Japan. J. Med. Sci. Biol, 40, 153-157, 1987.

Short Communication

**VIBRIO FLUVIALIS: A NEW SEROGROUP (19) POSSESSING
THE INABA FACTOR ANTIGEN OF VIBRIO CHOLERAЕ O1**

Toshio SHIMADA, Riichi SAKAZAKI and Katsuhiko TOBITA¹

Department of Bacteriology, National Institute of Health, Kamiosaki, Shinagawa-ku, Tokyo 141 and ¹Kobe Quarantine Station, Hyogo-ku, Kobe 351-01

(Received October 6, 1987. Accepted March 2, 1988)

SUMMARY: A serogroup of *Vibrio fluvialis* possessing the C (Inaba) antigen but not the B (Ogawa) nor A antigen of *V. cholerae* O1 is described. The O-antigen of this serogroup was identical with that of bioserogroup 1875-variant of a marine *Vibrio* species. As the O-antigen of this serogroup was not agglutinated by any of O-antisera for the 18 serogroups of *V. fluvialis* already recognized, it was designated O-serogroup 19 of this species.

In a previous paper, Shimada et al. (1) described a marine vibrio possessing the Ogawa and Inaba factor antigens of *Vibrio cholerae* O1 together with its own specific major antigen. Since the phenotypic characteristics of this vibrio suggested that it possibly belonged to an unrecognized *Vibrio* species, it was tentatively labeled bioserogroup 1875. Recently, a strain of *V. fluvialis*, 181-86, isolated from cuttle fish, was strongly agglutinated by antiserum to *V. cholerae* O1 and the major antigen of the serogroup 1875, but it did not react with any of the

島田俊雄・坂崎利一(国立予防衛生研究所細菌部)
飛田克彦(神戸検疫所 神戸市兵庫区小松通5-1-14)

antisera for the 18 recognized serogroups of *V. fluvialis* (2). In view of the interest in serological properties of this strain, the antigenic relationship among *V. fluvialis* 181-86, *V. cholerae* O1 and the bioserogroup 1875 was examined by agglutination and agglutinin-absorption tests. The present paper describes the serologic characteristics of *V. fluvialis* strain 181-86.

The phenotypic characteristics were tested as described by Sakazaki and Shimada (3). All media for biochemical tests contained 1% NaCl.

Antisera were prepared and agglutination and agglutinin-absorption tests carried out as described by Sakazaki and Donovan (4) and Shimada and Sakazaki (2). The A factor serum of *V. cholerae* O1 was prepared by absorbing antiserum for the Inaba form of *V. cholerae* O1 with cultures of a variant form of the marine vibrio 1875; and the D factor serum was produced by absorbing antiserum to the variant form of the marine vibrio 1875 with cultures of the Inaba form of *V. cholerae* O1. Absorbed antisera for the B and C of *V. cholerae* O1 were prepared as described by Sakazaki and Donovan (4) from O1 antiserum of *V. cholerae*. In addition, agglutination tests were performed also with monoclonal antibodies recently developed by Sugiyama et al. (5) against each of the three antigenic factors, A, B and C of *V. cholerae* O1.

The phenotypic characteristics of the strain 181-86 are shown in Table I in which it is apparent that the vibrio is a strain of *V. fluvialis*.

As strain 181-86 was agglutinated by the diagnostic antiserum for *V. cholerae* O1, agglutination tests were carried out with absorbed antisera for factors A, B and C. Agglutination tests were performed also with an absorbed antiserum for the major antigen (D) of the marine vibrio bioserogroup 1875. The results are shown in Table II. Strain 181-86 reacted with antisera for the C factor of *V. cholerae* O1 and the D factor of the marine vibrio, but not with antisera for factor A or B. The presence of the C factor and absence of the A and B factors were confirmed also with monoclonal antisera.

Quantitative variation of O-antigen components of the marine vibrio bioserogroup 1875 similar to that from Ogawa to Inaba in *V. cholerae* O1 was previously described by Shimada et al (1). The variation with loss of the B antigen factor was designated 1875-variant. When cross agglutinin-absorption tests were performed, all the agglutinins in the O-antiserum for 181-86 were removed with cultures of 1875-variant and *vice versa* (Table III) suggesting that the O-antigen of strain 181-86 of *V. fluvialis* is identical with that of the marine vibrio bioserogroup 1875-

Table I. Physiological and biochemical characters of strain 181-86

Test (substrate)	Reaction
Oxidase	+
Motility	+
Growth in NaCl	
0%	—
3%	+
6%	+
8%	—
Growth on CLED agar	+
O/129 susceptibility (10 mcg)	+
Gelatinase	+
Luminescence	—
Indole	+
Voges-Proskauer	—
H ₂ S (Kligler)	—
Lysine decarboxylase	—
Arginine dihydrolase	+
Ornithine decarboxylase	—
Phenylalanine deaminase	—
Urease	—
Nitrate reduction	+
ONPG	+
Esculin hydrolysis	+
Fermentation	
glucose, acid	+
glucose, gas	—
arabinose	+
mannose	+
salicin	+
raffinose	—
rhamnose	—
sucrose	+
adonitol	—
inositol	—
sorbitol	—
mannitol	+

Table II. Cross reactions among antisera of *Vibrio fluvialis* strain 181-86, bioserogroup 1875 and *V. cholerae* O1

Antigen	Antiserum					
	O1	A ^a	B ^b	C ^c	D ^d	181-86
<i>V. cholerae</i> O1						
NIH 41 (Ogawa)	640	320	320	—	—	—
NIH 35A3 (Inaba)	320	320	—	80	—	320
Bioserogroup 1875						
Original	640	—	320	—	320	1280
Variant	320	—	—	80	320	1280
<i>V. fluvialis</i>						
181-86	320	—	—	80	320	1280

a: Antiserum to A (specific major antigen of *V. cholerae* O1)

b: Antiserum to B (Ogawa factor of *V. cholerae* O1)

c: Antiserum to C (Inaba factor of *V. cholerae* O1)

d: Antiserum to D (specific major antigen of bioserogroup 1875)

—: No agglutination at a dilution of 1:10 or higher.

Table III. Cross agglutinin-absorption results between antisera of bioserogroup 1875 variant and *Vibrio fluvialis* strain 181-86

Antiserum	Antigen	
	1875 variant	181-86
Bioserogroup		
unabsorbed	640	320
absorbed with 181-86	—	—
<i>V. fluvialis</i> 181-86		
unabsorbed	1280	1280
absorbed with 1875 variant	—	—

—: No agglutination at a dilution of 1:10 or higher.

variant. However, the O-antigen of 181-86 was not agglutinated by any of the antisera of the 18 O-serogroups of *V. fluvialis* already recognized, we have designated it O-serogroups 19 of the species. Close O-antigenic relationship between *V. fluvialis* and *V. cholerae* non-O1 was reported previously by Shimada and Sakazaki (2).

REFERENCES

1. Shimada, T., Sakazaki, R. and Oue, M. (1987): J. Appl. Bacteriol., 62, 453-456.
2. Shimada, T. and Sakazaki, R. (1983): Japan. J. Med. Sci. Biol., 36, 315-323.
3. Sakazaki, R. and Shimada, T. (1986): In R. K. Robinson (ed.), Developments in Food Microbiology-2, pp. 123-151. Elsevier Applied Science Publishers, London.
4. Sakazaki, R. and Donovan, T. J. (1984): In T. Bergan (ed.), Methods in Microbiology, Vol. 16, pp. 271-289. Academic Press, London.
5. Sugiyama, J., Gondaira, F., Matsuda, J., Soga, M. and Terada, Y. (1987): Microbiol. Immunol., 31, 387-391.