SPA

Society for Pediatric Anesthesia
NEWSLETTER

Volume 6 Number 1 Winter-Spring, 1993

PRESIDENT'S ADDRESS

By Charles H. Lockhart, M.D.

I look forward to the privilege and challenge that you have afforded me in leading your Society (with more than 1,300 members) into its seventh year. I know the Society for Pediatric Anesthesia (SPA) membership joins me in our appreciation and gratitude to Aubrey Maze, M.B. for his performance as SPA President the past two years and for his vision toward the future as we initiate new programs to enhance the benefits — material as well as spiritual — of SPA membership.

My primary objectives during my two-year tenure are to maintain the excellence we now enjoy with the SPA Annual Meeting, Newsletter, education and research support, while expanding the participation of our members in existing and new activities.

With this in mind, the SPA Board of Directors has designated the following Committees and Chairmen:

Education:
William J. Greeley, M.D.
Vice President
Membership:
Mark A. Rockoff, M.D.
Secretary
Finance:
Steven C. Hall, M.D.
Treasurer
Nominating:
Aubrey Maze, M.B.
Past President
Publications:
Peter J. Davis, M.D.
Newsletter Editor
American Pediatric Surgical Association Liaison:
Eric B. Furman, M.B.

Each committee will have at least four members. Initial reports from the committees will be received by the Board at its March meeting. All chairmen welcome feedback from SPA members.

Charles H. Lockhart, M.D.

Solicitation for participation conducted at the SPA Annual Meeting resulted in an enormous number of volunteers. Many will be assigned; others may be accommodated in the future. What an exciting, enthusiastic response! Expanded Society and member activities will not be limited to these areas. I welcome recommendations as to other appropriate endeavors. In

(Continued on page 11)

SPA SIXTH ANNUAL MEETING

By Peter J. Davis, M.D. and Frank X. McGowan, Jr., M.D.

The sixth Annual Meeting of the Society for Pediatric Anesthesia (SPA) convened on October 16, 1992 at the New Orleans Hilton Hotel in New Orleans, Louisiana for another in a series of successful and informative Annual Meetings. More than 400 registrants attended the meeting, which focused on developmental pediatric pharmacology.

The lecture sessions were evenly balanced between the scientific principles that form the basis of drug pharmacology and the practical issues governing the administration of anesthetic agents and anesthetic adjuncts to children of different ages. A highlight of this meeting was the addition of speakers from the Association of Paediatric Anaesthetists (APA). Our colleagues from Great Britain and other parts of Europe provided insight into both the differences and similarities in their practice of pediatric anesthesia.

The morning sessions addressed developmental pharmacology and new anesthetic agents and adjuncts in pediatric anesthesia. The first session, "Developmental Pharmacology," was moderated by **Aubrey Maze, M.B.**, Phoenix, Arizona and included talks by **Dennis M. Fisher, M.D.**, Professor of Anesthesia and Pediatrics, University of California,

(Continued on page 2)

Aubrey Maze, M.B.

SPA Contents

The Society for Pediatric Anesthesia (SPA) publishes the SPA Newsletter twice a year: the Winter-Spring issue and the Summer-Fall Issue. The information presented in the SPA Newsletter has been obtained by the Editors. Validity of opinions presented, drug dosages, accuracy and completeness of content are not guaranteed by SPA.

Editor: **Peter J. Davis, M.D.**, Department of Anesthesiology, Children's Hospital of Pittsburgh, 3705 Fifth Avenue at DeSoto Street, Pittsburgh, PA 15213-2583

Associate Editor: **Francis X. McGowan, Jr., M.D.,** Department of Anesthesiology, Children's Hospital of Pittsburgh, 3705 Fifth Avenue at DeSoto Street, Pittsburgh, PA 15213-2583

Assistant Editors: **David E. Cohen, M.D.,** Department of Anesthesia, Children's Hospital of Philadelphia, 34th Street and Civic Center Boulevard, Philadelphia, PA 19104

Anne E. Dickison, M.D., Department of Anesthesia, Dartmouth-Hitchcock Medical Center, One Medical Center Drive, Lebanon, NH 03756

Lawrence H. Feld, M.D., 913 Ventura Way, Mill Valley, CA 94941

Brian J. Gronert, M.D., Department of Anesthesiology, Children's Hospital of Pittsburgh, 3705 Fifth Avenue at DeSoto Street, Pittsburgh, PA 15213-2583

Howard B. Gutstein, M.D., Section of Pediatric Anesthesia, Mott Children's Hospital, C4139, Box 0800, Ann Arbor, MI 48109

Alan S. Klein, M.D., Department of Anesthesiology, University of Florida, Box J254, J.H.M.H.C., Gainesville, FL 32610

Barbara W. Palmisano, M.D., Medical College of Wisconsin, Departments of Anesthesiology and Pediatrics, Anesthesia Research, MFRC-A1000, 8701 Watertown Plank Road, Milwaukee, WI 53226

Stephen Rimar, M.D., Department of Anesthesiology, Yale University School of Medicine, 333 Cedar Street, P.O. Box 3333, New Haven, CT 06510

Scott R. Schulman, M.D., Department of Anesthesia, Duke University Medical Center, Raleigh-Durham, NC 27709

James P. Viney, M.D., New Primary Children's Medical Center, 100 North Medical Drive, Salt Lake City, UT 84113

Mehernoor F. Watcha, M.D., Department of Anesthesia, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-9068

SPA SIXTH ANNUAL MEETING

(Continued from page 1)

San Francisco, California; **Barbara W. Brandom, M.D.,** Professor of Anesthesiology/CCM, University of Pittsburgh, Children's Hospital of Pittsburgh, Pennsylvania; and **Gavril W. Pasternak, M.D.,** Professor of Neurology and Neuroscience, Cornell University and Memorial Sloan-Kettering Cancer Center, New York, New York.

When Does the Infant Become an Adult With Respect to Its Pharmacology?

In an elegant and coherent lecture titled, "When Does the Infant Become an Adult With Respect to Its Pharmacology?" Dr. Fisher reviewed the maturation of body structure and organ function during both neonatal and childhood periods. Dr. Fisher also explained how these changes affect the pharmacokinetics and pharmacodynamics of neonates' and infants' responses to intravenous anesthetic agents.

In a tightly woven discussion on maturational changes in body composition (i.e., total body water, fat stores, muscle mass),

Dennis M. Fisher, M.D.

protein binding, organ clearance (i.e., hepatic enzyme maturation and hepatic blood flow), and blood-brain-barrier permeability, Dr. Fisher synthesized a pharmacokinetic maturational model based on known physiological and anatomical models.

Although Dr. Fisher noted that it is unclear exactly when the infant becomes adult-like in its pharmacological response, he speculated that since anatomic and physiologic maturation occurs by one year of age, maturational changes that affect drug distribution and organ clearance are also probably completed by one year of age.

Age-Related Differences in Response to Neuromuscular Blocking Agents

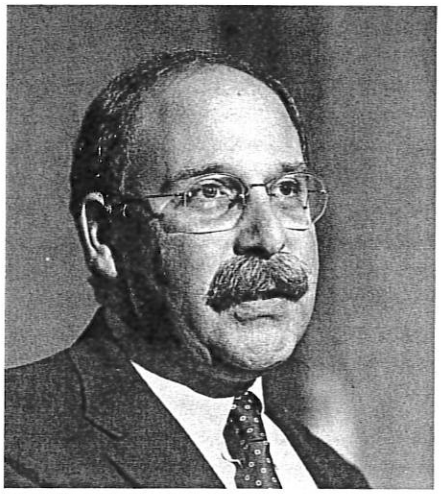
Dr. Brandom described the age-related pharmacology of muscle relaxants. In her review, Dr. Brandom noted that though there are age-related differences among the neuromuscular blocking agents with respect to onset time, maintenance dose and rate of spontaneous recovery, these differences are not similar for all agents. In addition, since onset of paralysis and spontaneous recovery from paralysis are related to drug potency, Dr. Brandom noted that comparisons for age must be made at equivalent doses.

Barbara W. Brandom, M.D.

In general, she stated, infants appear to be more sensitive than children to muscle relaxants and, on average, children require a larger dose and recover more quickly than do adults.

Maturation of the Opioid Receptor

The presentation from Dr. Pasternak provided a comprehensive summary of current knowledge of central and spinal cord opiate receptors and mechanisms, with an emphasis on the treatment of chronic pain. Recent knowledge about the location and effects of receptor subtypes (such as Mu_2, which mediate spinal analgesia but also respiratory depression and delayed gastrointestinal transit and $Kappa_3$ supraspinal receptor; ma-



Gavril W. Pasternak, M.D.

R. Gordon Bush, M.D.

jor site of action of levorphanol) may aid in the rational design of specific delivery routes and new agents that maximize efficacy and minimize unwanted side effects.

These multiple classes of receptors act independently, but currently used opiates may have efficacy at more than one receptor. Rate of tolerance also depends upon receptor subtype. This may explain the frequent response obtained by switching agents in patients tolerant to a particular opiate.

Genetic differences may significantly influence dosage requirements and drug efficacy (e.g., some children respond best to kappa agonists).

Of particular interest to pediatric anesthesiologists, infant rats require proportionately greater doses of morphine to produce analgesia than to produce respiratory depression (i.e., the therapeutic index is lower in neonates). Furthermore, kappa receptors may develop earlier in neonates than do Mu_1 (supraspinal analgesia) receptors, suggesting a potential role for kappa agonists in treating pain safely and effectively in infants.

What Is New in Pediatric Anesthesia?

The second session of the morning, "What Is New in Pediatric Anesthesia?" was moderated by **R. Gordon Bush, M.D.**, London, England, Past President of APA. The speakers included **L. Roddy McNicol, M.B.**, Consultant Anaesthetist from The Royal Hospital for Sick Children, Glasgow, Scotland; **Jerrold Lerman, M.D.**, Anaesthetist-in-Chief for the Department of Anaesthesia at The Hospital for Sick Children in Toronto, Ontario, Canada; and **George Meakin, M.B.**, Senior Lecturer in the Manchester University Department of Anaesthesia and a physician at the Royal Manchester Children's Hospital in Manchester, England.

Advances in Local Anesthetic Agents

Dr. McNicol reviewed new developments in local anesthetic agents. Although quick to note that very little is new, he commented that anaesthetists/anesthesiologists would do well to evaluate how these agents are currently used. Dr. McNicol emphasized "simple techniques should be used for simple procedures." Noting that while the efficiency of local anesthetic agents (whether administered by wound infiltration, regional nerve blockade or the caudal/epidural route) appears similar, simple techniques should be used to lessen the potential side effects from these agents.

In addition, Dr. McNicol noted that simple techniques of scalp infiltration may decrease the hemodynamic instability seen during the incision of neurosurgical procedures. Also, wound infiltration following pyloromyotomy may make these infants more comfortable in the postoperative period, and instillation of local anesthetic eye drops following eye surgery may decrease the incidence of postoperative vomiting and pain.

The role of EMLA® Cream for intravenous inductions also was discussed. Dr. McNicol noted that EMLA Cream takes 60-90 minutes to work, and that it can cause an irritating vasoconstriction. Because of these drawbacks, attention is now being focused on a 4-percent tetracaine cream. Tetracaine has the advantage of a quick onset time and it produces vasodilation. Once the tetracaine cream is removed, analgesia is maintained for an additional four hours.

New Inhalational Anesthetics in Children

Dr. Lerman discussed the pharmacology of sevoflurane and desflurane, two new inhalant anesthetic agents. Dr. Lerman noted that both sevoflurane and desflurane are methyl ethyl ethers. Both

(Continued on page 4)

L. Roddy McNicol, M.B.

Jerrold Lerman, M.D.

SPA SIXTH ANNUAL MEETING

(Continued from page 3)

agents are nonflammable, lack arrhythmogenicity, provide hemodynamic stability and, because of their low blood-gas partition coefficients, should provide a rapid onset and offset of anesthetic action.

The minimum alveolar concentration (MAC) of sevoflurane (a drug still undergoing clinical trials) appears to change with age (3.1 percent in infants 1-6 months of age, 2.7 percent in infants 7-12 months of age and 2.55 percent in children older than one year). However, in children 1-3 years of age, the addition of 60 percent nitrous oxide appears to reduce the MAC by only 25 percent. The cardiovascular effects of sevoflurane appear similar to those of isoflurane.

The major concern (which Dr. Lerman feels is not really a problem) is that sevoflurane is metabolized in the liver, by the microsomal P450 isoenzymes, to organic and inorganic fluorides. Although inorganic fluorides have been associated with nephrotoxicity, the plasma fluoride profile following sevoflurane exposure is similar to that produced by enflurane. Dr. Lerman noted that peak plasma fluoride concentrations occur 60 minutes after the cessation of the anesthetic agent, and that by four hours, the plasma concentrations are less than 10 μM. Thus, the area under the plasma concentration-time curve is well below the nephrotoxic threshold.

Desflurane (Suprane®) is a Food and Drug Administration-approved agent and currently is ready for marketing in the United States. It has a blood gas solubility of 0.42 and, like other inhalant anesthetic agents, has age-related differences in MAC. The MAC is 9.16 percent in infants 1-6 months of age, and reaches its maximum (9.92 percent) at 7-12 months of age. As with sevoflurane, the addition of 60 percent nitrous oxide decreases the MAC of desflurane by only 25 percent. Hemodynamic changes during desflurane anesthesia appear similar to those with isoflurane.

As opposed to sevoflurane, desflurane does not undergo metabolism and, therefore, does not increase serum inorganic fluoride concentrations or pose a nephrotoxic risk to patients. Studies have indeed demonstrated that children have a faster recovery with desflurane than with halothane. However, the airway effects of desflurane cause a high incidence of breathholding, coughing and laryngospasm after inhalation inductions. Therefore, desflurane cannot be recommended as a suitable induction agent in children.

During the presentation, Dr. Lerman frequently noted that although both sevoflurane and desflurane possess new properties, as practitioners, we must consider fiscal prudence in deciding the role of these new agents in the practice of pediatric anesthesia.

Neuromuscular Blocking Agents

Dr. Meakin discussed age-dependent differences in the response of the neuromuscular junction. Noting that neonates

George Meakin, M.B.

require significantly less d-tubocurarine or atracurium than older children or adults do to achieve a given degree of neuromuscular blockade, some of his work has focused on delineating the cellular basis for such differences. Using a rat phrenic nerve-hemidiaphragm preparation, he described a biphasic response to curare.

Whereas fetal rats were resistant to curare and displayed no significant fade, infant rats developed increased sensitivity and fade, and adult rats demonstrated less sensitivity and no fade. Dr. Meakin explained his findings by suggesting that the amount of acetylcholine released may be lower in the fetal and newborn nerve terminus and that the fetus also possesses slow-gated acetylcholine receptors that produce a large endplate current for a given amount of acetylcholine. This large endplate current for a given amount of acetylcholine probably increases the margin of safety of neuromuscular transmission and reduces the effect of tubocurarine.

In contrast, infant rats displaying fade and sensitivity, comparable to the neuromuscular effects observed in human neonates, have smaller stores of acetylcholine and more adult-type, faster-gated receptors that produce lower endplate current when exposed to a given quanta of acetylcholine. These physiological findings of endplate currents and receptor pools may explain why infant rats appear to be more sensitive to competitive neuromuscular blocking agents.

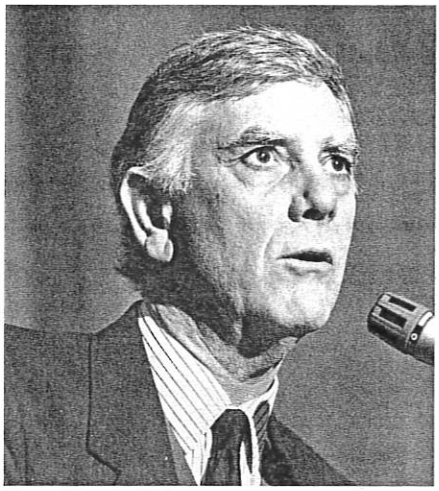
The afternoon session, moderated by **Frederic A. Berry, M.D.**, was directed toward practical issues and controversies in pediatric anesthesia, including parental presence in the operating room, the need for intravenous catheters, routes for premedication and induction techniques. The discussants in this session included **Peter Morris, M.B.**, President of APA and Senior Consultant Anaesthetist at the Royal Manchester Children's Hospital, Manchester, England; **Susan E. F. Jones, M.B.**, Consultant Anaesthetist from the Children's Hospital of Birmingham, England; **Peter J. Davis, M.D.**, Associate Professor of Anesthesiology/CCM and Pediatrics at Children's Hospital of Pittsburgh, Pennsylvania; and **Anneke E. Meursing, M.B.,** Senior Consultant at the

Frederic A. Berry, M.D.

Sophia Kinderziekehuis in Rotterdam, The Netherlands.

Parents in the Operating Room

Dr. Morris noted that even the rigidity of the British hospital system has relaxed with respect to its view on the presence of



Peter Morris, M.B.

parents in the operating room. Citing evidence both for and against the presence of parents in the operating room, Dr. Morris warned that this information must be critically evaluated and that the anaesthetist must act in the best interest of the patient's safety and must not bend to pressure from organized groups with good intentions. Although some studies suggest that children may be calmer and more cooperative at induction of anesthesia than when a parent is present, other studies suggest that parental presence has no effect or a disturbing effect.

Citing the work of Bevan and associates, Dr. Morris noted that it is important for the parents to be calm. Thus, education of the parents and patients with respect to hospital admission and surgical procedures, video demonstrations and proper anesthesia evaluation/preparation visits are important techniques for reducing the child's psychological trauma of surgery and hospitalization.

In addition to parental presence in the operating room, Dr. Morris also commented on the logical extension of allowing parents to be present in the recovery room. Although there is scant information concerning the value of this practice, Dr. Morris' view is that parental presence in the recovery room will be an accepted practice in the future.

Intravenous Inductions in Pediatrics

Dr. Jones succinctly reviewed the need for intravenous catheters. Citing the two

Susan E. F. Jones, M.B.

main uses of an intravenous infusion during anesthesia as 1) immediate and reliable access for drug administration and 2) intravenous fluid delivery. Dr. Jones pointed out that venous access can be achieved, but continued fluid administration is not necessary for children undergoing "minor surgery." The need to replace fluid deficits is called into question by the work of Aun and Panesar (*Br J Anaesth* 1990; 64:413-418), in which healthy children who *did not* receive IV fluids during minor surgery had glucose homeostasis for eight hours after surgery, plus recent recommendations suggesting that the NPO period for fluids can be two to three hours, coupled with the fact that minor surgery is generally not associated with significant third space fluid loss.

Issues of Premedication

The issue of which orifice is best for premedication was addressed by Dr. Davis. The large number of articles written on the subject and the numerous ways available to administer premedication suggest that there is no perfect preanesthetic medication. Dr. Davis was careful to point out that medication of the patient is only one of many components in preparing the child for surgery. Preparation and education of the parents and child, along with a hospital environment sympathetic to the child's needs, are important aspects of preparing the child; nonetheless, a certain percentage of children still require premedication.

Peter J. Davis, M.D.

Since most children fear needles and injections, Dr. Davis focused his discussion on alternative routes of delivery for preanesthetic medication. Dr. Davis noted that all routes (oral, oral transmucosal, nasal transmucosal and rectal transmucosal) have limitations and advantages of which the practitioner should be aware. The administration of preanesthetic medications should be individualized according to the timing and type of the procedure and the needs of the child.

Induction Techniques in Children

Dr. Meursing summarized her views about anesthetic techniques in infants and children. She emphasized that pediatric premedication is subject to great variability due to practitioner preference and skill, drug availability and social customs. Nonetheless, careful psychological preparation of both the parents and patient, guided by age, previous hospital experiences and anticipated procedures is essential. Preoperative teaching should be individualized based upon age, using play-therapy (2-4 years), video (4-6 years) and/or photographs/storytelling (6-10 years), or standard teaching methods (> 10 years).

(Continued on page 6)

SPA SIXTH ANNUAL MEETING

(Continued from page 5)

Anneke E. Meursing, M.B.

Charles H. Lockhart, M.D.

Noninvasive nasal or oral premedicants have become the preferred methods for pharmacologic preoperative preparation. Intravenous induction techniques have become the induction method of choice for European pediatric anaesthetists, in large part because of the availability of EMLA Cream. EMLA is best used by allowing sufficient time (approximately one hour), applying a sufficient amount (approximately 2 g) and diverting the child's attention when the needle is inserted. Recently, a 4-percent tetracaine patch has become available that will probably supplant EMLA since it is effective in approximately 30 minutes, lasts four to five hours (versus approximately 30 minutes for EMLA) and produces vasodilation.

Inhalational-Versus-Opioid Anesthesia for Neonates with Congenital Heart Disease

The final session of the meeting, moderated by **Charles H. Lockhart, M.D**. of Denver Children's Hospital, Denver, Colorado, featured a point-counterpoint presentation on inhalational-versus-opioid anesthesia for neonates with congenital heart disease. The discussants were **David J. Hatch, M.B.**, Hospital for Sick Children, London, England, and **Paul R. Hickey, M.D.**, Children's Hospital, Boston, Massachusetts. Both speakers agreed that it was a sign of advances made thus far that *choice* of technique was the topic being debated, as opposed to whether anesthesia of any form was possible and safe in these small, critically ill infants.

Dr. Hatch noted that the skill of the anesthesiologist and particular circumstances of the patient were the overriding issues in choice of anesthetic, and that inhalant agents allowed greater flexibility in terms of manipulating anesthetic depth, myocardial contractility and afterload. In combination with controlled alveolar ventilation, one can affect right-sided outflow tract obstruction, afterload and the ratio of systemic-to-pulmonary vascular resistance in lesions such as tetralogy of Fallot. The magnitude of left-to-right shunts may be similarly approached by maintaining normoxia and normocarbia in tandem with systemic vasodilation (e.g., isoflurane).

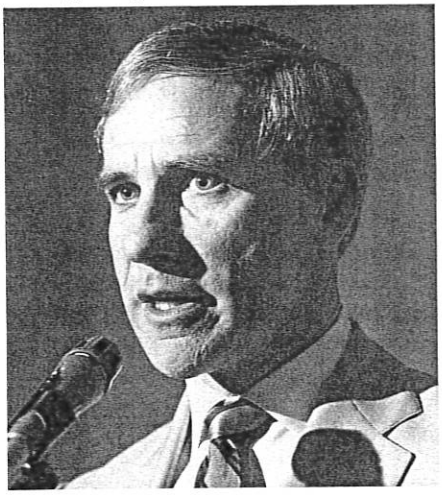
Dr. Hatch was particularly eloquent in

David J. Hatch, M.B.

stressing that it remains impossible to know if patients receiving high-dose opioids alone are completely anesthetized (i.e., without awareness) and that the stress response is not completely ablated by such techniques.

Dr. Hickey agreed that the stress response to surgery and cardiopulmonary bypass may not be completely prevented by opioid anesthesia. However, in his discussion, Dr. Hickey presented the results of his work in patients undergoing repair of congenital heart defects, suggesting that patients anesthetized with high-dose opioids had reduced stress hormone responses and improved outcomes compared with patients anesthetized with halothane.

In infants undergoing deep hypothermia-circulatory arrest, a technique consisting of high-dose fentanyl (100 mg/kg)



Paul R. Hickey, M.D.

plus thiopental (10 mg/kg) may be associated with decreased blood glucose and postoperative seizure activity. In the laboratory, experimental fetal animal surgery results in a significant stress response in the fetus with increased placental and fetal vascular resistance, diminished placental blood flow, fetal acidosis and fetal death.

Comparison of anesthetic techniques suggest that total spinal anesthesia, and not opioid or inhalational anesthesia, may be the optimal anesthetic for fetal surgery. Dr. Hickey concluded that the "best" technique remains to be defined. Both opioids and inhalant agents have beneficial and detrimental features. ❑

SOCIETIES FOR PEDIATRIC ANESTHESIOLOGISTS

By Steven C. Hall, M.D.
Associate Professor of
Clinical Anesthesia
Northwestern University Medical School
Anesthesiologist-in-Chief
Children's Memorial Hospital
Chicago, Illinois

Which Organization to Join?

Which organization should one join — the Society for Pediatric Anesthesia (SPA) or the American Academy of Pediatrics (AAP)? The leadership of both groups feel that they are complementary to each other. The AAP Section on Anesthesiology is the liaison between the anesthesia community and the pediatric community, while SPA is the liaison between the anesthesia community and those with a specific interest in pediatric anesthesia. SPA and the AAP Section on Anesthesiology also send liaison representatives to one another.

Both groups have a significant focus on the education of its members. Certainly, the atmosphere of the annual meetings of these two groups is different, with the AAP Section on Anesthesiology focusing on original scientific work and SPA focusing on lectures by experts in anesthesia and other areas. The AAP meeting is a more intimate gathering, while the SPA meeting benefits from being the day before the American Society of Anesthesiologists (ASA) Annual Meeting.

Until recently, it has been significantly easier to join SPA because full membership in the AAP Section on Anesthesiology is restricted to Board-certified anesthesiologists whose practices are at least 50 percent pediatric. However, associate membership in the AAP Section on Anesthesiology is now offered to all physicians at a lesser cost. Both organizations encourage their members to belong to both organizations.

Both groups offer the practicing anesthesiologist two extremely important advantages. First, the educational efforts of both are excellent, increasing scientific and clinical horizons of their members. Second, there is the opportunity to meet and get to know others interested in pediatric anesthesiology. Together, these two groups will continue to work to influence and improve the health care delivered to children.

Anesthesiologists with an interest in pediatric anesthesiology are fortunate to have two organizations available to them that are dedicated to advancing the practice and science of the field. However, there is some confusion about the two organizations and what they offer the practicing physician. The following is one person's view of the two organizations.

American Academy of Pediatrics Section on Anesthesiology

Founded more than 25 years ago, the American Academy of Pediatrics Section on Anesthesiology was started for two reasons. First, it was a forum for members of the new subspecialty of pediatric anesthesia to discuss common interests and problems. Second, it was a liaison between AAP and the anesthesia community.

To be a full member of the Section on Anesthesiology, one must fulfill criteria for membership in AAP. The candidate must be Board-certified in anesthesiology or pediatrics and be recommended by a current AAP fellow. Also, the candidate's practice must be at least 50 percent pediatrics. For those who do not meet this criteria but are interested in joining the Section, there is an associate membership at reduced cost.

The Section on Anesthesiology Annual Meeting, concurrent with the AAP Spring Meeting, is a weekend program that consists of scientific papers and panel discussions. Because the scientific papers are not currently published in a journal, they often are presented again at major anesthesia meetings. This allows "fine tuning" of the paper before a smaller, friendly audience. Panelists discuss controversial topics of interest to those with a predominantly pediatric practice. Other educational efforts include presentations at the plenary sessions of the AAP meetings that are geared to the pediatrician, a breakfast panel at the ASA Annual Meeting and a yearly pamphlet sent to the ASA membership. This pamphlet includes a reading list, new AAP policies of interest and articles written specifically on pediatric topics. Because full members of the Section are also AAP members, they receive the journal, *Pediatrics*, and the other publications AAP sends to its members.

The second important aspect of the Section on Anesthesiology is its interaction with AAP and pediatricians throughout the country. AAP uses the Section on Anesthesiology as its resource when dealing with areas of common concern and has included collaboration on AAP policy statements for newborn anesthesia and sedation protocols for children. This has been an area in which anesthesiologists have had significant influence with another specialty and their approach to areas of common interest.

Society for Pediatric Anesthesia

The Society for Pediatric Anesthesia had its first Annual Meeting in 1987 in Atlanta and is significantly larger than the AAP Section on Anesthesiology. SPA has two functions: providing education in pediatric anesthesiology and acting as liaison with ASA.

SPA is open to all physicians with an interest in pediatric anesthesiology. There is no restriction as to Board certification, training or type of practice of the members. The application process requires only submission of dues and the application form.

The SPA Annual Meeting is held the day before the ASA Annual Meeting and at the same site. The all-day meeting offers a wide variety of lectures and panels that are designed to inform about the current scientific and clinical bases of the practice of pediatric anesthesia. The talks are usually divided so that the morning sessions are devoted to new scientific initiatives and the afternoon is devoted to common clinical problems. There is an effort to include both anesthesiologist and nonanesthesiologist speakers of national stature. The Society also publishes a semiannual newsletter with articles and abstracts of interest.

SPA is officially recognized by ASA as the subspecialty organization it uses as a resource for questions about pediatric anesthesiology. Because it is an officially recognized liaison with ASA, it is granted a voting seat in the ASA House of Delegates. SPA has held a joint meeting with the American Pediatric Surgical Association in an effort to increase communication with its surgical colleagues. □

PRESENTATION OF ROBERT M. SMITH AWARD

Michael Broennle, M.D., Chairman of the American Academy of Pediatrics Section on Anesthesiology, presented the seventh Robert M. Smith Award to G. Jackson Rees, M.B., Ch.B., Liverpool, England.

This award honors Robert M. Smith, M.D., who for many years served as the Director of Anesthesia at the Children's Hospital in Boston, and is presented to an individual who has made outstanding contributions to children through achievements in pediatric anesthesia.

In his comments, Dr. Broennle expressed his appreciation to SPA President Aubrey Maze, M.B., and the Society for Pediatric Anesthesia leadership for the opportunity to present the Robert M. Smith Award at the SPA Annual Meeting. Participants included attendees from the Association of Paediatric Anaesthetists of Great Britain and Ireland, the Society for Pediatric Anesthesia and the American Academy of Pediatrics Section on Anesthesiology.

Dr. Rees earned his medical degree 50 years ago in Liverpool (and this year he also will celebrate 50 years of marriage to his wife, Betty, who is a physician with an international reputation).

Dr. Rees trained in anesthetics initially in the Royal Air Force and then in Liverpool where he served as a consultant anaesthetist at the Royal Liverpool Hospital, the Royal Liverpool Children's Hospital and the Alder Hade Children's Hospital for 34 years. He retired in 1983.

Dr. Rees' name lives on in pediatric anesthesia for his efforts beginning around 1950 to modify the Ayre's T piece by lengthening the reservoir tube and attaching a double-ended bag to its distal end. The Jackson Rees circuit enabled the anaesthetist to control respiration. This facilitated the use of muscle relaxants. Soon the Liverpool technique using nitrous oxide and curare was popularized by Dr. Rees and his colleagues as a safe, nonexplosive alternative to ether anesthesia.

The anesthetic management of infants and children undergoing all types of surgery, especially cardiovascular surgery, benefits from Dr. Rees' efforts. He published and traveled widely, talking about pediatric anesthesia. He was active in organized medicine, including a term as President of the Association of Paediatric Anaesthetists. He also was a founding member of that group.

Dr. Broennle also acknowledged the financial support of Burroughs Wellcome Company for helping to make the Smith Award possible.

In accepting the award, Dr. Rees stated that the presentation represented to him the combination of some 40 years of "help, friendships and encouragement" from the anesthesiologists of the United States. He said, "The first paper I wrote on a pediatric topic related to neonatal anesthesia and following the publication of that paper by this totally unknown young man, I have a letter from our old colleague, the late Dr. Digby Lee of Los Angeles, saying carry on with the good work.

G. Jackson Rees, M.B., Ch.B., Liverpool England, was the 1992 recipient of the Robert M. Smith Award.

"Now, since that time, which is now more than 40 years ago, I have visited this country and received most generous hospitality from you all so very, very many times, and I have an eternal debt of gratitude to the pediatric anaesthetists of North America, and I do thank them for having selected me," Dr. Rees said.

Dr. Rees thanked the American Academy of Pediatrics Section on Anesthesiology for electing him as the recipient of the seventh Robert M. Smith Award. □

SPA BUSINESS MEETING

At the conclusion of the 1992 program, it was announced during the Sixth Annual SPA Business Meeting that there are more than 1,300 members in the organization and that the Society is fiscally sound.

As his last act as SPA President, Aubrey Maze, M.B., Phoenix, Arizona, presided over the election of new SPA officers. Newly elected positions included President, Vice-President, Secretary and Treasurer as well as three Board of Director positions. These three new Board of Director positions replaced retiring Board members Myron Yaster, M.D., Baltimore, Maryland; and Barbara W. Brandom, M.D., Pittsburgh, Pennsylvania; and filled the vacancy created by the election of Steven C. Hall, M.D., Evanston, Illinois, to the position of Treasurer.

The new officers and directors of the Society for 1993 are:

Charles H. Lockhart, M.D. (President)
William J. Greeley, M.D. (Vice-President/President-Elect)
Mark A. Rockoff, M.D. (Secretary)
Steven C. Hall, M.D. (Treasurer)
Juan F. Gutierrez-Mazorra, M.D. (Director)
Susan C. Nicolson, M.D. (Director)
Leila G. Welborn, M.B. (Director) □

UPDATE ON PROPOFOL FOR USE IN PEDIATRIC ANESTHESIA

By Mehernoor F. Watcha, M.D.
Associate Professor of Anesthesiology
University of Texas
Southwestern Medical Center
Dallas, Texas

Propofol (2-6 disoprophylphenol), an intravenous anesthetic agent chemically unrelated to other anesthetic drugs, was introduced into clinical practice in the United States in 1989. Although it has not been "approved for use in children" by the Food and Drug Administration, there are extensive data on the experiences with propofol in this patient population. This review of the induction,[1-8] maintenance,[6-9] recovery characteristics[1-9] and pharmacokinetics[10-14] of propofol anesthesia in children is limited by the space available, but it does include descriptions of specific situations where the use of propofol may be advantageous.

Induction:

The intravenous route of administering drugs for induction of anesthesia in healthy children is not popular in the United States. However, it provides a smooth rapid induction of anesthesia, which may be preferable to airway-related problems and excitement noted during induction with inhalational agents. The fast onset and smooth transition from the awake to the anesthetized state in unpremedicated children, along with a short, predictable duration of action, has made propofol a satisfactory induction agent.[1-8]

The availability of EMLA® Cream in Canada and Europe has reduced pain (but not patient anxiety) associated with the insertion of a needle for vascular access. However, pain on injection of propofol is noted in 28-60 percent of cases and remains a significant drawback to its otherwise satisfactory use. This pain may be ameliorated by the use of large antecubital veins and by the administration of lidocaine or opioids prior to the injection of propofol.[1-5]

Although hiccups have not been reported as frequently with propofol as with thiopental, induction with propofol is associated with a higher incidence (21-28 percent) of spontaneous choreiform, dystonic flexion, twisting or extension movements of subcortical origin.[6] This incidence can be reduced by administering higher doses of propofol or by the concomitant use of opioids.[6]

Other side effects noted with induction of anesthesia with propofol include apnea (21 percent)[1-5] and a decrease in blood pressure and heart rate.[7] However, cardiovascular measurements usually remain in the clinically acceptable range.[7]

Maintenance and Recovery Characteristics:

Propofol has been used for both induction (single dose)[1-3,6-8] and for maintenance (continuous infusions) of anesthesia.[4,9] Total intravenous anesthesia has the advantage of not requiring special equipment to vaporize agents and avoids the problems of atmospheric pollution with inhaled agents.

Blood concentrations decrease rapidly following the termination of propofol infusions because of the large volume of distribution and fast metabolism of the drug.[10-14] In a number of studies, standard recovery end points (eye opening, response to commands, ambulation, oral intake and discharge readiness) occurred earlier in children receiving propofol (versus halothane).[4,9] This rapid recovery after discontinuation of propofol infusions is a major advantage compared to traditional inhalational agents, particularly in ambulatory surgery, which constitutes >70 percent of pediatric cases.

An additional major benefit in this population is the very low incidence of postoperative emesis with propofol.[4] For example, 60-80 percent of children undergoing strabismus surgery with halothane anesthesia will vomit in the postoperative period compared to 16-20 percent with propofol.[9] Propofol may even have an antiemetic effect in children undergoing chemotherapy[15] and in adults with nausea in the postanesthetic care unit.[16]

Pharmacokinetics:

The blood concentration curves of propofol are best fitted to a three-compartment model, with a first-stage short half-life (1.5-4.2 minutes) when redistribution occurs; followed by a second phase (9.3-56 minutes) associated with a high metabolic clearance in the liver and at other sites and a large volume of distribution; and a final third phase (209-475 minutes) which reflects the slow elimination from poorly perfused tissues.[10-14]

The volume of distribution of the central compartment is larger for propofol in children than adults (343 ml/kg versus 228 ml/kg). The clearance of propofol has been reported to be 32-57 ml/kg/min in children compared to 27 ml/kg/min for adults.[13] Therefore, higher doses are required to achieve and maintain the same blood levels in children compared to adults. In addition, the theoretical target concentration required to maintain an adequate depth of anesthesia may be higher in children than adults.[13]

Doses of 3 mg/kg have been recommended to obtain satisfactory induction of anesthesia in children.[5,14] A simple scheme based on pharmacokinetic data involves a loading dose of 3 mg/kg followed by an initial infusion of 15 mg/kg/hr for the first 10 minutes, then 12-14 mg/kg/hr for the next 10 minutes; and a final infusion rate of 8-10 mg/kg/hr with further adjustments based on signs of light anesthesia (tearing, hypertension, tachycardia) [Watcha MF: Unpublished observations].

The concomitant administration of opioids, nitrous oxide or other anesthetic agents will reduce the requirements of propofol. More complex computer-controlled infusion devices have been used to establish a desired blood level.[13] However, ethnic and interpatient variability in pharmacokinetics may reduce the clinical usefulness of such devices.[10-14]

Specific Situations Where Propofol May Be Preferred:

The rapid onset of action of propofol along with a low incidence of emesis has made it an attractive choice in ambulatory surgery, particularly in operations associated with a high incidence of emesis (stra-

(Continued on page 10)

UPDATE ON PROPOFOL FOR USE IN PEDIATRIC ANESTHESIA

(Continued from page 9)

bismus correction, middle ear surgery).[4,9] With the advent of small, portable microprocessor-controlled infusion devices, the advantages of total intravenous anesthesia with propofol have been appreciated in situations where space for anesthesia machines is limited (e.g., during radiological imaging) and during transport.[17]

Propofol also has been used to good effect when quick emergence is required following brief, but intensely stimulating procedures (e.g., following microlaryngeal surgery where the patient needs to be wide awake to protect the airway).[18] Although tracheal intubation without neuromuscular blockade is possible if large doses of propofol are used, the drug does not have an effect at the neuromuscular junction. In fact, severe muscle spasms during electrical stimulation of nerve rootlets has made propofol unacceptable as the primary anesthetic during selective dorsal rhizotomy procedures.[19]

Subanesthetic doses of propofol have been used for sedation for radiological or diagnostic procedures such as cardiac catheterization.[17,18] Although propofol has been used for long-term sedation in patients undergoing ventilation in the intensive care unit (ICU),[20] recent reports of neurological dysfunction following the termination of the infusion have raised some questions about its use in this patient population.[21] In addition, five cases of metabolic acidosis and fatal myocardial failure have been reported in children with respiratory infections who received prolonged, high dose infusions of propofol for sedation during mechanical ventilation.[22] However, there are no data to suggest that adding propofol to the therapeutic regimens of pediatric ICU patients is associated with increased morbidity.

In summary, propofol is characterized by a rapid onset and offset of action, pain on injection and a low incidence of emesis. It has rekindled interest in total intravenous anesthesia and may have a role to play in pediatric anesthesia. However, propofol should not be used for sedation of children in the ICU until more data on its safety in this population are available.

References available on request. ☐

IN THE NEWS

- **Paul R. Hickey, M.D.** has assumed the Chairman's position at Children's Hospital of Boston, Massachusetts, succeeding the late **Milton H. Alper, M.D.**, a founder of the Society for Pediatric Anesthesia.
- **Gary E. Hirshberg, M.D.** has become the new Chief of Pediatric Anesthesia at Children's Hospital of St. Louis, Missouri. The department had been without a Chief of Service for almost six years.
- **Steven R. Tosone, M.D.** has become the Chief of Pediatric Anesthesia at Egleston Children's Hospital in Atlanta, Georgia. He succeeded **James W. Bland, Jr., M.D.** who had been there for many years. There are 13 attending anesthesiologists in the group, most of whom are double Board-certified in either pediatrics or critical care medicine.
- **David A. Rosen, M.D.** and **Kathleen R. Rosen, M.D.** have joined the anesthesia faculty at West Virginia University (WVU), Morgantown, West Virginia, joining **Lynn M. Broadman, M.D.** Dr. Broadman is the Vice-Chairman of the Department of Anesthesia at WVU.
- **Richard A. Helffrich, M.D.** has become the Chief of Pediatric Anesthesia at Nemour's-Wolfson Children's Hospital in Jacksonville, Florida. Nemour's is a private foundation dedicated to improving the health of children in the states of Delaware and Florida. Its sister institution in Delaware is rapidly expanding as well. The Department of Anesthesia there is run by **Robert G. Kettrick, M.D.**
- **Jayant K. Deshpande, M.D.** has become the Chief of Pediatric Anesthesia at Vanderbilt University Hospital in Nashville, Tennessee. He is presently looking for attending level people interested in pediatric anesthesia.
- **Robert K. Crone, M.D.,** former President of the Society for Pediatric Anesthesia, has resigned his position as the Chief of Anesthesia and Intensive Care Medicine at Children's Hospital of Seattle, Washington to become Senior Vice-President of Medical Operations of Project HOPE. The Acting Chief is **Donald C. Tyler, M.D.**
- **Mark C. Rogers, M.D.,** Professor and Chairman of the Department of Anesthesiology and Critical Care Medicine at Johns Hopkins Hospital, Baltimore, Maryland, has resigned his position to become the Vice Chancellor of Duke University and Chief Executive Officer of the Duke University Hospital and Health Systems, Durham, North Carolina. Dr. Rogers was instrumental in the formation of the Society for Pediatric Anesthesia. He provided the encouragement, vision and financial backing that were so vital in the early formation of the Society.
- **J. Michael Badgwell, M.D.,** Associate Professor of Anesthesiology and Pediatrics at Texas Tech University Health Sciences Center, Lubbock, Texas, was chosen Executive Committee Chairperson-Elect of the American Academy of Pediatrics Section on Anesthesiology.

Submissions to "In The News" should be directed to:

Myron Yaster, M.D.
Department of Anesthesiology
The Johns Hopkins Hospital
600 North Wolfe Street
Baltimore, Maryland 21205 ☐

REMOTE SITE SURVEY — INITIAL FINDINGS

By Burdett S. Dunbar, M.D.
Director of Pediatric Anesthesiology
Texas Children's Hospital
Houston, Texas

We undertook this survey to establist the frequency with which complex procedures such as repair of congenital diaphragmatic hernia were accomplished outside the operating room, e.g., in the neonatal intensive care unit (NICU) or more emergently in the delivery room. In addition, our own experience reflects a rapid growth in requests for nonoperating room anesthetic care.

Anesthesiology services away from the operating room have been a topic of some discussion lately, but there has not been much documentation of sites and procedures actually used. In 1991, we sent surveys to 28 children's hospitals or large pediatric anesthesiology services in the United States and Canada. We believed that a significant effort — 10 percent of total anesthesia cases — was required for providing remote site anesthesia care. Further, we believed that repair of congenital diaphragmatic hernia (CDH) outside the O.R. occurred infrequently.

We received responses from 26 hospitals representing more than 6,000 pediatric beds and more than 210,000 O.R. cases per year. Most of the respondents were teaching hospitals with supervised residents doing a large share of the care. The 1990 directory of the National Association of Children's Hospitals and Related Institutions (NACHRI) lists 72 hospitals with more than 100 pediatric beds. We estimate that at least 30 percent of pediatric anesthesia care in North America, as reported by NACHRI, was provided by the respondents to this survey. All data reported as number of cases done are estimates provided by respondents.

All hospitals gave anesthesia care outside of the O.R. The most frequent requests for anesthesia care came from radiology. MRIs (1,290), CT scans (1,060) and angiograms (845) were the procedures usually attended. Radiation therapy (760) and myelograms (35) were attended less often.

Cardiology also requested frequent anesthesia care outside the O.R. Cardiac catheterizations (2,275) presumably included electrophysical studies, radiofrequency ablations and pacemaker insertions and revisions. Anesthesia attendance was also requested for cardioversions (125). In those hospitals where the laser suite is not located in the O.R. area, attendance was requested for laser procedures.

Procedures done in the NICU included placement of central lines. Six hospitals performed congenital diaphragmatic herniorrhaphy in the ICU using extracorporeal membrane oxygenation (ECMO). Two hospitals reported doing CDH repair without ECMO. Altogether, CDH made up less than 1 percent of the procedures done outside the operating room. Of 55 herniorrhaphies done outside the O.R., 38 were done with ECMO. One hospital reported that infants were placed immediately on ECMO in the ICU without participation of the anesthesiologists. A few days later, they are brought to the O.R. (with the ECMO equipment) for CDH closure.

It is unclear if anesthesiologists who function as intensivists significantly alter the impact of remote site anesthesia care on O.R. function.

Our hypotheses before the survey were that a significant amount of remote site anesthesia care is provided, but that few tertiary pediatric hospitals performed CDH repair outside the O.R. The conclusions drawn from the responses to the survey were that few CDH repairs are done outside the O.R. as emergencies. Very few CDH repairs are done in remote sites unless ECMO is ongoing. Approximately 6 percent of the surveyed institutions' surgical cases are conducted in remote sites, which is less than expected.

A follow-up survey is planned based on a further hypothesis that requests for remote site anesthesia care are increasing. ❑

PRESIDENT'S ADDRESS

(Continued from page 1)

future Newsletters, I will keep you informed of further developments.

Other upcoming benefits of SPA membership:

1) The meeting Syllabus will be mailed to those unable to attend the SPA Annual Meeting.
2) A new Membership Directory with telephone and fax numbers will be distributed in 1993.
3) Negotiations are under way for discounted subscription prices for a popular professional journal.

Personally, and on behalf of the Society, I must acknowledge the special efforts of several people. The Annual Meeting featured an outstanding professional and social program. Dr. Aubrey Maze contributed countless hours in his role as meeting leader coordinator. A. Michael Broennle, M.D., representing the American Academy of Pediatrics Section on Anesthesiology, was responsible for communications with our international colleagues primarily from the Association of Paediatric Anaesthetists (APA) of Great Britain and Ireland. Douglas Arthur, M.D. of the APA served as a primary communications liaison. Feedback indicates that the content and presentation styles of the speakers were diverse and universally appreciated. The meeting's success was assured by the more than 400 attendees. I hope that you will be able to attend the 1993 SPA Annual Meeting to be held October 8 in Washington, D.C.

Finally, a welcome to new Board members Susan C. Nicolson, M.D., Philadelphia, Pennsylvania; Leila G. Welborn, M.B., Washington, D.C.; and Juan F. Gutierrez-Mazorra, M.D., Birmingham, Alabama, as we gratefully bid adieu to those retiring: Myron Yaster, M.D., Baltimore, Maryland; and Barbara W. Brandom, M.D., Pittsburgh, Pennsylvania. ❑

Society for Pediatric Anesthesia

520 N. Northwest Highway
Park Ridge, IL 60068-2573

Non-Profit Org.
U.S. POSTAGE
PAID
Permit No. 62
Palatine, IL

SPA/FAER Starter Grant Funded

The Society for Pediatric Anesthesia (SPA) and the Foundation for Anesthesia Education and Research (FAER) look forward to jointly funding a Research Starter Grant in the general areas of pediatric anesthesiology, developmental pharmacology or developmental physiology. The $15,000 award will be administered by FAER.

In 1991, FAER awarded 16 starter grants for a total of $230,971. These funds were contributed by the American Society of Anesthesiologists, its Component Societies, individual anesthesiologists and corporate sponsors. The SPA/FAER award thus joins many other efforts on the part of our profession to foster research.

Through its contribution, SPA hopes to encourage those applications addressing areas of relevance to the practice of pediatric anesthesiology. The next application deadline is **July 31, 1993**.

For information and application guidelines, contact Martin D. Helrich, M.D., FAER Executive Director, University of Maryland Medical Center, Box 273, 22 South Green Street, Baltimore, Maryland 21201-1595; (410) 328-8222. ❑