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**Identification and Characterization of *Vibrio vulnificus* AphB,
a Novel Global Regulator**

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Vibrio vulnificus AphB is a member of the LysR family of transcriptional regulators. The functions of the AphB were assessed by comparing phenotypes of the *V. vulnificus aphB* mutant with those of the parental wild type *in vitro* and in mice. The disruption of *aphB* resulted in a substantial decrease in cytotoxic activity, adherence to host cells *in vitro*, and motility. Furthermore, the intraperitoneal LD₅₀ of the *aphB* mutant was approximately 10³ times higher than that of the parental wild type. To identify genes regulated by AphB, gene expression profiles of the wild type and those of the *aphB* mutant were analyzed using the *V. vulnificus* whole genome microarray. A number of novel targets regulated by AphB were identified, including *nanA* encoding *N*-acetylneuraminidase lyase. *N*-acetylneuraminidase lyase catalyzes the reversible reaction of *N*-acetylneuraminic acid to *N*-acetylmannosamine and pyruvate. A mutant in which *nanA* gene was inactivated by allelic exchanges was constructed and phenotype changes between the *nanA* mutant and its parental wild type were evaluated. The activity of cytotoxicity from the INT 407 cells infected with the *nanA* mutant was almost 2 to 3-fold less than that from the cells infected with the wild type. In a mouse model, the LD₅₀ of the wild type was about 10³ times lower than that of the *nanA* mutant. The cell density of the *nanA* mutant colonizing in the mouse intestine was 10² times lower than that of the wild type. These results suggest that *nanA* is essential for virulence of *V. vulnificus* in mice as well as *in vitro*. Accordingly, it appears that the AphB and its candidate NanA are important proteins involved in *V. vulnificus* virulence.