



# INTERFACE

SOCIETY FOR TECHNOLOGY IN ANESTHESIA

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J U L Y 1 9 9 2 • V O L U M E 3 • N O . 3

## Recent Meetings in Japan

Naosuke Sugai, MD, PhD  
Tokyo, Japan

### Anesthesia Equipment: A Vector for Infection?

Reynolds Saunders, MD  
Cedars-Sinai Medical Center  
Los Angeles, CA

■ *“When perioperative infections do occur, we rarely ask whether anesthesia equipment might have caused them.”*

Since the time of Lister and Semmelweis, iatrogenic perioperative sepsis has been controlled to the extent that such incidents are reportable, rather than endemic. When perioperative infections do occur, we rarely ask whether anesthesia equipment might have caused them. The prevalence of an incurable, invariably fatal disease transmitted by contact with body fluids (AIDS) has however, stimulated concern about our patients' welfare. In addition, there are increased efforts to eliminate weak links in the defense against perioperative infection, and to prevent needless regulatory intervention. To better understand the issues related to anesthesia equipment, we can examine the tools we use and how they might be cleaned.

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### Japan Society of Anesthesiology— Focus On Safety and Technology

The Japan Society of Anesthesiology held its 39th Annual Meeting from April 9-11 in Fukuoka, which is the largest city of Kyushu, the southern most of the four major islands of the Japanese archipelago. The meeting was organized by Dr. Kenjiro Dan of Fukuoka University. Because of its close proximity to the Korean peninsula, a large contingent from Korea attended as well as individuals from mainland China and Taiwan. Guest speakers were invited from the United States, the United Kingdom and Australia. For those who were not very familiar with the Japanese language, English language sessions were held for free papers.

Anesthesia safety and technology were featured in various sessions in the meeting. In a symposium on anesthesia safety, Dr. C.D. Hanning of the University of Leicester in the U.K. emphasized that safety in anesthesia does not depend just on techniques and monitoring. The first requisite is that the anesthesiologist has professional pride in himself and his practice, based on proper training.

Dr. T. Kugimiya of Tokyo University talked on the standardization of anesthetic machines and monitors in Japan. By the improvement of Japanese standards for anesthetic equipment and the efforts of the makers of these

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### Japan Society for Clinical Monitoring

JSCM had its 3rd annual meeting in Tokyo February 7-8, 1992 at Nihon Seinenkan in Tokyo close to the State Guest House where President and Mrs. Bush had stayed during their recent visit. The meeting was organized by M. Tsuzuki, K. Suwa and Y. Yamada, all from Tokyo University. The society is composed of members from diverse specialties; although anesthesiologists comprise one-half of the present membership. The program included 87 free papers, 7 refresher courses, 2 symposia, and 4 guest lectures (including Jeffrey B. Cooper of Boston and John Zelcer of Melbourne). Approximately 350 people attended the meeting.

The free paper sessions included presentations on monitoring of respiration, blood pressure, EKG, pulmonary circulation, CNS including intracranial pressure, cardiac output, cardiac performance, cerebral circulation, periph-

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#### INSIDE THIS ISSUE:

- ◆ News from Japan
- ◆ Latin America Anesthesiology
- ◆ Perspective: Central Venous Catheters
- ◆ Participate in a clinical thermometer standard!

# How One King's Fear Cost Latin America Its Technology

Jorge Urzua, MD

Professor, Departments of Anesthesiology and Electrical Engineering  
Catholic University, Santiago, Chile



The Society for Technology in Anesthesia counts more than 400 members from Europe, the U.S. and Australia. From Latin America, however, there are only two. It is surprising that a whole continent, inhabited by more than 380 million people including nearly 20,000 anesthesiologists, may be so poorly represented. The number of papers originating from Latin America that are published by Anesthesiology, Anesthesia and Analgesia and the Journal of Clinical Monitoring, are also disproportionately small. It is of interest, I believe, to analyze why this has happened.

Contrary to popular belief, Latin America is not younger than the U.S. Walking the old streets and admiring the imposing stone buildings of Cartagena de Indias, Ciudad de Mexico, Quito, Lima, Cusco, it becomes evident that Latin America was a major cultural and economic force during the 16th and 17th centuries. The precolumbian civilizations of the Mexica, the Maya, the Aztec and the Inca, of course had attained a very high level of social, cultural and aesthetic accomplishment many centuries earlier. Modern disciplines such as Anesthesiology, have not developed in Latin America as they have elsewhere in the world. I believe that, at least in part, this has resulted from the relative isolation of Latin America during the scientific and technological revolutions that transformed the world during the last five centuries.

The isolation originated in Spain, where Felipe II, concerned about departures from orthodox Catholicism in Europe, closed Spain and the members of its empire to the developments taking place in the world. While mod-

ern science was instituted with the creation of Scientific Academies in Britain, Italy, France and Germany, Spain remained isolated. The practice of experimental science in Spain and its colonies was sternly discouraged using penalties no less than execution. While most of Western Europe embraced

■ ***“...Felipe II...closed Spain and the members of its empire to the developments taking place in the world.”***

physics and mathematics instead of supernatural faith to explain the universe, Spain and Latin America persisted in the old thinking patterns. It is of interest to note that, even today, there is only one S.T.A. member from Spain, compared with 5 from Finland and 3 from New Zealand.

In the U.S. and Europe, the scientific revolution of the 16th and 17th centuries gave way to the technological revolution of the 18th and 19th. At the root of modern technology, of course, lies modern science, insofar as its essence is precisely the application of scientific knowledge to the solution of practical problems. The newly acquired knowledge of physics multiplied human power to modify nature. The 18th and 19th centuries witnessed the appearance of innumerable “inventors”; those who were successful gave birth to industrial companies, in many cases the big corporations of today. Industrial growth in the U.S. and Europe, therefore, was a consequence of invention, technological creativity and research, based in turn on scientific knowledge.

Due to the Spanish influence, Latin America has not kept pace with the rest of the world. Experimental science did not develop until the first half of the

this century, when universities either imported foreign scientists or sent young faculty to be trained abroad. Scientific research has, for the most part, remained within the universities and failed to stimulate industrial development or technological innovation. The growth of industry that has occurred, has been based on the importation of technologies, not innovation at home.

This historical perspective explains why technology does not have the same priority in Latin America than in the U.S. or Europe. In the latter, technology is a tool to solve problems and to generate wealth; it may be created by anyone with the required knowledge, and its purpose is to help society as much as to enrich its inventor. Technology is part of everyday reality. In Latin America, on the contrary, technology is foreign in more ways than the

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**INTERFACE** is the official newsletter of the Society for Technology in Anesthesia. The newsletter is published quarterly and mailed directly to the membership of the society. The editors invite suggestions, contributions and commentary about published items. Please send all correspondence to:

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The newsletter is printed on recycled (and recyclable) paper.

# PERSPECTIVES ON TECHNOLOGY

## TOPIC: CENTRAL VENOUS CATHETERS

■ “... good models do not exist to test the wide range of performance characteristics that are of interest.”

### The Industrial Perspective

**Bruce Gingles, Director, Sales & Marketing**  
**Kem Hawkins, Vice President**  
 Cook Critical Care  
 Bloomington, IN

Percutaneous central venous catheterization has undergone substantial evolution since the first reports of its use by Aubaniac in 1952.<sup>1</sup> Over many years, the technique was improved and its relative safety documented. Once this safe, reliable means of obtaining central venous access became widely adopted, attention turned to the design of catheters themselves. Simple physical properties such as radiopacity, kink ability, i.d./o.d. ratio for flow rate and ease of insertion were a few of the common material considerations. Teflon® was the first popular material. It is strong, easily made radiopaque, available with thin walls to maximize lumen size and has a slippery surface. The primary drawback of Teflon® is a low resistance to kinking. Polyethylene and polyurethane were introduced in the late 1970s in an effort to improve upon Teflon®'s kinking deficiency. Polyvinyl chloride has been in existence for a number of years but wide popularity was never achieved due to concern about excessive thrombogenicity. Silicone elastomers have been extremely successful for long-term indwelling applications due to low clotting and infection rates.

Despite the many advances in central venous catheter design a variety of complications still occur. Three primary types of complications are associated with the catheters that pose a challenge to the design process: thrombus formation, vessel perforation and infection.

### Thrombogenicity

Reports concerning the relative thrombogenicity of various materials are conflicting. It is generally accepted however, that silicone elastomers and some polyurethanes have fewer thrombotic complications. Two approaches are currently being pursued to reduce the intrinsic thrombogenicity of the catheter material.

The bonding of heparin to the surfaces of catheters reduces catheter thrombus formation for short periods of time. Since bonded heparin degrades rapidly in vivo, experimental techniques to prolong the presence of heparin on the catheter are under investigation and show promise.

A newer approach to reducing thrombogenesis is based upon the concept of surface energy. Surface energy de-

■ “...the evolution of clinical understanding and improved catheter design continue to reduce central venous catheter related complications.”

### The Clinical Perspective

**Robert H. Blackshear, MD, Resident**  
**Nikolaus Gravenstein, MD, Associate Professor**  
 Department of Anesthesiology  
 University of Florida College of Medicine  
 Gainesville, Florida

The technologies and techniques of central venous catheterization have progressed a long way from the original trial and error placement techniques and single lumen, virtually rigid, polyethylene or Teflon catheters. Despite advances in technique and an increase in the variety of catheters, significant complications remain commonplace. Fortunately, the evolution of clinical understanding and improved catheter design continue to reduce central venous catheter related complications.

### Placement

Large series have repeatedly demonstrated a 4% to 5% incidence of unintentional carotid artery puncture associated with internal jugular vein cannulation, while the subclavian approach has a 2% to 3% incidence of associated pneumothorax. The carotid artery can, however, be readily identified and avoided if a sterile pencil probe Doppler is used to guide needle placement. Only experience (i.e. more than 50 placements) appears to lower the incidence of pneumothorax associated with the subclavian approach.

In recent years, evidence has accumulated that the majority of catheter - related perforations are associated with introduction of the catheter from the left side, regardless of whether the jugular or subclavian entry is used. With left-sided placements there is a greater likelihood than with right-sided placements that the angle between catheter tip and superior vena cava will be acute causing contralateral perforations of the vein.

### Position

The literature is replete with warnings against positioning a catheter tip in the atrium, except for brief periods for the identification or removal of air embolism. In all other cases, if a catheter is determined to be in the atrium, it should be withdrawn.

If the catheter tip is above the pericardial reflection and is at less than a 40° incident angle to the superior vena cava, it is probably acceptable. No published chest roentgenograms show perforations with catheters positioned at inci-

# CLINICAL INPUT NEEDED FOR INTERNATIONAL THERMOMETER STANDARD

Gregg Lavenuta, President, COO

Dan McGillicuddy, Vice-President, Marketing

Alpha Thermistor, Inc.  
San Diego, CA

Clinicians, have you ever been frustrated because a new medical product, specification, or regulation is introduced without apparent clinical input? Are you tired of manufacturers and regulatory agencies dictating what kind of medical devices you should use, rather than asking advice about what products you need to assist you in your practice? If your answer is "Yes" to either of these questions, then please read on, because you now have the opportunity to participate with manufacturers and the International Organization for Legal Metrology (OIML) to develop a standard for clinical electronic thermometers.<sup>1</sup>

The International Recommendation entitled "Clinical Thermometers for Continuous Measurement", is nearing its final stage but several issues remain to be resolved. A questionnaire to facilitate resolution of these issues through clinical input has been posted on the STA Forum on CompuServe. We are encouraging as much participation in the survey as possible during the next two weeks. This information will be processed and passed along to the OIML. Instructions on how to obtain the questionnaire are located at the end of this article. Clinical input is ESSENTIAL to prevent unnecessary or inadequate product specifications.

## Issues

The Recommendation applies to clinical electronic thermometers that use NTC (negative-temperature-coefficient) thermistors as temperature sensors. NTC thermistors are thermally

sensitive resistors which exhibit a predictable and repeatable decrease in electrical resistance with a corresponding increase in temperature. Of particular concern is a requirement to prevent an artifactual increase in measured temperature due to self-heating;

■ *"Clinical input is essential to prevent unnecessary or inadequate product specifications."*

warming of the sensor when the electrical energy from the indicating unit is conducted through the sensor element. The draft specification allows only 0.01°C maximum self-heat error at 0.1 mW of applied power. If retained, this may significantly increase the cost of the temperature probes because special materials and manufacturing methods will be needed to improve the thermal dissipation properties of the probes.

The concern for regulating the amount of self-heat error in temperature probes would not be necessary if manufacturers of temperature monitors understood the power dissipation characteristics of NTC thermistors and built their instruments accordingly. Today, manufacturers can utilize technology which would allow for application of less than 0.1 mW to the thermistor element without sacrificing the

integrity of the indicating unit. As long as older equipment is in use however, the problem will remain. Efforts to control health care costs often include keeping older equipment in service longer, so the issue must be addressed.

Another related issue exists in the international market place. Most European manufacturers of temperature monitors have already adopted 0.1 mW of power applied to the sensor as the de facto standard for all indicating units, both new and old. Changing the specification for power from the indicating unit is not likely to take place in Europe. Therefore, the only other avenue left for change is to broaden the self-heat tolerance of the sensor. The OIML committee members are amenable to consider such a change as long as an appropriate clinical consensus is obtained.

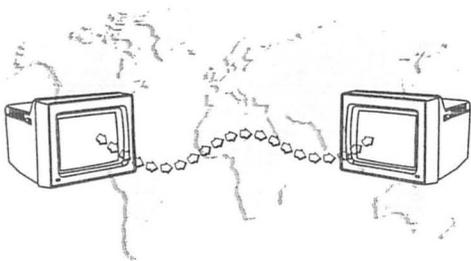
As an example of the problem, three types of temperature probes were tested for self-heat error using an applied power of 0.1 mW. The results of the tests and the worst-case maximum errors for these probes are illustrated in the table below. These results indicate that the esophageal stethoscope exhibited the worst case self-heat error of almost 0.03°C. This is understandable since this type of probe has an insulating air space surrounding the sensor, causing poor dissipation of thermal energy. The critical issue that requires clinical input is whether or not these levels of self-heat error will adversely affect clinical temperature measurement. In other words, does it matter

*continued on page 35*

Type of Probe	System	Self-Heat	Worst Case
Esophageal/rectal	+0.2°C	+0.015°C	= +0.215°C
Foley catheter	+0.2°C	+0.018°C	= +0.218°C
Esophageal/ stethoscope	+0.2°C	+0.029°C	= +0.229°C

# SIGnatures

Notes from the STA Special Interest Group



## Michael S. Gorback, MD

Telecommunications Editor

A novel use of the forum feature on CompuServe is now underway in the STA forum. Alpha Thermistor, a manufacturer of medical temperature measuring thermistors, is helping to develop a standard for these devices. A questionnaire has been posted in

the library files (THERM.ASC) to help the standards organization obtain clinical input and avoid unnecessary engineering and product costs associated with an inappropriate standard. Clinicians interested in having an impact on clinical device standards are asked to download the questionnaire, complete the questions and E-mail or Fax the completed copy to Alpha Thermistor. The questionnaire is available directly from the company as well. For more information about how to participate in this important evaluation, sign on to the forum or see the accompanying article entitled "Clinical Input Needed for Thermometer Standard" (p. 28).

One of the hotter topics on MedSig this Spring is Ketorolac (Toradol TM). One thread is devoted to the use of Ketorolac for migraine headaches, while another explores the relationship between preexisting renal disease and the incidence of acute renal failure in patients receiving NSAIDs - Ketorolac in particular. ♦

### LOOK IN THE LIBRARY

FILENAME (type/size)	Description
WSTA.TXT (ascii/6K)	International E-mail directory of STA members
MED492.BBS (ascii/39K)	List of Medical BBS as of 4/92
THERM.ASC (ascii/12K)	Questionnaire on clinical requirements for temperature measurement

### SUMMARY OF SIGN-ON INSTRUCTIONS:

1. Determine the access number. (Usually apparent from CompuServe starter kit)
2. Set the modem for Baud Rate (typically 1200 or 2400), 7-bit data, 1 stop bit, even parity.
3. Sign on using your User ID number and Password.
4. At the "!" prompt type "GO MEDSIG" to access the medical forum.
5. STA uses the Subspecialty forum which is entered from the MEDSIG menus.
6. If it is not clear how to best use the forum, type "GO PRACTICE" at the "!" prompt to get the practice forum which can be used without charge.

## CORRECTION — STA '92 Videotapes

In the April 1992 issue of *Interface*, we published a FAX number to contact for more information about ordering videotapes from STA '92. This number was incorrect. If you are interested in ordering, please FAX your name, address, and phone number to:

Don Proffer, Proffer Productions  
FAX (816) 474-7023

We apologize for the confusion and any inconvenience it may have caused.

# UPCOMING EVENTS

## ESCTAIC

The European Society for Computers and Technology in Anesthesia and Intensive Care will hold its third annual meeting once again at beautiful Goldegg Castle, Salzburg, Austria from October 7 to 10, 1992. For information contact: Dr. Leo Moser, Anaesthesiologie, P.O. Box 30, A5014 Salzburg, Austria.

## ASA '92

To be held October 17 through 21 in New Orleans, Louisiana. Contact: American Society of Anesthesiologists, 515 Busse Highway, Park Ridge, IL 60068-3189, (708) 825-5586.

### STA Sponsored Events

#### Dinner

Sunday, October 18, 1992  
Speaker: John K. Lauber, PhD, National Transportation Safety Board  
Time and location to be announced

#### Breakfast Panel

Wednesday, October 21, 1992-7:30 am  
Topic: Anesthesia in Remote Locations  
Location to be announced

*Note: The National Anesthesia Database Committee will meet during the ASA meeting. The tentative meeting time is Tuesday evening during the ASA. A final time and place will be announced at the time of the STA dinner, Sunday evening of the meeting.*

## Computers in Anesthesia XIII

To be held October 21 through 24 at the Bourbon Orleans Hotel, New Orleans, LA. Contact: Ann Y. Loffi, T-4126 MCN, Vanderbilt Univ. Medical Center, Nashville, TN 37232-2125.

## 1993 STA - ISCAIC Annual Meeting

For details, see page 31. ♦

## Anesthesia Equipment

*continued from the cover*

### The Things We Clean

Anesthesia equipment that contacts the patient can transmit "germs" (for want of a better five-letter inclusive term for infectious agents). In this era of AIDS, transplant recipients and other immuno-compromised patients, any germ can be a pathogen. We must look afresh at our work area, identify surfaces to sterilize, and recognize that effectively cleaning them is a daunting problem. The more intimately that the surface of equipment is involved with the patient, the more concern we must have about its infectious potential.

The exterior of our monitors, gas delivery system and other "machinery" cannot, and probably should not, be sterilized, but what about an invasive substance such as respiratory gas? It passes over several different surfaces, many of them inaccessible without dismantling the anesthesia delivery system. We know that germs can pass through the delivery system and we can trap them with efficient filters. Proving that these germs cause disease in anesthetized patients is a problem to address before adopting elaborate cleaning schemes.

### Sterilizing Anesthesia Equipment: Not As Simple As It Looks

Should I wash my equipment between cases, autoclave it, pasteurize it, soak it, gas-sterilize it, or throw it away? At first glance, this question boils down to "What organisms are killed by which disinfection technique?" Then all we have to do is decide 1) what organism is contaminating our equipment, 2) whether the organism (or the equipment) will survive the disinfection process, and 3) whether we can afford the resources needed to do the job.

Anesthesiologists must examine the issue more carefully than deciding to just use disposables. If your department is contemplating a rigorous infection-control program, planning and executing sterilization procedures represents both a potential benefit to the patient, and many potential hazards as well. Details of the technically and administratively complex issues are beyond the scope of this article. Jerry

and Susan Dorsch's twenty-eight page book chapter (1) thoughtfully discusses the many factors involved. Standards organizations such as JCAHO may be helpful as well.

The most urgent question is: What can carry infectious secretions or blood from patient to patient? Face masks, endotracheal tubes, oral and nasopharyngeal airways, topical spray applicators, Magill intubating forceps, laryngoscope blades (and handles), and the surfaces on which they rest are all possible vectors. Decontamination can quickly become either a logistical nightmare or a futile exercise since many of these items were not designed for cleaning or sterilization.

What anesthesia equipment touches a patient besides the endotracheal tube (and IV catheters and needles)? Lots of less invasive items: the blood pressure cuff, pulse oximeter probe, precordial stethoscope, the rubber tourniquet, nerve stimulator pads, arm and head straps, and positioning equipment. Processing this multitude of untidy items for re-use is expensive, but most are not disposable; can we afford to process all of them? Most hospitals in the United States take the "easy" way out by buying disposables. Hospital administrators are rarely in the OR and frequently do not understand the problem. When we confront the question of cleaning equipment, administrators ask whether the items are amenable to cleaning, disinfection, packaging, storage and redistribution to clinicians. Disposables are appealing since they are, 1) untouched by previous patients, 2) probably clean, and 3) maybe even sterile. Unfortunately many disposable instruments (laryngoscopes are conspicuous examples) don't function as well as their reusable counterparts. Manufacturers have delivery problems; quality control sometimes fails; the disposables also present a logistics and disposal problem.

A hybrid approach uses recycling of items labeled "For Single Patient Use Only" (FSPUO). Anesthesia does not have well developed standards for recycling FSPUOs. Because some plastics and other materials absorb certain disinfectants or change when gamma-irradiated during manufacture, recycled FSPUOs can endanger the next patient by leaching toxins into mucosa or skin. Such items typically don't function as well with repeated use, and it is

hard to track how often an item has been recycled.

### How We Clean The Things We Have

The anesthesiologist "cleaning" a laryngoscope with an alcohol swab or a used scrub brush at the scrub sink needs a better solution. Improving cleaning and disinfection implies dealing with procedures, issues, committees, agencies, people and costs. What do we do with our dirty supplies? Making an item safe for use with your next patient requires 1) removing it from the last patient, 2) removing it from the anesthesia work surface, 3) getting it to a facility where it can be cleaned, 4) cleaning it, 5) disinfecting it, 6) removing traces of any chemicals used in disinfection, 7) packaging it to prevent casual contamination, 8) storing it, preventing pilferage, breakage and loss, and 10) getting it back to the clinician. Sterilizing anesthesia equipment involves more than buying a sterilizer. The logistics of moving an item through the chain involve training and coordination between departments. Someone has to decide which items need to be kept sterile or "just clean" after disinfection. Because we are dealing with AIDS and other fatal pathogens, the problem is more acute than when Dorsch and Dorsch published their chapter in 1984.

### A Plea For Sanity

What is our goal? Could we use our resources better by identifying the enemy before we escalate the conflict? We need better data before we accept the tacit assumptions that drive the marketplace and our own approaches to contaminated anesthesia equipment. Concern for our patients should spur research into more easily sterilized, reusable equipment and more highly functional disposables. And each department of anesthesia should review its infection control policies as they relate to nosocomial infections and anesthesia equipment. We cannot afford to have a single patient needlessly infected by anesthesia equipment, but panic will not produce long-term solutions to the problems.

#### REFERENCES

1. Dorsch JA and Dorsch SE: "Cleaning and Sterilization," Chapter 14 in *Understanding Anesthesia Equipment*, 2nd Ed., Williams & Wilkins, Baltimore, 1984. ♦

# 1993 STA - ISCAIC

## Annual Meeting

***“Human Performance and Anesthesia Technology”***

**February 17–19, 1993**

**Sheraton New Orleans Hotel**

**New Orleans, Louisiana**

Also, **“Mardi Gras Anesthesia Update,”** February 20–22, 1992

**Abstract deadline: December 1, 1992**

Topics include:

The OR Environment

Design Issues for Future Anesthesia Technology

Improving the Anesthesia Provider

Crisis Resource Management

Performance-Shaping Factors

Music and Reading in the OR

Technology and Medical Decision Making

How to Obtain Funding for Technology in Anesthesia

Alarms—What Do We Want When?

Critical Issues in Enhancing the Use of Technology to Increase Patient Safety During Anesthesia

The Introduction of Technology into the Third World: Problems and Solutions

*And much more...*

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**“This is Mardi Gras time  
and promises to be exciting and fun!”**

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For information contact:

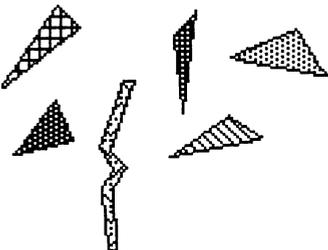
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## Japan Society for Clinical Monitoring

*continued from the cover*

eral circulation, metabolism and more. Some presentations of note included:

✓ Y. Onishi of the National Cardiovascular Center reporting on the detection of microemboli in the descending aorta through computerized processing of the TEE image. This system allows anesthesiologists to detect microemboli automatically without the need for continuous assessment of the TEE image.

✓ M. Takashina of Osaka University described the use of ultrared light to transmit patient information in the operating room. He described a system of information transmission using an ultrared light modem to minimize the hindrance to the transmission of the ultrared light by various objects in the operating room.

✓ T. Tsuji of Tokyo Medical and Dental University described a method intended to detect the rejection of the transplanted kidney by examining the temperature difference between the liver and the kidney. He described the results of implanting a crystal temperature transmitter in the kidney of animals. This transmitter is used to detect the temperature of the kidney by use of an ultrasonic sensor on the skin. Liver temperature is measured by a probe placed only on the skin.

✓ S. Ichida of the National Cardiovascular Center developed a computerized system for instantaneous measurement of LVEDP by analyzing the initial portion of the rising part of the intraventricular pressure wave.

✓ The symposium on monitoring of blood levels of drugs dealt with the monitoring of antiarrhythmic agents, antispasmodics, bronchodilators, antibiotics, anaesthetic agents, and immunosuppressives.

✓ The utility and limitations of monitoring were discussed in another symposium. The discussants agreed that there is a danger of forgetting to examine the patient as monitoring develops. This observation was noted to be first pointed out when the stethoscope had been introduced. Everyone agreed with the comment of John Zelcer that what we should have is both high-tech AND high-touch.

✓ Guest lectures include "Human errors and accidents: The role of monitoring" by J. Cooper, "MIB - new technical architectures for future monitoring systems" by J. Zelcer, "Micromachines and Measurement" by I. Fujimasa of Tokyo University.

✓ There was a lively buffet party on the evening of February 7th. Attendees left the meeting with more information on patient safety and happy memories of the colorful life of Tokyo. ♦

## Japan Society of Anesthesiology

*continued from the cover*

equipments, the quality of Japanese machines has been improved. Japan, however, does not yet have a national standard of monitoring during anesthesia although this is a goal for the near future.

Dr. S. Takahashi of Kyushu University talked about the anesthesiologist's role in maintaining patient safety in the hospital at large especially in critical care areas.

Dr. K. Ikeda of Hamamatsu University demonstrated their program for continuous quality improvement in anesthetic practice which covers their main university hospital as well as the other affiliated hospitals. He emphasized that the indicators of quality of care to be recorded should be as simple as possible to make the CQI program practical.

Twenty two free papers were presented in computer sessions. The topics discussed included computerized anesthetic chart and information storage during anesthesia, computerized

bedside teaching, use of computers in monitoring and more. A computer software contest was held. The contest was started last year by Dr. K. Suwa of Tokyo University. Among the winners of the contest were Dr. O. Uchida of the National Circulatory Disease Center with "A micro bubble detection system by digitizing the transesophageal echocardiogram", Dr. K Nitta of Uwajima City Hospital with "Ten thousand titles from various Japanese anesthesia and/or related journals", Dr. R. Watanabe of Fukuoka University with "A method of processing authors and titles for the 39th congress of JSA", Dr. M. Sanduke of Hiroshima University with "Anesthesia memo on Macintosh Hypercard" and Dr. S. Hagihira of Kansai Occupational Injury Hospital with "Anesthesia information and tutorial system for bed-side use".

Another feature of the safety of anesthesia was a talk by Dr. David Lees of Georgetown University on the safety of anesthetic equipment and machines. He predicted that there will be a significant progress in the software in the nineties. He also predicted a new anesthetic machine with built-in infusion pumps, single shot vaporizers and a fiber optic light source.

A total of more than 800 free papers were presented at the meeting and members were encouraged by the increasing international attendance. ♦

### "Mardi Gras Anesthesia Update"

February 20-22, 1992  
New Orleans, Louisiana

Watch *Interface* for  
more details

# STA '92 Panel Discussion: Data Acquisition

The panel on data acquisition discussed the various monitors that provide data input to the anesthesia workstation. The panel emphasized newer techniques and the manner in which they will affect anesthetic management. Dr. David Wong discussed recent developments in hemodynamic monitoring; Dr. Betty Grundy discussed neurological function monitoring; Dr. Dwayne Westenskow covered recent developments in monitoring anesthesia circuit gases; and Dr. Steven Barker discussed recent developments in oxygen and carbon dioxide monitoring.

## Monitoring Cardiac Output

Dr. Wong reviewed recent developments in monitoring cardiac output and continuous non invasive blood pressure (CNIBP). Current non invasive cardiac output monitors utilize Doppler, bioimpedance, and arterial pressure pulse contour methods. Doppler techniques usually measure blood velocity accurately, but measuring the cross-sectional area of the aorta poses problems. The physiologic basis of the thoracic bioimpedance wave form is poorly understood. Arterial pressure pulse contour techniques must be initially calibrated with a reference cardiac output, because the aortic impedance is not totally predictable, and varies with time. Thus, there is room for improving the accuracy of all of these methods.

New invasive cardiac output techniques attempt to provide continuous measurement of cardiac output through modifications of the pulmonary artery catheter. These modifications include the addition of Doppler transducers, heated wires to inject heat for thermodilution measurement and continuous Fick methods using fiber optic pulmonary artery catheters. Initial studies with these modified invasive techniques are very promising.

Several different continuous non invasive blood pressure (CNIBP) methods have been reported: Penaz method, arterial tonometry, Photometric pulse wave delay, and pneumatic servo control. Initial reports show that

these devices may agree very well with simultaneous radial artery pressures.

## Monitoring Neurological Function

The next talk, by Dr. Grundy, covered recent developments in the monitoring of neurological function. The main objective of monitoring the brain and spinal cord in the operating room is to protect them from injury. Many factors initially thought to limit monitoring of the electroencephalogram (EEG) and evoked potentials (EP) have now been overcome.

EEG can be used to monitor the cerebral cortex by means of scalp electrodes, ideally using multiple channels that reflect regional brain activity. A number of devices for processing EEG signals are now available for routine brain function monitoring in the operating room and critical care unit. These range from small relatively inexpensive machines requiring minimal training to sophisticated units that require skilled operators.

Evoked potentials represent the electrophysiological response of the nervous system to stimulation. The measured signals are displayed as plots of voltage versus time. Intraoperative monitoring of EP's can detect many threats to the functional integrity of the CNS. For example, somatosensory evoked potentials (SEP's) can be useful in monitoring function of the spinal cord during surgery where the spinal cord is at risk. Brain stem auditory evoked potentials (BAEP's) can monitor function of the eighth nerve and brainstem during operations in the posterior cranial fossa. Visual evoked potentials (VEP's) are difficult to use in the operating room, but they can monitor perfusion of the retina and anterior visual pathways. Neurological function monitoring, once viewed as a tool only for highly specialized individuals, has become a valuable data source for the anesthesia workstation during operations that pose risks to the brain or spinal cord.

## Monitoring Respiratory Gases

Dr. Westenskow, emphasized recent advances in technologies for monitoring respiratory gases in the operating room. Oxygen monitoring has turned to paramagnetic sensors which are fast enough for breath-by-breath oxygen analysis, giving added confidence in the readings and an indication of oxygen uptake. Smaller infrared CO<sub>2</sub> sensors warm up fast and can be placed mainstream. The photo acoustic CO<sub>2</sub> sensor has improved stability with low background noise. Infrared anesthetic vapor analyzers use multiple wavelengths or frequency sweeping to identify agents. The Raman and mass spectrometers measure all gases, including N<sub>2</sub>. We now need ways to display the gas concentrations, respiratory flow and airway pressure, so the data can be quickly interpreted by the clinician.

## Monitoring O and CO<sub>2</sub> Transport Processes

The final talk by Dr. Barker covered new techniques for monitoring the oxygen and carbon dioxide transport processes. Intraoperative monitoring of these two substances is now available at the levels of respiratory gas, arterial blood, tissue, and venous blood. Less than ten years ago, only respiratory gas levels of O<sub>2</sub> and CO<sub>2</sub> were routinely monitored. Pulse oximetry has made oxygen monitoring in the arterial blood a routine standard of care. Another new technique of arterial blood monitoring is the intraarterial fiber optic photoluminescence technique, which can determine pHa, PaCO<sub>2</sub>, and PaO<sub>2</sub> continuously. Laboratory studies and clinical trials have shown great promise. Transcutaneous gas monitors perform tissue monitoring of both O<sub>2</sub> and CO<sub>2</sub>. These non invasive devices determine O<sub>2</sub> and CO<sub>2</sub> tensions in the heated skin, which reflect both arterial gas content and skin perfusion. At the venous blood level, the fiber optic pul-

## Latin America

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place of origin. Latin American culture lacks the metaphysical and mathematical perception of the world to understand technology. Technology, therefore, to some extent belongs to the world of magic.

This is not to say that the clinical competence of Latin American anesthesiologists is in any way inferior to their North American or European counterparts. In fact, it may well be that the opposite is true; clinical results obtained in Latin America compare favorably with those observed in wealthier countries, in spite of severely limited resources. This is achieved by exercising a high degree of creativity and ingenuity, optimizing the use of equipment and replacing costly techniques with clinical acumen. I believe that Latin American anesthesiology could perhaps serve as a model of cost containment for the rest of the developed world. Also, I believe that there is in Latin America a large reserve of creativity, waiting to be utilized. Hopefully, the Society for Technology in Anesthesia may help in this respect. ♦

## Panel Discussion

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monary artery catheter determines mixed venous oxygen saturation ( $S_{vO_2}$ ) continuously, thereby providing a monitor of the overall well-being of the entire oxygen transport system.  $S_{vO_2}$  will reflect changes in oxygen consumption, arterial blood oxygen saturation, hemoglobin, and cardiac output. Interpretation requires an informed clinician.

The integration of all of these monitors is a challenge to the designers of the anesthesia workstation. As the number and complexity of the data sources increases, it becomes essential to present these data in a well-integrated and interpretable fashion. The success of tomorrow's anesthesia workstation will depend upon not only the accuracy and clinical relevance of these devices but also the manner in which the data are presented to the clinician. ♦

—S.J. Barker

## Clinical Input Needed

*continued from page 28*

whether the total system accuracy is  $+0.2^\circ\text{C}$ ,  $+0.3^\circ\text{C}$ , or  $+0.4^\circ\text{C}$ ? More generally, at what point does a given level of accuracy become a significant factor and influence the clinician's decisions regarding patient care? Responses to these and other questions on the MedSIG Forum Questionnaire will supply the crucial information the OIML needs to complete a relevant recommendation.

We look forward to receiving your responses to the Questionnaire and any other comments or suggestions you may have regarding clinical electronic thermometers. Results of this survey will be published in a future issue of INTERFACE.

We thank Dr. Samuel E. Chappell, Chief of the Standards Management Program at NIST and U.S. Representative to the OIML, for his editorial comments and assistance with this project.

To receive and return the questionnaire using the CompuServe forum see the SIGNatures column in this issue (p. 29). To receive and return the questionnaire by FAX, please contact:  
Alpha Thermistor at 1-800-235-5445  
or send your request to  
FAX # 619-549-4791.

The OIML is an intergovernmental treaty organization with representation by the United States through the National Institute of Standards and Technology (NIST). ♦

## Call for Papers

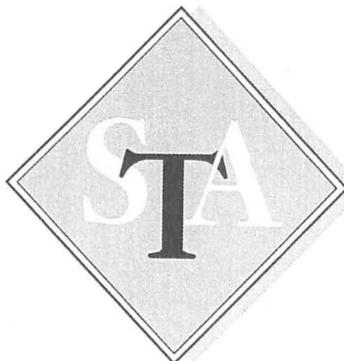
The deadline for receipt of abstracts for the 1993 STA - ISCAIC Annual Meeting is **December 1, 1992**. Abstracts kits will be mailed to all STA members in July. If you are not a member of the Society, but would like to submit an abstract, please contact the National Office to request an abstract kit.

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If you require special assistance in order to attend the 1993 STA - ISCAIC Annual Meeting, please contact the Meeting Department at the STA National Office:

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## Who's Who At the STA National Office

STA is professionally managed by The Phenix Corporation. Listed below are the individuals who are available to assist you. If you have any questions or concerns, please contact the National Office at (804) 379-5513, FAX (804) 379-1386.

### **Jerry Wilhoit, CAE, Executive Director**

- Jerry is the primary liaison between STA and The Phenix Corporation. He is ultimately responsible to STA for all Phenix activities. He has a broad awareness and understanding of STA activities. There are many specialists within The Phenix Corporation that will handle specific projects for STA; however, Jerry will be familiar with the project, or can direct you accordingly.

### **Kim Roberts, Associate Executive Director/Newsletter Coordinator**

- Kim also has an intricate knowledge of STA. She is familiar with many of the day to day affairs of the association and is an excellent resource to call with STA questions or needs. She also works directly with the newsletter editor on the design and coordination of the STA newsletter, *Interface*.

### **Cherie Warfield, Director of Marketing**

- Cherie oversees all meetings and membership marketing. She also coordinates all printed material distributed on behalf of STA. This includes the printing of the meeting programs, the membership brochure, newsletters, membership campaigns and surveys. If you are considering the production of a publication, or want to discuss some marketing ideas, contact Cherie.

### **Kevin Johns, Director of Conventions**

- Kevin manages all aspects of annual meetings, regional meetings and board meetings including menu selection, hotel negotiations, audio-visual, room setups, ground and air transportation and social activities. Any special requests you have for a meeting should be addressed to Kevin.

### **Wendy Kidwell, Exhibit Manager**

- Wendy manages all exhibit functions including service contractors selection, hall layout, prospectus development, and exhibit sales for STA's Annual Meetings.

### **Debra Price, RN, Industry Liaison**

- Deb works extensively with industry, marketing STA. She seeks funding for STA conferences and other requested projects. Contact Deb if you need funding for a Board approved project, or if you have a lead or potential supporter.

### **Brenda Jones, Accounting Coordinator**

- Brenda develops the STA operating statements and oversees the fiscal affairs of the society. She pays the bills and collects the revenues. If you have any questions on the status of an expense report, call Brenda.

### **Patty Wray, Membership Services Coordinator**

- Patty oversees the processing of all STA membership applications, dues and meeting registrations. If you have questions on the status of any of these items, contact Patty.

### **Linda Dismore, Administrative Coordinator**

- Linda is Jerry's Secretary. She coordinates the word processing of most STA correspondence. If you need clerical assistance with a project, Linda is a great resource.

### **Marcia Borton, Production Department Manager**

- Marcia oversees all distribution and copying. If you need supplies i.e. letterhead, envelopes, etc., or a mail list, call Marcia.

### **Cindy Forman, Receptionist**

- Cindy answers the telephone and handles general information requests.



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