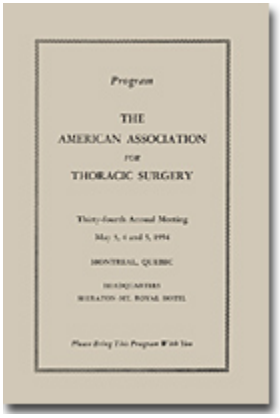
1954 ANNUAL MEETING PROGRAM



THE AMERICAN ASSOCIATION *For* THORACIC SURGERY
1953 -1954

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Monday Morning, May 3, 1954

8:30 A.M. Business Meeting.

9:00 A.M. Scientific Session: REGULAR PROGRAM.

1. Lipid Deposition in Pulmonary Tissue.

WILLIAM R. WADDELL *(by invitation),* RONALD C. SNIFFEN *(by invitation)*
and LAWRENCE L. WHYTEHEAD *(Traveling Fellow of the Association), (by invitation),* Boston, Mass.

In 1949 Waddell, Sniffen and Sweet drew attention to a form of chronic interstitial pneumonitis in man characterized by unusual deposits of cholesterol within the lung (cholesterol or endogenous lipid pneumonia). The present report concerns observations on the experimental reproduction of the condition in animals and the pathogenesis of the lesions. The pulmonary inflammatory lesions produced by bacterial agents have been compared with inflammatory response in muscles made ischemic by ligation of the major blood supply.

In rabbits the intratracheal inoculation of either Pasteurella pseudotuberculosis or Klebsiella pneumoniae results in an interstitial pneumonitis in which large numbers of macrophages appear. In the presence of lipemia and hypercholesterolemia these cells become laden with cholesterol and fat, reproducing the pathologic picture seen in the human cases mentioned above. Even normocholesterolemic animals accumulate lipid in inflammatory sites but the amount is much less and the lesions develop over a longer period of time.

Muscle ischemia in the presence of lipemia results in the accumulation of lipid within macrophages activated in response to the degenerating muscle. This observation shows that specific infectious agents are probably not etiologically related to the pulmonary lesions and that local physicochemical conditions are responsible for the local deposition of fat and cholesterol. The known facts concerning the factors responsible for lipid deposition in tissue will be discussed.

2. Absence and Hypoplasia of a Pulmonary Artery Unassociated with Congenital Heart Disease.

HERBERT C. MAIER, New York, N. Y.

Increasing experience with atypical thoracic lesions and the greater use of angiocardiography in the study of patients with obscure pulmonary conditions has resulted in the more frequent recognition of congenital anomalies of the pulmonary vessels. Numerous reports of anomalous systemic arteries supplying portions of a lung which was often the site of inflammatory or cystic disease have appeared in recent years. But less well known are the clinical and radiologic findings in persons with complete absence of the pulmonary artery to one lung, or those with hypoplasia of one pulmonary artery associated with anomalous systemic arteries. Although such anomalies may be associated with congenital heart disease, in some cases the only cardiac lesion, if any, that is present is secondary to the abnormal pulmonary circulation. The recognition of such anomalies can be of clinical importance as illustrated by the fact that some of our patients were incorrectly treated because of error in diagnosis. When large anomalous systemic arteries cause a considerable high pressure blood flow to a lung, an interesting clinical syndrome may be present. The surgical treatment of such lesions will be discussed.

3. Surgical Reconstruction of the Superior Vena Cava.

J. GORDON SCANNELL and ROBERT S. SHAW *(by invitation),* Boston, Mass.

It is unusual to find superior vena caval obstruction that lends itself to surgical relief. There is, however, a small group of patients in whom a "superior vena caval" syndrome is the result of a benign process and in whom the symptoms are sufficiently disabling to warrant operation.

The authors present two operative cases in which a free vein graft was placed between the internal jugular vein and the right atrium to reconstruct, in effect, a superior vena cava. One patient showed marked clinical improvement and in this individual patency of the graft was demonstrated by venography six months post-operatively. In the other case autopsy proved the graft to be patent one week following operation.

4. 2-Hydroxy-Stilbamidine as an Adjunct to the Surgical Treatment of Pulmonary Blastomycosis.

PAGE W. AGREE *(by invitation),* PAUL T. DECAMP and ALTON OCHSNER, New Orleans, La.

The history of blastomycosis is briefly described and the literature of this disease is reviewed. Pertinent facts concerning pathologic physiology of the lungs are considered. The various methods of treating blastomycosis are discussed with particular emphasis on the use of stilbamidine.

Experience with surgical resection in 6 patients with pulmonary blastomycosis is presented. Two of these cases are recorded in detail. One patient died two years postoperatively with widely disseminated blastomycosis. In contrast, the other patient with widely disseminated bilateral pulmonary as well as cutaneous disease was treated with stilbamidine. This resulted in subsidence of the disease but left a destroyed left lower lobe, which was excised. The patient is well six months postoperatively.

Our experience with blastomycosis has led us to believe that it is a generalized systemic disease which is in many ways similar to tuberculosis. It is believed that stilbamidine is a better drug than anti-tuberculosis preparations for controlling the disease so that surgical treatment can be instituted if it becomes necessary.

5. The Conservative and Surgical Management of Benign Strictures of the Esophagus.

PAUL H. HOLINGER, KENNETH C. JOHNSTON *(by invitation),* WILLIS J. POTTS and FERNANDO DACUNHA *(by invitation),* Chicago, Ill.

Benign strictures of the esophagus present a variety of problems depending upon their etiology, severity, duration and previous therapy. Strictures may be congenital, inflammatory, chemical, traumatic, or surgical in origin. They vary from small, superficial webs to extensive fibrous stenosis or atresia, with a duration ranging from acute, recent obstruction to years, and to complete closure.

Management must be sufficiently flexible and varied to be adapted to changing situations. Simple endoscopic dilatation suffices for the majority of congenital strictures. Early mercury bougie dilatation has been most effective in prevention of strictures due to chemical burns. Gastrostomy allowing for prograde or retrograde dilatation is the most rapid means of dilating firm, multiple strictures of this character once they have formed, and normal swallowing function is effectively restored in the majority of cases. Pneumatic, or large mercury bougie dilatation, is effective in the great majority of cases of cardiospasm, and in view of its effectiveness deserves an adequate trial.

Surgical resection of benign strictures is indicated only when endoscopic dilatation has been demonstrated, after prolonged trial, to be relatively ineffective. Furthermore, the most rapidly increasing series of patients with benign strictures of the esophagus are those with recurrent strictures following esophageal surgery. Sixty plus patients, adults and children, with post-surgical strictures will be analyzed giving the etiology of the original obstruction, the type of surgery, the post-surgical interval at which obstructive symptoms recurred and subsequent management required.

Some of the operative procedures for correction of extensive strictures in children will be discussed.

6. A Method of Preventing Peptic Esophagitis Following Esophago-gastrostomy: Exprerimental and Clinical Study.

DAVID H. WATKINS *(by invitation),* ARTHUR PREVEDEL *(by invitation)*
and FRED R. HARPER, *Denver, Colorado*

Reestablishment of continuity by esophagojejunostomy or esophagogastrostomy following total gastrectomy or subtotal proximal gastrectomy is not entirely satisfactory because of the development of chemical esophagitis with its attendant complications of stricture formation, hemorrhage, and even perforation. This same problem also appears in the management of patients with esophageal hiatal hernias associated with chemical esophabitis.

Previous investigators have shown that even in dogs subjected to 50 per cent proximal gastrectomy followed by esophagogastrostomy, 62 percent died of spontaenous esophageal complications in an average of 56 days.

In order to overcome the above complications, we have prepared a series of dogs in which a flutter valve mechanism was fashioned in the esophageal portion of the esophagogastric anastomosis.

The method has been used on dogs which have been carefully followed and studied and also on patients with gratifying results.

The presentation will cover the technical procedure used and also carefully prepared studies of the animal experiments and case histories of the patients operated upon.

Monday Afternoon, May 3, 1954

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

7. Opportunities for Research in Thoracic Surgery with the Use of Tissue Culture Methods.

C. M. POMERAT *(by invitation),* Galveston, Texas

Recent advances in the management of cells in culture, particularly with the use of recordings made by phase contrast, time-lapse cinematography, find new important applications in research on chest pathology. Cultures of pulmonary tissue from human fetuses have demonstrated differentiation *in vitro* and differential viability of epithelial versus connective tissue cells as a function of the incubator temperature. On the basis of studies performed with exfoliative cells from breast tissue and prostatic secretions an important challenge is offered to study the desquamated epithelium from the pulmonary tree with *in vitro*techniques. Pleural fluid can be easily managed in tissue culture for the analysis of pathological processes. The modulations observed in the behavior of many species of cells invites much further study. In borderline malignancies the use of tissue cultures may assist in establishing a clear diagnosis. Pleural effusions are useful for the demonstration of the deposition of acellular fibrillar material, silver staining revealing feltworks of reticular fibers produced within one or two weeks of the cultivation of pleural fluid of certain types. A series of studies performed on the adult human nasal mucosa serve as illustrations of what may be learned from an analysis of the behavior of pulmonary epithelium *in vitro.* The most notable finding to date has been the demonstration of nuclear rotation in cells of epithelial origin as revealed by time-lapse moving picture technique. The nature of this process will be discussed following cinematographic demonstrations.

8. The Results of Treatment in Carcinoma of the Lung.

DAVID P. BOYD, HOWARD B. KIRTLAND *(by invitation),* MAGNUS I. SMEDAL

(by invitation) and JOHN G. TRUMP *(by invitation),* Boston, Mass.

This report is an analysis of 403 proven cases of carcinoma of the lung seen at the Lahey Clinic up to January 1, 1952. We were especially concerned with assessing our results in terms of five-year survivals: Prior to January 1, 1948, there were 159 cases; from January, 1948, to December, 1951, there were 244 cases.

Of great interest today is the question of etiology in carcinoma of the lung. Despite the enthusiastic endorsement of thoracic specialists, it would appear from our figures that a longer period of time will be required to settle the true role of smoking.

The question of diagnosis is reviewed and therapy is considered.

The Survival Figures: The tragically low salvage rate in carcinoma of the lung is well shown by our statistics. The average duration of life of all patients after discharge from the clinic or hospital was 10.7 months. Patients treated medically lived an average of four months. Those treated with X-ray alone lived 7.9 months. All patients who had resections lived an average of 27.9 months after discharge from the clinic or hospital.

Every patient who had a resection was followed. It was found that 15 patients lived five years more. This is 9.4 per cent of our total cases. One patient who had X-ray therapy alone is alive five years after treatment. Thus, it is seen that 9.5 per cent of all patients and 37.8 per cent of those given a curative resection (who survived), lived five years or longer. There was a total hospital mortality for all the years of 7.6 per cent.

The role of super voltage therapy and the results up to this point are reviewed. Certain misconceptions regarding the use of this very powerful agent have appeared in the recent literature. Our experience with more than 40 cases at the Lahey Clinic and at the Massachusetts Institute of Technology is presented.

9. A Clinical Survey of Adenomas of the Trachea and Bronchus in a General Hospital.

LAMAR SOUTTER, Boston, Mass.

In the past 44 years the diagnosis of adenoma of the trachea or bronchus has been established by pathologic means in 59 patients at the Massachusetts General Hospital. Twenty-nine were diagnosed microscopically 10 or more years ago and 45, five or more years ago. Three were found at autopsy, 10 were biopsied but not resected and the remaining 46 were removed by pneumonectomy, lobectomy, seg-mental or local resection.

In an attempt to obtain a clearer picture as to the behavior of these tumors, the clinical courses of the patients subsequent to the tissue identification of these growths have been carefully studied. Although the malignant implications of the ademona are well known, the longevity of many of these patients provides evidence that the actual course of the disease is usually benign.

The causes of death among the untreated patients and those who left the hospital alive following surgical extirpation of their growths have been analyzed. Some of the patients have lived untreated for many years without evidence of spread of their tumors. One death due to a recurrent cylindroma has been recorded but none have been found due to the recurrence of a so-called carcinoid adenoma.

Although this series of cases has been small, the evidence presented is somewhat enhanced by the consistency of the results and the fact that the follow-up in all cases is complete.

10. Palliation of Esophageal Obstruction Due to Carcinoma with a Permanent Intra-Luminal Tube.

S. MACKLER and ROLAND MAYER *(by invitation),* Chicago, Ill.

Resection of the esophagus is feasible only in approximately one-third of the cases of carcinoma. The rate of unresectability rises in accord with the anatomic height of the lesion because of involvement of contiguous vital structures; primarily the bronchus and the aortic arch. Extirpation of the diseased segment, thus, is not possible frequently even for the sole purpose of palliation of obstruction without the expectation of cure. The esophagus, particularly in the upper region, does not lend itself to short-circuiting procedures to circumnavigate the obstructed site, as does the lower alimentary tract. A gastrostomy, or a jejunostomy, is the sole alternative to death by starvation. Either procedure leaves much to be desired from the standpoint of mechanical function as well as esthetic appeal. Moreover, gastrostomy or jejunostomy does not affect the distressing symptom of salivary overflow, resulting from obstruction. A disinclination to perform either procedure is furthered by its attendant mortality risk, which is not inconsiderable, and which must be added to that of the primary thoracotomy.

To eliminate the need for a gastrostomy or jejunostomy, a procedure was devised whereby food could negotiate the site of carcinomatous obstruction, and is performed at the time of the primary thoracotomy. In essence, the method consists of locally intubating the esophagus at the site of neoplastic constriction with an especially designed tube. The latter is passed into the lumen through an incision in the normal esophageal wall immediately above the lesion, and after having been threaded through the pathologic segment, is left in place as a permanent prosthesis. An artificial lumen is therefore constantly maintained in spite of the continued growth of the tumor.

A motion picture film is presented to demonstrate the surgical technique.

11. Studies on Cardiac Arrest: The Relationship of Hypercapnia to Ventricular Fibrillation.

WILL C. SEALY, W. GLENN YOUNG *(by invitation)* and
JEROME S. HARRIS *(by invitation),* Durham, N. C.

The factors responsible for sudden cessation of cardiac action during surgery are still poorly understood. In an investigation of this problem the role of hypercapnia in the production of this accident was studied. In dogs hypercapnia is well tolerated for hours even though the arterial blood pH is reduced to 6.7 - 6.9. On the other hand, striking changes in the EKG and even ventricular fibrillation frequently occur in the immediate post-hypercapneic period in dogs allowed to breathe carbon dioxide for three or more hours. The EKG changes were similar to those caused by hyperkaliemia. Studies of the blood potassium during hypercapnia showed a rise to levels below that expected to cause EKG changes. In the post-hypercapneic period, however, the potassium continued to rise even though the arterial blood pH approached normal. This rise was of sufficient magnitude to explain the EKG changes and the ventricular fibrillation that frequently developed.

In other experiments dogs were given potassium intravenously in quantities below that necessary to give EKG alteration. If 30% carbon dioxide and 70% oxygen mixtures were then administered, severe changes in the electrocardiogram developed; and the blood potassium level increased to levels consistent with the EKG changes.

In other experiments it was found that intravenous hypertonic solutions of glucose, sodium bicarbonate, and sodium chloride would reverse the changes in the EKG that indicated impending ventricular fibrillation. Once the latter state occurred, these methods were unsuccessful.

The case records of 34 patients who died from cardiac arrest were reviewed. These studies and other clinical findings are correlated with the laboratory observations on dogs.

12. The Physiology of Hypothermia and Its Application to Cardiac Surgery.

W. G. BIGELOW *(by invitation),* Toronto, Ont.

General hypothermia is being investigated as a means of reducing the oxygen requirements of the body sufficiently to allow exclusion of the heart from the circulation, thereby permitting intracardiac surgery under direct vision. Ordinary adult laboratory animals cannot be cooled safely to a body temperature much below 20° C. In dogs, the oxygen consumption, blood pressure, venous pressure, heart rate and cardiac output have been studied during cooling to 20° C. and during rewarming.

In monkeys, electrocardiogram and electro-encephalogram changes have been studied during cooling and rewarming and behaviour tests have been performed.

The resuscitation from low body temperatures has resulted in the development of an electrical artificial pacemaker for standstill of the heart and a radio frequency re-warming device. Applying this principle surgically in monkeys with body temperatures of 16 to 19° C., has been found possible to exclude the heart from the circulation and open it from 14 to 24 minutes with survival in 12 of the 13 experiments.

As another approach to the problem, a study of hibernation was initiated. The groundhog will not only hiberate at low body temperatures as low as 3°C., but he can be artificially cooled at this level. His unusual cold tolerance is attributed to a hibernating gland which appears to have an endocrine function and the activity of this gland is related to the animal's ability to tolerate very low body temperatures. This gland is at present under study.

Application to hypothermia to intracardiac surgery and techniques will be discussed.

6:30 P.M. -8:00 P.M. Cocktails

Informal, Sheraton-Mt. Royal Hotel. Guests limited to Members of the Association and their wives.

This party is tendered by the Local Committee: Dr. C. A. McIntosh, *Chairman.*

Tuesday Morning, May 4, 1954

8:30 A.M. Scientific Session: THORACIC SURGICAL FORUM.

13. Use of the Endotracheal Tube in Pulmonary Edema.

WATTS R. WEBB *(by invitation)* and GUY D. CAMPBELL *(by invitation),*
Sanatorium, Mississippi

Pulmonary edema which develops during an operation or early in the postoperative period is a distressing and frequently fatal complication, regardless of its etiology. Utilization of currently described medical measures often fails, usually due to drowning of the patient in retained alveolar fluid.

It is desirable not only to apply positive pressure oxygen to prevent anoxia and retard further transudation but to remove mechanically the accumulating fluid. By maintenance of an indwelling endotracheal catheter with an inflated cuff in the trachea, positive pressure oxygen has been given continuously for long periods, with frequent very brief interruptions for endotracheal aspirations. Always the volume of fluid to be aspirated has been far greater than anticipated. Successful clinical experience in combatting pulmonary edema is briefly described in three patients, each of whom was undergoing or had just undergone a pneumonectomy. In the light of previous experience, it is believed that recovery could not have been possible without utilization of the indwelling endotracheal tube to remove a great volume of aspirated pulmonary fluid.

It is suggested that this technique will have applicability in medical as well as surgical cases of severe pulmonary edema.

14. A Satisfactory Shunting Technique for Surgery of the Aortic and Pulmonary Valves and Proximal Great Vessels.

FREDERICK S. CROSS *(by invitation)* and EARLE B. KAY, Cleveland, Ohio

Work has been underway to develop a shunt: (1) to bypass the aortic and pulmonary valves; (2) to operate in a dry field; (3) to carry out surgery on the great vessels at the base of the heart.

Such a shunting mechanism has been developed out of plastic tubing fitted with a special leaflet type valve to prevent regurgitation into the ventricles. The proximal end of the shunt is sutured into the right or left ventricle, the distal end into the right pulmonary artery, or the descending aorta corresponding to the ventricle from which the blood is being shunted. It has been shown that they are well tolerated since with the shunts in place and the aorta and pulmonary artery cross-clamped at the base of the heart, it has been possible to bypass the aortic and pulmonary valves simultaneously in dogs for periods over an hour with no apparent harm. Using this shunting technique in experimental animals, direct exposure of the pulmonary valve has been possible; the aortic valve has been approached and dilated in a retrograde manner, and it has been possible to divide and resuture the aorta and pulmonary artery at the base of the heart.

The structure of the shunts, as well as the surgical technique for their insertion, will be reported in detail. The application of such shunting procedures to the problems of aortic stenosis and insufficiency, pulmonary valvular stenosis, as well as transposition of the great vessels, will be discussed.

15. The Closure of Interventricular Septal Defects in Dogs During Open Cardiotomy with the Maintenance of the Cardiorespiratory Functions by a Pump Oxygenator.

BERNARD J. MILLER *(by invitation),* HANS C. ENGELL *(by invitation),* ANTHONY R. DOBELL *(by invitation)* and JOHN H. GIBBON, JR., Philadelphia, Pa.

Interventricular septal defects were produced in dogs using a 9.3 mm. cork borer in a manner previously described. After an average interval of 53 days, 15 dogs were subjected to a second operation for the repair of the defect under direct vision.

The systemic venous return to the heart was deviated to the extracorporeal circuit containing an artificial lung. Oxygenated blood was returned from the apparatus to the femoral artery of the dogs. A left ventricular vent was employed as a method for avoiding air embolism to the systemic circulation. While the cardiorespiratory functions were maintained by the extracorporeal circuit, a right ventricular cardiotomy was performed and the repair of the interventricular septal defect accomplished under direct vision.

In three of the 15 dogs, healing had nearly completely closed the interventricular septal defect. The murmur, originally loud and coarse, became just audible. In these instances, it was necessary to recreate the defect by excising the scar at the second operation. The defects in the remaining 12 animals approximated their original size. All defects were closed with three or four cotton sutures and interrupted mattress sutures produced a more satisfactory closure.

Five of the 15 dogs failed to survive the repair of the septal defect. Of the remaining dogs, six were sacrificed from one week to three months following repair. At the time of sacrifice, a well-healed scar was observed at the site of the sutured defect and there were no associated thrombi. In one instance in which gross pleural and pericardial infection were present, friable vegetations covered the healed defect. The ventricular wounds were well healed and were without aneurysms.

Four dogs are still well and will be sacrificed later.

16. Studies of the Venous Collateral Circulation of the Lung.

ALFRED HURWITZ, AVERILL A. LIEBOW *(by invitation),* PAUL KUNKEL *(by invitation),* MASSIMO CALABRESI *(by invitation)* and RONALD W. COOKE *(by invitation),* New Haven, Conn.

After ligating the major pulmonary veins close to the auricle in dogs, infarction of the lung does not occur. Ligation of the pulmonary veins was performed as a two-stage procedure on the right side and as a single operation on the left without a mortality. As in previously reported observations in man, the bronchial

veins of the dog are joined by short broad channels to the largest pulmonary veins and permit of a sufficient drainage. Within three months a very extensive venous collateral circulation is found to deliver the blood from the lung on the side of ligation to the right auricle. It is apparent from the study of bronchovascular casts that some of the collateral vessels communicating with the pulmonary veins at the hilum represent an expansion of the bronchopulmonary venous system. Others are obviously newly formed vessels, since they enter via adhesions, on the mediastinal aspect largely from the internal mammary veins (superior caval system), and on the lateral aspect from the intercostal veins (azygous system). Many collateral vessels of the last two groups are remarkable in that they join the distal ends of pre-existing pulmonary veins, end-on. The mechanism for establishing these connections is unknown, and its elucidation would contribute to the solution of some of the fundamental problems of the development of collateral circulation in general.

Correlated functional observations in these animals have indicated also a striking rise in the oxygen content of the azygous vein.

One application of this work may be in the treatment of congenital transposition of the great vessels, in which ligation of the pulmonary veins of one lung should create a left-to-right shunt, useful in carrying oygenated blood to the right heart and transposed aorta.

17. The Physiological Basis for Utilization of Esophagocardiomy-otomy in the Treatment of Achalasia-an Experimental Study.

PAUL NEMIR, JR. *(by invitation)* and H. R. HAWTHORNE *(by invitation).*
Sponsored by JULIAN JOHNSON, Philadelphia, Pa.

We have performed esophagocardiomyotomy on a large number of patients having cardiospasm. Follow-up study has been for from six months to five years. The results with this procedure are unequivocally better than with other surgical procedures, and the complications of esophagitis, hemorrhage, and perforation have been, thus far, much less frequent and less severe.

The method by which this procedure exerts its beneficial effect is not clear. Studies were undertaken to clarify this aspect of the problem. Utilizing a triple lumen tube with attached balloons, esophageal motility patterns at various levels of the esophagus have been concomitantly recorded on the Sanborn Electromanometer before, and at varying periods following esophagocardiomyotomy. Alterations of the patterns with the use of various drugs have been studied also. The manner in which procaine exerts its beneficial effect was clarified.

Special fluoroscopic observations have been performed in conjunction with the motility patterns. Preliminary experiments indicate a possible explanation for the better results obtained with esophagocardiomyotomy. While regurgitation of gastric contents into the lower espphagus is almost an invariable accompaniment of operations upon the esophago-gastric junction, its occurrence is less frequent following esophagocardiomyotomy. Studies indicate a definite relationship between regurgitation and recurrence of symptoms or complications.

18. The Effect of Intrapericardial and Intracardiac Procaine Upon the Circulation in Man.

E. M. PAPPER, HUGH FITZPATRICK *(by invitation),* ENZO KRAHL *(by invitation),* F. F. McALLISTER *(by invitation)* and GEORGE H. HUMPHREYS, II, New York, N. Y.

Operations upon the heart have been associated with disorders of cardiac rate and rhythm. Among the methods of prophylaxis and therapy have been the injection of procaine into the pericardial sac and within the heart itself.

This presentation will be concerned in part with the theoretical and pharmacological implications of the use of procaine for this purpose. In addition, studies on a series of patients subjected to a variety of operations upon the heart will be presented. Continuous recordings of arterial pressure were made with Lilly Capacitance Manometers and continuous electrocardiography was employed. Suitable control studies without the use of procaine were also undertaken.

It was clearly demonstrated that the use of intrapericardial and intracardiac procaine produced a significant rise in heart rate and a fall in blood pressure in the majority of cases. In the control series these changes in circulation did not develop. The most common arrhythmia observed was ventricular extrasystole. The incidence was approximately the same in the two groups. It was concluded that procaine does not exert an anti-arrhythmic influence of significance and that it may produce harmful sequelae upon the circulation.

19. Intracardiac Surgery with the Aid of Artificial Operative Tunnels.

WILLIAM K. SWANN *(by invitation),* JACOB T. BRADSHER, JR. (by *invitation)* and JORGE RODRIGUEZ-ARROYO *(by invitation),* Knoxville, Tenn.

The principle of the operative tunnel, or sleeve, as employed in mitral valve surgery utilizes the left aurical appendage as the sleeve device.

The authors have attempted to substitute a fabric or plastic sleeve for use in approaching other areas of the heart where tissue such as an auricular appendage is not available.

On the basis of operations on dogs suitable materials were selected and the best size and configuration of the sleeves were determined. In some experiments a bifid or "inverted pair of pants" sleeve was used to allow simultaneous digital visualization and operative maneuver. In the animals the method was used to operate on the aortic valve through the aorta and on the pulmonic valve through the pulmonary artery. The mitral valve was approached through the wall of the left auricle, and the tricuspid valve through the wall of the right auricle. The interauricular septum was similarly approached through the wall of the right auricle.

The authors first applied this method in a human patient in June, 1953, when a transaortic aortic valve commissurotomy was done. This and subsequent operative experiences are described.

20. Cardioangiography.

PHILIP W. SMITH *(by invitation),* HUGH CRAIG *(by invitation)* and KARL P. KLASSEN, Columbus, Ohio

In 1951 Pomsdomenech and Nunez reported on visualization of the chambers of the heart and of the great vessels by direct cardiac puncture and injunction of contrast media. After preliminary animal experiments they carried out the procedure in 30 humans without mortality.

The method appeared simple and offered theoretical advantages over presently accepted techniques. Intravenous aniocardiography permits dilution of the contrast media with venous blood so that sharp radiographic contrast is often lacking, particularly in the left side of the heart. The X-ray value of cardioangiography should include a better visualization of the chamber of the left side of the heart, the thoracic aorta and its branches, and visualization of septal defects and certain valvular deformities. We felt that clarification of the advantages, disadvantages, damages and safeguards of the method was in order.

Fifty cardiac punctures were accomplished in 13 dogs with electrocardiographic tracings throughout the procedure. Injection of contrast media into the right or left ventricle was accomplished with fluoroscopic or radiographic control. Ventricular fibrillation and cardiac arrest were not observed. Coronary artery laceration was not encountered with the infra-xyphoid approach to the diaphragmatic surface of the heart. Pericardial bleeding was minimal. Autopsies were performed at varying intervals after puncture with gross and microscopic study of the heart. The method as finally evolved proved safe in dogs. The radiographic detail obtainable was excellent.

We have applied this method in humans and thus far there has been no mortality. The dangers and safeguards of the method will be discussed.

21. Creation of Autogenous Vessels.

NEWTON CHUN *(by invitation),* RICHARD FORNEY *(by invitation)* and EGBERT H. FELL *(by invitation),* Chicago, Ill.

The need for large vessel grafts has given rise to the use of homogenous aorta grafts and the development of blood vessel banks. This is definitely an advance in vascular surgery. Because of the need and the acknowledged superiority of autogenous grafts to homogenous grafts, an experimental study has been in progress to determine if autogenous vessels can be made to size, using vein and fascia, supported by a prosthesis and then placed subcutaneously.

These vein-fascia tubes have been removed from their subcutaneous environments one to four weeks after implantation, a portion removed for microscopic study and the remainder of the tube is used to replace a portion of either the thoracic or abdominal aorta. Postoperative studies consist of aortagrams, gross and histological studies of the vein-fascia aorta as compared to the normal aorta. The results are most encouraging and the procedure may be practical for the human.

22. Experimental Esophagogastrectomy. Evaluation of Gastric Drainage Procedures Performed in Association with Esophagogastrectomy.

HAROLD W. NEUMAN *(by invitation)* and F. HENRY ELLIS *(by invitation).*
Sponsored by HERBERT W. SCHMIDT, Rochester, Minn.

Acid-peptic esophagitis is a well-known complication of esophagogastrectomy. Experimentally, this complication usually can be prevented by resecting all the acid-secreting portion of the stomach. The addition of pyloromyotomy to experimental esophagogastrectomy has been shown to facilitate gastric emptying.

The purpose of this study was to evaluate various gastric drainage procedures performed in association with esophagogastrectomy. Three such procedures were studied in dogs: pyloromyotomy, gastroenterostomy and pyloroplasty. The results in these animals were compared with results in a group of dogs that underwent esophagoduodenostomy. Esophagoscopic examinations and studies of gastric secretion were carried out postoperatively before death or disposal of the animals.

A high incidence of ulcerative esophagitis due to regurgitation of alkaline secretions occurred after gastroenterostomy and esophagogastrectomy with removal of all the acid-secreting portion of the stomach.

Pyloroplasty was accompanied by a moderate degree of esophagitis somewhat comparable to that seen following esophagoduodenostomy. Pyloromyotomy, when performed with esophagogastrectomy and anastomosis of antrum to esophagus, resulted is mild esophagitis in only an occasional instance.

23. Experimental Pedunculated Flaps Used for Cardiac Abnormalities in Dogs.

ARNOLD E. BOTWIN *(by invitation),* Kansas City, Kansas

A technique for the construction of a pedunculated flap from the anterior atrial wall has been developed in dogs and these pedicled flaps have been used for the repair of various intracardiac lesions. This procedure has been used in 10 dogs with interatrial septal defect, in 10 dogs with mitral insufficiency and one dog with tricuspid insufficiency. All of the dogs survived operation.

The pedunculated flap is fashioned by clamping the anterior portion of the left atrium, incising the edges of this segment, and then rotating and suturing the lateral segments of atrial wall over the strip of atrium to be used for the flap. Thereby, the defect is over one-half closed before the atrial chamber is entered. Sutures to secure the flap in its future position are placed, the distal end of the flap cut free and swung into the chamber, and the remaining defect in the atrium closed.

In repairing atrial septal defects, from the left side, two sutures are used, one medial to the superior vena cava and one medial to the inferior vena cava. From the right side the repair is made with two or three sutures placed medial to the inferior vena cava and through the septum. Mitral insufficiency is repaired with one suture through the posterior left ventricular wall and tricuspid insufficiency with one suture through the posterior right ventricular wall.

Slides showing the steps of operation, short and long term results, and pressure studies will be shown.

24. Synchronous Combined Abdomino-Right Thoracic Approach for Carcinoma of the Upper Thoracic Esophagus.

HAWLEY H. SEILER *(by invitation),* Tampa, Florida

There has been controversy regarding the merits of a right versus a left thoracic approach to lesions of the middle and upper thirds of the esophagus. Esophageal dissection and esophagogastric anastomosis are somewhat facilitated when performed through the right chest, especially when the lesion is in the area of the aortic arch. Rather than being a handicap as is true on the left side, the aortic arch may act as a buttress against which tumor dissection can more readily be accomplished.

When the right-sided approach is used it is also necessary to perform laparotomy in order to mobilize the stomach and explore for metatases. Some surgeons have preferred to space the two operations a few days apart and in certain instances the patient's condition has deteriorated in the interval to the point where the thoracic operation could not be performed. On the other hand, when the laparotomy is performed first and immediately followed by the right thoracic operation at the same sitting, the procedure is unduly long and may prove to be too extensive for the patient who is already in poor condition.

The combined abdomino-right thoracic approach has been used by the author, the two procedures being performed synchronously. The patient is positioned on the table at a 45 degree angle and two surgical teams are used, one performing laparotomy and mobilizing the stomach while the other carries out the right thoracotomy. The stomach is then drawn into the right chest, the esophagus amputated, and esophagogastrostomy performed. Operating time has been considerably shortened.

25. Differential Behavior of Arterial Homografts Implanted in the Thoracic and Abdominal Aorta.

EDMUND A. KANAR, LLOYD M. NYHUS, EVERETT J. SCHMITZ, LESTER R. SAUVAGE, HORACE G. MOORE, JR., RALPH K. ZECH and HENRY N. HARKINS *(all by invitation).*
Sponsored by K. ALVIN MERENDINO, Seattle, Wash.

Many of the beliefs concerning the fate of arterial homografts implanted into the thoracic aorta are based on assumptions derived from experience in the abdominal aorta. No single report is available wherein the behavior of aortic homografts is evaluated with respect to the anatomic site of implantation. Most investigators have chosen the abdominal region alone for vascular experimentation.

This communication gives data showing that aortic homografts act quite differently when implanted in the chest as compared to the abdomen. Up to the present time we have implanted 403 vascular grafts of various types into the abdominal aorta and 226 into the thoracic aorta. Our observations are based on this overall experience with experimental vascular grafts, but special emphasis is placed on a detailed analysis of 42 aortic homografts of the thoracic aorta and 55 homografts of the abdominal aorta in growing pigs. These homografts were implanted for an average of 191 days (thoracic aorta) and 204 days (abdominal aorta).

A distinctly higher incidence of late and serious degenerative changes, including calcification and subendothelial plaque formation, was observed in the homografts implanted into the thoracic aorta. This unexpected finding occurred even following implantation of fresh aortic homografts. The relationship of these

degenerative changes to growth of the host animal, site of graft implantation, period of preservation, and length of the graft are discussed. The overall biologic significance of these findings to chest surgery will be stressed.

26. A Method of Supplementing the Coronary Circulation by a Jejunal Pedicle Graft.

JAMES A. KEY *(by invitation),* FREDERICK G. KERGIN, YVES MARTINEAU *(by invitation)* and R. G. LECKEY *(by invitation),* Toronto, Ont.

A method has been devised to increase the blood supply of the dog's heart by grafting a segment of jejunum with intact blood supply onto the myocardium. The segment of bowel is split along the antimesenteric border, the mucosa removed and the raw submucosal surface is sutured to the surface of the heart. One hundred experiments on 50 dogs have been carried out to date.

Various investigations to determine the efficiency of the graft have been carried out. The graft afforded 100% protection against death from ligation of the anterior descending branch of the left coronary artery in 20 dogs as opposed to a 75% mortality rate in a control series. In the grafted animals, following coronary ligation, electrocardiograms were normal or indicated minimal infarction. Autopsy confirmed that the area of infarction was much smaller than in the control animals which survived ligation. Injection studies have demonstrated free communication between the jejunal artery and the coronary arteries. Histologic studies have confirmed the presence of patent vascular channels between the graft and the myocardium.

Among the advantages of this method are its relative simplicity, the fact that the graft affords a good arterial supply with a large surface area of contact, and that it stimulates intercoronary as well as extracoronary anastomoses. The investigation is being continued.

27. Controlled Cross Circulation for Intracardiac Surgery.

HERBERT WARDEN, MORLEY COHEN, RAYMOND C. READ and C. WALTON LILLEHEI *(all by invitation).*
Sponsored by RICHARD L. VARCO, Minneapolis, Minn.

A less complicated method is presented for performing intracardiac operations under direct vision in the open heart. By using a donor individual as an oxygenator and a simple mechanical pump as the heart, surgery can be prolonged for relatively unlimited periods.

The circulatory flow required has been based upon the "azygos flow principle". The required blood flow has been supplied by a single pump which circulates equal amounts of oxygenated blood from the donor's artery to the recipient's aorta, and venous blood from the recipient's cavae to the donor's venous circulation. Under these conditions the recipient's cardiac inflow may be totally occluded, a cardiotomy performed, and an intracardiac procedure easily carried out. This method has the advantage of prolonging the safe operating time in a dry field, it is simple to apply and at the same time has carried very little risk to either donor or recipient.

Numerous detailed physiologic and metabolic data will be presented from a series of animals subjected to total cardiac inflow stasis for approximately 30 minutes or longer by this method.

Tuesday Afternoon, May 4, 1954

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

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

Address of the President, Emile Holman, San Francisco, Calif.

28. The Surgery of Infundibular Pulmonic Stenosis with Intact Ventricular Septum. (A Type of "Pure" Pulmonic Stenosis.)

ROBERT P. GLOVER, HUGO GONTIGO *(by Invitation),* THOMAS C. MCAULIFFE *(by invitation),* THOMAS J. E. O'NEILL and ROBERT E. WELLS *(by invitation),* Philadelphia, Pa.

The term pulmonary stenosis has been loosely applied to all obstructions of pulmonary artery blood flow, be they due to pulmonary valvular stenosis, obstructing malformations of the infundibulum proximal to the valve, pulmonary artery stenosis or combinations of these defects.

True pulmonary stenosis is a valvular lesion recognizable clinically, easily confirmed by physiologic studies and readily relieved by surgical means. The condition is not associated with a ventricular septal defect and does not produce cyanosis except in rare instances (patent foramen ovale with high right atrial pressure).

A fact little realized clinically and scarcely referred to except in pathological treatises is that this same syndrome not infrequently is reproduced by an infundibular stenosis in which the pulmonary valve is normal. This condition is recognizable if not clinically then certainly by physiologic means (catheterization) and can be treated with equal satisfaction by surgical methods.

Six of our 25 cases of "pure" pulmonic stenosis were of the infundibular variety-a startling and rather significant finding. Their management, catheterization data, technic of surgery and eventual result are detailed. There was no mortality in the entire series. Illustrated by slides and moving pictures in color.

29. Pulmonic Valvular Stenosis: Technic of Open Valvuloplasty and Results.

HENRY SWAN, HENRY C. CLEVELAND *(by invitation),* HELMUT MUELLER *(by invitation)* and S. GILBERT BLOUNT *(by invitation),* Denver, Colorado

Pure pulmonic valvular stenosis has been treated almost universally by the trans-ventricular incision procedure of Brock. The operation is of low risk and is followed by apparent clinical improvement. However, objective physiologic studies, when made some months postoperatively, have been disappearing in the majority of instances, and serious elevations of right ventricular pressures remain. The long term outlook of such individuals would seem to be far from normal.

Hypothermia has allowed visual exploration of the valve and direct valvuloplasty via the pulmonary artery. Under direct vision, the funnel-shaped deformity is converted to a bicuspid valve with commissures extending the entire distance to the valve ring.

Postoperative studies on patients undergoing this procedure have to date been most gratifying. The dynamics of the right circulation have returned essentially to normal. The evidence is good that the valvular stenosis has been entirely relieved. Complete data on five patients will be presented. Eight patients have been treated by this method and there have been no deaths.

The techniques of the operation and the significance of pulmonary regurgitation, should it occur, will be discussed. A colored sound movie illustrating the surgical procedure will be presented.

30. Experiences in the Surgical Treatment of Aortic Stenosis.

WILLIAM H. MUELLER, JR., ALBERT A. KATTUS *(by invitation),* J. FRANCIS DAMMANN, JR. *(by invitation)* and RODNEY T. SMITH *(by invitation),* Los Angeles, Calif.

The importance of developing a method for surgically treating aortic stenosis cannot be overemphasized, because it is the second most common acquired stenotic valvular deformity. Many investigators have helped to establish methods for the treatment of this defect on a sound clinical basis. Bailey and co-workers demonstrated the blunt dilatation of the valve with the usual tear along the commissural fusion areas. At present this is the most satisfactory procedure for opening the valve but yet preventing significant regurgitation.

We have used a method which employs the introduction of a dilating instrument through a stab wound in the wall of the left ventricle to engage the aortic valve and open it. If an additional deformity such as mitral stenosis is present, this valve is also opened in the usual manner.

We have performed aortic valvulotomy on 16 patients. Their ages range from 14 to 61. All had acquired deformities except one who had a congenital lesion. Six had comcomitant mitral stenosis which was relieved simultaneously, and one had a coarctation of the aorta which was resected also. The oldest patient died during an operation in which the dilating instrument was being passed retrogradely through the innominate artery into the valve. Two others died, one three days after operation and one five days after operation. A cardiac pace-maker was used for 60 hours on one patient who developed complete heart block just after the aortic valve was opened and who later developed cardiac arrest. He subsequently regained a sinus rhythm.

Technical considerations, pressure studies, and problems encountered in dealing with these patients will be presented.

6:30 P.M. Cocktails, Dinner and Dancing, Sheraton-Mt. Royal Hotel.

Address by Guest of Honor, Dr. F. Cyril James, Principal and Vice-Chancellor, McGill University, Montreal.

Attendance limited to Members of the Association and their ladies, Invited Speakers and their ladies. Dinner Dress.

Wednesday Morning, May 5, 1954

9:00 A.M. Scientific Session: REGULAR PROGRAM.

31. The Surgical Correction of Mitral Insufficiency by Valvular Suturing.

CHARLES P. BAILEY, W. L. JAMISON *(by invitation),* H. T. NICHOLS *(by invitation),* and A. BAKST *(by invitation),* Philadelphia, Pa.

The causes of clinical mitral insufficiency are classified. Some may be ignored. Some are presently incorrectable. Some may be alleviated by commissurotomy for associated mitral stenosis; the anterior commissure tends to retain full competence.

The reasons for the great frequency of incompetence in the posterior portion of the mitral valve are illustrated. It has been possible to devise a method of corrective suturing of this commissure with or without the addition of grafted tissue to correct an actual or relative lack of valvular substance.

Ninety-four of over 380 patients with proven mitral insufficiency have been definitely treated by valvular suturing by all developmental techniques with an over-all mortality of 27%. The newest technique utilizes a special "sewing machine" which obviates the former dangerous trans-ventricular approach. A mortality of 10% or less is expected.

The mitral stitcher consists of a flat instrument similar to our guillotine knives with an underbeak and a sliding spear-like knife three millimeters in width. This knife has a diagonal slot which picks up the suture as it punctures the valvular substance after the beak has been placed under the ventricular aspect of the valve cusp. By two passages of a right and left instrument, both valve leaflets are perforated and the sutures are applied through them. This non-living suture material is then replaced by strips of pericardium to form a living graft suture. This is done entirely through the auricular appendage.

32. The Surgical Correction of Mitral Insufficiency.

DWIGHT S. HARKEN, HARRISON BLACK, LAURENCE B. ELLIS *(by invitation)* and LEWIS DEXTER *(by invitation),* Boston, Mass.

The pathology of mitral insufficiency and a morphologic classification are presented.

At the operating table the exploring finger can be inserted through the auricular appendage to the region of the mitral valve and block the regurgitant jet. This is commonly associated with prompt elevation of blood pressure, presumably due to increased aortic output. This simple demonstration of kinetic pathology and its correction affords a starting point for understanding some fundamental aspects of this peculiarly "self-aggravating" disease. Regurgitation from absolute leaflet insufficiency is followed by compensatory dilatation of the left ventricle. This in turn produces a larger mitral annulus, increasing relative leaflet insufficiency, further aggravating regurgitation, thus initiating a vicious cycle. Conversely, a lucite prosthesis can reverse this cycle. This simple maneuver at the operating table helps to emphasize the absolute necessity of preserving leaflet mobility.

Experience with mitral insufficiency spanning the past five years will be discussed. The place for simple valvuloplasty with improvement of leaflet mobility in combinations of stenosis and regurgitation is recognized. Forty-three baffle procedures of various types and the evolution of the current spindle baffle operation will be reviewed. The technique of inserting the spindle baffle will be demonstrated in moving pictures.

33. Four Years Clinical Experience with Internal Mammary Artery Implantation in the Treatment of Human Coronary Artery Insufficiency Including Additional Experimental Studies.

ARTHUR VINEBERG, D. D. MUNRO *(by invitation),* HERMAN COHEN *(by invitation)* and WILLIAM BULLER *(by invitation),* Montreal, Canada

In previous publications we have shown that the internal mammary artery after implantation into the left ventricular wall branches and forms anastomoses with the left coronary circulation. The value of this extra coronary blood source has been shown by survival ligation studies and by the experimental production and treatment of coronary artery insufficiency. One can measure the amount of blood delivered to the left ventricular myocardium by an implanted internal mammary artery. This may be of value in relation to the total work of the heart.

After implantation, the internal mammary artery forms mammary-coronary anastomoses in from 60 to 70 per cent of our animals. A pericardial vascular fat pad has been used to supplement the artery transplant. The fat is separated from the fibrous pericardium of the left ventricle and the latter entirely cut away. The epicardium is then removed from areas of the left ventricle after the internal mammary artery has been

implanted. The vascular fat blanket is then applied to the left ventricle so that its vessels lie in direct contact with the ventricular muscle interspaces.

Thirty cases of human coronary artery .insufficiency treated by internal mammary artery implant have been followed for from 3 months to 3½ years. The results have been encouraging. Angina pectoris slowly disappears after implantation. Improvement is steady and can be correlated with the time that the internal mammary artery is known to send out new branches. Exercise tolerance likewise improves and many patients previously totally disabled have returned to full time active occupations.

34. Anatomic, Physiologic and Surgical Considerations in Closure of Atrial Septal Defects in Man.

JOHN W. KIRKLIN, EARL H. WOOD *(by invitation),* JESSE E. EDWARDS *(by invitation)* and HOWARD B. BURCHELL *(by invitation),* Rochester, Minn.

The various anatomic and physiologic features of atrial septal defects as seen at the Mayo Clinic are reviewed. In certain cases of atrial septal defect, the orifices of the right pulmonary veins are very near the defect. This permits some preferential shunting of blood from the right lung across the defect. In a few cases, there are actual anatomic anomalous pulmonary venous connections so that the veins from the right lung drain directly into the right atrium. Small and large right-to-left shunts are discussed.

Experience in 5 patients is reviewed, with surgical closure of the defect using an atrial well. There were no deaths. Some points of technic, including the use of a polyvinyl plastic sponge for closure of the defect, are reviewed. The technic employed in cases in which there is anomalous connection of the right pulmonary veins to the right atrium, as well as an atrial septal defect, is emphasized. Preoperative and postoperative data obtained at cardiac catheterization are presented in detail.

35. Aortic Arch Resection and Grafting for Aneurysm Employing an External Shunt.

ALLAN STRANAHAN, RALPH D. ALLEY *(by invitation),* WILLIAM H. SEWELL *(by invitation)* and HARVEY W. KAUSEL *(by invitation),* Albany, N. Y.

The procedure of choice in the surgical management of aneurysms of the intra-thoracic aorta is excision, with restoration of normal blood flow in the parent vessel. The application of this ideal in treating aneurysms which require temporary aortic occlusion, except for those complicating coarctation, has awaited the development of an adequate and safe means of diverting the blood flow during the period of aortic obstruction.

In two cases of aneurysm of the intrathoracic aorta treated by surgical excision and grafting, the aortic blood flow was diverted through a shunt of large caliber for periods of six hours and forty-five minutes and three hours and twenty minutes, respectively.

The first case was a fusiform and saccular leutic aneurysm of the entire intrathoracic aorta which was excised and replaced by a heterologous freeze-dried graft. The procedure was technically achieved but the patient expired during recovery from anesthesia as the result of hemorrhage from the pulmonary artery stump of an incidental pneumonectomy.

The second case is a classical post-traumatic saccular anerrysm of the first portion of the descending aorta accompanied by a patent ductus arteriosus, treated by partial aortic resection, homologous freeze-dried graft replacement, and division of the ductus.

The false preoperative estimate that the second case would be amenable to local excision and aortorrhaphy supports our thesis that a shunt and suitable graft should always be available when a case of intrathoracic aneurysm is explored.

36. Resection of the Thoracic Aorta with Replacement by Homograft for Aneurysms and Constrictive Lesions.

DENTON A. COOLEY and MICHAEL E. DEBAKEY, Houston, Texas

Excision of aneurysms and constrictive lesions of the aorta provides the optimum method of treatment wherever conditions permit its satisfactory application. For sacciform aneurysms usually of the arch, excision of the lesion with lateral aortorrhaphy may be feasible; but for fusiform aneurysms, some large sacciform lesions, and many constrictive lesions, extirpation of the lesion requires sacrifice of a segment of aorta with restoration of continuity by aortic homograft. Application of this latter technic involves periods of temporary aortic occlusion for approximately one hour and tissues distal to the occlusion may suffer irreversible damage from anoxia. The central nervous system is most vulnerable; where the temporary occlusion is of the thoracic aorta, cerebral and spinal cord damage is likely to prevent a successful outcome. In constrictive lesions the collateral arterial circulation is well developed and prolonged aortic occlusion is easily tolerated.

This report deals with our experience with cases where lesions involved various areas of the thoracic aorta, including the distal portions of the arch and where segments up to 22.5 cm. in length were resected with restoration of continuity by aortic homograft. Certain technical aspects of the problem will be considered with particular reference to choice of approach, choice and preparation of the graft, and methods of prevention of

central nervous system damage during temporary aortic occlusion, including the use of general body hypothermia for this purpose.

Wednesday Afternoon, May 5, 1954

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

37. The Viability of Tubercle Bacilli in Healed Tuberculous Lesions Following Long-Term Chemotherapy.

GLADYS L. HOBBY *(by invitation),* OSCAR AUERBACH, TULITA F. LENERT *(by invitation),* MAURICE J. SMALL *(by invitation)* and JOHN V. COMER *(by invitation),* East Orange, N. J.

This study was undertaken to determine the viability of tubercle bacilli in resected lesions from patients who had had long-term chemotherapy and who had been culture negative for periods of several months. Eighteen patients were studied. These fell into the following groups: (1) Nine patients who, we believe, met the criteria defined by D'Esopo et al. for "target point" lesions (8 had received more than 8 months of chemotherapy and 1 had received 4 months of chemotherapy) ; (II) two patients who met all of the criteria for "target point" lesions except that smears (but not cultures) were positive within a period of 1 to 2 months prior to resection; (III) two cases who met the criteria for "target point" lesions, based on roentgenographic evidence and duration of chemotherapy, but had one isolated positive culture 4 to 6 weeks prior to resection, after having been culture negative for a period of several months previously; (IV) three patients with negative cultures and patent cavities; and (V) two control patients.

In Group I (9 patients), positive culture occurred in 7; of 17 lesions examined, 11 were positive by culture. In Group II (2 patients), 4 of 5 lesions were culture positive. In Group III (2 patients), 2 lesions were negative by culture and by guinea pig inoculation. In Group IV (3 patients), all 8 lesions were positive for tubercle bacilli on culture. In Group V (2 control patients), 2 lesions were positive. From these data, it is apparent that viable tubercle bacilli were present in the majority of the lesions studied.

Comment will be made in the present report concerning the nature of these lesions, and concerning the microbiological technics utilized for cultivation of the organisms present in them.

38. Resection Surgery in Tuberculosis: Complications and After-History.

RICHMOND DOUGLASS, JAMES M. JUDD *(by invitation),* E. B. BOSWORTH *(by invitation)* and K. H. CHANG *(by invitation),* Ithaca, N. Y.

A group of 508 patients who had received antimicrobial therapy were submitted to resection surgery for tuberculosis during the years 1948-53. Pneumonectomy was done in 39, lobectomy was the major procedure in 127, segmental resection in 215, and local excision in 209. Bilateral procedures were carried out on 74 patients.

The postoperative complications and morbidity for the entire group is reviewed. A distinction is drawn between "salvage" and "elective" cases and an attempt made to weigh the operative risks for the latter group in particular. The after-history of the 1948-52 patients is presented for both the "salvage" and "elective" groups by the Anniversary Method of Bosworth and Ailing. The "salvage" group consisted of 107 patients of whom 10 died, 9 in the postoperative period; while 5 deaths, all postoperative, occurred in the elective group of 401 patients.

A special subgroup of 141 patients in whom all palpable and X-ray demonstrable disease was removed has been designated for special study. The postoperative course is considered to be completely satisfactory in 96 per cent.

39. The Coordination of Surgery and Combined Chemotherapy in the Treatment of Pulmonary Tuberculosis.

ALFRED M. DECKER *(by invitation),* JAMES W. RALEIGH *(by invitation)* and EDWARD S. WELLES, Sunmount, N. Y.

Although 80% or more of drug sensitive cases of pulmonary tuberculosis convert their sputa during prolonged combined therapy, only 50-70% close all lesions. Classification as CLOSED NEGATIVE, OPEN NEGATIVE and OPEN POSITIVE seems convenient.

The worth of this categorization in evaluating surgical intervention during therapy is suggested by the following observations:

Sputum conversion approaches 100% in the absence of open lesions. Failure to convert or bacteriologic relapse during or after prolonged therapy is common if open lesions persist. Relapse is rare within 4 years following therapy in the CLOSED NEGATIVE group, resected or unresected.

Resected open lesions are significantly more often positive on culture than are closed lesions. In the OPEN groups, patients resected appear to save a definitely lower relapse rate than those unresected.

Therapeutic failures and tuberculous operative complications are much more infrequent in the CLOSED NEGATIVE and OPEN NEGATIVE groups than in the OPEN POSITIVE group. Failure to achieve persistent sputum conversion after 6-8 months of treatment permits emergence of resistant organisms in an increasing percentage. It is suggested every effort be made to close cavitary lesions in the first 6-8 months of combined therapy. If closure is achieved, the necessity for resection remains an open question. If closure is not achieved, prompt resection of residual open lesions appears to offer therapeutic benefit. There is great need for clinicopathologic correlation of the morbid anatomy of residual open lesions in patients converting their sputa during prolonged combined chemotherapy.

40. The Role of Pulmonary Insufficiency in Mortality and Invalidism Following Surgery for Pulmonary Tuberculosis.

EDWARD A. GAENSLER, DAVID W. CUGELL *(by invitation),*
JEAN M. VERSTRAETEN *(by invitation),* SYLVIA S. SMITH *(by invitation)*
and JOHN W. STRIEDER, Boston, Mass.

The evaluation of pulmonary function studies for thoracic surgical patients has been often discussed in general terms. This is a report of mortality and disability among 460 consecutive patients after major thoracic surgery for tuberculosis whose pulmonary function had been defined preoperatively. The disease was far advanced in most cases (78 per cent). Clinical and physiologic follow-up studies ranged from 6 months to 6 years

Early (30-day) mortality was 4.3 per cent. Respiratory failure was the main cause of death. Cardiac arrest, the second-most important cause of death, could not be related to the degree of pulmonary insufficiency before operation but was always preceded by periods of hypoxia during anesthesia.

Late mortality (30 days to 6 years) was 3.9 per cent. During this period pulmonary insufficiency, always accompanied by cor pulmonale, ranked last among the causes of death. However, other late complications took a higher toll among patients with poor pulmonary reserve.

Total mortality was 5 per cent in patients with preoperative maximum breathing capacities above one-half of normal and was 40 per cent in those with lesser capacities. Patients who were considered too ill for any preoperative function studies did not survive surgery. If the pulmonary reserve was minimal, operation often proved fatal although roentgenograms and bronchospirograms, had shown no function on the involved side before surgery.

Conclusions based on statistical analyses and study of individual patients should help to prevent repetition of past mistakes and should lead to better criteria for evaluation of physiologic data.

41. Experiences with Enlarging the Indications for Tracheal and Bronchial Grafts.

OSLER A. ABBOTT, WM. E. VANFLEIT *(by invitation)* and
ALBERT ROBERTO *(by invitation),* Emory University, Georgia

Since the initial descriptions by Gebauer of the cutaneous-bronchial graft the authors have had experiences with the use of this technique in the handling of several different lesions. Of particular interest has been the use of these grafts in children aged 4 and 10, and we have had opportunity to observe the course of these patients for two and three years since the placement of such grafts. The grafts have also been utilized in patients having major degrees of hypertrophic-type emphysema requiring lobectomy for carcinoma. Such grafts have been subjected to postoperative radiation. Massive grafts have been used to replace major concomitant resections of the lower trachea, carina and contralateral bronchus in patients with extensive carcinoma of the right upper lobe. The complications encountered with this have been instructive. The replacement of the carina and posterior wall of the trachea in a patient with carcinoid-type of bronchial adenoma is also described. The problem is discussed in detail and indications and contraindications are suggested and analyzed.

42. Bronchial Anastomosis and Bronchoplastic Procedures in the Interest of Preservation of Lung Tissue.

DONALD L. PAULSON and ROBERT R. SHAW, Dallas, Texas

Bronchial anastomosis and plastic reconstruction of the bronchus in the interest of preservation of lung tissue are relatively new developments in the field of thoracic surgery. A lesion of the bronchus no longer always requires resection of all the lung supplied by the involved bronchus. By means of various types of repair it is possible to excise a portion of bronchus and restore the bronchial continuity, thus salvaging a portion, or all, of the lung tissue distal to the point of excision.

The authors have used a variety of procedures to preserve good lung tissue in 13 patients. The lesions of the bronchus so treated include traumatic bronchial occlusion (2), bronchial adenoma (2), tuberculosis stricture (3), and bronchogenic carcinoma (6).

In the 7 patients for whom bronchial resections and anastomoses or bronchoplastic procedures were done for benign lesions, a total of 3 lungs and 6 lobes of lung were preserved that would otherwise have been sacrificed.

Of the 6 patients in whom a bronchial reconstruction was done following resection for bronchogenic carcinoma, a total of 7 lobes of lung were preserved. Three patients have died of the carcinoma from 4 months to 1 year following operation. The remaining 3 patients are alive and well 6, 8, and 14 months after operation respectively.

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1953-1954

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Chamberlain, John Maxwell.. 39 East 75th St., New York, N.Y.
Clagett, O. Theron..... Mayo Clinic, Rochester, Minn.
Condon, William B... 1008 Republic Bldg., Denver, Colo.
Cohn, Roy Barnett.. Stanford University Hospital, San Francisco, Calif.
Coleman, Frank Philip..... 810 W. Franklin St., Richmond, Va.
Conklin, William S... 1016 Standard Ins. Bldg., Portland 5, Ore.
Cotton, Bert Hollis..... 1321 N. Vermont Ave., Los Angeles 27, Calif.
Cournand, Andre..... Bellevue Hospital, 28th St. and 1st Ave., New York, N.Y.
Crandell, Walter B..... Veterans Administration Hospital,White River Junction, Vt.
Crimm, Paul D..... Boehne Tuberculosis Hospital, Evansville, Ind.
Curreri, Anthony R.1300 University Ave., Madison, Wis.
Curtis, George M..... Ohio State University, College of Medicine,Columbus, Ohio
Dailey, James E.... 4109 Montrose Blvd., Houston 6, Texas
Daniel, Rollin A..... Vanderbilt University Medical School, Nashville, Tenn.
Davidson, Louis R.30 East 60th St., New York 22, N.Y.
Davis, Edgar W.1150 Connecticut Ave., Washington, D.C.
Day, J. Claude307 David Whitney Bldg., Detroit 26, Mich.
DeBakey, Michael E.Baylor School of Medicine, Dept. of Surgery,
Houston, Tex.
Decker, Harry R..... 730 The Park Bldg., 355 - 5th Ave., Pittsburgh 22, Pa.
Dennis, Clarence E..... Edgewood Ave., Pelham Manor, N.Y.
Deterling, Ralph A..... 180 Ft. Washington Ave., New York, N.Y.
Dodrill, Forest D..... 621 David Whitney Bldg., Detroit, Mich.
Dolley, Frank S..... 2010 Wilshire Blvd., Los Angeles 5, Calif.
Dorner, Ralph A..... 710 Equitable Bldg., Des Moines 9, Iowa
Dorsey, John M..... 636 Church Street, Evanston, Ill.
Douglass, Richmond.. Biggs Memorial Hospital, Ithaca, N.Y.
Drash, Everett C..... University of Virginia Hospital, Charlottesville, Va.
Dugan, David J.2938 McClure St., Oakland 9, Calif.
Effler, Donald B.... Euclid and East 93rd Sts., Cleveland, Ohio
Ehrenhaft, Johann L..... University of Iowa, Iowa City, Iowa
Ellison, Robert G..... University Hospital, Augusta, Ga.
Fischer, Walter W.. 170 East 78th St., New York, N.Y.
Flick, John B.The Pennsylvania Hospital, 8th and Spruce Sts.,
Philadelphia, Pa.
Forsee, James H., Col., M.C., U.S.AFitzsimons Army Hospital,
Denver 8, Colo.
Freedlander, Samuel O... 10515 Carnegie Ave., Cleveland, Ohio
Gale, Joseph W..... Wisconsin General Hospital, Madison 6, Wis.
Garlock, John H... 50 East 77th St., New York, N.Y.
Gebauer, Paul... Leahi Hospital, 649 Pokole St., Honolulu, T.H.

Gerbode, Frank L..... Stanford Univ. Hospital, San Francisco, Calif.
Gibbon, John H., Jr..... Jefferson Medical College, 1025 Walnut St., Philadelphia, Pa.
Glover, Robert P.269 S. 19th Street, Philadelphia, Pa.
Gordon, Joseph. 106 Girard Blvd., S.E., Albuquerque, N.M.
Grace, Archibald J.530 Wellington St., London, Ont.
Gray, Howard K..... Mayo Clinic, Rochester, Minn.
Gross, Robert E..... 300 Longwood Ave., Brookline, Mass.
Grow, John B..... 3705 E. Colfax, Denver, Colo.
Haight, Cameron..... University Hospital, Ann Arbor, Mich.
Hanlon, RollinsSt. Louis University School of Medicine, 1401 S. Grand Blvd., St. Louis, Mo.
Harken, Dwight E..... 67 Bay State Road, Boston 15, Mass.
Harper, Frederick R... 1104 Republic Bldg., Denver, Colo.
Harrison, Albert W..... Medical Branch, University of Texas, Galveston, Texas
Harrison, Harlon W..... Veterans Administration Center, Whipple, Ariz.
Hart, Deryl. Duke University, Durham, N.C.
Harter, John S.212 Brown Bldg., Louisville 2, Ky.
Head, Jerome R.55 E. Washington St., Chicago, Ill.
Helmsworth, James A..... Cincinnati General Hospital, Cincinnati, Ohio
Himmelstein, Aaron..... 70 East 96th St., New York 28, N.Y.
Holinger, Paul H. 700 N. Michigan Ave., Chicago, Ill.
Hollingsworth, Russell K... Baker Veterans Administration Hospital, Martinsburg, W. Va.
Holman, Emile722 Funston Ave., San Francisco, Calif.
Holman, Cranston William. 862 Fifth Ave., New York 21, N.Y.
Hudson, W. A..... 602 David Whitney Bldg., Detroit, Mich.
Hughes, Felix A., Jr..... Kennedy Hospital, Memphis, Tenn.
Humphreys, George H.. 180 Ft. Washington Ave., New York, N.Y.
Jackson, Chevalier L.. 1901 Walnut St., Philadelphia, Pa.
Janes, Ernest C..... 250 Main St., Hamilton, Ont.
Janes, Robert M..... Medical Arts Bldg., Toronto, Ont.
Johnson, Julian..... Hospital, University of Pennsylvania, 3400 Spruce St., Philadelphia, Pa.
Jones, John C.1136 West 6th St., Los Angeles, Calif.
Kay, Earle B.... 10465 Carnegie Ave., Cleveland, Ohio
Kent, Edward M.. 1406 Clark Bldg., Pittsburgh 22, Pa.
Kergin, Frederick G.... Medical Arts Bldg., Toronto 5, Ont.
Kessler, Charles R..... 1027 Woodward Bldg., Birmingham 3, Ala.
Kinsella, Thomas J..... 1251 Medical Arts Bldg., Minneapolis, Minn.
Kirby, Charles K... 3400 Spruce St., Philadelphia, Pa.
Klassen, Karl Peter..... Dept. of Research Surgery, Ohio State University, Columbus, Ohio
Knoepp, Louis F..... Veterans Administration Hospital, Alexandria, La.
Laird, Robert. 399 Bathurst St., Toronto Western Hospital, Toronto, Ont.
Lam, Conrad R..... Henry Ford Hospital, Detroit, Mich.
Lambert, Adrian, Jr.... 122 East 76th St., New York, N.Y.
Langston, Hiram Thomas.133 Gage Road, Riverside, Ill.
Leahy, Leon J.105 Medical Arts Bldg., Buffalo, N.Y.
Lester, Charles W.... 70 East 80th St., New York, N.Y.
Leven, N. Logan..... 1464 Lowry Medical Arts Bldg., St. Paul, Minn.
Lindskog, Gustaf E..... 50 Marvel Road, New Haven, Conn.
Lynch, Joseph P.. 1180 Beacon St., Brookline, Mass.
McGrath, Edward J..... Cincinnati General Hospital, Cincinnati, Ohio
Mclntosh, Clarence A.. 1390 Sherbrooke St., W., Montreal, Que.
McDonald, John R..... Mayo Clinic, Rochester, Minn.

MacManus, Joseph..... 491 Delaware, Buffalo, N.Y.
Maier, Herbert C..... 3 East 71st St., New York, N.Y.
Major, Robert CarlisleUniversity Hospital, Augusta, Ga.
Maurer, Elmer P. R..... 827 Union Central Bldg., Cincinnati, Ohio
Mautz, F. R..... University Hospital, Cleveland, Ohio
Meade, Richard H..... Blodgett Medical Bldg., Grand Rapids, Mich.
Meltzer, HerbertMedical Director, Charles Camsell Hospital,
Edmonton, Alberta
Merendino, K. Alvin. University of Washington, Seattle, Wash.
Merkel, Carl G... 8 Church St., Saranac Lake, N.Y.
Meyer, Herbert Willy..... 170 East 78th St., New York, N.Y.
Minor, George R..... University of Virginia Hospital, Charlottesville, Va.
Miscall, Laurence.. 11 East 68th St., New York, N.Y.
Moersch, Herman.. 725 Tenth Ave., Rochester, Minn.
Moore, Julian A.404 Flatiron Bldg., Asheville, N.C.
Moore, Richmond L..... 180 Ft. Washington Ave., New York, N.Y.
Mudd, James L..... 634 N. Grand Blvd., St. Louis, Mo.
Mulvihill, Daniel A..... 15 East 77th St., New York, N.Y.
Murphy, James D..... Veterans Administration Hospital, Oteen, N.C.
Newton, Harlan F..... 319 Longwood Ave., Boston, Mass.
Nixon, J. W.. 1121 Nix Professional Bldg., San Antonio, Texas
O'Brien, Edward J..... 307 David Whitney Bldg., Detroit 26, Mich.
Oatway, William H., Jr..... La Vina Sanatorium, Altadena, Calif.
Ochsner, AltonTulane University School of Medicine,
Department of Surgery, New Orleans, La.
O'Rourke, Paul V..... 307 David Whitney Bldg., Detroit, Mich.
Overholt, Richard H..... 1101 Beacon St., Brookline, Mass.
Paine, John Randolph..... The Buffalo General Hospital, 100 High St.,
Buffalo, N.Y.
Parker, Edward F..... 86 Hasell St., Charleston, South Carolina
Paulson, Donald L..... 3810 Swiss Ave., Dallas, Texas
Pool, John L.. 755 Park Avenue, New York 21, N.Y.
Potts, Willis J.707 Fullerton Ave., Chicago 14, Ill.
Proctor, Oscar C..... Box 126, University P.O., Seattle, Wash.
Raine, Forrester425 E. Wisconsin Ave., Milwaukee, Wis.
Rasmussen, Richard A.Blodgett Medical Bldg., Grand Rapids, Mich.
Ravitch, Mark M..... Mt. Sinai Hospital, Fifth Ave. and 100th St.,
New York 29, N.Y.
Rienhoff, William F., Jr..... 1201 N. Calvert St., Baltimore, Md.
Riggins, H. McLeod140 East 54th St., New York, N.Y.
Robertson, Ross.... 3830 West 37th Ave., Vancouver, B.C.
Rogers, W. L. 490 Post St., San Francisco, Calif.
Rosemond, George Parrott.... 3401 Broad St., N., Philadelphia, Pa.
Ross, Dudley E..... 974 Dunsmuir Road, Mount Royal, Que.
Rumel, William R.807 Medical Arts Bldg., Salt Lake City, Utah
Samson, Paul C.2938 McClure St., Oakland 9, Calif.
Sanger, Paul W..... Doctors Bldg., Kings Drive, Charlotte, N.C.
Scannell, J. Gordon... Massachusetts General Hospital, Boston, Mass.
Schaffner, Vernon D.Kentville, Nova Scotia
Scott, Henry W., Jr..... Vanderbilt University Hospital, Nashville, Tenn.
Shaw, Robert R.3810 Swiss Ave., Dallas, Texas
Shefts, Laurence M..... 503 Moore Bldg., San Antonio, Texas
Shumacker, Harris B., Jr..... Indiana University Medical Center,
Indianapolis, Ind.
Skinner, Edward F..... 899 Madison Avenue, Memphis, Tenn.
Skinner, George F... 36 Coburg St., St. John, N.B.

Sloan, Herbert..... University Hospital, Ann Arbor, Mich.
Sommer, George N. J., Jr..... 120 W. State St., Trenton, NJ.
Soutter, Lamar203 Commonwealth Ave., Boston, Mass.
Steele, J. D... 1324 West Wisconsin Ave., Milwaukee 3, Wis.
Stephens, H. Brodie... 384 Post St., San Francisco, Calif.
Strieder, John W.. 1180 Beacon St., Brookline, Mass.
Swan, Henry, II... 410 Marion St., Denver, Colo.
Sweet, Richard Harwood..... 205 Beacon St., Boston, Mass.
Thompson, Samuel A..... 850 Park Ave., New York, N.Y.
Touroff, Arthur S. W.994 Fifth Ave., New York 28, N.Y.
Turtle, William M..... 307 David Whitney Bldg., Detroit 26, Mich.
Tyson, M. DawsonHitchcock Clinic, Hanover, N.H.
Van Hazel, Willard..... 224 S. Michigan Blvd., Chicago, Ill.
Varco, Richard L..... University Hospital, Minneapolis, Minn.
Vineberg, Arthur M..... 1108 Elgin Terrace, Apt. 101, Pell St., Montreal, Que.
Wangensteen, Owen H..... University Hospital, Minneapolis, Minn.
Waterman, David H..... 607 Medical Arts Bldg., Knoxville, Tenn.
Watson, William Law..... 1088 Park Ave., New York, N.Y.
Weinberg, Joseph A..... Veterans Administration Hospital, Long Beach, Calif.
Welles, Edward S..... 110 Park Ave., Saranac Lake, N.Y.
White, Marion Lawrence, Jr.First Huntington Nat. Bank Bldg.,
Huntington, W. Va.
Williams, Mark H..... 63 Front St., Binghamton, N.Y.
Wilson, Norman J..... 8 Church St., Saranac Lake, N.Y.
Woods, Francis M.... 1101 Beacon St., Brookline, Mass.
Wright, George Wilbur. St. Luke's Hospital, 11311 Shaker Blvd.,
Cleveland 4, Ohio
Wylie, Robert H..... 535 Park Ave., New York, N.Y.

ASSOCIATE MEMBERS

Ackman, F. Douglas..... 1374 Sherbrooke St., W., Montreal, Que.
Aitchison, David Bancroft.. Mount Sanatorium, Hamilton, Ont.
Ashburn, Frank S..... 1835 Eye St., N.W., Washington, D.C.
Auerbach, Oscar..... Veterans Administration Hospital, East Orange, NJ.
Badger, Theodore... 264 Beacon St., Boston, Mass.
Beecher, Henry K... Massachusetts General Hospital, Boston 14, Mass.
Benedict, Edward Benson... Massachusetts General Hospital, Boston 14, Mass.
Black, Harrison67 Bay State Road, Boston 15, Mass.
Bortone, Frank..... 2765 Hudson Blvd., Jersey City, NJ.
Bosher, Louis H.. Medical College of Virginia Hospital, 1200 E. Broad St.,
Richmond, Va.
Bosquet, Ernest O.5689 Boulevard Rosemont, Montreal, Que.
Boyd, David P..... 605 Commonwealth Ave., Boston, Mass.
Brindley, George Valter, Jr..... Scott and White Clinic, Temple, Texas
Brownrigg, Garrett M..... 47 Queens Rd., St. Johns, Newfoundland
Bruneau, Jacques..... 847 Cherrier, Montreal 24, Que.
Burbank, Benjamin..... 244 Henry St., Brooklyn 2, N.Y.
Carswell, James, Jr..... Veterans Administration Hospital, McKinney, Texas
Carter, Max G.614 Orange St., New Haven, Conn.
Chandler, John Hughes..... 420 E. Main St., Jackson, Tenn.
Chesney, John G..... 2300 Biscayne Blvd., Miami, Fla.
ChodofT, Richard Joseph. 1823 Pine St., Philadelphia, Pa.
Chunn, Charles Francis..... 442 W. Lafayette St., Tampa 6, Fla.
Churchill, Ambrose Sevier524 West "G" St., San Diego, Calif.
Cooley, Denton A..... Baylor University College of Medicine, Houston 25, Texas

Cooper, David A... 1520 Spruce St., Philadelphia, Pa.
Cox, William V..... 133 Court St., Auburn, Maine
Cracovaner, Arthur J.114 East 72nd St., New York, N.Y
Crecca, Anthony Daniel..... 376 Roseville Ave., Newark 7, NJ.
Cutler, Preston R.807 Medical Arts Bldg., Salt Lake City 1, Utah
Dafoe, Colin S.11037 - 80th Ave., Edmonton, Alberta
Dasch, Frederick W.... 5908 Greene St., Philadelphia 44, Pa.
Davison, Richard5300 N. Christian Ave., Chicago 13, Ill.
DeCamp, Paul Trumbull..... 3503 Prytania St., New Orleans 15, La.
Delarue, Norman C..... 25 Donlea Drive, Toronto 7, Ont.
De Matteis, Albert. 1216- 13th Ave., Altoona, Pa.
Deshaies, George..... 37 Bellingham Road, Montreal, Que.
Dodds, G. Alfred.... 807 Broadway, Fargo, N.D.
Domm, Sheldon E..... 605 W. Main Ave., Knoxville, Tenn.
Drake, Emerson H.29 Deering St., Portland, Maine
Eglee, Edward P.105 East 53rd St., New York, N.Y.
Evans, Byron Henry..... 2940 Fresno St., Fresno, Calif.
Falor, William H..... 623 Second National Bldg., Akron 8, Ohio
Finney, George G..... 2947 St. Paul Street, Baltimore, Md.
Finnerty, James..... 862 Park Ave., New York 21, N.Y.
Fishback, Frederick C.. 1835 Eye St., N.W., Washington, D.C.
Ford, William B.. 1107 Clark Bldg., Pittsburgh 22, Pa.
Fox, Robert.... 636 Church St., Evanston, Ill.
Frank, Howard A..... 330 Brookline Ave., Boston 15, Mass.
Friedlander, Ralph... 1215 - 5th Ave., New York 29, N.Y.
Gaensler, Edward A., Capt. (MC) USAF..... Base Hospital Box 469,
Sampson AFB, Geneva, N.Y.
Gagnon, Edouard Donat..... 3411 St. Denis St., Montreal, Que.
Geary, Paul.... 909 Park Ave., Plainfield, NJ.
Goldman, Alfred.... 416 N. Bedford Drive, Beverly Hills, Calif.
Grace, Edwin J..... 121 Fort Green Place, Brooklyn, N.Y.
Grimes, Orville F..... University of California Hospital, San Francisco 22, Calif.
Hampton, Foster, Jr..... Suite 101, Interstate Bldg., Chattanooga, Tenn.
Harrison, Elliott... 925 W. Georgia St., Vancouver, B.C.
Herben, George F.House of Rest at Sprain Ridge, Yonkers, N.Y.
Heroy, William W.... 22 Oakwood Road, Huntington, N.Y.
Herrerra-Llerandi, Rodolfo E..... 7-A Avenida Sur 18, Guatemala City,
Guatemala
Higginson, John F..... 2455 N.W. Marshall St., Portland, Ore.
Hochberg, Lew A..... 135 Eastern Parkway, Brooklyn 17, N.Y.
Hopkins, William A..... 1374 Villa Drive, Atlanta, Ga.
Hudson, Theodore R.55 E. Washington St., Chicago, Ill.
Hun, Henry... 149 Washington Ave., Albany, N.Y.
Hurley, G. A. Patrick3001 Kent Ave., Montreal, Que.
Hurwitz, Alfred..... Veterans Administration Hospital, Newington, Conn.
Ingram, Ivan N.. 350 Post St., San Francisco 8, Calif.
Iovine, Vincent M..... 1150 Connecticut Ave., N.W., Washington, D.C.
Jarvis, Fred J.900 Boylston Ave., Seattle, Wash.
Johnson, Elgie K.909 President St., Brooklyn, N.Y.
Johnson, Hollis E.... 2122 West End Ave., Nashville, Tenn.
Johnston, James H., Jr.121 Carlisle St., Jackson, Miss.
Joynt, G. H. C.399 Bathurst St., Toronto, Ont.
Judd, Archibald R... 304 N. Fourth St., Hamburg, Pa.
Kelly, Winfield O..... Uncas on Thames, Norwich, Conn.
Kemler, R. Leonard..... 576 Farmington Ave., Hartford 5, Conn.
King, Charles R..... 814 Doctors Bldg., Atlanta, Ga.

Kipp, Harold A.. Mercy Hospital, Pittsburgh, Pa.
Kirklin, John W..... Mayo Clinic, Rochester, Minn.
Klepser, Roy GeorgeSuite 501, 1835 Eye St., N.W., Washington, D.C.
Klopstock, Robert.. Veterans Administration Hospital, Brooklyn 9, N.Y.
Kunderman, Phillip John... 165 Livingston Ave., New Brunswick, NJ.
Kunstler, Walter E..... 5238 Queen Mary Road, Montreal, Que.
Lampson, Rutledge Starr.85 Jefferson St., Hartford, Conn.
Laurey, James R..... 1318 Girard St., N.W., Washington, D.C.
Lawrence, Edwin A..... Dept. of Surgery, Indiana University Medical Center, Indianapolis, Ind.
Lees, William Morris..... 30 N. Michigan, Chicago, Ill.
Leetch, Henry W..... 108 Main St., Saranac Lake, N.Y.
Leibovitz, Martin812 Medical Arts Bldg., Tulsa, Okla.
Lewis, Rubin M.... 2380 Ellsworth, Berkeley, Calif.
Longacre, Jacob James1503 Carew Tower, Cincinnati, Ohio
Lyon, Clayton384 Post St., San Francisco, Calif.
MacDonald, Neil..... Medical Arts Bldg., Windsor, Ont.
Mackler, Saul Allen..... 104 S. Michigan Ave., Chicago 3, Ill.
Macpherson, Lachlan.. St. John Tuberculosis Hospital, East St. John. N.B.
Mader, Victor O..... 149 S. Park St., Halifax, Nova Scotia
Mannix, Edgar P... 7539 Kessel St., Forest Hills, N.Y.
Mason, James Monroe, III.. 1023 South 20th St., Birmingham, Ala.
Mayer, John Henry, Jr..... 829 West 55th St., Kansas City, Mo.
Melick, Dermont W..... 1005 Professional Bldg., Phoenix, Ariz.
Mendlesohn, Harvey J..... 2065 Adelbert Road, Cleveland, Ohio
Michelson, Elliott1801 Eutaw Place, Baltimore, Md.
Midelfart, Peter A..... 321 Summit Ave., Eau Claire, Wis.
Miller, Carrol C.. 1265 Beacon St., Brookline 46, Mass.
Miller, Felix P.109 N. Oregon St., El Paso, Texas
Mills, Waldo O..... 437 Stimson Bldg., Seattle 1, Wash.
Mousel, Lloyd H..... Dept. of Anesthesiology, The Swedish Hospital, Seattle, Wash.
Muller, Wm. H., Jr..... School of Medicine, U.C.L.A., Los Angeles 24, Calif.
Olsen, Arthur M.... 102 - 2nd Ave., S.W., Rochester, Minn.
O'Neill, James F..... 32 Roslyn Avenue, Glenside, Pa.
O'Neill, Thomas J..... 269 South 19th St., Philadelphia 3, Pa.
Papper, Emmanuel M.622 West 168th St., New York 32, N.Y.
Phillips, Francis J..... Seward Sanatorium, Seward, Alaska
Pinkham, Roland Davis. Suite 1445, Medico-Dental Bldg., Seattle, Wash.
Pollock, William C., Col., M.C., U.S.A1336 Cherry St., Denver 8, Colo.
Poppe, J. Karl..... 1130 S.W. Morrison St., Portland, Ore.
Potter, Benjamin P..... 821 Bergen Ave., Jersey City, N.J.
Pratt, Lawrence Arthur. Suite 800, Doctors Bldg., 3919 John R. St., Detroit, Mich.
Ramsay, Beatty H.12300 Wilshire Blvd., Los Angeles 25, Calif.
Read, Charles T..... Park Central Medical Bldg., 550 West Thomas Road, Phoenix, Ariz.
Richards, Victor..... Stanford-Lane Hospital, San Francisco 15, Calif.
Ripstein, Charles B..... 4802 Tenth Ave., Brooklyn 19, 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.
Schafer, Paul W..... University of Kansas Medical Center, Kansas City, Kan.
Schmidt, Herbert Wm.Mayo Clinic, Rochester, Minn.
Sealy, Will C.. Duke University Hospital, Durham, N.C.
Seley, Gabriel Parkurs.... 30 East 61st St., New York 21, N.Y.

Seybold, William Dempsey..... Hermann Professional Bldg.,
Texas Medical Center, Houston, Texas
Shipman, Sidney. 490 Post St., San Francisco, Calif.
Simpson, H. Murray..... 292 Queen's Ave., London, Ont.
Skinner, A. M..... Homer Folks Tuberculosis Hospital, Oneonta, N.Y.
Snyder, Howard Errol..... 103V2 E. Ninth Ave., Winfield, Kan.
Stayman, Joseph..... Germantown Hospital, Philadelphia 44, Pa.
Stenstrom, John D..... 2390 Bowker Ave., Victoria, B.C.
Storey, Clifford F., Capt., MCU. S. Naval Hospital, Portsmouth, Va.
Stranahan, AllanAlbany Hospital, Albany, N.Y.
Strode, Joseph E..... Straub Clinic, 1021 Kapiolani, Honolulu 14, Hawaii
Sullivan, Herbert J... 58 Wellington St., South, Hamilton, Ont.
Swenson, Orvar.... 300 Longwood Ave., Boston, Mass.
Terrill, Frank I..... Montana State Tuberculosis Sanatorium, Deer Lodge, Mont.
Test, Frederick C., II... 91 Cass Ave., Mount Clemens, Mich.
Thornton, Thomas F., Jr.... 1201 Hammond Ave., Waterloo, Iowa
Tillou, Donald J..... 311 W. Church St., Elmira, N.Y.
Tricerri, Fernando E..... Montevideo 1986, Buenos Aires, Argentina
Valle, A. R., Major (MC)..... Walter Reed Army Hospital, Washington 12, D.C.
Veal, J. Ross3560 Appleton St., N.W., Washington, D.C.
Vorwald, Arthur J..... College of Medicine, Wayne University, Detroit, Mich.
Walker, James H.. 1101 Beacon St., Brookline, Mass.
Ware, Paul F., Capt. (MC)Fitzsimons Army Hospital, Denver 8, Colo.
Weisel, Wilson324 E. Wisconsin Ave., Milwaukee 2, Wis.
Whiteside, William Carleton ... 342 Birks Bldg., Edmonton, Alberta
Willauer, George1930 Chestnut St., Philadelphia, Pa.
Wilson, Julius Lane..... Henry Phipps Institute, Philadelphia, Pa.
Wiper, Thomas B.... 536 Mason St., San Francisco, Calif.
Wolff, William15 E. 91st St., New York 28, N.Y.

SENIOR MEMBERS

Allen, Duff S..... Washington University Medical School, St. Louis, Mo.
Amberson, J. B..... Bellevue Hospital, New York, N.Y.
Ballon, David1538 Sherbrooke St., N., Montreal 25, Que.
Bazin, A. T.. 1414 Drummond St., Montreal, Que.
Berry, Frank B..... 4301 Massachusetts Ave., Washington 16, D.C.
Bettman, Ralph B... 104 S. Michigan Ave., Chicago, Ill.
Butler, Ethan Flagg... 956 West Water Street, Elmira, N.Y.
Byers, H. RoddickGanonoque, Ont.
Carlson, Herbert A.4241 East 14th St., Long Beach, Calif.
Carter, B. Noland..... Cincinnati General Hospital, Cincinnati, Ohio
Churchill, Edward D.Massachusetts General Hospital, Boston, Mass.
Clerf, Louis H... 1530 Locust St., Philadelphia, Pa.
Cole, Dean B..... Professional Bldg., Richmond, Va.
Crowe, Samuel J..... John Hopkins Hospital, Baltimore, Md.
Davison, T. C.478 Peachtree St., N.E., Atlanta, Ga.
Dieffenbach, Richard H.570 Mt. Prospect Ave., Newark 4, NJ.
Dovell, Chauncey D., Col. (MC) USA..... Regional Hospital, Fort Sheridan, Ill.
Eggers, Carl... 850 Park Ave., New York, N.Y.
Einhorn, Max.. 20 East 63rd St., New York, N.Y.
Elkin, Daniel C.Emory University Hospital, Atlanta, Ga.
Eloesser, Leo490 Post St., San Francisco, Calif.
Faulkner, William B., Jr.. 1796 Geary St., San Francisco, Calif.
Ferguson, R. G.Ft. San, Sask.
Frank, Louis W..... 614 Heyburn Bldg., Louisville, Ky.

Graham, Evarts A.. Barnes Hospital, St. Louis 10, Mo.
Harrington, Stuart W... Mayo Clinic, Rochester, Minn.
Hayes, John N.24 Church St., Saranac Lake, N.Y.
Heinbecker, Peter..... Washington University Medical School, St. Louis, Mo.
Johns, Frank S... Johnston-Willis Hospital, Richmond, Va.
Kernan, John D.103 East 78th St., New York, N.Y.
King, Donald S.... Massachusetts General Hospital, Boston, Mass.
Lemon, Willis S.1100 Kensington Ave., Clifton Forge, Va.
Lewald, Leon T... 1200 Fifth Ave., New York, N.Y.
Lockwood, A. L... 300 Bloor St., E. Toronto, Ont.
McSweeney, E. S.102 East 35th St., New York, N.Y. (Mail Returned)
Miller, Robert T., Jr.Mountain Lake, Lake Wales, Fla.
Myers, J. Arthur730 LaSalle Bldg., Minneapolis, Minn.
Neuhof, Harold..... Box 198, Huntington Road, Strafford, Conn.
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.
Rigler, Leo G..... University Hospital, Minneapolis, Minn.
Shipley, Arthur M..... University Hospital, Baltimore, Md.
Singer, J. J.616 N. Crescent Drive, Beverly Hills, Calif.
Smith, David T.Duke University, Durham, N.C.
Stewart, George A.3301 N. Charles St., Baltimore, Md.
Thearle, William H..... 4800 Gibson Ave., Albuquerque, New Mexico
Thorburn, Grant..... 1602 West Genessee St., Flint, Mich.
Tucker, Gabriel.... 250 South 19th St., Philadelphia, Pa.
Van Allen, Chester M.. State Hospital, Bikaner, Rajputana, India
Whittemore, Wyman.... Boyce, Va.

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1931-San Francisco..... President, Ethan Flagg Butler
1932-Ann Arbor..... President, Frederick T. Lord
1933-Washington..... President, George P. Muller
1934-Boston..... President, George J. Heuer
1935-New York..... President, John Alexander
1936-Rochester, Minn..... President, Carl Eggers
1937-Saranac Lake..... President, Leo Eloesser
1938-Atlanta..... President, Stuart W. Harrington
1939-Los Angeles..... President, Harold Brunn

1940-Cleveland..... President, Adrian V. S. Lambert
1941-Toronto..... President, Fraser B. Gurd
1944-Chicago..... President, Frank S. Dolley
1946-Detroit..... President, Claude S. Beck
1947-St. Louis..... President, I. A. Bigger
1948-Quebec..... President, Alton Ochsner
1949-New Orleans..... President, Edward D. Churchill
1950-Denver..... President, Edward J. O'Brien
1951-Atlantic City..... President, Alfred Blalock
1952- Dallas..... President, Frank B. Berry
1953- San Francisco..... President, Robert M. Janes