24th Annual Department of Surgery Research Symposium

“Strategies for Translational Research”

Frederick A Moore, MD, FACS, MCCM
Professor of Surgery & Anesthesia
Chief, Division of Acute Care Surgery
College of Medicine, University of Florida

“The UC Davis Mouse Biology Program:”
Developing precision animal models enabling human health research

K. C. Kent Lloyd, DVM, PhD
Professor and Director, Mouse Biology Program
University of California Davis

APRIL 16, 2013
9:00 a.m. - 5:00 p.m. Courtyard by Marriott Ballroom, 4422 Y Street, Sacramento, California
With appreciation, we wish to acknowledge the support of Ethicon, Inc. for the 24th Annual Department of Surgery Research Symposium.
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<td>7:50am</td>
<td>MORNING</td>
<td>MORNING SESSION</td>
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<tr>
<td>8:55am</td>
<td>KEYNOTE</td>
<td>7:50am – KEYNOTE SPEAKER – FREDERICK A. MOORE, MD</td>
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<td>SPEAKER</td>
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<td>8:55am Opening Remarks by the Department Chair Diana Farmer MD</td>
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<td><strong>Session I:</strong></td>
<td><strong>Moderators:</strong> Carol Schermer MD</td>
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<tr>
<td>9:00am</td>
<td></td>
<td>“Mechanisms of coagulopathy in Metabolic Acidosis Induced by Fluid</td>
<td>Caitlin A. Smith, MD</td>
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<td>Resuscitation of Critically Ill Trauma Patients”</td>
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<td>9:15am</td>
<td></td>
<td>“Combat Gauze and Qwick-aid are Equivalent Hemostatic Agents in</td>
<td>Hilary Gallogly, MD</td>
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<td>Swine Grade IV Liver Injury.”</td>
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<td>9:30am</td>
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<td>“Instituting a Massive Transfusion Protocol Significantly Decreases</td>
<td>Jason B. Young, MD, PharmD</td>
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<td>Use of Recombinant Factor VIIa in Trauma Patients.”</td>
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<td>9:45am</td>
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<td>“Tempers Flare with Rising Temperature: Myth busted – higher</td>
<td>Peter LaBreche, MD</td>
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<td>temperatures do not predict violent trauma”.</td>
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<tr>
<td>10:00am</td>
<td></td>
<td>“The Value of Color Duplex Imaging for Planning and Performing a</td>
<td>David Dorfman, MD, DDS</td>
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<td>Free Anterolateral Thigh Perforator Flap.”</td>
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<td>10:15am</td>
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<td>“Honey Oil Burns: A Growing Problem.”</td>
<td>Guy Jensen, MD</td>
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<td>10:30am</td>
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<td><strong>10:30am - MORNING BREAK – 15 MINUTES</strong></td>
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<td><strong>Session II:</strong></td>
<td><strong>Moderators:</strong> Chandrasekar</td>
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<td>Santhanakrishnan, MD and Claus</td>
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<td>Svane Sondergaard, PhD</td>
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<td>10:45am</td>
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<td>“A Hyperactive SNP of the Human Glucocorticoid Receptor and its</td>
<td>Michael V. Lasker, MD</td>
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<td>Implications for the Stress Response.”</td>
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<td>11:00am</td>
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<td>“Oral Albuterol Decreases the Need for Chronotropic Agents in</td>
<td>Charity Evans, MD</td>
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<td>Patients with Cervical Spinal Cord Injury (CSCI) Induced Bradycardia:</td>
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<td>A Retrospective Case Series”.</td>
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<td>11:15am</td>
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<td>In Utero Repair of Fetal Myelomeningocele with Autologous Amniotic</td>
<td>Erin Brown, MD</td>
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<td>Membrane in the Fetal Lamb Model.”</td>
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<td>11:30am</td>
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<td>“Do More With Less: A Surgery Directed Institutional Model for</td>
<td>David Leshikar, MD</td>
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<td>Resident Central Line Training.”</td>
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<td>11:45am</td>
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<td>“Efficient Differentiation of Endothelial and Osteoblastic Lineages</td>
<td>Brittany Busse, MD</td>
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<td>from Adipose Derived Stem Cells In Vitro.”</td>
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<td>12:00pm</td>
<td></td>
<td>“Isolation and Characterization of Placental Mesenchymal Stem Cells</td>
<td>Lee Lankford, MD</td>
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<td>for Autologous In Utero Cell Therapy.”</td>
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<tr>
<td>12:15pm</td>
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<td>“Predictors of Radioactive Iodine Ablation Use for Micropapillary</td>
<td>Andrew Chae, MD</td>
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<td>Thyroid Carcinoma Over Two Decades.”</td>
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<td><strong>12:30pm - LUNCH BREAK</strong></td>
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# AFTERNOON SESSION

**Session III:**  
**Moderators:** Anthony Yang, MD and Aijun Wang, PhD

<table>
<thead>
<tr>
<th>Time</th>
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<th>Speaker</th>
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<tbody>
<tr>
<td>12:45pm</td>
<td>“Kidney Rescue and Recovery: A Safety and Feasibility Pilot Study on the Use of Ex Vivo Normothermic Perfusion in Deceased Donor Kidney Transplantation.”</td>
<td>Richard Perez, MD</td>
</tr>
<tr>
<td>1:00pm</td>
<td>“Differential Inflammatory Properties of GAG Genes of Two Burn Injury-Associated Human Endogenous Retroviruses.”</td>
<td>Kang-Hoon Lee, PhD</td>
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<tr>
<td>1:15pm</td>
<td>“Point-of-Care BNP and NGAL Measurements for Acute Burn Resuscitation: A Pilot Study.”</td>
<td>Erin Howell, MD</td>
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<tr>
<td>1:30pm</td>
<td>“Regenerating the diseased heart with cells and extracellular matrix.”</td>
<td>Claus Svane Sondergaard, PhD</td>
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<tr>
<td>1:45pm</td>
<td>“Outcomes of Pancreatoduodenectomy: Where should we focus our efforts to improve outcomes?”</td>
<td>Erin Brown, MD</td>
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<tr>
<td>2:00pm</td>
<td>“A Retrospective Review of Consultations in Plastic Surgery to Evaluate the Effect of Web Based Education on Patient Satisfaction and Consultation Time.”</td>
<td>David Boudreault, MD</td>
</tr>
<tr>
<td>2:15pm</td>
<td>“Normothermic Renal Perfusion: A Novel Way to Preserve Grafts and Prevent Ischemic Reperfusion Injury?”</td>
<td>Chandrasekar Santhanakrishnan, MD</td>
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2:30pm – AFTERNOON BREAK – 15 MINUTES

**Session IV:**  
**Moderators:** Kullada Pichakron, MD and David Sahar, MD

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<tr>
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<th>Speaker</th>
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<tbody>
<tr>
<td>2:45pm</td>
<td>“The Effect of Tilt on Flow and Pressures in a Miniaturized Extracorporeal Life Support System (CARDIOHELPTM).”</td>
<td>Hilary Gallogly, MD</td>
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<tr>
<td>3:00pm</td>
<td>“Successful Postnatal Surgical Repair Model for Rodents with Spina Bifida.”</td>
<td>Christopher Pivetti, MS</td>
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<tr>
<td>3:15pm</td>
<td>“Human Multipotent Vascular Stem Cells in Vascular Remodeling and Diseases.”</td>
<td>Aijun Wang, PhD</td>
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<tr>
<td>3:30pm</td>
<td>“Challenging Scalp Reconstructions in a Devastating Neurosurgical Patient.”</td>
<td>Rohit Jaiswal, MD, MPH</td>
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<tr>
<td>3:45pm</td>
<td>“A Comprehensive Approach to Lower Extremity Free-Tissue Transfer: A Single Surgeon’s Clinical Outcome.”</td>
<td>Lee L.Q. Pu, MD, PhD, FACS</td>
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<tr>
<td>4:00pm</td>
<td>“Genome Signature Image (GSI): Concise visualization of species/strain-specific profiles of repetitive element occurrences for cataloguing and evolutionary studies.”</td>
<td>Kiho Cho, PhD</td>
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</table>

4:15pm – KEYNOTE SPEAKER – K.C. KENT LLOYD, DVM, PhD
Frederick A. Moore was born, raised and educated in western Pennsylvania. After graduating from the University of Pittsburgh, School of Medicine in 1979, he moved to Denver, Colorado where completed his General Surgery training at the University of Colorado (UC). In 1986, he joined the faculty in the UC Surgery Department and became a trauma surgeon at Denver General Hospital. Here he organized the Surgical ICU to be a translational research laboratory for the UC Trauma Research Center. He focused his clinical efforts on surgical critical care and started the Denver MOF database. In 1996, he moved to the University of Texas Houston Medical School to become the Chief of General Surgery and Medical Director of the Level I trauma center at Hermann Hospital. Here he became the Dr “Red” Duke Professor of Surgery and the Program Director of a NIH sponsored Trauma Research Center which studied the role of the gut in MOF. In the ICU he began using computerized clinical decision support (CCDS) to direct traumatic shock resuscitation. In 2006, Dr Moore moved to The Methodist Hospital, in Houston to develop Acute Care Surgery. Here he reorganized the Surgical ICU and used CCDS as a tool to implement evidence based care for patients with surgical sepsis. In 2011, Dr Moore moved to the University of Florida in Gainesville to become the Head of Acute Care Surgery and is the Medical Director of the Level I trauma center at the Shand’s Hospital. Here he has teamed up with a diverse multidisciplinary research team to study a new ICU syndrome called the persistent inflammatory/immunosuppression catabolism syndrome (PICS).
KEYNOTE SPEAKER

K.C. Kent Lloyd, DVM, PhD
Director, Mouse Biology Program, University of California, Davis,
Professor, Dept. Anat., Physiol., Cell Biol., School of Veterinary
Medicine, UC Davis, Professor, Center for Comparative Medicine,
School of Veterinary Medicine, UC Davis and Associate Dean, Research
and Graduate Education, School of Veterinary Medicine, UC Davis.

Dr. Lloyd is a veterinarian and
professor of gastrointestinal anatomy
and physiology at UC Davis. His
research emphasizes the application of
mouse biology, genetics, stem cells, and
reproductive physiology to address and
resolve biological questions. Dr. Lloyd
serves as Director of the UC Davis
Mouse Biology Program, in which he
oversees the development,
manipulation, and study of transgenic
and genetically-altered (e.g., knockout)
mutant mice.
PAST VISITING PROFESSORS

Haile T. Debas, M.D.
Dean, School of Medicine
Maurice Galante Distinguished Professor of Surgery
University of California, San Francisco
June 10, 1995

Basil A. Pruitt, Jr., M.D.
Professor, Department of Surgery
University of Texas Health Science Center
June 6, 1996

Douglas Wilmore, M.D.
Frank Sawyer Professor of Surgery
Harvard Medical School
June 10, 1997

Richard L. Simmons, M.D.
George Vance Professor of Surgery
Chairman, Department of Surgery
University of Pittsburgh
June 8, 1999

Clyde F. Barker, M.D.
John Rhea Barton Professor of Surgery
Chairman, Department of Surgery
University of Pennsylvania
June 1, 2000

John A. Mannick, M.D.
Moseley Distinguished Professor of Surgery
Harvard Medical School, Department of Surgery
Brigham and Women’s Hospital
June 5, 2001

David N. Herndon, MD
Chief of Staff
Director of Research
Shriners Burns Hospital, Galveston, Texas
June 11, 2002

Alden Harken, M.D.
Chair, Department of Surgery
UCSF East Bay Surgical Program
June 10, 2003

Carlos O. Esquivel, M.D. Ph.D.
The Arnold and Barbara Silverman Professor of Pediatric Transplantation, Professor of Surgery and Chief, Division of Transplantation
Stanford University
June 1, 2004

Sarah Yuan, M.D., Ph.D.
Pearl Stamps Stewart Professor
Director of Research, Department of Surgery
UC Davis Medical Center
June 7, 2005

Henri R. Ford, M.D.
Vice-President and Surgeon-in-Chief
Children’s Hospital Los Angeles
Department of Surgery, Keck School of Medicine
May 16, 2006

Michael Longaker, M.D.
Denae P. and Louise Mitchell Professor
Director, Children’s Surgical Research
Stanford University School of Medicine
May 15, 2007

Andrew M. Lowy, M.D.
Professor of Surgery
Director of Surgical Oncology
Moores UCSD Cancer Center
University of California, San Diego
June 3, 2008

John D. Birkmeyer, M.D.
George D. Zuidema Professor & Chair
Surgical Outcomes Research
University of Michigan Health Systems
June 16, 2009

Dai Chung, M.D.
Professor of Surgery
Department of Pediatric Surgery
Vanderbilt University
June 15, 2010

Colleen Brophy, M.D.
Professor, Vascular Surgery
Vanderbilt University Medical Center
June 14, 2011

Jeffrey R. Saffle, MD, FACS
Professor of Surgery
Department of Surgery
University of Utah School of Medicine
June 19, 2012
ABSTRACTS
Mechanisms of Coagulopathy in Metabolic Acidosis Induced by Fluid Resuscitation of Critically Ill Trauma Patients.

Caitlin A. Smith, Carol R. Schermer, Robert Gosselin, Jason Young, Lynette A. Scherer. Department of Trauma/Critical Care and Department of Pathology, University of California, Davis

Introduction: Metabolic acidosis has been implicated in the development of coagulopathy, although the specific mechanisms for this effect have not been well characterized. We sought to determine whether the different crystalloids used in resuscitation affect coagulation by measuring Endogenous Thrombin Potential (ETP) and Thromboelastography (TEG) in trauma patients receiving 2 different crystalloids.

Methods: TEG and ETP data were obtained in a subset of patients from a randomized, double blinded clinical trial comparing resuscitation with normal saline (NS) to Plasma-lyte A (PLA) on acidosis and other secondary endpoints. Plasma from admission and subsequent time points was frozen and saved for ETP and TEG analysis. Samples from patients receiving NS were compared to samples from patients receiving PLA.

Results: Baseline and follow-up data were available from 18 patients, 9 in each group. All baseline characteristics were similar between the two groups. At 6 hours, patients receiving NS were more acidemic. Baseline parameters for ETP and TEG did not differ between groups. At 6-hours, there were no differences in any ETP parameter between groups. However, at 6-hours, TEG demonstrated statistically significant differences for K and \( \alpha \) angle with K being lower and the alpha angle being higher in the PLA group. (Table 1)

Table 1. Endogenous Thrombin Potential and Thromboelastography Results

<table>
<thead>
<tr>
<th></th>
<th>NS (N=9)</th>
<th>PLA (N=9)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>ETP (mean, SD)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>t-lag 0 (sec)</td>
<td>252.6 (61.6)</td>
<td>233.6 (90)</td>
<td>0.61</td>
</tr>
<tr>
<td>t-lag 6</td>
<td>266.3 (29.5)</td>
<td>287.8 (47.7)</td>
<td>0.27</td>
</tr>
<tr>
<td>t-max 0 (sec)</td>
<td>450.4 (88.7)</td>
<td>375.7 (146.6)</td>
<td>0.21</td>
</tr>
<tr>
<td>t-max 6</td>
<td>456.0 (56.8)</td>
<td>441.6 (62.2)</td>
<td>0.61</td>
</tr>
<tr>
<td>C-max 0 (mA/min)</td>
<td>38.0 (18.5)</td>
<td>46.9 (10.2)</td>
<td>0.22</td>
</tr>
<tr>
<td>C-max 6</td>
<td>31.5 (8.0)</td>
<td>31.5 (9.7)</td>
<td>0.99</td>
</tr>
<tr>
<td>AUC 0 (mA)</td>
<td>184.0 (103.5)</td>
<td>225.7 (86.5)</td>
<td>0.38</td>
</tr>
<tr>
<td>AUC 6</td>
<td>227.8 (247.2)</td>
<td>151.6 (85.5)</td>
<td>0.40</td>
</tr>
<tr>
<td>TEG (mean, SD)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>R 0</td>
<td>7.5 (1.4)</td>
<td>8.0 (2.9)</td>
<td>0.66</td>
</tr>
<tr>
<td>R 6</td>
<td>13.4 (11.1)</td>
<td>9.3 (3.3)</td>
<td>0.31</td>
</tr>
<tr>
<td>K 0 (sec)</td>
<td>3.2 (2.0)</td>
<td>4.5 (5.7)</td>
<td>0.60</td>
</tr>
<tr>
<td>K 6</td>
<td>7.2 (2.8)</td>
<td>3.8 (2.1)</td>
<td>.06</td>
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<tr>
<td>( \alpha ) angle 0</td>
<td>43.4 (16.1)</td>
<td>49.8 (17.1)</td>
<td>0.42</td>
</tr>
<tr>
<td>( \alpha ) angle 6</td>
<td>23.6 (15.2)</td>
<td>41.1 (8.1)</td>
<td>0.008</td>
</tr>
<tr>
<td>MA 0 (mm)</td>
<td>22.9 (11.0)</td>
<td>27.1 (7.5)</td>
<td>0.50</td>
</tr>
<tr>
<td>MA 6 (mm)</td>
<td>22.4 (17.7)</td>
<td>24.0 (8.3)</td>
<td>0.81</td>
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</table>

0: Baseline sample, 6: 6-hour time point

Discussion: In this study NS induced a metabolic acidosis. However this acidosis does not appear to be associated with decreased thrombin generation as measured by ETP. TEG results demonstrate that NA and PLA may differentially impact clotting factor availability. The lower K and greater \( \alpha \) angle imply that there may be faster amplification of clotting factors in the PLA group with no differential effect on latency time or clot strength. Further studies are warranted to determine whether some of the coagulopathy seen in trauma patients can be attributed to NS induced acidosis.
COMBAT GAUZE AND QWICK-AID ARE EQUIVALENT HEMOSTATIC AGENTS IN SWINE GRADE IV LIVER INJURY

Capt Hilary Gallogly MD, General Surgery, Travis AFB
Maj Brian Gavitt MD, MPH, General Surgery, Travis AFB
J. Kevin Grayson, DVM, PhD, Clinical Investigation Facility, Travis AFB
LtCol Kullada O. Pichakron, MD, General Surgery, Travis AFB

BACKGROUND: Kaolin impregnated Combat Gauze (CG) is the current DoD standard dressing for controlling severe hemorrhage. Qwick-AID (QA) is a newer, less expensive all natural three layer composite textile with hemostatic, antiseptic, and anti-inflammatory characteristics. We compared QA with CG in a grade IV liver injury model in swine.

METHODS: Anesthetized, instrumented, and splenectomized swine had a grade IV liver injury created. After 30 seconds of free bleeding, damage control liver packing was performed with either QA or CG. Hemodynamics and laboratory data were recorded, and blood loss was measured after two hours. Post-mortem histopathology was performed on the liver injury sites.

RESULTS: There were no pre-injury differences between groups, and all animals survived the entire two hours. The QA and CG groups had similar amounts of blood loss (13.6 ± 3.0 vs. 14.0 ± 2.4 mL/kg, p = 0.51). However, QA treated animals had significantly higher mean arterial pressure than CG animals at 120 minutes post injury (74 ± 14 vs. 67 ± 13 mm Hg, p = 0.02). Histopathology revealed no adverse cellular effects from either treatment.

CONCLUSIONS: In severe liver injury, QA and CG performed similarly, although hemodynamics were better with QA. We conclude that QA may be an effective hemostatic agent that can be used to treat severe liver hemorrhage.
Instituting a Massive Transfusion Protocol Significantly Decreases Use of Recombinant Factor VIIa in Trauma Patients

Jason B. Young, MD PharmD, Joseph M. Galante, MD, Sarah B. Bateni, BA MSW, Gina Cates, RN, Hanne M. Jensen, MD, Lynette A. Scherer, MD.
University of California, Davis Medical Center.

Instituting a Massive Transfusion Protocol Significantly Decreases Use of Recombinant Factor VIIa in Trauma Patients

**Objective:** Assessment of recombinant factor VIIa (rFVIIa) use after implementation of a massive transfusion protocol (MTP) incorporating a 1:1:1 ratio of packed red blood cells (pRBC), plasma (FFP) and platelets (PLTs).

**Design:** Retrospective review.

**Setting:** University Level I Trauma Center.

**Patients:** All trauma patients receiving ≥10 units of pRBCs within 24 hours of admission, for time periods pre MTP (2006-2007) and post MTP (2009-2010) implementation.

**Main Outcome Measures:** Utilization of rFVIIa, total blood products transfused and ratio of blood products transfused pre and post initiation of a MTP.

**Results:** In 48 months we admitted 12,700 trauma patients and identified 103 patients who received ≥10 units of pRBCs within 24 hours of admission. 41% had penetrating trauma and the mean ISS was 34 ± 13.

<table>
<thead>
<tr>
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<th>Pre MTP (n=49)</th>
<th>Post MTP (n=54)</th>
<th>p-Value</th>
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<tbody>
<tr>
<td>Received rFVIIa</td>
<td>21 (43%)</td>
<td>10 (19%)</td>
<td>0.007</td>
</tr>
<tr>
<td>48 Hour Mortality</td>
<td>16 (33%)</td>
<td>21 (39%)</td>
<td>0.51</td>
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<tr>
<td>30 Day Mortality</td>
<td>22 (45%)</td>
<td>27 (50%)</td>
<td>0.60</td>
</tr>
<tr>
<td>pRBCs over 24 Hrs (units)</td>
<td>29 ± 24</td>
<td>26 ± 17</td>
<td>0.36</td>
</tr>
<tr>
<td>FFP over 24 Hrs (units)</td>
<td>17 ± 17</td>
<td>20 ± 16</td>
<td>0.40</td>
</tr>
<tr>
<td>Platelets over 24 Hrs (units)</td>
<td>18 ± 19</td>
<td>19 ± 19</td>
<td>0.70</td>
</tr>
<tr>
<td>Total Blood Products over 24 Hrs (units)</td>
<td>64 ± 53</td>
<td>65 ± 48</td>
<td>0.96</td>
</tr>
<tr>
<td>pRBC:FFP Ratio 1-1.4:1</td>
<td>15 (31%)</td>
<td>34 (63%)</td>
<td>0.001</td>
</tr>
<tr>
<td>pRBC:Platelet Ratio 1-1.4:1</td>
<td>17 (35%)</td>
<td>28 (52%)</td>
<td>0.08</td>
</tr>
<tr>
<td>Both pRBC:FFP &amp; pRBC:Platelet Ratio 1-1.4:1</td>
<td>6 (12%)</td>
<td>24 (44%)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Venous Thromboembolism at 30 Days</td>
<td>1 (2%)</td>
<td>3 (6%)</td>
<td>0.36</td>
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</tbody>
</table>

**Conclusions:** Instituting a hemostatic MTP for trauma patients in hemorrhagic shock that approached a 1:1:1 ratio of pRBC:FFP:PLT significantly reduced the use of rFVIIa without increasing blood product usage or mortality.
**Tempers Flare with Rising Temperature: Myth busted – higher temperatures do not predict violent trauma**

Peter LaBreche, MD, Edgardo. S. Salcedo, MD, Carol R. Schermer, MD, Gina Cates, R.N., VSN, CCRN, David V. Shatz, MD,
Department of Surgery, University of California, Davis Health System, Sacramento, CA,
Division of Trauma & Emergency Surgery.

**Introduction:** The relationship between temperature and trauma volume is accepted lore in the trauma community. Higher trauma volumes are expected on hotter days. The few studies that correlate climate to trauma volume are directed towards pediatric orthopedic injuries. Our goal was to determine whether the volume of trauma due to interpersonal violence is associated with temperature.

**Methods:** Trauma Registry data was matched with climate data from the National Oceanic and Atmospheric Administration database. Interpersonal violence was defined as assault by firearm, cutting or piercing instrument, abuse, fighting/brawling, strangulation, and other or unspecified means. Overall and interpersonal violent trauma volume was plotted against maximum daily temperature and hours of daylight in the catchment area (2006-2011).

**Results:** The relationship between month and overall trauma volume in a given year (Fig 1) is not as evident over several years, where overall trauma volume more closely follows hours of daylight (Fig 2). In contrast, interpersonal violent trauma was consistently unrelated to season (Fig 3) and temperature (Fig 4).

**Conclusions:** In a temperate climate, overall trauma volume increases with increasing daylight hours and temperature. However, in contrast to pervasive dogma, interpersonal violent trauma volume does not increase with increased temperatures. Corroboration of these findings with other trauma centers in different climates would be of interest in guiding prevention efforts.
The Value of Color Duplex Imaging for Planning and Performing a Free Anterolateral Thigh Perforator Flap

David Dorfman, MD, DDS and Lee L.Q. Pu, MD, PhD, FACS

Introduction: The free anterolateral thigh (ALT) flap has been used successfully for various soft tissue reconstructions. However, the drawback of this flap has been the difficulty associated with finding consistent perforators due to the variable anatomy. In this study, the value of color duplex imaging for reliably identifying the perforators of the flap was investigated.

Methods: Nineteen patients of various ethnicities and sex (17 male, 2 female) were studied that were planned to undergo reconstruction with free ALT flaps. They were evaluated using color Duplex in the operating room prior to flap elevation. This imaging was performed in less than 20 minutes by a vascular technologist under the guidance of the surgeon.

Results: All imaged major perforators were identified during flap elevation (Sensitivity, 100%) and all the flaps were successfully elevated based on one or two identified perforators. There were no unexpected operative plan changes. The perforators were mapped allowing for easy dissection secondary to the ability to evaluate the perforators for their size and location as well as potential intramuscular course. Also, the surgeons were able to select the side with the highest probability of success.

Conclusion: The Color Duplex scan is a useful imaging modality for planning and performing free ALT flap transfer. It enables surgeons to improve efficiency in the operating room and overall outcomes, as well as shortens the learning curve when first performing these highly variable flaps. The close working relationship between the vascular technologist and the surgeon may be the key to its success.
HONEY OIL BURNS: A GROWING PROBLEM

Jensen, G., MD; Bertellotti, R.P., MD; Greenhalgh, D., MD; Palmieri, T., MD; Maguiña, P., MD.
Department of Burn Surgery
University of California Davis Medical Center, Sacramento, CA

OBJECTIVES: We have noticed an emerging mechanism of burn injury as a result of the ignition of butane gas used in the extraction of tetrahydrocannabinol (THC), during the manufacture of a THC concentrate known as Butane Honey Oil (BHO). We report of a series of patients who presented with this mechanism of injury and a description of the process that causes these burns.

METHODS: Patient data was gathered on 8 patients treated at the University of California Davis Medical Center (UCDMC) and Shriners Hospital of Northern California from the medical record. Information on the manufacturing process of BHO was gathered from internet searches and published literature on the topic.

RESULTS: The burns witnessed at our institutions ranged from 16-95% Total Body Surface Area (TBSA), with an average of 49.9%. The average length of stay for the patients was 118.3 hospital days and 114.4 ICU days, with an average of 43.8 days spent on mechanical ventilation. The average age of patients was 22 years with only one patient above the age of 30.

CONCLUSION: Accidents during honey oil production have resulted in a surge of burn injuries in our community over the last year. The manufacture of this product by the use of volatile butane gas is gaining in popularity. Although considered to be safer than previous methods, multiple casualties with extensive burn injuries have resulted from this process. Associated injuries from blast trauma or chemical burns are not likely to occur in these types of explosions and have not been observed in our series. With increasing popularity of honey oil, it is important for burn care providers to gain awareness and understanding of this problem and its growing presence in the community.
A Hyperactive SNP of the Human Glucocorticoid Receptor and its Implications for the Stress Response

Michael V. Lasker, MD, Stacey M. Leventha., MD, Debora Lim, MD, Tajia L. Green, MD, Kiho Cho, MD, David G. Greenhalgh, MD
Department of Surgery, University of California, Davis Health System, Shriners Hospital for Children Northern California

Glucocorticoids serve as critical therapeutic agents for inflammatory diseases, but the use of steroids in septic shock has shown variable outcomes. Previous studies in our laboratory have implicated human glucocorticoid receptor (hGR) polymorphisms as a plausible reason for this variability. To further evaluate the stress response we tested a single nucleotide polymorphism (SNP) of hGR with various steroids. We hypothesized that hGR SNPs vary in constitutive activity and in their functional response to steroids. Total RNA was isolated from healthy human blood samples and examined using RT-PCR to evaluate for various hGR isoforms. Polymorphisms were identified by comparing to the reference, hGRα. A previously identified SNP, A2297G, was selected for analysis. Functional response was measured using a luciferase reporter assay after hGR isoforms were transfected into tsA201 cells and stimulated with various concentrations of steroids. A2297G resulted in transactivation potential that was nearly three times higher compared to hGRα in the absence of steroids. In the presence of hydrocortisone stimulation both hGRα and A2297G began to respond at 1x10-2 µM with similar activity levels. Methylprednisolone stimulation of both hGRα and A2297G initiated response at 1x10-4 µM with A2297G transactivation potential at least twice greater compared to hGRα at this concentration. Dexamethasone stimulation of both hGRα and A2297G initiated response at 1x10-5 µM with A2297G transactivation potential at least twice increased compared to hGRα at this concentration. In conclusion, A2297G has a higher constitutive transcriptional activity than hGRα. In response to certain types of steroids, A2297G has a hyperactive response at low concentrations when compared to hGRα. Characterization of this hyperactive hGR SNP provides a possible mechanism for variation in response to steroid therapy.
Oral Albuterol Decreases the Need for Chronotropic Agents in Patients with Cervical Spinal Cord Injury (CSCI) Induced Bradycardia: A Retrospective Case Series

CE Evans, JJ Duby, A Berry, CS Cocanour
Department of Surgery
Division of Trauma and Emergency Surgery
University of California, Davis

CSCI can cause life-threatening bradycardia from autonomic instability. It requires treatment with chronotropic agents or even pacemaker placement. B-adrenergic receptors offer a potential target for modulating cardiac vagal activity and heart rate. Enteral albuterol (EA) has been advocated for CSCI patients with symptomatic bradycardia (SB). Our hypothesis: EA decreases the need for chronotropic agents in patients with CSCI-induced bradycardia.

The charts of CSCI patients admitted to a level I trauma center from Feb 2008 through Mar 2012 were retrospectively reviewed for demographics, episodes of SB (defined as heart rate <60 and systolic blood pressure <90), use of EA, total atropine administered, and hospital days requiring phenylephrine, dopamine, and/or epinephrine use.

18 patients had CSCI; 8 patients received treatment with EA (EA+), 10 patients did not (EA-). The table shows average time from injury to first episode of bradycardia, total number of SB episodes, total atropine administered, and chronotropic agent use before and during administration of EA. Subjects’ age and ISS were similar between the EA- and EA+ groups. In EA+ patients, atropine use decreased from 0.6 mg to 0 mg, and days on chronotropic agents from 3.5 to <1. One EA- patient required pacemaker placement. 4 patients died in each group, and no death was related to bradycardia.

EA appears to blunt the degree of SB in CSCI patients resulting in less atropine and chronotropic agent use. Although this is a retrospective study, it provides impetus for a more rigorous study of prophylactic enteral albuterol for CSCI-induced bradycardia.
Purpose: Despite advances in fetal repair for myelomeningoele (MMC), severe deficits in neurological function persist after prenatal repair. Using autologous amnion for in utero repair of MMC can improve neurological function. We aimed to evaluate the benefit of amnion repair in comparison to standard skin closure in the fetal lamb model of MMC.

Methods: Fetal lambs (n=4) underwent surgical MMC creation followed by repair. Lambs were randomized to receive amnion patch repair versus standard skin closure (n=2 in each group). Gross necropsy and immunohistochemistry were performed after birth at term.

Results: Immunohistochemical analysis of repaired spinal cords demonstrated increased preservation of normal spinal cord tissue in amnion repaired lambs. Lambs repaired with only skin closure demonstrated very little normal spinal cord tissue.

Conclusions: This is the first description of use of amnion for patch repair in a fetal model of MMC. These results support the use of amnion to address spinal cord damage in MMC.
Do More With Less: A Surgery Directed Institutional Model for Resident Central Line Training

David Leshikar, M.D., Jonathan Pierce, M.D., Gurpreet Bola, Edgardo Salcedo, M.D., Joseph Galante, M.D.

Introduction: Simulation training can improve proficiency in central line placement, but simulation training programs are expensive and resource dependent. We developed a surgery directed streamlined 3-phase approach to central line training, including an automated on-line multimedia module, mannequin based simulation and department directed clinical training. We hypothesized that standardizing institution central line training would improve resident training efficiency and reduce faculty time and resource utilization.

Methods: After introduction, pre and post intervention assessments were collected to evaluate the program effect. Program surveys were collected to evaluate resident satisfaction with training. Additionally, resident training encounters, simulation equipment and faculty resources utilized were compared pre-implementation and 2 years after implementation.

Results: Module pre v. post-test mean scores improved significantly with completion of the online curricula (Table 1). The initial evaluation of simulation training demonstrated a significant improvement in pre v. post-test assessment scores with high intraclass correlation between video assessment evaluators despite disparate experience/training. Training surveys revealed significantly higher resident satisfaction and increased procedure confidence. Pre v. post implementation comparison suggests higher resident recruitment, reduced simulation training supplies, and a reduction in required faculty trainers/ hours.

Conclusion: Standardized training is effective with an institution-wide learner group. Institutional training efficiency is improved and is more cost-effective than the traditional approach. Offering a single curriculum on the national scale has similar potential.

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<td><strong>Online Module Interim Analysis by PGY Level</strong></td>
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<td><strong>Video Module Interim Analysis by PGY Level</strong></td>
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**Intraclass Correlation Coefficient Between Video Raters**

| **2011** |
| ICC | 0.9713 |
| 95% CI | 0.9539 to 0.9829 |
Efficient Differentiation of Endothelial Cells from Adipose Derived Stem Cells In Vitro

Brittany Busse, MD, Christopher Little, BS, David Sahar, MD
University of California Davis Health System, Department of Surgery

Introduction: Multipotent stem cells that have been isolated from the stromal vascular fraction (SVF) of white adipose.[1] Efficient and simple differentiation of cells into multiple lineages in co-culture would be a goal for clinical application of ASCs to tissue engineering. There are currently commercially available kits that provide both media and pre- aliquoted growth factors that have been reported to promote endothelial differentiation of ASCs in vitro (“Bullet Kits”, Lonza; Walkersville, MD). The goal of this study was to determine whether an endothelial bullet kit provided expedited and/or increased differentiation compared to standard induction media.

Materials/Methods: ASC isolation and culture - Animal procedures were conducted under a protocol approved by the UC Davis IACUC. Adipose tissue was harvest from the inguinal fat pad of two female 300g Sprague-Dawley rats. The adipose derived stem cells were then isolated from the tissue using a modification of a previously described procedure.[1] The cells were cultured in ASC medium (AM) consisting of DMEM:F12, 10% FBS, and 1% pen/strep/amphotericin. Cells were passaged at 80% confluency.

Endothelial differentiation- For endothelial cell differentiation cells from passage 3 were equally plated onto 100cm2 cell culture treated dishes. Group 1 was cultured in EGM-2 medium (Lonza; Walkersville, MD) with SingleQuots containing VEGF, b-FGF, epidermal growth factor, insulin-like growth factor-1, heparin, ascorbic acid, and 5% FBS (50ng/mL VEGF added in separate experiment). Group 2 was cultured in DMEM:F12, 5% FBS, 1% pen/strep/amphotericin with the addition of 50ng/ml VEGF-C. Group 3 was cultured in DMEM:F12, 5% FBS, 1% pen/strep/amphotericin with the addition of 50ng/ml VEGF-C and 10ng/ml b-FGF. These cells were examined for endothelial differentiation at 7, 14, or 21 days by flow cytometry for CD31 (PECAM) expression.

Results: Maximum CD31 expression was seen after 7 days in culture in the EGM and VEGF-C + FGF groups (3% and 2.85% respectively); however, this was not a statistically significant increase from control (undifferentiated ASC). CD31 expression dropped off significantly in the remaining time.

Conclusion: At this time neither a standard induction media nor the EGM Bullet kit was able to induce significant differentiation to endothelial lineage based on CD31 expression. One important confounding factor that we failed to control for in this study is that endothelial cells, unlike their ASC precursors, are not plastic adherent. Subsequently, the cells that had potentially differentiated to endothelial cells may have detached and been removed from the culture during media changes.

In utero surgical intervention has been provided as a means of treatment for numerous congenital and developmental abnormalities such as congenital diaphragmatic hernia, sacrococcygeal teratoma, spina bifida with myelomeningocele, and cardiac malformations among others. Among the first conditions targeted for in utero intervention were central nervous system (CNS) abnormalities. Spina bifida with myelomeningocele (MMC), a type of CNS abnormality known as a neural tube defect, involves the protrusion of the spinal cord and meninges through an unfused region of the spinal column. Current treatments for MMC include pre- and postnatal surgery, but in the future patients treated for MMC in utero may benefit from a stem cell therapy and/or nanoscaffold implantation. In order for a feasible stem cell therapy for MMC to be developed, candidate cell types for treatment must be identified and characterized. We propose the use of placental-derived mesenchymal stem cells obtained from tissues collected by chorionic villus sampling (CVS) as an autologous cell source for many in utero interventions including, but not limited to, spina bifida with MMC. Here we assessed growth rates of early passage cells from CVS-size tissues, their multipotency using differentiation assays, expression of various surface and intracellular proteins by immunostaining and flow cytometry, and cytokine secretion using profiling arrays. Preliminary results show that these pre-term chorionic villus mesenchymal stem cells can be grown quickly and efficiently from CVS-size tissue samples (20-40mg), are multipotent, express neural-related surface and intracellular proteins and transcription factors, and secrete numerous angiogenic and immunomodulatory cytokines significant for tissue repair and regeneration. Future research in vitro will focus on particular variations in the cell subsets identified here, as well as the capacity of these cells to generate functional Schwann cell-like cells that can promote neural regeneration and myelinate axons in animal models in vivo.
Predictors of Radioactive Iodine Ablation Use for Micropapillary Thyroid Carcinoma Over Two Decades

Andrew Chae, MD, Anthony Yang, MD and Steve Martinez, MD

**Background:** Radioactive iodine (RAI) is not routinely recommended for the adjuvant treatment of micropapillary thyroid carcinoma (MPTC). We aimed to report on clinical and pathologic factors associated with use of RAI in this patient population.

**Methods:** The Surveillance, Epidemiology, and End Results database was queried for patients who underwent surgery for MPTC (tumor size ≤ 1 cm) from 1988 to 2009. We excluded patients without a biopsy-proven diagnosis, those diagnosed at autopsy, and patients with documented extrathyroidal extension. Patients were further stratified by lymph node status. Multivariate logistic regression models predicted use of RAI based upon patient, tumor, and treatment-related factors.

**Results:** Among 24,076 patients with MPTC, 23,748 (98.6%) had complete information on the use of RAI and were eligible for study inclusion. Of these, 6,172 (26%) received RAI. Lymph node status was known for 8,230 (34.7%). Node metastasis was present in 23.8%. On multivariate analysis of all patients, an increasing number of positive nodes (OR 1.24, CI 1.19-1.29; p<0.001), increasing tumor size (OR 1.17, CI 1.15-1.19; p<0.001), Asian race (OR 1.39, CI 1.15-1.66; p<0.001), and male sex (OR 1.20, CI 1.05-1.37; p=0.007) predicted use of RAI. RAI use was less likely with advancing age (OR 0.99, CI 0.99-1.00; p<0.001), in those with an increasing number of lymph nodes examined (OR 0.99, CI 0.99-1.00; p=0.049) and those undergoing thyroid lobectomy (OR 0.16, CI 0.13-0.20; p<0.001), nodulectomy (OR 0.12, CI 0.04-0.41; p=0.001), subtotal thyroidectomy (OR 0.45, CI 0.36-0.57; p<0.001), or thyroidectomy NOS (OR 0.51, CI 0.27-0.98; p=0.042). Among node-negative patients, Asian race and increasing tumor size predicted RAI. Factors predicting decreased use of RAI were an increasing number of lymph nodes examined, unknown race, less than total thyroidectomy, and advancing age.

**Conclusions:** A significant number of MPTC patients receive potentially unnecessary RAI. Patients with MPTC and the physicians who treat them should be educated about the appropriate use of this important adjuvant treatment.
Kidney Rescue and Recovery: A Safety and Feasibility Pilot Study on the Use of Ex Vivo Normothermic Perfusion in Deceased Donor Kidney Transplantation

Richard Perez, Chandrasekar Santhanakrishnan, John McVicar, Christoph Troppmann. Division of Transplant Surgery

Introduction: Despite advances in organ preservation with the use of hypothermic organ perfusion 30% of extended criteria donor kidneys are discarded due to inadequate methods to assess kidney viability and future function prior to transplantation. Ex vivo normothermic perfusion has been proposed as a modality to assess organ viability and possible salvage otherwise unuseable organs in high risk deceased donor kidney transplantation.

Methods: We propose to demonstrate that ex vivo normothermic perfusion is safe and feasible in a prospective study of patients undergoing deceased donor kidney transplantation. Patients receiving organs from donors known for a high risk of post-transplant organ dysfunction due to ischemia-reperfusion injury will be included in the study (Recipients of kidneys from donors of advanced age, organs with acute injury and organs from donors in the setting of circulatory death). Study patients will receive allografts that have been treated with standard pre-operative hypothermic perfusion after which they will be subjected to 60 minutes of warm normothermic perfusion utilizing a standard pediatric extracorporal membrane oxygenation system. The contralateral kidney from the same donor will be transplanted with standard hypothermic preservation of the allograft without normothermic perfusion. All patients will receive standard immunosuppression with anti-thymocyte immunoglobulin and maintenance therapy with tacrolimus and mycophenolate mofetil.

Results: Ex vivo renal blood flow, resistance, O2 consumption and urine output will be assessed. Ex vivo urine will be collected for measurement of markers of acute kidney injury. Pre and post-perfusion biopsies will be taken to assess for markers of acute inflammation. Post-transplant recipient outcomes to be compared will include urine output, renal function, need for dialysis and allograft survival. Urine will also be collected to characterize markers of acute renal injury.

Conclusion: If this study demonstrates that ex vivo normothermic perfusion is safe, future studies will examine whether pharmacologic or biologic agents introduced during normothermic perfusion may possibly mitigate ischemia-reperfusion injury and improve function in deceased donor renal transplantation.
DIFFERENTIAL INFLAMMATORY PROPERTIES OF GAG GENES OF TWO BURN INJURY-ASSOCIATED HUMAN ENDOGENOUS RETROVIRUSES

Kang-Hoon Lee, HyungChul Rah, Tajia Green, Young-Kwan Lee, Debora Lim, Jean Nemzek, Wendy Wahl, David Greenhalgh, and Kiho Cho*

Shriners Hospitals for Children Northern California and Department of Surgery, University of California, Davis, Sacramento, CA 95817, 1Unit for Laboratory Animal Medicine and Department of Pathology, University of Michigan, Ann Arbor, MI 48109-0614, and 2Department of Surgery, Saint Joseph Mercy Health System, Ann Arbor, MI 48106

Common polymorphisms found in gene functions have been the centerpiece of studies investigating post-burn systemic pathogenesis. However, the sum of all known conventional genes consists of only ~3 % of the human genome, whereas ~8% is occupied by human endogenous retroviruses (HERVs), and it is anticipated that genomic HERV profile is individual-specific. We recently reported that certain gene products of murine endogenous retroviruses can modulate the production of inflammatory cytokines in macrophages. In this study, we identified burn-associated HERVs by examining the changes in the expression of various HERV families in buffy coat cells of burn patients. Subsequently, the gag genes from two burn-associated HERVs, which were isolated from the genome of one patient (Pt1), were characterized in regard to their potential roles in inflammatory processes. The two gag genes of Pt1 were presumed to be derived from the HERV-K109 and HERV-K115 loci on the NCBI reference chromosomes 6 and 8, respectively. The putative amino acid sequences of both gag-HERV-K109Pt1 (666 amino acids) and gag-HERV-K115Pt1 (545 amino acids), which were cloned from Pt1’s genome, were not identical to the corresponding reference sequences. Overexpression of the gag-HERV-K109Pt1 markedly induced the expression of IL-6, IL-1β, COX-2, and iNOS in macrophages while only the expression of IL-1β was increased by gag-HERV-K115Pt1. The expression of TNF-α was not affected by overexpression of either HERV gag gene. These findings suggest that the inherent HERV gene polymorphisms function as uncommon genetic factors which contribute to individual-specific burn as well as other disease phenotypes.
Introduction: Severe burn injury produces significant perturbations to the homeostatic state that necessitates massive intravenous fluid resuscitation. Adequate resuscitation of burn patients is central to survival and recovery. Hypo-resuscitation leads to deleterious consequences including progressive multi-system organ failure and often death. Conversely, hyper-resuscitation can lead to prolonged mechanical ventilation and poor wound healing. Traditional endpoints of resuscitation such as urine output poorly reflect cardiac volume or function. Biomarkers of cardiac volume and function are critically needed in acute burn care. We proposed the use of B-type natriuretic peptide (BNP) and neutrophil gelatinase associated lipocalin (NGAL) to determine the adequacy of resuscitation. BNP is a biomarker of myocardial stretch, while NGAL is a marker of renal ischemia. We hypothesize BNP and NGAL measurements will help predict inadequate resuscitation during the first 48 hours following burn injury.

Methods: We conducted a pilot observational study recruiting 10 patients with greater than 20% total body surface area (TBSA) burns. BNP and NGAL measurements were performed using a point-of-care (POC) immunoassay. Creatinine measurements were performed using a handheld POC analyzer. Whole blood samples were tested every four hours for the first 48 hours of admission using point of care (POC) devices. Age, percent TBSA burn, fluid rates, UOP, and vitals were also recorded. AKI was determined based on the RIFLE criteria.

Results: We found that patients that developed AKI (n=4) had significantly higher levels of NGAL over their first 48 hours of fluid resuscitation than non-AKI patients (n=6) (241.19 ± 106.62 ng/ml vs 129.15 ± 78.53 ng/ml, p<0.001). The same was found for BNP (32.54 ± 23.20 pg/ml vs 19.74 ± 17.51 pg/ml, p=0.007) and creatinine (1.37 ± 0.32 mg/dL vs 1.02 ± 0.23 mg/dL, p<0.001). Mean NGAL results were abnormally elevated 12 hours earlier than creatinine levels in AKI patients. Age, percent TBSA, fluid rates, vitals, and UOP were similar between AKI and non-AKI patients.

Conclusions: Point-of-care BNP and NGAL measurements may have clinical utility during acute burn resuscitation. NGAL appears to rise 12 hours earlier than creatinine in the presence of AKI. Further studies are warranted to determine specific cut-offs for BNP and NGAL in guiding acute burn resuscitation.
Regenerating the diseased heart with cells and extracellular matrix

Claus Svane Sondergaard, Ph.D.,
Institute for Regenerative Cures, Division of Cardiothoracic Surgery
Department of Surgery, University of California, Davis

Regenerative therapy has in recent years offered new opportunities for treating a wide range of devastating disease for which we currently have few curative options. Stem cell therapies targeting acute and chronic heart disease have been among the very first to enter early and late clinical trials, yet significant challenges must still be addressed before regenerative medicine can meet its fullest potential. Our work focuses on addressing key barriers that have emerged from pre-clinical and clinical research in the past decade. Firstly, we wish to identify optimal cell populations that will induce lasting site specific regeneration of the diseased myocardium. Secondly, we wish to overcome the poor cell retention and survival that has until now resulted in only a fraction of the donor cells being available to exert their regenerative potential. Finally, we wish to better our understanding of the basic biological mechanisms governing tissue regeneration so that we may optimize our therapeutic strategy. Our early research focused on systemic or local delivery of mainly hematopoietic stem and progenitor cells in suspension. This led to only modest improvement in infarct related vascular density and only limited retention and long term survival of donor cells. Our current efforts therefore focus on improving donor cell survival and local retention by combining stem and progenitor cells with novel custom made and commercially available de-cellularized extracellular matrix scaffolds. We utilize a wide range of in vitro and in vivo models that allow us to explore the angiogenic, immune modulatory and regenerative potential of therapeutic stem and progenitor cells as well as their potential to positively influence cardiac function and remodeling. We expect that our efforts will lead directly to new clinical trials targeting acute and chronic heart disease while at the same time support new direction in regenerative therapy for cardiovascular diseases and beyond.
Outcomes of pancreaticoduodenectomy: Where should we focus our efforts to improve outcomes?

E. Brown, A. Yang, R. Canter, R. Bold
University of California, Davis

Objectives: To evaluate the impact of length of hospital stay and the occurrence of postoperative complications on total cost in patients undergoing elective pancreaticoduodenectomy.

Methods: Retrospective review of institutional database from an academic center. 89 patients who underwent elective pancreaticoduodenectomy at a tertiary medical center between December 2007 and May 2012. Main outcome measures were occurrence of postoperative/inpatient complications, length of stay (LOS), incidence of re-admission within 30 days of discharge, and total charge from postoperative hospitalization. Linear regression was performed comparing LOS with hospital charge.

Results: 34 of 89 patients developed postoperative complications. Mean and median LOS were 12 and 8 days. Postoperative complications were significantly related to LOS. Of the 34 patients developing a complication, the average LOS was 19 days compared to the 7 days for those patients not developing a complication. Furthermore, only 1 of 42 patients discharged within 7 days was re-admitted to the hospital, while 9 of 47 patients with initial LOS >7 days required readmission, most commonly related to ongoing care of postoperative complications. Hospital charges were significantly related to LOS (Figure 1A, R2= 0.837). However, a superior linear regression was observed for those patients without complications with a $11,520 per day rate (Figure 1B, R2= 0.924). The optimal relationship between LOS and hospital charge for those patients with complications was an exponential relationship (Figure 1C, R2= 0.812).

Conclusions: Prolonged LOS is associated with increased total costs. These increased costs can be attributed largely to complications. The drive to reduce LOS following pancreaticoduodenectomy has minimal impact on overall costs to the patient. Instead efforts should be directed at reducing complications as this has a much more significant impact on financial outcomes.
A Retrospective Review of Consultations in Plastic Surgery to Evaluate the Effect of Web Based Education on Patient Satisfaction and Consultation Time

David Boudreault, M.D. and Michael Wong, M.D.

Background: Patient satisfaction is an integral part of our current healthcare system. Many health care processes are driven by ways to improve the quality of care for patients. One target for improving quality of care is through patient education. This process is filled with opportunities for omission of information, either from the patients’ failure to remember the details of the discussion or the physician’s failure to present all the necessary information. EmmiEngage™ (EE) supports the clinical conversations with reliable, repeatable, actionable information. EE interactive programs (delivered over the web and to mobile devices) combined with convenient printable materials for “point of care” communication, help organizations overcome health literacy and retention challenges throughout the entire continuum of care. EE helps patients make sense of complex medical information and manage their expectations around diagnostic and surgical procedures, chronic health conditions, the hospital experience, and more. UC Davis Medical Center has been using EE since November 2011. Although it would seem to be a benefit, we do not know the impact EE has on our patient population.

We are evaluating the effect of implementing this web based educational software on patient satisfaction and consultation time. Our hypothesis is that EE can help us decrease consultation time with patients, while also improving patient satisfaction. The results of this study, will help pave the way for a prospective trail looking at these endpoints and the effects on litigation.

Materials and Methods: This retrospective review shows the results of surveys collected in the routine consultation of plastic surgery, as well as consultation times. We have identified patients who completed EE prior to their consultation. The surveys were collected from patients after the consultation is complete. The consulting surgeon recorded the start and stop time for each consultation.

Results: Between May 10th 2012 and October 12th 2012, UC Davis plastic surgeons saw 261 new patients for consultation. The average number of patients per physician was 52.2 [26-121], with an average consultation time of 0:52:20[0:31:13-1:12:49]. Overall, the average satisfaction score was 1.29 [1-3] on a 5 point scale, where a 1 means ‘excellent’ and 5 means ‘poor’. For those patients using EE, the average satisfaction score was 1 and the average consultation time of was 46 minutes. For the patients who did not use EE, the average satisfaction score was 1.8 [1-3] and their average consultation time was 55 minutes.

Conclusion: There appears to be an association with decreased consultation time and improved satisfaction scores with the use of EE.
Normothermic renal perfusion: A novel way to preserve grafts and prevent ischemic reperfusion injury?

Santhanakrishnan C, Troppmann C, McVicar J, Perez R

Background: Currently, the main mode of preservation for organs is cold static storage or hypothermic perfusion. Although, such modes of preservation allow transplantation of organs by allowing for longer cold ischemia time, there remain issues with ischemic reperfusion injury (IRI) which possibly affects graft function in the long term. Normothermic perfusion (NP), still in the experimental stages, promises a way to prevent IRI and potentially provide avenues to assess, rehabilitate marginal grafts.

Proposed study: We propose to assess the effects of normothermic perfusion on kidney grafts by setting up an animal model – porcine or sheep, subject to availability. The recovered kidneys will be connected ex vivo to a modified ECMO circuit. This way we can perfuse the organ with autologous blood and conduct basic tests. It would be possible to measure creatinine (which we would add to the circuit) and creatinine clearance – this would allow us to assess overall graft function. Urine output is another measure to assess the graft. Markers for cellular injury like products of lipid peroxidation and products of inflammation (IL-6 and TNF) can be measured in the urine. NP also holds promise for incorporating mesenchymal stem cells into the organ ex vivo and possibly immunomodulate the organ itself.

Conclusion: Normothermic perfusion of kidney grafts presents an exciting new modality to preserve and more importantly assess and rehabilitate organs. If found to be a feasible method of organ preservation, NP can be used to assess and preserve marginal grafts, thereby making available more transplantable organs.
THE EFFECT OF TILT ON FLOW AND PRESSURES IN A MINIATURIZED EXTRACORPOREAL LIFE SUPPORT SYSTEM (CARDIOHELPTM)

Capt Hilary Gallogly MD, General Surgery, Travis AFB  
Capt Ryan Schutter MD, Flight Medicine, McConnell AFB  
Maj Brian Gavitt, MD, MPH, General Surgery, Travis, AFB  
J. Kevin Grayson DVM, PhD, Clinical Investigation Facility, Travis AFB  
B. Zane Atkins, MD, Cardiothoracic Surgery, Travis AFB

Objectives: Wounded warriors with severe lung injuries are currently being transported via fixed wing aircraft in theater on extracorporeal life support (ECLS). There has been no systematic evaluation of the effects of flight and altitude on circuit flows and pressures, or on patient hemodynamics during transit. The first step in evaluation is to determine the effects of head up and head down tilt, simulating the angles of takeoff and landing, on the ECLS circuit and patient. A novel self-contained ECLS circuit/pump manufactured by Maquet (CardioHelp, Maquet Getinge Group, Hirrlingen, Germany) is a miniaturized version of an ECMO circuit, and is ideal for transport.

Methods: Swine placed on the CardioHelpTM extracorporeal life support system were allowed to equilibrate. They were then placed in both 15 degrees head up and head down positions for periods of thirty minutes with a neutral period in between. Hemodynamics as well as circuit flow and pressures were recorded and compared to baseline.

Results: Cardiac output was significantly increased in both the head up (7.1 ± 0.2 L/min, p = 0.002) and head down positions (6.5 ± 0.3 L/min, p = 0.01) compared to neutral (5.5 ± 0.2 L/min). Stroke volume was significantly increased in the head up position (71.6 ± 2.4 mL, p = 0.014) but not in the head down position (65.5 ± 4.0 mL, p = 0.07) compared to neutral (57.3 ± 4.0 mL). Venous drainage pressure in the ECLS circuit (Pven) was significantly decreased in the head up position (-28.0 ± 1.5 mm Hg) compared to both neutral (-36.5 ± 2.2 mm Hg, p = 0.005) and head down (-33.3 ± 1.6 mm Hg, p = 0.027) positions.

Conclusion: Animals were not only able to maintain cardiac output while tilted, but showed increased values. We believe this was due to improved venous drainage (head up) compared to increased venous return (head down). This suggests that patient positioning in an aircraft while on ECLS does not alter hemodynamics or circuit parameters during takeoff and landing.
Successful postnatal surgical repair model for rodents with spina bifida.

E. Brown, C. Pivetti, D. Farmer
University of California- Davis

Objectives: A retinoic acid-induced rat model of myelomeningocele has previously been established, but no surgical repair models have been developed. The goal of the present study is to develop a postnatal surgical repair model for immature neonatal rats with myelomeningocele in order to provide a superior way to evaluate methods for fetal surgical repair of spina bifida.

Design: Surgical technique for postnatal surgical repair of myelomeningocele in rats.
Setting: Tissue engineering laboratory at an academic medical center.
Patients: Newborn immature rat pups born to retinoic acid-treated mothers.
Intervention: Repair of myelomeningocele within 24 hours of birth.
Main Outcome Measures: Successful repair of myelomeningocele

Results: Retinoic acid was administered to time-dated pregnant Sprague-Dawley rats on gestational day 10. 23 pups were born via natural birth and evaluated for presence of myelomeningocele (incidence 61%). 4 pups died prior to defect repair. All live pups with myelomeningocele were placed on ice for anesthesia until cessation of movement was noted. Under a microscope, the skin surrounding the MMC was mobilized with blunt dissection to allow tension-free closure. The skin was reapproximated with interrupted sutures using 7-0 Vicryl. The repair was technically successful in all pups.

Conclusions: Postnatal surgical repair of RA induced myelomeningocele in rat pups is a technically feasible procedure. Retinoic acid-induced neural tube defects in rats represent a unique developmental model of spina bifida which is superior to the surgically created large animal models. The development of this model may enable significant research regarding improved strategies for fetal intervention in spina bifida.
Human Multipotent Vascular Stem Cells in Vascular Remodeling and Diseases

Aijun Wang Ph.D.
Assistant Professor
Co-Director, Surgical Bioengineering Laboratory
Department of Surgery
UC Davis School of Medicine

Vascular disease is one of the leading causes of death worldwide. Atherosclerosis, the most common cause of vascular disease, is often preceded by intimal hyperplasia, a thickening of the blood vessel wall. While this neointima formation has traditionally been attributed to mature smooth muscle cell (SMC) dedifferentiation, migration and proliferation, recent research has revealed that vascular progenitor cells also contribute to disease development. We recently discovered that multipotent vascular stem cells (MVSCs) actively participate in neointima formation in a rat model of endothelial denudation. MVSCs constitute the dominant proliferative cell type in expanded vascular culture in vitro. MVSCs express the Sox1, Sox10, Sox17 and Snail transcription factors, do not express Sca-1 and c-Kit, have telomerase activity, can self-renew, and can differentiate into multiple mesenchymal (chondrogenic, adipogenic and osteogenic) and neural (peripheral neuron, glial cell) lineages. We also found that MVSCs from human arterial tissue display the same unique marker expression as rodent MVSCs. Currently, we are investigating changes in MVSC properties and activities associated with the aging process and the role MVSCs play in vascular disease development, specifically the development of human atherosclerosis.
Challenging Scalp Reconstructions in a Devastating Neurosurgical Patient

Rohit Jaiswal, MD, MPH, and Lee L.Q. Pu, MD, PhD, FACS
Department of Surgery, Division of Plastic Surgery

Introduction: Patients with multiple previous craniotomies, wound break down with failed cranioplasty, altered vascular anatomy of the scalp, or poor wound healing problems due to chronic illness may present with challenging reconstructive needs for scalp reconstruction as a life saving operation. We present a case of a neurosurgical patient who required multiple scalp reconstructions due to several previous failures including free flap loss. Ultimately, a successful reconstruction was accomplished through an additional free flap transfer once the patient’s medical condition became more stable.

Methods: An 18 year old woman developed coccidiomycosis meningitis and encephalopathy, requiring multiple neurosurgical procedures including frontoparietal craniotomy for decompression, ventriculoperitoneal shunt placements, and subsequent cranioplasty for skull reconstruction. She developed right frontoparietal scalp wound break down with infected cranioplasty titanium mesh. Scalp reconstruction was attempted by a local rotation/advancement flap, local tissue rearrangements, and skin grafts which all failed. A free right latissimus dorsi flap was performed but lost due to post-operative hemodynamic instability. Eventually, she was discharged home with dressing changes to a large, unstable, chronic scalp wound with exposed frontotemporal dura.

Results: After nearly 4 months non-operative management, her medical conditions were optimized and nutritional status was improved. She then underwent a staged free tissue transfer for definitive scalp reconstruction. The first stage involved identifying suitable neck recipient vessels for free tissue transfer and served as a test to determine whether she could tolerate a prolonged operation. The second stage involved a relatively quick free left latissimus dorsi myocutaneous flap transfer to her right frontoparietal scalp wound 3 days later. A successful scalp reconstruction was finally achieved with stable soft tissue coverage to the exposed dura and scalp wound.

Conclusions: Patients with challenging medical and neurosurgical issues in need of scalp reconstruction may be at risk for multiple failed attempts at reconstruction. The reconstructive surgeon may increase the likelihood of success by optimizing the patient’s nutritional and medical conditions and then performing a well-planned, staged, free flap transfer to achieve reliable soft tissue reconstruction of the scalp.
A Comprehensive Approach to Lower Extremity Free-Tissue Transfer: A Single Surgeon’s Clinical Outcome

Lee L.Q. Pu, MD, PhD, FACS
Division of Plastic Surgery, Department of Surgery, University of California Davis

Introduction: The success of free tissue transfer to the lower extremity can be critical for limb salvage. However, such a transfer has been less successful when comparing with the one to the breast and head and neck. Furthermore, free tissue transfer to the lower extremity is commonly performed by the youngest, least experienced surgeons in a relatively unsupported environment. Over the past 5 years, the author has developed a comprehensive approach to lower extremity free-tissue transfer with great success. The purpose of the present study is to introduce such an approach and also to report the clinical outcome that has been achieved.

Methods: The comprehensive approach developed by the author includes patient selection, flap selection, selection of the recipient vessels, flap dissection, flap preparation, microvascular anastomosis, flap inset, immediate post-operative care, intermediate post-operative care, and further follow-up care. Each part of this approach has its own special considerations with standard protocol and well instructed procedures. Between 2007 and 2012, 24 consecutive lower extremity free tissue transfers in 24 patients were performed by the author for soft-tissue reconstruction of a leg, ankle, or foot wound primarily following orthopedic trauma using this approach. There were 17 fasciocutaneous flaps (16 anterolateral thigh and 1 free-style) and 7 muscle flaps (3 rectus abdominis, 2 latissimus dorsi, and 2 gracilis). The clinical outcome was recorded based on the success of free tissue transfer in the operating room, any re-operations related or unrelated to the revision of microvascular anastomosis, and any total or partial flap loss during up to 5 years follow-up.

Results: All 24 lower extremity free tissue transfers were performed successfully in the operating room. All patients were discharged home once they tolerated dangling according to the protocol. One patient had evacuation of hematoma under the flap, two patients had additional skin grafting procedures, and two patients had flap debulking for contour improvement. There were no any re-operations related to the revision of microvascular anastomosis. No total or partial flap loss was encountered in this series and overall success of free tissue transfer to the lower extremity is reaching 100%.

Conclusions: A superb clinical outcome of free tissue transfer to the lower extremity can be accomplished through this comprehensive approach developed by the author. With some clinical experience along with adequate microsurgical skill, good surgical judgment, well instructed and step-by-step intra-operative execution, and a protocol driven practice, one can certainly be able to improve his or her success with less complications in free tissue transfer to the lower extremity.
Genome Signature Image (GSI): Concise visualization of species/strain-specific profiles of repetitive element occurrences for cataloguing and evolutionary studies.

Kang-Hoon Lee1, Kyung-Seop Shin2, Woo-Chan Kim2, Jeongkyu Roh2, Seung-Ho Choi1, David Greenhalgh1, Dong-Ho Cho2, and Kiho Cho1

1Department of Surgery, University of California, Davis and Shriners Hospitals for Children Northern California, United States, and 2Division of Electrical Engineering, School of Electrical Engineering and Computer Science, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, South Korea

The genomes of living organisms, ranging from bacteria to humans, contain diverse populations of repetitive elements (REs). Our recent studies revealed that the RE profile, including RE arrays, of the human genome is unique in comparison to the mouse genome while gene sequences of humans and mice share a homology of ~90%. Also, a preliminary survey of the genomes of various other species demonstrated that genomic RE profiles are species-specific. In this study, we developed a suite of protocols/programs to concisely visualize genome signatures using species/strain-specific RE profiles. Since the genomes of higher eukaryotes, including humans and non-human primates, have not yet been fully decoded, we developed the genome signature technology using complete genome sequences from the domains of Archaea and Bacteria. The genome sequences of 117 Archaea-domain and 1,068 Bacteria-domain members were obtained from the National Center for Biotechnology Information and subjected to a genome-wide survey for the occurrence of 5-nucleotide REs. The top 50 highest frequency REs were then selected from each genome followed by an assembly of the 50 different REs into a RE string of 250 nucleotides, from high to low frequency. The string of high frequency REs now represents a unique signature of each genome. Of note, the two key parameters (number of high frequency REs and RE length) for the generation of genome signature sequences are tuneable. The genome signature sequence was then visualized into an image, named Genome Signature Image (GSI), using a CMYK color scheme. Interestingly, not all members within a pre-established phylogenetic branch shared similar CMYK color patterns and it can be confirmed by examination of the GSIs of the 1,185 microorganisms using different parameters. The tuneable GSIs represent and visualize unique characteristics of any genome and the concise RE string of each genome enables phylogenetic studies involving large sample numbers.