



Diagnos**t**ics

Bulletin

Sept./Oct. '98

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FYI...

Notes from the Chair

by Carl Mottram, RRT, RPFT

*Never leave that till tomorrow
which you can do today.*
—Benjamin Franklin

By the time this edition of the *Bulletin* is published we will be gathering for the 44th International Respiratory Congress in Atlanta. I would like to extend a personal invitation to all section members to join us at the Diagnostic Section business meeting scheduled for late Monday morning (please check your final program for exact time and place). This meeting gives us an opportunity to share thoughts and ideas with our colleagues in diagnostics. It also offers you, the members, the opportunity to provide feedback to section leaders on the direction the section should take over the coming year. So please make sure you mark this important meeting on your busy conference calendars.

This issue of the *Bulletin* is dedicated to bronchoscopy, and we are extremely pleased to present a review article authored by Udaya B. S. Prakash, MD. Dr. Prakash is a leading

authority on bronchoscopy and holds many leadership positions related to the field, including editor of the journal *Bronchoscopy*.

The wonderful thing about bronchoscopy is that it transcends all aspects of care in the patient with respiratory disease. It is a valuable diagnostic tool, but also has many therapeutic applications. The technology is ever-advancing, and even if it is not in your "bag of tricks" or area of practice, I think it does us all well to review its many functions.

On another note, the *American Thoracic Society's Pulmonary Function Laboratory Management and Procedure Manual* is now available. This comprehensive, literature-referenced manual written by your colleagues in diagnostics is a practical tool to help you manage your pulmonary function lab. The manual includes both a print and electronic form, so you can incorporate and integrate the contents into your own procedure manual. For more information contact the ATS at (212) 315-8821. ■

Turkish RCP Earns First NBRC Credential Awarded in Her Country

Last June, Arzu Ari, MS, PT, CPFT, became the first Turk to obtain an NBRC credential. This credential, which recognizes her as a Certified Pulmonary Function Technician, is a "milestone" toward professional credentialing and recognition for RCPs in Turkey.

Arzu has a history of accomplishments that have established her as a professional leader in her country. She is the First Governor of the Turkish Society for Respiratory Care, which was established in April 1997. She is also a member of the AARC's International Respiratory Care Council.

Arzu earned her Master's Degree at Istanbul University, completing a thesis

on the "Affects of Chest Physical Therapy on Selected Pulmonary Function Tests and Arterial Blood Gases in the Patient with Medium and Severe Chronic Airways Disease." She continues to provide instruction at Istanbul University in physical therapy and respiratory care-related curriculum, and is also employed by Amerikan Hastanesi in Istanbul, where she holds the position of education and special projects coordinator.

The growth and worldwide expansion of the respiratory care profession is only possible through the outstanding professional leadership of RCPs like Arzu Ari. ■

Advances in Bronchoscopy

by *Udaya B. S. Prakash, MD, FRCP(C), FACP, FCCP, Edward Scripps Professor of Medicine, Mayo Medical School and Mayo Graduate School of Medicine, Consultant in Pulmonary, Critical Care, and Internal Medicine, Director of Bronchoscopy, Mayo Medical Center and Mayo Clinic, Rochester, MN*

The field of bronchoscopy has rapidly emerged as a major component of pulmonary and critical care medicine. It is perhaps the most commonly employed invasive diagnostic procedure in pul-

monary diseases. The quality of instrumentation continues to improve, and newer applications have evolved. Many recent developments are still in their infancy, and their future remains to be seen. This article summarizes recent developments in both diagnostic and therapeutic bronchoscopy. It is important for the bronchoscopist to be aware of the newer developments and be cautious in applying the newer techniques in clinical practice. Both the advantages and disadvantages of the newer developments are discussed.

Flexible bronchoscope (FFB)

FFBs, with their larger working channel, permit the bronchoscopist to insert larger biopsy forceps, balloon catheters, laser fibers, and other instruments into the airways to obtain larger biopsies and higher quality specimens, thereby enhancing the diagnostic yield.

Ultra-thin FFBs are available in different diameters (as small as 1.2 mm). These have permitted the examination of the tiny airways of very small infants. The ultra-thin FFBs also enable the bronchoscopist to directly visualize the 8th through 12th branchings of the bronchial tree in adults. This has permitted detection of airway lesions in smaller airways missed earlier by the standard-size FFB. Investigators have been able to introduce an ultra-thin FFB, with a diameter of 1.8 mm, through the 2.6 mm channel of the conventional FFB to perform alveolobronchography. The ultra-thin FFB is useful in the placement and assessment of endotracheal tubes, particularly in patients with trauma, hemorrhage, or spinal instability. They are very helpful in examining the airways through the double-lumen endotracheal tubes. The disadvantages of these instruments include the lack of working channel (thus the inability to suction mucus and blood), smaller bronchoscopic image, somewhat flimsy movement of the distal (flexible) tip, and the delicate structuring that renders it easily damaged with routine handling and thus increases the cost of maintenance.

Videobronchoscope (VB)

The VB consists of a charge-couple device (CCD) at its distal tip. The CCD is essentially a miniature video camera located at the tip of the FFB. The image captured is digitally transmitted to a video processor for display on a television monitor. The image quality with the VB is now very near to that of the rigid broncho-

scope-telescope system. The obvious advantages of VB include the much improved optics, ability to use video monitor to teach bronchoscopy students, light weight of the proximal end of the FFB (without the need to attach earlier heavy "teaching head"), and the ability to digitally record video images for teaching/publishing purposes. The images can be stored in a variety of video formats, including 35 mm, video tapes, floppy diskettes, and laser disks.

There have been some publications claiming that early mucosal (cancerous) changes can be discerned earlier with VB. This assertion has yet to be documented by rigorous studies. It is true that the image quality is far superior and allows for a more accurate and detailed evaluation of mucosal surface, vascular patterns of tracheobronchial mucosa, mucosal folds, and tumor. The disadvantages include the added expense of purchasing video equipment and a computer terminal, and the larger working and storage space required for the bronchoscopy equipment. The ability to view through the head-piece of the FFB is totally lost and the bronchoscopist has to depend on the video monitor to visualize bronchoscopic findings. The image on the monitor is only as good as the monitor. Lack of faithful color images on the video monitor is a real and serious problem. Another concern is the gradual phase-out of all the older FFBs that are still in good working order. As these are replaced by VB, service and repair work may become unavailable, thereby forcing the bronchoscopist to purchase the newer VB. It is important to point out that there are no studies that show that VB is better than the traditional FFB in clinical practice.

Rigid bronchoscope (RB)

The RB, while maintaining its basic structural format, has also undergone serial changes to accommodate specialized procedures such as laser bronchoscopy, stent placement, and dilatation of tracheobronchial stenosis. The newer rigid bronchoscopes allow the passage of flexible bronchoscopes, thereby enabling the bronchoscopist to take advantage of the capabilities of both instruments simultaneously. The major applications for RB include laser bronchoscopy, tracheobronchial stent placement, dilatation of tracheobronchial strictures using balloons and bougies, and removal of foreign bodies, particularly in children.

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Ancillary instruments

Many new instruments designed to be used in conjunction with the FFB continue to appear on the market. Some are designed to increase the diagnostic yield while others are for entirely new applications. A new “needle brush” (a cytology brush with a needle at the distal tip) has been designed for procuring pathologic specimens from peripheral lesions. It is reported to have a higher diagnostic yield in malignant lung masses or nodules than the regular brush and forceps biopsy.

In a well-designed study it was shown that larger flexible biopsy forceps (cup size 3x2x0.9 mm) obtained more tissue in 74% of 27 patients in contrast to small biopsy forceps (cup size 2x1.5x0.6 mm), which obtained more tissue in only 19% of 27 patients. Large forceps also obtained more alveolar tissue in 73% of patients whereas small forceps obtained more alveolar tissue in only 27%. There was no difference in the post-BLB bleeding with either forceps. Potential problems with the use of larger forceps include the inability to pass the forceps through the working channel of smaller adult FFB and difficulty in getting the jaws to open in small peripheral airways.

Bronchoscopic (endobronchial) ultra-sonography (BUS)

BUS includes an echographic camera, a bronchoscopic ultrasonic probe, a video monitor to obtain the echographic image, and the facility to develop ultrasonographic histograms and echo enhancement. BUS has been reported, in preliminary studies, to identify subtle submucosal changes and lesions adjacent (extra-bronchial lymph nodes and other structures) to the airways. Early diagnosis of mucosal cancer and identification of paratracheal, hilar, or mediastinal lymph nodes by BUS may alter the current modes of therapeutic approach to bronchogenic carcinoma. Earlier work from Japan has observed that BUS can clearly delineate the thoracic aorta, pulmonary artery, esophagus, and peribronchial tissues. The probe head's diameter of 6.3 mm limited its insertion into lobar bronchi. In patients with bronchogenic cancer, BUS detected invasion of vessel wall and paratracheal lymph nodes. In a prospective study, BUS identified the presence and estimated the size of subcarinal, tracheobronchial, paratracheal and periesophageal lymph nodes better than CT, with diagnostic rate of malignancy in 72%. Lymph nodes behind air-containing organs (paratracheal lymph nodes) could not be identified.

The major deterrent to the use of BUS

is the inability to maintain fluid-bronchial mucosal interphase during the procedure. Therefore, the tumors within the lung parenchyma are difficult to identify. Some studies have shown that combination of BUS with needle aspiration (USTBNA) has a higher diagnostic yield. Mediastinal anatomy, including vascular structures and lymph nodes, is clearly imaged with endobronchial ultrasonography and USTBNA decreases the number of aspirates required for paratracheal lymph node sampling.

Virtual bronchoscopy

Advances in computer technology have permitted development of virtual reality images of the tracheobronchial tree using data sets derived from helical CT of the chest. The dynamic images thus obtained represent virtual bronchoscopy. Comparison of “virtual bronchoscopy” images with videotaped bronchoscopy images have shown that virtual bronchoscopy simulations accurately demonstrate endobronchial obstructions by tumor, airway distortion and/or ectasia, and extraluminal lesions (lymph nodes). This technique may have a role in pre-bronchoscopy planning, endoscopy training, and/or endobronchial therapy, and merits further study.

The major advantage of this technique is its ability to identify and map extra-bronchial anatomy, namely the relationship of the tracheobronchial tree to the surrounding structures, including blood vessels and lymph nodes. This can be very valuable in the staging of lung cancer and helping the bronchoscopist in planning appropriate procedure, such as bronchoscopic needle aspiration. The improving technology will further refine this technique and thus define a role for virtual bronchoscopy in pre-bronchoscopy planning of diagnostic and therapeutic procedures, endoscopy training, and staging of tumors. The most important aspect to remember is that while virtual bronchoscopy may reveal the endoluminal and extraluminal lesions, bronchoscopic procedures are required to obtain tissue diagnosis.

Laser bronchoscopy

The initial enthusiasm for laser bronchoscopy has waned somewhat. The reasons for this include the high cost of equipment, lack of proper training, need for rigid bronchoscopy in most cases, prolonged duration of the procedure, no improvement in mortality (quality of life is improved), and insufficient number of cases at many centers. However, laser bronchoscopy remains an important adjunct in the treatment of large airway lesions and in dilatation prior to placement of stents. The majority of bronchoscopic

laser therapies utilize Nd:YAG laser. In a series of 1,585 patients who underwent 2,253 Nd:YAG laser therapies over a 11-year period, 78% had non-small cell lung cancer, 6% had small cell lung cancer, 7% had metastatic tumors, and 5% had unclassifiable tumors. Almost all cases were performed under general anesthesia utilizing rigid bronchoscopy. More than 93% showed immediate good results. Complications included 18 hemorrhages, six pneumothoraces, and ten deaths. Laryngeal and subglottic lesions can be treated using CO₂ laser.

Bronchoscopic cryotherapy

The technique of applying extreme hypothermia to endobronchial tumors in an effort to destroy malignant cells has made a recent comeback. Using either a FFB or a RB (usually the latter), liquid nitrogen or nitrous oxide is circulated through a catheter probe (passed through bronchoscopic channel) that freezes the tumor on contact. The contact with the tumor is maintained for several minutes or until the formation of “frost” around the tumor. The tumor undergoes cold-necrosis over the next 48-72 hours. The necrotic tumor is expectorated by the patient. Objective improvement has been reported in 50%-70% of patients. Bronchoscopic cryotherapy has also been applied to treat benign airway strictures. Rigid cryoprobes of 3 mm diameter, for use through the rigid bronchoscopes, and flexible cryoprobes of 2-3 mm diameter for use through FFB are available. Bronchoscopic cryotherapy may become a less expensive alternative to laser therapy for treatment of tracheobronchial neoplasms.

Bronchoscopic diathermy (cautery)

Bronchoscopic electrocautery is an alternative to laser and cryotherapy for the treatment of both benign and malignant tracheobronchial lesions. The instruments available are easier to use in combination with the rigid bronchoscope, although electrocautery probes are also available for larger FFB. Diathermy can also be used for coagulation of bronchoscopically-visible bleeding lesions. Electrocautery is an available, economical tool which has potential value in the diagnosis and therapy of tracheobronchial tumors. The major disadvantage of cauterizing via the bronchoscope is the fact that the coagulation effect stops completely if carbonized tissue covers the surface of the electrode. Repetitive cleaning of the electrode is required, making it a time-consuming procedure. The risk of formation of tracheobronchial stricture secondary to electrocautery therapy itself is a potential complication.

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Brachytherapy

Another method in the adjuvant treatment of endobronchial malignancy involves bronchoscopic (FFB) placement of a radiation source within the bronchial tree so that the tumor is irradiated from within the bronchial lumen. Many use laser therapy or bronchoscopic debulking before placing radiation seeds. More recently, high-dose brachytherapy has been used to treat endobronchial tumors. The major advantage is the relative rapidity with which the treatment can be completed (often on an out-patient basis). Some studies have reported increased risk of significant, occasionally massive, hemoptysis as a complication of high-dose brachytherapy. Severe radiation bronchitis is another complication reported. However, reduction in hemoptysis in 60% and increase in airway diameter in 85% of patients have been described. In some series, patients with submucosal or peribronchial tumors that would not usually be amenable to laser therapy seemed to benefit from high-dose brachytherapy. Low-dose brachytherapy is slightly prolonged (24-48 hours) and requires hospitalization. The choice to use high- versus low-dose therapy remains controversial.

Bronchoscopic phototherapy

Fluorescent compounds such as hematoporphyrin derivative (HpD) and dihematoporphyrin ether (DHE) are well known to function as cancer “tags.” When administered to patients, these chemicals are retained in malignant tissue at higher concentrations than in normal tissue, and emit a characteristic salmon red fluorescence when exposed to light of the proper wavelength. Even though the fluorescent property of HpD and DHE has been used to detect cancers located in the tracheobronchial mucosa, particularly squamous cell carcinoma, the same properties have been used to treat bronchogenic cancers in patients who are surgically unresectable. HpD and DHE also mediate photodynamic chemical reactions which lead to cellular death through the production of toxic radicals including singlet oxygen and the hydroxyl ion. Experimental studies have shown that the photodynamic effect of these compounds may be useful in the treatment of small superficial cancers. Approximately 300 patients have been treated with photodynamic therapy worldwide; nearly a 50% complete response has been observed in tumors that measured <3 cm² in largest surface area. Many patients have received multiple therapies for recurrence or persistence of cancer. Complications include sunburn (if patients are exposed to sunlight after

administration of HpD or DHE), cough productive of blood and necrotic tumor debris, and formation of thick necrotic debris following treatment. The latter may require therapeutic bronchoscopy to remove the thick necrotic debris.

Tracheobronchial prosthesis (stent)

Tracheobronchial stenosis has garnered much interest from bronchoscopists in recent years because of the availability of various techniques to treat this problem. Bronchoscopic dilatation of tracheobronchial stenosis can be accomplished by balloon dilatation, stent placement, and laser therapy. The rigid bronchoscope itself can be used to dilate many strictures. Balloon dilatation can be performed through FFB with a larger working channel. Dilatation balloons designed for esophageal dilatation can be used to dilate airway stenosis. Esophageal bougies can be used through rigid bronchoscopes to dilate tight strictures.

Tracheobronchial stents are being used more frequently to treat both benign and malignant strictures of airways. The market has been flooded with various types of stents for use with rigid bronchoscopy as well as FFB. Several generalizations can be made regarding these stents. Rigid bronchoscopy is the preferred choice of instrument to insert these stents. General anesthesia is required for most stent placements. Special expertise is needed to insert these prostheses. Those inserted via FFB are almost always very difficult to remove with FFB. Frequent bronchoscopy and adjustment of the placement may be necessary. Tumor growth can occur through mesh stents. Retained secretions and obstruction by inspissated mucus is a frequent problem. Most strictures require dilatation of some sort before the stent can be placed. Placement of stents beyond the origin of lobar bronchus is usually not possible, and even if it is accomplished, may not provide much benefit. Most studies have reported that silicone stents are much better tolerated by patients and that they can be easily inserted and removed with the aid of the rigid bronchoscope. Several types of stents can be introduced through the FFB. Removal, however, with FFB is very difficult, if not impossible. In contrast to metal stents, the silicone stents are more likely to migrate. No long-term studies are available to evaluate the side effects and complications. Prospective studies are needed to assess the value of these devices.

Fibrin glue

Fibrin glue and other types of “adhesives” or chemical and organic “plugs” have been used to achieve bronchoscopic closure of bronchopleural fistula and persistent pneumothorax by occluding the

bronchus. The success of this treatment requires precise identification of the bronchial or segmental location of the air leak. This can be accomplished by injections of small boluses of ¹³³Xenon into a number of segmental bronchi through a FFB and identifying the increase in radioactivity in the intercostal drainage tube. A less expensive method is to use a Fogarty balloon to occlude the bronchus in question and observe for the stoppage of air-leak. A FFB is used in most cases. A double lumen catheter can be inserted into the bronchus to be blocked. These can be obtained from commercial vendors, or a triple-lumen pulmonary artery floatation catheter can be modified for this purpose. Injecting the chemicals through the FFB itself may clog the bronchoscopic channel. Equal amounts of cryoprecipitate and tissue thrombin are injected through the catheter to build layer after layer of fibrin glue. Repeated applications may be necessary to achieve good closure. There are several problems with the technique. The technique is time-consuming, and it is not easy to identify the bronchus leading to the fistula or pneumothorax. Fibrin glue is frequently coughed up or slips out of the bronchus. Repeated application may be necessary. Bronchoscopists should recognize that the technique is time-consuming and the results, not infrequently, disappointing.

Bronchoscopic drugs

Glycopyrrolate (Robinul®) has gradually replaced atropine as the antisialagogue. It is better tolerated, has no or negligible effect on cardiac rhythm, and can be administered IM or IV. Recently, inhaled ipratropium has been used, but more studies are needed before it can be recommended as a premedication for bronchoscopy. Midazolam (Versed®) is now the sedative of choice. It can be administered IM or IV. Midazolam is a better amnesic agent than diazepam. Dosage is 0.075 mg/Kg (overall, males require 1.0 mg more than females), but the dosage should be decreased in the elderly. Hypoventilation is a potential side effect; therefore, dosages have to be titrated. It lacks antitussive activity. With increasing sedation, patients lose inhibition to control cough during the procedure. Sedation is reversed by flumazenil 0.4-1.0 mg IV (see below).

Two narcotic sedatives that have become popular are propofol and fentanyl. Propofol is a lipid soluble phenol derivative available as a white aqueous emulsion (contains soybean oil and egg phosphatide in glycerol). It has a large volume of distribution and is rapidly eliminated by hepatic and extrahepatic metabolism. Its

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duration of action is short, and thus it is very useful for outpatient general anesthesia. It is an excellent sedative in small doses but may produce hypotension and myocardial/respiratory depression if given with barbiturates in hypovolemic patients and the elderly. Usual dosage is 50 g/Kg/min IV. Administration of lidocaine 100 mg IV is recommended before propofol because IV propofol is painful.

Fentanyl is a synthetic opioid related to phenyl piperidines. Its analgesic potency is 60 times that of morphine. Fentanyl has rapid onset of action (2 min) with limited duration (30 min) of action. In doses of 0.5-2.0 g/Kg, fentanyl is an excellent addition to Midazolam. Vigorous cough can be suppressed by 50-100 g (may cause chest wall rigidity in higher doses). Alfentanil (less potent) and sufentanil (more potent) are more expensive.

Flumazenil is a receptor-specific benzodiazepine antagonist and is capable of reversing benzodiazepine-induced sedation within 2 min. However, it does not reliably reverse respiratory depression. It is tolerated well in high-risk cardiac patients. The dose is 0.4-1.0 mg IV (increments of 0.1-0.4 mg).

Naloxone is an opiate antagonist that effectively reverses CNS side-effects of all opiates. It reverses opioid-induced respiratory depression without affecting pain relief. Larger doses may terminate analgesia and cause dysrhythmia, hypertension, and pulmonary edema. Dosage is 1-4 g/Kg (use in increments of 25-50 g).

Music has been used to soothe patients' anxiety during bronchoscopy. One study reported that music played to patients through ear phones during bronchoscopy is a simple and inexpensive non-pharmacologic way to improve patient comfort. Other studies on the role of music as an anxiolytic factor during medical procedures have shown conflicting results. During complicated procedures involving many personnel, and when communication among all members of the surgical team is important, a "deafening silence" is preferable to blaring music.

Miscellaneous

Broncholith extraction has been accomplished using bronchoscopic broncholithotripsy. The technique is similar to urolithotripsy. An ultrasonic lithotripter or pulse-dye laser can be used to pulverize the broncholiths in selected cases. Nd:YAG laser has been used to break broncholiths.

A foreign body in pediatric airways has traditionally required rigid bronchoscopic removal. More recently, small-diameter FFB with working channel diameter of 1.0 mm has been used to extract pediatric airway foreign bodies. Urologic instruments

(ureteral stone basket and forceps) can be passed easily through the narrow working channel to capture even large foreign bodies. Nevertheless, it is important to recognize that RB remains the instrument of choice for removal of pediatric airway foreign bodies. Even in adults with tracheobronchial foreign bodies, rigid bronchoscopy is preferable. The success rate with RB in adults is >95%, whereas FFB carries a success rate of about 61% in the removal of adult airway foreign bodies.

Blood clots in the major airways occasionally block the lumen and lead to respiratory distress. Removal of such clots via flexible bronchoscopy is difficult and time-consuming. This is because the clots fragment or the distal ends of the clots are very adherent to the distal bronchial lumen. To overcome this, several bronchoscopists have used intrabronchial instillation of streptokinase to effect endobronchial thrombolysis. Streptokinase has been used in doses of 80,000 to 120,000 U through the working channel of the flexible bronchoscope. No complications have occurred.

Bronchoscopy in AIDS

It is well-established that bronchoscopy and BAL are invaluable in the diagnosis of infections in patients with AIDS and in other (non-AIDS) immunocompromised patients. An interesting finding by the bronchoscopists has been the increasing number of endobronchial lesions observed in patients with AIDS. Tracheobronchial abnormalities in patients with AIDS can be caused by infectious and non-infectious etiologies. In the non-infectious group, endobronchial Kaposi sarcoma is an important entity. Nearly 50% of patients with cutaneous Kaposi sarcoma exhibit endobronchial involvement. Larger lesions may cause lobar or segmental atelectasis. The lesions are characterized by bright red or violaceous raised mucosal lesions. Airway obstruction is negligible. Hemoptysis and hemorrhage following endobronchial biopsy are unusual. Endobronchial lymphoma has been described in patients with AIDS.

Should one obtain both BAL and BLB to establish the diagnosis of *P. carinii* infection? One study has shown that BAL is significantly superior to BLB in detecting *P. carinii*. BLB, on the other hand, is helpful in diagnosing granulomatous inflammation, cytomegalovirus infection, Kaposi's sarcoma, infection caused by acid-fast bacilli, *Cryptosporidium*, and organizing pneumonitis. An important finding from a large study was that 6% of the BAL specimens were uninterpretable and 8% of BLB specimens were inadequate. The degree of current clinical reliance on these procedures is such that open lung biopsy is only occasionally considered in this special group of patients. A

publication (J Bronchol 1996;3:88-95), reported that an additional 8% of PCP diagnoses can be made by BLB and not by BAL alone, and that BLBs were much more important in diagnosing infections other than PCP (40% of all such diagnoses) and noninfectious disorders of the respiratory system (63% were diagnosed by BLB alone).

An important role for BLB in HIV patients and pulmonary infiltrates is in the diagnosis of Kaposi's sarcoma, cytomegalovirus, and other uncommon processes such as lymphoma, etc. Many major medical centers use a staged approach; that is, in patients for whom PCP is a major diagnostic consideration but whose sputa are negative for PCP only a diagnostic BAL is performed initially. BLB is added to the initial BAL if other diagnostic possibilities are considered likely, and if the initial BAL is nondiagnostic despite strong clinical suspicion of PCP, a BLB is performed.

Among the infectious complications of AIDS, several entities produce endobronchial lesions. Infection by Herpes simplex can cause tracheobronchial mucosal vesicles. Infection caused by *M. avium* complex can produce endobronchial nodules and segmental or lobar atelectasis. The endobronchial lesions appear pale white or pink and firm to biopsy. Biopsy specimens show typical tubercle granulomas. Patients with AIDS who develop endobronchial lesions secondary to *M. kansasii* are also described. Cases of Endobronchial mass from *P. carinii* have been described in patients with AIDS. Tracheobronchial invasive aspergillosis with formation of necrotic membrane in the tracheobronchial tree is also seen in patients with AIDS. Actinomycosis has been reported to produce a white-yellow exophytic mass partially obstructing the left main stem bronchus, with accompanying mucosal erythema and edema. Biopsies of the mass showed necrotic material, and the cytologic studies identified actinomycotic granules.

Repeat bronchoscopy within a 30-day period in patients with AIDS and pulmonary process is unlikely to provide a newer diagnosis. Many medical centers do not use the bronchoscopes used in patients with AIDS in non-AIDS patients. There is no scientific basis for this philosophy. Appropriate sterilization procedure should virtually eliminate the risk of transmission of HIV through the bronchoscope.

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FYI . . .

AHA calls on federal government to assist with Y2K issues

With the turn of the century drawing near, hospitals and health systems are diligently working to ensure that the smooth delivery of quality health care is not interrupted by Year 2000 (Y2K) computer problems. But hospitals can't take care of the problem alone, says the American Hospital Association (AHA). The AHA recently warned the Senate Special Committee on the Year 2000 Technology Problem that the federal government must exercise its authority to compel medical device manufacturers to share information on whether their devices are Year 2000 compliant.

"We do not have the legislative or regulatory authority to compel disclosure," says Jennifer Jackson, general counsel and vice president of clinical services at the Connecticut Hospital Association. "We believe that is a job for Congress and the FDA."

Jackson urged Congress to speak directly to manufacturers about the need for prompt, sufficient disclosure, and to

provide the FDA with the necessary resources to ensure timely reporting of information. She called on the FDA to work with public and private groups to maintain a national clearinghouse of information on Y2K compliance status of medical devices. The FDA already features a database on its web site (<http://www.fda.gov>) where manufacturers can voluntarily submit information about the Y2K status of their equipment.

Noting that half of the revenue in hospitals and health systems comes from government programs like Medicare and Medicaid, Jackson also called on the Health Care Financing Administration (HCFA) to take the necessary steps to prevent Y2K problems from delaying routine Medicare payment updates to providers at the turn of the century, a delay HCFA announced recently.

Says Jackson, "A delay in the Year 2000 update adds to hospitals' burden and causes unpredictability for them and their patients." She asked Congress to enact legislation to authorize an alterna-

tive system in the event that payment systems fail entirely because of the date change and requested that Congress establish some form of immunity from liability for providers that have taken steps to prevent Y2K problems. Additionally, she recommended broadening the president's "Good Samaritan" proposal — which shields businesses that share information on solving the Y2K problem from liability — to include protecting providers for treating a patient with a medical device that the manufacturer has assured is Y2K compliant, but has caused harm because it is not. (Source: AHA Press Release)

"Healthy" smokers have early signs of heart disease

Cigarette smoking causes subtle damage to blood vessels, signaling an early stage of heart disease that worsens as smoking continues, say researchers from the University of California at Los Angeles School of Medicine.

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The study involved 33 healthy individuals without chest pain, shortness of breath, artery blockage, or any other evidence of coronary heart disease. Sixteen were long-term smokers whose years of smoking ranged from 11 to 39 years, and 17 were nonsmokers.

None of the participants suffered from high blood pressure, diabetes mellitus, or genetic forms of high cholesterol. None were taking medications. The average levels of total and LDL cholesterol did not differ between the two groups, but average HDL cholesterol was lower among smokers. Two of the smokers and none of the nonsmokers had elevated blood levels cholesterol.

Each participant was injected with N-13 ammonia, a radioactive substance that allows researchers to visualize blood flow, and had a PET scan while resting. This was followed 45 minutes later by a cold pressor test in which the left hand was immersed in icy slush for 45 seconds. Then a second shot of N-13 ammonia was given and the exposure to the ice water continued for another minute as the PET scan recorded blood flow through the heart. Finally, to determine blood vessel dilation, each person received a four-minute infusion of the drug dipyridamole, which increases blood flow to the heart, followed by another injection of N-13 ammonia and further PET scanning.

Results showed that the blood vessels of smokers do not respond as well as those of nonsmokers when the heart needs more blood flow during physical exertion. Smokers averaged about 14% less blood flow to the heart than nonsmokers during the cold pressor testing, and blood flow was impaired even in smokers whose arteries were not obstructed by fat-filled plaque. However, an abnormal blood flow in response to the cold pressor test did correlate with a low ratio of "good" cholesterol to "bad" cholesterol. HDL, or "good" cholesterol, is thought to clear the fatty substances from artery walls. The LDL, or "bad" cholesterol, enters the artery walls and contributes to the creation of the obstructions that impede blood flow to the heart.

Although researchers cannot explain how the loss of blood vessel function occurs in smokers, they note that previous well-accepted research has shown that carbon monoxide, which is abundant in cigarette smoke, damages the endothelial cells that line the interior of blood vessels. Cigarette smoke also contains a number of cell-damaging toxins, and smoking increases the production of angiotensin II, which reduces the activity of nitric oxide, a substance in the

blood that instructs the blood vessels to expand.

The study was published in the July 13 issue of *Circulation: Journal of the American Heart Association*. (Source: AHA Press Release)

Impaired breathing may raise stroke risk—but marriage could lower it

High blood pressure, prior stroke, and having an irregular heartbeat are all well-established risk factors for stroke. Now Australian researchers have added another risk factor to that list: impaired breathing. Their study of the hospital and death records of 2,805 men and women over the age of 60 found that those whose peak expiratory flow was most impaired by chronic bronchitis had a 77% higher risk for having a stroke when compared to those whose breathing was the least impaired.

"The relationship between impaired peak expiratory flow and ischemic stroke has not, to our knowledge, been previously reported," say the authors. "A suggested link between inflammation and atherosclerosis is very topical, especially with recent research on the link between respiratory infection and heart disease. Our data allows the possibility of speculation and extrapolation, but more specific research needs to be done on this link."

Another interesting finding in the study was that marriage may protect against stroke. Investigators found that people who were married had a 30% lower risk of stroke, and married women, in particular, had a 46% lower risk.

The study was published in the June issue of *Stroke: Journal of the American Heart Association*. (Source: AHA Press Release)

Pediatric asthma doesn't benefit from adding salmeterol to corticosteroid therapy

Research has shown that adding salmeterol to a moderate dose of inhaled corticosteroid results in better outcomes for adult asthmatics than simply doubling the corticosteroid dose. Dutch researchers who evaluated the therapy in children, however, found no long-term benefits of such therapy.

They randomized 177 asthmatic children to receive either beclomethasone 200 mcg b.i.d., salmeterol 50 mcg b.i.d., or placebo, in addition to beclomethasone 200 mcg b.i.d. The results showed that while children in the salmeterol group had slightly superior peak expiratory flow rates during the first 24 weeks of therapy, measures of lung function

were about the same for all the groups at the one year follow-up.

The researchers note, however, that growth was significantly slower for the children who received the double dose of beclomethasone, leading them to conclude that increasing the corticosteroid dose is contraindicated in children. (*Am J Respir Crit Care Med* 1998;158:213-219)

Airway inflammation plays a role in childhood asthma

Researchers have traditionally questioned the importance of airway inflammation in asthmatic children. A new study from Australian investigators, however, suggests that airway inflammation is associated with both asthma symptoms and airway hyperresponsiveness (AHR) in this population.

Their study involved 170 children between the ages of eight and 14, 36% of whom had a previous diagnosis of asthma. All of the subjects underwent hypertonic saline challenge, and sputum samples were collected from 167 of the children. Those who had experienced asthma symptoms in the past two weeks were 2.25 times more likely to have significant sputum eosinophilia when compared to those who had not exhibited symptoms. Hyperresponsiveness to hypertonic saline was also strongly associated with higher levels of sputum eosinophils, sputum mast cells, and nasal eosinophils.

The authors conclude that airway inflammation is "an important determinant of asthma symptoms and AHR," and note that induced sputum analysis can be used to evaluate the problem and also holds potential as a monitoring tool. (*Am J Respir Crit Care Med* 1998; 158:36-41 ■)

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