THE UNIVERSITY *of* EDINBURGH

D. Findlay

Thesis.

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

Seldom, if ever, in the history of modern medicine, has any one 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, Mme Curie shares 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, first used 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 and magnetism are all affections of the

same medium; and the experiments of Hertz. He found electro magnetic vibrations had a rate of frequency between those of light & sound, & travelled through space with a velocity about equal to that of light. He demonstrated the vibrations & different wave lengths of the colours 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 increase, & 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 called after the eminent physicist Hertzian waves. Towards the ultra violet ends & far beyond, the wave-length of the vibrations diminished progressively from about 1/60,000 of an inch

to one of almost infinitely small size. The curious actinic & germicidal properties of the ultra violet rays in the one case, exchange their germicidal, for a wonderful power of penetrating solid bodies in the other. To this latter class belong the Röntgen & Radium rays. What their wave-length is or the number of their vibrations per second are as yet unknown. Of the discovery of Röntgen 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 successor. 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. Lenard 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~~ 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 Röntgen, by still further increasing the vacuum of the tube discovered the rays known by his name, but called by him X rays. These 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 & Dorlet. They found by experiment the best way to stop the kathode stream, was to place in its path, within the tube a platinum target. When the kathode stream impinges on this it is stopped, and a fresh series of electric wave impulses 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 over-estimated. Sir James Y. Simpson in his day, is said to have predicted that at 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. To 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 was set at rest. Difficult fractures & obscure joint injuries ceased to worry him, and in favorable cases calculi could be made out in a kidney or ureter symptoms were doubtful or absent. The anatomist could study the growth of the epiphyses of the bones in the living subject, with an ease & accuracy hitherto impossible; and by injecting the vessels of the cadaver with a preparation of lead he could study them & their branches with equal facility. To the physician the X rays 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 experimenters 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 more or less directly through the tube, the discharge coming from a Winhurst 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. Of the batteries the secondary are undoubtedly the most convenient & portable, though requiring to be recharged from time to time by dynamo or other suitable method, they last, & 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 Neef-Hammer break, others are of a rotatory or vibratory nature, in which the contact breaker, rapidly dips in & 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 made, & so on. The X-ray 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, & there impinges 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 & produce the rays the secondary terminals of the coil are attached to the terminals of the tube, the break is set & the current turned on from the battery. The methods of applying X rays for therapeutic purposes are 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 impervious covering. If the disease be 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 two 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, & eight 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 exposures may be continued for from fifteen to twenty minutes without much danger. A case under my care was exposed for from fifteen to twenty two minutes daily during a period of three weeks without any reaction, the distance between tube & skin being from two & a half to three inches; on this distance being reduced to two inches however, a moderate reaction followed. The tube was equal to a seven & a half inch spark gap 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 other words becomes hard. When new, the ordinary focus tube has a spark gap length of about two or three inches ie. the current would rather 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 & physiological qualities.
The chief of these with which we are 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, probably 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 penetrating 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 reasons 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 deep seated growths, where one would expect the penetrating effects of the hard tube would be peculiarly suitable & beneficial, results so far are very 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/03 number of Treatment Dr 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 - Rodent ulcer - as a sine quâ 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 Turner 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 they 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, 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 & simple, we have in the neighbourhood of an active tube some cathode rays, heat waves, green visible rays & ultra violet 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, which is surely unique. Pigmentation, analgesia,

falling out of hair, hyperaemia, pain of a scalding nature, necrosis of the skin & subjacent tissues may be brought about, as desired according to the length of exposure, though these effects may not appear till some days afterwards. Morbid 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 & 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 metastasis 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 dogmatising about either method. The only two cases however 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 Sarcoma 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 & Morphia & even with them it was short. Deafness followed on that 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, & over 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 pains & 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 bearing on that side became normal. Such are the wonderful effects of Xrays in some cases. Exposures were increased to ten minutes every other day and very soon to daily. The tumour, 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 act beneficially. One ~~with~~ equal to a seven + a half inch 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 & his people remarked it was much smaller. The patients 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 tube 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 & a 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 two following days, & the patient was asked not to present himself for a day or two. Up to this time no dermatitis had taken place & though most of the hairs of his face on that side had been bleached some even remained on the most prominent part of the tumour. Two days afterwards patient returned to say his face was smarting & tingling and on the next day 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 ~~distance~~ 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 ~~coicoid~~ coracoid cartilage. These were attacked also, & appeared to be giving way to the rays when others made their appearance on the scalp outside the secondary area. As the patients health too began to give way it was decided to discontinue using the x rays. The 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 ulcer on the right ~~heel~~ 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 anti-syphilitic remedies he developed an ulcer on the head of the heel. His doctor continued to dress 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, at long intervals in regard to it & they all told him pretty much the same thing. They varied the medicine a little & assured 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 & worry. He was then taking 7 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 of detached & fairly sound skin, giving the whole a worm eaten appearance. It was very tender to touch. Exposures were

begun with a moderately soft tube at eight inches distant & duration of seven minutes twice a week. As the patients occupation prevented him from coming often 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 much smaller & the deeper parts had filled up to be almost on a level with the surrounding skin. At that point progress seemed to stop & indeed it was again becoming more painful & angry 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 enjoined for another week before resuming the exposures. At the end of this time the ulcer showed a tendency to revert to its original condition & 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 thus uninterruptedly for six weeks no advance whatever was made, & I then stopped applying the x-rays. On substituting them for the effluve 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 septic slonghing, slow-healing wound below his ear, could in any way improve the prognosis. The second case was not unlike the conditions that prevail in a Rodent ulcer where reaction from the x-ray 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 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 inches was employed.

Of other cases is one of recurrent Carcinoma of the rectum. Twenty six months ago Feb. 1902. a male patient of 58 years had excision for a Columnar celled carcinoma of rectum. Ten months later Nov. 1902 he had a recurrence within the bowel, & an epithelioma on

the posterior part of the scar externally. These were excised with the Coccyx. 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 like the epithelioma previously excised, was started on a course of X rays. 200 at first & later three exposures were given at week with a moderately soft tube. The result was a diminution in size, & gradual disappearance of the recurrence within the bowel. However, & subjacent to the mucous membrane a small fresh growth was recognised in June 1903. This had been watched most carefully & the rays were continued twice a week from then 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 on 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 so far then is, 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 epitheliomatous 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 Eczema & Psoriasis. I have had one case of each. Acute & Chronic Eczema under my care recently. The acute case was that of a child of 7 years. A patch of Eczema settled on the right cheek in

in front of the ear, & continued to spread forwards in spite of constitutional & local treatment. She also had several patches on the trunk & also on the arms & legs. She had sixteen exposures to the face, many of the first being given very cautiously, & for not more than five minutes at ten inches distant, owing to inflamed condition of the skin, with the result that all signs of the patch on the face quite 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.

Psoriasis 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 make

little impression on an attack of Psoriasis, 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 they rapidly 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 Psoriasis on his elbows & chest for many years. After a slight injury to one elbow a bursitis followed, the bursa was opened, scraped, packed & the latter repeated daily. Owing apparently to the presence of the Psoriasis which had now increased enormously, the wound would not heal. I therefore decided to try the effect of the x-ray. His elbow had four exposures & within three weeks the wound had quite healed up & the Psoriasis had disappeared, & though the patch was not so large as formerly it returned two months after treatment.

Still more wonderful is the effect of X-rays on Rodent Ulcer & Lupus Vulgaris. Hitherto these diseases have proved almost as baffling as Cancer itself, & although many cases of both have yielded to rlcur doubtless with a wider knowledge, & improved methods a large percentage of permanent Cures will result. Fifteen exposures sufficed to heal up a small Rodent ulcer of the outer angle of left eyelids. Time alone can show whether it can be classed as Cured. I have only had one case of each Lupus Vulgaris & Lupus Erythematosus. The first had been in other hands before, showed no improvement after three months treatment. It was then given up. The other has been given up also so far as X-rays are concerned, after over five months treatment, tho now being treated with high frequency Currents.

Very good results appear also to have been got in Cases of Favus, Acne, & ~~Favus~~ Sycosis 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 Finsen

light & radium no such valuable therapeutic force has been placed in the hands of the physician for a generation more, than that of the Roentgen rays.

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 radio 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 actinic properties & can be deflected by a magnet. Their mass is greater than the other two.

Beta rays are negatively charged particles like the Cathode rays from a Crookes tube, are very penetrating & more actinic than α rays & can also be deflected by a magnet.

The Gamma rays are more penetrating than either the α or β rays & resemble the rays from a hard focus tube. It would therefore seem possible that by stopping the α rays with vulcanite or mica, & deflecting

the β 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 & might help us also to a better understanding of the difference between a hard & 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 1/4 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, & like the satisfactory results from x rays they have been obtained in superficial diseases as Rodent Ulcer, Lupus etc.

Dr Kedley in "Medical Electrology & Electro-Therapeutics" for January 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 result, 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 Crois-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 & radium.

With Ultra-violet rays or Finsen 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 necessary pressure of the lamp.

The advantages of x rays are

1 a more rapid action & result
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 of that
2 falling out of the hair sometimes.

I have seen it stated, that of the cases of Intercular Lupus treated by Finsen an average of ninety per cent of cases are cured. I doubt whether anything like that can be shewn in this country, although the per centage of cures is probably very high. For all round excellence & 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 a combination of the two produces in many cases the best results. Dr Lyster of Middlesex Hospital informed me that in some cases a point is reached when the x rays seem to lose their effect, & then they are treated with Finsen light they usually finish off rapidly & in the most satisfactory way.

David Findlay

28 April 1904