PRIMARY MENINGOCOCCAL OPHTHALMIA

BY

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The following two cases, seen in Leeds school-children, are considered worthy of record because the condition is uncommon and was relatively unknown until the recent war, during which several cases have been described. With the exception of the four cases of Hayden and Hayden (1939), Bennett (1940), and Clifton and Laird (1941), all cases in which the literature has been available to us have occurred in America.

Case I

A boy aged 7 years reported at the ophthalmic casualty clinic with a sore left eye which had troubled him since the previous evening. Examination showed a left acute purulent conjunctivitis; the cornea was hazy, it did not stain, and there was no hypopyon. The right eye was white. Hot steam bathings, mercury oxycyanide lotion 1/8,000, and dark glasses were ordered. On the next day there was no pus but still a marked injection of the conjunctiva. Fluorescein showed a superficial corneal involvement. The following day the boy was admitted with a central corneal ulcer; a swab was taken, and the lacrimal sac syringed and found patent.

Treatment in the ward consisted of thrice-daily hot bathings and application of ung. atropin. 1% twice a day. In seven days the corneal lesion had healed, though there was slight pericorneal injection, and he was discharged home. Seen as an out-patient three days later, he still had this residual injection, and 30% sulphacetamide drops twice daily were ordered. Six days later the eye was white. No corneal scar remains—evidence that Bowman's membrane was not involved in the ulcerative process of the cornea. Vision in both eyes is 6/6.

Bacteriology.—On first isolation a moderately heavy pure culture of *Neisseria* was obtained; the organism grew rapidly and healthily on ordinary chocolate agar without a carbon-dioxide atmosphere. It was strongly oxidase-positive and had the morphological and cultural characteristics of the meningococcus. In view of the possibility that this was a relatively non-pathogenic *neisseria*—such infections having been reported—an interim report was sent, and the organism was subcultured into fermentation-heated blood broth. As the organism fermented glucose and maltose but not sucrose it was considered to be a meningococcus. By the time these fermentation reactions had been checked the eye showed only slight injection.

Case II

A year later a boy aged 6½ years reported to the out-patient department with a four-day history of a sore and discharging left eye. Examination revealed a chemosis of the left conjunctiva with pus at the inner canthus. There were also two raised nodules on the bulbar conjunctiva, some 2 to 3 mm. in diameter and each discharging pus. The cornea was clear. The right eye was white. A swab was taken and the boy sent home with the eye covered by a flap of lint, and with instructions that hot-spoon bathings should be given three times a day and penicillin drops, 2,000 units per ml., instilled three-hourly. Two days later the eye was much improved; treatment was continued. When seen after a further two days—that is, four days' treatment in all—the eye was white. The local penicillin treatment was continued for another two days. The vision in both eyes is now 6/6.

Bacteriology.—A swab was taken at the first attendance. On initial isolation a profuse pure culture of *Neisseria* was obtained. The coccus had exactly the same characteristics as that isolated in Case I, and gave a positive agglutination reaction with anti-serum to meningococcus Type II only. The organism was therefore a meningococcus. It was markedly sensitive to two

drops of penicillin (2 units per ml.), using the "punch-plate" technique. An eye swab taken one week later gave no growth on chocolate agar after incubation for three days. In view of the possibility of an auto-infection, if the child was a carrier, a West's nasopharyngeal swab was taken. No meningococcal colonies were obtained, though β -haemolytic streptococci, *Haemophilus*, and a few *Neisseria catarrhalis* strains were cultured. It was unfortunately not possible to obtain swabs from the patient's younger brother.

In both the above cases there was no complaint of a sore throat, either before or during the period of eye infection, nor was any history obtainable of contact with a case of meningitis. No case of meningococcal infection (meningitic, septicaemic, or conjunctival) occurred subsequently among the family of either patient, although the boy in Case II slept in the same bed as his younger brother. It is, however, of interest that, two months later, both the brothers were attacked at the same time by bilateral pneumococcal conjunctivitis, and ten days later their father also became infected. The probability, therefore, may well be that meningococcal ophthalmia is not highly infective—a suggestion supported by the general rarity of the condition. It is, however, possible that some cases have remained undiagnosed because, as records show, confusion between this condition and blennorrhoea has been caused by direct examination of pus by the stained-smear technique only, a full cultural investigation not being undertaken.

Discussion

Cases of meningococcal ophthalmia so far reported appear to fall roughly into three natural groups:

Primary cases: (a) not complicated by meningitis; (b) in which cerebrospinal fever follows the conjunctivitis (Reese, 1936; Mangiaracine and Pollen, 1944).

Secondary cases—those occurring as an associated infection during and/or shortly after an attack of cerebrospinal fever (e.g., Cushing, 1940).

The possibility of an ensuing meningitis indicates the need for early recognition and treatment in uncomplicated primary cases. Meningococci have been isolated from the conjunctiva by various workers (Duke-Elder, 1938), and it is presumed that, like the nasopharynx, with which it is continuous, it acts as a "carrier" reservoir and is a potential source of invasion, whether or not inflammation supervenes.

The records show that the methods of treatment adopted have been: (1) local symptomatic, with or without systemic sulphonamide; (2) local sulphonamide, with or without systemic sulphonamide; (3) systemic penicillin (Herrell, 1945). Choice of method did not seem to affect noticeably the return of the eye to normal, but local chemotherapy would seem desirable from the point of view of removing the meningococcus from a potentially dangerous site as soon as possible.

Some salient features of the condition, culled from the literature, with the addition of our own cases, are brought out in the following table.

	No. of Cases
Total cases	30
Age group:	
Under 2	2
2-5	18
Over 25	0
No indication	10
Sex:	
Male	21
Female	7
No indication	2*
Average duration in days	8
Bilateral in	12
Corneal ulceration present in	5
Complications:	
Meningitis followed in	1
Meningococcal septicaemia followed in	2
Source of infection:	
History of sore throat (meningococci recovered in 1 case)	11
History of contact with meningitis	2*
Direct implantation from throat	1

* Same cases.

The predominance among males is well seen, the only specifically mentioned female cases being direct contacts of meningitis. (Mangiaracine and Pollen give no indication of the sex of five of their patients.) In nearly half the cases both eyes were involved, either simultaneously or at short intervals; corneal ulceration is mentioned in one-sixth of cases; in no case was the eye permanently damaged by the infection. Meningitis is an unusual but possible sequel.

Summary

Attention is drawn to the importance of recognizing the meningococcus as a primary cause of conjunctivitis.

Two cases in Leeds school-children are described, the first being treated eventually by local sulphacetamide and the second by local penicillin, with good results.

Some aspects of the literature are discussed.

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Those marked with a * were used in the compilation of the Table.

THE BIOCHEMISTRY OF SENESCENCE*

BY

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Ray Lankester differentiated between "specific longevity" (the expectation of life at birth of a normal individual) and "potential longevity" (the duration of life which might be expected under an ideal environment). Knowledge of the processes involved in senescence, by which term we usually imply the generalized weakening of the vitality that accompanies growing old, may be expected to narrow the gap between specific and potential longevity. No doubt a gap must always remain, for even if we knew enough to provide the ideal physiological environment with complete protection from disease, and if we had the wit to apply our knowledge, there would still be occasional accidents.

The use of the term "potential longevity" implies a belief that the life of an organism is in fact limited and that senescence with ultimate death is its necessary fate. It is perfectly possible to argue that certain single-celled organisms are potentially immortal, since, given the

proper environment, they appear to be capable of reproducing themselves indefinitely. In one experiment extending over five years a single cell of paramecium was shown to be capable of producing 2^{3029} similar cells (equivalent to 10^{1000} times the volume of the earth), and the last cultures showed no signs of senility. But even if we admit that a complex organism such as man may be regarded as potentially immortal in the special sense that he can apparently produce children who in turn can reproduce their species, and so on *ad infinitum*, we have no reason for believing that the individual man can escape death. In studying senescence, therefore, we are not looking for the *elixir vitae*; we are seeking, from the point of view of abstract knowledge, to understand the changes produced by the passage of time; and by applying such knowledge we may hope to achieve a closer approximation between "specific" and "potential" longevity, with, in particular, an extension of the period of active and useful life. To believe in the possibility of such an approximation and to attempt its achievement is not to deny the proposition that heredity plays an important part in determining longevity. Whatever part heredity may play, be it great or small, the actual duration of life is the resultant of the effects of inheritance and environment. We may at least seek by knowledge and the application of knowledge to influence the latter.

Changes in Basal Metabolic Rate

There are many scattered references in the literature to quantitative changes associated with old age, in the composition of body fluids, in the estimated need for particular nutrients, and in the functional capacity both of individual organs and of the body as a whole. Perhaps the best-known of these is the change in the basal metabolic rate. The "prediction tables," produced by estimating the B.M.R. of considerable groups of subjects of different ages, indicate that the B.M.R. is practically constant during adult life to the age of 40, but thereafter falls each decade by approximately 1 calorie per sq. metre per hour. The differences between the age groups are statistically significant. Since this relationship between age and metabolic rate may be of fundamental importance it behoves us to examine it very carefully before accepting it at its face value. We may believe that the average B.M.R. of 100 men in the age group 60-70 is lower than that of a similar number of men aged 30-40. But, even though gross disease be excluded, a group of 100 men may be expected to include some with pathological changes not detectable by anything short of a most rigorous clinical examination—and perhaps not even then. The number is likely to be greater among the old than among the young. Is, then, the lower average B.M.R. of the older men due not to their greater age *per se* but to the greater incidence of pathological changes which may occur at any age but are commoner among the old? This is, of course, a difficulty of interpretation which must occur in any measurement comparing the old and young when the subjects are chosen only as "apparently healthy." It is obviously a serious difficulty and one which must be faced if we are to disentangle the changes inherent in the ageing process from those due to coincident disease. It is possible to get evidence on this point. In a small number of individuals the B.M.R. has been measured at frequent intervals over a considerable number of years. In two such cases the measurements extended roughly from age 40 to 60, during which period there were no more than inconsiderable changes in height and weight; in both the B.M.R. was significantly lower at 60 than at 40, though both individuals remained in good health. In a third case, over approximately the same period, the B.M.R. did not fall, and in this case the body weight was greater and the general

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