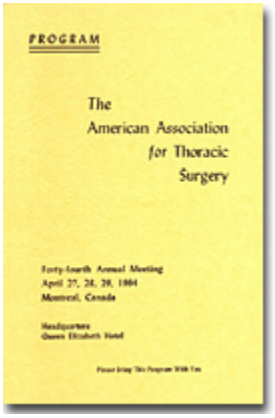
1964 ANNUAL MEETING PROGRAM



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Monday Morning, April 27, 1964

8:30 A.M. Business Session (Limited to Members)
Grand Ballroom

8:45 A.M. Scientific Session: REGULAR PROGRAM
Grand Ballroom

1. Clinical Homograft Valve Transplantation

W. G. BIGELOW, R. O. HEIMBECKER, and D. W. GORDON MURRAY*,
Toronto, Canada

Homograft aortic valves have been transplanted in humans (a) into the descending aorta as treatment for aortic insufficiency, (b) as replacement for the mitral valve, and (c) in the subcoronary position to replace the aortic valve. Follow-up haemodynamic studies have been carried out. In six patients the valve has been functioning for 2 to 8 years. Reference will be made to less successful studies with intracardiac homograft valve transplantations in dogs with survival up to 3 years.

2. Clinical Experience and Operative Technique of Valve Replacement with Sutureless Aortic and Mitral Valves

G. J. MAGOVERN, HARRY W. CROMIE*, E. M. KENT,
and W. B. CUSHING*, Pittsburgh, Pa.

The paper describes the operative technique and clinical experience with forty-five patients with sutureless mitral or aortic valves. These valves were previously described at the 1963 American Association for Thoracic Surgery Forum, along with out initial clinical experience. Twenty-nine patients 1 month to 16 months following surgery are living and well. There were six operative deaths, seven hospital deaths and three late deaths, which will be discussed. Preoperative and postoperative catheterization data will be presented. The advantages of a rapid method of valve fixation reducing the period of bypass time, coronary perfusion and hypothermia to a minimum will be stressed in these patients all of whom had preoperative catheterization and were considered totally disabled. Their ages ranged from 19 years to 71 years, and six patients had recurrent disease with previous open heart surgery. The average bypass time and the actual time of insertion will be presented.

3. Aortic Insufficiency Secondary to Aneurysm Changes in the Ascending Aorta: Surgical Management

LAURENCE K. GROVES, DONALD B. EFFLER, and K. GULATI*,
Cleveland, Ohio

This report is based on experience with 11 patients treated for aortic insufficiency secondary to aneurysmal changes in the ascending aorta. Only 2 basic pathologic entities have been recognized in these 11 patients: 3 had syphilitic aortitis, the other 8 had idiopathic medial necrosis. Of these 8 patients, 3 had Marfan's syndrome, but pathologic material was indistinguishable from idiopathic medial necrosis. Ideal treatment for such patients requires (1) treatment of the aortic insufficiency and, (2) treatment of the aneurysm itself. Ten of these 11 patients had normal valve leaflets inadequate to fill the aortic lumen; each had Starr-Edwards prosthetic replacement. The 11th patient had prolapse of the noncoronary cusp due to a dissection behind this cusp. The valve was satisfactorily reconstructed. Unusual care and thoroughness must be exercised in suturing a prosthetic valve in place in these cases where the structures are attenuated, as opposed to the sclerosis of rheumatic valvulitis. Treatment of the aneurysm is influenced by the positions of the coronary ostia. Our approach has varied from no treatment through varying degrees of aneurysmorrhaphy to excision and graft replacement. The methods used are discussed. The authors' experience is presented along with suggestions based thereon.

4. Bilateral Pulmonary Resections for Tuberculosis

ROBERT D. SELLERS*, WILLIAM R. SCOTT*, HARLAN D. ROOT*,
and JOHN F. PERRY, JR.*, Minneapolis, Minn.
Sponsored by C. WALTON LILLEHEI

In the 10 year period from 1950 to 1960, bilateral pulmonary resections for tuberculosis were carried out in 100 neuropsychiatric patients. Sixteen of the patients had bilateral resections in one stage while the surgery in the remaining 84 patients was carried out in two stages. A total of 200 operative piocedures were carried out in this group of patients. This included 187 pulmonary resections, 15 thoracoplasties, and 2 decortications (4 of the procedures were simultaneous pulmonary resection and thoracoplasty or thoracoplasty and decortication). There were 3 operative deaths. Thirty-three

complications occurred in 29 patients. In 11 of this group additional surgery was required for management of the complication. During the 3to 12 year period of follow-up, relapse of the tuberculosis has occurred in 5 patients. Each of these now has inactive disease. This aggressive surgical approach to the treatment of tuberculosis in the neuropsychiatric patient has been most encouraging. It has allowed the rehabilitation of a difficult group of patients with advanced disease.

5. The Surgical Treatment of Pulmonary Neoplasms: A Ten-Year Experience

O. THERON CLAGETT, W. SPENCER PAYNE*, THOMAS H. ALLEN*, and LEWIS B. WOOLNER*, Rochester, Minn.

A very extensive literature concerning the surgical treatment of pulmonary neoplasms has appeared in recent years. Most of the published papers have dealt with the surgical treatment of a particular type of pulmonary neoplasm. We have not been able to find any comprehensive reviews of the entire spectrum of pulmonary tumors that are presently being treated by surgical means. Therefore, we have reviewed a series of approximately 1800 pulmonary benign and malignant neoplasms treated surgically at the Mayo Clinic in the 10-year period, January 1, 1950, to December 31, 1959. This study has afforded (1) a practical pathologic classification of pulmonary neoplasms, (2) an accurate appraisal of the relative incidence of the various pulmonary neoplasms that can be treated surgically, and (3) some knowledge of the clinical behavior of the various pulmonary tumors and the results of surgical treatment. The results of this study will be reported.

6. Bilateral Primary Bronchogenic Carcinoma

T. W. SHIELDS, C. T. DRAKE*, and J. C. SHERRICK*, Chicago, Ill.

Resectable bilateral primary bronchogenic carcinoma has not been seen frequently in clinical practice, though bilateral lesions have been recognized in the nonresectable state or as an autopsy finding. A review of the literature revealed that 10 bilateral primary lung cancers have been diagnosed during life and reported. Surgical therapy has been carried out in only 5 of these 10 patients. Recently 3 of our patients with lung cancer were discovered to have developed a second primary bronchogenic carcinoma after apparent successful resection of the initial lesion. The time interval was 6 years in one patient and 2½ years in each of the other 2. The initial surgery was a lobectomy in one patient and a pneumonectomy in the others. The subsequent procedure on the second side was a lobectomy in 2 and a wedge resection in the third. Detailed case histories will be presented. The problems of determination of the primary nature of the second lesion and the management of such patients will be discussed. The apparent increase in recognition of nonsimultaneous double primaries will likewise be discussed in relationship to the choice of the initial surgical procedure and the long term evaluation of the patient with bronchogenic cancer.

7. The Results of Raising the Resectability Rate in Operations for Lung Carcinoma

R. ABBEY SMITH*, Hertford Hill, Nr. Warwick, Warwickshire, England

Sponsored by J. MAXWELL CHAMBERLAIN

The operation of exploration only without resection of the lung containing the tumour is unsatisfactory. To reduce the number of such operations a policy of resecting every lesion explored is followed. The tumour may be incompletely removed. Over 12 years, 600 patients with lung cancer have been personally explored and the growth removed in 96% of patients (i.e., a resectability rate of 96%). No patient has been lost to follow-up. The fate of every patient is known and all survivors examined at regular intervals. For all resections the hospital mortality is 6.6%. The short and long term results of this procedure are presented with emphasis on the long term results in patients in whom the operation appeared to be of a non-curative or palliative nature. The results indicate the type of lung cancer in which the non-curative operation is a worthwhile procedure. Techniques will be presented for (1) right pneumonectomy with superior vena caval Teflon replacement, (2) left pneumonectomy with supra aortic tracheal suture for left main bronchus tumours, and (3) sleeve resection of the bronchus and a segment of the main pulmonary artery.

*By Invitation

Monday Afternoon, April 27, 1964

2:00 P.M. Scientific Session: REGULAR PROGRAM
Grand Ballroom

8. Two Years Clinical Experience with the Implantable Synchronous Pacer

SOL CENTER*, DAVID NATHAN*, CHANG WU*, and DAIRO DUQUE*,

Miami, Fla.

Sponsored by THOMAS H. BURFORD

The first pacer to synchronize atrial and ventricular contractions in the human heart was implanted in June, 1962. More than twenty synchronous pacers have been implanted in the past two years for the correction of complete heart block and various cardiac arrhythmias. Cardiac output determinations before and after surgery in patients with heart block have shown

an increase in cardiac output at increasing ventricular rates in the majority of patients. Repeated measurements of the P wave and ventricular threshold were carried out over a twelve month period in ten patients. Maintenance of an adequate atrial potential and a ventricular threshold of less than three millivolts were present in all but the two infected cases, proving the feasibility of long term synchronous pacing. Follow-up has been obtained in all patients. The cause of death has been determined in those who died in the two year period. The performance of the pacer during periods of normal sinus rhythm and in the presence of atrial or ventricular arrhythmias will be discussed. Recent changes in the pacer parameters and surgical technique will be presented.

9. Cor Triatriatum-A Diagnostic Surgical Enigma

CLAUDE GRONDIN*, ARNOLD LEONARD*, KURT AMPLATZ*,

RAY C. ANDERSON*, JESSE E. EDWARDS*, and

RICHARD L. VARCO, Minneapolis, Minn.

The intriguing condition, cor triatriatum, presents a challenging diagnostic problem, yet simplicity of surgical correction (with good record of survival) as demonstrated in three of four operated cases, makes prompt diagnosis of this defect incumbent on the diagnostician. Six cases of cor triatriatum are presented. The embryologic origin of this anomaly is discussed in an attempt to correlate and differentiate this entity from supra-valvar stenosing ring of the mitral valve, atresia of the common pulmonary vein, anomalous pulmonary venous return, and hypoplasia of the pulmonary veins. The combined diagnostic studies of angiocardiography, cardiac catheterization, and electro-cardiography have demonstrated the feasibility of arriving at a preoperative diagnosis of this defect. Three of the four patients subjected to corrective surgery are living today. The overlooked anomalous return of the pulmonary veins into the left innominate vein accounted for the only operative death. Results of postoperative catheterization have shown return to normal pulmonary artery and right ventricular pressures. Early presumptive diagnosis of cor triatriatum, especially in infants who present with left heart failure, could lead to prompt correction and increased salvage, rather than terminate as painful awareness at the final pathological examination.

10. Surgical Treatment of Congenital Aortic Stenosis: Valvular, Subvalvular and Supravalvular

THOMAS PUTNAM*, PAUL D. HARRIS*, WILLIAM F. BERNHARD, and

PAUL HUGENHOLTZ*, Boston, Mass.

Three hundred and twenty-four patients with congenital aortic stenosis have been evaluated during a six-year period, 1958 to 1963. Of this number, 82 have had surgical correction of their defects. Valvular stenosis was present in 57 patients (70%), a subvalvular fibrous ring was noted in 18 patients (22%), and supravalvular obstruction occurred in 7 (8%). Males predominated in the valvular stenoses (90%), while 60% of the supravalvular stenosis group were females. The syndrome of growth retardation, mental deficiency, and peculiar facies was present in 40% of the supravalvular cases. The ages of all patients ranged from 24 months to 28 years. Associated congenital cardiac defects were present in 24 patients (30%): valvular stenosis 20%, supravalvular 40% and subvalvular 50%. Coarctation of the aorta was the most frequent lesion (16 patients, 20%). Symptoms of angina and syncope were common in the subvalvular cases, in contrast to the valvular stenosis group, who were frequently asymptomatic. The overall mortality in patients with valvular stenosis was 3%. Death occurred in 5 other patients: 2 supravalvular and 3 subvalvular. Five of the eight fatal cases (70%) had associated cardiac lesions. Postoperative follow-up data will be presented.

11. Complete Correction of Tetralogy of Fallot. Clinical and Hemodynamic Results in 80 Patients Studied Postopera-tively by Recatheterization

C. WALTON LILLEHEI, and MORRIS J. LEVY*,

Minneapolis, Minn.

Tetralogy of Fallot became correctable in 1954. In assessing the value of a new surgical procedure, an accurate postoperative evaluation by objective methods is particularly important. In this study are included all patients with the tetralogy malformation treated surgically by the authors since 1954, and who have had postoperative recatheterization. Since all patients had a preoperative catheterization, hemodynamic data for comparison has been available. The interval between surgery and recatheterization varied from 4 months to 9 years, and the age range of patients studied from infancy to 55 years. To date, 80 patients have been studied, and approximately 70 per cent have been found to have normal or very near normal right heart physiology. The remainder are approximately equally divided between those with a closed ventricular defect but significant gradients remaining across the pulmonic outflow tract, or those with a residual shunt with or without some outflow obstruction or pulmonic insufficiency. Fifty-two per cent are completely cured hemodynamically. Analysis of the pathologic anatomy as determined by preoperative angiography and as observed at surgery in correlation with postoperative results have permitted certain deductions of value concerning indications for, and timing of surgery, case selection, and choice of surgical techniques.

12. The Diagnosis and Surgical Correction of Total Obstruction of the Right Ventricle

DAVID C. SABISTON, JR , WILLIAM P. CORNELL*,

J MICHAEL CRILEY*, CATHERINE A. NEILL*, and

RICHARD S. ROSS*, Baltimore, Md.

Pulmonary atresia with total obstruction of the right ventricular outflow tract or of the pulmonary valve is a severe form of the tetralogy of Fallot. Ten patients were investigated by angiocardiography and cardiac catheterization. *Total* obstruction of the right ventricle was demonstrated in each, five at the infundibulum and five at the pulmonary valve. Although this condition may occur as congenital lesion, review of the data in these cases led to the development of a new concept that this obstruction represented an *acquired* lesion. A previous subclavian-pulmonary (Blalock) anastomosis was previously performed in all patients, permitting survival despite complete right ventricular obstruction. The characteristic features of this physiopathological entity and intermediate forms in the pathogenesis of the condition will be illustrated by cine-angiography. Seven patients have been operated upon, four of whom have had total correction and are long-term survivors. Clinical manifestations may be quite marked and hemoconcentration severe. Anatomical features which may offer difficulty in operative repair include severe infundibular stenosis, diminutive right ventricular outflow tract, pulmonary valvular atresia, and hyoplasia of the pulmonary artery. The technic of surgical correction will be discussed and illustrated by a cine-film.

13. Surgical Treatment of Ventricular Septal Defect Associated with Pulmonary Hypertension

GRADY L. HALLMAN*, DENTON A. COOLEY, ROBERT R. WOLFE*,

and DAN G. MCNAMARA*, Houston, Texas

As continuing refinements in technics of extracorporeal circulation and intracardiac repair enable the correction of ventricular septal defect with ever lower mortality and morbidity, the problem of associated pulmonary hypertension becomes increasingly important. The difficulty imposed on the operative treatment of ventricular septal defect by elevated pressure in the pulmonary arterial system comprises one of the last significant barriers to the successful management of this lesion. Between 1956 and 1963 four hundred and eighty-two operations have been performed for closure of isolated ventricular septal defects. The pulmonary arterial pressure was elevated in 114 instances. The hospital mortality rate was 16 per cent in patients with pulmonary hypertension and 8 per cent in the remainder. Postoperative cardiac catheterization has been performed in sixty-five patients. Experience with this large group of patients has helped define the criteria for selection of patients for operation. Details of current surgical management will be presented including the hemodilution technic of perfusion, transverse ventriculotomy, patch closure of large defects, and the use of elective tracheostomy with assisted respiration following operation. Postoperative clinical and physiologic data extending over a period of seven years will be discussed with particular attention to the fate of patients with persistent pulmonary hypertension.

14. Congenital Heart Disease in Adults

FRANK GERBODE, WILLIAM J. KERTH*, ERCUN F. SABAR*,

JOHN J. OSBORN*, and ARTHUR SELZER*. San Francisco, Calif.

t is generally believed that the duration of life among patients with congenital heart disease averages 30 to 35 years. Some individuals reach middle or advanced age, but by this time the abnormal circulation has frequently caused serious secondary changes or some degree of heart failure. Operative correction may be more difficult than during childhood and the postoperative management is more exacting, requiring special attention to respiratory problems and cardiac arrhythmias. We have operated upon more than 150 patients over 21 years of age with congenital cardiac lesions. Two-thirds of these were intracardiac lesions operated upon with cardiopulmonary bypass. Included in this group are 60 patients with atrial septal defect, 13 patients with ventricular septal defect, 3 of whom had severe pulmonary hypertension and 3 who had concomitant aortic insufficiency. The hospital mortality for this group of patients with intracardiac lesions was 11%, for the entire group 7%. It is the purpose of this paper to describe some features of our operative and postoperative management for this challenging group of patients.

*By Invitation

Tuesday Morning, April 28, 1964

8:30 A.M. Scientific Session: THORACIC SURGERY FORUM
Grand Ballroom

15. The Experimental Production of Hypertrophic Subaortic Stenosis

J. S. MCLAUGHLIN*, A. G. MORROW, and M. J. BUCKLEY*,

Bethesda, Md.

In patients with hypertrophic subaortic stenosis it has been shown that obstruction to left ventricular ejection results from the contraction of an abnormal muscle mass within the outflow tract of the left ventricle. This dynamic obstruction contrasts with the fixed stenotic orifice associated with other forms of aortic stenosis and has not, heretofore, been produced in the experimental animal. Coarctation of the ascending aorta was produced in dogs and, over a period of 4-6 months, resulted in the progressive development of concentric left ventricular hypertrophy. Cardiac catheterizations at this time revealed intraventricular pressure gradients up to 75 mm. Hg which persisted after the aortic obstruction was relieved. In every animal the administration of small doses of isuprel increased the hypertrophic obstruction significantly but it was not altered by the changes in left ventricular flow and volume associated with aortic regurgitation or a subclavian-left atrial shunt. The operative methods utilized in producing experimental hypertrophic subaortic stenosis and physiologic comparisons between this lesion and that encountered in man will be presented.

16. The Fate of the Starr-Edwards Valve in the Aortic Area of Calves

PETER E. BLUNDELL*, and DWIGHT C. MCGOON, Rochester, Minn.

The fate of the Starr-Edwards ball valve in the subcoronary position of calves has been followed for periods up to 8 months. Animals were sacrificed at regular intervals after insertion of the prosthesis, for gross and microscopic study of the operative area. Special note was made of any alterations of blood coagulability or of the presence of infection on the prosthesis. There were no operative deaths during this study. In the absence of infection, fibrin deposition was minimal. During the first few days, a thin layer of fibrin formed over the Teflon on the prosthesis. By the end of 1 week, fibroblasts could be seen invading this material; and 1 week later they were organizing the interstices of the Teflon mesh. During the first month, extensions of fibrin could be seen creeping up the struts of the cage but thus far have not been seen thereafter in this study. In contrast, the presence of infection resulted in severe fibrin deposition beginning after 2 weeks and becoming severe enough to cause marked aortic stenosis and bacterial endocarditis at the end of 8 weeks. There was no significant change in the plasma clotting time or in the prothrombin time during the first 2 postoperative months.

17. A Hinged-Leaflet Valve for Total Replacement of the Human Aortic Valve

VINCENT L. GOTT*, RONALD L. DAGGETT*, JAMES D. WHIFFEN*,

DONALD E. KOEPKE*, and WILLIAM P. YOUNG*, Madison, Wisc.

Sponsored by ANTHONY R. CURRERI

A new type prosthetic valve has been developed for complete replacement o£ the human aortic valve. The valve consists of a rigid housing of graphite coated Lexan plastic with a central cross strut for the anchoring of a flexible "butterfly-wing" leaflet. This prosthetic valve evolved through many modifications made during the course of 115 canine valve replacements. To date the hinged-leaflet valve has been utilized as a total aortic valve replacement in eight patients at the University of Wisconsin Hospitals. The first placement was 7 months ago, and in those patients catheterized to date none has shown a systolic pressure gradient. Three of the eight patients have died but from causes other than valve malfunction. The hinged-leaflet valve appears to offer several significant advantages over existing prosthetic aortic valves. These advantages include a large I.D./O.D. ratio which eliminates any significant systolic gradient, an extremely low profile (5/16" tall) which permits easier suture and valve placement, and a graphite-heparin coating which significantly reduces the incidence of thrombosis. Also, with the use of a hinged-leaflet as opposed to a caged ball the stress placed on the anchoring sutures is considerably reduced.

18. Homotransplantation and Autotransplantation of a Pulmonary Lobe

OTTO GAGO*, EMILIO DELGADO*, FRED SCHOENFELD*,

KLAUS RANNIGER*, FRANCIS L. ARCHER*, and WILLIAM E. ADAMS,

Chicago, Ill.

The feasibility of the transplantation of a lower pulmonary lobe in the human with respiratory insufficiency seems to us greater than the transplantation of the total lung. The surgical technique is easier and less traumatic, avoiding the risk of a pneumonectomy in a patient with severe functional deficit. In order to study this problem, transplantation was done in a

group of 20 pairs of nonrelated mongrel dogs, with two teams working simultaneously. Methotrexate in large dose was used postoperatively as an immuno-suppressive drug. Angiographic studies of the pulmonary tree were made at different times following the graft. Oxygen saturation of the pulmonary vein draining the transplanted lobe was also made at different postoperative periods. Open chest biopsies and pathologic findings will be discussed.

19. Replacement of Tracheobronchial Defects with Autogenous Pericardium

LESTER R. BRYANT*, Lexington, Ky.

Sponsored by BEN EISEMAN

The size of the defect following excision of deformities or tumors of the trachea may require the use of a tracheal graft. In this study, free grafts of unsupported autogenous pericardium were used to bridge defects in the tracheobronchial tree of mongrel dogs. In twenty animals, portions of the carina, main stem bronchi, or trachea were excised to produce defects two to five centimeters in length and involving up to two-thirds the circumference of the airway. Circumferential defects of the intra-thoracic trachea were created in another ten animals by excising three to eight cartilaginous rings. Repair was effected by interposition of a tubular pericardia! graft without rigid support of the pericardium. The grafts functioned well in the immediate postoperative period and became airtight in 24 hours. Collapse of the graft with respiratory obstruction did not occur. Four animals died of mediastinal suppuration and severe stenosis developed at the graft site in three dogs with circumferential grafts before a program of bronchoscopic dilatations was begun. The grafts in the remaining animals have functioned satisfactorily for periods up to eight months. The results indicate that pericardium may be used satisfactorily to patch defects and as a tubular substitute when circumferential tracheal resection is required.

20. A New Method for Extensive Resection and Reconstruction of Mediastinal Trachea and its Bifurcation in Man, without Prosthesis or Graft

HERMES C. GRILLO*, and ELLEN B. DIGNAN*, Boston, Mass.

Sponsored by J. GORDON SCANNELL

A new method is presented for extensive resection and reconstruction of the trachea within the thorax, where complex techniques other than direct anastomosis of tracheobronchial tissue so frequently fail. The anatomic basis of the method lies in (a) extension of the limits of mobilization of the trachea and (b) transfer of the cervical trachea into the thorax. In a series of dissections in fresh cadavers, in the age group 55-90, an average of 6.5 cm. of lower trachea was resected and continuity restored directly, without excessive tension. This was accomplished by (1) mobilization of the right hilum, (2) division of the pulmonary ligament, (3) reimplantation of the left main bronchus and (4) pericardial vascular mobilization. Additional length was resected and tracheal continuity restored within the mediastinum by division of the trachea below the cricoid cartilage and downward mobilization of the cervical segment, establishing a cervical tracheostomy. Vascular supply of the transferred segment was maintained. These methods supply a unified approach to wide tracheal resection at any level, transferring any necessary reconstruction into the neck, where complex methods may be applied safely.

21. Pulmonary Surgery in Cystic Fibrosis

SAMUEL R. SCHUSTER, HARRY SHWACHMAN*,

G. B. C. CARRIS*, and KON-TAIK KHAW*,

Boston, Mass.

The usual cause of death and most serious manifestation of cystic fibrosis is chronic pulmonary infection with resultant bronchiectasis that often progresses toward total lung destruction. In addition to the usual medical therapy, we have utilized limited pulmonary resection in carefully selected patients with evidence of bronchiectasis and or localized lobar collapse as a palliative measure to slow down the unrelenting pulmonary involvement. A review of this series of children with cystic fibrosis undergoing palliative pulmonary resection is presented and demonstrates the effectiveness o£ such surgery in slowing the progress of pulmonary involvement once overt structural changes have occurred. Also demonstrated is the fact that these surgically treated patients, if operated upon early enough, are usually more comfortable and less symptomatic for significantly longer periods of time than those who have not had surgical intervention at this stage in the disease.

22. Direct Sputum Smear for Diagnosis of Pulmonary Histoplasmosis

LEON P. WOODS*, ELLIS A. TINSLEY*, and

WALTER L. DIVELEY, Nashville, Tenn.

In pulmonary histoplasmosis, diagnosis by culture and serologic means has been slow and too often only presumptive. At the R. S. Gass Hospital we have come to accept as routine the success with which pulmonary histoplasmosis is diagnosed from simple sputum smears, and we were quite surprised to find that there has been no emphasis upon this method in the literature. Feeling that this very old and useful diagnostic technique is virtually unknown and unused for this disease, we

have analyzed our experience to confirm the accuracy of the method. Of 84 patients seen with pulmonary histoplasmosis since 1960, 54 submitted sputum specimens for direct examination. H. Capsulatum was identified within macrophages, using histologic stains, in 35 of these cases; 88% of these diagnoses were later proven and 12% were presumed correct because both complement fixation and skin test were positive. Smears were not diagnostic in 19 of the54 submitted cases. Cavitary lesions were most often associated with positive sputum smears (70%), while only 50% of the cases with infiltrative lesions were smear positive. Thus % of active pulmonary histoplasmosis cases were diagnosed by direct sputum smear, and false positives did not occur.

23. Surgical Correction of Ruptured Chordae Tendineae

JOE D. MORRIS, RALPH L. BRANDT*, and

DAVID A. PENNER*, Ann Arbor, Mich.

Ruptured chordae tendineae has been the mechanism of mitral valve insufficiency in eleven patients put of fifty-two who underwent open operation for correction of pure mitral insufficiency. The diagnosis was made preoperatively in six of these patients on the basis of history and distinguishing physical findings. Only four patients in this series had a history of rheumatic fever while five patients presented a history of coronary artery disease. Trauma and hypertension were thought to be the etiology of the chordae rupture in two cases. A satisfactory surgical correction employing a prosthetic chorda of Teflon cloth has been evolved. The technique permits adjustment of tension on the flail leaflet and preserves an otherwise satisfactory mitral valve. The results of operative correction will be presented. Fabrication of the Teflon prosthesis and appearance of the valve will be shown by a short film strip.

24. Increase in Blood Flow in Experimental Replacement of the Superior Vena Cava

THEODOR M. SCHEININ*†, and JAMES R. JUDE*, BALTIMORE, MD.

Sponsored by ALFRED BLALOCK

Early thrombosis has made experimental superior vena caval (SVC) replacement unsatisfactory. Blood flow through the graft is recognized as an important early factor in maintaining patency. This study encompassess such effect by increasing superior caval blood flow by a temporary distal arterio-venous fistula. Studies were performed on 36, 11-16 Kgm mongrel dogs. In the test series, the entire SVC was replaced by a crimped teflon or dacron tube or an autogenous external jugular vein graft. A temporary carotid to external jugular arteriovenous (A-V) fistula was then immediately constructed. This A-V fistula was closed four weeks later. The control series had no A-V fistula. In both groups the azygos vein was not ligated and no anticoagulants employed. The fate of the grafts was determined by repeated cavograms and gross and microscopic studies up to eight months. The patency rate in the test series was 83%. The average follow-up was 5.7 months. There was no instance of late thrombosis or narrowing of any of the grafts. In the control series only 26% remained patent. Stenosis occurred only in this group. Teflon tubes and autogenous vein grafts appeared to be superior to dacron. The temporary distal A-V fistula markedly enhanced persistent patency of all types of grafts.

25. Operations Upon Coronary Arteries Using Absorbable In-traluminal Gelatin Tubes

WALTER F. BALLINGER II*, NOEL FISHMAN*, and

RUDOLPH C. CAMISHION, Philadelphia, Pa.

Operations upon coronary arteries require hypothermia or temporary shunts to protect the myocardium from ischemia. Early thrombosis frequently occurs, with death due to arrhythmias or myocardial infarction. In-traluminal gelatin tubes dilate spastic arteries, provide rigidity to facilitate suturing, allow blood flow to the distal myocardium and dissolve quickly and completely after arterial repair. Fifteen linear arteriotomies and nine transections were performed on the left circumflex coronary artery of 24 normothermic dogs. Repair over a gelatin tube was accomplished without arrhythmias or ischemia. There were 15 long-term survivors, nine with repair of arteriotomies and six with end-to-end anastomoses. Three deaths occurred from thrombosis due to poor intimal apposition, three from atelec-tasis and three from gelatin emboli. This latter complication did not recur once the proper technique of cutting the tube to size was learned. Long-term survivors were sacrificed after three to nine months. A varying degree of late narrowing without myocardial infarction was observed and was due to progressive fibrosis around the suture. Gelatin tubes provide a high rate of immediate successs in experimental operations upon coronary arteries. Long-term patency is related to choice of suture material which will be discussed. A short film strip illustrating this technique will be shown.

26. Metabolism of Vasomotor Agents by the Isolated Perfused Lung

BENEISEMAN, LESTER BRYANT*, and THEODORE WALTUCH*,

Lexington, Ky.

Although primarily considered as an organ devoted to gaseous exchange, the lung also is active in the metabolism of non-gaseous substances. This is a study of metabolic degradation of various vasoactive substances by isolated freshly

excised canine lungs aseptically perfused with heparinized blood and oxygenated by mechanical insufflation through the cannulated trachea. Temperature, pH, pO_2, pCO_2, pulmonary artery pressure, pulmonary venous return and airway pressure were monitored during each perfusion. Forty-five technically successful experiments have been performed with a total of 60 loading experiments divided as follows: serotonin, 5 and 10 milligram loads, 19 experiments; histamine, one to ten milligram loads, 35 experiments; nore-pinephrine, 150 micrograms to one milligram loads, six experiments. Serotonin is promptly cleared by the lung with the production of 5-HIAA. The pulmonary blood flow is markedly reduced by this agent and the airway resistance is increased. Histamine produces increased airway resistance and a moderate increase in pulmonary vascular resistance, but it is not metabolized by the lung. Norepinephrine is quickly degraded but it produces little change in pulmonary vascular resistance or airway resistance. The implications of the non-gaseous metabolic properties of the lung during pulmonary by-pass and with the infusion of vasoactive agents are discussed.

27. Pulmonary Artery Bypass: A Simplified Method For Prolonged Support

JOHN JUST*, THOMAS O'CONNOR*, ROBERT BRAULT*,

and DERWARD LEPLEV, JR., Milwaukee, Wisc.

This study reports the use of a disposable oxygenator without extra-corporeal pumps for use in emergency pulmonary embolectomy or for prolonged pulmonary support. Fifteen dogs were subjected to a small left anterior thoracotomy. A large cannula, attached to the oxygenator, was inserted into the right ventricular outflow tract. The oxygenator was placed at slightly above the level of the heart. The arterial limb was then inserted into the left auricular appendage. The pulmonary artery was clamped and the lungs bypassed for a period of one hour with the heart used as a pump. Normothermia and flows ranging from 45 to 60 milliliters/kilogram of body weight were realized throughout the period of bypass. Blood samples were drawn periodically for gas analysis and plasma hemoglobin. Survivors were observed for neurologic deficit. Our results show that the animals can be so perfused, maintaining normal blood pressure and without development of metabolic acidosis. To date, all animals have survived without sequlae. Plasma hemoglobin levels indicated minimal blood trauma. In a second series of 15 dogs, prolonged support for many hours was carried out with an identical procedure and the results of these studies will be discussed.

†Evarts A. Graham Memorial Traveling Fellow, 1962-63. Present address: Oulun LÃ¤Ã¤ninsairaala, Oulu, Finland

*By Invitation

Tuesday Afternoon, April 28, 1964

2:00 P.M. Executive Session (Limited to Active and Senior Members) Grand Ballroom

3:00 P.M. Scientific Session: REGULAR PROGRAM Grand Ballroom

Address by the President
Robert E. Gross, Boston
"Thoracic Surgery for Infants"

Address by Honored Guest
Dr. I. Boerema
Professor of Surgery
University of Amsterdam, Netherlands
"The Use of Hyperbaric Oxygen in Thoracic Surgery"

28. Foregut Cysts of the Mediastinum-A Study of 26 Cases

JOSEPH W. PEABODY, JR., SOL KATZ*, WILLIAM S. LYONS*,

EDWARD J. JAHNKE, and EDGAR W. DAVIS, Washington, D.C.

Mediastinal cysts of foregut derivation represent one of the more bizarre and complex segments of mediastinal neoplasia. Depending upon the tissue elements they contain and the organ to which they are attached, these cysts traditionally have been classified as bronchogenic, esophageal or gastro-enterogenous, when in reality they may be an admixture of two or even all three. The problem is compounded by the occasional lack of attachment or the presence

of dual attachments, the finding of "respiratory" epithelium and cartilage in the wall of esophageal and gastric cysts, the presence of squamous epithelium and muscular layers resembling esophagus within bronchogenic cysts, etc. As a consequence, no satisfactory classification has yet been proposed. Twenty-six such cases, the largest series reported, form the basis for this report. Surprisingly, bronchogenic cysts account for only nine. The remaining 17 cases constitute an unique assortment of supposedly rare cysts, some simulating duplications, some traversing the diaphragm and others presenting bilaterally. Three instances of tracheoesophageal cysts, a very specific and potentially fatal lesion of infancy, are included. Correlation of the embryological, clinicopathological and surgical features has proved quite informative and clarifies both the terminology and classification of cysts derived from the primitive foregut.

29. Lobar Emphysema and Congenital Heart Disease in Infancy

JOHN C. JONES, CARL ALMOND*, BERT W. MEYER,

H. MARTIN SNYDER*, and JAMES PATRICK*, Los Angeles, Calif.

Twelve infants with lobar emphysema, three weeks to seven months of age, have been treated surgically at the Children's Hospital in Los Angeles. Eight of these had congenital heart defects. Four of the cardiac defects were ventricular septal defects, two were patent ductus arteriosus, and two were tetralogy of Fallot. There were two deaths, and both of these patients had congenital heart disease. One was a very ill infant in acute respiratory distress with lobar emphysema and tetralogy of Fallot, who did not survive the operation. The other patient had lobar emphysema of the right middle lobe and a patent ductus arteriosus. This patient died of postoperative complications following respiratory and cardiac recovery from his immediate operation. It is important to stress the diagnosis of lobar emphysema in infants with acute respiratory distress. We would like to emphasize that two-thirds of these cases had accompanying congenital heart lesions. The lobar emphysema is an acute problem and necessitates early surgical intervention even in the presence of cardiac disease. After recovery from the respiratory emergency, the cardiac problem may be dealt with at an appropriate later time.

30. Mediastinoscopy: A Method of Biopsy in the Superior Mediastinum

F. G. PEARSON*, Toronto, Canada

Sponsored by FREDERICK G. KERCIN

Mediastinoscopy is a method for biopsy and exploration in the superior mediastinum, which is useful both for the assessment of operability and re-sectability in bronchogenic carcinoma, and for establishing a tissue diagnosis in certain intrathoracic lesions. Like scalene node biopsy it is primarily of value in providing information otherwise obtainable only by thoracotomy. The procedure, originally described by Carlens of Stockholm in 1959, has since found favour elsewhere in Scandinavia, but to date there has been little apparent interest generated in North America. The procedure is a safe and relatively simple one, and the present paper offers a description of the technique and a presentation of experience with 48 patients at the Toronto General Hospital. There were 25 patients with proven bronchogenic carcinoma considered operable by conventional methods of assessment. In 7 patients mediastinoscopy provided information interpreted as evidence of inoperability, and thoracotomy was avoided. In the remaining 18 patients mediastinoscopy indicated an operable lesion, and 17 proved operable and resectable at subsequent thoracotomy. One patient did not come to operation. Of 23 patients with previously undiagnosed intrathoracic lesions a tissue diagnosis was obtained at mediastinoscopy in fifteen instances. There have been no significant complications.

*By Invitation

Tuesday Evening, April 28, 1964

7:00 P.M. Reception
Duluth and MacKenzie Rooms

8:00 P.M. Banquet and Dancing
Marquette and Jolliet Rooms

Speaker
Dr. Leonard W. Cronkhite, Jr.
"Man in Space"

Attendance limited to Members of the Association and their ladies, Invited Speakers and their ladies, Invited Guests and their ladies
Dinner dress preferred

Wednesday Morning, April 29, 1964

8:30 A.M. Scientific Session: THORACIC SURGERY FORUM
Grand Ballroom

31. Blood Loss Associated with Administration of Low Molecular Dextran

ANTONIO A. GARZON*, GERALD W. SHAFTAN*,

and KARL E. KARLSON, Brooklyn, N.Y.

Five groups of dogs were bled a volume equivalent to the test infusion. According to group, they were immediately infused with either 30 ml./kg. L.M.D. in saline, 20 ml./kg. L.M.D. plus 10 ml./kg. saline, 10 ml./kg. L.M.D. plus 20 ml./kg. saline, 30 ml./kg. saline or 30 ml /kg. auto-logous blood. One group was neither bled nor infused and only repeat sets of incisions were made. Before bleeding five incisions down to fascia were made on one flank of each dog. After bleeding and infusion of the test solution, five similar incisions were made in the other flank. The duration of bleeding and amount of blood loss per unit time was determined for each set of incisions. The following coagulation tests were performed before infusion and 15 minutes, 60 minutes, and 4 hours after infusion: clotting time, clot retraction, whole blood clot lysis, euglobulin clot lysis, prothrombin consumption, prothrombin activity, fibrinogen, and platelet count. There was no significant change in any of these tests attributable to L.M.D. Only animals receiving L.M.D. had increased bleeding. Duration of bleeding increased an average of 15% after 10 ml./kg. L.M.D., 462% after 20 ml./kg., and 407% after 30 ml./kg. L.M.D. Weighed blood loss increased 1.8-fold after 10 ml./kg. L.M.D., 4 6-fold after 20 ml./kg, and 42-fold after 30 ml./kg. L.M.D.

32. Extracorporeal Circulation, Pulmonary Compliance, and Pulmonary Surfactant

ISIDORE MANDELBAUM*, and SAMUEL T. GIAMMONA*,

Indianapolis, Ind.

Sponsored by HARRIS B SHUMACKER, JR.

Respiratory insufficiency may be a serious problem following extracorporeal circulation. This experiment was carried out to study the effects of extra-corporeal circulation upon the pressure-gas volume relationship and surface active agent content of a dog's lung. Since cardiopulmonary bypass is associated with decreased pulmonary arterial blood flow, the left pulmonary artery was occluded initially in 7 dogs for 3 hours There was no alteration in the pressure-volume curves or surfactant content (modified Wilhelmy and Du-Nuoy methods). In 7 animals, the left pulmonary artery was ligated for two weeks. The surfactant content of the left lung decreased considerably and pulmonary compliance fell 50 per cent In 9 dogs, cardiopulmonary bypass with extracorporeal circulation was performed and hourly determinations of pulmonary pressure-volume relationship and surfactant content carried out for 5 hours. There was a progressive decrease in compliance. Surfactant content remained normal until the fourth hour when significant decreases occurred. No surfactant inhibitor was detected in the pump-oxygenator blood. Therefore, temporary pulmonary ischemia for 3 hours has no demonstrable effect upon pulmonary compliance or surfactant content of the lungs. Prolonged ischemia for two weeks alters both factors appreciably. During extra-corporeal circulation, compliance is decreased progressively and significant decreases of surfactant occur after 4 hours

33. Cooling Gradients and Brain Damage with Deep Hypothermia

CARL ALMOND*, JOHN C. JONES, BERT W. MEYER, and

H. MARTIN SNYDER*, Los Angeles, Calif.

During our own experience with deep hypothermia, patients were cooled rapidly and a portion of them suffered brain damage. Drew found mental changes in the first four cases operated upon with a more efficient heat exchanger with rapid cooling. Bjork reported brain damage in five children operated upon utilizing deep hypothermia. In this experiment, dogs were cooled with wide and narrow cooling gradients to determine the effect upon the brain. Brain cell death was seen in the cerebellum, hippocampus, cerebral cortex and basal ganglia in animals cooled rapidly with wide gradients of 15 degrees to 25 degrees Centigrade to temperatures below 10 degrees C. and arrested for thirty minutes. Animals cooled slowly with 5 degrees C. gradients showed only microscopic brain edema. These findings are consistent with the pathological findings reported by Bjork. Clinical evidence has suggested, and this experimental evidence tends to verify the fact that the rate of cooling is important as a cause of brain damage utilizing deep hypothermia.

34. Hemodynamic Studies Before and After Cardioversion

DONALD R. KAHN*, WILLIAM WEBER*, WILLIAM S. WILSON*,

and HERBERT SLOAN, Ann Arbor, Mich.

Fifteen patients from one week to eight months after successful mitral valve surgery were studied during atrial fibrillation. The electrocardiogram, central aortic pulse and the cardiac output were measured at rest and after three minutes of exercise (710 foot lbs. per min.). Atrial fibrillation was converted to normal sinus rhythm by DC shock, and the above variables were measured six to twelve hours later. During normal sinus rhythm the mean resting cardiac output was 22% higher and the mean cardiac output during exercise was 34% higher than during atrial fibrillation. The increase in cardiac output with exercise during atrial fibrillation was associated with a large rate increase and a small decrease in stroke volume. During normal sinus rhythm the increase in output during exercise was greater and was associated with an increase in both rate plus stroke volume. Patients having a mitral Starr-Edwards valve prosthesis differed qualitatively in that the increase in output after exercise during normal sinus rhythm was not associated with an increase in stroke volume. These studies indicate that atrial contraction significantly augments ventricular performance and suggest that patients with the Starr-Edwards prosthesis cannot increase their stroke volume.

35. Evaluation of Factors Involved in Gastroesophageal Reflux

HAROLD STERN, DANIEL H. WINSHIP*, LEWIS M. KARAS*,

WALTER R. THAYER*, GILBERT S. MELNICK*, ELTON R. POINDEXTER*,

and HOWARD M. SPIRO*, New Haven, Conn.

The esophagus of the Macaca mulatta (Rhesus) resembles that of the human anatomically and physiologically. For this reason, it is ideally suited for studies to evaluate factors affecting esophago-gastric reflux. We have studied esophageal function in unanesthetized but restrained monkeys by means of manometric motility techniques, pH determinations, using inlying electrodes, and cineradiographic studies. After the normal sphincteric mechanism was evaluated, various surgical procedures which might effect reflux at the gastroesophageal junction were performed. These included production of fixed or sliding hiatus hernias, unilateral and bilateral phrenic nerve crush, removal of the diaphragmatic sling mechanism, and resection of the gastroesophageal junction as well as alteration of the angle of entry at the junction. Postoperative studies have helped to assess the relative importance of intrinsic and extrinsic sphincteric mechanisms in the prevention of esophageal reflux and will be documented by demonstration of appropriate cineradiographic and esophageal motility studies.

36. Replacement of the Left Hemidiaphragm by an Abdominal Muscular Flap

JENS G ROSENKRANTZ*, and ERNEST K. COTTON*,

Denver, Colo.

Sponsored by WILLIAM R. WADDELL

A simple technique for replacement of the left hemidiaphragm and its application in an infant with agenesis of the left hemidiaphragm are reported. A muscular flap was fashioned from the left upper abdominal wall which, already attached along the costal margin, was swung down and sutured medially and posteriorly to replace the left hemidiaphragm. The details of the procedure will be described. In order to evaluate the function of this innervated muscular flap, two groups of puppies were subjected to trans-abdominal excision of the left hemidiaphragm; in one group the left hemidiaphragm was replaced by the muscular flap; and in the second group by Marlex mesh. Survivors were sacrificed and studied at various times post-operatively (up to one year) and compared with a group of normal dogs of similar ages The following were observed: diaphragmatic excursion under the fluoroscope, integrity at autopsy of the diaphragmatic replacement; and pressure-volume curves on the excised, degassed lungs. The results will be discussed in detail. From these studies it is concluded that this is a simple method for replacement of the left hemidiaphragm and offers certain advantages over previously described procedures

37. Diaphragmatic Thoracoplasty

WILLIAM D. LOGAN, JR.*, NICHOLAS D. EXARHOS*,

and OSLER A. ABBOTT, Atlanta, Ga.

The control of intrathoracic space following lobectomy has been managed .by various methods. Primarily these consist of disfiguring procedures on "the chest wall or the insertion of foreign material into the pleural space. Incising the diaphragm at the periphery and re-implantation at several rib spaces higher will effectively decrease the intrathoracic space following lobectomy in animals. Twelve dogs were operated upon and the diaphragm transplanted following upper or lower lobectomy. Preoperative and postoperative pulmonary function studies and postoperative pulmonary angiograms were done on four animals. All of the animals survived, and their studies were normal. The diaphragm seemed to retain most of its motion and function. This study would indicate that this procedure is surgically feasible and has the advantage of no deformity of the chest wall, no foreign material placed inside the chest, and good postoperative lung function.

38. Definitive Anatomic Repair of Ebstein's Malformation: A New Surgical Technique

KENNETH L. HARDY*, IVAN A. MAY*,

CHARLES A. WEBSTER*, and KENT G. KIMBALL*,

Oakland, Calif.

Sponsored by PAUL C. SAMSON

The complex of deformities included under the heading of Ebstein's Malformation has become more clearly understood in the past few years with the use of more refined diagnostic techniques. Heretofore the surgical therapy of this condition has been limited to a palliative procedure which included some form of right heart by-pass, such as caval-pulmonary artery anastomosis or systemic pulmonary artery shunting. A concept of the physiologic abberations in this condition, together with a surgical technique to correct the altered cardiodynamics, will be defined. A case with preoperative and six months postoperative follow-up, with electrode catheter data, will be presented in which successful anatomic correction of the deformity was carried out, illustrating the validity of the concept.

39. Evaluation of Cardiac Drugs in the Presence of an Implanted Pacemaker: Experimental Study

PIERRE GRONDIN*, GILLES LEPAGE*, JEAN GUICNARD*,

and AYDIN KARAMEHMET*, Montreal, Canada

Sponsored by EDOUARD D. GAGNON

An ever increasing number of cardiac patients have benefited from an implantable pacemaker. These patients occasionally willrequire some form of treatment for associated cardiac conditions. An effort is made to elucidate problems that have arisen in the postoperative and long-term management of these patients. In the presence of myocardial insufficiency should the treatment be different? A number of authors have frowned upon the use of digitalis. Isoproterenol has been blamed for the occurrence of sudden ventricular fibrillation induced by the electrical stimuli as reported in such conditions. Using two groups of dogs the individual effects of digitalis, quinidine, procaine amide and isoproterenol have been studied. Group A consists of animals with an implantable pacemaker in which a complete A-V block was surgically created. In group B a pacemaker was implanted but the normal sinus rhythm was preserved. These groups fairly well represent the clinical conditions of patients first with a permanent block and second with an intermittent A-V dissociation. The conclusion of these studies are demonstrated.

40. The Surgical Management of Transposition of the Great Vessels

W. T. MUSTARD, J. D. KEITH*, G. A. TRUSLER*, R. FOWLER*,

and L. KIDD*, Toronto, Canada

Mortality from this condition is extremely high in the first few months of life. Total correction under six months will probably remain a surgical feat with a high mortality. A palliative procedure in the neonatal period which would allow subsequent total correction appears to us to be a satisfactory goal. Our results, and those of others, of creating an atrial septal defect in the first few months are encouraging; 75% of these infants can be improved. The second stage, total correction, should be performed before the child deteriorates or develops irreversible pulmonary vascular changes. The operation should be as simple as possible and allow for growth of the heart. Preliminary studies in the laboratory demonstrated that autogenous pericardium will grow when sutured into the atrial wall in piglets. An operation was devised in which a pericardial baffle transposed pulmonary venous return to the right ventricle and systemic venous return to the left ventricle. This procedure has been clinically successful and will be described in detail.

41. Evaluation of Cardiac Function by Suprasternal Puncture

V. L. WILLMAN*, C. R. HANLON, P. N. SYMBAS*,

J. J. KELLY*, and J. G. MUDD*, St. Louis, Mo

Measurement of pressure and wave forms in the left atrium and pulmonary artery is useful in evaluation of patients with disease of the mitral valve. The transbronchial, paravertebral percutaneous and transseptal approaches to the left atrium are undesirable because of complexity, discomfort or significant complications. The percutaneous suprasternal puncture of the great vessels and left atrium is simple and safe. It may be performed under local anesthesia without fluoroscopy in less than thirty minutes. Despite its limitations as an investigative tool, it provides information valuable in making clinical decisions. We shall present our experience with the technique including complications and comparison with other methods in a total of 280 patients.

42. Carbodissection of Perivascular Tissue

RUSSELL M. NELSON, and BRENT C. SANDERS*,

Salt Lake City, Utah

The feasibility of dissecting blood vessels from surrounding investiture by carbon dioxide gas under pressure has been evaluated experimentally and clinically. An apparatus has been developed to accomplish this. Experimental studies were performed in 16 dogs to assess the limits of safety in the event of inadvertent arterial or venous administration of the gas. Safe limits were found to be up to 15 ml/kg. A transient rise in pCO_2 was found, but no effect was observed on survival, pH or pO_2 values. Clinically, this technique has been employed most helpfully in aortic and pulmonary surgery and in secondary cardiac operations in separating pericardial adhesions. No complications have been observed. The assistance rendered to the process of dissection has been gratifying, as will be illustrated by motion pictures. In the dense planes surrounding certain difficult aortic aneurysms, this technique has its limitations, however. The apparatus for sterilizing and delivery of 100% CO_2 gas for dissection will be illustrated.

43. In Vitro Preservation of the Heart with Hypothermia and Hyperbaric Oxygen

JACK H. BLOCK*, WILLIAM G. MANAX*, and

RICHARD C. LILLEHEI*, Minneapolis, Minn.

Sponsored by RICHARD L. VARCO

There is a great need for a simple method to preserve hearts in vitro for transplantation. Previously, others have frozen dog hearts with a variety of preservative solutions. Inevitably upon thawing and re-establishing coronary circulation to such hearts in the necks of host dogs, these hearts have shown severe tissue damage and have beat only briefly, if at all. In contrast are the results when dog hearts are held in vitro for 24 hours in a small, pressure-cooker sized hyperbaric chamber at 0 to -4°C and 3 atmospheres of oxygen. When these hearts are placed in the neck of host dogs and coronary circulation restored, the hearts promptly resume beating for prolonged periods without evidence of tissue damage. Neither hypothermia alone nor hyperbaric oxygen alone gives the same results as the combination of the two. Further studies are in progress to find if dog hearts preserved for 24 hours with hypothermia and hyperbaric oxygen will support the circulation when replaced as functioning homografts. If so, such a procedure may be of value in preserving cadaver hearts for transplantation.

*By Invitation

Wednesday Afternoon, April 29, 1964

2:00 P.M. Scientific Session: REGULAR PROGRAM
Grand Ballroom

44. Endoscopic Aspects of Post-Surgical Management of Congenital Esophageal Atresia and Tracheo-Esophageal Fistula

PAUL H. HOLINGER, WILLIAM T. BROWN*, and DINO G. MAURIZI*,

Chicago, Ill.

One hundred twenty-nine infants with congenital esophageal atresia, tracheo-esophageal fistula or both were observed on the Endoscopic Service of The Children's Memorial Hospital, Chicago, between 1947 and 1962. Problems involving the larynx, trachea, bronchi or esophagus requiring endoscopic management are reviewed. Associated laryngeal anomalies were common. Eleven infants had laryngeal paralysis, six bilateral, two right and three left cord paralysis. Laryngeal anomalies, edema, paralyses or excessive tracheobronchial secretions necessitated tracheotomy in twenty-four infants. Major tracheal problems occurring at the fistula site included fourteen with granulomas or stenoses, eight with recurrent fistulas and seven with diverticula. Bronchial secretions, chemical bronchitis, atelectasis and bronchiectasis necessitated bronchoscopic or tracheotomy management. Seventy-nine infants were treated for esophageal stenosis, sixty-nine with end-to-end anastomosis, eight with stenosis at esophago-gastric, -colic, of -jejunal anastomosis, and two at cologastric anastomosis. Early recognition and management with various dilatation techniques are discussed.

45. Oesophageal Reconstruction with Left Colon

RONALD BELSEY*, Bristol, England

Sponsored by O. THERON CLAGETT

Certain criteria must be satisfied by any acceptable method of oesophageal replacement (1) simultaneous one-stage oesophageal resection and reconstruction should be possible, (2) sufficient tissue to replace the entire oesophagus must be available when necessary in cases of high strictures, or congenital oesophageal atresia unsuitable for primary anastomosis, (3) the method should be applicable to infants and children, and (4) the mortality and morbidity rates, and the long-term functional results must be acceptable. The use of an isoperistaltic transplant of splenic flexure of colon fulfils these criteria. The operative technique and clinical features in 100 cases of oesophageal obstruction treated by this method of reconstruction will be discussed. The indications for reconstruction in this series were (1) benign strictures, 79 cases, (2) high malignant strictures, 11 cases, and (3) congenital oesophageal atresia, 10 cases. There were 4 postoperative deaths, only 2 directly attributable to the operation. Convalescence has been remarkably smooth in all but two of the remainder. There have been no intra-thoracic anastomotic leaks and no case of recurrent oesophagitis. The long-term functional results will be compared with those that follow other methods of oesophageal replacement especially oesophago-gastrectomy.

46. Assisted Circulation for Cardiac Failure Following Intra-cardiac Surgery with Cardiopulmonary Bypass

F. C. SPENCER, B. EISEMAN, J. K. TRINKLE*, and

N. P. ROSSI*, Lexington, Ky.

Four moribund patients with cardiac failure 12-24 hours following intra-cardiac surgery have been treated with 4-6 hours of assisted circulation with a roller pump and a disc oxygenator. All had Class 4 cardiac failure before operation, an adequate surgical repair (mitral and aortic insufficiency, 3, ventricular septal defect with pulmonary hypertension, 1), and a good initial response. Subsequent postoperative monitoring with indwelling left atrial and pulmonary artery catheters showed progressive cardiac failure: mixed venous oxygen saturation 20-30%, left atrial pressure 20-35 mm/Hg., hypotension requiring vasopressors, metabolic acidosis, and severe oliguria. A peripheral veno-arterial bypass of 2-2.5 L/min. in 2 patients increased blood pressure, cardiac output, and urine secretion, but the left atrial pressure remained elevated and one developed a marked increase in pulmonary vascular resistance; both died afterwards. Subsequently a left atnal-femoral bypass of 3-5 L/min. in 2 patients similarly increased peripheral blood flow but also lowered left atrial pressure and did not increase pulmonary vascular resistance. One died but one made a dramatic recovery, even though the cardiac output remained decreased until 3 days later. These experiences indicate the possible value, safety, and effectiveness of assisted circulation with left atrial-femoral bypass.

47. High Flow Total Body Perfusion Utilizing Diluted Per-fusate in a Large Prime System

ROBERT S. LITWAK, B. GEORGE WISOFF*, and

HOWARD L. GADBOYS, New York, N. Y.

Reduction of homologous blood requirements in high flow extracorporeal circulation has been accomplished by perfusate dilution up to 57% or total volume in 103 cases. This abstract summarizes volumetric and biochemical data obtained in the last 62 cases in which the diluent employed was a dextrose/Ringers/albumin (DRA) solution. Perfusions were generally conducted at 30°C. with flow rates of 2.0-2.4 L/M^2/min. Three groups were studied (a) 16 patients (32% DRA dilution), (b) 40 patients (43% DRA/THAM dilution), and (c) 6 patients (57% DRA/THAM dilution with priming Hct. 21). Perfusions averaged 80, 134, and 106 minutes for the three groups. Immediate postperfusion overinfusion was required for all groups. Normal postperfusion hematocrits were observed in all patients and reflected probable loss of diluent from intravascular space. Moderate postoperative metabolic acidosis occurred with DRA (base deficit - 7) but was absent in both THAM series. All groups showed satisfactory late perfusion pO_2 and pCO_2. Serum electrolytes (Na, K, Cl, Ca) were normal during and after perfusion in all groups. Hemodilution (33-57%) has been well tolerated. Pulmonary and metabolic complications have been less than with whole blood. It appears that the high flow rates achieved compensate for initially reduced oxygen carrying capacity of the diluted blood.

48. Acute Constrictive Pericarditis

ROSS ROBERTSON, and CRAIG ARNOLD*, Vancouver, B.C.

In 1962 we reported five cases of constrictive pericarditis with evidence that they were not tuberculous in origin but resulted from an acute pericarditis attributed to the Coxsackie virus. Subsequently six additional cases have been seen with a similar history of virus pericarditis antedating the constriction by several months and with negative tuberculin tests. The clinical picture differs considerably from the patient with tuberculous constriction, and early diagnosis is more difficult. Calcification of the pericardium has not occurred. Enlargement of the liver, ascites, and pleural effusion have appeared late and rather suddenly. In some of these patients cardiac tamponade has progressed with great rapidity and operation has been

required urgently. Discussion will include the diagnosis of pericardial constriction, the indications and optimum time for operation, and the results of surgery. Because of the acute and insidious onset of the constriction constituting an emergency in some of our patients, "acute" has been added to the title.

49. Myocardial Revascularization by Omental Graft Without Pedicle. Report on 30 Cases Followed Six Months to One and One-half Years.

ARTHUR M. VINEBERG, JOHN SHANKS*, ROQUE PIFARRE*,

ROSENDO CRIOLLOS*, YUTAKA KATO*, and K. S. BAICHWAL*,

Montreal, Canada

The greater omentum arises from the same embryological anlage as the spleen. Primitive characteristics of phagocytosis and the ability to form new blood vessels persist when the omentum is completely detached from the colon, it survives by obtaining blood from surrounding tissues. It forms a capillary circulation in 3 days and arteriolar circulation in 8 days. The ability to penetrate mesenchymal cell layers to obtain its blood supply makes it an important tissue for the relief of myocardial ischaemia. Ameroid occlusion of three major coronary arteries causes 100% mortality. An omental graft without pedicle when attached to the ascending aorta and heart protects 80% of the animals. Large vessels leave the aorta, pericardium and chest wall, enter the omental graft, coronary arteries and myocardium. Thirty patients with extensive coronary artery disease have undergone the omental graft operation. Cine coronary arteriography showed disease in main right (69%), main left (44%), anterior descending (1007_0) and circumflex (87%). Patients with angina decubitas, formerly rejected for implant, have been accepted. Operative mortality has been low, post-operative courses have been similar to implant. There has been no evidence of omental graft necrosis. All cases have improved, some dramatically. Detailed results will be presented.

50. Surgical Management of Dissecting Aneurysms of the Aorta

MICHAEL E. DEBAKEY, WALTER S. HENLY, DENTON A. COOLEY,

GEORGE C. MORRIS, JR., E. STANLEY CRAWFORD, and ARTHUR C. BEALL, JR.

Houston, Texas

Certain conceptual changes and new methods of surgical treatment of dissecting aneurysm have grown out of a better understanding of the anatomic and pathologic patterns of the disease during the past decade. These lesions are now classified as follows: (1) Type 1, the intimal tear arises in the ascending aorta and the dissecting process extends distally into the arch for a varying distance. (2) Type 2, the dissecting process is limited to the ascending aorta. Types 1 and 2 are usually associated with aortic valve incompetence. (3) Type 3, the dissecting process arises in the descending thoracic aorta near the origin of the left subclavian artery and extends distally, often into the abdominal aorta. For each of these basic types of dissection appropriate operative procedures have evolved through application of concepts which provide better understanding of the disease. Recent experience based upon these concepts of therapy shows that operative mortality has been reduced to 12 per cent from our previous experience of 26 per cent. Surgical management of all types of dissecting aneurysms is now considered the treatment of choice, and in select instances emergency operation should be performed.

*By invitation

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1963-64

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BARRETT, RAYMOND J.18280 Fairfield St., Detroit 21, Mich.
BATTERSBY, JAMES S.. 1040 W. Michigan St., Indianapolis 7, Ind.
BEATTIE, EDWARD J., JR... 1753 W. Congress Parkway, Chicago 12, Ill.
BEECHER, HENRY K..... Massachusetts General Hospital, Boston 14, Mass.
BELL, JOHN W..... Veterans Adm. Hospital, Seattle 8, Wash.
BENOIT, HECTOR W., JR.... 503 Plaza Parkway Bldg., Kansas City 12, Mo.
BENSON, CLIFFORD D.1515 David Whitney Bldg, Detroit 26, Mich.
BERG, RALPH, JR.231 Medical Center Bldg., Spokane 4, Wash.
BERGMANN, MARTIN. 4409 W. Pine Blvd., St. Louis 8, Mo.
BERNATZ, PHILIP E..... Mayo Clinic, Rochester, Minn.
BIGELOW, WILFRED G.... 300 Medical Arts Bldg., Toronto, Ontario
BLACK, HARRISON..... 319 Longwood Ave., Boston 15, Mass.
BLADES, BRIAN.. 901 Twenty-third St., N.W., Washington 7, D. C.
BLAKEMORE, WILLIAM S.19th & Lombard St., Philadelphia 46, Pa.
BLOOMBERG, ALLAN E..... 1095 Park Ave., New York 28, N. Y.
BLOOMER, WILLIAM E.... 841 North Ave. 63, Los Angeles 42, Calif.
BOSHER, LEWIS H... 1200 E. Broad St., Richmond 19, Va.
BOYD, DAVID P... Lahey Clinic, 605 Commonwealth Ave., Boston 15, Mass.
BRADSHAW, HOWARD H..... Bowman Gray School of Medicine, Winston-Salem, N. C.
BRANTICAN, OTTO C.... 104 W. Madison St., Baltimore 1, Md.
BREWER, LYMAN A. III..... 658 South Bonnie Brae St., Los Angeles 57, Calif.
BRINDLEY, G. VALTER, JR.. Scott and White Clinic, Temple, Texas
BROOKS, JAMES W.... 1200 E. Broad St., Richmond 19, Va.
BROWN, IVAN W. JR.Duke University Hospital, Durham, N. C.
BROWN, ROBERT K... 1624 Gilpin St., Denver 18, Colo.
BROWNRIGG, GARRETT M.... 47 Queens Road, St. Johns, Newfoundland
BRUNEAU, JACQUES.. 847 Rue Cherrier, Montreal 24, Quebec
BUCKINGHAM, WILLIAM W.. 314 Professional Bldg., Kansas City 6, Mo.
BUDGEN, WALTER F... 1200 East Genesee St., Syracuse 10, N. Y.
BURFORD, THOMAS H.Barnes Hospital Memorial Plaza, St. Louis 10, Mo.
BYRON, FRANCIS X.... 1136 West 6th St., Los Angeles 17, Calif.
CALLAGHAN, JOHN C..... 502 Medical Arts Bldg., Edmonton, Alberta
CAMPBELL, GILBERT S..... 800 Northeast 13th St., Oklahoma City 4, Okla.
CARLSON, ROBERT ISunmount Veterans Adm. Hospital, Tupper Lake, N. Y.
CARR, DUANE. 20 S. Dudley St., Memphis 3, Tenn.
CARTER, MAX G.670 George St. New Haven, Conn.
CHAMBERLAIN, JOHN MAXWELL.... 23 East 79th St., New York 21, N. Y.
CHAMBERS, JOHN S., JR..... 2850 Sixth St., San Diego 3, Calif.
CHESNEY, JOHN G.. 1550 N.W. 10th Ave., Miami 37, Fla.
CLAGETT, O. THERON..... Mayo Clinic, Rochester, Minn.
CLATWORTHY, H. WM., JR..... 695 Bryden Road, Columbus 5, Ohio
CLOWES, GEORGE H. A., JR.... Medical College Hospital, Charleston, S. C.
COHN, ROY B... Stanford Hospital, Palo Alto, Calif.
COLEMAN, FRANK P.1111 W. Franklin St., Richmond 20, Va.
CONDON, WILLIAM B.. 1850 Gilpin St., Denver 18, Colo.
CONKLIN, WILLIAM S.... 511 S.W. Tenth Ave., Portland 5, Ore.
CONNOLLY, JOHN E.. Stanford Medical Center, Palo Alto, Calif.
COOLEY, DENTON A.Baylor University College of Medicine, Houston 25, Texas
CORDELL, A. ROBERT.. Bowman Gray School of Medicine, Winston-Salem, N. C.
COTTON, BERT H.... 111 Congress St., Pasadena, Calif.

COWLEY, R. ADAMS. University Hospital, Baltimore 1, Md.
CRANDELL, WALTER B..... Veterans Adm. Hospital, White River Junction, Vt.
CRAWFORD, E. STANLEY1200 M. D. Anderson Blvd., Houston 25, Texas
CREECH, OSCAR, JR..... Tulane University School of Medicine, New Orleans 12, La.
CROSS, FREDERICK S.11311 Shaker Blvd., Cleveland 4, Ohio
CURRERI, ANTHONY R.1300 University Ave., Madison 6, Wis.
CUTLER, PRESTON R.... 535 East 1st South, Salt Lake City 2, Utah
DAILEY, JAMES E..... 347 Hermann Professional Bldg., Houston, Texas
DAMMANN, JOHN F."Barrsden", Stony Point Rd., Charlottesville, Va.
DANIEL, ROLLIN A.410 Medical Arts Bldg., Nashville 12, Tenn.
DANIELS, ALBERT C..... 490 Post St., San Francisco 2, Calif.
DAUGHTRY, DEWITT C... 1550 N.W. 10th Ave., Miami 37, Fla.
DAVILA, JULIO C.. 3401 N. Broad St., Philadelphia, Pa.
DAVIS, EDGAR W... 1150 Connecticut Ave., Washington 6, D. C.
DAY, J. CLAUDE307 David Whitney Bldg., Detroit 26, Mich.
DE BAKEY, MICHAEL E.Baylor University, Dept. of Surgery, Houston, Texas
DECAMP, PAUL T.3503 Prytania St., New Orleans 15, La.
DELARUE, NORMAN C..... 25 Donlea Drive, Toronto 17, Ontario
DENNIS, CLARENCE..... 989 Edgewood Ave., Pelham Manor, N. Y.
DESFORGES, GERARD..... 452 Pleasant St., Maiden, Mass.
DESHAIES, GEORGES..... 37 Bellingham Road, Montreal, Quebec
DETERLING, RALPH A, JR.. 171 Harrison Ave., Boston 11, Mass.
DODRILL, FOREST D..... 641 David Whitney Bldg., Detroit 26, Mich.
DOMM, SHELDON E... 1918 W. Clinch Ave., Knoxville 16, Tenn.
DORNER, RALPH A..... 710 Equitable Bldg., Des Moines 9, Iowa
DORSEY, JOHN M..... 636 Church St., Evanston, Ill.
DRAKE, EMERSON H.. 18 Bramhall St., Portland 3, Maine
DRASH, EVERETT C..... University of Virginia Hospital, Charlottesville, Va.
DUGAN, DAVID J..... 459 30th St., Oakland 9, Calif.
EDWARDS, W. STERLING... 619 S. 19th St., Birmingham 9, Ala.
EFFLER, DONALD B.... Euclid and East 93rd Sts., Cleveland 6, Ohio
EHRENHAFT, JOHANN L.University of Iowa, Iowa City, Iowa
ELLIS, F. HENRY, JR..... Mayo Clinic, Rochester, Minn.
ELLISON, ROBERT G.Medical College of Georgia, Augusta, Ga.
EMERSON, GEORGE L..... II Rochester St., Scottsville, N. Y.
EVANS, BYRON H.2930 North Fresno St, Fresno 3, Calif.
FALOR, WILLIAM H.208 Medical Arts Bldg., Akron 4, Ohio
FELL, EGBERT H.122 South Michigan Ave., Chicago 3, Ill.
FERGUSON, THOMAS B.Barnes Hospital Memorial Plaza, St. Louis 10, Mo.
FINDLAY, CHARLES W., JR..... 180 Fort Washington Ave., New York 32, N. Y.
FISCHER, WALTER W... 170 East 78th St., New York 21, N. Y.
FORD, JOSEPH M..... 1056 Fifth Ave., New York 28, N. Y.
FORD, WILLIAM B.. 3500 Fifth Ave., Pittsburgh 13, Pa.
FORSEE, JAMES H., MAJ. GEN. (MC), USA..... 5207 Falmouth Rd., Washington 16, D.C.
Fox, ROBERT T.... 2136 Robin Crest Lane, Glenview, Ill.
FRANK, HOWARD A..... 330 Brookline Ave., Boston 15, Mass.
FRENCH, SANFORD W. III. 904 East Main St., Barstow, Calif.
GAENSLER, EDWARD A.... 229 Dudley Road, Newton Centre 59, Mass.
GAGNON, EDOUARD D.. 902 Est., Rue Sherbrooke, Montreal, Quebec
GARAMELLA, JOSEPH J..... 1629 Medical Arts Bldg., Minneapolis, Minn.
GEBAUER, PAULLeahi Hospital, 649 Pokole St., Honolulu, Hawaii
GERBODE, FRANK..... Presbyterian Medical Center, San Francisco 15, Calif.
GIBBON, JOHN H., JR.1025 Walnut St., Philadelphia 7, Pa.
GILBERT, JOSEPH W., JR..... National Heart Institute, Bethesda 14, Md.
GLENN, FRANK.. 525 East 68th St., New York 21, N. Y.
GLENN, WM. W. L..... 333 Cedar St., New Haven 4, Conn.
GOLDMAN, ALFREDSuite 906, 9201 Sunset Blvd., Los Angeles, Calif.
GORDON, JOSEPH.. 717 Encino Plaza, N.E., Albuquerque, N. M.
GRACE, ARCHIBALD JSuite 310, 450 Central Ave., London, Ontario
GRAVEL, JOFFRE-ANDRE170 Grande-Allee West, Quebec 6, Canada
GREER, ALLEN E.430 N. W. 12th St., Oklahoma City 3, Okla.
GRIMES, ORVILLE F..... University of California Hospital, San Francisco 22, Calif.
GROSS, ROBERT E..... 300 Longwood Ave., Boston, Mass.
GROVES, LAURENCE K..... Cleveland Clinic, Cleveland 6, Ohio
GROW, JOHN B..... 3705 E. Colfax, Denver 6, Colo.
HAIGHT, CAMERONUniversity Hospital, Ann Arbor, Mich.
HANLON C. ROLLINS... 1325 S. Grand Blvd., St. Louis 4, Mo.
HARDY, JAMES D..... University of Mississippi Medical Center, Jackson, Miss.
HARKEN, DWIGHT E.67 Bay State Road, Boston 15, Mass.
HARRISON, ALBERT W..... Medical Branch, University of Texas, Galveston, Texas

HARRISON, ELLIOTT.. 750 W. Broadway, Vancouver 9, B. C.
HARTER, JOHN S..... 118 W. Medical Arts Bldg., Louisville 17, Ky.
HAUPT, GEORGE J..... 306 Lankenau Medical Bldg., Philadelphia 51, Pa.
HELMSWORTH, JAMES A.Cincinnati General Hospital, Cincinnati 29, Ohio
HEROY, WILLIAM W.. East Gate Road, Lloyd Harbor, Huntington, N. Y.
HIGGINSON, JOHN F.1430 Chapala St., Santa Barbara, Calif.
HILL, Lucius D. III... 1118 Ninth Ave., Seattle 1, Wash.
HOCHBERG, LEW A..... 563 Rockaway Parkway, Brooklyn 12, N. Y.
HOLINGER, PAUL H.700 N. Michigan Ave., Chicago 11, Ill.
HOLLAND, ROBERT H.... 3216 Beverly Drive, Dallas 5, Texas
HOLMAN, CRANSTON W.862 Fifth Ave., New York 21, N. Y.
HOPKINS, WILLIAM A.1293 Peachtree St., N.E., Atlanta 9, Ga.
HUDSON, THEODORE R.. 55 E. Washington St., Chicago 2, Ill.
HUFNACEL, CHARLES A.. 3800 Reservoir Road, N.W., Washington 7, D. C.
HUGHES, FELIX A., JR..... Kennedy Hospital, Memphis 17, Tenn.
HUMPHREYS, GEORGE H. II. 180 Fort Washington Ave., New York 32, N. Y.
HURLEY, GERARD A. P.3869 Cote Des Neiges Rd., Montreal 25, Quebec
HURWITT, ELLIOTT S..... Montefiore Hospital, New York 67, N. Y.
HURWITZ, ALFRED4 Belmeade Rd., Portland, Maine
JAHNKE, EDWARD J., JR.Walter Reed General Hospital, Washington 12, D. C.
JARVIS, FRED J.. 1115 Columbia St., Seattle 4, Wash.
JENSIK, ROBERT J.224 South Michigan Ave., Chicago 4, Ill.
JOHNS, THOMAS N. P.. 6305 Towana Road, Richmond 13, Va.
JOHNSON, ELGIE K.... 230 Hilton St., Hempstead, N. Y.
JOHNSON, FRANK E.829 Medical Arts Bldg., Minneapolis 2, Minn.
JOHNSON, JULIAN..... 3400 Spruce St., Philadelphia 4, Pa.
JOHNSTON, FRANK R.Bowman Gray School of Medicine, Winston-Salem, N. C.
JOHNSTON, J. HARVEY, JR... 710 N. State St., Jackson 2, Miss.
JONES, JOHN C.. 1136 West 6th St., Los Angeles 17, Calif.
JOYNT, G. HARRY C.. 399 Bathurst St., Toronto, Ontario
JULIAN, ORMAND C.25 E. Washington St., Chicago 2, Ill.
KARLSON, KARL E..... 451 Clarkson Ave., Brooklyn 3, N. Y.
KAUSEL HARVEY W.Albany Hospital, Albany 8, N. Y.
KAY, EARLE B..... 10515 Carnegie Ave., Cleveland 6, Ohio
KAY, JEROME HAROLD122 North Alta Vista Blvd., Los Angeles 36, Calif.
KEE, JOHN L., JR.. 3707 Gaston Ave., Dallas, Texas
KEELEY, JOHN L.30 North Michigan Ave., Chicago 2, Ill.
KELLEY, WINFIELD O.. Uncas-on-Thames, Norwich, Conn.
KENT, EDWARD M.3500 Fifth Ave., Pittsburgh 13, Pa.
KERCIN, F. G.. 139 Private Patients Pavilion, Toronto General Hospital, Toronto 2, Ontario
KESSLER, CHARLES R..... 5 Medical Arts Bldg., Birmingham 5, Ala.
KEY, JAMES A.170 St. George St., Toronto, Ontario
KING, RICHARD..... Suite 233, 340 Boulevard, N.E., Atlanta 12, Ga.
KINSELLA, THOMAS J.... 1251 Medical Arts Bldg., Minneapolis 2, Minn.
KIRKLIN, JOHN W..... Mayo Clinic, Rochester, Minn.
KIRSCHNER, PAUL A..... 2 East 92nd St., New York 28, N. Y.
KITTLE, C. FREDERICK..... University of Kansas Medical Center, Kansas City 12, Kan.
KLASSEN, KARL P..... Ohio State University, Columbus 15, Ohio
KLEPSER, ROY G.1835 Eye St., N.W., Washington 6, D. C.
KLOPSTOCK, ROBERT.. Veterans Adm. Hospital, Brooklyn 9, N. Y.
LAIRD, ROBERT.... 399 Bathurst St., Toronto, Ontario
LAM, CONRAD R..... Henry Ford Hospital, Detroit 2, Mich.
LAMBERT, ADRIAN. 768 Park Ave., New York 21, N. Y.
LANCSTON, HIRAM T..... 1919 West Taylor St., Chicago 12, Ill.
LAUREY, JAMES R..... 5710 16th St. N.W., Washington 11, D. C.
LAWRENCE, G. HUGH.. 1118 Ninth Ave., Seattle 1, Wash.
LEEDS, SANFORD E.2211 Post St., San Francisco 15, Calif.
LEES, WILLIAM M.7000 N. Kenton Ave., Lincolnwood 46, Ill.
LEWIS, F. JOHN..... Northwestern University Medical School, Chicago 11, Ill.
LILLEHEI, C. WALTON..... University of Minnesota Medical Center, Minneapolis 14, Minn.
LINDSKOG, GUSTAF E..... 50 Marvel Road, New Haven, Conn.
LITTLEFIELD, JAMES B.University of Virginia School of Medicine, Charlottesville, Va.
LITWAK, ROBERT S.5th Ave. at 100th St., New York 29, N. Y.
LONGMIRE, WILLIAM P, JR..... UCLA Medical Center, Los Angeles 24, Calif.
LYNCH, JOSEPH P..... 1180 Beacon St., Brookline 46, Mass.
LYNN, R. BEVERLEYR.R. #1, Westbrook, Ontario
MACKLER, S. ALLEN..... 104 S. Michigan Ave., Chicago 3, Ill.
MACMANUS, JOSEPH E.73 High St, Buffalo 3, N. Y.
MADOFF, IRVING M.1180 Beacon St., Brookline 46, Mass.
MAHONEY, EARLE B..... 260 Crittenden Blvd., Rochester 20, N. Y.

MAIER, HERBERT C.... 3 East 71st St., New York 21, N. Y.
MALONEY, JAMES V., JR..... UCLA Medical Center, Los Angeles 24, Calif.
MANNIX, EDGAR P., JR..... 12 Forest Turn, Manhasset, Long Island, N. Y.
MAURER, ELMER P. R..... 507 Union Central Bldg., Cincinnati 2, Ohio
MAYER, JOHN H., JR..... 503 Plaza Parkway Bldg., Kansas City 12, Mo.
MCBURNEY, ROBERT P..... 899 Madison Ave., Memphis 3, Tenn.
MCDONALD, JOHN R..... Harper Hospital, 3825 Brush St., Detroit, Mich.
McGooN, DWIGHT C..... Mayo Clinic, Rochester, Minn.
MECKSTROTH, CHARLES V.University Hospital, Columbus 10, Ohio
MELICK, DERMONT W.909 East Brill St., Phoenix 6, Ariz.
MENDELSOHN, HARVEY J..... 2065 Adelbert Road, Cleveland 6, Ohio
MERENDINO, K. ALVINUniversity of Washington, Seattle 5, Wash.
MERKEL, CARL G..... 8 Church St., Saranac Lake, N. Y.
MEYER, BERTRAND W.922 Keatley Road, La Canada, Calif.
MICHELSON, ELLIOTT..... 1801 Eutaw Place, Baltimore 17, Md.
MILLER, GEORGE E.214 Sixth Avenue West, Calgary, Alberta
MILLS, WALDO O..... Suite 250, 1120 Cherry St., Seattle 4, Wash.
MINOR, GEORGE R..... University of Viriginia Hospital, Charlottesville, Va.
MISCALL, LAURENCE11 East 68th St., New York, N. Y.
MOORE, THOMAS C.Indiana University Medical Center, Indianapolis, Ind.
MORRIS, GEORGE C., JR... 1200 M. D. Anderson Blvd., Houston 25, Texas
MORRIS, JOE D.University Hospital, Ann Arbor, Mich.
MORROW, ANDREW G..... National Heart Institute, Bethesda 14, Md.
MOULDER, PETER V.950 East 59th St., Chicago 37, Ill.
MULDER, DONALD G.UCLA Medical Center, Los Angeles 24, Calif.
MULLER, WM. H., JR..... University of Virginia Hospital, Charlottesville Va.
MULVIHILL, DANIEL A.15 East 77th St., New York 21, N. Y.
MUNNELL, EDWARD R.... 301 N.W. 12th St., Oklahoma City 3, Okla.
MUSTARD, WILLIAM T... 200 St. Clair Ave., W., Toronto 7, Ontario
NARDI, GEORGE L..... Masschusetts General Hospital, Boston 14, Mass.
NEALON, THOMAS F., JR..... 1025 Walnut St., Philadelphia 7, Pa.
NELSON, RUSSELL M... 508 East South Temple, Salt Lake City, Utah
NEMIR, PAUL, JR..... 237 Medical Laboratories Bldg., Philadelphia 4, Pa.
NEPTUNE, WILFORD B.... 135 Francis St., Boston 15, Mass.
NEWMAN, MELVIN M.3800 E. Colfax Ave., Denver 6, Colo.
OLSEN, ARTHUR M..... 102 2nd Ave., S.W., Rochester, Minn.
O'NEILL, THOMAS J. E..... Suite 110, Centennial Bldg., Philadelphia 25, Pa.
O'ROURKE, PAUL V..... 307 David Whitney Bldg., Detroit 26, Mich.
OVERHOLT, RICHARD H.... 135 Francis St., Boston 15, Mass.
PAINE, JOHN R..... Buffalo General Hospital, 100 High St., Buffalo 14, N. Y.
PAPPER, EMANUEL M.622 West 168th St., New York 32, N. Y.
PARKER, EDWARD F..... 158 Rutledge Ave., Charleston 8, S. C.
PAULSON, DONALD L... 3810 Swiss Ave., Dallas, Texas
PEABODY, JOSEPH W., JR... 1150 Connecticut Ave., N.W., Washington 6, D. C.
PECORA, DAVID V..... Box 20, Ray Brook, N. Y.
PERKINS, REX BEACH..... 1919 Seventh Ave., South, Birmingham 3, Ala.
PETERS, RICHARD M..... University of North Carolina, Chapel Hill, N. C.
PHILLIPS, FRANCIS J.2220 E. Northern Lights Blvd., Anchorage, Alaska
POLK, JOHN W..... 315 Professional Bldg., Springfield 4, Mo.
PONTIUS, ROBERT G..... 125 DeSoto St., Pittsburgh 13, Pa.
POOL, JOHN L.755 Park Ave., New York 21, N. Y.
POPPE, J. KARL1130 S.W. Morrison St., Portland 5, Ore.
POTTS, WILLIS J.707 Fullerton Ave., Chicago 14, Ill.
RAMSEY, BEATTY H.11600 Wilshire Blvd., Los Angeles 25, Calif.
RASMUSSEN, RICHARD A..... Blodgett Medical Bldg., Grand Rapids 6, Mich.
RAVITCH, MARK M.... Baltimore City Hospital, Baltimore, Md.
READ C. THOMAS. 550 West Thomas Road, Phoenix 13, Ariz.
REEMTSMA, KEITH1430 Tulane Ave., New Orleans 12, La.
RICHARDS, VICTOR..... Presbyterian Medical Center, San Francisco 15, Calif.
RICGINS, H. McLEOD1031 Fifth Ave., New York 28, N. Y.
RIPSTEIN, CHARLES B..... 15 Birch St., Great Neck, L. I., N. Y.
ROBERTSON, Ross..... 416-750 West Broadway, Vancouver 9, B. C.
ROBINSON, GEORGE..... 105 Stevens Ave., Mount Vernon, N. Y.
ROE, BENSON B..... University of California Medical Center, San Francisco 22, Calif.
ROSEMOND, GEORGE P.... 3401 North Broad St., Philadelphia 40, Pa.
ROSENBERG, DENNIS M.... 3600 Prytania St., New Orleans, La.
RUMEL, WILLIAM R..... 535 East 1st South, Salt Lake City 2, Utah
SABISTON, DAVID C..... Johns Hopkins Hospital, Baltimore 5, Md.
SALYER, JOHN M..... 2032 North Broadway, Santa Ana, Calif.
SAMSON, PAUL C..... 15 La Salle Ave., Piedmont 11, Calif.

SANGER, PAUL W... 1012 Kings Drive, Charlotte 7, N. C.
SAROT, IRVING A... 107 East 85th St., New York 28, N. Y.
SCANNELL, J. GORDON..... Massachusetts General Hospital, Boston 14, Mass.
SCHAFFNER, VERNON D..... 12 Cornwallis St, Kentville, Nova Scotia
SCHRAMEL, ROBERT J..... 1430 Tulane Ave., New Orleans 12, La.
SCOTT, HENRY W., JR.... Vanderbilt University Hospital, Nashville 5, Tenn.
SEALY, WILL C..... Duke University Hospital, Durham, N. C.
SEILER, HAWLEY H..... 517 Bayshore Blvd., Tampa 6, Fla.
SELEY, GABRIEL P.... 799 Park Ave., New York 21, N. Y.
SHEFTS, LAWRENCE M.614 Medical Professional Bldg., San Antonio 12, Texas
SHIELDS, THOMAS W.... 700 North Michigan Ave., Chicago 11, Ill.
SHUMACKER, HARRIS B, JR.. Indiana University Medical Center, Indianapolis 7, Ind.
SHUMWAY, NORMAN E..... Stanford Medical Center, Palo Alto, Calif.
SIRAK, HOWARD D..... Ohio State University Hospital, Columbus 10, Ohio
SKINNER, EDWARD F... 20 S. Dudley St., Memphis 3, Tenn.
SLOAN, HERBERTUniversity Hospital, Ann Arbor, Mich.
SNYDER, JOHN M.1236 Moffitt Ave., Bethlehem, Pa.
SOMMER, GEORGE N. J. JR..... 120 W. State St., Trenton 8, N. J.
SOUTTER, LAMAR577 Bridge St., Dedham, Mass.
SPENCER, FRANK C..... University of Kentucky School of Medicine, Lexington, Ky.
STARKEY, GEORGE W. B.319 Longwood Ave., Boston 15, Mass.
STARR, ALBERT..... 3181 S.W. Sam Jackson Park Road, Portland 1, Ore.
STATE, DAVID..... Albert Einstein College of Medicine, New York 61, N. Y.
STEPHENS H. BRODIE.. 384 Post St., San Francisco 8, Calif.
STOREY, CLIFFORD F.6330 Alvarado Road, San Diego 20, Calif.
STRANAHAN, ALLAN..... Albany Hospital, Albany, N. Y.
STRIEDER, JOHN W.1180 Beacon St., Brookline 46, Mass.
STRUG, LAWRENCE H.... 2435 Octavia St., New Orleans 15, La.
SWAN, HENRY II... 303 Josephine St, Denver 6, Colo.
TABER, RODMAN E..... Henry Ford Hospital, Detroit 2, Mich.
TAKARO, TIMOTHYVeterans Adm. Hospital, Oteen, N. C.
TAYLOR, FREDERICK H... 1012 Kings Drive, Charlotte N. C.
TAYLOR, WARREN J..... 452 Pleasant St., Maiden, Mass.
TEMPLETON, JOHN Y. III..... 311 Airdale Rd., Rosemont, Pa.
THOMAS, GORDON W.... Int. Grenfell Association, St Anthony, Newfoundland
TIMMES, JOSEPH J.Seton Hall College of Medicine, Jersey City, N. J.
TOCKER, ALFRED M.. Suite D, Medical Arts Bldg., Wichita 14, Kan.
VARCO, RICHARD L..... University of Minnesota Medical Center, Minneapolis 14, Minn.
VINEBERG, ARTHUR M.. 1390 Sherbrooke St., W., Montreal 25, Quebec
VORWALD, ARTHUR J.College of Medicine, Wayne State University, Detroit 7, Mich.
WADDELL, WILLIAM R.. 4200 East 9th Ave., Denver 20, Colo.
WALKER, JAMES H.1323 Quarrier St, East, Charleston 1, W. Va.
WALKUP, HARRY E... 1790 Broadway, New York 19, N. Y.
WARE, PAUL F..... 124 Russell St., Worcester, Mass.
WATERMAN, DAVID H..... 1918 West Clinch Ave., Knoxville 16, Tenn.
WATKINS, ELTON, JR.. Lahey Clinic, 605 Commonwealth Ave., Boston 15, Mass.
WATSON, WILLIAM L.... 340 East 72nd St, New York 21, N. Y.
WEBB, WATTS R.University Hospital, Jackson, Miss.
WEINBERG, MILTON, JR.1753 West Congress Parkway, Chicago 12, Ill.
WEISEL, WILSON... 324 E. Wisconsin Ave , Milwaukee 2, Wis.
WHEAT, MYRON W., JR..... Univ. of Florida, College of Medicine, Gainesville, Fla.
WHITE, MARION L., JR... Huntington Bank Bldg., Huntington, W. Va.
WICHERN, WALTER A., JR.620 Park Ave., New York, N. Y.
WILKINS, EARLE W., JR..... Zero Emerson Place, Boston 14, Mass.
WILLIAMS, MARK H..... 63 Front St., Binghamton, N. Y.
WILSON, JOHN L..... American University of Beriut, Beriut, Lebanon
WILSON, NORMAN J..... 135 Francis St., Boston 15, Mass.
WIPER, THOMAS B..... Suite 615, 909 Hyde St., San Francisco 9, Calif.
WOLCOTT, MARK W.... Veterans Adm. Hospital, Coral Gables, Fla.
WOLFF, WILLIAM I.10 Perlman Place, New York 3, N. Y.
WOODS, FRANCIS M... 135 Francis St., Boston 15, Mass.
WRIGHT, GEORGE W..... 11311 Shaker Blvd , Cleveland 4, Ohio
WYLIE, ROBERT H.... 903 Park Ave., New York, N. Y.
YOUNG, W. GLENN, JR..... Box 3396, Duke University Medical Center, Durham, N. C.

Associate Members

ACKMAN, F. DOUGLAS..... 1374 Sherbrooke St., W., Montreal 25, Quebec
ADAMS, JESSE E., JR.966 East 3rd St., Chattanooga, Tenn.
ADELMAN, ARTHUR. 751 East 63rd St., Kansas City 10, Mo.

AITCHISON, DAVID B.Mountain Sanatorium, Hamilton, Ontario
ATTAR, SAFUH M. A..... University Hospital, Baltimore 1, Md.
BEALL, ARTHUR C., JR... 1200 M. D. Anderson Blvd., Houston 25, Texas
BERNHARD, WILLIAM F.... 300 Longwood Ave., Boston 15, Mass.
BESKIN, CHARLES A.3929 Convention St, Baton Rouge, La.
BLALOCK, JOHN B.... Ochsner Clinic, 1516 Jefferson Highway, New Orleans 21, La.
BOUGAS, JAMES A... 135 Francis St., Boston 15, Mass.
BOUSQUET, ERNEST O.... 5689 Boulevard Rosemont, Montreal, Quebec
BOYD, THOMAS F.. 784 Massachusetts Ave., Boston 18, Mass.
BRYANT, J. RAY..... 1169 Eastern Parkway, Louisville 17, Ky.
BURBANK, BENJAMIN..... 244 Henry St., Brooklyn 1, N. Y.
CAHAN, WILLIAM G... 444 E. 68th St., New York 21, N. Y.
CAMISHION, RUDOLPH C.1025 Walnut Street, Philadelphia 7, Pa.
CANTRELL, JAMES R.325 Ninth Ave., Seattle 4, Wash.
CHANDLER, JOHN H..... 616 W. Forest Ave., Jackson, Tenn.
CHODOFF, RICHARD J..... 255 South 17th St., Philadelphia 3, Pa.
CHUNN, CHARLES F..... 316 Magnolia Ave., Tampa 6, Fla.
CINCOTTI, JOHN J..... Veterans Adm. Hospital, Sepulveda, Calif.
COHEN, MORLEY..... 1200 Grosvenor Ave., Winnipeg 9, Manitoba
COLE, FRANCIS H.1375 Goodbar Ave., Memphis, Tenn.
COLLINS, HAROLD A..... Vanderbilt University Hospital, Nashville, Tenn.
CONNAR, RICHARD G.... One Davis Blvd., Tampa 6, Fla.
COOKE, FRANCIS N..... 25 S.E. Second Ave., Miami 32, Fla.
COX, WILLIAM V..... 133 Court St., Auburn, Maine
CRACOVANER, ARTHUR J..... 103 East 78th St., New York 21, N. Y.
CRASTNOPOL, PHILIP.. 1221 East 21st St., Brooklyn 10, N. Y.
CRECCA, ANTHONY D.. 376 Roseville Ave., Newark 7, N. J.
CRUTCHER, RICHARD R.. 2101 Nicholasville Road, Lexington, Ky.
DAFOE, COLIN S.... 508 Medical Arts Bldg., Edmonton, Alberta
DALE, W. ANDREW..... 2000 Church Street, Nashville 3, Tenn.
DASCH, FREDERICK W..... Union St. and Avenue C, Schuylkill Haven, Pa.
DAVIS, MILTON V.. 3707 Gaston Ave., Dallas 10, Texas
DEATON, W. RALPH, JR.... 1027 Professional Village, Greensboro, N. C.
DEBORD, ROBERT A.... 1240 Jefferson Bldg., Peoria, Ill.
DECKER, ALFRED M, JR.8 Church St., Saranac Lake, N. Y.
DEMATTEIS, ALBERT..... 2612 Pleasant Valley Blvd., Altoona, Pa.
DENIORD, RICHARD N.... 707 Allied Arts Bldg., Lynchburg, Va.
DERRICK, JOHN R.University of Texas Medical Branch, Galveston, Texas
DEWALL, RICHARD A.. 1041 Jackson Ave., River Forest, Ill.
DILLON, MARCUS L., JR.. 203 Frances St., Durham, N. C.
DIVELEY, WALTER L..... 410 Medical Arts Bldg., Nashville 12, Tenn.
DOBELL, ANTHONY R. C..... 4500 Sherbrooke St., Montreal 6, Quebec
DODDS, G. ALFRED..... 807 Broadway, Fargo, N. D.
EISEMAN, BEN..... Univeristy of Kentucky Medical Center, Lexington, Ky.
FELTON, WARREN L. II1200 N. Walker Ave., Oklahoma City 3, Okla.
FINEBERG, CHARLES.... 255 S. 17th St., Philadelphia 3, Pa.
FINNERTY, JAMESBrookhaven Medical Arts Bldg., Patchogue, N. Y.
FITZPATRICK, HUGH F.. St. Luke's Hospital, New York 25, N. Y.
FRIEDLANDER, RALPH.The Bronx Hospital, New York 56, N. Y.
FRIESEN, STANLEY R.. 39th and Rainbow, Kansas City 3, Kan.
FROBESE, ALFRED S.1425 Scrope Road, Rydal, Pa.
FULLER, JOSIAH..... 205 W. 2nd St., Duluth 2, Minn.
GADBOYS, HOWARD L..... 11 East 100th St., New York 29, N. Y.
GAHAGAN, THOMAS..... 2799 West Grand Blvd., Detroit 2, Mich.
GARDNER, RICHARD E..... University of California Medical Center, San Francicso 22, Calif.
GERBASI, FRANCIS S..... 426 Eastland Center Professional Bldg., Detroit 36, Mich.
GWATHMEY, OWEN..... 501 East Franklin St., Richmond 19, Va.
HALL, DAVID P.. Medical College of Georgia, Augusta, Ga.
HAMPTON, FOSTER, JR... Suite 101, Interstate Bldg., Chattanooga, Tenn.
HANNER, JOSEPH M..... United States Naval Hospital, Jacksonville 14, Fla.
HARRISON, ROBERT W... 1810 Wealthy St., S. E., Grand Rapids, Mich.
HAUSMANN, PAUL F.2309 West State St., Milwaukee 3, Wis.
HEANEY, JOHN PMedical Professional Bldg., San Antonio 12, Texas
HEIMBECKER, RAYMOND O..... Toronto General Hospital, Toronto 2, Ontario
HENLY, WALTER S.... 1200 Moursund Ave., Houston 25, Texas
HERTNG, ALEXANDER C.United States Naval Hospital, Newport, R. I.
HERRERA, RODOLFO11 Calle #2-37, Guatemala City 1, Guatemala
HERTZLER, JACK H.4377 West Maple Road, Birmingham, Mich.
HEWLETT, THOMAS H., Colonel, OMS.. 326 Fitzsimmons Gen. Hosp., Denver, Colo.
HOLSWADE, GEORGE R..... 525 East 68th St., New York 21, N. Y.

HOOD, R. MAURICE..... 10-A Medical Arts Square, Austin 5, Texas
HOWARD, JOHN M.230 North Broad St., Philadelphia 2, Pa.
INGRAM, IVAN N... 655 Sutler St., San Francisco 2, Calif.
IOVINE, VINCENT M.1150 Connecticut Ave., N.W., Washington 6, D. C.
JAMPLIS, ROBERT W.300 Homer Ave., Palo Alto, Calif.
JARETZKI, ALFRED, IIIAtwell Road, Cooperstown, N. Y.
JAVID, HUSHANG25 East Washington St., Chicago 2, Ill.
JENSEN, NATHAN K..... 1629 Medical Arts Bldg., Minneapolis 2, Minn.
JOHNSON, CLIVE R.... 800 Fifth Ave., Fort Worth 4, Texas
JUDD, ARCHIBALD R.304 N. Fourth St., Hamburg, Pa.
KAUNITZ, VICTOR H..... 3878 Delaware Ave., Tonawanda, N. Y.
KEMLER, R. LEONARD..... 576 Farmington Ave, Hartford 5, Conn.
KENNEDY, JOHN H..... Metropolitan General Hospital, Cleveland 9, Ohio
KENNEY, LEO J.456 Cherry St., S. E. Grand Rapids 3, Mich.
KING, HAROLD..... 1100 West Michigan St., Indianapolis 7, Ind.
KRAEFT, NELSON H.1433 Miccosukee Road, Tallahassee, Fla.
KUNDERMAN, PHILIP J..... 185 Livingston Ave., New Brunswick, N. J.
KUNSTLER, WALTER E... 1538 Sherbrooke St., W., Montreal 25, Quebec
LAFORET, EUGENE G.... 1180 Beacon St., Brookline 46, Mass.
LASLEY, CHARLES H.Hillcrest and Pierce, Clearwater, Fla.
LAWRENCE, MONTAGUE S.University of Iowa, Iowa City, Iowa
LEIBOVITZ, MARTIN..... 812 Medical Arts Bldg., Tulsa 3, Okla.
LEMMON, WILLIAM M.1500 Vine Street Medical Bldg., Philadelphia 2, Pa.
LEPLEY, DERWARD, JR.8700 W. Wisconsin Ave., Milwaukee 13, Wis.
LEWIS, J. EUGENE, JR.... 634 North Grand Blvd., St. Louis 3, Mo.
LEWIS, RUBIN M... 2435 Webster St., Berkeley, Calif.
LUCIDO, JOSEPH L.634 North Grand Blvd., St. Louis 3, Ma,
MACDONALD, NEIL.. Medical Arts Bldg., Windsor, Ontario
MACLEAN, LLOYD D..... Royal Victoria Hospital, Montreal 2, Quebec
MAGOVERN, GEORGE J..... 3500 Fifth Ave., Pittsburgh 13, Pa.
MAHAFFEY, DANIEL E..... 1112 Heyburn Bldg., Louisville 2, Ky.
MALM, JAMES R..... 180 Fort Washington Ave., New York 32, N. V.
MANGIARDI, JOSEPH I..... 520 Franklin Ave., Garden City, N. Y.
MASON, JAMES M. III1023 South 20th St., Birmingham 5, Ala.
McKEOWN, JOHN L., JR.... 203 Forest Ave., Narberth, Pa.
MENDELSSOHN, EDWIN1351 West Tabor Road, Philadelphia 41, Pa.
MEREDITH, JESSE H..... Bowman Gray School of Medicine, Winston-Salem, N. C.
MILLER, ARTHUR C..... Veterans Adm. Hospital, Roseburg, Ore.
MILLER, CARROLL C.... 304 Humphrey St., Swampscott, Mass.
MILLER, DON R..... University of Kansas Medical Center, Kansas City 3, Kans.
MILLER, FLETCHER A.Creighton-St. Joseph Hospital, Omaha 2, Nebr.
MORSE, DRYDEN P.302 East Main St., Moorestown, N. J.
MORTENSEN, JD..... 535 East First South, Salt Lake City 2, Utah
MOUSEL, LLOYD H.
Dept. of Anesthesiology, The Swedish Hospital, Seattle 4, Wash.
NEERKEN, ADRIAN J..... 404 Bronson Medical Center, Kalamazoo 4, Mich.
NETTERVILLE, RUSH E..... 514 E. Woodrow Wilson Drive, Jackson 6, Miss.
NEWMAN, ROBERT W.. Medical Arts Bldg., Knoxville, Tenn.
NICHOLS, HENRY T.245 North Broad St., Philadelphia 7, Pa.
OCHSNER, ALTON, JR..... Ochsner Clinic, 1516 Jefferson Highway, New Orleans 21, La.
OCHSNER, JOHN L.... Ochsner Clinic, 1516 Jefferson Highway, New Orleans 21, La.
O'NEILL, JAMES F.... 140 Roslyn Ave., Glenside, Pa.
OVERSTREET, JOHN WM..... 508 Hermann Professional Bldg., Houston 25, Texas
PATE, JAMES W..... 858 Madison St., Memphis 3, Tenn.
PAUL, JOHN S.... Baker VA Center, Martinsburg, W. Va.
PINKHAM, ROLAND D.... Suite 250, 1120 Cherry St., Seattle 4, Wash.
PRATT, LAWRENCE A.U.S.O.M. APO 143, San Francisco, Calif.
QUINLAN, JOHN J..... Nova Scotia Sanatorium, Kentville, Nova Scotia
RANSDELL, HERBERT T., JR... Louisville General Hospital, Louisville 2, Ky.
RIVKIN, LAURENCE M.2320 Sutler St., San Francisco 15, Calif.
ROBBINS, S. GWIN. 899 Madison Ave., Memphis 3, Tenn.
ROBINSON, JOSEPH L..... 320 West Temple St., Los Angeles 12, Calif.
Ross, RALEIGH R.2 Medical Arts Square, Austin 5, Texas
RUBENSTEIN, LAURENCE H.571 Woodlawn Ave., Glencoe, Ill.
RUBIN, MORRIS..... 2021 Grand Concourse, New York 53, N. Y.
RYAN, BERNARD J.375 East Main St., Bay Shore, N. Y.
RYAN, THOMAS C.. 90 Shenango St., Greenville, Pa.
SANES, GILMORE M.3500 Fifth Ave., Pittsburgh 13, Pa.
SCHUSTER, SAMUEL R..... 300 Longwood Ave., Boston 15, Mass.
SCHWARTZ, SEYMOUR L... 260 Crittenden Blvd., Rochester 20, N. Y.

SCOTT, STEWART M.... 349 Vanderbilt Road, Asheville, N. C.
SELMAN, MORRIS W..... 2302 Meadowwood Drive, Toledo 2, Ohio
SEYBOLD, WILLIAM D.6624 Fannin St., Houston 25, Texas
SKINNER, A. M..... Galeton Pa.
SMYTH, NICHOLAS P. D..... Washington Hospital Center, 110 Irving St., N.W., Wash., D. C.
SNYDER, HOWARD E.103 E. Ninth Ave., Winfield, Kan.
SPEAR, HAROLD C.. 1550 N.W. 10th Ave., Miami 36, Fla.
STAYMAN, JOSEPH W.... 8815 Germantown Ave., Philadelphia 18, Pa.
STENSTROM, JOHN D.. 220-1105 Pandora Ave., Victoria, B. C.
STEPHENSON, SAM E., JR..... Vanderbilt University Hospital, Nashville 5, Tenn.
STERN, HAROLD. 100 York St., New Haven 11, Conn.
SULLIVAN, HERBERT J.. Medical Arts Bldg., Hamilton, Ontario
SWENSON, ORVAR..... The Children's Memorial Hospital, Chicago 14, Ill.
TEST, FREDERICK C. II. 20252 Meyers Road, Detroit 35, Mich.
THAL, ALAN P... Rivard St., Detroit 7, Mich.
THROWER, WENDELL B.... 55 Sacramento St., Cambridge 38, Mass.
TILLOU, DONALD J.311 W. Church St., Elmira, N. Y.
TRICERRI, FERNANDO E..... 3 Chemin Mornex, Lausanne, Switzerland
VALLE, A. R.
USPHS, American Consulate General, Navy #850, Box 100, FPO, San Francisco, Calif.
VAN FLEIT, WILLIAM E.... 407 Jefferson Med. Arts Bldg., South Bend 17, Ind.
WALKER, GEORGE R..... 289 Cedar St., Sudbury, Ontario
WATKINS, DAVID H... Denver General Hospital, Denver 4, Colo.
WESOLOWSKI, SICMUND A..... 44 Roosevelt Ave., Long Island, N. Y.
WHITESIDE, WILLIAM C.... 415 Medical Arts Bldg., Victoria, B. C.
WILDER, ROBERT J.101 West Read St., Baltimore, Md.
WILLIAMS, G. RAINEY.. 800 N.E. 13th St., Oklahoma City 4, Okla.
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Senior Members

ADA, ALEXANDER E. W.... 139 East 94th St., New York 28, N. Y.
AMBERSON, J. B... Bellevue Hospital, New York 16, N. Y.
AUFSES, ARTHUR H.165 East 72nd St., New York 21, N. Y.
BADGER, THEODORE L.264 Beacon St., Boston 16, Mass.
BALLON, DAVID H.1538 Sherbrooke St., N., Montreal 25, Quebec
BARNWELL, JOHN B..... R.D. 2, Blairstown, N. J.
BECK, CLAUDE S.2065 Adelbert Road, Cleveland 6, Ohio
BENEDICT, EDWARD B..... Massachusetts General Hospital, Boston 14, Mass.
BERRY, FRANK B... 169 East 69th St., New York 21, N. Y.
BETTS, REEVE H..... Veterans Adm. Hospital, Oteen, N. C.
BIRD, CLARENCE E... 64 Alfred Stone Rd., Providence 6, R. I.
BISGARD, J. DEWEY..... 422 Doctors Bldg., Omaha 31, Neb.
BLALOCK, ALFRED..... Johns Hopkins Hospital, Baltimore 5, Md.
BLOCK, ROBERT G..... Montefiore Hospital, New York 67, N. Y.
BORTONE, FRANK2765 Hudson Blvd., Jersey City 6, N. J.
BURNETT, W. EMORY. Broad and Ontario Streets, Philadelphia 40, Pa.
CARLSON, HERBERT A..... 21 Seventh Place, Long Beach 2, Calif.
CARTER, B. NOLAND. Maderia, Cincinnati 43, Ohio
CHURCHILL, EDWARD D.... 269 Prospect St., Belmont 78, Mass.
CLERK, Louis H..... 5575 Eight Ave, North, St. Petersburg 2, Fla.
COLE, DEAN B.. Professional Bldg., Richmond, Va.
COOPER, DAVID A.. 1520 Spruce St., Philadelphia 2, Pa.
COURNAND, ANDRE.... Bellevue Hospital, 27th St. & 1st Ave., New York 16, N. Y.
CRIMM, PAUL D.... Boehne Hospital, Evansville 12, Ind.
CURTIS, GEORGE M..... Ohio State University College of Medicine, Columbus, Ohio
DAVIDSON, LOUIS R.. 1025 Fifth Ave., New York 28, N. Y.
DOUGLASS, RICHMOND..... Veterans Adm. Hospital, Castle Point, N. Y.
DOVELL, CHAUNCEY, Col. (MC), USA (Ret.)62 South Boxwood St., Hampton, Va.
ELOESSER, LEO.... 490 Post St., San Francisco 2, Calif.
FAULKNER, WILLIAM B., JR.20 San Rafael Way, San Francisco 27, Calif.
FERGUSON, R. G..... Balfour Apts., Regina, Saskatchewan
FLICK, JOHN B..... 819 Black Rock Road, Gladwyne, Pa.
FREEDLANDER, SAMUEL O... 2460 Fairmount Blvd., Cleveland Heights 6, Ohio
GALE, JOSEPH W..... University Hospitals, Madison 6, Wis.
GARLOCK, JOHN H.47 East 77th St., New York 21, N. Y.
GEARY, PAUL1430 Highland Ave., Plainfield, N. J.
HARPER, FREDERICK R..... 1825 Gilpin St., Denver 18, Colo.
HARRINGTON, STUART W.. Mayo Clinic, Rochester, Minn.
HARRISON, HARLON W., CAPT. (MC), USNR

U.S. Naval Training Command, Omaha, Neb.
HART, DERYL.... Duke University, Durham, N. C.
HAYES, JOHN N.24 Church St., Saranac Lake, N. Y.
HEAD, JEROME R... 55 E. Washington St., Chicago 2, Ill.
HEINBECKER, PETERWashington University Medical School, St. Louis 10, Mo.
HOLMAN, EMILE..... Presbyterian Medical Center, San Francisco 15, Calif.
HUDSON, WILLIAM A.Hudsonakers, Jasper, Ark.
JANES, ERNEST C.250 Main St., East, Hamilton, Ontario
JANES, ROBERT M.904 Medical Arts Bldg, Toronto 5, Ontario
JOHNS, FRANK S..... Johnston-Willis Hospital, Richmond 21, Va.
JOHNSON, HOLLIS E.... 2122 West End Ave., Nashville 5, Tenn.
KIPP, HAROLD A..... Mercy Hospital Pittsburgh 19, Pa.
KNOEPP, LOUIS F..... Veterans Adm. Hospital, Alexandria, La.
LEAHY, LEON J..... 176 Bryant St., Buffalo 22, N. Y.
LESTER, CHARLES W.... 320 East 72nd St., New York 21, N.Y.
LEVEN, N. LOGAN1464 Lowry Medical Arts Bldg., St. Paul 2, Minn.
LOCKWOOD, A. L.... 300 Bloor St., E., Toronto, Ontario
MAUTZ, F. R..... 10515 Carnegie Ave., Cleveland 6, Ohio
McINTOSH, CLARENCE A.1390 Sherbrooke St., W., Montreal, Quebec
MEADE, RICHARD H..... 750 San Jose Drive, S.E., Grand Rapids, Mich.
MELTZER, HERBERT..... 505 Medical Arts Bldg., Edmonton, Alberta
MEYER, HERBERT WILLY... Box 507, Rancho Santa Fe, Calif.
MOERSCH, HERMAN..... 1064 Plummer Lane, Rochester, Minn.
MOORE, RICHMOND L.180 Ft. Washington Ave., New York 32, N. Y.
MURPHY, JAMES D..... U. S. Veterans Adm. Hospital, Oteen, N. C.
MYERS, J. ARTHUR.... 730 La Salle Bldg., Minneapolis, Minn.
NIXON, JAMES W..... 1121 Nix Professional Bldg., San Antonio 5, Texas
OATWAY, WILLIAM H., JR.La Vina Sanatorium, Altadena, Calif.
OCHSNER, ALTON..... Ochsner Clinic, 1516 Jefferson Highway, New Orleans 21, La.
ORNSTEIN, GEORGE. 965 Fifth Ave. New York, N. Y.
PACKARD, EDWARD N.... 142 Park Ave., Saranac Lake, N. Y.
PICKHARDT, OTTO C.... 66 East 79th St., New York, N. Y.
PROCTER, OSCAR S..... Box 662, San Antonio, Texas
RIENHOFF, WILLIAM F., JR.1201 N. Calvert St., Baltimore 2, Md.
RIGLER, LEO G.Los Angeles Center for Health Sciences, Los Angeles 24, Calif.
ROGERS, W. L.490 Post St., San Francisco 2, Calif.
ROSS, DUDLEY E..... St. Adolphe de Howard, Quebec, Quebec
SCHMIDT, HERBERT WM..... Mayo Clinic, Rochester, Minn.
SHAW, ROBERT R... 5323 Harry Hines Blvd., Dallas 35, Texas
SKINNER, GEORGE F.36 Colburg St., St. John, New Brunswick
SMITH, DAVID T..... Duke University, Durham, N. C.
STEELE, J. D..... Veterans Adm. Hospital, San Fernando, Calif.
STRODE, JOSEPH E.... Kapiolani St. at Thomas Square, Honolulu 14, Hawaii
THOMPSON, SAMUEL A..... 850 Park Ave., New York 21, N. Y.
THORBURN, GRANT (mail returned)1602 West Genessee St., Flint, Mich.
TOUROFF, ARTHUR S. W.333 E. 79th St., New York 21, N. Y.
TYSON, M. DAWSONHitchcock Clinic, Hanover, N. H.
VAN ALLEN, CHESTER M.. State Hospital, Bikaner, Rajputana, India
WANCENSTEEN, OWEN H..... University of Minnesota Medical Center, Minneapolis 14, Minn.
WEINBERC, JOSEPH A.Veterans Adm. Hospital, Long Beach 4, Calif.
WELLES, EDWARD S..... 20 Church St., Saranac Lake, N. Y.
WILLAUER, GEORGE..... 1930 Chestnut St., Philadelphia, Pa.
WILSON, JULIUS LANE..... 1790 Broadway, New York 19, N. Y.
WOODRUFF, WARRINER..... 8 Church St. Saranac Lake, N. Y.

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