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Circular Letters:

Ballistocardiography: The ballistocardiograph may be defined as a device for recording the movements imparted to the body by the recoil of the heart and movement of the blood, or the forces generated when these movements are restrained. Interest in these movements has grown considerably in the past 10 years, largely through the persistent efforts of Isaac Starr who has written extensively on the subject. At the present time, there are 3 types of apparatus in use: (1) the high frequency undamped ballistocardiograph designed by Starr and Rawson; (2) the low frequency, critically damped ballistocardiograph designed by Nickerson and Curtis; (3) the simplified types of apparatus for recording movements directly from the body, as described by Dock and Taubman.

Recently Dock and Taubman have demonstrated 3 technics for recording ballistocardiograms directly from the human body. The first, a sphygmographic method, employs a standard Cambridge Simplitrol pulse recording device. The movements are picked up from the subject's head by either a glycerine capsule or a receiver made by mounting a piece of cork button 3 cm. in diameter on a rubber membrane 5 cm. in diameter. The second, a photoelectric method, records variations in electric current produced in a photoelectric cell by movements of a shadow cast by a piece of cardboard, metal, or occulting edge attached to a subject's head or shins. The third, an electromagnetic method, differs from the second in that a coil of fine copper wire is substituted for the occulting strip and an Alnico magnet is substituted for the photoelectric cell. A galvanometer attached to the coil inscribes a ballistocardiogram through variation in current produced by movements of the wire in the electrical field. Although attempts at standardization have been made, Dock feels that the curves inscribed by the ballistocardiograph are more suited to clinical application as empirical indices of disease than for precise physiological measurements of function. His simple little devices should open up this field to a much larger group of investigators than has been possible up to the present time. Several other forms or modifications of the ballistocardiograph have also been described.

Despite the differences in types of recording apparatus, the form of ballistocardiograms obtained by different methods are actually quite similar. At the beginning of electrocardiographic systole, the body moves headward a little producing the H wave. This wave is produced by the accleration footward of the heart itself during auricular contraction and the period of isometric ventricular contraction. In complete heart block, in those ventricular contractions where there is no immediately preceding auricular contraction, the H wave is usually absent. The larger footward movement, the I wave, occurs at, or shortly after, the onset of ejection, and represents the recoil of the heart as it ejects blood into the aorta and pulmonary arteries. This is not dissimilar from the recoil of a gun. Hamilton, Dow and Remington have pointed out, after comparison with simultaneous pulse tracings, that this

wave occurs actually a fraction of a second later than it should if it represents the cardiac recoil, but account for this by the time necessary to neutralize persistent forces set up during the H wave. The largest headward movement, the J wave, is produced by a combination of factors including the impact of blood against the aortic arch and against the bifurcation of the pulmonary artery, the acceleration footward of blood in the aorta and the deceleration of blood in the heart. The largest footward deflection, the K wave, is often even larger than the J wave. It represents a summation of forces produced by the after fling of the aorta and the impact of blood against small arteries in the lower part of the body. It occurs simultaneously with the peak of the femoral pulse wave. Nickerson and Curtis, using a model heart and aorta, have shown that the depth of the K wave is proportional to the length of the aorta.

The smaller waves following the K wave are called by Starr "diastolic waves" or "after vibrations". He has not attempted to identify them with specific impacts in the cardiac cycle. These waves are not recorded on the low frequency, critically damped ballistocardiograph. Hamilton et al. have suggested that the L wave is caused by slowing of blood in the ascending aorta, the peaks occurring at the time of closure of the aortic valves. The footward movement, the M wave, represents a thrust against the aortic valve, N an after fling, and O the development of a diastolic pressure wave in the lower extremity. Against this argument that the diastolic waves represent active surging of blood in the aorta, Starr has demonstrated that the movements are not very different from the vibrations of a cadaver.

In the normal ballistocardiographic tracing, the size of the impacts increases with each inspiration, to diminish again as the subject exhales. The H waves, on Starr's ballistocardiograph, vary in height depending on the phase of the vibrations. The amplitude of these vibrations depend on whether or not the impulses are delivered in phase. The HI segment is sharp and clearly defined. HI and IJ make acute angles with the vertical and they occur in the first half of systole. The J peak dominates the record. There are more variations in amplitude of the K wave than the other promient waves. In most records, L and M are the most prominent diastolic waves, although it is not uncommon for N to be higher than L. None of the diastolic waves approach the amplitude of the I, J, and K waves. The lines connecting the H, I, and J peaks are nearly straight and notches or slurs are not seen. JK, straight in most records, may have a conspicuous notch when the rate is slow.

The advantages of the ballistocardiograph in determing cardiac output lie in its simplicity of operation, the ease with which prolonged and repeated observations can be made, and the lack of any physical or mental trauma to the patient. It seems to be especially adapted for making repeated observations to detect changes in the same patient and in running acute experiments in which even beat-to-beat changes in output are of interest. Numerous acute

experiments have been made. For example, Hardy and Godfrey studied the effect of intravenous fluids on cardiac output in dehydrated patients and in normal subjects. Both groups were given fluids at the rate of 20 cc. per minute until 2,500 cc. were administered. The cardiac output of the dehydrated patients increased from -12 percent below average normal to + 30 percent. The 6 normal subjects showed no change. The increase in the dehydrated patients accompanied an increase in blood volume and was found to be due to an increase in stroke volume. The controls all had a diuresis and no significant change in blood volume occurred. Segers and Walsh injected 50 cc. of 50 percent glucose into normal subjects and cardiacs and found that a rise in cardiac output of between 10 and 30 percent lasting for five minutes occurred in the normals, but that an average increase of 40 percent, lasting 15 or 20 minutes, occurred in the cardiacs. They attributed this difference to a direct effect of glucose on the myocardium. Numerous other studies on the effects of drugs, of hemorrhage and intravenous gelatin, of pressure breathing at different simulated altitudes, etc., have been made.

Starr has also used the ballistocardiogram to test "coordination"of the circulation by studying the circulatory adjustments necessary to prevent pooling of blood in the lower extremities on arising from the recumbent to the standing position. The normal cardiac output shows an average increase of + 1 percent, ranging between +29 percent and -27 percent. If in the upper normal in the recumbent position, the tendency is for output to drop on arising. The reverse is true for those subjects with low normal output in the recumbent position. Patients with abnormal coordination show exaggerated changes and tend to be inconsistent in their reactions. It was found that patients with mild ill health increased their cardiac output on arising in order to maintain normal circulation. If this was not sufficient, muscular trembling occurred in the lower extremities to prevent pooling in the legs, and if this too was insufficient syncope occurred. In advanced heart disease, increase in cardiac output may not be possible so that incoordination downward was encountered most frequently in this group. In neurocirculatory asthenia, there was a tendency for cardiac output to rise on standing.

The disadvantages of the ballistocardiograph in determining cardiac output have also been long recognized. They stem from the fact that the apparatus cannot be attached directly to the heart and that, therefore, the form of the curves obtained is altered by parts of the body, clothing, bedding, table, pick up units and recording device Each distortion depends on its natural frequency of vibration and inherent damping. In addition, the output cannot be determined where cardiac disease has distorted the ballistocardiographic curves, in shock, in the presence of severe dyspnea, tremor or during exercise. Both Dock and Hamilton have stated that there can be no simple correspondence between force curves of the ballistocardiogram and the stroke volume because of the fact that the curves depend on velocity rather than on

volume alone and because there are so many complexities in the manner in which the forces are produced. Hamilton recommended that investigation take an empirical and descriptive trend rather than one based on oversimplified mathematics.

Because of these limitations, the ballistocardiograph will probably not have wide application as a quantitative research instrument. As a tool for measuring qualitatively changes in cardiac output and in the state of the circulation in the same subject and especially in acute situations, it should have great value. Whether or not the simple direct recording types of apparatus will have value along these lines still remains to be seen. In clinical diagnosis and as an aid in determing prognosis, the ballistocardiograph provides a method for measuring the functional state of the heart, irrespective of the type of organic pathology present. (J. Mount Sinai Hosp., March-April '51, L. B. Turner)

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Extract of Licorice for the Treatment of Addison's Disease: Extract of licorice, used in various forms as a sweet for children, has been in use in Western Europe for many years as an adjuvant for disguising the taste of other drugs in medical mixtures. In 1946, Revers noted a beneficial effect in gastric ulcer, with but a doubtful effect in duodenal ulcer. This curative action on ulcer of the stomach may be due to the presence of a spasmolytic principle. In addition, Revers noticed that about 20 percent of his patients developed side-effects of edema and hypertension or cardiac asthma, or both. His observations have been confirmed by many physicians in the Netherlands, including the authors. It was evident that these side-effects could not be due to damage to the heart or to the kidneys; the electrocardiogram remained normal, there were no changes in the urine, and there was no diminution in the protein content of the serum. Borst and his co-workers demonstrated that extract of licorice causes sodium retention and potassium loss, which leads to an increase in extracellular fluid and plasma volume and through this to an increased venous pressure with increase in systolic arterial pressure and increase in pulse pressure. Their conclusion was that licorice contains a substance with a DOCA-like action.

Confusion arose because a patient of Borst with Addison's disease did not react to the administration of licorice extract in the expected manner. For a time it seemed that licorice might be effective only in the presence of an intact adrenal gland, but Borst and others demonstrated that licorice had no action like ACTH; it produced no remission in patients with rheumatoid arthritis and it caused no decrease in eosinophil count. Borst's observations were repeated, therefore, on another case of Addison's disease.

After preliminary treatment with desoycorticosterone acetate, the authors' patient showed maintenance of mineral equilibrium on the administration

of 15 Gm. of extract of licorice per day. Withdrawal of the extract was followed by reappearance of the clinical, biochemical and hemodynamic disturbances. A second course of 30 Gm. of licorice daily again produced sodium retention, potassium loss, reversal of the abnormal hemoconcentration and a clinical remission.

The conclusion of Borst and Molhuysen and their co-workers that licorice extract contains a substance with desoxycorticosterone-like action was, therefore, confirmed. The only difference observed is that licorice seems to act more slowly than DOCA and that the rebound on withdrawal is less prompt. Because this substance is active when taken by mouth, licorice, or its active principle, may well have a prominent position in the future treatment of Addison's disease. It is not understood why Dr. Borst's patient did not react to licorice, whereas this patient did. (New England J.Med., 29 March '51, J. Groen et al, Amsterdam, The Netherlands)

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A Study of Long Term Hearing Results in Fenestration Surgery: In an attempt to gauge the permanency of the hearing result and the effect of the fenestration operation on the progressive nature of the disease, a study was made of 390 cases of fenestration which were followed 5 to 10 years. The cases were chosen chronologically from a total series of 743 fenestrations performed between 1940 and 1945 at the Wesley Memorial Hospital, Chicago. The continuous irrigation and binocular dissecting microscope technic devised by Shambaugh at Northwestern University was used, and those in the present study had follow-up examinations by repeated audiograms and clinical observations for at least 5 years.

The patients ranged in age from 12 to 74 years, with the 4th and 5th decades accounting for the majority. Suitability for the fenestration operation was classified preoperatively on the basis of findings of air and bone conduction audiometry and tuning fork testing. Class A, or ideal suitability designation was given those patients with hearing loss due solely to partial or complete stapedial fixation without any secondary nerve degeneration involving the critical speech frequencies. Class B signified slight to moderate nerve change for 2,048 cycles per second, and class C, borderline, was designated if there was nerve degeneration for 2 or 3 of the most important speech frequencies.

In the follow-up observations, it was noted that 70 percent of the patients received a significant hearing improvement, which was maintained. In 18.7 percent there was a partial loss of the initial gain; in 5.6 percent there was a hearing gain after the operation which was lost over a variable period to within 10 decibels of the preoperative level; and in 5.6 percent there was no significant gain in hearing at any time after the operation.

It was noted that whereas only 50 percent of the 4 patients operated on under the age of 20 obtained a hearing gain that was fully maintained for 5 years or more , 100 percent of the 7 patients operated on past the age of 60 obtained such a hearing gain. These small groups may not be statistically significant; the conjecture that the bone of the labyrinthine capsule reacts most vigorously to the trauma of operation in a patient less than 20 years and least vigorously in a patient more than 60 years must be regarded as only a suggestion until larger groups have been studied for a sufficient period. Others, however, have noted that poorer results are obtained in the younger age group.

It was also observed that probable bone closures occurred infrequently (0.6 percent) during the last 2 years of the 5 year period, when most of the features of the improved "Northwestern University technic" were being employed. Symptoms of inner ear disturbances, suggesting labyrinthine hydrops, were noted in more than 10 percent of all the patients postoperatively.

Progressive postoperative cochlear nerve degeneration was noted considerably more frequently in ears not operated on than in ears operated on. The fenestration operation thus affords at least partial protection to an ear against future cochlear nerve degeneration. The mechanism of this protection is not known. Pregnancy following the fenestration operation does not seem to result in further cochlear nerve damage. (A. M. A. Arch. Otolaryng., March '51, L. E. Adin, Jr. and G. E. Shambaugh, Jr.)

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Comparative Effects of Ether, Alcohol, Tetraethylammonium, and Priscoline in Producing Vasodilation in Peripheral Vascular Conditions: The determination of therapeutic and diagnostic effectiveness of various agents in peripheral vascular conditions has made a real demand upon investigators and clinicians. It is apparent from the literature that no single pharmacological agent has been uniformly consistent in producing the desirable effect of increased blood flow to the extremities.

In many people suffering from peripheral arterial insufficiency there is a functional element of vasoconstriction superimposed on the organic occlusive changes. The functional element which is considered to be due to overactivity of the sympathetic vasocontrictor system can be altered by various procedures. This relates strongly to the question of the degree of constriction or vasospasm necessary to reduce perceptibly the blood flow through a vessel. Mann and Baldes have demonstrated experimentally in dogs that the area of the lumen of an artery may be reduced as much as 90 percent before a 50 percent reduction in blood flow occurs. After the constriction is sufficient to

cause appreciable change in blood flow, additional constrictions have marked effects. The reduction in flow is rapid after a certain critical point in the degree of constriction has been reached.

In correlating their data with the human peripheral circulation it is reasonable to conclude that any small effect in relieving vasoconstriction by vasodilators is helpful. Any agent which allows one to measure the degree of vasoconstriction is important diagnostically and therapeutically.

The present study embraces the results of clinical investigation with several drugs (intravenous ether, alcohol, tetraethylammonoium (etamon chloride) and benzylimidazoline (priscoline) used to produce vasodilation in the presence of peripheral arterial insufficiency. Sixteen subjects were studied, including 11 with arteriosclerosis of the lower extremities, 1 with arteriosclerotic endarteritis obliterans of the upper extremities, and 4 with vasospastic disorders of the lower extremities. Of these, 15 received priscoline, 11 received tetraethylammonium, 6 received alcohol, and 6 received ether. These drugs were used for their comparative vasodilator effects in the same individuals under as nearly similar circumstances as possible. All drugs were administered intravenously, usually in the following dosages: priscoline, 75 mg.; tetraethylammonium, 500 mg.; ethyl alcohol and ether 25 cc. in one-half liter of 5 percent glucose or physiologic saline solution.

The intravenous injection of ether had no consistent effect on digital cutaneous blood flow as determined by skin temperature studies. In 1 of 6 subjects there was evidence of increased skin temperature, but the remainder demonstrated a decrease in digital skin temperature. This indicates that intravenous ether in a 5 percent solution fails to improve the circulation to the skin of the lower extremities. If it improved skin circulation there should be an increase in skin temperature. Clinical trials with intravenous ether in subjects not included in the present study have shown that there is relief of pain in the absence of peripheral vasodilation. It may be that intravenous ether interrupts pain impulses without producing demonstrable vasodilation.

There was failure to conform to the widespread agreement that alcohol has definite vasodilating effects. The results of this study may have been due to different susceptibilities in various individuals. The initial control skin temperatures were not unlike those at which these same subjects showed an increased response in skin temperature following the use of other vasodilators in this series. The amount of alcohol given intravenously is equivalent to about 60 cc. of whiskey by mouth. Five of the 6 subjects who received intravenous alcohol failed to exhibit an increase in surface temperature. These same 5 subjects, however, exhibited an excellent digital skin temperature increase following priscoline in either one or both extremities.

Tetraethylammonium failed to elicit the increased flow of blood to the skin reported by others. This drug has been reported useful as an index of the possible benefits that might be derived from a lumbar sympathectomy in peripheral arteriosclerosis obliterans. It failed to demonstrate the surprising degree of abnormal vasoconstriction which is often associated in this type of arterial insufficiency.

The failure to approach the normal vasodilation level in 6 of the 11 patients tested with tetraethylammonium would indicate that there was a slight element of vasoconstriction. This would imply that there was a preponderance of organic occlusive changes. But this is not the situation, evidenced by the response of these same subjects to other vasodilating agents in this study. The short duration and subnormal vasodilation level obtained with tetraethylammonium were such that it seems unlikely that it could be of great therapeutic value.

Several of the patients given priscoline were astounded to palpate the skin of their own feet and actually find it warm to their touch. This appeared to have a strong psychological influence upon the patient. It seemed to make him realize that something could be done for his feet which had been cold for so many months.

It appears that the increase in skin temperature is in proportion to the degree of organic obstruction. The subjects who had a different net change in surface temperature between the right and left toes also exhibited more symptoms and physical findings in the leg showing the lesser rise in skin temperature. There is a correlation between the degree of obstruction of the peripheral vessels, the clinical picture, and the skin temperature response.

The appearance of increased skin temperature after priscoline was slower than with tetraethylammonium and its duration of action was considerably longer. In the 4 patients observed for changes in pulse rate after priscoline the average increase was 26 beats per minute, while in 6 patients after tetraethylammonium the average pulse rise was 6.6 beats per minute. Priscoline caused a more rapid pulse, a less intense drop in blood pressure, and a greater degree of peripheral vasodilation than the other agents used in this series. (J. Lab. & Clin. Med., March '51, W. J. Reedy)

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Experiences with Ligation and Heparin in Thromboembolic Disease: During the 5-year period from 1945 through 1949, the members of the Surgical Department of the Hospital of the University of Pennsylvania utilized several methods of therapy to reduce the incidence of thromboembolic complications. The results in 27,802 patients operated upon during this period on the general surgical, urologic and neurosurgical services were carefully recorded and

analyzed. Because studies of specific prophylactic and therapeutic measures were in progress elsewhere, an effort was made to stress the use of several supposedly helpful general prophylactic measures and to individualize the use of anticoagulants and proximal vein ligation after a diagnosis of thrombosis was made. The general plan of management, which was adhered to in so far as possible, is shown in Table I.

TABLE I. MANAGEMENT OF THROMBOEMBOLIC DISEASE; MEASURES USED AGAINST THROMBOEMBOLIC DISEASE FROM 1945 TO 1949, INCLUSIVE

A. Prophylaxis	
	Routine measures: "promenade in bed"; frequent change of position in bed; early ambulation; compression bandages, applied before anesthesia and operation and maintained until discharge; deep breathing exercises; prompt replacement of blood loss; avoidance of abdominal distention and of heavy sedation; prevention of dehydration, electrolyte imbalance, and hypotension.
	In patients in whom there is an unusual risk of a thromboembolic complication, especially when there is a history of previous embolism, prophylactic use of anticoagulants and prophylactic superficial femoral vein ligation (patients to be selected by the chief of service).
B. Treatment	
Phlebothrombosis	Bilateral superficial femoral vein ligation or anticoagulants, at the discretion of the chief of service
Acute thrombophlebitis	Lumbar sympathetic block or anticoagulants
Extension of thrombus proximal to femoral vein	Anticoagulants
Suppurative iliofemoral or pelvic thrombophlebitis.	Ligation of the iliac veins or vena cava
Pulmonary infarction without dyspnea.	Bilateral superficial femoral vein ligation or anticoagulants at the discretion of the chief of service
Massive pulmonary embolism	Heparin 50 mg. intravenously at once; in addition, atropine, papaverine, oxygen, and morphine

Of the 27,802 patients operated upon, a diagnosis of phlebothrombosis or thrombophlebitis was made during the postoperative period in 181, an incidence of 0.651 percent (1 in 153 operations). Superficial phlebitis of the arm veins and of the superficial saphenous system are not included. Although patients with minimal signs and symptoms were considered to have phlebothrombosis, and those with massive edema, a sharp temperature elevation and vasospasm were diagnosed as having acute thrombophlebitis, many patients were in a borderline category in which it was not certain which of the 2 conditions predominated. Of the 181 patients, 34 (18.8 percent) were below the age of 40; 19 of these were treated "conservatively," that is, without ligation or anticoagulants, 6 having procaine blocks of the lumbar sympathetic ganglia. The other 162 patients were treated by ligation, with anticoagulants, or both, as follows: superficial femoral vein ligation, 69; superficial femoral vein ligation and heparin, 21; iliac vein ligation, 3; vena cava ligation, 3; heparin, 48; dicumarol, 11; and heparin and dicumarol, 7. An additional 21 patients who were not operated upon, or were on other services, and in whom a diagnosis of phlebothrombosis or thrombophlebitis was made, had superficial femoral vein ligation.

It is apparent that thromboembolic complications still constitute a serious problem in spite of the methods of therapy used. Phlebothrombosis or thrombophlebitis occurred in 1 out of 153, nonfatal pulmonary infarction in 1 of 487 and fatal pulmonary embolism in 1 of 896 postoperative patients. Approximately 1 percent of all postoperative patients had a thromboembolic complication. Many of the 27,802 patients had a relatively minor operative procedure; the incidence following major surgical procedures was thus considerably higher. Fatal pulmonary embolism was the cause of 7 percent of all postoperative deaths during this period.

In an earlier analysis of 67,402 postoperative patients during the period from 1925 to 1944, inclusive, the incidence of fatal pulmonary embolism was found to be about 0.08 percent (about 1 in 1,200 operations). The higher incidence in the present series is probably due to the more frequent performance of procedures of greater magnitude in a somewhat older age group. Increased interest in thromboembolism problems resulting in more accurate diagnoses and more accurate records are probably contributory factors.

General prophylactic measures, such as using elastic bandages and early ambulation, have not been strikingly successful in the authors' experience, as evidenced by their statistics. Many of the patients who developed phlebothrombosis or thrombophlebitis, 26 of those with nonfatal pulmonary infarction and 5 of those with fatal pulmonary embolism satisfied the criteria of moderate to full ambulation. In 19 patients with fatal embolism ambulation was not possible because the patients were comatose, too ill or too debilitated to be out of bed.

The treatment of diagnosed phlebothrombosis, thrombophlebitis and nonfatal pulmonary infarction by ligation, or with anticoagulants, was successful in most instances. Three patients with phlebothrombosis had pulmonary infarction following ligation but recovered on heparinization. A fourth had an infarct after unilateral ligation, and a fifth, who was heparinized, had repeated infarcts which stopped after ligation. A massive fatal embolism occurred in a patient who was, apparently, adequately heparinized. In all other instances the patients were free of further complications, which suggests that they were adequately protected.

Whether ligation or anticoagulants, used as prophylactic measures, would have spared the lives of many of the patients with fatal pulmonary embolism is, of course, not known. It is known that 4 of the patients who were given the benefit of these measures were not protected. Two had prophylactic bilateral superficial femoral vein ligations, 1 was apparently adequately heparinized, and 1 died 24 hours after heparin therapy was stopped. The principal problem in the patients with fatal embolism was the absence of warning. Specific protective measures could not have been made available to them unless they were used prophylactically in many thousands of patients, or unless

the relatively small number of patients susceptible to massive pulmonary embolism could have been detected by some simple, reliable laboratory test.

During the 5 year period under discussion the authors have followed with interest the experiences of others with the application of mass prophylactic technics. Allen and his associates have reported the use of prophylactic bilateral superficial femoral vein ligation in 984 elderly patients in whom the risk of fatal embolism was known, from previous experience, to be unusually great. Four patients died of pulmonary embolism. In 2 the emboli originated in the iliac and in 2 in the deep femoral vein. In a "control" series of 984 patients of similar age, sex, and lesion, 37 patients died of pulmonary embolism. By the use of this prophylactic method, therefore, 33 deaths from pulmonary embolism were apparently prevented.

In 1946 and 1947 the authors used this method on their service and a number of prophylactic ligations were done. They were discouraged from continuing this method more widely by the 2 instances of fatal embolism which occurred following prophylactic ligation. Erb and Schumann were similarly discouraged by their experience with prophylactic ligation at the Philadelphia General Hospital. In a series of 100 consecutive patients with hip fractures, bilateral superficial femoral ligation was done in alternate patients. Death from massive embolism occurred in 2 of the 50 ligated patients and in 2 of the 50 not ligated. In addition, nonfatal pulmonary infarction occurred in 7 patients following ligation and in 4 who were not ligated.

Several large series have recently been reported in which anticoagulants have been used prophylactically, and in them there is evidence of protective action against fatal embolism by both heparin and dicumarol. Protection has been obtained at the risk of hemorrhage and in some instances fatal hemorrhage has occurred. While protamine can be used to neutralize the effect of heparin, the authors' experiences with the use of vitamin K_1 oxide in overcoming rapidly the effect of dicumarol on the coagulation mechanism have been far from satisfactory, and increasingly they rely on heparin administered in one form or another. The cost of this type of therapy is considerable, however. It is to be hoped that some other agent will soon be available which will have all of the advantages of heparin and dicumarol with none of the disadvantages. Recent experimental studies suggest that it is not necessary to reduce the prothrombin to hemorrhagic levels to obtain protection against thrombosis by dicumarol therapy.

Simple laboratory tests, sufficiently sensitive to detect early changes in the coagulability of the blood or which will indicate incipient or subclinical thrombosis, have long been sought. A modified prothrombin test has been reported useful by Sandrock and Mahoney, although less encouraging results

with this test were reported by McClure and associates. The suggestion of Cummine and Lyons that fibrinogen B and clotting time determinations might be helpful was not confirmed by Kay et al. A recent test proposed by Ochsner, Kay, DeCamp, Hutton, and Balla is based on the determination of the antithrombin and prothrombin levels daily during the postoperative period. In 301 surgical patients it was found that if the antithrombin level remained at 1 to 32 or higher, intravascular clotting did not occur. It was suggested that the circulating antithrombin is alpha tocopherol, and that the administration of alpha tocopherol phosphate and calcium gluconate prophylactically might maintain high antithrombin levels and prevent postoperative thrombosis. The results in the small series reported would appear encouraging, but the number of patients so treated must be greatly extended before the real usefulness of this method of therapy can be adequately assessed. Cullen, Darrow, and Reese have attempted to predict incipient peripheral venous thrombosis by using radioactive sodium deposited in the tissues of the foot, but apparently no important diagnostic aid can be expected from further studies of this type.

So little is known of prothrombin A and B and fraction 5, of their physiologic control, and of their alternations under a wide variety of pathologic disorders, that important aid in therapy can hardly be expected until studies of a more fundamental type are vigorously pursued. (Surgery, March '51, I. S. Ravdin and C. K. Kirby)

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Pathogenesis of Oliguria in Eclampsia, Abortion and Abruptio Placentae: The development of renal impairment as a complication of certain obstetric abnormalities is well known. In eclampsia 90 percent of the patients are oliguric and 5 percent are anuric. Furthermore, renal insufficiency is the prominent clinical feature in symmetric cortical necrosis of the kidneys as a complication of premature separation of the placenta. Recently, lower nephron nephrosis has been described as a sequel of abruptio placentae. There is also an accumulation of evidence that abortion itself is a condition that may be followed by renal insufficiency.

Examination of the kidneys of eclamptic patients reveals a fairly constant pattern with the anatomic alteration largely limited to the glomeruli. The thickening of the glomerular capillary walls interferes with filtration. The permeability of the glomeruli must be further altered to account for the proteinuria and the pigmented (heme) casts found in some patients. It is difficult to understand how the functioning tubular complex would play any significant role in the pathogenesis of the oliguria, since there is no evidence of retrogression in these structures. Studies of renal function in eclamptic patients appear to be in accord with these morphologic observation.

Renal failure following abortion is even more serious and the structural changes in the kidneys are those of lower nephron nephrosis. In this condition the explanation of the oliguria may involve two mechanisms - reduced glomerular filtration and excessive and unselective resorption of the glomerular filtrate. The degenerative and necrotic changes in the tubular epithelium are morphologic manifestations which are consistent with the latter view, while cortical medullary circulatory shunts may account for the reduced intraglomerular pressure and diminished filtration. It is also possible that the reduced blood supply to the tubules may lead to the retrogressive changes described. Lower nephron nephrosis and symmetric cortical necrosis have a common pathogenesis, namely, renal cortical ischemia. Cortical necrosis is the manifestation of a more severe degree of ischemia, or, at least, of ischemia involving more extensive areas of the cortex.

In earlier reports, bilateral cortical necrosis was named as the morphologic change when renal failure followed abruptio placentae. There is increasing evidence that the structural alterations characteristic of lower nephron nephrosis also may be seen in patients dying of renal complications in premature separation of the placenta.

Further study is needed to determine if toxemias of pregnancy, particularly eclampsia, can initiate the lower nephron syndrome. It is readily admitted that serious renal failure may develop in cases of toxemia associated with abruptio placentae but the placental separation alone may be responsible for the renal changes. Young thought the underlying change is concealed accidental hemorrhage and that renal azotemia develops subsequent to the intrauterine crisis. Nephrotoxic products derived from placental tissue in varying stages of lysis may be absorbed into the circulation which persists in the living portion of the placenta. The toxemia which is present in some cases of premature separation may likewise have a placental origin and develop concurrently with the renal failure.

A practical clinical application of an understanding of the nature of the renal lesion in cases of this group is evident. If the patient with oliguria or anuria can be maintained by means of the artificial kidney, or otherwise, until renal parenchyma has regenerated, her life may be saved. Such regeneration may be possible if the lesion involves the epithelium of tubules or the endothelium of glomerular capillaries. With extensive cortical necrosis, however, there would seem to be no possibility of adequate functional restoration, no matter how long life may be sustained by artificial means. (Am. J. Obst. & Gynec., March '51, W. M. O'Donnell)

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Extensive Secondary Axillary Lymph Node Carcinoma Without Clinical Evidence of Primary Breast Lesion: Breast cancer continues to present a

challenge to surgical therapy. Although the technic in the handling of the operable case has remained essentially unchanged since the monumental descriptions of Halsted and Meyer near the end of the last century, some 15,000 women still succumb to this disease in this country every year. The critical controversy between the proponents of radiotherapy and those of radical surgery is once again arising. Most American clinics cite approximate 50 percent 5 year arrests without evidence of recurrence of this disease; this breaks down to some 70 to 75 percent of 5 year arrests in the absence of axillary node metastases and about 20 to 25 percent with axillary node metastases in otherwise operable cases. These figures are being challenged to a certain extent by the current experiments of McWhirter and others, who feel that they have adequately demonstrated the superior results obtainable in simple mastectomy followed by immediate multiport radiation to treat the axilla and other areas. These English investigators have been studying an enormous number of control cases and the final figures on their 5 year projection curve of unselected cases must be critically accepted or rejected at maturation.

The anatomic basis for the metastatic behavior of breast cancer has been reviewed many times. The composite subareolar plexus of lymphatics eventually drains toward the long thoracic vessels and thence up into the higher axillary lymph nodes and subsequently into the supraclavicular group, and finally intravascularly. Although there are generally conceded to be few significant blood vessel channels at the inferomesial margin of the breast, there is a well-developed chain of lymphatics communicating here with the falciform ligament of the liver and with the diaphragm. Students of the pathologic, anatomic manifestations of breast cancer spread are devoting more and more attention to the significance of the deep breast lymphatics which arborize directly with the communicating lymphatics draining in juxtaposition to the internal mammary vessels at the mesial margins of the anterior mediastinal costal interspaces. Gordon-Taylor and Handley and Thackray in England have for some years emphasized this mode of spread and maintained that American anatomic statistics on 5 year "cure" will be improved only when further dissections on so-called operable cases are carried out in this region. These English workers routinely do chest wall dissection biopsy of these medial intercostal nodes without increase in operative mortality or morbidity.

One feature characterizing the pathogenesis of breast cancer, and which in general has received scant attention in the literature, is the unpredictability of the behavior of the individual case. Patients have been observed with carcinoma of the breast arising during pregnancy who were treated by radical mastectomy with a subsequent 5 year salvage free of detectable disease. There are also patients with rare cases of breast cancer with supraclavicular metastasis treated surgically or with a combination of surgery and irradiation resulting in successful 5 year arrest of disease; and there are patients who have had a similar favorable result with treatment of so-called "inflammatory" carcinoma of the breast. All three of these situations are usually

accepted as death sentences and in several superior clinics are regarded as "inoperable". Small lesions without node involvement are not infrequently lethal, and large gelatinous masses with several nodes involved in the axilla are not uncommonly amenable to surgical treatment on 5 year follow-up.

The designation of "5 year cure" must be accepted with considerable reservation in this disease. Skeletal, visceral, or local dissemination is not unusually encountered after the arbitrary 5 year period which serves well prognostically in interpreting primary malignant disease elsewhere in the body. Histologic grading is being dispensed with gradually in carcinoma of the breast as being not nearly as valuable a prognostic yardstick here as in tumors elsewhere. There is now considerably more regard for the anatomic extent of local and lymph node disease for prognostic purposes, but with some reservation, as previously commented upon. Warren and Tompkins have statistically demonstrated that "cure" and survival time are inversely proportional to the extent of axillary involvement as recorded by the actual number of nodes microscopically invaded by disease at the time of surgery.

The authors feel that in such a situation as breast cancer every anatomic feature of the behavior of the disease should be brought to the attention of the profession if methods of diagnosis, interpretation and treatment are to be improved. Hence, they record 5 cases in which an involved axillary node (or nodes) was palpated as a solitary mass in the absence of clinical breast findings. In each instance, following excision of the axillary node, the mass proved to be carcinoma metastasis, and after clinical elimination of the possibility of a skin or lung or other distant primary lesion, the patient was immediately treated as having an operable carcinoma of the breast and classical radical mastectomy was done accordingly. Subsequent examination of each amputated breast demonstrated a very small primary malignancy. It is felt that this is a significant demonstration of the behavior of a small group of carcinomas of the breast and it is strongly suggested that carcinoma in an axillary node of a female, in the absence of clinically detectable malignancy elsewhere in the body, particularly in the lung, should be treated without delay as metastasis from a clinically undetectable primary breast lesion. (Surgery, February '51, H. A. Weinberger and D.W. Stetten)

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The Treatment of Epilepsy by Cortical Excision: Because knowledge of the epilepsies is so confused, it does not seem wise to attempt a rigid classification at this time. For the purpose of this paper, symptomatic epilepsy will have the connotation that a known factor is operating upon the brain, whereas idiopathic will imply that the etiological factors are unknown. The idiopathic group then includes most of the cerebral dysrhythmias, subcortical epilepsies and genuine or genetic epilepsies.

It cannot be too strongly emphasized that the primary therapy for a patient suffering from convulsive seizures is medical - anticonvulsive medication, psychotherapy, and social and occupational rehabilitation. Surgical procedures are no substitute for medical management. Of course, if there is evidence of a progressive lesion of the brain such as tumor, abscess, hematoma, etc., appropriate surgical measures are imperative, but in the chronic epilepsies medical management is of prime importance.

Operative intervention should be considered when medical management has failed to control the seizures. This implies that those drugs which are commonly considered effective in the treatment of the type of epilepsy involved have been given along and in combination to toxic limits. In general, seizures due to cortical lesions respond to phenobarbital, diphenylhydantoin (dilantin), methylphenylethyl-hydantoin (mesantoin), methylethylphenyl barbituric acid (mebaral) and bromides, in approximately that order of effectiveness. Such anticonvulsant medication will eliminate the attacks in more than 50 percent of the cases, and markedly decrease the seizures in another 25 percent of cases. Thus, only 20 to 25 percent of the focal epilepsies become candidates for surgical intervention.

It would seem foolish to subject an individual to a surgical procedure having a definite risk for the relief of a condition which is of secondary importance to a more crippling ailment. Hence, if the patient is so severely crippled mentally or physically as to render him or her incapacitated, even if the convulsions are eliminated, operation is contraindicated. Each case merits a careful evaluation on this point.

When it was demonstrated that electrical stimulation of the cerebral cortex produced clonic movements resembling the motor aura of an epileptic seizure, it was a natural, although not entirely logical, assumption that a cortical lesion was responsible for a focal epilepsy. Upon this hypothesis has been based the treatment of focal epilepsy by cortical excision.

The focal nature of an epilepsy may be suggested by the clinical history, the electroencephalogram and angiogram, but only established by the results of the various diagnostic tests. In the author's 3 cases, the focal nature of the seizures could be established by clinical history and examination as well as electroencephalography. Pneumoencephalographic and angiographic evidence was corroborative in 2 cases.

The type and extent of cortical extirpation necessary to eliminate the epileptic focus vary greatly. In Case 1, subpial resection of the focus was adequate and should produce minimal scarring. In Case 2, in which the epileptogenic zone involved a large area at the occipital pole, a partial occipital lobectomy was necessary. In Case 3, a child with infantile hemiplegia, a hemisperectomy was required to eliminate the abnormal scarred tissue. In planning a resection, it is essential to avoid increasing the disability of the patient.

In post-traumatic conditions, it is surprising how much atrophic scarred tissue may be resected without impairing further the strength of hemiplegic limbs and in some cases with actual improvement of the mental and physical status of the child.

The end results of surgical treatment cannot be assessed accurately until cases have been followed for a period of at least 5 years. Because present electrocorticographic techniques have only been in use slightly longer than that time, a large series of children treated by these methods is not available. Many isolated cases have been reported with good results for relatively long periods of time. Such reports have emphasized the physical and mental improvement which may follow surgical resection of epileptogenic foci.

If one may assume that the results in children would be similar to those obtained in adults, slightly more than 50 percent of the patients should be relieved or almost relieved of attacks and another 25 percent improved. Since surgical extirpations are made only when medical management has failed, these results must be considered satisfactory. They should be bettered as diagnostic and surgical technics improve. But even now, cortical excision of an epileptogenic focus offers considerable promise to a group of patients otherwise considered incurable. (J. Pediat., March '51, A. E. Walker)

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Diffuse Calcification of the Pancreas: Pancreatic calcification is a disease entity with a distinct clinical and pathological picture which must be considered in the differential diagnosis of abdominal pain. When the condition is looked for carefully by means of roentgenography, the diagnosis can be established in a greater number of cases than previously reported. Since there are few laboratory findings other than roentgenographic appearance and changes in the serum amylase level to help localize the disease to the pancreas, it is imperative that accurate history, physical examination and clinical judgment be used to help make a positive diagnosis.

Stones in the pancreas may be either intraductal or parenchymal. The intraductal stones are usually solitary and may be the only evidence of calcification. When diffuse calcification is present, the clinical, roentgenologic and pathological picture is the same as that of so-called disseminated calcification of the pancreas, mixed calcification or multiple stones. Therefore, calcific deposits in the pancreas should be classified either as solitary stones or as diffuse calcification. Diffuse calcification of the pancreas is a clinicopathological entity encompassing multiple calculi spread widely within the pancreas, with fibrosis, inflammation and parenchymal damage. The pancreas may vary in size but is usually atrophic. The exploring surgeon, as a rule, feels a firm gland or sac of gravel and stones. The calculi are found to be

within the ducts or in the immediate vicinity of dilated ducts or pseudocysts. The widened ducts often contain thickened pancreatic secretion. Microscopically, an intense fibrosis replaces the serous and islet tissue. Collections of polymorphonuclear cells, lymphocytes or histiocytes are observed in the interstices. Calculi are found either in larger or finer duct radicles or in spaces without perceptible epithelial lining.

During a period of 2 years the authors collected a series of 21 cases of diffuse pancreatic calcification. Of these patients, 6 died and were studied at autopsy. In another case, a specimen of pancreas was available for study after surgical resection. In the 18 patients under personal observation, serum amylase determinations, dextrose tolerance tests when necessary, stool examinations and x-ray examinations were done. Several had the Schmidt nuclear test, which consists of oral administration of small piece of thymus wrapped in gauze The specimen recovered from the stool is studied histologically for evidence of nuclear autolysis due to pancreatic enzymatic action. In several patients fractional serum amylase levels were determined after the injection of a neostigmine (prostigmin) salt.

The patients can be divided into those who had the disease without any symptoms suggestive of pancreatic involvement and those with symptoms pointing to the pancreas as the seat of trouble. In the first group there were 3 patients, 2 of whom had preexisting diabetes but no symptoms from their pancreatic disease. In these 2 patients the existence of the calcification was discovered by roentgenography in a survey of 100 diabetics. In the second group there were 18 patients who had one or a number of symptoms referable to the pancreas.

In this series there were a total of 16 patients with diabetes, the presence of which was proved by either abnormal dextrose tolerance curves and glycosuria or high fasting blood sugar levels and glycosuria. Of the total, 18 patients were alcoholics, 15 of whom could be classified as heavy drinkers, the others as moderate drinkers. Habitual use of alcohol was denied by 3 patients. Tuberculosis, either active or in the past history, was recorded for 4 patients. Pain was the outstanding symptom in 17 patients. Abnormal stools were noted for only 5 persons, 2 of whom had as their only symptom abnormal and frequent bowel movements. Partial resection of the pancreas was done in 1 patient. Another patient had resection of the pancreas with removal of many stones. In a third splanchnicectomy was performed. Three patients were operated on for pancreatitis. No biopsy specimens were available from any of these. All of the patients had the antemortem diagnosis established by roentgenography, with the exception of 1 in whom calcification was first discovered at postmortem examination.

The symptoms of calcification of the pancreas simulated those of gallbladder colic, peptic ulcer, perforated viscus, appendicitis, severe gastritis

and malingering. The pain was of such intensity and duration that 2 of the patients became addicted to morphine because of their constant request for something to relieve the pain. As one reads through the case histories, nearly all the common causes of an acute abdominal condition are present at one time or another in association with calcification of the pancreas; it is therefore very important to be able to differentiate and arrive at a diagnosis of the true condition. A scout film of the abdomen may reveal pancreatic calcification. This, however, does not mean that the calcification is the cause of the abdominal complaints. Changes in the serum amylase level, on the other hand, may be the only evidence of pancreatic involvement. It is stressed that only after exclusion of all the above mentioned conditions can one be certain that pancreatic calcification is the cause of the abdominal pain. In this way many patients will not be subjected to prolonged and erroneous treatment. With the recent advances in pancreatic surgery, partial or total pancreatectomy or splanchnicectomy may be helpful. Surgical procedures on the pancreas were done in 2 patients, 1 of whom had temporary relief; the other has had relief for 2 years. A 3d patient underwent splanchnicectomy and has had relief of pain for approximately 18 months. (A. M. A. Arch. Int. Med., March '51, B. J. Peters et al.)

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Clinical Factors Affecting Mortality in Strangulated Hernia: A study of 100 consecutive cases of intestinal strangulation obstruction due to hernia revealed that certain tangible and clinically measurable factors can be relied on to serve as an index to prognosis and mortality. The highest mortality rate occurred in men between the ages of 50 and 79. Although there was no correlation between the duration of symptoms and the presence of gangrene, there was a statistically valid correlation between the duration of symptoms and the mortality. The incidence of strangulation in inguinal hernia is higher than in commonly supposed. The mortality rate was significantly increased when the involved segment of intestine was long. The character of the sac fluid can serve as a prognostic sign. When it is cloudy or consists of gross blood, one must suspect irreversible damage to the bowel.

The overall mortality rate for this series was 12 percent. Errors in judgment of viability occurred in 3 cases. The mortality rate for resection and primary anastomosis, including deaths from all causes, was 15.8 percent, a figure considerably lower than those in the literature.

The main features of preoperative and postoperative care which have lowered the mortality rate include the judicious use of suction, parenteral fluid and electrolyte therapy and blood and plasma replacement. Antibiotic therapy has proved to be of inestimable value in reducing toxicity and mortality in this condition. The important contribution of experimental work in this field is stressed.

The "unavoidable" mortality rate at present appears to be in the neighborhood of 6 percent. These figures reflect an improvement in surgical results and indicate that good surgical management can further lower existing mortality rates.

Comment: In cases of incarcerated, nonreducible external hernia with obstructive symptoms, emergency surgical intervention is mandatory as soon as the condition of the patient permits. It is generally not possible to judge which of such incarcerations have become strangulated, and therefore overzealous attempts at reduction by taxis are to be avoided.

When mechanical obstructions due to intra-abdominal disease are being dealt with, the question of strangulation is not always easily answered. The persistence of pain between cramps is an important sign. The roentgenologic picture of a fixed area of distention, a persistently tender, distended abdomen and varying degrees of shock are contributory findings. The inconstancy of these signs, however has led many surgeons to the conclusion that any patient with mechanical obstruction unrelieved by 24 hours of good therapy should be subjected to immediate operation. This policy, in general, was followed in the present series.

As a result of this study, the authors feel that the following measures might serve to lower the heretofore reported high mortality rates: (1) elective surgical repair of all uncomplicated hernias; (2) emergency surgical intervention for all complicated external hernias as soon as the condition of the patient permits; (3) judicious employment of adequate supportive care in all cases; (4) the adequate use of blood and plasma when indicated; (5) attention to the dangers of the too protracted use of suction in the presence of mechanical obstruction with continued abdominal pain; (6) resection and primary anastomosis when resuscitative measures leave the least iota of doubt regarding the viability of a released loop; (7) careful examination of the thinned-out portions of bowel at the level of the constriction ring, (8) avoidance, when possible, of exteriorization procedures. (A. M. A. Arch. Surg., March '51, H. Laufman and J. Daniels)

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Report of Conference on Motion Sickness: A report of a symposium on motion sickness is now being distributed to the Armed Forces and to civilian scientists. The symposium was sponsored by the Naval Research Advisory Panel for Psychophysiology at the request of ONR.

The symposium reviewed the status of research, discussed basic and applied research which should be expedited or initiated and discussed ways and means of utilizing results of research most effectively by the Armed Forces. The program was divided into: (1) Recent and Current Research,

(2) Present Military Importance of the Problems, (3) Present Status of Knowledge of Preventive and Therapeutic technics, (4) Present and Future Research Needs, (5) Dissemination and Utilization of Research Results.

Definite conclusions were derived from the discussion of each of the program groups. Among the conclusions reached were: The concensus of the group was that "(1) The official remedies used by the Canadian, English, and U. S. Forces during the last war are still good, in that they prevent about 60 percent of sea or airsickness under normal conditions." (2) The most promising new development is in the use of certain of the antihistamines such as benadryl, dramamine, histadyl, etc. The most promising remedy appears to be a combination of hyoscine hydrobromide with one of the antihistamines. (3) Basic research is urgently needed and it would have a high and immediate practical value. (4) Applied research problems are many and work in each is essential.

Four types of obstacles to dissemination of scientific knowledge were discussed. These are (a) lack of liaison between field staff and research groups, (b) inadequate continuity of personnel in the medical departments of the military forces; it is all too frequently the case that those responsible for the medical handling of men in the Armed Forces do not have passed on to them information and operational experience of their predecessors, (c) the general prejudice against the use of depressants, (d) incorrect notions about the rate of psychological factors; the conference was well-nigh unanimous in its conviction that psychological factors are not actually significant with military operation, whatever their role may be elsewhere. (Psychophysiology Branch, Human Resources Division, ONR)

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Battle Casualties in Continental Naval Hospitals - 6 Sep 1950 - 7 Feb 1951: Battle casualties returned to the United States have had a marked effect on the patient load in continental naval hospitals. A substantial part of this increase represents active-duty personnel of the Army and Air Forces who are being cared for in naval hospitals under the provisions of the joint hospitalization procedures. Since the start of the influx of battle casualties in September 1950, there has been a steady increase in this part of the patient load, which reached a high of almost 3,000 by the end of October. Since then, the weekly census of battle casualties in continental naval hospitals showed a slight decline or leveling off which reversed itself again in December, reaching a new high of almost 5,000 during January 1951.

Data have been compiled from the census figures reported on the Weekly Report of Patients (Navmed-I) and supplemental reports of battle casualties hospitalized in naval hospitals for the period September 1950 through January 1951. It is significant that by the end of the year there was about 1 Army and Air Force patient to every 5 Navy and Marine Corps patients in continental

naval hospitals, as compared to a ratio of approximately 1 to 2 at the end of October.

The total patient load of Navy and Marine Corps personnel has almost doubled between September and January. The number of Navy and Marine battle casualties has also increased steadily during this entire period with a sharp upswing in December from a total of 800 to over 3,000. Navy and Marine Corps non-battle casualty patients reached 12,000 by 7 February 1951. (Statistics Navy Med., March '51)

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Effect of Length of Service on Retirement and Separation Due to Physical Disability: Length of service is one of the factors used in determining the type of diposition for physically disabled persons who are to be retired or separated from the naval service. However, other factors such as degree of disability, conduct status, and unauthorized leave also affect the determination of the final disposition.

Among the first 1,789 physically retired or separated persons for whom records were processed in this Division during 1950, approximately 25 percent had 8 years or more of service. On the other hand, approximately 6 percent had served less than 6 months. Data presented in this article exclude those recruits with less than 6 months service who waived their rights to appear before Physical Evaluation Boards in order to expedite their discharge from the service. There are included, however, some individuals with less than 6 months service who did not waive their right to appear, either by choice or by the fact that their cases were already being processed when the waiver directive was issued (21 April 1950).

Among those individuals who were permanently retired, the majority (53 percent) had performed at least 8 years of active service. Nearly half of this group had served for 20 years or longer. Of the temporarily retired persons, less than one-fourth had more than 8 years of service. In contrast, only about 5 percent of the individuals who were severed with pay, and none of the discharged personnel, had more than 8 years of service.

There were included among these persons who were either separated or retired, 265 officers, one officer candidate, and 1,523 enlisted personnel. In general, the officers had greater terms of service than the enlisted personnel. This was true of both the Navy and the Marine Corps. Among the officers, 73 percent had had 8 or more years of service in contrast to only 15 percent of the enlisted persons. It should be noted that among officers, the ratio of Navy to Marine Corps was 7 to 1, while for enlisted personnel the ratio was 4 to 1.

The leading causes of disability were mental, psychoneurotic, and personality disorders. Diseases of the bones and organs of movement ranked second, and tuberculosis ranked third among the disabling conditions for all lengths of service. Only for individuals with less than 6 months, or more than 20 years, were mental diseases replaced as a primary cause of disability. Among persons in the former group, diseases of bones and organs of movement ranked first, accounting for more than one-fourth (27 percent) of the separations in that length of service group. However, it was diseases of the circulatory system which disabled 1 out of every 3 retired persons who had contributed 20 or more years of service. (Statistics Navy Med., March '51)

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From the Note Book

1. Lt. J. M. Packard, MC, USN, of the School of Aviation Medicine, Pensacola, Florida, is now making an investigation of 66 Naval aviators remaining from 1,000 aviators whose hearts were examined 10 years ago. These tests will reveal the effect of aging on the ECG of normal young men. This 10 year program promises to yield a wealth of information in the diagnosis of diseases of the heart. (PIO, U. S. Naval School of Aviation, Pensacola, March '51)

2. Homologous Serum Jaundice as an occupational hazard to Medical Personnel is discussed in J. A. M. A., 31 March 1951, M. L. Trumbull and D. J. Greiner.

3. "Adverse Mercurial Reactions in the Form of Acrodynia and Related Conditions in Children" is discussed in A. M. A. American Journal of Diseases of Children, March 1951, J. Warkony and D. M. Hubbard.

4. The "Physiologic Principles in the Management of Dermatitis" is discussed in New England Journal of Medicine, 22 March, 1951, D. M. Pillsbury)

5. "Prevention of Minor Skin Irritation (Miliaria) and Impetigo in the Newborn" is discussed in A. M. A. American Journal of Diseases of Children, March 1951, J. Glaser et al.

6. More than 236,000 persons in Atlanta and vicinity were tested for 7 diseased conditions in a public health accomplishment during 1950. Nearly 50,000 persons were found with diseased or abnormal health conditions. The sevenfold tests and examinations were: serologic test for Syphilis; blood sugar determination; hemoglobin test for anemia; chest x-ray for tuberculosis, heart abnormalities and other pathologic conditions of the chest; a check of height and weight; and examination of the mouth, teeth and gums. (Industrial Health Monthly, F. S. A., April '51)

7. Proposed chemical tests for malignancy are discussed in Journal of the Mount Sinai Hospital, March-April 1951, H. Sobatka.

8. "The Blood Vessel Bank" is discussed in J. A. M. A., 24 March 1951, E. B. C. Keefer et al.

9. "Priscoline in Therapy of Dysmenorrhea" appears in American Journal of Obstetrics and Gynecology, March, 1951, R. B. Greenblatt et al.

10. A 1951 memorandum of the Medical Research Council of Great Britain reports on "The Social Consequences of Pneumoconiosis among coalminers in South Wales".

11. Mercuric Bichloride Poisoning is discussed in the New England Journal of Medicine, 29 March 1951, by Lieutenant P. Troen, MC, AUS et al.

12. The Animal Health Laboratory, South Dakota Agricultural College, has reported an outbreak of rabies among skunks, dogs, cattle, and civet cats in the eastern part of the State. It is also reported that an epizootic of rabies in wild animals of Iowa and Minnesota is moving west and northward. Control measures have been instituted by health and agricultural authorities. (F. S. A. P. H. S., Office of Vital Statistics, March '51)

13. Manometrics of the cerebrospinal Fluid in Cervical Lesions is a discussion of a new diagnostic test, varying from the original Queckenstedt Test by addition of changes in head position during jugular compression. (Brain, Vol. 73, Part 3, '51, L. Kaplan and F. Kennedy)

14. Doctor Dorothy A. Elias is the first woman physician commissioned by the Air Force. She holds the rank of Captain. (J. A. M. A. Military Notes, 31 March '51)

15. The U. S. Naval Hospital and Hospital Corps School, U. S. Naval Training Center, Bainbridge, Maryland, were reestablished on 3 April 1951.(BuMed PIO, April '51)

16. Intersitial Myocarditis in Children is discussed in the New England Journal of Medicine, 8 March 1951, C. G. Tedeschi and T. D. Stevenson, Jr.

17. The Local Use of Cortisone in Opthalmic Diseases appears in A. M. A. Archives of Ophthalmology, March 1951, H. A. Mosher.

18. A discussion of the Post-Partum Bladder appears in Urologic and Cutaneous Review, February 1951, A. L. Wolbarst.

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Correspondence Courses for Dental Corps Personnel: Fourteen correspondence training courses for personnel of the Dental Corps, Regular and Reserve components of the Navy, are currently available. Personnel wishing to enroll in a correspondence training course should submit their requests to the Dental Division, Bureau of Medicine and Surgery (Code 614).

Under the provisions of Public Law 810, 80th Congress, Reserve officers satisfactorily completing the courses are given retirement and promotion points. Reserve enlisted personnel satisfactorily completing the course are given retirement points only. Retirement and promotion points are based on the number of hours determined to be required for the average individual to read the assigned work for each course.

The mission of the correspondence training course division is to plan, produce and administer correspondence training courses for dental personnel of the Regular and Reserve components of the Navy. Correspondence training courses afford dental personnel the means of acquiring detailed knowledge of those professional and technical subjects peculiar to the naval service. Correspondence courses in the following subjects, the number of assignments, and the number of promotion and retirement points are offered at this time:

Course	Assignments	Retirement Points	Promotion Points
Medical Department Administration	8	12	12
Medical Department Orientation	6	12	12
Functions of Officers of the Medical Department	8	12	12
Aviation Medicine Practice	8	32	32
Combat and Field Medicine Practice	8	32	32
Tropical Medicine in the Field	8	32	32
Special Clinical Services - General	8	32	32
Special Clinical Services - Dental	8	32	32
Clinical Laboratory Procedures	8	36	36
Naval Preventive Medicine and Field Sanitation	12	36	36
Physical and Psychobiological Standards and Examinations	12	36	36
Submarine Medicine Practice	8	32	32
Radiological Defense and Atomic Medicine	12	36	36
Insect, Pest, and Rodent Control	8	32	32

(Dental Div., BuMed.)

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Selected Research Reports

Studies in Diffusion Respiration: Diffusion respiration has been studied in anesthetized dogs. It has been shown that maintenance of life in the absence of respiratory movements is possible in the dog under certain conditions. These conditions are fundamentally (a) an open airway, (b) denitrogenation, (c) an external source of oxygen at atmospheric pressure. Anuria accompanies diffusion respiration in the absence of anoxia, hypotension, central nervous system depression, hypercarbia and respiratory acidosis. This anuria is prevented by renal denervation. Diffusion respiration is accompanied by a fall in cardiac output, with a stable blood pressure and normal constant heart rate.

Applications of diffusion respiration to aviation medicine seem to be widespread. One practical application of diffusion respiration to resuscitation is discussed in the report. Others would include (a) mechanisms of oxygen requirements and utilization at sea level and at altitude, using diffusion respiration, (b) studying carbon dioxide metabolism using diffusion respiration so that oxygen consumption from respiratory movements may be controlled, (c) studying the therapeutic use of oxygen during rapid decompression, (d) control of respiratory rate to combat hyperventilation, "bends", and to lower oxygen consumption at altitude, (e) studying relationship of anuria produced by diffusion respiration to the anuria of deep anesthesia and change in renal function associated with congestive heart failure. (Project NM 056. 03.01, NMRI, NNMC, Bethesda, Md.)

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The Effect of Alcohol Upon Link Trainer Performance: Link Trainer performance, after ingestion of whiskey, was tested in 2 groups of subjects. Of the 4 subjects in the first group, 1 showed a significant impairment of performance with a dosage of 60-ml. of 86 proof straight Bourbon whiskey. In the second group, 3 of 6 subjects showed impairment of performance with 120 ml. of 86 proof straight Bourbon whiskey. It is concluded that although the Link Trainer can be used to measure the effect of drugs upon the performance of a skilled task under certain conditions, the Link Trainer is too insensitive, and the training of subjects for its operation too time consuming, for its employment as a satisfactory laboratory instrument. (Project NM 001 056.06. 01, NMRI, NNMC, Bethesda, Md.)

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BUMED CIRCULAR LETTER 51-52 28 March 1951

From: Chief, Bureau of Medicine and Surgery
To: Commanding Officers, All Naval Hospitals (Continental)

Subj: Medical and service records of Naval and Marine Corps personnel ordered to appear before Physical Evaluation Boards, request for

Ref: (a) BuMed Cir Ltr No. 50-134
(b) SecNav Regulations and Instructions for Administration of Title IV of Career Compensation Act of 1949, approved 16 November 1949
(c) BuMed Cir Ltr No. 50-22
(d) BuMed Cir Ltr No. 50-47

1. Reference (a) is superseded and canceled.

2. It is essential that all practicable measures be taken to expedite action in the cases of Naval and Marine Corps personnel being processed under the provisions of reference (b).

3. To eliminate possible delays in the appearance of such members before a physical evaluation board, addressees shall initiate a request for medical and service records as soon as it becomes apparent that a member will probably be referred to a clinical board with a view to subsequent appearance before a physical evaluation board. As a general rule, such requests shall be made by speedletter; however, dispatches may be used when indicated in the interest of saving time.

4. The requests should contain the member's name in full, his file or serial number, and his rank or rate, and should designate the physical evaluation board before which the member will be ordered. Requests shall be addressed to the Bureau of Medicine and Surgery, Code 334, Yards and Docks Annex, Department of the Navy, Washington 25, D. C. The following shall be included as information addressees:

a. The physical evaluation board.

b. Headquarters, U. S. Marine Corps (MARCORPS Code DM), in the case of Marine Corps personnel.

c. Bureau of Naval Personnel (Code E-340 in case of naval enlisted members, or Code E-24 in case of naval officers).

5. The endorsed report of the clinical board, the orders for the member concerned to appear before a physical evaluation board, and a complete copy of the member's clinical record shall be forwarded to the cognizant physical evaluation board as quickly as possible after the clinical board hearing. The copy of the clinical record should include all clinical material in the clinical record but need not include copies of purely administrative material or reports which may have been filed with or as a part of the clinical record.

6. If, for any reason a member is not ordered to appear before a physical evaluation board after medical and service records have been requested, addressees shall so advise the physical evaluation board and shall request that the records be returned to the Department by the physical evaluation board.

7. The foregoing does not modify current instructions in references (b), (c) and (d) concerning distribution of copies of orders for appearance before physical evaluation boards.

H. L. Pugh

The above letter will not be printed in the Navy Department Bulletin.

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BUMED CIRCULAR LETTER 51-53 29 March 1951

From: Chief, Bureau of Medicine and Surgery
To: All Ships and Stations

Subj: Hospital Corpsmen; utilization and training of

1. It is necessary that all Medical Department officers responsible for assignment of hospital corpsmen review their individual qualifications and utilize their technical talents to the fullest possible extent in order to avoid improper utilization of manpower. It is recognized that most naval reserve hospital corpsmen recalled to active duty involuntarily have made great personal sacrifices, and it is therefore necessary that their services be utilized to the best interest of the Medical Department and of the individual.

2. Reports received in the Bureau of Medicine and Surgery indicate that large numbers of regular and naval reserve hospital corpsmen presently reporting for duty possess degrees in pharmacy, chemistry, bacteriology, psychology, and other sciences allied to medicine. Also, many hospital corpsmen are registered and licensed in technical fields such as x-ray, physio-therapy, laboratory, embalming, and occupational therapy. Others possess degrees in subjects not directly related to the duties of the Hospital Corps, such as teaching, physical education, and speech; however, full use can be made of such

personnel in the Hospital Corps.

3. It is directed that review of special qualifications of reserve Hospital Corps personnel on active duty be of a continuing nature and that requests for certification in technical specialties be forwarded to the Bureau of Medicine and Surgery (Code 344 and Code 6133 in the case of dental personnel), together with a photostatic copy of the individual's certificate of graduation and current license, if such license is required for state registration purposes. Requests for certification in the technical specialties should be confined to the current list of navy job code numbers. Where personnel have special qualifications not covered by a navy job code number, a letter report with full details should be forwarded to the Bureau of Medicine and Surgery, Code 344, or Code 6133 in the case of dental personnel, in order that a record of special qualifications may be maintained and such personnel assigned where their services can best be utilized. This information should also be reported on line 10, NavMed HC-3.

4. Due to the fact that most naval reserve hospital corpsmen have not been employed in duties related to the naval Medical Department for approximately five years, it is considered to be essential that all reserve hospital corpsmen be given strictly supervised refresher training upon reporting at a permanent duty station. Continuous training is necessary to bring them up to the high standard expected of all hospital corpsmen, and to qualify them to assume the responsibility associated with their petty officer ratings. The military aspect of training should not be overlooked in order to provide a smart Medical Department, whether ashore or afloat. Such training will ensure that hospital corpsmen of the highest caliber are made available to the fleet commanders for assignment to ships and overseas bases. Inasmuch as it is not feasible to provide technical training aboard ship it is the responsibility of the shore establishment to train hospital corpsmen so that they may assume their place in the shipboard organization with a good working knowledge of the requirements of their particular rating and technical specialty.

5. All reserve hospital corpsmen must be fully instructed in the present day concept of examinations for advancement in rating. The present promotion system is a drastic departure from the one used in the Navy during World War II. Reserve hospital corpsmen are expected to meet all the requirements established for Regular Navy hospital corpsmen. Information regarding examination for advancement in rating is available in all commands.

6. It is realized that there may develop a situation where all technicians on board in a particular specialty cannot be assigned to duty in that field. When this occurs, the commandant of the naval district should be notified of the excess so that he may reassign them within the district where their specialties

can be fully utilized. The same situation may develop aboard ship, in which case the type command and/or the fleet personnel representative should be notified.

7. Attention of all Medical Department reporting officers is called to the importance of the "Chief and First Class Petty Officer Evaluation Sheet", submitted periodically as required by the Bureau of Naval Personnel. Careful and complete processing of these forms is essential since all qualified senior petty officers, regular and reserve, are eligible for selection to warrant and commissioned officer status.

8. With the Navy building up, and the resulting increase in the strength of the Hospital Corps, there will be many vacancies for advancement in the petty officer field below chief, and it is recommended that completion of training courses for advancement in rating be given high priority in all medical and dental activities to insure fully qualified personnel as petty officers. Some hospital corpsmen need additional guidance along this line and all officers of the medical department are expected to provide such guidance as may be required.

9. It was necessary to discontinue the Class "C" school of Medical Clerical and Medical Property and Accounting. In order to train Hospital Corps personnel in this field, it is the responsibility of each medical department activity to institute on-the-job instruction for the required number of men to meet their needs.

10. The above information should be given the widest possible circulation to enlisted personnel of the Hospital Corps and to all officers of the medical department.

H. L. Pugh

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BUMED CIRCULAR LETTER 51-54 4 April 1951

From: Chief, Bureau of Medicine and Surgery
To: All Ships and Stations

Subj: Medical Department Money Allotments for Ships, Fiscal Year 1952

Ref: (a) BuMed Cir Ltr 50-46
(b) BuMed Cir Ltr 45-178
(c) BuMed Cir Ltr 48-26
(d) BuMed Cir Ltr 49-103
(e) BuMed Cir Ltr 50-101

(f) BuSandA Manual, Vol III, Para 36001
(g) BuSandA Manual, Vol III, Appendix A
(h) BuSandA Manual, Vol VII, 72200

1. Reference (a) is hereby cancelled. This letter which appears in full in 15 April 1951, Navy Department Bulletin, contains information and instructions covering money allotments for ships.

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Issues of the News Letter prior to 7 November 1947 (Vol. 10, No. 10) remain in the Security Category of "Restricted" and have not yet been downgraded.

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