twenty-five years. I have found that tuberculin has been able to produce just the effect that Aschoff speaks of as being so desirable. Children up to the age of 10 or 12 years respond readily to tuberculin, and even those who show evidence of more than average infection respond more readily when it is added to other measures for relief.

Needless to say, the ideal cases of tuberculosis for tuberculin treatment are the same as for any other form of treatment—those with limited areas of involvement in which fibrosis predominates. The exudative type is not so favourable for treatment, but need not be excluded. In many a patient suffering from the exudative type of tuberculosis its character can be changed, so that fibrosis becomes the dominant characteristic; and just as small reinoculations produce this effect in the natural course of the disease, so can small doses of tuberculin aid in establishing the same result if injected at not too short intervals.

It has long been recognized, even by those who are not particularly inclined to use tuberculin, that patients in whom the healing process has come to a standstill are often helped by tuberculin. Many curable cases of tuberculosis can secure sufficient stimulation of their immunizing forces to produce healing without any artificial or therapeutic aid. The reactions produced by their own reinfections are sufficient. But Nature sometimes fails, and it is often highly desirable that the allergic reaction should be still further invoked in order to bring about focal response. Stimulation of the allergic reaction can only result regularly from reinoculations of bacilli, or from the administration of dead bacilli or bacillary protein. Therefore in all instances when further allergic reactions are desirable to complete encapsulation of foci, tuberculin may be used advantageously. Those who follow out a satisfactory treatment including tuberculin secure a larger percentage of favourable results with fewer relapses than those who omit tuberculin from their treatment. This fact should be inferred because of the specific power which resides in tuberculin when properly administered to stimulate fibrosis.

In its property of fortifying an already established immunity and utilizing the allergic response in the formation of fibrosis lies the main claim for the therapeutic value of tuberculin. This, however, is not its only property. When employed improperly it has the property of favouring caseation and necrosis in a tissue which is already prone to take on these changes. This is what many clinicians fear, but such fear is displaced by experience. It is now plain that reinfections caused by small numbers of tubercle bacilli, which occur at not too frequent intervals, increase immunity and favour healing by producing an encapsulating fibrosis; and that reinfections caused by large numbers of tubercle bacilli, particularly if repeated at too frequent intervals, depress immunity and favour the spread of the disease by producing necrosis and softening of caseous foci. This is identical with the effects of small and large doses of tuberculin. Small doses of tuberculin may produce no reaction at all in the tuberculous focus; larger ones may cause only a slight hyperaemia about the periphery of the tubercle with the exudation of a few cells and the formation of fibrous tissue. Still larger ones produce more pronounced effects; and very large ones cause marked exudation with softening of the caseating foci.

There is nothing in this to frighten a trained physician. It simply emphasizes the necessity of learning how to use tuberculin so as to obtain the healing effects and avoid the destructive action.¹⁰ I can speak from an experience extending over thirty years, including the treatment of several thousand patients, and wish to emphasize the fact that it is possible to obtain the fibrosis-producing effects and avoid those which cause necrosis. Rarely do we get a temperature reaction of more than 100° during the entire treatment of a patient extending over a period of months; yet we secure the beneficial focal effects necessary to promote healing.

The danger from reactions is very much exaggerated in the minds of many. Only such reactions as greatly depress the patient's immunity are harmful. The patient's reinfections frequently give temperatures up to 100° or 101°, lasting four or five days, with no ill effect following;

and, as Aschoff says, the larger reinfections, if they are overcome by the patient, leave him with his immunity very much increased. Our attitude toward tuberculin reaction should be governed by what we know of the reactions caused by natural reinfection. Since the patient can build up a high state of immunity by repeated reinfections, so small as not to disturb the temperature curve, or cause other constitutional effects, and can also by such slight reactions build up a fibrous wall sufficiently strong to encapsulate his bacilli, we should emulate this natural method in our administration of tuberculin. This does not mean that we should have fear of an occasional focal reaction accompanied by temperature elevation. On the contrary, healing is often hastened by such an allergic response. We should, however, always endeavour to avoid severe repeated reactions.

Rise of temperature and constitutional symptoms are not necessary to focal reaction. Sometimes general response may be suspected by feelings of increased nervousness following the injection; but this must be definite, for patients are prone to blame the injections for every uncomfortable feeling that comes to them. Increased cough and expectoration is usually present short of temperature elevation, and by this the clinician may know that he is securing desired focal effects. Focal reactions are desirable, but severe focal reactions are unnecessary and usually to be avoided.

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CARBOLIC SATURATION IN THE TREATMENT OF CERTAIN TYPES OF STREPTOCOCCAL BLOOD INFECTION.*

BY

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THE object of this communication is to draw attention to the clinical possibility of introducing carbolic acid into the body in such large amounts that the growth of streptococci in the circulating fluids is thereby arrested, and the patient cured. In my hands this method has proved efficacious in streptococcal infections after scarlet fever, and those accompanying rheumatic fever, as well as other types of infection, and my experience leads me to hope that on a more extended trial it will be found that by its use the treatment of endocarditis, which is liable to accompany rheumatic fever, may be brought completely under control and robbed of all its power of mischief.

The treatment was first brought to my knowledge by the late Dr. William Carter of Liverpool about 1895, and consists in the administration of sodium sulphocarbolate in sufficiently large doses to give rise to the first symptoms of carbolic poisoning—namely, enfeeblement of muscular tone, general malaise, or a marked lowering of the temperature. The dose necessary to produce this degree of carbolic saturation is 20 to 25 grains every two hours, in the case of an adult, or an adolescent of 16 or more, and in the case of a child of 8 to 10 years a dose of 8 to 10 grains every two hours.

As this method of treatment, if it is to be both efficacious and safe, must be carried out with certain precautions, I give the following notes in the hope that it may be given

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a more general trial, for I have confidence that if it be freely used in rheumatic and other forms of streptococcal endocarditis it will very greatly lessen the incidence of valvular disease in these cases.

The following brief notes of cases illustrate the method.

Case 1.—In a case of obstinate chorea in a girl of 8 years, 10 grains of sodium sulphocarbonate were given every two hours. In a few days complete muscular relaxation suddenly supervened. Treatment was stopped. Rapid and complete recovery ensued.

Case 2.—A child, aged 6, with acute otitis media and threatened involvement of the mastoid. Ten grains of sulphocarbonate, given every two hours except at midnight, and 2 and 4 a.m. After sixteen doses complete muscular relaxation supervened. The drug was stopped. There was complete cessation of inflammation of membrane and the external meatus, but pneumococcal inflammation of the tympanum persisted, and two days later incision of the membrane brought about rapid recovery.

Case 3.—A girl, aged 8, suffering from endocarditis after scarlet fever, and symptoms of streptococcal blood infection, was given $7\frac{1}{2}$ grains of the drug every two hours. In a fortnight she became pallid and listless and the drug was stopped, although the temperature had not come down to normal. After a week's interval it was recommenced in 6-grain doses every two hours, but in a few days the temperature became subnormal. The drug was stopped. The child made a perfect recovery, and had no recurrence.

Case 4.—A girl, aged about 14, was admitted to hospital with rheumatic swelling of most joints, a temperature of 103°, pericarditis, a recent valvular murmur, pneumonic consolidation in one lung, and choreic movements. Sodium sulphocarbonate, 20 grains every two hours, and the usual raw meat feeding were commenced immediately. Rapid improvement set in, and she made a good recovery.

Case 5.—A boy, aged 14, was recovering from pneumonia following double mastoid operation after measles, when acute rheumatism supervened. After a few days acute carditis set in, with alarming heart weakness, pulse of 148, no sounds at the bend of the elbow when using the sphygmomanometer, followed in twenty-four hours by the appearance of a mitral systolic murmur. Sodium sulphocarbonate in 20-grain doses every two hours was commenced within twenty-four hours of the onset of the cardiac symptoms. A rapid and continuous improvement resulted. The murmur disappeared in a fortnight and the heart became normal. The patient was kept recumbent for six months as a precaution, and suffered no cardiac disability afterwards.

Summary.

1. By the administration of sodium sulphocarbonate in sufficiently large doses it is possible to arrest certain types of streptococcal blood infection.

2. To attain this end the drug must be given in such a manner as to cause the early symptoms of carbolic acid poisoning.

3. The symptoms which must be watched for are: (1) feebleness and want of tone of the voluntary muscles. In children this may come on so suddenly as to amount to the complete muscular relaxation characteristic of accidental carbolic poisoning. (2) General malaise and debility. (3) A subnormal temperature. In some cases the temperature curve is not only subnormal, but also remarkably free from the usual variations.

4. When any of the above symptoms of carbolic poisoning appear it may be taken for granted that the streptococcal blood infection has been arrested by the action of the carbolic; clinical experience with this mode of treatment demonstrates this as a fact.

5. As soon as any symptoms of carbolic poisoning appear the sodium sulphocarbonate should be stopped immediately. In many cases there is no need for a repetition of the treatment, and convalescence is uninterrupted from this point onwards.

6. Sometimes it is necessary to repeat the treatment after an interval of some weeks or months.

7. The voluntary muscles seem to be more susceptible to the action of carbolic than the heart muscles, and there appears to be no risk to the patient so long as the drug is stopped as soon as muscular weakness begins to develop.

8. Carboluria has never been observed by me, even in cases where an adolescent continues to take 20 grains of sodium sulphocarbonate every two hours for three months or more. Nevertheless it is advisable to watch the urine regularly for this symptom.

9. For an adult 20 (or even 25) grains should be given every two hours in an urgent case, such as one where streptococcal endocarditis is threatening. In a less urgent case three out of twelve doses may be omitted—namely, those at midnight, and 2 a.m. and 4 a.m. In an adolescent

of from 14 to 16 years of age the dose should be 15 to 20 grains every two hours. In a child of from 6 to 10 years of age 8 to 10 grains can be given every two hours.

10. An important point is that the treatment should begin with a maximal dose. If at the commencement of treatment a small dose only be given the body appears to become accustomed to the drug, and it may be difficult subsequently to get the desired effect on increasing the dose.

11. In some cases of chronic streptococcal infection, where, presumably, there are streptococci in situations where the circulating fluids of the body do not easily reach them, the treatment may have to be persevered with for two or three months.

12. In patients with chronic non-pyrexial streptococcal infection who are taking 20 grains of sodium sulphocarbonate every two hours without any symptoms of carbolic saturation a gradual improvement in general condition and a somewhat rapid gain in weight may be noticeable.

13. With this treatment it is always well to combine raw meat feeding, 4 to 6 ounces being given daily. If worked through a brass wire sieve of one-sixteenth of an inch mesh with a porcelain pestle it is easily treated and flavoured so that the patient is unaware that raw beef is being eaten.

14. In my hands this treatment has proved wonderfully reliable, but it is possible that in certain states of the body the sulphocarbonate may not be decomposed in amounts adequate to bring about the cure of the streptococcal infection.

15. Whenever there is good reason to suspect the presence of vegetations upon the endocardium or the cardiac valves, the cessation of the inflammation which this treatment can almost invariably bring about is almost certain to result in exfoliation of the vegetations, and death from cerebral embolism. In such cases the cure of the streptococcal infection causes the death of the patient more speedily than would be the case if the disease were allowed to run its natural course, and it should not, therefore, be attempted. In these cases, even though the dose of the sulphocarbonate be so small that the temperature does not begin to approach normal till after three months of treatment, death from cerebral embolism is nevertheless extremely liable to occur just when success seems about to crown the physician's efforts.

TWO CASES OF HYDATID DISEASE OF THE PLEURA.

BY

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In view of the comparative rarity of this condition and the absence of the disease, so far as my knowledge goes, from this locality, the two cases here recorded, occurring simultaneously in the Royal Infirmary, Preston, may prove of interest.

CASE I.

A married woman, aged 47, admitted on March 26th, 1927, was born in Preston and has lived there all her life with the exception of four years (1889-93) spent in Bolton. She has worked as a spinner in one mill in Preston since 1893. No dog has ever been kept in her house, nor has she had any association with dogs except that she was bitten by one three or four years ago. Her skin has always been of a dark colour. She stated that she had been quite well until November, 1926, when she slipped down some steps and hurt her back and right side. The following day she had pain in the right side and epigastrium and began to vomit. The vomit consisted of food, and later clear fluid, and relieved the pain. This sequence of pain and vomiting continued off and on down to admission, and most of this time she was confined to bed. She was considered to be suffering from gall stones.

For about a week before admission she had pain in the region of the right scapular angle and in the right side of the chest; cough without much expectoration developed, and vomiting continued.

On admission the temperature was 99° F., pulse 138, respirations 52. The skin was dark brown. The usual signs of the presence of fluid in the right side of the chest were found, with well marked tubular breathing over the upper part of the right lung and in the axilla. Greyish-brown pus, rather thin in consistence, was aspirated. It contained a preponderance of streptococci with staphylococci and pneumococci. Hooklets were not looked for and not found.

I operated on the day after admission (March 27th). A portion of the eighth rib on the right side was resected and there was