has been very difficult to explain how sheep and other animals lived and were healthy without iodin in the thyroid. It is quite probable, then, that in those cases something else takes the place of iodin in the compound; and that would show that iodin is only an incident in the makeup of the molecule and is not essential.

Dr. E. C. Kendall, Rochester, Minn.: The relation between the administration of iodin and thyroid trouble assumes two distinct conditions: One is the relief of goiter by the administration of iodin, and the second is the production of hyperthyroid symptoms by the administration of iodin. In the first condition, the gland is enlarged because it is stimulated, due to the insufficient amount of its active constituent available for the body. Administration of iodin, in this condition, allows the gland to manufacture its active constituent; the stimulus on the gland is, therefore, removed and the size diminished, possibly restoring it to normal. If encapsulated adenoma or a cystic condition is present, a mechanical factor enters which does not permit the gland to return to normal size.

The administration of thyroxin in large amounts produces typical hyperthyroid symptoms. It would, therefore, be expected that the administration of iodin in such amounts as to produce an excessive outpouring of thyroxin, would result in hyperthyroid symptoms. Besides these symptoms, due to the active constituent of the thyroid, there is still another condition, known as “iodinism,” which is a distinctly different trouble.

Very small amounts of iodin given to an exophthalmic goiter patient sometimes produces clinical improvement, but it is not a curative measure. The relation between iodin and clinical symptoms is very difficult to explain, but it seems probable that the determination of the functioning groups in the active constituent of the thyroid will throw much light on the subject. It is possible to explain the toxic symptoms produced by the hyperplastic thyroid by assuming that an excess of its secretion is being formed. This can be disproved by the fact that the amount of iodin in the gland is lower than normal, which probably is not entirely explained by the iodin being poured out of the substance from the gland, although this may, in part, be the explanation. Another explanation is that the gland produces thyroxin without the iodin attached. The body would thus be supplied with possibly an enormous quantity of the functioning part of thyroxin, which could theoretically produce the effects that are known.

Iodin in myxedema depends entirely on the amount of active thyroid substance which is present. Myxedema may be due to a partial failure of the gland to maintain a normal supply of thyroxin, or to complete atrophy of the gland. In the first place, the administration of iodin would possibly enable the thyroid substance which is present to make sufficient thyroxin to relieve the symptoms. In the second condition no amount of iodin would avail because the gland, being completely atrophied, could not manufacture any of the active constituent.

In regard to the animals that have iodin-free thyroids, it seems probable that these fall into the same condition as in myxedema in which the gland is completely atrophied and the metabolic rate is below normal. In time this causes a clinical condition which is marked by edema and other well-known signs and symptoms. However, the human being or the animal does not die. It is, therefore, apparent that something in the body can maintain the metabolic rate, at least up to 40 per cent. below normal. Reasoning from the analogy of the active groups in thyroxin, the question arises whether it is not creatin, amino acids and proteins in general that have this power.

The administration of corpus luteum for the relief of exophthalmic goiter has been tried. I am not in a position to discuss its merits, but I am certain that it is not a specific cure.

**Syphilis.**—The danger of syphilis to the community or individual is increased in proportion to the inadequacy of the treatment received by those suffering with the disease.——Vedder.

**THE USE OF DICHLORAMIN-T IN THE PREVENTION AND CONTROL OF SURGICAL INFECTION**

WALTER ESTELL LEE, M.D.

Captain, M. C., U. S. Army.

AND

WILLIAM H. FURNESS, M.D.

Captain, M. C., U. S. Army.

**PHILADELPHIA**

The attempts of surgeons, during the early months of the present war, to close gunshot wounds at the time of the primary operation were uniformly followed by disastrous results. Virulent infections of gas gangrene, streptococci, pneumococci, and other pathogenic organisms had invariably followed primary closure and it was therefore ordered that all gunshot wounds should be left open. This decision, of course, ordained that practically every gunshot wound was to become an infected wound.

At the present time surgeons of the allied armies are closing their wounds, when mechanically possible, at the time of the primary operation as a matter of routine, just as they would civilian wounds, and are obtaining primary union without infection in from 85 to 90 per cent. of the cases so treated.

After four years, military surgeons are now agreed that the most important factors in the prevention of infection in traumatic military wounds are: (1) Surgical treatment at the earliest possible moment; (2) the removal of all foreign bodies; (3) the complete removal of devitalized tissues; (4) the application of such a germicide as will not delay the time of the closure of the wound by the method of its application; and (5) the earliest possible closure of the wound when the foregoing procedures have been practiced.

When it is not possible to prevent infection by such measures, another problem is presented, namely, the control of infection. Here again the same principles should be followed: early operation, and removal of foreign bodies and dead and devitalized tissues; but, in our experience, the additional use of a germicide will be a definite aid in the control of these infections.

**DISINFECTION METHODS REVOLUTIONIZED BY CHLORIN**

Voluminous reports of results obtained in the treatment of gunshot wounds with the use of many germicidal agents appeared in 1915 and 1916, and still continue to appear. On careful analysis, it will be found that only in those cases in which the surgeon has practiced early operation, within three hours after the patient is wounded, and has effected the aseptic surgical removal of foreign bodies and dead tissues do the results in any way approach those reported by Carrel, Dehelly, Depage, Tuffier and Chutro, who, in addition to these surgical procedures, use Dakin’s hypochlorite solution.

The experience of the surgeons of the American Ambulance during the last two and a half years is entirely in accord with that of the majority of surgeons who have served in the present war, namely, that chlorin preparations have proved superior to all
other germicidal agents. It is really revolutionary from the laboratory point of view that chlorin should be found to be applicable in any form for the treatment of infected wounds, for chlorin is a general disinfectant, and as such, it is to be expected that it should be a general protoplastic poison, fully as destructive to tissues as to bacteria. It is an agent which destroys everything with which it comes in contact, unless very carefully controlled. Before Dakin developed his unique method of control, decidedly unfortunate results followed attempts to use such standard preparations as Javel water and Labarque’s solutions.

It is now Dakin’s belief that the germicidal action of all chlorin preparations depends on substances resulting from the chemical reactions between the chlorin and the proteins of the tissues and exudates in infected wounds, which substances are known as chloramins.

These chloramins, unlike chlorin, are not destructive to the tissues and may be used in solutions as strong as 10 per cent. Thus with the chloramins, it is not necessary to employ the very weak concentrations which require the frequent applications, most essential when chlorin solutions are used.

At the Boston meeting of the American Surgical Association in June, 1917, Commander Robert G. LeConte, U. S. N. R., presented a preliminary report on “The use of dichloramine-T in the treatment of infections and infected wounds” which was based on experimental and clinical work started in December, 1916, at the Pennsylvania Hospital. In September, 1917, Major Edward Martin, M. R. C., was detailed to investigate the clinical value of dichloramine-T in the treatment of surgical infection, and Lieut. Paul A. Lewis, U. S. N. R., Capt. William F. Furness and Capt. Walter E. Lee were assigned to assist him.

The concluding paragraph of our first report on dichloramine-T expressed the attitude with which this investigation was undertaken. “One should not depend on a chemical agent to perform, in the prevention or treatment of suppuration in traumatic wounds, that which can and should be done quickly and thoroughly by mechanical means. Neither chemistry nor bacteriology can or should be expected to replace the mechanics of surgery. At best, these chemical germicides can react only on the bacteria with which they actually come in contact, which means a very superficial process. Therefore, at the primary operation all foci of infection, foreign bodies and dead and devitalized tissues must be removed, when possible, by surgical procedures and adequate drainage, dependent if indicated, should be provided.”

**PROPERTIES OF A SUCCESSFUL DISINFECTANT**

Dichloramine-T has been found to be a germicide which possesses to an unusual degree the properties that make it possible to meet the conditions which Dunham has demonstrated govern the success of disinfection. Those properties are contact, time and mass—the mass of germicide. The irritation which accompanies the application of most germicides, limiting their use and governing their permissible concentrations, is negligible with dichloramine-T. Dichloramine-T can be used in solutions as strong as 10 per cent., the germicidal mass of such a concentration being forty times that of a 0.5 per cent. solution of hypochlorite. Because of the peculiar stability of this germicide in oil solutions and its unusual speed of disinfection, the required time of contact with the infecting organisms is readily maintained. Under average conditions its germicidal activity lasts about eighteen hours, in contrast to the thirty to sixty minutes of Dakin’s hypochlorite solution.

Dunham has found that its speed is eight times that of Dakin’s hypochlorite, 800 times that of a 1:1,000 solution of mercuric chloride and at least 2,800 times that of a 2 per cent. solution of phenol (carbolic acid). These tests were made in a uniform medium of blood serum and muscle extract.

Contact is essentially a mechanical problem, for the surgeon can place no dependence on the power of penetration of any known germicide. The development of a mechanical method to obtain, in traumatic and in infected wounds, the all-important contact between this agent and the infecting organisms has been the object of this investigation. At the present time, records have been obtained from 19,040 completed cases in civil surgical practice which have been treated with this agent. The patients in these cases have been treated in the Pennsylvania, the University of Pennsylvania, Germantown, Children’s and Bryn Mawr Hospitals, and in the accident services of the Midvale Steel Works and the Remington Arms Company. Dr. Robert P. Cummings and Dr. George B. Sickel directed the work at the latter places.

**CONCLUSIONS**

After fifteen months’ work, we have come to the following conclusion:

1. The use of dichloramine-T has definitely improved the results we have been able to obtain in the primary closure of traumatic wounds of the soft tissues, bones and joints.

2. In the treatment of superficial accessible surgical infections, the use of dichloramine-T has uniformly given us better results than any other germicide we have employed, and the method of its application is simpler and the dressings are more economical than with any of the other chlorine agents.

3. The best results with dichloramine-T can be obtained only when actual chemical contact of the germicide with the infecting organisms is maintained. To maintain such contact in superficial surgical infections is a simple matter and in the first few months of the work a satisfactory technic for this class of wounds was developed. In deep and inaccessible infections, the problem is more difficult and the greater part of these fifteen months has been devoted to this aspect.

4. Our confidence in the germicidal value of dichloramine-T has so developed that when it does not control a surgical infection we believe that the chemical contact has not been maintained, the mass of the germicide employed has not been sufficient, or adequate surgical treatment has not been given.

5. The striking detoxicating effect of the chlorin group of germicides, which has become common knowledge through the general use of Dakin’s hypochlorite solution, is just as satisfactorily exhibited with dichloramine-T.

**ABSTRACT OF DISCUSSION**

**Dr. Edward H. Ochsner, Chicago:** The treatment of wounds and infections has interested surgeons from time immemorial. In the pre-Listerian days there were two great schools in the treatment of surgical infections—one of the...
GOITER IN PREGNANCY

LEIGH F. WATSON, M.D.
CHICAGO

Exophthalmic goiter in pregnancy is rare, owing to the restraining influence the disease exerts on conception. Halliday-Croom reports only one case in 15,000 dispensary patients, while in his private practice he found twelve cases, causing him to believe that this complication is more prevalent among the upper classes. Bonnaire found two cases in 30,000 dispensary patients. Seitz in 1913 was able to collect 112 cases from his own material, literature and circular letters. Additional cases have been reported by Gellhorn, Ward, Markoe, Crotti, Davis, Porter, Stowe and others.

I want to report seven cases of toxic goiter with exophthalmos and nine cases of toxic nonexophthalmic goiter occurring during pregnancy, seen during the past five years.

I believe that occasionally patients with goiter of brief duration ascribe their increase in symptoms at pregnancy to the pregnancy itself, while in reality the symptoms are due to a beginning hyperthyroidism. There is no doubt that some of these patients are treated for neurasthenia, hysteria, palpitation of the heart, and gastro-intestinal and nervous disorders. Many physicians do not regard goiter seriously unless it is accompanied by marked exophthalmos. At any rate, we should be more on the alert for this condition and many questionable cases should receive more painstaking diagnosis and more continued observation. One of the best means we have of furthering the study of this obscure subject is by reporting and discussing the few cases we see. I believe the subject may be most conveniently considered under the following headings: 1. Experimental Studies, 2. Clinical Observations, 3. Treatment, 4. Case Reports.

EXPERIMENTAL STUDIES

While it is true that animals lack the characteristic symptoms associated with thyroid hyperplasia in the human, the similarity of the structure of the gland makes it possible to carry out certain studies which obviously cannot be done on man.

Interest in this subject was stimulated twenty-two years ago by Halsted, who reported that partially thyroidectomized dogs showed evidence of athyreosis as time of parturition approached, but the condition disappeared soon after delivery. The pups born of these dogs showed thyroid many times the normal size. Carlson found, from an extensive study of newly born pups of mothers with colloid goiter, that the pups' thyroids were similar in weight to those of pups born of mothers with normal thyroids; on the other hand, pups from mothers with active thyroid hyperplasia had thyroids larger than the normal, in direct proportion to the degree of hyperplasia in the mother.

*Read before the Section on Obstetrics, Gynecology and Abdominal Surgery at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

1. Halliday-Croom, quoted by Crotti: Thyroid and Thymus, 1918.
2. Benedict, quoted by Crotti: Thyroid and Thymus, 1918.
7. Crotti, A.: Thyroid and Thymus, 1918.