DISTILLED WATER VERSUS SALVARSAN IN THE TREATMENT OF SYPHILIS.

BY

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THE simple treatment for syphilis herein recommended consists of the hypodermic injection of 6 to 10 c.cm. of distilled water every three days for two to four weeks.

I was induced to give this treatment a trial as the result of some research work I had done on surface tension, the results of which I published privately some fifteen months ago. I had previously published in the *Practitioner* an article on the Part Played by Colloids in Physiology and Pathology, in which I drew attention to the value of a consideration of surface tension. An experiment that I carried out to show the effect of the calcium salts on surface tension is rather interesting:

When pure hydrogen peroxide is added to pure mercury in a clean test tube, catalytic action occurs and oxygen is given off, the mercury remaining unaltered. This reaction is due to an extremely fine film that forms on the surface of the mercury, but, on account of the tension, breaks almost as soon as formed, the making and breaking being rhythmic. On adding a small quantity of a 10 per cent. solution of pure calcium chloride to the mercury, shaking well and draining it off, the mercury itself behaved peculiarly, its surface tension having been modified to such an extent that it could be induced to take up all sorts of shapes instead of the usual globular one. When the hydrogen peroxide was added the mercury was immediately changed into a grey colour and was then broken up into minute grey masses, many of which passed, as in the colloidal form, through filter paper; meanwhile the ebullition of oxygen was exceedingly great, and the heat generated sufficient to make the test tube very hot.

This experiment has been given at such length in order to show the marked effect of a slight alteration of surface tension.

The value of mercury in the colloidal form as an antiseptic is due to its possessing the powers of both classes of antiseptics—namely, the power of the heavy metals to combine with protein matter, and the power of chloroform, toluol, and the like to interfere with the surface tension of all living cells. It seemed to me, therefore, that it would be of interest to find out the surface tension of individual substances, and with that object I instituted some experiments.

In some of the experiments it was found that colloid mercury as well as mercury perchloride and carbolic acid have a tendency to reduce the surface tension existing between mercury and potassium chloride, and the fall is not complete at once, but is progressive. This fact is important, for with such a varying surface tension around a living cell the latter finds it very difficult to accommodate itself to its surroundings; in fact it fails, and its life ends.

The water soluble contents of coal-tar pitch, which no doubt are responsible for pitchworkers' cancer, have surface tensions that tend to drop considerably, whereas the soluble contents of blast furnace pitch have not this tendency, at least not to the same extent.

In the *Dublin Journal of Medical Science* for June, 1911, I gave the results of some experiments in which boiled yeast had been added to living yeast in a suitable growing medium, and I there showed that the effect of this addition was to stimulate the living yeast to marked activity, to a rapid life, and consequently to an early death. My experiments on the surface tension of boiled and unboiled yeast showed that whereas the surface tension of the latter was 70.62 dynes per centimetre, the surface tension of boiled yeast solution fell in twenty-four minutes from 70.96 dynes per centimetre, to 66.31, and in five hours to 61.02 dynes per centimetre.

I have previously shown that fertilizing with boiled bacteria stimulates the living ones to rapid growth and an early death. Boiled bacteria being vaccines, we can conclude that vaccines lower the surface tension, and by so doing produce their good results.

This lowering of surface tension is associated with a more rapid production of catalytic products in the cells, but the injection of vaccines is associated with the production of antibodies; therefore it seems but right to

infer that the production of antibodies is closely associated with a lowering of the surface tension.

The addition of distilled water to blood corpuscles so affects the osmotic pressure as to cause a passage of water into the cell, which gets larger and eventually scatters its contents. In disease the rapid catalytic changes and the rapid production of antibodies are interdependent, and if one can induce these marked catalytic changes with or without a vaccine, one stands the chance of setting free a number of very useful and remedial antibodies.

In such a chronic disease as cancer it seemed to me that the process was allowed to continue owing to the absence of sufficient antibodies, or at least a sufficient number to act together at the same time, and if one could set free any catalytic antibodies in sufficient numbers one might get a good result.

Knowing of no vaccine to induce this antibody effect, it occurred to me that the injection of distilled water might so affect the surface tension as to bring about the osmotic effects, and with this object I determined to try the effect at the first opportunity, which I owe to Dr. Lloyd Edwards, Medical Officer of the Swansea Union, and to whom I desire to express my thanks.

CASE I.

A man (in the infirmary), aged 62, who was suffering from immensely enlarged glands of the neck, secondary to an epithelioma of the lip. The glands were suppurating profusely, and the smell was so bad that the room had to be fumigated continuously. I injected 8 c.cm. of distilled water into the skin of the back, having previously rubbed it with alcohol to remove the grease (for the introduction of grease has a marked effect on surface tension). I did this every other day, and after the third injection the smell had disappeared almost entirely and the fumigation was discontinued. The surface of the sore seemed to be much cleaner, and the suppuration became more profuse, but otherwise the disease was not checked.

CASE II.

A man who had previously been operated on for epithelioma of the lower jaw by Mr. Bilton Pollard, and soon after for clearing out the glands of the neck. This latter was an extensive operation, but the wound eventually healed up well and firmly. Within three weeks of his discharge from University College Hospital there was a return of the growth, and I thought that if injections of distilled water were started early enough one might be able to do some good. At this time the wounds were quite sound and firm, but after three injections, to my great surprise an abscess headed and burst about the middle of the scar. I continued the injections in the hope that this marked activity presaged a favourable catalytic change in the cells, but the growth increased rapidly and the suppuration came to a head in two other openings. Closely following the suppuration appeared a mass of granulation tissue arising out of the part where the wound had quite healed, which spread rapidly. During all this time the pus was inoffensive, and the nursing of the patient was never objectionable to the least extent.

The marked effect produced by the injections of distilled water made me feel certain that in any similar disease of less malignancy their effect ought to be still better, so with that object I undertook, with Dr. Lloyd Edwards's permission, the treatment of the syphilitic patients under his charge. Both he and his assistant, Dr. Dunbar, were rather inclined to treat my mission as somewhat harebrained, but at the end of a week's treatment of my first patient I was able to prove to their satisfaction that the effect was excellent. The Wassermann reaction is, in my opinion, nothing but a very roundabout way of determining the surface tension at which haemolysis occurs, and if this view is correct, the time ought not to be far distant when a simpler and more scientific method is introduced, and one that is not open to so many pitfalls.

It is easily understandable from the point of view of surface tension that in several diseases the haemolytic point may be the same although the antibodies may be different.

CASE I.

An alcoholic prostitute, aged 26, had been in the infirmary since June, 1912, suffering from ulcers on the face and a large ulcer on the left shin. She was first admitted in August, 1910, having been infected a few months previously.

The area covered by the inflammation and ulcers was wing-shaped, covering both cheeks, upper lip, and a good part of the nose, and over the whole of this area there was considerable thickening. The ulcer on the leg looked indolent and unhealthy. She had not menstruated for two years.

I started treatment on October 25th, and continued it every other day until November 4th, but discontinued it on November 6th, as she had started to menstruate. I restarted treatment on November 8th, and continued it every third day till November 23rd, when the ulcer on the leg had healed. By November 9th the ulceration on the face had cleared, although there was still some thickness, as well as dilated venules to be seen.

Her general health improved greatly, and she looked better and felt in better spirits than she had done for a long time.

The readiness with which the edges of the ulcer took on a healthy appearance was extraordinary, especially as she had ceased to respond to the ordinary methods of syphilitic treatment.

After each injection there was a marked reaction, the face becoming very flushed, and the temperature rising in a short time afterwards as indicated by the two-hourly chart. The four-hourly chart shows it still better.

Her general improvement was a matter of comment by all the others in the ward, and both Dr. Edwards and Dr. Dunbar were surprised.

CASE II.

T. A., aged 35, had been in the navy, but after leaving was employed at some works in the neighbourhood, where he received a blow on the arm, as the result of which there was a thickness which persisted longer than the usual bruise. With a history of syphilis, I naturally concluded that this was a syphilitic thickening of the periosteum, and gave him the injections of distilled water every other day. At the end of the fortnight the swelling and pain had disappeared, and he returned to work.

CASE III.

T. J., aged 46, was admitted to the infirmary on March 6th suffering from multiple ulcers of the left leg and foot. There was the brownish scar on the right shin, which confirmed the diagnosis of syphilis. The ulcers on the left leg and foot would nearly heal and then again break down, but never assumed a healthy appearance. I started injecting distilled water on October 31st, and continued the treatment every other day until November 16th, when I did it every third day. By the end of the first week the edges of the ulcers had taken on a very healthy appearance, and the pain from which the man suffered had practically disappeared.

There were ten ulcers altogether, and by November 23rd seven of them had healed over, and the two largest were two-thirds covered with new tissue. The man appeared healthier, and some colour had returned to his face. He said he felt much better, and looked forward to the time for each injection.

A reference to his temperature chart shows that there was a reaction after each injection, but the temperature did not rise nearly so high as in Case I.

CASE IV.

B. T., aged 24, had a hard chancre $\frac{1}{2}$ in. in diameter on the dorsum penis, which appeared a fortnight before I saw him.

I started injecting him with distilled water on November 2nd, and injected him every third day, and by the 14th it had practically disappeared, as well as the enlargement of the glands in the groin. His general health improved rapidly, and he looked much better after a fortnight's treatment.

CASE V.

M. S., aged 20, single, was admitted in November, 1911, as she was pregnant and infected with syphilis. After confinement and some treatment she was discharged, to be readmitted on November 11th, 1912, suffering from tertiary ulcers in different parts of the body. There was a small sore on the right ear and one on the right eye, whilst one seemed to be forming on the forehead.

Treatment was started on November 12th, and by November 19th there was considerable improvement, the ear and eye being practically well, and the swelling on the forehead had subsided.

All the other ulcers had taken on a healthy appearance, so that by November 25th they were all covered over.

Her general health improved greatly, she seemed brighter, looked healthier, and had colour in her cheeks, whilst the appetite improved. She much appreciated the treatment, although she cried on the first occasion.

The temperature reactions in this case were very marked, as in Case I, rising a few hours after each injection to 100° F.

CASE VI.

W. E., aged 26, admitted October 10th for sores on the right leg. Was infected with syphilis in the army.

Treatment was started on November 10th, and, after injections every third day, the gummata on thigh and leg were all covered over by healthy tissue on November 25th. A sore inside the right cheek also subsided, whilst his general appearance became more healthy.

THE fourth International Congress of School Hygiene will be held at Buffalo, New York, in August next (25th to 30th), under the honorary presidency of Dr. Woodrow Wilson, President of the United States. The actual president is Dr. Charles W. Eliot, formerly president of Harvard University. The general secretary is Dr. Thomas A. Storey, Professor of Hygiene, College of the City of New York.

The Arris and Gale Lectures

ON

THE GENITAL FUNCTIONS OF THE DUCTLESS GLANDS IN THE FEMALE.

DELIVERED AT THE ROYAL COLLEGE OF SURGEONS ON
MARCH 10TH AND 12TH, 1913,

BY

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[Abstract.]

LECTURE II.

IN the last lecture I endeavoured to estimate the direct and indirect influences of the ovaries in regard to the genital functions. In considering the indirect influences I discussed the effects of ovarian insufficiency, both in physiological and pathological circumstances, on what I may, perhaps, describe as the rest of the genital system of ductless glands; and I also demonstrated the effects produced on the general metabolism by this condition.

In this lecture I shall reverse the process and endeavour to trace as far as possible in the time at my disposal the influence of the rest of the ductless glands upon the ovaries and the reproductive functions generally.

THE RELATION OF THE THYROID TO THE GENITAL SYSTEM.

We shall, perhaps, be in a better position to consider the changes that occur in the rest of the genital system if we first discuss the effect on the general metabolism of removal of this organ.

Effects of Thyroidectomy on the General Metabolism.

Different mammals vary very much in their power of withstanding the disastrous results which may follow complete removal. I have never observed any grave effects supervene on the removal of the thyroid in rabbits. This has been explained on the ground that the parathyroids are relatively large, and lie well away from the thyroid itself, and consequently cannot be removed without a careful search—in other words, they escape removal during the operation of thyroidectomy.

Swale Vincent and Jolly have shown that after thyroidectomy the parathyroids actually secrete colloid, and, in fact, perform the functions of the thyroid, just as they resemble it in structure after this operation. But I do not believe that this question of the remaining parathyroids is the whole truth.

I think rodents have less need of the thyroid than other mammals, such as the carnivora. It may be because the diet is different, but also I feel sure it is due in some measure to the variations in the structure and function (or degrees of function) seen in the other ductless glands. I have already alluded to the differences in structure between the ovaries of rodents and the higher mammals. If we take cats and remove their thyroids many die in a few days, usually with convulsions. In these cases it is probable that the immediate result is due to the removal of the whole thyroid apparatus (thyro-parathyroid). Some, however, survive the operation for a long period of time. In all these cases one can demonstrate the removal of the whole thyroid together with the internal parathyroids, which are embedded in the two lobes of the thyroid. So that one gets in these animals the true effects of thyroid insufficiency. The number in which the metabolism was investigated fully was small, for, as already stated, many died too soon for the metabolism, as represented by the urinary excretion, to be estimated. The record of one non-pregnant cat, which was destroyed two and a half months after operation, has been selected as typical. Other cases were complicated by the cats having had kittens shortly before operation, and in consequence did not appear to be suitable for averaging.

In this animal acetone was present three times in twenty estimations after operation. The calcium excreted