Mycobacteria in the Anterior Chamber of the Eye: Drug Therapy of Irido-Cyclitis through Vasoconstriction; Differentiation between BCG and Virulent Human M. Tuberculosis

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In order to induce experimental iridocyclitis in rabbits, we injected M. tuberculosis into the anterior chamber of the eye. In this way we proposed to cause iridocyclitis with about the same picture as in man, and to establish whether the course of this iridocyclitis could be modified by vasoconstriction.

It may be known that the rabbit is much less sensitive to human than to bovine tb 1.

When we had injected human M. tuberculosis into the anterior chamber, there developed, contrary to our expectations, an extremely violent tb, which destroyed the eye, and which was sometimes followed by general dissemination. This showed that, although the rabbit is not very sensitive to human tb, this is quite different when the infection takes place through the anterior chamber 2.

To induce iridocyclitis of the violence desired, we then used BCG, with which we obtained reproducible results.

For the bacteriologist the above-mentioned experience was a reason to inject the anterior chamber INH-resistant M. tuberculosis, which are known to have lost something of their virulence. This produced iridocyclitis, the intensity of which lay between that caused by human M. tuberculosis and that caused by BCG. When

1 After infection with bovine tb the rabbit dies, whereas infection with human tb is overcome. This may be the basis of a method of differentiation between bovine and human M. tuberculosis.

2 In 1884, Robert Koch, in «Mitteilungen aus dem Kaiserlichen Gesundheits-amt» described "Impfung von Reinkulturen in die vordere Augenkammer" (inoculations of pure cultures into the anterior chamber of the eye) as the method of choice to induce tb in rabbits in approximately one month. He found that the spread from the eye was very easy. Koch afterwards used the guinea-pig as a test animal.

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acid-fast saprophytes are injected the picture becomes even more favourable.

One of us has made use of these phenomena to assess in experiments his clinical impression that local vasoconstriction 3 may affect the course of inflammatory processes such as iridocyclitis.

This was actually true. Not only was the course less violent but the changes were also less extensive and less scar tissue developed. After sedation of the process there was a smaller degree of destruction in the treated eyes. The results were statistically significant *.

The experiments provided an excellent opportunity for the bacteriologist to get some idea on the virulence of myobacteria cultured from the material sent to him.

If after inoculation with BCG a tuberculous process develops somewhere, the question may be raised whether the affection is caused by BCG or by re-infection.

This question is difficult to answer, except when the material is injected into the anterior chamber of the rabbit's eye. This is now being done by one of us at the State Institute of Public Health. The method has attracted attention, also from abroad.

Discussion.

BinkhoΓst: For the induction of an experimental iritis with an inflammatory intensity comparable to that known in human pathology, strikingly large numbers of bacteria were necessary.

However, bacteriological examination in human eyes with tuberculous iritis is often negative.

Are other factors than the differences in sensitivity to infection also involved?

Hagedoorn: You have been able to induce inflammations of controlled violence. If this is also done with known strains of rabbits and a determined number of bacteria in a larger series, it is possible to test a certain therapeutic agent in such a way that significant results can be obtained.

von Nordheim replied: Although the pictures of the iridocyclitides resemble each other, it is not certain that their pathogeneses are comparable. In man, the infection is practically never primarily in the eye. Thus, the substrate in man reacts differently. Man is already allergic at the time of development of ocular tb. Moreover, doubt is justified as to whether many cases diagnosed as ocular tb are actually due to M. tuberculosis. The patho-genesis of iridocyclitis in man is, therefore, largely obscure.

3 Continuous and consistently applied vasoconstriction was obtained by instillation of 0.5%-0.9% 2-naphthyl-ethyl imidazolin (commercial brand "Cefasan").

4 Coster and von Nordheim: Ned. T. Geneesk. 101: 710 (1957).