

Development of virus-binding protein-based technologies for concentration, detection and identification of pathogenic viruses in water environment

Tatsuo Omura

(Tohoku University, Department of Civil & Environmental Engineering, Professor)

【Outline of survey】

The principal researcher and co-workers have successfully found virus-binding protein (VBP) from activated sludge microorganisms. Virus-binding proteins (VBPs) are bacterial proteins to which human viruses preferentially adsorb in water environment. In addition, the research group headed by the principal researcher has developed the Enzymatic Virus Elution (EVE) method, in which solid-embedded viruses are efficiently recovered with the degradation of solids by hydrolytic enzymes and recovery of multivalent cations by cation exchange resin. These outcomes have been presented in international journals and conferences as original and outstanding accomplishments.

The objective of this study is to develop novel technologies for virus concentration, detection and identification. Specifically, EVE method will be applied to a variety of environmental fomites for recovering pathogenic viruses from these surfaces. Furthermore, VBP will be used as viral adsorbent and detection probe in order to concentrate, detect and identify pathogenic viruses in water.

【Expected results】

The VBP-based technologies for virus concentration, detection and identification will allow us to monitor a variety of pathogenic viruses in human society, and to survey the prevalence of viral infectious diseases. Since pathogenic viruses are likely to constitute a threat to the sustainable development of human society in the 21st century, this study could contribute to the construction of reassurance and safety community in the future.

【References by the principal investigator】

- Construction of a cloning system for the mass production of virus-binding protein for poliovirus type 1. Sano, D. and Omura, T. Applied and Environmental Microbiology, 71 (5), 2608-2615, 2005
- Virus-binding proteins recovered from bacterial culture derived from activated sludge by affinity chromatography assay using a viral capsid peptide. Sano, D., Matsuo, T. and Omura, T. Applied and Environmental Microbiology, 70 (6), 3434-3442, 2004

【Term of project】 FY2007– 2011

【Budget allocation】 33,800,000 yen
(2007 direct cost)

【Homepage address】 <http://www.water.civil.tohoku.ac.jp/c-indexj.html>