Biodegradable Molecularly Imprinted Polymers for Drug Delivery

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Molecular imprinting has been established as a new technique that allows the creation of tailor-made binding sites for certain molecules. In this study, we developed biodegradable molecularly imprinted polymers (MIPs) by combining two important properties required for ideal biomaterials, biodegradability (with biocompatibility) and molecular recognition property. We prepared two biodegradable MIPs based on poly(ε-caprolactone) (PCL) and poly(3-hydroxybutyrate) (PHB), which represent biodegradable polymers from chemical and biological origin, respectively. MIPs were prepared using theophylline (drug used in the treatment of asthma) as template with biodegradable crosslinker (PCL- or PHB-based) and acrylic acid as functional monomer. The theophylline-imprinted polymers showed higher binding capacity for theophylline compared with non-imprinted polymer (NIP) and selectivity for theophylline over caffeine. Theophylline-loaded MIP showed sustained drug release compared with NIP. These biodegradable MIPs can be potentially utilized in drug delivery systems such as controlled drug release and targeted drug delivery.