Arch. Inst. Razi, 1959, 11, 20-23

ANOMALOUS CLOSTRIDIUM WELCHII TYPE B STRAINS ISOLATED IN IRAN

by

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Clostridium welchii Type B is most frequently isolated from cases of lamb dysentery, and is characterised by the production of major lethal toxins α, β and ε, and the minor antigens θ, λ and μ (hyaluronidase). The sub-division of *Cl.welchii* strains into Types A., B, C, D and E is based on the major lethal toxins produced (Wilsdon, 1931; Glenny et al, 1933), the distribution of which is shown in the table. (The separation of Type F is based on other criteria (Oakley, 1949; Brooks, Sterne and Warrack, 1957).

TABLE

Distribution of major lethal toxins

Cl. welchii Type	Toxins produced			
	α	β	ε	ι
A	+	−	−	−
B	+	+	+	−
C	+	+	−	−
D	+	−	+	−
E	+	−	−	+

* British Veterinary Journal, December, 1957, Volume 113, No. 12.

From the above table it will be seen that any strain which produces both β and ε toxins must be classified as Type B. This note is concerned with three β, ε-producing *Cl. welchii* strains in which the production of minor antigens did not follow the classical Type B pattern.

HISTORY

The three strains. HG 576, 32 and 277/27, were isolated in Iran and subsequently sent to the Wellcome Research Laboratoires for typing. Strain HG 576 was isolated in April, 1954, from the intestine of a six-week-old kid belonging to a herd of 300 of similar age, a hundred of which died over a period of two weeks of a disease diagnosed as enterotoxæmia. There was no mortality among adult she-goats. strain 32 was isolated in April, 1955, from the intestine of a young goat which had died of enterotoxæmia, near the village where strain HG 576 was isolated. Strain 277/27 was isolated in July, 1956, from the intestine of an adult sheep, some twenty kilometers from the village where the other strains were isolated.

EXAMINATION FOR ANTIGEN PRODUCTION

The three strains were grown in broth containing meat particles, and Seitzfiltrates from six-hour cultures were examined for the production of soluble antigens by the methods described by Oakley and Warrack (1953). Supernatants of five-hour cultures in broth without meat particles were examined for the presence of θ toxin.

RESULTS

All three strains were found to produce the major tethal toxins α, β and ε, and the minor antigens θ and κ. The production of κ, and the non-production of λ and μ (hyaluronidase) distinguish these strains from the classical Type B strains. Both κ and λ (Oakley, Warrack and van Heyningen, 1946; Oakley, Warrack and Warren, 1948) attack azocoll, a preparation of hide powder coupled with an azo-dye which is released when the collagen of the hide powder is attacked. The two antigens can be distinguished from each other (i) by the use of collagen paper which is disintegrated by κ but not affected by λ, and (ii) by the addition of κ and/or λ antisera to the filtrate at least thirty minutes prior to the addition of azocoll. (Both

these methods were used in testing filtrates of the three strains). Typically κ is produced by most strains belonging to Type A and D and by all Type C and E strains; λ is produced by Type B and E and some Type D strains.

The failure of the Iranian strains to produce μ (hyaluronidase) is in sharp contrast to the classical Type B strains which usually produce it in very large amounts.

DISCUSSION

Although the three *Cl. welchii* strains described above were isolated at wide intervals and from two different animal species they differ from the classical Type B strains in identical ways. Their assignment to Type B is unquestionable since they produce the major lethal toxins characteristic of that type. These Iranian strains appear to form a homogeneous group which may be an ecological sub-division of Type B. All three strains were isolated in such close geographical proximity that the possibility of their being a single strain, derived from a single source of infection, must be considered. The anomalous pattern of antigen production exhibited by these strains may be characteristic of all Iranian Type B strains, or the classical Type B may also occur in Iran. In this connection it should be noted that none of the three anomalous strains was isolated from a case of lamb dysentery, and that classical lamb dysentery as described in the literature, has not yet been seen in Iran.

SUMMARY

Three strains of *Cl. welchii* Type B isolated in Iran were found to differ from the classical Type B strains in their production of κ and non-production of λ and hyaluronidase. Two of the strains were isolated from young goats and the other from an adult sheep.

ACKNOWLEDGEMENTS

We wish to thank Dr. A. Rafyi and Dr. M. Kaweh, of the Razi Institute, Teheran, and Dr. G. Harriet Warrack and Dr. M. Sterne, of the Wellcome Research Laboratories, for help in the examination of the Iranian Type B strains, and A. Tamadun for help in the isolation of two of the strains.

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