Small rodent ulcers not affecting the mucous membrane or bone are easily cured by a dose of from 500 to 800 milligram hours through a filter of silver, 1½ mm. thick. A much smaller dose would suffice to cause the ulcer to heal over, but it would probably recur. Rodent ulcers at the side of the nose where the alae nasi join the cheek are more refractory; so too are those affecting the ear and just below it. Unless completely cured by the first applications they tend to become radio-resistant and further exposures may do harm.

Small epitheliomas of the lip are quite amenable to surface applications. I have had tubes prepared with an eyehole at each end so that they can be sutured by both ends to the lip and maintained in close apposition to the growth for the necessary time. When the floor of the mouth, tongue, or fauces are attacked the condition is difficult to benefit materially by radium.

Of all new growths the most susceptible to radiations are the lympho-sarcomata. They melt away in a surprising manner but tend to recur or form metastases. Sarcomas affecting the nasal passages are favourably influenced by radium. The writer has had cases which have remained free from the disease for many years and still are free.

Much experience has been gained in recent years regarding the use of radium in gynaecology, but I must limit myself in this article to a few general remarks. In malignant disease of the external genitals treated by radium the prognosis as a rule is bad; in early and limited disease of the vaginal wall the prognosis seems better, and I have seen one complete cure. It is in early malignant disease of the cervix that the best results are obtained; all observers are agreed upon this. Big doses of 6,000 to 10,000 milligram hours should be given, and at the first treatment. Smaller doses repeated are a mistake. Recurrence, after a longer or shorter interval, is, however, the rule, because of the difficulty of efficiently raying the more distant portions of the disease. Few cases are sent for radium treatment which are not in an advanced condition; even in these cases, however, some improvement is always observed both locally and generally. Pain is relieved, discharges cease, ulceration heals, and the patient gains in general health, strength, and weight. An important question is, How far does the beneficent activity of radium extend? Professor Bumm found in *post-mortem* examinations of the radiated cervix that cancer cells were only destroyed to a distance of three centimetres from the radiating source. It must, however, be remembered that the sphere of beneficent activity would depend upon the length of the exposure as well as upon the quantity of radium—the longer the exposure the greater the cumulative effect upon outlying cells; moreover, those cancer cells, which appeared to Professor Bumm to be normal, may yet have been rendered incapable of proliferation. Wassermann radiated small bits of mouse cancer *in vitro*. In certain experiments the tumour retained its vitality when inoculated, but did not grow. He concluded that the rays did not kill the cancer cells, but stopped their power of proliferating.¹

Exophthalmic goitre is a condition for which in recent years radiation has been found consistently useful. The writer has now treated with radium upwards of 200 cases, and with two exceptions all derived more or less benefit both in their general condition and special symptoms. Thus the patients regain strength, put on weight, and lose the tired feeling, and at the same time the tachycardia, tremor, and breathlessness are diminished and may disappear altogether. Not much change need be expected in the size of the thyroid or in the exophthalmos, except in early cases. It is well to warn patients of this lest they suffer disappointment; but operative measures might now be considered, to reduce the size of the gland, both because its vascularity is diminished and because the patient is better able to stand an operation. A dose of 300 to 500 milligram hours, properly screened so as to avoid injury to the skin, may be given to each lobe, to the isthmus, and over the thymus. The latter organ should not be neglected. I have had cases which were somewhat refractory so long as the applications were confined to the thyroid but which yielded rapidly when the thymus was exposed.

Under second-class subjects recurrent scirrhus nodules, even when attached to or growing from the bone, will disappear; but they recur. Carcinoma of the rectum is refractory except in limited annular strictures, where, by placing tubes inside the stricture considerable benefit may follow. In Hodgkin's disease amelioration may be expected by applications over the glands or by burying tubes inside them. In

spleno-medullary leukaemia, by exposures over the spleen it will be reduced in size, the white blood corpuscles diminished, and the general health improved; but in a few months the patient will return with a recurrence; this will again yield to treatment, but will be followed by another recurrence, and each recurrence requires larger doses, and in time the patient succumbs. The following case with graph illustrates the fall in white blood corpuscles following the application of radium.

A man, aged 32, suffering for the last nine months from spleno-medullary leukaemia, was recommended by Professor Gulland for radium treatment in April, 1921. The spleen was considerably enlarged but did not cross the middle line. The white blood corpuscles numbered 310,000. He was given a dose of 3,000 milligram hours, screened by 1½ mm. of silver over the spleen. This produced a good effect, the spleen decreased, and in two months, when he was discharged, the white blood corpuscles numbered 9,600.

For four months he remained fairly well, but was then readmitted; the spleen had crossed the middle line and was also lower down. The white blood corpuscles had increased to 316,000. A dose of 5,120 milligram hours was now given under the same conditions as the previous one. In a fortnight the white blood corpuscles numbered 136,000 and he was discharged.

He had no further treatment until June, 1922, when the spleen was found to be just over the middle line and the white blood corpuscles numbered 250,000. A dose of 4,800 milligram hours was given. In a week's time he felt much better, the white blood corpuscles had fallen to 152,500, and he was discharged.

In three months (November, 1922) he was readmitted in a worse condition; the spleen was hard and reached to within one inch of the umbilicus, the liver was enlarged and painful, and the white blood corpuscles were up to 300,000. He was now given a larger dose, amounting to 9,000 milligram hours. In a week he felt better, and the white blood corpuscles had fallen to 80,000. He was able to return home, but a month later died suddenly.

In the treatment of exophthalmic goitre and of naevi in children by radiation, radium has the following advantages as compared with the x rays: (1) Absolutely constant emission of rays, and therefore exact dosage possible. (2) Greater penetration of its rays, so that the deeper parts are reached. (3) Saving of time, as the radiation is maintained night and day until the necessary dose has been administered. (4) No noisy, exciting apparatus, so that the treatment can be applied at the bedside without in any way alarming or disturbing the patient.

REFERENCE.

¹ F. E. Simpson: *Radium Therapy*, p. 90.

SUDDEN DEATH FROM ANAPHYLACTIC SHOCK.

BY

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In my capacity of medical officer to a girls' school in Simla I was called, in October, 1922, to see a sick girl; the condition of the throat was suggestive of diphtheria, and a throat swab confirmed the suspicion. I advised the head mistress that all contacts be given a prophylactic hypodermic injection of diphtheria antitoxin and be segregated for fourteen days, and that the rest of the school be placed out of bounds. This was agreed to.

The syringe I used for inoculation was one of 10 c.cm. capacity; it was thus capable of holding the contents of several 2½ c.cm. bottles (each containing 2,000 units), and it

was possible to inject several girls out of one syringe. The routine was as follows: A girl in room (1) would have her loin uncovered, would come into an adjoining room (2) and lie on a couch; here iodine would be applied; she would receive 1,000 units, and, holding an iodine swab to the needle-hole, would pass on to an adjoining room (3).

As I was injecting the fourth girl (the first and second girls being sisters), out of one and the same syringe, a mistress hurriedly came to me from room (3), saying that a girl (the second of that syringe) was not feeling well. I immediately went and found this girl (aged 8) lying on a bed; she was obviously *in extremis*, was foaming at the mouth, and breathing in a very shallow manner; her pulse was scarcely perceptible; she was almost comatose, making no sound, and incapable of speech. She was lying on her right side and was endeavouring to turn on to her face; there was some cyanosis of her face and congestion of her conjunctivae, with protrusion of her eyeballs; the region round her nose was pallid in comparison with the rest of her face; the lower part of her face had the appearance of being somewhat swollen, as also the tongue and mouth; there was no rigidity or spasm of muscles.

I immediately commenced artificial respiration, controlled the tongue by a ligature passed through its tip, periodically swabbed the mucus out of the fauces, got the head low down, had the trunk massaged, and gave a stimulant hypodermically; but there was no response or sign of life after the first minute or two. Nevertheless, the artificial respiration was kept up for half an hour.

The condition of the girl during the interval between her leaving room (2) and my seeking her in room (3)—about one to two minutes—I found, by questioning the mistress there present, to be as follows: "On entering room (3) she stood for a few seconds and laughed with the other girls; she then started whimpering, and said, 'My throat is paining me.' She began to cough, a kind of cough which a child gives who is forcing herself to cough and making herself sick; she did not stagger; her face went white round the nose and mouth (she was normally a pale child); a utensil was brought to her as it was thought she might be sick. She was then placed on the bed on her back; she foamed at the mouth, turned on her right side, had some slow movements of her left hand and arm; there was no twitching or other movements of muscles."

She had never had any previous injection of any sort.

No other of the ten cases injected had any anaphylactic symptoms, nor had the diphtheria child herself, who was given a large curative dose.

Deceased was, I understand from the school mistresses (never having myself seen her previous to this occasion), a girl of average size for her age, rather heavy in the face, and one who struck them as having enlarged tonsils and adenoids.

A careful investigation of her history brings out the following points:

1. She was always apparently a healthy child.
2. She had had only one illness, bronchopneumonia, in 1918.
3. She was subject to colds.
4. She slept with her mouth open.
5. A wheezing at her mouth could be clearly and frequently heard; a doctor said she had asthma.
6. In 1917 she was examined in St. George's Hospital, Lucknow, where the report is stated to have been: "It was necessary that the bone of her nose at the back should be scraped."
7. Her eyes would become inflamed and her nose would run whenever she took a drive behind horses, which was a frequent occurrence, but this would not happen after a motor drive; this lasted up to 1920, since when the symptoms did not occur although she had a drive behind horses every evening for months.
8. She never allowed the top button of her dress to be fastened; she gave no reason for this. (Enlarged thymus gland?)
9. She had had a fainting attack three weeks before after a heavy picnic lunch; she did not get out of breath easily; she, generally speaking, was pale and looked puffy under the eyes.
10. She had been at school for several months, and there had been no necessity to bring her to me for any treatment or examination.

Family History.

She had one sister and two brothers; the sister was at the same school, was quite healthy, had had no illnesses, and was given a prophylactic injection at the same time as her own fatal one. One brother died of heart disease after rheumatic fever; the other brother had congenital heart disease (a patent foramen ovale being diagnosed); his face was of a grey colour for six months, but this has passed off and the boy is apparently quite well.

Her father's brother, six years after a heat-stroke, died

suddenly within an hour; "a necropsy was done and a large blood clot found in the head."

There is no history of bleeders in the family, and no consanguinity of the parents.

Remarks.

In this case the striking features are:

1. The likelihood of a condition of "status lymphaticus" with probable enlargement of the tonsils, adenoids, and persistent thymus.
2. The intolerance to the vicinity of horses during life (conjunctival, nasal, and bronchial catarrh and spasm resulting).
3. The intolerance to the subcutaneous injection of horse serum, causing rapid death.
4. The individuality of the intolerance; deceased's sister was one of the girls injected from the same syringe and suffered no ill effects.
5. The diagnostic cry, "My throat pains me."
6. The diagnostic frothy viscid mucus on the lips.
7. So rapid a fatal result, occurring within five minutes after injection is unique in a human being, though such rapid effects were experimentally produced in dogs.³
8. Severe anaphylaxis is a rare occurrence after a first injection of serum, anaphylactic shock being still rarer, and fatal anaphylactic shock practically unknown. A very rough estimate of the mortality from anaphylaxis among first injection cases at 1 per 1,000,000 and among subsequent injection cases at 1 per 10,000 would not be wide of the mark.
9. The sudden death was such an unexpected and overwhelming blow to the parents that an autopsy was out of the question.
10. A War Office pamphlet entitled *Memorandum on the Use of Curative Sera* says: "It may be remarked that sometimes anaphylactic shock occurs after a primary injection of horse serum such as is given in diphtheria, especially in persons suffering from Graves's disease, or subject to asthmatic attacks, or who are affected by emanations from horses. But this is so rare (1 in 50,000) that it may be ignored in practice."

The *post-mortem* changes as seen in Professor Dean's case¹ of a soldier dying of anaphylactic shock following antitetanic serum injections, Gurd, Fraser, and Roberts's similar case² and anaphylaxis studies in dogs³ show, in brief, that, with a rapidly occurring death from anaphylactic shock, the prime lesion is in the liver, consisting of engorgement with leucocytes, and haemorrhage into its substance; there is profound disturbance and death of the liver elements. This acute and fatal turmoil of the liver may be compared to that occurring in late chloroform poisoning and in the eclampsia of pregnancy. A similar engorgement of the lungs occurs, becoming more and more marked the longer the patient lives; death results from oedema of the lungs.

These deaths, appallingly sudden and unexpected and regrettable, merge, however, into insignificance when one reflects on the enormous saving of life by the use of various serum injections—for example, tetanus in the great war, and diphtheria in civil life; the risk to life is less than that of the most trivial surgical operation.

Doubtless in process of time the vehicle of the antibody content—the horse serum—will be modified in some way to prevent any chance of anaphylaxis occurring, whether by using some other less toxic animal serum or by adding some protective bodies to give it a colloidal character.

Till such a time a preliminary intravenous injection of 1/2 c.cm. of the 10 per cent. diluted serum and, if no adverse symptoms arise in an hour, the subcutaneous injection of the remainder of the dose should eliminate the possibility of anaphylactic disaster; a preliminary intravenous injection of sodium carbonate 5 grains, gum arabic 1 drachm, glucose 1 drachm, in normal saline solution up to 30 c.cm., together with an intramuscular injection of a sterile solution of 1 grain of calcium chloride dissolved in 10 minims of normal saline solution an hour before the serum injection, should also do away with any chance of anaphylaxis.

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