



学際物質科学研究センター(TIMMS)セミナー

題目： 『Polymer Genomics: Shifting the Gene and Drug Delivery Paradigm』

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日時： 5月16日(月曜日) 16:30-17:30

場所： 総合研究棟 B 0110 公開講義室

概要：

Biological activities of biocompatible synthetic polymers used in gene and drug delivery will be discussed. Synthetic polymers affect signal transduction mechanisms involving inflammation, differentiation, proliferation, and apoptosis. The ability of the cells and organisms to respond to the effects of these polymers can be dependent on phenotype or genotype. Overall, these effects are relatively weak as they do not result in cytotoxicity or major toxicities in the body. However, when combined with specific biological agents, such as cytotoxic agents, bacterial DNA or antigens, either by mixing or covalent conjugation, the polymers can drastically alter specific genetically controlled responses to these agents. One example is an amphiphilic block copolymer of poly(ethylene oxide) and poly(propylene oxide) called Pluronic, a commercially available pharmaceutical excipient, which attracted considerable attention in gene and drug delivery applications. It was demonstrated that Pluronics can increase regional expression of the naked DNA after its injection in the skeletal and cardiac muscles or tumor. Notably, Pluronic can increase transcription in already transfected cells, i.e. through a mechanism other than enhanced DNA delivery. At least in some cases Pluronic acts as biological adjuvant by activating selected signaling pathways, such as NF- κ B, and upregulating the transcription of selected genes. Furthermore, Pluronic combined with chemotherapeutic drugs prevent development of multidrug resistance in cancer cells. Collectively these studies propose the need for thorough assessment of pharmacogenomic effects of polymer materials to maximize the clinical outcomes and understand the pharmacological and toxicological effects of polymer formulations of biological agents, i.e. *polymer genomics*.

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