APSF Grants Awards – 2008

Anesthesia Patient Safety Foundation (APSF) is pleased to report that it continues to attract outstanding applications for funding. The educational focus of APSF includes innovative methods of education and training to improve patient safety, development of educational content with application to patient safety, and development of testing of educational content to measure and improve safe delivery of perioperative anesthetic care.

The application process continues with an electronic, on-line submission format that was introduced in 2005. The applications, as well as all the required attachments, are uploaded to the new APSF redesigned website (www.APSF.org), a process that facilitates the application review by members of the Scientific Evaluation Committee, improves the timeliness of response to queries, and facilitates transmission of reviewer feedback to the applicants. The Scientific Evaluation Committee members continue to modify and perfect the electronic application and review process.

This year, the Scientific Evaluation Committee is very pleased to report on several significant developments in the APSF Grant Program. The first is the total amount of funding that APSF awarded this year; for the first time in its 21 year-history, the Scientific Evaluation Committee of the APSF approved funding for 9 applications, for a total amount of support in excess of $1 million.

The second development is the continued increase in the number of named awards, including the inauguration of the **APSF / American Society of Anesthesiologists (ASA) Endowed Research Award**, made possible by the continuous and generous support of the ASA. This $150,000 award joins the two other fully funded named awards, the **APSF / Anesthesia**

Healthcare Partners (AHP) Research Award, made possible by a $150,000 unrestricted grant from Anesthesia Healthcare Partners, and the **APSF / Cardinal Health Foundation Research Award,** made possible by a $150,000 grant from the Cardinal Health Foundation. The third major development is the inauguration this year of the **APSF / Merck Research Award,** made possible by a partial ($100,000) grant from Merck and Company.

In addition to the ***Clinical Research*** and ***Education and Training*** content that is the major focus of the funding program, APSF continues to recognize the patriarch of what has become a patient safety culture in the United States and internationally, and one of the founding members of the foundation - Ellison C. "Jeep" Pierce Jr., MD. The APSF Scientific Evaluation Committee continues to designate each year one of the funded proposals as the recipient of this prestigious nomination, the **Ellison C. Pierce Jr. Research Award**. The selected nomination carries with it an additional, unrestricted award of $5,000.

For the year 2008 (projects to be funded starting January 1, 2008), nine grants were selected for funding by the APSF Scientific Evaluation Committee (for names of committee members, please refer to the list in this issue). The APSF Scientific Evaluation Committee members were pleased to note that they reviewed a total of 39 applications in the first round, 17 of which were selected for final review at the American Society of Anesthesiologists' (ASA) Annual Meeting in San Francisco, California. As in previous years, the grant submissions addressed areas of high priority in clinical anesthesia. The major objective of APSF is to stimulate the performance of studies that lead to prevention of mortality and morbidity from anesthesia mishaps. A particular priority continues to be given to studies that address anesthetic problems in healthy patients, and to those studies that are broadly applicable and promise improved methods of patient safety with a defined and direct path to implementation into clinical

care. Additionally, APSF is encouraging the study of innovative methods of education and training to improve patient safety, and methods for the detection and prevention of medication errors.

The APSF Scientific Evaluation Committee convened during the ASA Annual Meeting on October 13, 2007 in San Francisco for final evaluation and selection of the proposals. Of the 17 finalists, the members of the APSF Scientific Evaluation Committee selected the following nine applications:

David J. Murray, MD – Professor, Department of Anesthesiology, Washington University School of Medicine, St. Louis, Missouri. Dr. Murray's submission is entitled, ***"Web-based Program for Ultrasound Training."***

Background: Ultrasound guided central line insertion is recommended as a technique that could improve the safety of central venous access. The **goal** of this proposal is to develop and validate a web-based training program that could be used to train physicians in the implementation of ultrasound guided central venous access. During the project, a set of tiered adaptive training exercises developed at Washington University School of Medicine will be transferred to the web and data will be collected for assessment and validation of the training. One of the goals of this approach is to determine whether web-based training and simulation are effective instructional tools. **Implications**: The main objective of the project is to provide a validated interactive training program for physicians that will enhance the adoption of ultrasound guidance during central venous access and ultimately improve patient safety by decreasing the potential for vascular injury.

In addition to receiving the requested funding of $149,992 for this project, Dr. Murray is also the recipient of the **Ellison C. Pierce, Jr. Research Award,** which consists of an additional, unrestricted award of $5,000.

Thomas J. Ebert, MD, PhD – Professor, Department of Anesthesiology, Medical College of Wisconsin, Zablocki VA Medical Center, Milwaukee, Wisconsin. Dr. Ebert's research proposal is entitled, ***"Obstructive Sleep Apnea and Adverse Perioperative Outcomes."***

Background: Obstructive sleep apnea (OSA) is a common medical condition, occurring in approximately 80% of patients with symptoms. It is associated with substantial morbidity and a 40% eight-year mortality rate if left untreated. In the surgical patient, it is often first suspected in the preoperative anesthesia interview, but there is no quick and reliable method to determine its presence or severity. This information is critical because OSA is an independent risk factor for untoward events in the post anesthesia period, during which one-third of these patients will develop significant respiratory and cardiac complications and have a longer hospital stay, often including unplanned ICU admission and/or tracheal reintubation. **Goal**: the investigators will study 200 patients with documented OSA who are scheduled for elective in-patient surgery. The investigators will track screening information (including co-morbidities), the sensitivity, specificity and the positive or negative predictive power of four screening tools, and the frequency and type of postoperative complications. These data will be used to develop a logistic regression model to determine the strongest predictors of adverse postoperative outcomes.

Implications: This research will evaluate pre-surgical patients with OSA and will identify co-morbid conditions and screening tests with a strong predictive power for adverse postoperative respiratory and cardiac events. Adequate OSA screening has the potential to identify at-risk

patients and to enable special perioperative management to reduce adverse postoperative outcomes.

In addition to receiving the requested funding of $150,000 for his project, Dr. Ebert's application was designated as the **APSF / American Society of Anesthesiologists (ASA) Endowed Research Award**, made possible by an unrestricted, $150,000 grant from the ASA.

Jacqueline M. Leung, MD, MPH – Professor, Department of Anesthesiology and Perioperative Care, University of California at San Francisco, San Francisco, California. Dr. Leung's research proposal is entitled, ***"Pathophysiology of Postoperative Delirium."***

Background: Because of changing demographics in the United States, more patients undergoing major surgery are now over 65 years of age. Compared with younger patients, the older patients tend to have more concurrent medical conditions, more severe illnesses, and poorer clinical outcomes after surgery. Of the adverse outcomes, postoperative delirium and cognitive decline are particularly common among this group of patients. Postoperative delirium is associated with longer hospital stays, poor functional outcomes, and higher healthcare costs. A milder form of acute cognitive changes, known as postoperative cognitive decline (POCD), may be associated with long-term declines in daily functioning. Despite the prevalence and clinical importance of postoperative delirium and cognitive decline, no specific causative factor has yet been identified for these two conditions, and no preventive therapy is currently available. The **goal** of this research proposal is to investigate the pathophysiology of postoperative delirium and cognitive decline in older patients undergoing major surgery. **Implications**: The results of this investigation will lead to an improved understanding of the pathophysiology of two significant

morbidities, postoperative delirium and cognitive decline, and lead to an appropriate management strategy to minimize the occurrence of these adverse events.

In addition to receiving the requested funding of $149,800 for her project, Dr. Leung is the recipient of the **APSF / Anesthesia Healthcare Partners (AHP) Research Award**, made possible by an unrestricted educational grant in the amount of $150,000 from the Anesthesia Healthcare Partners.

Mark D. Rollins, MD. – Assistant Professor, Department of Anesthesiology and Perioperative Care, University of California at San Francisco, San Francisco, California. Dr. Rollins' research proposal is entitled, ***"Supplemental Oxygen: A Reduction in Pulse Oximetry Sensitivity, or an Increased Margin of Safety?"***

Background: Patients receiving opioids for pain control or sedation for procedures outside the operating room are at risk for respiratory depression, apnea, and hypoxia. The primary monitor currently used to detect these possible complications is pulse oximetry. Supplemental oxygen may mask respiratory depression by decreasing the sensitivity of pulse oximetry until the patient is severely compromised, yet several prospective studies demonstrated supplemental oxygen improved safety in patients receiving postoperative opioids and conscious sedation. For a given oximetry alarm threshold, supplemental oxygen may result in either an increased or decreased rate of desaturation and thereby affect the time to intervene. The investigators will use opioid only and opioid with propofol models of gradual, progressive respiratory depression to study various degrees of hypoxia with and without supplemental oxygen in healthy volunteers. The primary **goal** is to better understand the impact of supplemental oxygen on the margin of safety

that pulse oximetry monitoring provides for respiratory depression, and the utility of new transcutaneous arterial carbon dioxide monitoring in detecting respiratory depression. **Implications**: This information has the potential to improve patient safety, decrease morbidity, and guide future patient research.

In addition to receiving the requested funding of $150,000 for his project, Dr. Rollins is the recipient of the **APSF / Cardinal Health Foundation Research Award**, made possible by an unrestricted educational grant in the amount of $150,000 from the Cardinal Health Foundation.

Benjamin A. Kohl, MD. - Assistant Professor, Department of Anesthesiology and Critical Care, University of Pennsylvania, Philadelphia, Pennsylvania. Dr Kohl's research proposal is entitled, ***"Identifying a Novel Mechanism for Perioperative Hyperglycemia in Cardiac Surgery: A Role for Incretins."***

Background: Hyperglycemia is a common and reproducible phenomenon in the cardiac surgical population. Numerous investigations have implicated hyperglycemia with increased perioperative morbidity and mortality. Recent data suggest that poor *intraoperative* glycemic control may be deleterious. As a result, the American College of Endocrinology, in conjunction with the American Society of Anesthesiologists, published a position statement that outlines goals for perioperative glycemic control. While insulin therapy has been the mainstay of treatment, it has become apparent that this strategy is frequently unsuccessful and potentially deleterious because of lack of precision in controlling serum glucose levels. The **purpose** of this

grant is to evaluate a novel strategy to reduce insulin resistance, maintain euglycemia and avoid the negative consequences of hypoglycemia during cardiac surgery. Incretins are a group of gut-derived factors that potentiate glucose-stimulated insulin secretion. One of these hormones, Glucagon-Like Peptide 1 (GLP-1) stimulates the synthesis and secretion of insulin from pancreatic β-cells and inhibits glucagon secretion from pancreatic α-cells, both in a glucose-dependent manner. **Implications**: the investigators will perform a randomized, double blind, placebo-controlled study to evaluate the efficacy of a continuous GLP-1 infusion, compared with standard insulin therapy in treating perioperative hyperglycemia. These studies will help elucidate the molecular mechanisms of perioperative insulin resistance and lead to better glycemic control of patients undergoing surgery.

In addition to receiving the requested funding of $150,000 for his project, Dr. Kohl is the recipient of the **APSF / Merck Research Award**, made possible by an unrestricted, partial educational grant in the amount of $100,000 from Merck and Company.

Asokumar Buvanendran, MD. – Associate Professor, Department of Anesthesiology, Rush University Medical Center, Chicago, Illinois. Dr Buvanendran's research proposal is entitled, ***"Patients after Minor Surgery with Monitored Anesthesia Care: Is It Safe to Drive?"***

Background: Patients are currently advised to refrain from driving motor vehicles or from using public transportation unescorted for a 24 hour-period if they undergo any minor ambulatory surgical procedure with monitored anesthesia care (MAC). These recommendations arose from research carried out on anesthetic agents that were utilized in the 1970's. However,

recently introduced short-acting anesthetics may facilitate rapid recovery and an earlier return to normal daily activities. In addition, current simulation technology has advanced greatly, providing highly detailed and accurate driving simulation tests as well as comprehensive evaluations not available previously. This offers the opportunity to study the influence of the newer anesthetic agents on driving performance. The **goal** of the proposed study is to compare newer short-acting anesthetic agents (propofol, benzodiazepine, opioid) utilized during MAC, to determine if a particular pharmacological agent, or a combination of agents, impairs driving performance as evaluated by driving simulator assessment at time of discharge from the ambulatory center after minor surgical procedures. The three critical measures of driving performance selected are: weaving, reaction time, and number of collisions. If any of the experimental MAC conditions show statistical equivalence with baseline at the time of discharge, for all three critical measures of driving performance, then that anesthetic regimen can be designated as "safe to drive." **Implications**: The present investigation will help determine the degree to which driving skills are affected by the treatment, and provide evidence-based justification for whether the restrictions for driving are warranted.

The requested funding for this study in the amount of $149,775 is made possible by a grant from APSF.

Zeev Friedman, MD. - Assistant Professor, Department of Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, Canada. Dr Friedman's research proposal is entitled, ***"Evaluation of an Anatomically Guided, Logically Formulated Airway Measure to Predict Difficult Intubations."***

Background: Adverse airway events are responsible for a majority of serious anesthesia complications. A simple and reliable bedside test that improves the ability to predict difficult intubations may help reduce the incidence of these events. Numerous investigations have attempted to predict difficult intubation by using simple bedside physical examinations. The most widely used and investigated maneuvers are the Mallampati score, the distance from the thyroid notch to the mentum (thyromental distance), the distance from the upper border of the manubrium sterni to the mentum (sternomental distance), and a combination of factors. The **goal** of the proposed study is to validate a novel method for predicting difficult intubations. The necessary line of vision (NLV) for intubation follows the direct line that light will travel between the larynx (superficially represented by the thyroid cartilage) and the upper incisors to reach the anesthesiologist without being obstructed. This new test measures a ratio of two parameters directly affecting the difficulty of achieving the necessary NLV for intubation. It is based on the rationale that to view the larynx during direct laryngoscopy, one must displace the tongue past the direct line of sight between the larynx and the operator. The difficulty of achieving the NLV is influenced by how far the tongue has to be displaced and by the space available to accommodate it. The authors hypothesize that this new test will accurately predict those patients in whom anterior displacement of the tongue, and hence visualization of the larynx, will be difficult. **Implications**: The ability to accurately predict difficult intubation is a critical first step in avoiding airway catastrophes. It allows for proper preparation of alternative techniques and a different, safer approach to airway management.

The requested funding for this study in the amount of $45,730 is made possible by a grant from APSF.

Dan J. Kopacz, MD. – Medical Education and Research Institute of Colorado, Colorado Springs, Colorado; Clinical Associate Professor, University of Washington School of Medicine, Seattle, Washington. Dr. Kopacz' research protocol is entitled, ***"Absorption of Intravascular Drugs by Intravenous Infusion of Lipid Emulsion."***

Background: The dangers of local anesthetic toxicity became apparent in 1979 when eight deaths were reported after the accidental intravenous administration of bupivacaine. Attempts to treat this disastrous complication have mainly been supportive (standard ACLS protocol), extreme (cardiopulmonary bypass), but rarely successful. Recent animal studies and case reports have documented the efficacy of intravenous lipid emulsion in the treatment of accidental intravenous local anesthetic overdose. One explanation for its efficacy is that lipid emulsion acts as a 'sink' to absorb these lipid soluble local anesthetic agents - preventing them from acting on the heart. A second theory suggests that the lipid emulsion provides additional 'fuel' for the heart at a time when the local anesthetic is blocking the heart's ability to efficiently utilize fatty acids as an energy source. It is presently unknown to what degree the lipid emulsion binds the local anesthetic in the bloodstream. Current suggestions for the amount and timing of lipid administration in this scenario have also been empirically derived. The **goals** of this study are to determine the mechanism of lipid emulsion in the scenario of local anesthetic overdose, and the degree to which lipid emulsion binds local anesthetic in the bloodstream. **Implications**: This study will establish the basis for subsequent determination of the most effective regime for administration of lipid emulsion as a rescue medication in the treatment of accidental intravenous local anesthetic overdose.

The requested funding for this study in the amount of $22,379 is made possible by a grant from APSF.

David B. Mayer, MD. – Associate Professor, Department of Anesthesiology, University of Illinois at Chicago, University of Illinois Medical Center, Chicago, Illinois. Dr. Mayer's research protocol is entitled, ***"Facilitating Patient Safety through Resident Hand-off Training."***

Background: In 2006, The Joint Commission (TJC) started requiring organizations to implement a new patient safety goal aimed at improving communication between providers. Root cause analyses of anesthesia-related sentinel events in 2005 concluded that poor communication was the leading cause of adverse outcomes in the operating room, being a factor in almost 80% of the reported sentinel events. In response to a survey about what is most needed to improve safety and efficiency in operating rooms, two thirds of physicians and nurses cited better communication. Of particular interest is the communication process of "handing-off" the care of a patient from one provider to another. Based on previous work, the **goal** of this research project is to create an instructional training module to facilitate successful hand-off communications among anesthesia residents in the operating room. The project will also facilitate the development and production of educational materials (toolkit) needed for the training module. **Implications**: This proposal seeks to provide a faculty development workshop with protocols and toolkits that will be launched in conjunction with APSF at the 2008 ASA Annual Meeting. This workshop will enable anesthesiology program directors to implement the hand-off training module in their own departments, facilitating transfer of up-to-date information

regarding the patients' previous care, treatment and services, as well as current condition and any anticipated status changes.

The requested funding for this study in the amount of $124,687 is made possible by a grant from APSF.

On behalf of APSF, the members of the Scientific Evaluation Committee wish to congratulate all of the investigators who submitted their work to APSF, whether or not their proposals were funded. The Committee members hope that the high quality of the proposals, the significant amount of resources offered by APSF, and the important findings that will undoubtedly result from completion of these projects will serve as a stimulus for other investigators to submit research grants that will benefit all patients and our specialty.

Sorin J. Brull, MD

Chair, APSF Scientific Evaluation Committee