34th Annual Meeting of the

Academy of Surgical Research

34 YEARS

September 26 - September 28, 2018

Charleston, South Carolina
Charleston Marriott Hotel

"A Professional Collaboration of Colleagues"

"The most valuable resource that we all have is each other. Without collaboration our growth is limited to our own perspectives."

-Robert John Meehan

The 34th Annual Academy of Surgical Research Meeting will include new, novel and refined models, methods and materials in the arts and sciences of experimental surgery. Every new idea or refinement comes with challenges and stories along the way-- so let's listen and share our experiences with each other, as we continue to journey together to advance the field of surgery in all aspects of research, education and the development of products for clinical applications.

Learn about surgical research and surgical challenges in areas including:

- Anesthesia and Pain Management
- Suturing
- Cardiac Surgical Models
- Neurological Surgical Models
- General Surgery
- Telemetry
- Infusion and Ports
- Refinement, Replacement and Reduction Innovations
- Ethics and Welfare
- Model Development
- Medical Devices

Meeting attendees will have the opportunity to network with speakers and presenters, colleagues and friends. The meeting will offer diverse scientific content that will promote and encourage the advancement of the field of experimental surgery.

Academy of Surgical Research

Thank You to the following Corporate Partners for their generous contributions:

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Welcome

Welcome to Charleston, South Carolina, also known as the Holy City! Renowned for its cobblestone streets, horse-drawn carriages and pastel antebellum houses, this unique location will be an exciting venue for the 34th Annual Meeting of the Academy of Surgical Research! I would like to extend a special welcome to new members of the Academy and those individuals attending the annual meeting for the first time! I can tell you from personal experience there is not a better venue in our industry in which to learn from your peers. We focus on refinements of 'routine" procedures and sharing our successes and failures in developing new surgical and anesthetic models. I know I am repeating myself but I believe it bears repeating that you will make life-long friends and colleagues who quickly develop into a network of supporters.

I would like to recognize and thank this year's Program Chair, Leslie Stoll, for the endless hours of hard work that she devoted to planning this year's program. I would also like to thank all of the members of the Program Committee, the wet and dry lab instructors and all the presenters for volunteering their time to help make this meeting a success.

Once again, this year's program is excellent and includes some very exciting wet labs, dry labs, and presentations planned for your benefit. We are fortunate to be working with the Medical University of South Carolina this year as our wet lab location. This facility affords us the ability to offer major, complicated procedures such as myocardial infarction models in rats and swine! The faculty at this facility are amazing surgeons and longtime ASR members. I would like to recognize all of them for their support and significant amount of work to help us provide these exciting wet labs!

An additional advantage the annual meeting brings to the membership is an intimate setting in which to meet our exhibitors and vendors and to discuss your current needs with them. This setting provides an opportunity for direct networking with these individuals and to spend as much time with them as you need!

These exhibitors and corporate sponsors are a major arm of the Academy. Their continued support of the Academy, year after year, is a catalyst to our growth and to our ability to offer more and more to our membership. Please take some time to visit with each one of them and to thank them for their support!

I am very fortunate to have served as your President for the past two years. During this time, the Board of Directors and I have implemented several initiatives to further the growth of the Academy and find new ways to support the current membership. One initiative that I am very excited about is the new Mentorship Program! This program will provide significant opportunities to current members interested in growing their careers. Please visit our website for more information on this exciting new program.

Good luck to all those members sitting for a certification this year! I commend you for taking on this major challenge and I guarantee you will grow significantly from doing so.

As I complete my tenure as President I would like to recognize and thank all of you that have been so helpful and supportive of me in this role , especially Jim Manke, Kathi Schlieff, the Board of Directors and committee chairs and members.

It is with great pleasure and excitement that I once again welcome you to Charleston and our 34th annual meeting!!

Jon Ehrmann
2018 ASR President

2018 ASR

PRESIDENT

Jon Ehrmann, BS, SRS, SRA, LATG

Technical Operations Manager, Bristol Myers Squibb
Department of Veterinary Sciences
Veterinary Care and Research Support

Jon Ehrmann is the Technical Operations manager for the Veterinary Care and Research Support Group at Bristol Myers Squibb (BMS). He manages a specialized group within BMS providing surgical models and advanced study support to multiple therapeutic areas across several BMS sites. Additionally, his group supports the clinical research programs for the central New Jersey BMS facilities.

Jon has over 18 years of experience in preclinical and surgical research with a focus on cardiovascular, neurological, gastrointestinal and vascular surgery.

He is certified by ASR as a Surgical Research Specialist and a Surgical Research Anesthetist, having received the Barry Sauer Award for each certification exam. Jon joined ASR in 2004 and served on the certification committee for 6 years.

Jon has served on the Board of Directors since 2013 and is currently the President for 2018.

He has co-authored several peer reviewed publications and is a frequent presenter at national conferences.

Jon earned a Bachelor's of Science degree in Zoology from Michigan State University.

Welcome

Welcome to Beautiful Charleston, South Carolina!

I have been a member of the Academy of Surgical Research for 19 years and this group of professionals is dynamic. We are team players, mentors, competitors, innovators, teachers and friends just to name a few. This is why we chose this years' theme "A Professional Collaboration of Colleagues". I have learned valuable and relevent information from all the people in this group and have had the pleasure of meeting, speaking to and working along side many of them over the years.

Here in Charleston, the Program Committee has worked hard assembling an exciting program for you. We hope you meet new friends, share new ideas, learn from each others experiences, successes and failures. When we gather together from all over the country, even the world, and interface , we all benefit from each other. This inspires all of us to move forward, improve and succeed in our profession as surgeons, technicians and scientists.

Over the next few days, you will have the opportunity to meet with some great exhibitors as well! They collaborate with us as well, providing essential and quality products, equipment and tools. Please make sure to take the time to meet with these vendors whom have been so generous in supporting this meeting. We have some amazing instructors and experts here to inspire you in our various labs and roundtable discussions. A special thanks to them for putting in the time and effort to plan, organize and execute these venues. Lastly, you will hear two days of informative presentations which cover a broad range of topics.

I would like to thank our very generous sponsors, participating exhibitors, key note speakers, our colleagues at the Medical University of South Carolina, Steve Kreuser as my assistant in all things rodent and all the volunteer Program Committee members for supporting this year's meeting and helping to ensure ASR's success.

Leslie J. Stoll
2018 Program Chair

PROGRAM

CHAIR

Leslie J. Stoll, SRS, LATG, RVT

Lead Surgical Technician, Charles River Laboratories
Saftey Assessment-Nevada

Leslie began her career when she joined Sierra Biomedical, Inc in 1998 as a Registered Veterinary Technician and part of a new and evolving surgical team. Leslie has 28 years experience in veterinary medicine and is currently Lead Surgical Technician and Surgeon for Charles River Laboratories, Saftey Assessment, Nevada. Leslie is responsible for maintaining the integrity of a small surgical team and surgical OR. She manages surgical scheduling and study logistics, interacts with clients, cares for and maintains the Telemetry and Port Implanted Primate colony and performs surgical procedures in support of cardiovascular, reproductive and toxicology studies.

Leslie joined ASR in 1999, became certified as an Surgical Research Specialist in 2002, having recieved the Barry Sauer award and has been a Board Member for 6 years. Leslie initiated the Surgical Savvy Newsletter and took over as creator and editor of the ASR Conference program in 2015.

Program Committee

Tracy Zeigelhoffer, SRS, LATG, BS
Brad Gein, BSc
Envigo

Leslie J. Stoll, SRS, LATG, RVT, AS
April Carlson, SRT, LATG, RVT, BS
Charles River Laboratories

Steven Kreuser, SRS, SRA, RLATG, AS
Pfizer Global Science & Technology-
Comparative Medicine

Eric Adams, SRA, MS
Northern Biomedical Reasearch, Inc.

Melanie Graham, MPH, PhD
University of Minnesota

Susan Fleming
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Scott Stoll, Pre-Press Technician
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Lisa Johnson, SRS, RLATG, BA
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& Committee Chairs

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ASR

ASSOCIATION MANAGER

Jim Manke, CAE

Association Solutions, Inc. (ASI)

Jim Manke is owner and founder of Association Solutions, Inc. (ASI) since 1998. ASI is headquarted in Minneapolis and has a client portfolio of seven associations. Jim started in the association business in 1977. He served for 14 years as Executive Director of the Minnesota Association of REALTORS, a 12,000 member association.

In 1996 he was selected by the National Association of REALTOR, the largest trade association in the country, to serve as their Chairman of the Executive Officers Committee. That role led him to working with numerous REALTOR associations around the country on developing strategic plans to boost their value propositions to the membership. It eventually culminated in his working with the startup of the Russion REALTORS Guild to introduce free market thinking and processes into their members' business operations.

Back in 2002, Association Solutions Inc., became the management arm of the Academy of Surgical Research.

ASR

SENIOR ACCOUNT MANAGER

Kathi Schlieff

Association Solutions, Inc. (ASI)

Kathi serves as senior account manager at ASI. She has supported ASR since 2004. She is responsible for all aspects of the Annual Meeting, the Certification Program and responding to membership questions.

Prior to that she worked 15 years with the Minnesota Independent Insurance Agents and Brokers Association as their Director of Education.

In that role, Kathi was responsible for all aspects of the CIC certification Program. During her tenure, the CIC program achieved an all time high in participation and profitability.

Jim and Kathi are married, have five daughters and five grand-babes.

KEYNOTE

SPEAKER

Dr. M. Michael Swindle, DVM, Diplomate ACLAM & ECLAM

Professor Emeritus, Comparative Medicine , Medical University of South Carolina

M. Michael Swindle, D.V.M. is Professor Emeritus since he retired in 2013 as Director, Division of Laboratory Animal Resources and Professor & Chairman in the Department of Comparative Medicine at the Medical University of South Carolina. He also holds a Professorship in the Department of Surgery. He was employed at MUSC since 1985.

Dr. Swindle received his B.S. degree (1968) and his D.V.M. degree (1969), both from Texas A & M University and is a Diplomate of the American College of Laboratory Animal Medicine (1982) and a Defacto Specialist, European College of Laboratory Animal Medicine (2001). He is also a Founding Fellow of the Academy of Surgical Research. He was in the U.S. Army Veterinary Corps from 1969 to 1972; in private veterinary practice from 1972 to 1979; and the faculty at Johns Hopkins Medical School from 1979-1985.

He has served the following professional organizations either as a member of the board of directors, committee chairman and/or officer: American Association for the Accreditation of Laboratory Animal Care; American Association for Laboratory Animal Science; American College of Laboratory Animal Medicine; American Heart Association; Academy of Surgical Research; S.C. Consortium for Comparative Medicine; American Society of Laboratory Animal Practitioners; DHHS Secretary's Advisory Committee on Xenotransplantation; European College of Laboratory Animal Medicine. He is the recipient of the Smithy Research Award from the American Heart Association, the Von Recum Award from the Academy of Surgical Research, the Markowitz Award for Contributions to Experimental Surgery, the Brewer Scientific Achievement Award from the Animal Association for Laboratory Animal Science, the American Society of Laboratory Animal Practitioners Research Award and the Comparative Medicine Scientist Award from the American College of Laboratory Animal Medicine. He was given the titles of Honorary Professor by the University of Arhus in 2009 and Distinguished Graduate by Texas A&M University in 2010. In 2013 he was awarded the C William Hall Award for Outstanding Scientific Publication.

His publications and presentations are mainly in the areas of experimental surgery, anesthesia, and swine as animal models. They are as follows: Abstracts (155), Journal Articles (89), Books & Book Chapters (54), Internet/CD/Video Programs (76) and Oral Presentations (>400).

KEYNOTE

SPEAKER

Dr. Norman Wainwright

Senior Director, R&D, Endotoxins/Microbial Detection, Charles River Laboratories

Dr. Wainwright, has been working on the primitive innate immune system found in the American horseshoe crab (Limulus polyphemus) for almost 30 years. Most recently, he has directed research and new product development at Charles River Laboratories in Charleston SC, a major manufacturer of the bacterial endotoxin test (LAL) derived from the blood cells of the horseshoe crab. LAL is an ultra-sensitive enzyme cascade, adapted from the immune response of the crab to bacterial infection. Miniaturization of the test and a development of a 'hand-held" instrument to read it has resulted in a major decrease in the amount of horseshoe crab blood needed. The portable test has become a standard in the pharmaceutical manufacturing industry, assuring safety of injectable drugs. It has also been flown to the International Space Station as a test of new technology to rapidly assess microbial cleanliness of spacecraft. Prior to Charles River Laboratories, Dr. Wainwright was a Senior Scientist at the Marine Biological Laboratories in Woods Hole, Massachusetts, where the LAL test was discovered.

His recent research involves a continued interest conserving species of horseshoe crabs around the world as well as studying the molecular biology of marine invertebrates. Practical applications stemming from this technology include monitoring the health and safety of humans and animals. Dr. Wainwright also continues his work with NASA on the development of new life detection and planetary protection procedures using the rapid, point of use technology.

KEYNOTE

SPEAKER

Dr. R. Timothy Bentley, BVSc, MRCVS, DACVIM (Neurology)

Associate Professor, Veterinary Neurology & Neurosurgery
Department of Veterinary Clinical Sciences
Purdue Veterinary Medicine

Dr. Bentley graduated as a veterinarian from the University of Liverpool in 2005, completed a small animal internship at the Royal Veterinary College in 2006 and a neurology & neurosurgery residency at Tufts University in 2009. He is board-certified in the neurology subspecialty by the ACVIM.

An Associate Professor of Veterinary Neurology & Neurosurgery at Purdue University, Dr. Bentley's discovery program revolves around development of an improved VP shunt for hydrocephalus, and translational glioma research. His clinical interests include intracranial surgery and MRI application.

KEYNOTE

SPEAKER

Dr. Vincent Mendenhall, DVM, PhD

Consultant, Pre-Clinical Services

Vince Mendenhall received his Doctor of Veterinary Medicine degree at Colorado State University (CSU) in 1968, and his Ph.D. in Experimental Surgery/Comparative Anatomy, also from CSU, in 1981. In 1975, he joined 3M Company where he developed their Department of Surgical Research as it related to Medical Device development. There, he worked in all areas of experimental surgical techniques, including neuro-orthopedic, ophthalmic, cardiovascular, microvascular, wound healing, and abdominal surgery in all species of laboratory animals. He completed more than 500 research projects in these areas in the 17 years he was at 3M, and is co-holder of the patents on TegadermÆ, the Microvascular Anastomotic Device™, the Ligament Augmentation DeviceÆ, DuraPrep™, silicone malleable retractors, and a biconvex, reverse haptic, hydrogel intraocular lens. He continued these efforts at Primedica/Charles River's Preclinical Services, Massachusetts, from 1993 to 2008, developing many new surgical models for Safety Pharmacology, Pharmacokinetics and Experimental Medicine. He continued all of these efforts and his long career in experimental surgery as Director of Preclinical Surgical Services and then Preclinical Translational Services at Wake Forest Innovations, from 2008 to 2015.

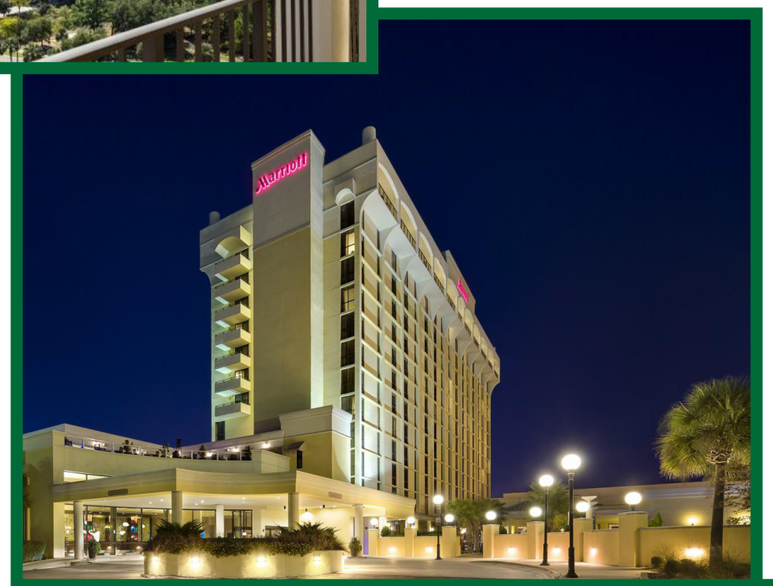
He now consults with sponsors on preclinical study designs for necessary animal studies on newly developed medical devices in all specialties, performing extensive discovery and developmental work along with pilot studies to establish a definitive GLP protocol. During the developmental stages, he emphasizes the importance of selection of the correct animal model and other techniques in order to gain definitive results that are translatable to the human condition. He can then accompany the sponsor for necessary FDA panel meetings if so desired.

He writes definitive protocols, acts as "on-site Study Director" for the sponsor, and will actually perform the necessary surgical procedures and follow up examinations and necropsies and help direct histopathological and other endpoints, including MRI, CT and microCT examinations. He is instrumental in writing the final report for the study, suitable for submission to the FDA.

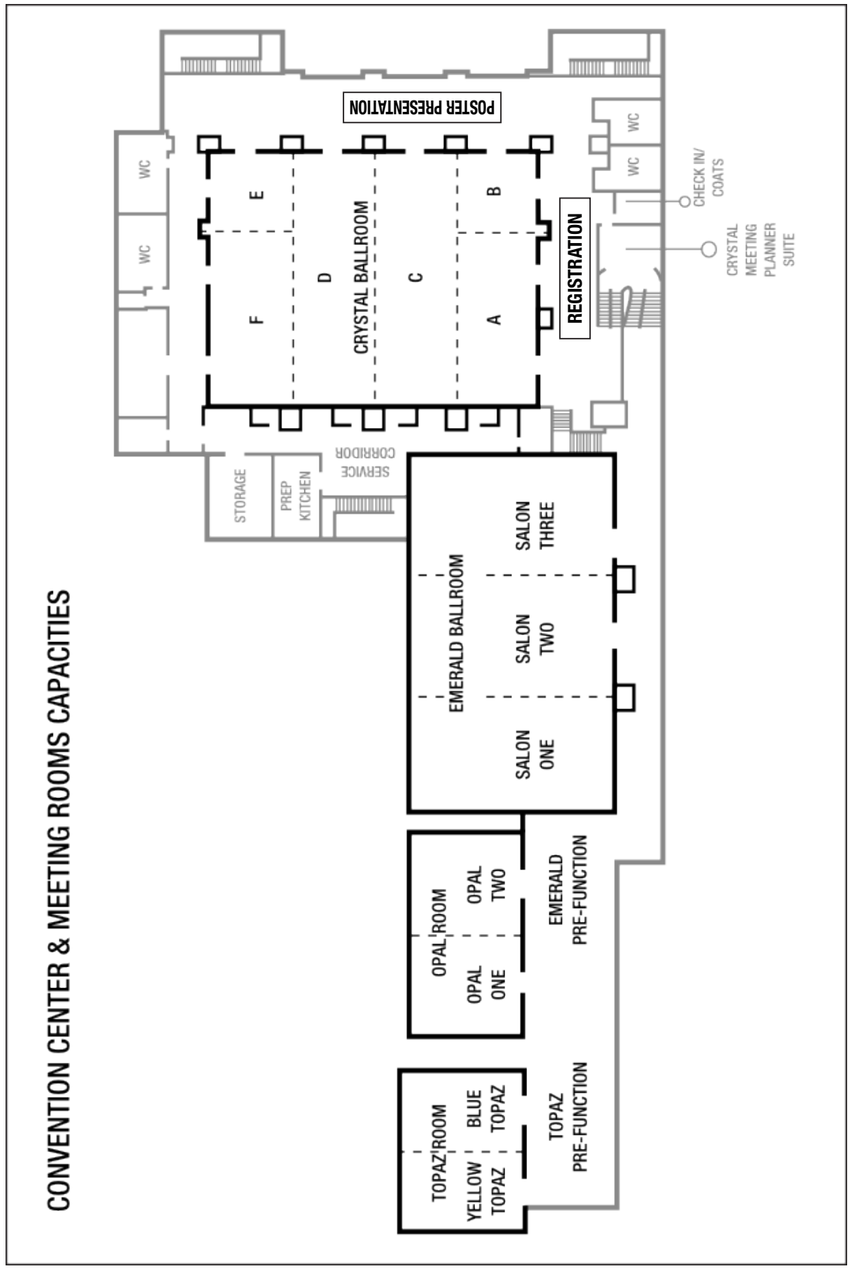
He is also involved in specialized toxicology studies from the standpoint of targeted drug delivery and specialized pharmacokinetics, i.e., CSF, bile duct implants for first pass pharmacokinetics, and lymphatic PK.

He is known worldwide for his innovative surgical techniques in all surgical specialties. To date, he has presented the results of his developmental and definitive work at 182 national and international peer reviewed meetings, published 12 book chapters, and 29 referred publications. He has received many awards for his work in these areas from organizations such as the Academy of Surgical Research (of which he was President in 2005), the Society for Biomaterials, the European Intraocular Implantlens Commission, The European Society of Arthroscopy and Knee Surgery, and local AALAS organizations.

Venue



Floor Plan



Meeting Overview

Registration Hours	
Wednesday, September 26	07:00 am – 05:00 pm
Thursday, September 27	07:00 am – 05:00 pm
Friday, September 28	07:00 am – 12:00 pm
Tuesday, September 25	
02:00 PM – 05:00 PM	ASR Board Meeting - Opal
Wednesday, September 26	
07:00 AM – 08:00 AM	Registration for Test Takers and Morning Wet Lab Attendee's - Crystal Promenade AB
07:00 AM – 08:00 AM	Light Continental Breakfast for Test Takers and Morning Wet Lab Attendee's
07:30 AM	Bus Departs from Hotel to Morning Wet Labs at the Medical University of South Carolina (MUSC)
08:00 AM - 12:00 PM	ASR Examinations - Crystal F
08:00AM – 11:00 AM	Wet Labs - The Medical University of South Carolina (MUSC) - Lumbar Intrathecal Cannulation in the Rat - Vascular Access Port Implant in the Swine Model
11:00 AM - 12:00 PM	Lunch for Morning Wet Lab Attendee's - **Sponsored by Marshall Bioresources** - MUSC Conference Room
12:00 PM	Bus Departs with Morning Wet Lab Attendee's from MUSC to Hotel
12:30 PM	Bus Departs from Hotel to Afternoon Wet Labs at MUSC
01:00 PM – 04:00 PM	Wet Labs - The Medical University of South Carolina (MUSC) - A Demonstration : Myocardial Infarction in the Swine Model - Advanced Suturing - Myocardial Infarction in the Rat Model
01:30 PM - 04:30 PM	Poster Set Up - Crystal Promenade CD
04:30 PM	Bus Departs with Afternoon Lab Attendee's from MUSC to Hotel
05:30PM – 07:00PM	Welcome Reception with Exhibitors- **Sponsored by emka TECHNOLOGIES and SAI Infusion Technologies-** Crystal ABCD
Thursday, September 27	
08:00 AM – 08:45 AM	Continental Breakfast with Exhibitors - **Sponsored by Hilltop Lab Animals, Inc.** - Crystal ABCD
08:45AM - 09:00 AM	Opening Remarks - ASR President Jon Ehrmann Crystal EF
09:00 AM - 10:00 AM	Keynote Speaker - Dr. Michael Swindle "Translational Science - The Pig and I" - Crystal EF
10:00 AM - 10:30 AM	Break with Exhibitors - Crystal ABCD
10:30 AM - 12:00 PM	Track 1 Scientific Session - Crystal EF
10:30 AM - 12:00 PM	Track 2 Surgical Writing Workshop - Marc Basson - Opal
12:00 PM – 01:00 PM	Lunch With Exhibitors - **Sponsored by Instech Laboratories, Inc.**- Crystal ABCD
01:00 PM - 02:00 PM	Keynote Speaker - Dr. Norm Wainwright "Contributions of the Horseshoe Crab to Science and Human Health" - Crystal EF
02:00 PM – 04:30 PM	Track 1 Scientific Session - Crystal EF
02:00 PM - 02:30 PM	Track 2 Scientific Session - Opal
02:30 PM - 03:30 PM	Monitoring Anesthesia Dry Lab - Cholawat Pacharinsak - Opal
03:00 PM – 03:30 PM	Break with Exhibitors - Crystal ABCD
03:30 PM - 04:30 PM	Track 2 Scientific Session - Opal
04:30 PM – 05:30 PM	Poster Judging - Crystal Promenade CD
05:30 PM - 07:30PM	Reception & Foundation Auction - **Sponsored by Data Sciences International and Lomir Biomedical, Inc** - Topaz Room

Meeting Overview

Friday, September 28	
08:00 AM - 08:45 AM	Continental Breakfast - Crystal CD
08:45 AM – 09:00 AM	Opening Remarks - ASR President Jon Erhmann - Crystal EF
08:00 AM - 12:00 PM	Poster Board Tear Down
09:00 AM – 10:00 AM	Keynote Speaker - Dr. Timothy Bentley - A Self-Clearing VP Shunt for Hydrocephalus: Developing a Model Highly Prone to Shunt Obstruction and Evaluation of a New Device - Crystal EF
10:00 AM - 10:30 AM	Break
10:30 AM - 12:00 PM	Track 1- Scientific Session - Crystal EF
10:30 AM- 11:00 AM	Track 2- Surgical Saavy Ideas and Submission - Crystal A
11:00 AM - 12:00 PM	Anesthesia / Analgesia Roundtable - Crystal A
12:00 PM - 02:00 PM	Business Lunch/ASR Awards Presentations - Dr. Vincent Mendenhall "Collaboration: The Key To Success! Surround Yourself with Compentence" - **Sponsored by Colonial Medical Inc.** - Crystal CD
02:00 PM – 03:00 PM	Track 1 -Scientific Session - Crystal EF
02:00 PM - 03:00 PM	Track 2 -Technicians Roundtable - Crystal A
03:00 PM	Meeting Adjourned
03:00 PM - 05:00 PM	Board of Directors Meeting - Crystal B

Lab Descriptions

34 YEARS

Wet Lab Instructors

Dr. M. Michael Swindle, DVM
Dr. Alison C. Smith, DVM, DACLAM
Dr. A. Marissa Wolfe, DVM, DACLAM
Dr. M.A. McCrackin, DVM, PhD, DACVS, DACLAM, CMAR
Dr. Jean Marrie Ruddy, MD
Medical University of South Carolina (MUSC)

Eric Adams, MS, SRS
Andy Carlson, BS, SRS
Northern Biomedical Reasearch, Inc.

Brad Gien, BSc
Chelsey Gosman SRS
Jazmyne Spear BS
Envigo

Jan Bernal, DVM
Pfizer Global Science & Technology-Comparative Medicine

Jenifer Sweet, SRS, LATG, BS
Janelle Gesaman, SRS, LATG
Charles River Labortories, Mattawan

Wet Lab Instructors Assistants

Roxanna Swagel ,RLATG
Sharon Thomas, LVT, LATG
Stephanie Lane, RLATG
Lindsay Olin, LVT, RLATG
Nola Shepard, RLATG
Medical University of South Carolina (MUSC)

Wet Lab Volunteers

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

Leslie Stoll, SRS, LATG, RVT
April Carlson, SRT, LATG, RVT
Charles River Laboratories, Nevada

Rubina Corazzini, LATG, BS
Amanda L. McSweeney, SRS, RLATG, MS
CBSET, Inc.

Dry Lab Instructors

Dr Marc Basson, MB, PhD, MBA
University of North Dakota
Cholawat Pacharinsak, DVM, PhD, DACVAA
Stanford University

Program Chair Assistant - Wet Labs

Steven Kreuser, AS, SRS, SRA, RLATG
Pfizer Global Science & Technology-Comparative Medicine

Thank you to the Medical University of South Carolina, Dr. M.A. McCrakin and Roxanne Swagel for hosting our wet labs and all of your support!

Wet Lab Sponsors

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MEDLINE

NBR Northern Biomedical Research, Inc.

Pfizer

Wet Labs

The Medical University of South Carolina (MUSC)

Wednesday, September 26, 2018 (Morning)

8:00 a.m. - 11:00 a.m.

Vascular Access Port Implant in the Swine Model

Dr. M. Michael Swindle, DVM**,** Dr. Alison C. Smith, DVM, DACLAM ,Dr. A. Marissa Wolfe, DVM, DACLAM
Dr. M.A. McCrackin, DVM, PhD, DACVS, DACLAM, CMAR - MUSC

This hands-on workshop provides an opportunity to practice surgical technique, become familiar with instrumentation for vascular cannulation and learn valuable skills in a swine model all in a supportive setting with an excellent instructor. Beginners will gain a better anatomical understanding of various approaches and learn basic techniques. More experienced participants will have the opportunity to collaborate with fellow students, refine skills, share experiences and ideas and have immediate feedback to enhance technique for improved outcomes.

8:00 a.m. - 11:00 a.m.

Intrathecal Lumbar Catheterization in Rats

Eric L. Adams, MS, SRS, Andy Carlson, BS, SRS Northern Biomedical Research

This hands-on laboratory experience will introduce participants to the equipment, surgical technique, and nuances of performing an intrathecal lumbar catheter placement using the lumbar puncture approach in the rat model. This is a great opportunity for those who need experience with the rodent model or those who wish to fine tune their training with this implantation technique in the company of experienced instructors.

Wet Labs

The Medical University of South Carolina (MUSC)

Wednesday, September 26, 2018 (Afternoon)

1:00 p.m. - 4:00 p.m.

Demonstration: Myocardial Infarction (MI) and Long-Term Instrumentation in the Swine Model

Dr. Jean Marie Ruddy, MD MUSC

Swine ischemic myocardial infarction model will be demonstrated in a farm pig using a left lateral thoracotomy approach. Participants will observe anatomy of cardiac vessels, locations for temporary occlusion, strategy for placement of 1) vascular access ports in large vessels, 2) flow probe, and 3) pacemaker, and plan for safely tunneling implant wires/tubes out of the chest. Information shared will include standard anesthetic protocol, emergency drugs for cardiac arrhythmias, surgical tray contents, and supply list for an MI surgery.

1:00 p.m. - 4:00 p.m.

Advanced Suturing Techniques

Jan Bernal, DVM - Pfizer Global Science & Technology-Comparative Medicine,
Jenifer Sweet, SRS, LATG, BS, Janelle, Gesaman, SRS, RLATG Charles River Laboratories, Mattawan, Michigan

This unique hands-on workshop will provide the opportunity to learn advanced sutuing techniques on real tissue. Abdominal organs, dermis, ophthalmic, musculoskeletal and dental are just some of the tissues that will be provided to participants. Experienced surgeons will be present to provide advanced suturing instruction and assistance.

1:00 p.m. - 4:00 p.m.

Myocardial Infarction (MI) in the Rat Model

Brad Gien, BSc, Chelsey Gosman SRS, Jazmyne Spear BS - Envigo

The induction of myocardial infarction in animal models is becoming increasingly important in research. This workshop provides an opportunity to create myocardial infarction in the rat model while receiving hands-on instruction from surgeons very experienced in this procedure.

Dry Lab Opportunities

Thursday, September 27th - 10:30 AM – 12:00 PM

Surgical Writing-From Protocol Development, Conception of the Research Hypothesis, Data Collection, Manuscript Preparation through Publication.

Dr. Marc Basson
University of North Dakota

An interactive workshop on surgical writing with the new Editor-in-Chief of the Journal of Investigative Surgery. The session will include an overview of the process from hypothesis and experimental design through manuscript writing and submission and handling peer review and interaction with journals. The most common reasons for rejection of manuscripts will be discussed. In addition to a Q&A session, there will be an opportunity to participate in guided peer review of your own manuscript or someone else's manuscript.

Thursday, September 27th - 2:30 PM – 3:30 PM

Monitoring During Anesthesia

Cholawat Pacharinsak DVM, PhD, DACVAA
Department of Comparative Medicine, Stanford University

Anesthetic monitoring is one of the key components for general anesthesia in laboratory animal research. Such monitoring provides an early warning system, the first step to alert anesthetists to take action before complications become irreversible. The anesthetic monitoring process will increase patient safety and assist the anesthetist's decision-making regarding patient care throughout the anesthetic procedure. The monitoring techniques covered include anesthetic depth, ECG, blood pressure, %SpO2, ETCO2, and temperature for large animals

Program Schedule

34 YEARS

Tuesday, September 25th

2:00 PM - 5:00 PM	ASR Board of Directors Meeting - **Opal**

Wednesday, September 26th

07:00 AM - 07:30 AM	Registration for Wet Lab Attendee's - **Crystal Promenade AB**
07:00 AM - 08:00 AM	Registration for Exam Takers - **Crystal Promenade AB**
08:00 AM - 12:00 PM	Certification Exams - **Crystal F**
08:00 AM - 05:00 PM	Wet Labs - **The Medical University of South Carolina (MUSC)**
05:30 PM - 07:00 PM	Welcome Reception with Exhibitors - **Sponsored by emka TECHNOLOGIES and SAI Infusion Technologies - Crystal ABCD**

Track 1

Thursday, September 27th

08:00 – 08:45 AM	Continental Breakfast with Exhibitors – **Sponsored by Hilltop Lab Animals, Inc - Crystal ABCD**	
08:45 - 09:00 AM	Opening Remarks – ASR President Jon Ehrmann- **Crystal EF**	
09:00 - 10:00 AM	Keynote – Dr. M. Michael Swindle "Translational Science - The Pig and I" - **Crystal EF**	
TRACK 1 – CRYSTAL EF		
10:00– 10:30 AM	Break with Exhibitors – **Crystal ABCD**	
MODERATOR	Hylton Gordon	
10:30 - 11:00 AM	Simplification of Portal Vein VAP Placement in Beagles	Randall Pielemeier
11:00 - 11:30 AM	Thoracic Lymph Duct Catheterization with a Venous Shunt in the Primate	Jon Ehrmann
11:30 - 12:00 PM	Novel Approah to Bilateral Middle Ear Cannulation and Administration in the Guinea Pig	Frederick Emond
12:00 – 01:00 PM	Lunch with Exhibitors – **Sponsored by Instech Laboratories, Inc - Crystal ABCD**	
01:00 – 02:00 PM	Keynote – Dr. Norman Wainwright "Contributions of the Horseshoe Crab to Science and Human Health - **Crystal EF**	
MODERATOR	Jenifer Sweet	
02:00 – 02:30 PM	Development of a Swine Model of Radiation-Induced Retinopathy for Therapeutic Drug Testing	Magrath III GN
02:30 - 03:00 PM	Evaluation of Shipping Stress in Surgically Altered Rodents During Commercial Air Transport	Steven Kreuser
03:00 – 03:30 PM	Break with Exhibitors –**Crystal ABCD**	
MODERATOR	Maureen Lamkin	
03:30 – 04:00 PM	Microporous Polysaccharide Hemosphere (MPH) Based Surgical Hemostat Powder Does Not Interfere with Healing When Applied to a Surgically Created Ovine Bone Defect	Darcy H. Gagne
04:00 - 04:30 PM	Overcoming Surgical Challenges; When Surgery Throws You a Curve Ball	Kimberly Holliday-White
04:30 PM - 05:30 PM	Poster Judging – **Crystal Promenade CD**	
05:30 PM - 07:30PM	Reception / Foundation Auction - **Sponsored by Data Sciences International (DSI) and Lomir Biomedical Inc. - Topaz Room**	

Track 2

Thursday, September 27th

08:00 – 08:45 AM	Continental Breakfast with Exhibitors – **Sponsored by Hilltop Lab Animals, Inc - Crystal ABCD**	
08:45 - 09:00 AM	Opening Remarks – ASR President Jon Ehrmann- **Crystal EF**	
09:00 - 10:00 AM	Keynote – Dr. M. Michael Swindle "Translational Science - The Pig and I" - **Crystal EF**	
TRACK 2 – Opal Room		
10:00– 10:30 AM	Break with Exhibitors – **Crystal ABCD**	
MODERATOR	Leslie Stoll	
10:30 - 12:00 PM	Surgical Writing Workshop	Marc Basson
12:00 – 01:00 PM	Lunch with Exhibitors – **Sponsored by Instech Laboratories, Inc - Crystal ABCD**	
01:00 – 02:00 PM	Keynote – Dr. Norman Wainwright "Contributions of the Horseshoe Crab to Science and Human Health - **Crystal EF**	
02:00 - 02:30 PM	Anesthesia and Aalgesia for Telemetry Implants in Gottingen Minipigs: Challenges with Buprenorphine SR	Michelle Salerno
02:30 - 03:30 PM	Monitoring Anesthesia Dry Lab	Cholawat Pacharinsak
03:00 - 03:30 PM	Break with Exhibitors –**Crystal ABCD**	
MODERATOR	Melanie Graham	
03:30 - 04:00 PM	Evaluation of a Multimodal Analgesia Plan in Cynomolgus Macaques for Moderate to Severe Post-Operative Pain	Jan Bernal
04:00 - 04:30 PM	Intentional Fracture of Previously Placed Stents: Impact of Pre-Stenting in a Piglet Model	Jose Negron
04:30 - 05:30 PM	Poster Judging – **Crystal Promenade CD**	
05:30 - 07:30 PM	Reception / Foundation Auction - **Sponsored by Data Sciences International (DSI) and Lomir Biomedical Inc. - Topaz Room**	

Track 1

Friday, September 28th

08:00 – 08:45 AM	Continental Breakfast - **Crystal CD**	
08:45 – 09:00 AM	Opening Remarks – ASR President Jon Ehrmann - **Crystal EF**	
09:00- 10:00 AM	Keynote Speaker - Dr. Timothy Bentley - A Self-Clearing VP Shunt for Hydrocephalus: Developing a Model Highly Prone to Shunt Obstruction and Evaluation of a New Device - **Crystal EF**	
Track 1 – Crystal EF		
10:00 - 10:30 AM	Break	
MODERATOR	Brad Gien	
10:30 - 11:00 AM	Investigative Thermography: Evaluation of Normotherm Heat Support for Cynomolgus Macaques	Jan Bernal
11:00 - 11:30 AM	Recommended Surgical Technique for Collecting Left Ventricular Pressure, Systemic Blood Pressure, ECG and Core Body Temperature in Rodents	Heather Bogie
11:30 - 12:00 PM	Recommended Surgical Technique for Collecting Systemic Blood Pressure, ECG and Core Body Temperature in Ferrets	Kim Swearingen
12:00 - 02:00 PM	Business Lunch/ASR Awards Presentations - **Sponsored by Colonial Medical** - Dr. Vincent Mendenhall "Collaboration: The Key To Success! Surround Yourself with Compentence" - **Crystal CD**	
MODERATOR	Amy Davidson	
02:00 - 02:30 PM	Scar Size and Other Parameters for Tracking Left Ventricular Dysfunction after Induction of Myocardial Infarcts in Sheep (OVIS aries)	Hylton Gordon
02:30 - 03:00 PM	Retrograde Delivery of Cellular Products Using Advanced CS Coronary Sinus Infusion Catheters	Jose Negron-Garcia
03:00 PM	Meeting Adjourned	
03:00 – 05:00 PM	Board of Directors Meeting – **Crystal B**	

Track 2

Friday, September 28th

08:00 – 08:45 AM	Continental Breakfast - **Crystal CD**	
08:45 – 09:00 AM	Opening Remarks – ASR President Jon Ehrmann - **Crystal EF**	
09:00- 10:00 AM	Keynote Speaker - Dr. Timothy Bentley - A Self-Clearing VP Shunt for Hydrocephalus: Developing a Model Highly Prone to Shunt Obstruction and Evaluation of a New Device - **Crystal EF**	
Track 2 – Crystal A		
10:00 - 10:30 AM	Break	
MODERATOR	April Carlson	
10:30 - 11:00 AM	Surgical Saavy Ideas and How To Submit	Jennifer Sheehan Tracy Ziegelhofer, Brad Gien
11:00- 12:00 PM	Anesthesia / Analgesia Roundtable	Jan Bernal, Randy Pielemeier, Vince Mendenall
12:00 - 02:00 PM	Business Lunch/ASR Awards Presentations - **Sponsored by Colonial Medical** - Dr. Vincent Mendenhall "Collaboration: The Key To Success! Surround Yourself with Compentence" - **Crystal CD**	
MODERATOR	Melanie Graham	
02:00 – 03:00 PM	Technicians Roundtable - **Crystal A**	Lisa Johnson, Leslie Stoll, Jennifer Sheehan, Heather Bogie, Jon Ehrmann
03:00 PM	Meeting Adjourned	
03:00 – 05:00 PM	Board of Directors Meeting – **Crystal B**	

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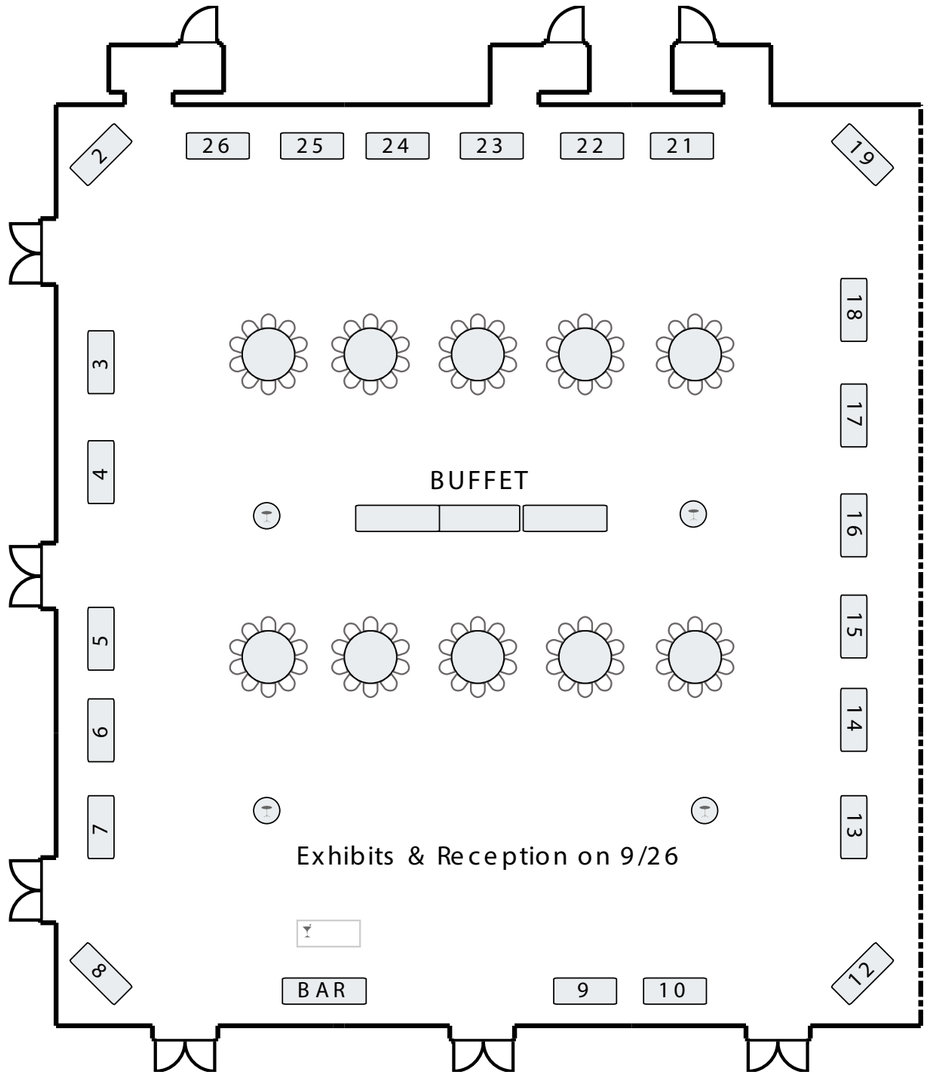
Exhibitor Directory



Access Technologies

BOOTH 15

www.norfolkaccess.com

For over 35 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. The acquisition of Solomon Scientific has allowed Access Technologies to offer a more complete line of infusion devices for all species to the research community. Access Technologies prides itself on offering high quality products and superior technical and customer support. Custom design and prototyping is our specialty. To learn more visit us at www.norfolkaccess.com, email pwolf@norfolkmedical.com or call us 847-674-7131

AVA Biomedical, Inc.

BOOTH 18

www.avabio.com

AVA Biomedical, Inc. Advanced Infusion Systems AVA Biomedical, Inc. is a leading manufacturer of cutting-edge infusion devices. We provide complete, customized infusion systems for all species. AVA Biomedical provides researchers with unique variety of infusion products including; New Conventional Ports for all species, Cath-In-Cath2 Port systems the gold standard for long-term access, the FastTether2 modular rodent infusion system and state of the art infusion pump systems for tethered or ambulatory applications. Come see what makes us different.

ClearH2O

BOOTH 22

www.clearh2o.com

ClearH2O is a life science company meeting the needs of leading industry researchers and breeders with products that hydrate, nourish and enrich animals' lives. A strategic partnership with nutrition and food science allows us to provide cost-effective solutions to address unmet demands, while saving time and labor. Our products are always consistent, eliminating nutrition and hydration variables. HydroGel® is the #1 choice of breeders worldwide, for hydrating research animals in transit. DietGel® products are the #1 soft dietary supplement for compromised or special needs animals. MediGel® and MediDrop® products are fast becoming the preferred medication delivery method while LabGels® and FiberBites® continue to offer enrichment for non-human primates.

Colonial Medical Supply

BOOTH 7

susan@colmedsupply.com

For 40 years Colonial Medical Supply has been dedicated to delivering the highest standard in medical equipment, personalized customer service and on-site anesthesia machine maintenance to the animal health community. We take pride in the equipment we sell, support and service to run as smoothly as possible every day.

DRE Scientific

BOOTH 4

www.dreveterinary.com/scientific

DRE Scientific, a Division of DRE Veterinary, is your source for new and professionally refurbished medical equipment. Our product line encompasses anesthesia (including rodent and MRI-compatible), ventilators, monitoring (telemetry), tables, lighting, electrocautery, and more. We offer calibration services of anesthesia machines and vaporizers along with biomedical field service preventive maintenance programs, performance verification, and parts.

emka TECHNOLOGIES Inc.

BOOTH 2

www.emkatech.com

emka TECHNOLOGIES and SCIREQ offer in-vivo and ex-vivo research instruments & telemetry hardware for physiology, pharmacology, and toxicology. Our solutions provide unparalleled accuracy and reproducibility for cardiovascular, respiratory and neurology studies, as cited in over 1,000 scientific publications.
Visit our booth to discuss your research application!

Envigo

BOOTH 14

www.envigo.com

Envigo provides mission-critical products and research services for pharmaceutical, crop protection, and chemical companies as well as universities, governments, and other research organizations. Our company is founded on the principle that research partnerships depend on unmatched expertise, unwavering dedication to customer service and shared goals, Envigo is committed to helping customers realize the full potential of their products and research which contribute to enhancing the lives of people and animals as well as protecting the environment.

Read more at envigo.com

Hilltop Lab Animals, Inc.

BOOTH 24

www.Hilltoplabs.com

Hilltop Lab Animals, Inc. produces research animals including rats, mice and guinea pigs. Hilltop also provides: contract housing including aged animals, precisely time-mated animals, tissues, blood products, and wide variety surgical procedures including catheter (vascular, bile duct, intra-gastric, urinary bladder) implants. For more information call customer service at 724-887-8480.

Instech Laboratories Inc.

BOOTH 23

www.instechlabs.com

Instech designs and manufactures products for rodent infusion, sampling and oral gavage, including: catheters, tethers, swivels, infusion pumps, automated blood samplers and flexible animal feeding tubes. Highlighted at ASR: OrchesTA pumps and software for automating GLP infusion studies, external ports for mice and rats that allow group housing.

Kent Scientific Corporation

BOOTH 17

www.kentscientific.com

Kent Scientific Corporation serves medical and research scientists as a worldwide provider of integrated solutions for pre-clinical research. As a leader in non-invasive blood pressure, physiological monitoring and anesthesia products for mice and rats, we enable our customers to achieve results that are fast, consistent and exceedingly accurate.

Lomir Biomedical Inc.

BOOTH 6

www.lomir.com

Lomir is the world's largest manufacturer of animal jackets, infusion products and restrainers. Currently celebrating our 25th Anniversary our mission has been to manufacture equipment that is reliable, durable and easy to use. In depth knowledge enables Lomir to design and manufacture equipment with the exact precision to meet your scientific requirements. New products made using innovative materials enable researchers to consider new applications, often reducing labor while improving comfort and well-being of the subjects. Visit our booth to find out how working with the manufacturer can help you achieve your objectives.

Marshall BioResources

BOOTH 8

www.marshallbio.com

Marshall BioResources is a global provider of purpose bred animals for biomedical research and related services. We provide Marshall Beagles from our harmonized breeding facilities in both the United States and China. We also provide ferrets, mongrels and hounds, and Gottingen Minipigs from our AAALAC accredited facilities in the United States. Rodents and additional services are available via our facilities in the United Kingdom. For over 75 years our animals have been recognized as standard research models, known for their good health, genetic consistency, gentle temperament and uniformity.

Medline Industries, Inc.

BOOTH 21

www.medline.com

Medline is a global manufacturer and distributor serving the healthcare industry with medical supplies and clinical solutions that help customers achieve both clinical and financial success. Headquartered in Northfield, Ill., the company offers 350,000+ medical devices and support services through more than 1,400 direct sales representatives who are dedicated points of contact for customers across the continuum of care. For more information on Medline, go to www.medline.com/science or http://www.medline.com/social-media to connect with Medline on its social media channels.

Patterson Scientific

BOOTH 9

www.pattersonscientific.com

We are the industry leader in the manufacture and sale of premier veterinary and research inhalant anesthesia systems and accessories. We base the development and manufacture of our products on proven technology and testing procedures. We are committed to educating and providing researchers and veterinarians worldwide with our high quality, safe, reliable, effective and user-friendly products for every research application.

ReCathCo

BOOTH 3

www.recathco.com

ReCathCo small animal research catheters. Rat and Mouse catheters, jugular, carotid artery, femoral vein & artery, bile duct, portal 'T" and customer specific designs. Our expertise using high technology bonding and fusion, tipping, drilling, slitting, banding and printing. In-house capabilities are with state of the art equipment and materials used in medical device manufacturing settings. ReCathCo's extrusion capabilities for micro-bore tubing includes polyethylene (PE), polyurethane (PU), polypropylene (PP), silicone, Pebax, including ReCathCo Low Friction PU & ReCathCo PEBA soft flexible and chemical resistant tubing. All production in cleanroom environment and sterilization available to customer required configurations. ISO 13485 company.

SAI Infusion Technologies

BOOTH 10

www.sai-infusion.com

SAI makes superior products and then we make them work for you. SAI creates systems for preclinical infusion and sampling, including pumps, harnesses, ports, swivels, catheters and accessories. SAI stands behind our products and will support you with our staff of experienced professionals who have shared your challenges. Our team is eager to work with you to make your studies successful.

Stoelting Co.

BOOTH 5

www.stoeltingco.com

Stoelting Co. (www.stoeltingco.com) has been an innovator in producing neuroscience research equipment since 1886; we offer a wide variety of stereotaxic instruments used in laboratories all over the world. Moreover, we also offer a complete line of gas anesthesia products, using gas anesthesia during stereotaxic surgery. In addition, a new rodent warming system is built right into the base plate allowing the user to maintain the temperature of the animal during surgery. At Stoelting, we have a strong commitment to support scientific research. We offer only high quality, reliable instruments, including prompt, educated customer service from science professionals.

Taylor & Francis

BOOTH 13

www.tandfonline.com

For two centuries, Taylor & Francis has been fully committed to the publication of scholarly research. We publish a variety of books and journals relevant to medicine and health science. Be sure to stop by our booth to view our products and to pick up FREE sample copies of our journals!

UID Identification Solutions

BOOTH 26

www.uidevices.com

RFID provides a secure method for the identification of animals and other laboratory items using implantable and externals RFID Transponders. The UID Identification system includes RFID implantable transponders, readers, programmers and software for laboratory automation processes. We will introduce advanced RFID microchips and custom software for tracking all elements of a research study from simple applications such as high throughput body weight screening, minor surgical modifications, major surgical disease models, medical device implants, PK/PD research and short and long duration toxicology studies.

Keynote Speakers

34 YEARS

Translational Research -"The Pig and I"

Dr. M. Michael Swindle, DVM, Diplomate ACLAM & ECLAM

Swine have been developed as a true translational research model which has approximately 85% homology with humans in most biomedical applications. This is substantially higher than most other animal models. In particular, porcine models have been instrumental in developing treatments for humans in cardiovascular, digestive, integumentary and urogenital systems. They have been evolving as CNS and trauma models in recent years. The author has been involved in the development of models and technical procedures which have contributed to the evolution of the species as a primary large animal model over the last 40 years. This presentation will review some of the models developed by the surgical research laboratories at the Medical University of SC which have had direct human applications.

NOTES

Contributions of the Horseshoe Crab to Science and Human Health

Norman R Wainwright, PhD

When Frederic Bang and Jack Levin collaborated to make critical observations of the horseshoe crab blood clotting in the presence of bacterial endotoxin, it began our understanding of the innate immune system of the crabs and created technology that launched the LAL (Limulus amebocyte lysate) industry. Further study of the molecular biology of the clotting cascade continues to advance our understanding of the defense mechanisms and evolution of antimicrobial strategies. LAL has become the standard assay for bacterial endotoxin, keeping our injectable pharmaceuticals and medical devices safe, saving thousands of lives. More recently, LAL has also been enlisted in the study environmental health, and the new field of Astrobiology – the search for life in our solar system and beyond.

NOTES

A Self-Clearing VP Shunt for Hydrocephalus: Developing a Model Highly Prone to Shunt Obstruction and Evaluation fo a New Device

Dr. R. Timothy Bentley, BVSc, MRCVS, DACVIM (Neurology)

Obstruction of ventriculoperitoneal (VP) shunts for hydrocephalus becomes increasingly prevalent over time. VP shunt failure occurs within 6 to 12 months in 15–40% of cases, and in 40–70% of cases within one to two decades. The predominant cause of shunt failure is obstruction at the ventricular catheter or valve. Obstruction occurs due to proteinaceous debris, choroid plexus in-growth, coagulation or infection, and generally necessitates surgical explantation and the implantation of a new shunt. A self-clearing shunt could revolutionize hydrocephalus management. VP shunts consist of a ventricular catheter (placed into the lateral ventricle), a valve (to ensure one-way CSF flow), and a distal catheter (which enters the peritoneal cavity). Models of obstructive hydrocephalus include blood injection in swine and kaolin injection in sheep, however models including VP shunting were not available. In particular need was a VP shunt model prone to early shunt occlusion, in order to develop and evaluate a self-clearing shunt.

A porcine model of obstructive hydrocephalus, highly prone to early shunt occlusion, was developed. Autologous blood admixed with thrombin was injected into the lateral ventricle. Intracranial pressure was continuously monitored at baseline, during blood injection and until 30 minutes after shunting. A self-clearing VP shunt was evaluated using Treatment, Control and Sham-operated animals. For the purposes of this study, the ventricular catheter had only a single inlet pore, and the ventricular catheter was placed directly into the hematoma created in the lateral ventricle. Treatment shunts additionally contained a micro-actuator at the inlet pore. The micro-actuator was non-invasively actuated at days 0, 6, 21 and 35 by an electromagnet. Control shunts were identical, except no micro-actuator was present. Computed tomography was performed pre-operatively, post-operatively, and at weeks 1, 3 and 5. Animals were sacrificed at week 6 for necropsy with standardized ventricular measurements.

All 6 Control shunts obstructed with hematoma after 0.5 - 5 days (median, 3 days). Only 1 of 7 Treatment shunts was obstructed by hematoma. Treatment shunts remained patent for longer than Control shunts (p=0.0047). Obstruction(s) occurred due to hematoma within the ventricular catheter (n=3), valve (n=4) or distal catheter (n=2). Placement over a VP shunt allowed a more rapid return to baseline ICP, when compared to sham-operated animals that were not shunted. Fatal shunt infections developed at days 7 to 13 in both Treatment (n=2) and Control (n=1) animals, developing subcutaneously around the valve and tracking down the ventricular catheter into the brain.

A micro-actuator at the inlet pore significantly reduces shunt obstruction in intraventricular hemorrhage and should be evaluated in other forms of hydrocephalus. Advantages include no requirement of a battery and non-invasive actuation. In future studies, micro-actuators within the valve could be evaluated. It is unknown how micro-actuators might perform against the chronic deposition of proteinaceous debris, but their efficacy in reducing acute obstruction due to hematoma is encouraging. Micro-actuators have no role in preventing or treating shunt infection, but might be combined with newer shunt systems encompassing impregnated antibiotics.

NOTES

Collaboration: The Key to Success! Surround Yourself with Competence!

Dr. Vincent Mendenhall, DVM, PhD

Collaboration: 'The action of working with someone or some group to produce or create something".

Team: 'Two or more people with a full set of complementary/inter-dependent skills, working together with a high degree of interdependence while at the same time, sharing authority and responsibility, to achieve a shared and common goal". So – 'Collaboration" takes place in 'Teams".

Complementary/Interdependent Skills: Pair competent people with opposite skills to work together. Thus, they are all individually surrounded by competence. This requires that they recognize their weaknesses as well as their strengths. Personality types: Pair opposites – they work better together - eventually.

Pair extroverts with introverts; intuitives with realists; feeling with thinking; perceptive with judgmental.

A true team is more than just a collection of people. The group has a strong sense of mutual commitment that creates synergy, and thus, can generate a performance that is greater than the sum of the performance of its individual members.

'EVERY SURGEON DEVELOPS TECHNICAL INDIOSYNCRASIES TO SUIT HIS/HER STYLE. A GOOD SURGEON PERFORMS AT HIS/HER BEST IN THE OPERATING ROOM ONLY IF THE ASSISTANTS AND NURSES ARE ATTUNED TO HIS/HER WAYS. THEY ANTICIPATE HIS/HER MOVES AND WISHES AND THE OPERATION PROCEEDS WITH UNHURRIED SPEED. A POOR SURGEON FORFEITS THE COOPERATION OF HIS/HER ASSISTANTS BY A FALTERING AND DISORDERLY TECHNIQUE"

If people are working together, but have no shared goals, they are cooperating (hopefully), not collaborating.

Generally, collaboration happens within small groups of people; there is an upper limit to how many people can collaborate at once. It is a targeted, team-based activity, and is mostly about people's interaction with each other. Attempts to collaborate across a large group will result in noise, distraction, and annoyance.

EXCEPTION: Zoobiquity: 'Zoobiquity is an interdisciplinary field that draws together knowledge from human medicine, veterinary medicine, and evolutionary biology to create an integrated view of physical and behavioral health. Zoobiquity has a strong basis in established science and research from all three fields, as well as related disciplines including anthropology, psychology, neurobiology, paleontology, and physiology."

The ultimate in veterinary and human medical collaboration. Dr. House, meets Dr. Dolittle.

By broadening the field in this way, Zoobiquity makes comparative medicine relevant to the daily work of rank-and-file physicians, nurses, psychotherapists, and other healthcare professionals, including, of course, veterinarians and vet techs.

WATCH: https://www.ted.com/talks/barbara_natterson_horowitz_what_veterinarians_know_that_doctors_don_t

NOTES

Presentation Abstracts

34 YEARS

Thursday, Track 1

Simplification of Portal Vein VAP Placement in Beagles

Presenter: Randall Pielemeier
Charles River Laboratories

Introduction:

The mesenteric vein approach to portal vein cannulation in beagles is well described in a number of publications. Conventional dissection of the vessel for insertion requires revascularization during healing. Palpation of the catheter tip manually is limited in precision.

Methods :

Using angiography during implantation enables the surgeon to fine tune position of the catheter tip by visualizing the relation of the tip to the vessel wall and venous valves. Historically the mesenteric vessel has been isolated with blunt dissection, occluded with ligatures, and a catheter and wire inserted into the incised vessel with aid of a vein pick. The procedure has been modified using a needle stick into the mesenteric vein to introduce a 0.18" flexible-tipped vascular wire which is advanced under fluoroscopic guidance. The needle is then removed and the catheter advanced over the wire into the vessel, again under fluoroscopic guidance. The wire is then removed and contrast injections used to finalize catheter tip placement in the portal vein.

Results:

This catheter insertion methodology is simpler, requires less dissection, and eliminates the need for vessel ligation. This less invasive procedure reduces impact of the surgery on venous drainage from the intestine. Catheter tip placement can be visualized more precisely utilizing angiography.

Conclusions:

The use of less invasive methods of catheter introduction reduces the need for revascularization of the bowel during healing. More precise catheter tip placement should theoretically improve longevity of 2 way patency but as only 4 animals have been implanted with this methodology data is not yet available at this time to support this conclusion.

NOTES

Thoracic Lymph Duct Catheterization with a Venous Shunt in the Primate

Presenter: Jon Ehrmann
Bristol-Meyers Squibb

Introduction:

One of the main functions of the lymphatic system is the removal of interstitial fluid from tissues into the lymph fluid, which is then filtered and returned to the blood stream through the subclavian veins near the heart. In an effort to demonstrate the degree of drug absorption and transport via the lymphatic system a reliable and reproducible surgical model was developed to sample lymph from the thoracic lymph duct in the cynomologous macaque. Additionally, a venous shunt was created to allow the lymph to recirculate into the venous system thus allowing for chronic sampling up to eight days post-operatively.

Materials and Methods:

The thoracic duct was identified sub-pleural between the aorta and the vertebral bodies, and carefully dissected from the surrounding tissue for approximately 3 pleural between the aorta and the vertebral bodies, and carefully dissected from the surrounding tissue for approximately 3-cm. A 3.5 French hyrdocoated polyurethane catheter was inserted into the duct and immobilized with two encircling ligatures around the duct and catheter. A venous shunt was created by inserting a 3.5 French hyrdocoated polyurethane catheter into the azygous vein. This catheter was then connected to the thoracic lymph duct catheter via a male-male luer connector. Thus, the flow of lymph from the thoracic duct back to the azygous vein was reestablished. The catheters associated with the system were passed through the right seventh intercostal space subcutaneously to a site caudal to the shoulder blades. A custom made jacket was worn by the primate to prevent disruption of the exteriorized catheters which laid in a pocket on the back of the jacket. This procedure was approved by the site governing Institutional Animal Care and Use Committee.

Results:

A total of 32 surgical procedures were performed, 23 of which were successful resulting in a 72% success rate. Of the nine procedures that were not successful, three had no visible duct present and six had very small ducts which we were unable to catheterize. In regards to patency, 87% remained patent for the length of the requested study which ranged from 24 hours to 168 hours. Loss of patency was due to clotting within the catheter lumen.

Conclusion:

Thoracic lymph duct catheterization is a well-established and published animal model in several species including the nonhuman primate. The planned presentation will focus on the surgical techniques necessary to create a model with a venous shunt to chronically sample lymph fluid. This model was presented briefly at a previous ASR conference during a round table. Within this time frame our experience with this model has increased significantly including the development of several refinements to the surgical procedure and the overall maintenance of the model.

NOTES

Novel Approach to Bilateral Middle Ear Cannulation and Administration in the Guinea Pig

Presenter : Frederick Emond
Charles River Laboratories

Introduction:

The development of drugs focusing on preventing or treating hearing loss and auditory diseases has increased in recent years. Thus, the need for a reliable method of administering drugs targeting the middle and inner ear in biomedical research has too. The guinea pig is frequently a model of choice because of the similarity of otic structures to human anatomy and the auditory system's suitability in relation to the size of the animal. Trans-tympanic middle ear administration is a traditional method of choice with single or infrequent dose administration. However, repeated injection can be associated with potential risks including external ear canal irritation, damage to the tympanic membrane and/or middle ear structures in addition the inherent anesthetic risks associated with each dosing. A reliable surgical method for middle ear administration would mitigate potential complications.

Materials and Methods:

Ten guinea pigs of approximately 6-9 weeks old and weight range of 350-450g were socially housed in custom built enclosures that included an opaque roofed section, chewing objects, water bottles and free choice hay, pelleted feed and fresh produce. Perioperative analgesia along with antibiotics were administered prior to surgical procedures for bilateral middle ear cannulation under a combination of injectable and inhalant anesthesia. A curvilinear incision was made caudal to the base of the auricular cartilage. Using blunt dissection, the auditory bulla was exposed and entered using a small drill bit. A custom made catheter was inserted and secured using an anchoring disk glued over the external surface of the bone. Each catheter was subcutaneously tunneled to connect to an interscapular dual channel vascular access button. After a two week recovery from surgery, the animals were dosed with either gentamicin 42 mg/dose in 70 µL or with a saline dose of 70 µL, twice weekly for two weeks, to demonstrate suitability of the model. Animals were monitored for up to 9 weeks and underwent auditory brainstem response (ABR) at 2, 6 and 9 weeks following surgery.

Results:

Overall this novel model for middle ear cannulation and administration was successful despite and one animal where the cannulation was sub-optimal due to difficulties encountered while accessing the bulla. The animals recovered well from surgery with some showing transient clinical signs of dehydration and that resolved within a week with subcutaneous fluid administration. ABR were within expected ranges 2 weeks after surgery. Saline treated animals underwent a slight shift in ABR threshold (up to +15 to +30 dB) at 6 and 9 weeks after surgery but remained in excellent health. Administration of gentamicin to the middle ear resulted in toxicities expected with administration of a high dose, including vestibular abnormalities, lack of ABR response to even loud stimuli, and significant cochlear hair cell loss.

Conclusion:

This model offers marked positive surgical outcomes of bilateral middle ear administration in guinea pigs. The surgical approach is minimally invasive, does not damage the tympanic membrane and post-operative complications, when seen, and were minor. Additionally, repeat dosing avoids the need for repeat anesthesia associated with the trans-tympanic method.

NOTES

Development of a Swine Model of Radiation-Induced Retinopathy for Therapeutic Drug Testing

Presenter: Margrath III GN
Medical University of South Carolina

Introduction:

We treat people with choroidal melanoma using potentially vision-saving radiotherapy called plaque brachytherapy. A plaque (gold disk) studded with radioactive seeds is customized for each patient and surgically secured to the sclera for four days. A complication of plaque brachytherapy is post-radiotherapy intraocular inflammation that can result in vision loss. Our goal was to develop a translational swine model of brachytherapy-induced retinopathy for testing candidate anti-inflammatory drugs.

Methods:

All procedures were approved by the institutional IACUC. Eight YorkshireX castrated male farm pigs (mean: 24.1kg; SD: 3.1) were used. Eye dimensions were measured ultrasonagraphically under anesthesia one week before plaque placement, allowing customized plaque production to standardize the radiation dose. We first compared the effects of two I-125 plaque doses (70 or 210 Gray; depth: 8 mm). All remaining pigs (6) received 70 gray over 4 days. For plaque placement, a conjunctival peritomy was completed. The plaque was sutured 5 mm posterior to the limbus in the inferotemporal quadrant with 6-0 vicryl and the conjunctiva closed over it with vicryl. A temporary tarsorrhaphy was created using 2-0 nylon horizontal mattress sutures. Average surgical time for plaque placement was 25 minutes (range: 16-39). Analgesics included buprenorphine SR, proparacaine, and retrobulbar bupivacaine. The first two pigs had lead-blocking eye shields sutured to the periorbital skin. Shields, tarsorrhaphies, and plaques were removed 4 days later. Serial follow-up was conducted weekly for 1 month and biweekly to 3 months. Binocular indirect ophthalmoscopy was performed to grade degree of vitritis, stage of radiation retinopathy, retinal edema, optic disc edema, and other retinal anomalies. At each time point, a fine needle biopsy of the vitreous and anterior chamber was collected for quantification of inflammatory cytokine levels. At experimental endpoints, pigs were euthanized and eyes harvested for histopathological evaluation.

Results:

Eight animals were studied. All pigs displayed differing degrees of retinal degeneration. Some pigs showed posterior lens fiber changes histologically consistent with early posterior subcapsular cataract. This may have resulted from radiation or vitreous biopsies. Two vitreous needle biopsies caused hemorrhage. Pigs tolerated the plaque and temporary tarsorrhaphy; one plaque was dislodged slightly anteriorly. Lead shields were dislodged in the first two pigs. Dosimetry by the Radiation Safety Office confirmed that lead shields were unnecessary due to low recorded doses, so their use was discontinued. Intraocular cytokine levels are under analysis.

Conclusions:

Brachytherapy plaque placements were successfully performed in swine. Lead eye shields were not tolerated by pigs, but radiation dose chosen (70 Gray) did not require lead shielding. Retinopathy occurred as expected in a dose dependent fashion, but contribution of radiation, vitreous biopsies and plaque placement are not clear at this point. In this early pilot study, contralateral eyes did not undergo radiation or vitreous/anterior chamber serial biopsies in order to assure pigs remained sighted in one eye for humane reasons. Studies are underway to evaluate pharmaceuticals to potentially decrease the vision loss and inflammation associated with radiotherapy.

NOTES

Evaluation of Shipping Stress in Surgically Altered Rodents During Commercial Air Transport

Presenter: Steven Kreuser
Pfizer

Introduction:

Pfizer currently outsources the production of many rodent surgical models to vendors across the country for delivery to Pfizer locations. At this time, the only approved method for shipment is by ground courier due to concerns about the impact of shipping stress on the animals. Given there is limited published information on the duration of physiological stress indicators present before, during, and after transportation, the objective of this study was to evaluate stress in rodents following surgery during air transportation in relation to time of shipment and acclimation, direct comparison with ground transportation and to assist in establishing guidelines for humane shipping for both methods of transportation post operatively. A partnership between Charles River Laboratories (CRL) and Pfizer was formed to investigate shipping stress.

Methods:

Starr_Oddi DST micro-HRT data logger devices were purchased to evaluate heart rate and temperature in rodents. Each device was programmed to collect data from the time of surgery through delivery and acclimation at the destination facility. Twelve male, 8-10 week, variable weight, CRL CD Sprague Dawley rats were used. Group A (n=6) were rats that had control data logger implants only with sham jugular vein surgery. Group B (n=6) had both jugular catheter and data logger implantation. Surgery took place on day 0.

Daily clinical and behavior assessments were completed as per CRL guidelines. The behavioral observations were recorded which evaluates movement, posture, body condition, respirations, and other parameters. On day 3, a physical exam was performed including body weight assessment. The rats were shipped via commercial air flight from CRL Raleigh, NC, to CRL San Diego. Major events such as transfer to airport holding areas, loading and unloading from the plane, transfer to the ground transportation and other significant events were logged. On day 4 the rats were delivered to CRL San Diego, the animals underwent a physical exam, body weight assessment, and were placed in home cages. Daily log entry was completed to record significant events as well as behavioral observations. Body weights were collected at the time of surgery, prior to shipment, and receipt in San Diego and on days 7 and 14. On day 14 final assessments were completed and data loggers were collected and data analyzed.

Conclusion:

Understanding shipping stress of surgically altered rodents is relevant to animal welfare as well as the science and research that these models support. The changes in normal physiological levels associated with shipment related stress can affect scientific validity and consequently alter study results. The focus in this study was heart rate, body temperature and weight. Heart rate is one of the physiologic parameters previously documented and associated with stress. Based upon this assumption significantly increased heart rates were correlated with increased stress.Additionally, body temperature was collected and analyzed as a potential indicator of stress during transit as well as the potential effects of the ambient/environmental temperature on any physiologic changes. Finally, body weight measurements and behavioral observations were collected pre-shipment, transit and post-transit for evaluation of more chronic associated stress responses.

NOTES

Microporous Polysaccharide Hemosphere (MPH) Based Surgical Hemostat Powder Does Not Interfere with Healing When Applied to a Surgically Created Ovine Bone Defect

Presenter: Darcy H. Gagne
BD Interventional

Objective:

The objective of the current preclinical study was to determine if wax-based or a MPH powder-based hemostatic product inhibit or influence the bone re- growth when applied into a femoral diaphyseal cortical defect.

Methods:

A total of 42 defects in eleven total female Polypay sheep (NE Ovis, Rollinsford, NH) underwent a single surgical procedure on day 0 during which each femur was surgically exposed and two 4.5 mm diameter defects were created in the diaphyseal region of the bone. The defects were treated with a MPH powder-based hemostat (Arista™ AH, C.R. Bard, Inc. (Davol)) or Bone Wax (Ethicon, Inc.) or untreated and the tissues overlying the bone were subsequently closed in layers. Fluoroscopy was performed post-operatively on Day 0 and at interim timepoints (2, 5, & 7 weeks) and at the time of necropsy at 9 weeks to evaluate the bone regrowth. Seven days prior to euthanasia, animals received calcein (~20 mg/kg, intravenous [IV]), and one day prior to euthanasia, the animals received tetracycline hydrochloride (30 mg/kg,IV) as fluorescent markers to evaluate bone formation. At the end of the 9-week survival period, the treatment sites were harvested, fixated in 10% neutral buffered formalin and evaluated for macroscopic, histomorphologic and histomorphometric endpoints.

Results:

Histomorphometric and histomorphologic analysis indicated that there was minimal inflammatory response in all groups and the MPH powder-based hemostat did not interfere with bone re-growth, as compared to untreated controls. Defects treated with Bone Wax demonstrated significantly less bone re- growth. Bone wax-treated groups demonstrated significantly ($p<0.05$) more residual material present (moderate to marked presence) within the defect sites, as compared to MPH powder-based hemostat defects, where there was no residual material present.

Conclusions:

In this sheep femoral diaphyseal cortical defect model, the use of the MPH powder-based hemostat into 4.5 mm diameter defects was interpreted to have no adverse effects on healing the cortical bone, when compared to untreated defects as evidenced by intra-defect new bone growth. When compared to defects treated with Bone Wax, healing of cortical bone was increased ($p<0.05$) in defects treated with the MPH powder-based hemostat. Furthermore, fluoroscopic and radiographic images of the femurs showed that over 75% of each of the cortical bone defects were filled by new bone growth from Week 5 onward for MPH powder-based hemostat treated defects and untreated defects, while no bone growth was observed through Week 5 and overall minimal new bone growth was observed from Week 7 onward for Bone Wax-treated defects. In addition, there was no evidence of adverse pathology (e.g., inflammation) associated with either of the MPH powder-based hemostat in the cortical defects and no evidence of MPH powder-based hemostat related animal morbidity or mortality. The project was sponsored by C.R. Bard, Inc. (Davol), Warwick, RI. Data was generated in a preclinical model. Data may not correlate to performance in humans.

NOTES

Overcoming Surgical Challenges: When Surgery throws You a Curve Ball

Presenter: Kimberly Holliday-White
DSI

For those of us that perform quite a few surgeries, it is very normal to come across issues that you have never seen before. Over the last year we have experienced several challenges that we were able to overcome. We have experienced issues with catheter erosion after recovery, surgical complications with high blood pressure, and hindlimb paralysis in NHPs and Fisher 344 rats. We have discovered solutions for most of these challenges. This presentation will focus on not only the challenges and how we overcame them but also the various tools that have made our lives easier. Being adaptable and willing to make changes as necessary to our surgical protocols has increased our success rate.

NOTES

Thursday, Track 2

Surgical Writing Workshop

Presenter: Marc Basson
University of North Dakota

An interactive workshop on surgical writing with the new Editor-in-Chief of the Journal of Investigative Surgery. The session will include an overview of the process from hypothesis and experimental design through manuscript writing and submission and handling peer review and interaction with journals. The most common reasons for rejection of manuscripts will be discussed. In addition to a Q&A session, there will be an opportunity to participate in guided peer review of your own manuscript or someone else's manuscript.

NOTES

Anesthesia and Analgesia for Telemetry Implantation in Gottingen Minipigs: Challenges with Buprenorphine SR

Presenter: Michelle Salerno
Marshall BioResources

The use of swine in biomedical research has increased in recent decades. Technical procedures can be stressful and difficult in swine. The implantation of devices such as telemetry units for monitoring and capturing physiological data from conscious, free moving animals, or catheters and vascular access ports to help minimize handling and restraint for collecting blood samples or administering compounds has become a common consideration as an option to reduce stress for the animals as well as the handlers, and capture accurate data.

This presentation provides an overview of the anesthesia and analgesia protocol for 7 Gottingen Minipigs implanted at Marshall BioResources with telemetry units and vascular access ports, or telemetry units. In addition, we describe injection site reactions while using Buprenorphine SR in Gottingen Minipigs.

NOTES

Monitoring Anesthesia Dry Lab

Presenter: Cholawat Pacharinsak
Department of Comparative Medicine, Stanford University

Anesthetic monitoring is one of the key components for general anesthesia in laboratory animal research. Such monitoring provides an early warning system, the first step to alert anesthetists to take action before complications become irreversible. The anesthetic monitoring process will increase patient safety and assist the anesthetist's decision-making regarding patient care throughout the anesthetic procedure. The monitoring techniques covered include anesthetic depth, ECG, blood pressure, %SpO2, ETCO2, and temperature for large animals

NOTES

Evaluation of a Multimodal Analgesia Plan in Cynomolgus Macaques for Moderate to Severe Post-Operative Pain

Presenter: Jan Bernal
Pfizer

Introduction:

Optimize nonhuman primate (NHP) well-being post operatively with appropriate multimodal analgesia; addressing appropriate level of pain and duration.

Purpose:

Provide appropriate analgesia for perceived pain and appropriate duration of analgesia based upon classification and type of surgery. Provide clearly defined plan with options based upon clinical presentations and responses as well as addressing multiple pain pathways.

Method:

Retrospective review of post-surgical observations, analgesia administration, weights and pain assessment of two multimodal analgesia plans in cynomolgus macaques following Left Ventricular Pressure (LVP) telemetry implantations via a thoracotomy. 23 NHP were evaluated that received Analgesia/anesthesia plan 1 between January 2015 and June 2016 and 23 NHP were evaluated that received Analgesia/anesthesia plan 2 between July 2016 and January 2017. Analgesia/anesthesia plan 1 and 2 will be described and compared in detail.

Results:

NHP receiving analgesia/anesthesia plan 2 displayed reduced pain assessments, increased food intake and significantly less weight loss post surgery.

NOTES

Intentional Fracture of Previously Placed Stents: Impact of Pre-Stenting in a Piglet Model

Presenter: Jose Negron-Garcia
Cook Research Inc.

Background:

Intentional stent fracture in vivo induces medial dissection/vessel injury. Spontaneous stent fracture in humans can lead to stent collapse, hemodynamic compromise, and embolization of stent fragments, which could be prevented by pre-stenting.

Purpose:

This study evaluated the short-term and mid-term effects of pre-stenting prior to intentional stent fracture on vessel size and integrity in a piglet model.

Methods:

A carotid approach was used to implant a total of 14 low-profile stents (Cook Formula 418® stents) to the aorta of four piglets (three stents in two piglets and four stents in two piglets). Five months after implantation, the stents were intentionally fractured using ultra-high-pressure balloons with (pre-stent group) or without (single-stent group) with another stent placed inside. Two pigs (one from each group) were euthanized immediately to evaluate the short-term effects of pre-stenting and two pigs (one from each group) were allowed to recover and euthanized two months after stent fracture to evaluate the mid-term effects of pre- stenting. Following euthanasia, the animals underwent a thorough necropsy, and the stented vessels were submitted for high-resolution radiography, micro-CT, and histopathologic evaluation.

Conclusions:

Compared with the single-stent group, the pre-stent group showed a significantly larger vessel lumen area (109 mm2 (89–141) vs. 57 mm2 (47–73), P = 0.019), less mid-term luminal diameter loss (44% (26–59) vs. 75% (62–85), P = 0.007), lack of strut protrusion, and improved endothelialization (100% (89–100) vs. 73% (56–96), P = 0.022). Vessel wall injury was similar between groups at the time of stent fracture. However, the injury score was significantly improved at mid-term in the pre-stent group compared with the single-stent group (P = 0.046). No damage to the external part of the blood vessels or the surrounding soft tissue was observed in either group.

NOTES

Friday, Track 1

Investigative Thermography: Evaluation of Normotherm Heat Support for Cynomolgus Macaques

Presenter: Jan Bernal
Pfizer

Introduction:

Heat support is an essential component to successful post-operative recovery in non operative recovery in non-human primates. Traditional heating methods such as heating pads, hot water bottles, lamps, or blowers often provide inconsistent or injurious results. Normotherm Infrared Heaters manufacturer by Britz & Company were recently introduced into a post-operative recovery plan to aide with thermoregulation and to promote adequate tissue perfusion. This new technology is a dual panel warming system that transfers heat through infrared waveforms, warming the body tissue without warming the air. Utilizing a thermography camera, and implanted telemetry units, this technology was investigated to ensure it was providing adequate heat support to recovering non operative recovery plan to aide with thermoregulation and to promote adequate tissue perfusion. This new technology is a dual panel warming system that transfers heat through infrared waveforms, warming the body tissue without warming the air. Utilizing a thermography camera, and implanted telemetry units, this technology was investigated to ensure it was providing adequate heat support to recovering non-human primates. A comparison between tail temperatures (i.e. an area with minimal body fat), absorbing heat disproportionately to core body temperature, potentially leading to thermal injury, was also investigated.

Methods:

Six male unaltered Cynomolgus macaques ranging from 4.5-6.0kgs were anesthetized for a telemetry unit implantation. Physical exams, blood work, and veterinary approvals were conducted prior to surgery. Immediately prior to anesthesia, each animal was imaged utilizing a FLIR T650sc infrared camera. This device produced a heat map-like image depicting body surface temperatures. Each animal was then induced for surgery and implanted with a telemetry device that recorded blood pressure and core body temperature. Each animal was evaluated for a 2-3 hour immediate post-operative recovery period. A thermal image was taken immediately before any heat support was applied to the animal. After this image, the Normotherm was applied to the recovering animal's cage front. Access to telemetry unit information displaying vitals, including body temperature, was available at this time. The FLIR T650sc infrared camera was then again used to image each animal. Thermal images were captured with 15, 30, 45, 60, 90, 120, 150, and 180 minutes of infrared heat support applied to the animal. Animals were monitored for 1 week BID observations, 1 week SID observations, followed by physical exams performed at week 3. Thermal images were processed utilizing FLIR Tools software. Temperature measurements were recorded at the animals' core, and at three different locations along the tail.

Results:

Core body temperatures returned to pre-operative body temperatures on average within 90-120 minutes post procedure when the Normotherm was applied. In each tail location, temperatures were observed to be lower than core body temperature readings collected from the thermal camera and telemetry unit. A temperature gradation was observed between proximal, midpoint, and distal areas of the tail.

Conclusion:

The Normotherm Infrared Heat technology provided adequate heat support to recovering non-human primates. No evidence of thermal injury was identified via thermal imaging, daily visual assessments or physical e examination. Tails increased in temperature at slower rate compared to core body temperatures.

NOTES

Recommended Surgical Technique for Collecting Left Ventricular Pressure, Systemic Blood Pressure, ECG and Core Body Temperature in Rodents

Presenter: Heather Bogie
DSI

Assessment of cardiac function has been steadily increasing throughout the years as diseases emerge and progress and new drugs are developed. Cardiac contractility is routinely being included in the assessment of cardiac function and as such, the need to assess earlier in the development phase, with a smaller species, is desired. The surgical technique for the chronic implantation of a telemetry device to collect left ventricular pressure (LVP), systemic blood pressure, ECG, and core body temperature in rodents will be discussed, as well as, highlighting the equipment requirements needed to ensure a successful outcome.

NOTES

Recommended Surgical Technique for Collecting Systemic Blood Pressure, ECG and Core Body Temperature in Ferrets

Presenter: Kim Swearingen
DSI

Ferrets are commonly used in research as a model to study respiratory disease and human influenza. Due to the unique nature of the ferret body type, surgical implantation methods required some modifications from that of a rat. The surgical technique for the chronic implantation of a telemetry device to collect systemic blood pressure, ECG, and core body temperature in ferrets will be discussed as well as the obstacles that were overcome in the process.

NOTES

Scar Size and Other Parameters for Tracking Left Ventricular Dysfunction after Induction of Myocardial Infarcts in Sheep (Ovis aries)

Presenter: Hylton Gordon
Icahn School of Medicine at Mount Sinai

Background:

The use of scar size and other parameters to track progression of left ventricular dysfunction following induced myocardial infarction (mi) in sheep (Ovis aries).

Purpose:

MI is a major cause of heart failure yet the progression of the resultant left ventricular dysfunction is often undetected after incidental or induced myocardial infarction.

Methods:

Progression of heart failure, following induced mild and severe myocardial infarction, was tracked using scar size, left ventricular ejection fraction, hematology, serum biochemical biomarkers, S-T elevation, and clinical observation. All parameters were assessed at baseline and at 3 wk and 3 mo after infarction, except that clinical observation of the animals was conducted daily.

Conclusions:

The different parameters differed in their usefulness: some verified appropriate creation of the model, whereas others enabled assessment of the progression of heart disease. Daily routine clinical evaluation of the animals was uninformative in the assessment of the onset and progression of disease. The observed signs of ill health were not directly related to myocardial disease and resultant dysfunction of the left ventricle. Although some parameters, such as cardiac biomarkers (troponin, total creatine phosphokinase) and electrocardiography (ST elevation),were useful indicators of acute ischemic insult, they were of less value for tracking the progression of left ventricular dysfunction. Scar size combined with the left ventricular ejection fraction was the most robust indicator of progressive failure of the myocardium and the resultant dysfunction.

NOTES

Retrograde Delivery of Cellular Products Using Advance® CS Coronary Sinus Infusion Catheters

Presenter: Jose Negron-Garcia
Cook Research Inc.

Background:

Experimental models have shown the feasibility of utilizing angiogenic proteins, gene therapy or stem cells for inducing neovascularization of chronically ischemic myocardium. Modes of cell delivery include intracoronary, intramyocardial, and retrograde coronary sinus perfusion.

Purpose:

This study evaluated the biodistribution of cellular products following retrograde coronary venous infusion with the Cook Advance® CS Balloon Catheter in a porcine model.

Methods:

The left jugular vein was surgically exposed and the Seldinger technique was used to gain vascular access. A guiding sheath was tracked to the coronary sinus and a venogram of the great cardiac vein was obtained. The guiding sheath was used to facilitate the placement of an appropriately sized Advance® CS Coronary Sinus Infusion Catheter. Once occlusion of the great cardiac vein was confirmed, approximately 100-400 million Human Derived Mesenchymal Stem Cells (hMSC) transfected with Firefly Luciferase and labeled with a lipophilic fluorescent tracer were delivered through the catheter over a period of ten minutes. The animals were recovered for 24 hours, then the explanted hearts were immersed in a solution of D-Luciferase for 20 minutes. The hearts were then imaged for both relative fluorescence and bioluminescence in an IVIS Lumina system.

Conclusions:

Both fluorescence and bioluminescence were observed throughout the extent of the target area (the path of the great cardiac vein) 24 hours following cell delivery. These results suggest that hMSC were successfully delivered via retrograde coronary venous delivery. Retrograde coronary sinus perfusion is a reasonable alternative for delivery of therapeutic agents to the ischemic myocardium, and further clinical studies are underway.

NOTES

Friday, Track 2

Surgical Saavy Ideas and How To Submit

Presenter: Jennifer Sheehan, SRS, LATG, BS, Tracy Zeigelhoffer, SRS, LATG, BS, Brad Gien, BSc
ASR Publications Committee

Join us to learn about the popular ASR Surgical Savvy Newsletter. Learn what subjects to write about and how you may submit your articles, tips, experiences and share your "surgical savvy" with us.

NOTES

Anesthesia / Analgesia Roundtable

Presenter: Jan Bernal DVM, Vincent Mendenhall, DVM, Randy Pielemeier, SRS, LATG, LVT
ASR Consultants

We have gathered some of our most reputable members to join as an experienced panel to open up discussion regarding best anesthesia and analgesia practices with our meeting attendees. Please join them with your questions, experience, techniques and even share stories of successes and failures. This is a fun and educational way to collaborate to provide our animal models with the best we can provide for them.

NOTES

Technicians Roundtable

Lisa Johnson, SRS, RLATG, Leslie Stoll, SRS, LATgG RVT, Jon Ehrmann SRS, SRA, LATG, Heather Bodie, SRS, RLATG, CVT, Jennifer Sheehan, SRS, LATG
ASR Board Members

We have gathered some of our most senior SRS members to join as an experienced panel to open up discussion regarding any and all subjects concerning surgical techniques, anesthesia, analgesia, medical, humane care, successes and failures with our meeting attendees. Please join them with your questions and experiences. This is a fun and educational way to collaborate tp provide our animal models with the best we can provide for them.

NOTES

Poster Abstracts

34 YEARS

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Minimally Invasive Surgical Model for Intrathecal Catheterization and Ovariectomy in Non-Human Primates Traslatable to Tau Pathology (Alzheimer's disease) Model

POSTER 1

Presenter: Marissa Erickson
AbbVie Inc

Introduction:

Neurodegenerative disease, especially Alzheimer's disease, is a high priority target for AbbVie in pursuit of a treatment for this highly debilitating disorder. Induction of tauopathy in primates via intrathecal delivery of oligomer is being pursued to help with the mechanistic understanding of the pathology of Alzheimer's disease. The development of such an animal model represents a significant advancement for our scientists. Traditional access to the intrathecal space for catheterization required a major surgery that involving dissection of neck or back muscles and drilling a hole through a vertebral body. This model also required an ovariectomy in order to eliminate the estrogen source for optimal uptake of a tracer for translational imaging like MRI, PET etc. This was performed through a standard celiotomy involving a large abdominal incision. Due to the invasiveness of these two major surgeries, animals required significant amounts of analgesia and generally experienced prolonged, post-surgical recoveries. As a refinement, a minimally invasive percutaneous approach was established to catheterize the intrathecal space using a 'Touhy' needle to act as a conduit for the catheter passage. The catheter is then connected to a port placed under the skin through a 1-2 cm incision. Similarly, the ovariectomy surgical procedure was reduced to a key-hole surgery using laparoscopic technique.

Eleven non-human primates have undergone surgery using these refined techniques and all animals had faster recovery (i.e., normal food intake, body posturing, etc.) with less post-operative pain and complications than when using previous, more invasive surgical methods. All authors are employees of AbbVie. The design, study conduct, and financial support for this research was provided by AbbVie. AbbVie participated in the interpretation of data, review, and approval of the publication.

General Anesthesia and Monitoring of Callithrix jacchus (Common Marmoset) for Magnetic Resonance Imaging Studies

POSTER 2

Presenter: Maureen Lamkin
Bristol-Meyers Squibb

Introduction:

Multiple sclerosis(MS) is an inflammatory disease in which the fatty myelin sheaths around the axons of the brain and spinal cord are damaged, leading to demyelination an and scarring as well as a broad spectrum of signs and symptoms. To evaluate the development of lesions within the brain a reliable and reproducible anesthetic protocol for Magnetic Resonance Imaging was essential for these studies. The Common Marmoset was selected because of its size, availability, and unique biological characteristics that are very similar to humans, especially in neuroscience research.

Methods:

Twelve intact male and female Common Marmosets, 3-5 years of age, average weight of 350 grams were selected for this study. They were group housed as appropriate and each received a thorough physical exam (to include a routine bloodwork panel) and an accurate body weight was obtained prior to the anesthetic event. Following a 4-6 hour fast they received a pre-imaging anesthetic regime of 0.02mg/kg Atropine and 7mg/kg Telezol IM; and 2mg/kg Propofol IV. Once at a proper depth for intubation they were maintained on Isoflurane gas anesthesia (1-2%) during the imaging procedure. Proper depth of anesthesia was maintained by monitoring the heart rate, respiratory rate, end-tidal CO2; oxygen saturation and body temperature. Lactated Ringers were also administered IV pre and post imaging at 2.5mls for a total of 5mls. The primates were kept warm by wrapping them in cotton stockinet gauze - in addition to a circulating warm water heating pad. Following the imaging procedure the primate was maintained on supplemental oxygen until extubation (as evident with a gag reflex) along with accompanying heat sources.

Results:

In human patients with MS, magnetic resonance imaging or other imaging modalities are frequently used to evaluate the development and progression of damage ("lesions") to the brain of affected individuals. This imaging study in the marmoset helped develop a correlation between the efficacy of the compound (as assessed by our visual clinical scoring) and reductions in the number or severity of lesions in the central nervous system.

Conclusion:

Performing anesthesia techniques in the MRI environment can be extremely challenging, requiring extensive skills to maintain the safety of the animals and produce useful study results. The common marmoset has been increasingly used for research in the biomedical field; however, there is little information available regarding effective methods of anesthesia in this species. Their unique size requires a specialized anesthetic protocol as well as MRI-compatible monitoring equipment. A concise regimen from pre-anesthesia to post recovery is imperative for a successful study outcome. For this MS model requiring the use of anesthetized primates in an MRI setting we were able to successfully contribute to the results necessary to analyze the biological drug under study.

Implantation of Rat Vascular Access buttons in Gottingen Minipigs

POSTER 3

Presenter: Adrian Zeltner
Ellegaard Gottingen Minipigs

Introduction:

Superficial vessels in the minipig are few and frequently accessing them for Infusion and serial blood sampling can be a challenge. Although Göttingen Minipigs have a convenient size for handling, restraint and venipuncture can be stressful and affect blood parameters; catheterization is often the best option. Implantation of Seldinger catheters and VAP are well described, but this approach is new.

Methods:

Pilot study to determine implantation site and catheter type: Four male Göttingen Minipigs (Ellegaard Göttingen Minipigs AS, Denmark) between 15 and 15 kg. Rat Vascular Access Buttons (Instech Laboratories, Inc. USA) with three ports for three catheters were chosen for this study. Each Minipigs had three catheters implanted: one in the left carotid artery, one, with perfusion holes, in the left internal Jugular vein and one in the right internal jugular vein. Patency was tested for two months Group housing study: Four male Göttingen Minipigs, 15-20kg had a Button (single port) without catheter implanted. They were group hosed for one week.

Main Study: (ongoing) 16 Göttingen Minipigs 10-12kg: 4M+4F with one catheter implantation in the right external jugular vein and 4M+4F with two catheters in the left external jugular vein, same venous puncture but different length of insertion. Intended length of study. 3 months. All Göttingen Minipigs were induced with a Zoletil/Ketamine/xylazine/Butorphanol injection, intubated and maintained with Isoflurane in Oxygen. Buttons were implanted behind the left ear by creating a subcutaneous pocket for the Dacron cuff and close the skin tight around the core of the button.

Implantation procedures for catheters were similar to VAP procedures: dissection of the desired vessel, ligation, puncture, insertion of catheter and tying the catheter to the vessel. Catheters were tunneled to the site of the button. The arteries were not ligated, a purse sting suture was placed around the catheter and for additional fixture of the catheter some tissue glue was applied. One week after surgery testing of patency and functionality commenced.

Results:

A total of 24 Göttingen Minipigs were implanted with Buttons. No Complications were observed in the first two studies. The incisions in the neck and at the site of the button healed well and no signs of infection was observed. The Dracon collar of the button was grown in the subcutaneous tissue to seal the exit site completely. In the main study some infections around the button appeared in 6 cases (25%) four weeks post-surgery. In four of them recovered after treatment with antibiotics but two animals (8%) were euthanized, as infection did not clear and the button was rejected by the tissue. Accessing the ports was easy and painless and with the Minipig in a hammock it could be performed by one person only. All catheters worked fine initially, but some typical catheter related issues appeared along the way. In the pilot study the standard catheter in the jugular vein performed best in regard to patency, therefore this method was chosen for the main study.

Conclusion:

The amount of infection in the main study, relatively late after surgery, might be because of a small change in procedure. The button was pressed to the dorsal end of the incision, closing the skin on one side only, compared with placing the Button in the middle of the incision in the pilot. In some cases, the Dracon cuff was placed in the subcutaneous fat rather than below the fat layer. That might have slowed down the ingrowing process and mad it more prone to infections. Further studies will be needed to address this issue. It can be concluding that Rat Vascular Access ButtonsTM can successfully be implanted in Minipigs and provide long term vascular access. The buttons can accommodate 1-3 catheters which gives to opportunity to infuse and sample trough the same unit without cross-contamination.

Pain Managment in Canines

POSTER 4

Presenter: Amanda Klenoski
MPI Research, A Charles River Company

Introduction:

Buprenorphine is a common preemptive analgesia in animals. A different formulation of buprenorphine was created and the formula provides analgesia for a period of 72 hours following a single subcutaneous dose. Perioperative pain management presents a significant challenge due to pain only being observed when an animal expresses it. The purpose of this study was to evaluate the efficacy of buprenorphine vs buprenorphine sustained release (SR) in regards to post-operative pain in canines. We hypothesize that if buprenorphine SR is given a day prior to surgery, then the animals will recover faster compared to both buprenorphine and buprenorphine SR given the day of surgery.

Methods:

Half of the animals were administered buprenorphine SR (0.12 mg/kg SC) at least 24 hours prior to surgery and the other half received buprenorphine (0.02 mg/kg IV, pre-operative) and buprenorphine SR (0.06 mg/kg SC, post- operative). Buprenorphine was available as a rescue analgesic (0.02 mg/kg)for the animals receiving buprenorphine SR the day prior to surgery. Forty-three beagles underwent a laparotomy, with an arteriotomy performed for insertion of a blood pressure transducer into the internal iliac. Two bio-potential leads were trocared from the abdominal incision to a skin incision made on the left lateral thorax. The positive (red) and negative (clear) leads were positioned 5 cm below the heart and in the right upper quadrant under the clavicle, respectively. Detailed clinical observations, food consumption, pain assessments, inhalant off time, extubation time, final heart rates, and induction volumes were recorded.

Results:

Animals that received buprenorphine SR a day prior to surgery had an average inhalant end time to extubation of 14 minutes and an average final heart rate of 122. The animals that received both buprenorphine and buprenorphine SR the day of surgery had an average inhalant end time to extubation of 30 minutes and an average final heart rate of 109. Out of 22 animals that received buprenorphine SR a day prior to surgery, 7 animals consumed more food post-surgery than pre-surgery. Out of 21 animals that received both buprenorphine and buprenorphine SR the day of surgery, 6 animals consumed more food post- surgery than pre-surgery. Rescue analgesia was not administered to any animal. There was no difference in induction volumes, pain assessments, and observations in terms of activity between the two drug regimens.

Conclusion:

The results of this study conclude that the administration of buprenorphine SR a day prior to surgery will enable the animals to recover faster when compared to the animals receiving buprenorphine and buprenorphine SR the day of surgery. Perhaps a shift towards providing buprenorphine SR to the animals a day prior to surgery will ultimately contribute greater benefits. Further investigation needs to be performed to reveal the true preemptive analgesic potential of buprenorphine SR.

Ocular Implantation and Infection Potentiation Study of Brown Glaucoma Implant in Swine

POSTER 5

Presenter: James P. Long
NAMSA

Introduction:

The Brown Glaucoma Implant is a novel ab externo Minimally Invasive Glaucoma Surgery (MIGS) micro implant for the treatment of glaucoma. The purpose of this study was to characterize exclusion of bacteria from the anterior chamber of the eye with the Brown Glaucoma Implant following repeated topical ocular inoculation with methicillin resistant Staphylococcus aureus (MRSA).

Methods:

The Brown Glaucoma Implant was implanted in the anterior chamber of both eyes in each of four Yucatan minipigs. The eyes were inoculated with 1.2 x 106 -1.9 x 106 colony forming units of MRSA once daily for 5 of 7 days of the week for two weeks. Prior to surgery, on day 7 following implantation, and prior to termination on day 14, each animal was weighed, and received biomicroscopic slit-lamp examinations. Animals were euthanized following examination on day 17 and an aspirate of the aqueous humor collected from each eye. Aqueous humor, and all recovered test articles were cultured for purposes of confirming exclusion of bacteria. No bacterial growth was detected for the aqueous humor or recovered excised test article samples.

Results:

Ocular examinations revealed no significant ocular irritation or effects associated with implantation of the test article. Additionally, there was no evidence of infection within the anterior chamber subsequent to repeated topical ocular inoculation with MRSA. The results suggest that MRSA was excluded from the anterior chamber of the eye implanted with the Brown Glaucoma Implant following repeated topical ocular inoculation.

Microporous Polysaccharide Hemosphere (MPH) Based Surgical Hemostat Powder Does Not Interfere with Healing When Applied to a Surgically Created Ovine Bone Defect

POSTER 6

Presenter : Darcy H Gagne
BD Inerventional

Introduction:

The objective of the current preclinical study was to determine if wax-based or a MPH powder-based hemostatic product inhibit or influence the bone re- growth when applied into a femoral diaphyseal cortical defect.

Methods:

A total of 42 defects in eleven total female Polypay sheep (NE Ovis, Rollinsford, NH) underwent a single surgical procedure on day 0 during which each femur was surgically exposed and two 4.5 mm diameter defects were created in the diaphyseal region of the bone. The defects were treated with a MPH powder-based hemostat (Arista™ AH, C.R. Bard, Inc. (Davol)) or Bone Wax (Ethicon, Inc.) or untreated and the tissues overlying the bone were subsequently closed in layers. Fluoroscopy was performed post-operatively on Day 0 and at interim timepoints (2, 5, & 7 weeks) and at the time of necropsy at 9 weeks to evaluate the bone regrowth. Seven days prior to euthanasia, animals received calcein (~20 mg/kg, intravenous [IV]), and one day prior to euthanasia, the animals received tetracycline hydrochloride (30 mg/kg,IV) as fluorescent markers to evaluate bone formation. At the end of the 9-week survival period, the treatment sites were harvested, fixated in 10% neutral buffered formalin and evaluated for macroscopic, histomorphologic and histomorphometric endpoints.

Results:

Histomorphometric and histomorphologic analysis indicated that there was minimal inflammatory response in all groups and the MPH powder-based hemostat did not interfere with bone re-growth, as compared to untreated controls. Defects treated with Bone Wax demonstrated significantly less bone re- growth. Bone wax-treated groups demonstrated significantly ($p<0.05$) more residual material present (moderate to marked presence) within the defect sites, as compared to MPH powder-based hemostat defects, where there was no residual material present.

Conclusion:

In this sheep femoral diaphyseal cortical defect model, the use of the MPH powder-based hemostat into 4.5 mm diameter defects was interpreted to have no adverse effects on healing the cortical bone, when compared to untreated defects as evidenced by intra-defect new bone growth. When compared to defects treated with Bone Wax, healing of cortical bone was increased ($p<0.05$) in defects treated with the MPH powder-based hemostat. Furthermore, fluoroscopic and radiographic images of the femurs showed that over 75% of each of the cortical bone defects were filled by new bone growth from Week 5 onward for MPH powder-based hemostat treated defects and untreated defects, while no bone growth was observed through Week 5 and overall minimal new bone growth was observed from Week 7 onward for Bone Wax-treated defects. In addition, there was no evidence of adverse pathology (e.g., inflammation) associated with either of the MPH powder-based hemostat in the cortical defects and no evidence of MPH powder-based hemostat related animal morbidity or mortality. The project was sponsored by C.R. Bard, Inc. (Davol), Warwick, RI. Data was generated in a preclinical model. Data may not correlate to performance in humans.

A Novel Approach to Surgical Resident Training Using Fresh Organs Unfit for Transplantation

POSTER 7

Presenter : Sheila R. Russell
University of Vermont

Introduction:

Each year there are a significant number of recovered organs deemed unfit for transplant. We have secured access to these for training and research through the local organ procurement organization. This is a proof of concept study demonstrating feasibility, reproducibility and use of a novel surgical simulation model.

Methods:

Attending surgeons from Transplant, and Cardiac Thoracic specialties along with surgical residents participate in these surgical simulations. Organs we have used thus far include hearts, Livers, pancreata, and Kidneys. An anatomic model was modified to accommodate ports for the various organs. Gore-Tex graft is secured to the ports. Organ anatomy and function is reviewed. The organs are sewn in-line, major vessels to grafts creating closed circuits, and perfused with roller pumps using pigmented blood substitute. Residents perform tissue and vascular dissections, mobilization of structures, vessel repair and ligation, surgical injury repair, and vascular anastomosis, valve replacement, and CABG procedure using standard open surgical techniques with appropriate tissue response.

Results:

We have found the simulation to have realistic anatomic landmarks, appearance, texture and vascular flow. The simulation of blood pressure, tissue perfusion and bleeding during injury provides an ideal environment for development of technical skills with no risk to living patients.

Conclusion:

These hands on sessions allow our training program to improve surgical resident comfort and performance in complex open surgeries. Use of organs unfit for transplantation allows a near-realistic operative experience, which prepares trainees for challenging operative cases. This simulation augments surgical training in advance of operating on living patients.

Surgically Induced Kidney Failure: Comparison of Two Mouse Strains

POSTER 8

Presenter: Bonnie Lyons
The Jackson Laboratory

Introduction:

Each year there are a significant number of recovered organs deemed unfit for transplant. We have secured access to these for training and research through the local organ procurement organization. This is a proof of concept study demonstrating feasibility, reproducibility and use of a novel surgical simulation model.

Methods:

We have previously evaluated two models of renal failure in mice. Comparison of the 3/4 and 5/6 nephrectomy techniques demonstrated a more severe compromise of renal function in the 5/6 nephrectomy model. To determine if there is a clinical difference in outcome between two commonly used mouse strains, we conducted both 3/ 4 and 5/6 nephrectomy on C57BL/6J and 129S1/SvImJ mice. Six groups (n=12) of male, mice at 4 and 8 weeks post surgery were evaluated. The groups consisted of Group A: 129S1/SvImJ mice with 3/4 nephrectomy as one surgical procedure; Groups B:129S1/SvImJ mice with 5/6 nephrectomy as two surgical procedures (nephrectomy followed by partial nephrectomy); Group C: 129S1/SvImJ mice control group no surgical procedure; Group D: C57BL/6J mice with 3/4 nephrectomy as one surgical procedure; Group E: C57BL/6J mice with 5/6 nephrectomy as two surgical procedures (nephrectomy followed by partial nephrectomy) and Group F: C57BL/6J mice control group no surgical procedure. Mice were anesthetized with isoflurane gas anesthesia and analgesics were administered (carprofen subcutaneously and bupivacaine topically). Mice undergoing two surgical procedures had a one-week recovery period between the procedures. For the partial nephrectomy procedure both poles of the kidney were excised leaving a 4 mm remnant for the 3/4 model and a 3 mm remnant for the 5/6 nephrectomy. Body weight, kidney weight, blood and urine samples were collected pre-operatively and at 4 and 8 weeks post operatively.

Vascular Access Button Use in Ferrets

POSTER 9

Presenter : Michael S. Horsmon
US Army CBRDEC

Introduction:

A common requirement of in-vivo research studies is the collection of blood samples from study animals. When infrequent blood sampling is required it is often most cost effective and efficacious to perform blood collection through venipuncture of large vessels. When serial collections are required, the use of an indwelling vascular access catheter is preferred. In larger animal models protection of the externalized catheter is easily accomplished through ports or simple dressing. In smaller animal models the exterior portion of the catheter is often clipped with skin staples and left in place. In a group housing environment these externalized catheters are vulnerable to damage. The present study employed the use of an externalized button device to afford protection for an indwelling jugular vein catheter in ferrets.

Methods:

Twenty five castrated, descented, influenza free male ferrets (Mustela putorius furo), weighing 900 1100g were supplied by Marshall BioResources. Each ferret was surgically implanted with an external jugular vein catheter (3Fr. C30PU-RJV1405, Instech, Plymouth Meeting,PA) which was connected to a single channel vascular access button (VABR1B/22, Instech). Anesthesia was induced by either ketamine, dexmedetomidine (5.0 / 0.04mg/kg,IM) or by placing the ferret in an isoflurane (4.0%) charged induction chamber. General anesthesia was maintained with isoflurane by mask 1.0-2.0% O2, 1.0 L/min. Catheters were advanced 7.5cm to a location ~2.0cm above the heart. The distal end of the catheter was connected to a button which was placed subcutaneously at the scapula. Catheters were locked with taurolidine and citrate solution. A subset of 12 ferrets were selected for a 21 day patency study, blood samples were withdrawn from each ferret once daily for 21 days to ensure the catheter preparation was adequate for study needs.

Results:

Of the 25 ferrets used in the present study only one loss of function occurred. This was in the first ferret and was determined to be due to the catheter slipping from the vein. Withdrawal patency was maintained for 21 days in all twelve of the ferrets selected for the patency study. Four ferrets required gentle lock solution massaging on at least one occasion to restore proper blood flow, however in no case was blood unattainable when required. One ferret presented with a moderate, non-infected seroma three days post-surgery which resolved without intervention.

Conclusion:

All ferrets in the present study were housed in groups of four. The primary concern was that conspecifics would damage the externalized button. Aluminum caps were placed on each button to afford additional protection. Initial contact post-surgery with conspecifics resulted in light mouthing of the buttons. The protective caps were often removed by normal animal activity and their use was discontinued. The conspecifics never damaged the buttons, the only modification to regular enrichment was restriction from small tubes for a period of five days post-surgery. The present study indicates that an externalized button is an efficacious solution for indwelling catheter access in group housed ferrets for a period of at least 21 days.

Infraspinatus Tendon Implantation in an Ovine Model

POSTER 10

Presenter: Jolee Bartrom
NAMSA

Introduction:

Rotator cuff repair is a common surgical procedure clinically, with a variable success rate. Aside from the patient's age and the size of the repair, healing of the repair can be impacted by the surgical methods and post- operative care. Additionally, the type of suture used can have an impact on healing. Therefore it is imperative to use a suture that will minimize suture laxity, as this will help to prevent stiffness and reduce over-stretching and instability. In this study, a new laxity minimizing suture and a commonly used predicate suture were compared to assess local tissue response and systemic effects, following surgical implantation in the infraspinatus tendon in an ovine model for five days and six weeks.

Methods:

Twenty-one skeletally mature Dorset-cross sheep were assigned to the study and to a treatment group (test or predicate). To limit movement and weight bearing, the animals were acclimated to a suspension system (livestock sling). Monitoring was conducted to ensure each animal was slightly elevated above ground or could toe-touch, but was unable to bear full body weight. Sheep were anesthetized with ketamine and xylazine, intubated, and maintained on isoflurane inhalant anesthetic. The animals were treated with analgesics (buprenorphine, fentanyl patch, and flunixin meglumine) and antibiotics (ceftiofur sodium and florfenicol). A hemi transection of the right infraspinatus tendon of each animal was repaired with the test article or the predicate suture, using two parallel series of locking suture patterns (e.g. Krackow Stitches). The two suture lines were brought together, tied tightly, and finished with a standardized 40 N re-apposition force on the repair. The fascia and skin were closed. Each animal was placed in a suspension system and monitored for recovery from the anesthetic. Over the next week, animals received antibiotics and analgesics. The animals remained in the suspension system for up to two weeks and were gradually reintroduced to standing without support. Clinical observations were conducted daily and animals were monitored at least twice daily while in the suspension system.

Results:

At five days and at six weeks post- surgery, designated animals were anesthetized/euthanized and were necropsied. The right infraspinatus tendon and the repair site, select tissues, and the regional draining lymph nodes were macroscopically examined, collected, saved in 10% neutral buffered formalin (NBF), histologically processed, and microscopically evaluated. For both intervals, there were no complications associated with the tendon repair. At both intervals, the amount of surgical trauma noted macroscopically and microscopically was appropriately resolving and the responses were similar between the treatment groups. For all animals at five days post-surgery, the gap between the cut edges of the tendon was filled with fibrin, which is the first indication of healing in a transected tendon. For the majority of animals at six weeks post-surgery, the gap between the cut edges of the tendon was filled with fibrous tissue that was dense and well organized. At both intervals, efficacy of the repair and healing was equivalent for both treatment groups and there was no evidence of systemic effects.

A Comparison of Catheterization Methods for the Pre-term Piglet

POSTER 11

Presenter : Arthur Nedder
Boston Children's Hospital

Introduction:

Piglets of varying gestational ages (105-107 days) underwent venous catheterization. A retrospective review was conducted to determine the best catheterization methods in pre-term piglets.

Methods:

Three litters were delivered via c- section with a total of N=33 piglets. The piglets were delivered and immediately placed under isoflurane inhalation via mask or intubation. Piglets underwent right external jugular catheterization via cut down method. The catheters were secured in place using 2-0 PDS suture for the duration of the study. Each piglet received Banamine (2mg/kg) intramuscularly twice daily for three days and Cephalexin (20mg/kg) IV for the duration of the study. Comparatively, 10 piglets presented at smaller weights, making jugular catheterization more difficult or impossible.

Alternative to jugular cannulation, umbilical vein catheters were placed using aseptic technique temporarily the day of c-section for administration of 0.45% NaCl with 5% dextrose, B12 supplement, blood collection and maternal plasma transfusion.

Results:

This second method, umbilical catheterization was highly favorable and more successful because of the multiple implications presented while using long term central lines.

Conclusion:

Umbilical catheterization did not require anesthesia, did not require alterations or surgical replacement during the study, was least invasive and did not present the risk for irritation or patency issues as there was no central line in place for the entire duration of the study.

Comparative Analysis of Hemostatic Agents in a Porcine Liver Biopsy Model

POSTER 12

Presenter : Krista Schutt
Cresilon, Inc.

Introduction:

Intraoperative bleeding remains a major concern for surgeons, as increased blood loss is known to have a direct effect on postoperative complication and long-term survival in patients [1]. Although various hemostatic agents are currently on the market in the form of gauzes, sponges, topical granules, or viscoelastic matrices, most of them require a certain level of initial preparation before they are deployed into the surgical field as well as required manual compression following application. Cresilon, Inc. has developed VETIGEL™ (VG), a hemostatic gel that requires no preparation or compression to treat hemorrhagic lesions. In this study, VG's efficacy was investigated in comparison to common veterinary and human surgical hemostatic agents in an acute hepatic porcine biopsy punch model.

Methods:

A midline laparotomy was created to gain access into the abdominal cavity and expose the diaphragmatic portion of the left, right, or quadrate lobe of the liver in four male Yorkshire cross swine weighing between 33.3-63.5 kg. Biopsies were performed using 10mm punches (Robbins Instrument Inc., Chathan, NJ) at varying depths (1-9mm), and the resulting wound sites were left to free bleed for 5-10 seconds. During that period, the bleeding level (BL) was identified using a comparable scale used in a previous study [2]. The treatment groups consisted of two gelatin sponges (GelFoam® (GF), VETSPON® (VS)), two powders (HemaBlock® (HB), ClotIt® (CT)), one gelatin/thrombin matrix (FLOSEAL® Matrix (FS)) and a plant-derived gel (VETIGEL™ (VG)). Each treatment group had a total of 8 biopsies (n=8), was observed for a 3-minute post-application period, and time to hemostasis (TTH) was recorded. TTH was defined as the time between the end of application and complete cessation of bleeding at the wound site. If bleeding was observed during the 3-minute window, additional material was applied onto the lesion with compression if the product-specific IFU stated as necessary.

Results:

Bleed levels ranged from mild to moderate (2 to 4) for all treatment groups, with 50% of biopsies having a BL of 3 or above. For effective hemostasis on first application in figure 1, VG had a 100% hemostatic success rate upon first application and was significantly more effective than CI (37.5%, $p<0.01$) and HB (50%, $p<0.05$). In addition to effective hemostasis on first application, figure 2 displays TTH for all products where VG had a significantly lower TTH (2.50 ± 0.53 sec) compared to CI (36.5 ± 25.30 sec, $p<0.05$), FS (126 ± 1.39 sec, $p<0.01$), GF (171 ± 75.8 sec, $p<0.01$), VS (224 ± 98.7 sec, $p<0.01$), and HB (250 ± 150 sec, $p<0.01$). All products, except for CI, were able to successfully achieve hemostasis on all trials.

Conclusions:

This study showed VG's potential as a viable hemostatic agent in treating a hepatic biopsy punch. VG had a significant reduction in TTH, only required one application, and did not require compression to achieve hemostasis in comparison to the other products that are currently on the market with this model.

Comparison of Shipping Stress in Surgically Altered Rodents During Commercial Ground and Air Transport

POSTER 13

Presenter: Steven Kreuser
Global Science and Technology, Comparative Medicine, Pfizer Inc.

Introduction:

Pfizer currently outsources the production of many rodent surgical models to vendors across the country for delivery to Pfizer locations. At this time, the only approved method for shipment is by ground courier due to concerns over the impact of shipping stress on the animals during shipment by air. The objective of this study was to evaluate stress in rodents following surgery, during air transportation and ground transportation in relation to time of shipment and acclimation. The comparison would help assist in establishing guidelines for humane shipping for both methods of transportation post operatively.

Methods:

Star Oddi DST micro-HRT data logger devices were purchased to evaluate heart rate and temperature in rodents. Each device was programmed to collect data from the time of surgery through delivery and acclimation at the destination facility.

Twenty four, 8-10 week, variable weight, CRL CD Sprague Dawley rats were used. Group A (n=12) were rats that had control data logger implants only with sham jugular vein surgery. Group B (n=12) had both jugular catheter and data logger implantation. Surgery took place on day 0.

Daily clinical and behavior assessments were completed as per CRL guidelines. The behavioral observations were recorded which evaluates movement, posture, body condition, respirations, and other parameters. On day 3, a physical exam was performed including body weight assessment. The rats were shipped via ground transportation from Raleigh, NC to Groton, CT or a commercial air flight from CRL Raleigh, NC, to CRL San Diego. Major events such as transfer at transfer hubs, traffic, airport holding areas, loading and unloading from truck and plane, and other significant events were logged. On day 4 the rats were delivered to the end destination and underwent a physical exam, body weight assessment, and were placed in home cages. Daily log entry was completed to record significant events as well as behavioral observations. Body weights were collected at the time of surgery, prior to shipment, and receipt at the destination and on days 7 and 14. On day 14 final assessments were completed and data loggers were collected and data analyzed.

Conclusion:

Understanding shipping stress of surgically altered rodents is relevant to animal welfare as well as the science and research that these models support. The changes in normal physiological levels associated with shipment related stress can affect scientific validity and consequently alter study results. The focus in this study was heart rate, body temperature and weight. Heart rate is one of the physiologic parameters previously documented and associated with stress. Based upon this assumption significantly increased heart rates were correlated with increased stress. During this study a significantly increased heart rate of the surgical group was seen during air transportation. However, return to normal circadian rhythm and equalization between ‘peak” heart rate and ‘resting” heart rate of air transported surgically altered animals occurs in a comparable or earlier timeframe than ground transport.

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