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Study Concerning Tetanus Prophylaxis with Procaine Penicillin G: *Clostridium tetani* is sensitive to penicillin *in vitro*. The development of certain preparations of procaine penicillin has resulted in prolonged therapeutic blood levels following a single injection; claims have been made for inhibitory levels which are maintained for as long as 4 or 5 days following injection of 300,000 or 600,000 units. The possibility of penicillin action against spores of tetanus in tissue during the incubation period of the disease posed the question of the probability of its use as a prophylactic agent. Its value in this instance would be especially desirable in minor injuries in which there is hesitancy in the use of antitoxin because of the dangers from foreign protein sensitization. Its use to prevent toxin formation in tissue would seem more rational than use of antitoxin to neutralize toxin after it is formed.

Both the reduction in mortality and prolongation of life obtained with mice indicate the prophylactic effect of the procain penicillin compound. Administration of penicillin within 24 hours after the injection of spores of *Cl. tetani* serves to reduce the mortality as compared with the untreated controls. The lowest mortalities resulted when 150 and 300 units of penicillin were given in the infected leg immediately, and when 150 units were given after 3 and 6 hours' delay. These series having low mortalities were also observed to have the greatest time lapse before symptoms and deaths. When compared with the rapid development and fatal termination of the disease as observed in the controls, the noticeably longer time required before symptoms and deaths occur in the low mortality series receiving penicillin may indicate that the number of organisms capable of producing toxin is considerably reduced and that only when there are organisms which survive in remaining necrotic areas, and multiply and produce a lethal dose of toxin, does a fatality result. The similarity between the mortality rates and time lapse before death in the series in which an immediate injection of penicillin was given and in the two series in which administration of penicillin was delayed for 3 hours in one and for 6 hours in the other, may be explained by the fact that it is generally acknowledged that penicillin is most effective against sensitive micro-organisms during the period of active growth and multiplication; therefore, the efficacy of penicillin administered after 3- or 6-hour lapses may indicate that those times allow germination of spores and the vegetative cells are then inhibited by the concentration of penicillin available. Because procaine penicillin G in oil and aluminum monostearate is reported to maintain concentrations at effective therapeutic levels for 96 hours, the longer time lapse before symptoms appear may be accounted for if it is only after this level has dropped that a lethal toxin is produced by surviving organisms.

When 150 units of penicillin were administered with no delay but in the leg opposite the necrosis, 80 percent of the mice died. When the penicillin was injected into the necrotic leg after a 24-hour delay, 52.6 percent of the mice died. The indication in the former series is that (1) a sufficient amount of penicillin does not reach the necrotic area to inhibit growth and production

of toxin by Cl. tetani, or (2) that organisms produce a lethal dose of toxin before being inhibited, with this second possibility being especially applicable to the latter series. The rate at which penicillin is released and the rate and extent of penetration into necrotic areas are probably the significant factors.

It is concluded that procaine penicillin G in sesame oil and 2 percent aluminum monostearate is of significant value prophylactically in lowering the mortality in mice experimentally infected with a lethal dose of detoxified spores of Cl. tetani. In addition to decreasing the mortality, it retards the development of symptoms and resulting deaths. Injected into the necrotic areas, it is more effective than the same unitage injected at an uninfected site. Whether this is caused by insufficient penetration of the drug due to the presence of necrotic tissue or to interference by the calcium chloride which was used to produce the area of necrosis has not been determined. (Proc. Soc. Exper. Biol. and Med., April '49, M. Novak et al.)

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Recent Advances in the Domain of the Antihistamine Substances - The Phenothiazine Derivatives: In 1946, Halpern and Ducrot showed that certain phenothiazine derivatives possessed antihistamine properties which were in many respects more powerful than those of any previously described substance. A series of experiments was made to study the activity of this new group of substances, particularly N-dimethylamino-2-propyl-I-phenothiazine, known as 3277 R.P. or phenergan.

Phenergan possesses the same well-established properties as the other antihistamines, but quantitatively its action is much more powerful in many respects. The antagonism of phenergan to histamine is well shown in experiments on the smooth muscle of the bronchi, intestine and uterus and by its inhibition of (1) the Triple Response of Lewis and (2) the histamine effect on the blood pressure. The degree of protection against histamine conferred by phenergan is much greater than that given by any other antihistamine substance. A dose of phenergan of 20 mgm. per kilogram protects the guinea pig against 1,500 and the rabbit against 450 lethal doses of histamine. The antianaphylactic effect is equally striking. Phenergan counteracts anaphylactic shock and prevents the Prausnitz-Kustner reaction. This action is much greater than that of the other antihistamine substances. The duration of action of phenergan is much prolonged; for example, the duration of action against experimental asthma in the guinea pig is 3 times as long as the action of antergan or neo-antergan under the same conditions. Studies made in man by following the intradermal histamine response after oral administration of various antihistamines have shown that the duration of action of phenergan is quite remarkable in the slowness with which it disappears. Phenergan, like the other antihistamine substances, cannot, however, counteract the effect of histamine on the secretions. This probably explains the constant appearance of gastric ulceration in animals given large doses of histamine after

the administration of phenergan. Last and Loew had already demonstrated by Menkin's method that benadryl and neo-antergan counteract the local increase of capillary permeability induced by histamine. By noting the penetration of fluorescein into the anterior chamber of the eye and by the diffusion of dyes into peritoneal exudates it has been shown that phenergan powerfully opposes the increase of capillary permeability produced by histamine and various other substances. Phenergan prevents the appearance of the acute pulmonary edema, which is induced in unprotected animals by intravenous epinephrine or by certain poison gases, such as chloropicrin or phosgene and prevents the induction of experimental orthostatic albuminuria in rabbits. It has shown in various functions a non-negligible atropine-like activity.

Phenergan was administered orally in the form of 25 mgm. tablets. The usual dosage varied between 25 and 100 mgm. daily, but in certain cases, up to 200 mgm. were given. Blood counts were carried out before and every two weeks during treatment. Allergic clinical and skin tests were carried out before and during treatment whenever possible.

Seventeen patients with serum sickness were treated. In each case the skin manifestations, such as pruritus and urticaria, disappeared within from 30 minutes to 3 hours after administration of the drug. Joint pains were present in 4 patients and disappeared under treatment in only two of the cases. The fever was not influenced appreciably.

One hundred and twenty-three patients with urticaria of varying origin have been treated. In only 12 of these patients could an allergic basis be demonstrated by clinical and cutaneous tests. One hundred and eight patients (87.8 percent) showed immediate improvement. The pruritus was the first symptom to disappear; then the skin reaction tended to diminish and had often entirely disappeared after a few hours. Of the remaining 15 patients, 6 showed signs of intolerance and were unable to continue treatment, and 9 patients were little, or not at all, benefited by the drug. In all the cases of definitely allergic origin improvement occurred under treatment, but among the successes were several cases in which there was no reason to suspect any such cause. Failure previously to respond to neo-antergan had occurred in about 60 percent of the successful cases. Out of 19 patients with angioneurotic edema, only 3 were not improved by treatment (84 percent of favorable results). Two of the successful cases were in patients in whom edema of the lips had persisted in-between the acute exacerbations. Apart from these cases of true angioneurotic edema, there were two patients who suffered a local edema after the slightest pressure on any part of the body. These patients were uninfluenced by phenergan.

Out of 18 patients with pruritis from varying causes, 6 were not influenced by phenergan, but 12 were vastly improved, the pruritus ceasing even when the visible lesions persisted unchanged. Included in these 12 are

several patients with pruritus due to scabies. None of the 17 patients with chronic eczema was completely cured by treatment. In a few cases slight relief was obtained, especially from the subjective symptoms such as pruritus. Out of 22 patients with acute eczema and contact dermatitis, 3 showed rapid improvement which ended in complete cure. The rest of the patients improved only after a much longer period and it is difficult to assess the influence of phenergan on these results. Three cases of arsenical and one case of gold erythrodermia showed no real improvement on treatment with phenergan. Administration of the drug was followed by immediate cessation of fresh eruptions in one patient with allergic purpura, in whom new crops of petechiae appeared daily for 3 weeks before treatment.

One hundred and forty-two patients with hay fever were treated between the spring of 1947 and that of 1948; 98 patients (69 percent) showed complete disappearance of all signs and symptoms; 36 patients were only partially relieved; the sneezing ceased but the nasal congestion remained more or less the same; 8 patients were completely unchanged by treatment but most of these were unable to tolerate full doses of the drug. It should be noted that, in the majority of patients, 25 mgm. of the drug daily suppressed sneezing, but a dose of from 4 to 6 times as great is usually necessary to give complete relief from all the symptoms. For a few patients, however, from 6 to 12 mgm. daily sufficed to suppress all symptoms. At the 1948 meeting of the French Society of Allergy, Pasteur Vallery-Radot, Blamoutier and B. N. Halpern communicated statistics of 200 cases of hay fever treated with phenergan with a dosage of from 25 mgm. to 50 mgm. daily; they reported excellent results in 86 percent with relief of all symptoms; in only 14 percent the improvement was incomplete.

Seventy-two patients with asthma were treated but an allergic basis could only be demonstrated in 9 of them. In all these 9 patients, considerable relief or even complete disappearance of the asthma was obtained. In 21 other patients without any appreciable allergic origin, there was a certain degree of improvement. In the remaining 42 patients, the results were completely negative. Nine patients with spasmodic cough were entirely uninfluenced by treatment. Out of 20 patients with migraine, 6 were improved by phenergan. It was impossible to determine an allergic basis for any of these 6 cases. Phenergan appeared to have no effect on chronic or subacute rheumatism or on acute glomerulo-nephritis. It did not seem to influence the allergic manifestations of tuberculosis or the intradermal tuberculin test. This latter observation is in contrast to its action on allergic skin tests for other diseases. In such cases, whenever skin tests were found to be positive before treatment, immediately after adequate dosage with phenergan they became temporarily negative.

The drug was usually well tolerated. In particular, it did not provoke the digestive upsets which often occur with the other antihistamine substances.

The blood picture was affected in only two cases, a slight neutropenia being observed; administration of the drug was immediately stopped. The only important side-effects were of nervous origin; about 25 percent of the patients showed a certain degree of drowsiness accompanied by vertigo and instability when standing upright and by sensations of drunkenness. Occasionally there was also a slight decrease in intellectual power. In rare cases, insomnia occurred. These troubles, which are impossible to predict and which may occur even with feeble doses, constitute the most serious disadvantage to the use of phenergan. Usually they seem to be partially neutralized by the simultaneous administration of benzedrine. Moreover, the nervous troubles almost always disappear within a few days, even if treatment is continued with the same dosage. The drowsiness may be neutralized if phenergan is given at night. This effect wears off before morning but the true action of the drug continues throughout the following day.

The experimental work described above suggests that phenergan acts on capillary permeability. In this connection, it is very striking that most of the pathological conditions controlled by phenergan are characterized by extravasation of fluid through the capillary wall, for example, experimental acute pulmonary edema and orthostatic albuminuria, urticaria and even, perhaps, migraine. (Bull. N. Y. Acad. Med., May '49, B. N. Halpern)

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Evaluation of the Hyperemia Test for Pregnancy as a Routine Clinical Laboratory Procedure: In this study the rat test as modified for routine diagnostic purposes was performed simultaneously with the routine Friedman tests on 1000 consecutive specimens of urine. The specimens were obtained in cases of suspected normal pregnancy, various types of abortions, ectopic pregnancy, testicular tumors, chorio-epithelioma and hydatiform mole before and after treatment, in short, all situations wherein the presence of chorionic gonadotropin serves as a diagnostic or prognostic aid. From 3 to 5, but preferably 5, female rats ranging in age from 21 to 26 days and in weight from 35 to 50 Gm. were given by subcutaneous injection 2 cc. of the urine from the same specimens on which the Friedman tests were done. Four hours after injection the rats were killed by ether asphyxiation, the ovaries removed by wide dissection, laid on wet blotting paper, and examined under an ordinary desk lamp. Ovaries from rats which have not received injections are light yellow. Ovaries of rats into which chorionic gonadotropin has been injected range in color from pink to deep red, depending on dosage. An unequivocal positive result was concluded when about half of the ovaries were from pink to deep red, a negative result when no ovaries were hyperemic. After a brief period of observation, all technicians can perform and read the results of this procedure satisfactorily.

Friedman tests could not be performed on 30 of the specimens because of toxicity to the rabbits whereas the rat test was completed in all cases.

There remained 970 cases in which both rabbit and rat tests were completed. Of these, 924 were in agreement with one another, and 46 did not agree. In 475 of the 924 cases in which there was agreement Friedman tests gave positive results and the same specimens of urine gave positive results in the rat tests. There were 449 negative findings in Friedman tests and the same specimens gave negative results on rat tests. Because the Friedman test has been estimated to be about 98 percent accurate, it would follow that the rat test has in general a similar degree of accuracy.

A further appraisal of the relative degree of accuracy of the two tests can be made in the 30 cases in which the Friedman test could not be done because of toxicity, and in the 46 cases in which results disagreed. Of the 30 tests done only on rats, 18 gave positive and 12 gave negative results. In the positive category, 12 were on urine of patients who had apparently normal pregnancies, 2 on urine of patients who had chorio-epitheliomas, 2 on urine obtained during spontaneous abortion, one was on urine of a patient who had an ectopic pregnancy, and for one patient the diagnosis was not available. Thus the rat test was correct in each case in which a definite diagnosis was possible. In the negative category, 8 tests were on urine of patients who were not pregnant, 2 were from patients who were aborting, one test was on a patient from whom a hydatid mole was removed, and one was made in a case in which a diagnosis was not available. Again the rat test was correct in each instance in which a clinical diagnosis was made.

Of the 46 cases in which results of the Friedman and rat tests disagreed, there were 16 instances of abortion (tubal, spontaneous, inevitable, threatened) in which the results of the Friedman test were positive and the results of the rat test negative. Both results are probably correct as will be explained later. There were 9 cases in which pregnancy was excluded; in these, the Friedman test gave a positive result and the rat test gave the correct negative result. There were 8 cases of pregnancy in which the Friedman test gave negative results and the rat test gave the correct positive result. In 7 cases of very early pregnancy, the Friedman test gave positive results, the rat test negative results. In one case of hydatiform mole after operation, the result of the Friedman test was positive and of the rat test negative. In the remaining 5 cases in which lack of agreement occurred, no clinical diagnosis was available.

Proper appraisal of the comparative validity of the two tests for pregnancy and of the interpretation of results obtained from them involves understanding of two basic considerations. The first consideration is the comparative sensitivity of the two reactions. Any test for pregnancy dependent on the biologic properties of chorionic gonadotropin is not an all or none test in that it is capable of determining the presence or absence of pregnancy. Rather, such tests are of the all or none type only for a given concentration of hormone. For the rabbit, the critical dose of chorionic gonadotropin which will induce positive results was determined by direct bio-assay to be 5 international units (2.5 I.U. per kg.) or more. Assuming ideal conditions (all

rabbits being equally responsive, and so forth) and for the moment disregarding fluctuations in concentration of urine, results of the rabbit test will be positive whenever 500 I.U. or more of hormone are present in the 24-hour specimen of urine and negative when less than this amount is present. This calculation is based on an assumed daily output of 1500 cc. of urine, the critical ovulatory dose of hormone (5 I.U.) and the use of 15 cc. of urine for injection ($\frac{1500}{15}$ X 5 = 500 I.U.). A similar calculation for the rat test in the strain of animals used shows that unequivocal positive results will be obtained when the daily excretion is about 1,000 I.U. or more, and negative when it is less. Thus, under such ideal conditions the rabbit test is at least twice as sensitive as the rat test, and any urine tested will be theoretically positive by the Friedman test and negative by the rat test if the daily excretion of hormone were more than 500 I.U. and less than 1,000 I.U.

The second consideration involves the fluctuating character of the excretion of hormone during pregnancy. Soon after the formation of the trophoblast, chorionic gonadotropin appears in the urine in increasing amounts so that by the third month, several hundred thousand international units are being excreted daily. During the last two trimesters, the daily output is of the order of from 5,000 to 40,000 I.U. daily until parturition when in the matter of a few days the hormone disappears completely from the urine. Consequently, in very early pregnancy there is a brief period of time during which the excretion of hormone is increasing from zero to levels at which it can be detected. Tests performed during this critical period when the level is between 500 and 1,000 I.U. will give positive results if the Friedman test is used and negative if the rat test is used. As soon as higher levels are attained, results of both tests will become positive. Following abortion or fetal death when the level of excretion of hormone is falling, results of the rat test will become negative before results of the Friedman test, and when the amount excreted has fallen to less than 500 I.U. daily, both tests will give negative results. Similar considerations apply to other situations (testicular tumors, chorio-epithelioma, hydatiform mole before and after operation, or during the development of metastasis) when the amount of hormone may be rising or falling.

On the basis of these considerations, interpretation of the results in the 46 instances in which the two tests disagreed becomes clear. In the 16 cases of abortion, both results are correct but the negative one from the rat test has greater meaning in that it has predicted the eventual clinical outcome. The critical level of chorionic gonadotropin in the urine that is usually incompatible with continuing pregnancy remains to be determined, but it appears to be less than 1,000 I.U. per day during the period when most abortions occur. In the 9 cases in which pregnancy was excluded, the rat test was correct in each instance. The Friedman test gave false positive results, a feature that is well known, and is due either to poor supply and handling of animals or to excessive amounts of pituitary gonadotropin. False positive results have not been known to occur in this present series of rat tests, probably by virtue of

its lesser sensitivity, which exclude reactions to pituitary gonadotropin, and by virtue of the fact that exogenous stimuli which induce false positive results in the rabbit do not occur in the rat. The rat test responded accurately in 8 cases of pregnancy in which the Friedman test gave 8 false negative results. False negative findings in the Friedman test are due among other things to refractoriness or immaturity, a situation which is avoided in the rat test by the use of 5 animals instead of one, and by a greater uniformity in test material due to the use of a highly inbred strain of animals. In the 7 cases of early pregnancy, the Friedman test proved superior in that it gave the correct result. This is due to its greater sensitivity, and represents the only situation in which it was superior to the rat test. In the remaining cases of disagreement, and in the 30 cases in which only the rat test was done, the rat test can be considered correct in each instance in that it responded correctly to situations in which the excretion of hormone was either more or less than 1,000 I.U. daily. The disadvantage of the rat test in early pregnancy can easily be offset by repetition of the test in a few days, or else by the injection of twice as much urine. With regard to the remaining attributes, the rat test is simpler to perform, yields results in 4 hours instead of two days, and is much more convenient for use in the Mayo Clinic laboratory in that it involves less cost and less space and utilizes an endogenous source of a highly uniform strain of animals. (Proc. Staff Meet., Mayo Clin., 11 May '49, A. Albert)

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Radiation Protection: In 1928 the first set of radiation protection rules or recommendations was adopted on an international basis by the Second Congress of Radiology in Stockholm. In these rules agreement was reached on some of the broader factors involved, but because ready agreement on details was not attainable, these were left for future amplification by individual countries. These 1928 rules have required little alteration other than to cope with the rapidly extending horizon of available x-ray energies.

In 1929, an effort to amplify and extend the recommendations of the International Commission, suitable to the radiological needs of this country, was undertaken. Upon the recommendation of the International Commission on X-ray and Radium Protection, the Advisory Committee on X-ray and Radium Protection was formed by the Bureau of Standards and composed of representatives of the Radiological Society of North America, the American Roentgen Ray Society, the National Research Council, the American Medical Association, and x-ray and radium manufacturers. This group formulated the well known Handbooks on X-ray Protection in 1930 and 1935 and on Radium Protection in 1938. These served as the major bases for later codes on industrial x-ray and radium protection and for the operation of the Manhattan District in its early days.

Need for revision of Handbook 20 on X-ray Protection was felt some years ago, but the war interfered with the work. When this revision was finally undertaken in 1947, it was realized that the problem of radiation protection had been so broadly expanded by the advent of atomic energy as to necessitate an enlargement and reorganization of the original committee. The sponsorship was enlarged to include representation of the Atomic Energy Commission and United States Public Health Service, and the name was changed to National Committee on Radiation Protection. This Committee now embodies eight subcommittees to deal with the following subjects: permissible external exposure; permissible internal exposure; x-rays up to two million volts; gamma rays and electrons above two million volts; protons, neutrons and heavy particles; handling of radioactive isotopes; radiation instrumentation and measurement; and waste disposal and decontamination. The Committee has included in its membership outstanding authorities throughout the country on all phases of radiation protection.

The first of the new reports prepared by this Committee is Handbook 41 on Medical X-ray Protection Up to Two Million Volts (now obtainable from U. S. Government Printing Office, Washington, D. C., for $0.15 per copy). This is a complete revision of the earlier handbook. One of the major changes consists in a more detailed presentation of protective barrier requirements. In the international recommendations and previous handbooks, a single table of lead thicknesses was given. These applied only to direct beam shielding at one meter from the tube under average operating conditions. Literal use of these figures often resulted in over-protection, particularly for scattered radiation, and excessive installation costs. The new recommendations take into consideration such factors as distance, tube output, scattered or direct radiation, different kinds of protective materials, etc. It should now be possible to design shielded installations affording adequate protection with substantial savings in cost.

Other handbooks on The Safe Handling of Radioactive Isotopes, Permissible Exposure of the Body to External Radiations, and Radiological Instrumentation are now nearing completion and announcements of their release will be made later. (Radiology, May '49, Editorial, L. S. Taylor)

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Decamethonium Iodide as a Muscle Relaxant in Anesthesia: Bistrimethylammonium decane diiodide (decamethonium iodide; C10) is stated to have curarizing properties in animals and man, with little effect on the muscles of respiration. An investigation has been carried out to ascertain the clinical application of this drug as a muscle relaxant in surgical anesthesia. This preliminary report is based on a study in 85 cases.

The subjects, whose ages ranged from 13 to 79 years, were unselected, and the surgical procedures varied from simple orthopedic manipulations to major thoracic surgery. All patients, after premedication with omnopon and scopolamine, or morphine and atropine, were induced with thiopentone. For maintenance of anesthesia various combinations of the following agents were used: thiopentone, nitrous oxide, cyclopropane, ether, and trichlorethylene. The majority of the patients were anesthetized with intermittent thiopentone-nitrous oxide-oxygen; whenever necessary, respiration was assisted by rhythmic pulmonary inflation. The dosage of decamethonium iodide varied from 3 to 15 mg. which was always given intravenously. Two methods of dosage were employed; in the first the initial amount was from 3 to 5 mg., and subsequently from 1 to 3 mg. was given as required. In the second the initial dose was calculated on the basis of 1 mg. per 15 kg. (33 lb.) body-weight, and subsequent doses were approximately from one half to one third of this amount.

The onset of curarization began after from 2 to 3 minutes and reached a peak within from 4 to 8 minutes. The duration of muscular relaxation was found to be fairly constant at from 15 to 25 minutes. This relaxation as judged by the operators was satisfactory. It was observed, however, that relaxation comparable to that of d-tubocurarine could only be obtained with doses which paralyzed the muscles of respiration, but very adequate operating conditions were present during the phase of respiratory recovery. In some cases this state of muscular relaxation with respiratory paralysis was obtained with the initial dose of 3 mg. Complete curarization was produced by a dose little above the subthreshold one, and occurred suddenly. The return of muscular tone and respiration was equally abrupt, the tidal air returning to normal within 3 minutes of the onset of recovery. Repeated doses of the drug produced no cumulative effect even when given to maintain relaxation for as long as 3 hours. Decamethonium iodide appeared to be equally effective with all the anesthetic combinations employed, including ether, although this has been stated to have an inhibitory effect on muscular relaxation in animals.

No significant side-effects were noted, except a transient rise of respiratory rate on recovery from respiratory paralysis. There was no significant change in the cardiovascular system, as evidenced by recordings of blood pressure, pulse rate, and the electrocardiogram. No circulatory changes in the skin were observed, neither was there any evidence of increased bleeding. Prothrombin times determined before, during, and after operation showed no significant change. Bronchial or laryngeal spasm was not observed in any case after the administration of decamethonium iodide. In 21 cases a dose of from 2 to 3 mg. was used with thiopentone to facilitate oral intubation. In 4 cases a previously existing bronchial spasm was temporarily abolished by the drug. In 12 cases an intradermal injection of 0.1 ml. of a 0.1-percent solution of decamethonium iodide did not produce the characteristic histamine weal and flare, which appeared in every one of 100 persons similarly tested with a solution of d-tubocurarine of the same, or weaker, dilution.

Postoperative restlessness was observed in 4 cases, in 3 of which it was severe enough to necessitate restraint. Two cases of urinary retention were noted, but this condition disappeared within 24 hours. There were no cases of thrombosis or ileus, and no increase in the pulmonary complication rate.

Decamethonium iodide produces adequate muscular relaxation for major surgery, but only in doses which produce respiratory paralysis. The fact that respiratory paralysis is a constant accompaniment of good muscular relaxation may appear to be a disadvantage, but as the action of decamethonium iodide is transient (from 15 to 25 minutes) there is no real danger of postoperative respiratory depression. Again, because of its lack of cumulative effects, it has a wide margin of safety, when used in the amounts suggested. In none of the 85 cases was there sufficient respiratory depression at the end of the operation to cause alarm. In fact, the duration of muscular relaxation from any one dose was surprisingly constant. Because of this transient action and lack of cumulative effect, decamethonium iodide may prove most useful for some operative procedures. The absence of immediate side-effects with it, particularly those affecting the bronchial tree, is noteworthy.

The clinical impression was gained that the drug had a slight vagal inhibitory effect, although no actual observations were recorded on this point. During upper abdominal surgery, the tendency to respiratory grunting seemed to be less than with d-tubocurarine. Again in pulmonary surgery, traction on the bronchus did not provoke spasm. This clinical impression of vagal inhibition is borne out by the failure to observe bronchial spasm in any of the 85 cases. In fact, in 4 cases, pre-existing bronchial spasm was temporarily alleviated.

Bistrimethylammonium pentane diiodide (pentamethonium iodide; C5) is claimed by Paton and Zaimis to be an antidote to decamethonium iodide. They also draw attention to its autonomic blocking effect, which would appear to be a definite contraindication to its use in major surgery, with the attendant liability to shock. However, to evaluate the clinical effect in restoring respiration to normal, it was deliberately used in 8 cases, in a dose of from 30 to 50 mg. In 6 of these the results were not spectacular, and the time taken for respiration to return to normal was not markedly lowered. In 3 cases the autonomic blocking effect of pentamethonium iodide produced an alarming degree of circulatory collapse. These were cases in which the surgical maneuvers (two laparotomies and one thoracotomy) were in themselves shock-producing. (Lancet, 14 May '49, A. J. H. Hewer et al.)

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Comparison of Decamethonium Iodide with d-Tubocurarine in Controlling Electrically Induced Convulsions: In a previous study by the authors it was shown that curarization of the patient avoids the traumatic complications of

electroconvulsion therapy (E.C.T.), and enables this form of treatment to be administered to patients in whom unmodified convulsion therapy would be contraindicated because of physical abnormalities. The treatment has not been very widely accepted, and has been criticized as unnecessary and dangerous. The authors have continued, however, as a routine, to modify E.C.T. with d-tubocurarine and thiopentone, and have given over 1500 treatments, with no residual complications of any kind. Of the 200 patients treated, 5 developed bronchospasm while under treatment, but this was relieved by giving a second injection of thiopentone and adequate insufflation with oxygen, without any sequelae.

Bronchospasm is, however, an alarming condition to combat, and is potentially dangerous. It is felt that the histamine-producing property of curare preparations, with the attendant risk of bronchospasm, is the chief drawback to their use. The description of the relative sparing of respiration and the absence of side-effects in the curarization produced by bistrimethylammonium decane diiodide (now known as decamethonium iodide and commonly as C10) led the authors to investigate the drug as a possible substitute for d-tubocurarine chloride in modifying electrically induced convulsions.

As each patient received a course of several convulsions the curarizing properties of decamethonium iodide and d-tubocurarine were effectively compared by using them in alternate treatments in the same patient, who thus became his own control.

Decamethonium iodide and thiopentone were administered to 40 patients undergoing E.C.T. for psychiatric illness; approximately half were in-patients and half out-patients. In all, 200 treatments were given. Of the 40 patients treated, 20 were on other occasions given E.C.T. controlled by d-tubocurarine, in order to compare the effects of the two drugs. An attempt was made to collect as many patients as possible in whom unmodified E.C.T. would have been dangerous if not absolutely contraindicated. One agitated depressed patient had previously had a coronary thrombosis, and 3 months before his treatment was suffering from all the signs of severe left-ventricular failure with a blood urea of 200 mg. per 100 ml. After 6 treatments this patient's depressive symptoms disappeared and there was no evidence of any adverse effect upon his cardiac condition. Also included in the series were hypertensive, arteriosclerotic, diabetic, and senile patients, and two patients with hernia.

It was found by preliminary investigation that 1 mg. of decamethonium iodide produced the same degree of curarization as 4 mg. of d-tubocurarine chloride. The dose of d-tubocurarine chloride required to give adequate relaxation is approximately 0.3 mg. per kg. of body weight. The dose of decamethonium iodide given therefore was approximately 0.08 mg. per kg. of body weight. Bistrimethylammonium pentane diiodide (pentamethonium iodide, C5),

the antagonist of decamethonium iodide was always kept in readiness but never used as severe respiratory depression was never encountered. The patients were insufflated with oxygen after the convulsion if there was the slightest sign of cyanosis or respiratory depression. Occasionally, when there was respiratory obstruction, an airway was inserted. The treatment was usually given in the morning with the patient fasting. Blood pressure and pulse rate were taken before treatment. Decamethonium iodide, thiopentone, and atropine sulfate were given intravenously from the same syringe. No disadvantage was found in giving the injection rapidly. The usual dosage of the drugs was decamethonium iodide 0.08 mg. per kg. of body weight; thiopentone 0.3 g. in 5-percent solution; atropine sulfate gr. from 1/75 to 1/50. The treatment was usually given to patients twice weekly. Outpatients were allowed to rest for two hours before going home.

The patient became unconscious within a few seconds of receiving the thiopentone. Within 3 minutes the patient was relaxed, respiration slightly depressed, and breathing mainly abdominal. Immediately after administration of the shock the patient gave a slight jerk and after a latent period of a few seconds there was a very modified tonic convulsion. There was no gross movement of the limbs, and the cry and opisthotonos of the unmodified convulsion were absent. There was no detectable difference between the softening of the convulsion due to decamethonium iodide or due to d-tubocurarine. There was no evidence that decamethonium iodide produced muscular paralysis while sparing respiration. Sweating and cyanosis were not usually seen and there were no histamine-like reactions. No complications followed any of the treatments in the present series. No fractures or dislocations occurred and there were no complaints of muscle stiffness. The only unpleasant symptoms between treatments were headache and impairment of memory and concentration, which evidently resulted from the electrical convulsion rather than from the administration of decamethonium iodide.

Although the series is too small to draw a statistically significant conclusion, decamethonium iodide appears not to influence the therapeutic effect of E.C.T. Enough patients have now been treated with d-tubocurarine and intocostrin to demonstrate that curarization does not affect the efficacy of induced convulsions.

The major drawbacks of E.C.T., namely, fractures, dislocations, and cardiovascular accidents, are eliminated as effectively with decamethonium iodide as with d-tubocurarine. Mechanical precautions are rendered unnecessary. Preliminary curarization enables E.C.T. to be given to patients to whom unmodified E.C.T. would be dangerous. No patient should be given a curarizing drug unless efficient facilities for controlled respiration are at hand and the administrator is competent to deal with the apneic patient. The injection of stimulants or analeptics cannot replace the provision of a clear airway and rhythmic insufflation with oxygen. It seems probable that fatalities

which have occurred in using curarizing drugs to soften electrically induced convulsions have been due to the inefficient methods of artificial respiration used. (Lancet, 14 May '49, J. A. Hobson and F. Prescott)

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Curare-like Actions of Tri-(Diethylaminoethoxy)-Benzene Triethyliodide: Some experiments on animals with tri-(diethylaminoethoxy)-benzene triethyliodide or R.P. 3697, now called 'Flaxedil,' have already been described. A preliminary clinical account has also been given by Huguenard. The main pharmacological properties of flaxedil may be summarized as follows: (1) although it is less potent, weight for weight, than d-tubocurarine, this of itself is of little significance; the relation of its curarizing potency to the effect on respiration must be taken into account. An ideal curarizing agent should be relatively nontoxic, and it should be possible to give many times the paralyzing dose with eventual recovery, provided artificial respiration is given. Assays by the rabbit head-drop method indicated that flaxedil was about a third as potent as d-tubocurarine. After a dose producing head-drop for 5 minutes, the respiration was almost unchanged. With higher doses paralysis of the muscles of the neck and limbs was followed by paralysis of the intercostal muscles, respiration being maintained by the diaphragm; excessive doses inhibited respiration. In the rabbit flaxedil has about the same margin of safety as d-tubocurarine. The dose needed to arrest respiration was about 1.7 times the curarizing dose, and the ratio for d-tubocurarine was 1.5. Previous injection of d-tubocurarine sensitizes animals to flaxedil. (2) The neuromuscular blocking effects of flaxedil are easily reversible by prostigmine or by physostigmine. This is demonstrable in the rabbit phrenic-nerve diaphragm preparation and strikingly in man. Unlike some synthetic curarizing agents, flaxedil has no eserine-like properties. It slightly stimulates isolated rabbit gut but only in comparatively high concentrations. (3) No vasodepressor effect is caused, even with many times the paralyzing dose, provided there is adequate oxygenation. The injection of 2 mg. of flaxedil into the arterial supply of a dog's hind-limb perfused with heparinized blood had no effect, whereas 1 mg. of d-tubocurarine chloride produced a slight fall of pressure and dilatation of the vessels. (4) Experiments on isolated tissues (rat diaphragms) showed that flaxedil liberated less histamine (from 1/5 to 1/2) than did d-tubocurarine. (5) Flaxedil has little paralyzing action on ganglia. This was shown in anesthetized cats, in which the contractions of the nictitating membrane were recorded by stimulation of the preganglionic fibers of the cervical sympathetic nerves. Whereas the intravenous injection of 1 mg. of d-tubocurarine caused pronounced inhibition, 100 mg. of flaxedil had only a slight effect; this confirmed an observation of Depierre.

The authors observed that in cats under light pentobarbital anesthesia, when the corneal reflexes could be briskly elicited, it was possible with an intravenous injection of flaxedil to paralyze almost completely the gastrocnemius muscle, without affecting the respiratory ventilation much. Although

the intercostal muscles were paralyzed, respiration was efficiently carried on by movements of the diaphragm. To analyze this effect graded doses of d-tubocurarine and of flaxedil were injected intravenously and the paralysis of the gastrocnemius was compared with the depression of the respiration. A comparison of the dose just causing complete paralysis with that just arresting respiration (10 percent of normal or 90 percent paralysis) indicated the margin of safety or sparing action on the respiration. For flaxedil the doses were respectively 0.45 and 0.86 mg. per kg. of body weight (ratio 1.9); for d-tubocurarine chloride 0.2 and 0.34 mg. (ratio 1.7); and for C10 (bistrimethylammonium decane diiodide), the respective doses were 0.053 and 0.13 mg. per kg. of body weight (ratio 2.45). At the dose just causing 100-percent paralysis of the gastrocnemius the respiratory ventilation was 25 percent of the normal for d-tubocurarine, 30 percent for flaxedil, and 45 percent for C10. Because the previous injection of d-tubocurarine enhanced the effect of a subsequent injection of flaxedil and antagonized that of C10, each compound was used separately in each experiment. A paralyzing dose of flaxedil had a slightly shorter action, about 20 minutes before full recovery compared with 30 minutes for d-tubocurarine.

The authors' studies with volunteers to determine the effects of flaxedil on conscious persons may be summarized as follows: (1) in doses of from 40 to 70 mg. (about 1 mg. per kg. of body weight) injected intravenously in conscious persons, complete paralysis of the flexor muscles of the forearm and of the muscles of the abdominal wall developed within 4 minutes; (2) the paralysis so induced passed off in about 25 minutes, leaving strikingly few after-effects; (3) at this dosage there was no demonstrable decrease in pulmonary ventilation, although some of the volunteers, who were doctors, reported that intercostal breathing was interfered with. The absence of any effect on the diaphragm was confirmed by recording the movements of the diaphragm in some experiments. In only one person was there hyperventilation during the time of greatest paralysis. This appeared to the authors to be due to apprehension. This person also showed hyperventilation in a subsequent and similar experiment with d-tubocurarine; (4) the paralysis induced by flaxedil was completely and rapidly neutralized by an intravenous injection of prostigmine, which restored full muscular power in about 10 minutes; (5) the blood pressure showed no pronounced alteration; (6) when no power remained in the flexor muscles of the forearm, the sole of the foot was stroked, and no reflex was elicited. At this moment the jaw was relaxed and required support; (7) sweating was not marked and none of the volunteers became cyanosed, although no assistance was given to respiration; (8) about 1 mg. per kg. of body weight was the paralyzing dose in conscious men. Experiments are in progress to determine the dose which just stops respiration, so that the ratio discussed above for animals can be calculated for man. The subjective sensations of the volunteers tallied closely with those already described for d-tubocurarine.

Flaxedil has also been used during light cyclopropane and ether anesthesia in 45 adult patients to paralyze the abdominal wall during major abdominal operations. In most cases it was necessary to give up to a total of from 100 to 120 mg. Usually two doses were necessary, the first one wearing off after about half an hour. The effect of 80 mg. of flaxedil was roughly equivalent to about 15 mg. of d-tubocurarine in similar circumstances.

The authors have confirmed the speedy elimination of flaxedil in anesthetized and artifically respired rabbits and cats which, given from 3 to 10 times the curarizing dose, excreted within 2 hours from 30 to 100 percent in the urine (assayed on the rabbit phrenic-nerve diaphragm preparation).

From the various studies made, it is concluded that flaxedil is an effective curarizing agent. It is a stable and easily prepared synthetic compound, soluble in water, and aqueous solutions are miscible with those of thiopentone sodium. Investigations so far have revealed no side-effects. (Lancet, 30 April '49, W. W. Mushin et al.)

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Note on the Chemistry of Dramamine: In the treatment of various allergies by the many antihistaminic drugs which have appeared in the last few years, there have been observed undesirable side reactions, such as drowsiness, which detract from their usefulness. Attempts have been made with certain of the antihistamines to offset the drowsiness by chemical combination with the methyl xanthines, selected because of their central nervous system stimulating properties; but because of the low ionization constants of the methyl xanthines, no stable salts were obtained.

However, by the use of 8-chlorotheophyllin, which has a high enough ionization constant to form a stable salt, the chemical problem has been solved in the case of β-dimethylaminoethyl benzohydryl ether (benadryl base) to produce dramamine (benadryl plus 8-chlorotheophyllin) (see News Letter of 22 April '49, page 21). This salt is readily made by dissolving the 8-chlorotheophyllin with a slight excess of the benadryl base in any suitable hot organic solvent, such as methyl ethyl ketone or ethanol; on cooling, it precipitates as a sandy material in almost quantitative yield based on 8-chlorotheophyllin, mp 101-3° C., empirical formula $C_{24}H_{30}O_3N_5Cl$. (Science, 3 June '49, J. W. Cusic)

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Concerning Deaths in USN for 1947: During 1947, there were 1,194 deaths recorded for active-duty personnel of the Navy and Marine Corps. These deaths represented an annual rate of 203.3 per 100,000 average strength; a rate of 200.7 was recorded for the calendar year 1946. The data for this study were compiled from the NAVMED-N (Certificate of Death) and include only the primary cause of death.

During 1947 there were three and one-half times as many deaths due to injury as there were due to disease as compared to a proportion of two and one-half to one in 1946. Although the proportion of fatal injuries to disease fatalities increased over 1946, it was still below the ratio recorded for noncombat deaths during the war period (1942-1945).

Injuries and poisonings accounted for 79 out of every 100 deaths; non-communicable conditions such as diseases of the blood, circulatory, digestive, and nervous systems and tumors were responsible for 18 out of every 100 deaths; and the communicable diseases category for 3 out of every 100 deaths. Injuries, which were responsible for the majority of the deaths among Navy and Marine Corps personnel during 1947, were also entirely responsible for the slight increase in the death rate over 1946 for all causes, rising almost 10 percent. Communicable diseases, which declined 58 percent, and non-communicable diseases, which had decreased 10 percent since 1946 were numerically too few to counterbalance the increase in injuries.

The seven leading causes of death attributed to disease, in 1947, as shown in the table below accounted for 3 out of every 4 fatalities. Neoplastic conditions were diagnosed in 29 percent of the disease deaths.

TABLE A. Leading Causes of Death Due to Disease 1947

DISEASE	NUMBER
Neoplastic conditions	72
Heart diseases	59
Diseases involving coronary arteries	43
Diseases of heart valves	5
All other heart diseases	11
Tuberculosis	17
Pneumonia, all types	12
Nephritis	10
Cirrhosis of liver	9
Hemorrhage, intracranial	9

Extreme multiple injuries were again the leading cause of fatality in the injury or poisoning group. Drowning, which for years prior to World War II ranked first as a cuase of death, ranked third, with gunshot wound fourth. It is noteworthy that the 7 diagnoses shown in table B have almost always ranked among the first 10 and that together they are responsible for 88 percent of all the deaths reported as caused by injuries or poisonings.

TABLE B. Leading Causes of Death Due to Injuries and Poisonings - 1947

INJURY OR POISONING	NUMBER
Injury, multiple, extreme	320
Fracture, simple and compound	157
Drowning	154
Wound, gunshot	67
Intracranial injury	47
Injury, type unknown	47
Poisoning, acute	34

In general, the death rate for officers was higher than for enlisted personnel; the death rate among officers from injuries and poisonings was more than twice that for enlisted personnel. The higher mortality rates among officers were due, in part, to the higher median age of this group and to the fact that the exposure and therefore the risk of dying from aircraft accidents is much greater among officers.

The death rate for Marine Corps officers was about 24 percent higher than that for Navy officers. This was primarily due to the higher death rate from aircraft hazards among the Marines. It is because of the deaths from injury or poisoning that the death rate for Marine Corps enlisted men was 17 percent higher than that for Navy enlisted personnel despite the fact that the death rate from disease causes was lower in the Marine Corps. Although the death rates for males were generally higher than those for females, the rates for the women officers were in turn much higher than those for the enlisted women.

The trend of the age specific death rates was not as smooth and consistent as one might expect. The rate started at 128 per 100,000 for ages under 20, reached a peak of 271 for age group 25-29, decreased to 215 per 100,000 and then increased steadily thereafter. However, the reasons for the fluctuations in the younger age groups become apparent when the deaths are classified according to diseases or injuries and poisonings. The death rates for diseases increased with age whereas the rates for injuries and poisonings increased with age up to age group 25-29 and then declined steadily. It is also of interest that although injuries accounted for more than 3 out of every 4 deaths in the naval service, the death rates beginning at age 35 were higher from diseases than those from injuries.

The death rate due to disease causes among forces based ashore was higher than that for forces afloat. For mortality due to injuries and poisonings, the higher rates for forces ashore than for forces afloat resulted from the greater exposure to risk of accidents connected with aircraft and vehicles.

Differences in the death rates between officers and enlisted personnel are observed when fatal injuries and poisonings are distributed by cause of the violence. Among officers, aircraft accidents caused at least five times as many deaths as did vehicle accidents. For enlisted men, vehicle deaths were about three times as numerous as aircraft deaths. Accidents involving passenger automobiles accounted for 65 percent of all those killed by vehicles and 40 percent of all the violent deaths. The number of deaths resulting from motor vehicle accidents assumes added significance when correlated with the fact that approximately 87 percent of all these fatalities occurred while the individuals were on leave or liberty. A greater percentage of Navy than Marine Corps personnel who died because of vehicle accidents, received the injury while absent from command.

There were further variations in the distribution of vehicle deaths by age of the victims. Among Navy personnel the fatal vehicle accident rate increased from the low point at age group 19 and under to the peak at ages 20 through 24 and decreased steadily thereafter. This trend pattern was also indicated for automobile and motor cycle deaths but was quite dissimilar for the truck and miscellaneous vehicle fatalities. Among the Marine Corps personnel who died as a result of vehicle accidents, the peak death rate was at age group 19 and under, with a lower rate in the 20-24 year group, and with considerable fluctuation thereafter. (Statistics of Navy Medicine for June 1949)

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List of Recent Reports Issued by Naval Medical Research Activities:

Naval Medical Research Institute, NNMC, Bethesda, Maryland

Project	Report No.	Date	Title
NM 000 003	1	6 Jan '49	Direct Calorimetry by Means of the Gradient Principle
NM 001 007 (X-651)	4	21 Jan '49	Determination of the Most Comfortable Knee Angle for Pilots
NM 004 001	3	6 Jan '49	Changes in the Structure of Cells on Exposure to Ultrasound
NM 005 007	8	14 Apr '49	The Recovery of Poliomyelitis Virus after Parenteral Introduction into Cockroaches and Houseflies

Naval Medical Research Institute, NNMC, Bethesda, Maryland (Cont.)

Project	Report No.	Date	Title
NM 005 010 (X-756)	5	16 Mar '49	Field Trial of Shigella flexneri III Vaccine. I. Background, Scope, and Organization of the Program
NM 005 010 (X-756)	6	17 Mar '49	Field Trial of Shigella flexneri III Vaccine. II. Serum Agglutination Studies
NM 005 020	1	31 Mar '49	A Manual of the Mosquitoes of Ponape Island, Eastern Carolines
NM 007 017 (X-696)	1	25 Jan '49	The Pathology of Louse-Borne Typhus Fever from the Epidemic of 1943-1945 in Egypt
NM 007 039	19	3 Jan '49	A Critical Analysis of the Syndrome of Acute Total Body Radiation Illness, Its Role in Atomic Warfare and Its Influence on the Future Practice of Military Medicine
NM 007 039	20	18 Mar '49	The Reaction Between Heparin and Fibrinogen
NM 011 013	5	7 Feb '49	Shielding of Syringes Used for Injecting Radioactive Solutions
			Summaries of Research (1 July - 31 December 1948)

Medical Field Research Laboratory, Camp Lejeune, N.C.

NM 005 026 (Sub-Proj. 2-48)	-	25 Apr '49	Physical and Biological Properties of DDT Residues Produced by a DDT-Fog Generator
NM 005 026 (Sub-Proj. 3-48)	-	13 Apr '49	Surface Film Studies in DDT-Oil Larvicides
NM 005 036	-	14 Apr '49	The Mosquitoes and Mosquito-Borne Diseases of the Treasury Islands (British Solomon Islands)

Medical Field Research Laboratory, Camp Lejeune, N. C. (Cont.)

Project	Report No.	Date	Title
NM 012 007	1	10 Jan '49	Development and Testing of Field Medical Assembly Chests (Summary of Preliminary Development Procedures)
NM 012 007	2	1 Feb '49	Development and Testing of Field Medical Assembly Chests (Testing of Proposed Field Medical Assembly Chests)
NM 012 007	3	25 Apr '49	Development and Testing of Field Medical Assembly Chests (Testing of Proposed Field Assembly Chests)
NM 012 012	-	5 Apr '49	Effect of Dramamine on Landing Boat Motion Sickness and Marksmanship

Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn.

NM 003 017	1	9 Mar '49	A Study of the Interrelationships of Psychological and Physiological Measures on Submarine Enlisted Candidates: I. History, Experimental Design, and Statistical Treatment of Data

Note: Those interested in seeing copies of the complete reports should address their request to the research activity from which the report originates.

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Training in Medical Aspects of Radiological Defense: The Atomic Energy Commission has invited the Armed Forces to participate in a Fellowship Training Program in Bio-Physics, Biology, and Medicine. The training involved in this program will cover a period of approximately 12 months and will be composed of a basic phase and an advanced phase.

For the basic phase, tentatively scheduled to start on or about 15 September 1949, those assigned will be sent to the North Carolina Regional Training Center, Duke University, Durham, North Carolina, or to the Colorado Training Center, University of Colorado, Denver, Colorado. The basic training at the above institutions will include courses in biology, mathematics, physics, and chemistry as they apply to atomic energy. In addition there will be an opportunity to participate in research and development in this field, combined with activities in clinical medicine and biology.

Upon completion of the basic training phase, the students will be sent to The Institute of Nuclear Studies at Oak Ridge, Tennessee, for advanced study for a period of six months. During this phase, the students will attend conferences and participate in the laboratory program of the institute. In addition to a general coverage of the field, specialization in a particular phase of atomic energy as related to medicine will be possible.

Requests are desired immediately from medical officers of the regular Navy who are interested in this field. Each request must contain a three-year service agreement. Reserve medical officers who have served at least one year of active duty may apply providing they (1) agree to submit application for transfer appointment in the regular Navy, (2) agree to accept their commission when tendered,and (3) sign the required three-year service agreement. Requests may be made by dispatch when required and must be confirmed by letter. (Professional Div., BuMed)

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Advanced Commissary Instruction Available: Three officers will be selected from volunteer Medical Service Corps officers and/or commissioned warrant officers of the Hospital Corps for advanced training in food preparation and service at the U. S. Army Advanced Food Service School, Camp Lee, Petersburg, Va., beginning in September 1949. The scope of the course of study, which is of 9 months' duration, permits comprehensive technical training in food service, with emphasis on food preparation, nutrition, menu planning, equipment operation and maintenance, and supervision of all types of military messes.

Requests are desired from CWOHC and MSC officers in any rank. Requests must be received in BuMed (Attn: Code 345) by 15 July 1949; they may

be made by dispatch if necessary. It is desired that only officers with practical experience in, or those possessing an above average theoretical knowledge of, and interest in commissary procedures, apply for this instruction. (Personnel Div., BuMed)

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BUMED CIRCULAR LETTER 49-62 26 May 1949

To: All Stations Continental

Subj: Ambulance Inventories; Reduction of

Refs: (a) BuDocks Semi-Annual Automotive Inventory and Cost Reports (NavDocks-576, Rev.)
(b) NPR&D Reg. No. 1, Pars. 502.2 to 502.5, and 606.

This letter (1) states certain reports indicate that some activities under the management control of the Bureau of Medicine and Surgery and other medical installations now have more ambulances than are required to carry out the assigned mission, and (2) requests that addressees furnish information and recommendations concerning these ambulances.

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BUMED CIRCULAR LETTER 49-63 27 May 1949

To: All Ships and Stations

Subj: Navy Ophthalmic Program

Refs: (a) BuMed CircLtr No. 43-154; N.D. Bul. Cum. Ed. 1943, 43-1485, p. 490.
(b) BuMed CircLtr No. 45-180; AS&SL Jul-Dec 1945, 45-803, p. 367.
(c) BuMed CircLtr No. 48-12 of 27 Jan 1948.

This letter, which appears in the Navy Department Bulletin of 31 May 1949, consists of 8 pages and outlines the Navy's ophthalmic program which will become effective 1 July 1949.

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BUMED CIRCULAR LETTER 49-64 JointLtr 1 Jun 1949

To: MOinCs, NavHosps within Continental U. S.
Commanders, All Naval Training Centers
COs, All MarCorps Activities, Continental U.S.

Subj: Authority to Take Final Action on Certain Reports of Medical Survey in Cases of Male Enlisted or Inducted Personnel: Modification of

Ref: (a) Joint Ltr Pers-66-JMS, P3-5; BuMed-3352-FGS-keh, P3-5 (C/L 48-128); MarCorps-DGK-356-mla, 1500-120; dated 22 Nov 1948.

This joint letter (Chief of BuPers, Commandant of USMC, and Chief of BuMed) contains modifications of reference (a).

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BUMED CIRCULAR LETTER 49-65 3 June 1949

To: Medical Officers in Command, U. S. Naval Hospitals

Subj: Graduate Medical Training Program (Internships and Residencies)

Ref: (a) BuMed C/L No. 49-50

1. Reference (a) is hereby modified as follows:

In paragraph 2, title C, after "Obstetrics," add the words "and Gynecology."

--BuMed. C. A. Swanson

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BUMED CIRCULAR LETTER 49-66 7 June 1949

To: All Dental Officers

Subj: Dental Forms and Procedures: Standardization of

Ref: (a) BuMed News Letter, Volume 10, No. 5, page 26, dtd 29 August 1947.

Encls: (A) NAVMED-1298, Dental Appointments, Daily
(B) NAVMED-1299, Dental Examination and Treatment Record
(C) NAVMED-1300, Precious Metal Issue Record
(D) NAVMED-1301, Statement and Inventory of Precious and Special Dental Metals
(E) Standard Procedure for NAVMED-1298
(F) Standard Procedure for NAVMED-1299
(G) Standard Procedure for NAVMED-1300
(H) Standard Procedure for NAVMED-1301

This letter states that dental activities were requested by reference (a) to submit a copy of each locally designed and reproduced dental form to the Bureau for the purpose of ascertaining which of these forms could be standardized. The standard NAVMED forms listed as enclosures were developed from a review and analysis of the local forms submitted. Enclosures (A) and (B) are for use by all dental activities. In addition, enclosures (C) and (D) are for use by those dental activities having dental prosthetic facilities. These standard NAVMED forms were designed in such a manner as to be sufficiently flexible for the basic purposes and needs of all dental departments and shall be used in lieu of present local dental forms serving the same purposes. The most essential features of the local dental forms submitted were incorporated into the standard NAVMED forms to the extent practicable. Enclosures (A) through (D) are now available and should be requisitioned from the appropriate District Publications and Printing Office. Instructions are given for the requisitioning and use of these forms. The NAVMED-L, Report of Prosthetic Dental Treatment, will continue to be accomplished. The original and card copy shall be forwarded to the Bureau of Medicine and Surgery each month with the NAVMED-K, Report of Dental Operations and Treatments. Suggestions are invited for modifications of standard forms and procedures after they have been in use for at least three months.

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BUMED CIRCULAR LETTER 49-67 7 June 1949

To: All Ships and Stations

Subj: Urological Technic; Hospital Corps Specialization Course in

Refs: (a) Catalog of Hospital Corps Schools and Courses, Revised 1944 (NavMed 367).
(b) Addendum to Catalog of Hospital Corps Schools and Courses.

Encl: (A) (HW) Curriculum and Prerequisites for Hospital Corps Course of Instruction in Urological Technic.

It is stated in this letter, which appears in full in the 15 June Navy Department Bulletin, that a specialization course for enlisted personnel of the Hospital Corps in Urological Technic has been established and shall be made a part of ref (a). The length of the course is to be nine (9) months, consisting of thirty-six (36) weeks of forty hours each for a total of 1440 hours, currently accelerated to six (6) months, consisting of twenty-four (24) weeks of forty hours each for a total of 960 hours. The centers for instruction will be the naval hospitals at Mare Island, Vallejo, Calif.; Oakland, Calif.; Long Beach, Calif.; Portsmouth, Va.; and NNMC, Bethesda, Md. The number, rating, and service requirements of students assigned will be incorporated in BuPers quota letters. Hospital corpsmen satisfactorily completing the prescribed course of instruction will be issued a Certificate of Graduation and officially designated Urological Technicians.

The material contained in enclosure (A) follows:

Certificate in Urological Technic
(Technician)

		Clock Hours Theoretical	Practical
UR 1	Urological Anatomy and Physiology: Genito Urinary System - structure, location and function.	10	0
UR 2	Urological Operating Room Technic: Preparation, sterilization and utilization of urological instruments, dressings, linens, and glassware, and general urological operating room procedures.	90	390
UR 3	Urological Radiographic Technic: General principles of x-ray technic, and taking and processing of urological x-ray films.	120	330
UR 4	Urological Dressing Station Technic: General and special dressing room procedures.	30	120
UR 5	Urological Clinic and Ward Procedures: Organization and operation of urological clinic, and preoperative, postoperative and general urological ward procedures.	50	300
	Total hours	300	1140

Minimal Prequisites

2 years High School
Combined GCT plus ARI score of 100
Recommended by Medical Officer

Desirable Prerequisites

High School Graduate
Allied training or experience

Textbooks: Handbook of the Hospital Corps, U. S. Navy - 1939.

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