To the Editor:
I feel compelled to comment upon the sixth unit of the current \textit{AANA Journal} Course: "Advanced scientific concepts: Update for nurse anesthetists—The Henderson:Hasselbalch equation in clinical anesthesia decisions" by Dr. M. Catchpole (February 1988 \textit{AANA Journal}).

Under "Treatment of acidosis and alkalosis, Example 1", Dr. Catchpole discusses the treatment of a patient with the following blood gas results: \( pH = 7.19, \text{HCO}_3^- = 24 \text{mEq/L}, \text{PCO}_2 = 65 \text{mmHg}, \text{O}_2 \text{Sat} = 82\%, \text{PO}_2 = 74 \text{mmHg} \). She recommends that the anesthetist calculate the deficit in bicarbonate which she states is "possible diabetes." Using the recommended formula the total deficit in bicarbonate is 147 mEq/L and Dr. Catchpole states "the practitioner can safely give this much HCO$_3^-$ without taking a blood gas measurement." The treatment fails to address the existing hypoxia.

There is no clinical history given with the blood gases, a problem in the context of presenting methodology with which to deal with \textit{clinical} problems. Dr. Catchpole treats this patient as if he is a chronic bronchitic who is normally hypoxemic with compensated respiratory acidosis, and who has developed a metabolic acidosis. Yet this type of blood gas result is most usually seen in the setting of acute respiratory acidosis and hypoxemia due to hypoventilation\(^1\) and the treatment of choice is hyperventilation, ventilation and oxygen therapy to correct the acid base abnormality and hypoxemia.

Since this article is part of the \textit{AANA Journal} Course, I feel this interpretative ambiguity should be examined in order to avoid difficulties with the testing process and also to discuss the common cause and treatment of arterial blood gas results wherein the patient has a low pH, elevated \text{PCO}_2, normal bicarbonate and low \text{PO}_2.

CHARLES E. GRIFFIS, CRNA, MS
Clinical instructor
UCLA Program of Nurse Anesthesia
Los Angeles, California

REFERENCES

Response:
Mr. Griffis is correct that very similar blood gases could be found in an acute respiratory acidosis with hypoxemia. One would \textit{expect} to find in an acute situation that is not complicated by a metabolic problem, an HCO$_3^-$ of about 26.5 mEq/L, not very different from the value given. The reader will note, however, that the example is prefaced with the statement that this is "a patient with known COPD." These might be normal oxygen levels for him. Complete removal of a "chronic" hypoxia might well remove the patient's drive to breathe, and cause respiratory arrest.

Again, as stated in the article, at no time will the anesthetist be making evaluations without either a patient or a history. Usually both are available. Thus the metabolic component as well as the respiratory component in the acidosis would be easier to evaluate. How is the patient responding to the levels of oxygen present? Perhaps the hypoxic drive will have to be sacrificed to increase these oxygen levels.

In this example the bicarbonate is not at the expected level for a patient with COPD, a patient with chronic respiratory acidosis who should be maximally compensated by an increase in the HCO$_3^-$ of 4 mEq/L for every 10 mmHg pressure increase in CO$_2$. The expected metabolic component, HCO$_3^-$ should be 34 mEq/L. The metabolic abnormality might be diabetes. Bicarbonate could be given as described without overdosing the patient even if the extracellular fluid alone is deficient. Obviously, other treatments would be initiated prior to, or simultaneously with, the treatment described. There was no intent by the author to discuss total care of this patient.

MATTILOU CATCHPOLE, CRNA, PhD
School of Health and Human Services
Sangamon State University
Springfield, Illinois

Test Yourself Answers
(Questions appeared on page 374.)

1. Verapamil is most commonly used as an antiarrhythmic agent in atrial tachyarrhythmias. Nifidipine and diltiazem are most useful as antianginal agents although nifidipine has beneficial antihypertensive activity. Nifedipine is administered as an antihypertensive agent.

2. Since the SA and AV nodes are primarily "calcium dependant" pacemakers, they play a critical role in atrial conduction and are the logical sites of action for a calcium antagonist drug. The ventricular conduction system and muscle are primarily "sodium dependant," therefore ventricular arrhythmias exhibit little sensitivity to calcium antagonists. They respond to Class 1 antiarrhythmics such as lidocaine and quinidine.

3. The calcium antagonists produce their beneficial antianginal action via two mechanisms. First, they produce vasodilation which reduces afterload lowering cardiac demand. Second, they cause coronary dilation which improves myocardial oxygenation.

4. The common side effects include bradycardia, hypotension, AV nodal block, nausea, vomiting, pedal edema and constipation.

5. A patient on calcium antagonist therapy should be continued on their medication throughout the operative period. Anesthetic techniques should be formulated with consideration of the cardiac depressant action of these drugs. Verapamil may be administered for atrial tachyarrhythmias and nifedipine for angina or hypertension as described.
Regonol® (pyridostigmine bromide) Injection, USP

BRIEF SUMMARY—(Please consult full package insert, enclosed in every package, before using Regonol.)

INDICATIONS—Pyridostigmine bromide is useful as a reversal agent or antagonist to nondepolarizing muscle relaxants.

CONTRAINDICATIONS—Known hypersensitivity to anticholinesterase agents; intestinal and urinary obstructions of mechanical type.

WARNINGS—Pyridostigmine bromide should be used with particular caution in patients with bronchial asthma or cardiac dysrhythmias. Transient bradycardia may occur and be relieved by atropine sulfate. Atropine should also be used with caution in patients with cardiac dysrhythmias. When large doses of pyridostigmine bromide are administered, as during reversal of muscle relaxants, prior or simultaneous injection of atropine sulfate is advisable. Because of the possibility of hypersensitivity in an occasional patient, atropine and antishock medication should always be readily available. When used as an antagonist to nondepolarizing muscle relaxants, adequate recovery of voluntary respiration and neuromuscular transmission must be obtained prior to discontinuation of respiratory assistance and there should be continuous patient observation. Satisfactory recovery may be defined by a combination of clinical judgment, respiratory measurements, and observation of the effects of peripheral nerve stimulation. If there is any doubt concerning the adequacy of recovery from the effects of the nondepolarizing muscle relaxant, artificial ventilation should be continued until all doubt has been removed.

Use in Pregnancy—The safety of pyridostigmine bromide during pregnancy or lactation in humans has not been established. Therefore its use in women who are pregnant requires weighing the drug's potential benefits against its possible hazards to mother and child.

ADVERSE REACTIONS—The side effects of pyridostigmine bromide are most commonly related to overdosage and generally are of two varieties, muscarinic and nicotinic. Among those in the former group are nausea, vomiting, diarrhea, abdominal cramps, increased peristalsis, increased salivation, increased bronchial secretions, miosis, and diaphoresis. Nicotinic side effects are comprised chiefly of muscle cramps, fasciculation, and weakness. Muscarinic side effects can usually be counteracted by atropine. As with any compound containing the bromide radical, a skin rash may be seen in an occasional patient. Such reactions usually subside promptly upon discontinuance of the medication. Thrombophlebitis has been reported subsequent to intravenous administration.

DOSEAGE AND ADMINISTRATION—When pyridostigmine bromide is given intravenously to reverse the action of muscle relaxant drugs, it is recommended that atropine sulfate (0.6 to 1.2 mg) or glycopyrrolate in equipotent doses be given intravenously immediately prior to or simultaneous with its administration. Side effects, notably excessive secretions and bradycardia, are thereby minimized. Reversal dosages range from 0.1 to 0.25 mg/kg. Usually 10 or 20 mg of pyridostigmine bromide will be sufficient for antagonism of the effects of the nondepolarizing muscle relaxants. Although full recovery may occur within 15 minutes in most patients, others may require a half hour or more. Satisfactory recovery can be evident by adequate voluntary respiratory measurements and use of a peripheral nerve stimulator device. It is recommended that the patient be well ventilated and a patent airway maintained until complete recovery of normal respiration is assured. Once satisfactory reversal has been attained, recautionalization has not been reported.

Failure of pyridostigmine bromide to provide prompt (within 30 minutes) reversal may occur, eg, in the presence of extreme debilitation, carcinomatosis, or with concomitant use of certain broad-spectrum antibiotics or anesthetic agents, notably ether. Under these circumstances, ventilation must be supported by artificial means until the patient has resumed control of his respiration.

HOW SUPPLIED—Regonol is available in:
5 mg/mL:
2 mL ampuls—boxes of 25—NDC-0052-0460-02
5 mL vials—boxes of 25—NDC-0052-0460-05


A reversal agent with significant advantages.

- Low incidence of cardiovascular effects with the anticholinergic glycopyrrolate.1,2
- Few muscarinic side effects.2
- Wide therapeutic index.2
- Long duration of action.2

Contraindicated in patients with known hypersensitivity to anticholinesterase agents or mechanical intestinal/urinary obstructions. Use with particular caution in patients with bronchial asthma or cardiac dysrhythmias.

See adjacent brief summary of prescribing information.
Now, savings are no accident.
Introducing the new
Hespan®
(hetastarch)
Plastic Bag

The new Hespan Plastic Bag saves time, work—and money. There's nothing accidental about that. Savings are built right in.

Set-up is fast and easy, with the readily accessible extended butterfly administration port. For reliable tracking of therapy, the bag has easy-to-read, 50 mL incremental markings. The easy-opening overwrap is clear for instant product identification, and leakage—although unlikely—can be spotted in seconds.

Plastic construction means no problems with cracking or breakage. The bag is flexible, to allow for rapid, pressurized infusion in emergencies. And it contains very little air to minimize the risk of air infusion.

Best of all, the Hespan Plastic Bag is so economical, albumin and PPF can cost your hospital tens of thousands of dollars more.

So, for the added advantage of plastic—plus the savings of Hespan itself—stock the new Hespan Plastic Bag in your pharmacy, and where it's needed throughout the hospital.

New
Hespan® 500-mL
(hetastarch)
Plastic Bag

Compact, lightweight shelf cartons for stat-stocking in trauma, the OR, and other emergency-oriented units where it's crucial to have enough Hespan—fast.
Hespan®
(6% hetastarch in 0.9% sodium chloride injection)

Contraindications
Hetastarch is contraindicated in patients with severe bleeding disorders or with severe congestive cardiac and renal failure with oliguria or anuria.

Warnings
Large volumes may alter the coagulation mechanism. Thus, administration of hetastarch may result in transient prolongation of prothrombin, partial thromboplastin clotting times. With administration of large doses, the physician should be alert to the possibility of transient prolongation of bleeding time. Hematocrit may be decreased and plasma proteins diluted excessively by administration of large volumes of hetastarch. Usage in Leukapheresis. Significant declines in platelet counts and hemoglobin levels have been observed in donors undergoing repeated leukapheresis procedures due to the volume expanding effects of hetastarch. Hemoglobin levels usually return to normal within 24 hours. Use over extended periods: Hespan has not been adequately evaluated to establish its safety in situations other than leukapheresis that require frequent use of colloidal solutions over extended periods. Certain conditions may affect the safe use of Hespan on a chronic basis. For example, in patients with chronic hemorrhage where Hespan is used repeatedly over a period of days for the prevention of cerebral vasospasm, significant clinical bleeding may occur. Hemodilution by hetastarch and saline may also result in 24 hour declines of total protein, albumin, calcium and fibrinogen values. Usage in Pregnancy: Reproductive studies have been done in mice with no evidence of fetal damage. Relevance to humans is not known since hetastarch has not been given to pregnant women. Therefore, it should not be used in pregnant women, particularly during early pregnancy, unless in the judgment of the physician the potential benefits outweigh the potential hazards. Usage in Children: No data available pertaining to use in children. The safety and compatibility of additives have not been established.

Precautions
The possibility of circulatory overload should be kept in mind. Special care should be exercised in patients who have impaired renal clearance since this is the principal way in which hetastarch is eliminated. Caution should be used when the risk of pulmonary edema and/or congestive heart failure is increased. Indirect bilirubin levels of 0.83 mg% (normal 0.0-0.7 mg%) have been reported in 2 out of 20 normal subjects who received multiple hetastarch infusions. Total bilirubin was within normal limits at all times, indirect bilirubin returned to normal by 96 hours following the final infusion. The significance, if any, of these elevations is not known; however, caution should be observed before administering hetastarch to patients with a history of liver disease. Regular and frequent clinical evaluation and laboratory determinations are necessary for proper monitoring of hetastarch use during leukapheresis. Studies should include CBC, total leukocyte and platelet counts, leukocyte differential count, hemoglobin, hematocrit, prothrombin time (PT), and partial thromboplastin time (PTT). Hetastarch is nonantigenic; however, allergic or sensitivity reactions have been reported (see Adverse Reactions). If such reactions occur, they are readily controlled by discontinuation of the drug and, if necessary, administration of an antihistaminic agent.

Adverse Reactions
The following have been reported: vomiting, mild temperature elevation, chills, itching, submaxillary and parotid glandular enlargement, mild influenza-like symptoms, headaches, muscle pains, peripheral edema of the lower extremities, and anaphylactoid reactions consisting of periorbital edema, urticaria, and wheezing.

Dosage and Administration
Dosage for Acute Use in Plasma Volume Expansion: Hespan® is administered by intravenous infusion only. Total dosage and rate of infusion depend upon the amount of blood or plasma lost. In adults, the amount usually administered is 500 to 1000 mL. Doses of more than 1500 mL for the typical 70 kg patient (approximately 20 mL per kg of body weight) are usually not required, although higher doses have been reported in postoperative and trauma patients where severe blood loss has occurred. In acute hemorrhagic shock, administration rate approaching 20 mL per kg per hour may be used; in burn or septic shock it is usually administered at slower rates.

Dosage in Leukapheresis: In continuous-flow centrifugation (CFC) procedures, 250 to 700 mL hetastarch is typically infused at a constant fixed ratio, usually 1.8 to venous whole blood. Multiple CFC procedures using hetastarch of up to 2 per week and a total of 7 to 10 have been reported to be safe and effective. Adequate data are not available to establish the safety of more frequent or a greater number of procedures.

How Supplied
Hespan® (6% hetastarch in 0.9% sodium chloride injection) is supplied as a sterile and nonpyrogenic solution.
NDC 0094-0037-05 500 mL intravenous glass bottles
NDC 0094-0037-44 500 mL intravenous plastic containers

Exposure of pharmaceutical products to heat should be minimized. Avoid excessive heat. Protect from freezing. It is recommended that the product be stored at room temperature (25°C), however, brief exposure up to 40°C does not adversely affect the product.

Caution: Federal (USA) law prohibits dispensing without prescription.

Distributed by
Du Pont Critical Care
Waukegan, IL 60085

Rev: March, 1988
Printed in USA
A43083

CRNA/Eligible
Immediate full-time position available in modern 500+ bed general hospital. All types of surgery except open heart. Located on Lake Ontario near skiing, boating, Adirondack mountains and the Finger Lakes resort areas. Competitive salary and benefits. Resumes may be forwarded in confidence to:

Victoria Wise, Employment Manager
ROCHESTER GENERAL HOSPITAL
1425 Portland Avenue Rochester, NY 14621

Rochester General Hospital
The Specialists in Caring

An Equal Opportunity Employer M/F

CRNAs
The Right Location. The Right Time.

If you’re an experienced CRNA with a California license or license eligibility, and you’re looking for the right opportunity, in the right location, take a look at Kaiser Permanente.

We have immediate full-time, part-time and per diem positions available at many of our nine full-service medical centers located throughout Southern California.

Southern California offers many advantages including mild winters, nearby mountain skiing, beautiful beaches and a wide range of cultural and recreational opportunities. To help you take advantage of them, we offer an attractive compensation and benefits package — in addition to our supportive working environment. If our location and opportunities sound right for you, this is the right time to call us collect at (818) 405-3224, or send resume to: Terry McLeod, Professional Recruiter, Dept.J-4308, 393 E. Walnut Street, 7th Floor, Pasadena, CA 91188-8854.

Equal Opportunity Employer

Kaiser Permanente
Good People. Good Medicine.
Nurse Anesthetist CRNA

Our modern voluntary teaching hospital located in Manhattan, offers a challenging opportunity in its Department of Anesthesiology (O.R. & O.B.). Must be certified Nurse Anesthetist. Would consider a recent graduate to GROW WITH US.

Excellent salary and benefits program. Upper East Side location near museums, shops and the excitement of mid-town Manhattan. Send resume with salary requirements to:

Margaret McKenna
Human Resources Department
LENOX HILL HOSPITAL

100 E. 77th St.,
New York, NY 10021
an equal opportunity employer

RHODE ISLAND:
State of Excellence in Health Care

NURSE ANESTHETISTS

As a Nurse Anesthetist at Rhode Island Hospital, the state’s Trauma Center, your skills and knowledge will be challenged by a diversified caseload including open heart, trauma and pediatric surgery. Rhode Island Hospital is a 719-bed advanced tertiary care medical center and the primary affiliate with the Brown University Program in Medicine. We are currently seeking Nurse Anesthetists who are either Board Certified or eligible for the same to work full-time, part-time or summer only.

Rhode Island Hospital is located in Providence, a delightful city rich in historic interest and exceptional educational and cultural facilities. We’re the ocean state, with over 400 miles of coastline — convenient to Boston, Cape Cod, sailing and ski areas.

We offer excellent benefits and salary commensurate with experience. Please forward resume to Employment Office, Rhode Island Hospital, 593 Eddy Street, Providence, RI 02902, (401) 277-5337. An Equal Opportunity/Affirmative Action Employer.

Introducing a NEW Disposable Monascope

SoftEar™

- A better seal enhances transmission of sound
- SoftEar™ foam earpiece is comfortable
- Connect to chestpiece, esophageal or diastyst stethoscope
- Four foot tubing
- Low cost

Dealer inquiries invited

Sun ∙ Med inc.
P.O. Box 20838, St. Petersburg, FL 33742 1-800-433-2797
IN SHORT SURGICAL PROCEDURES, AN OPTIMAL OPIOID ANESTHETIC FOR

MOMENT-TO-MOMENT CONTROL

RAPID ONSET OF ACTION
for prompt control of hemodynamic response to surgical stimulation*

SHORT DURATION OF ANALGESIC ACTION
permits titrating to patient response

PROMPT RECOVERY in short-stay procedures¹

world leader in anesthesia research

JANSSEN PHARMACEUTICA

© Janssen Pharmaceutica Inc. 1988 JPH-AL-OMH
RAPID-ACTING

Alfenta
(alfentanil HCl) Injection ®

A PHARMACOKINETIC PROFILE THAT PERMITS FLEXIBILITY OF DOSING TECHNIQUE

BOLUS/INCREMENTAL ADMINISTRATION
for short procedures lasting up to 30 minutes in spontaneously breathing patients, or for procedures lasting 30 to 60 minutes in intubated patients

CONTINUOUS INFUSION
for procedures lasting more than 45 minutes in intubated patients

*As with other opioids, hypotension and bradycardia have been reported.
*As with all potent opioids, appropriate postoperative monitoring should be employed to ensure that adequate spontaneous breathing is established and maintained.
The duration and degree of respiratory depression and increased airway resistance usually increase with dose, but have also been observed at lower doses. Because of the possibility of delayed respiratory depression, monitoring of the patient must continue well after surgery. Skeletal muscle rigidity is related to the dose and speed of administration of ALFENTA. Dosage should be individualized in each case.

See following page for brief summary of Prescribing Information.
RAPID-ACTING
Alfenta-
(alfentanil HCl) Injection

AN OPTIMAL OPIOID ANESTHETIC FOR MOMENT-TO-MOMENT CONTROL
BEFORE AND DURING SURGERY... THE FOLLOWING IS A BRIEF SUMMARY.

CAUTION: Federal Law Prohibits Dispensing Without Prescription

DESCRIPTION: ALFENTA is a sterile, non-pyrogenic, preservative-free aqueous solution containing alfentanil hydrochloride, a synthetic opioid analgesic, per ml of alfentanil base for subcutaneous injection. The solution, which contains sodium chloride for tonicity, has a pH range of 4.0-6.0

CONTRAINDICATIONS: ALFENTA (alfentanil hydrochloride) is contraindicated in patients with known hypersensitivity to the drug.

WARNINGS: ALFENTA should be administered only by persons specifically trained in the use of intravenous and general anesthetic agents and in the management of respiratory effects of alfentanil.

AN OPIOID ANTAGONIST RESUSCITATIVE AND INTUBATION EQUIPMENT AND OXYGEN SHOULD BE READILY AVAILABLE.

BECAUSE OF THE POSSIBILITY OF DELAYED RESPIRATORY DEPRESSION, MONITORING OF THE PATIENT MUST CONTINUE WELL AFTER SURGERY.

ALFENTA (alfentanil hydrochloride) when administered in initial dosages up to 20 µg/kg may cause skeletal muscle rigidity, particularly of the truncal muscles. Incidence and severity of muscle rigidity is usually dose related. Administration of ALFENTA in anesthetic reduction dosages (above 100 µg/kg) will consistently produce muscle rigidity with no apparent adverse effect. The onset of muscle rigidity usually occurs sooner with higher than with other opioids. ALFENTA may produce muscle rigidity that involves all skeletal muscles, including those of the neck and axilla, and may be reduced by: 1) routine methods of administration of neuromuscular blocking agents for balanced opioid anesthesia; 2) administration of up to 1/4 of the total paralyzing dose of a neuromuscular blocking agent just prior to administration of alfentanil at dosages up to 100 µg/kg following loss of consciousness; 3) a full paralyzing dose of a neuromuscular blocking agent should be administered prior to the institution of balanced opioid anesthesia; or 4) selective administration of ALFENTA and a full paralyzing dose of a neuromuscular blocking agent when ALFENTA is used in rapidly administered anesthetic dosages (above 100 µg/kg).

The neuromuscular blocking agent should be appropriate for the patient's cardiovascular status. Adequate facilities should be available for postoperative monitoring and ventilation of patients administered ALFENTA. It is essential that these facilities be sufficiently equipped to handle all degrees of respiratory depression.

PRECAUTIONS: DELAYED RESPIRATORY DEPRESSION, RESPIRATORY ARREST, BLOOD PRESSURE, AND HYPOTENSION HAVE ALSO BEEN REPORTED. THEREFORE, IT IS ESSENTIAL TO BE MONITORED FOR THESE CONDITIONS.

General: The initial dose of ALFENTA (alfentanil hydrochloride) should be appropriately reduced in elderly and debilitated patients. The effect of the initial dose should be considered in determining the dosage in obese patients (more than 20% above ideal body weight). The dosage of ALFENTA should be determined on the basis of lean body weight.

In general, the dose of ALFENTA required to produce anesthesia, as determined by appearance of delta waves in EEG, was 50% lower in geriatric patients than that needed in healthy young patients.

In patients with compromised liver function and in geriatric patients, the plasma clearance of ALFENTA may be reduced and postoperative recovery may be prolonged. Induction doses of ALFENTA should be administered slowly (over three minutes). Administration may produce vasodilation and a transient decrease in blood pressure. The hemodynamic effects of a particular muscle relaxant and the degree of skeletal muscle relaxation required should be considered in the selection of a neuromuscular blocking agent.

Administering an anesthetic induction dose of ALFENTA, requirements for volatile inhalation anesthetics or ALFENTA infusion reduced by 50% for the first hour of maintenance.

Administration of ALFENTA infusion should be discontinued at least 15-30 minutes prior to the end of surgery.

Respiratory depression caused by opioid analgesics can be reversed by opioid antagonists such as naloxone. Because the duration of opioid depression produced by ALFENTA may last longer than the duration of opioid antagonism produced by the opioid antagonist, appropriate surveillance should be maintained. As with other drugs, profound nausea is accompanied by respiratory depression and diminished sensitivity to CO2 stimulation which may persist into or recur in the postoperative period. Intercostal hyperventilation may further alter postoperative respiratory response. Appropriate postoperative monitoring should be employed. Partial nausea and large doses of ALFENTA, to ensure that adequate spontaneous breathing is established and maintained in the absence of stimulation prior to discharging the patient from the recovery area.

Head Injuries: ALFENTA may obscure the clinical course of patients with head injuries.

In patients with bright light or low vision, ALFENTA should be used with caution in patients with pulmonary disease, increased respiratory rate, or who are potentially compromised respiration. In such cases, opioids may additionally decrease respiratory drive and increase airway resistance. During anesthesia, this can be managed by assisted or controlled respiration.

Impaired Hepatic or Renal Function: In patients with liver or kidney dysfunction, ALFENTA should be administered at a reduced dosage. The importance of the organs in the metabolism and excretion of ALFENTA has not been fully evaluated.

Drug Interactions: Both the magnitude and duration of the action of the various system and cardiovascular effects may be enhanced when ALFENTA is administered in combination with other CNS depressants such as barbiturates, benzodiazepines, and other opioids. Postoperative respiratory depression may be enhanced or prolonged by these agents. In such cases of combined treatment, the dose of one or both agents should be reduced. Limited clinical experience indicates that requirements for volatile inhalation anesthetics are reduced by 50-50% for the first hour. (50 minutes following ALFENTA administration.

Perioperative administration of drugs affecting hepatic blood flow or enzyme function may reduce plasma clearance and prolong opioid effects.

Cardiovascular, Metabolic, and Inflammation of Fertility: No long-term animal studies of ALFENTA have been performed to evaluate carcinogenic potential. The mouse neoform test in female rats and the dominant lethal test in female rats were negative. A single intravenous dose of ALFENTA at 50 mg/kg (approximately 40 times the human dose) produced no structural chromosome mutations or induction of dominant lethal mutations. The Ames Salmonella typhimurium plate test with metabolic activation also revealed no mutagenic activity.

Pregnancy Category: ALFENTA has been shown to have an embryocidal effect in rats and rabbits when given in doses 2.5 times the human dose for a period of 40 days or over 30 days. These effects could have been due to maternal toxicity (increased food consumption with increased mortality) following prolonged administration of the drug. No evidence of teratogenic effects has been observed after administration of ALFENTA in rats or rabbits. There are no adequate and well controlled studies in pregnant women. ALFENTA should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Before Prescribing, Please Consult Complete Prescribing Information Of Which The Following Is A Brief Summary.

Labor and Delivery: There are insufficient data to support the use of ALFENTA in labor and delivery.

Placental transfer of the drug has been reported; therefore, use in labor and delivery is not recommended.

Marijuana: In one study of nine women undergoing postpartum tubal ligation, significant levels of ALFENTA were detected in colostrum four hours after administration of 60 µg/kg of ALFENTA, with no detectable levels present after 24 hours. Caution should be exercised when ALFENTA is administered to a nursing woman for postpartum analgesia.

Pediatric Use: Adequate data to support the use of ALFENTA in children under 12 years of age are not available.

ADVERSE REACTIONS: The most common adverse reactions, respiratory depression and skeletal muscle rigidity, are extensions of known pharmacological effects of opioids. See CLINICAL PHARMACOLOGY, WARNINGS and PRECAUTIONS on the management of respiratory depression and skeletal muscle rigidity.

Delayed respiratory depression, respiratory arrest, bradycardia, asystole, arrhythmias and hypotension have also been reported.

The reported incidence of adverse reactions listed in the following table are derived from controlled and open clinical trials involving 1863 patients, of whom 786 received ALFENTA. The controlled trials involved treatment comparisons with ketamine, thiopental sodium, fentanyl and lidocaine. Incidences are based on monitoring and nonmonitoring adverse reactions reported. The comparator employed at an open side effects is influenced by the type of use, e.g., chest wall rigidity has a higher reported incidence in clinical trials of ALFENTA for sedation, and for the type of surgery, e.g., nausea and vomiting have a higher incidence in patients undergoing gynecologic surgery.
With our VITACOMM 140, you never miss a beat.

In fact, you'll never miss a breath or heart sound, a temperature, $O_2$ saturation or blood pressure trend* either with this remarkable new monitor. Omni-directional infrared light and programmable prompts are the reasons.

Now clinicians can maintain constant patient contact from anywhere in the OR, without being mechanically tethered. That's because an infrared light beams all vital data—including amplified heart and breath sounds—directly and privately to your ear with crystal clarity. What you're hearing, of course, is the sound of better risk management. Because nonstop audio feedback of cardiopulmonary sounds, pulse oxygenation and blood pressure means you can concentrate more fully on the patient and your surgical field.

What's more, the VITACOMM 140 from Siemens further reduces the chance of human error by prompting you in its synthesized voice whenever a vital parameter reaches a pre-set limit. It's an invaluable assistant that works hard for you... so you'll never miss a beat.

For more information, call (312) 397-5975 or toll free 1-800-323-1281. Or write us:
Siemens-Elema Ventilator Systems
2360 North Palmer Drive
Schaumburg, IL 60173-3887

*The VITACOMM 140 from Siemens has interface capabilities with popular monitors.

Siemens-Elema... your partner for life.
No peaks & valleys: A smoother road for surgical muscle relaxation

TRACRIUM® Injection by continuous infusion avoids the peaks and valleys associated with intermittent bolus injections, producing a smoother, steady level of relaxation, thereby providing greater control.

In operative procedures lasting longer than one hour, TRACRIUM by continuous infusion provides superior, predictable control unmatched by other neuromuscular blocking agents. Predictable control means a reliable pattern of response can be maintained without spending valuable time on dosage adjustments,¹ and once a steady level of neuromuscular block is attained, your time in the operating room can be used more efficiently and productively. Predictable control also means the effects of neuromuscular blockade are easily reversed, even following extended periods of infusion. Your patients can be in the recovery room faster.

The more control you have over the effects of surgical muscle relaxation, the more time you can devote to specialized and extensive patient monitoring and overall clinical assessment. That adds up to better total patient care.

Infusion: Paving the way to predictable control

The distinctive clinical benefits of TRACRIUM via continuous infusion are, in part, the result of its unique metabolism. Unlike all other neuromuscular blocking agents, TRACRIUM is not dependent on the liver or kidneys for elimination. Clinically, this means you can administer equal doses of TRACRIUM at equal intervals or maintain a relatively constant infusion rate to provide a consistent level of neuromuscular blockade and a more predictable spontaneous recovery.²

TRACRIUM by continuous infusion eliminates the peaks and valleys in surgical muscle relaxation, resulting in a smoother, more predictable road to recovery.
TRACRIUM® INJECTION
(atracurium besylate)
Brief Summary
This drug should be used only by adequately trained individuals familiar with its actions, characteristics, and hazards.

CONTRAINDICATIONS: Tracrium is contraindicated in patients known to have a hypersensitivity to it.

WARNINGS: TRACRIUM SHOULD BE USED ONLY BY THOSE SKILLED IN AIRWAY MANAGEMENT AND RESPIRATORY SUPPORT EQUIPMENT AND PERSONNEL MUST BE IMMEDIATELY AVAILABLE FOR EMERGENCY INTUBATION AND SUPPORT OF VENTILATION, INCLUDING ADMINISTRATION OF POSITIVE PRESSURE OXYGEN. ADEQUACY OF RESPIRATION MUST BE ASSURED THROUGH ASSISTED OR CONTROLLED VENTILATION. ANTIHISTAMINE/STEREOL REVERSAL AGENTS SHOULD BE IMMEDIATELY AVAILABLE.

DO NOT GIVE TRACRIUM BY INTRAMUSCULAR ADMINISTRATION

Tracrium has no known effect on consciousness, pain threshold, or cerebration. It should be used only with adequate anesthesia.

Tracrium injection, which has an acid pH, should not be mixed with alkaline solutions (e.g., barbiturate in the same syringe or administered simultaneously by intravenous infusion through the same needle). Depending on the resultant pH of such mixtures, Tracrium may be inactivated and a free acid may be precipitated.

PRECAUTIONS:

General: Although Tracrium is a less potent histamine releaser than d-tubocurarine or m-tubocurarine, the possibility of substantial histamine release in sensitive individuals must be considered. Special caution should be exercised in administering Tracrium to patients in whom substantial histamine release would be especially hazardous (e.g., patients with clinically significant cardiovascular disease) and in patients with any history (e.g., severe anaphylactoid reactions or asthma) suggesting a greater risk of histamine release. In these patients, the recommended initial Tracrium dose is lower (0.3 to 0.4 mg/kg) than for other patients and should be administered slowly or in divided doses over one minute.

Since Tracrium has no clinically significant effects on heart rate in the recommended dosage range, it will not counteract the bradycardia produced by many anesthetic agents or vagal stimulation. As a result, bradycardia during anesthesia may be more common with Tracrium than with other muscle relaxants.

Tracrium may have profound effects in patients with myasthenia gravis, Eaton-Lambert syndrome, or other neuromuscular diseases in which potentiation of nondepolarizing agents has been noted. The use of a peripheral nerve stimulator is especially important for assessing neuromuscular blockade in these patients. Similar precautions should be taken in patients with severe electrolyte disorders or carcinomas.

The safety of Tracrium has not been established in patients with bronchial asthma.

Drug Interactions: Drugs which may enhance neuromuscular blocking action of Tracrium include: dantrolene, isoflurane, halothane, certain antibiotics, especially the aminoglycosides and polypeptides, theophylline, magnesium sulfate, procainamide, and quinidine.

If other muscle relaxants are used during the same procedure, the possibility of a synergistic or antagonistic effect should be considered.

The prior administration of succinylcholine does not enhance the duration, but quickens the onset and may increase the depth of neuromuscular blockade induced by Tracrium. Tracrium should not be administered until a patient has recovered from succinylcholine-induced neuromuscular blockade.

Carcinogenesis, Mutagenesis, Impairment of Fertility:
Tracrium is a less potent histamine releaser than d-tubocurarine or metocurine. Although Tracrium is a less potent histamine releaser than d-tubocurarine or metocurine, studies in mice and rats have shown that the in vitro dose required to produce histamine release is greater than the in vivo dose required to produce the same effect. As a result, Tracrium is unlikely to produce the same degree of histamine release as these other muscle relaxants.

Pregnancy Category C. Tracrium has been shown to be potentially teratogenic in rabbits, when given in doses up to approximately one-half the human dose. There are no adequate and well-controlled studies in pregnant women. Tracrium should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Lactation and Delivery: It is not known whether muscle relaxants administered during vaginal delivery have immediate or delayed adverse effects on the fetus or increase the likelihood that resuscitation of the newborn will be necessary. The possibility that forcespasm will be necessary may increase. Tracrium (0.3 mg/kg) has been administered to 26 pregnant women during delivery by cesarean section. No harmful effects were observed in the newborn infants, although small amounts of Tracrium were shown to cross the placental barrier. The possibility of respiratory depression in the newborn infant should always be considered following cesarean section during which a neuromuscular blocking agent has been administered. In patients receiving magnesium sulfate, the reversal of neuromuscular blockade may be unsatisfactory and Tracrium dose should be lowered as indicated.

Nursing Mothers: It is not known whether the drug is excreted in human milk. Caution should be exercised when Tracrium is administered to a nursing woman.

Pediatric Use: Safety and effectiveness in children below the age of 1 month have not been established.

ADVERSE REACTIONS:

Observed in Controlled Clinical Studies: Tracrium produced few adverse reactions during extensive clinical trials. Most were suggestive of histamine release (see Precautions Section). The overall incidence rate for clinically important adverse reactions was 7.83% or 0.8%.

Most adverse reactions were of little clinical significance unless they were associated with significant hemodynamic changes. Substantial vital sign changes greater than or equal to 30% observed in 530 patients, without cardiovascular disease, were as follows: in those patients given the recommended initial dose of 0.3 to 0.4 mg/kg, mean arterial pressure increased in 2.8% and decreased in 2.1% of patients while the heart rate increased in 2.2% of these patients. At doses of > 0.6 mg/kg, 12.4% of the studied patients had a decrease in mean arterial pressure while 4.8% had an increase in heart rate. At doses < 0.3 mg/kg, mean arterial pressure increased in 1.9% and decreased in 1.1% of patients, while heart rate increased in 1.6% and decreased in 0.8% of these patients.

Observed in Clinical Practice: Based on clinical experience in the U.S. and the United Kingdom of approximately 3 million patients given Tracrium the following adverse reactions are among the most frequently reported: General: Allergic reactions (anaphylactic or anaphylactoid) which, in rare instances, were severe (e.g., cardiac arrest, Masosodium) inadequate, prolonged block, Cardiovascular: Hypotension, vasodilation (flushing), tachycardia, bradycardia, Respiratory: Dyspnea, bronchoconstriction, laryngospasm, laryngospasm, intubation, injection site reaction, rash, urticaria, injection site reaction.

Spasm, laryngospasm; approximately 3 million patients given Tracrium, the following adverse reactions are among the most frequently reported: General: Allergic reactions (anaphylactic or anaphylactoid) which, in rare instances, were severe (e.g., cardiac arrest, Masosodium) inadequate, prolonged block, Cardiovascular: Hypotension, vasodilation (flushing), tachycardia, bradycardia, Respiratory: Dyspnea, bronchoconstriction, laryngospasm, laryngospasm, intubation, injection site reaction, rash, urticaria, injection site reaction.

Methodist
The Methodist Hospital
Houston, Texas
CRNAs
The Methodist Hospital, located in Houston's world-renowned Texas Medical Center is reaching new heights as we expand to over 1500 beds this year. As the primary teaching hospital for the Baylor College of Medicine, we have integrated teaching and research together with our mission of providing the finest patient care in the world. Because of our unprecedented growth, we are seeking qualified applicants to join our staff of 45 CRNAs and 30 MDs.

We offer:

• A 40-hour work week without call or weekend duty
• A most competitive salary and benefits package, including 3 weeks vacation
• $1,000 education allowance, plus one week education
• Relocation assistance

If you would like to make a commitment to a progressive organization where management cares about your professional development, please call our professional recruitment office COLLECT to (713) 790-2186, or send your resume to: The Methodist Hospital, 6888 Fannin, MT 101, Houston, TX 77030.

An Equal Opportunity/Affirmative Action Employer
M/F/H/V.

Educational/ Clinical Coordinator

The Harrisburg Area School of Anesthesia serves a vital nursing anesthesia education role for a large geographical area. To work as a classroom instructor, integrating didactical theory with clinical experiences, as well as to provide administrative assistance to the Director of our fully-accredited school, we are seeking a CRNA who has the desire and capacity to teach.

Candidates should possess a B.S. Degree (M.S. preferred) and 2 more years clinical CRNA experience.

Joining us in this position will place you with a multi-faceted, progressive health-care system located in a beautiful area of Southcentral Pennsylvania where the living is easy and affordable. The salary structure is competitive and the benefits are extensive. To explore this opportunity, please send your resume or call: Ann Anderson, RN, Nurse Recruiter, at (717) 231-8612.

HARRISBURG HOSPITAL
A CAPITAL HEALTH SYSTEM
HARRISBURG, PENNSYLVANIA 17101 2009
an equal opportunity employer
After three years as an Army Intensive Care Nurse, Captain Mary Muench applied for the Nurse Anesthetist course: "For what I want, Army anesthesia is perfect. It gives me more mental stimulation. There's plenty of variety in cases, and being an Army officer is very exciting."

Because Army nurses are commissioned officers, they're given much more responsibility and comprehensive training. Captain Muench explains: "Your first nine months are bookwork, and that's longer than they give you in most civilian programs. "Army Nurse Anesthetists always score high on the national boards. And they can now get a Master's Degree for their Army education."

If you're ready to test your skills as a leader, have a BSN, and are registered to practice in the United States or the U.S. Virgin Islands (or if you're still a student), write: Army Nurse Opportunities, P.O. Box 7713, Clifton, NJ 07015.
What is the preferred anesthetic in North America?
FORANE®... Complete,
(isoflurane, USP)
Preferred in North America

A Complete Anesthetic
(with or without nitrous oxide)
• Unconsciousness
• Amnesia
• Analgesia
• Surgical muscle relaxation

True “Moment-to-Moment” Control
• Little patient-to-patient variability of dose response
• Low blood/gas solubility, for rapid, precise changes in depth

Cardiovascular Stability
• Little myocardial depression

<table>
<thead>
<tr>
<th>Blood/Gas Solubility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent</td>
</tr>
<tr>
<td>Forane®</td>
</tr>
<tr>
<td>Halothane</td>
</tr>
<tr>
<td>Enflurane</td>
</tr>
</tbody>
</table>


- Notable stability of heart rhythm
- Excellent control of blood pressure
- Often beneficial in geriatric anesthesia
Predictable Anesthesia

Rapid Recovery from Anesthesia—with Few Symptoms
- An excellent choice in outpatient anesthesia

Excellent Safety Record
- After 50 million anesthetics, an excellent record of safety
- Low biotransformation—little likelihood of toxic metabolites

The Preferred Anesthetic

Forane® v. Alfenital: Time to Total Recovery

Forane®  (120 min.)
Alfenital  (180 min.)

1  2  3  Hours

Forane® v. Alfenital: Incidence of Nausea and/or Vomiting

Forane®  (14%)
Alfenital  (48%)

Percent of Anesthetic Taken Up Recovered as Metabolites

0  10  20  30  40  50

Forane®  | Enflurane  | Halothane


Anaquest
BOC Health Care
FORANE®
(isoflurane, USP)
Preferred in North America

CAUTION: Federal Law Prohibits Dispensing without Prescription

DESCRIPTION
FORANE (isoflurane, USP) is a nonflammable liquid administered by vaporizing, in a general anesthesia environment, in an anesthetic vaporizing chamber designed for this purpose, and in anesthetic vaporizer designed for this purpose.

Properties:

- Molecular weight:
  - Isoflurane, 184.5
  - Anesthetic gas, 184.5
- Building pressure at 760 mm Hg:
  - Anesthetic gas, 696.3 mm Hg
- Relative density:
  - Anesthetic gas, 1.290
- Specific gravity:
  - Anesthetic gas, 2.0
- Vapor pressure at 24 °C:
  - Anesthetic gas, 230 mm Hg
- Vapor pressure at 35 °C:
  - Anesthetic gas, 410 mm Hg
- Vapor pressure at 40 °C:
  - Anesthetic gas, 580 mm Hg

 properties of vapor pressure calculation:

\[ \text{VM}_{\text{F}} = \text{A} \times \frac{\text{B}}{\text{C}} \]

where:

- A = 193.84
- B = MFP
- C = 26°C ± 1.5

Fraction coefficient at 37 °C:

- Anesthetic gas, 0.41
- Nitrous oxide, 1.43

Ventilation properties at 25 °C, 1 atmosphere, and 90% nitrogen and 10% oxygen:

- Anesthetic gas, 3.68
- Nitrous oxide, 2.96

Lower limit of flammability at 25 °C, 1 atmosphere, and 90% nitrogen and 10% oxygen:

- Anesthetic gas, 9.20
- Nitrous oxide, 7.90

Time to complete anesthesia, 100 Hogben

- Anesthetic gas, 22.3 minutes
- Nitrous oxide, 23.6 minutes

Unusual physiological effects:

- Anesthetic gas, None
- Nitrous oxide, Non-unusual effects

WARNING

Inhalation of anesthetic gases is a rapid process, which may cause unconsciousness or unconsciousness in subsequent inhalation.

- Anesthetic gas, Inhalation of anesthetic gases is not recommended for use in an unconscious patient.
- Nitrous oxide, Inhalation of nitrous oxide is not recommended for use in an unconscious patient.

CLINICAL PHARMACOLOGY

FORANE anesthesia, USP is an anesthetic, USP. The MAC of human anesthesia is 0.028.

WARNING

- Anesthetic gas, Inhalation of anesthetic gases is not recommended for use in an unconscious patient.
- Nitrous oxide, Inhalation of nitrous oxide is not recommended for use in an unconscious patient.

INDICATIONS AND USAGE

FORANE anesthesia, USP may be used for induction and maintenance of general anesthesia.

- Anesthetic gas, Adequate data have not been developed to establish its application in obstetrical anesthesia.
- Nitrous oxide, Adequate data have not been developed to establish its application in obstetrical anesthesia.

CONTRAINDICATIONS

Aerosol sensitivity to FORANE (isoflurane, USP) or to other halogenated agents.

Anaphylactic or severe anaphylactic reaction to FORANE anesthesia USP.

CONTRAINDICATIONS

Aerosol sensitivity to FORANE (isoflurane, USP) or to other halogenated agents.

Anaphylactic or severe anaphylactic reaction to FORANE anesthesia USP.