serum may fail to give a true indication of the ability of the body to deal with the bacteria forming that toxin.

Summary

In strictly localized diseases the body does not produce serum antibodies to the infecting organism.

This is illustrated by infections of the urogenital system, peritonaeum, pleura, nasal sinuses, respiratory tract, and meninges.

The explanation offered is that fibrin forms a selective membrane excluding some of the protein molecules together with larger particles.

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A NEW SALMONELLA TYPE: SALMONELLA CARDIFF

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A new type of *Salmonella* has been isolated from a patient with acute enteritis, the organism containing an H antigen in Phase 2 that has not previously been described. Details of its isolation and characters are therefore given.

Clinical History

The patient, a soldier aged 37, was admitted to hospital on Sept. 7, 1942, with a history of severe diarrhoea and generalized abdominal pain. The onset had been sudden the previous evening. No other men in his unit were affected, although they had shared the same food. Midday dinner that day had included canned pork; the patient admitted to having had a large helping.

On admission he was still complaining of generalized abdominal pain and headache. He was obviously ill and dehydrated. His temperature was 100° F. There were no abnormal physical signs and his spleen was not palpable. The urine was normal. His motions were frequent—seven in six hours; they were fluid, greenish in colour, streaked with blood, and contained many white flakes. During the night following his admission his condition deteriorated; the diarrhoea became worse and vomiting of bile-stained fluid started, so that he was unable to take fluids by mouth. By 6 a.m. on Sept. 8 he was very collapsed, with a rapid thready pulse and subnormal temperature. The collapse was treated with injections of nikethamide and adrenal cortical extract; he was also given 1½ pints of glucose-saline intravenously. His condition began to improve; vomiting ceased, but he continued to have abdominal pain and diarrhoea.

The next day (Sept. 9), although his general condition was slightly improved, the diarrhoea was as severe as before. Therefore a course of chemotherapy with sulphaguanidine was begun. A total of 50 g. of the drug was given over 6 days, starting with 16 g. on each of the first two days. Thereafter the patient's condition gradually improved and the diarrhoea got less, until by Sept. 15 he was having only one motion a day, although it was still soft. He was discharged from hospital on Oct. 1, and was able to return to his unit after a stay of three weeks at a convalescent home.

Investigation

A specimen of faeces passed soon after admission was examined bacteriologically. A non-lactose-fermenting organism was isolated which had the cultural characteristics and biochemical properties of the *Salmonella* group. A similar organism was isolated from the faeces on a number of subsequent occasions, but was not found in a faecal specimen passed shortly before the patient was discharged. Three days after the onset of acute symptoms the patient's serum

was tested for agglutinins to *S. typhi* H and O, *S. paratyphi* A H, *S. paratyphi* B H and O, and *Brucella abortus*, using 1/80 as the lowest dilution of serum. No agglutination was noted except for a weak partial reaction at 1/80 with *S. paratyphi* B. A blood count showed the number of white blood cells to be 5,000 per c.mm. The urine showed no abnormalities.

Bacteriology

The non-lactose-fermenting organism isolated from the faeces was shown to be a Gram-negative motile bacillus which produced a shiny round colony 1 mm. in diameter on MacConkey agar. The biochemical reactions were as follows: fermentation of glucose, maltose, mannitol, dulcitol, arabinose, rhamnose, sorbitol, xylose, inositol, and trehalose with the production of acid and gas in 24 hours; no action on lactose, saccharose, salicin, adonitol, raffinose, and inulin. The citrate-utilization test was positive; it produced hydrogen sulphide, but indole was not formed and gelatin not liquefied. When examined serologically the organism was agglutinated by *S. paratyphi* C O antiserum. Absorption of this serum by the organism completely removed the homologous agglutinins. Similarly, *S. paratyphi* C O removed all the homologous O agglutinins from an antiserum prepared against the organism. Therefore the somatic antigenic complex appeared to be VI.VII. On first isolation the organism was firmly in flagellar Phase 2, and was agglutinated to 1/40 by Standards (M.R.C.) Oxford non-specific *Salmonella* H serum (homologous titre 1/640). It was tested with single-factor sera containing agglutinins 2, 3, 5, 6, and 7, but was unaffected by these. An antiserum was prepared, and the following absorption tests were made (see Table):

	S. cardiff Phase 2 Serum						
	Unabsorbed	Absorbed by					
		S. paratyphi B (1,2...)	S. newport (1,2,3...)	S. thompson (1,5...)	S. anatum (1,6...)	S. maderia (1,7...)	S. thompson (1,5...)+ S. maderia (1,7...)
S. paratyphi B (1,2...)	2,000	<100	<100	<100	1,500	800	<100
S. newport (1,2,3...)	500	<100	<100	<100	2,000	200	<100
S. thompson (1,5...)	2,000	<200	<100	<100	1,000	400	<100
S. anatum (1,6...)	2,000	<100	<100	<100	<100	<100	<100
S. maderia (1,7...)	5,000	500	200	500	2,000	<100	<100
S. cardiff ..	20,000	8,000	8,000	16,000	16,000	8,000	8,000

It is obvious from the table that the recognized Phase 2 strains failed to absorb the agglutinins from the antiserum prepared against Phase 2 of the organism; therefore the strain must have contained a new antigen. This has been designated 10, the full structure of Phase 2 being 1,10 . . .

Phase 1 of the organism was isolated by the inoculation of culture into semi-solid agar containing serum for *S. paratyphi* B, Phase 2. Phase 1 of *S. cardiff* was isolated without difficulty from the first passage. It was agglutinated to titre by *S. thompson* (k) serum, and completely removed the homologous agglutinins from this serum. *S. thompson* (k) was agglutinated to titre by a serum prepared with Phase 1 of the organism, and gave full reciprocal absorption. Phase 1 was denoted by k.

Summary

A new *Salmonella* type has been isolated from the faeces of a human case of acute enteritis. This organism has the antigenic structure VI.VII: k ↔ 1,10 . . ., and is designated *S. cardiff*.

Our thanks are due to Dr. W. J. D. Fleming for his help in the technical investigation of this organism; to Dr. T. J. Hennelly for permission to use the clinical notes of the patient; and to Dr. J. M. Naftalin for some results of laboratory investigations.

Some 150 doctors of the Royal Navy, British and American Armies, and R.A.F. attended a conference held in a Bengal hospital recently, when the work of the regimental medical officer was discussed. Many speakers saw in the duties of the R.M.O. and his relation to the rest of the Army's medical services a similarity with the position of the G.P. at home in relation to the civilian medical services. Both carried heavy responsibilities, and just as the G.P. was the backbone of the profession at home so the R.M.O. was the backbone of the Army's medical service. For the R.M.O. there was often too little reward. His work was at times monotonous, at times arduous, and nearly always taken for granted. He lacked the stimulus of contact with colleagues and with hospital work, and his patients were soon lost to him. The regimental medical officer, working alone and under conditions of maximum discomfort and often of danger, with no one to fall back on for advice, was the embodiment of the R.A.M.C. motto, *In arduis fidelis*.