

What's Inside

President's Message	Inside Front Cover
DSA Recipient: José Carlos Almeida Carvalho, MD, PhD, FANZCA	page 1
PRO/CON:	page 3
Research Article	page 8
Pain Directors Meeting Minutes	page 11

News on the Web

- Calendar of Meetings
- Resident Section
- CME Needs Assessment
- 2002 Annual Spring Meeting, Chicago, IL
- Carl Koller Memorial Research Grant



www.asra.com

Email: asra@societyhq.com

Website: www.asra.com



FEBRUARY 2002

ASRA News

A PUBLICATION OF THE AMERICAN SOCIETY OF REGIONAL ANESTHESIA AND PAIN MEDICINE

ASRA NEWS

A PUBLICATION OF THE AMERICAN SOCIETY OF REGIONAL ANESTHESIA & PAIN MEDICINE



*Lynn M. Broadman, MD
President, ASRA*

President's Message

2002 DSA Recipient

José Carlos Almeida Carvalho, MD, PhD, FANZCA

José Carlos Almeida Carvalho (José CA Carvalho) was born on May 14, 1953, in São João da Boa Vista, State of São Paulo, Brazil. Married to Marilourdes, they have three children, Carolina (22), Gabriela (21) and Guilherme (19), currently living in São Paulo, Brazil.

Dr. Carvalho graduated from the University of São Paulo School of Medicine in 1977 and completed his Residency in Anesthesiology at the University of São Paulo in 1980. He obtained his Masters' degree in Pharmacology in 1984 and his Ph.D. in Pharmacology in 1988, both at the University of São Paulo. Dr. Carvalho developed his academic career as a Professor at the University of São Paulo holding different positions. From 1988 thru 1996 he served as Director of Obstetric Anesthesia, where he was involved with clinical practice, research and teaching. From 1997 thru 2000 he served as Director of Education at the Department of Anesthesia. He is currently a Professor at the PhD Program.

He has held Visiting Professorships at the Department of Anesthesia of the Brigham and Women's Hospital, Boston, in 1987; at the Department of Obstetric Anesthesia of the University of California, San Francisco, in 1988; at the State University of New York at Buffalo in 1993; to the Australian and New Zealand College of Anaesthetists in 1994; to the Malaysian Society of Anesthesiology in 1997, as a WFSA invited professor. In 1994 he was elected to Fellowship of the Australian and New Zealand College of Anaesthetists. He has delivered over 70 lectures in international meetings in 17 different countries in North and Latin America, Europe, Asia and Oceania.

Dr. Carvalho dedicated his entire career to the practice and teaching of and research in Obstetric Anesthesia. His dissertation for Master's Degree was on the pharmacokinetics of bupivacaine in term pregnant women and his PhD thesis addressed the gastric accumulation of bupivacaine in the neonate after epidurals for Cesarean section and vaginal delivery. Dr. Carvalho was a member of the WFSA Committee on Obstetric Anesthesia and Analgesia from 1988 thru 1992 and re-elected for the 1992-1996 term. Dr. Carvalho has authored and co-authored 50 full papers, 16 book chapters, 33 abstracts presented in international meetings and 100 abstracts presented in national meetings. He has also delivered over 240 lectures in national meetings. The vast majority of his publications and lectures were related to Obstetric Anesthesia

Dr. Carvalho has served as Consulting Editor (1986-88), Associate Editor (1989-1991) and Co-Editor (1992-97) for the Brazilian Journal of Anesthesiology and continues in its Editorial

Board. He has served as Consulting Editor (1990-1994) and subsequently as Associate Editor (1995-1997) for the journal Regional Anesthesia and Pain Medicine. He has served on the Editorial Board of the International Journal of Obstetric Anesthesia in 1998 and is currently on the Editorial Board of Obstetric Anesthesia Digest.

Dr. Carvalho was the Founding President of the Latin American Society of Regional Anesthesia (LASRA) in 1993 and finished his term as President in 1995. He served as Secretary-General and Treasurer of LASRA from 1997 thru 2000. He also served as the President of the Brazilian Chapter of LASRA from 1996 thru 2000. He has chaired 6 Brazilian LASRA meetings and 2 Latin American Symposium on Regional Anesthesia since the establishment of LASRA in 1993. He still serves as a member of the Board of Directors of the Brazilian Chapter of LASRA

In the Brazilian Society of Anesthesiology, besides his involvement with the Brazilian Journal of Anesthesiology since 1986, Dr. Carvalho served the Committee on Obstetric Anesthesia and the Board of Examiners, which he chaired in his 4th year.

Dr. Carvalho is currently working for one private institution with 2 different Maternity Hospitals. Hospital e Maternidade Santa Joana is a busy setting with 1,200 deliveries per month and Pro Matre Paulista is a smaller institution with 270 deliveries per month. He serves as the Scientific Director for the Department of Anesthesia and Secretary-General for the Continuing Medical Education Program at both Hospitals and as Technical Director at Pro Matre Paulista. Dr Carvalho has just completed his third year at Universidade Paulista Law School in São Paulo and shall receive his Bachelor Degree in law in 2003.



ASRA News

is a publication of the American Society of Regional Anesthesia & Pain Medicine.

Co-Editors

F. Kayser Enneking, MD
Julia E. Pollock, MD

© Copyright 2001 American Society of Regional Anesthesia & Pain Medicine

Officers

Lynn Broadman, MD
President
James C. Eisenach, MD
President-Elect
Terese T. Horlocker, MD
VP Scientific Affairs
Michael F. Mulroy, MD
Past President
F. Michael Ferrante, MD
Secretary-Treasurer

Board of Directors

F. Kayser Enneking, MD
Vincent W.S. Chan, MD
Jordan Katz, MD
Mark J. Lema, MD, PhD
P. Prithvi Raj, MD
Richard W. Rosenquist, MD
John Rowlingson, MD
Denise J. Wedel, MD
Alon P. Winnie, MD
L. Donald Bridenbaugh, MD *Emeritus*

Newsletter Committee

David J. Birnbach, MD
F. Kayser Enneking, MD
Marc B. Hahn, DO
James E. Heavner, DVM, PhD
Robert Kettler, MD
Sunil J. Panchal, MD
Julia E. Pollock, MD
John A. Hinckley, *Adjunct Foreign Corresponding*
José C.A. Carvalho, MD
André Van Zundert, MD, PhD
Resident Section
Allan R. Escher, DO

PRO

Multiple Injection Technique For Peripheral Nerve Blocks

Andrea Casati, MD
Vita – Salute University of Milano
Dept. of Anesthesiology
IRCCS H San Raffaele (Milano)

The use of a nerve stimulator provides the anesthesiologist with the huge advantage of a clear and objective endpoint to look for when placing peripheral nerve blocks: the contraction of the muscle innervated by the stimulated nerve. This represents a crucial feedback about the appropriateness of needle position (1), minimising the discomfort for the patient and improving the reliability and ease of peripheral nerve blocks (2,3).

When using a single injection technique several studies failed to demonstrate clinically relevant differences between the use of nerve stimulation or paresthesia techniques (4,5). However, we must remember that, contrary to the illustrations made by medical artists, peripheral nerves and plexuses are included in compartments containing connective tissue and fat; while terminal branches of plexuses and nerves divide and separate very frequently, and the different branches may run at some distance one from each other. Also big terminal nerves are often constituted by different branches: the sciatic nerve, in example, is constituted by the tibial and common peroneal branches, which are often separated at the level of the pelvis (each of them with its own perineural fascia) (Figure 1). Similar consideration can be made also for the femoral nerve, which divides in 6 – 7 terminal branches just below the inguinal ligament (and the needle is usually inserted at the level of the inguinal crease, below the inguinal ligament) (Figure 2). Accordingly, once injected at one single site the local anesthetic molecules have to diffuse through several barriers before reaching the nerves, the first barrier being represented by the distance between the injection site and each branch.

Using a nerve stimulator easily allows to identify different muscular twitches during block placement by simply redirecting the stimulating needle using the “so called” multiple injection technique (6). The rationale of the multiple injection technique is to block each branch involved in surgery with a small volume of local anesthetic solution. The nerve stimulator is set at 1 – 1.5 mA intensity to get the first twitch. Afterwards, the intensity of stimulating current is progressively reduced to less than 0.5 mA maintaining the proper twitch; then 5 – 7 ml of local anesthetic solution is injected. When the first branch is blocked, the nerve stimulator is set again at 1 – 1.5 mA and the needle redirected to elicit the second twitch and the manoeuvre repeated for all the main branches (Table 1).

Searching for multiple muscular responses and injecting a small volume of local anesthetic solution at each twitch provides effective peripheral nerve blocks for both upper and lower extremity, with volumes of local anesthetic solution markedly lower than those usually reported (6). When injecting the same amount of local anesthetic solution at single branch, at two branches or at all four branches innervating the upper arm, Lavoie et al (7) demonstrated

that blocking selectively all the four branches of the upper limb, or at least two of them, gives a higher success rate of axillary block than the stimulation of only one nerve. Koscielniak-Nielsen and co-workers (8,9) reported similar results when comparing a transarterial or a multiple injection technique with nerve stimulator for the same nerve block, while other authors demonstrated similar results with other different nerve blocks, including the interscalene (10) or midhumeral (11) approach to brachial plexus anesthesia, the sciatic block (12,13) or the femoral nerve block (14). The use of this new philosophy for peripheral nerve block placement can also be used to produce a “super-selective” analgesia according to surgery (15,16).

Most anesthesiologists claim that looking for multiple muscular twitches requires too much time for block placement. However, different studies in different clinical setting, including axillary, interscalene or femoral nerve blocks, demonstrated that, although the time required to place the block is slightly longer with the multiple injection technique, the latency of the surgical block is so much shorter with the multiple injection that total preoperative time (from skin disinfection to readiness to surgery) is significantly shorter with the multiple than single injection technique (8-10,13,14).

Looking for multiple twitches also minimises the dose of local anesthetic required to produce a successful nerve block. Using an up-and-down method, we recently demonstrated that the volume of local anesthetic solution required to produce complete sensory and motor block of the femoral nerve in 95% of patients within 20 min after the injection is reduced by nearly 30% when the three main branches of the femoral nerve are blocked separately (Figure 2) as compared with injecting all anesthetic volume at the contraction of the vastus intermedius muscle (17). Reducing the volume of local anesthetic become especially important for lower limb surgery, which requires a combination of different nerve blocks with increased risk for local anesthetic overdosing.

Another important advantage of the multiple injection technique concerns the occurrence of accidental intravascular injection. In fact, it is well known that a negative blood aspiration before the injection does not prevent the risk for unwanted intravascular injection (18,19). If a single injection technique is used we can theoretically inject up to 30 – 40 ml of local anesthetic solution according to the block we are placing (if seizures do not occur before we finish the injection). On the contrary, with the multiple injection technique we can not inject intravascularly more than 5 – 7 ml of local anesthetic solution.

Thus, the multiple injection technique provides shorter onset time, better success rate and potentially less risk for toxic reactions during peripheral nerve block than the single injection technique. Nonetheless, most anesthesiologists are concerned with using the multiple injection technique, because of the theoretically increased risk for direct nerve injury by moving the stimulating needle toward

Continued on page 6

CON

Multiple Injection Technique For Peripheral Nerve Blocks



Ralf E. Gebhard, MD

Ralf E. Gebhard, MD
 Assistant Professor of Anesthesiology
 Department of Anesthesiology
 The University of Texas – Houston Medical School

The multiple stimulation and injection technique for the performance of peripheral nerve blocks has been advocated in recent years, mainly by European investigations. Suggested indications include interscalene, axillary, humeral, femoral and lateral sciatic nerve blocks. When compared with single injection techniques, investigators have claimed a higher success rate (axillary, lateral sciatic), shorter onset time and quicker readiness for surgery (interscalene, axillary, femoral), and a reduction of the minimal local anesthetic dose needed to achieve satisfactory results (femoral), as main advantages of the multiple stimulation and injection approach. On first sight, these arguments appear to be convincing. However, a closer examination of benefits, possible risks and disadvantages associated with the multiple stimulation technique may lead to a different conclusion.

The multiple stimulation and injection technique was first described for the axillary block. Based on the concept of septa dividing the brachial plexus sheath into several compartments (1) and preventing local anesthetic spread, the authors thought it necessary to perform several injections in order to block all four brachial plexus nerves. Although, anatomic studies have shown that these septa are incomplete (2) and do not prevent local anesthetic spread in between compartments, investigations have recommended different numbers and combinations of necessary brachial nerve stimulations. Koscielniak Nielsen et al. (3) and Inberg et al. (4) have reported significantly higher success rates of axillary plexus blocks with a multiple injection technique (three and two nerves, respectively) compared with a single injection technique. However, the percentage of complete blocks in the single injection groups was only 43% and 52%, respectively, surprisingly low and in contrast to previous investigations (5) and our own data (6). Accordingly, the difference in success rates between a single and

double injection technique for the lateral approach to the sciatic nerve described by Paqueron et al. (7) are in contrast to the success rate observed by a single injection technique published by Hadzic and Vloka (8). Since the data are not conclusive, it remains uncertain how much stimulation is really needed to produce satisfactory axillary and lateral sciatic nerve blocks. It appears, that location and proper technique may be of more importance for successfully performed blocks than the number of injections.

Fanelli and Casati et al. reported an 8 min reduction for the interscalene block (9) and a 20 min reduction of onset time for the femoral nerve block (10), when three different injections were used for each approach. Koscielniak-Nielsen (3) demonstrated a 13 min reduction in time until readiness for surgery with the stimulation of three different brachial plexus nerves compared with single nerve stimulation. However, since a local anesthetic with a rather long onset time (ropivacaine) was solely used in two of these three studies, it is questionable if the rather small differences would have also been observed when using a local anesthetic with a short onset time (e.g., mepivacaine). In addition, onset time might be of importance when a nerve block is performed in the OR, with the surgeon waiting. In our institution, peripheral nerve blocks are performed prior to surgery in a designated block room. This not only allows performance of the nerve block without being rushed, but also verification of good block quality and completion of incomplete blocks if necessary, before the patient is brought to the OR and exposed to the surgeon.

Casati et al. (11) reported a reduction in the local anesthetic volume needed to produce the same degree of sensory and motor blockade from 29 mL to 21 mL for the femoral nerve block, using 0.5% ropivacaine and a multiple (three) stimulation technique. It is questionable whether this reduction represents a clinically significant achievement. Local anesthetic toxicity is estimated to have an incidence of 4:10,000 to 11:10,000 (12). Newer local anesthetic agents such as ropivacaine and levobupivacaine have been demonstrated to be associated with an extremely low level of toxicity (13), especially when maximum recommended dosages are not exceeded and are therefore most likely associated with an even lower incidence of adverse events.

The underlying mechanism of peripheral nerve injury caused by regional anesthesia techniques remains controversial (14). Multiple factors are thought to be responsible for this complication. However, direct contact between the needle used for the peripheral nerve block and the nerve itself may contribute to the development of peripheral nerve injury. In this setting, the risk of inflicting a nerve injury would be directly proportional to the number of stimulation attempts, making it advantageous to use as few stimulation attempts as possible. In addition, some multiple stimulation techniques may require the induction of the needle through an area in which local anesthetic was injected previously.

Continued from page 4

a partially anesthetized nerve. However, this concern is only theoretical, and no clinical evidence supports it. First of all, our problem is usually represented by the long latency of peripheral nerve blocks: placing a block with the multiple injection takes never longer than 5 min, while the block onset time (especially if we use reduced volumes of local anesthetic solution) requires 15 – 20 minutes. Second, we always use a “radar” to place the block, that is represented by the nerve stimulator: if we go again toward a nerve we already injected we will elicit again the twitch if this occurs within 5 min after the first injection. Furthermore, a prospective observational study on nearly 4,000 nerve blocks performed with the multiple injection technique (6) clearly demonstrated that the risk for permanent nerve injury with the multiple injection technique is similar to that reported in a prospective evaluation of severe complication on nearly 100,000 regional anesthetics (20), and lower than that recently reported in a study evaluating acute and nonacute complications associated with interscalene block performed with a single injection technique (21). There is no doubt that minor neurological complications most likely remain undiagnosed if a proper follow-up is not planned and performed, and properly designed, randomized studies should be advocated to clarify this crucial and controversial question. Nonetheless, no clinical evidence supports the hypothesized risk for increased nerve injury during block placement when a multiple injection rather than a single injection technique is used.

Withdrawing and redirecting the stimulating needle to elicit multiple muscular twitches during the same nerve block might cause more discomfort to the patient (6); however, a slight sedation-analgesia before block placement with very small doses of benzodiazepine and opioid drugs minimises the discomfort experienced by patients undergoing multiple injection for nerve block placement, whilst producing minimal sedation and optimising acceptance of the anesthetic procedure (22).

In conclusion, simply looking for multiple nerve branches when placing a peripheral nerve block with a nerve stimulator provides successful nerve block in less time and with less volume of local anesthetic solution than that required with the single injection technique, without increasing the risk for nerve injury.

References:

- Riegler FX. Brachial plexus block with the nerve stimulator: motor response characteristics at three sites. *Reg Anesth* 1992;17:295-9.
- Fanelli G. Peripheral nerve block by electric neurostimulation. *Minerva Anesthesiol* 1992;58:1025-6.
- Davies MJ, McGlade DP. One hundred sciatic nerve blocks: a comparison of localization techniques. *Anaesth Intensive Care* 1993;21:76-8.
- Jones TS. Comparison of axillary block techniques: is there a difference in success rate? *ANAA Journal* 1997;65:257-9.
- Baranowski AP, Pither CE. A comparison of three methods of axillary brachial plexus anaesthesia. *Anaesthesia* 1990;45:362-5.
- Fanelli G, Casati A, Garancini P, Torri G. Nerve stimulator and multiple injection technique for upper and lower limb blockade: failure rate, patient acceptance and neurologic complications. *Anesth Analg* 1999; 88:847-52.
- Lavoie J, Martin R, Tetrault JP, Cote DJ. Axillary plexus block using a peripheral nerve stimulator: single or multiple injections. *Can J Anaesth* 1992;39:583-6.
- Koscielniak-Nielsen ZJ, Hesselbjerg L, Fejberg V. Comparison of transarterial and multiple nerve stimulation techniques for an initial axillary block by 45 ml of mepivacaine 1% with adrenaline. *Acta Anaesthesiol Scand* 1998;42:570-5.
- Koscielniak-Nielsen ZJ, Rotboll Nielsen P, Sorensen T, Stenor M. Low dose axillary block by targeted injections of the terminal nerves. *Can J Anaesth* 1999;46:658-64..
- Fanelli G, Casati A, Beccaria P, et al. Interscalene brachial plexus anaesthesia with small volumes of ropivacaine 0.75%: effects of injection technique on the onset time of nerve blockade. *Eur J Anaesthesiol* 2001;18:54-8.
- Gaerter E, Kern O, Mahoudeau G, Freys G, Golfetto T, Calon B. Block of the brachial plexus branches by the humeral route. A prospective study in 503 ambulatory patients. Proposal of a nerve-blocking sequence. *Acta Anaesthesiol Scand* 1999;43:609-13.
- Bailey SL, Parkinson SK, Little WL, et al. Sciatic nerve block: a comparison of single versus double injection technique. *Reg Anesth* 1994;19:9-13.
- Paqueron X, Bouaziz H, Macalou D, Labaille T, Merle M, Laxenaire MC, Benhamou D. The lateral approach to the sciatic nerve at the popliteal fossa: one or two injections? *Anesth Analg* 1999;89:1221-5.
- Casati A, Fanelli G, Beccaria P, Cappelleri G, Berti M, Aldegheri G, Torri G. Effects of the single or multiple injection technique on the onset time of peripheral nerve blocks with 0.75% ropivacaine. *Anesth Analg* 2000;91:181-4.
- Sparks CJ, Quinn M. Selective block of nerves in the axillary approach to the brachial plexus. *Reg Anesth* 1992;17:300-2.
- Bouaziz H, Narchi P, Mercier FJ, Khoury A, Poirer T, Benhamou D. The use of a selective axillary nerve block for outpatient hand surgery. *Anesth Analg* 1998;86:746-8.
- Casati A, Fanelli G, Beccaria P, Magistris L, Albertin A, Torri G. Effects of single or multiple injections on the volume of 0.5% ropivacaine required for femoral nerve blockade. *Anesth Analg* 2001;93:183-6.
- Ellis JS Jr, Ramamurthy S. Seizure following stellate ganglion block after negative aspiration and test dose [letter]. *Anesthesiology*. 1986;64:533-4.
- Klein SM, Benveniste H. Anxiety, vocalization, and agitation following peripheral nerve block with ropivacaine. *Reg Anesth Pain Med* 1999;24:175-8.
- Auoy Y, Narchi P, Messiah A, et al. Serious complications related to regional anesthesia. *Anesthesiology* 1997;87:479-86.
- Borgeat A, Ekatothramis G, Kalberer F, Benz C. Acute and nonacute complications associated with interscalene block and shoulder surgery. *Anesthesiology* 2001;95:875-80.
- Kinirons BP, Bouaziz H, Paqueron X, et al. Sedation with sufentanil and midazolam decreases pain in patients undergoing upper limb surgery under multiple nerve block. *Anesth Analg* 2000;90:1118-21.

Figure 1: Anatomy of the sciatic nerve. Very often the sciatic nerve is constituted by its two terminal branches (the common peroneal and tibial nerves), which are already divided when getting out from the foramen ischiaticus often running close one to each other but each with its separate perineural fascia until they definitely divide at the level of the popliteal fossa.



Figure 2: Anatomy of the femoral nerve. Just below the inguinal ligament the femoral nerve divides into 6 – 7 branches which run at an increasing distance one from each other.



Table 1: Specific muscular twitches which we can look for when using a multiple injection technique.

Approach	Twitches
• Axillary	<ul style="list-style-type: none"> • Flexion of the elbow • Extension of the elbow, wrist, fingers • Flexion of fingers, wrist • Flexion V finger, thumb adduction
• Interscalene	<ul style="list-style-type: none"> • Shoulder abduction • Flexion of the elbow • Extension of the elbow
• Femoral	<ul style="list-style-type: none"> • Vastus medialis • Vastus intermedius • Vastus lateralis
• Sciatic	<ul style="list-style-type: none"> • Dorsiflexion/eversion of the foot • flexion plantaris/inversion of the foot

Continued from page 5

The patient may be unable to report discomfort, pain or paresthesia as a result of needle to nerve contact because the nerve may already have been partially or completely blocked. Although this has not been investigated in a controlled randomized fashion, this particular aspect of the multiple stimulation technique could present an increased risk for peripheral nerve injury, especially if sedation is provided during nerve block performance. On the other hand, if no sedation is provided, patients would experience discomfort during multiple injection techniques, resulting in a low desire to choose the same anesthetic technique for future surgery (15).

During their regional anesthesia rotation, our residents get exposed to both, single and multiple stimulation techniques. Multiple stimulation approaches are considered to have a steeper learning curve (16) and therefore require a higher level of training and experience. It comes as no surprise that most residents perform their first successful blocks with a single injection rather than with a multiple stimulation technique. As a result, most of our residents prefer single stimulation techniques to multiple stimulations at the end of their training and are more likely to use these techniques, once they start their own practice.

In conclusion, the data published in the literature do not convince me to endorse the multiple stimulation and injection technique. The potentially higher risk of peripheral nerve injury, the low acceptance by unsedated patients and the higher level of training required that are associated with multiple stimulations appear to outweigh the rather clinically irrelevant benefits. I believe, that the number of attempted nerve stimulations should be kept as low as possible and therefore multiple stimulations should mainly be chosen in settings in which single stimulation techniques are not available (e.g., humeral canal approaches).

References

1. Thompson GE, Rorie DK. Functional anatomy of the brachial plexus sheaths. *Anesthesiology* 1983; 59: 117-22
2. Partridge BL, Katz J, Benirschke K. Functional anatomy of the brachial plexus sheath: implications for anesthesia. *Anesthesiology* 1987; 66: 743-7
3. Koscielniak-Nielsen ZJ, Stens Pedersen HL, Lippert FK. Readiness for surgery after axillary block: single or multiple injection techniques. *Eur J Anaesthesiol* 1997; 14: 164-71
4. Inberg P, Annala I, Annala P. Double injection method using peripheral nerve stimulator is superior to single injection in axillary plexus block. *Reg Anesth Pain Med* 1999; 24: 509-13
5. Schroeder LE, Horlocker TT, Schroeder DR. The efficacy of axillary block for surgical procedures about the elbow. *Anesth Analg* 1996; 83: 747-51
6. Gebhard RE, Greger J, Al-Samsam T, Matuszczak M, Rieger A. Single injection high axillary block – Comparison with the multiple stimulation technique. *Anesthesiology* 2001; 95: A968
7. Paqueron X, Bouaziz H, Macalou D, Labaille T, Merle M, Laxenaire MC, Benhamou D. The lateral approach to the sciatic nerve at the popliteal fossa: one or two injections? *Anesth Analg* 1999; 89: 1221-5
8. Hadzic A, Vloka JD. A comparison of the posterior versus lateral approaches to the block of the sciatic nerve in the popliteal fossa. *Anesthesiology* 1998; 88: 40-6

Continued on page 8

Continued from page 7

9. Fanelli G, Casati A, Beccaria P, Cappelleri G, Albertin A, Torri G. Interscalene brachial plexus anaesthesia with small volumes of ropivacaine 0.75%: effects of the injection technique on the onset time of nerve blockade. *Eur J Anaesthesiol* 2001; 18: 54-8
10. Casati A, Fanelli G, Beccaria P, Cappelleri G, Berti M, Aldegheri G, Torri G. The effects of the single or multiple injection technique on the onset time of femoral nerve blocks with 0.75% ropivacaine. *Anesth Analg* 2000; 91: 181-4.
11. Casati A, Fanelli G, Beccaria P, Magistris L, Albertin A, Torri G. The effects of single or multiple injections on volume of 0.5% ropivacaine required for femoral nerve blockade. *Anesth Analg* 2001; 93: 183-6
12. Auroy Y, Narchi P, Messiah A, Litt L, Rouvier B, Samii K. Serious complications related to regional anesthesia: results of a prospective study in France. *Anesthesiology* 1997; 87: 479-86
13. Mather LE, Chang DH. Cardiotoxicity with modern local anaesthetics: is there a safer choice? *Drugs* 2001; 61: 333-42
14. Horlocker TT. Peripheral nerve injury following regional anesthesia: Diagnosis, prognosis and prevention. ASA 2001, Annual meeting refresher course lectures
15. Fanelli G, Casati A, Garancini P, Torri G. Nerve stimulator and multiple injection techniques for upper and lower limb blockade: Failure rate, patient acceptance, and neurologic complications. *Anesth Analg* 1999; 88: 847-52
16. Koscielniak-Nielsen ZJ, Hesselbjerg L, Fejlberg V. Comparison of transarterial and multiple nerve stimulation techniques for an initial axillary block by 45mL of mepivacaine 1% with adrenaline. *Acta Anaesthesiol Scand* 1998; 42: 570-75

Call For Nominations

Denise Wedel, MD, Chair of the Nominations Committee for the 200 Gaston Labat Award, seeks nominations for this singular award.

Please submit to Dr. Wedel at wedel.denise@mayo.edu by April 15, 2002.

Research Update: Toxicology of Intrathecal morphine

Continuous intrathecal infusion of morphine is widely used in chronic pain management. In spite of, and perhaps because of, its long history of use, there have been no systematic safety studies on the effects of continuously infused morphine sulfate. Now convergent preclinical and clinical observations suggest the consequences of this omission.

Preclinical observations

Recently, we examined the effects of intrathecal morphine sulfate infused over 28 days in the chronically catheterized canine model (Yaksh and Malkmus, 1999) at 1 ml/day in concentrations from 1.5 to 12 mg/ml. We found a time and concentration-dependent increase in the severity of motor dysfunction expressed as increased hind limb motor tone. Histopathology revealed modest pericatheter reaction in all animals. However, at higher morphine concentrations, an inflammatory mass consisting of multifocal accumulations of neutrophils, monocytes, macrophages and plasma cells developed at the catheter tip that produced a local compression of the spinal cord. Aside from compression, there were no other changes in spinal morphology, indicating that even high concentrations of morphine had no direct effect upon axons or cell bodies. Though a reaction was observed at lower doses, at concentrations / doses of 12 mg/mL/day, all dogs displayed granuloma formation. In these dogs, there was a significant increase in cisternal CSF protein and WBC's but not glucose as compared to other treatment dogs that did not develop granulomas. More recently, similar results have been observed in rats (J. Allen, T. Hofer and T. Yaksh, unpublished observations) and in sheep (S. Hassenbusch, personal communication).

Human clinical reports

Seven clinical case reports describe patients receiving chronic morphine infusion who present with a motor or sensory dysfunction secondary to a local compressive lesion. (North, et al, 1991; Aldrete, et al, 1994. Bejjani, et al 1997; Blount, et al, 1996. Schuchard, et al, 1998. North, et al, 1991. Blount et al, 1996; Cabbell et al, 1998; Langsam, 1999, Anderson, et al 2001). In an extensive review by Burchiel and Coffey (2002), 16 previously reported cases and an additional 25 patients receiving high dose opiate infusion between 1990 and 2000 are presented. In humans where masses were surgically resected, the typical histology emphasized, as in the dog, the presence of macrophages, neutrophils and monocytes, with a necrotic center and no evidence of an infectious process (Cabell *et al* (1998); Langsam, et al 1999). The time required for granuloma development is not certain, as therapy involves progressive incrementation of concentrations and doses over an extended period, but in the Coffee and Burchiel review, only 4 patients had received infusion for less than 6 months. The onset of the neurological symptoms in 23 patients was characterized as sudden in 6 patients, sudden with prodromal symptoms in 2 and slowly progressing in 15.

Underlying mechanisms of intrathecal morphine-induced granuloma

Several possible mechanisms may be considered.

Reaction to catheter or infusion. Current evidence emphasizes that neither the infusion nor the catheter alone is a sufficient explanation. In the canine model, the granulomatous reaction is not observed with low morphine concentrations or with certain other agents including baclofen, clonidine, adenosine, neostigmine (Sabbe et al, 1993, Chiari et al, 1999 Yaksh et al, 1995; unpublished observations). In humans, the doses of morphine associated with granulomas frequently exceeded 20-25 mg/day. Moreover, in spite of its extensive use, I am not aware of any report to date indicating that intrathecal baclofen is associated with granuloma formation.

Infection. Failure in the dog to obtain positive CSF or infusate cultures, the absence of positive stains for bacteria in the resected material, and normal CSF glucose emphasizes that the granuloma is not an infectious process. These observations are corroborated by case reports.

Opiate receptor activation. Do the effects of morphine represent an opioid receptor mediated effect? High concentrations of intrathecal morphine produce an allodynia and hyper-reactivity in several species that is not naloxone reversible and may be related to the formation of morphine 3 glucuronide (Yaksh et al, 1986; Yaksh and Harty, 1988). Whether the granuloma can be evoked by other μ opioids or metabolites is not clear. Human data suggests that chronic intrathecal hydromorphone infusion is also associated with granulomas (Burchiel and Coffey, 2001).

Morphine actions. What is the mechanism by which morphine exposure leads to the observed accumulation of these vascularly-derived inflammatory cells? Although μ opioids acting through μ receptors are reported to have a suppressive effect upon chemokine-mediated cell migration (Makman et al, 1995, Choi, et al, 1999), others have shown that morphine serves as a mitogen, activating lymphocyte activity (Chuang et al, 1997). Opiates can initiate release of nitric oxide in human endothelial cells (Stefano, 1998). The continued exposure of immunocytes to morphine *in vitro* leads to an exaggerated response of monocytes to other pro-inflammatory stimuli. (Stefano, et al, 1995). These observations lead to a working hypothesis that morphine at elevated concentrations and persistent exposure may activate nitric oxide synthase in meningeal vasculature and initiate a cascade that serve to increase local capillary permeability to these activated cells.

Clinical relevance

At a consensus conference on the continuous infusion of spinal drugs for chronic pain management, several points were noted: morphine is the principle agent employed; that doses up to 20 mg/day were "acceptable" and that concentrations should be adjusted to allow as long an interval between refills as possible (Bennett et al, 2000). Given that patients may receive up to 20 mg/day with long pump refill intervals, it is likely that patients routinely receive morphine at concentrations which exceed even that which is commercially available (e.g. 25 mg/mL), employing concentrations of morphine which are at or near the absolute solubility of morphine sulfate (e.g. 50-55 mg/mL). Market research indicates that approximately 80% of morphine used in implanted pumps is compounded (*K Hildebrand, Medtronic Corp. personal communication*). We hypothesize, but have not proven, that high concentrations (as compared to total dose) delivered at low infusion rates may account for an increased risk in developing a catheter-tip granuloma.

In view of the efficacy of spinal morphine in the management of various chronic pain syndromes, what should be the practical consequences of these observations? Given: i) the fact that every patient does not develop a granuloma, ii) the absence of definitive data implicating the importance of concentration as opposed to total daily dose, and iii) the advantages of achieving long pump refill intervals with high concentrations, many practitioners will doubtless make the clinical judgment to continue to employ elevated infusate concentrations.

So what is to be done? Medtronic deseminated a "Dear Colleague" letter which indicated the need to consider an inflammatory mass as a potential differential diagnosis in the face of: i) new or different sensory symptoms; ii) occasional/intermittent bowel or bladder dysfunction; iii) new motor symptoms and iv) any neurological symptom that differs from baseline. They suggest that whenever an intraspinal mass is suspected, the case and condition should be thoroughly evaluated, a neuroimaging procedure (MRI) or myelography be performed and surgical decompression considered. At present we cannot say that changing to another opiate or to a lower morphine concentration is a solution. Vigilance and suspicion are critical.

It is important to note that the human observations reflect upon the need to undertake appropriate preclinical observations. The highest concentration previously examined in a large intrathecal animal (dog) model was 10mg/mL given as a daily bolus for 28 days (Sabbe, et al 1993). Hence, until the preclinical studies outlined here, the actual formulation being delivered in humans had never been examined systematically much less with continuous intrathecal infusion. Moreover, while many patients start with morphine, over half will receive either other opioids alone including hydromorphone, methadone, fentanyl, or meperidine, or admixtures of morphine and bupivacaine or clonidine (Bennett et al, 2000a). Without exception, systematic safety evaluations have not been accomplished for these agents alone or in combination. Further, even for those agents that have been studied (as with morphine), the relevance of even the best safety evaluation is minimized when the parameters of clinical drug exposure exceed those examined. To paraphrase Paracelsus....there are no safe drugs, only safe doses.

References

- Coffey RJ, Burchiel K: Inflammatory Mass Lesions Associated with Intrathecal Drug Infusion Catheters: Report and Observations on 41 Cases. *Neurosurgery* (50[1]:Jan 2002, in press)
- Aldrete, JA, Vascello, LA, Ghaly, R, Tomlin, D. Paraplegia in a patient with an intrathecal catheter and a spinal cord stimulator. *Anesthesiology*. 81:1542-1545, 1994.
- Bejjani, GK, Karim, NO, Tzortzidis, F. Intrathecal granuloma after implantation of a morphine pump. *Surg. Neurol.* 48:288-291, 1997.
- Blount, JP, Remley, KB, Yue, SK, Erickson, DL. Intrathecal granuloma complicating chronic spinal infusion of morphine. *J. Neurosurg.* 84: 272-276, 1996.
- Schuchard, M, Lanning, R., North, R, Reig, R., Krames, E. Neurologic sequelae of intraspinal drug delivery systems. Results of a survey of of American Implanters of implantable drug delivery systems *Neuromodulation* 1:137-148, 1998.
- North, RB, Cutchis, PN, Epstein, JA, Long, DM. Spinal cord compression complicating subarachnoid infusion of morphine: Case report and laboratory experience. *Neurosurgery*. 29: 778-784, 1991.

Continued from page 9

- Anderson, etal 2001.
- Artru AA. Spinal cerebrospinal fluid chemistry and physiology. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 177-237.
- Belfrage M, Segerdahl M, Arner S, Sollevi A. The safety and efficacy of intrathecal adenosine in patients with chronic neuropathic pain. *Anesthesia & Analgesia*. 89(1):136-42, 1999
- Bennett G, Serafini M, Burchiel K, Buchser E, Classen A, Deer T, Du Pen S, Ferranate FM, Hassenbusch SJ, Lou L, Maeyaert J, Penn R, Portenoy RK, Rauck R, Willis KD, Yaksh TL. Evidence-based review of the literature on intrathecal delivery of pain medication. *J Pain Symptom Manage* 20: S12-36, 2000.
- Bernards CM. Epidural and intrathecal drug movement. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 239-252.
- Bernards CM. The spinal meninges and their role in spinal drug movement. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 133-144.
- Burchiel KJ, Coffey RJ. Inflammatory mass lesions associated with intrathecal drug infusion catheters: Report and observations on 41 cases. *Neurosurgery (abstract)* 49(2):535, 2001.
- Coffey RJ, Burchiel KJ. Inflammatory mass lesions associated with intrathecal drug infusion catheters: report and observations on 41 patients. *Neurosurgery*, 50(1): in press, 2002.
- Cabbell KL; Taren JA; Sagher O. Spinal cord compression by catheter granulomas in high-dose intrathecal morphine therapy: case report *Neurosurgery*, 1998 May, 42(5):1176-80.
- Chiari A, Yaksh TL, Myers RR, Provencher J, Moore L, Lee CS, Eisenach JC. Preclinical toxicity screening of intrathecal adenosine in rats and dogs. *Anesthesiology*. 91(3):824-32, 1999
- Drasner K, Rigler ML, Sessler DI and Stoller ML. Cauda equina syndrome following intended epidural anesthesia. *Anesthesiology* 77: 582-5, 1992.
- Eisenach JC. Analgesic drug classes in the management of clinical pain: a-2 agonists. In T. L. Yaksh, C. Lynch, III., W. M. Zapol, M. Maze, J. F. Biebuyck and L. J. Saidman (ed.), *Anesthesia: Biologic Foundations*, Lippincott-Raven, Philadelphia, 1997, 935-942.
- Eisenach JC. Clinical implementation of agents for spinal delivery. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 439-456.
- Eisenach JC, DuPen S, Dubois M, Miguel R and Allin D. Epidural clonidine analgesia for intractable cancer pain. The Epidural Clonidine Study Group. *Pain* 61: 391-9, 1995.
- Eisenach JC, James FM, 3rd, Gordh T, Jr. and Yaksh TL. New epidural drugs: primum non nocere [letter]. *Anesthesia and Analgesia* 87: 1211-2, 1998.
- Grouls RJE, Korsten EHM and Yaksh TL. General considerations in the formulation of drugs for spinal delivery. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 371-393.
- Hansdotir V, Hedner T, Woestenborghs R and Nordberg G. The CSF and plasma pharmacokinetics of sufentanil after intrathecal administration. *Anesthesiology* 74: 264-9, 1991.
- Hood DD, Eisenach JC and Tuttle R. Phase I safety assessment of intrathecal neostigmine methylsulfate in humans [see comments]. *Anesthesiology* 82: 331-43, 1995.
- Kalichman MW, Moorhouse DF, Powell HC and Myers RR. Relative neural toxicity of local anesthetics. *J Neuropathol Exp Neurol* 52: 234-40, 1993.
- Penn RD. Intrathecal baclofen for spasticity of spinal origin: seven years of experience. *J Neurosurg* 77: 236-40, 1992.
- Rigler ML and Drasner K. Distribution of catheter-injected local anesthetic in a model of the subarachnoid space [see comments]. *Anesthesiology* 75: 684-92, 1991.
- Ross BK, Coda B and Heath CH. Local anesthetic distribution in a spinal model: a possible mechanism of neurologic injury after continuous spinal anesthesia. *Reg Anesth* 17: 69-77, 1992.
- Sabbe MB, Grafe MR, Mjanger E, Tiseo PJ, Hill HF and Yaksh TL. Spinal delivery of sufentanil, alfentanil, and morphine in dogs. Physiologic and toxicologic investigations. *Anesthesiology* 81: 899-920, 1994.
- Sabbe MB, Grafe MR, Pfeifer BL, Mirzai TH and Yaksh TL. Toxicology of baclofen continuously infused into the spinal intrathecal space of the dog. *Neurotoxicology* 14: 397-410, 1993.
- Wallace M, Yaksh TL. Long-term spinal analgesic delivery: A review of the preclinical and clinical literature. *Reg Anesth Pain Med* 25: 117-157, 2000.
- Weller RO. Reaction of intrathecal and epidural spaces to infection and inflammation. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 297-315.
- Yaksh TL. Analgesia and the spinal action of opiates. In G. von Hempelmann and H. Muller (ed.), *Peridurale Opiatenalgesie*, Bibliomed, Melsungen, Germany, 1981, 43-53.
- Yaksh TL. General considerations in the characterization of drug action. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 407-416.
- Yaksh TL. Spinal systems and pain processing: development of novel analgesic drugs with mechanistically defined models. (review) *Trends Pharmacol Sci* 20: 329-337, 1999.
- Yaksh TL and Collins JG. Studies in animals should precede human use of spinally administered drugs. *Anesthesiology* 70: 4-6, 1989.
- Yaksh TL, Grafe MR, Malkmus S, Rathbun ML, Eisenach JC. Studies on the safety of chronically administered intrathecal neostigmine methylsulfate in rats and dogs. *Anesthesiology* 82: 412-27, 1995.
- Yaksh TL and Malkmus SA. Animal models of intrathecal and epidural drug delivery. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 317-344.
- Yaksh TL, Malmberg AB, Grafe M, Hruba V, Hasseth R. Preclinical safety studies for cyclic [D-penicillamine 5] enkephalin (DPDPE) a delta opioid analgesic delivered intrathecally. *Fundamental and Applied Toxicology Suppl* 30: 24, 1996.
- Yaksh TL, Rathbun M, Jage J, Mirzai T, Grafe M and Hiles RA. Pharmacology and toxicology and dogs [see comments]. *Anesthesiology* 82: 412-27, 1995. of chronically infused epidural clonidine HCl in dogs. *Fundam Appl Toxicol* 23: 319-35, 1994.
- Yaksh TL, Rathbun ML and Provencher JC. Preclinical safety evaluation for spinal drugs. In T. L. Yaksh (ed.), *Spinal Drug Delivery*, Elsevier Science B.V., Amsterdam, 1999, 417-437.

Acknowledgment: Work supported in part by DA02110, GM48085 and Medtronic Inc. I would like to thank Kjersti Horais, Jeff Allen Ph.D. and Nicollet Tozier for their contributions to the work cited herein.

Tony L. Yaksh, Ph.D.
 Vice chair for Research
 Department of Anesthesiology,
 University of California, San Diego
 La Jolla, Ca, 92093
 tyaksh@ucsd.edu

Association of Pain Program Directors

American Society of Regional Anesthesia and Pain Medicine

Richard L. Rauck, M.D.
Wake Forest University
President

James P. Rathmell, M.D.
University of Vermont
President-Elect

Sunil J. Panchal, M.D.
Cornell University
Secretary/Treasurer
Minutes of the Fall Semiannual Meeting
October 14, 2001, New Orleans, LA

In attendance:

Marc Hahn, Penn State University (presiding); Richard Rauck, Wake Forest University; James Rathmell, University of Vermont; Sunil Panchal, Cornell University; Lynn Broadman, University of West Virginia; Joshua Greenspan, SUNY Brooklyn; Allen Hord, Emory University; Richard Rosenquist, University of Iowa; Honorio Benzon, Northwestern University; Nagy Mekhail, Cleveland Clinic; Asokumar Buvanendran, Rush-Presbyterian; Sunil Dogra, University of North Carolina; Doris Cope, University of Pittsburgh; Nashaat Rizk, University of Pittsburgh; Joseph Holtman, University of Kentucky; Stephen Abram, University of New Mexico; Rafael Miguel, University of South Florida; Marc Huntoon, Mayo Clinic; Edward Heres, Allegheny General Hospital; Sean Mackey, Stanford University; Joel Kreitzer, Mout Sanai (New York); Brett Stacey, Oregon Health Sciences University; Vildan Mullin, University of Michigan; Kenneth Marshall, Mayo Clinic (Jacksonville); Hugh Allen, Virginia Mason Medical Center

Guests:

David Brown, ACGME RRC for Anesthesiology; James Arens, ACGME RRC for Anesthesiology; Patricia Kapur, American Board of Anesthesiology

The minutes of the May 11, 2001 APPD meeting held in Vancouver, BC were approved unanimously.

Elections

Elections were held for the office of Secretary/Treasurer. Drs. Sunil Panchal and Nagy Mekhail were nominated and the election was carried out by written ballot. Dr. Panchal was elected. The term of office is two years. The current officers will ascend to the next higher office: Dr. Hahn to Immediate Past President, Dr. Rauck to President, and Dr. Rathmell to President-Elect.

Proposal to move the fall APPD meeting to the new ASRAPM Annual Pain Meeting

ASRAPM has established an Annual Pain Meeting to be held in November of each year. The first meeting will be held in Phoenix, Arizona, November 14-17, 2002. ASRAPM has proposed an annual lecture to be given by the President of our organization during this meeting. ASRAPM has asked that we consider moving the fall

meeting of this group from the ASA Annual Meeting to the new ASRAPM Annual Pain Meeting. After discussion, the consensus was to keep the AAPD fall meeting during the ASA until we judge the popularity and success of the new ASRAPM Pain Meeting.

Training non-anesthesiologists within ACGME-accredited Pain Management Training Programs

Drs. David Brown and James Arens (ACGME RRC for Anesthesiology) and Dr. Patricia Kapur (Chair, American Board of Anesthesiology Pain Management Examination Committee) addressed our group regarding training of non-anesthesiologists within our Pain Management Training Programs. The American Board of Medical Specialties (ABMS) currently recognizes only a single examination process for pain medicine specialists, the American Board of Anesthesiology's (ABA) subspecialty Certificate in Pain Management. In recognition that physicians from a number of parent disciplines go on to specialize in pain medicine, last year an ABMS brokered agreement between the three boards, ie: ABA, ABPM&R and ABPN, to prevent a splintering and duplicative exam, opened the pain management examination to candidates who qualify for examination through other ABMS recognized primary specialties. These include physicians certified by the American Board of Physical Medicine and Rehabilitation and the American Board of Psychiatry and Neurology. However, all currently existing ACGME-accredited Pain Management Training Programs are affiliated with anesthesiology residency training programs. Non-anesthesiologists applying to our Pain Management Training Programs are having great difficulty with equal access to training.

While the ACGME has adopted Program Training Requirements for other disciplines, it is unclear how physicians from various disciplines can be trained with any degree of consistency such that graduating residents possess similar knowledge and skills. Drs. Arens has called a meeting with representatives from the RRCs for Anesthesiology, Neurology, Psychiatry, and Physical Medicine & Rehabilitation as well as representatives from the American Board of Pain Medicine (ABPM, which offers board certification in pain medicine and has unsuccessfully petitioned the ABMS to establish a new, primary specialty in pain medicine). This meeting will be held November 12, 2002. Drs. David Brown and James Rathmell have been invited to attend.

Curriculum development

A motion was made suggesting that our group begin development of a curriculum for subspecialty education in pain medicine to meet the needs physicians from all relevant parent specialties. This motion was seconded and approved unanimously. The group agreed to form a working group to help with preparation of a standardized curriculum when and if the ACGME requests our input. The International Association for the Study of Pain (IASP) has developed a core curriculum for professional education in pain, and the group agreed that this document could serve as a valuable starting point for the development of a standard curriculum. There was no further discussion of a concrete plan of action for developing the curriculum.

Continued from page 11

Establishing membership dues for the AAPD

The ASRAPM Board of directors chartered AAPD in 1994. ASRAPM has provided administrative support (transcription and publication of meeting minutes, meeting notices, the on-line Pain Fellowship Directory) as well as financial support for our meetings (approximately \$3,500/year for meeting rooms and meals). Our meeting is now well attended and serves as a valuable forum for discussion of issues relevant to all Pain Management Training Programs. Our group has been recognized by the ACGME as representing the views of Program Directors from ACGME-accredited programs. We can no longer rely on the support of ASRAPM for our meetings. A motion was made that we collect dues in the sum of \$100/year from each ACGME-accredited program to support our activities. The Ruggles Corporation, the management group that oversees ASRAPM, will provide administrative support for dues collection and accounting. The motion was seconded and passed unanimously.

ASA Task Force on Interventional Pain Medicine

Dr. Barry Glazer (ASA President) and James Cottrell (ASA President-Elect) are assembling a task force on interventional pain medicine. This task force will examine the role of ASA in representing members who are active in interventional pain medicine. Members of this group are likely to be called to serve on this Task Force.

Next meeting

ASRA Spring Meeting, April 2002, Chicago, IL

Respectfully Submitted,

James P. Rathmell, MD

Secretary, Association of Pain Program Directors



American Society of Regional
Anesthesia and Pain Medicine
P.O. Box 11086
Richmond, VA 23230-1086

Non-Profit U.S. Postage PAID Permit #365 Richmond, VA
--