

## Draft Genome Sequence of *Vibrio parahaemolyticus* SNUVpS-1 Isolated from Korean Seafood

Jin Woo Jun, a Ji Hyung Kim, b Casiano H. Choresca, a Sang Phil Shin, a Jee Eun Han, a Se Chang Parka

Laboratory of Aquatic Biomedicine, College of Veterinary Medicine and Research, Institute for Veterinary Science, Seoul National University, Seoul, Republic of Korea<sup>a</sup>; Korea Institute of Ocean Science & Technology, Ansan, Republic of Korea<sup>b</sup>

J.W.J. and J.H.K. contributed equally to this article.

*Vibrio parahaemolyticus* is the leading cause of food-borne diseases, and several pathogenic strains cause global gastroenteritis outbreaks. Here, we report a draft genome sequence of *V. parahaemolyticus* SNUVpS-1, which was isolated from seafood in a fishery market in the Republic of Korea and contained TL, *toxR*, and *toxRS*<sup>old</sup> genes. The current draft genome sequence will contribute to the effort to monitor the spread of *V. parahaemolyticus* seafood isolates and clinical isolates.

Received 14 November 2012 Accepted 5 December 2012 Published 7 February 2013

Citation Jun JW, Kim JH, Choresca CH, Shin SP, Han JE, Park SC. 2013. Draft genome sequence of *Vibrio parahaemolyticus* SNUVpS-1 isolated from Korean seafood. Genome Announc. 1(1):e00132-12. doi:10.1128/genomeA.00132-12.

Copyright © 2013 Jun et al. This is an open-access article distributed under the terms of the Creative Commons Attribution 3.0 Unported license.

Address correspondence to Se Chang Park, parksec@snu.ac.kr.

Vibrio parahaemolyticus is a curved, rod-shaped, oxidase-positive, facultatively aerobic, non-spore-forming, Gramnegative, and motile bacterium. As one of the most important causes of gastroenteritis, V. parahaemolyticus is associated with the consumption of raw or improperly cooked contaminated seafood (1). V. parahaemolyticus is recognized globally as an important human pathogen (1–3). V. parahaemolyticus pandemic strains, such as O3:K6, contain a unique toxRS sequence that is associated with the current pandemic (4, 5). Increasingly, there have been reports of antibiotic resistance in Vibrio species. The emergence of microbial resistance to multiple drugs is a serious clinical problem that impedes treatment and increases fatality rates (4, 6). Due to the consumption of raw finfish and shellfish, East Asians, especially Koreans and Japanese, have an increased risk of gastroenteritis caused by V. parahaemolyticus infection (1).

To date, only the genome sequences of clinical isolates, such as O3:K6 *V. parahaemolyticus* strain RIMD2210633, O4:K12 strain 10329, O3:K6 strain AQ3810, O4:K68 strain AN-5034, and strain 16, have been reported and deposited in GenBank (7–9). In the present study, *V. parahaemolyticus* SNUVpS-1 was isolated from seafood (corb shell, *Cyclina sinensis*) from a fishery market in Seoul, Republic of Korea (4). It contained the thermolabile hemolysin gene (TL gene), the *V. parahaemolyticus toxR* gene, and the *toxRS* sequence of the O3:K6 clone isolated before 1995 (*toxRS*<sup>old</sup>) (4). In addition, it evidenced multiple-antibiotic resistance and was found to contain the antibiotic-resistance genes *tetA* and *strB* (4).

V. parahaemolyticus SNUVpS-1 genomic DNA was extracted as described previously (10) and was sequenced using standard shotgun sequencing methods using a 454 GS-FLX Titanium sequencing system (Roche) by Macrogen in the Republic of Korea. The sequence data consisted of 253,436 reads (mean length, 708.26 bp), providing 36-fold coverage. De novo assembly of the whole sequencing reads was performed with a Genome Sequencer (GS) de novo assembler (v.2.6). Sixty contigs, with a minimum length of 500 bp, were obtained. The draft genome of V. parahae-

molyticus SNUVpS-1 was 5,241,845 bp in length with a G+C composition of 45.23%. A total of 4,705 open reading frames (ORFs) were discovered in the draft genome that was structured with 60 contigs.

In conclusion, the sequence data generated here will contribute to the understanding of genome variability and the epidemiology of *V. parahaemolyticus* seafood isolates, as well as of clinical isolates in future genomic studies.

**Nucleotide sequence accession number.** The draft genome sequence for *V. parahaemolyticus* SNUVpS-1 is available in GenBank under the accession no. AMRZ00000000.

## **ACKNOWLEDGMENTS**

This study was financially supported by the Basic Science Research Program (2010-0016748) through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science, and Technology, by a Korea Research Foundation grant (KRF-2008-331-E00385).

## **REFERENCES**

- Daniels NA, MacKinnon L, Bishop R, Altekruse S, Ray B, Hammond RM, Thompson S, Wilson S, Bean NH, Griffin PM, Slutsker L. 2000. Vibrio parahaemolyticus infections in the United States, 1973–1998. J. Infect. Dis. 181:1661–1666.
- Joseph SW, Colwell RR, Kaper JB. 1982. Vibrio parahaemolyticus and related halophilic vibrios. Crit. Rev. Microbiol. 10:77–124.
- Ottaviani D, Leoni F, Rocchegiani E, Santarelli S, Canonico C, Masini L, Ditrani V, Carraturo A. 2008. First clinical report of pandemic *Vibrio para-haemolyticus* O3:K6 infection in Italy. J. Clin. Microbiol. 46:2144–2145.
- Jun JW, Kim JH, Choresca CH, Shin SP, Han JE, Han SY, Chai JY, Park SC. 2012. Isolation, molecular characterization, and antibiotic susceptibility of *Vibrio parahaemolyticus* in Korean seafood. Foodborne Pathog. Dis. 9:224–231.
- 5. Matsumoto C, Okuda J, Ishibashi M, Iwanaga M, Garg P, Rammamurthy T, Wong HC, Depaola A, Kim YB, Albert MJ, Nishibuchi M. 2000. Pandemic spread of an O3:K6 clone of *Vibrio parahaemolyticus* and emergence of related strains evidenced by arbitrarily primed PCR and *toxRS* sequence analyses. J. Clin. Microbiol. 38:578–585.
- Okoh AI, Igbinosa EO. 2010. Antibiotic susceptibility profiles of some Vibrio strains isolated from wastewater final effluents in a rural com-

- munity of the Eastern Cape Province of South Africa. BMC Microbiol. 10:143.
- 7. Chen Y, Stine OC, Badger JH, Gil AI, Nair GB, Nishibuchi M, Fouts DE. 2011. Comparative genomic analysis of *Vibrio parahaemolyticus*: serotype conversion and virulence. BMC Genomics 12:294.
- Gonzalez-Escalona N, Strain EA, De Jesús AJ, Jones JL, DePaola A. 2011. Genome sequence of the clinical O4:K12 serotype Vibrio parahaemolyticus strain 10329. J. Bacteriol. 193:3405–3406.
- 9. Makino K, Oshima K, Kurokawa K, Yokoyama K, Uda T, Tagomori K, Iijima Y, Najima M, Nakano M, Yamashita A, Kubota Y, Kimura S, Yasunaga T, Honda T, Shinagawa H, Hattori M, Iida T. 2003. Genome sequence of *Vibrio parahaemolyticus*: a pathogenic mechanism distinct from that of *V cholerae*. Lancet 361:743–749.
- Sambrook J, Fritsch EF, Maniatis T. 1989. Molecular cloning: a laboratory manual. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY.