holiday, returned to his professional work in London in excellent health.

It is not suggested, however, that patients should be hurried back to work, or that all should be treated alike, for some need a longer holiday than others, and after some operations a long convalescence is essential. For instance, some overworked or exhausted patients, even after comparatively trivial operations, require a long convalescence to restore them to health; but the rest and change from work is all the more effective when it is combined with gentle, interesting, and increasing exercise, with mental diversion. Similarly, after gastro-jejunostomy, especially for an active duodenal ulcer, prolonged convalescence and dieting for from two to three months are necessary to ensure permanent healing of the ulcer and stoma, but only the first few days of this period need be spent in bed. The greater part can be passed more profitably in the open air, taking gradually increasing exercise, just short of fatigue, so that the patient becomes strong and well before he returns to work, about three months after the operation.

THE TREATMENT OF TUBERCULOSIS WITH COLLOID OF CALCIUM.

BY

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TUBERCULOSIS COMBINATION.

It is generally admitted that the present methods of treating pulmonary and also so-called surgical tuberculosis leave much to be desired. The methods suggested have been numerous, but a great deal of controversy is always in progress as to their respective merits. The dispute over tuberculin is perhaps the most familiar example of divergence of view. I am of opinion that the conflicting views on the value or otherwise of tuberculin arise from the two-edged nature of this substance, which although undoubtedly beneficial in some cases is harmful in many others; the difficulty of differentiating these cases without actual experiment makes many very chary of using the remedy.

With regard to new remedies there is always the difficulty of deciding whether any given improvement or other change is due to our treatment or is the result of the vagaries of the disease. Many new methods of treatment have apparently yielded good results in the hands of those who first used them, but have after a time been abandoned; this makes it appear possible that some of the results were psychic in origin, and it is therefore with some diffidence that I bring a new remedy to the notice of the profession.

In the BRITISH MEDICAL JOURNAL of March 19th, 1921, page 420, I published some remarks on the treatment of tuberculosis by means of calcium. There was considerable variability in the results obtained by the administration of calcium lactate—the particular salt I used—and it occurred to me that this might be due to differences of absorptive capacity in different individuals. I therefore cast about for some other method of administering the drug. I had at that time, for a rheumatic condition, been using with success some collosol iodine prepared at the Crookes Laboratories. I therefore asked whether I could obtain calcium in the colloid state, and was informed that at the suggestion of Sir Malcolm Morris—who I may say has taken a great interest in this investigation—they had just prepared some colloid calcium and sent me a supply to try.

Mr. J. F. Ward, the chief chemist at the Crookes Laboratories, who has rendered me every assistance in this investigation, tells me that the calcium is protected by glutaminic acid, which is prepared from gelatine; this is autoclaved to 140° C., which guarantees freedom from living organisms and spores. The strength is 1 in 2,000, representing the actual amount of calcium present, the amount of calcium oleate being approximately seventeen times as much. The colloid calcium, when examined with the ultra-microscope, is seen to be in active movement. The fluid is homogeneous, has the appearance of milk, and easily passes through a very fine hypodermic needle.

The drug is administered hypodermically. I inject it under the skin of the back of the forearm, as that situation is easily accessible, and the local reaction can more easily be observed. The skin is rendered aseptic, and the injection is made with

a Record hypodermic syringe graduated in tenths of a cubic centimetre. I use a very fine steel needle which renders the injection little painful—a matter of some importance. Veins should be carefully avoided. I have used an initial dose of 0.5 c.cm., the average dose used having been 0.7 c.cm., and I have not given larger doses than 1 c.cm.

The actual dose of calcium is extremely small, and I would warn any who are inclined to use this remedy not to increase the dose without due consideration; those indicated appear to have been quite sufficient. For instance, in a very acute case with very high temperature and night sweats I gave 1 c.cm., and the sweating ceased for ten days, but the temperature remained rather higher, and no benefit apparently followed. I have not yet quite decided as to the correct spacing of the doses; as a rule I have given them every five days to begin with, but I am not sure that a week is not a more satisfactory interval, and in some cases an interval even longer is perhaps better. This point must be decided by the general clinical condition of the patient.

There is generally some local reaction at the site of the injection visible the next day. This is a very variable factor, in some cases it is almost negligible, in a few severe; in one case which was suffering from tuberculous glands with discharging sinuses, the first reactions were very pronounced, and the second caused swelling of the whole of the forearm from the wrist to the elbow; nothing was done in the way of treatment; she continued her work as usual, and the swelling and redness disappeared in three days; as she was feeling so much better and the sinuses had ceased to discharge, she cheerfully went on with the treatment. I have not yet been able to satisfy myself whether there is any connexion between the amount of reaction and the amount of benefit or otherwise which follows, but it is quite possible that this can be worked out with more experience.

Most of the patients make no complaints after the injections, but certain symptoms follow in others. Vomiting occasionally occurs the day after an injection, and in some few cases palpitation has been complained of; in one case there was a complaint of giddiness; this, however, soon passed off, and no treatment was necessary except that it is perhaps advisable to decrease the dose and lengthen the intervals. One beneficial result of the injections is that in many cases the patient sleeps very much better. I generally give the injections in the evening, so that patients will not be taking exercise until the next morning. Where a patient is suffering from fever it is well to be cautious, as it sometimes happens that the injections are followed by a rise of temperature and the symptoms of a mild tuberculin reaction, including increase of sputum. The rise in temperature has never been much in my cases. I have given over 800 injections, many of them to young children of 5 or 6, and I have never experienced any anxiety—a very different experience from that one has when giving tuberculin.

All the 56 cases upon which this account is based, with the exception of one which was a domiciliary case, were living under sanatorium conditions—favourable conditions to improvement; the temperature in all cases was taken in the rectum, and I believe unless this is done it is impossible to gauge properly the effect of treatment. I would urge those who try this remedy not to omit keeping their patients in bed if they are suffering from fever.

I commenced treating cases with colloid calcium at the beginning of July, 1921; for obvious reasons I have to confine my report to immediate results which could be most easily observed. Of 56 patients treated 24 were males and 32 females. Owing to the less stable metabolism of calcium among females than males, we might expect that administration of calcium would be more beneficial in their case; nevertheless a considerable number of males benefited. It should be remembered that the actual amount of calcium given was extremely small.

Of the 56 cases treated 24 were males and 32 females. Of the 24 males 10 had tubercle bacilli in the sputum, and of these 3 lost them during treatment. Of the females 9 showed tubercle bacilli and 2 lost them.

Among the males, haemoptysis ceased in 4 cases, the temperature became normal in 1, the sputum dried up in 2 and became much less in 4 others; in 1 case breathlessness was markedly lessened, and in another with limitation of night sweats there occurred marked improvement in acne. One case suffering from Pott's disease showed much less spinal irritability. One case was doing so well that it was impossible to ascribe any of the improvement to the calcium. In 2 cases the general improvement in energy and appetite

was very marked, and in the remaining 7 no change was observed.

Of the females, in 1 case persistent epistaxis ceased; in 3 cases night sweats ceased and the temperature fell to normal; in 2 cases the night sweats ceased but the temperature did not fall; in 1 case night sweats ceased but the temperature rose slightly, but on continuing the treatment the temperature again became normal. In 2 cases the sweating was reduced but did not cease. In 2 the temperature was reduced to normal with improvement. In 1 the sputum was reduced to nothing with great improvement, and in 1 the sputum was reduced. In 1 breathlessness became much less. In 2 sputum containing tubercle bacilli appeared for the first time. In a spinal case irritability became less; 10 cases improved markedly in feeling of general well-being, and in 5 no change was observed.

The more immediate effects of treatment can be gathered from a perusal of the above, but I may say in passing that some of these cases have improved in a phenomenal manner, the majority being cases of long standing. The case having persistent epistaxis had suffered from it on and off since 1914, and just before the treatment was begun she was having attacks of epistaxis several times a day; after seven injections this completely stopped, and she had had none for six weeks; in addition she is not now short of breath, is feeling very fit and well, and is working hard as a ward maid. She was formerly an inmate of the Ayrshire Sanatorium. It seems difficult in this case to confuse cause and effect. One of the patients in which the haemoptysis ceased, had been having small haemorrhages for weeks; he has now been free for two months and tubercle bacilli have disappeared. One of those in whom the sputum dried up had had it for years; in addition her temperature has fallen to normal and she is able to do her work with comfort. One of those in whom the breathlessness was very much relieved has been under my care almost continuously for eight years; about four years ago I produced a partial pneumothorax in this case, without any improvement, and she then became quiescent under Spengler's I.K. therapy, but she was always troubled with shortness of breath when she gained weight. Since she has had the calcium she has gained over half a stone in weight and is less short of breath.

One of the cases in which the night sweats ceased and the temperature fell was very remarkable: she had been in bed in this sanatorium for seventeen weeks, with a continuous high remittent temperature; she had been ill for a long time, and was what is called a "third stager," with tubercle bacilli in the sputum; she had been treated by rest during all this time, and also with calcium lactate, but although an excellent patient she was no better. She was one of the first cases on which I tried this treatment: at the end of six weeks her temperature was normal, the night sweats ceased almost at once, and by the time she went out tubercle bacilli had disappeared, and she was very much improved.

In two cases something like a reaction occurred, as after the first injections sputum appeared for the first time containing tubercle bacilli. One was a patient who had been under my almost continuous care for six years; she had never had a normal temperature during that period, and was very breathless, largely owing to the extent of the disease reacting adversely on the heart. She has continued the treatment because she feels so much less tired after the injections, but is at present very ill. The other was a girl also with extensive disease, and I was much puzzled why she had no sputum; in this case the treatment was continued and the sputum is much diminished, and she is feeling very well. These two cases may serve as a warning that colloid calcium has in some cases a direct action on the lesion.

Colloid calcium would seem to be beneficial in surgical tuberculosis, for in one of the cases tuberculous glands rapidly diminished and sinuses dried up. In two cases of caries of the spine, in one of which paraplegia had been present for some months but had disappeared before I started the treatment, the remaining spinal irritability, as shown by increased knee-jerks and pronounced ankle clonus, became very much less, the latter being quite unobtainable on some days. In the other the knee-jerks became much less exaggerated and the temperature tended to fall.

The action of the calcium can, perhaps, to some extent be explained by a consideration of its effects. We believe that in a considerable number of cases it stops sweating; sweating lowers the temperature and therefore in those cases in which the sweats cease and the temperature falls there must be some other action at work, which, however, might be

explained similarly; the benefit may be due to the less permeability of the toxins shielding the remainder of the body tissues from poison derived from the lesion; the drug might by this action restore patients saturated with toxin to such a condition that they might ultimately be able to use toxin to form antibodies. I am inclined to think that a certain number of so-called chronic cases which exhibit a normal or subnormal temperature may really only have lost their sensitiveness and are being continuously poisoned by toxin, but are unable to react by a rise of temperature; many of these cases are doubtless thought to be doing well in sanatoriums, but their subsequent history differentiates them from cases in which a normal temperature indicates cure of the disease. Probably such cases will benefit by the administration of calcium. The two patients mentioned who lost their breathlessness may both come under this category, the breathlessness being due to toxæmia.

I think that colloid calcium may have a wider application in medicine than the treatment of tuberculosis; it may prove useful in rickets where there is a deficiency of calcium salts and where there is a great tendency to sweat. It is significant in this connexion that cod-liver oil is very useful in both these diseases. I would suggest that if colloid calcium be tried on quite young children a small dose of 0.1 c.cm. be first given, to be increased until the optimum dose is found. It is probable that adenoids would also be benefited, and the same caution would apply here.

In conclusion, I wish to express my thanks to Sir Malcolm Morris for the interest he has taken and the encouragement he has given me during this investigation, and to Mr. J. F. Ward, chief chemist to the Crookes Laboratories, for preparing the drug and for much valuable information concerning its properties.

POST-OPERATIVE HAEMORRHAGE.

BY

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In connexion with an extremely interesting communication made by Messrs. Pringle and Stewart and Professor Teacher in a recent number of the *Journal of Pathology and Bacteriology*,* the case hereafter recorded may be of some importance, for it seems to be analogous to the cases of post-operative haematemesis which they have described. I have now had a large experience of ophthalmic operations, but as far as I recollect I have never had a similar incident. Fortunately the patient concerned did not succumb to the condition. He made an excellent recovery, and therefore an accurate diagnosis of the source of the haemorrhage is impossible; only inferences can be made.

I performed the operation of cataract extraction one afternoon about 2 o'clock on a gentleman well over 70 years of age, being assisted thereat by my friend Dr. McMillan. The patient had been in a nursing home for a considerable time before the operation, for, at his first admission, inoculation of serum agar tubes with the conjunctival fluid gave a fairly active growth of *Staphylococcus albus*. I therefore had resort to the saline douche, which was applied every few hours for some days till the culture gave only two small colonies. When this condition of comparative sterility had been obtained I determined to operate. There was thus ample opportunity of observing his general condition prior to the operation. To all appearances he enjoyed excellent health; he took a full but plain diet, and in every way had a relish for food and never complained of the slightest pain. For years he had been in the habit of taking a mild aperient as occasion required, and this he continued to do while in the nursing home. The urine was found to be free from albumin and sugar. He was for his years possessed of a most unusual degree of vigour, both mental and physical. The only incident in his previous medical history which seems worthy of record is the fact that when a young man he was considerably troubled with epistaxis.

The operation of extraction gave no trouble; the lens came out quite easily, and an iridectomy was made; although the eye was highly myopic there was no escape of vitreous whatsoever. Altogether the conditions seemed very favourable. I visited the patient the same night about 10 o'clock, and found him as comfortable as could be expected. Following

* An account of this paper was given in the *BRITISH MEDICAL JOURNAL*, December 24th, 1921, p. 1038.