## A Facile Detection of Verotoxins by Quartz Crystal Microbalance

An artificial glycolipid was designed and applied to quartz crystal microbalance technique for the detection of verotoxins produced by highly toxic bacteria: Escherichia coli O-157. We have successfully detected both types of verotoxins (type-1 and 2) within 30 - 40 min in crude sample solutions and to determine the binding constants, associate and dissociate constants.



The QCM system for the detection of verotoxins produced by pathogenic bacteria: O-157.

Hirotaka UZAWA Nanoarchitectonics Research Center e-mail: h.uzawa@aist.go.jp AIST Today; Vol. 1, No. 8 (2001) 8

Naoki MORITA

e-mail:

Research Institute of

**Biological Resources** 

morita.n@aist.go.jp

## Gene Clusters Responsible for DHA and EPA Biosynthesis

- New Genetic Resources Found in Marine Bacteria -

Some marine bacteria have the ability to synthesize DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid). The fatty acid biosyn-

thetic (fab) gene cluster encoding a part of fatty acid synthetase (FAS) and the gene cluster responsible for biosynthesis of polyunsaturated fatty acid (PUFA) such as DHA or EPA have been cloned from DHA -producing and EPA-producing bacteria. The isolated gene clusters responsible for DHA and EPA biosynthesis from marine bacteria would be significant genetic resources for considering the origin of DHA and EPA in living organisms and for utilization



## AIST Today; EPA-producing bacterium Vol. 1, No. 9 (2001) 9 ( Shewanella sp. strain IK-1 ) plsX fabH fabD fabG acpP fabF (h) Gene cluster encoding FAS Gene cluster responsible for EPA biosynthesis (fab gene cluster) ( The genes shown by the black arrow are indispensable for EPA biosynthesis ) DHA-producing bacterium (Moritella marina strain MP-1) - plsX fabD fabG acpP fabF Gene cluster encoding FAS Gene cluster responsible for DHA biosynthesis ( fab gene cluster ) ( The genes shown by the black arrow are indispensable for DHA biosynthesis ) One arrow indicates one gene and the direction of transcription Bacterium which cannot synthesize PUFA plsX; PlsX protein, fabH; β-ketoacyl-ACP synthase III, fabD; malonyl-CoA, ACP (Escherichia coli) transacylase, fabG; β-ketoacy-l ACP reductase, acpP; acyl carrier protein (ACP), plsX fabH fabD fabG acpP fabF fabF; β-ketoacyl-ACP synthase II. The gene cluster responsible for EPA or DHA biosynthesis: The area shown by the color indicates the homologous region of fatty Gene cluster encoding FAS acid synthetase. Yellow: FabF, Pink: FabD, Blue: AcpP, Green: FabG, Orange: $\beta$ -( fab gene cluster ) hydroxydecanoyl-ACP dehydratase.

Gene clusters responsible for fatty acid biosynthesis found in bacteria. The bacterium that can synthesize DHA or EPA has the two gene clusters responsible for fatty acid biosynthesis. One is the gene cluster involved in DHA or EPA biosynthesis, and the other is the *fab* gene cluster encoding a part of FAS found in bacteria that cannot synthesize any PUFAs. Therefore PUFA-producing bacteria would have two fatty acid biosynthetic systems, the synthesis of fatty acids with up to 16- or 18-carbon atoms and the synthesis of DHA or EPA.