Microarray Technologies for Studying Carbohydrate-Related Biological Processes

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Cell surface carbohydrates are involved in a variety of physiological and pathogenic processes through their specific interactions with proteins. Therefore, it is important to determine the molecular basis for specific protein-carbohydrate recognition events. As attempts to develop powerfultools for studying high-throughput carbohydrate-protein interactions, we have fabricated carbohydrate microarrays by immobilizing a variety of carbohydrates onto the properly modified solid surfaces. The carbohydrate microarrays have been applied for biological and biomedical research including 1) high-throughput analysis of glycan-protein interactions, 2) characterization of carbohydrate-processing enzymes, 3) quantitative determination of binding affinities and 4) detection of pathogens.

In the post-genomic era, the functions of proteins are being extensively investigated in order to understand their biological roles and to develop novel therapeutic agents. The protein microarray is one of the most advanced technologies that can be employed for this purpose. In spite of the broad range of issues that this technique has been used to address, more applications remain to be exploited. In order to expand areas in which protein microarrays can be used to solve important problems, we have investigated ways in which the technique can be employed to rapidly identify carbohydrate-binding proteins and to detect proteins that interact with mammalian cells. In addition, the technique has been used to rapidly quantify binding affinities between lectins and carbohydrates. In this presentation, I discuss carbohydrate and protein microarrays for studying biological processes that are associated with carbohydrate-protein interactions.

Recent Publication

1. Myung-ryul Lee, Injae Shin, *Org. Lett.* 7, 4269 (2005).
2. Myung-ryul Lee, Injae Shin, *Angew. Chem. Int. Ed.* 44, 2991 (2005).
3. Injae Shin, Sungjin Park, Myung-ryul Lee, *Chem. Eur. J.* 11, 2984 (2005).
4. Sungjin Park, Myung-ryul Lee, Soon-Jin Pyo, Injae Shin, *J. Am. Chem. Soc.* 126, 4812 (2004).