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The Vanderbilt University School of Medicine is firmly committed to training future leaders and scholars in medicine. This includes the ability to recognize and understand the various challenges facing medicine as well as the vision and skill to address these challenges. That’s why we’ve created the EMPHASIS PROGRAM – an opportunity for our students to acquire specialized knowledge and experience in a focused area of their choosing.

The EMPHASIS PROGRAM is a unique mode of self-directed study which takes place during the first two years of medical school. We match the students’ area of interest with those of committed faculty mentors, providing them the opportunity to draw from seasoned professionals. Students cultivate knowledge and skill through these mentorship experiences, as well as hands-on research and study in desired areas of focus.

There are eight EMPHASIS focus areas in which students can choose projects: Biomedical Informatics, Community Health Initiatives and Outreach, Global Health, Healthcare and Public Health Research and Management, Laboratory-Based Biomedical Research, Medical Education, Medical Humanities, Ethics, and Policy, and Patient-Oriented Research. Students choose their areas, mentor, and projects during the fall semester of first year, and then use the spring semester to acquire general knowledge and skills within their EMPHASIS area. During this semester, they also work with mentors to design their studies. All students devote eight weeks to their projects during the first and second year while supported by an EMPHASIS stipend. Projects are completed during the second year and, in the spring; students present their work either as posters or oral presentations at our Spring EMPHASIS Forum.

Students who are part of our Medical Scientist Training Program are also featured in this publication. By the time they have completed the second year of medical school, these students will have selected research areas that will lead their doctoral degrees in biomedical research. The abstracts they have provided will serve as roadmaps for their future full-time doctoral studies.

In this publication, you will find abstracts of all projects carried out by the Class of 2012. The broad range of projects reflects the diversity of interests our students bring them to medical school.
In devising the **EMPHASIS PROGRAM**, Vanderbilt University School of Medicine sought to channel the diverse skills and passions of our students into the pursuit of scholarship and leadership. Believing that this aim is best achieved in the context of a relationship with a mentor, we sought the assistance of faculty in many different disciplines across the medical school, the university, the community, the country, and the globe. The response has been extraordinarily generous, both in terms of time and commitment. Each student has been able to work closely with a mentor for the duration of the program, spanning the first two years of medical school and including eight weeks during interviewing summer. As Director of the **EMPHASIS PROGRAM**, I want to express my thanks to those who willingly accepted responsibility of mentoring these students. The quality of the work reported in this volume is evidence of the effectiveness of this collaboration.

These 104 abstracts represent the posters that were presented at the **EMPHASIS** Forum at Vanderbilt University School of Medicine on May 4th and 11th, 2010. Of these abstracts, 93 represent the work of students who entered the **EMPHASIS PROGRAM** in the fall of 2008. Eleven abstracts describe research performed by students in Vanderbilt’s Medical Scientist Training Program.

Consistent with the aims of the **EMPHASIS PROGRAM**, the topic covered in the abstracts are wide ranging. Students explored innovative projects as diverse as medical informatics and healthcare policy. Students carried out complex, cutting edge laboratory investigations and undertook projects on healthcare delivery in developing countries and among the urban poor.

Many of these projects will be reported at scientific meetings and in peer-reviewed publications. Some students plan to continue to work on their projects as they move to the next phase of their medical education. Others may hand their projects off to the next class entering the program. Regardless of future direction these projects take, it is clear the collaboration between students and mentors has provided significant benefit to students, faculty, and the advancement of knowledge. For many, the opportunity to work closely with a faculty member over the past 18 months has forged a relationship that will endure in the incoming years.

The **EMPHASIS PROGRAM** is the result of many years of discussion and planning. Once initiated, refinement has continued as we have learned from the experience of students and their mentors. However, if we judge the work presented herein, the overarching goal of nurturing scholarship and leadership in our students has already been successful.
Biomedical Informatics is the scientific field that deals with the storage, retrieval and optimal use of biomedical information for problem solving and decision-making. Vanderbilt Biomedical Informatics is the largest academic department of biomedical informatics in the country, with more than 50 faculty members, a graduate training program, and a portfolio of research and development projects that spans from computational biology and bioinformatics applied to the understanding of biological molecules, through advanced clinical information systems that care for hundreds of thousands of patients at Vanderbilt, to regional health information projects that span many states. Research is focused on all areas of healthcare ranging from computer programs that alert physicians about patient problems to tools that assist basic scientists with bench research. The students’ educational focus is in three general areas of biomedical informatics:

1. Developing, evaluating and refining the computer tools available to clinicians caring for patients.

2. Using computer applications and techniques to better enable clinicians to assemble evidence for patient care and research.

3. Managing biologic or genomic information in ways that support discovery of new therapies or that guide basic science research.

“It has been very exciting to observe students as they learn about the field of biomedical informatics. We have had students with a wide range of technical backgrounds who have made landmark contributions to the field. The Emphasis Program is facilitating an exchange of knowledge among our medical students, our faculty, and our graduate students, in a way that has enhanced the intellectual capabilities of all three groups.”

Cindy Gadd is an Associate Professor of Biomedical Informatics. She has been the Director of Graduate Studies for the Department of Biomedical Informatics graduate degree programs since January 2006 and is the Principal Investigator on our NLM and Fogarty International Center Biomedical Informatics Training Grants. She is an elected Fellow of the American College of Medical Informatics and an active participant in the informatics education initiatives of the American Medical Informatics Association. She is a member of the VSM Academy for Excellence in Teaching. Her primary area of research and publication is the implementation and evaluation of integrated clinical information systems, including electronic health records (EHR) systems, in large health care networks. Since joining Vanderbilt, Dr. Gadd has become a co-investigator in the evaluation of a regional health information exchange, a web service for pediatric ePrescribing, and clinical documentation methods.
SURVEYING PERCEPTIONS ABOUT THE ATTRIBUTES OF CLINICAL DOCUMENTATION

KELLY KOHORST

BIOMEDICAL INFORMATICS

BACKGROUND PROBLEM
Healthcare workers want their documentation systems to be accurate, efficient, and allow them to be expressive. Different documentation methods have different advantages and disadvantages. There exists little evidence on end users’ perceptions of documentation tools.

OBJECTIVES
To create a survey that assesses clinicians’ perception of attributes of clinical documentation that can be used to evaluate various clinical documentation methods.

MATERIALS AND METHODS
Focus groups of clinicians, administrators, and ancillary care providers discussed their documentation methods and validated a list of attributes of clinical documentation and their definitions. Inductive approach used to code and identify emergent themes in focus group transcripts iterative process used to refine and validate attributes list and definitions. Survey created to collect user perceptions about attributes of clinical documentation and emergent themes from focus groups.

CONCLUSIONS
The survey will be distributed via REDCap to all VUMC employees and students. It can be used as a tool to compare relative value of the difference attributes to users and to assess user satisfaction with their primary methods in a systematic manner. This may be an important tool to assist in the task of creating new documentation systems.

ACKNOWLEDGEMENTS
Dr. Trent Rosenbloom, MD, MPH Dr. Cindy Gadd, PhD Dr. Xian Ho, PhD

PREPAREDNESS FOR “MEANINGFUL USE” OF ELECTRONIC HEALTH RECORDS IN THE ALASKA TRIBAL HEALTH SYSTEM

ADRIAN FURMAN

BIOMEDICAL INFORMATICS

BACKGROUND PROBLEM
The American Recovery and Reinvestment Act of 2009 apportioned approximately $19 billion for investment in healthcare IT. Provisions of this legislation include Medicare/Medicaid-linked financial incentives for adoption and meaningful use of electronic health record (EHR) technology by the year 2011. The Alaska Native Tribal Health System (ATHS) is intent on earning these incentives through development of interoperable health information exchange systems amongst its constituent tribal health organizations (THOs).

OBJECTIVES
To assess ATHS tribal health organizational “preparedness” for meeting ARRA meaningful use criteria

MATERIALS AND METHODS
A standardized questionnaire was utilized in email, phone and in-person interviews with ATHS THO representatives to assess factors associated with organizational “preparedness.” Data from the survey and descriptive statistics based on survey data were used to develop two algorithms for assessment of the THOs on the criteria of “Technological Preparedness” and “Behavioral Preparedness.” Microsoft Excel was then used for graphical analysis of the algorithm data.

CONCLUSIONS
High levels of “preparedness” are observed amongst physician-staffed THOs, which are in need of more in-depth technical support. However, the ATHS, as a whole, appears far ahead of the national average in terms of EHR adoption.

ACKNOWLEDGEMENTS
Richard A. Hall, Director of Data Management & Analytics, Alaska Native Tribal Health Consortium

MENTOR / DEPARTMENT
Dr. Trent Rosenbloom Department of Biomedical Informatics

MENTOR / DEPARTMENT
Nancy M. Lorenzi, Ph.D., Department of Biomedical Informatics, Vanderbilt University Medical Center

Low levels of “preparedness” are observed amongst physician-extender staffed THOs, which are in need of more in-depth technical support. However, the ATHS, as a whole, appears far ahead of the national average in terms of EHR adoption.
Community Health Initiatives and Health Outreach embraces health issues that disproportionately affect specific populations, especially but not exclusively underserved populations of all ages. Projects and study in this area link academic medical education with community needs. Student projects address one of the following six targeted areas of study:

1. Health risks/diseases – entities that disproportionately affect underserved populations.
2. Obstacles to health and healthcare for the underserved.
3. Socio-cultural, historical and medical aspects of caring for an underserved population.
4. The principles, approaches and skills needed by successful medical provider in an underserved community.
5. Skills and strategies that motivate patients to practice positive health behaviors.
6. Diagnosis of healthcare needs of a community and development of plans to meet those needs.

“These students who selected Community Health were, not surprisingly, advocates by nature. They demanded the support of the school in full measure, so that community people would not be left behind in the excitement over bench research or more glamorous emphasis areas. Thus group of Community Health Emphasis students are brilliant, energetic, and helpful to each other step of the way. It was pure pleasure to work with them and to share in their pride as their objectives were met, their papers were accepted for publication, they achieved funding for their community projects, and in some case, became award winners for service to the community.”

“They (students) demanded the support of the school in full measure, so that community people would not be left behind in the excitement over bench research or more glamorous emphasis areas.”

Barbara Clinton, M.S.W. is Director of the Center for Health Services at Vanderbilt University. Ms. Clinton is an Adjunct Assistant Professor in both the medical schools and nursing schools at Vanderbilt and has worked as a counselor, a community organizer and therapist with children. Ms. Clinton helped a system of alternative health services for seniors for the state of Georgia and has served as an advisor to the former Vice President Al Gore, the Tennessee Commission on Aging, the National Center for Children in Poverty at Columbia University, the Appalachian Rural Science Initiative of the National Science Foundation, and several private foundations.
ANALYSIS OF THE NUTRITIONAL QUALITY OF MEALS SERVED AT FIVE KITCHENS IN NASHVILLE, TENNESSEE

CHRISTINE KIRLEW

COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

OBJECTIVES
1) To determine the nutritional content of the food provided at 5 soup kitchens in Nashville
2) To compare the nutritional content of the meals to the recommended dietary allowance (RDA).
3) To make recommendations for possible improvements in the nutritional content of meals.

BRIEF DESCRIPTION
An analysis of the nutritional quality of meals served at five soup kitchens was performed in Nashville, TN.

CONCLUSIONS
There was an excess of saturated fats and sodium at all soup kitchens. The median sodium value for the kitchens overall was nearly two times the RDA, and the median saturated fat value was 145% of the RDA. Vitamin E and magnesium were low at all kitchens. Fiber, vitamin A, and calcium were also low at 3 or more kitchens. Fiber and vitamin E were the most dramatically reduced with the median fiber value being 54% of the RDA and the median vitamin E being 48% of the RDA.

MENTOR / DEPARTMENT
Community Mentor: Robertson Nash
Faculty Mentor: Dianne Killebrew

EVALUATING EDUCATION RESOURCES IN ADULT CANCER PATIENTS AND HEALTHY, TEENAGED GIRLS

ELIZABETH LIO

COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

OBJECTIVES
To evaluate the VICC Patient and Family Resource Center and Tools for Learning education notebook.

To identify breast cancer education strategies appropriate for women 13-25 years old.

BRIEF DESCRIPTION
Evaluation of education resources in two diverse populations revealed not only the additional challenge of distributing education materials to patients but also that information needs and preferences vary greatly among different populations.

CONCLUSIONS
The majority of Hematology/Stem Cell Clinic patients had not received the education notebook. 47% of patients who completed the survey had received the notebook and 55% knew of the Resource Center. Of the patients who received the notebook, 25% felt it did not have enough information on complementary therapies, 93% were pleased with its size, and 100% felt it was easy to understand. 63% preferred written materials to other means of education. Both focus groups liked the idea of using Facebook as a medium for breast cancer education. The groups deviated in their education strategy preferences. The 14-15 year-olds preferred strategies that were discreet, private, and conservative, while the 15-18 year-olds preferred attention-grabbing strategies including humorous approaches that might be considered risqué and sexually suggestive by younger or older people.

MENTOR / DEPARTMENT
Anne Washburn, VICC – Patient and Community Education Dr. Debra Friedman, Pediatric Hematology

THE RELATIONSHIP BETWEEN LATINO PARENTS AND THEIR PRESCHOOLERS’ SEDENTARY BEHAVIOR

RACHEL RUIZ

COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

OBJECTIVES
To determine sedentary behavior pattern correlations between Latino parents and their young preschool-aged children.

BRIEF DESCRIPTION
We examined baseline data collected as part of a randomized control trial, Salud con la Familia. Self-defined Latino parents with children (ages 3-5 years) were randomly assigned to either a weekly healthy lifestyle group (intervention) or a monthly school readiness group (control) for 3 months.

CONCLUSIONS
There is a significant positive correlation between parent and child sedentary behavior levels over the course of a day. Latino parents of preschool aged children will need to become more active if their children are to increase their activity level. Future obesity prevention and intervention studies in the Latino population would benefit from utilizing the parent-child dyad.

ACKNOWLEDGEMENTS
NCR/RNI Grant No.1 UL1 RR024975 State of Tennessee Project Diabetes Implementation Grant (Barkin, PI) and Vanderbilt Institute of Clinical and Translational Research Pilot Funds (Barkin, PI): Summer Research Training Program in Diabetes

MENTOR / DEPARTMENT
Dr. Shari Barkin, Department of Pediatrics

VALIDATION OF STRUCTURED OBSERVATION TO ASSESS HEALTH COMMUNICATION AND USE OF JARGON

JONATHAN STEER

COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

OBJECTIVES
Training residents in health communication skills with low literacy patients is important because low literacy negatively impacts health outcomes. A validated measure is required to observe and assess residents in proper health communication technique.
BRIEF DESCRIPTION
A 10 question measure was utilized by two independent reviewers to assess the encounter via relationship building, information sharing, and closure.

CONCLUSIONS
The mean resident scores showed a relatively normal distribution with strong correlation between the two reviewers. There was no statistically significant difference in mean resident scores or number of jargon phrases used based on: case number, resident years of training, resident gender, resident/patient gender concordance, or use of translator. The consistency of the scores between cases validates the accuracy of the measure and the strong correlation between the two reviewers demonstrates inter-rater reliability with the measure. The lack of statistically significant differences between any of the parameters suggests that the training was successful in improving the health communication and use of jargon with the residents. However a study with more participants across a wider training spectrum would have greater power to identify potential trends.

ACKNOWLEDGEMENTS
Philip Ciampa MD; Richard White MD; Lisa Rawn MA; Shari Barkin MD, MSHS; Bettina Beech DrPH, MPH; Heidi Silver PhD, RD;

MENTOR / DEPARTMENT
Russell Rothman MD, MPP; Vanderbilt University

ADDRESSING THE NEEDS OF LOW-INCOME MOTHERS AND PREGNANT WOMEN IN CENTRAL DAVIDSON COUNTY

MORGAN WALLS
COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

OBJECTIVES
To evaluate the needs and resources available to low-income women living in Nashville in order to address identified problem areas

BRIEF DESCRIPTION
This project investigated the needs and resources of low-income women in Nashville in order to implement effective community-based programs that improve health outcomes.

CONCLUSIONS
In both focus groups, women recognized stress as an integral part of their health. Mental health and youth assistance were identified as gaps in available services. Common locations to seek help included church, school, and health providers. The major obstacles to receiving help were emotional, including shame and pride. This information can be applied to the improvement of crisis response in South Nashville. Data from the MIHOW surveys provided information on support for women during pregnancy. Notably, many women reported having no support during pregnancy. Family was reported as the most common source of support but also a missing source of support that many women wanted. It is important to recognize the willingness for community members to help solve the current problems and to utilize this by involving them in new programming.

ACKNOWLEDGEMENTS
South Nashville Family Resource Center: Kimberly Newcomb, Leslie Hayes, Leah Scholma, Brad Gran MIHOW Program: Tonya Elkins, Nancy Mason Arnold P. Gold Foundation Summer Fellowship

MENTOR / DEPARTMENT
Dr. Elizabeth Heitman, Center for Biomedical Ethics & Society Barbara Clinton and Tonya Elkins, Center for Health Services

MIHOW PROGRAM: Tonya Elkins, Center for Health Services

CONCLUSIONS
To learn about the complex relationship between incarcerated fathers and their children, and to identify the major barriers to successful communication between both groups.

BRIEF DESCRIPTION
Structured in-person interviews were conducted with 98 men, ages 18-43, at a Davidson County male jail facility in Nashville, Tennessee from June 2009-July 2009.

CONCLUSIONS
Classes and/or workshops that discuss issues of concern for fathers should be offered to all inmates. Topics should include communication skills, conflict resolution, discipline, contraception, and parenting for children. Jails should continue rehabilitative programs in any capacity and pursue opportunities of both funding and programming with various agencies invested in successful inmate re-entry.

ACKNOWLEDGEMENTS
Jeff Blum, Dr. Jeffrey Stovall, Barbara Clinton, Scott Zuckerman, Kristy Kummerow, Correctional Male Development Center, Vanderbilt Center for Health Services

MENTOR / DEPARTMENT
Dr. Jeffrey Stovall, Department of Psychiatry Jeff Blum, Davidson County Sheriff’s Office

FATHERING BEHIND BARS: IMPROVING COMMUNICATION BETWEEN INCARCERATED FATHERS AND THEIR CHILDREN

SCOTT ZUCKERMAN

COMMUNITY HEALTH INITIATIVES AND HEALTH OUTREACH

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MENTOR / DEPARTMENT
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MIHOW PROGRAM: Tonya Elkins, Center for Health Services

CONCLUSIONS
To learn about the complex relationship between incarcerated fathers and their children, and to identify the major barriers to successful communication between both groups.
BRIEF DESCRIPTION
The 7.4 million children in our country with an incarcerated parent experience higher rates of depression, aggressive behavior, poor scholastic performance, and future imprisonment. The goal of this research is to learn how incarcerated fathers communicate with their children, improve this strained relationship, and reduce risk factors to children.

CONCLUSIONS
(1) Men are in jail for a long time. Inmates spent an average of 10 months in jail per sentence, with 5.6 separate incarcerations. (2) We have motivated fathers. Our results showed that 91% of inmates greatly enjoyed being a father, and 69% would be interested in taking a fatherhood class. (3) Relationships with mom. A poor relationship with the mother of their children was a significant barrier to communication. Forty-two percent of inmates had fathered a child with more than one woman, and 66% of inmates reported poor relationships with the mother of their children. (4) Most inmates grew up without a father. Fifty seven percent did not have a father present as a child, and 58% had a poor relationship with their father. (5) Visit shame. Visits were rated as the most effective way to bond with children, 3x more effective than phone calls or postal mail, yet many fathers refused visitation due to the shame of incarceration. Only 39% of men had seen their children since their incarceration.

ACKNOWLEDGEMENTS
This project would not have been possible without the help of the following people: Jeff Blum, Barbara Clinton, Dr. Jeffrey Stovall, Dr. Kristy Kummerow, Bill McReynolds, Danielle Wright, Dr. Mario Davidson, and Shreeti Bickett.

MENTOR / DEPARTMENT
Jeffrey Stovall, MD, Psychiatry Jeff Blum, M.Div, Davidson County Sheriff’s Office
The Global Health focus area provides students with the opportunity to expand their knowledge of health issues of international significance through research projects in developing countries. Potential projects span a broad range of current themes in global health; from medical sciences and clinical investigation to socio-cultural correlates of health and health care delivery. Participation in a Global Health focus area targets health problems of resource limited settings, including diseases of poverty and the tropics.

The primary objective of the Global Health component of the Emphasis program is to nurture a growing number of students interested in global health issues, helping them to assess and understand some of the most pressing public health issues of our time in their socio-economic and culturally specific context. The Global Health focus area serves to introduce these students to the fundamental principles of service, research, planning, and management methodology in resource-limited settings. Our program has fostered the enthusiasm of approximately 60 students who have elected to participate in Global Health in the past five years. A number of students have published their work in international peer-reviewed journals or in more informal ways for general audiences. Students must plan early because overseas projects have increased complexities to obtain final approvals.
DELAYED TREATMENT IN TYPHOID PATIENTS WITH PERFORATED BOWEL IN NIGERIA

BRIAN BARNETT
GLOBAL HEALTH

BACKGROUND PROBLEM
The early nonspecific features of typhoid often result in patients mistaking their illness for malaria or something less serious. This fact, along with a poorly regulated healthcare system and lack of patient healthcare knowledge, may lead patients in Nigeria to take actions that delay appropriate treatment. It is unknown whether these actions and the delays they cause, along with delays encountered post-presentation, impact mortality.

OBJECTIVES
Identify factors that cause treatment delays and determine their impact on mortality in typhoid patients with perforated bowel at Baptist Medical Centre in Ogbomoso, Nigeria (BMCO).

MATERIALS AND METHODS
We reviewed all charts of typhoid patients admitted to BMCO for surgical correction of perforated bowel from January 2004 to March 2009. 173 qualifying patients were treated during that period; however, adequate records were obtained for 144 patients. These were analyzed for relationships between various treatments/factors and delayed presentation/mortality.

CONCLUSIONS
Several factors delay treatment and impact mortality for typhoid patients with perforated bowel. A multifaceted approach is thus required to ensure that they present for and receive proper treatment as quickly as possible.

ACKNOWLEDGEMENTS
We would like to thank VUSM’s Overall Fellowship Program for providing additional funding for this research.

RESEARCH
providing additional funding for this Overall Fellowship Program for

MENTOR / DEPARTMENT
Margaret Tarpey- Department of Surgery, Vanderbilt University; Daniel Gbadero- Department of Pediatrics, Baptist Medical Centre

MATERIALS AND METHODS
We collected 147 stool samples from three diverse hospitals/clinics in Accra who reported with diarrhea and to assess the burden of rotavirus infections.

CONCLUSIONS
Rotavirus infections were the major cause of childhood diarrhea in urban Ghanaian children under 5 years of age seeking medical care. A true epidemiological picture of rotavirus strains in sub-Saharan Africa can inform relevant vaccine development.

MENTOR / DEPARTMENT
Dr. Sten Vermund, Institute for Global Health

EFFECTS OF ANTI-PVS25 ANTIBODIES ON DEVELOPMENT AND CHITINASE EXPRESSION OF PLASMODIUM VIVAX IN THE MOSQUITO

NICHOLAS BURJEK
GLOBAL HEALTH

BACKGROUND PROBLEM
The early sporogony phase of the Plasmodium vivax lifecycle, consisting of gametocyte fertilization, ookinete formation, and oocyst development, takes place in the mosquito midgut and represents an important bottleneck in parasite reproduction. Pvs25 is a predominant and highly invariant surface protein found on midgut-stage parasites that is necessary for the successful production of oocysts. These observations have established Pvs25 as a candidate target for a transmission blocking malaria vaccine.

OBJECTIVES
Here, we report studies examining the effects anti-Pvs25 antibodies on the survival of ookinetes and formation of oocysts within the midgut, as well as the effect on chitinase gene expression.

MATERIALS AND METHODS
Experiments with blood samples collected from human P. vivax gametocyte carriers and fed to mosquitoes showed that the addition of anti-Pvs25 antibodies to the blood resulted in fewer parasites at all stages of ookinete development, as well as decreased numbers of oocysts, when compared to mosquitoes fed on blood samples from the same gametocyte carriers without the addition of anti-Pvs25 antibody.

CONCLUSIONS
These data show that Pvs25 serves a protective function necessary for ookinete survival and midgut invasion, and may also play a role in cell signaling and gene expression. The successful inhibition of parasite development by antibodies directed against Pvs25 is encouraging in the consideration of this protein as a potential transmission-blocking target.
ACKNOWLEDGEMENTS
Work performed at the Armed Forces Research Institute of Medical Sciences Department of Entomology in Bangkok, Thailand. Local mentor was Dr. Prachumsri Jetsumon.

MENTOR / DEPARTMENT
Julián F Hillyer, Ph.D. Assistant Professor of Biological Sciences

OBSTACLES TO THE ACCESS AND DELIVERY OF MATERNAL HEALTH CARE IN NORTH-CENTRAL LIBERIA
MATTHEW GARTLAND
GLOBAL HEALTH
BACKGROUND PROBLEM
Every year worldwide an estimated 350,000 women die in childbirth. The most common causes of maternal mortality are hemorrhage, infection, and obstructed labor. The majority of these deaths could be ameliorated by increasing access to adequate obstetric services.

OBJECTIVES
Examine the obstacles to the access and delivery of obstetric care at GUMH and in the surrounding region in north-central Liberia.

MATERIALS AND METHODS
1.) 17-question community survey on knowledge and attitudes on maternal health care in the community. 315 women in 8 villages within 15km of GUMH were interviewed based on door-to-door convenience sampling. 2.) Retrospective review of delivery records at GUMH (April 2008-March 2009). Data gathered on method of delivery, outcome for infant, and indication for Cesarean section.

CONCLUSIONS
Interventions to increase access to maternal health care and decrease the morbidity and mortality associated with late presentation in the north-central region of Liberia should address the barriers to adequate care that exist in the community and in the hospital.

ACKNOWLEDGEMENTS
Dr. Andy Norman, Dr. Wilicor, Victor Taryor, Dr. Sten Vermund

MENTOR / DEPARTMENT
Sten H. Vermund, MD, PhD, Pediatric Infectious Disease

EVALUATION OF HIV/AIDS RISK BEHAVIOR AMONG YOUTH IN POST-CONFLICT LIBERIA
ALLISON MARTIN
GLOBAL HEALTH
BACKGROUND PROBLEM
In Liberia, HIV-1 prevalence increased 17-fold in 10 years from 0.5% (1998) to 8.2% (2008). The Liberian Civil War (1989-2003) crippled the country’s infrastructure, resulting in a lack of educational programs focused on improving the health of Liberian youth. The purpose of this study was to evaluate the efficacy of an HIV Prevention Program on the HIV/AIDS risk behavior of Liberian youth.

OBJECTIVES
Will youth exposed to MPC report a delay in initiation of sexual intercourse? Will youth exposed to MPC report greater changes in AIDS knowledge?

MATERIALS AND METHODS
Students from 8 junior high schools (n = 817) were chosen and randomly assigned to an 8-week HIV Prevention Program (“intervention” group) or a General Health Program (GHP) (“control” group) in order to assess the impact of the intervention (“Making Proud Choices” (MPC)) on knowledge and behavioral outcomes. Baseline, immediate-post, 3-month and 9-month follow-up surveys were administered.

CONCLUSIONS
Preliminary results indicate that there is a high rate of sexual activity among Liberian youths (age 13-19), as well as general misunderstanding and discomfort about condom usage. Additionally, knowledge about condoms and HIV was likely improved by the intervention.
ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
Dr. C. William Wester, Dept. of Infectious Diseases, VIGH Dr. Stephen Kennedy, PIRE, Louisville, KY

EPIDEMIOLOGY OF CHRONIC LUNG DISEASE IN VERY LOW BIRTH WEIGHT INFANTS IN COLOMBIA
EMILY E MASTON
GLOBAL HEALTH

BACKGROUND PROBLEM
Improvements in the care of premature infants has enabled the survival of more immature infants with an increase in morbidities such as Chronic Lung Disease (CLD). This is especially true in Colombia where the incidence of CLD has been reported at more than three times the rate at U.S. hospitals despite comparable rates of neonatal mortality/other morbidities.

OBJECTIVES
To determine the incidence of CLD and known risk factors in very low birth weight (VLBW) infants at the Hospital of San Ignacio (HSI), in Bogotá, Colombia and to understand how these rates compare to those in the U.S.

MATERIALS AND METHODS
This was a retrospective review of HSI electronic medical records for all infants born between May 1, 2008 and April 30th, 2009 at HSI.

CONCLUSIONS
The outcome of VLBW infants at the HSI slightly poorer than at U.S. hospitals, but better than in other countries of similar economic development. CLD rates are the exception with rates 2-3 times higher than comparable institutions. High elevation may be implicated, more research is necessary.

A COMPARISON OF EFFICACY AND EFFECTIVENESS OF ANTIRETROVIRAL THERAPY IN TREATMENT-NAIVE HIV PATIENTS
NATHAN O’BRIEN
GLOBAL HEALTH

BACKGROUND PROBLEM
The strong efficacy of antiretroviral therapy (ART) for the treatment of HIV/AIDS has been established through clinical trials. However, it is recognized that selection bias can favor the results of such studies, and the relationship between clinical trial efficacy and real-world effectiveness is not well studied for ART.

OBJECTIVES
The goal of this study was to compare efficacy and effectiveness of ART in the clinical setting of a developing country.

MATERIALS AND METHODS
A retrospective study evaluated treatment-naive patients who began ART through a clinical trial or through routine care between 2000 and 2008 in the HIV/AIDS Clinic at El Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán in Mexico City. The main outcome was virological failure at week 48.

CONCLUSIONS
Treatment-naive patients participating in clinical trials had less severe disease at baseline than those receiving routine care. Although no significant difference was found in virological failure at 48 weeks of treatment, the routine care group had a higher mortality rate than the clinical trial group.

MECONIUM ASPIRATION SYNDROME IN COSTA RICA: A CROSS-SECTIONAL STUDY
REJOICE OPARA
GLOBAL HEALTH

BACKGROUND PROBLEM
Hospital Nacional de Niños (HNN) houses the main NICU in Costa Rica, and receives referrals from across the country. Previous research revealed a high rate of Meconium Aspiration Syndrome (MAS) in the neonates treated at HNN.

OBJECTIVES
1. Obtain demographic information on MAS patients treated at HNN. 2. Identify data points associated with morbidity and mortality outcomes.

MATERIALS AND METHODS
This is a retrospective chart review of all MAS admissions from 01/01/07-12/31/08 (N=96). We calculated descriptive statistics, as well as \( \chi^2 \), Wilcoxon two-sample, and Kruskal-Wallis tests.

CONCLUSIONS
The disparity in MAS referrals indicates that hospital treatment protocols for MSAF deliveries may the baby’s risk for developing MAS. As such, the standardization of improved intrapartum protocols could be a potent public health intervention. MAS mortality rates in the US are significantly lower than the rate observed in this study. However, low US rates are attributed to the availability of ECMO. No patients in our study received ECMO.
We hope these results will be useful to the Costarican neonatal care community, both in evaluating the efficacy of current treatment practices, and implementing new practices to improve patient health outcomes.

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
Mario Rojas, MD, MPH, Pediatrics, Department of Neonatology

COST COMPARISON OF LABORATORY TESTING VS. EMPIRIC TREATMENT OF MALARIA: A PROSPECTIVE STUDY
RAVI PARIKH
GLOBAL HEALTH

BACKGROUND PROBLEM
Empiric treatment of malaria is common yet controversial.

OBJECTIVES
To compare the patients’ costs of empirical treatment for all patients clinically diagnosed with malaria to the costs of testing all and treating only those with positive tests via Giemsa thick blood smears (the gold standard) at Baptist Medical Centre Ogbomoso in southwestern Nigeria during May-July 2009. Another objective is to assess the sensitivity of the Leishman thin blood smear, which is often used in Nigeria to diagnose malaria.

MATERIALS AND METHODS
All patients with the clinical diagnosis of malaria received free Leishman thin smears, free Giemsa thick (diagnosis) and thin (differentiation) smears, and treatment. The patient costs are BMCO’s charges.

CONCLUSIONS
Thus, the more cost-effective approach to malaria treatment appears to be empiric treatment; further, Leishman thin smears should not be used malaria diagnosis. For pediatric patients, the cost of testing all and treating only Giemsa positive ones was N119,00 ($793.65); empiric treatment of all was N88,440 ($598.84). For adults using artesunate and sulfadoxine/pyrimethamine, the cost of testing all and treating only Giemsa positive ones was N120,950 ($806.61), and N124,100 ($827.61) for those using Artesunate and amodiaquine. The respective costs for empiric treatment of all adult patients was N103,700 ($691.57) and N115,600 ($770.93).

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MENTOR / DEPARTMENT
Vanderbilt Institute of Global Health

USE OF EPIDEMIOLOGIC DATA TO IMPROVE LATENT CLASS ANALYSIS OF TRYPANOSOMA CRUZI DIAGNOSTIC TESTS
AARON TUSTIN
GLOBAL HEALTH

BACKGROUND PROBLEM
Statistical methods such as latent class analysis (LCA) are often used to estimate the sensitivity and specificity of new diagnostic tests. When results from only two diagnostic tests are available, traditional LCA models cannot be solved without prior information or constraints on some model parameters.

MATERIALS AND METHODS
We modified standard LCA likelihood equations to relax the traditional assumption of constant disease prevalence. Our model incorporates measured epidemiological data to assign a different pre-test probability of disease to each individual. We applied this model to simulated and actual Trypanosoma cruzi diagnostic tests in a community near Arequipa, Peru.

CONCLUSIONS
When a population’s risk of disease varies in a known manner, measurement of individual-level epidemiological covariates improves LCA performance. Accurate estimates of sensitivity and specificity are possible with as few as two diagnostic tests, obviating the need to introduce constraints.

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MENTOR / DEPARTMENT
Dr. Sten Vermund, Director, Vanderbilt Institute for Global Health
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

Robert S. Dittus, M.D., M.P.H. is the Albert and Bernard Werthan Professor of Medicine and Public Health. He is also the Director of the Institute for Medicine and Public Health; Center for Health Services Research; Geriatric Research, Education and Clinical Center; Institute for Community Health, Center for Improving Patient Safety and Quality Scholars Program. He has advanced the methodology of medical decision making, conducted numerous studies delineating the cost-effectiveness of alternative strategies for clinical care, and created multiple clinical research training programs. He is a Senior Quality Scholar of the Department of Veterans Affairs and the founding President of the Academy for Healthcare Improvement.

The student experience in the area of Healthcare and Public Health Research and Management is designed around two tracks: 1) Health research and 2) Health management. The research track is focused on hypothesis-driven investigation in a field of healthcare research, which includes clinical epidemiology and outcomes research, clinical economics and management science, clinical improvement and operations research, chronic disease and molecular epidemiology, health behavior and education, and health policy. The healthcare management track is focused on a healthcare management science internship that includes a quality improvement project. It is expected that the student will become a successful member of an active research program or clinical management team and will have a clearly defined project to be completed in the time allotted.

“In the Healthcare and Public Health Research and Management Emphasis area, I was impressed with the students’ abilities to articulate an important question, identify an appropriate study design, implement the study with careful measurement and analyze and interpret the findings. The portfolio of projects represented the broad range of topics characterized by this area. I enjoyed the students’ passion and dedication in their work. From prevention, diagnosis, treatment, and prognosis, to the organization and management of health services and the health policies affecting care delivery, students made meaningful contributions that will improve the quality of health care and I was proud of their accomplishments.”

“...The research track is focused on hypothesis-driven investigation in a field of healthcare research...”
DEEPER SEDATION DURING COMA IS ASSOCIATED WITH DELIRIUM UPON EMERGENCE FROM COMA

JENNIFER ANDRESEN

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Benzodiazepine (sedative) exposure is a proven risk factor for delirium. Delirium occurs in approximately two-thirds of critically ill patients and is associated with increased mortality, lengthened hospital stay, and higher costs.

OBJECTIVES
We hypothesized that deeper levels of sedation as measured by a bispectral index (BIS) value of <40 would be associated with a greater risk of delirium upon emergence from coma.

MATERIALS AND METHODS
126 intubated ICU patients received BIS monitoring. BIS score and burst suppression data were recorded once per minute. Sedation was assessed twice per day using the Richmond Agitation Sedation Scale (RASS). Coma was defined as RASS = -3 or deeper and emergence was defined as 3 consecutive RASS scores of -2 or higher. Emergence delirium was defined as delirium at the first non-coma assessment.

CONCLUSIONS
Greater time spent at BIS < 40 while in coma increases the odds of emergence delirium. Decreasing the time a patient is deeply sedated may decrease the incidence of delirium and its associated costs and mortality, which should be evaluated in future studies.

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TREATMENT OF UNRUPTURED INTRACRANIAL ANEURYSMS IS ASSOCIATED WITH IMPROVEMENT IN HEADACHE PAIN SCORE

ANKEET A. CHOXI

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
BACKGROUND: Patients with unruptured intracranial aneurysms (UIAs) present with a wide variety of clinical manifestations. The most common presenting symptom for UIAs is headaches (HAs). However, most experts believe that HAs associated with UIAs are unrelated and incidental to the aneurysm.

OBJECTIVES
OBJECTIVE: The objective of this study is to analyze the incidence and characterization of headaches (HAs) in patients with unruptured intracranial aneurysms (UIAs) before and after treatment with either surgical clipping or endovascular embolization.

MATERIALS AND METHODS
METHOD: We prospectively determined the presence, quality, and severity of HAs preoperatively in patients who presented to the senior author with an UIA. A validated, quantitative 11-point HA pain scale was used in all patients. The same HA assessments were performed again on these patients an average of 32.36 months postoperatively.

CONCLUSIONS
CONCLUSION: This study suggests surgical and endovascular treatment of an UIA is associated with dramatic improvement in self-reported HA pain score.

ACKNOWLEDGEMENTS
American Heart Association Summer Research Training Program

DEVELOPMENT OF VANDERBILT HEAD AND NECK SYMPTOM SURVEY VERSION 2.0 (VHNSS 2.0)

EMILY COOPERSTEIN

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
HNC therapy causes adverse late oral health outcomes (LOHO), the prevalence, severity, and functional implications of which are largely unknown.

OBJECTIVES
VHNSS 1.0 was developed to measure treatment-related symptom burden, but common LOHO were not included. We report the development of a LOHO subscale.

MATERIALS AND METHODS
Questions were developed by an expert panel and review of oral health measures for the general population. Final tool included 50 items which scored symptoms or functional manifestations from 0 (none) to 10 (severe). It was administered to 70 subjects who completed radiation±chemotherapy.

CONCLUSIONS
The VHNSS 2.0 incorporates important LOHO in HNC patients. Preliminary data indicates that LOHO cause significant symptom burden and function loss.

ACKNOWLEDGEMENTS
Joel B. Epstein, University of Illinois at Chicago College of Dentistry Barbara A. Murphy, Vanderbilt-Ingram Cancer Center Mary S. Dietrich, Vanderbilt University School of Nursing and Department of Biostatistics
CLINICAL OUTCOMES OF “ONE STOP” HYBRID CORONARY REVASCULARIZATION

KIMBERLY EDWARDS
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
“One stop” hybrid revascularization combines the procedures performed in the catheterization laboratory with CABG surgery in one setting. This allows physicians to simultaneously utilize PCI and CABG to optimize patient outcomes.

OBJECTIVES
To compare the outcomes of patients who had hybrid revascularization with the outcomes of patients who had standard CABG with completion angiogram. To compare the outcomes of patients with planned versus unplanned hybrid coronary revascularization.

MATERIALS AND METHODS
Preoperative, intraoperative and postoperative information was gathered from the medical records of patients who had hybrid coronary revascularization and patients who had standard CABG with completion angiogram from April 2005-March 2009 at Vanderbilt University Medical Center.

CONCLUSIONS
The hybrid procedure is comparable in terms of safety and clinical outcomes when compared with standard CABG with completion angiogram. In addition, planned versus unplanned procedures were equally safe in terms of morbidity and mortality.

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MENTOR / DEPARTMENT
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ACCUULTURATION, HEALTH LITERACY, HEALTH BEHAVIORS, AND CHILD WEIGHT STATUS IN SPANISH-SPEAKING PARENTS OF YOUNG CHILDREN

ERYKA GAYLE
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Acculturation measures the level of cultural modification as practices of a new culture are incorporated into a native culture. Among parents of young children, acculturation levels may be modified by underlying literacy skills, and may affect parental health behaviors and child health status.

OBJECTIVES
To examine the association among acculturation, health literacy, health behaviors and child weight status for Spanish-speaking caregivers of young children.

MATERIALS AND METHODS
Spanish-speaking parents of children (< 30 months) completed validated measures of acculturation (SASH), health literacy (STOFHLA), numeracy (WRAT), and performance of pediatric health activities (PHLAT). Associations assessed using Spearman and Wilcoxon Rank-Sum tests.

CONCLUSIONS
Lower acculturation was associated with worse health literacy and diminished ability to perform child-health-related tasks. Addressing literacy and acculturation issues could improve health behaviors in Latino parents with young children.

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MENTOR / DEPARTMENT
Russell Rothman, M.D., M.P.P., Center for Health Services Research, Vanderbilt University Medical Center

CARDIOTOXICITY IN PATIENTS WITH DOWN SYNDROME AND ACUTE LYMPHOBLASTIC LEUKEMIA

NICOLE HAMES
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Children with Down syndrome are 10-20 times more likely to develop leukemia. The underlying biology of leukemia is quite different in children with Down syndrome and outcomes can be different depending on the type of leukemia, risk-stratification, and particular genetic factors. In particular, patients with Down syndrome are more likely to suffer from treatment related toxicity. In studies of anthracyclines and cardiotoxicity in childhood cancer, Down syndrome was found to impart a relative risk of 3.4, suggesting that they are particularly vulnerable to this type of toxicity. In an assessment of outcomes in patients with Down syndrome and AML, rates of cardiomyopathy were as high as 17.5% (O’Brien et al, 2008). Patients with Down syndrome and ALL represent a unique population with different treatment regimens and the incidence of cardiotoxicity in this population is currently unknown.

OBJECTIVES
The specific aims of this study are to assess incidence of cardiotoxicity in patients with Down syndrome treated for ALL and to compare this incidence with that of a control group without Down syndrome treated for ALL.

MATERIALS AND METHODS
Medical records were examined for 13 patients with Down syndrome and ALL at Vanderbilt Children’s Hospital. Two patients were selected for each case in a matched case-control fashion. Patients are matched by gender, age at diagnosis, ALL risk stratification, and anthracycline dose. The fractional shortening from patient echocardiograms completed at the start of therapy will be compared to those
completed at the end of therapy. Any additional echocardiograms completed after therapy will be collected and reviewed for further indications of cardiotoxicity.

CONCLUSIONS
In progress

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
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STATE OF THE ART OF BRAIN TUMOR DIAGNOSTICS, IMAGING AND THERAPEUTICS
CATHERINE HAWLEY

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Liposomes are spherical vesicles between 50 - 400 nm in size, composed of a lipid bilayer encapsulating a core of contrast agent. The Advanced Multimodality Image Guided Operating (AMIGO) Suite is a surgical and interventional suite that integrates Magnetic Resonance Imaging (MRI), Focused Ultrasound (FUS), Positron Emission Tomography (PET) and Computed Tomography (CT) for minimally-invasive procedures.

OBJECTIVES
To review published literature on liposomal contrast agents and intraoperative MRI and FUS in order to document the current state of nanoparticle and intraoperative imaging research and practice.

MATERIALS AND METHODS
Papers were selected from PubMed from January 1980 to July 2009 for the MRI, FU and the AMIGO suite and from January 1991- July 2009 for the Liposome review. 187 references were included for the former and 26 were used for the latter

CONCLUSIONS
Integration of image-guided technology and surgical procedures provides surgeons with information regarding physiologic and biologic properties of target tissue and operative site. Novel molecular imaging methods including liposomal contrast agents complement and extend image-guided therapy applications.

MENTOR / DEPARTMENT
Srinivasan Mukundan, Jr., M.D., Ph.D., Department of Neuroradiology, Brigham and Women’s Hospital; Megan Strother, M.D., Department of Radiology, Vanderbilt University Medical Center and Melissa McPheeters, Ph.D., M.P.H., Department of Obstetrics and Gynecology, Vanderbilt University Medical Center

STATE OF THE ART OF BRAIN TUMOR DIAGNOSTICS, IMAGING AND THERAPEUTICS
CATHERINE HAWLEY

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
TBI patients are high risk for venous thromboembolic (VTE) sequelae, yet prophylaxis is often delayed because of the perceived risk of intracranial hemorrhagic exacerbation.

OBJECTIVES
The goal of this study was to determine if early VTE prophylaxis is safe for hemodynamically stable TBI patients.

MATERIALS AND METHODS
Retrospective cohort analysis of TBI patients receiving early (0-72hrs) or late (>72hrs) VTE prophylaxis. Inclusion criteria: acute IHI on admission CT, head/neck AIS ≥3, age ≥16, hospital LOS ≥72 hrs. Exclusion criteria: ICP monitor/ventriculostomy, systemic anticoagulation, pregnancy, coagulopathy, previous DVT, continued intra-abdominal hemorrhage, or preexisting IVC filter. Progression of IHI defined as lesion expansion/new IHI on repeat CT.

CONCLUSIONS
We found no evidence that early VTE prophylaxis increases the rate of IHI progression in hemodynamically stable TBI patients. The natural rate of IHI progression observed is comparable to previous studies. While not powered to detect differences in the incidence of DVT and PE, the data trends toward increased proportions of both VTE outcomes in the late group.

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MENTOR / DEPARTMENT
Oscar Guillamondegui, M.D., Division of Trauma and Surgical Critical Care, Vanderbilt University Medical Center

ASSOCIATION BETWEEN LITERACY/NUMERACY, HOSPITAL ADMISSION FROM THE ED, AND HOSPITAL/ED RETURN VISITS

DAVID MARCOVITZ

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Emergency Department (ED) patients with lower health literacy have increased risk for hospital admission. In addition, patients with lower quantitative literacy (numeracy) may have difficulty performing related health tasks and have higher risk for admission.

OBJECTIVES
To determine whether low literacy/numeracy among ED patients is associated with: 1) hospital admission from that specific ED visit; 2) return visits (RVs) defined as 30-day or 90-day return to the ED/hospital.
MATERIALS AND METHODS
A convenience sample of ED patients completed demographic information and validated tests of literacy/numeracy including: the s-TOFHLA, REALM, WRAT4, 3-Item Health Literacy Screener and SNS. Hospital admissions from ED and 30/90 day RVs were obtained from chart review. Associations between literacy or numeracy and outcomes were tested using the Pearson chi-squared test or Wilcoxon rank sum test.

CONCLUSIONS
Higher objective and subjective numeracy was associated with decreased rate of 30-day ED or hospital RVs. One aspect of subjective literacy assessment was associated with increased ED or hospitalization rates. Addressing literacy and numeracy could be an important factor for reducing RVs and hospitalization from the ED.

MENTOR / DEPARTMENT
Alan Storrow, MD and Russell Rothman, MD

PATIENT CONTROLLED ANALGESIA: ATTITUDES OF HEALTHCARE PROVIDERS AND ITS EFFECTIVENESS IN CHILDREN

PUNEET MISHRA

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Patient controlled analgesia (PCA) is frequently used in Vanderbilt Children’s Hospital to manage postoperative pain. The benefit of PCA is that more frequent but lower level dosing allows for a more even distribution throughout the body. Although PCA is frequently used, little is known about its effectiveness in managing pain.

OBJECTIVES
This quality improvement study aims to determine whether PCA as currently used in VCH is effective in treating children’s postoperative pain.

MATERIALS AND METHODS
A retrospective chart review of postoperative PCA patients examines demographics, surgery type, pain score, and PCA and rescue medication and dosage. A survey probes providers’ attitudes regarding pain management and a self-assessment of their PCA knowledge level.

CONCLUSIONS
This study finds that while practitioners’ feel they have adequate knowledge about pain management, most children require rescue medication. Thus, practitioners’ impressions of their knowledge and understanding may not translate to effective PCA pain management. Furthermore, data suggest that defining specific criteria for different surgery types and age groups may improve PCA pain management.

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MODIFICATION OF PLUSOPTIX REFERRAL CRITERIA TO ENHANCE SENSITIVITY AND SPECIFICITY

NIRAJ R. NATHAN

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Amblyopia, with an estimated prevalence of 2 to 5 percent, is an important public health problem. Although treatment of amblyopia is usually successful when performed early, fewer than 37 percent of American children are screened for amblyogenic factors before the age of six. As a result, increased attention has been paid to the development of objective vision screening technology that can efficiently screen the preschool population.

OBJECTIVES
To determine the impact of utilizing several different proposed sets of referral criteria on the specificity and sensitivity of the Plusoptix photoscreener for detecting amblyogenic factors.

MATERIALS AND METHODS
During a 2-month period, 149 children were screened in the pediatric ophthalmology clinic setting. The estimated refractive error obtained by the Plusoptix instrument was compared to the results from a gold-standard pediatric ophthalmologic examination. Three previously-published sets of referral criteria were used, and their respective sensitivities and specificities to detect AAPOS Vision Screening Committee amblyogenic factors were calculated. Modifications of these criteria were also evaluated.

CONCLUSIONS
The manufacturer’s criteria has excellent sensitivity but unacceptably low specificity; other criteria increase specificity with minimal effect on sensitivity and should be considered for field use.

MENTOR / DEPARTMENT
Sean P. Donahue, M.D., Ph.D., Vanderbilt Eye Institute

PREDICTIVE FACTORS LEADING TO HEMODYNAMIC DELAYED NEUROLOGICAL EVENTS AFTER EMBOLIZATION OF INTRACRANIAL AVMS

FERNANDO OVALLE

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Hemodynamic delayed neurological events (HDNEs) arising after embolization of intracranial arteriovenous malformations (AVMs) can occur secondary to the sudden decrease in AV shunting. The mechanisms and management of this phenomenon have been widely debated, but the clinical factors which may predict it have not been elucidated.
OBJECTIVES
The aim of this study was to examine possible causes of HDNEs after embolization of intracranial AVMs.

MATERIALS AND METHODS
Patients with intracranial AVMs treated with embolization at VUMC were reviewed and divided into HDNE cases and controls. The following factors were analyzed as possible predictors: AVM size, volume of embolic agent injected, time between embolizations, percent of total AVM obliterated, and which embolization stage precipitated the HDNE.

CONCLUSIONS
Numerous factors may contribute to HDNEs. Two predictive factors are the amount of embolic agent used and the time between embolizations, specifically at the last procedure. AVM size does not appear to contribute directly to HDNEs.

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MENTOR / DEPARTMENT
Robert Mericle, M.D., Vanderbilt Department of Neurosurgery

CORNEAL ABRASIONS IN THE PERIOPERATIVE PERIOD: INCIDENCE AND CAUSATIVE FACTORS

F. JOSEPH REAL

HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
It is well known that patients who undergo general anesthesia are at risk for corneal abrasions. While a multitude of factors may contribute to this finding including lagophthalmos and mechanical injury, the exact mechanisms that promote eye injury have yet to be identified.

OBJECTIVES
1) Determine the incidence of corneal abrasions in the perioperative period at Vanderbilt Medical Center and 2) Identify risk factors for perioperative corneal abrasions

MATERIALS AND METHODS
To identify cases of corneal abrasion between January 2006 to May 2009, the following sources were utilized: the Department of Quality Improvement, the Department of Risk Management, the Vanderbilt Perioperative Information Management System, and the Department of Ophthalmology. These cases (n=5000) were reviewed for conclusive evidence of perioperative corneal abrasion. To identify potential risk factors, associations and differences were tested for using chi square, two-sample Wilcoxon, and Kruskal Wallis tests. A logistical regression describing events of corneal abrasion cases was also performed.

CONCLUSIONS
The incidence of corneal abrasions at Vanderbilt is similar to that at other major medical centers. The true incidence is likely larger than the value reported by this study due to the influence of “curbside” consults on the subject. The identification of risk factors is important in the attempt to reduce the frequency of perioperative corneal abrasions.

ACKNOWLEDGEMENTS
Mario A Davidson, Ph.D Paul J St Jacques, M.D.

MENTOR / DEPARTMENT
Michael A. Pilla, MD Department of Anesthesiology

DOES ROUTINE COMPLETION ANGIOGRAPHY FOLLOWING CABG SURGERY INCREASE THE RISK OF AKI?

MAZEYAR SABOORI

BACKGROUND PROBLEM
It is well known that patients who undergo general anesthesia are at risk for corneal abrasions. While a multitude of factors may contribute to this finding including lagophthalmos and mechanical injury, the exact mechanisms that promote eye injury have yet to be identified.

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ACKNOWLEDGEMENTS
Mario A Davidson, Ph.D Paul J St Jacques, M.D.
PEDIATRIC CRITICAL ILLNESS: IMPLICATIONS FOR LONG-TERM COGNITIVE IMPAIRMENT AND PTSD

JENNA SOPFE
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Children have disturbances of cognition following critical illness. Prevalence and risk factors associated with long-term cognitive impairment (LTCI) in children are not well described. Post-traumatic stress disorder (PTSD) may exacerbate cognitive dysfunction following critical illness.

OBJECTIVES
To identify the prevalence of LTCI and PTSD in children following critical illness, and assess likely risk factors such as severity of illness, length of stay, and delirium.

MATERIALS AND METHODS
This study is a prospective cohort study of patients 5 to 17 years old admitted to a university-based pediatric intensive care unit (PICU), with the requirement of one of the following criteria: mechanical ventilation, vasopressors/inotropes, Pediatric Risk of Mortality (PRISM) score over 15, or a neurological admission diagnosis. LTCI was determined using the Behavior Rating Inventory of Executive Function (BRIEF), a validated tool for assessing abnormalities. Parent interviews were completed during patients’ hospitalization using the BRIEF to establish baseline cognition, and at three and six months following discharge to assess changes in cognition. PTSD was measured in children eight years and older with the Child PTSD Symptom Scale (CPSS).

CONCLUSIONS
Critically ill children may be at risk for delirium, LTCI and PTSD. Currently, there is an unmet need to determine the prevalence of these serious morbidities of critical illness, and to identify the importance of early intervention for delirium and post-discharge cognitive rehabilitation.

ACKNOWLEDGEMENTS
Pam Berry, Research Nurse Specialist
Dr. Wes Ely, MD, MPH

MENTOR / DEPARTMENT
Dr. Heidi Smith, MD, MSCI, FAAP

CENTRAL LINE PLACEMENT IN PEDIATRIC ONCOLOGY AND STEM CELL TRANSPLANT PATIENTS

MATTHEW WILLIAM ZACKOFF
HEALTHCARE AND PUBLIC HEALTH RESEARCH AND MANAGEMENT

BACKGROUND PROBLEM
Complications of central venous catheters (CVC) are common occurrences within the pediatric stem cell transplant (SCT) population. Common complications consist of infection, occlusion, accidental pulls, breaks, and malpositioning.

OBJECTIVES
The aim of this study was to determine the frequency of these complications. This has never been analyzed for this patient population at Vanderbilt.

MATERIALS AND METHODS
We conducted a retrospective study of pediatric SCT patients at Vanderbilt, all of whom receive CVCs. Data collected included the number and type of catheters inserted and removed, duration of use, reason for removal, laboratory values, and demographic data from April 2004 through April 2009.

CONCLUSIONS
CVC complications occurred at a frequency of 53% among our patient population, for a total of 79 CVCs needing to be removed prematurely. Removals due to infection were most prevalent (with coagulase negative staphylococcus having the highest incidence), flowed by fractures of the line, malpositioning, and accidental pulls.

MENTOR / DEPARTMENT
Dr. Jennifer Ann Domm, MD, Division of Pediatric Hematology Oncology
Experiences in the Laboratory Based Biomedical Research Area of the Emphasis Program are focused on hypothesis-driven investigation primarily based within a laboratory environment. Each student becomes an active participant in a research program and completes a clearly defined project. During the first year, the lab-based explorer becomes acclimated with new protocols, becomes an integral member of the team and becomes well versed in the foundational literature in his/her chosen field of focus. By summer the student is ready for full-time research making ever evolving modifications to the research plan while attending occasional relevant seminars with the cohort of students in the lab-based research area.

Guiding students as they move through the project selection phase with its wealth of potential mentors and research areas toward their transformation into skillful and meticulous contributors at the bench is rewarding and fascinating for Co-Directors Lillian Nanney, Ph.D. and Michael Laposata, MD, Ph.D. Some students select projects based on collection of human samples and subsequent analysis at the lab bench. Others select in vivo work with unique animal models. Still others conduct in vitro analysis using sophisticated molecular tools. As students immerse themselves in experiential learning, each begins to take ownership and pride in expected and unexpected accomplishments. By the end of second year most students are making plans for national poster presentations and several polish off portions of manuscripts. A select number of students develop a real affinity for lab-based investigation and quickly seek and find new mentors and projects and maintain a sustain research experience throughout medical school. A few become fully committed and plan for a Medical Scholars year or enter the MSTP program. Every student hones his/her abilities to critically evaluate journal articles. Each has an opportunity to improve their interpersonal skills while experiencing the synergistic power of collaborative research. All students come to realize that the thrill of success in lab research is balanced with formidable challenges. Each student develops a much richer appreciation for the behind-the-scenes effort and serendipity that fuels discoveries that shape the future of medicine.
OXIDANT INJURY, NITRIC OXIDE, AND GENOTYPING ANALYSIS IN DOWN SYNDROME CARDIAC PATIENTS

RACHEL APPLE
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Patients with Down Syndrome (DS) have extra copies of over 400 genes and represent a largely unstudied population.

OBJECTIVES
It was hypothesized that patients with DS would show greater baseline and post-operative plasma isoprostanes and nitric oxide levels, and that the variation in genes involved in oxidant injury and nitric oxide processing would have a greater effect in DS patients as compared to controls.

MATERIALS AND METHODS
From a cohort of infants undergoing surgery for repair of specific congenital heart defects, arterial blood samples were obtained from each patient immediately before surgery and at 12 hours after surgery. Plasma samples were frozen until subsequent laboratory analysis. DNA was extracted for all patients. Isoprostane analysis (plasma), nitric oxide analysis (plasma), and SNP genotyping analysis (genomic DNA) were performed for each sample.

CONCLUSIONS
Our findings suggest the need for additional research into the role of therapeutic antioxidants in DS patients experiencing physiological stresses, both to block oxidant injury as well as to potentially improve the efficacy of endogenous NO production.

ACKNOWLEDGEMENTS
NIH T35ES10534 Summer Student Training Award Environmental Toxicology Marshall Summar, Gary Cunningham, Karen Summar, Laine Evans

MENTOR / DEPARTMENT
Marshall Summar CHGR

ROLE OF ASCORBIC ACID IN MAINTAINING INSULIN SECRETION OF INS-1 CELLS

JACOB T. ARK
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Diabetic hyperglycemia has been shown to produce cytotoxic free radicals capable of inhibiting insulin secretion of pancreatic beta cells due to excess glucose in a process referred to as glucotoxicity. Ascorbic acid’s (AA) antioxidant properties neutralize free radicals, showing potential to maintain adequate insulin secretion when beta cells are under oxidant stress.

OBJECTIVES
The goals of this study are to determine the rate of AA uptake in INS-1 cells as well as to determine the protective benefits of AA on insulin secretion of INS-1 cells experiencing glucotoxicity.

MATERIALS AND METHODS
INS-1 cells, representing pancreatic beta cells, were exposed to media containing 100µM AA for 2h to determine the rate of AA uptake. HPLC was used to quantify concentrations of AA. Using media with [AA] between 0-200µM, media was brought to 11.6M glucose to establish glucotoxicity and differences in insulin secretion were recorded.

CONCLUSIONS
Ascorbic acid is actively uptaken by INS-1 cells and aids in the maintenance of insulin secretion by INS-1 cells in response to glucotoxicity. However, AA in excess may be more deleterious than beneficial. Further tests are needed, but current results indicate Vitamin C should be considered when attempting to help control a diabetic’s hyperglycemia.

ACKNOWLEDGEMENTS
Dr. James May Dr. Richard Whitesell
Dr. Lan Wu Warren Elard Student Research Training Program

MENTOR / DEPARTMENT
James May, MD Diabetes, Endocrinology, and Metabolism

INCREASED BONE MASS FROM LOW SYMPATHETIC NERVOUS SYSTEM SIGNALING: THE ROLE OF THE NOREPINEPHRINE TRANSPORTER

MICHAEL BURNS
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
The Beta-2-Adrenergic Receptor (B2AR) and Norepinephrine Transporter (Net) of the sympathetic nervous system (SNS) are key regulators of bone mass density, and our research aims to characterize the role of Net in the SNS signaling pathway to bone.

OBJECTIVES
Determine if WT and NET-/- mice have equal ratios of mesenchymal stem cells (MSCs)/ total cells isolated from bone marrow. Determine if MSCs from each have an equal capacity to differentiate to adipocyte and osteoblast lineages.

MATERIALS AND METHODS
Bone marrow cells were isolated from WT and Net-deficient mice, plated at equal densities, and differentiated in vitro. Colonies were stained for alkaline phosphatase (CFU-F) activity and using Von Kossa’s method (CFU-Ob) for osteoprogenitor cells and terminal osteoblasts, respectively. The rate of differentiation down the osteoblast lineage was determined from this data.

CONCLUSIONS
The high bone mass phenotype of Net deficient mice is not due to an increased number of osteoblast precursor cells in the bone marrow; however, the Norepinephrine Transporter (Net) in bone may attenuate differentiation toward the osteoblast lineage. This is supported by the observation that MSCs from NET deficient mice demonstrate an increased rate of differentiation to osteoblasts.

NOTE: The text is formatted in paragraphs for clarity and readability.
ACKNOWLEDGEMENTS
Yun Ma M.D./Ph.D. Larry Swift, Ph.D. and NIH T35 Training Grant: 5T35HL090555-02

MENTOR / DEPARTMENT
Florent Elefteriou, Ph.D. Department of Medicine and Clinical Pharmacology

ROLE OF STAT6-INDEPENDENT MUCUS PRODUCTION WITH RSV A2 INFECTION OF STAT1 KO MICE

MICHAEL H. CHI
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
The longstanding concept is that signal transducer and activator of transcription (STAT) 6 is a transcription factor essential for mucus expression in airway epithelial cells. IL-17A is a recently discovered cytokine that induces mucus in airway epithelium, but the transcriptional regulation by which IL-17A regulates mucus expression is unknown. Both STAT6 and STAT1 activation negatively regulate IL-17A expression in vitro, and we have recently found that mice deficient in both these transcription factors have augmented lung IL-17A expression in the setting of respiratory syncytial virus infection. Therefore, STAT1/STAT6 double KO animals allow us to determine whether IL-17A driven mucus expression is dependent on the STAT6 signaling pathway.

OBJECTIVES
To determine if airway mucus expression in the setting of robust IL-17A expression is independent of STAT6-signaling.

MATERIALS AND METHODS
STAT1 KO, STAT6 KO and STAT1/STAT6 KO mice were infected intranasally with RSV A2 (105 PFU). Tracheas were harvested 6 days post-infection, homogenized, and examined by western blot for expression of gob-5, a protein involved with mucus production. Lungs were also harvested for IL-17A production by ELISA. Inflammation and mucus production was analyzed by histopathology, and gob-5 production was analyzed by immunohistochemistry.

CONCLUSIONS
These data suggest that mucus production occurs in a STAT6 independent manner, suggesting a novel STAT6-independent pathway for mucus production.

ACKNOWLEDGEMENTS
Dawn C. Newcomb, PhD

MENTOR / DEPARTMENT
R. Stokes Peebles, MD Department of Medicine Division of Allergy, Pulmonary, and Critical Care Medicine

TRKA ACTIVATION IS A POTENTIAL DRUG TARGET FOR INCREASING SENSITIVITY TO RADIATION

SRAVAN DHULIPALA
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Identification of activated proteins is difficult to assess shortly after irradiation.

OBJECTIVES
1) To identify kinases that are activated early after radiation exposure and determine how phosphorylation events change with time after irradiation of human umbilical vein endothelial cells (HUVEC) using a tyrosine kinase microarray. 2) To examine effects on radiation sensitivity by inhibiting Trk receptors.

MATERIALS AND METHODS
Human umbilical vein cells (HUVEC) were irradiated with 0 or 3Gy and incubated for 0-60min. Lysates from these cells were analyzed for activated tyrosine kinases using a pre-fabricated microarray chip containing consensus sequences which can be phosphorylated by the activated kinases. Phosphorylation events were identified in real time with imaging of the microarray chip every 6 seconds. Western blot performed to verify activation of TrkA receptor.

After identification of activated kinases, clonogenic assays of HUVEC cells treated with TrkA inhibitor or K252a (pan-Trk inhibitor) were performed to assess cell survival after irradiation.

CONCLUSIONS
Kinomic analysis shows that TrkA and TrkB are autophosphorylated and activated early after irradiation. Inhibition of these receptors confers radiation protection. Thus, activation of these receptors may induce radiation sensitization in vascular endothelium.

MENTOR / DEPARTMENT
Dr. Jerry Jaboin, Department of Radiation Oncology

INVESTIGATION OF CITRULLINE TO AMELIORATE THE EFFECTS OF SUBARACHNOID HEMORRHAGE INDUCED CEREBRAL VASOSPASM

ALIA DURRANI
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Sub arachnoid (SAH) hemorrhage post intracranial aneurysm rupture can induce cerebral vasospasm, causing delayed cerebral ischemia in 20-30% of people. Current therapies for cerebral vasospasm treatment are not perfect. Better therapies are needed for the patients who experience vasospasm as it is the leading cause of death and disability in patients post SAH.

OBJECTIVES
The goal of this animal model aims to investigate the use of citrulline, an alpha amino acid, as a potential ameliorate of SAH induced vasospasm. Citrulline, a product in the urea cycle, is converted to L-arginine in endothelial cells, which is then converted to nitric oxide via nitric oxide synthases (NOS). Nitric oxide, a vasodilator, potentially mitigates the over-contraction of blood vessels following intracranial aneurysm rupture and subarachnoid hemorrhage.
MATERIALS AND METHODS

10 control and 10 study White Rabbits were used to determine the efficacy of citrulline post SAH. A baseline cerebral angiogram was obtained. A SAH model was used based on previous studies, in which blood collected from the auricular artery was injected into the SAS via the cisterna magna. A catheter was placed in the jugular vein to deliver IV citrulline for three days via an infusion pump (20 mg/kg bolus, 9 mg/kg/hr dose). A post treatment angiogram was obtained, and the diameter of the basilar artery was compared to the baseline via a custom Matlab program. Plasma and CSF amino acid levels were also obtained.

CONCLUSIONS
n/a

ACKNOWLEDGEMENTS
Sheila Shay (VUMC Neurosurgery), Dr. Adam Reig (VUMC Neurosurgery), Ankeet Choxi

MENTOR / DEPARTMENT
Dr. Robert Mericle, Neurological Surgery, VUMC

OBJECTIVES
Given the cancer risk posed by four factor (4F) transduction techniques, we sought to develop an RPE-iPS protocol that reduced the incorporation of dangerous proto-oncogenes like c-Myc.

MATERIALS AND METHODS

IPS were generated from human fibroblasts (IMR-90) using standard 4F lentiviral transduction (Oct4, Klf4, Sox2, c-Myc) and compared to cell lines from primary human epidermal keratinocytes transduced with only Oct4, Klf4, and small molecules (CHIR99021, tranylcypromine). Human embryonic stem cells (H1) were used for comparison.

CONCLUSIONS
Our successful differentiation of 2F-derived IPS with features resembling RPE cells suggests a promising mode of autologous replacement therapy that may prove useful for the treatment of AMD. Future studies must increase transduction efficiencies and further eliminate oncogenic transcription factors with the potential for viral integration into host DNA.

ACKNOWLEDGEMENTS
The Nanney Laboratory, VUMC, The Friedlander Laboratory, The Scripps Research Institute VUMC Cell Imaging Shared Resource

MENTOR / DEPARTMENT
Dr. Lillian Nanney, Department of Plastic Surgery, VUMC Dr. Tim Krohne, Department of Cell Biology, The Scripps Research Institute

VALIDATING KNOWN AND IDENTIFYING NOVEL STROKE BIOMARKERS USING MRI AND MALDI-MS

RIMAL HANIF

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Treatments of ischemic strokes include thrombolytic and mechanical agents that must be used within 3-8 hours following stroke to minimize the risk of hemorrhage. Often, however, the time of stroke cannot be accurately determined. Discovery of a panel of reliable biomarkers—macromolecules that serve as markers for a biologic process—known to be elevated in the blood, cerebrospinal fluid, or brain tissue within 3-8 hours following stroke will establish the time profile of stroke and, therefore, aid physicians in making appropriate treatment decisions.

OBJECTIVES
We aim to validate known and identify novel biomarkers using matrix assisted laser desorption/ionization mass spectrometry (MALDI-MS) coupled with magnetic resonance imaging (MRI). MALDI-MS is a groundbreaking imaging technique that characterizes the biochemical composition of tissues. To analyze spatial distribution of biomarkers on tissue, biomarker information obtained using MALDI-MS will be superimposed upon MRI image slices.

MATERIALS AND METHODS

In Sprague-Dawley rats, the right middle cerebral artery was occluded to create a stroke. The rat was euthanized 6-8 hours following stroke and brain tissue was harvested. Brain tissue was stained with 2,3,5 triphenyltetrazolium chloride stain to determine area of stroke. In the future, starting at 2 hours post stroke, we will acquire MRIs every hour until 6 hours post stroke. The rat will then be euthanized and brain tissue will be assayed for biomarkers using MALDI-MS.

CONCLUSIONS
Pending

ACKNOWLEDGEMENTS
Dr. Michael Ayad Sheila Shay

MENTOR / DEPARTMENT
Dr. Michael J. Ayad Department of Neurological Surgery
CITRULLINE MAY ENHANCE NO PRODUCTION IN PULMONARY ARTERY ENDOTHELIAL CELLS

DUSTIN M. HIPP

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Nitric oxide (NO) is an important transient signaling molecule used to regulate vascular diameter. Recent data suggests that endothelial nitric oxide synthase (eNOS), which synthesizes NO, may be associated with hsp90, argininosuccinate synthase (AS), argininosuccinate lyase (AL), and the amino acid SN1 transporter in a “molecular assembly line” in endothelial cells.

OBJECTIVES
The purpose of this project was to determine if nitric oxide production in pulmonary artery endothelial cells could be enhanced in the presence of citrulline, a urea cycle metabolite and precursor to NO, and bradykinin, another peptide molecule known to amplify NO production.

MATERIALS AND METHODS
Human pulmonary artery endothelial cells (HPAEC) were plated in six well plates (400,000 cells/well) and exposed to 500uM citrulline and/or 10uM bradykinin for 30 minutes in Krebs-Henseleit buffer. Production of NO was measured using a quantitative chemiluminescent method.

CONCLUSIONS
HPAEC cells can be shown to produce more nitric oxide in the presence of citrulline and bradykinin. HPAEC cells in the presence of citrulline or bradykinin alone produced slightly greater nitric oxide. Cell culture experiments must continue to be refined to demonstrate repeatability. Once the protocol has been maximized, the “molecular assembly” hypothesis can be tested by comparing NO production with citrulline to arginine and argininosuccinate acid, other urea cycle metabolites.

ACKNOWLEDGEMENTS
Summer Research Training Program (SRTP), NIH National Heart Lung & Blood Institute (NHLBI), Dr. Larry Swift & Marnie McNamara; Summer Lab

MENTOR / DEPARTMENT
Dr. Marshall Summar, Departments of Pediatrics & Molecular Physiology

DEVELOPMENT OF AN OPTICAL PROBE FOR PERIPHERAL NERVE STIMULATION IN RATS

WILLIAM HOOPER

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Recent studies indicate that it is possible to stimulate nerve action potentials by using near-infrared light from a laser sources. While tissue damage from laser-mediated stimulation can be avoided acutely, many applications of nerve stimulation require long term use. Therefore, a device is needed to act as a permanent interface between the laser source and a peripheral nerve to test the chronic effects of laser-mediated nerve stimulation.

OBJECTIVES
To develop an implantable probe for optical stimulation that will be capable of delivering infrared light to rat sciatic nerves for weeks at a time.

MATERIALS AND METHODS
The device consists of optical fibers directed at an angled mirror by placing both in a polyethylene channel and coating the assembly with polydimethylsiloxane. The probe’s output was measured directing the beam into an power meter and blocking the beam with a razor blade, resulting in a gradual reduction in the beam output. By knowing the points at which blocking the beam reduced the detected power by 5% and 95%, an estimate of the beam diameter was obtained.

CONCLUSIONS
The optical probe has been shown to have losses of less than 20% and resolution of less than 0.6mm. This high output should be sufficient to produce nerve stimulation in rats.

MENTOR / DEPARTMENT
Peter Konrad, MD.,Ph.D. -Neurosurgery

CDK9 AND CYCLIN K IN THE REPLICATION STRESS RESPONSE

EMORY HSU

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
In response to challenges to DNA replication, such as from DNA lesions or replication blocks, the ataxia telangiectasia-mutated and Rad3-related (ATR) checkpoint kinase maintains genome integrity by activating signaling cascades which lead to cell cycle arrest, DNA repair, or apoptosis. Through a high-throughput loss of function genetic screen using RNA interference in human cells, followed by secondary validation methods such as co-localization and co-immunoprecipitation, our lab identified CDK9 as a novel protein in the replication stress response (RSR) and ATR signaling pathway.

OBJECTIVES
One goal is to determine the modulations of expression level of CDK9 and its cyclins with activation of the RSR. Also, as the kinase activity of CDK9 was shown to inhibit cell cycle recovery following a replication challenge, another hypothesis is that current CDK9 inhibitor pharmaceuticals such as flavopiridol or DRB can potentiate arrest of challenged cells.

MATERIALS AND METHODS
Human cell lines and standard molecular and cellular biology techniques

CONCLUSIONS
One means of improving CDK9 inhibitor efficacy is through
combination with replication stress agents such as HU. Further understanding of the CDK9-Cyclin K mediated ATR pathway interactions could aid in future developments of anti-cancer pharmaceuticals.

ACKNOWLEDGEMENTS
Thank you to the entire Cortez Lab for their support, including Gloria Glick and Jennifer Cayer. Assistance provided by Vanderbilt Functional Genomics Shared Resource (for microarray), and the Department of Biostatistics. Supported by: Vanderbilt Institute for Clinical and Translational Research StarBrite Grant #VR289; T-35 in Environmental Toxicology (Dr. Fred Guengerich); and the VUSM Emphasis Program

MENTOR / DEPARTMENT
Dr. David Cortez, Department of Biochemistry, Vanderbilt School of Medicine Dr. David Yu, Department of Biochemistry, VUSM; Department of Radiation Oncology, VUMC

OBJECTIVES
To assess whether the presence of modifier alleles or KCNQ1 allelic imbalance can account for the variable penetrance observed in LQTS.

MATERIALS AND METHODS
Linkage analysis of NOS1AP haplotype and QT interval was undertaken using Allegra software. Total RNA samples from transfected lymphoblastoid cell lines from a South African pedigree of A341V mutation carriers were reverse transcribed and subjected to polymerase chain reaction (PCR) preamplification, followed by Taqman real-time PCR analysis. Calculated allele expression ratios were analyzed against parental inheritance, QT interval, and symptom severity.

CONCLUSIONS
KCNQ1 allelic imbalance may play a significant role in the variable penetrance observed in LQTS.

ACKNOWLEDGEMENTS
Jennifer Kunic; Christine Simmons

POTENTIAL MECHANISMS OF VARIABLE PENETRANCE IN CONGENITAL LONG-QT SYNDROME
JOSEPH J. KNADLER
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Congenital Long-QT Syndrome (LQTS) is a genetic disorder characterized by abnormal prolongation of the QT interval on surface ECG, associated with increased incidence of syncope and sudden cardiac death triggered by physical or emotional stress. LQT1, the most common form, is caused by mutation in the KCNQ1 gene, which codes for the alpha subunit of the cardiac potassium channel that conducts the IKs cardiac slow delayed-rectifier current. Significant variability in disease symptoms is observed in LQT1. A South African founder population with a KCNQ1 mutation from alanine to valine at position 341 (A341V) can be used as a model for explaining the variable penetrance in LQTS.

OBJECTIVES
The goal of this project was to develop a decontamination protocol for ancient tooth samples that does not involve soaking the sample in bleach prior to DNA extraction and to transfer the protocol to child tooth samples.

MATERIALS AND METHODS
Both adult and child teeth were used to test decontamination protocols derived from Kemp et al. 2005. To mimic modern contamination of DNA, the tooth samples were either handled with bare hands, buried in dirt for a month, or painted with 3µL of DNA (10 ng/µL). Alternatives to bleach for the decontamination step included surface removal with an Er:YAG infrared laser (wavelength 2000nm) at different energy levels and UV cross-linking of surface DNA using a UV crosslinker oven (energy 200,000mJ, wavelength 254nm) for different time intervals.

CONCLUSIONS
Cross-linker ovens have the potential to serve as a sole DNA eradication method in aDNA protocols. However, consideration must be given to the amount of handling samples go through prior to the genetic laboratory. For lasers to be a viable option, post-ablation sterility procedures need to be developed.

ACKNOWLEDGEMENTS
This work was supported by Ucyclid. Also, we would like to thank S.M., D.L., P.L., and A.L. for their donation of teeth and my classmates and lab for handling teeth to contaminate them and J. Skelton for letting us use the Stratalinker 1800 Oven.

MENTOR / DEPARTMENT
Dr. Marshall Summar, Division of Genetics, Children’s National Hospital, Washington, DC; Dr. Tiffiny Tung, Department of Anthropology, Vanderbilt University
REGULATION OF SINGLE-STRANDED DNA-BINDING PROTEIN (SSBP) EXPRESSION IN CANCER

ZURABI LOMINADZE

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM

It has been shown that oral cavity carcinoma cells have increased levels of Ldb1, SSBP2, and SSBP3, protein constituents of an important transcription factor complex in hematopoietic cells. The SSBPs have been shown to interact with at least one E3 ubiquitin ligase, RLIM, to prevent turnover of Ldb1, thereby increasing its intracellular concentration. The mechanisms of regulation of SSBP2 and SSBP3 in tumor or normal cells, however, are unclear.

OBJECTIVES

The purpose of the present study was to compare the relative levels of SSBP2 and SSBP3 mRNA to their respective protein levels.

MATERIALS AND METHODS

RNA was extracted from ten head and neck cancer cell lines and reverse transcribed. Real-time RT-PCR was then performed to assess SSBP2 and SSBP3 RNA abundance. The Pfaffl method was used to determine relative quantities by using internal reference genes (PAPOLA, PUM1, and TBP1). This process was performed twice to obtain two independent sets of results.

CONCLUSIONS

The lack of correlation between mRNA and protein levels indicates some type of post-transcriptional regulation of both SSBP2 and SSBP3 expression occurs in head and neck cancer cell lines. Further, this may operate to differing extents in different cell lines, and presumably, in primary tumors.

ACKNOWLEDGEMENTS

Ying Cai, Soumyadeep Dey, Gideon Ewing, Grant Westlake

MENTOR / DEPARTMENT

Dr. Stephen Brandt, Department of Medicine

REANIMATION OF THE BILATERALLY PARALYZED LARYNX WITH AN IMPLANTABLE STIMULATION DEVICE

RAJSHRI MAINTHIA

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM

Bilateral laryngeal paralysis (BLP) is a serious, life-threatening condition, often requiring emergent tracheotomy. In the case of persistent paralysis, a patient can be relieved of a tracheotomy through surgical resection and enlargement of their airway. However, voice is impaired, aspiration may occur with swallowing, and ventilation is still partially compromised.

OBJECTIVES

Bilateral stimulation of the posterior cricoarytenoid (PCA) muscles offers a physiologic approach to restore ventilation to a normal level in the case of BLP. The objective of this prospective study was to evaluate the long-term efficacy and safety of a new generation stimulator in restoring glottal opening, ventilation, and exercise tolerance in four canines.

MATERIALS AND METHODS

A Genesis XP stimulator and electrodes were surgically implanted and the recurrent laryngeal nerves were sectioned and repaired bilaterally. In bimonthly sessions, vocal fold movement was measured endoscopically in the anesthetized animal. This movement resulted from PCA stimulation or induced-hypercapnea during spontaneous breathing. Exercise tolerance was measured on a treadmill using pulse oximetry and swallowing function was examined endoscopically and radiographically.

CONCLUSIONS

In the setting of BLP, bilateral PCA stimulation can result in complete, long-term restoration of ventilation and exercise tolerance without impairment of swallowing.

ACKNOWLEDGEMENTS

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MENTOR / DEPARTMENT

Dr. David Zealear, Department of Otolaryngology

EFFECT OF PROPRANOLOL ON NEURONAL VOLTAGE-GATED SODIUM CHANNELS

AKSHITKUMAR MISTRY

LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM

Propranolol is a beta-blocker used mainly in management of various cardiovascular conditions and in migraine prophylaxis. Its targets are traditionally known to be beta-adrenergic receptors. Recently Wang et al demonstrated that propranolol blocks human cardiac voltage-gated sodium channel Nav1.5 independent of beta-adrenergic receptor effects. These reports introduce the idea of exploring voltage-gated sodium channels as novel pharmacological targets of propranolol.

OBJECTIVES

To evaluate the pharmacological effects of propranolol on human neuronal voltage-gated sodium channels Nav1.1, Nav1.2, and Nav1.3, and on the biophysical properties of Nav1.1, linked to inherited forms of epilepsies and a rare monogenetic autosomal dominant form of migraine called familial hemiplegic migraine type 3.

MATERIALS AND METHODS

Whole-cell voltage-clamp experiments were conducted on HEK-293 cell lines stably expressing human Nav1.1, Nav1.2, or Nav1.3 using R-(+) propranolol, the stereoisomer that lacks beta-adrenergic receptor blocking activity.
CONCLUSIONS
Propranolol blocks neuronal voltage-gated sodium channels Nav1.1, Nav1.2, and Nav1.3 in a concentration-dependent manner. Specifically, it causes inactivation of Nav1.1 at more hyperpolarizing voltages and stabilizes the inactivated state of Nav1.1 prolonging refractoriness. These effects may underlie the CNS effects of propranolol.

ACKNOWLEDGEMENTS
Kris Kahlig, Ph.D., and Chris Thompson, Ph.D. This work was supported by the NIH Summer Research Training Program in Heart, Lung and Vascular Biology, 1 T35 HL090555-02 and the Vanderbilt Emphasis Program.

BACKGROUND PROBLEM
Colorectal cancer is the second leading cause of cancer-related deaths in the United States. Inactivating Adenomatus Polyposis Coli mutations contribute to >80% of sporadic colorectal cancers, resulting in constitutively active Wnt signaling, increased proliferation and loss of differentiation. TGF-β/BMP signaling is deregulated in 50% of colorectal cancer patients, and loss of the central mediator of TGF-β signaling, Smad4, is a frequent occurrence in invasive tumors. Recent evidence indicates that Smad4 inhibits Wnt signaling by transcriptional repression of β-catenin.

OBJECTIVES
To determine if a parallel post-transcriptional mechanism exists by which Smad4 inhibits β-catenin/Wnt signaling.

MATERIALS AND METHODS
Immunoblotting was performed (Smad4-null SW480 and SW480Smad4 colon cancer cells) with antibodies to ubiquitin, β-catenin, β-actin and β-TrCP. Transient transfection of pRK5-Smad4Flag and pRK5 was performed in SW480 cells. Cyclohexamide and MG132 were used for protein degradation and ubiquitylation assays. Xenopus laevis embryos were injected ventrally at the 4-cell stage with XWnt8 and/or human Smad4.

CONCLUSIONS
Smad4 inhibits canonical Wnt signaling not only by inhibition of β-catenin transcription, but also by increasing post-translational degradation of β-catenin. Inhibition of Wnt-stimulated axis duplication in a Xenopus laevis model supports post-transcriptional inhibition of Wnt signaling by Smad4 during embryonic development. Smad4 expression loss also enhances canonical Wnt signaling to promote tumor progression in colorectal cancer.

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
R. Daniel Beauchamp, Vanderbilt University School of Medicine

DEVELOPMENT OF SMALL MOLECULE GLUCAGON-LIKE PEPTIDE 1 RECEPTOR AGONISTS AND POTENTIATORS
JAMIE ROBINSON
LABORATORY-BASED BIOMEDICAL RESEARCH
EVALUATING NOVEL NANOPARTICLE DELIVERY OF HGF IN TREATMENT OF AGE-RELATED VOCAL FOLD DYSFUNCTION

ALEXANDRA C. SCHMIDT
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Presbyphonia is common in the elderly and is associated with atrophy and stiffness of the vocal folds. The molecular changes underlying this dysfunction include thickened bundles of excess collagen and decreased ground substance, which are likely related to a disruption in the balance of extracellular matrix (ECM) turnover.

OBJECTIVES
We evaluated the efficacy of a novel nanoparticle in providing controlled release of hepatocyte growth factor (HGF) to the aged rat vocal fold and reversing age-related molecular changes.

MATERIALS AND METHODS
Experiment#1: Fluorescent-labeled nanoparticles were injected into the vocal fold lamina propria of 9-month-old rats. After 24 hours or 14 days, vocal folds were harvested, counter-stained with DAPI, and visualized using fluorescence microscopy. Experiment#2: Nanoparticles were infused with HGF (1, 2, or 5 ng/µl) or PBS. 18-month-old animals received injections of HGF+nanoparticle, PBS+nanoparticle, or PBS (n=5 per group). Vocal folds were harvested two weeks later and quantitative polymerase chain reaction (qPCR) was performed.

CONCLUSIONS
The nanoparticle used here displays important properties, which may permit sustained release of therapeutic drugs to the aged vocal fold. Changes in gene expression may lead to increased ECM turnover and restoration of vocal fold viscoelastic properties.

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Suehiro Nicholas Echemendia Dr. Eva Harth Alice Van der Ende Hongmei Wu

MENTOR / DEPARTMENT
Dr. Bernard Rousseau, Otolaryngology

CYTOSOLIC PHOSPHOLIPASE A2 AS A NOVEL MOLECULAR TARGET FOR THE RADIOSENSITIZATION OF OVARIAN CANCER

RACHAEL CHASE SCHULTE
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Ovarian cancer is the most deadly gynecological cancer in the U.S., with a 5-year survival rate of <20%. Radiotherapy doses are limited by toxicity to nearby organs. An effective radiosensitizer would improve efficacy of lower doses.

OBJECTIVES
Upon irradiation, cPLA2 initiates a pro-survival signaling cascade in the tumor and its vasculature, decreasing radiotherapeutic effect. Inhibition of cPLA2 with AACOCF3 causes radiosensitization of other cancer types.

MATERIALS AND METHODS
The effect of the cPLA2 inhibitor AACOCF3 on radiosensitivity of ovarian cancer was tested in cell culture and in vivo. Human Umbilical Vein Endothelial Cells (HUVEC) or A2780 human ovarian carcinoma cells were treated with either vehicle or AACOCF3 prior to 3 Gy irradiation; clongenic survival assays were performed. Akt and ERK1/2 activation was studied using immunoblotting. For the in vivo study, female nude mice were injected subcutaneously in the hind limb with A2780 cells. The tumor-bearing mice were treated intraperitoneally with either vehicle or AACOCF3 prior to 2 Gy irradiation. After 3 days of treatment, tumor volumes were measured every other day using a caliper.

CONCLUSIONS
These results suggest that inhibition of cPLA2 may increase the efficacy of low-dose irradiation for ovarian cancer treatment.

ACKNOWLEDGEMENTS
Allie Fu for her assistance with the mouse study

MENTOR / DEPARTMENT
Dennis Hallahan, Eugenia Yazlovitskaya, and Amanda Linkous, Department of Radiation Oncology

NANOPARTICLE DRUG DELIVERY TO RETINAL GANGLION CELLS IN GLAUCOMA

GRACE C. SHIH
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Glucoma is the leading cause of irreversible blindness worldwide. Although age is the leading risk factor, elevated intraocular pressure (IOP) is the only modifiable risk factor and major therapeutic target. Current pressure-reducing treatments in the form of topical agents often prove marginal because of difficulties with patient compliance and variable retinal access.

OBJECTIVES
To examine feasibility of using nanoparticle-encapsulated agents administered intravitreally in mice with elevated IOP.

MATERIALS AND METHODS
Retinal deposition of DiO-encapsulated 53nm nanosponges were measured following intravitreal injection in C57BL/6 mice. DiO uptake was quantified by counting SMI31-positive RGCs with and without DiO. To determine efficacy of drug-loaded nanosponges in lowering IOP, C57BL/6 mice underwent microbead injection bilaterally to induce IOP elevation. Mice then received intravitreal injection of either brimonidine- or travatan-loaded nanoparticles into one eye and PBS in the other. IOP was measured bilaterally post-injection.
CONCLUSIONS
Reti-Nano nanoparticles reached the retina, remained for a period of weeks, and exhibited no obvious toxicity. DiO uptake by RGCs indicates the nanoparticles passed the inner limiting membrane, a major barrier to therapeutic compounds. Together with IOP reduction by nanoparticle-encapsulated brimonidine/travatan, this data suggests intravitreal injections of therapeutically-loaded nanoparticles may be a long-term drug delivery system in glaucoma.

ACKNOWLEDGEMENTS
I would especially like to thank Dr. David Calkins for his mentorship and supervision, Dr. Eva Harth (Chemistry) for provision of the nanoparticle materials, Drs. Sam Crish (Calkins laboratory) and Dr. Rebecca Sappington (Vanderbilt Eye Institute) for teaching me dissection and immunohistochemistry, Dr. Wendi Lambert (Calkins laboratory) for advice and editing, and Matthew Sternberg (Calkins laboratory) for help with initial image quantification.

MENTOR / DEPARTMENT
Dr. David J. Calkins, Director of Research, Vanderbilt Eye Institute

CHARACTERIZATION OF AN ANTI-HUMAN CRT MAB TARGETED AGAINST HUMAN LARGE CELL LUNG CANCER
JASON G SMITH
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Calreticulin (CRT) is an intracellular protein that is translocated to the cell surface by various tumors in response to chemotherapy and radiotherapy. Exposure of CRT induces immunogenic cell death, making it an attractive target for immunotherapy.

OBJECTIVES
The aims of this project were to generate a mouse anti-hCRT mAb and to investigate the CRT exposure phenomenon in human LCLC.

MATERIALS AND METHODS
The 5A6 anti-hCRT mAb was isolated from hybridomas generated from BALB/C mice inoculated with recombinant hCRT. Immunofluorescence and Western blotting were used for the in vitro binding assay. For the in vivo binding assay, Alexa Fluor 594-conjugated 5A6 was injected into nude mice pre-growing H460 (a human LCLC line) tumors. For the phagocytosis assay, H460 and mouse dendritic cells (mDCs) were cocultured and stained with DiI and DAPI. For the ELISPOT, irradiated H460 and mDCs were cocultured and injected into C57BL6/J mice; splenic lymphocytes were isolated to assay for IFN- secretion.

CONCLUSIONS
We generated an anti-hCRT mAb (5A6) that selectively binds human LCLC tumors in vivo. Secondly, CRT is a radiation-inducible neoantigen that relocates to the cell surface in human LCLC, and irradiated LCLC is immunogenic.

ACKNOWLEDGEMENTS
Allie Fu, Research Assistant, Department of Radiation Oncology

MENTOR / DEPARTMENT
Dr. Heping Yan, MD, Research Assistant Professor, Department of Radiation Oncology Dr. Dennis E Hallahan, MD, Principal Investigator, Professor and Chairman, Department of Radiation Oncology, Washington University in St. Louis

ANTIBIOTIC-MEDIATED DUCTUS ARTERIOSUS RELAXATION IN SEPSIS-ASSOCIATED PDA
MEGAN VUCOVICH
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Sepsis and patent ductus arteriosus (PDA) are often co-existing disease processes in premature infants. Recent studies show that neonates with sepsis have an increased incidence of PDA compared to those without sepsis. Sepsis-associated PDA has been attributed to increased prostaglandin levels, but indomethacin treatment failure in these infants suggests that other mechanisms exist.

OBJECTIVES
We hypothesized that infection per se, the host response to infection, or the treatment with aminoglycoside antibiotics have direct effects on the contractile response of the DA.

MATERIALS AND METHODS
Functional changes in vasomotor tone of the isolated fetal mouse DA were examined by pressurized microvessel myography in response to LPS, selected cytokines, and common neonatal antibiotics.

CONCLUSIONS
Overall, these findings suggest a potential role for cytokine-mediated DA relaxation in the presence of sepsis. Although inflammatory mediators did not cause direct vasodilation of the isolated DA, aminoglycosides did induce dose-dependent DA relaxation, albeit at suprapharmacological doses. Antibiotics may be an important contributor to sepsis-associated PDA.

ACKNOWLEDGEMENTS
Support: NIH HL090555, HL077395

MENTOR / DEPARTMENT
Dr. Jeff Reese, Dept of Pediatrics (Neonatology)

APPL1 IS A CRITICAL REGULATOR OF DENDRITIC SPINE AND SYNAPSE FORMATION IN HIPPOCAMPAL NEURONS
ADAM WEGNER
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Formation and plasticity of dendritic spines and synapses is critical for neural development and functions such as learning and memory. APPL1, an adaptor protein, is...
emerging as a critical regulator of processes in non-neuronal cells, but its function in the nervous system is poorly understood. APPL1 facilitates the interaction of signaling proteins, such as the serine/threonine kinase Akt.

MATERIALS AND METHODS
Sandwich cultures of E18 rat hippocampal neurons were transfected using the calcium phosphate method at day 3-6 in culture.

CONCLUSIONS
Collectively, our results point to a new role for APPL1, PI3K, and Akt in regulating spine and synapse formation.

ACKNOWLEDGEMENTS
Donna Webb, Devi Majumdar, Caroline Nebhan, Lan Hu

MENTOR / DEPARTMENT
Donna Webb, Biological Sciences

NOVEL VARIANTS OF SH3 AND MULTIPLE ANKYRIN REPEAT DOMAINS 2 (SHANK2) IN AUTISM
ASHLEY A. WEINER
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Autism spectrum disorder (ASD), a phenotypically heterogeneous neurodevelopmental condition, is characterized by impairments in social interaction, language deficits, and repetitive behaviors. Attempts to decipher the complex genetic etiology of ASD have been confounded by extreme locus heterogeneity. However, several gene networks relating to synapse function, neuronal cell adhesion, and neuronal regulation have been implicated in ASD. Copy number variants (CNVs) disrupting SHANK2 (involved in the glutamatergic postsynaptic density) have been detected in subjects with ASD. We hypothesize that cases without CNV disruptions may harbor deleterious mutations in this gene, making SHANK2 an ideal candidate gene for the identification of rare, disease-related variants in ASD.

OBJECTIVES
To screen SHANK2 for rare coding variants that may confer risk for ASD.

MATERIALS AND METHODS
Genomic DNA samples consisted of 96 probands with ASD recruited at Vanderbilt or Tufts-NEMC and 96 controls obtained from the Coriell repository. PCR primers flanking exons were designed for PCR amplification of exonic fragments for DNA sequencing using routine Sanger methods. In silico tools were used to predict the effect of given variants.

CONCLUSIONS
Rare SHANK2 variants may provide more insight into the complex genetic etiology of ASD. Current studies will be extended to provide greater power to detect rare variants.

ACKNOWLEDGEMENTS
Sabata C. Lund Ph.D., Emily Crawford

MENTOR / DEPARTMENT
James S. Sutcliffe Ph.D., Department of Molecular Physiology and Biophysics, Department of Psychiatry, Vanderbilt Kennedy Center

TREATMENTS AND SIGNALING IN SPINAL CORD INJURY AND REGENERATION
MICHAEL WOLF
LABORATORY-BASED BIOMEDICAL RESEARCH

BACKGROUND PROBLEM
Acute Spinal Cord Injury represents one in forty patients admitted to trauma centers (Sekhon et. al. 2001). Patients with acute SCI have a 46% 1-year fatality rate.

OBJECTIVES
To assess the effect of combinatorial treatment on raphespinal regeneration following spinal cord injury.

MATERIALS AND METHODS
Monkeys received C7 hemisections. One week later, experimental group animals received: Spinal injections of BDNF, NT-3, and chondroitinase, autologous fibroblast grafts expressing NT-3 and BDNF, and subcutaneous rolipram. Control animals received spinal injections of GFP in a viral vector, plus subcutaneous saline. All animals received spinal, cortical, and reticular formation tracers. Spinal cord slices through motor pools were immunostained for 5HT, and raphespinal arborizations were quantified on the lesioned and intact side of each slice, using stereological sampling. Six animals have undergone analysis to date. For each slice, raphespinal counts from the lesioned side were normalized to the intact side. Normalized values for treated animals were then compared to those for control animals.

CONCLUSIONS
Treatment delivery mechanism or spinal tracer injections likely killed motor neurons. The inflammatory response could have masked any therapeutic benefit of the combinatorial treatment. Six additional animals are scheduled for analysis. In addition, plans are underway for modified spinal tracing and treatment delivery techniques.

ACKNOWLEDGEMENTS
UCSD Center for Neural Repair, American Academy of Neurology

MENTOR / DEPARTMENT
Professor Mark Tuszyński, UCSD, Professor Bruce Carter, Vanderbilt University
This educational experience is designed to introduce students to theory and practice in the learning and teaching of medical students, residents, practicing physicians and patients as well as provide an opportunity to develop a project in an area of interest.

Students will be provided with opportunities to examine the practice of education in a wide variety of health care settings. Students will have opportunities to examine

- how learning occurs in medical school, residency, and practice
- how students can develop reflection and self assessment skills to develop an approach to lifelong learning that can be used throughout their medical careers
- what teaching strategies help medical students, residents, practicing physicians, and patients learn
- assessing the progress of student, resident, or patient learning
- curriculum development in specific content areas

The student experience will introduce them to the community of scholars at Vanderbilt and elsewhere who study and work in the field of medical education. Each student will work with a mentor who will provide direction to the student as he or she determines an area of focus, develop a project proposal, implement the project proposal, present findings, and prepare findings for publication. In addition, students in the Medical Education area will be expected to participate in ongoing educational activities such as Medical Education Grand Rounds, Medical Education Journal Club, and CORE Conversations dealing with issues in medical education research.

"Working with students in the Emphasis Program has been one of the highlights of my work at Vanderbilt. It has been an honor and a privilege for me to share their excitement and satisfaction as they worked through and accomplished their projects. I look forward to working with the students who choose the Medical Education area this year."
DIABETES-RELATED PATIENT-PROVIDER COMMUNICATION IN PRIMARY CARE

DAVID ESKIND
MEDICAL EDUCATION

BRIEF DESCRIPTION
The aims of my project are to describe diabetes-specific patient-provider communication during the routine follow-up primary care encounter, to evaluate the use of participatory decision-making between patient and provider and its impact on patients' satisfaction with communication, diabetes self-care behavior, and diabetes control, and to examine characteristics of patient satisfaction with patient-provider communication and its impact on diabetes control.

ACKNOWLEDGEMENTS
Dr. Cavanaugh and the Vanderbilt DRTC P&F program (NIDDK P60 DK020593) and by K23 DK080951

MENTOR / DEPARTMENT
Dr. Kerri Cavanaugh Vanderbilt DRTC

STANDARDIZING THE ASSESSMENT OF ABDOMINAL PAIN

CHRISTIAN FUCHS
MEDICAL EDUCATION

BRIEF DESCRIPTION
A standardized assessment of abdominal pain workups by third year medical students at the end of their medicine rotation.

ACKNOWLEDGEMENTS
Dr. Emil Petrusa, Dr. Lisa Rawn, Alan Johnstone, Dr. John Rhode, Dr. Beth Ann Sastre, Dr. Matthew Miller, Dr. Anderson Spickard, Dr. Kim Lomis

MENTOR / DEPARTMENT
Dr. Emil Petrusa, Office for Teaching and Learning in Medicine

PERCEIVED PHYSICIAN BARRIERS TO CLINICAL TRIAL ENROLLMENT

JUSTIN GREGG
MEDICAL EDUCATION

BRIEF DESCRIPTION
Attending academic physicians are comfortable with the clinical trial enrollment process, though reported patient enrollment varies based on individuals' knowledge about clinical trials that are currently enrolling and other factors.

ACKNOWLEDGEMENTS
Mario Davidson, Ph.D. – Department of Biostatistics

MENTOR / DEPARTMENT
Jill Gilbert, MD – Department of Medicine, Division of Hematology/Oncology Leora Horn, MD, M.Sc. – Department of Medicine, Division of Hematology/Oncology

RECALL PROMOTING BEHAVIORS IN PRIMARY CARE VISITS FOR PATIENTS WITH DIABETES

CONRAD MYLER
MEDICAL EDUCATION

BRIEF DESCRIPTION
A study which describes the prevalence and characteristics of recall promoting behaviors including a novel behavior, patient initiated teachback, and their association with self-efficacy, and self-care behaviors.

ACKNOWLEDGEMENTS
Dr. Kerri Cavanaugh, Dr. Russell Rothman

MENTOR / DEPARTMENT
Dr. Kerri Cavanaugh: Nephrology Division

ASSESSING THE ADHERENCE OF CYSTIC FIBROSIS-RELATED INFERTILITY WEBSITES TO AMA GUIDELINES

AUSTIN OSBORN
MEDICAL EDUCATION

BRIEF DESCRIPTION
This paper assesses the adherence of cystic fibrosis-related infertility websites to published AMA guidelines.

MENTOR / DEPARTMENT
Dr. Walter Robinson, Pediatrics

ANALYSIS OF LESBIAN, GAY, BISEXUAL, AND TRANSGENDER CULTURAL COMPETENCY AMONG THIRD-YEAR MEDICAL STUDENTS

CLAYTON R. WILBURN
MEDICAL EDUCATION

BRIEF DESCRIPTION
A study utilizing a survey tool to analyze lesbian, gay, bisexual, and transgender cultural competency among third-year medical students.

MENTOR / DEPARTMENT
Dr. Kevin Johnson and Dr. Don Moore of Biomedical Informatics and Medical Education, respectively.
Medicine both shapes and is shaped by the larger society. The medical humanities, ethics, and policy studies provide established ways for understanding how those interactions occur, and how they affect individual health care and health policies.

The medical humanities are not one discipline but many, including ethics, literature, history, religious studies and others. Each of these disciplines employs its own tools and methods. For example:

**Bioethics/medical ethics** provides tools for analyzing and resolving quandaries in practice and policy, and for discerning the moral dimensions of medical practice.

**History of medicine/science** provides tools and paradigms for placing contemporary medical practices and scientific knowledge into larger social-historical perspective.

**Literature** provides models for understanding persons and events that draw upon affective and aesthetic domains of knowledge, for example, the variety of ways that narrative is used in medicine, and aids in understanding the experiences of both patients and physicians.

**Religion/spirituality** provides strategies for appreciating the ways illness, suffering and death are interpreted by patients and their families and caregivers.

Medical humanities, ethics, and policy provide resources for both professional competence and also for personal and civic life. Historical perspective, literary imagination and ethical literacy can contribute substantially to good doctoring, but also to balance between professional and personal life, and to knowledgeable engagement in the larger community and society on health questions.
BARRIERS OF FOOD DESERT RESIDENTS TO PROCURING HEALTHY FOOD

CARMEN ADAMS
MEDICAL HUMANITIES, ETHICS & POLICY

BRIEF DESCRIPTION
To understand the barriers associated with procuring healthy food in Nashville’s food deserts, 402 residents in East Nashville, Edgehill, and North Nashville were interviewed with a survey instrument containing 52 items.

CONCLUSIONS
The results from this study indicate that transportation is a substantial barrier for residents of the East Nashville, Edgehill, and North Nashville food deserts. Car ownership in Edgehill is lower than that in the other two neighborhoods, which forces 36% of the residents to use public transportation as a frequent mode of transportation to the grocery store. Although car ownership is higher in East Nashville and North Nashville, up to 50% of residents pay a personal contact for transportation to the store. Because many of the residents surveyed do not live within walking distance to a grocery store, there is a need for full-service grocery stores in the neighborhoods of East Nashville, Edgehill, and North Nashville. Residents in these neighborhoods desire healthier food options and should not be limited to poor quality food simply because of the neighborhood in which they live.

ACKNOWLEDGEMENTS
Mario Davidson, Ph.D., Miriam Leibowitz, the Food Security Partners Leadership Team: Vernell McHenry, Sharon Terrell, Teresa Cantrell, Debbie Smith, Tonya Ferby, Beverly Jacobs, Jerri Kenner, the Food Security Partners Research Team

MENTOR / DEPARTMENT
Yvonne Joosten- Office for Community Engagement, Cassi Johnson- Manna-Food Security Partners of Middle Tennessee

MANAGING EMPIRICAL ETHICS: THE NORMATIVE VERSUS EMPIRICAL DEBATE IN BIOETHICS RESEARCH

WILLIAM SULLIVAN
MEDICAL HUMANITIES, ETHICS & POLICY

OBJECTIVES
The goal of this project was to analyze proposed solutions to the ethical debate over whether scholarly research in the field of Bioethics should be conducted as a branch of normative philosophical discussion or as an empirical enquiry of the social sciences.

BRIEF DESCRIPTION
By using the works of the philosopher Alasdair MacIntyre to complete a textual analysis of proposed theoretical solutions to the normative versus empirical debate in bioethics research, I propose that each argument makes a different, unsubstantiated claim to authority and that this method is a symptom of a far greater fragmentation of our modern ethical discussion.

MENTOR / DEPARTMENT
Jeffrey P. Bishop, M.D., Ph.D. Center for Biomedical Ethics and Society
The central goal of the Medical Scientist Training Program (MSTP) at the Vanderbilt University School of Medicine is to train leaders in academic medicine. Our program is based on solid clinical and research training and is designed to foster the development of independent scientific careers.

The MSTP is a joint endeavor between the Vanderbilt University School of Medicine and the Vanderbilt University Graduate School. Students usually complete the first two years of Medical School, pursue graduate studies for three to four years, then return to Medical School to complete the final two years of clinical training. Successful completion of the program leads to both the M.D. and Ph.D. degrees.

Full-time laboratory research is performed in three rotations from the summer prior to the first medical year through the summer following the first year of Medical School. These cumulative research experiences serve as the Emphasis project for MSTP students.

“The laboratory rotations that comprise the Emphasis experience are incredibly important for our students. They gain exposure to a variety of research opportunities and select a mentor, training environment, and scientific project best suited to their professional development.”

Terence S. Dermody, M.D., is the Dorothy Overall Wells Professor of Pediatrics and Microbiology and Immunology, Director of the Division of Pediatric Infectious Diseases, Director of the Lamb Center for Pediatric Research, and Director of the Vanderbilt Medical Scientist Training Program (MSTP). Dr. Dermody came to Vanderbilt in 1990 after completing his medical degree at Columbia University in New York, a residency of internal medicine at Presbyterian Hospital in New York, and fellowships in infectious diseases and virology at Brigham and Women’s Hospital and Harvard Medical School in Boston. Dr. Dermody is a physician scientist with clinical interests in pediatric infectious diseases and research interests in viral pathogenesis. He has been directing the MSTP since 2003.
INITIALIZATION PARAMETER SWEEP IN ATHENA: OPTIMIZING NEURAL NETWORKS FOR DETECTING GENE-GENE INTERACTIONS

CARRIE BUCHANAN

MSTP

BACKGROUND PROBLEM
Recent advances in genotyping technology have led to the generation of an enormous quantity of genetic data. Traditional methods of statistical analysis have proved insufficient in extracting all of the information about the genetic components of common, complex human diseases. A contributing factor to the problem of analysis is that amongst the small main effects of each single gene on disease susceptibility, there are non-linear, gene-gene interactions that can be difficult for traditional, parametric analyses to detect.

OBJECTIVES
This research addresses how different parameter settings and thus evolutionary processes affect detection of genetic disease models.

MATERIALS AND METHODS
The Analysis Tool for Heritable and Environmental Network Associations (ATHENA) is an analytical tool that incorporates grammatical evolution neural networks (GENN) to detect interactions among genetic factors.

CONCLUSIONS
The broadest implication of this study was to better understand evolutionary computation and how altering the process of evolution can result in an optimized combination of parameters that allows for accurate variable selection and modeling of complex interactions among susceptibility factors. The results of this study show that optimum detection power is achieved with addition-only activation functions and when the SNP genotypes were encoded as -1, 0, 1. Future analyses will determine if our optimized parameters are robust to larger, more complicated simulated data sets and in actual genetic data.

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
Marylyn, Ritchie, Ph.D.
Computational Human Genetics

THE ROLE OF FGF AND MELATONIN IN HABENULAR ASYMMETRY OF THE DEVELOPING ZEBRAFISH CNS

BENJAMIN JURRIEN DEAN

MSTP

BACKGROUND PROBLEM
Asymmetry is omnipresent in the vertebrate central nervous system (CNS), yet how it arises remains obscure. The pineal complex and nearby habenular nuclei – involved in higher-order processing of emotion and reward – serve as a model for studying the genetic and molecular signals that underlie CNS asymmetry.

OBJECTIVES
Lessons from this model will serve a greater understanding how asymmetry arise in the developing CNS and the role of asymmetry in normal and diseased CNS function.

MATERIALS AND METHODS
In the zebrafish, Danio rerio, the Fgf8 and melatonin signaling are known to play a role in lateralization during habenular development. Genetic and biochemical modulation of these signals and their downstream effectors will be employed to uncover how Fgf and melatonin differentially influence habenular development through Erk kinase.

CONCLUSIONS
Going forward this project has three specific aims: 1) Establish a protocol for Erk antibody use. 2) Characterize strength, localization and temporal nature of Erk signaling in the presence or absence of Fgf8 and melatonin respectively. 3) Determine the mechanistic role Fgf8 and melatonin play in habenular development (e.g. cell proliferation, differentiation).
BACKGROUND PROBLEM
Recent studies suggest that prenatal exposure to alcohol (PNAE) results in sustained behavioral deficits similar to attention deficit hyperactivity disorder (ADHD). Subtle differences in specific behavioral deficits suggest structural differences in the nature of the disruptions.

OBJECTIVES
Quantify the structural brain changes seen in young adults following exposure to alcohol in utero. Determine the dose-dependent effects of prenatal exposure on brain changes.

MATERIALS AND METHODS
Using structural MRI scans obtained from a cohort of young African-American adults (18-21 y.o.) whose in utero exposure to alcohol exposure was known, we tested the hypothesis that PNAE exhibit distinct effects of brain structural development that persist into adulthood. Using voxel-based morphometry (VBM) we compared PNAE (n=11) with healthy non-exposed volunteers (n=9).

CONCLUSIONS
These results support the hypothesis that prenatal alcohol exposure can cause long-term structural neurodevelopmental abnormalities. It is yet to be determined if alcohol exposure is linked to specific neural correlates of behavior.

ACKNOWLEDGEMENTS
Malcolm J. Avison, Ph.D., and Zhaohua Ding, Ph.D.; Department of Radiology and Radiological Sciences, Vanderbilt University Institute for Imaging Science.
CONCLUSIONS
In summary, it is the goal of our project to characterize the cellular machinery responsible for sorting of the RSV proteins and to show how alterations in that machinery can change the susceptibility of epithelial cells to RSV.

ACKNOWLEDGEMENTS
Support provided by the Vanderbilt Medical Scientist Training Program

MENTOR / DEPARTMENT
James R. Goldenring, M.D., Ph.D., Department of Cell & Developmental Biology

ROLE OF P73 IN DEVELOPMENT AND TUMORIGENESIS
PETER B KNOWLTON
MSTP

BACKGROUND PROBLEM
Whereas p53 is frequently mutated in human cancers, reflecting its well-characterized role as a tumor suppressor, p63 is over-expressed or amplified in a subset of carcinomas derived from stratified tissues (tissues with both basal and luminal/squamous layers). The predominant p63 isoform that is expressed in these carcinomas is the inhibitory ΔNp63 isoform; this isoform is critical for the development, growth and maintenance of stratified tissues. Thus, the opposing statuses of p53 and p63 in tumors matches their respective suppressive and oncogenic functions. In contrast, multiple isoforms of p73 are over-expressed in tumors despite the fact that many of these isoforms act as tumor suppressors in vitro. Further, unlike p53 and p63, reagents and model systems are limited for analysis of the various p73 isoforms, both their expression and function.

OBJECTIVES
The overall goal of this project is to determine the role of p73 in development and tumorigenesis.

MATERIALS AND METHODS
1. To analyze newly developed conditional p73 null mice model for developmental, metabolic and tumorigenic phenotypes. 2. To perform tissue-specific, conditional targeting of p73 and p63 in the mouse mammary gland, alone and in combination, to assess the effect of gene targeting on mammary gland development and susceptibility to tumorigenesis. 3. To determine the relative levels and activity of the various p53 family isoforms in select tissues under a given physiologic condition (during development or tumorigenesis).

CONCLUSIONS
N/A

ACKNOWLEDGEMENTS
Jennifer A. Pietenpol, Ph.D.

BACKGROUND PROBLEM
Genetic mutations influencing neural crest cell migration and differentiation lead to anatomical abnormalities, such as aganglionosis of the gut. In humans, this manifests itself as Hirschsprung’s disease (HSCR). Although migration is definitely reduced in multiple mouse models of HSCR, Dr. Southard-Smith’s group has determined that lineage segregation and patterning may also contribute to the diversity in surgical outcomes seen in HSCR human patients.

OBJECTIVES
To determine the alterations in lineage segregation and patterning that contribute to aganglionosis in several HSCR mouse models and factors influencing differential surgical outcomes in HSCR patients.

MATERIALS AND METHODS
Previous in vitro analysis of lineage segregation has been carried out in Sox10Dom mice using immunohistochemistry and flow cytometry. Lineage segregation will be further analyzed in several known HSCR mouse models. To determine lineage divergence in vivo, I will use immunohistochemistry in a newly generated Sox10-Cre transgenic line to examine enteric lineage segregation. To determine whether altered patterning and lineage segregation occurs in pediatric HSCR patients, I will examine enteric ganglia in surgical resections.

CONCLUSIONS
Pending.

ACKNOWLEDGEMENTS
Lauren Walters for foundational work. Michelle Southard-Smith Lab. Jose Correa, M.D., for colon samples. Vanderbilt MSTP.

MENTOR / DEPARTMENT
Michelle Southard-Smith, Ph.D., Department of Human Genetics, VU School of Medicine

GENETIC EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE
RISK FACTORS IN A GHANAIAN POPULATION
RAFAL SOBOTA
MSTP

BACKGROUND PROBLEM
Expression levels of tissue plasminogen activator (tPA) and plasminogen activator inhibitor-1 (PAI-1) have previously been demonstrated as reliable predictors for cardiovascular events such as Myocardial
Infarctions or measurable risk factors such as hypertension.

OBJECTIVES
To explore the relationship between the distribution of specific genotypes among various Ghanaian populations and the corresponding prevalence rates of cardiovascular disease phenotypes.

MATERIALS AND METHODS
A recently assembled data set for both urban and rural Ghanaian populations will allow for the elucidation of the extent of the effects of genotypic differences on cardiovascular phenotypes in comparison to the effects of environmental disparities between the two populations, which include but are not limited to differences in nutrition and an active versus sedentary lifestyle. The cardiovascular risk factors assessed in this study were BMI, diastolic and systolic blood pressure, cholesterol, LDL, HDL, Triglycerides and Glucose.

CONCLUSIONS
In order to assess whether the high prevalence of cardiovascular disease in African Americans has a genetic basis, analysis of risk factors in the West African Country of Ghana was carried out. Adjusting for lifestyle differences between rural and urban populations demonstrated that the environment is an important factor in the effectiveness of using predictors such as LDL and Cholesterol for cardiovascular risk.

MENTOR / DEPARTMENT
Dr. Scott Williams, Department of Human Genetics

INCREASED DELTA-9 DESATURASE AND ELONGASE5 CONTRIBUTE TO FATTY ACID ABNORMALITIES IN CF

OBIINNA UMUNAKWE
MSTP

BACKGROUND PROBLEM
Cystic fibrosis is a heritable autosomal recessive disease caused by mutations in the CFTR gene. The median life expectancy is under 37 years. There is emerging evidence that CFTR mutations alter fatty acid metabolism in CFTR expressing tissues. Various studies using CFTR knockout mice, CF cell lines, and tissues from CF patients most commonly report decreased linoleate and docosahexaenoate, and increased arachidonate compared to healthy controls. These changes have been associated with increased expression and activity of delta-6 and delta-5 desaturase enzymes. Increased palmitoleate, oleate, and eicosatrienoate have also been reported in CF. These fatty acids may contribute to CF pathophysiology.

OBJECTIVES
Determine whether increased palmitoleate, oleate, and eicosatrienoate result from increased expression and activity of delta-9 desaturase and elongase 5.

MATERIALS AND METHODS
Human bronchial epithelial cells (16HBE) were transfected with plasmids containing the first 131 nucleotides of CFTR in either the sense or antisense orientation. Cells were plated in 6 well-plates and incubated in reduced lipid medium containing either radiolabeled palmitate, stearate, or oleate. Cells were harvested, and lipids were extracted and methylated. Identification and quantification of downstream radioactive fatty acid metabolites were performed by reversed phase HPLC coupled with a scintillation detector. qRT-PCR for delta-9 desaturase and elongase 6 mRNA transcription was performed.

CONCLUSIONS
These results suggest an increase in elongase 5 and delta-9 desaturase expression and activity is responsible for fatty acid abnormalities in CF cells.

ACKNOWLEDGEMENTS
Laposata lab, Vanderbilt MSTP

MENTOR / DEPARTMENT
Michael Laposata, Department of Pathology

NEOADJUVANT VERSUS ADJUVANT THERAPY FOR POTENTIALLY RESECTABLE Pancreatic cancer is the fourth leading cause of cancer related deaths in North America. While survival rates have risen for many cancers over the past three decades, pancreatic cancer has remained a largely fatal disease. This is due largely to the fact that surgical removal is considered the only curative treatment, and over 80% of cases are unresectable at diagnosis. Neoadjuvant chemoradiotherapy may offer an advantage to patients with potentially resectable disease.

OBJECTIVES
This project provides a decision model framework for thinking about how to best treat patients with potentially resectable pancreatic carcinoma by examining the relative merits of both adjuvant and neoadjuvant approaches, with regards to survival and quality of life.

MATERIALS AND METHODS
This work constitutes a decision analysis of previous trials found through MEDLINE that examined the outcomes of neoadjuvant or adjuvant therapy. The decision model was created from the weighted probabilities abstracted from these studies, assuming that patients with potentially resectable cancer could either elect to receive primary surgery, preoperative chemoradiotherapy, or no treatment. The primary outcome was median survival time.

CONCLUSIONS
Data suggests slight decision benefits for adjuvant therapy over neoadjuvant therapy, but does not account for patient preferences.
ACKNOWLEDGEMENTS
Vanderbilt MSTP

MENTOR / DEPARTMENT
Gretchen Purcell Jackson, M.D., Ph.D.
Assistant Professor of Pediatric Surgery
Assistant Professor of Biomedical Informatics
The area of Patient-Oriented Research addresses:

1. The mechanisms of human disease,
2. Therapeutic interventions,
3. Clinical trials,
4. The use of new technologies for the diagnosis, treatment, or prevention of disease, and
5. The emotional, social, development and behavioral mechanisms of health and disease.

In addition to standard randomized clinical trials, patient-oriented methodologies also include self-perception measures (e.g., patients completing questionnaires), interviews, and focus groups. The core of this focus group is the scientific study of human participants to understand the cause of disease, health, and function. This understanding contributes to therapy and prevention. Clinically derived scientific knowledge, laboratory science, and patient-oriented science are core disciplines of the medical profession.

“The Emphasis Program provides me a unique opportunity to nurture aspiring medical students in the field of clinical research. The motivation to learn from each clinical encounter, fostered by the patient-oriented research of the Emphasis Program, is likely to transform each participating student into a life-long learner, effective problem-solver, and compassionate thinker. To paraphrase William Osler, ‘No matter trifling the clinical question at hand, answer it with a feeling that is demands the best that it is in you, and when done look it over with a critical eye, not sparing a strict judgment of yourself.’ Through the auspices of the Emphasis Program, I wish to inculcate such a spirit of reflection in each medical student.”
TEMPERIMENTAL DIFFERENCES IN AMYGDALA AND HIPPOCAMPAL HABITUATION TO NOVEL, NEUTRAL FACES

AMIL ALLEN

PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM

Children with inhibited temperament avoid new situations and are more at risk for the development of anxiety disorders later in life. Amygdala activation for novel faces is greater in adults with inhibited temperament relative to those with uninhibited temperament. It is possible that the amygdala differences reported are due to underlying differences in habituation to novel faces.

OBJECTIVES

We hypothesize that adults with inhibited temperament will habituate more slowly than the uninhibited adults. The hippocampus is also involved in novelty detection and was also examined.

MATERIALS AND METHODS

In a MRI scanner, 14 inhibited and 12 uninhibited subjects viewed four blocks of novel, neutral human faces. Each block consisted of 2 presentations of 6 faces. Percent signal change was extracted for two functional clusters and post hoc two tailed paired t-tests were performed.

CONCLUSIONS

These results support the hypothesis that previous differences in amygdala activation seen in individuals with inhibited temperament could be caused by a lack of habituation and this slowness to habituate may underlie the avoidance of novelty, and resulting anxiety, characteristic of persons with inhibited temperament.

ACKNOWLEDGEMENTS

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MENTOR / DEPARTMENT

Jennifer Urbano Blackford (Department of Psychiatry)

EVALUATION OF CHOLESTASIS IN NEONATE GASTROCHISIS

GABRIELA ANDRADE

PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM

The overall birth prevalence of gastroschisis has increased three fold worldwide in the past two decades with 2-6 per 10,000 infants affected. Long-term intravenous nutrition is needed for most of these neonates. This often leads to total parenteral nutrition associated-cholestasis (PNAC), a persistent problem that has been a major cause of morbidity and mortality in neonates. It is unclear why this complication occurs in only some gastroschisis patients.

OBJECTIVES

Our study aims to be the first to evaluate the characteristics and risk factors that explain why only some gastroschisis patients develop cholestasis. Information acquired in this study will lead to a better understanding of this common complication in gastroschisis, improve patient care, and aid in the counseling of parents as to prognosis.

MATERIALS AND METHODS

This is a retrospective analysis that included all neonatal born with gastroschisis from January 2007 to December 2008 at Vanderbilt Children’s Hospital. A logistic regression analysis was used to analyze the collected data.

CONCLUSIONS

Although this study uses a small sample, it shows key significant differences that help us understand the underlying factors that increase the risk of developing this complication with Gastroschisis. Future research needs a larger sample to validate these findings.

MENTOR / DEPARTMENT

Dr. Jayant Shenai

EFFECT OF NEBIVOLOL VERSUS METOPROLOL ON INSULIN SENSIVTY AND FIBRINOLYTIC BALANCE

KATIE AYERS

PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM

Obesity and metabolic syndrome represent major health risks to a growing population in developing countries. Metabolic syndrome and insulin resistance are characterized by elevated concentrations of circulating plasminogen activating inhibitor-1 (PAI-1), the major physiological inhibitor of fibrinolysis, which confers an increased risk for thrombotic events. However, during angiotensin- converting enzyme inhibition (ACEi), endogenous nitric oxide decreases PAI-1 antigen and improves fibrinolytic balance. ACE inhibition also produces increased insulin sensitivity and muscle glucose uptake through a nitric oxide dependent mechanism.

OBJECTIVES

Nebivolol is a third-generation β-blocker which acts by increasing the bioavailability of nitric oxide. We hypothesize that increasing nitric oxide will improve fibrinolytic conditions and insulin sensitivity through a cGMP-dependent pathway.

MATERIALS AND METHODS

48 patients, all 18-70 years of age, non-pregnant, and having Metabolic Syndrome will be enrolled and randomized into two study groups. Hypertensive subjects will discontinue hypertensive medications three weeks prior to initiation of study drug. Subjects will all be treated with placebo in a single-blind fashion for 21 days, and then randomized to receive 12 weeks of treatment with either nebivolol 5mg/day or metoprolol 100 mg/day. Intravenous Glucose Tolerance Tests will be performed prior to and immediately following the 12-week treatment stage, and results analyzed via MinMod. Fibrinolytic parameters will also be assessed.
CONCLUSIONS
Study is on target to complete enrollment and data collection in July 2010.

ACKNOWLEDGEMENTS
Thank you to Loretta Byrne, RN, Brown lab, and the Student Research Training Program in Diabetes. Funding from Forest Laboratories.

MENTOR / DEPARTMENT
Nancy Brown, MD, Department of Clinical Pharmacology

USING A KEYPRESS TASK TO STUDY RESTRICTED INTERESTS IN CHILDREN WITH AUTISM
MARISSA BLANCO
PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
Restricted and repetitive behaviors are a cardinal feature of autism spectrum disorders (ASD). Parental interviews and behavior scales suggest that restricted interests in children with ASD are more disruptive than hobbies in typically developing (TD) children [1]. However, children have rarely been studied as they interact with their hobbies and so little is known about how to address these behaviors.

OBJECTIVES
The purpose of this study was to attempt to characterize how autistic children differ from TD children with regard to restricted interests.

MATERIALS AND METHODS
In a keypress task, the children were shown digital images and could control the amount of time a given image remained on the screen. Some images related to their hobby and others did not.

CONCLUSIONS
This data suggests that there may not be a difference in the duration in which TD vs ASD children desire to view images related to their hobby. Since previous studies show that restricted interests do differ from simple hobbies, it will be important to further investigate what aspects of restricted interests differ from typical behaviors. In doing this, new treatments may be developed to better address the needs of this population.

ACKNOWLEDGEMENTS
Akua Cosby, Department of Psychiatry, Vanderbilt University, Nashville, TN 37232; Denis O’Day, MD, Vanderbilt Eye Institute, Vanderbilt University, Nashville, TN 37221; Samantha Martin, Office of Undergraduate Medical Education, Nashville, TN 37212

MENTOR / DEPARTMENT
Carissa Cascio, PhD, Department of Psychiatry, Vanderbilt University, Nashville, TN 37232 Mario Davidson, PhD, Department of Biostatistics, Vanderbilt University School of Medicine, Nashville, TN 37232

SUBTHALAMIC NUCLEUS STIMULATION AND EMOTION INDUCTION IN PARKINSON’S DISEASE
SARAH BOURNE
PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
Deep brain stimulation (DBS) of the subthalamic nucleus (STN) improves motor symptoms in severe Parkinson’s disease (PD). However, STN DBS may also effect emotion, possibly by interfering with a limbic-basal ganglia circuit. Both impaired emotion recognition and impaired emotion induction have been reported in PD patients with STN stimulation. Positive and negative emotions have been reported to be represented by different lateralities in the prefrontal cortex, thus we used near infrared spectroscopy (NIRS) to examine changes in oxygenated hemoglobin concentration in the prefrontal cortex during an emotion induction task in patients both on and off STN stimulation.

OBJECTIVES
To determine whether emotion induction is impaired during STN stimulation, and whether such differences are reflected in prefrontal cortex activation.

MATERIALS AND METHODS
STN DBS Parkinson’s patients were tested in on and off stimulation conditions. The task involved watching a series of positive, negative, and neutral videos previously characterized for emotional qualities. NIRS was used to measure changes in prefrontal oxy and deoxy hemoglobin while subjects were viewing the videos. Subjects were asked to rate the emotion and intensity of each emotional video.

CONCLUSIONS
These results suggest that STN stimulation may impair both positive and negative emotion induction.

ACKNOWLEDGEMENTS
Bradley Folley

MENTOR / DEPARTMENT
Joseph Neimat, Department of Neurological Surgery

FORECASTING DONOR LIVER FUNCTION USING PROTEOMIC PROFILING
CHUKWUDI CHIAGHANA
PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
The profound disparity between available donor livers and patients dying from end-stage liver disease, has led to extending the criteria of donor (ECD) livers for transplant. With this expanded use, there is demonstrated benefit to recipients, but there is also increased risk of graft-related morbidity and failure. At present, there are no reliable biomarkers that preemptively define ECDs as acceptable for transplant.

OBJECTIVES
The specific aim of this study is to identify protein signatures from donor liver tissue that would define the ECD liver and the concomitant risk for initial poor graft function (IPF) following transplant.
MATERIALS AND METHODS
Clinical donor information was used to calculate the risk of graft failure after transplant. Based on this Donor Risk Index (DRI), each biopsy was stratified into low (LDR) and high (HDR) donor risk categories. Proteomic profiling experiments were performed on 35 livers (N=17, LDR; N=18, HDR) stratified around the median DRI score. The differences in protein expression patterns between the two groups were quantified.

CONCLUSIONS
There is differential protein expression between HDR and LDR livers. These proteins may serve as biomarkers for predicting outcome following liver transplantation, and help to identify high risk organs that are suitable for transplant.

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
Beau Kelly, MD. Hepatobiliary Surgery and Liver Transplantation Charles Flynn, PhD. Surgical Sciences

TEMPERAMENTAL MODERATES THE EFFECT OF NOVELTY ON RESPONSE TO FEAR FACES

IACQUELINE A. CLAUS

BACKGROUND PROBLEM
Inhibited temperament – the predisposition to respond to new people, places, or things with avoidance behaviors – is associated with increased risk for social anxiety disorder. The amygdala’s response to novel faces has been identified as a neural substrate of inhibited temperament.

OBJECTIVES
To explore temperamental differences to novel faces.

MATERIALS AND METHODS
We performed an fMRI study in which subjects passively viewed fearful faces during 4 12-second blocks. Approximately half of each temperament group was told that they would see fearful faces and shown an exemplar (Exposure). The other half was told that they would be seeing faces, with no exemplar (Novel). Percent signal change in significant amygdala clusters was extracted (MarsBar); post-hoc ANOVAs confirmed the Temperament X Condition differences. Exploratory whole brain analyses were also performed.

CONCLUSIONS
Temperament moderated the amygdala activation to novel fear faces. The Uninhibited subjects showed a reduced amygdala response with one prior exposure to the stimulus, consistent with a habituation effect. The Inhibited subjects showed an enhanced amygdala response, suggesting an expectancy effect. Inhibited temperament may have an exaggerated anticipation response to mildly negative stimuli.

ACKNOWLEDGEMENTS
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MENTOR / DEPARTMENT
Jennifer Blackford, PhD. Psychiatric Neuroimaging Program, Department of Psychiatry

DOES CLONIDINE IMPROVE POSTOPERATIVE EPIDURAL ANALGESIA EFFICACY IN PEDIATRIC PATIENTS?

SARAH DEERY

BACKGROUND PROBLEM
Epidurally-administered local anesthetics and opioids are used in the operative and postoperative period in children. However, local anesthetics can cause motor block, seizures, and arrhythmias, and opioids can cause nausea/emesis, pruritus, and apnea. Because of the limitations of these agents, non-opioid additives are being used. Clonidine, an α2 adrenergic agonist, may act centrally to improve analgesia and could ultimately reduce the dose of anesthetic and opioid required to achieve acceptable analgesia.

OBJECTIVES
The primary objective is to determine if clonidine reduces pain, as measured by whether the epidural must be discontinued prematurely due to inadequate analgesia. The secondary objective is to see if adding clonidine will decrease the incidence of adverse effects.

MATERIALS AND METHODS
The charts were reviewed of all pediatric patients who received epidural analgesia in the postoperative period at Vanderbilt Children’s Hospital between July 2008 – July 2009.

CONCLUSIONS
Clonidine did not significantly improve analgesia in this population when administered as an epidural additive.

ACKNOWLEDGEMENTS
Jayant Deshpande, M.D., M.P.H., Christopher Lemelle, M.D., Stephen Hays, M.D., F.A.A.P, Twila Luckett, B.S.N., Nathaniel Mercaldo, M.S., and Jonathan Schildcrout, Ph.D.

MENTOR / DEPARTMENT
Jayant Deshpande, M.D., M.P.H., Department of Anesthesiology, Vanderbilt University Medical Center

REDUCTION OF MORBID OBESITY COMORBIDITIES POST-BARIATRIC SURGERY IN PATIENTS OVER 60 YEARS OF AGE

DANIEL ESAGHIAN

BACKGROUND PROBLEM
Epidurally-administered local anesthetics and opioids are used in the operative and postoperative period in children. However, local anesthetics can cause motor block, seizures, and arrhythmias, and opioids can cause nausea/emesis, pruritus, and apnea. Because of the limitations of these agents, non-opioid additives are being used. Clonidine, an α2 adrenergic agonist, may act centrally to improve analgesia and could ultimately reduce the dose of anesthetic and opioid required to achieve acceptable analgesia.

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ACKNOWLEDGEMENTS
Jayant Deshpande, M.D., M.P.H., Christopher Lemelle, M.D., Stephen Hays, M.D., F.A.A.P, Twila Luckett, B.S.N., Nathaniel Mercaldo, M.S., and Jonathan Schildcrout, Ph.D.

MENTOR / DEPARTMENT
Jayant Deshpande, M.D., M.P.H., Department of Anesthesiology, Vanderbilt University Medical Center
BACKGROUND PROBLEM
Obesity has become a pandemic in the United States, affecting people in all age groups. The prevalence of obesity in people 60 and older was 32.0% in 2000 and is estimated to increase to 37.4% in 2010. Many surgical studies have demonstrated the safety and efficacy of bariatric surgery in terms of complications, mortality, and reduction of comorbidities. Some studies have determined that bariatric surgery is safe and effective for elderly patients, whereas others have suggested poor outcomes and recommend against it.

OBJECTIVES
This study aims to compare reduction of comorbidities related to morbid obesity in patients 60 years and older to those younger than 60 who underwent bariatric surgery at the UCLA Medical Center between 2003 and 2008.

MATERIALS AND METHODS
Under IRB protocol, one year post-operative data was collected through phone interviews and online surveys and compiled into a comprehensive database with information regarding weight loss and comorbidities. Weight loss and reduction of comorbidities were compared between patients 60 and older to those patients 18-59.

CONCLUSIONS
Patients of advanced age should be considered candidates for bariatric surgery. Older patients have an overall reduction in comorbidities associated with obesity and will enjoy better quality of life post-operatively. This study suggests relatively poor management of psychological disorders related to obesity in the elderly such as depression and anxiety.

MENTOR / DEPARTMENT
Benjamin Poulose, M.D., Vanderbilt Department of Surgery; Amir Mehran, M.D., Director, UCLA Department of Bariatric Surgery

OUTCOMES COMPARISON OF POLYETHERETHERKETONE CAGES AND ALLOGENOUS BONE GRAFTS IN ACDF
RYAN ANDREW FRITZ
PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
Anterior cervical discectomy and fusion (ACDF) is a standard surgical procedure to repair cervical spinal degeneration and disc injury. Early ACDF techniques entailed harvesting autogenous bone segments from the iliac crest to replace damaged IV discs; however harvest site morbidity led to increased use of graft substitutes including cadaveric donor allografts, xenografts, and synthetic polymer matrices such as polyetheretherketone (PEEK) cages.

OBJECTIVES
Allogenic bone and PEEK cage grafts are popular choices for ACDF implant material. Understanding outcomes between these two methods is critical when deciding on a course of treatment, however little data exists comparing PEEK cages and allogenic grafts to one another. This project aims to investigate clinical outcomes to aid the decision process between procedures.

MATERIALS AND METHODS
This retrospective study was conducted from patients who underwent ACDF surgery between 10/2/07 and 12/30/08. Group A (20 patients) underwent inter-body fusion with an allograft containing demineralized bone matrix and Group B (10 patients) underwent inter-body fusion with a PEEK cage. Graft height and change in fusion angle were measured from mapped points on pre-op, immediate post-op, and follow-up x-rays (6 weeks, 4.5 months, 11 months).

CONCLUSIONS
Equivalent radiographic outcomes indicate that PEEK cage is a viable - and potentially preferential - alternative to allograft due to limitations in supply and a rare risk of infection from cadaveric donors.

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MENTOR / DEPARTMENT
Joseph S. Cheng, MD, Department of Neurological Surgery Richard Lebow, MD, Department of Neurological Surgery

LATE EFFECTS ON COGNITIVE FUNCTIONING IN SURVIVORS OF Pediatric Posterior Fossa/Infratemporal Tumors
DANA W. HIPP
PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
Survivors of pediatric brain tumors are at increased risk for late-effects including neurocognitive impairment, endocrine problems, and emotional distress. Research is devoting increased attention to the late effects on cognitive functioning in pediatric survivors of childhood brain tumors. Infratentorial/Posterior Fossa tumors are the most common type of tumor in childhood. We conducted a quantitative analysis studying the magnitude of neurocognitive deficits in survivors of pediatric brain tumors.

OBJECTIVES
Through the compilation of literature reviews and studies, we examined the following hypothesis: Survivors of pediatric posterior fossa tumors will perform more poorly than normative data on measures of cognitive ability. Measures include full scale, verbal and nonverbal intelligence on cognitive tests.
BACKGROUND PROBLEM
Fighting is a recognized cause of hockey injury, but the epidemiology and magnitude of these injuries has never been characterized. By quantifying the type and severity of fight-related injuries in the National Hockey League, the impact of fighting on the health of players and on game play can be determined. By identifying any risk factors for fight-related injury, rules and refereeing could potentially be modified in an attempt to reduce the incidence of such injuries.

OBJECTIVES
The epidemiology of fight-related injuries in the NHL from the 2006-07 to the 2008-09 season is described, and the severity of these injuries is characterized. Potential risk factors for fight-related injury are analyzed.

MATERIALS AND METHODS
Injury data from three seasons, 2006 – 2009, was collected from NHL game summaries, injury reports, player profiles, and a comprehensive NHL fight log. Only the injury data from the 2008-09 season was used in risk factor analysis; control data consisted of all fights that occurred during the 2008-09 season. Potential risk factors for injury analyzed were difference in height and BMI, and length, date, and time of fight.

CONCLUSIONS
There is significant physical risk to players who engage in fights, but the lack of identifiable risk factors may indicate an inherent, non-modifiable risk associated with fighting.

ACKNOWLEDGEMENTS
Dr. James Carey

MENTOR / DEPARTMENT
Dr. James Carey

ACCURACY OF TEMPLATING IN TOTAL ELBOW ARTHROPLASTY
ANITA PAI

PATIENT ORIENTED RESEARCH

The purpose of the current paper is to provide a comprehensive meta-analysis of the literature on long-term neurocognitive effects found in survivors of pediatric posterior fossa tumors as a subset of a larger study. Results. Results indicated significant deficits in overall cognitive functioning with large effects across all domains ranging from (Hedge’s g = -0.81 to -1.04).

CONCLUSIONS
These finding indicate significant neurocognitive deficits following treatment of pediatric brain tumors in the posterior fossa. This suggests deficits extend to other portions of the brain beyond tumor location. Our paper provides impetus for a future study examining neurocognitive sequelae in survivors of pediatric brain tumors through imaging techniques.

ACKNOWLEDGEMENTS
Jenni Champion, Ph.D., Charissa Andreotti, Anna Barnwell, Alex Bettis Members of the Stress & Coping Lab

MENTOR / DEPARTMENT
Bruce Compas & Department of Psychology

COMPARISON OF MATERNAL OUTCOMES BY INTENTION FOR FETAL RESUSCITATION AT PERIVIABLE AGE

TENDEUKAI HUNGWE

PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
Women undergoing delivery at the cusp of viability have many decisions to make regarding pregnancy management when either preterm labor or fetal or maternal complications lead to delivery at the limits of fetal viability. Neonatologists counsel these women regarding the likelihood of neonatal outcome by gestational age. We feel that women will benefit from information regarding maternal morbidities associated with mode of delivery.

OBJECTIVES
We hypothesize that women who desired full intervention for fetal resuscitation including cesarean section at 22 0/7 to 25 6/7 weeks gestational age, will experience increased maternal morbidity compared to women who do not desire intervention for fetal benefit.

MATERIALS AND METHODS
Women undergoing cesarean section who did not desire intervention are the control group. Those who desired full intervention for fetal benefit including performance of a cesarean section comprised the intervention group.

CONCLUSIONS
As cesarean section is associated with increased blood loss compared to SVD intending higher intervention may result in higher transfusion rates. Further work and a larger sample is indicated to more specifically answer this question. Based on our multicenter review women who desired full intervention including cesarean section are not likely to experience more major morbidity compared to women who do not choose intervention.

ACKNOWLEDGEMENTS
Ashley Hickman, M.D. Department of Obstetrics and Gynecology, Division of Maternal-Fetal Medicine, University of North Carolina, Chapel Hill

MENTOR / DEPARTMENT
Bennett Spetalnick, M.D. (Department of Obstetrics and Gynecology; Vanderbilt University of Medicine) Nancy Chescheir M.D. (Department of Obstetrics and Gynecology, Division of Maternal-Fetal Medicine, University of North Carolina, Chapel Hill)

THE EPIDEMIOLOGY AND RISK FACTORS OF FIGHT-RELATED INJURY IN THE NATIONAL HOCKEY LEAGUE
SHANNON MCCONNAUGHEY

PATIENT ORIENTED RESEARCH

MATERIALS AND METHODS
The epidemiology of fight-related injury analyzed were difference in height and BMI, and length, date, and time of fight.

CONCLUSIONS
The incidence of such injuries.

ACKNOWLEDGEMENTS
Dr. James Carey

MENTOR / DEPARTMENT
Dr. James Carey

ACCURACY OF TEMPLATING IN TOTAL ELBOW ARTHROPLASTY
ANITA PAI

PATIENT ORIENTED RESEARCH
BACKGROUND PROBLEM
Total elbow arthroplasty (TEA) is indicated for the treatment of severe trauma or degeneration of the joint. Pre-operative templating is used to approximate stem length and width of prostheses for total joint arthroplasty.

OBJECTIVES
The purpose of this project is to evaluate the reliability and accuracy of preoperative templating for estimating the size of the humeral and ulnar components of the elbow prosthesis used in this procedure.

MATERIALS AND METHODS
Twenty-eight non-consecutive patients underwent total elbow arthroplasty were included in the study. Two independent observers (1 attending, 1 fellow) examined preoperative radiographs, using templates made by the prosthesis manufacturers, and estimated the appropriate humeral and ulnar stem width and length. The observers also assessed postoperative X-rays and graded the appropriateness of fit on a nominal scale for the stem length and width. By comparing the actual implant size (from the op notes) to the estimated size, the accuracy of templating was also determined.

CONCLUSIONS
Templating is not always reliable for either implant type. The two varieties of elbow prostheses differ in the components that are successfully templated. The Biomet implant works best for ulnar stem length, whereas the Zimmer works best for the ulnar stem width. Both implants lead to successful post-surgical fits.

ACKNOWLEDGEMENTS
I would like to thank my mentor, Dr. Donald Lee, for his guidance. Also, this project would not have been possible without the support of Drs. Jeff Watson, John Erickson, Chris Stutz, Yu Shyr, Elizabeth Koehler, and Dennis O’Day. I also want to acknowledge Samantha Martin for her help and encouragement throughout this process.

MENTOR / DEPARTMENT
Dr. Donald Lee, Orthopaedic Surgery

CARLA SANDLER

LOSS IN THE NICU: SIBLING MATTERS

BACKGROUND PROBLEM
The NICU is a stressful environment for all related parties and can be difficult in regards to coping with the loss of a loved one. The purpose of our study was to better understand the grieving process as it relates to sibling loss in the NICU.

OBJECTIVES
Assess the effect of perinatal loss on siblings. Determine whether or not children are effectively processing the loss of their sibling, and Determine whether or not grief and bereavement services should be offered to siblings of NICU patients at Monroe Carrel, Jr. Children’s Hospital.

MATERIALS AND METHODS
Eligible participants were identified as those siblings between the ages of 5 years and 18 years at the time of death of a brother or sister who died in the NICU between 6 months and 2 years prior to the initiation of the study. The interviews were scripted. The process was approved by the Vanderbilt Medical Center IRB.

CONCLUSIONS
The loss of a perinatal sibling on a child is devastating. Without adequate intervention, children may suffer unnecessarily from the consequences of complicated grief.

ACKNOWLEDGEMENTS
Brain Carter, MD Elizabeth Robinson, LMSW Joyce Fox Lauren Thurman

MENTOR / DEPARTMENT
Brian Carter, MD: Monroe Carrel Jr. Children’s Hospital Neonatal ICU
ASSESSING PAO2 /FIO2 VS. SAO2 / FIO2 IN CRITICALLY ILL PATIENTS

ASMITHA SATHIYAKUMAR

BACKGROUND PROBLEM
The Pao2/fraction of inspired oxygen (Fio2) ratio, or PF ratio, is a useful tool to quantify hypoxemia and diagnose respiratory syndromes. However, obtaining PF ratios requires arterial blood gas sampling which can potentially cause anemia and blood loss and owing to its invasiveness. Thus, an alternative, non-invasive approach is necessary for measuring hypoxemia in critically ill patients. It has been hypothesized that pulse oximetric hemoglobin saturation (SpO2)/FiO2 ratio, or the SF ratio, can be utilized as a surrogate for the PF ratio. Recent studies have shown a strong correlation between SF and PF ratios in critically-ill adult populations. However, these studies were conducted retrospectively which allows for a time delay between acquiring SpO2 and PaO2 measurements.

OBJECTIVES
We conducted a prospective study where SpO2 and PaO2 were measured simultaneously and evaluated if factors such as PEEP, pH, the number of vasoactive drugs, body temperature skin pigmentation and age, affected the relationship between the SF and PF ratios.

MATERIALS AND METHODS
Nurses in ICUs at Vanderbilt University and Brazilian National Institute of Cancer recorded arterial blood gas data and pulse oximetry data at the time of drawing blood gases. A multivariable linear regression with GEE regression analysis was used to identify significant predictors of the PF ratio.

CONCLUSIONS
This predictive model can be used to obtain the PF ratio.
MDMA’S EFFECTS ON ANTERIOR CINGULATE GYRUS DURING FLANKER TASK PERFORMANCE: AN FMRI STUDY

ERIN TOAZ

BACKGROUND PROBLEM
MDMA (Ecstasy) is a widely used recreational drug that produces serotoninergic axon toxicity. Human MDMA users have impairments across a broad range of cognitive domains, including attention, concentration, psychomotor, and executive functions. A modified flanker task assesses error monitoring, attention, interference effect, and response inhibition. We have previously shown that MDMA users show a dose-response association of prior MDMA use and brain activation in visual and motor regions.

OBJECTIVES
To investigate the effects of long-term MDMA use on the ACC, an area implicated in a variety of cognitive functions, using fMRI.

MATERIALS AND METHODS
We used fMRI at 3 T to examine group activation in abstinent human MDMA users (N=20) during performance of a modified flanker task that included a response inhibition and neutral condition. Within those regions, we examined task-evoked signal intensity by task condition.

CONCLUSIONS
This overall pattern of increased activation and preserved task performance following MDMA exposure is suggestive of altered cortical excitability or reduced cortical efficiency, potentially secondary to altered serotonin signaling.

THE PROSCOPE HR®: A PROMISING DIAGNOSTIC TOOL IN SCARRING AND NON-SCARRING ALOPECIAS

STEPHEN M. TOURJEE

BACKGROUND PROBLEM
In the evaluation of hair loss disorders, imaging devices can enhance patient understanding and compliance. Several dermoscopic findings have been described for both scarring and non-scarring alopecias. The Proscape HR® is a hand-held digital microscope currently used in forensics and hair restoration sites worldwide, but it has not been tested in the dermatology setting.

OBJECTIVES
To investigate Proscape HR® as a diagnostic tool for Alopecia Areata (AA), Androgenetic Alopecia (AGA), and scarring alopecias (SA)

MATERIALS AND METHODS
We used the Proscape HR® to image the scalps of 77 patients with AA, 15 patients with AGA, and 24 patients with SA, using the 30x, 30x polarized, 50x and 100x lenses. We also compared Proscape HR, Dermilite II Pro (camera-attachable pocket dermoscope), and Fotofinder (videodermoscopy) in patients with AA and AGA.

CONCLUSIONS
These findings suggest that ApoE genotypes and gender are predictors of conversion to AD. Although other vascular risk factors are implicated in the development of MCI and AD, they did not prove to be significantly useful for predicting the conversion of MCI to AD in our study.

ACKNOWLEDGEMENTS
Mario Davidson Vanderbilt Department of Biostatistics

MENTOR / DEPARTMENT
Liana Apostolova UCLA Department of Neurology, Ronald Cowen Vanderbilt Department of Psychiatry

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CONCLUSIONS
Proscape HR® is affordable and user-friendly, does not require immersion oil, and uses various lens options including polarization. Both the 30x polarizing and non-polarizing lenses demonstrated findings in AA, AGA, and SA equivalent to what is seen with dermoscopy. This portable device may be a practical alternative to dermoscopy or videodermoscopy.
ACKNOWLEDGEMENTS
Work is supported in part by a research grant from the North American Hair Research Society (NAHRS)

MENTOR / DEPARTMENT
Adriana Schmidt, MD Lloyd E. King, Jr, MD, PhD Vanderbilt Dept. of Dermatology

PERIODIC FEVER, APHTHOUS STOMATITIS, PHARYNGITIS, AND CERVICAL ADENITIS (PFAPA) SYNDROME: LONG-TERM FOLLOW-UP

VICTORIA M. WURSTER

PATIENT ORIENTED RESEARCH

BACKGROUND PROBLEM
PFAPA is a pediatric autoinflammatory syndrome characterized by periodicity of fevers with aphthous stomatitis, pharyngitis, and adenitis.

OBJECTIVES
To describe the long-term follow-up of a cohort of patients with PFAPA syndrome. Specific goals include: 1) reassess the original criteria used to define PFAPA, 2) describe outcomes in this cohort, and 3) review PFAPA cases persisting into adulthood.

MATERIALS AND METHODS
PFAPA patients from a registry compiled over a 20-year period were contacted and surveyed.

CONCLUSIONS
The current PFAPA criteria appear appropriate for diagnosis. For most, PFAPA resolves without sequelae. Few patients are diagnosed with other conditions. While there is currently no method to determine which patients will experience episodes into adulthood, those continuing to have episodes show reduced frequency and severity.

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James G. Carlucci, MD, Henry M. Feder, Jr., MD, Darlene Batey Hoffman Pediatric Summer Scholarship
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