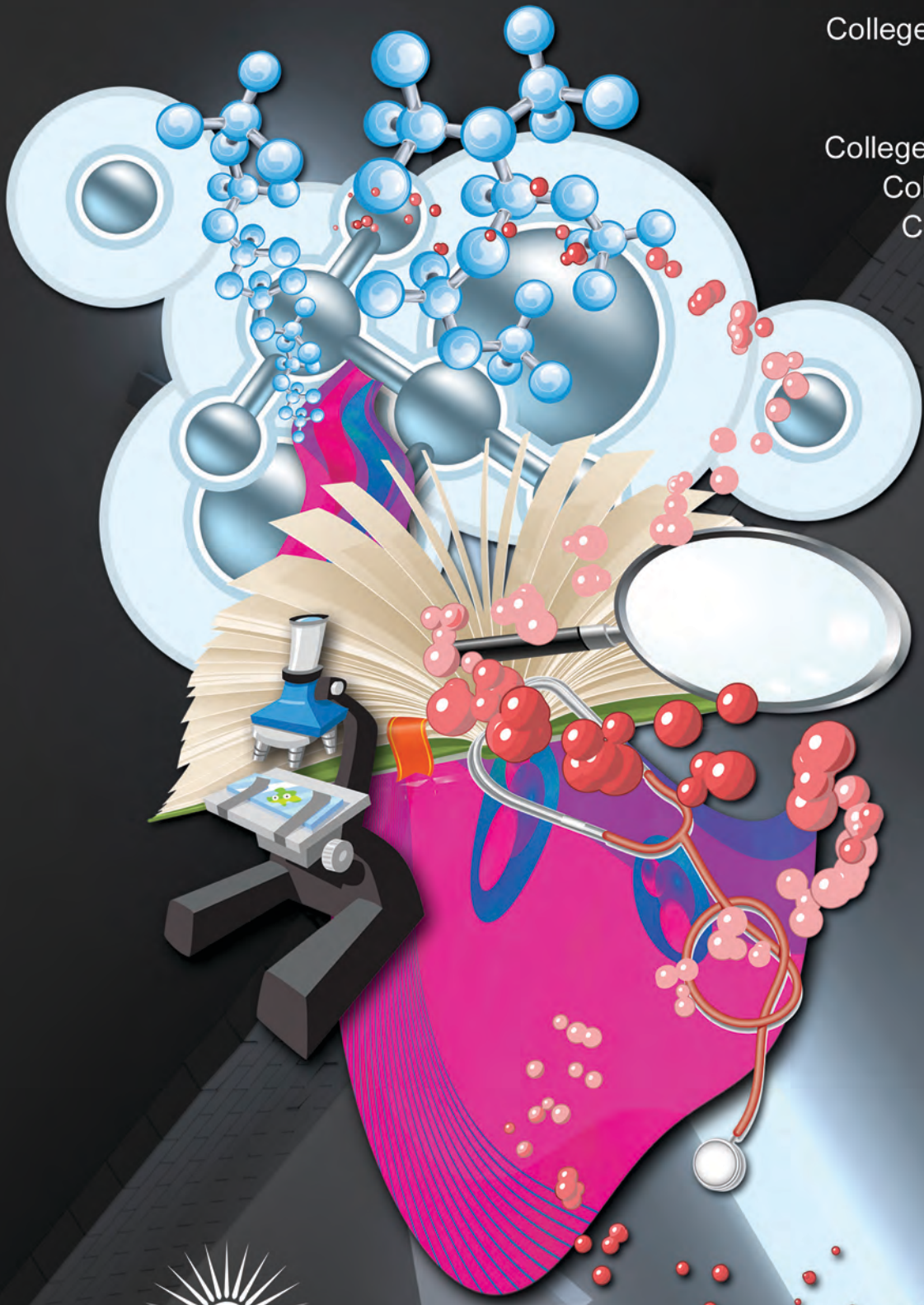


# HPD RESEARCH DAY

February 10, 2012

College of Osteopathic Medicine  
College of Pharmacy  
College of Optometry  
College of Health Care Sciences  
College of Medical Sciences  
College of Dental Medicine  
College of Nursing



## KEYNOTE PRESENTATION

# Climbing Mt. Everest: Steps (and Stumbles) on the Way to Better Health Care

by

**DeWitt C. Baldwin, Jr., MD**

A pediatrician, family physician, and psychiatrist, Dr. Baldwin was educated at Swarthmore College, the Sheffield Scientific School at Yale, Yale Divinity School, Yale Medical School, and at the University of Minnesota and Yale Graduate Schools. He is a Diplomate of the National Board of Medical Examiners, the American Board of Pediatrics and the American Board of Family Practice.

He has held professorial appointments in pediatrics, psychiatry, family medicine, community medicine, behavioral sciences, medical education, social dentistry, and human behavior and child development, at eight medical schools, two dental schools, three graduate schools, and two schools of social work. He was a member of the planning committees and founding faculties of the University of Connecticut and the University of Nevada Medical Schools.

He served as President of Earlham College in Richmond, Indiana before going to the American Medical Association in 1985 as Director of the Division of Medical Education and Research Information. He currently holds the titles of Scholar-in-Residence at the Accreditation Council for Graduate Medical Education (ACGME), Professor Emeritus of Psychiatry and the Behavioral Sciences, University of Nevada School of Medicine, and Adjunct Professor of Clinical Psychiatry, Northwestern University School of Medicine. In 2003, he received the degree of Doctor of Science (Honoris Causa) from the Northeastern Ohio Universities College of Medicine and in 2011, he received the degree of Doctor of Humane Letters (Honoris Causa) from Rosalind Franklin University.

During his academic career, he has written, lectured, and conducted research in the fields of higher education, moral development, interdisciplinary health professions education, medical ethics, rural health, behavioral sciences, humanistic medicine, child development, psychology, and dentistry. He has published over 200 articles and three books.



*DeWitt C. Baldwin, Jr., MD  
Scholar-in-Residence  
Accreditation Council for  
Graduate Medical Education*



## Message from the Health Professions Division Chancellor

Today is indeed a proud day for Nova Southeastern University's Health Professions Division (NSU-HPD) because it marks the third important milestone in our evolution as a collaborative multidisciplinary and clinical research venue. In the four years since the inaugural HPD Research Day, NSU has continued to expand and develop into a fine example of what dedicated researchers can accomplish when given the support and encouragement of their institution.

Thanks to the proactive nature of Dr. Patrick Hardigan, who chairs the HPD Research Committee, the committee agreed it would be an excellent opportunity to create a showcase for student and faculty involvement in what NSU traditionally calls scholarly activity, much of which is actually research. Interestingly, many people view research as working in a laboratory and using test tubes and specialty equipment when the fact is research extends far beyond that restrictive definition. Our multidisciplinary researchers do some of the finest statistical and clinical research that can be found in the nation. This research is being conducted in an applied research lab using sophisticated research methodology and advanced statistical analysis techniques.

Before I continue, I would like to thank and acknowledge the HPD Research Day Committee members who have been working so diligently to ensure the project's success. They are: Andrea Wray, Dr. Samuel Cheng, Dr. Ana Karina Mascarenhas, Dr. Harvey Mayrovitz, Dr. Jay Rumsey, Dr. Janet Leasher, Dr. Gabriel Suci, Dr. Steve Bowen, and Dr. Luigi Cubeddu.

Research Day allows our talented students to be present at one place at the same time so they can participate in and view various poster presentations as well as attend multiple discussion groups. This project has proven to be a truly time-consuming undertaking, so I commend the wonderful commitment of our deans and various program leaders who have allowed us to move forward with this multidisciplinary interchange in the area of research and scholarly activity.

Although it's impossible to predict the outcomes that will be realized in the weeks and months following Research Day, I have no doubt our students will be vastly enriched by the experience. I believe they will come away with a realization of the importance of research in the formative accumulation of knowledge one goes through regardless of what HPD program they're participating in here at NSU.

I'm proud to say we've come a long way in a relatively short period of time. We now have multiple numbers of well-known and respected academic researchers in our institution that encompass the health professions spectrum. When Southeastern University of the Health Sciences merged with Nova University in 1994, we only had about \$400,000 in externally funded research. Today, the Health Professions Division is over the \$22 million mark, while the university is approaching \$81 million.

Now that we've demonstrated our capabilities and showcased our acumen and research prowess, it's become apparent that we're viewed from a more-esteemed perspective than ever before. Thank you for your participation.

Sincerely,



Fred Lippman, R.Ph., Ed.D.  
Chancellor, Health Professions Division



# **Welcome to HPD Research Day**

## **February 10, 2012**

The Health Professions Research Division is excited to welcome you to Nova Southeastern University's Health Professions Division Research Day (HPD Research Day). All seven academic colleges of the Health Professions Division—Dental Medicine, Health Care Sciences, Medical Sciences, Nursing, Optometry, Osteopathic Medicine, and Pharmacy—have banded together to offer poster displays and oral presentations of their current research. In addition to the platform and poster presentations, we have invited Dr. DeWitt Baldwin, a leading figure in all aspects of medical education, to give a keynote address.

Adding to the festivities will be door prizes and awards for best student presentations. People from other colleges across NSU will visit our division to learn more about us and see the work we do here. Students and faculty from all HPD's Student Education Centers will participate via videoconferencing. This event promises to be more than a day-long celebration of research and scholarly activities. It is also an opportunity for students and faculty from multiple disciplines to interact with each other and with the larger research and NSU communities. I am so pleased that you are able to be a part of this academic research event.

Patrick C. Hardigan, Ph.D.  
Director HPD Research



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# PLATFORM PRESENTATIONS

## COLLEGE OF HEALTH CARE SCIENCES COLLEGE OF NURSING

### Human Factors, Nursing Practice, and Patient Safety: Heuristic Evaluation Method to Identify Patient Controlled Analgesia System Design and Performance Issues

Kristi R. Campoe<sup>1</sup>, M.S.N., Assistant Professor;

John S. Barnett<sup>2</sup>, Ph.D.;

Jacqueline F. Byers<sup>3</sup>, Ph.D., Professor

<sup>1</sup>College of Nursing; <sup>2</sup>U.S. Army Research Institute for Behavioral and Social Sciences; <sup>3</sup>University of Central Florida, College of Nursing

**Objective.** To demonstrate the heuristic evaluation (HE), an analytic usability inspection method and describe design/performance issues of a patient controlled analgesia (PCA) system affecting nursing practice and patient safety. **Background.** PCAs were designed to improve patient outcomes and safety. From 2005-2009, 6,069 PCA injuries/deaths were reported to the FDA. The frequency and severity of errors warrant the innovative application of methods to mitigate error. Human factors evidence supports HE as a method to promote safety in high-risk industries such as nursing and to identify usability problems contributing to medical errors. **Methods.** Relevant heuristic principles were selected from the literature. Four evaluators independently conducted HEs of the PCA system. Evaluators (a) rated PCA adherence to each of 10 heuristic principles on a 5-point scale, (b) identified usability concerns, and (c) rated severity of usability concerns on a 5-point scale. Usability concerns provided evidence of deviations from the principles and context for the each heuristic severity rating. **Results.** Preliminary results indicated PCA adherence ratings for aesthetic (median = 3.00, SD = .50) and error (median = 3.00, SD = 1.00) adhered most closely to their respective heuristics; visibility (median = .50, SD = 1.41) and flexibility (median = .50, SD = .58) adhered the least. Evaluators recorded usability concerns (n = 69) in free form for each heuristic. Severity rating were lowest for flexibility and aesthetic (median = 1.00, SD = 1.50). **Conclusion.** When automated system design departs from established standards, a myriad of usability and performance concerns arise that may inadvertently contribute to error, compromising patient safety. These finding may justify changes to organizational polices relating to PCA system selection and support for purchase planning, or address nurses training to offset system shortcomings. Future research should address the strategies for implementing heuristic evaluations in organizational medical device decision-making.

### How Perioperative Nurses React to Intraoperative Nursing Errors

Robin Chard, Ph.D., Associate Professor

College of Nursing

**Objective.** This study was conducted to determine how nurses cope with committing an error and whether changes in practice occur. **Background.** Errors in nursing practice are a growing concern in healthcare posing a threat to patient safety. Practitioners have been hesitant to come forward and report errors because of negative ramifications in the workplace. **Method.** For this descriptive, correlational study, OR RNs (N = 272) who were members of the Association of periOperative Registered Nurses (AORN) participated in the study. Of the sample, 158 participants admitted to committing an intraoperative nursing error. The conceptual framework that guided this study was Lazarus and Folkman's (1984) cognitive theory of psychological stress and coping. **Results.** Nurses who used accepting responsibility as a coping strategy tended to experience high levels of emotional distress ( $r = .55, p =$

.000). Using multiple regression analysis, the strategies of accepting responsibility ( $\beta = .34, p < .001$ ) and using self-control ( $\beta = .17, p < .05$ ) were found to be significant predictors of emotional distress. Seeking social support ( $\beta = .20, p < .05$ ) and planful problem solving ( $\beta = .29, p < .001$ ) emerged as significant predictors of constructive changes in practice. The most predictive of defensive changes was the strategy of escape-avoidance ( $\beta = .35, p < .001$ ). **Conclusion.** OR nurses experienced a variety of emotions after committing an error which led to alterations in the way they practiced. **Grants.** This study was funded by a grant from AORN.

### **Mountains to Climb. Male Nurses and Their Perspective on Professional Impairment**

Patricia Welch Dittman, Ph.D., Associate Professor  
College of Nursing

**Objective.** This study was designed to determine the lived experience of male nurses who struggle with chemical dependency. **Background.** Male nurses in recovery from chemical dependency in the State of Florida's Intervention Project for Nurses Rehabilitation Program open up about their experiences with drug addiction. The gender statistic of nurses in the Florida is 91% female and 9 % male. This is compared to the gender breakdown in which male nurses represent 38% in the State of Florida's Intervention Project for Nurses Rehabilitation Program. A literature review revealed limited information on this minority culture. **Method.** A hermeneutic phenomenological approach provided insight into their lived experience. The sample included 9 male nurses who had worked impaired from 6-22 years. **Results.** The major theme of "person" had three sub-themes of (a) pre-determined risk, (b) altered values, and (c) sensation seeking behaviors. The major theme of "profession" had six sub-themes of (a) masterminding, (b) professional heteronomy, (c) rehabilitation, (d) getting caught, (e) spirituality and (f) the nurse becoming the nursed. **Conclusion.** The study findings included drug use patterns that were gender specific and provided understanding and identification that can assist academic and clinical environments with prevention, education and early intervention. The metaphor "mountains to climb" depicts the daily struggle that chemically dependent male nurses face as part of their rehabilitative journey.

### **Adolescents' Experiences With Sickle Cell Disease Pain: Feeling Helpless but Determined to Endure**

Cynthia Fletcher, Ph.D., Assistant Professor  
College of Nursing

**Objective.** This study examined adolescents' beliefs and feelings about what hindered or helped adolescents' coping with and adapting to their sickle cell disease (SCD) pain. **Background.** SCD is a chronic hereditary disease affecting 1/300 live African-American (A/A) Births in US. Approximately 1/500 African-Americans are affected presently (72,000 individuals) and one in 12 have the trait. Individuals with SCD experience major medical complications resulting in morbidity and mortality and profound disturbances in psychosocial well-being. **Methods.** Subjects were 68 adolescents with SCD (53% females and 47% males) who provided written responses to two open-ended questions. (a) "What hindered your coping with SCD pain" and (b) "What helped your coping with SCD pain"? Responses were analyzed to explore and describe underlying patterns and themes. Two main categories and four subcategories were identified for the "hindered" question, and three main categories and six subcategories for the "helped" question. **Results.** Two opposing themes emerged from the data: helplessness and trying to endure. Helplessness occurred when emotional and physical effects of the SCD pain resulted in social isolation and loneliness, reduced academic performance and increased their feelings of despair and suffering. The theme trying to endure reflected the adolescents' attempts to successfully manage the psychosocially stressful and physically painful events and to preserve their peace of mind. **Conclusions.** The results identify that the adolescents with SCD behave purposefully, possess intrinsic holism and strive to maintain integrity. Findings suggest strategies for interventions to promote or enhance coping in adolescents experiencing pain from SCD.

## Procedure Skills and Job Functions of Acute Care Nurse Practitioners in Florida

Jo Ann Kleier, Ph.D., Professor  
College of Nursing

**Objective.** This study was designed to determine the procedure skills and job functions unique to the role of the acute care nurse practitioner (ACNP) in the state of Florida and to compare these findings to those obtained in a 2001 national survey of the same skills. **Background.** The specialization role of ACNP was established in 1993. Continuous role clarification is needed. Nursing faculty struggle with the appropriate skill set to include in the ANCP curriculum. Employers are unsure as to how to best use these specially trained nurses. Students entering the ACNP programs have preconceived expectations regarding the skills they will learn and use in their future employment. **Methods.** All identified nationally certified ACNPs in the state of Florida were approached. Procedure skills and job functions were assessed by means of a list of 56 items to which the participant could respond *yes/no* with *yes* indicating the item was a typical component of their job. **Results.** A total of 110 invitations were sent out and 44 (40%) individuals responded. A frequency summary table was constructed for each of the 56 items. Any item which achieved a *yes* response a minimum frequency of 51% was retained to define the role. **Conclusion.** The ACNPs practicing in Florida report using a skill set very similar to those practiced nationally in 2001 but with a higher frequency for advanced and invasive procedures.

## Acute Abdomen with a Rare Presentation of Emphysematous Cholecystitis: A Case Study

John W. Rafalko, Ed.D., Associate Professor;  
Alyson Campbell, MMS;  
Seth Holman, MMS;  
Gittel, Mindick, MMS;  
Christine Miskec, MMS;  
Jessica Moskowitz, MMS;  
Sara Mow, MMS;  
Lauren Murphy, MMS;  
College of Health Care Sciences

**Introduction.** The acute abdomen is a common presentation in the emergency department. In the adult population acute cholecystitis is often the diagnosis but rarely presents as emphysematous cholecystitis (EC). Traditional history and physical exam assisted by modern technology frequently aids clinicians in effectively determining the etiology of abdominal pain that lead to rapid treatment. EC has increased morbidity and mortality rates that demanded aggressive surgical intervention. **Case presentation.** A 61-year-old hypothermic male presented to the emergency department with an acute onset of epigastric abdominal pain that progressed in intensity over several hours. Associated symptoms included nausea, non-bilious vomiting, diaphoresis, and rigors. The patient presented with an acute abdomen. **Deviation From the Expected.** Despite high potential morbidity and mortality rates, aggressive surgical and intensive care pre and post-operative management led to a brief hospitalization and early discharge. **Discussion.** This patient presented with the risk factors for EC that were confirmed by pathology. Labs suggested and imaging techniques verified the diagnosis pre-operatively. Immediate medical therapy involved pain control, the rapid infusion of intravenous fluid replacement, and broad-spectrum IV antibiotics. The various surgical treatment options discussed included open versus closed laparoscopic surgery or gallbladder drainage. The definitive treatment of this condition was laparotomy with open cholecystectomy. **Conclusion.** The usual complications of EC that include peritonitis, gangrene, sepsis, or death were avoided in this case by aggressive surgical management. Clinicians in an acute setting must maintain a high index of suspicion for EC in the adult patients that present with an acute abdomen.



## Social Exchange Incentives to Increase Meaningful Posts and Online Learning

Sarah Ransdell, Ph.D.  
College of Health Care Sciences

**Objective.** This study was conducted to determine if social exchange incentives to increase meaningful posts would improve online learning. Meaningful posts focused on understanding concepts (i.e., “I just realized that an ANOVA is the same as a t-test when there are only two groups”). **Background.** Ransdell, Kent, Gaillard-Kenney, and Long (2010) have shown that digital immigrants from a baby-boomer cohort fare better than digital natives due to social reliance and meaningful posts. Meaningful posts include discussion comments that reflect meaning-based engagement with the course material. Ransdell (2010) has also shown that students with optimal patterns and types of discussion participation do better than those students who just follow a point system of quantity-based engagement. **Methods.** Students were given four types of social exchange incentives during an online graduate health science course to increase meaningful posts: anticipated reciprocity, personal reputation, altruism, and points. **Results.** A multiple regression shows that 53% of online learning is predicted by meaningful posts (20%) and homework performance (33%) while total online activity does not predict learning outcomes. **Conclusions.** Students can be encouraged to increase meaningful posts and improve their own engagement with the online materials.

## Peer to Peer Mentoring of Baccalaureate Student Nurses in the Simulation Lab Setting

Heather Saifman<sup>1</sup>, MSN, Assistant Professor;  
Yvonne Thelwell<sup>2</sup>, MSN, Assistant Professor;  
Marline Whigham<sup>1</sup>, MSN, Assistant Professor

<sup>1</sup>College of Nursing; <sup>2</sup>Baptist Health South Florida, College of Nursing

**Objective.** This teaching learning strategy was conducted to explore the impact of peer mentoring on the reduction of anxiety, and the increase in self-confidence and organizational skills in the simulation lab setting. **Background.** Earlier research supports the role of the nurse mentor as integral in the preparation of the novice nurse as they develop competent practice behaviors. **Methods.** Pre simulation experience questionnaires were completed by 55 third semester students (novices) who were asked to identify stressors associated with participation in a high fidelity simulation setting. Three primary themes emerged: high levels of anxiety related to being watched, questionable self confidence levels and concern related organizing care as stressors. Novice student nurses participated in one simulation experience prior to having them partnered with peer mentors (senior student nurses). Senior students were invited to participate to serve as resources for the 3rd semester students on a volunteer basis. The novices and seniors were paired in a second simulation separated by several weeks within one 16 week semester. Data collected from the novices on their experience with and without mentors serves to further the understanding of how peer mentoring impacts the stressors of novice nurses in the simulation setting. No control group was formed where novices were not paired in the second simulation **Results.** Students completed the standard simulation evaluation forms. **Conclusion.** Students felt that the teaching learning strategy increased self-confidence and reduced their anxiety. **Grants.** No grant funding was obtained for this project.

## Development and Implementation of a Prescription Refill Policy and Medication Flow Sheet for Primary Care Practice

Vicky Stone-Gale, DNP, Assistant Professor  
College of Nursing

**Objective.** This purpose of this quality improvement project was to: (a) develop a prescription medication refill policy to improve patient safety and decrease medication errors; and (b) design a medication flow sheet to monitor and track long-term medication treatment for chronic conditions. **Background.** The

absence of a prescription medication refill policy and lack of patient follow-up office visits are a significant problem in primary care practices. The lack of health care provider control and office policies regarding this process may lead to patient safety issues, which is a critical factor in improving the quality of care. Dispensing medications to patients that have not been seen in the office for a long period of time is not only dangerous but a liability to the provider. **Methods.** Data was obtained from chart reviews of 74 patients and three categories of chronic medications were requested and reviewed including antihypertensives, antidiabetics, and antihyperlipidemics. Descriptive statistics using SPSS were used to monitor and track correct data entered on refill request forms and transferred to a prescription medication flow sheet. **Results.** One of the key findings of this quality improvement study was that almost 20% of the patients had not been in the office for over one year which has a significant patient safety concern in regard to follow up and medication refills being dispensed without the patient being seen **Conclusion.** This quality improvement and patient safety project has the potential to change the primary care practice by improving efficiency and documentation practices that can provide a safety mechanism for the prevention of medication errors and for prescription medication refills to be dispensed too early causing possible harm to the patient.

## COLLEGE OF DENTAL MEDICINE

### High Costs and Low Healthy Days Gained by Using OralCDx Brush Biopsy as a Routine Oral Cancer Screening Instrument Compared to Conventional Oral Examination

Vinodh Bhoopathi<sup>1</sup>, DScD., Assistant Professor;  
James F. Burgess<sup>2</sup>, Ph.D., Professor;  
Ana Karina Mascarenhas<sup>1</sup>, DScD., Associate Dean of Research  
<sup>1</sup>College of Dental Medicine, <sup>2</sup>Boston University School of Public Health

**Objective.** To determine the cost effectiveness of using OralCDx brush biopsy as a routine oral cancer (OC) screening instrument compared to conventional oral examination (COE). **Background.** Though it is important that new oral cancer diagnostics are made available for public's use, it is even more imperative to question if they are effective in truly detecting oral cancer, and if the money spent on them is justifiable for the health outcomes achieved. **Methods.** For this cost effectiveness analysis (CEA) study we compared two decision analysis arms: brush biopsy and COE, from an insurance company perspective, including the direct costs only. Costs and healthy days gained over a period of 5-years were discounted at rate of 3% per year. Analysis of influence, two-way, and probabilistic sensitivity analyses were performed. **Results.** The additional cost of \$138 for brush biopsy yielded only an additional 0.0410 healthy days compared to COE, over a period of 5 years. Cost effectiveness acceptability curve derived a threshold ICER of \$3441 for every healthy day gain over a period of 5 years. **Conclusions.** Brush biopsy can be considered cost effective only at a willingness to pay threshold of \$3441 or more for every healthy day gained over a 5-year period in the target population. We believe this relatively low incremental value is not a good use of public dollars or resources. However, insurance companies should use these estimates to make logical policy decisions about reimbursing this screening instrument.

### Effectiveness and Utility of Oral Cancer Diagnostic Adjuncts in Adult US Populations

Vinodh Bhoopathi, DScD., Assistant Professor;  
Ana Karina Mascarenhas, DScD., Associate Dean of Research  
College of Dental Medicine

**Objective.** To compare the effectiveness of oral cancer diagnostic adjuncts (DA) and clinicians' conventional oral examination (COE) in detecting oral and pharyngeal cancers (OPC), in high-risk (HR), low-risk (LR), and in the overall adult US populations (GP). **Background.** Though it is important that new oral cancer diagnostics are made available for public's use, it is even more imperative to question if they are effective in truly detecting oral cancer. **Methods.** We assumed DAs to have 99% sensitivity and

specificity. For COE, 79.6% sensitivity, and 97.7% specificity was used. The positive predictive value (PPV) for a DA and COE were estimated for HR, LR and GP groups, respectively. Three different sensitivity analyses (Sensitivity constant but decreasing specificity, specificity constant but decreasing sensitivity, decreasing both sensitivity and specificity simultaneously) were performed to determine the effectiveness of DAs while keeping the prevalence of OPC in HR, LR, and GP groups constant at 0.4039%, 0.0362%, and 0.1109% respectively. **Results.** The PPVs for a DA in HR, LR and GP groups in the US, were estimated at 29%, 3%, and 10%, while for COE the PPVs would be at 12%, 1%, and 4% respectively. **Conclusions.** Utility of DAs in LR and GP groups is negligible. In HR population, DAs may have a slightly better effectiveness than clinicians when assumed to have high sensitivity and specificity.

### **Cytotoxicity of Root Perforation Repair Biomaterials Using Periodontal Stem Cells**

Francisco Espanol, DMD, Post Graduate Resident, Department of Endodontics;  
Peter Murray, Ph.D., Professor, Department of Endodontics;  
Kenneth Namerow, D.D.S., Chair, Department of Endodontics  
College of Dental Medicine

**Objective.** This study was intended to evaluate in vitro cytotoxicity of six common types of root perforation repair biomaterials on human periodontal stem cells (hPSCs). **Background.** An endodontic perforation is as an artificial communication between the root canal system and the external tooth surface, there are new materials that show better biocompatibility and results in direct contact with periodontal tissues. **Methods.** HPSCs (NIDCR, Bethesda, MD) were grown to confluence. Materials were packed into tubing to create 1mm by 1mm samples. The test biomaterials (n = 60 samples) were; A MTA (White ProRoot MTA, Dentsply, Tulsa, OK.); a calcium hydroxide material (USP, Henry Schein, Melville, NY.); a Zinc oxide-eugenol cement (IRM, Dentsply, Milford, DE.); a glass ionomer (Geristore, DenMat, St Maria, CA.); a composite (Resilon, Pentron, CT.), and amalgam (Dispersalloy, Dentsply Milford, DE.). The biomaterials were set for 48 hours in a 37°C incubator. The biomaterials were placed in contact with hPSCs for 24 hours. The cytotoxicity of the biomaterials was measured using a lactate dehydrogenase membrane integrity assay (CytoTox-ONE, Promega, Madison, WI). **Results.** The most to the least cytotoxic biomaterials were; Zinc oxide eugenol (96%), glass ionomer (49%), Amalgam (35%), mineral trioxide aggregate (30%), Composite (17%) and calcium hydroxide (8%). **Conclusion.** Root perforations should be repaired with calcium hydroxide, composite or MTA to limit the death of adjacent periodontal cells. **Grants.** This study was supported by the AAE Foundation and NSU HPD grants.

### **6-Week Clinical Trial Comparing Combination Hygiene and Professional Care**

Cristina Garcia-Godoy<sup>1</sup>, D.D.S., Assistant Professor;  
Robert Gerlach<sup>2</sup>, D.D.S., Oral Care Clinical Research  
<sup>1</sup>College of Dental Medicine, <sup>2</sup>The Procter & Gamble Company

**Objective.** To compare the safety and effectiveness of combination oral hygiene (brush, paste, rinse, floss) or dental prophylaxis on clinical gingivitis. **Methods.** Subjects were evaluated to measure gingivitis and randomly assigned to one of two interventions: combination hygiene (CH) or professional care plus routine hygiene (PC). Whole mouth gingivitis was measured at up to 168 sites by a treatment-blinded examiner using a standard index (Loe-Silness Gingivitis Index). The CH group received 0.454% stannous fluoride paste (Crest® Pro-Health Clinical Gum Protection) and a flexible crisscross manual brush (Oral-B® Pro-Health Clinical), 0.07% cetylpyridinium chloride rinse (Crest Pro-Health) and floss (Glide®), while the PC group received a dental prophylaxis plus a regular anticavity paste and manual brush. Subjects were evaluated biweekly over 6-weeks to assess change in gingivitis bleeding sites. **Results.** Both the CH & PC groups had significant ( $p < 0.01$ ) improvements in gingivitis bleeding beginning at Week 2 and continuing through Week 6. The CH group exhibited increasing improvement over time, with adjusted bleeding site means of 7.7, 5.2 and 2.2 at Weeks 2, 4 & 6, respectively, while in contrast, the PC group showed disease accumulation, with biweekly bleeding site means of 10.7, 13.2 & 15.5. Groups differed significantly ( $p < 0.008$ ) beginning at Week 2 and continuing throughout the study. A total of 46 subjects

(23 per group) completed the study, and both treatments were well-tolerated. **Conclusion.** Use of CH resulted in significant ( $p < 0.01$ ) 80%+ improvements in gingivitis and bleeding relative to PC. **Grants.** Funded by a grant from the Procter & Gamble Company.

### **Effect of Patient Satisfaction, Implant Integration and Masticatory Function of Two Types of Immediately Loaded Implant Overdenture Systems - A Pilot Study with 36-Month Results**

Maria Hernandez<sup>1</sup>, D.D.S., Post-Graduate Periodontics;  
Gregory A. Pette<sup>1</sup>, D.M.D., Periodontist;  
Fernando J. Padron<sup>1</sup>, D.D.S., Implant Fellow, Post-Graduate Periodontics;  
Patrick Hardigan<sup>2</sup>, Ph.D., Executive Director of Health Professions Division Research  
<sup>1</sup>College of Dental Medicine, <sup>2</sup>Health Professions Division Research

**Objective.** The purpose of this pilot study was to evaluate patient satisfaction, mastication and implant integration with two types of implant systems for implant-supported overdentures. **Background.** Since the evolution of implant dentistry, various attachments and components have been used on implant-supported overdentures to improve patient satisfaction. Narrower diameter one-piece implants have also been introduced to simplify the surgical aspect of implant dentistry. The success rates of such implants should be evaluated over time. **Methods.** Eight subjects were enrolled in this pilot study. Subjects were overall healthy and wore adequate complete upper and lower dentures. Initial patient survey was completed which measured comfort, retention, chewing ability, esthetics, appearance, speech and influence on self-esteem on a scale of 0-10. Subjects were then randomly selected to receive one of two types of dental implant systems. Group 1: Astra Tech. Group 2: IMTEC. All implant surgeries were performed under local anesthesia with identical open flap designs. Subjects were prescribed post-operative appropriate antibiotics and analgesics. All subjects received immediate loading of the implants. Subjects then returned for control appointments every six months over a period of three years. **Results.** Both implant systems had statistically improved all tested parameters of patient satisfaction. However, there was a higher implant failure rate and higher prosthetic complication rate with the four one-piece mini implants system versus two regular platform implant system with locator attachments. **Grants.** Funding was obtained from Astra Tech and the NSU HPD grant.

### **Effect of Retinoic Acid on Osteogenesis of Umbilical-Cord Stem Cells**

Umadevi Kandalam,  
Shannon K. McCarthy,  
Stephanie Chery,  
Eric J. Stelnicki,  
College of Dental Medicine

**Background.** Retinoic acid (RA) is known to induce osteogenic differentiation in many cell types including mesenchymal stem cells obtained from various sources. **Objective.** The objective of this study was to investigate the potential of retinoic acid as an inducer of osteogenic differentiation in human umbilical cord derived mesenchymal stem cells (hUMSCs) and its use in bone tissue engineering for the repair and regeneration of craniofacial bony defects. **Methods.** The hUMSCs obtained from Sciencell (Carlsbad, CA) were cultured in complete medium containing low glucose Dulbecco's modified eagle medium with 10% of fetal bovine serum and 1% antibiotic and antimycotic solution at 37°C in 5% CO<sub>2</sub>. Subconfluent cells were treated with retinoic acid (0.5, 1 and 2µM) in the presence of complete medium along with ascorbic acid and β glycerophosphate. Cell proliferation was measured by MTT assay and osteogenic marker gene expression was measured by RT-PCR. The activity of alkaline phosphatase (ALP) enzyme was determined using colorimetric assay. Matrix mineralization was assessed by alizarin red staining. **Results.** Cell proliferation was significantly decreased in dose dependent manner in the cells exposed to retinoic acid when compared to control. The ALP gene expression was significantly down regulated by RA in a dose dependent manner. The ALP activity showed a significant decrease in the cells treated with retinoic acid. hUMSCs did not show matrix mineralization. **Conclusion.** The results of this study

suggested that RA inhibits osteogenic differentiation in hUMSCs. **Grant.** NSUHPD Grant Number # 335298).

### **Clinical Reasoning in Dentistry: A Conceptual Framework for Dental Education**

Shiva Khatami<sup>1</sup>, Ph.D., Assistant Professor, Department of Orthodontics;  
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<sup>1</sup>College of Dental Medicine, <sup>2</sup>University of British Columbia

**Objectives.** To describe the process and strategies of clinical reasoning used by dental clinicians across different levels of expertise to develop a conceptual framework for curricular design and assessment of competency. **Methods.** Using “think-aloud” method, we interviewed 18 dental students about biopsychosocial issues influencing oral health identified in 6 vignettes; and 8 orthodontic residents plus 11 orthodontists about problems of craniofacial growth and malocclusion presented in 2 vignettes. The interview transcripts were analyzed to explore the process and strategies of clinical reasoning used. **Results.** The reasoning process in both groups included: 1) a ritualistic approach to collect information for a treatment plan; 2) forward and backward reasoning to make and test hypotheses from clinical information; 3) pattern recognition and an integrated script of knowledge and experience triggered by related attributes of the script leading to a clinical diagnosis and plan; and 4) decision trees to evaluate treatment options and maximize the probability and utility of outcomes. Seven reasoning strategies (scientific, conditional, collaborative, narrative, ethical, pragmatic and “part-whole”) were used by both groups. However, experienced clinicians were more confident in their appraisal of uncertain situations and dilemmas as they integrated several reasoning strategies in the process; used refined scripts of knowledge and experience in familiar situations; and were able to reflect on the impact on their reasoning of the larger social, cultural and political context. **Conclusions.** Clinical reasoning in dentistry is a contextual and interactive phenomenon that requires integration of specific reasoning strategies to address the biopsychosocial factors influencing oral health. **Grants.** This study was supported by the Institute for the Scholarship of Teaching and Learning at University of British Columbia, Vancouver, Canada.

### **In-vivo Assessment of Osseous Wound Healing Using Bone Putty in the Surgical Management of Tooth Extractions**

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**Objective.** This pilot study evaluated the systemic, radiographic and histological responses to bone putty containing lidocaine in a tooth extraction model in dogs. **Background.** Earlier research has shown that digestive enzymes tend to remain stable for individual mice over a lifetime when measured at the same point of a digestive cycle, but may differ widely among mice, even mice with close genetic bonds, e.g., siblings. To date, no explanation of this difference has been proposed. **Methods.** In five beagle dogs the right mandibular premolars were extracted and sockets grafted with either: 1) xenograft particulate bone and a collagen sponge plug (control), 2) bone putty alone, 3) bone putty mixed with xenograft (3:1), and 4) xenograft sandwiched between bone putty. After 6 weeks, the systemic and local responses were evaluated using a blood chemistry panel, microCT and histological analysis. **Results.** No significant differences in blood chemistries were noted at 6 weeks post-grafting compared to baseline. Sockets grafted with either of the bone putty formulations demonstrated comparable radiographic and histologic evidence of bone healing compared to control sockets. **Conclusion.** Our pre-clinical results indicate that



this bone putty is a safe, biocompatible device that may be useful in the post-operative management of tooth extractions. **Grants.** This study was funded by an unrestricted grant from Orthocon, Inc., Colts Neck, NJ, USA.

### Expression and Function of NUMB in Ameloblast Differentiation

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Carla Evans<sup>3</sup>, D.D.S., Professor;  
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**Objective.** To determine whether NUMB plays roles in the differentiation of the dental cells. **Background.** NUMB has been implicated to play roles in lineage commitment by both gain- and loss-of function approaches. Its function has been attributed to the asymmetric distribution in daughter cells. **Methods.** RT-PCR, western blot, immunocytochemistry, confocal microscopy and PCR super-array analysis were applied to study the expression and signaling regulatory effects of NUMB. **Results.** We isolated 2 full-length clones for NUMB from mouse dental pulp mRNA. One novel sequence contains 200bp insertion in the Phosphotyrosine Binding Domain (PTB) may encode for a new isoform of NUMB. Confocal microscopy detected strong NUMB expression in human dental pulp stem cells (hDPSC), odontoblasts (Od) and pre-ameloblasts (pre-Ab). Western blot analysis indicated NUMB isoforms were differentially expressed in dental tissues. In postnatal mouse tooth germs, NUMB was expressed in the pre-ameloblasts and Odontoblasts, cervical loops, and DPSC in the vicinity of the immature odontoblasts. NUMB overexpression in pre-ameloblasts, significantly reduced activated Notch1 protein expression level. In the super array analysis of Notch1 signaling, NUMB down regulates Shh expression in pre-ameloblasts. **Conclusion.** New NUMB mRNA was detected in dental pulp cells. NUMB has a temporal expression pattern in developing tooth germs suggesting critical role of NUMB in ameloblasts and odontoblasts differentiation. NUMB negatively regulate activated Notch 1 and SHH signaling in Hat-7 cells. **Grants.** This work was supported by NIH grant DE 11657 and the Department of Orthodontics at UIC.

### The Use of Nd: YAG Laser Therapy Following Initial Treatment of Periodontitis

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**Objective.** The purpose of this study was to evaluate the effectiveness of the combined use of Nd: YAG laser therapy with ultrasonic instrumentation on patients with residual pocketing after initial periodontal therapy. **Background.** Research has shown that the Nd: YAG laser has the ability to kill bacteria, ablate soft tissues, achieve hemostasis, and promote healing. Some studies indicate that when the Nd: YAG is used as an adjunct to mechanical debridement the clinical signs of periodontal disease are significantly reduced. However, randomized, controlled studies are lacking. **Methods.** Twenty patients were treated in split mouth design in which the test side received ultrasonic debridement in combination with use of Nd: YAG laser therapy and the control side received ultrasonic debridement alone. **Results.** Both groups showed reduction in probing depths, bleeding index, gingival index and plaque score with the laser group showing a slightly greater reduction in the aforementioned categories. However, probing depths greater than 5 mm have remained the same in both groups. **Conclusion.** The use of laser therapy in combination

with ultrasonic debridement may be useful in improving gingival index, bleeding index and probing depths less than 5 mm after initial therapy. **Grant.** This study was funded by the NSU Health Professions Grants.

### **Effect of low Elastic Modulus Liner and Base as Stress-Absorbing Layer in Composite Resin Restorations**

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Sillas Duarte, Jr.<sup>2</sup>, Department of Comprehensive Care  
Cleudmar A. Araujo<sup>3</sup>, Department of Mechanical Engineering  
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**Objectives.** The aim of this study was to evaluate the effectiveness of liner and base materials to reduce the stress resulting from polymerization shrinkage. The null hypothesis tested was that the presence of liner and base low viscosity materials under composite resin restoration reduces the polymerization shrinkage stress. **Methods.** A quasi-three-dimensional photoelastic model of a second premolar with a class I preparation was restored using four experimental groups (n = 7): RC, resin composite (Filtek Z250); FLRC, flowable liner (Filtek Flow) + resin composite restoration, VLRC, resin-modified glass-ionomer liner (Vitrebond) + resin composite restoration, and VBRC, resin-modified glass-ionomer base + resin composite restoration. The maximum shear stresses ( $\tau_{max}$ ) were calculated along the adhesive interface in 13 predefined and standardized point locations. Data were submitted to one-way ANOVA analysis, followed by a Tukey's post-hoc test ( $p < 0.05$ ). **Results.** A significant difference was found among the experimental groups ( $p = 0.001$ ); therefore, the null hypothesis was rejected. The mean maximum shear stress was: 38.0 KPa for RC, 52.1 KPa for FLRC, 72.8 KPa for VLRC, and 90.2 KPa for VBRC. The polymerization shrinkage stress level from least to greatest was: RC<FLRC<VLRC<VBRC. The overall stress distribution in class I restoration indicated that stresses were primarily accumulated at the cavosurface and internal line angles. **Significance.** Using a flowable composite or resin-modified glass-ionomer as liner or base material under composite resin restoration increases the polymerization shrinkage stresses at the adhesive interface leading to a possible adhesive failure.

### **Marginal Bone Support on Dental Implants With Sloped Marginal Contours**

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College of Dental Medicine

**Objective.** This study was conducted to evaluate the maintenance of marginal bone levels following placement of a sloped implant into a healed alveolar ridge where the bone slopes from lingual to buccal. **Background.** In situations where the crest of the alveolar bone is higher on the lingual than on the buccal, placement of a standard implant may be complicated. **Methods.** In this prospective, open, multicenter study, 65 patients between 18 and 75 years of age requiring replacement of a single tooth in a healed ridge were included. Inclusion criteria included: a difference in ridge height of 2 – 5 mm, and missing the tooth for at least 3 months. Sloped implants were placed and bone levels were evaluated after 16 weeks of healing followed by restoration with a cement retained definitive crown. Radiographs and clinical measurements were taken at 16 weeks, 21 weeks and 52 weeks after implant placement. **Results.** Implant survival was 100%, minimal changes in marginal bone were seen (mean = -0.2mm on the lingual and buccal at 16 weeks and -0.6mm on the proximal at 52 weeks.) **Conclusion.** The sloped implant is a predictable treatment option in cases where the bone slopes from lingual to buccal. **Grants.** This study was supported by Astra Tech AB, Mölndal, Sweden.

## Ex Vivo Evaluation of the Sealing Ability of BC Sealer in Ribbon-Shaped Canals

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**Objective.** The purpose of the present study is to evaluate the sealing ability of synchronized hydraulic condensation and BC Sealer cement in both ribbon-shaped and round root canal systems, and compare it to traditional warm vertical condensation technique with AH Plus. **Background.** Recently, Brassler USA, introduced a new philosophy for filling root canals termed “synchronized hydraulic condensation.” This method utilizes a bioceramic, aluminum-free sealer (BC Sealer) consisting of a cement-like paste that is able to be injected into the root canal requiring water to set and harden. Little has been reported as to the sealing ability of this sealer and technique. **Methods.** Forty-eight single rooted teeth were collected and decoronated at 17 mm. They were shaped using EndoSequence rotary instrumentation to a size of 30/04 and cleansed with NaOCl 5.25%. The specimens were divided into 2 groups (n = 20) according to their root canal anatomy: round, or ribbon shapes. Samples were sectioned horizontally and microscopically evaluated for canal space occupied with gutta percha /sealer relative to total canal volume. **Results.** To be determined. **Conclusion.** To be determined. **Grants.** This study was partially funded by the Health Professions Division grant.

## Comparison of Clinical and Digital Radiographic Detection of Occlusal and Proximal Dental Caries in Caries-Active Adults

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**Objective.** (1) to determine the agreement between a clinical examination (CE) and a radiographic examination (RE) in detecting caries lesions on occlusal and proximal surfaces of posterior teeth of participants enrolled in a longitudinal study; and (2) to determine the additional caries diagnostic yield on occlusal and proximal surfaces of posterior teeth obtained by supplementing CE with RE for those participants. **Background.** Radiographs have been shown to be an important adjunct to visual-tactile caries exams, but the contribution of radiographs to a CE in caries-active adults has not been fully determined. **Methods.** Participants were caries-active adults of both sexes with at least 12 erupted teeth who (1) received baseline visual-tactile caries CE, and (2) had a complete set of interproximal radiographs obtained within 7 months of the date of the CE (n = 114). After approval from IRB, two examiners on 114 participants' records (442 bitewings assessed radiographs independently. **Results.** A total of 2,415 surfaces were examined by both CE and RE. There were 1,233 (34%) surfaces considered missing. Among all surfaces the Kappa statistic was 0.18 (0.04 for occlusal and 0.18 for proximal). The additional diagnostic yield afforded by RE over CE was 69.2% for all surfaces combined, (54.6% for occlusal surfaces, and 71.0% for proximal surfaces). **Conclusions.** There is poor agreement between CE and RE when used to detect caries in posterior teeth of caries-active adults. However, a RE performed within 7 months of the date of the CE adds substantial diagnostic yield to the CE, especially on proximal surfaces.

## **Cryopreserved Amniotic Membrane for Modulation of Periodontal Soft Tissue Healing: A Pilot Study**

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Michael A. Siegel, D.D.S., Professor and Chair Department of Diagnostic Sciences;  
Maria Hernandez, D.D.S., Assistant Professor Department of Periodontics  
College of Dental Medicine

**Objectives.** The purpose of this randomized pilot study was to evaluate the value of cryopreserved amniotic membrane (CAM) in helping the cicatrization and wound healing after placement of dental implants. The epithelialization rate, the pain, the risk of infection, and the presence of inflammation and scarring were studied. **Background.** Amniotic membrane constitutes an immunologically compatible surgical patch, currently used in ocular surface reconstruction. Several lymphokines contribute to the amniotic membrane's biological actions: Transforming Growth Factor- $\beta$ , Transforming Growth Factor- $\alpha$ , Keratinocyte Growth Factor, Neural Growth Factor, and Collagens I, II, III, IV. It has been shown to reduce acute inflammatory response and to be an excellent tissue for reconstructive surgery, because it has healing properties, is commercially available, ethically acceptable, easy to use and easily stored. **Methods.** Cryopreserved amniotic membrane was placed in the area of periodontal surgical wounds related to implant placement. Randomization was achieved concerning which side had the CAM and what side was operated upon first. The extent of healing was evaluated by a blind investigator, for lesion size, epithelialization, pain, infection, inflammation and scarring. Clinical evaluation occurred at baseline, 72 hours, 144 hours, 2 weeks, 1 month, 1.5 months, and 3 months. The results were compared with conventionally managed similar lesions, treated the same day in the same patient, as self control. **Results.** This prospective randomized pilot study did show statistically significant differences between the experimental and the control groups. **Conclusion.** The usefulness of cryopreserved amniotic membrane during the healing and cicatrization period in periodontal surgery was demonstrated. **Grants.** Funding for this project was provided through the Nova Southeastern University President's Faculty Research and Development Grant #HPD-DEN04030801.

## **COLLEGE OF MEDICAL SCIENCES**

### **Rescue of Atypical PKC: Role of Hsp70 Chaperone and Intermediate Filament Cytoskeleton**

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**Objective.** In this study we tested the hypothesis that a pool of atypical PKC is associated with Hsp70 and intermediate filament scaffold in polarized epithelial cells. **Background.** The Protein Kinase C (PKC) family in humans comprises 10 isoforms categorized in 3 subclasses: conventional, novel and atypical. Atypical PKC is a key regulator of cell asymmetry organization. Unlike other kinases, PKC isozymes lose their activation phosphorylation in a substrate-dependent manner, i.e. they become inactivated as a consequence of their own function. Once dephosphorylated, the PKC molecules are ubiquitinated and degraded. Hsp70 chaperone was shown to bind dephosphorylated conventional PKC isoforms and rescue them from degradation to regain function. A role of Hsp70 in rescuing atypical PKC (aPKC) has not been established. However, based on the presence of the invariant Leu motif necessary for Hsp70 binding, we suggested that functional pool of aPKC is also maintained by Hsp70. **Methods.** We performed confocal colocalization experiments, immunoblot analysis, qPCR and shRNA-mediated knock-down of Hsp70 and keratins in Caco-2 (human colon carcinoma) epithelial cells. **Results.** Our experiments demonstrate that Hsp70 and aPKC exist in two different pools: soluble and associated to the cytoskeleton. Both Hsp70 and the native filamentous keratin cytoskeleton are necessary for the rephosphorylation of the inactive form of aPKC and its rescue from degradation. **Conclusion.** Our results not only confirmed the association of aPKC with Hsp70, but also showed a novel function of the

cytoskeleton in the post-translational regulation of aPKC expression and localization. **Grants.** Supported by NIH grant R01DK076652 (to P.J.S.).

### **Austrian Pathologist Anton Ghon and Curious Cases of Namesake Misattribution in the Medical Literature: A Form of the Matthew Effect?**

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**Objective.** This study explored the origin of author-name misattribution of colleagues of Austrian researcher Anton Ghon and relevance of the Matthew effect as a contributing casual factor to these types of errors. **Background.** The term Matthew Effect derives from a quote in the Gospel of St. Matthew; “For to all those who have, more will be given, and they will have abundance; but from those who have nothing, even what they have will be taken away.” The term is used on occasions when a piece of research, an idea or a quotation gets associated or attributed to a more famous person rather than to its originator. **Results.** I have investigated two examples of erroneous substitution of original authors for a better known namesake in the medical literature. In the first example, the description of *Moraxella catarrhalis* has been misattributed to a publication of Ghon with prominent Prussian bacteriologist Richard Pfeiffer. In fact, Hermann Pfeiffer, a less prominent Austrian specialist, co-authored the paper. In the second example, description of the certain features of *Clostridium chauvei* was misattributed to the efforts of Ghon with Hans Sachs, another renowned bacteriologist. In fact, the real co-author of the paper was Milan Sachs, who is not well known. Omission of the first names of authors was common in citations early in the 20th century. **Conclusion.** Omission of the first names of authors underlies substitution of their names with more prominent namesakes. These examples can be seen as a peculiar form of the Matthew effect.

## **COLLEGE OF OPTOMETRY**

### **Penetrating Corneal Injury: An Alternate Perspective**

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**Introduction.** One third of all vision loss in the first decade of life is secondary to trauma. **Case Presentation.** Surgery began 5 hours after a 6 year old female ruptured her right globe with a pair of scissors. The full thickness corneal, lenticular and scleral lacerations were treated by surgical repair of the cornea and sclera and patched overnight. **Deviation From the Expected.** This case will be presented from an alternate perspective; the parent. An innovative technique was utilized to increase compliance. **Discussion.** The next day the patch is removed and treatment with medication is initiated. Drop installation every two hours creates a traumatic situation for a 6 year old. Lens removal by pars plana vitrectomy and posterior capsulotomy was performed two and one half weeks later. The patient’s acuity was light perception with projection. The medications were tapered. The management incorporated protective eyewear, modifications to her school routines and training of the school nurse. Two months after the initial injury, all sutures were removed. Counseling began since the patient was experiencing night mares and despair about permanent blindness. The girl was eventually fit with a Silicone hydrogel which is inserted and removed independently. **Conclusions.** Techniques developed for compliance and management of this young child with a serious condition can be useful to other practitioners assisting families in similar situations. Presently, acuity maintained at 20/60 with contact lens and glasses. The patient has developed an 8 diopter exophoria resulting in an increased use of occlusion therapy. **Grants.** No funding source.



## Peripapillary Schisis With Sensory Detachment in Advanced Glaucoma

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**Introduction.** A case of juxtapapillary retinal schisis-like cavities associated with underlying serous detachment in a normal tension glaucoma patient is described. **Case Presentation.** A normal tension glaucoma patient with enlarged optic nerve cupping was observed to have temporally localized juxtapapillary serous retinal detachment OD. Optical coherence tomography (OCT) demonstrated an area of retinal schisis-like cavities with underlying serous detachment contiguous to the temporal disc margin. Presence of an atypical coloboma or optic nerve head pit was not observed during biomicroscopy, OCT or using Heidelberg retinal tomography (HRT). This presentation occurred in the absence of an atypical optic nerve coloboma, congenital or acquired optic nerve head pit. The juxtapapillary retinal schisis-like cavities resolved spontaneously. **Deviation From the Expected.** Few cases involving a similar presentation in glaucoma, exhibiting spontaneous resolution has been documented in literature. **Discussion.** Retinal schisis-like compartments with underlying serous detachment may develop in individuals with advance glaucomatous cupping independent of elevated intra ocular pressure or presence of an atypical coloboma or optic nerve head pit. **Conclusion.** A mechanism similar to that postulated for the development of optic nerve pit associated foveolar schisis and central serous detachment (CSD) may be responsible for this analogous presentation in advance glaucoma. Microscopic pores located at the inner limiting membrane, between the optic nerve, subarachnoid space and retina may provide an interconnecting access for fluid passage into the retina.

## Idiopathic Neuroretinitis: A Case Study and Differentials Discussion

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College of Optometry

**Introduction.** Posterior uveitis is an entity attributed to both infectious and non-infectious agents. Due to the numerous etiologies of neuroretinitis, it is important that ophthalmic physicians are able to diagnose these conditions using both clinical evaluation and supporting ancillary testing. **Case Presentation.** Presented is an atypical case of idiopathic posterior-uveitis in an otherwise healthy, black 15-year-old female. The patient presented with flu-like symptoms and painful, red eyes with blurry vision bilaterally. Clinical presentation included bilateral diffuse conjunctival injection, vitreous cells, peripheral creamy-placoid chorioretinal lesions, disc edema, and macular pucker. **Deviation From the Expected.** All serological and radiologic examination findings were unremarkable, suggesting no systemic or infectious etiology. Posterior uveitis is commonly attributed to infectious or non-infectious disease. **Discussion.** Ancillary testing was used to confirm the presence of optic disc swelling and macular pucker. Due to the idiopathic nature of this case, the patient was initiated on an oral steroid schedule without antibiotic, which resulted in an improvement in patient comfort, visual acuities, and improved clinical presentation. **Conclusion.** Due to the myriad of infectious and non-infectious etiologies, careful clinical assessment and use of proper ancillary testing is essential in making the diagnosis of posterior uveitis.

## Global Burden of Diseases, Injuries, and Risk Factors Study (GBD)- The Vision Loss Group—Early Trends and Considerations of the Global Prevalence of Blindness and Visual Impairment

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*on behalf of the GBD Vision Loss Expert Group*

**Objective.** This presentation shall describe the GBD, with emphasis on the global prevalence trends in visual impairment and blindness. **Background.** The GBD is a complete systematic assessment of the

data on *all* diseases and injuries and produces comprehensive comparable estimates of the burden of diseases, injuries and risk factors for the time periods 1990, 2005 and 2010 for 199 countries divided into 21 global sub-regions. It is directed by the World Health Organization in partnership with global experts in each disease area. **Methods.** A group of Vision Loss Experts conducted a systematic literature review from 2008-2010 for nationally-representative scientifically-valid peer-reviewed published articles describing the prevalence and incidence of case definitions for 7 levels of presenting vision loss. Studies were included if they were a representative sample of the national or regional population. Data were modeled in a hierarchical model in a linear and non-linear fashion, borrowing data across countries and regions where data was sparse or unsuitable. Covariates such as income (GDP), education, health systems access, and urbanization were also modeled. **Results.** The global trends over time, with age-adjusted estimates and gender-specific estimates will be presented. Selected examples of specific countries or regions will be highlighted. **Conclusions.** The World Health Organization's campaign to eliminate avoidable blindness by the year 2020 needs accurate data estimates to meet this ambitious objective. The results from the current GBD show trends of reduction in the global level of blindness across all regions from 1990 to 2010. **Grants.** None to NSU.

### **Myelinated Retinal Nerve Fiber Layer, Myopia and Amblyopia**

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College of Optometry

**Introduction.** The triad of myelinated retinal nerve fiber layer (RNFL), myopia, and amblyopia is a rarely reported syndrome. Myelinated RNFL is present in approximately 1% of eyes and associated with a variety of ocular and systemic conditions. This lecture presents a case of myelinated RNFL, myopia, and amblyopia as a platform for discussion of the pathogenesis of myelinated RNFL, ocular and systemic conditions associated with myelinated RNFL, and visual prognosis in this triad. **Case Presentation.** A 52 year old black female presents with longstanding decreased vision in the right eye. BCVA: OD 20/610 and 20/20 OS. Manifest refraction: -14.00-0.75x060 OD and +0.50-0.25x082 OS. Fundus examination reveals extensive superior temporal RNFL myelination OD. Macula optical coherence tomography reveals thinning with a central thickness of 175 microns OD. **Deviation From the Expected.** In patients with the triad of myelinated RNFL, myopia and amblyopia the prognosis of visual acuity is variable and may be worse than 20/200 even with aggressive amblyopia treatment. **Discussion.** The pathogenesis of myelination of retina is unknown but there are a few hypotheses including loss of barrier function of the lamina cribrosa and abnormal migration of oligodendrocyte precursors. Regression of myelination has been shown in certain conditions such as optic neuritis, pituitary adenoma, glaucoma, and Behcet's disease. **Conclusion.** It is important for the clinician to have a guarded prognosis in the treatment of amblyopia for patients with this triad. Although myelination of the RNFL is usually a benign clinical finding, it is important to be aware of its associated conditions.

### **Congenital Achromatopsia: A Case Study and Low Vision Aids**

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Shawn X. Yu, O.D., Instructor  
College of Optometry

**Introduction.** Congenital achromatopsia (CA) is predominantly an autosomal recessive disease affecting the retinal cone photoreceptors. The condition affects approximately 1 in 30,000 people. Individuals with CA generally have photophobia, pendular nystagmus, abnormal photopic electroretinogram, and lack of color discrimination. **Case Presentation.** Presented is a case of CA in a healthy, 24-year-old male. The patient presented with decreased vision since birth that was slightly improved with a spectacle prescription. The patient was unaware of the cause of his decreased vision at initial presentation, although he had been told previously that he "has a problem with his macula." The patient's uncorrected distance VA was 2/16 on the METDRS chart (20/160 Snellen equivalent) OD and OS and 0.1/0.8M at

near OU. Biomicroscopy revealed an unremarkable anterior segment and funduscopy revealed mild macular pigmentary changes OU. **Deviation From the Expected.** The macula was irregular and coincided with an abnormal OCT revealing a hypopigmented area centrally in the fovea OU. In addition, the photopic electroretinogram (ERG) revealed a reduced single-flash b-wave amplitude and a non-detectable 32-hz flicker response OU. **Discussion.** CA can cause varying degrees of decreased vision ranging from 20/80 to 20/200. Macular appearance varies from a completely normal macular appearance to an atrophic macular lesion and ancillary testing can be used to aid in the diagnosis. **Conclusion.** CA can be a difficult condition to diagnose without performing additional testing such as an OCT or ERG. While there is no treatment for the condition, low vision aids are often helpful to improve quality of life.

### **The Development of the Receptive-field Internal Structure of V2 Neurons in Primates**

Bin Zhang, M.D., Ph.D., Associate Professor  
College of Optometry

**Objective.** To study the maturation of the receptive-field (RF) internal structure of the of V2 neurons in primates. **Background.** Visual capacities of primates are limited near birth. Physiologically, multiple inputs from the primary visual cortex (V1) neurons tuned to various local stimulus features converge on V2 neurons and many of these early extrastriate neurons may acquire new sensitivities to more complex features of visual scenes. The responses of V1 neurons are qualitatively adult-like as early as 6-14 days after birth and well tuned to stimulus orientation, spatial and temporal frequency, size, contrast, and disparity by 4 weeks of age. However, we know very little about the functional maturation of extrastriate visual neurons. **Methods.** Each V2 neuron was stimulated with a dense dynamic noise array. A local spectrum reverse correlation analysis was performed to reveal the internal structure of the RF. **Results.** As early as 4 weeks of age, V2 neurons showed facilitatory subfields with similar homogeneity for the preferred orientation and spatial frequency as adults, although the maximum activation strength was significantly lower than those in adults. V2 neurons also showed suppressive subfields with similar degree dishomogeneity for the preferred orientation and spatial frequency as adults. The maximum suppressive strength in infants was not significantly different from those in adults. **Conclusion.** Our results suggest that, for V2 neurons, an adult-like spatial organization of receptive-field center is largely attained by 4 weeks of age. **Grants.** This study was funded by a grant from the NEI R01-EY-08128.

## **COLLEGE OF OSTEOPATHIC MEDICINE**

### **The Effect of Marital Status on the Treatment of Cancer of the Mouth**

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Erika Granada;  
Loyda Lavado;  
Lina Mejía;  
Carol Montoya;  
Ana María Ospina;  
Gabriel Suciú, Ph.D.

Oral cavity and oropharyngeal cancers are frequently described as part of a group of oral cancers or head and neck cancer. Treatment of oral cavity cancer is generally surgery followed by radiotherapy, whereas oropharyngeal cancers, which are more likely to be advanced at the time of diagnosis, are managed with radiotherapy or chemoradiation. Surgery for oral cancers can be disfiguring and both surgery and radiotherapy have significant functional side effects, notably impaired ability to eat, drink and talk. Risk factors that include the human papilloma virus (HPV), oral sex, a poor diet and differences in the habits regarding socio-demographic characteristics suggest that all these factors do play an important role in the early diagnosis and prognosis. This is a routine database analysis, comparable to a cross-sectional study

design. 2,569 individuals with cancer of the mouth, diagnosed in the state of Florida between January 1, 1994 and December 31, 2002 were studied. The objective of the study was to analyze the effect of socio-demographic factors, such as marital status on the treatment of cancer of the mouth. The outcome was considered the vital status (dead or alive) and the exposure factor was treatment (exposed (SUR+RT), vs unexposed (SURGERY)). Histology and Marital Status were found to be Effect Modifiers. The results are illustrated below. Single patients with squamous cell carcinoma at a localized or regionalized stage, are 69% more likely to die if they follow surgery + radiation than married patients.

### **Substance Abuse Treatment Modalities and Outcomes in a Naturalistic Setting**

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Outcome studies are gaining importance in all areas of medical, social services and education practices due to a growing emphasis on evidence-based interventions. Evidence-based programs and practices combine research evidence with clinical expertise; the ultimate goal is to optimize clinical outcomes and improve patient quality of life. The need to implement programs that have track records of effectiveness has never been greater. The specific research questions addressed by this study were: 1. Among patients who completed treatment, what are the abstinence rates at up to 3 months, 3-6 months, and 6-12 months post-discharge? 2. What are the effects of the various treatment modalities on inpatient treatment completion status? 3. How do demographic characteristics (age, gender, and diagnosis) affect treatment completion status? 4. Among patients who completed treatment, what are the effects of the various treatment modalities on abstinence at various points in time? 5. Among patients who completed treatment, how do demographic characteristics (age, gender, and diagnosis) affect abstinence? 6. By incorporating the significant results from questions 2-5, which factors remain significant in a final logistic regression model? A retrospective case series study based on chart review was conducted in a private residential substance abuse treatment facility. During the 18-month time period of the study, 775 patients entered treatment and 677 completed treatment (87.4%). For those who completed treatment, follow-up data were collected by telephone calls. The abstinence rate at one year, including non-respondents to follow-up, was approximately 11%. Women were less likely to be abstinent than men, even though they were more likely to complete treatment. Those aged 65+ and ≤ 30 were more likely to be abstinent than those aged 31-64, yet an incremental increase by age category was found to be associated with treatment completion. Two intervention modalities, relapse prevention and spirituality, significantly differentiated patients by treatment completion in a univariate analysis. In a multiple imputation logistic regression analysis of abstinence, social support was the only interventive modality found to be positively related to abstinence, OR=2.31 and 95% CI=(1.44, 3.68), while substance abuse counseling was the only modality found to be negatively associated with abstinence, OR=0.41 and 95% CI=(0.21, 0.82). Implications for treatment improvement are discussed.

### **Sex-Based Differences in Physiological Reactions to Playing MMORPGs**

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The use and popularity of video games, particularly massively multiplayer online role-playing games (MMORPGs), has increased exponentially in the past two decades (Entertainment Software Association; ESA, 2010). Research has been conducted on psychophysiological responsiveness to various video games, such as respiration, heart rate, muscle tension, peripheral temperature, and electrodermal activity. However, there has been a lack of research on psychophysiological responsiveness to MMORPGs. Mandryk, Inkpen, and Calvert (2006) suggest participants exhibited greater psychophysiological reactivity when playing against another human compared to a computer, which indicates that the social aspects of game play can further immersion in the game. In MMORPGs such as World of Warcraft, which are built upon social interactions, this finding may act as a reason for why this genre of games are more popular, players have increased engagement, and there are higher levels of addiction. Gender differences are also a significant variable to consider in terms of emotionality and physiological responsiveness to MMORPGs. Given these points, this study is designed to examine how participants respond physiologically to various conditions (such as questing, fishing, dueling, or character creation) while playing the MMORPG World of Warcraft. The mitigating effects of gender on their physiological reactivity to these conditions will also be evaluated. Participants for this study are ~60 individuals aged 18-35 who have played video games within the past 12 months. The primary data analysis will be done using an individual growth curve model including gender and game play condition as predictor variables for each physiological modality. Through increased understanding of how males and females differ physiologically in their reaction to different game play segments within MMORPGs, this could help increase the capacity of games to be stimulating and engaging or assist in developing a biofeedback-assisted intervention for video game addiction.

### **Sacral Neuromodulation for Non-Obstructive Urinary Retention: A Meta-Analysis**

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**Objective.** The object of this study is to systematically review the literature regarding the efficacy of sacral neuromodulation (InterStim<sup>®</sup>) for treatment of non-obstructive urinary retention. **Methods.** Eligible studies were selected through an electronic literature search of PubMed, Cochrane Collaboration, EMBASE, Web of Science and Scopus databases from January 1980 to August 2008. Two investigators independently reviewed all studies to assess methodological quality and inclusion criteria. Eligible studies evaluated sacral neuromodulation using implanted generators with permanent lead placement for treating non-obstructive urinary retention. The primary outcomes assessed were the change in pre- and post-operative post-void residual and voided volume. Exclusion criteria were neurogenic etiology (i.e. spinal cord injury) for urinary retention and non-English studies. The lead authors of all selected studies were contacted to identify ongoing or unpublished research, as was Medtronic, Inc. (Minneapolis, MN). Data were extracted from the selected studies and analyzed using RevMan 5 (Review Manager, Cochrane Collaboration, 2008). The mean difference with a 95% confidence interval was the effect of interest. **Results.** A total of 14 articles met all inclusion criteria for the systematic review. This included one randomized control trial (RCT) and thirteen observational studies. Outcome data was available from a total of 7 studies and used in the final analysis. After implantation, the mean difference in post-void residual decreased 236ml (95% CI: 219-253,  $p < 0.00001$ ) and voided volume increased by 299ml (95% CI: 280-318,  $p < 0.00001$ ). The randomized control trial alone ( $n = 51$ ) showed a mean decrease in post-void residual volume in the implanted group compared to control of 270ml (95% CI: 180-360,  $p < 0.00001$ ) and a mean increase in voided volume of 104 ml (95% CI: 55-152,  $p < 0.0002$ ). **Conclusion.** Based on the available literature, sacral neuromodulation is an effective therapy for treatment of non-obstructive urinary retention. Non-obstructive urinary retention is caused either by bladder dysfunction or from urethral obstruction. Bladder dysfunction may be caused by a weak or acontractile bladder muscle. The etiology of this disorder may be due to a myogenic, neurogenic or psychogenic origin. The multifactorial nature of this disorder contributes to the difficulty in finding an effective treatment modality. Traditional management has included pharmacotherapy and urethral dilation neither of which has been particularly successful. Individuals suffering from this disorder often need to learn how to perform clean



intermittent self-catheterization (CISC). Furthermore, individuals who cannot perform CISC due to physical limitations require an indwelling catheter. Although the mechanism of sacral neuromodulation was and remains unclear, the FDA approved its use for non-obstructive urinary retention in 1999.

### **Effect of Histology and Stage on the Survival of Elderly Women With Ovarian Cancer**

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**Introduction.** Approximately fifty percent of women diagnosed with ovarian cancer (OC) are elderly. Despite the higher prevalence of malignant neoplasms, treatment is often less aggressive than that in younger patients. This study examined a group of elderly women with stage III and stage IV epithelial OC, histologically typed as adenocarcinoma and papillary serous cystadenocarcinoma (PSC), for the effects of treatment outcome on survival. **Methods.** Study considered 6514 females, aged 65 and older, with OC from the Florida Cancer Registry (January 1, 2004 through December 31, 2009). Surveillance data with a follow-up period with maximum of 6 years were available. Some analyses are based upon on frequency tables reported at one point in time. Survival analyses were performed using Kaplan-Meier method, and nonparametric comparison techniques were used. Chi-Square test of independence with a two-sided p-value was reported for frequency comparisons. **Results.** Stage III and IV PSC cases received surgery plus chemotherapy (SCT) more frequently than surgery alone (S) ( $p = 0.0003$ ). Stage does not impact the median months of survival nor the three year survival time with treatment by S or SCT. For adenocarcinoma and PSC cases, survival was increased in stage III and IV cancers with SCT. Caucasian survival with adenocarcinoma and PSC was increased in stage III and IV cancers with SCT. Survival results were similar with non-married patients. Married patients had increased survival with SCT with stage III and IV PSC. **Conclusion.** Study demonstrated increased OC survival when patients were treated with SCT.

### **Vaginal Cuff Dehiscence in Patients Undergoing Total Robotic and Laparoscopic Hysterectomy and the Use of Bidirectional Barbed Suture**

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**Objective.** The current literature suggests that robotic procedures appear to incur the greatest risk of vaginal cuff dehiscence. The purpose of this study is to compare the clinical outcomes in relation to vaginal cuff dehiscence in patients undergoing total robotic hysterectomy (TRH) compared to conventional total laparoscopic hysterectomy (TLH) and the use of bidirectional barbed suture. **Methods.** A retrospective cohort study was performed including women undergoing either conventional total robotic hysterectomy (TRH) or total laparoscopic hysterectomy (TLH) from January 1, 2004 to July 31, 2011 performed by a single surgeon. Age, weight, BMI, surgical procedure, EBL, vaginal cuff complication, dehiscence, DVT, and PE were evaluated. Chi square tests were used to determine associations in the contingency tables while for the continuous variables we used Student t test when appropriate or the Wilcoxon nonparametric test. All comparisons were two-sided where we used a Type I error of 0.05. **Results.** A total of 437 patient charts were evaluated, with TRH group  $n = 243$  and TLH group  $n = 194$ . There was a lower estimated blood loss and slightly higher uterine weight (184.3 vs 183 g) in the TRH. Vaginal cuff dehiscence =1.3%, which was less among TRH (0.41%) vs TLH (2.58%),  $p = 0.053$ . Bidirectional barbed suture was used more often in the TRH group (46.5% in TRH vs 0.52% in TLH).

There was no significant decrease in the vaginal cuff dehiscence when a bidirectional barbed suture was used, ( $p = 0.92$ ). Yet, among the TRH group the risk of vaginal cuff dehiscence was 2.5 times higher when conventional suture (2.1%, 1/47) was used vs quill suture (0.8%, 1/114). **Conclusion.** Although there is a reported increased risk of vaginal cuff dehiscence after robotic hysterectomy compared to laparoscopic hysterectomy, our study found that the incidence doubled among those undergoing a total laparoscopic hysterectomy. In our study, the use of bidirectional barbed suture seems to show a decreased trend in vaginal cuff complications among the robotic subgroup.

### **Examining the Relationship Between Athletic Identity and Sport Motivation in Undergraduate Athletes**

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Sport motivation plays an integral role in sport participation. Research has revealed possible differences in competitive versus recreational athlete's motivational factors, with competitive athletes possessing less intrinsic motivation as compared to recreational athletes (Michelle, Vallerand, Briere, & Provencher 1995). Athletic identity is a personality construct that considers an athlete's identification of his/her role as an athlete. Athletic identity describes the extent to which an individual sees themselves as an athlete as opposed to someone who plays a sport. Athletic identity is associated with self-motivation and competitiveness (Tusak, Faganel, and Bednarik, 2005). There has been minimal research examining the relationship between an athlete's identity and sport motivation variables. Finding a relationship of an athlete's identity and motivational factors will enhance coaches' and sport psychologists' ability to enhance an athlete's performance by utilizing motivational techniques according to his/her athletic identity. Participants consisted of 508 National Collegiate Athletic Association Division-II student athletes at a university in the Southeastern United States, ranging in ages from 18 to 29 years-old. Participants completed the Sport Motivation Scale and the Athletic Identity Measurement Scale. Pearson Product Correlations will be conducted to analyze the subscales of the AIMS with the subscales of the SMS. It is predicted that athletes with higher athletic identity will be more intrinsically motivated than athletes with lower athletic identity. In contrast, athletes with lower athletic identity are predicted to be more extrinsically motivated.

### **Analysis of the Consistency of Post Concussion Symptoms Over Time**

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Cerebral concussion is defined as a closed head injury that produces a typically transient alteration in normal consciousness and brain processes as a result of the traumatic insult to the brain (Aubry, et al., 2002; McCrory, et al., 2005). Individuals sustaining mTBI often report physical, cognitive, emotional, and behavioral symptoms. Loss of consciousness, amnesia, and impairment of reflexive activities may follow, as does confusion and disorientation (Webbe, 2006, as cited in Moser, 2007). Through their ongoing work on the pathophysiology of mTBI, Giza and Hovda (2001) have detailed the biological reactions that are likely occurring within the brain of athletes who suffer concussions. As a result of their experimental research, concussion is now understood to involve a complex interplay between axonal shearing and an accompanying neurometabolic cascade of events. Given that the metabolic aspects of mTBI have been clearly demonstrated by the work of Hovda and his associates, psychophysiological assessment devices could have clinical utility in the management of mTBI or sport-related concussion. However, research using biofeedback as an assessment and intervention tool for clients with brain injury is limited. The few research studies conducted in this area have focused on clinical management, showing positive

associations between biofeedback and brain injury rehabilitation. For example, Holland, Witty, Lawler, & Lanzisera (1999) found that biofeedback-assisted relaxation training had a positive effect on the rehabilitation of clients in acute stages of brain injury recovery. To date, no-one has examined whether the metabolic changes observed within the brain following injury are associated with concomitant alterations in the physiological functioning of the rest of the body. The purpose of the proposed research study is to bridge this gap in the empirical literature on sport-related concussion and to ascertain whether athletes who suffer brain injury demonstrate consistent and predictable alterations in their psychophysiological functioning as a result of their injuries. Participants included ~20 high school and collegiate athletes who sustained a concussion within 10 days prior to the study. Participants completed the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT), a computer-administered, neuro-cognitive screening instrument that consists of 6 individual test modules measuring attention, memory, reaction time, and visual-motor processing speed. While completing the ImPACT, participants were monitored with biofeedback equipment assessing heart rate, muscle tension, peripheral temperature, respiration, and neurological responses. Athletes were repeatedly assessed each time they returned for post-concussion clinical care, producing both within and between-person change over time. The current study will use repeated measures MANOVA to evaluate changes in physiological responses based upon ImPACT scores and post-concussion symptom scores.

### **The Effect of Cranial Osteopathic Treatment on Visual Function**

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**Objective.** The objectives of this study were to determine if cranial osteopathy has an effect on visual function, and if that effect remained once the treatment was discontinued. **Background.** Although anecdotal evidence indicates that patients who undergo cranial osteopathic manipulation claim to experience an improvement in visual performance, there are few publications that demonstrate changes. **Methods.** Subjects were evaluated for cranial asymmetry and underwent optometric examination. The treatment group received cranial osteopathic manipulation, while the control group had a light pressure applied to their cranium. Subjects were reassessed for the presence of cranial dysfunction and underwent repeat optometric examination. This protocol was carried out for a total of 8 visits during the intervention phase. All subjects then returned for 8 follow-up visits during which only the optometric measurements were performed. A questionnaire was filled out by each subject after the intervention phase to assess the subject's perception of group assignment. **Results.** There was a statistically significant main effect for visit time in 8 of the 12 parameters measured. There was also a statistically significant effect for control vs. treatment in 2 of the parameters measured. **Conclusions.** Our study failed to consistently demonstrate a statistically significant change in visual function with the use of cranial osteopathic manipulation over time. We did see a significant change in multiple visual function parameters over time within both the control and treatment groups. Based on our results, we propose that active motion testing during cranial osteopathic assessment affects the cranial system to a level that results in a measurable effect. **Grants.** This study was funded by a grant from the Osteopathic Heritage Foundations.

### **The Perceptions of Physician Assistant (PA) Students about the PA-Patient Relationship**

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This study investigates the perceptions of Physician Assistant students about the relationships between the PA and the patient. Respondents included 120 students (response rate 74%). 58.8% were 1st year

students and 41.2% - 2nd year students or recent graduates. 81% were females, 74.8% were Caucasian, and 87.4% were 20-29 years old. Seventy percent worked previously in health-related professions, and were clustered in 4 groups: Medical Assistants, Medical Technicians, Medical Professionals, and Other. A survey was administered to assess the participants' views on knowing about a patient's personal life, their attitudes toward empathy and caring characteristics of practitioners, their interest in participating in professional group discussions on several topics including improving the medical provider-patient relationship, and the length of the consultation time with patients. Cronbach's alpha score for the total instrument was 0.80, indicating good internal reliability. Females differed significantly from males in many items. Non-significant differences were found between 1st year and more advanced students in the subscale scores. Compared with Medical Assistants, Technicians showed more empathy. They were less willing to ignore patients' personal issues (Means = 2.88 and 3.61,  $p < .05$ ), and more willing to know about families' financial concerns (Means = 3.15 and 2.53,  $p < .05$ ) and patients' ability to adjust to adversities (Means = 2.96 and 2.41,  $p < .05$ ). No significant differences were found between these groups and the Medical Professionals on those items. However, Medical Professionals were significantly less willing than Medical Assistants and Technicians to participate in professional group discussions (difficult medical cases, new developments/ research, and legal issues), ( $p < .05$ ).

## COLLEGE OF PHARMACY

### Tendencies in Clinical Pharmacy Journal Publications Over the Past Twenty Years

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**Objective.** The objective of the study is to evaluate pharmacy specific journals to determine publishing rates between original research, case reports, and review articles over the previous twenty years. **Background.** In the past 20 years, numbers of pharmacy faculty have dramatically increased. Additionally, scholarship requirements of pharmacy faculty have increased. It is unknown, however, to what degree research articles have increased. **Methods.** Pharmacy journals in print for at least 20 years, indexed in Medline, and authored primarily by pharmacists were evaluated. All publications were categorized either as research, case reports, reviews, letters/editorials, or other based on the publication types classification system used by PubMed. Descriptive statistics were described. Additionally, data were analyzed for statistical significance utilizing ANOVA with significance at  $p < 0.05$ . **Results.** Three journals meeting inclusion criteria were the American Journal of Health-Systems Pharmacy (AJHP), Annals of Pharmacotherapy, and Pharmacotherapy. The total publication rate from 1988-1989 to 2008-2009 increased from 1201 to 2096 (74%) ( $p < 0.05$ ). The rate of original research articles increased from 15% to 19% (NS). The rate of case reports decreased from 13% to 11% (NS). The rate of review articles increased from 12% to 18% (NS). However, individually AJHP and Pharmacotherapy decreased in terms of research publications while Annals of Pharmacotherapy increased. Annals of Pharmacotherapy also decreased the total number of review articles published whereas AJHP and Pharmacotherapy increased. **Conclusion.** Despite significant increase in publications in pharmacy specific journals, there appears to be minimal increases in original research, case reports, and review articles published. **Grants.** N/A.

### A Pharmacist Educational Intervention for Type 2 Diabetes: Clinical Outcomes for Latinos in South Florida

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**Objective.** To evaluate the effect of a pharmacist intervention on diabetes clinical outcomes. **Background.** Type 2 diabetes has reached epidemic levels in the United States (U.S.) by disproportionately affecting vulnerable groups including minorities. Latinos, the fastest growing minority have shown to poor control of diabetes when compared to whites. Pharmacist interventions and diabetes education have shown improvements in clinical outcomes in various populations, however culturally appropriate pharmacist interventions studies in the Latino population are needed. **Methods.** A prospective randomized design and a community-based approach tested a pharmacist-centered intervention on diabetes clinical outcomes. Diabetics and their support person were recruited from the Hispanic Unity of Florida. Data was collected at baseline and 3 months. The pharmacist intervention consisted of a focused discussion group and two individual counseling sessions during the first 6 weeks. **Results.** A total of 43 completed the study. Baseline characteristics were the same across groups except for income level and length of time living in the U.S. Most subjects were females with an average age of 55(26-79) years. Hemoglobin A1c was significantly reduced by  $0.94\pm 0.45\%$ , weight by  $1.68\pm 0.75\text{kg}$  and body mass index by  $0.73\pm 0.28 \text{ kg/m}^2$  (all  $p < 0.05$ ) while no significant changes were observed in the control group in any of these outcomes. No significant changes were observed in random blood glucose, blood pressure or lipid panel. **Conclusion.** A culturally-sensitive pharmacist intervention was effective in improving selected diabetes clinical outcomes in a Latino diabetic population in South Florida. **Grants:** Funded by CMS 1HOCMS030309-02.

### **Simvastatin Induces Nucleoporins Rae1/ mrnp41 and Nup98 via a STAT-1 Pathway, and Modulates Vesicular Stomatitis Virus Replication**

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**Introduction.** Statins, the cholesterol-lowering drugs, are known to exert pleiotropic effects that include inhibition of viruses such as HIV, HCV, polio and influenza-A. VSV is the prototype virus for take-over of nuclear pore complex (NPC) function via blockage of mRNA export; an effect antagonized by upregulation of Rae-1 and Nup98. Both nucleoporins are required for mRNA export and for the infection/replication of VSV, influenza A and polio viruses. **Case Presentation.** To determine a possible effect of statins on the NPC and on VSV replication, we investigated the effects of statins on VSV replication and on the expression of Rae1 and Nup98. Here we show for the first time that Simvastatin inhibits VSV replication and up-regulates both Nup98 and Rae1, in a concentration and STAT1-dependent manner. Simvastatin reversed VSV mRNA export block, a typical cytopathic effect of VSV on infected cells, and inhibited VSV replication. **Deviation From the Expected.** A low concentration of Simvastatin ( $0.125\mu\text{M}$ ) and Pravastatin ( $0.1\text{-}4 \mu\text{M}$ ) induced increases in VSV proteins and titers. **Discussion.** Here we reported that Simvastatin altered the replication of VSV and reduced the inhibition of gene expression induced by VSV. **Conclusion.** When drugs are directed towards cellular components, they could exert broad-range antiviral therapy. Simvastatin may be one example of drugs that modulate host factors needed for viral replication. Furthermore, modulation of antiviral nucleoporins might be an essential strategy of defense for both innate and adaptive immunity. **Grant.** The present studies were funded by NSU Chancellor's Faculty Research & Development Grant No. 335508.

## Attitudes of Florida Pharmacists Toward Implementing a State Prescription Drug Monitoring Program for Controlled Substances

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**Objective.** This study was conducted to assess Florida pharmacists' attitudes toward implementing a prescription drug monitoring program (PDMP) in the state. **Background.** As of October 20, 2011, 37 states had an operational PDMP. PDMPs are electronic databases that are intended to serve as a tool for health care practitioners when prescribing and dispensing controlled substances to reduce drug abuse and diversion. **Methods.** This was a cross-sectional study conducted in Florida between February 2010 and June 2010 prior to the implementation of the proposed PDMP. A random sample of 5,000 of approximately 26,000 pharmacists licensed in Florida was invited to participate in a voluntary and anonymous 10-question self-administered mail survey of which 4 survey items assessed pharmacists' attitudes towards implementing a PDMP in the state. **Results.** Of the 5,000 pharmacists contacted by mail, 911 (18.2%) completed the survey, of whom 836 responded to the items assessing opinions about PDMPs and provided practice site information. A majority of pharmacists across all practice settings agreed or strongly agreed with the statements that a PDMP "should be implemented in Florida" (chain 84.0%, hospital 74.2%, independent 77.9%, and other 71.1%) and that a PDMP would decrease "the incidence of doctor shopping" if implemented (chain 80.8%, hospital 67.2%, independent 71.7%, and other 63.3%). **Conclusion.** In a small-sample survey, a majority of Florida pharmacists across all practice settings were in favor of implementing a PDMP in Florida. **Grants.** This study was funded by a grant from the HPD Research Committee.

## Mutational Biomonitoring of Breast Cancer Chemotherapy Patients Reveals Dichotomy in Bone Marrow Response

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**Objective.** This study was conducted to determine whether there was significant variability in the bone marrow response to standard breast cancer chemotherapy regimen. **Background.** Cancer is the paradigm for late-onset diseases occurring through a combination of genetic susceptibility and environmental exposure. Traditional firstline cancer chemotherapy is based on genotoxicity; that is, agents that kill cancer cells by damaging their DNA, inducing apoptosis. Variability in response might therefore be due to differences in metabolism of the genotoxic agents or differences in repairing induced DNA damage, which might also affect tumor response. Chemotherapy dose is limited by its effects on normal cell-types, particularly the hematopoietic progenitor cells of the bone marrow, so bone marrow response may also be associated with treatment toxicity and tolerance. **Methods.** We have developed a fast, simple and inexpensive method of detecting and quantifying bone marrow somatic mutation. The *GPA* assay enumerates allele loss phenotypes in circulating erythrocytes that arise through somatic mutation in the bone marrow. **Results.** We applied the *GPA* assay to 24 breast cancer patients undergoing five types of genotoxic chemotherapy. We found great (20-200 fold) variation in induced mutation between these patients, fully half of whom showed low to no response to their firstline chemotherapy. We are investigating whether our quantitative measure of bone marrow response is associated with clinical parameters of acute toxicity, treatment efficacy and secondary carcinogenesis. **Conclusion.** Biomonitoring induced bone marrow mutation, if predictive of clinical efficacy, offers the possibility of individually adjusting dose and drug during cancer treatment for optimal effect. **Grants.** This study was partially funded by a grant from the Pennsylvania Department of Health.

## Predictors of Florida Pharmacists' Motivation to Work at Their Primary Place of Employment

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College of Pharmacy

**Objective.** The study purpose was to examine important predictors of active full-time Florida pharmacists' motivation to work at their primary place of employment. **Background.** As the pharmacy profession moves towards more patient-centered care, it is important to determine how this current nationwide trend impacts Florida pharmacists' motivation to work. **Methods.** Using a cross-sectional descriptive survey design, 2,400 pharmacists with active licenses in Florida were mailed a 4-page questionnaire about work characteristics such as practice setting, patient care services offered, actual time spent on patient care, workload level, and motivation to work at their primary place of employment. Additionally, pharmacists' personal information such as age, gender, position and employment status were collected. Descriptive statistics were calculated. Linear regression analysis was conducted to determine significant predictors of pharmacists' motivation to work ( $p < .05$ ). **Results.** A total of 2,353 surveys were delivered. The adjusted response rate was 22.4% ( $n = 528/2353$ ) with a total of 348 usable responses from full-time active Florida pharmacists. Respondents' average age was 44 years with more than half (51%) female. On average, four patient care services were offered and 27% of pharmacists' time was spent on patient care. A pharmacist's motivation to work was significantly associated with more patient care services offered, more time spent on patient care, and a lower workload level. **Conclusion.** Florida pharmacists at workplaces which offered more opportunities for patient-centered services were more motivated to work. Therefore, it is important to incorporate patient care into pharmacists' routine work responsibilities. **Grants.** Funded by the HPD Research Committee.

## Genetic Analysis of DNA Repair Deficiency in Novel Non-Tumor Adjacent and Tumor Cell Cultures Suggests a New Paradigm of Breast Cancer Etiology

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**Objective.** This study was conducted to determine the basis for the deficiency in DNA nucleotide excision repair (NER) that we have documented in stage I breast tumors. **Background.** One of the hallmarks of cancer is genetic instability, which can arise through loss of DNA repair. Using the functional assay for "unscheduled DNA synthesis" (UDS), we determined that stage I breast tumors had significantly less NER capacity (47%) than normal breast epithelium. **Methods.** Our laboratory has developed a novel tissue engineering system for human breast tissue, both normal and malignant. In order to study the loss of DNA repair as an etiological factor in breast cancer etiology, we generated over 20 matched pairs of cell lines from human breast tumors and isogenic non-tumor adjacent (NTA) tissue, without the use of immortalizing agents. **Results.** UDS analysis revealed that 75% of our NTA primary cultures ( $N = 42$ ) manifest the same NER deficiency as the matching tumor culture. **Conclusion.** In the majority of breast tumors loss of NER preceded the final mutation(s) that led to full blown transformation. An area of predisposed tissue remains around the tumor itself that can contribute to tumor "recurrence." We believe that NTA cultures with aberrations, such as deficient DNA repair, in common with the tumor represent

opportunities to investigate early changes during carcinogenesis, and can act as experimental models for later steps through promotion or genetic transformation. **Grants.** This study was partially supported by grants from the DOD CDBCPR and Susan G. Komen for the Cure.

### **Designing Medications That Thwart Abuse**

David Mastropietro, Graduate Student;  
Hossein Omidian, Ph.D., Associate Professor  
College of Pharmacy

**Objective.** Introduce the different approaches being utilized in designing abuse deterrent medications. **Background.** Abuse and misuse of prescription medications is a growing problem threatening public health. To combat this increase, novel drug formulations have recently been developed and are now becoming available as treatment options. **Methods.** An online search for relevant literature and formulation strategies was first conducted using the online database Embase. Next, a search for issued patents on abuse deterrent formulation methods was performed using PatFT from the United States Patent and Trademark Office. For the most up to date information, press releases and product innovators websites were reviewed for additional data. **Results.** Overall, two different formulation approaches were identified and labeled as (1) physical approaches and (2) chemical approaches. Physical approaches are designs having mechanical characteristic that prevent physical tampering. They were sub-categorized further based on their formulation as solids, gels, or non-intentional type products. Chemical approaches typically use the addition of one or more non-active ingredient(s) into the formulation to deter abuse. Other chemical methods involve modifications to the drug structure itself to produce prodrugs. The chemical approach types were labeled as agonist/antagonist, aversive agents, or metabolics. **Conclusion.** We found most formulations used a combination of approaches and utilized proprietary technologies from pharmaceutical manufacturers. Prodrug and agonist/antagonist formulations have been used in past, while solid and gel approaches are more common innovations in recent drug products. The effectiveness of these innovative formulations to deter abuse in the general population is yet to be determined. **Grants.**

### **A Comparison of Standards of Diabetes Care Across Different Racial/Ethnic Groups in the United States Non-institutionalized Adult Population: A Study Using the 2009-2010 NHANES Cohort**

Alexandra Perez, PharmD, Assistant Professor;  
Kojo A. Quansah Jnr, PHR-IV  
College of Pharmacy

**Objective.** To compare the quality of diabetes care across non-Hispanic whites and Blacks and Hispanics in the United States using selected American Diabetes Association standards of care. **Background.** There are few studies using large federal databases evaluating disparities among racial/ethnic groups in diabetes care. The last one was conducted using the Medication Expenditure Panel Survey 2000-2001 cohort. **Methods.** Data from the National Health and Nutritional Examination Survey 2009-2010 cohort was used to compare quality markers such as diabetes-related access to care (physician and diabetes specialists visits), medical care (self-monitoring, treatment, dietary habits, laboratories) and co-morbidities (prevalence, treatment and monitoring) across the racial/ethnic groups. We used one-way ANOVA and chi-square test to compare continuous and discrete variables across Whites, Blacks, Hispanics and other. **Results.** Overall this group had a mean age of  $61 \pm 14$ , 51% were male, 60% had no more than a high school diploma, and 55% had an income  $< \$35,000$ . Only age and education level were different across groups ( $p < 0.05$ ). Average blood pressure and total cholesterol levels were at goal except for hemoglobin A1c which was  $7.3\% \pm 1.7$  and different across groups ( $p = 0.003$ ). We found that the use of insulin, frequency of blood glucose monitoring, foot and exam in the last year, nurse educator/nutritionist/dietitian visits, and diabetic retinopathy, hypertension and hyperlipidemia diagnoses were significantly different across groups (all  $p < 0.05$ ). **Conclusion.** A possible relationship



between race/ethnicity and adherence to various standards of diabetes care may exist. A more rigorous epidemiologic study is needed to confirm our findings. **Grants.** Not funded.

### **Effect of Pharmacist Interventions on Consumer Knowledge of Generic vs. Brand-name OTC Label Comparison**

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<sup>1</sup>College of Pharmacy, <sup>2</sup>East Coast Institute for Research/St. Vincent's P.A.T.H. Program

**Objective.** To test the efficacy of two educational interventions to increase consumers' knowledge on how to compare drug package labeling information between generic and brand-name Over-the-Counter (OTC) products. **Background.** Consumers may have difficulty comparing labeling information on numerous OTC products. Because of potential cost savings, it is important to help them identify which OTCs are cheaper generic equivalents of brand-name products. **Methods.** Using a randomized-controlled post-test only design, 200 subjects were assigned to: (1) an intervention group receiving a pamphlet describing how to compare generic and brand-name OTC labels; (2) an intervention group receiving a 5-minute pharmacist consultation with pamphlet reinforcement; or (3) a control group receiving neither intervention. Subjects were asked post-intervention to recall 5 pieces of labeling information used to determine whether an OTC product is a true generic equivalent of the brand-name product. A knowledge score (0-100%) was calculated [(number of correct responses/5)x100] for each subject. T-test, chi-square and ANOVA analyses were conducted at  $p < .05$ . **Results.** 191 subjects completed the study. There were no significant group differences in their personal characteristics: 67% were female and average age was 48.6 (SD = 17.0) years. Knowledge scores were 53.5% (SD = 27.6, n = 63) for pamphlet group, 79.7% (SD = 24.3, n = 65) for consultation+pamphlet group, and 42.2% (SD = 22.5, n = 63) for control group. **Conclusion.** Subjects receiving pharmacist consultation with pamphlet reinforcement scored significantly higher in knowledge than those in the other two groups. It is important to utilize both verbal and written communication strategies in patient education related to OTCs. **Grant.** Funded by NSU-CFRDG program.

### **Development of Epinephrine Nanoparticles Using Chitosan for the Treatment of Anaphylaxis**

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**Purpose.** Epinephrine was previously formulated into fast-disintegrating sublingual tablets (AAPS PharmSciTech. 2006;7(2): Article 41) and the sublingual bioavailability was established in vivo (J Allergy Clin Immunol 2006;117(2):398-403) for the potential first-aid treatment of anaphylaxis. The purpose of this study was to develop and characterize epinephrine nanoparticles to enhance the sublingual bioavailability of epinephrine. **Methods.** Epinephrine bitartrate equivalent to epinephrine 10%, 20%, 30% and 40% were loaded into chitosan nanoparticles using ionic gelation method. Chitosan to tripolyphosphate (TPP) weight ratio was studied at 2:1, 3:1, 4:1, 5:1 and 6:1. Particle size and zeta potential were measured after nanoparticles fabrication using Zetasizer. Samples were centrifuged and supernatant was analyzed using HPLC to determine the encapsulation efficiency. **Results.** Nanoparticles in the size range of 100-400 nm were obtained using 2:1 and 3:1 weight ratios of chitosan to TPP. Zeta potential was increased with the increase chitosan weight ratio, and decreased with the increase in epinephrine load %. Encapsulation efficiency was increased by increasing weight ratio of chitosan; but resulted in lower encapsulation efficiency at epinephrine 40%. **Conclusion.** By adjusting the chitosan

weight ratio, optimum size of epinephrine nanoparticles can be obtained. Encapsulation efficiency of epinephrine into chitosan nanoparticles depends on weight ratio of chitosan and epinephrine load %.

### **Identification of Membrane-bound Variant of Endopeptidase 24.16 as the non-AT<sub>1</sub>, non-AT<sub>2</sub> Angiotensin II Binding Site**

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**Objective.** To determine the identity of the non-AT<sub>1</sub>, non-AT<sub>2</sub> angiotensin II (AngII) binding site in the mammalian brain. **Background.** New discoveries about the renin-angiotensin system continue to abound in the 21<sup>st</sup> century, e.g., discovery of a renin receptor, identification of the mas oncogene protein as the angiotensin 1-7 receptor, discovery of an enzyme (angiotensin-converting enzyme-2, ACE-2) that converts AngII to angiotensin 1-7, use of AT<sub>2</sub> receptor agonists as therapeutic agents, and discovery of a novel non-AT<sub>1</sub>, non-AT<sub>2</sub> angiotensin binding site in the brain. **Methods.** An angiotensin analog, photoaffinity probe <sup>125</sup>I-sarcosine<sup>1</sup>,benzoylphenylalanine<sup>8</sup>-AngII was used to specifically label the non-AT<sub>1</sub>, non-AT<sub>2</sub> AngII binding site in membranes prepared from mouse forebrain and HEK293 cell overexpressing mouse neurolysin in the presence of AT<sub>1</sub> receptor-saturating concentrations of losartan, AT<sub>2</sub> receptor-saturating concentrations of PD123319, and 150 μM parachloromercuribenzoate. The <sup>125</sup>I-sarcosine<sup>1</sup>,benzoylphenylalanine<sup>8</sup>-AngII radiolabeled binding site was purified by 2-Dimensional electrophoresis and analyzed by mass spectrometry, or solubilized and immunoprecipitated. Saturation binding assays or in vitro autoradiography with <sup>125</sup>I-sarcosine<sup>1</sup>,isoleucine<sup>8</sup>-AngII measured expression of the binding site in brain and HEK293 cell membranes. **Results.** The binding site is a ~75kDa membrane protein that fits a mass spectrometric profile of neurolysin. An antibody to neurolysin precipitated the <sup>125</sup>I-sarcosine<sup>1</sup>,benzoylphenylalanine<sup>8</sup>-AngII labeled protein. Overexpression of neurolysin in HEK293 cells increased non-AT<sub>1</sub>, non-AT<sub>2</sub> <sup>125</sup>I-sarcosine<sup>1</sup>,isoleucine<sup>8</sup>-AngII binding. Binding of <sup>125</sup>I-sarcosine<sup>1</sup>, isoleucine<sup>8</sup>-AngII to the non-AT<sub>1</sub>, non-AT<sub>2</sub> binding site in neurolysin knock-out mouse brains was dramatically decreased compared to wild-type brains. **Conclusion.** A membrane-bound variant of the metalloendopeptidase neurolysin (E.C.3.4.24.16) is the novel AngII binding protein. **Grants.** Supported by NHLBI HL-096357.

## Angiotensin III Induces c-Jun N-terminal Kinase Leading to Proliferation of Rat Astrocytes

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Chinh Nguyen, Pharm-IV;  
Michelle A. Clark, Ph.D., Associate Professor, Pharmaceutical Sciences Department  
College of Pharmacy

**Objective.** We determined whether Angiotensin (Ang) III induced phosphorylation of c-Jun N terminal kinase (JNK) mitogen activate protein kinases (MAPK) leading to astrocyte growth. **Background.** Ang III is a potent peptide with similar responses as Ang II. Studies in the brain focuses on responses observed after injection of the peptide with just a few studies focused on molecular effects of Ang III. We have shown in astrocytes that Ang III induced astrocyte proliferation and phosphorylation of ERK1/2 MAPK through the AT<sub>1</sub> receptor. **Methods.** Gel electrophoresis and Western blotting techniques were used to determine Ang III JNK MAPK effects. <sup>3</sup>H-Thymidine incorporation was used to determine astrocyte growth. **Results.** Ang III induced JNK phosphorylation in a concentration- and time-dependent manner. Maximal stimulation occurred with 100 nM Ang III and was apparent within a minute of peptide exposure. The JNK inhibitor, SP600125, prevented Ang III phosphorylation of JNK, as well as Ang III-mediated astrocyte growth. Losartan, the selective AT<sub>1</sub> receptor antagonist, prevented Ang III-induced JNK phosphorylation while the AT<sub>2</sub> receptor blocker, PD123319, was ineffective. Our findings suggest that Ang III interacts with Ang AT<sub>1</sub> receptors to stimulate the JNK MAPK pathway leading to astrocyte growth. This study is the first to show that Ang III actions may involve the JNK MAPK pathway in astrocytes and provide key information that may lead to a better understanding of Ang III functions in the brain, in particular in astrocytes. **Grants.** This study was supported by a President's Faculty Research and Development Grant.

## Inhibition of GRK2 Augments Cardiac Beta2-Adrenergic Receptor-Dependent Contractility and Survival

Ximena Vallejos, COP-III;  
Khyati Desai, Pharm.D.;  
Anastasios Lympereopoulos, Ph.D., Assistant Professor  
College of Pharmacy, Department of Pharmaceutical Sciences

**Objective.** Investigation of the effect of inhibition of cardiac GRK2 on  $\beta_2$ AR pro-contractile and pro-survival signaling in vivo. **Background.**  $\beta_1$ - and  $\beta_2$ -adrenergic receptors ( $\beta$ ARs) are G-protein coupled receptors (GPCRs) that play clearly distinct roles in cardiac physiology/pathology. This might be explained by differences in assembly of macromolecular signaling complexes:  $\beta_1$ AR forms a signaling complex with phosphodiesterase (PDE) type 4D8 directly, and agonist binding dissociates this complex. Conversely, GPCR kinase (GRK)2-induced  $\beta_2$ AR phosphorylation leads to recruitment of a complex consisting of  $\beta$ arrestin ( $\beta$ arr), a universal GPCR adapter/scaffolding molecule, and another PDE4D variant, PDE4D5. This PDE4D recruitment is postulated to constrain  $\beta_2$ AR pro-contractile signaling by limiting compartmentalization of 3'-5'-adenosine monophosphate signaling. **Methods.** We crossed  $\beta_1$ AR knockout (B1KO) mice, which do not express  $\beta_1$ AR, with M27 mice, which overexpress, specifically in cardiac myocytes, the GRK2 inhibitor GRK2ct. By blocking GRK2-mediated phosphorylation,  $\beta$ arr-dependent PDE4D recruitment to  $\beta_2$ AR is prevented. We studied the offspring both under normal conditions and after surgically induced myocardial infarction (MI). **Results.** Contractility was significantly augmented in M27/B1KO mice compared to B1KO's, both in healthy mice and at 4 weeks after MI, and M27/B1KO hearts displayed significantly less membrane recruitment of PDE4D compared to B1KO hearts, indicating less  $\beta_2$ AR-PDE4D interaction. Additionally, survival of M27/B1KO mice overexpressing the GRK2 inhibitor was increased after MI. **Conclusion.** Cardiac GRK2 inhibition by GRK2ct increases  $\beta_2$ AR-dependent contractility and survival both normally and in post-MI heart failure. **Grants.** This study

was funded in part by a Scientist Development Grant from the American Heart Association (AHA) and an HPD Research Grant, both to A.L.

# POSTER PRESENTATIONS

## COLLEGE OF HEALTH CARE SCIENCES COLLEGE OF NURSING

### Heading for a Fall: Correlation Between LE Sensory Status, Balance and Fall Risk in Individuals with DM Type 2

Annie Brodsky, PT3;  
Lauren Freve, PT3;  
Jennifer Kappler, PT3;  
Kelly Noonan, PT3;  
Debra F. Stern, DBA  
College of Health Care Sciences

**OBJECTIVE.** To determine the relationship between LE sensory integrity, balance status and fall risk in individuals with DM type 2. **BACKGROUND.** LE peripheral neuropathy including loss of sensation and proprioception is common in individuals with DM type 2, and can result in balance impairment and fall risk. Although the American Diabetes Association (ADA) recommends sensory testing, it does not recommend regular balance testing. **METHODS.** 16 subjects ages 44-83 participated. Range of time from diagnosis was 1 to 40 years with most recent HgA1C levels ranging from 6-12.2. Standardized bilateral LE proprioceptive testing of the great toes and ankles, monofilament testing of plantar foot surfaces, Romberg, Sharpened Romberg, and Functional Reach were performed. **RESULTS.** Although only 9/16 subjects demonstrated peripheral neuropathy, all sixteen demonstrated balance impairment and fall risk. **CONCLUSIONS.** In this study, all subjects demonstrated balance impairment and fall risk regardless of sensory status or age. The ADA has not included balance and fall risk assessment in their recommendations for managing individuals with DM type 2. Based on these preliminary findings, by addressing balance impairment and fall risk early in the disease course through appropriate therapies, falls may be prevented or the consequences ameliorated if or when sensory loss may develop. **GRANTS.** No grants or funding were used in the completion of this study.

### The Relationship Between the Allen Cognitive Level Screen and Adverse Driving Incidents in Young Adults: A Pilot Study of the Predictive Validity

Tia Hughes, MBA, Doctoral Student  
College of Health Care Sciences

**Objective.** This study was conducted as a pilot validation study to determine the relationship between the Allen Cognitive Level Screen (ACLS) and adverse driving incidents in young adults. **Background.** Research has been conducted in the past that has shown validation for the ACLS when used to make discharge plans for individuals with cognitive deficits such as supervision needs. Although the ACLS is a commonly used cognitive assessment for occupational therapists, it has not been validated for measuring safe driving skills. There have been no studies that researched the relationship between ACLS scores and adverse driving incidents, such as being ticketed for moving violations or causing an accident. This lack of evidence has created a need for research in order to determine if the assessment should be used to make recommendations regarding driving for those clients with impairments. **Methods.** This study was a quasi-experimental pilot study for theory validation using predictive correlation design. It examined the relationship of a participant's cognitive level as determined by the ACLS with the participant's reported level of adverse driving incidents. Fifty college students participated in cognitive assessments via the ACLS and completed anonymous surveys indicating the number of adverse driving incidents they had caused in the past five years. Students were between the ages of 20 and 31, have driven for at least five

years, and attend a college in Central Florida. The cognitive levels and summation of adverse driving events were compared using Pearson product moment correlation. **Results.** Although there were positive correlations between the number of participant moving violation tickets and accidents, there was no statistically significant relationship found between participant ACLS cognitive level score and number of adverse driving incident. **Conclusion.** The ACLS was not been found to be an accurate predictor of adverse driving incidents in this study. Further research is indicated.

### **Deep Vein Thrombosis: The Past, Present and Future**

Erica Jean-Baptiste, VS-II;  
Nathalie Garbani, EdD(c), MS, RVT, Assistant Professor  
College of Health Care Sciences

**Objective.** This study is undertaken as a historical review of the pattern of incidence and prevalence of deep venous thrombosis over time. **Background.** The prevalence of deep venous thrombosis seems to have increased over several centuries, and particularly since the industrial revolution. However the reasons and causes for the pattern have not been extensively explored. **Methods.** The research for this study will be done through a review of the literature of: a) the history of deep venous thrombosis occurrence; b) the implications of the changes in patterns of occurrence. **Results.** Not available at this point (the term will end in December) **Conclusion.** Not available at this point.

### **What is Physical Therapy? A Pre and Post Test to Determine Doctor of Osteopathy Students' Knowledge**

Jennifer Long, PT3;  
Jennifer Miano, PT3;  
Allison Edwards, PT3;  
Debra F. Stern, Associate Professor  
College of Health Care Sciences

**OBJECTIVE.** To determine the knowledge of 1st and 2nd year NSU Doctor of Osteopathic students about physical therapy before and after an educational session. **BACKGROUND.** Interprofessional health care dictates all team members are knowledgeable about each profession. As physicians are most often responsible for directing patient care, it is important they are familiar with PT referral and PT skills. **METHODS.** Ninety-three NSU Doctor of Osteopathic 1st and 2nd year students participated. Subjects completed a demographic questionnaire and a yes/no test. The pre-test was followed by a short presentation about physical therapist scope of practice. A post-test was administered to determine if knowledge changed. **RESULTS.** Post-test results showed a 40% increase in correct responses for appropriate referrals in some examinations, interventions and interpretation. The median score improved by 17% after the education session. **CONCLUSIONS.** According to the literature, medical students have insufficient knowledge about physical therapy. Based on results of the study, there was a statistically significant increase in NSU DO students' knowledge about PT following the presentation. The implication is that regular curricular inclusion about PT and other health care professions may result in better DO knowledge about the interprofessional team and ultimately better patient referral. **GRANTS.** No funding was used in the completion of this study.

### **Effects of Low Threshold Electrical Noise on Improving Balance Function**

Leah Nof, Ph.D., Professor;  
M. Samuel Cheng, Sc.D., Associate Professor  
College of Health Care Sciences

**Objective.** This study was conducted to investigate the effect of subsensory stimulation using commonly used micro current device on static and dynamic balance function in elderly subjects without known neurological disorders. **Background.** Stochastic resonance stimulation, which uses subsensory vibratory or electrical noise applied to the skin to enhance somatosensory inputs, has proven to be useful in enhancing balance in the elderly, patients post stroke and patients with chronic ankle instability. Instrumentation used in the past was specifically designed for research purposes and not available for clinical practice. **Method.** This was a single group, random order, test-retest exploratory study. Subjects underwent testing with and without micro-current electrical stimulation to the ankles. Balance was tested using single/double leg stance with eyes open/closed; tandem stance with eyes open/closed; functional reach; anterior-posterior and medial-lateral translation on center of pressure and latency on step excursion test. **Results.** Fifteen subjects ages 65-87 were tested. The micro-current electrical stimulation, as compared to no stimulation, increased time on tandem stance with eyes closed from 2.85 sec. to 6.09 sec. ( $p = .005$ ). No other balance test results were significantly different between the two testing conditions. **Conclusion.** The statistically significant improvement in tandem stance may be indicative of the positive effect of micro-current electrical stimulation on stance without visual feedback. The micro-current appeared to provide stimulation in tandem stance compensating for lack of visual input when balance was challenged. This may have functional implications in patients with balance deficits when challenged by situations requiring a narrow base of support and could be implemented in most clinics that have commonly available micro-current stimulators. The actual physiological and long term effects warrant further investigation. **Grants.** This study was partially funded by a Florida Physical Therapy Association grant.

### **Disease Patterns in the Lower Extremity Arteries: Implications for Treatment**

Willem Philippi, VS-II;  
Nathalie Garbani, EdD(c), MS, RVT, Assistant Professor  
College of Health Care Sciences

**Objective.** The focus of this study is to explore how we can incorporate scientific discovery regarding patterns of disease of the arteries of the lower extremities to more tailored, and effective treatments of such diseases. **Background.** In 1967, Henry Haimovici published his observations about patterns of disease of the arterial tree of the lower extremities. His observations showed distinct and specific patterns linked to age, possibly gender and underlying risk factors. Today, most arterial problems are treated in a similar fashion, and Haimovici's findings seem to have fallen into oblivion. **Methods.** The research for this study will be done through a review of the literature of: a) the patterns of lesions from atherosclerosis and other pathologies in the arteries of the lower extremities; b) the use of diagnostic techniques to assess these patterns; and c) the implications in regard to the treatments presently available. **Results.** Not available at this point (the term will end in December). **Conclusion.** Not available at this point.

### **Student Supervision Strategies Utilized by Physical Therapists in the United Kingdom**

Shari Rone-Adams, DBA, Associate Professor  
College of Health Care Sciences

**Objective.** The objective of this study was to explore approaches used by novice physical therapy (PT) clinical educators to supervise students on placement. **Background.** PT students undertake clinical placements during their programs of study with clinical educators supervising achievement of learning outcomes. The variety of supervision approaches used during clinical education has given rise to concern about the quality of supervision provided to students. Previous studies have indicated that supervision models used by some clinical educators have limited the students' development of critical thinking and reflective practice. **Methods.** Novice PT clinical educators completed a written questionnaire which focused on what strategies they use to supervise students on placement, how these strategies were developed by the clinical educator and what support is available to the educator when supervising a student. Following completion of the questionnaires participants discussed these topics in small groups. A

further large group plenary discussion was held. Written data was collected at each stage and subjected to content analysis which was triangulated across the stages of data collection. **Results.** Educators used a variety of approaches to provide student supervision. Inconsistency was seen between learning outcomes and supervision approaches utilized. Supervision skills were often developed through university held training courses and feedback from colleagues and students. The interdisciplinary team and peers assisted educators in selecting supervision approaches to meet the needs of individual students. **Conclusions.** Data analysis identified the need to explore the link between learning outcomes and supervision approaches and the use of formal and informal supervision approaches.

### **Presentation and Evaluation of an Evidence-based Algorithm for Overweight and Obese Adolescents in the Ambulatory Care Setting**

Jennifer Stone, DNP, Assistant Professor  
College of Nursing

**Objective.** The purpose of this project was to develop an evidence-based algorithm for the ambulatory care setting for the assessment and care of adolescents at high risk for, or diagnosed with overweight or obesity, and to present the algorithm to the attendees of the South Florida Council of Advanced Practice Nurses annual primary care conference. **Background.** Childhood obesity has more than tripled over the past 30 years, and is considered at epidemic proportions. Screening, diagnosis, and management of at-risk, overweight, or obese adolescents are often guided by individual provider preference rather than evidence-based guidelines. Nurse practitioners are often the first line of care in ambulatory clinics and need to systematically apply evidence-based care for screening and managing high risk for, overweight or obese adolescents. **Methods.** The sample for this project included the 51 attendees at the SFCAPN primary care conference. A pre- and post-test, single group design was used. A one hour PowerPoint presentation was conducted for the attendees. **Results.** There was a significant difference in the pre-test ( $M = 48.29$ ,  $SD = 21.43$ ) and post-test ( $M = 65.85$ ,  $SD = 24.99$ ) scores;  $t = -3.74$ ,  $p = 0.001$ . A wide variance is noted although; with a 5-item test, wide variance is not unexpected. The paired t-test results indicate learning during the algorithm presentation, or sensitization to the questions. **Conclusion.** Establishing an algorithm from evidence-based guidelines will support nurse practitioners in the early detection and intervention for overweight and obese adolescents. **Grants.** There were no grants or funding support for this project.

### **Evaluation of the Business and Leadership Components of an RN to BSN Nursing Program**

Linda Strommen, Ed. D.  
College of Nursing

**Objective.** This study was conducted to evaluate the business and leadership components of a Registered Nursing (RN) to Bachelor of Science in Nursing (BSN) program and determine if the best practices in business and leadership were current, applicable, and relevant in the current RN-to-BSN curriculum. **Background.** Today's nursing leaders are challenged by a rapidly changing health care environment that includes changes in technology, demographics, workforce diversity, fiscal management, rules and regulations, consumer demands, globalization of economics and politics, and changing health care reimbursement systems. To meet these challenges, strong nursing leadership is needed along with competent skills in business and leadership principles. The development of these skills is essential in positioning baccalaureate nurses as decision makers who are credible and valued members of interprofessional health delivery systems team. Prior to this study, the nursing department had not formally evaluated the business and leadership components of the RN to BSN program. **Methods.** An evaluation methodology to assess the business and leadership components of an RN-to-BSN nursing program was utilized. An evaluation tool was developed and used to compare expected outcomes (criteria) of current practices to expected outcomes (criteria) of best practices in the field of nursing. The expected outcomes (criteria) of current best practices were developed from a review of the literature, data collected from RN-to-BSN alumni students, and input from formative and summative committees. Thirteen



specific procedures guided the study to assess the value, merit, and worth of the program and answered six research questions. **Results.** The final evaluation was in the form of an analysis of themes. The final evaluation by an expert panel revealed that the current best practices taught in business and leadership courses were not current with preferred best practices. The final evaluation by the expert panel identified gaps in 10 of 11 criteria measured, between the current best practices taught in NUR 4020 and NUR 4030 of the RN-to-BSN program and the preferred best practices from the literature, practice, student surveys, and the formative and summative committee members. **Conclusion.** Conclusions from the final evaluations by the experts determined that the business and leadership courses were sound core courses that should be continued in the current RN-to-BSN program. Based on the gaps found in each of the categories and subsequent recommendations from the experts, the decision to update the courses was made to nursing administration. **Grants.** None.

### The Human Kangaroo

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**Objective.** This study was conducted to review the evidence, and determine the effectiveness of the nurse's role on education and maintenance of Kangaroo Mother Care on neonatal infants. **Background.** KMC was developed in Bogota, Colombia in 1978 by Dr. Edgar Rey to help increase the survival rate among both preterm and low body weight infants. The purpose of KMC is to involve mothers in being "natural incubators" to provide warmth to their infants by skin-to-skin contact. The problem we are facing today is once these infants are born, they are sent immediately to the NICU where they spend long periods of time. The long term care of infants in the NICU is costly whereas with KMC it is less cost effective and they will be discharged earlier. **Methods.** For this study systematic reviews were used. **Results.** Sufficient evidence exists to support the capacity of the KMC method for enhancing bonding and attachment between a parent and infant. KMC has many benefits such as reducing maternal post-partum depression and reducing infant pain. In addition, KMC has been associated with establishment and extended duration of breastfeeding, resulting in a positive effect on infant developmental and parental bonding. KMC has been shown to fulfill the emotional needs of both the infant and the mother." **Conclusion.** Healthcare providers play a pivotal role in supporting and educating parents about the benefits of KMC. **Grants.** This study was not funded by a grant.

## COLLEGE OF DENTAL MEDICINE

### Evaluation of Gelling Parameters of Alginates on Cell Viability of Umbilical Cord Stem Cells

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**Objective.** To assess ionogelling, ion concentration, and composition of pharmaceutical grade alginates on viability of human umbilical cord derived mesenchymal stem cells (hUMSCs). **Background.** Alginate is a widely used biomaterial due to its ionogelling property, therefore evaluation of gelling parameters of alginate is important for its use in tissue engineering. **Methods.** Two pharmaceutical grade sodium alginates, high and low guluronate (HG and LG) were used in three sets of experiments: 1) cells grown in 12-well plate were exposed to beads prepared by extruding 2% w/v alginate solutions into individual calcium chloride (CaCl<sub>2</sub>) solutions (50, 100, 150 and 200 mM); 2) the hUMSCs grown in similar culture conditions were exposed to 30 mg of CaCl<sub>2</sub> (10, 50, 100 and 200 mM) solutions; and 3) cells exposed to non-crosslinked HG or LG alginates. The cell viability was estimated by MTT assay. A student's test was used to evaluate the data and P<0.05 was considered statistically significant. **Results.** The cell viability in

the presence of alginate beads crosslinked with 50 and 100mM CaCl<sub>2</sub> solutions was comparable to control, and decreased significantly at higher concentrations. The cells treated with CaCl<sub>2</sub> solutions were comparable to control at all concentrations. The cell viability was significantly high in HG than LG alginate solution. **Conclusion.** High hUMSCs survival rate in the presence of alginate gels was primarily dependent on the alginate backbone structure (G content), and the concentration of calcium during ionogelation. The results suggest feasibility of using G rich alginates for tissue engineering purposes. **Grant.** This study was funded by the Chancellor's Faculty Research and Development Grant.

### **Bone Generation Within the Hard Palate Utilizing Recombinant Bone Morphogenetic Protein (rhBMP-2): A Novel Approach to Cleft Palate Repair**

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Anamaria I Cabel, D.D.S., Postgraduate Pediatric Resident;  
Eric J. Stelnicki, M.D., Associate Professor for Clinical Research  
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**Objective.** This study was conducted to quantify bone generation within the secondary palate following osteoinduction with rhBMP-2 at the time of palatoplasty. **Background.** Standard palatoplasty consists solely of soft tissue closure. The lack of a normal bony palate often results in collapse of the dental arch. An innovative approach to cleft palate repair is described. **Methods.** A retrospective review of thirteen patients (n = 13) with cleft lip and/or palate was performed. Patients had rhBMP-2 placed with either demineralized bone matrix (n = 8) or corticocancellous bone chips (n = 5) at the time of palatoplasty. CT scans were obtained postoperatively, and several months following surgery. Image J software was used to trace and calculate the percentage of bone within the secondary palate by two examiners. Six standardized reference lines were examined to determine the presence of transpalatal bone. **Results.** Follow-up CT scans demonstrated significant bone generation across the hard palate defect ( $p < 0.001$ ). The mean initial bone present within the secondary palate was  $68.6\% \pm 12.3\%$  and increased to  $94.1\% \pm 7.0\%$  in postoperative scans. Representing a 78.8% increase in transpalatal bone. Patients treated with demineralized bone matrix had more transpalatal bone present ( $p < 0.001$ ) compared to corticocancellous bone ( $p < 0.01$ ). CT analysis showed no alteration in tooth development or eruption pattern, the incisive foramen remained patent and no ectopic bone was observed. **Conclusion.** The use of rhBMP-2 at the time of palatoplasty is a promising adjunctive technique to traditional cleft repair.

### **Dental Insurance Coverage for Dental Students**

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Ana Karina Mascarenhas, DScD., Associate Dean of Research  
College of Dental Medicine

**Objective.** To examine dental insurance coverage status of dental students. **Background.** Dental students' health affects their academic performance, professional growth, and quality of life. To achieve good health, students should have access to health care, including dental care. However, it is unclear if dental students are offered school endorsed dental plans for their own dental needs. **Methods.** For this cross-sectional study, data was collected from websites of 57 dental schools across the US, websites of dental school endorsed insurance companies, and the 2009-2010 Dental Education Survey. Data was collected on: type of dental health plans offered, premium fee/year, deductible and maximum allowable fees, if coverage was included in the cost of attendance or not, and pre-doctoral dental student enrollment. Descriptive statistics were derived using excel software. **Results.** As of August 2011, 47 of the 57 dental schools offer some kind of dental plan. Seven schools with 1,710 pre-doctoral dental students offer no dental plan. The major dental providers include Aetna (37%), Delta Dental (13%), and plans offered through the school itself (9%). Eight out of 47 universities include the fee for the dental plan in the cost of attendance. Plans including dental coverage range from \$0 to \$1,508 per school year.

**Conclusions.** A significant proportion of schools do not offer school endorsed dental plans to almost 9% (n = 1,710) of all US dental students. Universities not currently offering dental coverage should consider ways to provide some form of dental health care coverage to their dental students.

### Comparison of Marginal Gap Using E4D Design and Conventional Cast Metal Copings

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Marvin Golberg<sup>1</sup>, D.D.S., Assistant Professor, Section of Prosthodontics;  
Patrick Hardigan<sup>2</sup>, Ph.D., Executive Director of Health Professions Division Research  
<sup>1</sup>College of Dental Medicine, <sup>2</sup>Health Professions Division Research

**Objective.** The purpose of this study was to evaluate if there was a significant difference on vertical marginal gap with metal copings fabricated by two different techniques. **Background.** The reduction of the marginal gap between a crown and tooth abutment is an important goal in Fixed Prosthodontics. Smaller gap produce less gingival irritation and decrease cement washout, improving the clinical outcome and longevity of the restoration. **Methods.** From a master die, eight impressions were made using PVS material. These 8 impressions were poured twice each in type IV die stone to produce 16 samples. The techniques used to fabricate the metal copings were: A wax pattern coping and a CAD/CAM milled plastic coping. The dies were numbered from 1 to 8 and marked A for the 1st pour group and B for the 2nd pour group. Groups 1 and 2 were organized as follows: Group 1 (CAD/CAM) included the first four samples of group A and the last four samples of Group B. Group 2 (WAX) included the last four samples of Group A and the first four samples of group B. The sixteen samples were sent to a dental laboratory for fabrication of metal copings produced by these two different techniques. **Results.** Mean separation for all four sides of the 16 copings were recorded. Significant differences found by Side ( $p < 0.05$ ) and Coping ( $p < 0.05$ ). **Conclusion.** The Wax technique resulted in a smaller vertical marginal gap ( $\mu\text{m}$ ) than the CAD/CAM technique. **Grants.** Grant from NSU-HPD supported this project.

### Three-Body Wear of Glazed and Veneered Zirconia

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James Rothrock, Research Associate;  
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Jeffrey Thompson, Professor, Prosthodontics  
College of Dental Medicine

**Objective.** To evaluate three-body wear of glazes, applied to dental zirconia, with different coefficients of thermal expansion. **Methods.** Yttria-stabilized zirconia (YSZ) plates (12x15x2mm) were divided into 4 groups (n=8/group): 1) YSZ, surface polished through to 1200 grit silicon carbide paper (Control), 2) YSZ (1mm thick), veneered (1mm thick), polished through 600 grit silicon carbide paper, then glazed, 3) YSZ, glazed, 4) YSZ, glazed. Groups were tested in three-body wear using a Leinfelder-style wear tester with a polyacetal antagonist ( $\varnothing = 6 \text{ mm}$ ) and artificial food bolus with a 1:1 weight ratio of poly(methyl-methacrylate) beads and de-ionized water. Groups were tested at 0, 100,000, 200,000, and 400,000 cycles with an applied contact load of 75 N. Surface roughness, wear depth, and volumetric loss were measured after each interval using a stylus profilometer. 3D surface images and SEM micrographs of specimens were obtained after each interval. The effect of cycles on properties was evaluated using one-way ANOVA with a Tukey's test for multiple comparisons if significant ( $p < 0.05$ ). **Results.** Group 1 exhibited significance in surface roughness over time. Group 1 showed significant decrease in gloss over time; however Group 1 was significantly greater in gloss than other groups at each interval. Group 2 showed significant wear depth and volume loss after baseline. After baseline, Group 2 exhibited significantly greater wear depths and volume losses after each interval when compared to other groups. **Conclusion.** Wear of glazes on dental zirconia was observed to be independent of thermal expansion coefficient of glazes. **Grants.** This study was funded by a grant from the NSU-HPD Research Committee.

## Effect of Silane Concentration on Resin Bond Strength of Zirconia

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**Objective.** To compare resin bond strength of zirconia using different concentrations of silane. **Background.** Silanes are commonly used in dentistry to enhance resin bonding of tribochemical-coated zirconia. However, there is no information on the optimal concentration of silane to use. **Method.** Zirconia ( $ZrO_2$ ) blocks were sectioned into plates (10x4x2mm) and polished through to 600 grit. Plates were divided into 4 groups (n=20/group), air-abraded (100 $\mu$ m  $Al_2O_3$ , 0.38MPa, 10mm, 20s), tribochemical-coated (CoJet – 0.28MPa, 10mm, 15s), then silane-treated as follows: 1)  $ZrO_2$ , treated with commercial silane (Control - 1vol% solution of 3-methacryloyloxypropyltrimethoxysilane (MPS) in ethanol-water mixture), 2)  $ZrO_2$ , treated with 1vol% solution MPS mixture, 3)  $ZrO_2$ , treated with 2.5vol% solution MPS mixture, and 4)  $ZrO_2$ , treated with 5vol% solution MPS mixture. Composite blocks (3x3mm) were resin bonded to silanized surfaces. Shear bond strength of specimens was then tested using a universal testing machine (crosshead speed of 1mm/min) after storage in deionized water (37°C) for 24 h and 60 days. The effect of water storage duration on bond strengths was evaluated using one-way ANOVA with a Tukey's test for multiple comparisons if groups were significant ( $p < 0.05$ ). **Results.** Use of commercial silane resulted in significantly greater bond strength after 24 hr; no significant difference observed between other silane groups. Bond strength between groups after 60 days was not significant; significant decrease in bond strength for all groups when compared to 24 hr. **Conclusion.** The resin bond strength of zirconia is not improved by increasing the concentration of MPS in silane solutions.

## COLLEGE OF MEDICAL SCIENCES

### Skin Tissue Water Variations in Different Races Measured via the 300 MHz Tissue Dielectric Constant Method

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**Objective.** To determine if skin tissue water, based on tissue dielectric constants (TDC), are different among anatomical sites and races and if TDC-values correlate with total body water percentage (TBW%). **Background.** Measuring TDC via the open-ended coaxial probe 300Mz method is a useful non-invasive measure for edema assessment but site, race and TBW% effects on TDC are unknown. Such information would aid in TDC clinical usage. **Methods.** TDC was measured in triplicate to depths of 1.5 and 5.0 mm bilaterally at the first intercostal space mid-clavicle (chest) and anterior forearm (arm) and to 1.5 mm at the medial malleolus (ankle). TBW was measured standing and supine with two different devices according to whole body impedance measurements. To date, measurements were done in five races: White (16), Black (4), Hispanic (5), Asian (7) and Asian Indian (10) for a total N = 42 (23 male). The study design calls for N = 100 with 20 per race. **Results.** Because the current N is insufficient for race comparisons, results focus on site variations in TDC and relationships between TDC and TBW. Composite TDC values for chest, arm and ankle (n = 84) were 36.0 $\pm$ 5.3, 34.5 $\pm$ 3.1 and 28.2 $\pm$ 6.4 ( $p < 0.001$ ) for 1.5mm-depth and for chest and arms at 5.0 mm-depth were 30.2 $\pm$ 4.7 vs. 30.0 $\pm$ 6.3 ( $p = 0.751$ ). The 5.0 mm-depth values were significantly less ( $p < 0.001$ ) than corresponding 1.5 mm-depth values. Standing and supine TBW% were 57.7 $\pm$ 6.9% vs. 56.3 $\pm$ 5.79%. TBW% correlated best with TDC-5.0mm measured on the arm ( $r = 0.635$ ,  $p < 0.001$ ). **Conclusions.** There are significant anatomical site and depth variations in TDC that may correlate with TBW%.

## Accessibility of the Active Site in the Enzyme Myeloperoxidase as Measured by Magnetic Resonance Studies of Solvent Proton Spin Relaxation

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**Objective.** This study was conducted to determine whether there is rapid solvent accessibility to the active site in the enzyme myeloperoxidase and whether these effects are dependent upon pH and ligand binding near the heme. **Background.** The enzyme myeloperoxidase, which is found in mammalian neutrophils, plays an important beneficial role in phagocytosis because of its antimicrobial and cytotoxic activities. These activities proceed via peroxidation of chloride ion to hypochlorite, chlorination of amino acids by hypochlorite, and by decarboxylation of the resulting amino acid chloramines. Deleterious effects in human cardiovascular disease have also been attributed to chlorotyrosine, nitrotyrosine, and tyrosyl radical products which can be generated by myeloperoxidase reactions. The kinetics and mechanisms of some of these reactions have been clarified although not all details of the reaction mechanisms are known. **Methods.** In this study, solvent proton spin relaxation enhancement properties of the enzyme solutions are explored as a means of probing accessibility of the heme site. Longitudinal (spin-lattice) relaxation times were measured for the enzyme solutions under various conditions. **Conclusion.** The heme site is accessible, and there is solvent exchange with water bound near the heme iron. The solvent proton relaxation rate depends upon electronic state of the heme iron, exchange rate of bulk solvent with that bound near the heme, temperature, magnetic resonance frequency, pH and chloride concentration.

## Detection of Incipient Lymphedema in Women Previously Treated for Breast Cancer via Non-Invasive Tissue Dielectric Constant Measurements

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**Objective.** To determine the utility of tissue dielectric constant (TDC) measurements to detect lymphedema in women previously treated for breast cancer. It was hypothesized that TDC values, as indices of local skin tissue water, would uncover incipient lymphedema for which there are not yet recognized symptoms. **Background.** These women are at-risk for developing treatment-related lymphedema but often lymphedema is not recognized until gross manifestations of swelling and functional limitations are present. **Methods.** In 46 women who were previously surgically-treated for unilateral breast cancer, at-risk and control arm volumes (VA and VC) were determined from girth measurements taken at 4cm intervals from wrist to axilla. Percentage edema volume (%EVOL) was determined as  $100(VA-VC)/VC$ . Ages (mean $\pm$ SD) were 63.3 $\pm$ 11.3 years and surgery was 32.6 $\pm$ 23.0 months prior to their evaluation. TDC was measured at 300 MHz bilaterally on the hand, forearm, biceps, shoulder and lateral thorax to a depth of 2.5mm. At-risk/control arm TDC ratios were determined for each site and compared in patient subsets grouped according to their %EVOL. **Results.** At the time of evaluation 34.9% had %EVOL>5% and 15.2% had %EVOL>10%. These levels are threshold-limits often used to define lymphedema presence. Bicep TDC ratios for patients with %EVOL below and above these thresholds were 0.993 $\pm$ 0.082 vs. 1.210 $\pm$ 0.376,  $p=0.006$  (Mann-Whitney) for the 5% threshold and 1.009 $\pm$ 0.099 vs. 1.396 $\pm$ 0.508,  $p=0.027$  for the 10% threshold. TDC ratios at no other site were significantly different between low and high %EVOL patient subsets. **Conclusion.** The biceps TDC ratio is indicative of a potentially useful lymphedema detection measure.

## Vav3/Rac1 Signaling Promotes Castration-Resistant Prostate Cancer

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**Objectives.** To define more clearly the role of Vav3 in the progression to castration resistant prostate cancer( CRPC). **Background.** Increased androgen receptor (AR) transcriptional activity drives growth of castration-resistant prostate cancer (CRPC). This enhanced AR activity is due to different mechanisms, including increased levels of AR coactivator proteins and ligand-independent activation of AR by growth factor-initiated signaling. We and others have shown that Vav3, a growth factor-activated Rho GTPase guanine nucleotide exchange factor (GEF), is up-regulated in cell and mouse models of CRPC and in a large proportion of primary prostate cancer clinical specimens. **Methods.** These studies used cell imaging of human prostate cancer cell lines, tumor xenograft models , three-dimensional protein modeling, and biochemical and molecular approaches. **Results.** We found that Vav3 activates the Rho GTPase, Rac1, in prostate cancer cells. Further, expression of wild type Vav3 or a constitutively active Rac1 mutant was sufficient for robust castration-resistant xenograft tumor growth. Further, Vav3 potentiates AR activity in the presence of very low androgen concentrations, in a PH dependent, yet GEF independent manner. We found that Vav3 nuclear localization is important to its coactivator function, and sequential chromatin immunoprecipitation experiments revealed that Vav3 and AR were simultaneously recruited to the same transcriptional complexes. **Conclusions.** Vav3 and Rac1 signaling pathways can act in concert to drive AR transcriptional activity and prostate cancer progression. These studies suggest a Key role for Vav3/Rac1 in CRPC progression and support therapeutic disruption of this signaling pathway.

## Morphometry of the Stored Mucus in Antigen Challenged Sheep Tracheal Epithelium

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**Objective.** To determine the effect of antigen challenge we measured stored mucus in the epithelium. **Background.** Airway surfaces are exposed to the particulates and chemicals in the inhaled air. Mucosa of the airway has to provide protection against the inhaled noxious agents in a number of ways, one of which is elaboration of secretions that protect the airway surface and facilitate the airway clearance. **Methods.** We compared the abundance and distribution of epithelial secretory (goblet) cells detected with Alcian blue /periodic acid Shiff reagent (AB/PAS) as measured with Image-Pro Plus<sup>®</sup> on digitized images of tracheal epithelium of 4 exposed and 4 control sheep. The AB/PAS positive carbohydrate was expressed as % of the measured epithelial area. Protocol and exposure details in: Effect of antigen on the glycoconjugate profile of tracheal secretions and epithelial glycocalyx in allergic sheep. Journal of Allergy and Clinical Immunology. 93(3):585-593.1993. **Results.** The allergen challenged sheep had a larger complement of AB/PAS positive cells (28% ± 5.34 STD) reactivity of AB/PAS when compared to controls (8% ± 3.43 STD, (P < 0.05). **Conclusions.** The increased volume of carbo-hydrates in the stored mucus in the epithelial (goblet) cells is thought to reflect the increased stimulus for mucus synthesis and storage to be delivered into the airway surface at a post acute period or a more drastic irritant. The antigen induced changes may be implicated in the altered pathogen attachment and susceptibility of airway cell membranes through carbohydrate ligands in airway epithelium and glycocalyx. **Grants.** Supported by NSU Faculty Research Grant.

## Tumor Necrosis Factor Alpha and Inflammation Disrupt the Atypical PKC Rescue Machinery in Intestinal Epithelial Cells

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**Objective.** In the present work we tested the hypothesis that the cytoskeleton and Hsp70 dependent atypical PKC (aPKC) rescue machinery is sensitive to pro-inflammatory signals. **Background.** Loss of tight junction (TJ) competence is an important pathophysiological mechanism in inflammatory bowel disease (IBD). Increased TJ permeability facilitates the diffusion of small antigens and bacterial toxins, which in turn can exacerbate and perpetuate inflammatory process. aPKC is one of the key players in polarity organization and TJ assembly in epithelial cells. Recently, we reported that the interaction of aPKC with intermediate filament cytoskeleton and Hsp70 is crucial to prevent activity-induced aPKC degradation. Hsp70 proteins were previously shown to be downregulated under pro-inflammatory signaling. Bearing in mind that a PKC rescue mechanism is dependent on Hsp70, we hypothesized that active aPKC levels may decrease during inflammation, thus becoming an additional molecular mechanism for the disruption of epithelial function. **Methods.** We performed confocal microscopy, metabolic labeling, luciferase refolding and in vitro rephosphorylation assays to study the components of aPKC rescue protein complex in TNF-alpha treated CACO-2 (human colon carcinoma) epithelial cells. **Results.** We found that aPKC is downregulated by TNF-alpha signaling. Decrease in aPKC levels is mediated via inhibition of Hsp70 chaperoning activity, which subsequently results in failure of the aPKC rescue machinery. **Conclusion.** We show that aPKC stability is under control of pro-inflammatory signals. Moreover, this study indicates that some potentially important pathophysiological events in IBD may not be detectable by mRNA screens. **Grants.** Supported by NIH grant R01-DK087359 (to P.J.S.).

## Skin Tissue Water Assessed via Tissue Dielectric Constant Measurements in Persons With and Without Diabetes Mellitus

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**Objective.** To determine if skin tissue water (STW) in persons with diabetes mellitus (DM) is less than in persons without DM (NO-DM). **Background.** Microvascular and other DM-related skin changes may cause skin dryness and other complications. However, no definitive data describing STW differentials exists. Herein the skin's tissue dielectric constant (TDC) that is directly proportional to STW was used to determine if differences in TDC are detectable between NO-DM vs. DM subjects. **Methods.** TDC was measured bilaterally on forearms and on foot dorsum of 18 persons with DM and 18 persons without DM. Measurements were made in triplicate with subjects supine to skin-depths of 2.5, 1.5 and 0.5 mm. NO-DM and DM groups did not differ by age (54.2±18.4 vs. 62.7±12.5 years,  $p = 0.21$ ) or BMI (28.4±4.2 vs. 29.9±5.2 Kg/m<sup>2</sup>,  $p = 0.36$ ). DM duration was 133±132 months and average HbA1c was 7.4±1.4. **Results.** Forearm TDC values did not differ between NO-DM and DM groups for any depth being 27.5±3.2 vs. 28.8±3.8 at 2.5mm; 30.5±2.4 vs. 31.8±3.5 at 1.5mm and 32.4±3.9 vs. 34.5±4.5 at 0.5mm. Contrastingly, TDC values were significantly greater ( $p < 0.05$ ) at the foot for the DM group at all depths being (NODM vs. DM) 29.1±4.1 vs. 33.3±6.4 at 2.5mm; 28.9±3.5 vs. 32.5±5.9 at 1.5mm and 28.3±5.1 vs. 31.9±4.2 at 0.5mm. **Conclusions.** Contrary to expectations, persons with DM had greater, not lesser skin tissue water in the foot dorsum. This elevation may reflect previously undetected DM-related pre-clinical edemas. If true, the TDC-method may be a useful screening tool. Further testing is indicated.

## Sequential Variability in Localized Thigh Skin Dermal Tissue Water

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**Objectives.** To learn to use tissue dielectric constant (TDC) measurement devices and apply them as part of research training to study variability of biophysical values. **Background.** Skin TDC-values have been used as indices of local skin tissue water and its change in a variety of clinically-related applications but the temporal variability in lower extremity TDC-values in young adults has not been previously reported. Because TDC-values vary by anatomical site such information is valuable directly as a reference and also to help set criteria for sequential studies in which measurements are made in patients over days or weeks. **Methods.** Six male student research-trainees performed self-TDC measurements on their anterior thigh while in a seated position at five sessions; day0, day1, day7, day21 and day 28. At each session TDC was measured in triplicate to a skin depth of about 1.5 mm which is a depth that includes the epidermis and dermis but not the underlying hypodermis or subcutaneous fat. For reference, the TDC value of 100% pure water measured at 300 MHz is about 78. Data was analyzed by a person not involved with the measurements. **Results.** TDC-values for the five sequential sessions (mean±SD) were respectively 33.3±2.1, 33.9±3.6, 34.1±2.8, 34.5±2.0 and 34.9±4.0. Although an ANOVA for repeated measures showed no overall time effect ( $p = 0.629$ ) an increasing trend appears present. As compared to day0, subsequent TDC-values increased sequentially by 1.7%, 2.6%, 3.6% and 4.5%. **Conclusions.** Interpretation of sequential changes in thigh dermal tissue water must take into account the normal time-dependent variations.

## $\alpha$ -Latrotoxin Indirectly Stimulates Melanophore-stimulating Hormone Secretion From Melanotrophs of the Neurointermediate Lobe of the Lizard *Anolis carolinensis*

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**Objective.** To determine the effect of  $\alpha$ -Latrotoxin ( $\alpha$ -Ltx), a toxin known to cause transmitter release from CNS neurons, on melanophore-stimulating hormone (MSH) secretion from the neurointermediate lobe (NIL) of the anole. **Background.** MSH secretion from the anole melanotrophs is considered to be under stimulant control exerted by factors released from neurons in the neural lobe. Since  $\alpha$ -Ltx induces transmitter release from such neurons it was tested on MSH secretion from the anole NIL. **Methods.** NILs were either used acutely or placed in culture in a medium containing a 50:50 mixture of Hams F12 and Hams F10 in a humidified atmosphere of 5% CO<sub>2</sub>/95%O<sub>2</sub> at 25° C for 7 - 10 days to allow nerve terminals in the neural lobe to degenerate. The freshly excised or cultured NILs were placed in a perfusion chamber and the MSH content of the perfusate measured by the *Anolis* skin bioassay. **Results.**  $\alpha$ -Ltx (3 nM) stimulated MSH secretion from freshly excised NILs but not from cultured NILs. In both preparations high [K<sup>+</sup>] (50 mM) administered 20 min after  $\alpha$ -Ltx exposure, produced a robust secretory response of up to 16 times basal level. **Conclusion.** The stimulant effect of  $\alpha$ -Ltx on MSH secretion from freshly excised NILs and the lack of effect on cultured (denervated) NILs suggest that the stimulation is neurally mediated and is thus consistent with the suggestion that stimulant factors, released from nerve endings in the neural lobe, are involved in the control of MSH secretion from melanotrophs of the lizard *Anolis carolinensis*.



## Depth Distribution of Thigh Skin-to-Fat Tissue Water

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**Objectives.** To learn to use tissue dielectric constant (TDC) measurement devices and apply them as part of research training to study biophysical measurement variability. **Background.** Forearm skin TDC-values, used as indices of local tissue water have been shown to vary with the tissue depth included in the measurement but no such data are available for lower extremities. Because TDC-values vary by anatomical site such information is valuable directly as a reference and to help select an appropriate measurement depth for a given test situation. **Methods.** Six male student research-trainees performed self-TDC measurements on both of their anterior thighs while in a seated position to depths of 0.5mm, 1.5mm, 2.5mm and 5.0mm at two sessions 28 days apart. These measurements include both epidermis and dermis with different amounts of subcutaneous fat at the deeper depths. For reference, the TDC value of 100% pure water measured at 300 MHz is about 78. Data was analyzed by a person not involved with the measurements. **Results.** At baseline (day0) TDC-values linearly decreased ( $r = 0.992$ ) with increasing depths with TDC-values (mean $\pm$ SD) being 36.4 $\pm$ 3.5, 34.6 $\pm$ 2.6, 31.2 $\pm$ 2.2 and 27.1 $\pm$ 2.3 measured through 0.5mm to 5.0mm depths. These values were insignificantly different from values obtained 28 days later. **Conclusions.** The anticipated reduction in tissue water with measured depth-volume is consistent with the inclusion of increasing amounts of low-water content fat tissue as observed in forearm. The similarity of the distribution over 28 days suggests that the depth-distribution of water-fat is reasonably constant over this time interval.

## Forearm Skin Tissue Dielectric Constant: Effect of Changes in Vascular Volume and Skin Blood Perfusion

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**Objective.** To determine vascular volume (VV) and skin blood perfusion (SBF) effects on skin tissue dielectric constants (TDC). **Background.** Measuring TDC via the open-ended coaxial probe 300Mz method is a useful non-invasive measure of local skin tissue water but VV and SBF effects on TDC is unknown. **Methods.** At a depth of 1.5mm TDC and SBF (laser-Doppler-Flowmetry) were measured on forearms of 20 subjects under two test conditions. Test 1 was done with the arm horizontal and then raised. Test 2 was done with the arm horizontal with and without a 50 mmHg cuff compression. **Results.** For Test 1, horizontal TDC values of 28.7 $\pm$ 2.9 decreased slightly but significantly on arm raising to 27.8 $\pm$ 2.5,  $p < 0.01$ . For Test 2, TDC values of 28.2 $\pm$ 2.8 increased slightly but significantly to 29.2 $\pm$ 3.1,  $p < 0.01$  during upper arm compression. At the forearm site SBF significantly increased during Test 1 maneuver (+102.6 $\pm$ 156%,  $p < 0.001$  and decreased during Test 2 maneuver (-39.5 $\pm$ 13.1%,  $p < 0.001$ ). **Conclusion.** Over the wide range of VV and SBF shifts used there was only a 3.0-3.5% change in TDC values. This suggests that for most clinical evaluation and tracking purposes the confounding effects of variations in SBF or volume are inconsequential. From the physiological perspective, the decrease in TDC with arm raising is consistent with a gravity-dependent drainage in vascular volume and the increase in TDC with application of cuff pressure is consistent with reduced drainage from vascular compression. The increase in forearm SBF agrees with previous work suggesting that venous emptying leads to arteriolar vasodilation.

## COLLEGE OF OPTOMETRY

### Effect of Hyperthyroidism on Electroretinogram Photopic Responses

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**Introduction.** It has been shown that thyroid hormone levels regulate cone photoreceptors development and modulate opsin production in mature cones. A limited number of cases have been reported where the flash electroretinogram (fERG), a global retinal response, have shown enhanced responses in patients with adult-onset thyroid dysfunction. It is unknown how retinal photoreceptor functions are affected topographically, and how this might impact multifocal ERG (mfERG) responses. **Case Presentation.** We report on a patient with hyperthyroidism caused by recently diagnosed Graves disease who presented with enhanced ERG cone responses. A 27-year-old white female was diagnosed with Graves disease two months prior and started on Methimazole and Propranolol. Her past ocular history was significant for strabismic amblyopia treated at age of six years with patching. Her best-corrected visual acuity was 20/25 in the right and 20/20 in the left eye. Flash ERG showed enhanced amplitude in the photopic responses. Further mfERG testing showed amplitude enhancement with normal implicit time from foveal to peri-foveal areas topographically in both eyes. **Deviation From the Expected.** This case first demonstrates enhanced cone responses in both fERG and mfERG testing in a patient with hyperthyroidism. **Discussion.** It provides evidence that thyroid hormone levels continue to affect adult retinal cone function. **Conclusion.** It shows the potential application of mfERG testing in mapping retinal function and diagnosis of ocular involvement in patients with early hyperthyroid dysfunction.

### Monitoring Diabetic Vision Changes in a Patient With Amblyopia

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**Introduction.** Amblyopia is a condition where vision loss exists in the absence of structural anomalies or ocular disease. Deterioration of vision can be missed in patients who have diseases that might lead to vision loss if they also have amblyopia. It is important to recognize the additional attention required when patients have diseases concurrent with amblyopia. **Case Presentation.** A 66-year-old Hispanic male presented with complaint of flashes and a floater OD, which is generally associated with retinal detachments or posterior vitreous detachments. Ocular history was remarkable for strabismic amblyopia OS. Medical history was positive for Type II diabetes, hypertension and hypercholesterolemia. Dilated fundus exam showed a PVD (OD) explaining the flashes and floater. However, it was also noted that his best-corrected acuity was reduced in the left eye from the previous visit from 20/40 to 20/60. Macular edema secondary to diabetes was suspected and confirmed with further testing. **Deviation From the Expected.** A complication from diabetes was detected because it was recognized that there was vision loss not consistent with amblyopia. Typically, patients who have vision loss from diabetic complications are aware of any reduction in their vision. This patient was unaware of his visual loss due to his pre-existing amblyopic condition. **Conclusion.** Patients who already have poor vision in one eye due to non-diabetic vision loss may not notice further vision deterioration due to diabetic complications. Suggestions on how to monitor for future vision changes in these types of patients are discussed.

## Evaluation of a Complete Third Nerve Palsy With Aberrant Regeneration in a Traumatic Brain Injury Patient

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**Introduction.** Aberrant regeneration occurs with traumatic, aneurismal, or compressive third nerve palsy. In a pupil involving third nerve palsy secondary to traumatic brain injury (TBI), careful observation with visual rehabilitation is warranted. **Case Presentation.** A 33 year-old male presented for sensory motor evaluation secondary to TBI, which occurred three years prior. He complained of intermittent diplopia in all secondary gazes yet was able to obtain single vision in primary gaze. Best correct acuity is 20/20 OD, OS. Pupil testing revealed a minimally reactive dilated left pupil, which was responsive to accommodation and constricted upon inferior gaze and adduction. EOMs revealed underaction OS in 6 out of 9 gazes excluding left and inferior left. Also an elevation of the upper eyelid was present with down gaze OS. Near cover test revealed 5 pd constant left hypertropia and 8-10 pd exophoria in primary gaze. **Deviation From the Expected.** This case presents a TBI patient with complete third nerve palsy and aberrant regeneration. **Discussion.** There are several etiologies for a complete third nerve palsy and the prognosis varies for each. Some may develop aberrant regeneration, which should be monitored closely. It is important to differentiate between the etiologies in order to understand the prognosis of each. **Conclusion.** In this case, visual rehabilitation should be implemented, due to the limited resolution of this condition. Visual rehabilitation is scheduled to begin with goals of improving visual skills, primary and secondary vergence fusional ability, and scanning techniques.

## A Myriad of Co-conspirators Leading to Ulcerative Keratitis

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**Introduction.** Ulcerative keratitis is attributed to an array of infectious, non-infectious, and immune etiologies. **Case presentation.** A 47 year old Hispanic female presents with decreased vision, photophobia and pain OS>OD that had worsened since starting new eye drops (FML 0.1% BID OU and Voltaren 0.1% BID OU) two weeks prior. Ocular history is significant for keratoconjunctivitis sicca and Epithelial Basement Membrane Dystrophy. Systemic history is remarkable for Sjogren's syndrome, MALT Lymphoma, anemia and presumed discoid Lupus. Visual acuity is 20/50 OD with NI on pinhole and 20/200 OS with 20/100 on pinhole. Corneal biomicroscopy shows 4+ diffuse PEK with (+) NaFI and (+) RB staining OU, instant TBUT OU, and a 3.5mm round epithelial/sub-epithelial defect with surrounding edema superior-nasal OS. Management included discontinuation of FML and Voltaren, Tobrex ung TID OU and pressure patching OS with full re-epithelialization of the ulcer in 3 days. **Deviation From the Expected.** The etiology of this ulcerative keratitis case is multifactorial including autoimmune disease, severe dry eye, a history of corneal basement membrane abnormality, use of topical NSAIDs, and an immunomodulating agent (Rituxan) associated with dry eye. **Discussion.** Immune related ulcers are generally peripheral, whereby sterile or infectious corneal ulcers can be either peripheral or central. Pathogenesis of autoimmune corneal ulcers is unknown. It has been proposed that the immune system is responding to unknown antigens resulting in antibody production and activation of complement pathway. **Conclusion.** The patient's autoimmune disease, corneal disease, and overall systemic health contributed to the severe nature of the presentation.

**Florida Heiken Children's Vision Program:  
Expansion of State-Wide Educational Outreach**

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Virginia Jacko<sup>2</sup>, President and CEO;  
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**Objective.** Raise awareness of prevention, early detection, and treatment of vision problems in children. **Background.** Vision problems in children, if left untreated, can lead to a variety of problems, including permanent loss of vision, learning difficulties and delayed development. Increase awareness of parents, school administrators and community leaders about the importance of comprehensive eye examinations for school children is an important to aspect of reducing visual impairment in children. **Methods.** The primary activity will be the creation of tri-lingual brochures and educational material about the importance of early intervention and eye examinations for children, targeting parents, school officials and community leaders. The educational material will be distributed to schools, to eye wellness professionals and at other community events. The purpose of these activities will be to generate parental agreement for eye examinations by the Florida Heiken Children's Vision Program to financially disadvantaged school children attending public schools in all Florida counties. **Results.** Tri-lingual brochures were created that will be distributed to approximately 5,500 patients. Due to increase awareness, a diverse patient population of children received comprehensive eye examinations for those children that failed the school vision screening. **Conclusion.** Reducing visual impairment in children and adolescents is a major objective of the U.S. Department of Health and Human Services (HHS) Healthy People 2020 health initiative. This project helped raise awareness of prevention, early detection, and treatment of vision problems in children. **Grant.** This project was funded by the American Optometric Association Healthy Eyes Healthy People/ Florida Optometric Association Grant.

**Adhesion of Lysozyme, Albumin and Transferrin to two Types of  
FDA Group II Contact Lenses**

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**Objective.** To determine the adhesion of three tear proteins to two different types of FDA Group II contact lenses (hilafilcon and omafilcon). **Background.** Tears contain ~60 different proteins that adhere to contact lenses, causing lens deterioration and ocular pathology. **Methods.** Lenses were incubated in 2.0 mg/ml solutions of human lysozyme, albumin and transferrin for 1-4 days. Protein adhesion was

determined by bicinchoninic acid assay. **Results.** Lysozyme adhered to hilafilcon lenses in an up-down pattern, with a maximum on day 3. Lysozyme adhesion to omafilcon lenses was high after 1 day and remained high on day 4. Albumin deposited on the lenses in a steadily increasing fashion. Transferrin adhered to Group II lenses in an increasing asymptotic pattern, reaching a maximum after three days of incubation, and then declining slightly on the fourth day. The pattern of transferrin adhesion differed from the patterns observed for lysozyme and albumin adhesion to the same lenses. These results are due to differences in lens material and tear protein structure. **Conclusion.** Levels of transferrin and lysozyme adhesion to omafilcon lenses are lower than their levels of adhesion to any other type of contact lenses in all four FDA groups, suggesting that omafilcon lenses are better able to resist protein adhesion than contact lenses fabricated from other materials. **Grants.** Supported by the Farquhar College of Arts and Sciences and the Health Professions Division, NSU.

## COLLEGE OF OSTEOPATHIC MEDICINE

### The Effect of Histology, Gender and Stage on the Treatment of Thyroid Cancer

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**Introduction.** Differentiated thyroid carcinoma makes up to 90% of all thyroid cancers. Literature review indicates that surgery is the primary mode of treatment for this type of thyroid carcinoma and is associated with lower recurrence rate. **Objective.** To investigate effect of surgery plus adjuvant therapy vs. surgery alone on the evidence or no evidence of thyroid cancer at the follow up. To investigate if the effect was confounded or modified by histological type, stage, or gender. **Methods.** Secondary database analysis of 4,699 patients diagnosed with thyroid carcinoma in Florida between January 1, 1994 and December 31, 2002 was performed. The Chi-square- General Association tested the independence of the treatment vs. outcome in the presence of the third stratification factor. Mantel-Haenszel stratified methodology was used to analyze all three third factors. **Results.** Patients with localized papillary thyroid carcinoma (PTC) are 20 % more likely to have evidence of carcinoma if they undergo surgery plus adjuvant therapy than patients with follicular variant of papillary thyroid carcinoma (FVPTC). Histology, gender and stage were found to be EM, risk factor and confounder, respectively. **Conclusion.** The data analysis suggests that patients with PTC, who were treated with surgery and adjuvant therapy, may more likely to have evidence of cancer at the follow up than patients with FVPTC. Authors suggest that histology, gender and stage should be considered and controlled for during planning stage of the study and/or during analysis.

### The Effect of Gender, Histology, and Stage on Radiotherapy Versus Surgery Treatment of Lung Cancer

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Lung cancer continues to be the most common cause of death in the United States, despite vast public health campaigns warning of the dangers of smoking and increasingly stringent anti-smoking laws. Patients diagnosed with lung cancer have also benefited from significant clinical advancements in a

variety of biological, surgical, and radiological therapies, yet certain varieties of lung cancer continue to have high morbidity and mortality rates throughout the U.S. We answered the following research question: what is the effect of gender, histology, and cancer stage on the survival ratio of radiotherapy vs. surgery? A subset of the Florida Cancer Registry of 14003 individuals with lung cancer, diagnosed in the state of Florida between 1994 and 2002 was considered. The two main methods of treatment for lung cancer investigated in this study are radiation therapy and surgery. In order to maximize the survival rate post-treatment and present a complete picture, previous outcomes are analyzed here. The outcome is solely decided on the mortality of the patient post treatment. Gender of the patients, histology of the cancer cells, and stage of cancer were used to categorize each patient. The survival rate of each category is analyzed and determined if they are effective modifiers of surgery treatment. This cross-sectional study uses survival rate as a factor in determining the relative risk of each factor. Once a variable is proven to be an effective modifier the relative risks is stratified to show the likelihood of the variables affecting mortality ratio. Our statistical analysis shows that the patient's gender, as well as the histology and stage of cancer should be factors in calculating the risk ratio when determining if radiotherapy should be administered as a treatment. The most important factor in determining the use of radiotherapy is the local or regionalized stage of cancer. For localized tumors, the risks of radiotherapy outweigh the benefits; treatment of non-metastatic lung tumors should be treated with surgery alone. Adenocarcinoma of the lung is the most common histological type of lung cancer in lifelong non-smokers. It also has the highest risk ratio of radiotherapy compared to the other histological types of lung cancer with greatest difference being a 98% increased risk in radiotherapy. Overall, females with adenocarcinoma of the lung are 69% more likely to die from radiotherapy than males, with a risk ratio of 3.59. The type of lung cancer with the lowest risk ratio was regionalized small cell lung carcinoma in females; its risk ratio is 1.40. There is an increased risk of radiation therapy that is modified by various factors. When considering the use of radiation therapy versus surgery one must consider the gender of patient, histology of cancer, and stage of development. These four variable are all effective modifiers that result in different rate of survival in patients. When treating a new patient with lung cancer, risk ratio should be calculated from Table 4 and determined if the survival rate is high enough for the treatment to be administered.

### **What is the Effect of Surgery vs Surgery + Adjuvant Therapy on the Colorectal Patient Outcome?**

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Colorectal cancer is on the rise in North America—it now ranks third most prevalent among all cancers and second in mortality, affecting more than 140,000 people each year. Various treatment options are available to patients depending on the type of colorectal cancer they are diagnosed with and how far the disease has progressed. The current standard of care for localized colorectal cancer which has no lymphatic nodes and not yet metastasized (Stages I and II) is surgical removal of the initial tumor. For more advanced disease (Stages III and IV), with diagnosed lymphatic nodes or metastases, adjuvant therapy involving chemotherapy, radiation, or both is indicated in addition to surgery. In this study, we compared the effectiveness of these two treatment methods, surgery alone versus surgery plus adjuvant therapy. We also examined whether the type of cancer histology and the progression of disease (stage) affected patient outcomes and chances of survival in regards to the aforementioned treatment options. A cross-sectional analysis was conducted in which 24,979 individuals with colorectal cancer were studied. Our research determined that treatment outcomes are highly correlated with the type of cancer histology and the stage. We found that surgery alone was a more effective treatment than the combination of surgery with adjuvant therapy in cases of both localized papillary carcinoma and localized adenocarcinoma; however, physicians should consider the histological type and the progression of the cancer (stage) before deciding on the best treatment option for each individual patient.

## **Mortality Rates for Bladder Cancer Patients Who Use Tobacco: Outcome of Surgery Alone vs Surgery, Chemotherapy, and Adjuvant Treatment**

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**Purpose.** Bladder cancer is responsible for over 12,000 deaths annually and the ninth most frequent cancer worldwide. Many bladder cancers can be managed conservatively, requiring a cystoscopic removal of identified cells. Other cancers, which are staged as a more invasive type, are treated more aggressively with surgery, chemotherapy, radiation and other adjuvant therapies. **Methods.** Utilizing Florida Cancer Data from the Department of Health, we will determine if there are differences in mortality rates by measuring treatment outcomes of performing surgery alone (Sr) Vs Surgery, Chemotherapy, and Adjuvant (Sr + CT + Adj). We evaluated subsets of data including treatment options SR and SR+CT+Adj, also histology, staging and smoker, non smoker. **Results.** We reported  $RR_{mh} = 1.18, (1.04, 1.35)$  of the adjusted association as a final effect of stage and smoking on the association of treatment and mortality.  $[1.18 - (2.13 - 1.17)] / 1.18 = 0.18 \times 100 = 18\%$ . Thus adjusting for Histology, patient with localized tumor who are smokers, are 18% more likely to die if they undergo Surgery + Chemotherapy + Adjuvant than if they undergo Surgery alone. **Conclusion.** Patients who underwent Chemotherapy with the surgery are 1.78 times more likely to die than those who underwent surgery alone. Assessment for bladder cancer must be done on clients presenting with symptoms and early management should be encouraged. Healthcare providers must perform in depth interviews to ascertain client smoking history and document on medical record.

## **Examining Processing Speed and Reaction Time Differences Among College Athletes**

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Processing Speed (PS) and Reaction Time (RT) are two important cognitive processes that directly influence an athlete's performance. Processing speed refers to a person's ability to complete cognitive tasks within a given amount of time. In contrast, reaction time refers to the mechanical ability to respond to a stimulus. Jensen (1993) states that a person's processing speed is dependent on a person's neuro-anatomical mechanisms. Mental practice and physical practice play a role in improving an athlete's reaction time indicating that someone should experience improvement after repeatedly practicing the same task. Given the research that states that a person's processing speed is a stable cognitive trait unaffected by training (Montgomery et al., 2008; Fabre-Thorpe et al., 2001; Thorpe et al., 1989), we anticipated no significant differences between athletes on the processing speed index. However, given the research that states that a person's reaction time is improved with experience or practice (Grouios 1988 & 1992), we anticipated a significant difference between athletes on the reaction time index. Participants for the study were 679 student athletes (293 men, 383 women, 3 missing) within a National Collegiate Athletic Association (NCAA) Division-II athletic program located in the Southeastern United States who participated in one of seven different sports who completed the Immediate Post-Concussion Assessment and Cognitive Testing instrument. Multiple ANOVAs will be implemented to determine if there is a difference in PS or RT between members of the different sports. Regression analyses will be conducted to determine how age and the number of years playing a sport may predict reaction time or processing speed.

## **Effect of Stage and Histology on the Treatment Outcomes of Cervical Cancer**

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Cervical cancer which affects a female reproductive organ is one of the most common cancers. There are an estimated 16,000 new cases of invasive cancer of the cervix and 5,000 deaths as a result of this disease, in the United States each year. The prognosis for this disease is markedly affected by the existence of disease at the time of diagnosis. Among the major factors which influence prognosis are the stages, grade of tumor and histology type. This study examined the effects of surgical vs. radiotherapy treatments on the mortality of cervical cancer patients, stratified by histology and cancer stages. Data used was obtained from the Florida Cancer Registry between January 1994 and December 2002; a total of 6,107 women diagnosed with Cervical Cancer in the state of Florida were included in the analyzed data set. The study was a routine database analysis; analogous in design to a cross-sectional study. The main association in the study shows that patients who underwent Radiotherapy (RT) alone were 11.8 times more likely to die than those who underwent Surgery (SR) alone. Stage and histology were both found to be significant third factors with P-value  $<.0001$  which showed a significant association for the used Mantel-Haenszel methodology. The stratified analysis showed that histology was not found to be either an effect modifier or a confounder; but was determined as a risk factor; stage was found to be an effect modifier. Patients with local stage cervical cancer and different histology types were 9 times more likely to die with RT alone then those with regional stage cervical cancer and different histology types. This study established that cancer stage is an effect modifier of the main association of mortality and treatment. Patient who incurred RT are less likely to survive than those who underwent SR alone.

## **Difference in Outcome Between Surgery and Radiotherapy for Localized and Regional Prostate Cancer**

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Isaac Glickfield;  
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There are no established guidelines for the management of low-risk, localized prostate cancer. In this analysis we assess the efficacy of two treatments, radiotherapy and radical prostatectomy, for improved outcomes in subsequent cancer recurrence stratified by cancer stage and histology. Treatment response is dependent upon tumor grading and lymph node involvement. Histology and stage are key prognostic factors used in the decision-making process for treatment of prostate cancer. This is a secondary data analysis of 53437 prostate cancer incidences cases from the Florida Cancer Registry. JMP is used to calculate RR of cancer evidence (outcome) by treatment option (exposure). Mantel-Haenszel stratified analysis assesses the effect of treatment on evidence stratified by four cancer histologies (adenocarcinoma, carcinoma, acinar carcinoma, malignant) and two clinical stages (localized, regional). A two-level stratified analysis of crossed effect determines significant stratum-specific RR associations. It was found that evidence of cancer is 2.2 times more likely with radiation therapy versus surgery (Table 1). Outcome was shown to be associated to stage ( $p < 0.0001$ ) and histology ( $p < 0.0001$ ) (Table 2 and Table 3). Mantel-Haenszel RR and CI for stage and histology show significant adjusted association to outcome and identify them as effect modifiers with 50% and 33% changes respectively from RR crude across strata (Table 3). Interpretation of crude RR suggests radiotherapy is less reliable than surgery for treating most prostate cancers. Specifically, risk difference data suggests that localized adenocarcinomas



(RR=2.80) are 39% more likely than regional adenocarcinomas (RR = 1.41) to have recurrence with radiotherapy than with surgery alone.

### **Shoulder Bags: Can They Actually Be Helpful?**

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**Purpose.** To investigate whether there is a way to wear a unilateral strap shoulder bag so the weight bearing forces through the lower extremities are more symmetrical. **Subjects.** Sixty-five college student volunteers. **Methods.** Each participant wore a shoulder bag two different ways on the dominant and non-dominant shoulder while standing on a scale (Postural Scale Analyzer) to measure the lower extremity weight distribution. **Results.** A significant improvement ( $p < 0.05$ ) in weight distribution was found in right hand dominant subjects ( $n = 63$ ) when wearing a shoulder bag draped across left shoulder to right hip. **Discussion.** When individual that are right hand dominant wear a shoulder bag draped across the left shoulder (non-dominant shoulder), the weight distribution through the person's lower extremities becomes more equal. **Conclusion.** It is possible that individual prescription of a unilateral bag on the non-dominant shoulder draped across the body can be utilized to create symmetry in lower extremity weight distribution. **Recommendations.** Individuals should wear shoulder bags on their non-dominant shoulder, draped across the body to reduce asymmetrical weight bearing forces through the body as a short term effect.

### **The Effect of Stage, Marital Status and Histology on the Treatment Outcome of Colorectal Cancer in Florida**

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Jeffrey Cave;  
Mimi Ribotsky;  
Robert Parkes, M.D.;  
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Colon cancer is the second most prevalent type of cancer in the Westernized world. There has been incongruity on how best to treat colorectal cancer with regard to surgery and/or adjuvant therapies. For early stage colorectal cancer, surgical resection alone can be curative; whereas, the addition of adjuvant therapies have been questioned for stages II and IV. This study seeks to determine the effect of stage, histology and marital status on treatment type (surgery or surgery plus adjuvant therapy) and outcomes. The study resembled a cross-sectional study and used incidence cases of colorectal cancers in Florida from 1994 to 2002. The crude risk ratio was calculated, along with strata-specific ratios. Effect modification was determined by calculating the percent change in risk ratios between the crude and stratum, while Mantel-Haenszel analysis allowed for determination of confounding, both with a 15% change being significant. The Chi-square general association test was used to determine independence of treatment and outcome in relation to the stratum factor. Data homogeneity was assessed using the Breslow-Day test. The  $RR_{Crude}$  for surgery alone compared to surgery and adjuvant therapy was calculated to be 1.20 (1.11, 1.30). Stage was determined to be a confounder, not an effect modifier. Histology and marital status were not effect modifiers or confounders, meaning that they are risk factors. Patients receiving surgery alone as opposed to surgery in conjunction with an adjuvant therapy are forty six percent more likely to die. This implies that for stage I and II cancer, surgery alone may be curative, but for more advanced stages, adjuvant therapy in addition to surgery should be the basic standard of care. It also emphasizes the need for regular colonoscopies among populations at risk.

## Biomechanical Changes and Weight Gain Throughout Pregnancy

Natalie Wessel, D.O.

**Background.** Low back and posterior pelvic pain are common musculoskeletal complaints during pregnancy. The biomechanical theory implies that the enlarging uterus causes the maternal center of gravity to move anteriorly causing stress on the low back. As the center of gravity shifts anteriorly, this can cause joint, muscle and fascial stresses on the body. The lumbosacral angle, weight distribution and low back pain were examined. These biomechanical measurements will be correlated with reported low back pain. As an Osteopathic physician, it is important to understand the biomechanical changes during pregnancy and their association with low back pain. This study will provide guidance in focusing Osteopathic Manipulative Treatments to the fascia and muscular attachments along the lumbosacral region that may have a contributing change in the biomechanics. **Hypothesis.** An increase in weight gain during the second and third trimesters of pregnancy will correlate with an increase in the sway rate, lumbosacral angle, and the percentage of body weight distribution posteriorly as the center of gravity moves anteriorly. An increase in reported low back pain during the 2nd and 3rd trimester will correlate with an increase in these biomechanical changes. **Materials and Methods.** Thirty pregnant ladies in at least their 2nd trimester (13-weeks) are being recruited at the Nova Southeastern University's Osteopathic Manipulation Clinic, NSU's Obstetrics and Gynecology Clinic, and at Red Pearl's Prenatal Yoga Class in Fort Lauderdale, FL. In this study, a quadruple postural scale is utilized to measure body weight distribution and sway rate. The quadruple postural scale measures the participants' weight gain and shift of weight anteriorly or posteriorly. A digital inclinometer is used to measure the lumbosacral angle. The Oswestry Low Back Pain Scale is utilized to measure the degree of reported low back pain. Ladies in the study will be measured throughout their 2nd and 3rd trimesters of pregnancy. **Results and Conclusion.** Preliminary (N = 22) results have shown that weight gain throughout the second and third trimesters of pregnancy increases the lumbosacral angle while the shift of body weight distribution moves posteriorly as the maternal center of gravity moves anterior. The higher degree of low back pain reported correlates with an increase in postural sway rate. Higher reports of low back pain also correlate with an increase in lumbosacral angle and shift of body weight posteriorly onto the heels. The results from 30 participants will be presented at the meeting.

## COLLEGE OF PHARMACY

### Long Acting Insulins Versus Intermediate NPH in the Management of Type 1 Diabetes in Pediatric Patients: A Systematic Review

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Reinaldo Basanez, PS-IV;

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**Objective.** The objective of this study is to analyze currently available trials in pediatric patients with type 1 diabetes mellitus (T1DM) on insulin therapy to determine whether long acting insulin or intermediate acting insulin is the most optimal with regard to glycosylated hemoglobin, body mass index, and hypoglycemic episodes. **Background.** In the last decade, the long acting insulins, glargine and detemir, have been used in place of intermediate acting insulin in the pediatric population. It is proposed that the long acting insulin analogues have equal efficacy as the intermediate acting insulin with less adverse reactions. **Methods.** An extensive literature search was conducted using the following key words: insulin glargine, detemir, isophane (NPH). Databases searched included EMBASE, PubMed, and International Pharmaceutical Abstracts (IPA). Studies were included if they met the following criteria: included pediatric patients (defined as less than 18 years of age) with T1DM, duration of the study of at least 12 weeks, and direct comparison of NPH with glargine or detemir. **Results.** A total of seven studies meeting inclusion

criteria were identified and analyzed for this study. Although there was no significant difference noted between the two insulin types, insulin glargine and detemir had a trend toward less hypoglycemic episodes in this population. One study reviewed found improved glycemic control with glargine in the first year after diagnosis. **Conclusions.** Long-acting insulin analogues (insulin glargine and detemir) and intermediate-acting insulin (NPH) offer similar clinical outcomes when treating pediatric patients with type 1 diabetes mellitus. **Grants.** N/A.

### **Active and Passive Tobacco Smoke Exposure Cause DNA Damage and Increased Cancer Risk Beginning in the Womb**

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College of Pharmacy

**Objective.** This study was conducted to demonstrate the induction of DNA damage and mutation caused by smoking and exposure to environmental tobacco smoke. **Background.** Human cancer is a multi-step process driven by somatic mutations and epigenetic events that mimic their effects. The frequencies of such events can be increased by occupational, environmental and medical exposures, although relatively few such agents have been unambiguously identified. Tobacco smoke is a pervasive anthropogenic agent proven to be associated with some types of cancer (lung, head and neck) and suspected to be involved in many others. **Methods.** We applied two well-established assays for locus-specific human somatic mutation, at the hemizygous X-linked gene for the purine scavenger enzyme hypoxanthine-guanine phosphoribosyltransferase (*HPRT*) and the autosomal (heterozygous) determinant for the MN blood group, glycoporphin A (*GPA*) to populations with known smoking status. **Results.** Smoking was associated with increased somatic mutation in two large studies of healthy individuals. Active smoking, as well of passive exposure, was associated with higher mutation frequencies in a population of young mothers, and in their newborn babies. Molecular analysis revealed that both active and passive exposure to tobacco smoke induced point mutations in the DNA of the children in utero, as well as the products of illegitimate V(D)J recombination, which are responsible for many of the molecular events underlying childhood leukemia. **Conclusion.** Tobacco smoke represents a widespread if not ubiquitous exposure that contributes to carcinogenesis throughout the body, beginning in the womb. Functional population monitoring therefore represents a feasible and actionable tactic for public health practitioners. **Grants.** This study was partially funded by grants from the NICHD and the University of Pittsburgh.

### **Viability of HeLa Cells in the Presence of Chelated Carboxymethyl Cellulose Beads**

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**Objective.** Evaluate viability of HeLa cells (a cervical cancer cell line) in the presence of an aluminum-carboxymethyl cellulose (Al-CMC) complex. **Background.** Cell scaffolds and drug delivery platforms are being developed from gelled hydrocolloids such as CMC. Therefore, cell sensitivity to the components of such systems should be thoroughly investigated. **Methods.** Using a bead generator, a 1% aqueous solution of sodium CMC was extruded into 50mL of 5% w/v aluminum chloride hexahydrate, forming chelated Al-CMC beads of varying diameters. After 15 minutes, the beads were extracted and triple washed with distilled water.  $30 \times 10^4$  of HeLa cells were suspended and fed in a growth medium containing DMEM, 10% fetal calf serum, and antibiotics. Cells were then plated in a flat bottom 24-well plate, and allowed to adhere for 4-5 hours. Cells were then exposed to 30 mg of beads and incubated at 37°C in 5% CO<sub>2</sub> for 48 hours. Cell viability was assessed using MTT assay; absorbance measured at 570nm. Statistical analysis was performed using a one-way ANOVA. **Results.** In the presence of beads with diameter 0.05, 2.20, 2.72, or 3.5mm, cell viability was  $81.0 \pm 0.01$ ,  $77.6 \pm 0.13$ ,  $64.9 \pm 0.08$ , and  $75.4 \pm 0.29\%$  (mean  $\pm$  SD, n = 4) respectively. **Conclusion.** When compared to control, cell viability was overall decreased by approximately 25%. Cytotoxicity was size-independent over the size ranges studied.

Research is ongoing to evaluate if cytotoxicity is predominantly due to the polysaccharide, cation, or the joined complex. **Grant # 335525.**

### **Viability of Human Umbilical Cord Cells in the Presence of Chelated Carboxymethyl Cellulose Beads**

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**Objective.** Investigate influence of aluminum-carboxymethyl cellulose (Al-CMC) complex on cell viability in human umbilical cord-derived Mesenchymal Stem cells (hMSCs). **Background.** When developing cell scaffolds and controlled delivery platforms made of chelated CMC, the effect of complex components on cell viability should be thoroughly investigated. **Methods.** A 1% w/v aqueous solution of sodium CMC was extruded dropwise into 50mL of 5% w/v AlCl<sub>3</sub>, 6H<sub>2</sub>O solution forming beads via ionic gelation. Tube diameter and composition were varied during extrusion to generate different bead sizes. After 15 minutes, the Al-CMC beads were eluted and triple washed with distilled water.  $30 \times 10^4$  of hMSCs were first suspended in a growth medium and then plated in a flat bottom 24-well plate, and allowed to adhere for 4-5 hours. Cells were then exposed to 30 mg of Al-CMC beads and incubated at 37°C in 5% CO<sub>2</sub> for 48 hours. Cell viability was assessed using MTT assay at 570nm absorbance. One-way ANOVA was used for the statistical analysis. **Results.** When compared to control, cell viability was overall decreased by approximately 30%. In the presence of beads with diameter 0.05, 2.20, 2.72, or 3.5mm cell viability was  $71.8 \pm 0.04$ ,  $71.0 \pm 0.02$ ,  $64.2 \pm 0.04$ , and  $73.6 \pm 0.04\%$  (mean  $\pm$  SD, n = 4) respectively. **Conclusion.** The Al-CMC complex was considered cytotoxic to hMSCs; this effect was size-independent over the bead diameter ranges studied. Further research is needed to determine if the hydrocolloid, cation, or complex cause these effects. **Grant # 335525**

### **The Context for Ancestry in the Breast Cancer Stem Cell Paradigm**

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Medicine, University of Pittsburgh

**Objective.** This study was conducted to determine whether epithelial stem cells, the primary targets for breast carcinogenesis, are intrinsically different in developmental potential in women of African-American (AA) ancestry and women of European white (EW) ancestry. **Background.** Breast cancer (BC) survival among AA is significantly lower than EW women, primarily because they are more likely to develop poorly prognostic disease. Since tumor type seems to be influenced by the cell type transformed, we measured the in vitro developmental potential of breast cultures from both groups of women. **Methods.** Our laboratory has developed a novel tissue engineering system for human breast tissue that allows for unusually long-term (>3 months) establishment of normal primary cultures that begin as 3-dimensional "epispheres," structures made up of 40-100 epithelial cells. These epispheres spontaneously differentiate into complex organotypic branching ducts and lobules. **Results.** 48 renewable explant cultures were established from non-diseased breast reduction mammoplasty tissues, including 12 (25%) from socioeconomically matched AA women, and allowed to differentiate in vitro. After multivariate analysis, a robust and significant model for the timing of in vitro ductal formation ( $P = 0.005$ ) involved only the ancestry of the donor and her height. Applied to the validation set, the sensitivity of this model was 100% and the specificity 66.7%. **Conclusion.** Intrinsic biological differences exist between AA and EW breast tissue that is demonstrated by the ability of these cultures to differentiate. Since factors affecting breast differentiation also affect breast cancer incidence, AA women may have an inherently higher risk of

developing this disease. **Grants.** This study was partially supported by grants from the DOD CDBCRP and Susan G. Komen for the Cure.

### **Angiotensin III Stimulates ERK1/2 Mitogen-Activated Protein Kinases and Astrocyte Growth in Rat Astrocytes**

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College of Pharmacy

**Objective.** We investigated in astrocytes whether Ang III stimulates ERK1/2 mitogen activated protein kinases (MAPK) and astrocyte growth. **Background.** Angiotensin (Ang) III is a biologically peptide with similar effects and receptor binding properties as Ang II. Most studies delineate physiological effects of the peptide, but the intracellular pathways leading to the actions are unknown and are a focus of these studies. **Methods.** Gel electrophoresis and Western blotting techniques were used to determine Ang III JNK MAPK effects. <sup>3</sup>H-Thymidine incorporation was used to determine astrocyte growth. **Results.** Ang III stimulated ERK1/2 MAPK in a dose- and time-dependent manner. Maximal stimulation occurred with 100 nM Ang III. This stimulation occurred as early as 1 minute, and was sustained for at least 15 minutes. The ERK1/2 MAPK inhibitor PD98059 attenuated Ang III-induced ERK1/2 phosphorylation. The Ang AT<sub>1</sub> receptor inhibitor, Losartan, prevented Ang III-induced ERK1/2 phosphorylation while the selective AT<sub>2</sub> Ang receptor blocker PD123319 was ineffective. Ang III stimulated astrocyte growth in a concentration-dependent manner, an effect that occurred via activation of the AT<sub>1</sub> receptor as well. These findings suggest that Ang III has similar effects as Ang II in astrocytes since it rapidly stimulates the phosphorylation of the ERK1/2 MAPK and induces astrocyte proliferation through activation of the AT<sub>1</sub> receptor. These studies are important in establishing signaling pathways for Ang III and provide validation of the central role of Ang III. **Grants.** This study was supported by a President's Faculty Research and Development Grant.

### **Incorporating Pharmacy Students Into Antimicrobial Stewardship Pharmacists**

Kristy Nguyen, Pharm.D.-IV  
College of Pharmacy

**Objective.** The purpose of this study was to investigate actual and potential fourth-year doctor of pharmacy students' involvement in Antimicrobial Stewardship Programs. **Background.** Antimicrobial Stewardship Programs (ASPs) aim to optimize antimicrobial selection, dosing, route, and duration of therapy in order to maximize clinical outcomes through treatment or prevention of infection while minimizing emergence of resistance, adverse drug reactions, and costs. **Methods.** Studies were identified through search databases CINAHL Plus with Full Text, International Pharmaceutical Abstracts, and MEDLINE. Following a review of the literature, articles were filtered to include those that identified incorporating pharmacy students or pharmacists on an antimicrobial stewardship team. The role of the pharmacist was evaluated for potential extrapolation to pharmacy students. Non-English articles were excluded. **Results.** Twenty-two articles were found to meet inclusion criteria. Of these, two mentioned the use of pharmacy students. Implementation of student into ASPs increases assistance in such areas as patient education, intravenous to oral conversions, streamlining or de-escalation, and dose optimization. **Conclusion.** Incorporating pharmacy students into ASPs can assist program directors in achieving their goals and growing their programs with limited resources. Students' role may be extrapolated to what the pharmacists have already been doing as a part of the antimicrobial stewardship team. However, future investigations are required to further understand the role of pharmacy students within ASPs. **Grants.** No grants were funded for this study.

## The Pharmacist's Expanding Role in the Care of Patients with HIV/AIDS Infection

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**Objective.** To collectively document the pharmacist's increasing role in the management of HIV-infected patients beyond those duties already listed in the 2003 American Society of Health-System Pharmacists (ASHP) position statement. **Background.** In 2003, ASHP published a position statement on the pharmacist's role in the care of patients with HIV infection. Almost a decade later, numerous published papers have described the developing roles of clinical pharmacists in the provision of pharmaceutical care for this patient population. **Methods.** A literature review was conducted by searching PubMed, Ovid and Embase databases from January 2002 through November 2011 using the following combined search terms: pharmacist or pharmacy and HIV. **Results.** Pharmacist's duties have continued to expand within HIV care at the national level, the state level, and the local/community level. The pharmacist's growing roles are documented in the inpatient/hospital, outpatient/ambulatory care, community pharmacy, academia, and pharmaceutical industry settings. Specifically, the literature describes pharmacist-lead initiatives in the areas of patient education with an emphasis on medication adherence, delivery of prevention messages and interventions to patients, collaboration with and education of healthcare providers in an interdisciplinary model, working with government organizations and serving on advisory panels, conducting clinical research and providing university-level education. **Conclusion.** The health care system is increasingly dependent upon pharmacist's expertise in the management of HIV infection.

## Isolation and Characterizations of Neurons and Astrocytes From Rat Brains

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**Objective.** We devised a method to isolate and culture neurons and astrocytes from the same newborn rat pups. **Background.** The ability to isolate different cells from the brain offers advantages for studying the complexity of the brain and the effects of angiotensin peptides on this system. Culturing of astrocytes and neurons from the same animals will allow us to study the interplay between these cells, in the control of central effects of the renin angiotensin peptides. **Methods.** Astrocytes and neurons were cultured from 2-3 days old rats by physical dissociation. The cell mixture destined for astrocyte cultures were plated in T-75 flasks while the cell mixtures destined for neurons were cultured in plates/coverlips previously coated with poly-L-lysine. Immunostaining techniques were used to determine the type of cells that were cultured. **Results.** We successfully cultured astrocytes using this method. Astrocyte cultures stained positive with glial fibrillary acidic protein, a selective marker for astrocytes but, stained negative with an antibody against neurofilament protein, a neuronal marker. These findings suggest that our current cell isolation methods for astrocytes yield relatively pure astrocyte cultures. However, the technique that was used to isolate pure neurons was unsuccessful. Only a few neurons survived the isolation method and were discernible under the microscope in culture. While we have successfully shown that growing of relatively pure astrocytes cultures could be illustrated with immunostaining techniques, the growing of neuronal cultures was unsuccessful, requiring a different protocol. **Grants.** This study was supported by a HPD Grant.

## The Impact of Clinical Pharmacists in Psychiatric Settings

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College of Pharmacy

**Objective.** The purpose was to evaluate the impact of clinical pharmacists' interventions in psychiatric settings. **Background.** The literature reports psychiatrists are suffering from burnout at a high rate and cite administrative pressures as a primary culprit. Clinical pharmacists have been collaborating with psychiatrists for decades; however, the impact of such collaboration is not fully elucidated. **Methods.** A literature search for studies analyzing the effects of pharmacists in the treatment of patients with psychiatric disorders was conducted using PubMed and CINAHL Plus with Full Text. Studies published between 1972 and 2011 were included. Search terms included: "pharmacy" or "pharmacist" in combination with "psychiatry," "psychiatric" or "mental illness." Studies referenced in identified trials were also included. Case studies and series were excluded. **Results.** Thirty-five studies met inclusion criteria: 22 outpatient studies and 13 inpatient studies. Only 13 trials utilized control groups, and eight studies included historic controls. Forty percent of all studies evaluated pharmacists' impact on patient response and one-third examined economic outcomes. Over 66% of the trials found pharmacists were responsible for clinical improvement in patient symptoms, but only one of these studies included a control group. Pharmacist interventions had positive economic outcomes in over 90% of the trials including those with a control group. **Conclusion.** Multiple studies demonstrate the positive impact of pharmacists in psychiatric settings, particularly with respect to economic outcomes. However, these studies vary widely in quality and measured outcomes, and additional controlled trials are recommended to support the role of pharmacists in psychiatric settings. **Grants.** N/A

## Fabrication of Epinephrine Nanoparticles Using Microfluidizer Processor for the Treatment of Anaphylaxis

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**Purpose.** Epinephrine was previously formulated into fast-disintegrating sublingual tablets (AAPS PharmSciTech 2006;7(2):41) and the sublingual bioavailability was established in vivo (J Allergy Clin Immunol 2006;117(2):398-403) for the potential first-aid treatment of anaphylaxis. The purpose of this study was evaluate the feasibility of reducing epinephrine particles size using high shear fluid processor (Microfluidizer) to enhance epinephrine sublingual bioavailability. **Methods.** (-)-Epinephrine (Epi) and (-)-epinephrine (+)-bitartrate (EpiBit) solubility were tested in various solvents as carriers for shear fluid processing. Epi and EpiBit suspensions were processed using M-110P Microfluidizer at 15 to 30 KPsi for several passes. Particles size was measured before and after processing using NiComp 370 and Mastersizer. Epi and EpiBit stability was monitored visually and by FT-IR. Powder was collected by ART bench top lyophilizer. **Results.** Water and isopropyl alcohol were selected as carriers for Epi and EpiBit respectively. Epi's particles size was reduced from 32.9±0.3 µm (mean±SD) to 905.9±82 nm and to 273.9±179 nm after one pass at 15 KPsi and 30 KPsi, respectively. EpiBit's particles size was reduced from 150.7±5.0 µm to 2.0±0.2 µm after 16 passes at 15 KPsi (1 pass) and 25 KPsi (15 passes). After processing, Epi suspension discolored to pinkish- brownish color and EpiBit did not change color. FT-IR spectrums reflected Epi degradation and confirmed EpiBit stability after processing. The process yield for EpiBit was 68%. **Conclusion.** Size reduction of Epi was achievable but resulted in its degradation. EpiBit was stable during the shear process and the particle size was reduced to 2 µm.

## Loss of <sup>125</sup>I-Sarcosine<sup>1</sup>, Isoleucine<sup>8</sup> Angiotensin II Binding in the Brain of Neurolysin Knock-out Mice

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**Objective.** To assess the distribution of a novel non-AT<sub>1</sub>, non-AT<sub>2</sub> binding site in mouse brain and determine whether this binding site is the metalloendopeptidase neurolysin (E.C.3.4.24.16).

**Background.** The brain renin-angiotensin system profoundly affects the cardiovascular system, often with pathological consequences. However, many unresolved questions about its functionality remain. Recently a novel, non-AT<sub>1</sub>, non-AT<sub>2</sub> binding site for angiotensin II (AngII) was found in the mammalian brain.

**Methods.** To assess the localization of this binding site in mouse brain, 3 mouse brains deficient in neurolysin as well as 3 wild-type mouse brains were evaluated for radioligand binding with <sup>125</sup>I-Sarcosine<sup>1</sup>,Isoleucine<sup>8</sup> AngII (250 pM) in the presence of receptor-saturating concentrations of losartan (an AT<sub>1</sub> receptor antagonist), PD123319 (an AT<sub>2</sub> receptor antagonist) and 150 mM parachloromercuribenzoate (to unmask the binding site) using in vitro autoradiography. **Results.** Specific (10 μM AngII displaceable) <sup>125</sup>I-Sarcosine<sup>1</sup>,Isoleucine<sup>8</sup> Ang II binding in wild-type mouse brains was abundant, with highest levels in the molecular layer of the cerebellum, cerebral cortex, hippocampus, amygdala, caudate-putamen, hypothalamus, lateral septum, and olfactory bulb. Specific <sup>125</sup>I-Sar<sup>1</sup>,Ile<sup>8</sup> AngII binding was profoundly reduced in neurolysin-deficient mouse brains. However, the extent of the reduction was region-specific. Greatest decreases were seen in the cerebral cortex, substantia nigra, hippocampus, paraventricular thalamus, lateral septum, and nucleus accumbens. The cerebellar cortex and hypothalamus showed the smallest reductions in <sup>125</sup>I-Sarcosine<sup>1</sup>,Isoleucine<sup>8</sup> AngII binding.

**Conclusions.** These results verify that the previously-reported novel non-AT<sub>1</sub>, non-AT<sub>2</sub> receptor binding protein, is neurolysin, but that there may be additional non-AT<sub>1</sub> non-AT<sub>2</sub> binding sites in the mouse brain.

**Grants.** Supported by NHLBI HL-096357.



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