available for all laboratory animals. Lomir's success is founded on respect for integrity and its absolute commitment to customer satisfaction. Biomedical research is a costly venture and our durable and reliable products reduce or eliminate many of the factors that can compromise investigations, whether they involve toxicology, pharmacology, physiology, neuroscience and veterinary science.

Exhibitor Directory

Marshall BioResources
Marshall BioResources is committed to being the world's premier supplier of beagles, mongrels, ferrets, and minipigs for biomedical research. We also provide a wide range of biological products and diagnostic services. Our sales and service maintain the highest level of integrity and quality expected by our customers.

Medline
Medline is the largest privately held medical device manufacturer in the United States, supplying a broad range of customers more than 100,000 different products. Medline focuses on a number of key customer groups, including acute and long term healthcare, retail, pharmaceutical R&D, contract research organizations, and academia.

Strategic Applications Inc. (SAI)
SAI provides all of the products and training necessary to run successful infusion related research in any laboratory species. SAI introduces Axios, the only networked infusion and data management software system capable of monitoring and controlling both syringe and ambulatory pumps. Axios is specifically designed to meet the needs of GLP Toxicology and Safety Pharmacology studies.

The Texas Society for Biomedical Research
The Texas Society for Biomedical Research, a statewide, non-for-profit organization whose mission is to promote research and education in the biomedical sciences. The goals of the organization are to provide: educational programs/initiatives designed to educate health care professionals, researchers, students, and the public on the benefits associated with biomedical research for human and animal health.

Toxikon
Toxikon is a preclinical contract research organization. We contract and partner with biotech, pharmaceutical, and medical device industries to deliver exceptional product development services from concept to final product.

The 27th Annual Meeting
of the

Academy of Surgical Research

Speaker Abstracts

Alphabetically listed by Author.
Underline indicates presenting Author.

Microsurgery Training Program At The Dept Of Orthopaedic Surgery, Columbia University, NY: Its Application To The World Of Small Lab Animal Science

Yelena Akelina, DVM, MS
Columbia University

The Microsurgery Research and Training Laboratory at the Department of Orthopaedic Surgery, Columbia University Medical Center was established in 1980 and has been expanded over the years and now trains more that 140 surgeons a year from more than thirty different programs from all over United States and from more than 25 countries around the world. Our program has become an internationally known state-of-the-art teaching facility in microsurgery over the last few years. Microsurgery is a very specific surgical skill that needs to be taught and refined by expert instructor and practice. It's becoming very useful and sometime essential skills for many research specialists and research technicians who involve in world of small lab animal science and perform different kind of surgeries on rodents. The best way of learning microsurgical skills is in the well-organized course in the laboratory setting with a constant monitoring of the progress of each student from one side and letting the students to do as many mistakes as possible and learn how to recognize them while in the lab. Independent learning under supervision of the instructor gives the student confidence that he/she can perform the procedures on their own in OR settings and also improves decision making skills. This training improves not only the surgical skills but judgment power of the futures surgeons. We offer a few different programs: Basic and Advanced Microvascular Training and Microsurgery Training in Rodent Surgery (Simple and Complex). Our basic microsurgery course includes 40 hrs of intensive one-on-one instruction upon completion of which the participant acquired the fundamental microsurgical skills necessary to successfully manipulate and repair small vascular structures. Surgeons also develop highly refined manual dexterity and eye-hand-foot coordination. The learning process includes use of the working knowledge of operating room microscope, instruments, and suturing techniques for the arterial, venous anastomosis as well as peripheral nerve repair utilizing live animal model and is closely monitored by the instructor who provides guidance, assistance, feedback, and skill evaluation throughout the entire course. Our Rodent surgery training course utilizes the same principals by applying them to teach basic rodent surgery by performing small vessels cannulations (jugular vein, femoral artery and vein, carotid artery), laparoscopy, wound closure and other simple surgeries such ovarioectomy, splenectomy, etc. Our belief is that the appropriate training in microsurgery should become an important part in training of research surgical personnel and essentially can replace some animals used for training with plastic models, reduce number of animals used for training purposes only and refine the experimental design.

NOTES

Sharing Best Veterinary Practices for Anesthetic and Analgesic Drug Selection in Canine Surgery

Poy N, DVM[1], Antil B. BS, CVT, RLAT, SRA [2]
[1]*Pfizer, Inc,* [2]*Charles River Laboratories*

There is much discussion in the veterinary profession as to which anesthetics, analgesics and combinations of the two works most effectively in canine surgery. This presentation will discuss the best veterinary practices applied in the surgery program employed by Worldwide Comparative Medicine, Global Science and Technology group at Pfizer. We will describe the strategy and discuss the anesthetic and analgesic agents, as well as the techniques used to optimize the most comfort for the patients. Multi-modal plans are always used and commonly include: Propofol, Isoflurane, Acepromazine, Meloxicam, Buprenorphine, Morphine, Bupivicaine, Fentanyl Transdermal Systems, and regional analgesia such as epidurals and nerve blocks. The dose, route and administration techniques for these agents will be presented. Different non-pharmacologic techniques used for supportive care such as the selection of enclosures, cold compressing the operative site, and topical agents, etc. that will aid in the management of pain but without contraindication to study protocols will also be presented. Observing each patient's individual behavior/personality traits prior to surgery will be used as a guide in the post-op assessment. The methods used to validate the usage of these agents will be documented through pre- and post-op assessment and observation, direct palpation, and clinical signs. Assessment of pain management and surgical recovery will be monitored via changes in the animal behavior, vital signs (heart rate, respiratory rate, blood pressure, mucous membrane refill time and color, etc.); Response to palpation of affected and surrounding areas of the surgery; alteration in food intake, urine and fecal output; and any reductions in activity/ambulation. In conclusion, we believe selection and administration of the appropriate anesthetic and analgesic agents is an imperative focus, but it is of vital importance to have a robust plan for the patient in order to optimize animal care, welfare, and surgical success.

NOTES

Title: Refinement Of Gastro-Intestinal Procedures In Rat Models For Obesity And Diabetes Studies.

Szczepan W. Baran[1], Cheryl Loughery[2], Run Zhuang[2], Veronica Maldonado[2], and Daniel C.-H. Lin[2]
[1]*Veterinary Bioscience Institute,* [2]*Amgen*

Rat models for diabetes and obesity studies are useful for the discovery of surgical and therapeutic interventions applicable to these human diseases. Surgical models include procedures such as Roux-en-Y gastric bypass, ileal transposition, duodenal-jejunal bypass, gastric liners and vertical sleeve gastrectomy. We evaluated current surgical practices and identified areas of improvement of these surgical procedures in rat models of obesity and diabetes. Areas of improvement included specific pre- and post-surgical fasting periods, incision closure, specific suture materials, physiological peri-operative monitoring, anesthesia, pre- and post-surgical drugs and ancillary peri-operative enhancements. The pre-surgical fast period was decreased from 24 hours to 2-4 hours. The post-surgical fasting period was decreased from 24-72 hours to a maximum of 20 hours. The amount of suture material used was decreased by utilizing smaller diameter suture and a continuous suture patterns. The number of post-surgical dehiscence was decreased from 50% to 10% by utilizing a subcuticular closure pattern instead of surgical clips for skin closure. The average dose of isoflurane was decreased from 3.0% to 1.5% and oxygen flow from 1 to 0.5 Liters/minute through utilization of physiological monitoring, which resulted in quicker recovery and a more stable respiratory rate. The use of a homoeothermic blanket, water heating pad, elevating ambient temperature, and the utilization of warmed saline to decrease tissue dehydration, normalized rats' body temperature, and contributed to faster recovery and a survival rate of ~90%.

NOTES

Development and Implementation of Objective Surgical Competency Assessment in the LAS and biomedical fields

Szczepan Baran, VMD, MS, James Kehler, VMD, PhD
Veterinary Bioscience Institute

The ability to objectively assess the technical competence of personnel utilizing animals in the laboratory animal science (LAS) and biomedical fields has always been challenging. In the human and veterinary surgical fields clinicians evaluate the surgical proficiency of trainees over months or years with independent review provided by national board examin ations. In contrast, instructors in the LAS and biomedical fields may only have hours or days to perform technical skill assessments. Furthermore, many LAS programs currently employ subjective and unreliable testing methods, such as depending upon the opinion of an examiner after direct observation and/or review of operation log-books. Often the same LAS personnel are charged with both instructing and testing participants. This creates an inherent conflict of interest, as the institutional review of the efficacy of courses and instructors may rely upon the percentage of trainees receiving passing scores. To address these deficiencies, novel objective methods of technical skill assessment are currently being developed and are undergoing rigorous validation within the human surgical and veterinary fields. They include methods such as direct observation with defined testing criteria, final product analysis, and hand-motion analysis. Instructors in the LAS or biomedical field must also face the challenge of how to integrate objective assessments into training programs and how to detect resultant improvements in surgical outcome. This presentation will provide a review of current and experimental methods of assessing technical skill in the human, veterinary, and LAS fields. This talk will include both published studies, as well as ongoing assessments performed by the authors and their national and international colleagues to determine the surgical competency of LAS trainees, In addition to assessing technical skills, methods for testing animal users' grasp of foundational components of surgical theory will be addressed. The presentation will conclude by reviewing the challenges and solutions to implementing new assessment technologies in LAS training programs. As these new methods are undergoing further validation, it is imperative that the LAS field adopt consistent and objective criteria for assessing improvement in surgical training outcomes.

NOTES

7 lead (3 channel) Surgical Implantation of DSI D70-EEE in the Rhesus Monkey.

Oscar (Tony) Bermeo, DVM, RLATG, SRS
Battelle

Implantable telemetry is considered a refinement since animals can be remotely monitored without interaction with humans. The use of implantable telemetry is judged, at present, one of the best available alternative methods. As it lowers the stress that would result from the use of more conventional electroencephalogram analysis methods is capable of continually collect real time physiological data from an unanesthetized model. This presentation will illustrate our experiences implanting a 3 channel (7 lead) radiotelemetry transmitter D70-EEE into the Rhesus Monkey.We will discuss materials and methods and lessons learned over the years.

NOTES

Use of DSI™ Radiotelemetry Transmitter HD-X11 in Freely Moving Syrian Golden Hamsters.

Oscar (Tony) Bermeo, DVM, RLATG, SRS
Battelle

Implantable telemetry is considered a refinement method since animals can be remotely monitored without interaction with humans. The use of implantable telemetry is judged, at present,one of the best available alternative method. As it lowers the stress that would result from the use of more conventional cardiovascular analysis methods, and is capable of continually collect real time physiological data from an unanesthetized model. Recent advancements in telemetry transmitters have allowed for a broader range collection capabilities in smaller(e.g. rodents) animal models. This presentation will illustrate our experiences with Golden Syrian Hamters implanted with the newly develop HD-X11 radiotelemetry transmitters from DSI™ (St. Paul MN), used primarily to collect cardiovascular (blood pressure and ECGs) and core temperature data for further safety evaluations.

NOTES

Surgical Implantation of a DSI TruSense TS-L21 Telemetry Implant in Large Animals

Heather Bogie, RLAT, CVT
Data Sciences International

The DSI TruSense® TS-L21 is a new telemetry implant for use with large animals. These devices are implanted into laboratory animals to acquire physiologic research data as part of the TruSense telemetry system. They detect internal animal characteristics, process the information into data and transmit the data from within the animals via radio-frequency signals. The TS-L21 implant is designed to monitor left ventricular pressure, systemic blood pressure, a biopotential signal, temperature, and physical activity. Detailed procedures for the implantation of this new device will be discussed, including insights from experiences in both dogs and primates. The techniques to be described are designed for large animals including dogs, primates and swine but may be applicable to other similar-sized animals.

NOTES

Myocardial Infarct Models in Rodents: Surgical Aspects

Delphine Bouard, DVM, Dip. Vet. LAS
Charles River Laboratories

Coronary disease is the most common cause of death in the US and Europe. In humans, the majority of myocardial infarcts result from thrombotic occlusion by arteriosclerotic plaques. In experimental animal models, this occlusion phenomenon can be mimicked by a ligation of one of the coronary arteries. Rodent model of acute myocardial infarction (MI) was first described in the rat in 1978. With the recent growth in utilization of genetically engineered mouse models, the opportunity to evaluate the effect of individual genes on infarct healing may become easier to achieve. Post-operative morbidity and mortality in the rodent model can be challenging and many variables are of vital importance for successful outcomes in the rodent MI model. For example, the size of the infarcted area has been extensively studied. However the impact of surgical technique and peri-operative care on success of the model has not been fully characterized. Refinement of surgical technique and peri-operative care may allow for reduction of post-operative complications. This presentation will review improvements in animal preparation, surgical procedure, post-operative care, continuous training techniques, and quality control that may contribute to improved outcomes in MI rodent models.

NOTES

Rabbit Anesthesia and Analgesia

Jon Ehrmann, BS, SRS, SRA, LATG
Bristol Myers Squibb

The oral presentation is intended for all audiences including technicians, investigators and veterinarians interested in providing anesthesia and analgesia to rabbits for surgical and long term imaging procedures. The presentation will cover all aspects of the perioperative process including the pre-operative, intra-operative and post-operative phases. Common anesthetic protocols for rabbits will be reviewed for both minor and major procedures along with appropriate analgesic use for these procedures highlighting a multimodal and pre-emptive approach to analgesic use. The presentation will also cover in detail three methods of intubation in rabbits; blind intubation, laryngeal mask airway "intubation" and endoscope guided intubation including video instruction of these techniques. Ventilation techniques will be reviewed for those performing thoracotomies in rabbits with discussion focusing on ventilator options, the use of a chest tube, arterial blood gas analysis and evaluating the ventilation status of the patient. Additionally, the use of local analgesics will be reviewed including splash blocks, intercostal blocks and intrapleural blocks. Intra-operative monitoring techniques will be reviewed including thermoregulation, pulse oximetry, ECG and placement of leads, end tidal CO2 , direct blood pressure and noninvasive blood pressure. Post-op radiography following a thoracotomy will be discussed along with the management and/or removal of a chest tube. Finally, post-operative monitoring techniques will be discussed in detail including which paramenters to monitor, analgesics, post-op arterial blood gases, and thermoregulation.

NOTES

Bone Response between Platform Switched Implants in Mini Pigs

Nicolas Elian, DDS

The aims of the studies are to investigate the bone tissue alterations at two adjacent implants with an inter-implant distance of 3 mm and 4 mm vs. 2 mm and 3 mm. The preservation of the peri-implant bone is one important factor for success. The quantity and quality of the bone surrounding an implant not only affects implant osseointegration, but also influences the shape and contour of the overlying soft tissues which are important for the esthetic outcome of treatment. A vertical marginal peri-implant bone loss of 1-1.5 mm during the first year of function followed by a yearly bone loss of 0.1-0.2 mm has been reported in abundant clinical studies describing two-piece implants. The bone loss may be greater when two implants are placed adjacent to each than when an implant is placed next to a natural tooth, especially if the distance between the implants is equal or less than 3.0 mm. The loss of marginal bone may result in loss of support of the overlying soft tissue, eventually leading to recession of soft tissue and an esthetically compromised result. The mandibular premolars and the first molar from 24 mini pigs (12 for study 1 and 12 for study 2) were extracted. After 3 months of healing, 72 implants were placed using a template guide (study 1). 65 implants were placed with the same guide (study 2). Three experimental platform switching implants with SLActive surfaces (Institute Straumann, Switzerland) were placed on one side of the mandible with an inter-implant distance of 3 mm while on the contralateral side the distance was 4mm. One stage procedure was used with abutment placement at time of surgery utilizing a transmucosal abutment healing cap. The minipigs were sacrificed 8 weeks after implant placement. Histomorphometric analyses including first bone to implant contact (fBIC) and bone to the implant contact in a defined region of interest (ROI) were performed.The results indicated a BIC of the interproximal sides of 88.8±9.7% for the 4 mm group and 85.1±12.2% for the 3 mm group (study 1). The results of study 2 indicated that a BIC of the interproximal sides of 77.9±17.4 % for the 3 mm group and 76.5±13.2% for the 2 mm group. There was no significant differences between group 3 mm and 4 mm. A mean bone gain of 0.5 mm ± 0.8 mm adjacent to the implants was recorded in the 3 mm inter-proximal distance group while a bone gain of 0.6 mm ± 0.5 mm in the 4mm inter-proximal distance group was measured. The results were not significant. The results of the present study revealed no bone loss and no statistically significant differences in the bone maintenance in the proximal areas between study 1(the implants with inter-implant distances of 3 mm and 4 mm) and study 2 (the implants with inter-implant distances of 2 mm and 3 mm).

NOTES

Combination of Scaffolds, Scaffold Retainers and Rhbmp-2 For Alveolar Ridge Augmentation in Various Animal Models

Martin A. Freilich DDS, Liisa Kuhn PhD, David Shafer DMD, Bo Wen DDS PhD, Peter Schleier DDS, David Pendrys DDS PhD, Denise Ortiz MS, Marcel Obrecht Chem Eng, Michel Dard DDS PhD
University of Connecticut Health Center

Introduction: Bone resorption following tooth loss can lead to a significant decrease in alveolar bone height compromising subsequent implant placement.
Hypothesis: Combination of an osteogenic agent and scaffold materials supported by a Ti scaffold-retaining device enhances the formation of a new layer of bone.
Methods: Studies have been carried out in various animal models including the mouse, rabbit and mini-pig, with a variety of scaffold materials in combination with osteoinductive agents. As part of this construct, miniature and full size implants have been used incorporating different surface treatments. In the latest mini-pig study, 48 Straumann implants were partially embedded in mandibles of 12 adult mini-pigs with the shoulder of the implant located 3 mm above the bone crest. Twenty-four each of test (rhBMP-2) and control implants were placed. rhBMP-2 was incorporated within resorbable scaffolds which were placed around the implant and covered with a newly developed Ti "umbrella" scaffold retainer. The extent of bone regeneration around the implant was evaluated with computerized microtomography (microCT) and histomorphometry at 9 weeks.
Results: MicroCT analysis and histomorphometry revealed the consistent regeneration of well-integrated new bone height and bone volume at test sites with a mean of 179±53 mm3 of new supracrestal mineralized tissue volume formation when rhBMP-2 was released from the scaffolds (all test sites pooled). Conversely, when the data was pooled for all control sites (without rhBMP-2) there was substantially lower mineralized tissue volume: 113±60 mm3. Histomorphometry showed new vertical bone growth (height) in the pooled rhBMP-2 (test) sites (2.2±1.0 mm) twice that of the pooled control sites (1.0±0.9 mm).
Conclusion: The release of rhBMP-2 from resorbable scaffolds adjacent to a dental implant and scaffold retention umbrella consistently regenerated the greatest volume and height of new bone along the length of the implant.

NOTES

Comparison of Electroencephalogram (EEG) Lead Placement for Measurement of Brain Activity in the Conscious, Free Roaming Dog

Teresa Gleason, BS, LVT, SRS, RLATG
WIL Research Laboratories, LLC

The dog is not commonly used for central nervous system (CNS) safety pharmacology studies, consequently, there is minimal literature on the optimal EEG lead placement. The objective for developing this model was to use the DSI TL11M3-D70-CCTP transmitter to enable the collection of EEG data as well as traditional cardiovascular data on the same group of animals. We compared two different surgical procedures in an attempt to minimize noise from muscle movement to achieve the best possible signal. Both procedures included placing the positive and negative EEG leads over the motor cortex (1 cm from midline, 5 mm anterior to the intra-aural line). The reference lead placement varied – we mimicked the recommended placement for rodents by securing the lead in the muscle of the lateral neck; alternatively we secured the lead on the skull anterior to the EEG leads. Surgical procedures were conducted following facility standard operating procedures for anesthesia and analgesia delivery as well as animal preparation and post-operative care. All procedures were approved by the institutional animal care and use committee and the veterinary staff. Following a minimal two week surgical recovery period, the EEG signals were evaluated using a proconvulsive agent. Pentylenetetrazole (PTZ) was intravenously infused via a time delayed ambulatory pump while the animal was observed via a radio telemetry receiver and camera for paroxysmal activity. Once overt convulsive activity was noted, the PTZ infusion was discontinued and diazepam was administered to effect. The EEG tracings for both surgical variations showed the overt convulsive activity. For the group with the reference lead attached directly to the skull, the tracings were much cleaner, allowing observation of pre-convulsive activity. Therefore, this surgical method is considered superior for evaluation of the seizure potential of new drug candidates.

NOTES

Experimental Models For Guided Bone Regeneration In Compromised Healing Conditions

Nikos Mardas, Dipl DS, MS, PhD
UCL Eastman Dental Institute

The Guided Tissue Regeneration (GTR) principle was based upon the observation that in order to achieve regeneration of a certain type of tissue, cells with ability to regenerate this particular tissue must be allowed to populate the wound area. Guided bone regeneration (GBR) is the specific GTR application where the regeneration of osseous defects is achieved by the application of occlusive membrane–like barriers which mechanically impede the proliferation of non-osteogenic cells from the surrounding soft tissue into the osseous wound area, thereby allowing the osteogenic cells originating from the parent bone to proliferate the osseous defect and promote new bone formation. Today, a significant number of patients are submitted to GBR procedures for dental or maxillofacial reconstructive surgery. A great percentage of these patients may suffer however from a variety of chronic metabolic diseases such as diabetes and osteoporosis. Appropriate treatment of bone defects in these patients requires an understanding of the effect of the metabolic diseases and their medication on the biologic mechanisms involved in bone healing. Therefore, the development and manufacturing of new devices for GBR requires reproducible, easy to control and manipulate, experimental models in which these compromised clinical situations can be successfully represented or at least simulated. Experimental animal models simulating osteoporosis or diabetes minimize some of the difficulties associated with studying these conditions in humans obtaining a level of experimental control impossible in human clinical research. This presentation will review: 1) the most common experimental animal models imitating type I diabetes and postmenopausal osteoporosis discussing the factors for consideration when choosing such a model for evaluating new technologies for bone regeneration 2) recent developments in designing preclinical models for GBR in osteoporotic and diabetic animals.

NOTES

An Alternative Approach to Venous Access for Large Diameter Catheters and Devices in the Swine Model: Using the Iliac Vein

Amanda L. McSweeney, BS, SRT, RLAT, Adam Groothuis, MS, PhD
CBSET, Inc.

Background: Preclinical models for large diameter catheters and devices continue to be a challenge for delivery in the thoracic region, including mitral valve devices. Often these devices require non-standard techniques in order to facilitate device implantation. While human venous anatomy may be more accommodating for larger diameter devices, the superficial femoral vein in the swine is not. Objective: This study required us to develop a method to gain iliac vein access without entering the abdominal cavity. Methods and Results: Five Yorkshire swine were utilized with IACUC approval for mitral valve device implants that required a modified approach to the standard femoral vein cannulation. Anesthesia was induced using Telazol (4-6mg/kg) and maintained using Isoflurane (0.25-5% in oxygen). Incisions were made across the inguinal region. Using manual retraction of the inguinal ligament, blunt dissection down to the profunda was performed. We then ligated the profunda while leaving the superficial femoral artery intact. This provided us a better access to the iliac vein, at the point where the internal and external iliac veins meet. Iliac vein access and percutaneous device delivery to the mitral valve was successfully achieved in all animals. Two survival animals' iliac veins were repaired, and three acute animals were euthanized at the end of the procedures. Minor post-operative complications occurred as a result of the iliac vein access including hematoma (n=2). Animals did not show signs of ischemia in the accessed leg. Pain was managed with hydromorphone (0.075-0.1mg/kg) and/or Buprenorphine (0.02mg/kg). Conclusions: As an alternative to major surgery for the delivery of large diameter catheters and devices, accessing the iliac vein via surgical cutdown in the inguinal region can produce good delivery and results in a less invasive surgery. Additional animals may be necessary to evaluate post-operative complications arising with ligation of vessels versus repair, evaluate vessel diameter limitations, as well as technique refinement.

NOTES

Hazard and Risk Analysis: Preclinical Study Planning (Animal Studies)

Vince Mendenhall, DVM, PhDC
Preclinical Surgical Services

The process of Hazard and Risk Analysis is a required part of all clinical trials for medical devices in humans, wherein the manufacturer of the new device must delineate all of the possible complications and side effects that could occur when the new device is implanted. This process should also be a part of all preclinical studies, and should involve an evaluation of the animal model used, the effected anatomy and physiology of the animal, the surgical technique, especially with regards to asepsis and lack of trauma, and the facility itself. Inattention to detail in such studies can commonly result in either false positive or false negative results – both of which can have a tremendous financial impact upon the future of the device. This presentation will give many examples of such incidents, and how to avoid them.

NOTES

Development of a surgical model with Intragastric and Vascular Access Ports in Rabbits

Kuldip Mirakhur, DVM, PhD, Amanda Wilsey, Tricia Galassi, Stacey Fossey and Christopher Medina
Abbott Laboratories

Oral dosing in pharmacokinetic studies in rabbits involves restraint of the rabbit either manually or in a restraint device by a skilled person in order to successfully dose them without error. Inadvertent intubation into trachea and subsequent gavage of solution will lead to aspiration pneumonia and probable death of the animal. The skill level and experience of the technician contributes greatly to achieving a positive outcome on a consistent basis. In order to eliminate the incidence of mis-dosing of rabbits at our institution, an alternative approach of surgical implantation of an intragastric access catheter port has been developed.

Eleven adult female, NZW rabbits were instrumented with intragastric catheters and vascular access ports to establish a chronic colony for PK study use. The anesthetic regimen consisted of induction with xylazine-ketamine followed by sevoflurane maintenance. They received buprenorhine and meloxicam for analgesia and enrofloxacin as an antibiotic. The femoral or jugular vein was catheterized using a 4-6 Fr polyurethane catheter which was coupled to a port on the back. For intragastric catheterization, the stomach was exteriorized through a para-costal incision on the left flank. A 9 Fr catheter was introduced in the greater curvature through a stab incision in the centre of a purse string suture and secured on the serosal wall with the dacron disc on the catheter. The other end of the catheter was tunneled subcutaneously and attached to a gastric port on the left back behind the scapula. An immediate post-operative contrast radiograph was taken to ensure there was no leakage. A restricted diet regimen was followed for nearly two weeks. Histologic examination of the stomach wall revealed bands of fibrous connective tissue with scattered small blood vessels and mononuclear cells surrounding the implant present externally to the gastric muscularis externa and serosa. Mock studies were performed to train the technicians on the proper use of the model which was highly accepted by the group once it was validated through side-by-side PK studies.

NOTES

Refinement of Surgical Wound Closure for Telemetry Implantation in Thirteen-Lined Ground Squirrels

Toni Mufford, RLATG, CVT
University of Colorado Denver

An annual surgically challenging project at the University of Colorado Denver is the insertion of telemetry devices into the abdominal cavity of thirteen-lined ground squirrels to measure temperature during hibernation. This is accomplished by surgical preparation of the animal, incisions into the skin and body wall, insertion of 1-2 devices, surgical wound closure and a stringent post-operative regimen. Ground squirrels, as with primates, can and will remove just about any surgical wound closure material. Since beginning work with this investigator in 2006, keeping the incision sites intact for the duration of healing has proved to be a major challenge. With an average of 30-50 wild caught and captive bred animals receiving telemeters annually and the variables of weight, sex, behavior and individual physiologic differences, there is great need to employ many methods to ensure success. Several different suture types, wound closure materials, surgical sites, various pain medications and antibiotics have been utilized in hopes of minimizing dehiscence, evisceration and ultimately euthanasia of animals. Mastering subcuticular suture techniques, stainless steel suture material, lessened pain medications and a strict pre- and post- operative plan proved to be the most successful combination. This approach kept body wall and skin sutures intact so that no animals were lost due to bowel evisceration. This refinement also decreased the amount of re-suturing required post-operative and allowed for many animals who consequentially removed some of their sutures to heal by second intention. We conclude that these refinements reduced dehiscence and subsequently extra anesthesia, animal handling, antibiotic use, pain medication or ultimately euthanasia. However, the success of surgical wound healing in this species is directly effected by the physiologic differences due to the the stages of hibernation and cannot be eliminated.

NOTES

How To Choose Anesthetic Protocols

Cholawat Pacharinsak , DVM, MS, PhD, Diplomate ACVA
Stanford University School of Medicine

When anesthesia is needed, anesthetic drugs must be carefully chosen. Anesthetics provide many advantages: unconsciousness, analgesia, amnesia and immobility, and disadvantages: prolonged recovery, hypotension, and hypothermia. It is ideal to have anesthetics that minimally affect animals' physiological status, and therefore research results. However, there are no perfect anesthetics for all research protocols. It is the researchers' responsibility to find the best anesthetic protocol for their particular research. To tailor the best possible anesthetic combinations for research, pharmacological knowledge of anesthetic drugs and their side effects are important. There are a variety of anesthetic agents: dissociatives, barbiturates, phenols and steroids. These drugs are mostly used in combination or prior to sedatives or tranquilizers: alpha-2 agonists, benzodiazepines, phenothiazines, and butyrophenones. Other important factors include species specific, familiarity of researchers, availability of drugs, and procedures: types, invasiveness, duration, and location. This presentation will focus on choosing appropriate anesthetic protocols for rodents and large animals for select procedures to prevent prolonged recovery.

NOTES

Overview of the 5/6 Nephrectomy in Rodent Models Targeting Anemia and Hypertension

Allison Parlapiano, BS, SRS, LATG
Merck & Co

The 5/6 nephrectomy model has great utility in the field of cardiovascular and metabolic research. This talk will deliver an overview of this surgical model and its ability to mimic disease states. It will also give a detailed explanation of the surgical procedure and technique in the rat and mouse model including; ablation, vessel ligation and pole resection. Additionally, this talk will provide an overview comparing efficacy of several model paradigms in both the rat and the mouse pertaining to the induction of hypertensive and anemic disease states.

NOTES

Advanced Anesthesia

[1]Nancy S. J. Poy, DVM; [2]Jennifer C. Smith, DVM, DACLAM; [3]Michael Talcott, DVM, DACLAM
[1]*Pfizer Inc,* [2]*Taconic,* [3]*Washington University School of Medicine*

General principles of anesthesia are based on three basic principles; Temperature, Pulse and Respiration (TPR). This session will expand these principles and include additional essential components relative to anatomy and physiology that should be considered in surgical and extended anesthesia cases. Each general area will be explored in depth as to the impact that each has on the overall physiologic state of the animal. Maintaining and monitoring normal pulmonary, cardiovascular and thermoregulatory functions are critical components of safe and effective anesthesia as well as adequate veterinary care and the presenters will review current and best practices for these procedures. In addition, the audience will participate in case study reviews and problem solving scenarios related to anesthesia monitoring, surgical complications and post operative care. Recognition and awareness of the surgical procedure and the depth and duration of anesthesia can improve animal welfare and assure best veterinary practices.

NOTES

Effect of Small-diameter Proximal Splenorenal Shunt in the Treatment of Portal Hypertension: Experience from 176 cases

Weiping Yang, Yongliang Yao, Anyd Lin, Hao Chen, Honwei Li, Weihua Qiu, MD, PhD
Ruijin Hospital, Shanghai Jiao Tong University School of Medicine

Objective To investigate the effects of small-diameter proximal splenorenal shunt (PSRS) in the treatment of portal hypertension. Methods 176 cirrhotic patients enrolled in this study. 96 patients underwent splenectomies and PSRS with the shunt stoma size of 8mm in diameter. 80 who took splenectomies and gastroesophageal devascularizations were included as the control group. The hemodynamics of the portal venous system was detected using Doppler color flow imaging (DCFI). Pre-, post-splenectomy and post-shunting, free portal pressures (FPPs) were measured in all cases during the operation. Mortality and incidences of complications (especially encephalopathy, liver failure, and occlusion) were documented in 158 patients during the average follow-up period of 76.32 months (12-165 months). Results Mean diameter of shunt was 8.54 ± 0.81 mm (7-10 mm). FPPs reduced significantly from 42.4±5.85 cmH2O to 29.01±3.48 cmH2O after shunting (P<0.01), but less apparent change was observed in control group. The portal vein flow decreased significantly in both groups, but no difference between two groups. In spite of the negative early mortality, 6 and 12 patients had recurrent variceal hemorrhage in two groups, respectively. DCFI revealed the shunts to be patent in 74 cases and occluded in 18 (18.37%) cases. The incidence of hepatic encephalopathy was 3.37% in shunting group. The survival rate in shunting group of 1, 3, 5 and 10-year was 95.90%, 67.74%, 48.35% and 15.38%, respectively, which was statistically superior to those in control group. Conclusion Small-diameter PSRS affords durable potency and protection against variceal rebleeding with a favorable survival. The low incidence of encephalopathy may result from the maintenance of majority of hepatopetal flow from the portal vein.

NOTES

Development of a Novel Duodenal Catherization Model in The Minipig Using an Implant Modified From the Clinic

Rita Rose, BSc, MA, VetMB, MSc(WAH), MRCVS
Huntingdon Life Sciences, UK

A minipig duodenal catheterization model was developed to investigate local irritancy of a test compound. Direct duodenal dosing is clinically required for certain medications used to treat conditions such as Parkinson's disease. As this study was concerned with local irritancy, it was essential to limit variables and use the same implants that would be used clinically. To make the minipig model directly comparable to the clinical trials, the surgical implant selected was specifically modified from a PEG tube and intestinal line used in human medicine (Freka®). Cadaver trials were undertaken in three minipigs to determine the optimum implant dimensions, and to perfect the surgical technique looking at both standard and minimally invasive approaches. A preliminary trial in three minipigs revealed the tendency for the intestinal catheter to be drawn back into the stomach, possibly due to the retention of a matt of fibrous material when the animals are bedded on straw. Two alternative methods were developed, one altering the position of the PEG tube in the stomach and the other avoiding use of the PEG tube and placing the intestinal catheter directly into the duodenum, via modification with a retention bead and Dacron mesh. Post operative orthoganol view radiographs were taken on the pilot study to ensure the correct location of the catheter in all animals during the dosing period. The pilot work proved the direct duodenal placement method was a successful and robust model allowing progression to the dose range finding and main studies. The surgical approach and fixation technique of the intestinal catheter will be explained visually. The presentation will also review feeding considerations, anesthesia, analgesia and post operative catheter maintenance regimes.

NOTES

Comparison of Peripheral vs. Surgically Cannulated IV Infusion Dosing in the Rat: Considerations when Selecting the Optimal Study Design

Jennifer Sheehan, BS, RLATG, SRS
Huntingdon Life Sciences

In experimental pharmacology and toxicology it is preferable to use nonstressed animals to minimize the confounding effects of stress on study results as well as to maximize animal well-being. For compounds requiring repeated intravenous (IV) administration, it is not always clear which dosing methodology produces the least stress. This study was designed to evaluate stress levels associated with two different methods of IV dosing in rats: tail vein infusion in restrained animals versus central vein infusion via a surgically implanted catheter. Male rats were dosed IV with 0.9% saline for one hour/day during 5 consecutive days via the tail vein during restraint or via a surgically implanted catheter in the inferior vena cava. Stress-related endpoints were assessed before and after surgical catheter implantation, recovery from surgery and IV dosing. The surgical catheterization procedure resulted in reductions in body weight and food consumption and elevations in serum corticosterone concentration, with return of all values to baseline 4-7 days post-surgery. Restraint during tail vein infusion was associated with decreased food consumption, elevated heart rate and body temperature, elevated fibrinogen and corticosterone concentrations and ALT/ALP activities, as well as inflammation at the infusion site. Despite an initial period of post-surgical stress, dosing via a central catheter was associated with less dose-administration stress and was considered to be preferable for prolonged and repeated dosing. Confounding factors noted with restraint dosing, such as increases in certain liver enzymes and inflammation at the infusion site, may be a reason to also opt for a central catheter for studies of short duration.

NOTES

An Improved Method for Sampling Thoracic Duct Lymph Fluid in Rats

Xiaolan Shen, LATG, MS[1], Bo Wang[1], Yan Zou[2], Xuening Hong[1], Christian N. Nunes[1], Thomas J. Bateman[2], Vijay Bhasker Gangula Reddy[2], Bernard J. Doerning[1], Chris Vernon Johnson[1]
Department of Laboratory Animal Resources [1] and Drug Metabolism [2], Merck & Co.

Following subcutaneous dosing, increase in size of the molecule (>16 kDa) enhances the proportion of dose absorbed through the lymphatic system and reduces direct vascular uptake. Thus, experimental drug absorption and pharmacokinetic studies require continual sampling of the total thoracic duct lymph fluid in conscious and unrestrained rats. Several reported protocols use cannulation of the thoracic lymphatic duct for this purpose. It is known that lymph fluid frequently clots inside the cannula due to its high protein content. Therefore, the success of the study relies heavily on the continuity of the lymph sampling. The method described in the present study demonstrates the use of a modified catheter system with proper nutrient and fluid replacements effectively to improve lymph flow rate to 2.2 ± 0.98 ml/hour. The collection of lymph fluid in the study was sustained for up to 10 days. The modified catheter system has two catheters combined with a mixing chamber. Lymph fluid flows from the cannula through the perforation in one catheter into a mixing chamber, which en-sleeves the perforated portion of the catheter. Microinfusion of heparin from the second catheter into the mixing chamber at a constant low flow rate of 50 µl/hour prevents the coagulation of lymph ex vivo and therefore maintains the free flow of lymph fluid. The low flow rate of microinfusion ensures no backflow of heparin into the animal *in vivo* due to the much higher lymph out flow rate of the thoracic duct. This model has proven useful in studying the absorption route of subcutaneously administered large molecular agents in rats.

NOTES

A Critical Comparison of Pre-Clinical Animal Models for Analyzing Peri-Implant Hard Tissue

Stefan Stübinger, DDS
University of Zurich

Objectives: Surgical reconstructive therapies in oral implant surgery mainly aim to enhance the process of peri-implant bone regeneration around dental implants. Evaluation of bone healing and remodelling after different time points and treatment options are a standard procedure. However, to choose a reliable and comprehensive animal model for analyzing the biological and biomechanical performance of newly designed dental implants and innovative reconstructive therapies still remains to be a challenge in implant dentistry.
Methods: To critical review and define new standards for experimental implant surgery this overview is designed to summarize the most commonly applied animal models in oral implantology. Advantages and disadvantages of rabbits, mini pigs, dogs and sheep for pre-clinical surgical research will be discussed. A special focus will be set on a critical comparison of pre-clinical animal models for their usability to closely resemble the anatomical characteristics of the human oral and maxillofacial system. In this context especially the different morphology and healing processes of intraoral hard tissue structures in the dog and mini pig model will be critically assessed. Currently they are the only two models for a specific and thorough investigation of the changes of the alveolar ridge. The possibilities and limitations of each model for the examination of the bone-to-implant-contact at dental implants will be demonstrated. Beneath scientific also economic and ethical reasons with a strong relation to the 3R (replace, reduce, refine) concept will be presented.
Conclusion: These considerations should finally help to cope with the increasing influence of the rapid developments in biomaterial research and the need and refinement of pre-clinical animal models to allow a rational adaption and transfer to a realistic clinical situation.

NOTES

Porcine Models in Surgical Research

M. Michael Swindle, DVM, Diplomate ACLAM & ECLAM
Medical University of South Carolina

Swine are one of the traditional large animal research models in which preclinical trials are conducted prior to performing a clinical trial in humans. For three decades our comparative medicine research group has performed preclinical trials using swine mainly in the area of surgically implanted devices and interventional radiology devices, such as intravascular stents. In addition swine are used as discovery models in a number of fields. The majority of the studies are performed in the cardiovascular system. Other systems of primary interest include digestive, integumentary, urinary and most recently neurologic. Cardiovascular models are mainly related to creation of heart failure, myocardial infarction, aneurysms, and atherosclerosis models. Surgical preparations involving the digestive system include hepatic procedures, gastrointestinal procedures and procedures related to the pancreas and islet cells. Because of the similarities in anatomy and physiology of the kidney a variety of renal surgical models have been produced including hydronephrosis and vesicoureteral reflux. The similarity of the skin to humans has made swine one of the most widely used models for wound healing. The fastest growing area of research in swine involves the brain and spinal cord. Neurotrauma models have become increasing important due to the large number of causalities due to victims of international terrorism. There is also an increased interest in the production of stroke models. Both solid organ and cellular transplantation studies are conducted with many organs and tissues. In addition to these models a substantial number of other devices and techniques have been developed in both miniature and domestic breeds of swine. This presentation will discuss comparative anatomy and physiology of the various systems as well as many of the surgical models which have been utilized. It is likely that swine will continue to be of importance in the development of therapies for humans in the foreseeable future.

NOTES

The Critical-size Supraalveolar Peri-implant Defect Model: Characteristics and Use

Ulf Wikesjö, DDS, DMD, PhD, Cristiano Susin
Georgia Health Sciences University

Novel implant technologies and reconstructive therapies for alveolar augmentation require pre-clinical evaluation to estimate their biologic potential, efficacy, and safety prior to clinical use. The objective of this report is to present characteristics and use of the critical-size, supraalveolar, peri-implant defect model for the evaluation of such novel technologies.

Bilateral extraction of the mandibular premolars was performed in 12 Hound Labrador mongrel dogs following horizontal surgical cut-down of the alveolar ridge approximating 6mm to provide baseline data for this defect model. Each jaw quadrant received three ø4.0x10mm threaded implants placed into osteotomies prepared into the extraction sites of the 3rd and 4th premolars. The implants were placed 5mm into the alveolar crest leaving 5mm supraalveolar. The implants were submerged under the mucoperiosteal flaps for primary intention healing. Fluorescent bone markers were administered at weeks 3 and 4 post-surgery, and pre-euthanasia. The animals were euthanized following an 8-week healing interval when block biopsies were collected for analysis.

Healing was generally uneventful. The radiographic and histometric evaluations demonstrate the limited osteogenic potential of this defect model. Whereas lingual peri-implant sites exhibit a mean (±SE) bone gain of 0.4±0.1mm, remodeling/resorption of the buccal crestal plate results in a mean bone loss of 0.4±0.2mm for an overall osteogenic potential following sham-surgery averaging 0.0±0.1mm. Overall bone density and bone-implant contact in the contiguous resident bone averages 79.1±1.1% and 76.9±2.3%, respectively.

In conclusion, the critical-size, supraalveolar, peri-implant defect model appears a rigorous tool in the evaluation of candidate technologies for alveolar reconstruction and osseointegration of endosseous oral implants. Limited innate osteogenic potential allows critical evaluation of osteogenic, osteoconductive, or osteoinductive technologies in a challenging clinical setting. We herein present the application novel bone morphogenetic protein technologies to illustrate the usefulness of this discriminating defect model.

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NOTES

Animal Model of Sporadic Alzheimer's Disease: The Surgically-Modified Samaritan FAB Rat

Weiner CM, Marla Wilwol LVT, RLATG, SRS
Taconic

The Samaritan FAB model animal is designed to chemically-induce the onset and progression of Alzheimer's disease in a Long Evans rat via the slow release of ferrous sulfate heptahydrate, L-Buthionine-(S,R)-sulfoximine, and Beta-amyloid peptide (Lecanu, L et. al Pharmacology 2006;76: 19-33) . Disease development is rapid (~4 weeks), which is an advantage over other models of this disease. Further, the animals are a model of sporadic Alzheimers, which represents ~95% of human cases. Animals demonstrate memory impairment, histologic lesions, and increased levels of hyperphosphorylated Tau protein in the cerebrospinal fluid. This animal model refines techniques used to study sporadic Alzheimer's disease and replaces other models that do not represent human disease as closely.

NOTES

Animal Model of Parkinson's Disease: Unilateral 6-Hydroxydopamine Lesion of the Nigrostriatal Pathway

Weiner CM, Marla Wilwol LVT, RLATG, SRS
Taconic

The neurotoxin 6-hydroxydopamine (6-OHDA) is administered unilaterally to destroy central dopamine neurons in order to study neurodegenerative processes associated with Parkinson's disease. Unilateral destruction of these neurons causes a chemical imbalance of the brain's content of dopamine. The animals are then evaluated post-operatively by administering a dopamine agonist, apomorphine, which stimulates intact dopamine neurons in the unaffected brain hemisphere. Animals with a demonstrable lesion can be used to assess the efficacy of therapeutic agents which may be used in the treatment of Parkinson's disease. This animal model refines techniques used to study Parkinson's disease.

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NOTES

The 27th Annual Meeting
of the

Academy of Surgical Research

Poster Abstracts

Alphabetically listed by Author.
Underline indicates presenting Author.

Poster #1

A New Model for Achilles Tendon Repair in the Rat

David A. Black, Sheila Lindley, Michelle Tucci, Tracye Lawyer, and Hamed Benghuzzi
University of Mississippi Medical Center

Most researchers use a modification of the Kessler technique for suture repair of the Achilles tendon in rats. While this technique provides adequate strength after healing, early mobilization is not recommended. Prior to healing, the load will be borne completely by the suture repair, subjecting it to rupture. To prevent this complication, investigators employing the Kessler repair often immobilize the operative extremity with a cast or splint. Such immobilization has also been shown to be detrimental to the peak load borne by the tendons prior to rupture. OBJECTIVE: To describe a new technique for Achilles tendon repair in the rat which is inherently strong enough to eliminate the need for post-operative splinting. METHODS: A double-loop locking technique of suture repair for rat Achilles tendons is presented utilizing 4-0 Supramid looped suture. Anesthesia is performed by induction with 2% isoflurane followed by intraperitoneal injection of ketamine (75 mg/kg) and xylazine (10 mg/kg) according to an IACUC approved protocol. Analgesia is by pre-operative subcutaneous injection of carprofen. Euthanasia is performed after two (n=50) or four (n=50) weeks of healing with overdose isoflurane followed by creation of bilateral pneumothorax. RESULTS: One hundred repairs have been performed using the double-loop locking technique. All animals have been able to mobilize with minimal limp immediately after recovering from anesthesia, and there have been no ruptures. No other complications have occurred (hematoma, seroma, infection, dehiscence). DISCUSSION: As force is applied across the repair, the suture pulls on the tendon, sharing the load. This allows for early mobilization of repaired tendons, with minimal risk of rupture. CONCLUSION: The double-loop locking repair technique is ideal for use in studies of tendon repair in the rat since it is strong, easy to perform, and eliminates the need for immobilization of the operative leg.

NOTES

Poster #2

A Comparison of Two Surgical Methods for Chronic Measurement of Blood Pressure in Juvenile Rats Through Adulthood

Bogie, HM; Sarazan, RD
Data Sciences International

Collecting chronic blood pressure (BP) from juvenile animals through adulthood can provide a number of research benefits. The number of animals used, coinciding surgical support, and animal variability can all be reduced by using one BP transmitter model throughout the animal's lifetime. The PA-C40 transmitter (DSI), typically used in rats and similar species is too large in size and catheter diameter for smaller rodent arteries. However, the PA-C10 transmitter (DSI), which is typically implanted in mice or similar-sized species, was chosen as a possible alternative to the larger PA-C40.
The PA-C10 was implanted in 12 male, juvenile rats (SD, ~90 grams) to determine the most suitable placement for the catheter and transmitter body to retain catheter patency during the growth period. Two separate surgical procedures were evaluated including direct aortic cannulation with intraperitoneal (IP) transmitter placement in six rats and direct femoral artery cannulation with subcutaneous (SQ) transmitter placement in an additional six rats. Blood pressure was monitored and collected three days per week for a total of 16 weeks. Catheter patency was determined by analyzing the collected data and visualizing in vivo catheter placement at necropsy.

NOTES

Poster #3

Chronic Aortic Root Pressure-Loading Assessment Model

Nancy Rakow[1], Noah Barka[1], Renee Gerhart[1], Paul Rothstein[2], Michael Green[2], Carl Schu[2], Erin Grassl[1], J. A. St.Cyr[1], Michael Kopcak[1]
Physiological Research Laboratories[1] and Structural Heart Disease[2], Medtronic, Inc.

Physiological Research Laboratories1 and Structural Heart Disease2, Medtronic, Inc., Minneapolis, MN Percutaneous placement of transcatheter prosthetic aortic valves without cardiopulmonary bypass (CPB) continues to gain clinical acceptance. Information on pressure-loading characteristics of the aortic root/annular areas is limited. Pressure-load sensing assessments of this region would provide a better understanding of the anatomical inter-relationships, potentially improving device designs and clinical outcomes. We designed a preclinical model to implant an aortic root load transducer with a power source and telemetry system for chronic, conscious, loading data acquisition. Preoperative echocardiography and magnetic resonance imaging were used to determine aortic annular and sinotubular junction dimensions and ascending aortic length. Anesthesia was induced with morphine, 0.5 mg/kg, and propofol, up to 10 mg/kg, and maintained with isoflurane, 0.5 - 2.5%, and an infusion of fentanyl, 400 mcg, lidocaine, 300 mg, ketamine, 100 mg, in 1L normal saline. Through a left thoracotomy six adult sheep were placed on CPB with dual arterial cannulation (descending thoracic aorta, brachiocephalic arterial trunk), right atrial venous drainage and apical left ventricular (LV) venting. The aortic root and ascending aorta were skeletonized and origins of the coronary ostia were marked. Cardiac arrest was initiated with cold coronary blood cardioplegia. A properly sized aortic root load-sensing device, consisting of a transcatheter aortic valve and ring load transducer was implanted through a left apical ventriculotomy at the LV vent site. Positioning was verified, using fluoroscopy and previously placed markers, with the frame secured to the ascending aorta. Following placement of the device, closure of the ventriculotomy was performed with a running, Teflon buttressed mattress suture technique. LV vent was re-established via the left atrium. Following re-warming, the animal was defibrillated, weaned from CPB, and closed in routine fashion. Echocardiography confirmed appropriate device placement. Perioperative analgesia was provided by bupivacaine blocks and fentanyl patches, 100 - 125 mcg/hr. Load sensor wires exited the LV apex and were connected to the device's power source in a remote subcutaneous pocket. There were no operative deaths or significant postoperative complications. Weekly, serial pressure-load sensing assessments in a conscious state produced reproducible proprietary data.

NOTES

Poster #4

Use Of Airway Exchange Catheters To Aid In Difficult Endotracheal Intubations

Julie Long
Washington University

Use of an airway exchange catheter (Arndt Airway Exchange Catheter-Cook Medical) in large animal anesthesia can aid in quick intubation when replacing an endotracheal tube with a damaged cuff or when dealing with a challenging intubation. We have found this method particularly useful in quickly securing a protected airway in ruminants and swine. Quick and effective intubation of ruminants is particularly important due to their increased risk of bloat and aspiration of rumen content while anesthetized. A rumen tube is placed to decrease the risk of these complications, but we have found using this technique allows rapid and efficient intubation in lateral recumbency and can be done by a single individual or with minimal assistance. After the animal has been anesthetized and the airway cleaned of saliva or debris it can be visualized with a laryngoscope. The exchange catheter is gently passed through the vocal chords and advanced 5-6 centimeters into the trachea. The catheter is secured by holding it against the hard pallet while the endotracheal tube is passed over the catheter and advanced into the trachea. Gentle rotation of the tube helps to advance it if laryngeal spasm has occurred. Once the tube is correctly positioned, the catheter can be removed. For large swine (400-500 lbs) the same technique can be used but often takes more than one individual to perform this task. When a damaged tube has to be replaced, this simple, quick technique reduces the need for equipment (laryngoscope for visualization) or changing positions in the middle of a procedure. This technique allows rapid, efficient intubation of difficult airways by a single individual or with minimal assistance and should be a useful skill for anesthesia of ruminants and swine.

NOTES

Poster #5

Telemeterized Collection of Respiratory Parameters While Optimizing Epicardial ECG Utilizing a DSI PCTR Transmitter: A Surgical Comparison of the Primate, Canine, and Gottengen Mini-Pig

David S. Moddrelle SRS.; Kyle O'Donohue BS; Travis Denton; Eric Herrmann; Theodore Baird PhD
MPI Research

The use of telemetry for the collection of various hemodynamic parameters, such as ECG, heart rate, core body temp, blood pressure, etc., is well documented. While respiratory rate may be accomplished via diaphragmatic EMG or pleural pressure it is generally recognized that consistent respiratory parameters have been unable to be accurately determined via telemetry. With respect that the three different species have unique anesthetic, analgesic, pre, intra and post-operative care regimens we will focus primarily on the basic surgical approach utilized for all three species. 5 animals of each specie were implanted with the PCTR transmitter for acquisition of epicardial ECG, blood pressure, core body temp and respiration parameters. All transmitters were implanted intra-peritoneally and the blood pressure catheter introduced into an appropriate arterial vessel (either the circumflex, caudal abdominal, or internal iliac, depending on the specie). Left lateral thoracotomies were performed for the epicardial lead placements resulting in either a base/apex lead configuration or a modification of the procedure which placed the negative lead over the right atrium. For the primate the four respiratory impedance leads were placed bilaterally on the mid thorax inline with the xyphoid process and in-line with the iliac crest. For the dog and the Gottengen mini-pig the four impedance leads were placed bilaterally mid thorax in line with the xyphoid process mid way between the spine and the sternum. All respiratory leads were placed and manipulated until an optimal impedance signal was captured and then anchored. The thoracotomies were apposed with cable ties and the incisions closed with absorbable suture. Laparotomies were closed with absorbable suture. All animals were recovered normally with no significant intra-operative or post-operative complications noted. The differences in the surgical approach for each species had no effect on respiratory impedance values.

NOTES

Poster #6

Development Of An Arthroscopic In Situ Polymerization Technique For Cartilage Defect Repair In Goats

Nance Moran
Genzyme

To begin to test the hypothesis that cartilage defect healing will be improved by prolonged local delivery of cartilage anabolic growth factors, we developed a clinically applicable technique for minimally invasive delivery using in situ polymerizable scaffolds of viral vectors similar to those we have engineered to express growth factor genes for our studies. Mature female goats underwent arthroscopy of one knee under general anesthesia induced using an IV diazepam (0.45mg/kg)/ketamine (10 mg/kg) combination and maintained with 2-5% isoflurane inhalation. Perisurgical pain relief was provided in the form of epidural morphine (0.1-0.2mg/kg) pre-operatively, application of a Duragesic dural patch (100-125ug) one day pre-operatively and two days post-operatively, and supplemental buprenorphine (0.01mg/kg SC/IM) as needed. Bone marrow was aspirated from an aseptically prepared iliac crest into a syringe coated with anti-coagulant and mixed with Adenovirus containing the gene for the marker protein green fluorescent protein (Ad-GFP). Full thickness cartilage defects were created arthroscopically on the medial femoral condyle. Freshly aspirated autologous bone marrow was mixed with fibrinogen in one syringe of a two syringe dual injection apparatus. Thrombin and calcium were aspirated into the second syringe of the apparatus, and under transient CO2 gas insufflation, the contents of both syringes were mixed and applied to the defect (n=3/timepoint). One defect was left empty as an autofluorescence control. Goats were sacrificed at 2 days, 2 and 6 weeks to assess synovial fluid white blood cell count, histological evaluation for clot persistence and synovial reaction, and GFP detection. No adverse effects were detected in cartilage or synovium. No GFP was detected in cartilage or synovium, likely due to the subsequent determination that CO2 insufflation was toxic to the administered Adenovirus. We have successfully polymerized autologous bone marrow containing Ad-GFP viral particles in cartilage defects and evaluated GFP expression levels in repair tissue over a short time course, combining development of an arthroscopic model applicable to nearly any in situ polymerization strategy with a preliminary proof of concept evaluation for eventually evaluating the effects of virally delivered growth factor genes in polymerizable scaffolds.

NOTES

Poster #7

Evaluation of an Ischemic Critical Length Bone Defect Model in Rabbits

Randy Pielemeier, BS, LVT, SRS, LATG
MPI Research

The critical size radial defect model in rabbits is frequently used to evaluate osteoinductive and osteoconductive materials. In order to evaluate compounds with angiogenic as well as osteoconductive or osteoinductive properties, a rabbit model comparing with and without ischemia in a critical length defect was developed. All procedures were performed under IACUC approved protocols. Anesthesia: Acepromazine 0.1mg/kg SC, Glycopyrolate 0.01mg/kg SC, Ketamine 25mg/kg SC, Isoflurane inhalation, LRS 15ml/kg/hr IV. Pain Management: Fenanyl Pathch 25ug/hr, Meloxicam 0.1mg/kg IM SID x 3 days. Antiinfective: Enrofloxacin 10mg/kg SC SID x 5 days. Methods: Two groups of three rabbits per group received 1.9cm radial defects with autografts. In Group 1 the radial and ulnar artery were cauterized with monopolar electrocautery. In Group 2 the radial and ulnar artery were left undisturbed. Radiographs were taken prior to surgery to establish skeletal maturity and every 2 weeks post operatively. Bone Densitometry was performed using Dual Energy X-ray Absorbtometry (DEXA) at 6 weeks post operatively. Histology of the bone and surrounding tissue was evaluated. Results: Complete union of the radii without destruction of the radial and ulnar arteries was seen at 4 weeks. Union of the radii with the radial and ulnar arteries cauterized was not seen at 9 weeks on radiographs. DEXA scans performed at 6 weeks are consistant with the results of the radiographs at 6 weeks. Decreased bone healing and atrophy of muscle tissue was seen in the radial and ulnar artery cauterized group. Skin healing grossly and return of limb function were comparable between the two groups. Decreased limb function was seen for 5-7 days post operatively in both groups. Conclusion: The restriction of blood suppply to the radial defect had a clear negative effect on healing. This model has the potential to be useful in the evaluation of angiogenic compound in bone healing. Further evaluation would be required with know angiogenic compounds such as VEGf as a positive control.

NOTES

Poster #8

Technique For Use Of Dacron Felt To Improve Ingrowth Of Subcutaneous Devices In Yucatan And Gottingen Swine.

Randy Pielemeier, BS, LVT, SRS, LATG
MPI Research

Long term subcutaneous and exteriorized implants in swine are problematic for a variety of reasons, ranging from pressure necrosis to infection via exteriorization sites. All procedures were performed under IACUC approved Protocols. Anesthesia: Acepromazine 0.1mg/kg IM, Atropine 0.05mg/kg IM,Telazol 5-8mg/kg IM, Isoflurane by inhalation, LRS 10-15ml/kg/hr IV. Pain Management: Buprenorphine 0.02mg/kg IM TID day of surgery, Carpofen 4mg/kg SC SID x 3 days. Antiinfectives: Cefazolin 25mg/kg IV, Cefiofur 2.2 mg/kg IM SID x 3 days. Methods and Results: Study#1 – A study requiring monthly access to a cable for electrical testing was performed in six yucatan swine. The solution to the problem involved silicone-coated Dacron mesh with Dacron felt on one side of the silicone sheeting. The pouch was created so that the Dacron felt was on the outer surface of the pouch, in contact with the subcutaneous tissues. There were no erosions through the skin after 12 months, there was good tissue ingrowth into the Dacron felt, and no seromas were present at necropsy. The material was assembled by Access Technologies, Skokie IL. Cat#DM-FC-RP. Study#2 – Bard top access ports were incased in a tight envelope of Cat#DM-FC-RP from Access Technologies, Skokie IL in 21 Gottingen Minipig for IV access. One animal was eliminated from study due to a post operative port infection. Three animals were treated for bruising at the port site. Microscopic examination of the tissue interface demonstrated encapsulation of the pouch with extensive tissue ingrowth into the Dacron felt. The Dacron felt was infiltrated by numerous macrophages and multinucleated giant cells (granulomatous inflammation) and fibrous connective tissue with a fibrous capsule surrounding the pouch. These tissue reactions were considered to be typical for subcutaneously implanted, non-absorbable materials. Within the pouches and along the catheter tracts, bacterial colonies and acute inflammation were present, with no clinical sign of infection. Conclusion:The use of Dacron felt covered pouches appears to facilitate stable ingrowth of subcutaneous devices in Yucatan and Gottingen swine.

NOTES

Poster #9

Evaluation of a Novel Method for Preventing Extra Cranial Tumor Growth in Orthotopic Tumor Models

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Imaging[1] and Laboratory Animal Resources[2], Merck & Co.

Orthotopic tumor models are commonly used in preclinical evaluation of anti-neoplastic compounds. The intra cranial rat glioma model provides a platform where tumor response can be evaluated in vivo using various imaging modalities. Here we report a positron emission tomography [PET] based imaging study that enabled us to modify techniques used when implanting 9L glioma cells in the striatum of rat brain. Traditionally, bone wax is used to prevent implanted tumor cells from growing extra cranially. We discovered that a micro screw prevented extra cranial tumor growth more effectively. Anesthetized rats were prepared using standard aseptic technique in a dedicated surgical suite. Animals were centered in a stereotaxic frame by positioning the head parallel to the base of the frame. Bregma and lambda were exposed by making an incision on top of the head. Bregma was located and the anterior/posterior and medial/lateral coordinates were recorded. A hole was drilled in the skull at the predetermined anterior/posterior and medial /lateral coordinates. A micro syringe was inserted into the hole and cells were injected slowly for 20 minutes. The syringe was left in the pre-drilled hole for 10 minutes following injection to allow for equilibrium. The hole was plugged with a titanium micro screw and tissue adhesive was applied over top. Rats were imaged by [PET], utilizing 11C-choline and 18F-FLT as tracers, 7, 14, and 21 days post cell implantation to assess tumor growth. Prior to using the micro screw, 11 rats out of 11 showed extra cranial tumor growth. After using the micro screw, only 5 rats out of 13 showed extra cranial tumor growth. Results were confirmed with histopathological examination. The micro screw was well tolerated and showed no artifacts on imaging, therefore, we can conclude that the use of the micro screw may be a useful alternative for preventing extra cranial tumor growth in this oncology model.

NOTES

Poster #10

Development Of A Novel Duodenal Catherization Model In The Minipig Using An Implant Modified From The Clinic

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Huntingdon Life Sciences, UK

A minipig duodenal catheterization model was developed to investigate local irritancy toxicology for a test compound. Direct intestinal infusion is clinically required for certain treatments and supportive therapies. As this study was concerned with local irritancy, it was essential to limit variables and look to use the same implants that would be used clinically. To make our minipig model directly comparable to the clinical trials, the surgical implant selected was specifically modified from a PEG tube and intestinal line used in human medicine. Cadaver trials were undertaken in three minipigs to determine the optimum implant dimensions, and to perfect the surgical technique looking at both standard and minimally invasive approaches. A preliminary trial in three minipigs revealed the tendency for the intestinal catheter to be drawn back into the stomach, possibly due to the retention of a matt of fibrous material when the animals are bedded on straw. Two alternative methods were developed, one altering the position of the PEG tube in the stomach and the other avoiding use of the PEG tube and placing the intestinal catheter directly into the duodenum, via modification with a retention bead and Dacron mesh. Post operative orthoganol view radiographs were taken on the pilot study to ensure the correct location of the catheter in all animals during the dosing period. The pilot work proved the direct duodenal placement method was a successful and robust model allowing progression to the dose range finding and main studies. The surgical approach and fixation technique of the intestinal catheter will be explained visually. The presentation will also review general surgical planning principles, feeding considerations, anesthesia, analgesia and post operative catheter maintenance regimes.

NOTES

Poster #11

The Surgical Procedure, Quality And Viability Of The Hd-X11 Transmitter In Mice

Janelle VanMiddlesworth, Marci Harter, Kyle O'Donohue, David Gauvin, Jill Dalton, Theodore Baird
MPI Research

Historically, cardiovascular research utilizing the mouse as a model has not benefitted from the availability of devices to continuously monitor a comprehensive range of variables over long-term data recording sessions. Among the issues contributing to the above, are the diminutive size of the species in relation to trends in miniaturization of relevant technologies and variables affecting battery life. The present study was designed to test the quality and viability of the commercially available Data Science International transmitter (HD-X11) which allows researchers to record blood pressure and ECG from a single mouse.

The HD-X11 transmitter was implanted in four animals (Crl:CD1®(ICR)) following procedures developed by Data Science International (DSI) for carotid pressure catheter placement. During the surgical procedure accurate telemetry measurements were used to verify correct pressure catheter placement and ECG leads prior to securing the device in place and closure of the animals.

Animals were allowed to recover prior to evaluation of blood pressure (500 Hz), heart rate, and the electrocardiogram (ECG; 1000 Hz). The methodology and equipment appear to be amenable to continuous, long-term monitoring of basic cardiovascular (hemodynamic and electrocardiographic) data in this species, which may render this species more amenable to use in a variety of efficacy and safety research testing situations. Necropsy evaluations will be conducted to determine correct catheter placement.

NOTES

Poster #12

Postoperative Pain Control Following Total Knee Arthroplasty Using Regional Anesthesia

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Department of Orthopedic Surgery[1] and Department of Anesthesiology[2] , University of Mississippi Medical Center

Patient satisfaction with operative interventions has become a focus of recent research and postoperative pain control is a major contributor to overall outcome. The purpose of the study is to compare length of stay and effectiveness of pain control in patients who received regional anesthetic blocks with or without intravenous patient controlled analgesia (PCA) for postoperative pain relief following total knee arthroplasty (TKA). The study design was a retrospective chart review of all patients who underwent primary unilateral TKA. Subjective pain scores were recorded preoperatively, postoperatively on the day of surgery, and on postoperative days one, two, and three. Regional anesthesia included a femoral nerve block preoperatively with 20mL 0.5% ropivicaine. Postoperative pain management involved intravenous morphine or dilaudid administered either via PCA or on an as needed basis. Over one calendar year, 160 patients who underwent TKA with sufficient documentation were included and a total of 37 were excluded. A significant difference between preoperative pain scores and pain scores postoperatively on the day of surgery was noted ($p<0.001$). There was no significant difference between preoperative and subsequent postoperative pain scores. There was a trend toward decreased length of stay in patients receiving femoral block and PCA analgesia (3.37 vs. 3.68 days), but the difference was not significant based on the study population. The addition of regional anesthesia has improved overall pain control, especially immediately postoperatively, but the ideal management is still unclear. Pain control via the combination of regional anesthesia and PCA appears to provide an improvement in early pain control as well as a possible decrease in hospital length of stay. The retrospective results provide baseline data for the development of a prospective, randomized trial evaluating the most beneficial perioperative pain management protocol.

NOTES

Poster #13

A Refined Technique for Vascular Access Port Implantation in Cynomolgus Macaques

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Huntingdon Life Sciences

Vascular Access Ports (VAPs) have been used for many years and are a vital instrument in animal research. They are ideal for studies requiring frequent intermittent or extended continuous intravenous dosing. Most implantation techniques involve subcutaneous placement of the port, however issues with this technique in monkeys have been noted at HLS and throughout the industry.

The implantation of subcutaneous devices is not ideal in monkeys as it can lead to pressure necrosis of the skin and ulcerations at the implant site. Even a low incidence of these observations is unacceptable because it can lead to loss of animals on study as there is no way to reverse the problem without removing the port. Therefore HLS investigated a way of refining the technique to prevent unnecessary losses.

The refinement involved placing the port and catheter pin under a thin layer of muscle while keeping the port in the ideal anatomical location for connection of infusion equipment. The catheter is inserted in the femoral vein and advanced into the inferior vena cava. The free end is tunneled subcutaneously to the intra-muscular pocket, trimmed to size and connected to the dome.

A total of 10 cynomolgus macaques (8 males and 2 females) were surgically implanted with VAPs using this technique. None of the animals showed any adverse signs (seroma formation, redness, swelling, thinning skin) during the surgical recovery or dosing periods. The animals did not show any signs of increased sensitivity during port access and the ability to access the port was not negatively impacted.

NOTES

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