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Thesis.

Röntgen rays in the treatment of disease compared with Radium & Finsen light.

Seldom if ever, in the history of modern medicine, has anyone outside the profession had the honour of placing in the hands of both physician & surgeon, an instrument, of such vast possibilities in the elucidation & treatment of pathological conditions, as that supplied by Röntgen in his X-ray tube, in 1896. More recently, Madame Curie states that honour by the contribution of another ray generator in the form of that remarkable substance named radium, which she discovered in 1902. After considering the nature, production & methods of applying X rays it will be convenient to compare this action with what is known of radium, the ultra violet rays, produced by Finsen some ten years ago. To understand the nature of these several kinds of rays, we have to recall the assertion of Maxwell that "light, electricity & magnetism are all affections of the
same medium, and the experiments of Huyghens, he found, electromagnetic vibrations had a rate of frequency between those of light & sound, it travelled through space with a velocity about equal to that of light. He demonstrated the vibrations of different wave lengths of the colors forming the visible spectrum, and showed that vibrations were not confined to that area, that in fact beyond either end of the spectrum rays existed which, though having some common characteristics yet differed in other respects. Proceeding from the red end to a point far beyond, he found the wave lengths of the vibrations increased, differ in character accordingly. Some being the source of radiant heat, others of a longer wave length, having the property of transforming a bad conductor of electricity into a good one. These waves have been termed after the eminent physicists; Hertzsprung towards the ultra violet end, Tyndall beyond, the wave length of the vibrations diminished progressively from about 6,000 to 4,000.
to one of almost infinitely small size. The curvies actinic & germicidal properties of the ultra violet rays in the one case, change their germicidal for a wonderful power of penetrating solid bodies in the other. So the latter class belong the Roentgen & radium rays. What their wave-length is or the number of their vibrations per second are as yet unknown. Of the discovery of Roentgen rays, probably nothing has ever excited such an interest in scientific circles than his announcement. To Crookes and Lenard however hardly less honour is due. They were the pioneers whose experiments suggested the way, and led to the brilliant achievement of their successors. Crookes, after having succeeded in exhausting a tube of air to about 1/10,000,000 part of an atmosphere, passed a current of electricity through it, and found the stream coming from the negative pole became fluorescent on striking the wall of the tube. This he termed the kathode stream, and he believed it
to be composed of innumerable small particles, driven off from the negative pole with a velocity of about 250,000 miles per second. Rutherford repeated these experiments, and then by removing a piece of glass opposite the negative pole, replacing it by a piece of aluminium, he was able owing to the penetrating power of the rays, to get the rays outside as through a window. This was a great advance, as otherwise we should never have been able to make use of the kathode stream as a therapeutic agent. Thus obtained, he found they could be deflected from their path by a magnet, could produce fluorescence of certain substances, act on a photographic plate, and pass through opaque bodies. Then Rutherford, by still further increasing the vacuum of the tube discovered the rays known by his name, but called by him X rays. Here he found to be more penetrating than those of the kathode stream and could not be deflected by a magnet. What however made his discovery
so popular, was the fact that their penetrating power depended upon the density of the substance exposed to them, hence, while they readily penetrated the skin they had a great difficulty in getting through bone. It was an easy matter therefore to obtain a shadow of the bones of the hand, for instance, by placing it between the rays and a photographic plate. A very great improvement on the tube was then made by Jackson & Poller. They found by experiment the best way to stop the cathode stream, was to place in its path, within the tube a platinum target. When the cathode stream impinges on this it is stopped, and a fresh series of electric waves impuluses are set up, which travel forth in straight lines through the tube with great velocity, and cannot be deflected by the strongest magnet. What the discovery of these X-rays meant to the medical profession can hardly be overestimated. Sir James J. Simpson in his day is said to have predicted that in some future time means would be discovered which would enable us...
to see through the soft parts of the body, but even could he now see the fulfillment of his prediction, he would be greatly astonished at the perfection of the result. So the surgeon the discovery became an incalculable boon. The uncertainty of knowing whether a foreign body as a bullet was, or was not present in any part of a patient who was set at rest. Difficult fractures obscure joint injuries ceased to worry him, and in favourable cases calculi could be made and in a kidney where symptoms were doubtful or absent. The anatomist could study the growth of the epiphyses of the bones in the living subject, with an ease and accuracy hitherto impossible, and by injecting the vessels of the cadaver with a preparation of lead he could study them and their branches with equal facility. So the physician the X-ray at first seemed to offer but little, other than perhaps in confirming or correcting his knowledge of clinical anatomical data; demonstrating by sight an enlarged heart or the presence...
of an aneurysm. As experience and knowledge increased daily, it was soon seen that the physician too was likely to be vastly benefited by this wonderful radiation. A great impetus was therefore given to the study of electro-therapeutics in general, to these new electric lamps with their mysterious green light, in particular. For the purposes of treatment, x-rays are most commonly produced by passing electrical discharges from a large induction coil through a high vacuum tube. Another method is to pass the ray or rays directly through the tube, the discharge coming from a Wimhurst or other powerful static machine. If a coil is used, the source of electricity may be obtained from primary or secondary batteries, or from the constant or alternating current mains - a transformer becoming necessary if the latter is used. If the batteries the secondary are undoubtedly the most convenient and portable, though requiring to be recharged from time to time by dynamos or other suitable method, the best have a high potential
energy. The suddenness with which the current is broken is of the highest importance in producing clear illumination of the tube. Many patent contact breakers have therefore been introduced, some of which have added greatly to the efficient working of the tube and coil. A few are modifications of the well-known Dreyfuss' hammer break, others are of a rotatory or vibratory nature, in which the contact breaker, rapidly dips in and out of a vessel of mercury, or still others, where the principle of the electrolytic action arising from passing heavy electrical currents through a small platinum electrode dipping in mercury is introduced, an instantaneous coating of gas is formed on the electrode when the current is made, this stops the current automatically, the gas as quickly escapes the current is again broke and so on. The Dreyfuss tubes now mostly in use are called focus tubes, and though varying in design and devices for regulating the vacuum, they essentially consist of a globular or bulb-shaped body
with a tubular extension on opposite sides, one being placed nearly at an angle of 45° to the other. These extensions carry the wires on which the electrodes are fixed, and the latter are so arranged, that the stream from the concave negative pole converges to a focus near the centre of the tube, and these impinge at a small point on the face of the anode. The rays from that point are free to escape in all directions through the tube on a level with the face of the anode. To complete the circuit, reproduce the rays, the secondary terminals of the coil are attached to the terminals of the tube. The break is set at the current turns from the latter. The methods of applying X-rays for therapeutic purposes is simple. The part we desire to treat is exposed to the active side of the tube at a distance varying from two to eight or more inches, the surrounding area is or is not protected with an imperious covering. If the disease lies within the rectum or vagina, the
tube may be covered with a lead-glass shield, to which may be attached specula of various sizes of the same material, allowing the rays to act on the part exposed on the end of the speculum & no other. The amount of current may vary from one to four amperes, or more. On the primary coil generally two or three are best. Exposures as a rule should not last for more than five or seven minutes twice a week for furthermore or three weeks to begin with, as some patients are peculiarly susceptible to the rays and may be scorched. At the end of that time if there be no tingling or redness of the part exposed, exposures may be increased to ten minutes every other day or if the case be an urgent one, daily. The distance between the part of the body exposed & the tube varies to some extent on the condition of the latter. With a soft tube it is not advisable to approach nearer than six inches. A light would be better with a hard one, however three or even two
Inches may intervene between tube & skin, and in the case of a hard tube, the exposure may be continued for from fifteen to twenty minutes without much danger. A case under my care was exposed for from fifteen to twenty minutes daily during a period of three weeks without any reaction. The distance between tube & skin being from two to a half to three inches; on this distance being reduced to two inches, however, a moderate reaction followed. The tube was equal to four & a half inch steel pipe on a ten inch coil. The vacuum of a tube after usage gradually becomes raised, and in consequence, it becomes more difficult to drive the current through it. The tube in this work becomes hard. When new, the ordinary focus tube has a spark gap length of about two & three inches. In this manner no current would pass through the tube than jump across from one discharging point on the coil.
to another three inches distant.
A tube that has become too hard
for an eight inch coil, may yet
however be only of medium hardness
for a fourteen inch. While this
process of hardening is going on a
change is taking place concurrently
in its physical and physiological qualities.
The chief of these with which we have concerned
are their healing power over diseased conditions
on the one hand, & their property of setting
up dermatitis on the other if too freely
used. The soft tube possesses these two
qualities in a greater measure than the
hard. Evidently, therefore, the rays are
not all alike. Prof. Lodge, believes
in the case of the hard tube less obstruction
is put in the way of the cathode stream,
with the result that it impinges with
maximum velocity on the target, and
gives rise to a volume of thin very pene-
trating rays. I am inclined to believe
that a wider experience will prove
that much of the therapeutic value.
Of a tube has been lost when it has
become hard. My reason for
that opinion are these:—The physiological effects produced in the skin on exposure to the rays from a soft tube, are brought about more rapidly than from a hard, and as the ionising action of the rays, are believed to be largely associated with these effects, it presumably follows, that the ionising property is more largely possessed by the soft tube. The time taken by the average hard tube to bring about anything of the nature of a dermatitis is so long, that it is at least less possessed of that quality. Amongst experienced X-ray workers it is commonly stated, that in many cases the best results are only to be obtained, after a more or less moderate dermatitis has been produced. In the case of deeply seated growths, where one would expect the penetrating effects of the hard tube would be peculiarly suitable, beneficial results as far are not, disappointing, whereas many superficial pathological conditions of a like nature, have yielded in the most satisfactory way to a moderately soft or soft tube. In the June 1935 number of "Treatment" W. C. Hall Edwards also says
In certain cases which have failed to respond in reasonable time to a hard tube, I have found the judicious use of a soft one to yield beneficial results; and I look upon the production of a reaction in these cases - Robert Clews as a sine qua non to successful treatment. Others believe the best results are to be got in some cases, by giving one exposure sufficient to cause a smart dermatitis & then leaving the rest to the peculiar, delayed, healing effects which follow. Which ever of these methods are taken, however, it is the soft tube that is used. Again Dr. Dawson L. has cited three cases where the Cathode rays proved beneficial when the X-rays had failed; and Dr. Lewis Jones says, the Cathode rays play an important part and are active factors in bringing about therapeutic results. The latter may not have more than a problematical bearing on the question, but the rays proceeding from a hard tube, are thinner, less hissed than those arising from a soft tube and Prof. Lodge thinks in the process of hardening many of the Cathode electrons...
do find their way through the glass walls of the tube. However in our present state of knowledge it is impossible to state precisely whether the penetrating action of the rays has or has not anything to do with the therapeutic results. Certain it is that besides the X-rays pure and simple, we have in the neighbourhood of an active tube some Cathode rays, X-ray waves, green visible rays, ultraviolet rays. The question therefore though very important abounds with difficulties and until we can analyse the several factors which produce certain results, understand the exact physiological effect of each, and be able to utilize just the one necessary to the effect desired, no other, we can have no standard whereby to measure the therapeutic value of a tube. The action of the rays on the tissues is also a matter of doubt. It is generally believed to perform the dual functions of destroying abnormal tissues and healing & stimulating the healthy ones. Analyses which are surely unique.
falling out of hair, hyperaemia, pain of a scalding nature, necrosis of the skin and subjacent tissues may be brought about, as desired according to the length of exposure, though these effects may not appear till some days afterwards. Malignant growths in the deeper tissues can however be attacked, without injury to the overlying skin, and this proves the cell elements of abnormal tissues to be less able to withstand the destructive effects of the rays than the normal ones. Exposed to them the growth shrinks, the cell elements break down and become absorbed. As already stated, many experienced workers believe the best results in many cases, follow after production of a moderate dermatitis. Both methods have their disadvantages and dangers. During the dermatitis no further exposures can be given, and unless the exposure has been sufficiently severe to kill all the diseased tissue, much valuable time has been lost if it has been severe the resulting
dermatitis may lead to an intractable ulcer that only a scalpel can remove. By the other method, ulceration is perhaps more apt to follow, and toxaemia certainly is a more or less common accompaniment. Indeed in the case of daily exposures, such a large amount of toxic matter may be thrown into the circulation, that unless the functions of the excretory organs are assisted to eliminate it, the general health of the patient may suffer considerably, as indicated by the furred tongue, the foul breath, the loss of appetite, headache, and general feeling of malaise. My limited experience does not justify me in dogmatizing about either method. The only two cases I have in which I purposely produced dermatitis gave such an unsatisfactory result, that I shall certainly hesitate before producing it again. The first was a case of carcinoma in the region of the parotid gland. Patient was a man of 52. His family history was rather strongly tubercular and he himself had suffered in his youth
from a tubercular knee joint. He had had several attacks of influenza the last occurring in April 1903. Within a month after that attack he became conscious of a swelling in his neck. It grew & soon became the seat of pain & neuralgia which shot up into the head. Sleep became impossible without the use of Chloral Hyoscyamin which was short. Deafness followed on this side. Shortly afterwards paralysis of the facial muscles. His doctor sent him to St Thomas' Hospital where they declined to operate. He then came to me. The tumour was seen to rise suddenly from behind the angle of the right jaw, find its highest point two inches below the lobe of the ear, then gradually fall away to a point near the spine behind ear, the side of the head upwards. Six exposures of seven eight minutes duration were given in the first three weeks. After three of these the pain & neuralgia had greatly diminished, after two more they had entirely gone. Natural sleep returned without the use of
drugs, and his general health was improved. After three more exposures hearing on that side became normal. Such are the wonderful effects of X-rays in some cases. Exposures were increased to ten minutes each other day and very soon to daily. The dimness from measurements carefully taken before the applications began showed some signs of diminution but not much after six weeks treatment. As the pains in the head threatened to return it was thought a harder tube might do beneficially. One with equal to a semi-tube spark gap length was then tried. The exposures were increased rapidly till from seventeen to eighteen twenty minutes were given daily. This was continued almost uninterruptedly for about three months. A little diminution in the growth was evident. This people remarked it was much smaller. The patient's health varied somewhat, owing doubtless to the absorption of toxic matter from the growth. During the greater part of that time I had been steadily reducing the distance
between the lake and the patient.
During the first of the three months it varied from 7 to 6 inches, the second from six to four inches & the third from four to two to half but generally three inches. No reaction of the skin having followed the progress made rather slow I decided to try the effect of a dose that would cause some dermatitis. The exposure was prolonged then to twenty two minutes & the distance reduced to two inches this was repeated on the last following day, the patient was asked not to present himself for a day or two. Up to this time he dermatitis had taken place though most of the hairs of his face on that side had been blanched some even remained on the most prominent part of the tumour two days afterwards patient returned to say the face was amazing tingling and in the healthy dermatitis was well marked. This continued for about sixteen days. At the end of that time the tumour had, instead of getting smaller as I had hoped,
increased appreciably in all directions. The inflammation having subsided, the exposures were again resumed. This time the moderately soft tube was again used. The length of exposures shortened. In about ten days however small nodular masses were to be made out running down towards the clavicle, & a small one over the costoid cartilage. These were attacked also, appeared to be giving way to its rays when others made their appearance on the scalp outside the secondary area. As the patient's health began to give way it was decided to discontinue using the x-rays. The x-rays had been used more or less regularly for nearly five months. He died in February.

The other case in which dermatitis was produced purposely was one of syphilitic ulcers on the right heel. Patient a man of 26 with a good family history had contracted Syphilis about 8 years previously. The early symptoms had been overlooked till the rash appeared. A proper course
of treatment was then adopted. About six months afterwards, while still taking antisyphilitic remedies he developed an ulcer on the back of the heel. His doctor continued to press him with iodide of potassium but without much effect on the sore other than increasing the pain, he said. He saw no less than five of the best men in London, in regard to it, all told him pretty much the same thing. They varied the medicine a little, reassured him it would be all right within three months. He came to me having had it for over six years. He was an abstainer, lived carefully but had lost a good deal of weight from the pain. Really, he was then taking 4 grains of potassium iodide a day in one dose. The ulcer was about two inches in diameter, rather deep in places with over-hanging edges and many little islands sterile. It fairly looked clean, giving the whole a worn eaten appearance. It was very tender to touch. Exposures were
began with a moderately soft tube at eight inches distant in duration of seven minutes twice a week. As the patient’s occupation prevented him from coming oftener for treatment it was kept up biweekly, from the beginning of October till the middle of December with considerable success. Its appearance varied from time to time but on the whole it was small; the deeper parts had filled up to be almost on a level with the surrounding skin. At that point progress seemed to stop and indeed it was again becoming more painful. Having in appearance I therefore decided to push for the reaction. Several exposures were therefore given with a soft tube at short distance in a few days dermatitis followed this lasted for a fortnight. Rest was enjoyed for another week before resuming the exposures. At the end of this time the silver showed a tendency to revert to its original condition of much of the progress gained had been lost. I returned to the exposures with the moderately soft tube.
was now able to give three a week instead of two previously. However, although the treatment continued, this uninterrupted, for six weeks no advance whatever was made, and I then stopped applying the rays, in substituting them for the effluvia from a high frequency apparatus. Improvement at once began; within a month it had nearly all healed over with sound skin, only three very small ulcerated points remaining. Unfortunately the patient was transferred to a business at Nottingham & had no further treatment. I saw him again about two weeks ago when the condition remained as I last saw him—three little ulcers surrounded with fairly good skin, no pain, able to walk on it with comparative comfort. Such is my unsatisfactory experience of producing dermatitis with a view to a cure by X-rays. Had I boldly produced a necrosis in the first case instead of a moderate degree of dermatitis, it may be the ultimate result would
have been different yet one can hardly imagine how a large, deep, sloughing, slow-healing wound below the ear, could in any way improve the prognosis. The second case was not unlike the conditions that prevail in a Robert ulcer where reaction from the X-rays is said to bring about the best results, subsequently. In this case of syphilitic ulcer the reverse was the case—fair progress up to a certain stage before reaction, rather, a retrograde tendency, after. In contrast with the latter was a case under my care, of a large inflamed varicose ulcer of the leg, which completely healed up after six exposures to X-rays, during the course of a month, no dermatitis being produced although a soft tube at eight miles was employed.

Of other cases is one of recurrent Carcinoma of the rectum. Twenty-six months ago a male patient of 55 years had excision for a Columnar Celled Carcinoma of Rectum. Ten months later he had a recurrence within the bowel, + an epithelioma on
the posterior part of the ear externally. These were excised with the Geyger. Fifteen weeks later a suspicious point having arisen in the scar posteriorly, the patient after a further week's rest during which the new growth became manifestly less, the epithelium previously excised, was started on a course of X-rays. Two at first. Later, three exposures were given at weeks with a moderate result, while the result was a diminution in size, gradual disappearance of this recurrence. Within the bowel, however, the mucous membrane, a small fresh growth was recognised in June 1913. This had been watched most carefully, & the X-rays were continued twice a week for four till a fortnight ago, when, as I believed some increase in its size was noticeable - for up till then it had been to all appearance quiescent - I removed it. The specimen is now in preparation for the microscope. I should have said that for the last four months he had also one an average one application per week of a high vacuum high frequency
current electrode within the rectum for fifteen minutes on each occasion. The net result as far as they are, the patient is in splendid health—before the operation of a fortnight ago he said he had never felt better— he lost a small growth, probably epithelium, while being exposed to X-rays & has just had a small growth removed of probably a malignant nature whose activity was, as judged by the other recurrences, greatly checked if not otherwise altered.

In general practice, perhaps nothing has proved so satisfactory in the treatment of certain skin affections as X-rays. Cases that have proved quite intractable to ordinary topical, or general remedial applications will in many cases heal up in the most remarkable way, after a varying number of exposures, as for example cases of Özema & Psoiinia. I have had one case of each. Acute & Chronic Özema under my care recently. The acute case was that of a child of 7 years. A patch of Özema settled on the right cheek in
in front of the ear, continued to spread forwards in spite of constitutional 
local treatment. He also had several patches on the trunk, also on the arms, 
legs. He had sixteen exposures to the face, 
many of the first being given very cautiously, 
for not more than five minutes at ten 
minutes distant, owing to inflamed condition 
of the skin, with the result that all signs 
of the patches on the face disappeared & 
the others on the body though not directly 
exposed to the rays were practically healed. 
The Chronic case occurred in a girl of 18 years 
also on the face. She had been under 
treatment of various kinds for two or three 
years; though that afforded her relief, 
it soon returned when the treatment ceased. 
Ten exposures to the rays resulted in 
an apparently normal skin and up to the 
present about four weeks since last exposure 
there has been no signs of return. 
Proprazis seems to afford in some cases a 
proof that the rays also in some way have 
a constitutional effect. A boy of 11 years is 
now under my care having been sent by his medical man because he could not make
little impression on an attack of Psoasitis, that developed soon after the lad was convalescent from Scarlet Fever. With the exception of the face, patches of it were thickly spread all over the body. After the third application, the rash began to disappear even in places remote from the area exposed. He has had some fifteen applications with the exception of two small areas on his arm, he is now free from it. Another interesting case of the same disease occurred in a male of 50. He had had patches of Psoasitis on his elbows and chest for many years. After a slight injury to one elbow, a tendinitis followed, the bursa was opened, aspirated, packed with the latter, repeated daily. Being apparently to the presence of the Psoasitis which had now increased enormously, the wound would not heal. I therefore decided to try the effect of the dry ray. His elbow had four exposures within three weeks; the wound had quite healed up. The Psoasitis had disappeared. Though the patch was not as large as former, it reappeared two months after treatment.
Still more wonderful is the effect of X-rays on Roder ulcers, Lupus vulgaris, and the like. These diseases are said to be as difficult to treat as Cancer, while, although many cases of both have been cured, there is no doubt that a wide knowledge of improved methods will result in a large percentage of permanent cures. I have tried all that was at my disposal to treat these cases. In one of my patients, I placed a small X-ray ulcer of the inner angle of the left eyelid. I was able to show whether it could be cured. I have only had one case of each Lupus vulgaris and Lupus erythematosus. The first had been in the hands of a surgeon before, relieved as improved after three months' treatment. It was then given up. The other has been given up also as far as the X-ray is concerned, after over six months' treatment, as now being treated with X-ray frequency currents.

Very good results appear also to have been obtained in cases of famous cancer, Lupus vulgaris, but I have had no experience of them. Looking at some of these cases in the light of the past one can surely say that, with the exception perhaps of the讥讽
light & radium as such valuable therapeutic force has been placed in the hands of the physician for a generation more, than that of the Roentgen ray.

Radium though giving rise to rays having much in common with X-rays is still practically an unknown power from the physician's point of view. It is the most radium active substance known & gives rise to three kinds of vibrations, known as the Alpha, Beta & Gamma rays.

An inert gas - Helium.
The Alpha rays are positively charged particles of electricity, having very little penetrating power. They have actinie properties can be deflected if a magnet. Their mass is greater than the other two. Beta rays are negatively charged particles like the cathode rays from a Crooke's tube, are very penetrating. More actinie than a ray can also be deflected by a magnet.
The Gamma rays are more penetrating than either the Alpha or Beta rays. Resemble the rays from a hard focus tube. It would therefore seem possible that by chopping the rays with a lead slide or iron & deflecting
the X-rays with a magnet we would be able to obtain each in a sufficiently pure state for testing its therapeutic value. This would be a great gain and might help us also to a better understanding of the difference between a hard X-ray tube and a soft X-ray tube. Of the several salts of radium now used, the radium bromide is the most radioactive, but that varies so much from a few thousand to half a million that it is hardly possible to come to a just conclusion in regard to its action. A few satisfactory results after treatment with radium have been published, and like the satisfactory results from X-rays, they have been obtained in superficial diseases, as in Robert Lee, Lupus, Dr. Keene in medical Electrology & Electro-Therapeutics, for example, cites an interesting case of Lupus, where all three, X-rays, radium, ultra violet rays were tried at the same time, each being applied to a separate patch. In the end, radium gave the best results, but unfortunately, he gives no details. On the other hand, many have had equally unsatisfactory results.
from its use. Knowing their physical and physiological properties are so much alike, one would expect to get similar results or at least something more uniform. Until however, we have a standard focal-tube, working under a standard electrical force, and a salt of radium of a standard radio-activity, it will be impossible to make a fair comparison between the therapeutic value of x-rays and radium.

With Ultra-Violet rays or Ir-Dine light, x-rays may very favourably be compared. Each has its advantages & disadvantages. The advantages of the former are:

1. No danger to the skin & therefore painless
2. Greater reliability than X-rays
3. Germicidal effects.

The disadvantages are:

1. Small area treated at one time & therefore
2. The long time required for a cure
3. Want of penetration. (The
4. Discomfort arising from pressure of the lamp.

The advantages of X-rays are

1. A more rapid action & results
2. A larger area can be treated
3. No discomfort while being applied
4. Great depth of penetration.
The disadvantages are
1. The danger of scorching even short hair
2. Falling out of the hair sometimes.

I have seen it stated, that of the cases of interocular lupus treated by frozen serum, an average of ninety per cent of cases are cured. I doubt whether anything like that can be shown in this country, although the percentage of cases is probably very high. For all round excellence and utility however, the X-rays seem to be preferred in this country where the question of expense is a consideration. The X-rays will be adopted where they are both procurable and a combination of the two produces in many cases the best results. Dr. Leigh of Middlesex Hospital informed me that in some cases a point is reached when the X-rays seem to lose their effect, if then they are treated with frozen light they usually finish off rapidly and in the most satisfactory way.

David Findlay

28 April 1904