

cautious and guarded tone of these remarks, tuberculin was claimed as a certain cure for even advanced cases of Phthisis—it was administered to all and sundry indiscriminately, with the result that it fell, shortly after, into great disfavour, and was abandoned by many. As early as 1890 Carl Spengler was investigating the nature of tuberculin—and instead of abandoning it he, and a few other persevering spirits, continued to steadily work at improving it. In 1893 Koch gave his tuberculin (T.O.) to Spengler, in order that his researches might be carried on. Among many improvements in tuberculin-therapy must be mentioned Spengler's alternating, or "vaccine," method of giving tuberculin. Briefly, human and bovine tuberculin are administered alternately. Spengler uses the term "vaccine" to denote the toxins derived from the *non-predominant type* of tubercle bacillus in any one case—*e.g.*, to a person suffering from an infection of *Humano-longus* the tuberculin of Koch's "Brevis T.B.," would act as a vaccine. If the treatment is carried out on these lines, it frequently enables a patient to obtain benefit from tuberculin who might have proved refractory and unsuitable when given tuberculin in the routine manner.

The success or failure of tuberculin-therapy is limited by the capacity of the patient's erythrocytes to respond to the stimulus of the tuberculin. In successful cases an examination of the blood will show a distinct increase in the quantity of immune substances, compared with the amount present prior to injection.

If, on the other hand, the erythrocyte system is too toxic, or too enfeebled, the tuberculin can only do harm—as no reaction will take place, and the immune substances will be further decreased. Carl Spengler's discovery that the erythrocytes were the producers and "store houses" of immune substances was the starting point of his "I. K." therapy. The symbol "I.K." is simply short for "Immunkörper," a German word meaning Immune Substances. The tuberculosis immune substances comprise lysins, anti-toxins, precipitins, agglutinins, and opsonins. Lysins and anti-toxins are the most important of these substances. Anti-toxins, as their name implies, neutralise the poisons poured out by the bacteria. "Lysins destroy the protoplasm of the bacilli, and dissolve their sheaths."

Opsonins are also important—they are normally present in blood serum, and they act by sensitising (almost, rendering digestible!) the protoplasm of the bacteria in such a manner as to enable the phagocytes to deal with them.

"I.K." Therapy has at least one great advantage over tuberculin or open-air treatment; it supplies the patient with tuberculosis immune substances, *without the help of his erythrocyte system*. In this way his blood may become as rich in immune substances as the blood of a healthy man. Moreover, the anti-toxins of "I.K." neutralise the toxins generated by the invading bacteria. These neutralised toxins stimulate the patient's erythrocytes to produce immune substances for themselves, without exerting any toxic effect. For full details of the preparation of "I.K." Carl Spengler's "Arbeiten" should be consulted. A short description only of the preparation of "I.K." can be given here. An animal (usually a rabbit or sheep) is inoculated intra-muscularly with fully virulent living cultures of tubercle bacilli. When the blood of the animal (after a sufficient number of inoculations of graduated doses of the virus), is proved to possess complete lytic-anti-toxic immunity, it is withdrawn with aseptic precautions. "It is collected in a vessel containing acidified carbol-sodium-chloride solution."† Put through several processes for adjusting its action and highly diluted, the final solution is called "I.K." Original—1 cc. of which contains one million (1,000,000) lytic-anti-toxic units. The results of "I.K." Therapy have been proved equal to combined tuberculin and climatic treatment in all cases, and superior in many. It can often be carried out in the patient's own home and without disturbing his usual employment. For mild and incipient cases it could be administered to out-patients attending tuberculosis dispensaries. "I.K." may be given subcutaneously by hypodermic injection, per-cutaneously by friction, or internally by mouth. The physician in attendance would naturally regulate the strength and frequency of the doses. The nurse must keep an accurate chart of the temperature, pulse, and sputum curves in every case. Spengler says, "Only in rare cases is it sufficient to take a morning and evening temperature." His charts provide for it to be taken four-hourly. The sputum is measured for the twenty-four hours. A weekly or fortnightly weight record is generally kept. Usually there is distinct improvement in all the subjective symptoms, and again in weight, even during the first month of treatment.

Sputum cups should be half filled with a 2 per cent. solution of formaldehyde, and must be kept covered, emptied frequently, and boiled daily.

† Fearis, "Immune Substances Therapy."

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