TREATMENT BY ROENTGEN AND RADIUM RAYS.*

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THE discovery of the therapeutic property of x rays, like the x rays themselves, was more or less accidental. The pioneers in the x -ray world, continually exposing their hands to the rays, began to notice after a time peculiar and unpleasant changes in the skin. A form of dermatitis developed, of a very obstinate character, especially if the x -ray work were persevered in. The changes in the skin of those parts most frequently exposed were of course quite unexpected and the tendency at first was to blame the developing solutions or anything but the real cause—the x -ray tube itself.

Finally parts were exposed deliberately to the action of the rays, and it was found that the dermatitis could be produced at will. It was also noted that, if sufficiently prolonged, a destructive inflammation was produced causing sloughing of the skin and more or less of the subcutaneous tissues, finally leaving behind an ulcer possessing unique characters, the chief of which was its great chronicity.

It was evident that here was an irritant and caustic having characteristics peculiarly its own and the effort to make use of it in the treatment of diseased tissues was merely a development along normal lines.

The changes observed on normal skin under the influence of x rays are (a) pigmentation, (b) erythema, (c) blanching and loosening of hairs. This order is not invariable. In individuals who burn rather than tan after exposure to ordinary sunlight the erythema usually precedes the pigmentation. These changes are superficial and of no serious moment and if the exposure to x rays be stopped at this point, the skin rapidly clears up and resumes its normal condition.

If, however, the exposures are continued another set of effects begin to manifest themselves, the first and most important of which is dermatitis or x -ray burn. The extent of this burn varies with the amount of exposure, and it will be found possible to divide x -ray burns according to their severity into degrees very much as in the case of ordinary heat burns (Pusey and Caldwell).

First Degree.—Dry dermatitis, without destruction of tissue, first appears around the follicles as a punctate redness, gradually becoming diffused over the whole exposed area. It is not accompanied by pain, but perhaps by a burning or tingling sensation. If the process stops here; irritation rapidly subsides, there is some desquamation and, except for more or less pigmentation, the area becomes normal.

Second Degree.—This proceeds as above, but goes on to the development of a bright red dermatitis with vesiculation. Vesicles rupture, leaving a weeping surface which gradually becomes covered with epidermis and returns to the normal, as in the first degree.

Third Degree.—Here we have a dark red, angry dermatitis with intense congestion. Redness disappears on pressure, but immediately returns. Vesicles and bullae develop, rupture, and leave a raw weeping surface, upon which is formed a greyish necrotic membrane composed of epithelium. This is adherent, and when removed forcibly the surface bleeds freely. Patients as a rule do not complain of much pain, but there is always some, and also burning or itching, which may be severe and last a long time. The connective tissue is not destroyed, but may be swollen and infiltrated.

The process of resolution after a burn of this degree is not so simple as in the first and second. Some cases throw off the membrane quickly and it is not reformed. Epithelium grows in from the margins and from small islands dotted over the surface of the ulcer, and, as a rule, healing will be complete in from three to four weeks from the development of the bullae. In other cases relapses occur which may carry on the process for three or four months. The newly-formed epidermis is generally very red for some weeks, and the skin is left smooth, thin, and softer than normal.

Fourth Degree.—In the development of this form of x -ray burn, the congestion goes on almost to the state of stasis. The skin becomes blue or purple, brawny, and tense, bullae are formed, and later on there is actual necrosis of the skin and subcutaneous tissues. The necrotic tissue is of a dark grey colour, tough and adherent and the line of demarcation is not well marked. It remains *in situ* for a very long time—

months—if left alone. After it is thrown off the surrounding tissues gradually regain tone, the ulcer contracts and heals over in the ordinary way, except that the scar is more vascular. This is a type of burn seldom seen nowadays and rarely if ever produced intentionally.

A friend of mine who produced intentionally a severe x -ray burn on the back of his hand, has now in the scar numerous telangiectases which are apparently permanent.

On the hands of those who are exposed to x rays more or less continually— x -ray workers—and who do not take precautions, there is developed a chronic persistent atrophic dermatitis seen almost entirely on the backs of the hands. The skin becomes thin and cracked, particularly about the joints, pink in colour, and marked with small telangiectic areas (Sequeira)—like small capillary hemorrhages. The nails become longitudinally striated and brittle. There may be exfoliation of epidermis, and suppuration under and loss of the nails. In all degrees of x -ray dermatitis the hairs suffer, they may be merely decolorized, but more often they fall out.

From the early effect on the hairs, and the dry, cracked condition of the skin after prolonged exposure, it would seem as if the hair follicles and sebaceous glands were peculiarly susceptible to the influence of x -rays.

The effect of x rays on deep-seated tissues is very much less than on the skin, for the very obvious reason that most of the rays are absorbed by the latter, and the deeper tissues come in only for a very small remainder. But that the x rays do affect the deeper tissues is beyond doubt; a happy instance of this is the relief of deep-seated pain which frequently follows exposure to their influence. In the treatment of a case in which pain is a feature, the relief—sometimes after a single application—is one of the most common observations, and this alone justifies its use in cases not otherwise very suitable. Individuals vary as regards susceptibility. Speaking generally, fair people are more so than dark, and it is well to remember that an area which has been the site of an x -ray dermatitis is more susceptible than it was before. No part of the body seems more susceptible than another, except the eyes; conjunctivitis being very easily produced. We are occasionally asked to treat cases of trachoma, and some of these have been apparently cured by this means, but the application requires to be made with the greatest care and skill.

The microscopic changes are very interesting, and consist, in general terms, of a slow degeneration affecting principally the epithelial cells, and, to a lesser extent, the cells of the glands and vessels. The cells of connective and muscular tissues are only affected in the very severe forms of x -ray burn. As the degeneration proceeds inflammatory reaction comes on, vessels are dilated, and there is a marked migration of leucocytes and red corpuscles. This active process of leucocytosis seems to be the chief agent in effecting the removal of masses of tissue which have undergone great degeneration.

The changes in the blood vessels are important, and, according to Gassmann, are as follows:

The vessels are changed into irregular swollen masses, the lumen being sometimes obliterated and sometimes filled with corpuscles, and surrounded with a mass of infiltrating cells. The intima is thickened, endothelium swollen and detached from the wall. In the larger arteries and veins there is also thickening of the intima, proliferation of the endothelium, and partial or complete obliteration of the lumen. There is considerable vacuolation of intima and muscular coat. In the latter the cells seem pressed together, are smaller, and the fibres between them do not stain well. Leucocytes are present in the middle and especially the outer coat. It seems to me that in these changes in the vessels we have an explanation of the great chronicity of the lesions produced by prolonged exposure to x rays. It is a case of starvation due to the interference with the proper supply of blood to the parts.

PRACTICAL APPLICATIONS IN THERAPEUTICS.

The first disease which occurs to one is rodent ulcer. In the treatment of this disease by x rays we have most distinctly a real acquisition to medical science. This disease is incurable otherwise; total extirpation by surgical means is not a cure. Its almost inevitable persistence after other forms of treatment is familiar to most of us. In short, a cure formerly was the rare exception, whereas now under x -ray treatment a cure is the almost invariable rule.

It seems to be primarily a disease of the sebaceous glands. It spreads locally all the time, but does not disseminate along blood or lymph channels. I mentioned above the apparent

* A paper read before the Kensington Division of the Metropolitan Counties Branch of the British Medical Association.

elective affinity of the x rays for the sebaceous glands. The great success of this method of treating rodent ulcer would seem to bear out this idea. Another point bearing on this is the fact that x -ray dermatitis is never seen on the palm, which has few, if indeed any, sebaceous glands. Of course it is not exposed to anything like the extent the back of the hand is, but it is just possible the absence of sebaceous glands may have something to do with it.

From rodent ulcer it is but a step to cancer; in fact I am not sure that rodent ulcer is not believed to be a form of cancer by some authorities. It is certainly sometimes very difficult to be sure which we are dealing with.

On the subject of cancer you will naturally be inclined to ask the question, Have any undoubted cases of epithelioma ever been cured by x rays? There is no doubt in my mind that the answer is "Yes," but it will be found that the successful cases were almost invariably superficial. Such cases are most often dealt with surgically, and rightly so; but sometimes the patient absolutely refuses operation, and under such circumstances, provided the growth is quite superficial and localized, the x rays can be depended upon to effect a cure in almost all cases.

One of the greatest uses of x rays with respect to cancer is that of their application after an operation for the removal of a cancerous growth. I think if ten or a dozen applications were given after the wound had healed, as a matter of routine, we would hear less of recurrences.

A common type of case sent to us for x -ray treatment is that in which we find numerous small lymphoid nodules in clusters, and in the immediate vicinity of the scar after an operation for the removal of a cancerous growth. These nodules are in or immediately beneath the skin, are undoubtedly cancerous, and are easily removed by x rays. Unfortunately, however, these recurring deposits do not spread only towards the surface, and the great majority of these, as indeed of all the cases that are sent to us for x -ray treatment, are doomed. All is not hopeless, however, as we are sometimes enabled to discharge a patient as apparently cured; but of course all such are kept under observation and instructed to report themselves immediately on the slightest suspicious sign of recurrence. But whatever the final result may be there is in all cases evidence of good effects locally—inhibition of the growth at least, if not definite reduction.

The microscopic changes in a cancer undergoing x -ray treatment are interesting. The young cells at the periphery of the cell nests are seen to be degenerating and breaking down, they lose their outline and the nucleus is fragmented.

These changes can take place in a growth covered by sound skin and without any signs of the skin breaking down. From this it would appear that the rays have some selective action on young cancer cells. As bearing on this statement, I saw a case at one of the large hospitals of a cancer of the neck, covered by sound skin, which softened and broke down under x -ray exposures. It discharged a quantity of liquid or semi-liquid material containing numerous white masses which were undoubtedly cell nests in an extreme state of degeneration. That such changes do occur in the cell masses of epithelial cancers under the influence of x rays has been clearly demonstrated by Pusey. The same writer thus sums up the action of x rays on cancerous tissues:

It is evident that we have to do here with an agent of extraordinary character; it destroys tumour cells which have power of proliferating and of infiltrating and destroying surrounding tissues almost regardless of their nature and structure. It attacks the youngest and most actively proliferating and most destructive cells, while its effect on the normal tissue is of markedly less severity.

In this very power of softening and breaking down cancerous tissues we are confronted by fresh difficulties. In the first place a considerable amount of toxins is sure to be liberated, and ultimately have an unfavourable influence on the patient's general health. I think it should be a rule in treating cancers of any size to promote the elimination of these toxins by every means at our disposal, such as iodides, purgatives, diuretics, and moderate outdoor exercise if circumstances permit.

A greater danger, also, has to be considered, and that is the one of disseminating the disease by loosening and setting free numerous cancer germs to form nuclei of fresh growths in distant parts. I am strongly of the opinion that in the x -ray treatment of large cancerous masses this is no imaginary danger, and is one reason why attempts to deal with them have met, so far, with so little success.

There is one variety of cancer which gives very good results with the x -ray treatment, and that is atrophic scirrhus.

Here we have a growth undoubtedly cancerous, but quite localized, and tending to shrink rather than to spread, but yet having the power to infect, more or less, distant parts, sooner or later, if not removed or destroyed. So far I have treated but one case of this kind, and the growth disappeared with surprising rapidity. Several other observers have noticed this.

Sarcoma.—The changes produced by x rays are very similar to those in epithelioma. There is the same destructive effect on the younger and most actively proliferating cells, but from the fact that sarcomata are vascular growths and more dependent on a free blood supply for their development, the x rays act with greater efficiency by virtue of their effect on the smaller blood vessels—thickening of the intima, with narrowing, or even obliteration, of the lumen. For this reason, under favourable conditions, we should get comparatively good results; but, unfortunately, most cases come to us after other methods have been tried and found wanting and local and general dissemination already begun.

To get good results we ought to be well on with our treatment before there is any dissemination, since the superficial parts of the growth are the first to succumb, and not until they are removed do the deeper portions come in for efficient treatment. From these deeper parts dissemination and local invasion may, in the meantime, extend to the point of rendering our efforts futile.

A case of sarcoma in the posterior triangle of the neck was treated at the London Hospital by x rays as a last resort. So far as local appearances were concerned this case did remarkably well. The tumour was about the size of half an orange, and it became so reduced that the normal contour of the neck was almost restored. Unfortunately, however, the disease invaded the chest, and the case passed out of my hands.

Another case treated in the same department—sarcoma of the scalp in the middle line at the back portion of the frontal bone—was twice operated upon, and recurred after each. Under the x rays the growth entirely disappeared. That was seven months ago, and there is still no sign of recurrence.

Tuberculosis.—The treatment of some of the manifestations of this disease by x rays is now an established method, notably in the case of lupus vulgaris. This was the first disease to be treated by x rays, and was suggested by the success of Finsen with his light treatment. Sufficient successful cases have been reported to give the x rays an established position in the treatment of this disease, and as a matter of fact there is a growing impression that it is as good, or even better, than the Finsen method. Next to rodent ulcer, the treatment of lupus is the most successful application of x rays. As compared to the older method, a much smaller number of shorter exposures are required, and in the great majority of cases the whole area can be treated at once. It is thus much less tedious, is cheaper, and apparently equally efficient. Cases, more or less successful, of the treatment of other tuberculous lesions have been reported, such as enlarged cervical glands, ulcers, scrofuloderma, and verruca necrogenica. Leigh reports a case where excision of the elbow was considered necessary, but was exposed two or three times weekly for two hours to x rays. After six exposures the inflammation disappeared, and there was no recurrence after eighteen months.

Tertiary Syphilides.—The results of the treatment of these have not been such as would justify one in substituting it for known methods of treatment. I might mention, however, that recently I was permitted to see at a large London hospital an extensive case involving the whole leg, which had resisted the usual methods and which took a decided turn for the better after x -ray treatment was begun.

Psoriasis.—Good results have been obtained by competent observers in the treatment of this disease by x rays. It cannot be said that it does anything to prevent recurrence, but the method is easy to apply and much more pleasant than the various evil-smelling compounds ordinarily used, and it has succeeded in bringing about a temporary alleviation in cases where all ordinary methods of treatment had failed.

Chronic Eczema.—There is abundant evidence to prove the value of x rays in this troublesome complaint, and often in a surprisingly short time. For many years before x rays were discovered I had suffered from a dry and very irritable form of eczema. A short time after I began to use x rays I noticed the eczema was very much better, but it did not occur to me to connect the two together. Considering what we now know about the therapeutic value of x rays, the ex-

planation is quite clear, and though I have never deliberately treated the eczema, so long as I am carrying on *x*-ray work the eczema remains in abeyance.

The number of diseases in which *x* rays have been tried is very large, and would take more time than we have at our disposal to even enumerate, let alone report the results obtained. It will probably be some time yet before the therapeutic value of *x* rays comes to be accurately defined; but so far as the investigation has been carried, it would seem that for the treatment of all chronic, obstinate, and malignant conditions of the skin and easily-accessible parts we have in *x* rays an agent of very great value.

THE TECHNIQUE.

In the selection of a coil for *x*-ray therapeutics it is important to see that it gives a thick fat spark. A coil giving such a spark, 6 in. to 8 in. long, will meet all requirements. In the choice of tubes, this depends entirely on the effects desired; the softer the tube the more superficial the effect. The therapeutic power of the very hard tubes is very limited. The rays from these penetrate so readily as to suffer little absorption by the tissues. Having chosen a tube for a case always use the same tube for that case, as it will be found much easier to keep control of the resulting effects.

When treating localized conditions such as rodent ulcer and lupus it is necessary to protect the surrounding parts. Thin sheet lead is mostly used, but special tubes have been devised for application to cavities and very localized areas. In treating cancer cases it is advisable to screen as little as possible.

Elaborate schemes of technique have been devised and are practised by some individuals, the idea being to arrive at a means of producing a certain effect, neither more nor less, as desired variations in personal susceptibility, and the difficulty of maintaining exactly the same conditions in battery, coil, and tube at all times have rendered such efforts more or less abortive.

The routine method employed at the London Hospital is as safe as any I know of. The tube is fixed about 9 in. from the exposed surface; a full span of the hand gives this distance with sufficient accuracy. Applications are made for ten minutes on an average of three times a week. This method enables one to keep in touch with the progress of the case, with little risk of producing a too severe dermatitis in the event of landing on a very susceptible individual. The question as to whether dermatitis should be produced at all or not is one about which there has been some difference of opinion. Probably the best results are obtained by producing and maintaining a mild degree of dermatitis; the great difficulty is to avoid overdoing it. Practice and experience are the only sure guides to successful treatment.

GENERAL CONCLUSIONS ABOUT X RAYS.

In conclusion, we may take for granted that in *x* rays we have an agent of considerable power and one capable of doing much good in the cause of suffering humanity—the results in rodent ulcer alone represent a great triumph—but also capable of doing much harm in the hands of unskilled and unqualified persons. There seems to be a popular idea, among some people at least—for which I think we have the instrument makers to thank in great measure—that all that is necessary is to buy a more or less elaborate outfit and learn to work the switches. The extent to which *x*-ray work and medical electricity generally is being commercialized is deplorable. Institutes under various titles are springing up in the various parts of London and the provinces. They advertise freely in the lay press, and receive and treat all and sundry who present themselves. One of the worst features of the case is that many members of our profession habitually employ unqualified men to do their electrical treatment—a practice not to be distinguished from “covering,” which is very severely dealt with by the General Medical Council. The subject really deserves a better fate than to fall into the hands of laymen to be exploited as a commercial undertaking.

A proper medical training is as essential here as in any other branch of medicine, and the more one has been trained in electricity the better will he be in a position to deal with the various problems which are always arising. That disaster sometimes follows the want of the above essentials is exemplified by occasional actions for damages in the law courts.

RADIUM.

This, the most wonderful discovery of the scientific world in recent years, is a metal forming the top member of the calcium-barium series. It is obtained from the barium residues which are left in the extraction of uranium from

pitchblende. It gives a red colour to the bunsen flames—resembling strontium in this respect. Almost all commercial radium is really a barium salt, containing a greater or lesser percentage of the corresponding salt of radium—usually the bromide. The physical properties of this wonderful substance have been already described in the *BRITISH MEDICAL JOURNAL* by Drs. Macintyre, Dawson Turner, Mackenzie Davidson, and others. Of all its wonderful and unique properties that of giving off rays which have an active and a therapeutic action is what concerns us most. These rays are of three kinds, each having characters peculiar to itself.

α Rays.—These consist of minute particles— $\frac{1}{80}$ the mass of the radium atom—of the radium itself, which are flung off at great velocity, and if these are projected against a suitable screen they cause a very beautiful fluorescence. It requires a dark room to see this well, and we are indebted to Sir W. Crookes for devising the spinthroscope, by which this phenomenon is seen to the best effect; α rays have little or no penetrating power, and as we must protect the radium from moisture by enclosing it in glass or metal, they cannot exercise any action on the tissues.

β Rays.—These penetrate glass, mica, and aluminium with more or less difficulty. They are primarily cathode rays, and as such must form *x* rays in collision with a solid body. The rays so produced correspond to those given out by a moderately hard *x*-ray tube. According to Dr. Mackenzie Davidson these are the rays which cause the burning and destructive action on the skin. For this reason it would seem that they are chiefly responsible for the therapeutic action possessed by radium.

γ Rays.—These are said to correspond to the rays given off by an exceedingly hard *x*-ray tube, though I doubt if the tube has yet been made to give off rays equal in penetrative power to those possessed by a good specimen of radium. With the sample at the London Hospital weighing 30 mg., the fluorescence was easily discerned with 2 in. of cast iron between the radium and the screen.

It is difficult to say how far the γ rays are responsible for the therapeutic activity of radium. We have compared the β and γ rays to the rays given off by ordinary *x*-ray tubes of different degrees of hardness. It is a matter of common knowledge among *x*-ray workers that a very hard tube giving off rays of high penetrative power has much less local action on the tissues than a soft tube. If the γ rays are merely *x* rays of exceedingly high penetrative power, one would expect their therapeutic value to be correspondingly reduced—in fact, to practically a negligible quantity. That such a standard of comparison is correct seems a matter of doubt. If we experiment in the dark room with a considerable mass of radium—30 mg. or more—and an *x*-ray screen, the difficulty soon becomes apparent. Holding the radium 12 or 18 in. behind a large screen, the latter is faintly but wholly illuminated, and if the hand be placed behind the screen it is seen in its gross outline as a dense black shadow. There is no greater translucency of the soft tissues, and by no adjustment of the screen, hand, and radium is it possible to get any differentiation between the hard and soft tissues. It is difficult from this to see how radium can ever take the place of the *x*-ray tube in diagnosis. It would seem that the rays given off by radium are not perfectly identical with *x* rays as we understand them, and consequently it is not safe to assume that γ rays have no therapeutic action because of their resemblance to *x* rays of great penetrative power.

For practical purposes we might speak of the rays of radium as of two kinds—the visible and the invisible. Specimens which have a large amount of self-luminosity are as a rule less therapeutically active. The amount of this self-luminosity possessed by the best specimens is comparatively small, but the amount of fluorescence imparted to an *x*-ray screen is very brilliant and the penetrating power exceedingly high.

PRACTICAL APPLICATIONS.

These are practically the same as in the case of *x* rays. Owing to the scarcity of the substance a very much less quantity of rays are available; but while we lose in quantity we gain in convenience and direct application. There are no wires necessary carrying a current of very high potential, and its small bulk renders it easy to apply it to parts not accessible to the *x*-ray tube.

The chief results attained so far have been in the treatment of rodent ulcer and lupus vulgaris, and the number of reported cases treated successfully is rapidly increasing. Successful cases have been reported by Mackenzie Davidson, Macintyre, Sequeira, Sichel, and others.

The value of radium in the treatment of malignant disease is still under investigation. Dr. Mackenzie Davidson has reported a case of carcinoma of the breast to which radium was applied to the extent of producing ulceration and sloughs with no resulting good of any kind, and from this he thinks radium is of no use in the treatment of this form of malignant disease. It is to be hoped further trial will give more encouraging results. Exner and Holzknecht, of Vienna, have reported cases of epithelioma and melanosarcoma treated with radium with results apparently satisfactory.

Dr. David Walsh has reported a case in which radium is being used in the treatment of a cancerous throat. The case was still under treatment but he is convinced that the progress of the case has been profoundly modified, if not arrested. The same may be said of a similar case under treatment at the London Hospital. A noteworthy fact is the great diminution in the amount and offensiveness of the discharge. Full details of this case will be reported in due course. So far as we have gone there seems reason to believe that radium has a more or less benign influence on malignant growths—whether this influence is sufficiently powerful to entitle radium to be regarded in any sense a cure is a matter for further research to determine.

METHOD OF APPLICATION.

No doubt the most efficient way would be to apply the radium near the area to be treated without any intervening diaphragm. This I have tried, but it is not satisfactory, owing to the impossibility of keeping the radium dry. Moisture reduces its radio-activity very seriously, so that any advantage there may be in direct application is very soon counteracted. The same objection applies to its use through mica, though to a lesser degree; mica obstructs the passage of the rays much less than glass.

The best plan is to have it in small glass tubes 1 in. or 2 in. long, containing 5 mg. in each, as suggested by Dr. Mackenzie Davidson. One, two, or more of these may be used according to the requirements of the case.

As to the length of time between the applications and the duration of each it is impossible to lay down any hard-and-fast rule as yet. So much depends on the amount and radio-activity of the radium used. Taking that of uranium as the unit of radio-activity, the specimens of radium obtainable range from 5,000 units to 1,000,000 units or more. The plan followed at the London Hospital is to apply it for half an hour every second or third day, and there has been no severe reaction in any case as yet. Once we can obtain an adequate supply of radium of a standard radio-activity, the question of application will be very much simplified.

The following notes refer to a case of rodent ulcer successfully treated with radium, which was shown at the meeting when the above paper was read.

It is not, of course, claimed that in this case a cure was brought about in record time. Probably the x rays would have cured the case within a month, instead of a little over fifteen weeks. It must be remembered, however, that at the time of commencing treatment very little was known of radium in the treatment of disease. It was the first case submitted to such treatment in the London Hospital, and it was considered advisable to proceed with caution, and for this reason there were two, if not three, intervals of a week during the first half of the time, that the treatment was suspended in view of the possibility of a severe reaction taking place. We now know such a precaution was unnecessary. A further reason for the long time taken in effecting a cure was the small amount of radium available. Placing the radium the same distance from the surface of an x -ray screen, it was seen that an area $\frac{1}{4}$ in. in diameter was all that came within the effective field of action, and I think I am safe in saying that had there been enough radium to subject the whole ulcer to its action a dozen applications would have been sufficient to effect a cure.

In support of this assertion I was shown a case of a small rodent ulcer, $\frac{1}{4}$ in. in diameter, under the care of my colleague Dr. Sequeira, which was quite healed over after nine applications with the same specimen of radium used in this case. From a cosmetic point of view the result has been exceedingly satisfactory.

J. B., age 57, sailor, came to the London Hospital in July last, suffering from rodent ulcer. He was under the care of Mr. Eve, who referred him to me for treatment with radium.

History.—The patient first noticed a "wart" two years ago on the left side of his nose, the top of which he rubbed off while drying his face with a towel, a scab formed which in turn was rubbed off, and this process had continued more or less ever since, with occasional bleeding and a progressive increase in size.

Condition at the Time of Admission (July 15th).—There was a furrowed ulcerating surface measuring $1\frac{1}{2}$ in. by $\frac{3}{4}$ in. on left side over the nasal bone, coming down slightly over the cartilage. The surface was raised above the level of the surrounding skin and of a pink colour. Up to the time of admission no treatment of any kind had been attempted.

Progress.—Ten milligrammes of radium bromide of good penetrating power were used held in a vulcanite capsule having a window of mica. It was supported about half an inch from the surface and applied for 30 minutes daily except Saturdays and Sundays. In the intervals of treatment a mixture of zinc ointment and lanoline was applied. As there was no perceptible change beyond a slight increase of redness ten days later, the radium capsule was applied almost in contact. August 3rd. Itching; the sore was discharging freely. August 24th. The itching had ceased, the sore was less swollen, and the surface had a more healthy appearance. September 16th. The surface was now almost level with the surrounding skin. There was very little discharge. The upper and inner parts were cicatrizing, and the appearance of the ulcerating surface was healthy, circular in shape, and $\frac{3}{4}$ in. in diameter. As there had never been anything approaching a decided reaction the length of exposure was increased to one hour. October 22nd. The raw surface was less than $\frac{1}{4}$ in diameter, quite level, and had all the appearances of a healthy granulating sore. This was quite healed on October 27th. There were 76 applications in all.

The patient was last seen on February 2nd, 1904, and except that it is more shiny, the scar very closely resembles the surrounding skin both in colour and texture.

A special feature of this case was that beyond the application of a little vaseline once or twice daily, no attempt had been made to effect a cure up to the time the case came under observation, and that radium was the only agent used in the treatment.

My thanks are due to Mr. F. S. Eve, surgeon to the hospital, for his kindness in allowing me to publish the details of this case.

SOME TYPICAL EXAMPLES OF ROENTGEN-RAY AND HIGH-FREQUENCY TREATMENT

WITH OBSERVATIONS THEREON.

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I SHOULD like to offer a few remarks on the following cases treated by the Roentgen rays and high-frequency electric current, and also on the general application of the Roentgen rays therapeutically. The few cases taken from my notebooks from some hundreds treated at the London Skin Hospital and in private, during the last four years, are fairly typical ones, as they are all absolutely cured cases, with no return during a long period after treatment. In the cases treated by the Roentgen rays, my *modus operandi* has been the use of a Mackenzie-Davidson break with a coil of 12-inch spark and a medium tube, rather hard than soft, made for me by Messrs. Harry W. Cox and Co., Limited, of Cursitor Street.

I use 24 volts for the break and coil, and generally give three amperes with the surface of the tube 4 in. from the part affected.

I generally, but not always, protect the surrounding parts by thick lead foil covered on both sides with silk, as the emanations from the tube consist of a large amount of static electricity from the surface of the glass, combined with the Roentgen rays from the interior, the lead foil thus cutting off the rays, and the silk, the static electricity. Proof of the amount of static electricity being given off, can be obtained by stroking the skin of the patient while under the rays, when a peculiar rasping will be felt by both patient and operator.

My experience had led me to trust in short applications 5 to 10 minutes—never more—ceasing treatment when any marked dermal congestion occurs, but keeping the patient under observation. By these means I have been enabled to give fairly continuous treatment until apparent cure, but the effect of the rays being cumulative I find that patients return, after a prescribed period of rest, in a better condition than after entire cessation of treatment.

The great point about the results of Roentgen-ray treatment is the very natural appearance of the scar which results—a soft and pliable one, with no keloid.

I should also like to draw attention to Cases v and viii, where the Roentgen rays, applied through a special nasal dilator made for me by Messrs. Allen and Hanburys, of vulcanite only, were enabled to affect the cartilaginous septum of the nose with the best results. In certain cases I have