Naomichi Baba et al., J Comput Sci Syst Biol, 5:1
doi: http://dx.doi.org/10.4172/0974-7230.S1.06

OMICS Group Conferences
Accelerating Scientific Discovery

International Conference and Exhibition on
Metabolomics & Systems Biology

20-22 February 2012 San Francisco Airport Marriott Waterfront, USA

Use of molecular probes and mass spectrometry for tracing metabolites of specific lipids

Naomichi Baba[1] Hiroko Tominaga[1] and Arnold N. Onyango[2]

[1]Division of Bioscience, Graduate School of Natural Science and Technology, Okayama University, Japan
[2]Department of Food Science and Technology, Jomo Kenyatta University of Agriculture and Technology, Kenya

Lipidomics have contributed greatly to the mapping of biological lipids typically using high performance liquid chromatography and mass spectrometry. The strategy has revealed relations between biological lipid profile and physiological disorder. In biological systems, however, lipids change their structure moment by. Moreover, there are many kinds of phospholipid species with similar structure in biological systems, since there are numerous combinations of different fatty acids at *sn*-1 and *sn*-2 position with different polar head groups. Therefore, it is almost impossible to trace structural changes of a specific phospholipid species in the complex mixture of biological samples. To solve this problem, we synthesized unnatural phosphatidylcholines (PC) in which an *N*-methyl group in polar head group of natural PC was replaced by a deuteriomethyl or an ethyl group. These synthetic PC's give a product ion at *m/z* 187 and 198, respectively, in tandem electrospray mass spectrometry (tandem ESI MS). These values are different from *m/z* 184 of natural PC's. Therefore, when we analyze these PC's at *m/z* 187 or 198 in precursor ion scan mode in tandem ESI MS, they can be detected exclusively with strict selectivity even in the presence of large excess of a complex mixture of natural phospholipids in biological samples. Any phospholipid species that are formed from them having the same unnatural polar head group can also be detected. Therefore, any structural changes at fatty acid side chains in the unnatural PC's can be traced by tandem ESI MS and they can be used as a molecular probe for natural PC's. Indeed, this technique was shown in the present study to be able to trace structural changes of hydroperoxy PC and PC having docosahexaenoic acid in human blood and on human skin surface. Since it is speedy with no separation procedure, the present method is potentially useful for tracing time-dependent phenomena in dynamic lipid biochemistry.

Biography

Naomichi Baba has completed his Ph.D. at the age of 28 years from Kyoto University and postdoctoral studies from Department of Chemistry, Luisiana State University (New Orleans). He became a research associate of Institute for Structural Research, Kyoto University on 1973 and full professor of Okayama University on 1991. He has published more than 100 papers. He is now Prof. Emeritus of Okayama University and serving as a senior educational and research adviser, Okayama University. He is also serving as a senior adviser for BIZEN CHEMICAL CO., LTD, Okayama, Japan.