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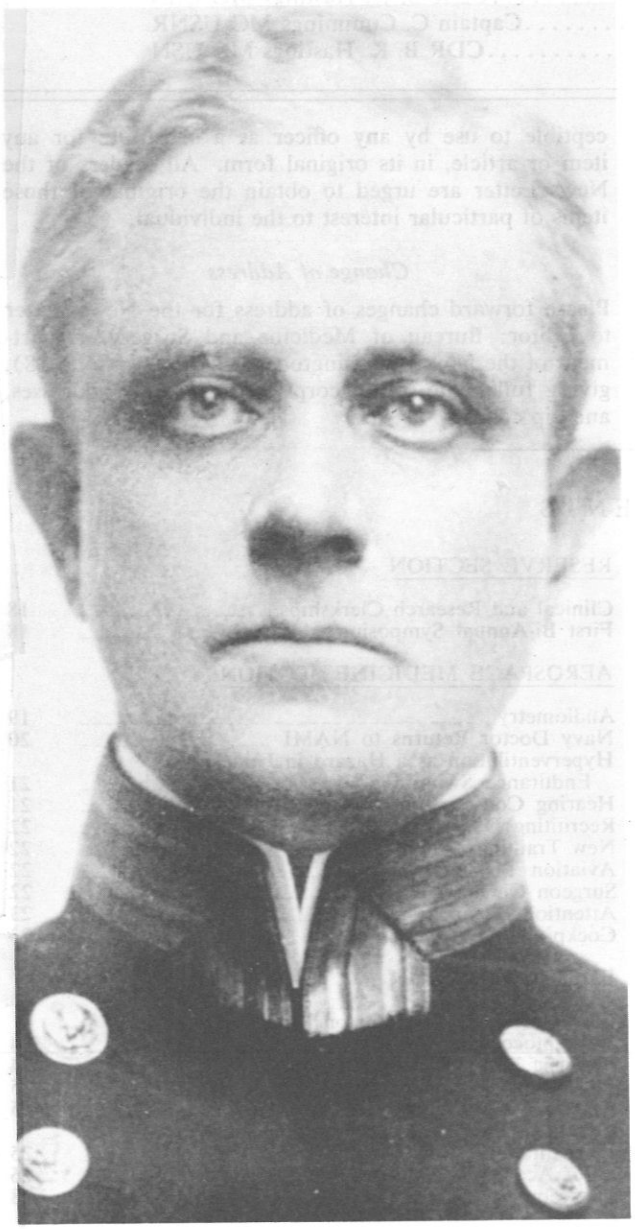

Surgeons General of the Past

(The eighteenth in a series of brief biographies)

Charles Francis Stokes, the eighteenth Chief of the Bureau of Medicine and Surgery and fourteenth Surgeon General of the Navy, was born in Brooklyn, N.Y. on 20 February 1863. He received his medical degree in 1884 from the College of Physicians and Surgeons in New York, was an intern at Bellevue, and became the first house surgeon of New York's newly erected Gouverneur Hospital. After appointment as an Assistant Surgeon in the Navy 1 February 1889, he served on the receiving ship Minnesota in New York and next at the naval hospitals in Mare Island, California, and Yokahama, Japan. During the Spanish-American War, he was operating surgeon aboard the hospital ship Solace, and later was Professor of Surgery at the Naval Medical School. He commanded the hospital ship Relief which supported the Atlantic Fleet that President Roosevelt sent around the world in 1908. President Taft appointed him Surgeon General 5 February 1910, his term lasting until 6 February 1914. RADM Stokes is best known for his invention of the stretcher (named after him) which proved of great value in carrying the sick and injured up and down narrow ladders and through other difficult to negotiate areas aboard ship. It is still used. Surgeon General Stokes carried on his predecessor's work in raising the professional standards of the Medical Corps, and stressed improved training of pharmacists and other corpsmen at the recently inaugurated Hospital Corps School in Norfolk. He instituted prophylaxis which practically ended typhoid in the Navy. His administration planned and built the new naval hospital at Pearl Harbor, and made plans for additional floating hospitals which eventually materialized in the new hospital ships Mercy and Relief. Admiral Stokes was retired from the Navy in June 1917 and died 29 October 1931.

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Policy

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The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

DIAGNOSTIC USEFULNESS AND SAFETY OF TRANSTRACHEAL ASPIRATION*

Robert W. Kalinske MD, Richard H. Parker MD, David Brandt MD, and Paul D. Hoeprich MD, Salt Lake City, Utah, New Eng J Med 266(11):604–608, March 16, 1967.

Accurate interpretation of the significance of the isolation of potentially pathogenic micro-organisms by culture of expectorated respiratory tract secretions is frequently impossible. Often, such material contains micro-organisms not recoverable by more direct means of culturing the lower respiratory tract. The problem cannot be solved by the usual transpharyngeal technics. Bronchoscopy is too specialized and too cumbersome for routine clinical use; in selected patients, however, the possibility of acquiring additional useful information by direct visualization of the lower respiratory tract recommends bronchoscopy. Catheters, peroral and nasal, are invariably soiled with pharyngeal secretions in the course of the generally unsuccessful battle to attain passage through the larynx. Washing of sputum is not always effective in removing oropharyngeal contaminants unless the washing is carried out with tedious repetition. Moreover, washing can never enable distinction of region of origin of sputum as coming from the supralaryngeal or infralaryngeal respiratory tract.

A much simpler method, transtracheal aspiration (that is, the direct, percutaneous, endotracheal aspiration of infralaryngeal respiratory tract secretions), was first proposed by Pecora in 1959. Specimens obtained in this fashion were more often free of pathogens than those obtained from the same patients by bronchoscopy. However, the validity of transtracheal aspiration, the indications for its use and its overall safety have been questioned. The present study was carried out to determine what value transtracheal aspiration might have to patient care on a general medical service.

Materials and Methods

One hundred and two transtracheal aspirations were performed in 94 hospitalized patients with various kinds of bronchopulmonary disease. Sixty-two of the 102 procedures were performed on patients who had received antimicrobial therapy within forty-eight hours before the procedure. Transtracheal aspiration was performed only if there were no abnormalities of the prothrombin time, the partial thromboplastin time and the blood platelets (Wright's stained smear).

Sedation was not used. With the patient in supine position the neck was hyperextended by a pillow placed beneath the shoulders. The anterior aspect of the neck was cleansed with 92 percent isopropyl alcohol; with the use of one percent lidocaine, a small intradermal wheal was produced just inferior to the thyroid cartilage. With an 18-gauge needle, a 30-ml. syringe containing 2 to 4 ml. of sterile 0.9 percent sodium chloride solution was attached to the 8-inch polyethylene catheter from a large-size intravenous catheter set.* The 14-gauge hypodermic needle from the set was then inserted through the cricothyroid membrane (in 10 patients, early in the series, puncture was performed below the cricoid cartilage). With the needle in the trachea and directed caudad, the catheter was rapidly threaded through the needle into the trachea. The 14-gauge needle was then quickly withdrawn, leaving the catheter in place in the trachea. Next, the saline solution was rapidly injected into the trachea, invariably evoking a paroxysm of coughing. At this instant suction was applied, and secretions were aspirated into the catheter and syringe. The catheter was removed and pressure was applied over the puncture site for three to five minutes to assure hemostasis.

A coughed, expectorated specimen or a nasotracheal suction specimen was obtained from each pa-

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*Bardic Intracath, C. R. Bard, Incorporated, Murray Hill, New Jersey.

tient immediately after the transtracheal aspiration was completed. These are referred to as specimens of sputum. All specimens were routinely cultured aerobically at 37°C. in a candle jar with increased humidity on sheep-blood agar, on Fildes peptic-digest blood agar containing 0.7μg. of nafcillin per milliliter and on MacConkey's agar. Seventy-three samples were cultured on an agar medium selective for fungi, modified from the diagnostic medium described by Pagano, Levin and Trejo and on Middlebrook's 7H10 agar. Culturing for fungi or mycobacterium species was performed on the other 29 specimens only when mycotic or tuberculous infection was suspected clinically. Micro-organisms were identified by standard methods. They were labeled "potential pathogens" unless they fell into the group of oropharyngeal bacteria that are rarely responsible for lower respiratory tract infections—that is, alpha-hemolytic or nonhemolytic streptococci, staphylococci that fail to reduce tellurite, neisseria species and fungi not generally considered to be respiratory pathogens, including candida species other than *Candida albicans*.

Transtracheal aspirations were also performed on 13 volunteers who had no evidence of pulmonary disease; these specimens were cultured as described above.

Results

Transtracheal aspiration infrequently led to any complications. Of the 102 patients, subcutaneous emphysema developed in five; in three, the anterior neck alone was involved, and in two others, there was involvement of neck, shoulders and chest wall, with extension to the face in one patient. There was radiographic evidence of mild mediastinal emphysema in the two patients with extensive subcutaneous air. The most severely afflicted patient had coughed repeatedly before aspiration and continued to cough for three or four hours afterward because of pre-existing laryngobronchitis associated with an extensive pneumonia.

Among the 13 volunteers, two suffered mild subcutaneous emphysema and moderate, although symptomatic, mediastinal emphysema. Both were ambulatory immediately after the procedure. In two other volunteers mild subcutaneous emphysema of the anterior neck area developed.

There were no cases of hemorrhage or infection of the puncture sites in any of the patients studied. Hemoptysis, lasting for only a few minutes, occurred commonly.

In general, the specimen obtained at transtracheal aspiration was small (0.5 to 3.0 ml.), and it was usually less viscid than sputum, possibly reflecting dilution with saline solution. However, on occasion quite viscid material was aspirated.

Fifty-three of the 102 paired aspiration and sputum specimens yielded a larger number of potentially pathogenic species from the latter than from the former. Agreement in the number of potentially pathogenic species was found 47 times, whereas a greater number of potential pathogens was found in aspiration specimens only twice. Twenty-five of the 102 aspiration specimens yielded non-pathogenic bacteria or fungi.

A single pathogen or no pathogens were isolated from 79 of the aspiration specimens, findings matched in only 53 of the companion sputums—that is, more than one potential pathogen was isolated in about half the sputums. When more than one potentially pathogenic species was isolated there was clear predominance of one species in 10 of 23 aspiration specimens (42.5 percent)—in marked contrast with 11 of the 49 sputums (22.4 percent). Isolation of a greater number of potentially pathogenic species from sputums than from companion aspiration specimens was more frequent among patients with chronic bronchitis, lung abscess, resolving pneumonia and pulmonary disease of undetermined etiology than it was in patients with pneumonia.

Potential pathogens were isolated from the routine sputum samples that were not found in the companion aspiration specimen. Gram-negative bacilli "contaminated" 32 percent of the sputum cultures.

In four patients who underwent transtracheal aspiration and died within twenty-four hours of the procedure, post-mortem examination of the respiratory tract was accomplished. The results of the ante-mortem aspiration culture and the post-mortem findings are given in Table 3; there was good agreement between the two. In the first patient, however, bronchial cultures at autopsy yielded alpha-hemolytic streptococci and tellurite-positive staphylococci in addition to the large numbers of the very same bacteria isolated from the ante-mortem aspiration specimen. It is probable that all these bacteria gained access to the tracheobronchial tree with pharyngeal and gastric contents aspirated into the respiratory tract during the patient's final hours of life.

There was no growth of micro-organisms from

TABLE 3. *Findings at Transtracheal Aspiration as Compared with Post-mortem Findings and Culture.**

AGE	SEX	CLINICAL IMPRESSION	RESULT OF TRANSTRACHEAL ASPIRATION	POST-MORTEM FINDINGS & CULTURES
yr.				
76	M	Aspiration pneumonia	Large no. of *Pseudomonas aeruginosa;* Large no. of *Streptococcus pyogenes* (Group A).	Extensive bronchopneumonia. *Ps. aeruginosa, S. pyogenes* (Group A), alpha-hemolytic streptococci & tellurite-positive *Staph.* species grown from bronchi
65	F	Probable pulmonary infarction	No growth	Massive pulmonary embolism, with infarction, recent; no broncho-pulmonary cultures obtained.
75	M	Bilateral bacterial bronchopneumonia	Large no. of *C. albicans*	Bilateral bronchopneumonia; *C. albicans* grown from lung.
65	M	Pneumonia, possibly viral	No growth	Extensive resolving pneumonia, with hyaline-membrane formation; no growth of bacteria, fungi or pleuropneumonia-like organisms

*Cultures & findings at autopsy in 4 patients, who died within 24 hr. after transtrachea aspiration had been carried out, corroborated ante-mortem transtracheal-specimen data.

the transtracheal aspirates of 13 volunteers with no evidence of pulmonary disease.

Discussion

The results of this study support the findings of others that expectorated sputum frequently contains potential pathogens that cannot be isolated when secretions are obtained for culture directly from the lower respiratory tract. The predominance of Gram-negative bacilli as "contaminants" of sputum has not previously been noted and may be related to the frequency of antimicrobial therapy before the specimens were obtained. Sixty-two of the 102 patients received antimicrobial agents within the forty-eight hours before study.

Transtracheal aspiration appears to be a reliable method for obtaining specimens for culture that are truly representative of the lower respiratory tract. Our limited post-mortem findings corroborated the results of transtracheal aspiration. Furthermore, specific antimicrobial therapy was withheld in 29 patients in whom pathogens present in sputum were not recovered from the companion aspiration specimen; none of these patients showed deterioration compatible with actual pulmonary infection.

Transtracheal aspiration failed to yield the pathogen causing pulmonary infection in one patient, an elderly man with recurrent staphylococcal bacteremia and a covert lung abscess. Both aspiration and sputum specimens were sterile on culture. The patient died approximately sixty hours after the procedure and was found to have had recent pulmonary emboli and a lung abscess from which *Staphylococcus aureus* was cultured. Apparently, the aspiration and sputum cultures were negative because the abscess did not communicate with a bronchus and there was no pus in the bronchi.

The wall thickness and rigidity of the large polyethylene catheters used in this study were such that cough displacement of the catheter from trachea to oropharynx was precluded. Not only was this not seen but also all specimens from the 13 volunteers were sterile. Twenty-three of the 102 aspiration specimens yielded more than one potential pathogen and an additional 24 yielded nonpathogenic microorganisms, which were always associated with potential pathogens. These findings may be related to the large number of patients (21) who probably had aspiration pneumonia or to the frequent use of nasotracheal suctioning before transtracheal aspiration. If the latter procedure had actually been successful there would have been transfer of microorganisms from the upper respiratory tract into the trachea.

The only significant complication encountered was subcutaneous or mediastinal emphysema. The latter occurred in two of the three normal volunteers who were permitted full activity immediately after transtracheal aspiration and in two patients, one of whom had an extremely severe pre-existing cough. The relatively rapid exchange of air and associated variation in mediastinal pressures in persons normally ambulant immediately after transtracheal aspiration may actually pump air into the soft tissues of the neck through the mucosal puncture site; subsequently, there could be dissection into

the mediastinum. The patient who coughs frequently and repeatedly after transtracheal aspiration may also force air into the soft tissues. Severe coughing after aspiration occurred only in patients who had had severe cough before the procedure. Accordingly, to prevent air from entering soft tissues after transtracheal aspiration, all patients should remain at bed rest for eight to twelve hours after the procedure and a severe cough should be regarded as a contraindication.

Mediastinal emphysema was looked for in posteroanterior films of the chest in 17 patients and 11 volunteers who had no symptoms after transtracheal aspiration; no evidence of occult emphysema was found. Only the two patients with extensive subcutaneous emphysema also had mediastinal emphysema. With strict bed rest, trivial subcutaneous emphysema occurred quite uncommonly (three patients).

Puncture into the trachea should be through the cricothyroid membrane, rather than between the cartilaginous rings of the trachea. One case of significant bleeding was called to our attention before this study began; a puncture site had been selected so far caudad that the needle passed through the thyroid plexus of veins. Moreover, two of the five patients in whom subcutaneous emphysema developed were among the first 10 patients studied—all of whom had transtracheal aspiration performed inferior to the cricothyroid membrane. Hemostasis does not appear to be a problem when transtracheal aspiration is performed with proper precautions, as described above.

Infection in and around the cricothyroid-membrane puncture site has been a rare complication of percutaneous induction of endotracheal anesthesia and of administration of contrast medium for bronchography. In a tuberculosis hospital Pecora twice encountered infection of the needle tract with *Mycobacterium tuberculosis* in approximately 400 transtracheal aspirations. There were no infections of the puncture site after the 102 procedures that we carried out.

The overall safety record of transtracheal aspiration is good—some 400 cases without serious complication in Pecora's experience and the cases in this report. However, as was found in the performance of bronchography, leaving a large bore catheter in the skin-cricothyroid membrane for twenty to thirty minutes results in a high incidence of subcutaneous emphysema. Although a small catheter should cause less subcutaneous emphysema, aspiration of viscid secretions would be difficult or impossible, and diagnosis would be compromised.

The procedure was very well tolerated by almost all of the patients studied. It was actually performed more than once in seven of the 94 patients of the series, and no patient refused to allow a second aspiration when it was recommended. Acute anxiety at the moment of tracheal catheterization was only occasionally encountered and was the most severe subjective reaction. Pain was not a problem.

Transtracheal aspiration can be used to advantage in the following clinical situations: a mixture of potential pathogens is found in routine sputum cultures or in Gram-stained sputum smears; there is difficulty in judging whether or not a particular micro-organism isolated from sputum is really the cause of a respiratory tract infection; the question of superinfection is raised during chemotherapy for infection of the lower respiratory tract; and sputum cannot be obtained by the usual methods. The procedure should not be used in the "routine" case of pneumonia. However, as emphasized by Shulman et al., medical progress has led to a high frequency of atypical, complicated, lower respiratory tract infections, especially among debilitated persons. Exclusion from therapeutic consideration of potentially pathogenic micro-organisms recovered from sputum samples, but not aspiration specimens, offers the patient the following advantages: decreased exposure to potentially toxic antimicrobial agents; lesser potential for overgrowth of antibiotic resistant micro-organisms (including *Candida albicans*); lesser opportunity for development of hypersensitivity; and decreased expense.

The isolation of a potential pathogen from an aspiration specimen is indication for specific treatment directed against that pathogen. Sterile cultures (for bacteria, fungi or pleuropneumonia-like organisms) of the specimens are associated with noninfectious processes, such as pulmonary infarction, or with infectious agents that require special technics for demonstration—for example, viruses.

Summary and Conclusions

Transtracheal aspiration of tracheobronchopulmonary secretions was performed 102 times in 94 patients with lower respiratory tract disease and in 13 normal volunteers. The aspiration specimens were definitely superior to simultaneously collected sputums in providing specific, interpretable culture information—that is, transtracheal aspiration provided specimens truly representative of tracheo-

bronchopulmonary processes. However, mild mediastinal emphysema and extensive subcutaneous emphysema occurred in two patients, and in two volunteers moderate mediastinal emphysema developed. Postaspiration bed rest and exclusion of patients with pre-existing, uncontrollable, severe cough will minimize these complications. Transtracheal aspiration is a simple bedside procedure that should be used in cases of complicated disease of the lower respiratory tract in which sputum has not been produced or in which examination of sputum has been either uninformative or confusing. The procedure is not indicated when study of sputum yields adequate information.

(The omitted figure, tables, and references may be seen in the original article.)

ANGIOGRAPHY: ADVANTAGES AND HAZARDS

Johnson McGuire MD and Te-Chuan Chou MD, Cincinnati, Ohio, Amer Heart J 73(3):293–295, March 1967.

Remarkable advances have been made in roentgen techniques for visualizing the major arterial pathways of the human body by the use of radiopaque contrast media since the publication on coronary arteriography in man by McGuire and associates in 1950. With safer contrast material and selective arteriograms making possible more accurate diagnoses, steady progress has been made in the treatment of cerebrovascular insufficiency due to obstruction of extracranial arteries, expanding intracranial lesions, and cerebral aneurysms, in the cure of hypertension resulting from renal ischemia, in operative treatment of congenital and acquired heart disease, and in the surgical cure of thoracic and abdominal aneurysms. There has also been significant improvement in the treatment of certain forms of peripheral vascular disease due to arteriosclerotic occlusion of large arteries with arteriotomy or bypassing techniques using grafts. Also encouraging progress has been reported in the surgical correction of mesenteric vascular obstruction causing abdominal angina. The diagnosis and localization of pulmonary embolism has recently been made possible by selective angiography of the pulmonary arteries, and occasionally embolectomy has been successful in such cases. The development of selective coronary arteriography has revived efforts to revascularize the ischemic heart muscle. When surgical treatment of aortic stenosis is contemplated, coronary arteriography may demonstrate extensive coronary artery disease and contraindicate operative treatment.

However, the risks inherent in angiography raise questions concerning indications for the procedure. In many instances, angiography has become routine when there is any evidence of arterial ischemia. Frequently, little consideration is given to the complications involved in these investigations. The hazards include death due to sensitivity to the contrast media, the creation of dissecting aneurysms resulting from perforation of the intima of diseased vessels by the tip of the catheter, or the production of dangerous and possibly fatal arrhythmias, especially in coronary artery visualization.

Complications of angiography.

Contrast Medium. The newer contrast media, such as diatrizoate (Hypaque), sodium iothalamate (Conray), and methyl glucamine diatrizoate (Renografin), are far superior to the older preparations, and allergic or toxic reactions involving renal and nervous tissue, formerly not uncommon, are now extremely rare.

Local Problems in Instrumentation. The Seldinger technique for angiography has largely replaced translumbar aortography but has occasionally been complicated by severe local hemorrhage, arterial thrombosis, and the production of dissecting aneurysms by the tip of the catheter.

Cardiac Disorders. Grainger has reported that, in 473 patients, right heart catheterization with angiography was thought to be responsible for nine deaths. Catheterization of the left side of the heart in 196 patients resulted in one immediate death, possibly due to electrocution caused by faulty grounding of the electrocardiograph.

Lang has reported, from a questionnaire to 300 radiologists in the United States, the results of 11,402 instances of retrograde aortography and arteriography. Seven deaths which were related to the procedure occurred in this series, with 81 seri-

ous and 325 minor complications. Arterial thrombosis at the site of puncture was the most common serious complication, occurring in 47 cases. Others were breakage of the guide wire or catheter, arterial embolism, perforation of major vessels, necrosis of the bowel, and renal shutdown.

Value of coronary cinearteriography in the investigation and treatment of coronary artery disease. In many large medical centers in this country and abroad there has been an increasing interest in coronary artery visualization, due in large part to the brilliant studies of Mason Sones, of the Cleveland Clinic. Determination of the location and extent of coronary obstruction is indispensable prior to surgical treatment of the disease. If the lesion is limited to the anterior descending branch of the left coronary artery, with some collateral circulation below the obstruction, transplantation of the internal mammary artery into a tunnel made in the myocardium (a technique utilized first by Vineberg, of Montreal) may provide an additional supply of blood to the ischemic myocardium. That a high proportion of such grafts produce collateral circulation has been shown by the injection of contrast medium into the internal mammary artery several months after implantation of the grafts into the myocardium. Although a number of patients have shown clinical improvement, this operation must still be regarded as being an experimental procedure. When a coronary arteriogram demonstrates obstruction to the three major branches of the coronary artery, operative treatment has been generally considered to be contraindicated. However, several procedures employing arterial or venous grafts to revascularize the posterior wall of the left ventricle are currently being investigated. Certain localized obstructions may be relieved by opening the coronary artery at the site of the lesion and enlarging the narrowed lumen by placing a graft of pericardium at the site of the arteriotomy or actually removing a thrombus. A number of patients have shown definite improvement after these procedures, although the mortality has been high with the direct approach.

Coronary arteriography is not entirely without risks, some of which may be quite serious. Sones has examined 6,400 patients by selective coronary arteriography, employing a special catheter which he designed for this purpose. To date, seven deaths which were related to the procedure, have occurred in this series, three in the first 1,000 studies and four in the last 5,400. Early in these studies, 20 percent of the brachial arteries were thrombosed, but in the last 1,000 cases, brachial occlusion occurred in less than two percent. Ventricular fibrillation occurred in 84 instances: in 80, defibrillation using direct current restored normal rhythm; fatal asystole developed in two. On four occasions, a dissecting aneurysm of a coronary artery was caused by the catheter as it entered the orifice of a coronary artery, but was fatal in only one case.

Higher mortality and morbidity have been reported in other studies on coronary arteriography and emphasize the fact that, when the technique is skillfully employed, as in the hands of Sones, it will cause far fewer complications than when performed by less experienced investigators.

Considerable difference of opinion still exists in regard to the role played by disease of the very small coronary arteries, in the absence of obstruction of the large branches, in the causation of angina. Many of the tiny arterioles, important for collateral circulation in patients with ischemic heart disease, have been beautifully demonstrated by Baroldi, employing injection of a plastic material in postmortem studies of the human heart. Such small collateral channels, undoubtedly of importance in myocardial perfusion, cannot be visualized by coronary arteriograms. Proudfit and associates have reported the correlation of effort angina with the demonstration of significant coronary artery obstruction by coronary cineangiography in 95 percent of the cases studied; and obstructive disease was correlated with myocardial infarction in 99 percent. Angiographic findings correlated less well with the clinical diagnosis of a typical angina or "coronary artery insufficiency." Future observations should be helpful in determining the number of false-positive and false-negative diagnoses in a typical angina.

Since coronary artery disease with intractable angina cannot be treated very satisfactorily by medical means at the present time, carefully planned surgical efforts to promote collateral circulation may be warranted in selected cases, until satisfactory prophylaxis of coronary atherosclerosis becomes a reality. Such surgical treatment should be limited to medical centers in which the operative procedure and postoperative evaluation are conducted by capable cardiac surgeons and cardiologists who have had an extensive experience in the treatment of coronary artery disease. An evaluation of the improvement in angina resulting from any form of treatment has been shown to be extremely difficult, as exemplified by the temporary enthusiasm several years ago for ligation of the internal mammary artery in the "cure" of angina.

The history, physical examination, and electrocardiograms of the patient usually provide adequate evidence whereby an experienced clinician can establish the diagnosis of coronary artery disease without resorting to angiography. The use of cineangiography merely to provide an academic demonstration of an obstructed coronary artery is unwarranted, in our opinion, unless it seems to be probable that such a demonstration may establish the location and extent of coronary obstruction and clarify indications or contraindications for surgical treatment. When the diagnosis of chest pain is obscure, coronary arteriography may be helpful in implicating or ruling out coronary disease as the etiological factor.

Conclusion. Angiography is of great diagnostic value but is associated with unavoidable risks to the patient. It is important that the patients subjected to angiography be carefully selected. The essential criterion for such a procedure should be the possible benefit to the patient and not that of academic diagnostic interest.

(The references may be seen in the original article.)

CANCER OF THE STOMACH

Malcolm C. Veidenheimer MD and C. J. Hume Logan MB, FRCS, Surg Clin N Amer 47(3):621–626, June 1967.

The last review of cancer of the stomach by the Lahey Clinic was reported by Marshall* in 1958, discussing 1,708 patients seen before 1954. This paper is a continuing review of this material, further relating this experience to more recent analyses of the results of treatment of gastric cancer.

Material

In the ten-year period from June 1948 through May 1958, the members of the Department of Surgery at the Lahey Clinic Foundation treated 687 patients with previously untreated malignant disease of the stomach. The course of all but five of these patients has been studied carefully—a follow-up rate which is 99.3 percent complete.

Four hundred and forty-seven (65.1 percent) of the patients were men and 240 (34.9 percent) were women. The age in decades at which these patients first came to the clinic may be seen in Table 1. The average age of the entire group was 59.7 years. There was no significant difference between males and females in the age groups studied.

The initial complaints of this group of patients varied greatly. The triad of indigestion, anorexia, and weight loss was most common, although some patients complained of vomiting and hematemesis or melena. Two thirds of the patients had a weight loss of more than 10 pounds at the time of their first visit to the Lahey Clinic and nearly one third of those examined had lost more than 20 pounds.

TABLE 1. *Age and Sex of 687 Patients with Cancer of the Stomach (Average age 59.7 years)*

AGE (years)	PATIENTS		
	Male	Female	Total
0–9	0	0	0
10–19	0	0	0
20–29	3	1	4
30–39	13	14	27
40–49	59	30	89
50–59	137	66	203
60–69	151	94	245
70–79	77	33	110
80–89	7	2	9

Table 2 defines the duration of symptoms before our examination of these patients; and although 42 percent of the patients had had symptoms for longer than six months, 82 percent of the entire group had had symptoms for less than one year.

Physical examination revealed normal findings in 492 (71.6 percent) of the patients. A palpable mass or clinical evidence of metastatic disease was present in 28.4 percent.

One half of the patients were anemic at the time of their initial visit to the clinic. Studies of gastric acidity were performed in 308 patients; 50 percent of these patients had a level of gastric acidity that was either normal or above normal. Most of the remaining patients did not demonstrate a complete anacidity. Roentgenographic study resulted in a correct diagnosis in 87.1 percent of the patients ex-

*Marshall, S. F.: Treatment of cancer of the stomach: End result. Gastroenterology 34:34–46 (Jan.) 1958.

TABLE 2. *Duration of Symptoms*

DURATION OF SYMPTOMS (months)	NUMBER OF PATIENTS
0–3	252
3–6	149
6–9	64
9–12	97
12–18	35
18–24	23
24–36	22
36+	36
Unknown	9

amined. An additional 6.2 percent of the patients examined were believed by radiologists to have a lesion highly suspicious of cancer. Incorrect radiologic diagnosis was made in only 6.7 percent of the entire series of cases.

Treatment

All but two patients had an abdominal exploratory operation. Resection of the stomach was possible in 407 patients (59.4 percent). Of the remaining 278 patients, 181 had biopsy alone, 58 had laparotomy without biopsy, 26 had a simple gastroenterostomy, 1 had a gastrostomy, and in 12 others various nonresective procedures were performed. The gastric resection was described by the operating surgeon as palliative in 148 patients. Therefore, there were 259 patients on whom resective surgery was performed with hope for cure.

Pathology

In the group of patients who were operated on, there were 13 basic pathologic types of tumor. The various pathologic diagnoses are listed in Table 3 and the anatomic sites at which the tumors were present are listed in Table 4.

Three hundred and fifty-five patients (51.7 percent) presented positive evidence of lymph node metastases. One hundred and twenty-five patients (18.2 percent) displayed no evidence of lymph node involvement at the time of pathologic examination of the specimen. The remaining 207 patients (30.1 percent) did not have definite evidence of either involvement or absence of involvement of the lymph nodes at the time of surgery. The majority of patients in this latter group did not have resective surgey and the biopsy was taken from some tissue other than the lymph node.

Results

Table 5 summarizes the various procedures performed for these patients. Only 259 of the resections were done with a hope for cure. The operative mortality rate for the 407 patients who had resections was 6.9 percent. The mortality for the 100 patients undergoing total gastrectomy was nine percent, and the mortality for the 307 patients having partial gastrectomy was 3.9 percent. For the 407 patients undergoing resections the five-year survival rate was 23.1 percent and the ten-year survival rate was 13.3 percent. No patient who did not have a resection lived five years after initial examination. For those patients having surgery with a hope for cure the five-year survival rate was 36.2 percent and the ten-year survival rate was 18.5 percent.

The relationship between lymph node involvement and survival is shown in Table 6. The survival rate for ten years in the presence of involved lymph nodes was almost zero, whereas nearly one fifth of the patients whose nodes were not involved were alive ten years after operation.

Table 7 defines the absolute survival of the entire series of patients. There were 687 patients

TABLE 3. *Pathologic Diagnosis Related to Survival in 687 Patients with Cancer of the Stomach*

PATHOLOGIC DIAGNOSIS	NUMBER OF CASES	PERCENTAGE OF SURVIVAL	
		5 years	10 years
Carcinoma simplex	268	10.1	4.5
Adenocarcinoma	247	16.6	3.2
Mucinous carcinoma	31	9.1	0
Unclassified carcinoma	28	3.6	0
Malignant adenoma	1	0	0
Carcinoma in a polyp	2	50.0	0
Adenoacanthoma	4	0	0
Lymphoma	6	50.0	33.3
Hodgkin's disease	3	33.3	33.3
Reticulum cell sarcoma	8	50.0	25.0
Lymphosarcoma	9	66.6	22.2
Lymphocytoma	1	100.0	0
Leiomyosarcoma	11	36.4	9.1
Unknown	68	1.5	1.5

TABLE 4. *Site of Gastric Carcinoma*

SITE OF TUMOR	CASES	
	Number	Percent
Antrum	204	30.1
Lesser curvature	164	23.9
Greater curvature	56	8.2
Cardia	173	25.2
Entire stomach	62	9.0
Unspecified	23	3.3

TABLE 5. *Operations on Patients with Cancer of the Stomach*

TYPE OF OPERATION	NUMBER
Total gastrectomy	100
Subtotal gastrectomy	307
Palliative or diagnostic	278
No operation	2
TOTAL	687

TABLE 6. *Survival Related to Lymph Node Involvement in 687 Patients with Cancer of the Stomach*

LYMPH NODE INVOLVEMENT	5-YEAR SURVIVAL (percent)	10-YEAR SURVIVAL (percent)
Nodes involved	7.6	0.8
Nodes uninvolved	47.3	18.4

TABLE 7. *Absolute Survival of 687 Patients with Cancer of the Stomach*

TERM	CASES	
	Number	Percent
5-year survival (684 cases)	94	13.7
10-year survival (445 cases)	29	6.5

available for a five-year survival study and 445 patients available for a ten-year follow-up.

Discussion

Although the outlook for the patient with cancer of the stomach is not good when measured by the absolute survival figures of 13.7 percent for five years and 6.5 percent for ten years, the fact remains that some patients do survive after surgical treatment for gastric cancer. There is no other known way of treating gastric cancer effectively. The rate of postoperative complications and the incidence of operative deaths have not changed appreciably over the past 15 years. Operative mortality of 3.9 percent for partial gastrectomy is an acceptable figure. The operative mortality of nine percent for total gastrectomy remains high, and survival rates following total gastrectomy have not been encouraging. Many of the patients who have had total gastrectomy have had complicated postoperative courses, and their long-term management has required constant medical supervision in order to maintain a reasonable state of nutritional health. The incidence of total gastrectomy at this clinic has decreased over the past 20 years because of these previously mentioned factors.

Subtotal gastrectomy including removal of the spleen and surrounding lymph node and vascular channels is an adequate operation for the majority of patients with gastric cancer. Many of the complications of total gastrectomy are thus avoided and an increased rate of survival through the operative period is achieved. Thus, high subtotal gastric resection is our operation of choice for gastric cancer; total gastrectomy is reserved for those patients in whom it is the only means of adequately removing the entire tumor.

Contrary to what might be expected, there was no relationship between survival rate and length of delay before surgical treatment. The implication resulting from these findings is that survival is basically dependent upon the type of tumor, its biologic nature, and the host resistance rather than upon the delay before surgery. Table 3 illustrates that patients who have certain types of cancer do not have a good prognosis regarding survival and that certain of the lymphomatous group of tumors have a particularly good rate of survival after resective surgery.

Any patient who exhibits a gastric lesion after barium x-ray examination must be suspected of having a gastric neoplasm. Although the antrum, lesser curvature, and cardia are the three principal sites of cancer involvement, Table 4 shows that no area of the stomach is immune to cancer; therefore, careful attention must be paid to any patient with a gastric lesion. An exploratory laparotomy must be undertaken in those patients in whom the gastric disease does not clear rapidly with medical management. The increased rates of survival for current surgical treatment of gastric cancer when compared to results of the management of gastric cancer 20 and 30 years ago must be related to the aggressive attitude toward every gastric lesion. However, despite this aggressive approach to gastric lesions, only 37.7 percent of our entire group of patients were operated on with any hope for cure. This percentage is exactly the same as the percentage of patients operated on for cure throughout the history of this clinic. The implication here is that many patients have cancer that has been allowed to develop too far before surgical treatment is employed. Progress still must be made in our efforts to make an earlier diagnosis and to bring our patients to earlier operation for cancer of the stomach. Gastric cancer must be excluded in those pa-

tients presenting bizarre gastrointestinal disturbances, especially persons suffering from anorexia and indigestion. It is only after thorough clinical evaluation, laboratory study, and roentgenologic examination of these patients that a course of medical management is justified.

COMPLICATIONS OF ACUTE PANCREATITIS— UNUSUAL SEQUELAE IN 100 CASES

CDR William M. Lukash MC USN, Bethesda, Md., Arch Surg 94(6):848–852, June 1967.

Unusual clinical features may develop in the course of pancreatitis. They may not only confirm an already established diagnosis, but also arouse the first suspicion of acute pancreatitis.

Complications and systemic involvement in pancreatitis can result from local suppuration and enzymatic activity on contiguous organs, or affect remote sites as a result of circulatory enzymes released from the gland. Local complications of obstructive jaundice and pseudocyst are well known, but less apparent are the infrequent peripancreatic inflammatory reactions causing massive ascites, splenic rupture, and colonic lesions. In addition to the typical picture of diabetes and exocrine deficiency seen with chronic pancreatitis, other unusual endocrine and metabolic complications may occur. Pulmonary involvement is seen in as high as 30 percent of the patients. Gastrointestinal hemorrhage and hematologic problems of hypercoagulability and hemolysis have been associated with this disease. An unusually high incidence of neuropsychiatric disturbances has been noted in patients with acute pancreatitis.

Material and Methods

Complications associated with pancreatitis have been analyzed from the records of 100 patients from the Naval hospitals at Philadelphia and Bethesda. The diagnosis of acute pancreatitis or an acute episode of chronic relapsing pancreatitis was based on a typical clinical pattern, or history of recurrent attacks and characteristic laboratory and radiographic findings. The diagnosis was confirmed by surgical exploration or necropsy examination in 18 percent of the cases. Forty of the 100 patients had more than one episode of pancreatitis and 15 of these (38 percent) had evidence of pancreatic insufficiency, or of pancreatic calcificaton, and were considered to have chronic pancreatitis.

The series was composed of 18 women and 82 men. The ages ranged from 17 to 77 with a mean of 40 years of age. The youngest patient was a 17-year-old girl with acute cholecystitis and acute pancreatitis.

Alcoholism in 66 of the cases was the most common associated condition. Twenty-three of the 100 patients had biliary tract disease. The remainder of the cases was associated with peptic ulcer, mumps, surgery, or was of unknown origin (Table 1).

TABLE 1. *Associated Factors in 100 Cases of Pancreatitis*

CONDITION	NO. OF CASES
Alcoholism	66
Gallbladder disease	23
Alcoholism and gallbladder disease, combined (10)	
Idiopathic	7
Postoperative	2
Peptic ulcer	1
Mumps	1
Total	100

Clinical and laboratory features typically associated with pancreatitis are abdominal pain and tenderness, fever, and occasionally, peripheral vascular shock. The incidence of abnormal laboratory findings in our series of 100 cases is noted in Table 2. The determination of the serum amylase is the most valuable laboratory diagnostic aid. Serum bilirubin elevation with clinical transitory jaundice may be present. Hyperglycemia has been found in 35 percent of the cases. With repeated inflammatory insults or suppuration, chronic pancreatitis may develop, and is characterized by frank diabetes, steatorrhea, and pancreatic calcification. Roentgenographic study may reveal evidence of a lo-

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calized ileus, the colon cut-off sign, or intrapancreatic calcification.

TABLE 2. *Incidence of Abnormal Laboratory Findings in 100 Cases of Pancreatitis*

ABNORMALITY	PERCENT OF CASES
Elevated serum amylase, lipase, or urinary diastase	84
Elevated serum transaminase	27
Elevated serum bilirubin	23
Elevated blood glucose	21
Elevated serum alkaline phosphatase	13
Low serum calcium	3
Hyperlipemia	3

Complications

Local Inflammation.—The diverse complications are discussed in the following categories by the local or the remote site of involvement and by the unusual systemic manifestations that occur with this disease (Table 3).

TABLE 3. *Complications Due to Local Inflammation*

COMPLICATION	PERCENT OF CASES
Obstructive jaundice	10
With pseudocyst (6)	
With pancreatic phlegmon (3)	
Abscess	9
Pseudocyst	8
Intestinal obstruction	3
Fistula (primary and secondary)	2
Massive ascites	1
Colonic lesions	1
Panniculitis	0
Splenic rupture	0

Obstructive Jaundice and Pancreatic Pseudocysts.—Obstructive jaundice occurred in 10 of the 23 patients with elevated serum bilirubin levels. In nine cases biliary obstruction resulted from mechanical compression of the intrapancreatic portion of the distal common bile duct as a result of pancreatic pseudocyst formation, or of an edematous phlegmon of the pancreas.

Although transient mild jaundice occurs in 15 percent to 30 percent of patients with pancreatitis, it is usually ascribed to concomitant hepatobiliary disease or toxic injury from alcoholism with pancreatitis. The occurrence of obstructive jaundice in pancreatitis appears to be substantiated in this study. Mechanical obstruction can be caused by progressive fibrosis of the pancreatic tissue, edema, or by a pseudocyst.

Pseudocysts.—Pseudocysts occurred in eight cases and resulted in obstruction jaundice, gastric outlet obstruction, and massive hemorrhage with death of one patient. These formations are encountered in an estimated 10 percent of chronic pancreatitis cases,[1] and their formation is dependent primarily on the presence of the corrosive action of the pancreatic secretion.

Peripancreatic Inflammatory Lesions.—Associated lesions of pancreatitis are attributed to action of activated enzymes on blood and local tissues. This process may result in abscess or pseudocyst formation and should be considered also in the differential diagnosis of massive ascites of obscure origin.

Pancreatic Fistula.—Pancreatic fistula is a more disturbing complication of pancreatitis. Spontaneous fistulization apparently is rare, but may develop from abscess or cyst rupture into contiguous structures. Probably the most common factor leading to fistula formation is surgery of the pancreas or adjacent structures, or surgical drainage postoperatively in patients with pancreatitis.

Splenic Rupture.—As a consequence of acute pancreatitis, the formation of perisplenic adhesions may cause spontaneous rupture of the spleen following minimal trauma.[2] Adhesions pulling on a relatively mobile spleen are considered to produce a shearing effect on the soft friable splenic tissue. Abdominal pain resulting from rupture of the spleen may be difficult to differentiate from that of acute pancreatitis.

Colonic Lesion.—One patient in this series developed a lesion in the hepatic flexure of the colon as a sequela of acute pancreatitis. Barium enema roentgenograms showed mucosal changes and narrowing in the hepatic flexure which simulated ulcerative colitis or carcinoma. The changes in the colon were due to an invasion by the pancreatic inflammatory process into the mesocolon, with resultant collapse of a contiguous localized segment of transverse colon. If a plain flat-plate roentgenogram of the abdomen were obtained during active mesocolon involvement, gas on both sides of the collapsed colonic segment would appear as the "cut-off sign," described by Stuart.[3]

Intestinal Obstruction.—Intestinal obstruction may occur in pancreatitis and may involve the duodenum

or upper jejunum. It is caused by an edematous pancreatic mass, peripancreatic inflammation, or encroachment by a pseudocyst.

Circulating Enzymes.—Circulating enzymes released by the gland itself may produce intrapancreatic and extrapancreatic fat necrosis. Less common sites of fat necrosis may be found in more distant organs, such as the mediastinum, pleura, bone marrow, joints, central nervous system, and skin.

In the etiology of fat necrosis it is believed that liberated lipase from the pancreas acts upon the involved fat tissue, changing the fat to fatty acid and glycerol. The fatty acids are carried into the lymphatics where they combine with calcium to produce insoluble soaps. The soaps constitute the opaque plaques which characterize fat necrosis. These enzymatic and chemical reactions explain the presence of fat necrosis and the hypocalcemia noted with acute pancreatitis.

Skin involvement consists of subcutaneous nodular fat necrosis which produces raised erythematous, nodular, and usually tender skin lesions. The lesions persist for days to weeks and leave no scarring.

Some patients with acute pancreatitis have developed arthritis or bony lesions. Despite the rarity of such patients, the association of bone changes with pancreatitis is probably much commoner than is realized. The arthritis has been attributed to periarticular fat necrosis. As with fat necrosis in other sites, several circulating enzymes have been incriminated as causative agents. These are trypsin, lipase, collagenase, elastase, and others. The bone lesions are of two types, producing either lytic or calcified defects. Small osteolytic lesions, from metastatic fat necrosis, are seen on x-ray films of long bones and tend to be without symptom in most of the cases. Osteolytic areas ultimately may develop intramedullary calcification from calcium deposition in areas of fat necrosis, or from medullary ischemia and the development of a bone infarct.

Endocrine and Metabolic.—Frank diabetes is known to occur in patients with pancreatitis, and more frequently in patients evidencing pancreatic calcification and associated exocrine insufficiency. Infrequently, the patient with acute pancreatitis will first be seen in diabetic coma. The coma occurs as a complication of the pancreatitis rather than the diabetic acidosis with its attendant dehydration and electrolyte imbalance causing the pancreatitis. Often the diabetes which develops in pancreatitis is transient and mild, but it may become permanent and increasingly severe, progressing to retinopathy and nephropathy. Although the diabetes which develops in pancreatitis is ascribed to repeated inflammatory insults and destruction of islet tissue with diminished production of insulin, Keller et al [4] found that patients with pancreatic diabetes commonly exhibit normal or high levels of serum insulin and insulin activity. The role of insulin antagonism will require further investigation.

Transient hyperlipemia has been found during acute episodes of pancreatitis in about five percent of the cases. Its etiology has not been clarified. Associated alcoholism or diabetes may contribute to the elevated serum lipids. An underlying idiopathic hyperlipemia may cause both lactescence and metabolism. Serious fat embolization of agglutinated serum lipid particles to other organs may occur occasionally during a bout with hyperlipemia.

The association of pancreatitis with parathyroid disease is established. It may further complicate calcium and phosphorus disturbances resulting in low serum calcium because of its mobilization in fat necrosis.

The development of acute renal failure is a serious complication in acute pancreatitis. Prolonged shock, anoxia, and hemoconcentration are all predisposing factors. The prognosis is poor. The dehydration of acute pancreatitis should not be confused with the oliguria of acute renal failure occasionally seen with acute pancreatitis (Table 4).

TABLE 4. *Endocrine and Metabolic Complications*

COMPLICATION	PERCENT OF CASES
Diabetes (diabetic coma)	13
Pancreatic calcification	12
Steatorrhea	8
Hypocalcemia and hypercalcemia	3
Hyperlipemia	3
Acute renal failure	0

Pulmonary and Pericardial.—Pulmonary involvement in pancreatitis occurred in 15 percent of our patients. Abnormal pulmonary manifestations have been found in as high as 30 percent of patients during an episode of pancreatitis. This includes a pleural effusion, atelectasis, or pneumonitis. A pericardial effusion also can occur. A small pleural effusion is most common, usually in the base of the left lung. The effusion fluid may be an exudate or a transudate, and occasionally is hemorrhagic. The fluid contains amylase and lipase, which are much higher in concentration and persist longer than in

the serum. The etiology of pleural effusion is not resolved, but effusions may result from the direct spread of enzyme rich fluid via diaphragmatic fistulas, or of transmission into the chest via lymphatics from the pancreas and adjacent peritoneum (Table 5).

TABLE 5. *Pulmonary and Pericardial Complications*

COMPLICATION	PERCENT OF CASES
Pleural effusion	9
Pneumonitis	6
Abscess	0
Pericardial effusion	0
Fistula	0

Hemorrhage and Shock.—Shock occurring in pancreatitis is generally ascribed to marked alterations in blood and plasma volume. Early severe shock may be attributed to massive hemorrhage or necrosis of the pancreas or peripancreatic tissues and can result in death. Milder degrees of shock, gradual in appearance, may result from fluid lost during persistent vomiting, from depletion of blood volume by hemorrhage of lesser degrees, or from large accumulations of exudate within the greater or lesser peritoneal cavities. Fluid loss by these means may amount to several liters a day. Toxic products liberated by proteolytic digestion of the pancreas have been shown to produce hypotension in experimental animals and may be involved in human beings. These toxic products may be related to trypsin release and kinin production of a polypeptide, such as bradykinin, which affects vascular smooth muscle and capillary permeability and results in hypotension.

Late shock resulted in the death of one of our patients who had a hemorrhagic pseudocyst consequent to the delayed erosion of a blood vessel by enzymatic digestion. Rupture of an abscess or cyst into a general peritoneal cavity, or into a neighboring viscus, and erosion of adjacent vessels can produce massive gastrointestinal hemorrhage. Pancreatic calculi associated with pancreatitis can be a cause, but rarely, of intestinal hemorrhage by either fistula formation or vessel erosion. Still another hemorrhagic complication is ruptured esophageal varices resulting from portal hypertension due to pancreatitis.

Neuropsychiatric.—Frank neuropsychiatric manifestations occurred in eight percent of the patients in this series, with acute pancreatitis. Transient psychosis was observed in 57 percent of the patients with alcoholic pancreatitis studied by Schuster and Iber.[5] Transient hallucinations were the major manifestation of their psychosis. It is well established that depression, insomnia, anxiety, and narcotic addiction are known to occur with pancreatitis and with carcinoma of the pancreas. It is difficult to correlate a specific relationship between the mental symptoms and the pancreatitis. Histories of alcoholism, so common in pancreatitis, can be implicated in the toxic psychosis of alcohol withdrawal and of delirium tremens. Electrolyte disturbances that frequently occur in acute pancreatitis may also be involved in mental changes. Calcium, magnesium, or potassium excesses or deficiencies have been implicated.

Small focal areas of capillary hemorrhage with perivascular edema and reactive gliosis have been found in the cerebral cortex of some patients who died with pancreatitis. Circulating pancreatic enzymes producing fat necrosis of cerebral fat and the embolization of fat particles to the central nervous system have also been considered in those patients who have mental changes (Table 6).

TABLE 6. *Neuropsychiatric Complications*

COMPLICATION	PERCENT OF CASES
Frank psychosis with delusions and hallucinations	3
Delirium tremens	2
Neurosis	1

Hematologic.—Alterations in blood coagulation with disseminated venous thrombosis accompanying carcinoma of the pancreas have also been observed to be associated with pancreatitis. Circulating trypsin and its effect on clotting factors may be an etiologic factor. Poor coagulation may also occur. Hypoprothrombinemia is fairly common and is usually attributed to impaired liver function. Occasionally a hemolytic anemia is seen in acute pancreatitis. However, this dyscrasia is usually associated with hyperlipemia and jaundice in alcoholic patients who have fatty cirrhosis of the liver and this may represent Zieve's syndrome.

Mortality.—The mortality rate in this series of 100 cases of acute pancreatitis was 5 percent. Death may have been a postoperative sequela in three cases. It usually results from circulatory collapse, secondary to late hemorrhage, or from sepsis and fulminating toxemia in pancreatitis. There has been a gradual downward trend in the overall mortality

rate from 50 percent, to approximately 15 percent to 10 percent. The decreased rate is attributed to more vigorous medical management of shock and the treatment of sepsis with antibiotics.

Both the prognosis and the mortality occurrence appear to be related to the inflammatory reaction in the pancreas. A hemorrhagic, necrotic pancreas has a mortality rate higher than that of acute edematous pancreatitis. The highest mortality rate occurs in postoperative pancreatitis.

Summary

In a review of 100 patients with pancreatitis, 38 percent had at least one unusual complication or systemic manifestation. An awareness of the protean features in acute pancreatitis may benefit the clinician in both diagnosis and management.

The inflammatory effects of enzymes released by pancreatitis result in local peripancreatic lesions, or may affect remote organs, such as bone and skin, as a result of pancreatic enzymes in the circulation. Unexpected metabolic and endocrine abnormalities may result in diabetic coma, hyperlipemia, and acute renal failure. Pulmonary lesions were common in our series and neuropsychiatric problems also developed. The mortality rate was 5 percent.

Technical editing was done by Frances H. Atkinson, BA, RRL.

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MEDICAL ABSTRACTS

RECENT DEVELOPMENTS IN TROPICAL MEDICINE

Charles Wilcocks, CMG MD FRCP DTM&H, Editor, Transactions of the Royal Society of Tropical Medicine and Hygiene. Abst World Med 41(4):241–257, Apr 1967, (Part 1) and 41(5):325–337, May 1967, (Part 2).

The Review article includes current information on epidemiology, symptomatology and treatment of Schistosomiasis, Filariasis, Loiasis, Onchocerciasis, Tropical Anemias, Cholera, Leprosy, Malaria, Trypanosomiasis, Leishmaniasis, and Amoebiasis. It is succinctly written with numerous references for further inquiry for those interested in Tropical Medicine.

PURSUIT OF THE PURPLE

Cecil J. Watson, MD, JAMA 197(13):1074–1079, Sept 26, 1966.

This Special Contribution was initially read as the first annual Distinguished Lecture before the Western Association of Physicians. It contains a historical purview of Porphyria with many interesting sidelights including a herd of remarkable cows afflicted with congenital bovine porphyria. Pursuit of the Purple is a "must read" article by one of the pioneers in the subject.

POISONING BY VENOMOUS ANIMALS

A Combined Staff Clinic edited by Dr. Nicholas P. Christy. Amer J Med 42(1):107–128, Jan 1967.

The report includes two types of injury i.e.—snake bite and bee sting, with a discussion of zoology, toxicology, immunology, biochemistry and clinical aspects. Since preparedness is the major factor in successful treatment, this general article serves as a current review of the subject. Illustrations are provided in addition.

GENETICS AND MEDICINE

G. R. Fraser, MD PhD—Reader in Genetics, University of Adelaide, South Australia. Brit Med J pages 345–347, Aug 6, 1966, (Part 1); pages 397–399, Aug 13, 1966, (Part 2); and pages 453–455, Aug 20, 1966, (Part 3).

This is a three part current review of genetics and its mechanisms. The review is summarized in the concluding statement that the prospectives for genetics in medicine for the next century are vast indeed; but they are no vaster than the knowledge which has already accumulated in the century which has elapsed since Mendel's discovery.

BASOPHIL DEGRANULATION TEST—A REVIEW OF THE LITERATURE

Bernard A. Kirshbaum, M.D. Howard B. Cohen, MD, Herman Beerman, MD, and Thomas Pastras, MD. Amer J Med Sci 253(1140):473–492, Apr 1967.

A comprehensive review of the literature on the Basophil Degranulation Test discusses means of evaluating untoward reactions to drugs. Swelling, oscillation of granules, pseudopod formation and extrusion of granules are the features of basophil degranulation and observation of these effects form the basis of Shelley's test for allergic states. It also affords an assay of the allergic potential of new drugs as well as problems of cross-sensitization, and is an aid in the diagnosis of some obscure as well as common allergic states.

However the technique depends upon the presence of circulating antibodies and these may not be present in all instances of drug allergy.

DENTAL SECTION

CONSERVATION OF MAXILLARY ANTERIOR ESTHETICS: A MODIFIED SURGICAL APPROACH

J. Frisch, R. S. Jones, and S. Bhaskar, J Periodont 38(1):11–17, Jan–Feb 1967.

Many surgical procedures have been advocated for the eradication of deep periodontal pockets. The techniques range from the standard gingivectomy to complicated muco-gingival surgery.

This article describes a variation of the standard gingivectomy used for maxillary periodontally involved teeth. The procedure involves the removal of gingival tissue from the palatal aspect and the retention of the facial gingival tissue. The purpose of this approach is to preserve the maxillary facial gingival architecture while eliminating the pathosis of the periodontium. The removal of gingival tissue from the palatal approach only, results in the retention of gingival tissue on the facial aspect, referred to as a "curtain" of tissue. The authors comment on the fact that the suspended "curtain" acts as a cul-de-sac for food, but this minor obstacle is amenable to good oral hygiene. The surgical approach described is advocated for use in the maxiliary anterior region.

The clinical response with this limited surgical approach results in the prevention of:

1. Increased interproximal spacing
2. Exposed, unsightly cementum
3. Sensitive cementum
4. Longer clinical crowns
5. Loss of lip support
6. Annoying speech defects

The disadvantages of this technique are:

1. Labial contour may be somewhat less than ideal
2. Limited to maxillary anterior region
3. Increased oral hygiene responsibility

(Abstracted by: CAPT P. C. Alexander DC USN.)

PERSONNEL AND PROFESSIONAL NOTES

MEDICAL HISTORY FORM

The Dental Division has been in receipt of numerous letters during the recent past which express the desirability of developing a standard medical history form to accompany Standard Form 603, Dental Record, for inclusion in DD 722–1.

The primary purpose of such a form should be to draw each dental officer's attention to specific items of concern such as drug sensitivities and other pertinent medical history that relate to dental treatment.

Many local forms have received extensive consideration for adoption as a standard item. A subsection of a recently convened workshop in the Bureau devoted considerable effort in a study of the problem. One recommendation of the above studies was that inasmuch as there already exists an acceptable medical history sheet, the creation of a new form is not indicated. This is in consonance with current policy in maintaining the number of standard forms at a minimum.

Accordingly, for the present, the use of Standard Form 89, Report of Medical History, is recommended for use, when indicated, in conjunction with the Dental Record. Maintaining the form in a current status is the responsibility of the individual dental officer.

Programmed for the future is a complete review of Standard Forms 603 and 722–1. In conjunction

with the review, a design for a dental history form will be included. Field activities are encouraged to forward copies of local dental history forms in use that may be of value in the design of a new form. Copies of forms should be directed to BUMED Code 611.

TREATMENT TRENDS—ENDODONTICS

In support of the Naval Dental Corps' policy of conserving and protecting the teeth of Naval and Marine Corps personnel, and restoring them to a functional, healthy condition, it is reassuring to note the increase in endodontic treatment during recent years. In 1962, the number of teeth restored endodontically was 18,524. In 1966, the number reached 26,281—an increase of 42%.

In the same four-year period, there was a decrease in the proportion of endodontic cases managed by surgical treatment. In 1962, 24% of all endodontic cases were managed by periapical surgery, as compared with 16.1% in 1966. This significant decrease in surgical treatment reflects selective diagnosis and the use of the surgical approach only when indicated.

CHALLENGE FOR THE FUTURE

Editor's note:

During the past fiscal year, 46 officers of the Dental Corps, U.S. Navy, have retired after having devoted a life-time of effort in providing an essential health service to personnel of the Navy and Marine Corps.

Retirement of a senior officer may well be a time of reflection, not only for the officer himself, but also for junior officers who remain to carry-on. It is the latter to whom the responsibility devolves for the future continued progress of insuring the mission of the Dental Corps.

Printed below are excerpts from a letter of an officer recently retired who recounts some of the progress he has seen develop during his 30 years of service. It presents a challenge for the junior officer today to be able to write a similar letter upon his retirement 25–30 years hence.

"In the more than thirty years of my experience on active duty in the Navy, revolutionary changes have taken place administratively as well as professionally. When I first reported for duty, the dental requirements for enlistment were as high or higher than those for a commission as an officer now. There were no reserve officers or enlisted men on active duty except for a very few on short training duty. Before proceeding with dental prosthesis or crown and bridge on an individual, permission had to be granted by letter from BUMED. After WW II autonomy was given the Dental Corps—we still remain the only Dental Corps in the Armed Forces anywhere in the world so organized.

"Postgraduate training was rare, and most of us got into specialties by the "apprentice" route. Preventive dentistry as we know it today was in its embryonic state since the Public Health Service was just concluding its historic work on fluorosis.

"As new techniques and modernization developed, and as old problems were solved, new ones took their place. Perhaps the most vexing and serious problem facing the Dental Corps is the one of dental assistants. The Navy Dental Corps has always been austere insofar as money and personnel were concerned. The increased emphasis on preventive dentistry, the new team concept in the dental operating room to accompany new dental equipment, and the unusual drain on DT's in Vietnam have made enlisted personnel demands impossible to meet within the present numbers limitation. BUMED and the Dental Division are doing all possible to relieve this situation. The Pacific Fleet itself it not affected seriously, but its Hawaii and CONUS shore-based support facilities are depleted most severely in dental technicians.

"If the Fleet does not have too serious a problem with personnel, it certainly has insofar as physical facilities are concerned. Many studies made by civilian investigators are doing much to point out to the profession the need for better noise contro! and better lighting. Too many of our afloat clinics are too noisy and too dark, and too many of them are too small. Deficiencies, such as size can never be alleviated. But much can be done with acoustic tile and other similar materials, drapes, carpets, and rugs. Dental and medical spaces should be oases of quiet; well lighted, and with tasteful decor where anxiety-prone patients can be treated in relaxed surroundings. The occupational hazards innate to the dental profession are exacerbated afloat.

"Dentistry in the Navy is practiced at a very high professional level. This is a tribute to not only the type individual coming into active duty, and his dental school training, but also to the very fine postgraduate training program pioneered by the Navy Dental Corps.

"Some of the finest experiences I have had these last few years were during my visits when I saw first-hand, the respect our dental personnel had earned in the ships and stations of this wonderful Navy of ours. I am sure that this will continue onward."

NURSE CORPS SECTION

GRADUATED MEMBERS OF NURSE CORPS INDOCTRINATION CLASS N709

On 23 June 1967, the U.S. Naval Schools Command, Newport, Rhode Island, graduated members of Nurse Corps Indoctrination Class N709. The 39 young graduates have just completed an indoctrination course preparing them for the demanding responsibilities of a naval officer.

Guest speaker for the graduation ceremonies was CAPT James A. McLaughlin, MC USN, Assistant District Medical Officer, Headquarters 1st Naval District, Boston, Massachusetts. LTJG David J. Lammers, NC USNR, from Dyersville, Iowa was elected to speak for the Nurse Corps class.

Mrs. Aaron Slom, President, Women's Division of the Newport County Chamber of Commerce presented the Honor Award to ENS Joan E. Newman, NC USNR, from Gilman, Vermont in recognition of her achievement in academic and military subjects which placed her first in the class.

A Leadership Award was presented to the student displaying outstanding personal example and sense of moral responsibility. Mrs. Michael Curran, President of the Aquidneck Business and Professional Women's Organization made the award to LT Lois E. Daly, NC USNR, from Stratford, Conn.

—Official U.S. Navy Photograph.

Back Row: Akunevich; Amstein; Barrett; Bodoh; Brush; Calabrese; Chella; Combs; Daly, L. E.; Daly, V. E.; George; Hamel; Hennessey; Hoffman

Middle Row: Hogan; Jankowski; Johnson; Kasserman; Kight; Lammers; Lucuis; Markovitch; McLeod; McNamara; Miller; Moyer; Munro

Front Row: Newman; Nyman; Oberhausen; Olsen; Packer; Robinson; Schroeder; Spinale; Vaplon; Whalen; Wood; Woodruff

RESERVE SECTION

CLINICAL AND RESEARCH CLERKSHIPS

Research and Clinical Clerkships are an opportunity available to Ensigns 1915 on a competitive basis. Those students who have completed the first year are eligible for the Research and those students who have completed two years of medical school may compete for their Clinical Clerkship. Applications should be submitted promptly when solicited by the district commandants. It is at this point that the Commandant's Local Representative in the medical school can be of greatest help both to the student and the District Medical Programs Officer first by informing the student of the exact nature of the clerkships and second by giving the Medical Programs Officer the information necessary to select the students best qualified on a competitive basis. This is a part of the Commandant's Local Representative's responsibilities.

A careful study is made continuously by Code 361 (Reserve and Personnel Training Branch) of the existing Ensign 1915 population in each Naval District and the past allocation and utilization of clerkship billets. The number of commissioned Ensigns 1915 less the number in the Senior Medical Student Program and those in the fourth or senior year who are ineligible for clerkships in a given Naval District (as compared to the total commissioned Ensign 1915 population in all the Naval Districts) establishes a percentage figure upon which the allocation of the number of available billets is determined. This is a basic working figure. The next step is a letter to each District requesting the exact number of billets utilized in the previous fiscal year and the anticipated number required. Information is also requested from each Teaching naval hospital and research activity as to the number of billets available to train research and clinical clerks. Based on all the foregoing figures, allocations are made within the total available billets. At the present time, there are 320 Clerkship billets available to the Medical and 30 to the Dental Department. In FY 66 only 250 billets were available and an increase of 150 was requested. With 70 being approved for the Medical Department and 10 approved for the Dental Department, this brought the total billets to the present figures.

Code 361 has ascertained that the saturation point has been reached by some Naval Medical and Research Facilities to properly train and instruct students in the Clerkships (e.g. Cardiopulmonary Laboratories and Diving School). The demands upon Naval Medical Facilities brought on by the world situation and in particular South East Asia has brought the saturation point closer. Therefore, any increase in the number of clerkship billets is dependent upon the abilities of the Naval Medical facilities to absorb the increase in student clerkships without lessening the excellent training offered at the present time. Present information predicates that an increase to a total of 370 medical and 30 Dental billets is the maximum number of students who can be trained without decreasing the quality. —Reserve Div, BuMed.

FIRST BI-ANNUAL SYMPOSIUM

The committee on Disaster Medical Care of the American Medical Association Council on National Security will hold its First Bi-Annual Symposium on the Current Management of Trauma and Disaster Medical Problems at the Carollon Hotel in Miami Beach, Florida on 10 and 11 November 1967.

This meeting has been approved for retirement point credit for eligible Medical Department officers who wish to attend. Attendees are authorized to certify their own attendance.—Reserve Div, BuMed.

AEROSPACE MEDICINE SECTION

AUDIOMETRY—CHANGE ASA TO ISO

CHABA Working Group No. 51 has recommended that audiometry in the Army, Air Force and Navy be based on the ISO (1964) reference zero levels vice the ASA (1951) reference levels.

Action began in this direction during 1966 when the Executive Council of CHABA expressed the unanimous opinion that the Department of Defense and all agencies within it, concerned with regulations, tests, instrument procurement, physical standards, and physical disability in connection with hearing thresholds, should take action through changes in regulations, physical standards and specifications in medical procurement, to bring themselves in line with current audiological practices of the medical, audiological and acoustical communities in the United States and other countries. As a result, ASA (American Standard Specification for Pure Tone Audiometers for General Diagnostic Purposes, 1951, published by American Standards Association—name since changed to the United States of American Standards Institute), is scheduled to be discontinued in the services, and the ISO (International Standards Organization-Standard Reference Zero for the calibration of Pure Tone Audiometers) is to be adopted in the near future.

The evaluation of this change began several years ago as new evidence, which originated in the United Kingdom and subsequently confirmed in the United States, showed that the older standards were too lenient and that the reference for zero-db hearing level in pure tone audiometers should be reduced. Recommendation No. R389 (1964) by the ISO was published to reflect these lower levels.

ISO reference thresholds have been endorsed by the American Academy of Ophthalmology and Otolaryngology, the American Otological Society, the American Speech and Hearing Association, and other professional groups.

How does this change from ASA to ISO Standards effect us in the Navy? Already, DOD specifications for new diagnostic audiometric equipment include ISO calibration, in accordance with the increasing use of ISO reference levels in civilian hearing clinics and in the literature pertaining to otology and audiology. Some commands *NOW* have ISO calibrated instruments and they (hopefully) mark their audiograms ISO. In fact, an extremely important step in audiometry is the clear marking on each chart and record of the calibration of the instrument used. The data should be recorded as read from the instrument. NAMI is currently sending out separate ASA and ISO marked rubber stamps, with instructions for utilization in the Navy's Hearing Conservation Program. Interpretations between ISO/ASA figures as related to current hearing standards are made by BUMED Code 511.

The exact translation formula will represent the differences between ASA–1951 and ISO–1964 recommended values, rounded to the nearest half-decibel. It is felt that these exact differences are appropriate for certain statistical, research, and perhaps special clinical purposes, see Figure I; however, an approximate formula, Figure II, is being considered for most other purposes. The approximations are all exact multiples of 5, appropriate to the 5db steps in which pure tone audiometers are calibrated. The greatest deviation from the exact value is 1.5db, which is within the tolerance allowed in the ASA–1951 standard for audiometers.

Audiometers will be recalibrated to ISO mainly by the audiology support teams from NAMI and NAVMISCEN Point Mugu when they are due for

FIGURE I

At	250	500	1000	2M	3M	4M	6M	8M	Hz
Add to ASA Hearing Levels	15	14	10	8.5	8.5	6	9.5	11.6	db

FIGURE II

At	250	500	1000	2M	3M	4M	6M	8M	Hz
Add to ASA Hearing Levels	15	15	15	10	10	5	10	10	db

recalibration. Equipment at commands not under Naval Air Systems Command will probably be recalibrated to ISO by commercial means. The actual program setting this up will be forthcoming. Audiometers with provision for testing of bone conduction will also be recalibrated so that the hearing threshold level (ISO) is numerically the same for bone and air conduction on subjects who are conductively normal.

Speech audiometers, used only for diagnostic, evaluative or other special purposes will probably remain unaltered until the next USASI standard for audiometers is issued. The change at that time will be only 2–3db.

It cannot be over emphasized that the successful transition from ISO to ASA will rest on the shoulders of those recording the calibration reference on the audiogram. In this regard, it is requested that particular emphasis be placed upon the proper labeling of each audiogram and utilization of stamps and instructions as they become available.—Aero-Med, BuMed.

NAVY DOCTOR RETURNS TO NAMI

For a man with an unquenchable thirst for adventure, the Navy is just the right place. LT Jimmy L. Gowan, MC USN, believes in this and is happy and proud to be a part of it. Back from an adventure-packed tour of duty on the Antarctic continent, he was honored in a ceremony at the Naval Aerospace Medical Institute, Pensacola, on June 2, 1967. For meritorious service on Antarctica during Operation Deep-Freeze, LT Gowan was awarded the Navy Commendation Medal and presented a letter of appreciation from the Commanding Officer, Detachment One, Naval Support Forces, Antarctica. In addition, on the same day he was officially informed that the Secretary of the Interior had approved the naming of a glacier on Antarctica in his honor.

This ceremony at NAMI was a culmination of a story which began 19 months ago when Dr. Gowan and his team of three Navy enlisted men and four civilian scientists were examined and observed by NAMI doctors, under the supervision of CDR H.S. Pratt, MC USN. The physical examinations completed, Dr. Gowan and his party headed for their far-flung rendezvous—Polar Plateau Station, Antarctica. They were to support the science program of Operation Deep-Freeze.

On December 13, 1965, mercury dropping down to minus 42 degrees, CAPT Bersik (Chief of Staff and Deputy Commander of Task Force 43) and LT Gowan stepped out of the Hercules plane that landed on the soft snow of Polar Plateau Station. They were the first human beings to set foot on that part of the vast Antarctic continent. In the face of one of the most hostile environments in the world, LT Gowan, as Officer in Charge of the station, was instrumental in the construction and maintenance of Polar Plateau Station, the bleakest and remotest American station on the Antarctica. He also conducted pulmonary studies, made psychological observations and checked vital physiological signs. Research data obtained were transmitted to NAMI, Pensacola, for evaluation.

All the supplies were airlifted to this high plateau which has an elevation of 11,890 feet—almost half as high as Mt. Everest, the highest known point of the earth's surface. Mountain tents and a temporary canvas-covered building were used as living quarters the first three weeks. Observations of prevailing winds and laying out of skiway completed, the station was ready then to receive the five heavily insulated pre-fabricated vans which would make up the camp. As an extra safety measure, an emergency camp was constructed 1,000 feet away.

The last flight into the station departed February 10, 1966. This marked the beginning of the long, bitter and hazardous winter for the eight men. Dr. Gowan, a chief mechanic, a cook, an electronic technician and four civilian scientists who were to study cosmic radiation, meteorology, geomagnetism, aurora, and very low frequency radio noise emission were not to see another human being until eight months later. Towards the end of March, temperatures were falling down to 100 degrees below zero. The sun set on April 21, to begin the total darkness lasting until sunrise on August 23. On July 6, 1966, with temperature at 110 degrees below zero and 10 knots of wind (causing a wind chill factor below minus 200 degrees) disaster struck Polar Plateau Station. Both main camp generators broke down simultaneously, requiring major overhaul. LT Gowan evacuated the station personnel to the emergency camp and began overhaul of generators. Nine days later, due to his diligent efforts and the skill of his men the party was able to move back to the main camp, thus averting a potential tragedy.

The mercury dropped down relentlessly until the world's coldest temperature for the year 1965–1966 was recorded at the Polar Plateau Station on August 24, 1966. The reading plummeted down to 121.4 degrees below zero! On October 18, the Commanding Officer, Air Development Squadron

Six, landed a big LC–130F Hercules on Polar Plateau Station at the coldest temperature ever attempted—74 degrees below zero. The aircraft brought in badly needed generator repair parts, food and mail from home.

For the eight lucky men, the year-long adventure, privation and isolation ended on November 24 when a Hercules plane with Surgeon General, VADM R. B. Brown, on board, airlifted them to the main base at McMurdo Sound, 1,150 miles away. Reporters from the United States and New Zealand asked them this question over and over again: "Why in the world did you do it?" For his own answer Dr. Gowan quotes the famous Norwegian explorer, Nansen—"Man wants to know; when he does not want to know he ceases to be a man."—Naval Aerospace Medical Center.

HYPERVENTILATION AS A HAZARD IN UNDERWATER ENDURANCE SWIMMING

LCDR Paul W. Scrimshaw MSC USN,
Naval Air Station, Norfolk, Va.

A recent near drowning at a COMNAVAIRLANT activity demonstrated the hazards of hyperventilating to extend underwater endurance.

True hyperventilation is usually characterized by a marked increase in the depth of breathing with little or no change in rate. It is known that under conditions of fright, pain, or emotional stress, lung ventilation volume may increase even though the carbon dioxide output of the tissues remains at a resting level. Such an occurrence is a demonstration of hyperventilation because the lungs are being ventilated beyond the requirements for the elimination of excess carbon dioxide. As a result the carbon dioxide level in the blood is reduced to an abnormally low level. The common symptoms of low carbon dioxide concentration in the blood are tingling and dizziness. In more severe cases a spasm of the hands and feet and unconsciousness may occur.

The onset of such an abnormal physiological state of hyperventilation finds the body making a quick compensatory reaction. The activity of the respiratory control center of the brain is influenced by the amount of carbon dioxide in the blood. With the existence of a carbon dioxide deficiency, the respiratory center fails to send out the necessary nerve impulses to activate the chest muscles and the breathing cycle. Breathing then stops until the continuing carbon dioxide production in the tissues has raised the pressure of carbon dioxide in the arterial blood to a level which will stimulate the breathing center. Thus we have a control or safety mechanism, which prevents hyperventilation from continuing to the stage of a serious disturbance to the normal chemical balance of blood and tissues.

Swimmers have been known to hyperventilate as a means to increase underwater endurance. The theory behind this is that in forced breathing, the carbon dioxide level is lowered so that the urge to breathe is not as noticeable and it becomes possible to hold the breath for longer periods of time.

In the air, an aviator in a stressful situation may hyperventilate to a state of dizziness, muscular spasm, and ultimate unconsciousness.

In the same manner, a swimmer could experience unconsciousness while trying to stretch his underwater endurance. His situation, however, is aggravated by his watery environment. The unconscious swimmer would lie on the bottom until his carbon dioxide level became sufficiently increased to stimulate his respiratory cycle. At this point he would spontaneously inhale water into his lungs.

The dangers of hyperventilation, either in aircraft involuntarily, or voluntarily as in underwater swimming, should be emphasized at command survival training as well as during aviation physiology refresher training. Involuntary hyperventilation may be controlled by conscious regulation of the respiratory cycle and incidents of near drowning or drowning caused by voluntary hyperventilation can be lowered by swimmer education at command level.

HEARING CONSERVATION AT AVIATION ACTIVITIES

From the rumbling roar of the supersonic jet taking off in afterburner, to the cockpit noises experienced in normal cruise at FL 400 the Naval Air Systems Command and Bureau of Medicine and Surgery are concerned about noise and its effect upon man.

Currently Air Systems Command supports the Bioacoustical Division, Naval Aerospace Medical Institute and the Bioacoustics Branch, Naval Missile Center. Each laboratory is involved in providing technical direction and assistance to the Navy's Hearing Conservation Program (HCP) and assisting in research of A/C noise and its effect on aircrewmen, as well as ground support personnel.

Since FY 1964 naval aviation activities have been participating in a five year audiometric equipment procurement program. This equipment is being pur-

chased with the sole purpose of protecting the hearing of naval personnel. Such equipment includes audiometers (automatic), audiometric booths, recheck audiometers (bone conduction capabilities) and sound level meters. Aviation medical technicians (8406) and/or aviation physiology technicians (8409) under the guidance of a Flight Surgeon or aviation physiologist normally operate the equipment in conjunction with their station Hearing Conservation Program. To assure familiarity with the equipment, a course of instruction is offered twice a year at NAVAEROSPMEDINST or NAVMISCEN. A special course is held for Flight Surgeons, aviation physiologists and industrial hygienists.

Each aviation activity has a professional sound/noise survey usually conducted by a team from one of the above laboratories. These surveys are supported by the Air Systems Command. Maps of noise hazardous areas are made by the team and a full report is submitted to each command with copies to Air Systems Command (AIR 531) and BUMED. Comments are made about the stations HCP, along with recommendations to improve the program. In the future, it is hoped that checks will be made by the Inspector General Team to determine activity progress and effectiveness of its hearing conservation.

Looking to the future, BUMED recently sponsored a meeting at NAMI to discuss the Navy's efforts, today and tomorrow, in Hearing Conservation. Attendees at the meeting included representatives from the Naval Aural Rehabilitation Center, Naval Air Systems Command, BUMED, NAS Jacksonville, NNMC, NAVMISCEN, and NAMI. From the meeting evolved a plan to consolidate the Navy's Hearing Conservation efforts. Such a plan is being presented to BUMED and if adopted, an extensive modernization program will begin early this fiscal year.—AeroMed, BuMed.

RECRUITING DUTY

In a community relations effort, the Aviation Physiology Training Unit at the Marine Corps Air Station, El Toro, California conducted a full day lecture program on various aspects of Aviation physiology for ninety (90) first year medical students from the University of Southern California. Fifty-six (56) of the students were given a simulated flight to 20,000 feet in the low pressure chamber. Such public relations can do much to create interest in the Navy's Flight Surgeon and aviation physiologist program.—AeroMed, BuMed.

NEW TRAINING ADDED

Constant and continuing efforts are made to increase the scope and to improve the quality of the Navy's residency training program in aerospace medicine. Recently approval was obtained from the Residency Review Committee for Preventive Medicine, Council on Medical Education, American Medical Association to include a six month period at the Naval Aviation Safety Center, Norfolk, in the residency schedule. This will be on a voluntary basis and will come either at the beginning or the end of the Pensacola portion of the program. It is felt that this addition will substantially benefit its participants, build a broader base from which the Center can draw future personnel, and will disseminate more of its special information into the field. Residents will be assigned to this training beginning in January 1968.—AeroMed, BuMed.

AVIATION PHYSIOLOGIST

Today's aviation physiologist is filling a gap between the Naval Air Systems Command, BUMED, field laboratories and the fleet. The aviation physiologist, best known in his role of teaching aircrewmen the physiological hazards of flight, has expanded his services to further assist man interface with his aircraft.

Aviation physiologists have recently been assisting Air Systems Command in introducing new fleet items to pilots and aircrewmen, conducting surveys on laboratory designed equipment, monitoring efforts in aircrew research, development, test and evaluation (RDTE) and in certain cases conducting RDTE. Most recent contributions are related to the A–7A and F–111B aircraft and to the APH–6A and SPH–3A flight helmets.

Funds supplied under the FAILSAFE (Fleet Air Introduction Liaison/Survival Aircrew Flight Equipment) Program have been provided to aviation physiologists in order to increase their contributions to fleet support. The combined team effort of Flight Surgeons and aviation physiologists can do much to improve the readiness of our Navy's Air Arm.—AeroMed, BuMed.

SURGEON GENERAL'S AWARD

Graduation Ceremonies were held on 22 June 1967 for Student Flight Surgeons Class 115. Forty-seven medical officers received their Navy Flight Surgeon wings of gold and one aviation medical examiner certificate was presented. Included in the class were medical officers from the Army, Public

Health Service and the Argentine and French Navies. LT David N. Sim, MC USNR was awarded the Surgeon General's Award. This award, established in 1962 by Surgeon General RADM Edward C. Kenny, MC USN, is presented to the outstanding student Flight Surgeon of each class in recognition of academic and leadership achievement during the six month course of instruction in Aviation Medicine.—AeroMed, BuMed.

ATTENTION FLIGHT SURGEONS

With the increasing use of sophisticated equipment in the Navy and Marine Corps, efficient vision becomes an important factor in the operation and maintenance of these devices. For this reason, correction of visual deficiences is of paramount importance. While some think of the determination and correction of refractive error as a simple procedure, qualified professional practitioners undergo considerable education and training to develop these skills. Examinations for detection and correction of refractive errors and coincidentally, the presence or absence of ocular pathology, are procedures which should be accomplished by professional practitioners only. Under no circumstances should these functions be delegated to non-professional personnel.—Optometry Section, BuMed.

COCKPIT NOISE LEVEL IN A–7A

During the Board of Inspection and Survey (BIS) trials on the LTV A–7A A/C, the Life Support Division, Naval Air Test Center, PAX River, became concerned about the cockpit noise levels in this new plane. Under Naval Air Systems Command's (Crew Systems Division (CSD)) management, PAX River, NADC (Aerospace Crew Equipment Department (ACED)), NAMI and NAVMISCEN studied the noise problem from two angles—(1) possibility of reducing cockpit noise and (2) sound attenuation afforded by the standard APH–6A flight helmet.

While LTV made futile efforts to quiet down the A/C cockpit noise, the laboratories began an extensive "crash" program to improve the sound attenuation of the APH–6A. During this process various flight helmets and types of ear cushions were tested (photo) for sound attenuation. When all the testing was over it was found that the current APH–6A with a new Gentex Liquid and/or foam ear cushion reduced the noise significantly from previous levels. Table 1 shows attenuation afforded by the unmodified APH–6A. Table 2 (A and B) depicts the degree of improved attenuation. Not only will the new helmet-fix provide greater protection for man's hearing mechanism, but it improves communications and the effectiveness of certain weapon system operation.

Work continues at NAMI and NAVMISCEN to further improve the sound attenuation of flight helmets. Noise problems confronting the Navy's helicopter sonar operator, as well as other fixed wing noise problems, are being studied.

TABLE 1 —*APH–6A (Unmodified)*

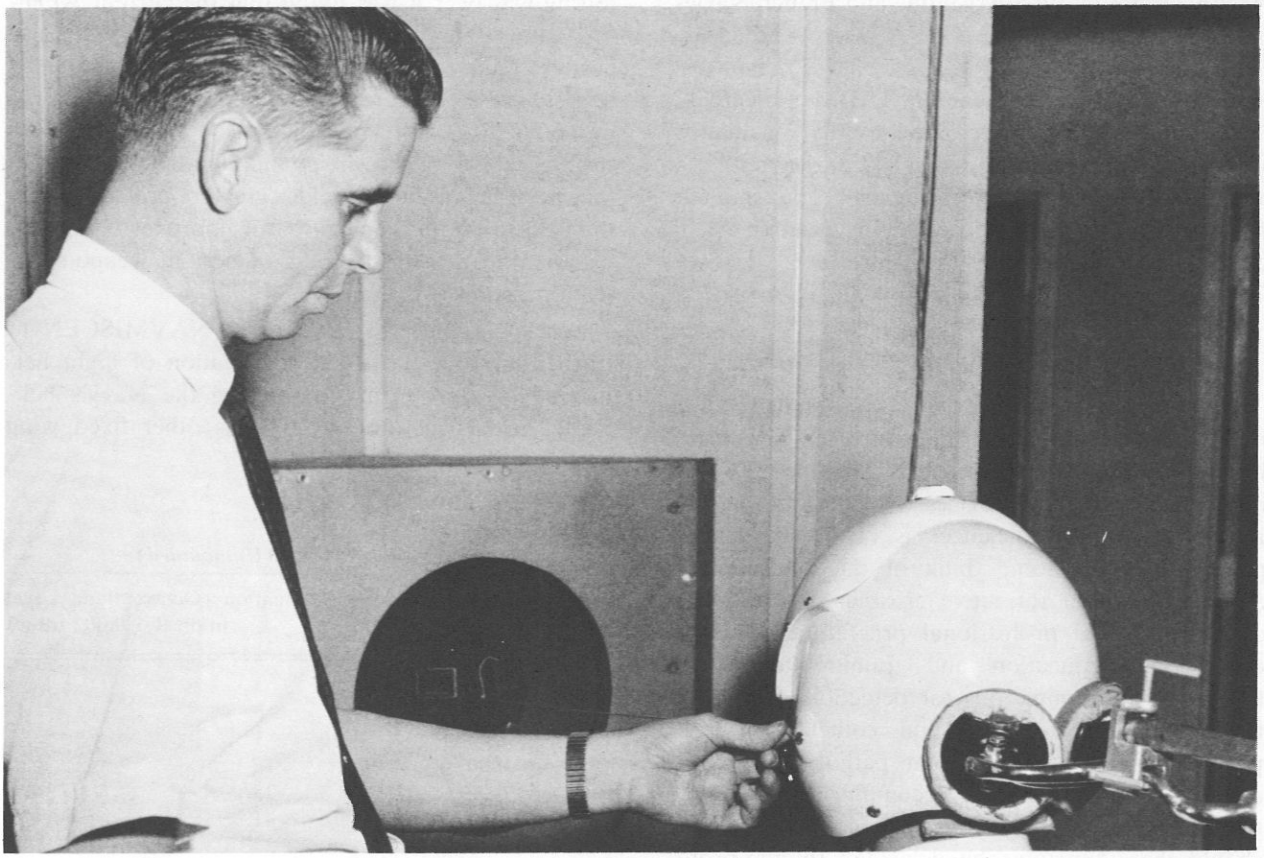
Freq. (Hz)	Attenuation (Octave Band Level in db Re: 0.002 uBar)
125	3
250	3
500	1
1000	18
2000	25
4000	41
8000	31

TABLE 2A—*APH–6A (Gentex Foam Earcups)*

Freq. (Hz)	Attenuation (Octave Band Level in db Re: 0.002 uBar)
125	10
250	9
500	17
1000	24
2000	39
4000	49
8000	43

TABLE 2B—*APH–6A (Gentex Liquid Earcups)*

Freq. (Hz)	Attenuation (Octave Band Level in db Re: 0.002 uBar)
125	10
250	14
500	25
1000	20
2000	34
4000	44
8000	41



—Official U.S. Navy Photograph.

EDITOR'S SECTION

ELEVENTH ANNUAL SEMINAR ON PROPHYLAXIS AGAINST STREPTOCOCCAL INFECTIONS

The Eleventh Annual Seminar on Prophylaxis Against Streptococcal Infections sponsored by the Armed Forces Epidemiological Board will be held at the U.S. Air Force Academy, Colorado Springs, Colorado, 2–3 October 1967. The Office of the Surgeon General Department of the Air Force, will host this year's Seminar.

Activities sending representatives to this conference should submit information copies of locally issued conference travel orders to BUMED, (Attention: Preventive Medicine Division, Code 72).

FORENSIC PATHOLOGY RESIDENCY

A one-year course designed to provide pathologists with advanced training in preparation for the practice of Forensic Pathology is offered at the Armed Forces Institute of Pathology beginning 1 July each year or as soon thereafter as possible.

The instruction is designed to cover the basic sciences thoroughly, as well as the special methods and techniques applicable in the practice of Forensic Pathology. There is a planned progression for residents to go from the more simple to complex procedures under supervision of trained staff. The methods of instruction include practical experience in the performance of medicolegal autopsies, aircraft accident investigations, toxicological examinations and criminological procedures; participation in postgraduate courses, conferences, supervised study, and research; and affiliation with other Federal agencies for experience in physical anthropology and investigative techniques. The resident is expected to take an active part in the educational and teaching programs related to Forensic Pathology. The ultimate goal of this residency is to produce a fully trained physician who can more than meet the requirements of the American Board of Pathology for certification in this special field.

An applicant must have completed the formal

training requirements in anatomic and clinical pathology as prescribed by the American Board of Pathology and must be either a diplomate in anatomic and clinical pathology, or be declared eligible to take these examinations. He must hold a commission in the Medical Corps of the Regular Navy or agree in writing to accept same if tendered.

Applications should be submitted without delay to the Chief, Bureau of Medicine and Surgery in accordance with BUMED INSTRUCTION 1520.10 Series.—Training Branch, BuMed.

A PROGRAMMED COURSE IN ELECTROCARDIOGRAPHY

A programmed course in Electrocardiography has been prepared for the Warner-Chilcott Laboratories by a group of consulting cardiologists under the direction of Louis F. Bishop, M.D. The reaction among medical teachers and trainees has been quite favorable.

This course may be used as a supplement in the teaching of interns and residents, especially those in Internal Medicine and Cardiology. The course can be obtained free of charge from Mr. V. P. Welsh, Director, Federal Sales, Warner-Chilcott Laboratories, Morris Plains, New Jersey. The Director of Medical Education or the Chief of Medicine may wish to examine the course before making a decision concerning its use. The course may also be requested by physicians on duty in small installations or on independent duty.

Also available from the same source and without cost is a useful device called the ECG Cali-Ruler. The trainees may find this a valuable aid in the interpretation of Electrocardiograms.—Training Branch, BuMed.

AMERICAN COLLEGE OF SURGEONS MEET

The American College of Surgeons will hold its annual Clinical Congress in Chicago this coming October, and the Naval Hospital, Great Lakes will again host a cocktail party for Navy medical officers and their guests. The Navy Cocktail Party will be held on Wednesday, 4 October 1967 in the Upper Tower of the Conrad Hilton Hotel from 6:00 to 8:00 p.m. There will be a cash bar and a charge of $2.50 per person for hors d'oeuvres. Reservations may be addressed to the Chief of Surgery, Naval Hospital, Great Lakes, Illinois, 60088 and are requested to be made prior to 15 September. Checks may be made payable to CAPT Philip O. Geib.—Naval Hospital, Great Lakes, Ill.

CHEMICAL, BIOLOGICAL AND RADIOLOGICAL WEAPONS ORIENTATION COURSE

Twenty-two classes of the Chemical, Biological, Radiological Weapons Orientation Course will be conducted at the U.S. Army Chemical Corps Proving Ground, Dugway Proving Ground, Dugway, Utah, by the Department of the Army during fiscal year 1968. The duration of the course is three and one-half days.

Officers of the rank of Lieutenant Commander or above are eligible to attend. Civilians in the grade of GS–12 or higher must be in a key position where need-to-know is mandatory. Officers of the rank of Lieutenant and civilians in the grade of GS–11 may be granted waivers where special circumstances warrant their attending the course. All requests for waivers must be accompanied by job description and need-to-know certification. Persons who have received complete CBR briefings during the past two years should consider delaying their attendance. Security clearance of INTERIM TOP SECRET is required. Limited quotas will be provided the Bureau of Medicine and Surgery by the Chief of Naval Personnel on a "first come first serve" basis. Requests should be forwarded in accordance with BUMEDINST 1520.8 Series.

The course provides a high level orientation on Chemical and Biological Warfare, and Radiological Implications of Nuclear Warfare, and is designed to acquaint military and civilian personnel of the Armed Forces with United States doctrine, policy, techniques and capabilities in CBR Warfare.

CONVENING DATES OF COURSES

28 Aug 67	11 Dec 67
11 Sept 67	26 Feb 68
18 Sept 67	4 Mar 68
25 Sept 67	11 Mar 68
2 Oct 67	25 Mar 68
9 Oct 67	8 Apr 68
30 Oct 67	15 Apr 68
6 Nov 67	29 Apr 68
13 Nov 67	20 May 68
27 Nov 67	3 Jun 68
4 Dec 67	10 Jun 68

—Training Branch, BuMed.

MSC ACADEMIC ACHIEVEMENT

The following Medical Service Corps officers received academic degrees during the Spring graduation at educational institutions as indicated:

	Duty Station	*Specialty*	*Educational Institution*
Doctor of Philosophy			
LT Roger H. Grothaus	DVCC, Jax.	Medical Entomology	Oklahoma State
Master of Public Health			
LCDR Edsel M. Fussel	NSA, DaNang	Medical Entomology	Yale University
LT T. A. Hill	PMU #2	Industrial Hygiene	University of Mich.
LT D. E. Rector	Norfolk Naval Shipyard	Industrial Health	University of Mich.
Master of Business Administration			
LT R. K. Zentmyer	NH, Yokosuka	Health Care Admin.	George Washington University (GWU)
Master of Science			
LCDR A. E. Bender	NNMC, Bethesda	Financial Mgmt.	GWU
LCDR B. J. Dietz	NSA, DaNang	Navy Mgmt.	PGS, Monterey
LT E. N. Giard	NSA, DaNang	Navy Mgmt.	PGS, Monterey
LTJG D. A. Hall	NSMC, New London	Pharmacology	Univ. of Pa.
LT R. B. Hinds	NH, Corpus Christi	Navy Mgmt.	PGS, Monterey
LCDR T. A. Hussey	BUMED	Personnel Admin.	GWU
LT D. Horrigan	NADC, Johnsville	Zoology	Univ. of Rhode Island
LT J. L. Myrah	BUMED (Code 33)	Navy Mgmt.	PGS, Monterey
LT L. E. Richardson	NH, Quantico	Personnel Admin.	GWU
LT Phyllis Warren	NMS, Bethesda	Bacteriology	Univ. of Kentucky
Bachelor of Science			
LT W. M. Beckner	NMRU #2	Physics	GWU
LT A. R. Duncan	NH, Beaufort	Hotel Admin.	Cornell Univ.
LT J. A. Faulkner	NH, Camp Lejeune	Hotel Admin.	Cornell Univ.

	Duty Station	*Specialty*	*Educational Institution*
Bachelor of Arts			
LT F. E. Bennett	NH, Annapolis	Social Sciences	GWU
LCDR T. G. Cooper	NH, Guam	Business Mgmt.	College of Guam
LTJG R. J. Cota	NTC, Great Lakes	Business Admin.	Roosevelt Univ.
LCDR W. P. Davis	BUMED	Social Sciences	GWU
LCDR J. R. Gouldman	NH, Pts., N.H.	Social Sciences	GWU
LT J. L. Graves	NNMC, Bethesda	Social Sciences	GWU
LT A. R. Rath	PGS, Monterey	Social Sciences	GWU
LT D. E. Reeves	NH, Pts., N.H.	Social Sciences	GWU
LCDR J. W. Richardson	NTC, San Diego	Health Ed. and Marketing	San Diego State
LCDR L. J. Schaffner	BUMED	Social Sciences	GWU
LCDR B. L. Stephens	NAMC, Pensacola	Social Sciences	GWU
LT B. E. Weems	PGS, Monterey	Social Sciences	GWU
LT A. O. Woods	NDW (DUINS GWU)	Social Sciences	GWU
Bachelor of Business Administration			
LCDR G. W. Ramsey	Hdqtrs, 5th N.D.	Business Admin.	GWU

—MSC Div, BuMed.

In Memoriam

LT Thomas L. Angros MC USN
LT Curtis R. Baker MC USN
WO–1 Loy Joseph Black USN (Ret)
CAPT Warren E. Bradbury MC USN (Ret)
LT John A. Brown MC USN
LT Leonard (n) Brown MSC USN (Ret)
LCDR Robert Allen Burke MC USN
CDR Richard E. Donahue MC USN
HMC John Dotsey USN
CAPT Harry (n) Eisenberg MC USNR (Ret)
LT Lloyd P. Hyde MC USNR
W–2 Robert L. Jenkins USN (Ret)
LCDR Charles R. Kistler MC USNR
LCDR Stanley J. Klyza MC USNR (Ret)
CDR Harry H. Linder MSC USN (Ret)
CAPT Morgan F. McAfee DC USN (Ret)
LT William M. Miller MC USN (Ret)
LCDR William B. Pitzer MSC USN
CAPT Victor B. Riden MC USN (Ret)
CAPT Joseph L. Schwartz MC USN (Ret)
HM3 James M. Shappee USN
CDR Thomas E. Shea, Jr. MSC USN (Ret)
HMC Elbert L. Silvers USN
CWO–3 John E. Wholley USNR (Ret)
CWO–4 Arthur H. Wood USN (Ret)

PHYSICAL CONDITIONING OF WOMAN MARINES

An investigation of a battery of new physical fitness tests for Woman Marines proposed by CDR Ann Jewett, USNR (W), is underway at Marine Corps Recruit Depot, Parris Island, South Carolina, by personnel of the Physiology Division, Naval Medical Field Research Laboratory, Camp Lejeune, North Carolina. The study will determine the pre- and post-training scores in a series of five tests, consisting of bent knee sit-ups, knee push-ups, jump and reach, a 600 yard run-walk, and a shuttle run. This evaluation is a follow-up of test accomplished in December 1966, and it is estimated that new standards for women's physical fitness tests will be established upon the basis of the results recorded. —Public Affairs Office, BuMed.

LT BERGNER RECEIVES DOCTOR OF PHILOSOPHY DEGREE

LT John F. Bergner, Jr., MSC USN, Department of Parasitology, received his Ph.D. degree recently from the University of Maryland. He enlisted in the Navy as a Hospital Recruit 19 years ago in his hometown of Berwick, Pa., and was stationed at NMRI during the period of 1954–57. He left the Navy to become a full time student at Wake Forest College, Winston-Salem, N.C., from 1957–60, and earned his B.S. degree during that time. In 1961, Dr. Bergner received his M.S. in Public Health from the University of North Carolina, Chapel Hill, N.C., and rejoined the Navy with the commission of Ensign in the Medical Service Corps. His first duty station as an officer was in the Parasitology Department of NMRI. He returned to this area in 1964 from NAMRU–2, Taipei, Taiwan, on a U.S. Navy Contract Graduate Fellowship at the University of Maryland where he served as a teaching assistant in Experimental Parasitology, Zoology, until 1966 when he reported again to NMRI. Early in June, Dr. Bergner departed on TAD as Project Leader, Onchocerciasis, NAMRU–3, Field Activity, Addis Ababa, Ethiopia.—NMRI Notes No. 5, May 1967.

Drug Abuse: Escape to Nowhere—A Guide for Educators is the title of a recent publication prepared by Smith Kline and French Laboratories in corporation with the National Education Association. This is a concise yet cogent book published in a field where continued hammering at facts is necessary in an attempt to counteract the mistaken impression too frequently left by the mass media. The book is readily available from the National Education Association at $2 per copy.

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